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申請專利範圍項數：27 項 圖式數：3 共 777 頁

(54)名稱

海藻糖磷酸化酶

(57)摘要

本發明涉及一種包含一胺基酸序列的海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1 的胺基酸序列具有至少 80%同一性及/或至少 80%同源性，其中該海藻糖磷酸化酶的胺基酸序列在一個或多個胺基酸位置處包含一胺基酸取代，其中該一個或多個胺基酸位置選自由以下胺基酸位置所組成之群組：SEQ ID NO: 1 的位置 712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703 以及 705。

The present invention is related to a trehalose phosphorylase comprising an amino acid sequence、wherein the amino acid sequence of the trehalose phosphorylase is at least 80% identical to and/or at least 80% homologous to an amino acid sequence of SEQ ID NO: 1, wherein the amino acid sequence of the trehalose phosphorylase comprises an amino acid substitution at one or more amino acid positions, wherein the one or more amino acid positions is/are selected from the group consisting of amino acid positions of SEQ ID NO: 1 712, 383, 10, 114, 118, 192, 197, 220, 225, 304, 306, 318, 323, 339, 349, 357, 459, 476, 481, 484, 487, 488, 506, 511, 526, 530, 532, 533, 537, 550, 556, 564, 590, 649, 667, 703 and 705.

指定代表圖：

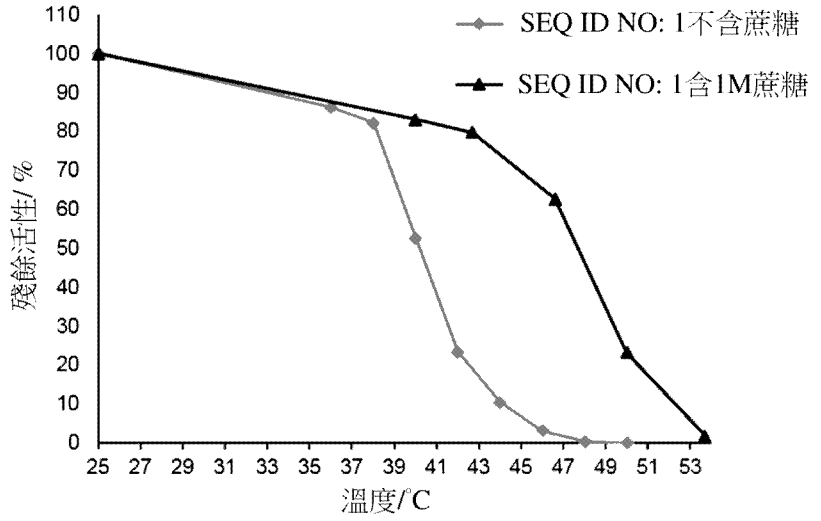

SEQ ID NO: 1不含蔗糖
SEQ ID NO: 1含1M蔗糖
殘餘活性/ %
溫度/°C
110
100
90
80
70
60
50
40
30
20
10
0
25 27 29 31 33 35 37 39 41 43 45 47 49 51 53

圖 1

專利案號：106141420

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【發明摘要】

【中文發明名稱】 海藻糖磷酸化酶

【英文發明名稱】 TREHALOSE PHOSPHORYLASE

【中文】

本發明涉及一種包含一胺基酸序列的海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少80%同一性及/或至少80%同源性，其中該海藻糖磷酸化酶的胺基酸序列在一個或多個胺基酸位置處包含一胺基酸取代，其中該一個或多個胺基酸位置選自由以下胺基酸位置所組成之群組：SEQ ID NO: 1的位置712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703以及705。

【英文】

The present invention is related to a trehalose phosphorylase comprising an amino acid sequence、wherein the amino acid sequence of the trehalose phosphorylase is at least 80% identical to and/or at least 80% homologous to an amino acid sequence of SEQ ID NO: 1, wherein the amino acid sequence of the trehalose phosphorylase comprises an amino acid substitution at one or more amino acid positions, wherein the one or more amino acid positions is/are selected from the group consisting of amino acid positions of SEQ ID NO: 1 712, 383, 10, 114, 118, 192, 197, 220, 225,

304, 306, 318, 323, 339, 349, 357, 459, 476, 481, 484, 487, 488, 506, 511, 526, 530, 532, 533, 537, 550, 556, 564, 590, 649, 667, 703 and 705.

【指定代表圖】第1圖

【代表圖之符號簡單說明】

111年6月14日修正本

【發明說明書】

【中文發明名稱】　海藻糖磷酸化酶

【英文發明名稱】　TREHALOSE PHOSPHORYLASE

【技術領域】

【0001】 本發明涉及一磷酸化酶，一使一葡糖基單醣與α-D-葡萄糖-1-磷酸反應之方法，一將葡萄糖與α-D-葡萄糖-1-磷酸鹽轉化為海藻糖與無機磷酸鹽之方法，以及該磷酸化酶用於生產海藻糖之用途。

【先前技術】

【0002】 磷酸化酶是催化將來自一無機磷酸鹽之磷酸基團添加至一受體分子的酶。催化海藻糖的可逆磷酸化裂解之磷酸化酶在本領域中是已知的，並被稱為海藻糖磷酸化酶。 海藻糖磷酸化酶可基於其所催化之反應的機制來加以區分。

【0003】 第一組海藻糖磷酸化酶使用無機磷酸鹽作為一進入葡萄糖與α-D-葡萄糖1-磷酸(aG1P)的葡糖基受體，以催化具有變旋異構組態淨保留的海藻糖之磷酸裂解，因此被歸類為保留磷酸化酶。這種第一組海藻糖磷酸化酶已被國際生物化學暨分子生物學聯盟(International Union of Biochemistry and Molecular Biology)指定為EC號為EC 2.4.1.231，並已經從各種真核生物真菌中進行功能鑑定。

【0004】 第二組海藻糖磷酸化酶為將EC號為EC 2.4.1.64的海藻糖磷酸化酶翻轉並催化海藻糖之磷酸裂解，並將構型轉化為葡萄糖與β-D-葡萄糖-1-磷酸鹽。因此這些磷酸化酶具有不同於EC 2.4.1.231的海藻糖磷酸化酶之反應機制。

【0005】 具體地，本發明涉及EC號為EC 2.4.1.231的某些磷酸化酶，其能夠在其它反應中將葡萄糖與α-D-葡萄糖-1磷酸(“aG1P”)轉化為海藻糖，或能夠在無機磷酸鹽的存在下將海藻糖磷酸解切割為葡萄糖與aG1P。

【0006】 海藻糖磷酸化酶的工業用途源於這樣的事實，亦即其生物化學特徵的反應，即催化海藻糖的磷酸裂解，是可逆的。因此，海藻糖磷酸化酶特別適用於催化葡萄糖與aG1P將其轉化為海藻糖與無機磷酸鹽。

【0007】 由海藻糖磷酸化酶催化的反應是可逆的(平衡反應)，且可能經歷基質或產物抑制，取決於該反應的具體方向。為了獲得一所需產物工業上相關的量，需要海藻糖磷酸化酶催化具有高比活性之基質的轉化。此外，海藻糖磷酸化酶的其他動力學因子，例如基質選擇性與K_M可能對產品收獲率具有重要作用。其它相關方面可以包括但不限於區域選擇性，由其他因素(例如，粗萃取物組成分、基質污染物或副產物)造成的抑制，以及在合適宿主中的重組可溶性表現。

【0008】 野生型海藻糖磷酸化酶的主要缺點為，即使在25°C至40°C之間的中等溫度下溶液中的酶活性也會迅速喪失，這明顯限制了它們的應用。對於工業應用而言，在高於30°C的溫度下幾天之內的高穩定性，或者甚至高於40°C的高溫穩定性都是需要的。對於熱不穩定的酶來說，反應時間長，在整個加工過程中需要更大量的酶，通常透過重覆添加酶來進行。例如，來自秀珍菇(*Pleurotus ostreatus*)的海藻糖磷酸化酶在25°C下顯示約1.3小時的半衰期以及在

約41°C下3分鐘的半衰期(Schwarz等人，J Biotechnol 129, 140-150 (2007)，Han等人，Protein Expression and Purification 30, 194-202 (2003))。來自裂褶菌(*Schizophyllum commune*)以及舞菇(*Grifola frondosa*)的海藻糖磷酸化酶則稍微穩定些，分別在30°C下的半衰期為4.8小時，在37°C下的半衰期為1小時(Schwarz等人，J Biotechnol 129, 140-150 (2007))。

【0009】 本領域應用了各種策略來解決這些缺點。例如，添加海藻糖、甘油以及聚乙二醇(polyethylene glycol, PEG)顯示增加海藻糖磷酸化酶的穩定性(Klimacek等人，Biotechnology Techniques 13：243-248, 1999，Eis等人，Biochem J 341, 385-393 (1999)，Schwarz等人，J Biotechnol 129, 140-150 (2007))。透過添加20%的PEG4000達到了最佳穩定化，這導致來自裂褶菌的海藻糖磷酸化酶在30°C、40°C以及50°C下的半衰期分別為4.5天、2.2小時以及6分鐘(Klimacek等人，Biotechnology Techniques 13：243-248, 1999，Eis等人，Biochem J 341, 385-393 (1999))。雖然添加PEG 4000改善了酶的穩定性，但是在40°C或40°C以上的應用仍然不足，且需要數小時至數天的處理時間進行這樣的改進。PEG 4000的存在可能進一步干擾透過酶促反應獲得之產物的工業規模成本結構以及下游加工要求。

【0010】 來自裂褶菌的海藻糖磷酸化酶的半衰期也可透過分別在30°C、40°C以及50°C固定化22天、3.3天以及2小時來改善(Klimacek等人，Biotechnology Techniques 13：243-248, 1999)。然而，由於昂貴的載體及製造成本，固定化會導致較高的酶生產成本，且只有當酶可以回收並重新使用多個循環時，在工業應用方面才是有效的。此外，固定化限制了酶促反應產物的過程及下游加工的選擇。

【0011】 因此，在25°C至35°C的溫度下進行以海藻糖磷酸化酶之合成反應並不令人驚訝 (Schwarz等人，J of Biotechnology 129 140-150 (2007)，Saito等人，Appl Microbiol Biotechnol 50:193-198 (1998)，Saito等人，Appl Microbiol Biotechnol 64: 4340-4345 (1998))。

【0012】 改進酶的性能及其在工業過程中之適用性的另一種方法為酶工程。該技術涉及開發具有改進性能的起始酶之變體(回顧文獻請參見，例如S. Lutz，U.T. Bornscheuer, Protein Engineering Handbook, Wiley VCH, Weinheim, 2009)。其中磷酸化酶透過酶工程改善。例如，美國專利申請公開號US 2013-0029384揭露了具有改善的熱穩定性之屬於糖基水解酶家族13的蔗糖磷酸化酶之變體。EC號為EC 2.4.1.231的海藻糖磷酸化酶的變體迄今僅限於用於闡明所述之海藻糖磷酸化酶的反應機理之變體。基於這樣的變體，Goedl等人(Biochem J 397；491-500；2006)發現在來自裂褶菌(*Shizophyllum commune*)的海藻糖磷酸化酶的胺基酸位置D379、H403、R507以及K512的取代導致活性降低。具有以下單一突變D379N、H403A、R507A以及K512A之一的變體顯示出海藻糖磷酸分解活性降低。Goedl等人(FEBS J 275； 903-913, 2008)更具體地發現來自裂褶菌(*Shizophyllum commune*)的海藻糖磷酸化酶突變R507A以及K512A對野生型海藻糖磷酸化酶的催化效率(k_{cat}/K_M)有影響。

【0013】 由於現有技術中可獲得的野生型海藻糖磷酸化酶在各方面都令人不滿意，且試圖有效地提高海藻糖磷酸化酶的工業應用性，如本領域所描述的那樣不成功，因此需要與野生型海藻糖磷酸化酶相比具有優勢之海藻糖磷酸化酶，特別是在工業生產海藻糖的高溫製程穩定性方面有優勢者。

【0014】 因此，本發明的基礎問題為提供適用於工業生產海藻糖之海藻糖磷酸化酶。

【0015】 本發明之另一問題為提供熱穩定之海藻糖磷酸化酶，且於52°C作用15分鐘後顯示出30%至90%或55%至100%的殘餘活性，而不需要酶的固定化或添加除了蔗糖以外之任何穩定劑(例如，PEG或甘油)。

【0016】 本發明之另一問題為提供一種熱穩定的海藻糖磷酸化酶，並且於45°C顯示3小時至9天或更長的半衰期，而不需要酶的固定化或添加除了蔗糖以外之任何穩定劑(例如，PEG或甘油)。

【0017】 本發明之另一問題為提供具有介於0.65和1.0之間的100/500-比率的海藻糖磷酸化酶。

【0018】 另一問題為提供允許將葡萄糖與α-D-葡萄糖-1-磷酸鹽轉化為海藻糖與無機磷酸鹽之方法。

【發明內容】

【0019】 所附之申請專利範圍獨立項解決了這些及其他的問題。較佳實施例可以由所附之申請專利範圍附屬項中獲得。

【0020】 更具體地，於第一方面，其也是第一方面的第一個具體實施例，中的這些及其它問題係透過包含一胺基酸序列的一多胜肽解決，該多胜肽較佳為海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少80%同一性及/或至少80%同源性，其中該海藻糖磷酸化酶的胺基酸序列包含在一個或多個胺基酸位置處的一胺基酸取代，其中該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、

556、564、590、649、667、703以及705。較佳地，該一個或多個胺基酸位置係各自並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703以及705。甚至更佳地，該一個或多個胺基酸位置係各自並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、667、703以及705。如在本發明之上下文中令人驚訝地發現的，一個或多個這些位置的突變導致與SEQ ID NO: 1的野生型序列相比的改善特徵，例如，該酶的熱穩定性提高導致於52°C作用15分鐘後的殘餘活性為至少22%，這是與由SEQ ID NO: 1的野生型胺基酸序列編碼的海藻糖磷酸化酶的19%相比。

【0021】 於第一方面之第二具體實施例中，其也是該第一方面之第一具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703以及K705。

【0022】 於第一方面之第三具體實施例中，其也是該第一方面之第一及第二具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、220、225、304、

318、323、349、357、481、487、488、506、511、550、556、564、590、649、703以及705。

【0023】 於第一方面之第四具體實施例中，其也是該第一方面之第一、第二及第三具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、Y220、N225、A304、P318、T323、F349、G357、E481、Q487、K488、A506、A511、V550、S556、T564、D590、A649、A703以及K705。

【0024】 於第一方面之第五具體實施例中，其也是該第一方面之第一、第二、第三及第四具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、357、487、550、556、564、590以及649。

【0025】 於第一方面之第六具體實施例中，其也是該第一方面之第一、第二、第三、第四及第五具體實施例的一具體實施例，較佳為第一方面之第五具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649。

【0026】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：383、225、304、323、487、550、556、564、590以及705。

【0027】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：383、225、304、487、556、590以及705。

【0028】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：383、225、304、487、556以及590。

【0029】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：383、556以及590。

【0030】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由SEQ ID NO: 1的胺基酸位置383與590所組成之群組。

【0031】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該一個或多個胺基酸位置係為SEQ ID NO: 1的胺基酸位置383。

【0032】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：P383、N225、A304、T323、Q487、V550、S556、T564、D590以及N705。

【0033】 於第一方面之另一具體實施例中，其也是該第一方面之前述的任一具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含根據SEQ ID NO: 2、84、85、86、87、88、89、90、91、92、93、94、95、96、97、98、99、100、101、102、103、104、105、106、107、108、109，較佳為根據SEQ ID NO: 2、84、85、87、88、89、91、92、93、94、95、97、98、99、100、101、102、103、104、105、106、107、109的任何之一，更佳為根據SEQ ID NO: 84、85、87、88、89、91、92、93、94、95、97、98、99、100、101、102、103、

104、105、106、107、109的任何之一，同等較佳為根據SEQ ID NO: 87、89、91、97、98、99、100、101、102、103、104、109的任何之一，甚至更佳為根據SEQ ID NO: 87、91、97、98、99、100、101、102、103、104、109的任何之一，以及最佳為根據SEQ ID NO: 87、97、98、99、100、101、102、103、104的任何之一的一胺基酸序列。

【0034】 於第一方面之第七具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五及第六具體實施例或前述的任何其他的一具體實施例，該一個或多個胺基酸位置為二個或更多個胺基酸位置。

【0035】 於第一方面之第八具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六及第七具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第七實施例，該一個或多個胺基酸位置為三個或更多個胺基酸位置。

【0036】 於第一方面之第九具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七及第八具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第八實施例，該一個或多個胺基酸位置為四個或更多個胺基酸位置。

【0037】 於第一方面之第十具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八及第九具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第九實施例，該一個或多個胺基酸位置為五個或更多個胺基酸位置。

【0038】 於第一方面之第十一具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九及第十具體實施例或前述

的任何其他的一具體實施例，較佳為第一方面之第十實施例，該一個或多個胺基酸位置為六個或更多個胺基酸位置。

【0039】 於第一方面之第十二具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十及第十一具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十一實施例，該一個或多個胺基酸位置為七個或更多個胺基酸位置。

【0040】 於第一方面之第十三具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一及第十二具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十二實施例，該一個或多個胺基酸位置為八個或更多個胺基酸位置。

【0041】 於第一方面之第十四具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二及第十三具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十三實施例，該一個或多個胺基酸位置為九個或更多個胺基酸位置。

【0042】 於第一方面之第十五具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三及第十四具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十四實施例，該一個或多個胺基酸位置為十個或更多個胺基酸位置。

【0043】 於第一方面之第十六具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四及第十五具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十五實施例，該一個或多個胺基酸位置為十一個或更多個胺基酸位置。

【0044】 於第一方面之第十七具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五及第十六具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十六實施例，該一個或多個胺基酸位置為十二個或更多個胺基酸位置。

【0045】 於第一方面之第十八具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六及第十七具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十七實施例，該一個或多個胺基酸位置為十三個或更多個胺基酸位置。

【0046】 於第一方面之第十九具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七及第十八具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第十八實施例，該一個或多個胺基酸位置為十四個或更多個胺基酸位置。

【0047】 於第一方面之第二十具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八及第十九具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八及第十九實施例，每個及任何該胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、

323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703以及705，較佳地每個及任何該胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703以及705。

【0048】 於第一方面之第二十一具體實施例中，其也是該第一方面之第二十實施例的一實施例，每個及任何該胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703以及K705，較佳地每個及任何胺基酸位置係各自且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703以及K705。

【0049】 於第一方面之第二十二具體實施例中，其也是該第一方面之第二十實施例的一實施例，每個及任何該胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、220、225、304、318、323、349、357、481、487、488、506、511、550、556、564、590、649、703以及705，較佳地每個及任何胺基酸位置係各自且獨立地選自由下列SEQ ID NO: 1的胺基

酸位置所組成之群組：712、383、10、114、118、220、225、304、318、323、349、357、481、487、488、506、511、550、556、564、590、649、703以及705。

【0050】 於第一方面之第二十三具體實施例中，其也是該第一方面之第二十二實施例的一實施例，每個及任何該胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、Y220、N225、A304、P318、T323、F349、G357、E481、Q487、K488、A506、A511、V550、S556、T564、D590、A649、A703以及K705，較佳地每個及任何胺基酸位置係各自且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、Y220、N225、A304、P318、T323、F349、G357、E481、Q487、K488、A506、A511、V550、S556、T564、D590、A649、A703以及K705。

【0051】 於第一方面之第二十四具體實施例中，其也是該第一方面之第二十二實施例的一實施例，每個及任何該胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、357、487、550、556、564、590以及649，較佳地每個及任何胺基酸位置係各自且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、357、487、550、556、564、590以及649。

【0052】 於第一方面之第二十五具體實施例中，其也是該第一方面之第二十四實施例的一實施例，每個及任何該胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649，較佳地每個及任何胺基酸位置係各自且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群

組：L712、P383、L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649。

【0053】 於第一方面之第二十六具體實施例中，其也是該第一方面之第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四及第二十五具體實施例的一具體實施例，該二個或多個胺基酸位置包含一對二個胺基酸位置，其中該對二個胺基酸位置係選自由下列所組成之群組：10與114、10與118、10與220、10與225、10與304、10與323、10與349、10與357、10與383、10與487、10與506、10與550、10與556、10與564、10與590、10與649、10與705、10與712、114與118、114與220、114與225、114與304、114與323、114與349、114與357、114與383、114與487、114與506、114與550、114與556、114與564、114與590、114與649、114與705、114與712、118與220、118與225、118與304、118與323、118與349、118與357、118與383、118與487、118與506、118與550、118與556、118與564、118與590、118與649、L118與705、118與712、220與225、220與304、220與323、220與349、220與357、220與383、220與487、220與506、220與550、220與556、220與564、220與590、220與649、220與705、220與712、225與304、225與323、225and 349、225與357、225與383、225與487、225與506、225與550、225與556、225與564、225與590、225與649、225與705、225與712、304與323、304與349、304與357、304與383、304與487、304與506、304與550、304與556、304與564、304與590、304與649、304與705、304與712、323與349、323與357、323與383、323與487、323與506、323與550、323與556、323與564、323與590、323與649、323與705、323與712、349與357、349與383、

349與487、349與506、349與550、349與556、349與564、349與590、349與649、349與705、349與712、357與383、357與487、357與506、357與550、357與556、357與564、357與590、357與649、357與705、357與712、383與487、383與506、383與550、383與556、383與564、383與590、383與649、383與705、383與712、487與506、487與550、487與556、487與564、487與590、487與649、487與705、487與712、506與550、506與556、506與564、506與590、506與649、506與705、506與712、550與556、550與564、550與590、550與649、550與705、550與712、556與564、556與590、556與649、556與705、556與712、564與590、564與649、564與705、564與712、590與649、590與705、590與712、649與712、649與705，以及705與712，較佳地，該對二個胺基酸位置係選自由下列所組成之群組：V10與L114、V10與I118、V10與Y220、V10與N225、V10與A304、V10與T323、V10與F349、V10與G357、V10與P383、V10與Q487、V10與A506、V10與V550、V10與S556、V10與T564、V10與D590、V10與A649、V10與K705、V10與L712、L114與I118、L114與Y220、L114與N225、L114與A304、L114與T323、V10與F349、L114與G357、L114與P383、L114與Q487、L114與A506、L114與V550、L114與S556、L114與T564、L114與D590、L114與A649、L114與K705、L114與L712、I118與Y220、I118與N225、I118與A304、I118與T323、I118與F349、I118與G357、I118與P383、I118與Q487、I118與A506、I118與V550、I118與S556、I118與T564、I118與D590、118與A649、L118與K705、I118與L712、Y220與N225、Y220與A304、Y220與T323、Y220與F349、Y220與G357、Y220與P383、Y220與Q487、Y220與A506、Y220與V550、Y220與S556、Y220與T564、Y220與D590、Y220與A649、Y220與K705、Y220與L712、N225與A304、N225與T323、N225與F349、

N225與G357、N225與P383、N225與Q487、N225與A506、N225與V550、N225與S556、N225與T564、N225與D590、N225與A649、N225與K705、N225與L712、A304與T323、A304與F349、A304與G357、A304與P383、A304與Q487、A304與A506、A304與V550、A304與S556、A304與T564、A304與D590、A304與A649、A304與K705、A304與L712、T323與F349、T323與G357、T323與P383、T323與Q487、T323與A506、T323與V550、T323與S556、T323與T564、T323與D590、T323與A649、T323與K705、T323與L712、F349與G357、F349與P383、F349與Q487、F349與A506、F349與V550、F349與S556、F349與T564、F349與D590、F349與A649、F349與K705、F349與L712、G357與P383、G357與Q487、G357與A506、G357與V550、G357與S556、G357與T564、G357與D590、G357與A649、G357與K705、G357與L712、P383與Q487、P383與A506、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與K705、P383與L712、Q487與A506、Q487與V550、Q487與S556、Q487與T564、Q487與D590、Q487與A649、Q487與K705、Q487與L712、A506與V550、A506與S556、A506與T564、A506與D590、A506與A649、A506與K705、A506與L712、V550與S556、V550與T564、V550與D590、V550與A649、V550與K705、V550與L712、S556與T564、S556與D590、S556與A649、S556與K705、S556與L712、T564與D590、T564與A649、T564與K705、T564與L712、D590與A649、D590與K705、D590與L712、A649與L712、A649與K705，以及K705與L712。

【0054】 於第一方面之第二十七具體實施例中，其也是該第一方面之第二十六具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：10與114、10與220、10與383、10與506、10與705、10與712、114與118、

114與220、114與225、114與304、114與225、114與349、114與357、114與383、114與487、114與506、114與550、114與556、114與564、114與590、114與649、114與705、114與712、118與225、118與304、118與323、118與349、118與357、118與383、118與487、118與550、118與556、118與564、118與590、118與649、118與712、220與383、220與506、220與705、220與712、225與304、225與323、225與349、225與357、225與383、225與487、225與550、225與556、225與564、225與590、225與649、225與712、304與323、304與349、304與357、304與383、304與487、304與550、304與556、304與564、304與590、304與649、304與712、323與349、323與357、323與383、323與487、323與550、323與556、323與564、323與590、323與649、323與712、349與357、349與383、349與487、349與550、349與556、349與564、349與590、349與649、349與712、357與383、357與487、357與550、357與556、357與564、357與590、357與649、357與705、357與712、383與487、383與506、383與550、383與556、383與564、383與590、383與649、383與705、383與712、487與550、487與556、487與564、487與590、487與649、487與712、506與705、506與712、550與556、550與564、550與590、550與649、550與712、556與564、556與590、556與649、556與712、564與590、564與649、564與712、590與649、590與712、649與712、705與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：V10與L114、V10與Y220、V10與P383、V10與A506、V10與K705、V10與L712、L114與I118、L114與Y220、L114與N225、L114與A304、L114與T323、L114與F349、L114與G357、L114與P383、L114與Q487、L114與A506、L114與V550、L114與S556、L114與T564、L114與D590、L114與A649、L114與K705、L114與L712、I118與N225、I118與A304、I118與

T323、I118與F349、I118與G357、I118與P383、I118與Q487、I118與V550、I118與S556、I118與T564、I118與D590、118與A649、I118與L712、Y220與P383、Y220與A506、Y220與K705、Y220與L712、N225與A304、N225與T323、N225與F349、N225與G357、N225與P383、N225與Q487、N225與V550、N225與S556、N225與T564、N225與D590、N225與A649、N225與L712、A304與T323、A304與F349、A304與G357、A304與P383、A304與Q487、A304與V550、A304與S556、A304與T564、A304與D590、A304與A649、A304與L712、T323與F349、T323與G357、T323與P383、T323與Q487、T323與V550、T323與S556、T323與T564、T323與D590、T323與A649、T323與L712、F349與G357、F349與P383、F349與Q487、F349與V550、F349與S556、F349與T564、F349與D590、F349與A649、F349與L712、G357與P383、G357與Q487、G357與V550、G357與S556、G357與T564、G357與D590、G357與A649、G357與K705、G357與L712、P383與Q487、P383與A506、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與K705、P383與L712、Q487與V550、Q487與S556、Q487與T564、Q487與D590、Q487與A649、Q487與L712、A506與K705、A506與L712、V550與S556、V550與T564、V550與D590、V550與A649、V550與L712、S556與T564、S556與D590、S556與A649、S556與L712、T564與D590、T564與A649、T564與L712、D590與A649、D590與L712、A649與L712、K705與L712。

【0055】 於第一方面之第二十八具體實施例中，其也是該第一方面之第二十七具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：10與114、10與712、114與118、114與304、114與357、114與383、114與590、114與712、118與304、118與357、118與383、118與556、118與564、118

與590、118與712、225與304、225與383、225與487、225與550、225與556、225與590、304與323、304與357、304與383、304與487、304與556、304與564、304與590、304與712、323與357、323與487、323與556、323與564、323與590、323與649、349與383、349與590、357與383、357與590、357與705、357與712、383與487、383與550、383與556、383與564、383與590、383與649、383與712、487與564、487與590、487與649、550與590、556與564、556與590、556與649、564與590、564與712、590與649、590與712、and 649與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：V10與L114、V10與L712、L114與I118、L114與A304、L114與G357、L114與P383、L114與D590、L114與L712、I118與A304、I118與G357、I118與P383、I118與S556、I118與T564、I118與D590、I118與L712、N225與A304、N225與P383、N225與Q487、N225與V550、N225與S556、N225與D590、A304與T323、A304與G357、A304與P383、A304與Q487、A304與S556、A304與T564、A304與D590、A304與L712、T323與G357、T323與Q487、T323與S556、T323與T564、T323與D590、T323與A649、F349與P383、F349與D590、G357與P383、G357與D590、G357與K705、G357與L712、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與L712、Q487與T564、Q487與D590、Q487與A649、V550與D590、S556與T564、S556與D590、S556與A649、T564與D590、T564與L712、D590與A649、D590與L712，以及A649與L712。

【0056】 於第一方面之第二十九具體實施例中，其也是該第一方面之第二十八具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：114與118、114與304、114與357、114與383、114與590、114與712、118

與304、118與357、118與383、118與556、118與564、118與590、118與712、225與304、225與383、225與487、225與550、225與556、225與590、304與323、304與357、304與383、304與487、304與556、304與564、304與590、304與712、323與357、323與487、323與556、323與564、323與590、323與649、349與383、349與590、357與383、357與590、357與705、357與712、383與487、383與550、383與556、383與564、383與590、383與649、383與712、487與564、487與590、487與649、550與590、556與564、556與590、556與649、564與590、564與712、590與649、590與712，以及649與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：L114與I118、L114與A304、L114與G357、L114與P383、L114與D590、L114與L712、I118與A304、I118與G357、I118與P383、I118與S556、I118與T564、I118與D590、I118與L712、N225與A304、N225與P383、N225與Q487、N225與V550、N225與S556、N225與D590、A304與T323、A304與G357、A304與P383、A304與Q487、A304與S556、A304與T564、A304與D590、A304與L712、T323與G357、T323與Q487、T323與S556、T323與T564、T323與D590、T323與A649、F349與P383、F349與D590、G357與P383、G357與D590、G357與K705、G357與L712、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與L712、Q487與T564、Q487與D590、Q487與A649、V550與D590、S556與T564、S556與D590、S556與A649、T564與D590、T564與L712、D590與A649、D590與L712，以及A649與L712。

【0057】 於第一方面之另一較佳具體實施例中，其也是該第一方面之任何其他的前述具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：114與118、114與304、114與357、114與383、114與590、114與712、

118與304、118與357、118與383、118與556、118與564、118與590、118與712、225與304、225與383、225與487、225與550、225與556、225與590、304與323、304與357、304與383、304與487、304與556、304與564、304與590、304與712、323與357、323與487、323與556、323與564、323與590、349與383、349與590、357與383、357與590、357與705、357與712、383與487、383與550、383與556、383與564、383與590、383與712、487與564、487與590、550與590、556與564、556與590、564與590、564與712，以及590與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：L114與I118、L114與A304、L114與G357、L114與P383、L114與D590、L114與L712、I118與A304、I118與G357、I118與P383、I118與S556、I118與T564、I118與D590、I118與L712、N225與A304、N225與P383、N225與Q487、N225與V550、N225與S556、N225與D590、A304與T323、A304與G357、A304與P383、A304與Q487、A304與S556、A304與T564、A304與D590、A304與L712、T323與G357、T323與Q487、T323與S556、T323與T564、T323與D590、F349與P383、F349與D590、G357與P383、G357與D590、G357與K705、G357與L712、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與L712、Q487與T564、Q487與D590、V550與D590、S556與T564、S556與D590、T564與D590、T564與L712，以及D590與L712。

【0058】 於第一方面之第三十具體實施例中，其也是該第一方面之第二十九具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：118與383、118與556、118與564、118與590、225與304、225與383、225與487、225與550、225與556、225與590、304與323、304與383、304與487、304與556、304與564、304與590、323與357、323與487、323與556、323與564、323

與590、323與649、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383與590、383與649、383與712、487與564、487與590、487與649、550與590、556與564、556與590、556與649、564與590、564與712、590與649、590與712、649與712，以及705與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：I118與P383、I118與S556、I118與T564、I118與D590、N225與A304、N225與P383、N225與Q487、N225與V550、N225與S556、N225與D590、A304與T323、A304與P383、A304與Q487、A304與S556、A304與T564、A304與D590、T323與G357、T323與Q487、T323與S556、T323與T564、T323與D590、T323與A649、F349與P383、F349與D590、G357與P383、G357與D590、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與L712、Q487與T564、Q487與D590、Q487與A649、V550與D590、S556與T564、S556與D590、S556與A649、T564與D590、T564與L712、D590與A649、D590與L712、A649與L712，以及K705與L712。

【0059】 於第一方面之另一較佳具體實施例中，其也是該第一方面之任何其他的前述具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：118與383、118與556、118與564、118與590、225與304、225與383、225與487、225與550、225與556、225與590、304與323、304與383、304與487、304與556、304與564、304與590、323與357、323與487、323與556、323與564、323與590、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383與590、383與712、487與564、487與590、550與590、556與564、556與590、564與590、564與712、590與712，以及705與712且較佳地該對二個胺基酸位置係選自由下列所組成之群組：I118與P383、I118與S556、

I118與T564、I118與D590、N225與A304、N225與P383、N225與Q487、N225與V550、N225與S556、N225與D590、A304與T323、A304與P383、A304與Q487、A304與S556、A304與T564、A304與D590、T323與G357、T323與Q487、T323與S556、T323與T564、T323與D590、F349與P383、F349與D590、G357與P383、G357與D590、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與L712、Q487與T564、Q487與D590、V550與D590、S556與T564、S556與D590、T564與D590、T564與L712、D590與L712，以及K705與L712。

【0060】 於第一方面之第三十一具體實施例中，其也是該第一方面之第二十九具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：114與118、114與383、114與712、118與383、118與556、118與590、118與712、225與304、225與383、225與550、225與590、304與383、304與556、304與590、323與556、323與590、323與649、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383與590、383與649、383與712、556與564、556與590、564與590、564與712、590與649，以及590與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：L114與I118、L114與P383、L114與L712、I118與P383、I118與S556、I118與D590、I118與L712、N225與A304、N225與P383、N225與V550、N225與D590、A304與P383、A304與S556、A304與D590、T323與S556、T323與D590、T323與A649、F349與P383、F349與D590、G357與P383、G357與D590、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、 P383與L712、S556與T564、S556與D590、T564與D590、T564與L712、D590與A649，以及D590與L712。

【0061】 於第一方面之另一較佳具體實施例中，其也是該第一方面之任何其他的前述具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：114與118、114與383、114與712、118與383、118與556、118與590、118與712、225與304、225與383、225與550、225與590、304與383、304與556、304與590、323與556、323與590、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383與590、 383與712、556與564、556與590、564與590、564與712，以及590與712且較佳地該對二個胺基酸位置係選自由下列所組成之群組：L114與I118、L114與P383、L114與L712、I118與P383、I118與S556、I118與D590、I118與L712、N225與A304、N225與P383、N225與V550、N225與D590、A304與P383、A304與S556、A304與D590、T323與S556、T323與D590、F349與P383、F349與D590、G357與P383、G357與D590、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、 P383與L712、S556與T564、S556與D590、T564與D590、T564與L712，以及D590與L712。

【0062】 於第一方面之第三十二具體實施例中，其也是該第一方面之第二十九具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：114與118、114與304、114與357、114與383、114與590、114與712、118與304、118與357、118與383、118與556、118與590、118與712、225與383、304與357、304與383、304與590、304與712、323與590、349與383、349與590、357與383、357與590、357與705、357與712、383與487、383與550、383與556、383與564、383與590、383與649、383與712、556與590、564與590、590與649，以及590與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：L114與I118、L114與A304、L114與G357、L114與P383、L114與D590、L114與L712、

I118與A304、I118與G357、I118與P383、I118與S556、I118與D590、I118與L712、N225與P383、A304與G357、A304與P383、A304與D590、A304與L712、T323與D590、F349與P383、F349與D590、G357與P383、G357與D590、G357與K705、G357與L712、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與L712、S556與D590、T564與D590、D590與A649，以及D590與L712。

【0063】 於第一方面之另一較佳具體實施例中，其也是該第一方面之任何其他的前述具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所組成之群組：114與118、114與304、114與357、114與383、114與590、114與712、118與304、118與357、118與383、118與556、118與590、118與712、225與383、304與357、304與383、304與590、304與712、323與590、349與383、349與590、357與383、357與590、357與705、357與712、383與487、383與550、383與556、383與564、383與590、383與712、556與590、564與590，以及590與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：L114與I118、L114與A304、L114與G357、L114與P383、L114與D590、L114與L712、I118與A304、I118與G357、I118與P383、I118與S556、I118與D590、I118與L712、N225與P383、A304與G357、A304與P383、A304與D590、A304與L712、T323與D590、F349與P383、F349與D590、G357與P383、G357與D590、G357與K705、G357與L712、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與L712、S556與D590、T564與D590，以及D590與L712。

【0064】 於第一方面之另一較佳具體實施例中，其也是該第一方面之任何其他的前述具體實施例的一具體實施例，該對二個胺基酸位置係選自由下列所

組成之群組：118與383、118與590、225與383、225與590、304與383、304與590、323與590、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383與590、383與649、383與712、487與590、550與590、556與590、564與590、590與649、590與712，且較佳地該對二個胺基酸位置係選自由下列所組成之群組：I118與P383、I118與D590、N225與P383、N225與D590、A304與P383、A304與D590、T323與D590、F349與P383、F349與D590、G357與P383、G357與D590、P383與Q487、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與L712、Q487與D590、V550與D590、S556與D590、T564與D590、D590與A649、D590與L712。

【0065】 於第一方面之第三十三具體實施例中，其也是該第一方面之第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一及第三十二具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第二十六、第二十七、第二十八、第二十九、第三十、第三十一及第三十二實施例或前述的任何其他的具體實施例，該海藻糖磷酸化酶的胺基酸序列在至少一個或多個另外的胺基酸位置上包含一胺基酸取代，其中該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703以及705，較佳地，除了在二個胺基酸位置處的取代之外，該海藻糖磷酸化酶的胺基酸序列在至少一個或多個另外的胺

基酸位置處包含一胺基酸取代，其中該一個或多個另外的胺基酸位置係獨立且各別選自胺基酸位置選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703以及705。

【0066】 於第一方面之第三十四具體實施例中，其也是該第一方面之第三十三具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703與K705，較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703以及K705。

【0067】 於第一方面之第三十五具體實施例中，其也是該第一方面之第三十三具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、10、114、118、220、225、304、318、323、349、357、481、487、488、506、511、550、556、564、590、649、703以及705，較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、10、114、

118、220、225、304、318、323、349、357、481、487、488、506、511、550、556、564、590、649、703以及705。

【0068】 於第一方面之第三十六具體實施例中，其也是該第一方面之第三十五具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、V10、L114、I118、Y220、N225、A304、P318、T323、F349、G357、E481、Q487、K488、A506、A511、V550、S556、T564、D590、A649、A703以及K705，較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、V10、L114、I118、Y220、N225、A304、P318、T323、F349、G357、E481、Q487、K488、A506、A511、V550、S556、T564、D590、A649、A703以及K705。

【0069】 於第一方面之第三十七具體實施例中，其也是該第一方面之第三十三具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、10、114、118、225、304、323、349、357、487、550、556、564、590以及649，較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、10、114、118、225、304、323、349、357、487、550、556、564、590以及649。

【0070】 於第一方面之第三十八具體實施例中，其也是該第一方面之第三十七具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、V10、L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649，

較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、V10、L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649。

【0071】 於第一方面之第三十九具體實施例中，其也是該第一方面之第三十三具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、357、487、550、556、564、590以及649，較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、357、487、550、556、564、590以及649。

【0072】 於第一方面之第四十具體實施例中，其也是該第一方面之第三十九具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649，較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649。

【0073】 於第一方面之第四十一具體實施例中，其也是該第一方面之第三十三具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、114、118、225、304、357、487、556，以及590，較佳地該一個或多個另外的胺基酸位置係獨立並各

別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：712、383、114、118、225、304、357、487、556，以及590。

【0074】 於第一方面之第四十二具體實施例中，其也是該第一方面之第四十一具體實施例的一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、L114、I118、N225、A304、G357、Q487、S556，以及D590，較佳地該一個或多個另外的胺基酸位置係獨立並各別地選自由下列SEQ ID NO: 1之胺基酸位置所組成之群組：L712、P383、L114、I118、N225、A304、G357、Q487、S556，以及D590。

【0075】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含在SEQ ID NO: 1的胺基酸位置383，以及590處的一胺基酸取代，較佳為在SEQ ID NO: 1的胺基酸位置P383，以及D590處，且其中該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的下列胺基酸位置處包含進一步的胺基酸取代

(i) 114、118、304、357，以及 712、較佳為 L114、I118、A304、G357，以及 L712，或

(ii) 114、118、304、357、550、556，以及 712、較佳為 L114、I118、A304、G357、V550、S556，以及 L712，或

(iii) 114、118、225、304、357、487、564，以及 712、較佳為 L114、I118、N225、A304、G357、Q487、T564，以及 L712，或

(iv) 114、118、304、323、357、550、564，以及 712、較佳為 L114、I118、A304、T323、G357、V550、T564，以及 L712，或

(v) 114、118、225、304、323、357、487，以及 712、較佳為 L114、I118、N225、A304、T323、G357、Q487，以及 L712，或

(vi) 114、118、225、304、357、487、550、556，以及 712、較佳為 L114、I118、N225、A304、G357、Q487、V550、S556，以及 L712，或

(vii)114、118、225、304、357、487、550、564，以及 712、較佳為 L114、I118、N225、A304、G357、Q487、V550、T564，以及 L712，或

(viii) 114、118、225、304、357、550、556、564，以及 712、較佳為 L114、I118、N225、A304、G357、V550、S556、T564，以及 L712，或

(ix) 114、118、225、304、357、550、564，以及 712、較佳為 L114、I118、N225、A304、G357、V550、T564，以及 L712，或

(x) 114、118、304、323、357、550、556、564，以及 712、較佳為 L114、I118、A304、T323、G357、V550、S556、T564，以及 L712，或

(xi) 114、118、304、323、357、487、550、649，以及 712、較佳為 L114、I118、A304、T323、G357、Q487、V550、A649，以及 L712，或

(xii)114、118、225、304、357、487、550、556、564，以及 712、較佳為 L114、I118、N225、A304、G357、Q487、V550、S556、T564，以及 L712，或

(xiii) 114、118、225、304、357、550、556、564、649，以及 712、較佳為 L114、I118、N225、A304、G357、V550、S556、T564、A649，以及 L712，或

(xiv) 114、118、225、304、323、357、487、550、564，以及 712、較佳為 L114、I118、N225、A304、T323、G357、Q487、V550、T564，以及 L712，或

(xv) 114、118、225、304、323、357、487、550、649，以及 712、較佳為 L114、I118、N225、A304、T323、G357、Q487、V550、A649，以及 L712，或

(xvi) 114、118、225、304、323、357、487、550、556，以及 712、較佳為 L114、I118、N225、A304、T323、G357、Q487、V550、S556，以及 L712，或

(xvii) 114、118、225、304、323、357、550、556、564，以及 712、較佳為 L114、I118、N225、A304、T323、G357、V550、S556、T564，以及 L712，或

(xviii) 114、118、304、323、349、357、487、550、649，以及 712、較佳為 L114、I118、A304、T323、F349、G357、Q487、V550、A649，以及 L712，或

(xix) 114、118、304、323、357、487、550、556、564，以及 712、較佳為 L114、I118、A304、T323、G357、Q487、V550、S556、T564，以及 L712，或

(xx) 114、118、304、357、487、550、556、564、649，以及 712、較佳為 L114、I118、A304、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxi) 114、118、225、304、323、349、357、550、556、649，以及 712、較佳為 L114、I118、N225、A304、T323、F349、G357、V550、S556、A649，以及 L712，或

(xxii) 114、118、225、304、323、357、487、550、556、649，以及 712、較佳為 L114、I118、N225、A304、T323、G357、Q487、V550、S556、A649，以及 L712，或

(xxiii) 114、118、225、304、349、357、487、550、556、564，以及 712、較佳為 L114、I118、N225、A304、F349、G357、Q487、V550、S556、T564，以及 L712，或

(xxiv) 114、118、225、304、349、357、487、550、564、649，以及 712、較佳為 L114、I118、N225、A304、F349、G357、Q487、V550、T564、A649，以及 L712，或

(xxv) 114、118、225、304、323、349、357、487、550、556、564、649，以及 712、較佳為 L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxvi) 114、118、225、304、357、487、550、556、564、649，以及 712、較佳為 L114、I118、N225、A304、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxvii) 114、118、304、323、357、487、550、556、564、649，以及 712、較佳為 L114、I118、A304、T323、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxviii) 114、118、225、304、323、357、487、550、556、564、649，以及 712、較佳為 L114、I118、N225、A304、T323、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxix) 114、118、225、304、323、349、357、487、550、556、564、649，以及 712、較佳為 L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxx) 114、225、304、323、357、487、550、556、564、649，以及 712、較佳為 L114、N225、A304、T323、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxxi) 114、118、225、323、357、487、550、556、564、649，以及 712、較佳為 L114、I118、N225、T323、G357、Q487、V550、S556、T564、A649，以及 L712，或

(xxxii) 114、118、225、304、323、349、487、550、556、564、649，以及 712、較佳為 L114、I118、N225、A304、T323、F349、Q487、V550、S556、T564、A649，以及 L712，或

(xxxiii) 114、118、225、304、323、349、357、487、550、556、564，以及 649、較佳為 L114、I118、N225、A304、T323、F349、G357、Q487、V550、S556、T564，以及 A649.

【0076】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組處包含一個或多個另外的胺基酸取代：712、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、649、667、703以及705，較佳係選自由下列SEQ ID NO: 1的位置所組成之群組：L712、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、A649、R667、A703以及K705。

【0077】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，且最佳在SEQ ID NO: 1的六個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由712、383、114、118、225、304、357、487、556，以及590組成之群組。

【0078】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，且最佳在SEQ ID NO: 1的六個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由

L712、P383、L114、I118、N225、A304、G357、Q487、S556，以及D590組成之群組。

【0079】 於第一方面之第四十三具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一及第四十二具體實施例或前述的任何其他的一具體實施例，較佳為第一方面之第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一及第四十二實施例或前述的任何其他的具體實施例，更佳為第一方面之第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一及第四十二實施例或前述的任何其他的具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，且最佳在SEQ ID NO: 1的六個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由712、383、114、118、304以及357組成之群組。

【0080】 於第一方面之第四十四具體實施例中，其也是該第一方面之第四十三具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基

酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，且最佳在SEQ ID NO: 1的六個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由L712、P383、L114、I118、A304以及G357組成之群組。

【0081】 於第一方面之第四十五具體實施例中，其也是該第一方面之第四十三及第四十四具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的四個胺基酸位置處包含一胺基酸取代，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由712、383、114、118、304以及357組成之群組。

【0082】 於第一方面之第四十六具體實施例中，其也是該第一方面之第四十三及第四十四具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的四個胺基酸位置處包含一胺基酸取代，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由L712、P383、L114、I118、A304以及G357組成之群組。

【0083】 於第一方面之第四十七具體實施例中，其也是該第一方面之第四十三、第四十四、第四十五及第四十六具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的五個胺基酸位置處包含一胺基酸取代，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由712、383、114、118、304以及357組成之群組。

【0084】 於第一方面之第四十八具體實施例中，其也是該第一方面之第四十三、第四十四、第四十五及第四十六具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的五個胺基酸位置處包含一胺基酸取代，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由L712、P383、L114、I118、A304以及G357組成之群組。

【0085】 於第一方面之第四十九具體實施例中，其也是該第一方面之第四十三、第四十四、第四十五、第四十六、第四十七及第四十八具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的六個胺基酸位置處包含一胺基酸取代，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由712、383、114、118、304以及357組成之群組。

【0086】 於第一方面之第五十具體實施例中，其也是該第一方面之第四十三、第四十四、第四十五、第四十六、第四十七及第四十八具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的六個胺基酸位置處包含一胺基酸取代，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由L712、P383、L114、I118、A304以及G357組成之群組。

【0087】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，且最佳在SEQ ID NO: 1的六個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由712、383、118、225、304、349、357、487、556、564，以及590組成之群組。

【0088】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，且最佳在SEQ ID NO: 1的六個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由712、383、225、304、349、556，以及590組成之群組。

【0089】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由383、225、304、556，以及590組成之群組。

【0090】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由383、556，以及590組成之群組。

【0091】 於第一方面之另一較佳具體實施例，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的三個胺基酸位置處包含一胺基酸取代，較佳在SEQ ID NO: 1的四個胺基酸位置處，更佳在SEQ ID NO: 1的五個胺基酸位置處，且最佳在SEQ ID NO: 1的六個胺基酸位置處，其中SEQ ID NO: 1的每個及任何胺基酸位置係選自由L712、P383、I118、N225、A304、F349、G357、Q487、S556、T564，以及D590組成之群組。

【0092】 於第一方面之第五十一具體實施例中，其也是該第一方面之第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含

(a) 一胺基酸取代，係在SEQ ID NO: 1的四個胺基酸位置712、383、114與118，及/或SEQ ID NO: 1的位置383、487、556，以及590，及/或SEQ ID NO: 1的位置

383、225、556，以及590；或

(b) 一胺基酸取代，係在SEQ ID NO: 1的五個胺基酸位置712、383、114、118與304，及/或SEQ ID NO: 1的位置712、383、114、118與357，及/或SEQ ID NO: 1的位置383、225、304、556，以及590，及/或SEQ ID NO: 1的位置383、225、487、556，以及590；或

(c) 一胺基酸取代，係在SEQ ID NO: 1的六個胺基酸位置712、383、114、118、304與357，及/或SEQ ID NO: 1的位置383、225、304、487、556，以及590；或

(d) 一胺基酸取代，係在SEQ ID NO: 1的三個胺基酸位置383、556，以及590。

【0093】 於第一方面之第五十二具體實施例中，其也是該第一方面之第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含

(a) 一胺基酸取代，係在SEQ ID NO: 1的四個胺基酸位置712、383、114與118，及/或SEQ ID NO: 1的位置383、487、556，以及590，及/或SEQ ID NO: 1的位置383、225、556，以及590，且較佳為在SEQ ID NO: 1的四個胺基酸位置L712、P383、L114與I118，及/或SEQ ID NO: 1的位置P383、Q487、S556，以及D590，及/或SEQ ID NO: 1的位置P383、N225、S556，以及D590；或

(b) 一胺基酸取代，係在SEQ ID NO: 1的五個胺基酸位置712、383、114、I118與304，及/或SEQ ID NO: 1的位置712、383、114、118與357，及/或SEQ ID NO: 1的位置383、225、304、556，以及590，及/或SEQ ID NO: 1的位置383、225、487、556，以及590，且較佳為在SEQ ID NO: 1的五個胺基酸位置L712、P383、L114、

I118與A304，及/或SEQ ID NO: 1的位置L712、P383、L114、I118與G357，及/或SEQ ID NO: 1的位置P383、N225、A304、S556，以及D590，及/或SEQ ID NO: 1的位置P383、N225、Q487、S556，以及D590；或

(c) 一胺基酸取代，係在SEQ ID NO: 1的六個胺基酸位置712、383、114、118、304與357，及/或SEQ ID NO: 1的位置383、225、304、487、556，以及590，且較佳為在SEQ ID NO: 1的六個胺基酸位置L712、P383、L114、I118、A304與G357，及/或SEQ ID NO: 1的位置P383、N225、A304、Q487、S556，以及D590；或

(d) 一胺基酸取代，係在SEQ ID NO: 1的三個胺基酸位置383、556，以及590，且較佳為在SEQ ID NO: 1的三個胺基酸位置P383、S556，以及D590。

【0094】 於第一方面之第五十三具體實施例中，其也是該第一方面之第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一及第五十二具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含如SEQ ID NO: 14所示之胺基酸序列。

【0095】 於第一方面之第五十四具體實施例中，其也是該第一方面之第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一及第五十二具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列由如SEQ ID NO: 14所示之胺基酸序列組成。

【0096】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個另外的胺基酸位置處包含一胺基酸取代，其中該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、114、118、192、197、220、225、304、306、318、323、339、349、357、383、

459、476、481、484、487、488、506、511、526、530、532、 533、537、550、556、564、590、649、667、703、705以及712。

【0097】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個另外的胺基酸位置處包含一胺基酸取代，其中該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703、K705，以及L712。

【0098】 於第一方面之第五十五具體實施例中，其也是該第一方面之第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三及第五十四具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個另外的胺基酸位置上包含一胺基酸取代，其中該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、 533、537、550、556、564、590、649、667、703以及705，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703以及705。

【0099】 於第一方面之第五十六具體實施例中，其也是該第一方面之第五十五具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703以及K705，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703以及K705。

【0100】 於第一方面之第五十七具體實施例中，其也是該第一方面之第五十五具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、220、225、304、318、323、349、357、481、487、488、506、511、550、556、564、590、649、703以及705，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、220、225、304、318、323、349、357、481、487、488、506、511、550、556、564、590、649、703以及705。

【0101】 於第一方面之第五十八具體實施例中，其也是該第一方面之第五十七具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、Y220、N225、A304、P318、T323、F349、G357、E481、Q487、K488、A506、A511、V550、S556、T564、D590、A649、A703以及K705，較佳地該一個或多個另外的胺基酸位置係獨立且

各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、Y220、N225、A304、P318、T323、F349、G357、E481、Q487、K488、A506、A511、V550、S556、T564、D590、A649、A703以及K705。

【0102】 於第一方面之第五十九具體實施例中，其也是該第一方面之第五十五具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、225、304、323、349、357、487、550、556、564、590以及649，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、225、304、323、349、357、487、550、556、564、590以及649。

【0103】 於第一方面之第六十具體實施例中，其也是該第一方面之第五十九具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649。

【0104】 於第一方面之第六十一具體實施例中，其也是該第一方面之第五十五具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：225、304、323、349、357、487、550、556、564、590以及649，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：225、304、323、349、357、487、550、556、564、590以及649。

【0105】 於第一方面之第六十二具體實施例中，其也是該第一方面之第六十一具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：N225、A304、T323、F349、G357、Q487、V550、S556、T564、D590以及A649。

【0106】 於第一方面之第六十三具體實施例中，其也是該第一方面之第五十五具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：304、357以及590，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：304、357以及590。

【0107】 於第一方面之第六十四具體實施例中，其也是該第一方面之第六十三具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：A304、G357以及D590，較佳地該一個或多個另外的胺基酸位置係獨立且各別地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：A304、G357以及D590。

【0108】 於第一方面之第六十五具體實施例中，其也是該第一方面之第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三及第六十四具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含如SEQ ID NO: 44所示之一胺基酸序列。

【0109】 於第一方面之第六十六具體實施例中，其也是該第一方面之第六十五具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列係由如SEQ ID NO: 44所示之一胺基酸序列所組成。

【0110】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個另外的胺基酸位置上包含一胺基酸取代，其中該一個或多個另外的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、114、118、192、197、220、225、304、306、318、323、339、349、357、383、459、476、481、484、487、488、506、511、526、530、532、 533、537、550、556、564、590、649、667、703、705以及712。

【0111】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個另外的胺基酸位置上包含一胺基酸取代，其中該一個或多個另外的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703、K705，以及L712。

【0112】 於第一方面之第六十五具體實施例中，其也是該第一方面之第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三及第六十四具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個另外的胺基酸位置上包含一胺基酸

取代，其中該一個或多個另外的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、192、197、220、225、306、318、323、339、349、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、649、667、703以及705，較佳地該海藻糖磷酸化酶的胺基酸序列在一個或多個更進一步的胺基酸位置上包含一胺基酸取代，其中該一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、192、197、220、225、306、318、323、339、349、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、649、667、703以及705。

【0113】 於第一方面之第六十八具體實施例中，其也是該第一方面之第六十七具體實施例之一具體實施例，該一個或多個更進一步的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、S192、S197、Y220、N225、D306、P318、T323、L339、F349、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、A649、R667、A703以及K705，較佳地該一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、S192、S197、Y220、N225、D306、P318、T323、L339、F349、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、A649、R667、A703以及K705。

【0114】 於第一方面之第六十九具體實施例中，其也是該第一方面之第六十七具體實施例之一具體實施例，該一個或多個更進一步的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、 220、225、318、323、

349、481、487、488、506、511、550、556、564、649、703以及705，較佳地該一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、 220、225、318、323、349、481、487、488、506、511、550、556、564、649、703以及705。

【0115】 於第一方面之第七十具體實施例中，其也是該第一方面之第六十九具體實施例之一具體實施例，該一個或多個更進一步的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、Y220、N225、P318、T323、F349、E481、Q487、K488、A506、A511、V550、S556、T564、A649、A703以及K705，較佳地該一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、Y220、N225、P318、T323、F349、E481、Q487、K488、A506、A511、V550、S556、T564、A649、A703以及K705。

【0116】 於第一方面之第七十一具體實施例中，其也是該第一方面之第六十七具體實施例之一具體實施例，該一個或多個更進一步的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、225、323、349、487、550、556、564以及649，較佳地該一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：10、225、323、349、487、550、556、564以及649。

【0117】 於第一方面之第七十二具體實施例中，其也是該第一方面之第七十一具體實施例之一具體實施例，該一個或多個更進一步的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、N225、T323、F349、Q487、V550、S556、T564以及A649，較佳地該一個或多個更進一步的胺基酸位

置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：V10、N225、T323、F349、Q487、V550、S556、T564以及A649。

【0118】 於第一方面之第七十三具體實施例中，其也是該第一方面之第六十七具體實施例之一具體實施例，該一個或多個更進一步的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：225、323、349、487、550、556、564以及649，較佳地該一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：225、323、349、487、550、556、564以及649。

【0119】 於第一方面之第七十四具體實施例中，其也是該第一方面之第七十三具體實施例之一具體實施例，該一個或多個更進一步的胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：N225、T323、F349、Q487、V550、S556、T564以及A649，較佳地該一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：N225、T323、F349、Q487、V550、S556、T564以及A649。

【0120】 於第一方面之第七十五具體實施例中，其也是該第一方面之第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三及第七十四具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的胺基酸位置　處包含一胺基酸取代，較佳為在SEQ ID NO: 1的胺基酸位置　處，且該海藻糖磷酸化酶的胺基酸序列在下列SEQ ID NO: 1的胺基酸位置處包含另外的胺基酸取代：

(i) 550 與 556、較佳為 V550 與 S556，或

(ii) 225、487 與 564、較佳為 N225、Q487 與 T564，或

(iii) 323、550與564、較佳為T323、V550與T564，或

(iv) 225、323與487、較佳為N225、T323與Q487，或

(v) 225、487、550與556、較佳為N225、Q487、V550與S556，或

(vi) 225、487、550與564、較佳為N225、Q487、V550與T564，或

(vii) 225、550、556與564、較佳為N225、V550、S556與T564，或

(viii) 225、550、564與649、較佳為N225、V550、T564、A649，或

(ix) 323、550、556與564、較佳為T323、V550、S556、T564，或

(x) 323、487、550與649、較佳為T323、Q487、V550與A649，或

(xii) 225、487、550、556與564、較佳為N225、Q487、V550、S556與T564，或

(xiii) 225、550、556、564與649、較佳為N225、V550、S556、T564與A649，或

(xiv) 225、323、487、550與564、較佳為N225、T323、Q487、V550、T564，或

(xv) 225、323、487、550與649、較佳為N225、T323、Q487、V550與A649，或

(xvi) 225、323、487、550與556、較佳為N225、T323、Q487、V550與S556，或

(xvii) 225、323、550、556、564、較佳為N225、T323、V550、S556、T564，或

(xviii) 323、349、487、550與649、較佳為T323、F349、Q487、V550與A649，或

(ixx) 323、487、550、556與564、較佳為T323、Q487、V550、S556與T564，或

(xx) 487、550、556、564與649、較佳為Q487、V550、S556、T564與A649，或

(xxi) 225、323、349、550、556與649、較佳為N225、T323、F349、V550、S556與A649，或

(xxii) 225、323、487、550、556、649、較佳為N225、T323、Q487、V550、S556與A649，或

(xxiiii) 225、349、487、550、556與564、較佳為N225、F349、Q487、V550、S556與T564、and/or

(xxiv) 225、349、487、550、564與649、較佳為N225、F349、Q487、V550、T564、A649，或

(xxv) 225、487、550、556、564與649、較佳為N225、Q487、V550、S556、T564與A649，或

(xxvi) 323、487、550、556、564與649、較佳為T323、Q487、V550、S556、T564與A649，或

(xxvii) 225、323、487、550、556、564與649、較佳為N225、T323、Q487、V550、S556、T564與A649。

【0121】 於第一方面之第七十六具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、

第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四及第七十五具體實施例或前述的任何其他的一具體實施例，在該任何胺基酸位置的取代係選自由胺基酸A、R、N、D、C、Q、E、G、H、I、L、K、M、F、P、S、T、W、Y，以及V所組成之群組，較佳地在該任何胺基酸位置的取代係各別且獨立地選自由胺基酸A、R、N、D、C、Q、E、G、H、I、L、K、M、F、P、S、T、W、Y，以及V所組成之群組。

【0122】 於第一方面之第七十七具體實施例中，其也是該第一方面之第七十六具體實施例之一具體實施例，該取代係位於任何下列SEQ ID NO: 1的胺基酸位置：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705。

【0123】 於第一方面之第七十八具體實施例中，其也是該第一方面之第七十七具體實施例之一具體實施例，該取代係位於任何下列SEQ ID NO: 1的胺基酸位置：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、

A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703與K705。

【0124】 於第一方面之第七十九具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七及第七十八具體實施例或前述的任何其他的一具體實施例，較佳為該第一方面之第七十六、第七十七及第七十八具體實施例，該海藻糖磷酸化酶的胺基酸序列包含一個或多個取代，其中該取代係選自由下列所組成之群組：

在SEQ ID NO: 1的V10位置處的一個胺基酸取代，該取代為V10R、V10H或V10K，較佳為V10R；

在SEQ ID NO: 1的L114位置處的一個胺基酸取代，該取代為L114A、L114G、L114I、L114M、L114P或L114V，較佳為L114I；

在SEQ ID NO: 1的I118位置處的一個胺基酸取代，該取代為I118A、I118G、I118L、I118M、I118P或I118V，較佳為I118V；

在SEQ ID NO: 1的S192位置處的一個胺基酸取代，該取代為S192A、S192G、S192I、S192L、S192M、S192P或S192V，較佳為S192V；

在SEQ ID NO: 1的S197位置處的一個胺基酸取代，該取代為S197A、S197G、S197I、S197L、S197M、S197P或S197V，較佳為S197G；

在SEQ ID NO: 1的Y220位置處的一個胺基酸取代，該取代為Y220F或Y220W，較佳為Y220F；

在SEQ ID NO: 1的N225位置處的一個胺基酸取代，該取代為N225A、N225G、N225I、N225L、N225M、N225P或N225V，較佳為N225I、N225L、N225M或N225V，以及更佳為N225V；

在SEQ ID NO: 1的A304位置處的一個胺基酸取代，該取代為A304G、A304I、A304L、A304M、A304P或A304V，較佳為A304I或A304L，以及更佳為A304I；

在SEQ ID NO: 1的D306位置處的一個胺基酸取代，該取代為D306R、D306H或D306K，較佳為D306H；

在SEQ ID NO: 1的P318位置處的一個胺基酸取代，該取代為P318R、P318H或P318K，較佳為P318H；

在SEQ ID NO: 1的T323位置處的一個胺基酸取代，該取代為T323A、T323G、T323I、T323L、T323M、T323P，或T323V，較佳為T323I或T323V，以及更佳為T323I；

在SEQ ID NO: 1的L339位置處的一個胺基酸取代，該取代為L339A、L339G、L339I、L339L、L339M、L339P或L339V，較佳為L339I；

在SEQ ID NO: 1的F349位置處的一個胺基酸取代，該取代為F349W或F349Y，較佳為F349Y；

在SEQ ID NO: 1的G357位置處的一個胺基酸取代，該取代為G357A、G357I、G357L、G357M、G357P或G357V，較佳為G357A；

在SEQ ID NO: 1的P383位置處的一個胺基酸取代，該取代為P383A、P383G、P383I、P383L、P383M、P383V、P383N、P383C、P383Q、P383S或P383T，較佳為P383A、P383G、P383M、P383V、P383N、P383C、P383Q、P383S或P383T，更佳為P383G、P383V、P383C或P383S，或P383T，甚至更佳為P383V或P383T，以及最佳為P383V；

在SEQ ID NO: 1的A459位置處的一個胺基酸取代，該取代為A459N、A459C、A459Q或A459S、A459T，較佳為A459S；

在SEQ ID NO: 1的Q476位置處的一個胺基酸取代，該取代為Q476A、Q476G、Q476I、Q476L、Q476M、Q476P或Q476V，較佳為Q476G；

在SEQ ID NO: 1的E481位置處的一個胺基酸取代，該取代為E481A、E481G、E481I、E481L、E481M、E481P或E481V，較佳為E481I；

在SEQ ID NO: 1的A484位置處的一個胺基酸取代，該取代為A484N、A484C、A484Q、A484S或A484T，較佳為A484S；

在SEQ ID NO: 1的Q487位置處的一個胺基酸取代，該取代為Q487A、Q487G、Q487I、Q487L、Q487M、Q487P或Q487V，較佳為Q487A、Q487G、Q487L、Q487M或Q487V，更佳為Q487A；

在SEQ ID NO: 1的K488位置處的一個胺基酸取代，該取代為K488A、K488G、K488I、K488L、K488M、K488P或K488V，較佳為K488A；

在SEQ ID NO: 1的A506位置處的一個胺基酸取代，該取代為A506N、A506C、A506Q、A506S 或A506T，較佳為A506S；

在SEQ ID NO: 1的A511位置處的一個胺基酸取代，該取代為A511N、A511C、A511Q、A511S或A511T，較佳為A511S；

在SEQ ID NO: 1的R526位置處的一個胺基酸取代，該取代為R526D或R526E 較佳為R526E；

在SEQ ID NO: 1的E530位置處的一個胺基酸取代，該取代為E530A、E530G、E530I、E530L、E530M、E530P、E530V，較佳為E530V；

在SEQ ID NO: 1的G532位置處的一個胺基酸取代，該取代為G532R、G532H或G532K，較佳為G532R；

在SEQ ID NO: 1的D533位置處的一個胺基酸取代，該取代為D533A、D533G、D533I、D533L、D533M、D533P或D533V，較佳為D533G；

在SEQ ID NO: 1的D537位置處的一個胺基酸取代，該取代為D537A、D537G、D537I、D537L、D537M、D537P或D537V，較佳為D537M；

在SEQ ID NO: 1的V550位置處的一個胺基酸取代，該取代為V550A、V550G、V550I、V550L、V550M或V550P，較佳為V550I或V550P，以及更佳為V550I；

在SEQ ID NO: 1的S556位置處的一個胺基酸取代，該取代為S556N、S556C、S556Q或S556T，較佳為S556T；

在SEQ ID NO: 1的T564位置處的一個胺基酸取代，該取代為T564D或T564E，較佳為T564E；

在SEQ ID NO: 1的D590位置處的一個胺基酸取代，該取代為D590N、D590C、D590Q、D590S、D590T、D590A、D590G、D590I、D590L、D590M、D590P或D590V，較佳為D590N、D590G或D590A，以及更佳為D590N；

在SEQ ID NO: 1的A649位置處的一個胺基酸取代，該取代為A649D或A649E，較

佳為A649E；

在SEQ ID NO: 1的R667位置處的一個胺基酸取代，該取代為R667D、R667E、R667R、R667H或R667K，較佳為R667E或R667K、更佳為R667E；

在SEQ ID NO: 1的A703位置處的一個胺基酸取代，該取代為A703D或A703E，較佳為A703E；以及

在SEQ ID NO: 1的K705位置處的一個胺基酸取代，該取代為K705N、K705C、K705Q、K705S或K705T，較佳為K705N；

在SEQ ID NO: 1的L712位置處的一個胺基酸取代，該取代為L712A、L712G、L712I、L712M、L712P或L712V，較佳為L712M。

【0125】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶包含一個或多個取代，其中該取代係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712M、P383G、P383V、P383C、P383S、P383T、V10R、L114I、I118V、S192V、S197G、Y220F、N225I、N225L、N225M、N225V、A304L、A304I、D306H、P318H、T323I、T323V、L339I、F349Y、G357A、A459S、Q476G、E481I、A484S、487A、Q487G、Q487L、Q487M、Q487V、K488A、A506S、A511S、R526E、E530V、G532R、D533G、D537M、V550I、V550P、S556T、T564E、D590N、D590G、D590A、A649E、R667E、R667K、A703E，以及K705N，較佳地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：P383G、P383V、P383C、P383S、P383T、V10R、L114I、S192V、S197G、N225I、N225L、N225M、N225V、A304L、A304I、D306H、P318H、T323I、T323V、L339I、F349Y、G357A、A459S、Q476G、E481I、A484SQ487G、Q487L、Q487M、Q487V、K488A、A506S、A511S、R526E、

E530V、G532R、D533G、D537M、V550I、V550P、S556T、T564E、D590G、D590A、A649E、R667E、R667K、A703E，以及K705N。

【0126】 於第一方面之第八十具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八及第七十九具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具至少81%、或至少82%、或至少83%、或至少84%、或至少85%、仍然更佳為至少86%、或至少87%、或至少88%、或至少89%、或至少90%、甚至更佳為至少91%、或至少92%、或至少93%、或至少94%、或至少95%、以及最佳為至少96%、或至少97%、或至少98%、或至少99%、至少99.1%、或至少99.2%、或至少99.3%、或至少99.4%、或至少99.5%、或至少99.6%、或至少99.7%、或至少99.8%、以及尤其是至少99.9%，或100%的同一性。

【0127】 於第一方面之第八十一具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九及第八十具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、84、85、86、87、88、89、90、91、92、93、94、95、96、97、98、99、100、101、102、103、104、105、106、107、108、109、110、111、112、113、114、115、116、117、118、119、120、121、122、123、124、125、126、127、128、129、130、131、132、133、134、135、136、137、138、139、140、

141、142、143、144、145、146、147、148、149、150、151、152、153、154、155、156、157、158、159，或190的胺基酸序列具有至少85%的同一性。

【0128】 於第一方面之第八十二具體實施例中，其也是該第一方面之第八十一具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、87、88、89、91、93、94、95、97、98、101、103、104、105、107、109、110、111、113、114、115、117、119、121、123、125、128、130、131、132、133、134、135、136、137、138、139、140、141、146、147、149、150、151、152、154、155、156、157、158、159，或190的胺基酸序列具有至少85%的同一性。

【0129】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、155、156、157，或190的胺基酸序列具有至少85%的同一性。

【0130】 於第一方面之第八十三具體實施例中，其也是該第一方面之第八十二具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID

NO: 3、7、9、10、12、13、15、20、29、44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、98、104、110、113、115、121、125、132、133、134、135、136、137、138、139、140、141、147、152、154、155、156、157、158、159，或190的胺基酸序列具有至少85%的同一性。

【0131】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79，或190的胺基酸序列具有至少85%的同一性。

【0132】 於第一方面之第八十四具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二及第八十三具

體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78 79、84、85、86、87、88、89、90、91、92、93、94、95、96、97、98、99、100、101、102、103、104、105、106、107、108、109、110、111、112、113、114、115、116、117、118、119、120、121、122、123、124、125、126、127、128、129、130、131、132、133、134、135、136、137、138、139、140、141、142、143、144、145、146、147、148、149、150、151、152、153、154、155、156、157、158、159，或190的二個或多個胺基酸序列具有至少85%的同一性。

【0133】 於第一方面之第八十五具體實施例中，其也是該第一方面之第八十四具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、87、88、89、91、93、94、95、97、98、101、103、104、105、107、109、110、111、113、114、115、117、119、121、123、125、128、130、131、132、133、134、135、136、137、138、139、

140、141、146、147、149、150、151、152、154、155、156、157、158、159，或190　的二個或多個胺基酸序列具有至少85%的同一性。

【0134】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、155、156、157，或190的二個或多個胺基酸序列具有至少85%的同一性。

【0135】 於第一方面之第八十六具體實施例中，其也是該第一方面之第八十五具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 3、7、9、10、12、13、15、20、29、44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、98、104、110、113、115、121、125、132、133、134、135、136、137、138、139、140、141、147、152、154、155、156、157、158、159，或190的二個或多個胺基酸序列具有至少85%的同一性。

【0136】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79，或190的二個或多個胺基酸序列具有至少85%的同一性。

【0137】 於第一方面之第八十七具體實施例中，其也是該第一方面之第八十、第八十一、第八十二、第八十三、第八十四、第八十五及第八十六具體實施例或前述的任何其他的一具體實施例，該胺基酸序列的同一性為至少86%、或至少87%、或至少88%、或至少89%、或至少90%、更佳為至少91%、或至少92%、或至少93%、或至少94%、或至少95%、以及最佳為至少96%、或至少97%、或至少98%、或至少99%、至少99.1%、或至少99.2%、或至少99.3%、或至少99.4%、或至少99.5%、或至少99.6%、或至少99.7%、或至少99.8%、以及尤其至少99.9%，或100%。

【0138】 於第一方面之第八十八具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六及第八十七具體實施例或前述的任何其他的一具體實施例，較佳為該第一方面之第一、第二、第三、第四、第五、第六、第

七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八及第七十九具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少81%、或至少82%、或至少83%、或至少84%、或至少85%、仍然更佳為至少86%、或至少87%、或至少88%、或至少89%、或至少90%、更佳為至少91%、或至少92%、或至少93%、或至少94%、或至少95%、以及最佳為至少96%、或至少97%、或至少98%、或至少99%、至少99.1%、或至少99.2%、或至少99.3%、或至少99.4%、或至少99.5%、或至少99.6%、或至少99.7%、或至少99.8%、以及尤其至少99.9%，或100%的同源性。

【0139】 於第一方面之第八十九具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、

第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六、第八十七及第八十八具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、84、85、86、87、88、89、90、91、92、93、94、95、96、97、98、99、100、101、102、103、104、105、106、107、108、109、110、111、112、113、114、115、116、117、118、119、120、121、122、123、124、125、126、127、128、129、130、131、132、133、134、135、136、137、138、139、140、141、142、143、144、145、146、147、148、149、150、151、152、153、154、155、156、157、158，或159的胺基酸序列具有至少85%的同源性。

【0140】 於第一方面之第九十具體實施例中，其也是該第一方面之第八十九具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、

21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、87、88、89、91、93、94、95、97、98、101、103、104、105、107、109、110、111、113、114、115、117、119、121、123、125、128、130、131、132、133、134、135、136、137、138、139、140、141、146、147、149、150、151、152、154、155、156、157、158、159，或190的胺基酸序列具有至少85%的同源性。

【0141】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、155、156、157，或190的胺基酸序列具有至少85%的同源性。

【0142】 於第一方面之第九十一具體實施例中，其也是該第一方面之第九十具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 3、7、9、10、12、13、15、20、29、44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、98、104、110、113、115、121、125、132、133、134、135、136、137、138、139、140、141、147、152、154、155、156、157、158、159，或190的胺基酸序列具有至少85%的同源性。

【0143】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79，或190的胺基酸序列具有至少85%的同源性。

【0144】 於第一方面之第九十二具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六、第八十七、第八十八、第八十九、第九十及第九十一具體實施例或前述的任何其他的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、

50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78 79、84、85、86、87、88、89、90、91、92、93、94、95、96、97、98、99、100、101、102、103、104、105、106、107、108、109、110、111、112、113、114、115、116、117、118、119、120、121、122、123、124、125、126、127、128、129、130、131、132、133、134、135、136、137、138、139、140、141、142、143、144、145、146、147、148、149、150、151、152、153、154、155、156、157、158、159，或190的二個或多個胺基酸序列具有至少85%的同源性。

【0145】 於第一方面之第九十三具體實施例中，其也是該第一方面之第九十二具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、87、88、89、91、93、94、95、97、98、101、103、104、105、107、109、110、111、113、114、115、117、119、121、123、125、128、130、131、132、133、134、135、136、137、138、139、140、141、146、147、149、150、151、152、154、155、156、157、158、159，或190的二個或多個胺基酸序列具有至少85%的同源性。

【0146】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、

27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、155、156、157，或190的二個或多個胺基酸序列具有至少85%的同源性。

【0147】 於第一方面之第九十四具體實施例中，其也是該第一方面之第九十三具體實施例的一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 3、7、9、10、12、13、15、20、29、44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、98、104、110、113、115、121、125、132、133、134、135、136、137、138、139、140、141、147、152、154、155、156、157、158、159，或190的二個或多個胺基酸序列具有至少85%的同一性。

【0148】 於第一方面之另一較佳具體實施例中，其也是第一方面的任何其他前述具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79，或190的二個或多個胺基酸序列具有至少85%的同一性。

【0149】 於第一方面之第九十五具體實施例中，其也是該第一方面之第八十八、第八十九、第九十、第九十一、第九十二、第九十三及第九十四具體實施例或前述的任何其他的一具體實施例，該胺基酸序列的同源性為至少86%、或至少87%、或至少88%、或至少89%、或至少90%、更佳至少91%、或至少92%、或至少93%、或至少94%、或至少95%、最佳至少96%、或至少97%、或至少98%、或至少99%、至少99.1%或至少99.2% 或者至少99.3%、或者至少99.4%、或者至

少99.5%、或者至少99.6%、或者至少99.7%、或者至少99.8%，並且尤其是至少99.9%或者100%。

【0150】 於第一方面之第九十六具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六、第八十七、第八十八、第八十九、第九十、第九十一、第九十二、第九十三、第九十四及第九十五具體實施例或前述的任何其他的一具體實施例，本發明之基礎問題透過一多胜肽，較佳為一多胜肽，來解決，其中該多胜肽包含如SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、

84、85、86、87、88、89、90、91、92、93、94、95、96、97、98、99、100、101、102、103、104、105、106、107、108、109、110、111、112、113、114、115、116、117、118、119、120、121、122、123、124、125、126、127、128、129、130、131、132、133、134、135、136、137、138、139、140、141、142、143、144、145、146、147、148、149、150、151、152、153、154、155、156、157、158、159，或190所示之一胺基酸序列。於一較佳具體實施例中，該多胜肽為一海藻糖磷酸化酶。無論何時在本公開中，其係指該第一方面及其任何具體實施例之多胜肽及海藻糖磷酸化酶，這樣的第一方面包括其任何的子方面，包括其任何之具體實施例。

【0151】 於第一方面之第九十七具體實施例中，其也是該第一方面之第九十六具體實施例的一具體實施例，該多胜肽包含或由如下列所示之一胺基酸序列組成：2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、87、88、89、91、93、94、95、97、98、101、103、104、105、107、109、110、111、113、114、115、117、119、121、123、125、128、130、131、132、133、134、135、136、137、138、139、140、141、146、147、149、150、151、152、154、155、156、157、158、159，或190。

【0152】 於第一方面之第九十八具體實施例中，其也是該第一方面之第九十七具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，包含

或由如下列所示之一胺基酸序列組成：3、7、9、10、12、13、15、20、29、44、45、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、98、104、110、113、115、121、125、132、133、134、135、136、137、138、139、140、141、147、152、154、155、156、157、158、159，或190。

【0153】 於第一方面之第九十九具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六、第八十七、第八十八、第八十九、第九十、第九十一、第九十二、第九十三、第九十四、第九十五、第九十六、第九十七及第九十八具體實施例或前述的任何其他的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，能夠催化糖基單醣與α-D-葡萄糖-1磷酸鹽之反應。

【0154】 於第一方面之第一百具體實施例中，其也是該第一方面之第九十九具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，能夠催化

葡萄糖與α-D-葡萄糖-1磷酸鹽轉化為海藻糖與無機磷酸鹽

及/或

海藻糖與無機磷酸鹽轉化為葡萄糖與α-D-葡萄糖-1磷酸鹽。

【0155】 於第一方面之第一百零一具體實施例中，其也是該第一方面之第九十九及第一百具體實施例的一具體實施例，該轉化為一可逆之轉化。

【0156】 於第一方面之第一百零二具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六、第八十七、第八十八、第八十九、第九十、第九十一、第九十二、第九十三、第九十四、第九十五、第九十六、第九十七、第九十八、第九十九、第一百及第一百零一具體實施例或前述的任何其他的一

具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，係為一如EC號為EC 2.4.1.231所示之海藻糖磷酸化酶。

【0157】 於第一方面之第一百零三具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六、第八十七、第八十八、第八十九、第九十、第九十一、第九十二、第九十三、第九十四、第九十五、第九十六、第九十七、第九十八、第九十九、第一百、第一百零一及第一百零二具體實施例或前述的任何其他的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有特徵(A)、(B)、(C)、(D)與(E)中的至少一個，或其任何組合，

其中特徵(A)為於52°C作用15分鐘後的熱穩定性，由一具有以下百分比的殘餘活性所定義：

i) 30%至90%，較佳為39%至90%，更佳為42%至90%，更佳為54%至90%，更佳為55%至90%，甚至更佳為63%至90%，甚至更佳為64%至90%，甚至更佳為68%至90%，最佳為64%至86%，及/或，

ii) 30%至90%，較佳為31%至90%，較佳為32%至90%，較佳為33%至90%，較佳為34%至90%，較佳為35%至90%，較佳為36%至90%，較佳為37%至90%，較佳為38%至90%，較佳為39%至90%，更佳為40%至90%，更佳為41%至90%，較佳為42%至90%，更佳為43%至90%，更佳為44%至90%，更佳為45%至90%，更佳為46%至90%，更佳為47%至90%，更佳為48%至90%，更佳為49%至90%，進一步較佳為50%至90%，進一步較佳為51%至90%，進一步較佳為52%至90% ，甚至更佳為53%至90%，甚至更佳為54%至90%，甚至更佳為55%至90%，甚至更佳為60%至90%，甚至更佳為61%至90%，甚至更佳為65%至90%，甚至更佳為70%至90%，甚至更佳為75%至90%，且最佳為72%至81%，及/或

iii) 55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100%，較佳為78%至100%，較佳為79%至100%，更佳為80%至100%，更佳為81%至100%，更佳為82%至100%，更佳為83%至100%，更佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，更佳為89至100%，進一步較佳為90%至100%，進一步較佳為91%至100%，進一步較佳為92%至100%，進一步較佳為93%至100%，進一步較佳為94%至100%，進一步較佳為95%至100%，進一步較佳為96%至100%，進一步較佳為97%至100%，進一步較佳為98%至100%，特別較佳為99%至100%，且最佳為100%

以及

其中特徵(B)為於52°C作用15分鐘後的熱穩定性，其特徵在於

i) 至少52°C的Tm30值，及/或

ii) 至少52°C的Tm50值；

以及

其中特徵(C)為以以下為特徵的熱穩定性

i) 一介於以下溫度之間的*Tm30*值：52°C至90°C，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C 80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，較佳為58°C至80°C，較佳為58.5°C至80°C，甚至更佳為52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，甚至更佳為53.5°C至70°C，甚至更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56°C至70°C，更佳為56.5°C至70°C，甚至更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為58°C至70°C，甚至更佳為58.5°C至70°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至65°C，甚至更佳為53°C至65°C，甚至更佳為53.5°C至65°C，甚至更佳為54°C至65°C，甚至更佳為54.5°C，甚至更佳為55°C至65°C，甚至更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳為56.5°C至65°C，甚至更佳為57°C至65°C，甚至更佳為57.5°C至65°C，甚至更佳為58°C至65°C，甚至更佳為58.5°C至65°C，甚至更佳為52°C至60°C，甚至更佳為52.5°C至60°C，甚至更佳為53°C至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C至60°C，甚至更佳為54.5°C至60°C，甚至更佳為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至60°C，甚至更佳為56.5°C至60°C，甚至更佳為57°C至60°C，甚至更佳為57.5°C至60°C，甚至更佳為58°C至60°C，甚至更佳為58.5°C至60°C，最佳為53.5°C至58.5°C，及/或

ii) 一介於以下溫度之間的*Tm50*值：52°C至90°C，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C至80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，甚至更佳為52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，

甚至更佳為53.5°C至70°C，甚至更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56°C至70°C，甚至更佳為56.5°C至70°C，更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至70°C，更佳為53°C至65°C，甚至更佳為53.5°C至65°C，甚至更佳為54°C至65°C，甚至更佳為54.5°C至65°C，甚至更佳為55°C至65°C，甚至更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳56.5°C至65°C，甚至更佳57°C至65°C，甚至更佳57.5°C至65°C，甚至更佳52°C至60°C，甚至更佳為52.5°C至60°C，甚至更佳為53°C至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C至60°C，甚至更佳為54.5°C至60°C，甚至更佳為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至60°C，甚至更佳為56.5°C至60°C，甚至更佳為57°C至60°C，甚至更佳為57.5°C至60°C，最佳為52°C至57.5°C

以及

其中特徵(D)為以以下為特徵的熱穩定性

i) 一*製程穩定性*，其特徵在於45°C的半衰期為3小時至9天或更多，較佳為24小時至9天或更多，較佳為39小時至9天或更多，較佳為2天至9天或更多，更佳為4天至9天或更多，更佳為5.5天至9天或更多，更佳為至少7天至9天或更多，更佳為至少9天或更多，且最佳為9天；

ii) 一*製程穩定性*，其特徵在於45°C半衰期為24小時至9天或更多，更佳為39小時至9天或更多，更佳為2天至9天或更多，更佳為4天至9天或更多，更佳為5.5天至9天或更多，更佳為7天至9天或更多，甚至更佳為至少9天或更多，且最佳為9天；

iii) 一*製程穩定性*，其特徵在於45°C半衰期為4天至9天或更多，較佳為5.5天至9天或更多，更佳為7天至9天或更多，甚至更佳為至少9天或更多，且最佳為9天；

以及

其中特徵(E)為以介於下列範圍之100/500-比率表示的相對活性

i) 0.65至1.0，較佳為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0，以及更佳為至少0.7至1.0；

ii) 0.65至1.0之間，較佳為0.7至1.0之間，較佳為0.75至1.0之間，較佳為0.8至1.0之間，較佳為0.85至1.0之間，較佳為0.9至1.0之間，較佳為0.95至1.0之間；且更佳為0.8至1.0之間；

其中該100/500-比率被定義為

[100 mM葡萄糖與100 mM α-葡萄糖-1磷酸鹽的海藻糖活性] /

[500 mM葡萄糖與100 mM α-葡萄糖-1-磷酸鹽的海藻糖活性] 的比率。

【0158】 於第一方面之第一百零四具體實施例中，其也是該第一方面之第一百零三具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，於52°C作用15分鐘後具有熱穩定性，該熱穩定性由具有介於以下之間之百分比的殘餘活性所定義

30%至90%，較佳為39%至90%，更佳為42%至90%，更佳為54%至90%，更佳為55%至90%，且甚至更佳為63%至90%，甚至更佳為64%～90%，甚至更佳為68%至90%，且最佳為64%至86%；及/或

30%至90%，較佳為31%至90%，較佳為32%至90%，較佳為33%至90%，較佳為34%至90%，較佳為35%至90%，較佳為36 %至90%，較佳為37%至90%，較佳為38%至90%，較佳為39%至90%，更佳為40%至90%，更佳為41%至90%，更佳為42%至90%，更佳為43%至90%，更佳為44%至90%，更佳為45%至90%，更佳為46%至90%，更佳為47%至90% ，更佳為48%至90%，更佳為49%至90%，甚至更佳為50%至90%，甚至更佳為51%至90%，甚至更佳為52%至90%，甚至更佳為53%至90%，甚至更佳為54%至90%，甚至更佳為55%至90%，甚至更佳為60%至90%，甚至更佳為61%至90%，甚至更佳為65%至90%，甚至更佳為70%至90%，

甚至更佳為75%至90%，且最佳為72%至81%，及/或

55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100%，較佳為78至100%，更佳為79至100%，更佳為80至100%，更佳為81至100%，更佳為82至100%，更佳為83至100% ，較佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，更佳為89%至100%，甚至更佳為90%至100%，甚至更佳為91%至100%，甚至更佳為92%至100%，甚至更佳為93%至100%，甚至更佳為94%至100%，甚至更佳為95%至100%，甚至更佳為96%至100%，甚至更佳為97%至100%，甚至更佳為98%至100%，甚至更佳為99%至100%，且最佳為100%。

【0159】 於第一方面之第一百零五具體實施例中，其也是該第一方面之第一百零三及第一百零四具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有由至少52°C的Tm30-值所定義之熱穩定性。

【0160】 於第一方面之第一百零六具體實施例中，其也是該第一方面之第一百零三、第一百零四及第一百零五具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，於45°C的半衰期為3小時至9天或更多，較佳為24小時至9天或更多，較佳為39小時至9天或更多，較佳為2天至9天或更多，更佳為4天至9天或更多，更佳為5.5天至9天或更多，更佳為7天至9天或更多，甚至更佳為至少9天或更多，最佳為9天。

【0161】 於第一方面之第一百零七具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五及第一百零六具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有相對活性，其表現為100/500比率在0.65至1.0之間，較佳為0.7至1.0之間，較佳為0.75至1.0之間，較佳為0.8至1.0之間，較佳為0.85至1.0之間，較佳為0.9至1.0之間，較佳為0.95至1.0之間，且更佳為0.7至1.0之間。

【0162】 於第一方面之第一百零八具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六及第一百零七具體實施例的一具體實施例，其中該多胜肽為該第一方面之第二十六、第二十七、第二十八、第二十九、第三十、第三十三、第三十四、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十五、第六十七、第六十八、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十四、第八十八、第八十九、第九十二、第九十九、第一百及第一百零二具體實施例或前述的任何其他的一具體實施例之任何一個，較佳為該第一方面之第二十六、第二十七、第二十八、第二十九、第三十、第三十三、第五十五、第六十七、第六十八、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十四、第八十八、第八十九、第九十二、第九十九、第一百及第一百零二具體實施例之任何一個。

【0163】 於第一方面之第一百零九具體實施例中，其也是該第一方面之第一百零三具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，於52°C作用15分鐘後具有熱穩定性，該熱穩定性係由介於以下範圍之間的殘餘活性所定義：

30%至90%，較佳為31%至90%，較佳為32%至90%，較佳為33%至90%，較佳為34%至90%，較佳為35%至90%，較佳為36 %至90%，較佳為37%至90%，較佳為38%至90%，較佳為39%至90%，更佳為40%至90%，更佳為41%至90%，更佳為42%至90%，更佳為43%至90%，更佳為44%至90%，更佳為45%至90%，更佳為46%至90%，更佳為47%至90% ，更佳為48%至90%，更佳為49%至90%，甚至更佳為50%至90%，甚至更佳為51%至90%，甚至更佳為52%至90%，甚至更佳為更佳為53%至90%，甚至更佳為54%至90%，甚至更佳為55%至90%，甚至更佳為60%～90%，甚至更佳為61%至90%，更佳為65%至90%，甚至更佳為70%至

90%，甚至更佳為75%至90%，最佳為72%至81%，及/或55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100%，較佳為78%至100%，更佳為79至100%，更佳為80%至100%，更佳為81%至100%，更佳為82%至100%，更佳為83%至100%，較佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，更佳為89%至100%，甚至更佳為90%%至100%，甚至更佳為91%至100%，甚至更佳為92%至100%，甚至更佳為93%至100%，甚至更佳為94%至100% ，甚至更佳為95%至100%，甚至更佳為96%至100%，甚至更佳為97%至100%，甚至更佳為98%至100%，甚至更佳為99%至100%，且最佳為100%。

【0164】 於第一方面之第一百一十具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八及第一百零九具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有熱穩定性，該熱穩定性的特徵在於至少52°C的Tm30值及/或至少52°C的Tm50值。

【0165】 於第一方面之第一百一十一具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八、第一百零九及第一百一十具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有於45°C的半衰期1天至9天，更佳為2天至9天，更佳為4天至9天，更佳為5.5天至9天，更佳為7天至9天，最佳為9天。

【0166】 於第一方面之第一百一十二具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八、第一百零九、第一百一十及第一百一十一具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有相對活性表示為介於0.65至1.0，較佳

為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0之間，更佳為0.7至1.0之間的100/500比率。

【0167】 於第一方面之第一百一十三具體實施例中，其也是該第一方面之第一百零九、第一百一十、第一百一十一及第一百一十二具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，係為該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例或前述的任何其他的一具體實施例之任何一個，較佳為該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例之任何一個。

【0168】 於第一方面之第一百一十四具體實施例中，其也是該第一方面之第一百一十三具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，於52°C作用15分鐘後具有熱穩定性，該熱穩定性由介於以下百分比之間的殘餘活性所定義：55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100% ，較佳為78%至100%，較佳為79%至100%，更佳為80%至100%，更佳為81%至100%，更佳為82%至100%，更佳為83%至100%，更佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，甚至更佳為89%至100%，甚至更佳為90%至100%，甚至更佳為91%至100%，甚至更佳為92%至100%，甚至更佳為93%至100%，甚至更佳為94%至100%，甚至更佳為95%至100%，甚至更

佳為96%至100%，甚至更佳為97%至100%，甚至更佳為98% 至100%，甚至更佳為99%至100%，最佳為100%。

【0169】 於第一方面之第一百一十五具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八、第一百零九、第一百一十、第一百一十一、第一百一十二、第一百一十三及第一百一十四具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有熱穩定性，該熱穩定性的特徵在於至少52°C的Tm30值及/或至少52°C的Tm50值，且其較佳之特徵在於至少52°C的Tm30值及至少52°C的Tm50值。

【0170】 於第一方面之第一百一十六具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八、第一百零九、第一百一十、第一百一十一、第一百一十二、第一百一十三、第一百一十四及第一百一十五具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有熱穩定性，該熱穩定性之特徵在於：

i) 介於以下溫度之間的的Tm30值：52°C至90°C，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C至80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，較佳為58°C至80°C，較佳為58.5°C至80°C，甚至更佳為52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，甚至更佳為53.5°C至70°C，更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56.5°C至70°C，甚至更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為58°C至70°C，甚至更佳為58.5°C至70°C，甚至更佳為52°C至65°C，更佳為52.5°C至65°C，甚至更佳為53°C至65°C，甚至更佳為53.5°C至65°C，甚至更佳為54°C至65°C，甚至更佳為54.5°C

至65°C，甚至更佳為55°C至65°C，更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳為56.5°C至65°C，甚至更佳為57°C至65°C，甚至更佳為57.5°C至65°C，甚至更佳為58°C至65°C，甚至更佳為58.5°C至65°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至60°C，甚至更佳為53°C至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C至60°C，甚至更佳為54.5°C至60°C，甚至更佳為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至60°C，更佳為56.5°C至60°C，甚至更佳為57°C至60°C，甚至更佳為57.5°C至60°C，甚至更佳為58°C至60°C，甚至更佳為58.5°C至60°C，最佳為53.5°C至58.5°C，及/或

ii) 介於以下溫度之間的的Tm50值：52°C至90°C，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C至80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，甚至更佳為52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，甚至更佳為53.5°C至70°C，甚至更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56°C至70°C，甚至更佳為56.5°C至70°C，甚至更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至70°C，更佳為53°C至65°C，甚至更佳為53.5°C至65°C，甚至更佳為54°C至65°C，甚至更佳為55°C至65°C，甚至更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳為56.5°C至65°C，甚至更佳為57°C至65°C，甚至更佳為57.5°C至65°C，甚至更佳為52°C至60°C，甚至更佳為52.5°C至60°C，甚至更佳為53°C至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C之間至60°C，甚至更佳為54.5°C至60°C，甚至更佳為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至60°C，甚至更佳為56.5°C至60°C，甚至更佳為57°C至60°C，甚至更佳為57.5°C至60°C，且最佳為52°C至57.5°C。

【0171】 於第一方面之第一百一十七具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八、第一百零九、第一百一十、第一百一十一、第一百一十二、第一百一十三、第一百一十四、第一百一十五及第一百一十六具體實施例的一具體實施例，其中該多胜肽，較佳為該海藻糖磷酸化酶，於45°C下的半衰期為4天至9天或更多，較佳為5.5天至9天或更多，更佳為7天至9天或 更多，甚至更佳為至少9天或更多，最佳為9天。

【0172】 於第一方面之第一百一十八具體實施例中，其也是該第一方面之第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八、第一百零九、第一百一十、第一百一十一、第一百一十二、第一百一十三、第一百一十四、第一百一十五、第一百一十六及第一百一十七具體實施例的一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，具有一相對活性，該相對活性表示為介於0.65-1.0之間的100/500比率，較佳為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0，更佳為0.8至1.0。

【0173】 於第一方面之第一百一十九具體實施例中，其也是該第一方面之第一百零四、第一百零五、第一百零六、第一百零七具體實施例的一具體實施例，其中該多胜肽，較佳為該海藻糖磷酸化酶，係為該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例或前述的任何其他的一具體實施例之任何一個，較佳為該第一方面之第二十

八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例之任何一個。

【0174】 於第一方面之第一百二十具體實施例中，其也是該第一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十、第二十一、第二十二、第二十三、第二十四、第二十五、第二十六、第二十七、第二十八、第二十九、第三十、第三十一、第三十二、第三十三、第三十四、第三十五、第三十六、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第四十七、第四十八、第四十九、第五十、第五十一、第五十二、第五十三、第五十四、第五十五、第五十六、第五十七、第五十八、第五十九、第六十、第六十一、第六十二、第六十三、第六十四、第六十五、第六十六、第六十七、第六十八、第六十九、第七十、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十二、第八十三、第八十四、第八十五、第八十六、第八十七、第八十八、第八十九、第九十、第九十一、第九十二、第九十三、第九十四、第九十五、第九十六、第九十七、第九十八、第九十九、第一百、第一百零一、第一百零二、第一百零三、第一百零四、第一百零五、第一百零六、第一百零七、第一百零八、第一百零九、第一百一十、第一百一十一、第一百一十二、第一百一十三、第一百一十四、第一百一十五、第一百一十六、第一百一十七、第一百一十八及第一百一十九具體實施例或前述的任何其他的一具體實施例，較佳為該第一方面之第二十

八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例，更佳為該第一方面之第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例，其中該多胜肽，較佳為該海藻糖磷酸化酶，相較於SEQ ID NO: 1的海藻糖磷酸化酶，其特徵在於熱穩定性的提高，由此該熱穩定性的提高為

i) 將*Tm30值*增加至少2°C至40.5°C，較佳為2°C至30.5°C，較佳為至少2.5°C至30.5°C，較佳為至少3°C至30.5°C，較佳為至少3.5°C至30.5°C，較佳為至少4°C至30.5°C，較佳為至少4.5°C至30.5°C，較佳為至少5°C至30.5°C，較佳為至少5.5°C至30.5°C，較佳為至少6°C至30.5°C，較佳為至少6.5°C至30.5°C，較佳為至少7°C至30.5°C，較佳為至少7.5°C至30.5°C，較佳為至少8°C至30.5°C，較佳為至少8.5°C至30.5°C，較佳為至少9°C至30.5°C，更佳為2°C至20.5°C，更佳為至少2.5°C至20.5°C，更佳為至少3°C至20.5°C，更佳為至少3.5°C至20.5°C，更佳為至少4°C至20.5°C，更佳為至少4.5°C至20.5°C，更佳為至少5°C至20.5°C，更佳為至少5.5°C至20.5°C，更佳為至少6°C至20.5°C，更佳為至少6.5°C至20.5°C，更佳為至少7°C至20.5°C，更佳為至少7.5°C至20.5°C，更佳為至少8°C至20.5°C，更佳為至少8.5°C至20.5°C，更佳為至少9°C至20.5°C，甚至更佳為2°C至15.5°C，甚至更佳為至少2.5°C至15.5°C，甚至更佳為至少3°C至15.5°C，甚至更佳為至少3.5°C至15.5°C，

甚至更佳為至少4°C至15.5°C，甚至更佳為至少4.5°C至15.5°C，甚至更佳為至少5°C至15.5°C，甚至更佳為至少5.5°C至15.5°C，甚至更佳為至少6°C至15.5°C，甚至更佳為至少6.5°C至15.5°C，甚至更佳為至少7°C至15.5°C，甚至更佳為至少7.5°C至15.5°C，甚至更佳為至少8°C至15.5°C，甚至更佳為至少8.5°C至15.5°C，甚至更佳為至少9°C至15.5°C，甚至更佳為2°C至10.5°C，甚至更佳為至少2.5°C至10.5°C，甚至更佳為至少3°C至10.5°C，甚至更佳為至少3.5°C至10.5°C，甚至更佳為至少4°C至10.5°C，甚至更佳為至少4.5°C至10.5°C，甚至更佳為至少5°C至10.5°C，甚至更佳為至少5.5°C至10.5°C，甚至更佳為至少6°C至10.5°C，甚至更佳為至少6.5°C至10.5°C，甚至更佳為至少7°C至10.5°C，甚至更佳為至少7.5°C至10.5°C，甚至更佳為至少8°C至10.5°C，甚至更佳為至少8.5°C至10.5°C，甚至更佳為至少9°C至10.5°C，最佳為至少4°C至9°C；及/或

ii) 將*Tm50值*增加至少2°C至42.5°C，較佳為2°C至32.5°C，較佳為至少2.5°C至32.5°C，較佳為至少3°C至32.5°C，較佳為至少3.5°C至32.5°C，較佳為至少4°C至32.5°C，較佳為至少4.5°C至32.5°C，較佳為至少5°C至32.5°C，較佳為至少5.5°C至32.5°C，較佳為至少6°C至32.5°C，較佳為至少6.5°C至32.5°C，較佳為至少7°C至32.5°C，較佳為至少7.5°C至32.5°C，較佳為至少8°C至32.5°C，較佳為至少8.5°C至32.5°C，較佳為至少9°C至32.5°C，較佳為至少9.5°C至32.5°C，較佳為至少10°C至32.5°C，更佳為2°C至22.5°C，更佳為至少2.5°C至22.5°C，更佳為至少3°C至22.5°C，更佳為至少3.5°C至22.5°C，更佳為至少4°C至22.5°C，更佳為至少4.5°C至22.5°C，更佳為至少5°C至22.5°C，更佳為至少5.5°C至22.5°C，更佳為至少6°C至22.5°C，更佳為至少6.5°C至22.5°C，更佳為至少7°C至22.5°C，更佳為至少7.5°C至22.5°C，更佳為至少8°C至22.5°C，更佳為至少8.5°C至22.5°C，更佳為至少9°C至22.5°C，更佳為至少9.5°C至22.5°C，更佳為至少10°C至22.5°C，甚至更佳為2°C至17.5°C，甚至更佳為至少2.5°C至17.5°C，甚至更佳為至少3°C至17.5°C，甚至

更佳為至少3.5°C至17.5°C，甚至更佳為至少4°C至17.5°C，甚至更佳為至少4.5°C至17.5°C，甚至更佳為至少5°C至17.5°C，甚至更佳為至少5.5°C至17.5°C，甚至更佳為至少6°C至17.5°C，甚至更佳為至少6.5°C至17.5°C，甚至更佳為至少7°C至17.5°C，甚至更佳為至少7.5°C至17.5°C，甚至更佳為至少8°C至17.5°C，甚至更佳為至少8.5°C至17.5°C，甚至更佳為至少9°C至17.5°C，甚至更佳為至少9.5°C至17.5°C，甚至更佳為至少10°C至17.5°C，更佳為2°C至12.5°C，甚至更佳為至少2.5°C至12.5°C，甚至更佳為至少3°C至12.5°C，甚至更佳為至少3.5°C至12.5°C，甚至更佳為至少4°C至12.5°C，甚至更佳為至少4.5°C至12.5°C，甚至更佳為至少5°C至12.5°C，甚至更佳為至少5.5°C至12.5°C，甚至更佳為至少6°C至12.5°C，甚至更佳為至少6.5°C至12.5°C，甚至更佳為至少7°C至12.5°C，甚至更佳為至少7.5°C至12.5°C，甚至更佳為至少8°C至12.5°C，甚至更佳為至少8.5°C至12.5°C，甚至更佳為至少9°C至12.5°C，甚至更佳為至少9.5°C至12.5°C，甚至更佳為至少10°C至12.5°C，且最佳為至少4°C至9°C；及/或

iii) 改進的製程穩定性，其特徵在於45°C下半衰期延長

i) 至少3倍至216倍或更多，較佳為至少24倍至216倍或更多，較佳為至少39倍至216倍或更多，較佳為至少48倍至216倍或更多，較佳為至少96倍至216倍或更多，較佳為至少132倍至216倍或更多，更佳為至少216倍或更多倍，最佳為216倍；

ii) 至少24倍至216倍或更多，較佳為至少39倍至216倍或更多，較佳為至少48倍至216倍或更多，較佳為至少96倍至216倍或更多，較佳為至少132倍至216倍或更多，更佳為至少216倍或更多，最佳為216倍；

iii) 至少96倍至216倍或更多，較佳為至少132倍至216倍或更多，更佳為至少216倍或更多，最佳為216倍。

【0175】 更具體地，於第二方面，其也是第二方面的第一個體實施例，透過包含一胺基酸序列的一多胜肽，較佳為海藻糖磷酸化酶，解決了這些及其它問題，其中該多胜肽，較佳海藻糖磷酸化酶，的該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少80%同一性及/或至少80%同源性，其中該多胜肽，較佳海藻糖磷酸化酶，具有特徵(A)、(B)、(C)、(D)與(E)中的至少一個或其任何組合，其中特徵(A)為於52°C作用15分鐘後的熱穩定性，其由一介於以下範圍之間的殘留活性所定義

i) 30%至90%，較佳為39%至90%，更佳為42%至90%，更佳為54%至90%，更佳為55%至90%，甚至更佳為63% %至90%，甚至更佳為64%至90%，甚至更佳為68%至90%，最佳為64%至86%，及/或

ii) 30%至90%，較佳為31%至90%，較佳為32%至90%，較佳為33%至90%，較佳為34%至90%，較佳為35%至90%，較佳為36%至90%，較佳為37%至90%，較佳為38%至90%，較佳為39%至90%，更佳為40%至90%，更佳為41%至90% ，較佳為42%至90%，更佳為43%至90%，更佳為44%至90%，更佳為45%至90%，更佳為46%至90%，更佳為47%至90%，更佳為48%至90%，更佳為49%至90%，甚至更佳為50%至90%，甚至更佳為51%至90%，甚至更佳為52%至90% ，甚至更佳為53%至90%，甚至更佳為54%至90%，甚至更佳為55%至90%，甚至更佳為60%至90%，甚至更佳為61%至90%，甚至更佳為65%至90%，甚至更佳為70%至90%，甚至更佳為75%至90%，最佳為72%至81%，及/或

iii) 55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100%，較佳為78%至100%，較佳為79%至100%，更佳為80%至100%，更佳為81%至100%，更佳為82%至100%，更佳為83%至100% ，更佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，更佳為89%至100%，甚至更佳為90%至

100%，甚至更佳為91%至100%，甚至更佳為92%至100%，甚至更佳為93%至100%，甚至更佳為94%至100%，甚至更佳為95%至100%，甚至更佳為96%至100%，甚至更佳為97%至100%，甚至更佳為98%至100%，尤其較佳為99%至100%，最佳為100%，以及

其中特徵(B)為於52°C作用15分鐘後的熱穩定性，其特徵在於

i) 至少52°C的Tm30值，及/或

ii) 至少52°C的Tm50值，

以及

特徵(C)為以以下為特徵的熱穩定性

i) 介於以下溫度之間的Tm30值：52°C至90°C，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C 80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，較佳為58°C至80°C，較佳為58.5°C至80°C，甚至更佳為52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，甚至更佳為53.5°C至70°C，甚至更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56°C至70°C，更佳為56.5°C至70°C，甚至更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為58°C至70°C，甚至更佳為58.5°C至70°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至65°C，甚至更佳為53°C至65°C，甚至更佳為53.5°C至65°C，甚至更佳為54°C至65°C，甚至更佳為54.5°C至65°C，甚至更佳為55°C至65°C，甚至更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳為56°C至65°C ，甚至更佳為5°C至65°C，甚至更佳為57°C至65°C，甚至更佳為57.5°C至65°C，甚至更佳為58°C至65°C，甚至更佳為58.5°C至65°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至60°C，甚至更佳為53°C

至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C至60°C，甚至更佳為54.5°C至60°C，甚至更加為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至60°C，甚至更佳為56.5°C至60°C，甚至更佳為57°C至60°C，甚至更佳為57.5°C至60°C之間，甚至更佳為58°C至60°C，甚至更佳為58.5°C至60°C，最佳為53.5°C至58.5°C，及/或

i) 介於以下溫度之間的Tm50值：52°C至90°C，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為在54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C至80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，甚至更佳為52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，甚至更佳為53.5°C至70°C，更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更加更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56°C至70°C，甚至更佳為56.5°至70°C，更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為52°C至65°C，甚至更佳為60°C至70°C，較佳為52.5°C至65°C，甚至更佳為53°C至55°C，甚至更佳為53.5°C至65°C，更加較佳為54°C至65°C，甚至更佳為在54.5°C至65°C，甚至更佳為55°C至65°C，甚至更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳為56.5°C至65°C，甚至更佳為57°C至65°C，甚至更佳為57.5°C至65°C，甚至更佳為52°C至65°C，更佳為52.5°C至60°C，甚至更佳為53°C至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C至60°C，甚至更佳為54.5°C至60°C，甚至更佳為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至60°C，甚至更佳為56.5°C至60°C，甚至更佳為57°C至60°C，甚至更佳為57.5°C至60°C，最佳為52°C至57.5°C；

以及

特徵(D)為以以下為特徵的熱穩定性

i) 一*製程穩定性*，其特徵在於45°C的半衰期為3小時至9天或更多，較佳為24小時至9天或更多，較佳為39小時至9天或更多，較佳為2天至9天或更多，更佳為4天至9天或更多，更佳為5.5天至9天或更多，更佳為至少7天至9天或更多，再更佳為至少9天或更多，且最佳為9天；

ii) 一*製程穩定性*，其特徵在於45°C的半衰期為24小時至9天或更多，更佳為39小時至9天或更多，更佳為2天至9天或更多，更佳為4天至9天或更多，更佳為5.5天至9天或更多，更佳為7天至9天或更多，甚至更佳為至少9天或更多，且最佳為9天；

iii) 一*製程穩定性*，其特徵在於45°C的半衰期為4天至9天或更多，較佳為5.5天至9天或更多，更佳為7天至9天或更多，甚至更佳為至少9天或更多，且最佳為9天；以及

其中特徵(E)為相對活性，表示為介於以下數值之間的100/500-比率，

(i) 0.65至1.0，較佳為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0，且更佳為至少0.7至1.0；

(ii) 0.65至1.0，較佳為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0，更佳為0.8至1.0之間；其中100/500比率被定義為

[100 mM葡萄糖與100 mM α-葡萄糖-1磷酸鹽的海藻糖活性] /

[500 mM葡萄糖與100 mM α-葡萄糖-1-磷酸鹽的海藻糖活性] 的比率。

【0176】 於第二方面之第二具體實施例中，其也是該第二方面之第一具體實施例的一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，於52°C作用15分鐘後具有熱穩定性，該熱穩定性係由一介於以下百分比之間的殘餘活性所定義：為30%至90%，較佳為39%至90%，更佳為42%至90%，更佳為54%至90%，更佳為55%至90%，且甚至更佳為63%至90%，甚至較佳為64%至90%，甚至較佳為

68%至90%，最佳為64%至86%，及/或

30%至90%，較佳為31%至90%，較佳為32%至90%，較佳為33%至90%，較佳為34%至90%，較佳為35%至90%，較佳為36 %至90%，較佳為37%至90%，較佳為38%至90%，較佳為39%至90%，更佳為40%至90%，更佳為41%至90%，更佳為42%至90%，更佳為43%至90%，更佳為44%至90%，更佳為45%至90%，更佳為46%至90%，更佳為47%至90% ，更佳為48%至90%，更佳為49%至90%，甚至更佳為50%至90%，甚至更佳為51%至90%，甚至更佳為52%至90%，甚至更佳為更佳為53%至90%，甚至較佳為54%至90%，甚至較佳為55%至90%，甚至較佳為60%至90%，甚至較佳為61%至90%，更佳為65%至90%，甚至更佳為70%至90%，甚至更佳為75%至90%，最佳為72%至81%，及/或

55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100%，較佳為78%至100%，較佳為80%至100%，更佳為79%至100%，更佳為80%至100%，更佳為81%至100%，更佳為82%至100%，更佳為83%至100%，較佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，更佳為89%至100%，甚至較佳為90%至100%，甚至較佳為91%至100%，甚至較佳為92%至100%，甚至較佳為93%至100%，甚至較佳為94%至100% ，甚至較佳為95%至100%，甚至較佳為96%至100%，甚至較佳為97%至100%，甚至較佳為98%至100%，甚至較佳為99%至100%，最佳為100%。

【0177】 於第二方面之第三具體實施例中，其也是第二個方面的第一及第二具體實施例一之具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有熱穩定性，其特徵在於至少52°C的Tm30值。

【0178】 於第二方面之第四具體實施例中，其也是第二個方面的第一、第二及第三具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，

於45°C下的半衰期為3小時至9天或更多，較佳為24小時至9天或更多，較佳為39小時至9天或更多，較佳為2天至9天或更多，更佳為4天至9天或更多，更佳為5.5天至9天或更多，更佳為7天至9天或更多，甚至更佳為至少9天或更多，最佳為9天。

【0179】 於第二方面之第五具體實施例中，其也是第二個方面的第一、第二、第三及第四具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有以100/500-比率表示之相對活性，該100/500-比率介於0.65至1.0之間，較佳為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0，更佳為0.7至1.0。

【0180】 於第二方面之第六具體實施例中，其也是第二個方面的第一、第二、第三、第四及第五具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，係定義如在該第一方面之第二十六、第二十七、第二十八、第二十九、第三十、第三十三、第三十四、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十五、第六十七、第六十八、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十四、第八十八、第八十九、第九十二、第九十九、第一百及第一百零二具體實施例中的任何一個所述，較佳定義如在該第一方面之第二十六、第二十七、第二十八、第二十九、第三十、第三十三、第三十四、第五十五、第六十七、第六十八、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十一、第八十四、第八十八、第八十九、第九十二、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0181】 於第二方面之第七具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五及第六具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，於52°C作用15分鐘後具有以殘餘活性所定義之熱穩定

性，該殘餘活性為

30%至90%，較佳為31%至90%，較佳為32%至90%，較佳為33%至90%，較佳為34%至90%，較佳為35%至90%，較佳為36%至90%，較佳為37%至90%，較佳為38%至90%，較佳為39%至90%，更佳為40%至90%，更佳為41%至90%，更佳為42%至90%，更佳為43%至90%，更佳為44%至90%，更佳為45%至90%，更佳為46%至90%，更佳為47%至90%，更佳為48%至90%，更佳為49%至90%，甚至更佳為50%至90%，甚至更佳為51%至90%，甚至更佳為52%至90%，甚至更佳為更佳為53%至90%，甚至更佳為54%至90%，甚至更佳為55%至90%，甚至更佳為60%至90%，甚至更佳為61%至90%，更佳為65%至90%，甚至更佳為70%至90%，甚至更佳為75%至90%，最佳為72%至81%；及/或

55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100%，較佳為78%至100%，更佳為79%至100%，更佳為80%至100%，更佳為81%至100%，更佳為82%至100%，更佳為83%至100%，較佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，更佳為89%至100%，甚至更佳為90%至100%，甚至更佳為91%至100%，甚至更佳為92%至100%，甚至更佳為93%至100%，甚至更佳為94%至100%，甚至更佳為95%至100%，甚至更佳為96%至100%，甚至更佳為97%至100%，甚至更佳為98%至100%，甚至更佳為99%至100%，最佳為100%；

且其中該海藻糖磷酸化酶係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八

十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0182】 於第二方面之第八具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六及第七具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有以至少為52°C的Tm30值及/或至少為52°C的Tm50值為特徵的熱穩定性；且其中該海藻糖磷酸化酶係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0183】 於第二方面之第九具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七及第八具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有於45°C下之半衰期1天至9天或更多，更佳為2天至9天或更多，更佳為4天至9天或更多，更佳為5.5天至9天或更多，更

佳為7天至9天或更多，甚至更佳為9天或更多，最佳為9天；且其中該多胜肽，較佳海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0184】 於第二方面之第十具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八及第九具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有以100/500-比率表示之相對活性，該100/500-比率介於0.65至1.0之間，較佳為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0，更佳為0.7至1.0，且其中該海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十七、第

二十八、第二十九、第三十一、第三十五、第三十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0185】 於第二方面之第十一具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八、第九及第十具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，於52°C作用15分鐘後具有以一殘餘活性定義之熱穩定性，該殘餘活性為55%至100%，較佳為60%至100%，較佳為70%至100%，較佳為75%至100%，較佳為76%至100%，較佳為77%至100%，較佳為78%至100%，較佳為79%至100%，更佳為80%至100%，更佳為81%至100%，更佳為82%至100% ，較佳為83%至100%，更佳為84%至100%，更佳為85%至100%，更佳為86%至100%，更佳為87%至100%，更佳為88%至100%，更佳為89%至100%，甚至更佳為90%至100%，甚至更佳為91%至100%，甚至更佳為92%至100%，更佳為93%至100%，甚至更佳為94%至100%，甚至更佳為95%至100%，甚至更佳為96%至100%，甚至更佳為97%至100%，更佳為98%至100%，甚至更佳為99%至100%，最佳為100%；且其中該海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十

九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0186】 於第二方面之第十二具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八、第九、第十及第十一具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有以至少為52°C的Tm30值及/或至少為52°C的Tm50值為特徵的熱穩定性，且其較佳為特徵在於至少52°C的Tm30值與至少52°C的Tm50值；且其中該海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0187】 於第二方面之第十三具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一及第十二具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有熱

穩定性，其特徵在於

i) 一Tm30值，介於52°C至90°C之間，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C至80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，較佳為58°C至80°C，較佳為58.5°C至80°C，甚至更佳為52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，甚至更佳為53.5°C至70°C，更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56.5°C至70°C，甚至更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為58°C至70°C，甚至更佳為58.5°C至70°C，甚至更佳為52°C至65°C，更佳為52.5°C至65°C，甚至更佳為53°C至65°C，甚至更佳為53.5°C至65°C，甚至更佳為54°C至65°C，甚至更佳為54.5°C至65°C，甚至更佳為55°C至65°C，更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳為56.5°C至65°C，甚至更佳為57°C至65°C，甚至更佳為57.5°C至65°C，甚至更佳為58°C至65°C，甚至更佳為58.5°C至65°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至60°C，甚至更佳為53°C至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C至60°C，甚至更佳為54.5°C至60°C，甚至更佳為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至65°C，更佳為56.5°C至60°C，甚至更佳為57°C至60°C，甚至更佳為57.5°C至60°C，甚至更佳為58°C至60°C，甚至更佳為58.5°C至60°C，最佳為53.5°C至58.5°C，及/或

ii) 一Tm50值，介於52°C至90°C之間，較佳為52°C至80°C，較佳為52.5°C至80°C，較佳為53°C至80°C，較佳為53.5°C至80°C，更佳為54°C至80°C，較佳為54.5°C至80°C，甚至更佳為55°C至80°C，較佳為55.5°C至80°C，較佳為56°C至80°C，較佳為56.5°C至80°C，較佳為57°C至80°C，較佳為57.5°C至80°C，甚至更佳為

52°C至70°C，甚至更佳為52.5°C至70°C，甚至更佳為53°C至70°C，甚至更佳為53.5°C至70°C，甚至更佳為54°C至70°C，甚至更佳為54.5°C至70°C，甚至更佳為55°C至70°C，甚至更佳為55.5°C至70°C，甚至更佳為56°C至70°C，甚至更佳為56.5°C至70°C，甚至更佳為57°C至70°C，甚至更佳為57.5°C至70°C，甚至更佳為52°C至65°C，甚至更佳為52.5°C至65°C，更佳為53°C至65°C，甚至更佳為53.5°C至65°C，甚至更佳為54°C至65°C，甚至更佳為55°C至65°C，甚至更佳為55.5°C至65°C，甚至更佳為56°C至65°C，甚至更佳為56.5°C至65°C，甚至更佳為57°C至65°C，甚至更佳為57.5°C至65°C，甚至更佳為52°C至60°C，甚至更佳為52.5°C至60°C，甚至更佳為53°C至60°C，甚至更佳為53.5°C至60°C，甚至更佳為54°C至60°C，甚至更佳為54.5°C至60°C，甚至更佳為55°C至60°C，甚至更佳為55.5°C至60°C，甚至更佳為56°C至60°C，甚至更佳為56.5°C至60°C，更佳為57°C至60°C，甚至更佳為57.5°C至60°C，且最佳為52°C至57.5°C；且其中該海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0188】 於第二方面之第十四具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二及第十三具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有於45°C下半衰期為4天至9天或更多，較佳為5.5天至9天或更多，更佳為7天至9天或更多，甚至更佳為9天或更多，且最佳為9天；且其中該多胜肽，較佳為海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0189】 於第二方面之第十五具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三及第十四具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，具有以*100/500-比率*表示之相對活性，該100/500-比率介於0.65至1.0之間，較佳為0.7至1.0，較佳為0.75至1.0，較佳為0.8至1.0，較佳為0.85至1.0，較佳為0.9至1.0，較佳為0.95至1.0，更佳為0.8至1.0；且其中該海藻糖磷酸化酶，

係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0190】 於第二方面之第十六具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五及第六具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，相較於SEQ ID NO: 1的海藻糖磷酸化酶，其熱穩定性增加，由此熱穩定性增加為

i) 該*Tm30值*增加至少2°C至40.5°C，較佳為2°C至30.5°C，較佳為至少2.5°C至30.5°C，較佳為至少3°C至30.5°C，較佳為至少3.5°C至30.5°C，較佳為至少4°C至30.5°C，較佳為至少4.5°C至30.5°C，較佳為至少5°C至30.5°C，較佳為至少5.5°C至30.5°C，較佳為至少6°C至30.5°C，較佳為至少6.5°C至30.5°C，較佳為至少7°C至30.5°C，較佳為至少7.5°C至30.5°C，較佳為至少8°C至30.5°C，較佳為至少8.5°C至30.5°C，較佳為至少9°C至30.5°C，更佳為2°C至20.5°C，更佳為至少2.5°C至20.5°C，更佳為至少3°C至20.5°C，更佳為至少3.5°C至20.5°C，更佳為至少4°C至20.5°C，更佳為至少4.5°C至20.5°C，更佳為至少5°C至20.5°C，更佳為至少5.5°C

至20.5°C，更佳為至少6°C至20.5°C，更佳為至少6.5°C至20.5°C，更佳為至少7°C至20.5°C，更佳為至少7.5°C至20.5°C，更佳為至少8°C至20.5°C，更佳為至少8.5°C至20.5°C，更佳為至少9°C至20.5°C，甚至更佳為2°C至15.5°C，甚至更佳為至少2.5°C至15.5°C，甚至更佳為至少3°C至15.5°C，甚至更佳為至少3.5°C至15.5°C，甚至更佳為至少4°C至15.5°C，甚至更佳為至少4.5°C至15.5°C，甚至更佳為至少5°C至15.5°C，甚至更佳為至少5.5°C至15.5°C，甚至更佳為至少5°C至15.5°C，較佳為至少6°C至15.5°C，甚至更佳為至少6.5°C至15.5°C，甚至更佳為至少7°C至15.5°C，甚至更佳為至少7.5°C至15.5°C，甚至更佳為至少8°C至15.5°C，甚至更佳為至少8.5°C至15.5°C，甚至更佳為至少9°C至15.5°C，甚至更佳為2°C至10.5°C，甚至更佳為至少2.5°C至10.5°C，甚至更佳為至少3°C至10.5°C，甚至更佳為至少3.5°C至10.5°C，甚至更佳為至少4°C至10.5°C，甚至更佳為至少4.5°C至10.5°C，甚至更佳為至少5°C至10.5°C，甚至更佳為至少5.5°C至10.5°C，甚至更佳為至少6°C至10.5°C，甚至更佳為至少6.5°C至10.5°C，甚至更佳為至少7°C至10.5°C，甚至更佳為至少7.5°C至10.5°C，甚至更佳為至少7.5°C至最高10.5°C，更佳為至少8°C至10.5°C，甚至更佳為至少8.5°C至10.5°C，甚至更佳為至少9°C至10.5°C，最佳為至少4°C至9°C；

ii) 該*Tm50值*增加至少2°C至42.5°C，較佳為2°C至32.5°C，較佳為至少2.5°C至32.5°C，較佳為至少3°C至32.5°C，較佳為至少3.5°C至32.5°C，較佳為至少4°C至32.5°C，較佳為至少4.5°C至32.5°C，較佳為至少5°C至32.5°C，較佳為至少5.5°C至32.5°C，較佳為至少6°C至32.5°C，較佳為至少6.5°C至32.5°C，較佳為至少7°C至32.5°C，較佳為至少7.5°C至32.5°C，較佳為至少8°C至32.5°C，較佳為至少8.5°C至32.5°C，較佳為至少9°C至32.5°C，較佳為至少9.5°C至32.5°C，較佳為至少10°C至32.5°C，更佳為2°C至22.5°C，更佳為至少2.5°C至22.5°C，更佳為至少3°C至22.5°C，更佳為至少3.5°C至22.5°C，更佳為至少4°C至22.5°C，更佳為至少4.5°C

至22.5°C，更佳為至少5°C至22.5°C，更佳為至少5.5°C至22.5°C，更佳為至少6°C至22.5°C，更佳為至少6.5°C至22.5°C，更佳為至少7°C至22.5°C，更佳為至少7.5°C至22.5°C，更佳為至少8°C至22.5°C，更佳為至少8.5°C至22.5°C，更佳為至少9°C至22.5°C，更佳為至少9.5°C至22.5°C，更佳為至少10°C至22.5°C，甚至更佳為2°C至17.5°C，甚至更佳為至少2.5°C至17.5°C，甚至更佳為至少3°C至17.5°C，甚至更佳為至少3.5°C至17.5°C，甚至更佳為至少4°C至17.5°C，甚至更佳為至少4.5°C至17.5°C，甚至更佳為至少5°C至17.5°C，甚至更佳為5.5°C至17.5°C，甚至更佳為6°C至17.5°C，甚至更佳為6.5°C至17.5°C，甚至更佳為至少7°C至17.5°C，甚至更佳為至少7.5°C至17.5°C，甚至更佳為至少8°C至17.5°C，甚至更佳為至少8.5°C至17.5°C，甚至更佳為至少9°C至17.5°C，甚至更佳為至少9.5°C至17.5°C，甚至更佳為至少10°C至17.5°C，甚至更佳為2°C至12.5°C，甚至更佳為2.5°C至12.5°C，甚至更佳為3°C至12.5°C，甚至更佳為至少3.5°C至12.5°C，甚至更佳為至少4°C至12.5°C，甚至更佳為至少4.5°C至12.5°C，甚至更佳為至少5°C至12.5°C，甚至更佳為至少5.5°C至12.5°C，甚至更佳為至少6°C至12.5°C，甚至更佳為至少6.5°C至12.5°C，甚至更佳為至少7°C至12.5°C，甚至更佳為至少7.5°C至12.5°C，甚至更佳為至少8°C至12.5°C，甚至更佳為至少8.5°C至12.5°C，甚至更佳為至少9°C至12.5°C，甚至更佳為至少9.5°C至12.5°C，甚至更佳為至少10°C至12.5°C，最佳為至少4°C至9°C；

iii) 改進的*製程穩定性*，其特徵在於45°C下半衰期延長

i) 至少3倍至216倍或更多，較佳為至少24倍至216倍或更多，較佳為至少39倍至216倍或更多，較佳為至少48倍至216倍或更多，較佳為至少96倍至216倍或更多，較佳為至少132倍至216倍或更多，甚至更佳為至少216倍或更多，最佳為216倍；

ii) 至少24倍至216倍或更多，較佳為至少39倍至216倍或更多，較佳為至少

48倍至216倍或更多，較佳為至少96疊至216倍或更多，較佳為至少132倍至216倍或更多，甚至更佳為至少216倍或更多，最佳為216倍；

iii) 至少96倍至216倍或更多，較佳為至少132倍至216倍或更多，甚至更佳為至少216倍或更多，最佳為216倍。

【0191】 於第二方面之第十七具體實施例中，其也是第二個方面的第十六具體實施例之一具體實施例，該多胜肽，較佳為該海藻糖磷酸化酶，係為一多胜肽，較佳為一海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十七、第二十八、第二十九、第三十一、第三十五、第三十六、第五十七、第六十九、第七十、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十、第九十三、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0192】 於第二方面之第十八具體實施例中，其也是第二個方面的第十六具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，係為一多胜肽，較佳為一海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、

第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述。

【0193】 於第二方面之第十九具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七及第十八具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，係為一多胜肽，較佳為一海藻糖磷酸化酶，係定義如在該第一方面之第一至第一百二十具體實施例或其任何其他具體實施例之任何一個所述，較佳為如該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第四十一、第四十二、第四十三、第四十四、第四十五、第四十六、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，更佳定義如在該第一方面之第二十八、第二十九、第三十二、第三十七、第三十八、第三十九、第四十、第五十九、第六十、第六十一、第六十二、第七十一、第七十二、第七十三、第七十四、第七十五、第七十六、第七十七、第七十八、第七十九、第八十、第八十二、第八十四、第八十八、第九十一、第九十四、第九十九、第一百及第一百零二具體實施例中的任何一個所述，其

中該多胜肽，較佳為該海藻糖磷酸化酶，能夠催化葡糖基單醣與α-D-葡萄糖-1磷酸鹽的反應。

【0194】 於第二方面之第二十具體實施例中，其也是第二個方面的第十九具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，能夠催化

葡萄糖與α-D-葡萄糖-1磷酸鹽轉化為海藻糖與無機磷酸鹽

及/或

海藻糖與無機磷酸鹽轉化為葡萄糖與α-D-葡萄糖-1磷酸鹽。

【0195】 於第二方面之第二十一具體實施例中，其也是第二個方面的第十九及第二十具體實施例之一具體實施例，該轉化為可逆之轉化。

【0196】 於第二方面之第二十二具體實施例中，其也是第二個方面的第一、第二、第三、第四、第五、第六、第七、第八、第九、第十、第十一、第十二、第十三、第十四、第十五、第十六、第十七、第十八、第十九、第二十及第二十一具體實施例之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，係根據EC號為EC 2.4.1.231之海藻糖磷酸化酶。

【0197】 更具體地，於第三方面，其也是第三方面之第一具體實施例，透過一熱穩定之海藻糖磷酸化酶變體解決了這些與其它問題，其中該變體在含有1M蔗糖的緩衝液中於52°C作用15分鐘後保留其初始活性的至少30%，且該初始活性係於室溫下作用15分鐘後所測定。

【0198】 於第三方面之第二具體實施例中，其也是第三個方面的第一具體實施例之一具體實施例，該變體在含有1 M蔗糖的緩衝液中於52°C下作用15分鐘後保留其初始活性的至少50%，且該初始活性係在室溫下作用15分鐘後測定。

【0199】 更具體地，於第四方面，其也是第四方面之第一具體實施例，透過一海藻糖磷酸化酶的熱穩定變體來解決這些及其它問題，該變體係衍生自屬

於擔子菌門(Basidomycota)的一生物體，較佳來自屬於傘菌綱(Agaricomycetes)的一生物體，且更佳來自屬於由裂褶菌屬(Schizophyllum)、側耳屬(Pleurotus)、奇果菌屬(Grifola)、蘑菇屬(Agaricus)、栓菌屬(Trametes)、革蓋菌屬(Coriolus)、栓菌屬(Trametes)、附毛菌屬(Trichaptum)，以及摺孔菌屬(Lenzites)所組成之群組的屬的一生物體，且最佳來自裂褶菌(*Schizophyllum commune*)，或來自舞菇(*Grifola frondosa*)的一生物體，其中該變體於52°C作用15分鐘後具有至少30%的殘餘活性，且其初始活性係在室溫作用15分鐘後測定。

【0200】 於本發明第四方面之第一具體實施例之一較佳具體實施例中，該海藻糖磷酸化酶的熱穩定變體於52°C作用15分鐘後具有至少30%的殘餘活性，其中初始活性係在室溫作用15分鐘後測定，且其中該海藻糖磷酸化酶係為一來自裂褶菌之海藻糖磷酸化酶的變體。

【0201】 於本發明第四方面之第一具體實施例之另一較佳具體實施例中，該海藻糖磷酸化酶的熱穩定變體於52°C作用15分鐘後具有至少30%的殘餘活性，且其中該初始活性係在室溫作用15分鐘後測定，且其中該海藻糖磷酸化酶係為一來自舞菇之海藻糖磷酸化酶的變體。

【0202】 更具體而言，於一第十四方面，其也是該第十四個方面之第一具體實施例，透過一包含一胺基酸序列的多胜肽來解決這些及其它問題，該多胜肽較佳為一海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸序列具有至少85%同一性及/或至少86%同源性，其中該海藻糖磷酸化酶的胺基酸序列在一個或多個胺基酸位置處包含一胺基酸取代，其中該一個或多個胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108、112、221、300、319、345、379、483、544、550、558、584、643，以及707，且其較佳係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳

SEQ ID NO: 160，的胺基酸位置所組成之群組：108、112、221、300、319、379、483、544、550，以及558，且其更佳係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108、221、319、379、483、550，以及558。

【0203】 於該第十四方面之第二具體實施例，其也是該第十四個方面之第一具體實施例之一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 160的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、F345、P379、V483、V544、S550、Q558、N584、A643，以及L707，其較佳係選自由下列SEQ ID NO: 160的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、P379、V483、V544、S550，以及Q558，且其更加係選自由下列SEQ ID NO: 160的胺基酸位置所組成之群組：L108、V221、T319、P379、V483、S550，以及Q558。

【0204】 於該第十四方面之第三具體實施例，其也是該第十四個方面之第一具體實施例之一具體實施例，該一個或多個胺基酸位置係選自由下列SEQ ID NO: 81的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、F345、P379、I483、V544、S550、Q558、N584、A643，以及L707，其較佳係選自由下列SEQ ID NO: 81的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、P379、I483、V544、S550，以及Q558，且其更加係選自由下列SEQ ID NO: 81的胺基酸位置所組成之群組：L108、V221、T319、P379、I483、S550，以及558。

【0205】 於該第十四方面之第四具體實施例，其也是該第十四個方面之任何其他具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個胺基酸位置處包含一胺基酸取代，其中該一個或多個胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所

組成之群組：108、112、221、300、319、345、379、483、544、550、558、584、643，以及707。如在本發明的上下文中令人驚訝地發現的，一個或多個這些位置的突變增加了該酶的熱穩定性，導致於52.5°C作用15分鐘後的殘餘活性至少為12%，與由SEQ ID NO: 160的野生型胺基酸序列編碼的海藻糖磷酸化酶的9%殘餘活性相比。

【0206】 於該第十四方面之第五具體實施例，其也是該第十四個方面之任何其他具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個胺基酸位置處包含一胺基酸取代，其中該一個或多個胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108、112、221、300、319、379、483、544、550，以及558。如在本發明的上下文中令人驚訝地發現的，一個或多個這些位置的突變增加了該酶的熱穩定性，導致於52.5°C作用15分鐘後的殘餘活性至少為30%，與由SEQ ID NO: 160的野生型胺基酸序列編碼的海藻糖磷酸化酶的9%殘餘活性相比。

【0207】 於該第十四方面之第六具體實施例，其也是該第十四個方面之第一具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列在一個或多個胺基酸位置處包含一胺基酸取代，其中該一個或多個胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108、221、319、379、483、550，以及558。如在本發明的上下文中令人驚訝地發現的，一個或多個這些位置的突變增加了該酶的熱穩定性，導致於52.5°C作用15分鐘後的殘餘活性至少為50%，與由SEQ ID NO: 160的野生型胺基酸序列編碼的海藻糖磷酸化酶的9%殘餘活性相比。

【0208】 於該第十四方面之第七具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含一胺基酸序列，其係根據SEQ ID NO: 161、162、163、164、165、166、167、168、

169、170、171、172、173、174、175、176、177、178、179、180、181、182、183、184、185、186、187、188，以及189的任一個，較佳為根據SEQ ID NO: 163、165、166、168、171、173、176、177、178、179、180、184、185、186、187、188，以及189的任一個，更佳為根據SEQ ID NO: 176、178、180、185，以及188的任一個。

【0209】 於該第十四方面之第八具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該海藻糖磷酸化酶的胺基酸序列係由一胺基酸序列組成，其係根據SEQ ID NO: 161、162、163、164、165、166、167、168、169、170、171、172、173、174、175、176、177、178、179、180、181、182、183、184、185、186、187、188，以及189的任一個，較佳為根據SEQ ID NO: 163、165、166、168、171、173、176、177、178、179、180、184、185、186、187、188，以及189的任一個，更佳為根據SEQ ID NO: 176、178、180、185，以及188的任一個。

【0210】 於該第十四方面之第九具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該一個或多個胺基酸位置為二個或更多個胺基酸位置。

【0211】 於該第十四方面之第十具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該一個或多個胺基酸位置為三個或更多個胺基酸位置。

【0212】 於該第十四方面之第十一具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該一個或多個胺基酸位置為四個或更多個胺基酸位置。

【0213】 於該第十四方面之第十二具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該二個或更多個胺基酸位置包含一二

個胺基酸對位置，其中該二個胺基酸對位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108與112、108與221、108與300、108與319、108與345、108與379、108與483、108與544、108與550、108與558、108與584、108與643、108與707、112與221、112與300、112與319、112與345、112與379、112與483、112與544、112與550、112與558、112與584、112與643、112與707、221與300、221與319、221與345、221與379、221與483、221與544、221與550、221與558、221與584、221與643、221與707、300與319、300與345、300與379、300與483、300與544、300與550、300與558、300與584、300與643、300與707、319與345、319與379、319與483、319與544、319與550、319與558、319與584、319與643、319與707、345與379、345與483、345與544、345與550、345與558、345與584、345與643、345與707、379與483、379與544、379與550、379與558、379與584、379與643、379與707、483與544、483與550、483與558、483與584、483與643、483與707、544與550、544與558、544與584、544與643、544與707、550與558、550與584、550與643、550與707、558與584、558與643、558與707、584與643、584與707，以及643與707，較佳為選自由下列胺基酸位置所組成之群組：L108與V112、L108與N221、L108與A300、L108與T319、L108與F345、L108與P379、L108與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、L108與V544、L108與S550、L108與Q558、L108與N584、L108與A643、L108與L707、V112與N221、V112與A300、V112與T319、V112與F345、V112與P379、V112與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、V112與V544、V112與S550、V112與Q558、V112與N584、V112與A643、V112與L707、N221與A300、N221與T319、N221與F345、N221與P379、N221與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、N221與V544、N221與S550、N221與Q558、N221與N584、N221與A643、N221與L707、A300與T319、

A300與F345、A300與P379、A300與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、A300與V544、A300與S550、A300與Q558、A300與N584、A300與A643、A300與L707、T319與F345、T319與P379、T319與SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、T319與V544、T319與S550、T319與Q558、T319與N584、T319與A643、T319與L707、F345與P379、F345與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、F345與V544、F345與S550、F345與Q558、F345與N584、F345與A643、F345與L707、P379與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、P379與V544、P379與S550、P379與Q558、P379與N584、P379與A643、P379與L707、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與V544、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與S550、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與Q558、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與N584、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與A643、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與L707、V544與S550、V544與Q558、V544與N584、V544與A643、V544與L707、S550與Q558、S550與N584、S550與A643、S550與L707、Q558與N584、Q558與A643、Q558與L707、N584與A643、N584與L707，以及A643與L707。

【0214】 於該第十四方面之第十三具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該二個胺基酸對位置係選自由下列胺基酸位置所組成之群組：L108與V112、L108與N221、L108與A300、L108與T319、L108與P379、L108與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、L108與V544、L108與S550、L108與Q558、V112與N221、V112與A300、V112與T319、V112與P379、V112與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、V112與V544、V112與S550、V112與Q558、N221與A300、N221與T319、N221與P379、N221與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、

N221與V544、N221與S550、N221與Q558、A300與T319、A300與P379、A300與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、A300與V544、A300與S550、A300與Q558、T319與P379、T319與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、T319與V544、T319與S550、T319與Q558、P379與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、P379與V544、P379與S550、P379與Q558、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與V544、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與S550、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與Q558、V544與S550、V544與Q558，以及S550與Q558。

【0215】 於該第十四方面之第十四具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，該二個胺基酸對位置係選自由下列胺基酸位置所組成之群組：L108與T319、L108與P379、L108與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、L108與S550、L108與Q558、N221與T319、N221與P379、N221與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、N221與V544、N221與S550、N221與Q558、T319與P379、T319與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、T319與V544、T319與S550、T319與Q558、P379與分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、P379與V544、P379與S550、P379與Q558、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與V544、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與S550、分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483與Q558，以及S550與Q558。

【0216】 於該第十四方面之第十五具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，除了在該二個胺基酸位置處的取代之外，該海藻糖磷酸化酶的胺基酸序列包含在至少一個或多個另外的胺基酸位置

處的一胺基酸取代，其中該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108、112、221、300、319、345、379、483、544、550、558、584、643，以及707，較佳為除了在該二個胺基酸位置處的取代之外，該海藻糖磷酸化酶的胺基酸序列包含在至少一個或多個另外的胺基酸位置處的一胺基酸取代，其中該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108、112、221、300、319、379、483、544、550，以及558，更佳為除了在該二個胺基酸位置處的取代之外，該海藻糖磷酸化酶的胺基酸序列包含在至少一個或多個另外的胺基酸位置處的一胺基酸取代，其中該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：108、221、319、379、483、550，以及558。

【0217】 於該第十四方面之第十六具體實施例，其也是該第十四個方面之另一具體實施例之一具體實施例，該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、F345、P379，分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、V544、S550、Q558、N584、A643，以及L707，較佳為除了在該二個胺基酸位置處的取代之外，該海藻糖磷酸化酶的胺基酸序列包含在至少一個或多個另外的胺基酸位置處的一胺基酸取代，其中該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、P379，分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、V544、S550，以及Q558，更佳為除了在該二個胺基酸位置處的取代之外，該海藻糖磷酸化酶的胺基酸序列包含在至少一個或多個另外的胺基酸位置處的一胺基酸取

代，其中該一個或多個另外的胺基酸位置係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸位置所組成之群組：L108、V221、T319、P379，分別為SEQ ID NO: 160的V483或SEQ ID NO: 81的I483、S550，以及Q558。

【0218】 於該第十四方面之第十七具體實施例，其也是該第十四個方面之前述的任何具體實施例之一具體實施例，在該胺基酸位置處的任何取代係選自由A、R、N、D、C、Q、E、G、H、I、L、K、M、F、P、S、T、W、Y，以及V所組成之群組，較佳為在該胺基酸位置上的任何取代係各別且獨立地選自由A、R、N、D、C、Q、E、G、H、I、L、K、M、F、P、S、T、W、Y，以及V所組成之群組。

【0219】 於該第十四方面之第十八具體實施例，其也是該第十四個方面之第十二具體實施例或該第十四方面之前述具體實施例的任何其他之一具體實施例，該取代係位於SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的以下任何一胺基酸位置：160 108、112、221、300、319、345、379、483、544、550、558、584、643，以及707。

【0220】 於該第十四方面之第十九具體實施例，其也是該第十四個方面之第十三具體實施例或該第十四方面之前述具體實施例的任何其他之一具體實施例，該取代係位於SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的以下任何一胺基酸位置：L108、V112、N221、A300、T319、F345、P379、V483、V544、S550、Q558、N584、A643，以及L707。

【0221】 於該第十四方面之第二十具體實施例，其也是該第十四個方面之前述具體實施例的任何其他之一具體實施例，該海藻糖磷酸化酶的胺基酸序列包含一個或多個取代，其中該取代選自由下列所組成之群組：

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第L108個位置處的一個胺基酸取代，該取代為L108A、L108G、L108I、L108M、L108P或L108V，

較佳為L108I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第V112個位置處的一個胺基酸取代，該取代為V112A、V112G、V112L、V112M、V112P或V112I，較佳為V112I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第N221個位置處的一個胺基酸取代，該取代為N221A、N221G、N221I、N221L、N221M、N221P或N221V，較佳為N221I、N221L、N221M或N221V，以及更佳為N221V；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第A300個位置處的一個胺基酸取代，該取代為A300G、A300I、A300L、A300M、A300P或A300V，較佳為A300I或A300L，以及更佳為A300I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第T319個位置處的一個胺基酸取代，該取代為T319A、T319G、T319I、T319L、T319M、T319P，或T319V，較佳為T319I或T319V，以及更佳為T319I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第P379個位置處的一個胺基酸取代，該取代為P379A、P379G、P379I、P379L、P379M、P379V、P379N、P379C、P379Q、P379S或P379T，較佳為P379A、P379G、P379M、P379V、P379N、P379C、P379Q、P379S或P379T、更佳為P379G、P379V、P379C或P379S，或P379T、even 更佳為P379V或P379T，以及最佳為P379V；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第I483個位置處的一個胺基酸取代，該取代為I483A、I483G、I483I、I483L、I483M、I483P或I483V，較佳為I483A、I483G、I483L、I483M或I483V、更佳為I483A；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第Q483個位置處的一個胺基酸取代，該取代為Q483A、Q483G、Q483I、Q483L、Q483M、Q483P或Q483V，較佳為Q483A、Q483G、Q483L、Q483M或Q483V、更佳為Q483A；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第V544個位置處的一個胺基酸取代，該取代為V544A、V544G、V544I、V544L、V544M或V544P，較佳為V544I或V544P，以及更佳為V544I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第S550個位置處的一個胺基酸取代，該取代為S550N、S550C、S550Q或S550T，較佳為S550T；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第Q558個位置處的一個胺基酸取代，該取代為Q558D或Q558E，較佳為Q558E；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第D558個位置處的一個胺基酸取代，該取代為D558N、D558C、D558Q、D558S、D558T、D558A、D558G、D558I、D558L、D558M、D558P或D558V，較佳為D558N、D558G或D558A，以及更佳為D558N；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第A643個位置處的一個胺基酸取代，該取代為A643D或A643E，較佳為A643E；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的第L707個位置處的一個胺基酸取代，該取代為L707A、L707G、L707I、L707M、L707P或L707V，較佳為L707M。

【0222】 於該第十四方面之第二十一具體實施例，其也是該第十四個方面之前述具體實施例的任何其他之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 81或SEQ ID NO: 160，較佳SEQ ID NO: 160，的胺基酸序列具有以下同一性：至少85%，還更佳為至少86%，或至少87%，或至少88%，或至少89%，或至少90%、甚至更佳為至少91%，或至少92%，或至少93%，或至少94%，或至少95%，以及最佳為至少96%，或至少97%，或至少98%，或至少99%、至少99.1%，或至少99.2%，或至少99.3%，或至少99.4%，或至少99.5%，或至少99.6%，或至少99.7%，或至少99.8%，以及尤其至少99.9%，或100%。

【0223】 於該第十四方面之第二十二具體實施例，其也是該第十四個方面之前述具體實施例的任何其他之一具體實施例，該海藻糖磷酸化酶的胺基酸序列與下列胺基酸序列具有至少85%同一性：SEQ ID NO: 161、162、163、164、165、166、167、168、169、170、171、172、173、174、175、176、177、178、179、180、181、182、183、184、185、186、187、188、189，較佳為根據SEQ ID NO: 163、165、166、168、171、173、176、177、178、179、180、184、185、186、187、188、189、2、84、85、87、88、89、91、92、93、94、95、97、98、99、100、101、102、103、104、105、106、107、109的任何之一，更佳為根據SEQ ID NO: 176、178、180、185、188的任何之一。

【0224】 於該第十四方面之第二十三具體實施例，其也是該第十四個方面之第十七具體實施例或該第十四方面之前述具體實施例的任何其他之一具體實施例，該胺基酸序列的同一性為至少86%，或至少87%，或至少88%，或至少89%，或至少90%、更佳為至少91%，或至少92%，或至少93%，或至少94%，或至少95%，以及最佳為至少96%，或至少97%，或至少98%，或至少99%、至少99.1%，或至少99.2%，或至少99.3%，或至少99.4%，或至少99.5%，或至少99.6%，或至少99.7%，或至少99.8%，以及尤其是至少99.9%，或100%。

【0225】 於該第十四方面之第二十四具體實施例，其也是該第十四個方面之前述具體實施例的任何其他之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，能夠催化一糖基單醣與α-D 葡萄糖-1磷酸鹽之反應。

【0226】 於該第十四方面之第二十五具體實施例，其也是該第十四個方面之第十九具體實施例之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶能夠催化

葡萄糖與α-D-葡萄糖-1磷酸鹽轉化為海藻糖與無機磷酸鹽

及/或

將海藻糖與無機磷酸鹽轉化為葡萄糖與α-D-葡萄糖-1磷酸鹽。

【0227】 於該第十四方面之第二十六具體實施例，其也是該第十四個方面之第十九及第二十具體實施例之一具體實施例，該轉化為一可逆之轉化。

【0228】 於該第十四方面之第二十七具體實施例，其也是該第十四個方面之前述具體實施例的任何其他之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，係一根據EC號為EC 2.4.1.231之海藻糖磷酸化酶。

【0229】 於該第十四方面之第二十八具體實施例，其也是該第十四個方面之前述具體實施例的任何其他之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，其特徵在於於52.5°C作用15分鐘後的熱穩定性，其係由一殘餘活性所定義，該殘餘活性為15%至100%，較佳為30%至100%，更佳為50%至100%，最佳為70%至100%。

【0230】 更具體而言，於第十五方面，其也是該第十五個方面之第一具體實施例，透過包含一胺基酸序列的多胜肽，較佳為海藻糖磷酸化酶，解決了這些及其他問題，其中該多胜肽，較佳為海藻糖磷酸化酶，的胺基酸序列與SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的胺基酸序列具有至少85%同一性及/或至少85%同源性，其中該多胜肽，較佳為海藻糖磷酸化酶，其特徵在於於52.5°C作用15分鐘後的熱穩定性，其係由一殘餘活性所定義，該殘餘活性為15%至100%，較佳為30%至100%，更佳為50%至100%，最佳為70%至100%。

【0231】 於該第十五方面之第二具體實施例，其也是該第十五個方面之第一具體實施例之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，係如該第十四方面之任一具體實施例所定義。

【0232】 於該第十五方面之第二具體實施例的一較佳具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，係如該第十四方面之任一具體實施例，較佳為第十四方面的第五個具體實施例所定義。

【0233】 於該第十五方面之第二具體實施例的一較佳具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，係如該第十四方面之任一具體實施例，較佳為第十四方面的第六個具體實施例所定義。

於該第十五方面的第三個具體實施例，其也是第十四及第十五個方面的任何其它具體實施例之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，的特徵在於於52.5°C作用15分鐘後的熱穩定性，其係由一殘餘活性所定義，該殘餘活性為30%至100%，較佳為50%至100%，最佳為70%至100%。

【0234】 於該第十五方面之第三具體實施例的一較佳具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，係如該第十四方面之任一具體實施例，較佳為第十四方面的第五個具體實施例所定義。

【0235】 於該第十五方面之第三具體實施例的一較佳具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，係如該第十四方面之任一具體實施例，較佳為第十四方面的第六個具體實施例所定義。

【0236】 於該第十五方面之第四具體實施例，其也是該第十四及第十五方面之任何其他的具體實施例之一具體實施例，其中該多胜肽，較佳為海藻糖磷酸化酶，其中該多胜肽，較佳為海藻糖磷酸化酶，能夠催化一葡糖基單醣與α-D-葡萄糖-1磷酸鹽的反應。

【0237】 於該第十五方面之第五具體實施例，其也是該第十四及第十五方面之任何的具體實施例之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，能夠催化

葡萄糖與α-D-葡萄糖-1磷酸鹽轉化為海藻糖與無機磷酸鹽

及/或

將海藻糖與無機磷酸鹽轉化為葡萄糖與α-D-葡萄糖-1磷酸鹽。

【0238】 於該第十五方面之第六具體實施例，其也是該第十五方面之第四及第六具體實施例或該第十四及第十五方面之任何的具體實施例之一具體實施例，該轉化為一可逆之轉化。

【0239】 於該第十五方面之第七具體實施例，其也是該第十四及第十五方面之任何的具體實施例之一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，為一根據EC號為EC 2.4.1.231之海藻糖磷酸化酶。

【0240】 更具體而言，於一第五方面，其也是該第五方面之第一具體實施例，透過包含SEQ ID NO: 1，或SEQ ID NO: 160或SEQ ID NO: 81的胺基酸序列的海藻糖磷酸化酶的熱穩定變體，解決了這些和其他問題，其中該變體於52°C作用15分鐘後具有至少30%的殘餘活性，且初始活性係在室溫作用15分鐘後測定。

【0241】 於本發明之第五方面的第一具體實施例之一較佳具體實施例，該海藻糖磷酸化酶的熱穩定變體包含SEQ ID NO: 1的胺基酸序列，其中該變體於52°C作用15分鐘後具有至少30%的殘餘活性，且初始活性係在室溫下作用15分鐘後測定。

【0242】 於本發明之第五方面的第一具體實施例之另一較佳具體實施例，該海藻糖磷酸化酶的熱穩定變體包含SEQ ID NO: 160的胺基酸序列，其中該變體於52°C作用15分鐘後具有至少30%的殘餘活性，且初始活性係在室溫下作用15分鐘後測定。

【0243】 於本發明之第五方面的第一具體實施例之一較佳具體實施例，該海藻糖磷酸化酶的熱穩定變體包含SEQ ID NO: 81的胺基酸序列，其中該變體於

52°C作用15分鐘後具有至少30%的殘餘活性，且初始活性係在室溫下作用15分鐘後測定。

【0244】 於第四方面及第五方面的一第二具體實施例，其也是該第四方面之第一具體實施例的具體實施例以及該第五方面的第一具體實施例，以及也是該第四方面及該第五方面之前述的具體實施例的任何其他之一具體實施例，該變體在含有1M蔗糖的緩衝液中於52°C作用15分鐘後具有至少50%的殘餘活性，且初始活性係在室溫下作用15分鐘後測定。

【0245】 於該第二方面之第二十三具體實施例，其也是該第三方面之一第三具體實施例，該第四方面之一第三具體實施例，以及該第五方面之一第三具體實施例，以及該第十五方面之另一具體實施例，或該第二、第三、第四、第五或第十五方面之前述的任一具體實施例，該多胜肽，較佳為海藻糖磷酸化酶，包含

(i) 如該第一方面之第一至一百二十具體實施例或任何其他具體實施例中任一個所定義之胺基酸序列，較佳如本發明第一方面之第一至九十八具體實施例之任一項所定義

及/或

(ii) 如本發明第十四方面之任一個具體實施例中所定義的胺基酸序列

及/或

(iii) 如本發明第十三方面之任一具體實施例中所定義的胺基酸序列。

【0246】 更具體而言，於一第十六方面，該方面也是該第十六方面之第一具體實施例，且其也是本發明之所有方面之一較佳具體實施例，以及本發明之所有方面的任何所有的具體實施例，且特別是如本文所述之本發明的第一、第二、第三、第四、第五、第十三、第十四，及第十五方面的任何具體實施例中，這些和其他問題係由該多胜肽解決，其中該多胜肽，較佳為海藻糖磷酸化酶，

係為該多胜肽的酶促活性片段，較佳為本發明之海藻糖磷酸化酶的酶促活性片段，如在任何方面或在本文所述及/或如上所述之方面的任何較佳具體實施例中所定義。

【0247】 於該第十六方面之一較佳具體實施例，其也是該第十六方面之前述具體實施例的任何一具體實施例，該海藻糖磷酸化酶係為該多胜肽的酶促活性片段，較佳為本發明之海藻糖磷酸化酶的酶促活性片段，具有一至少400個至750個胺基酸，或至少450個至750個胺基酸，或至少500個至750個胺基酸，或至少550個至750個胺基酸，或至少600個至750個胺基酸，或至少650個至750個胺基酸，或至少700個至750個胺基酸，或至少700個至730個胺基酸的長度。

【0248】 於該第十六方面之一較佳具體實施例，其也是該第十六方面之前述具體實施例的任何一具體實施例，該多胜肽係為該多胜肽的酶促活性片段，較佳為本發明之海藻糖磷酸化酶的酶促活性片段，其中該海藻糖磷酸化酶為

【0249】 (i) 在其N-端截短至少1至37個胺基酸，至少1至87個胺基酸，至少1至137個胺基酸，至少1至187個胺基酸 ，至少1至237個胺基酸，至少1至287個胺基酸，至少1至337個胺基酸；及/或

【0250】 (ii) 在其C-端截短至少1至˜37個胺基酸，至少1至87個胺基酸，至少1至137個胺基酸，至少1至187個胺基酸 酸，至少1至237個胺基酸，至少1至287個胺基酸，至少1至337個胺基酸；及/或

【0251】 (iii) 在一個或多個內部位置截短，其中每個或多個內部位置攜帶刪除1、2、3、4、5、6、7、8、9、10，或至少10至15、至少15至20、至少20至25、至少25至30、至少30至35、至少35至40、至少40至45，或至少45至50個胺基酸。

【0252】 於該第十六方面之一較佳具體實施例，其也是該第十六方面之前述具體實施例的任何一具體實施例，該多胜肽，較佳為本發明之海藻糖磷酸化

酶，為該多胜肽，較佳為本發明之海藻糖磷酸化酶，的酶促活性片段，根據本文及/或上下文定義的任何具體實施例，其保留海藻糖磷酸化酶活性。

【0253】 更具體而言，於一第六方面，其也是該第六方面之第一具體實施例，這些及其他問題透過一種用於以下之反應的方法解決：

葡糖基單醣與α-D-葡萄糖-1磷酸鹽的反應方法

其中該方法包括

以本文公開之本發明的第一、第二、第三、第四、第五、第十三、第十四、第十五及第十六方面之任何具體實施例中所定義的海藻糖磷酸化酶

使葡糖基單醣與α-D-葡萄糖-1磷酸鹽反應。

【0254】 更具體而言，於一第七方面，其也是該第七方面之第一具體實施例，透過一種方法解決這些及其他問題，該方法係用於將葡萄糖與α-D-葡萄糖-1磷酸鹽轉化為海藻糖與無機磷酸鹽，其中該方法包括以如本文所揭露之本發明的第一、第二、第三、第四、第五、第十三、第十四、第十五及第十六方面的任何具體實施例中所定義之海藻糖磷酸化酶，使葡萄糖與α-D-葡萄糖-1磷酸鹽產生反應。

【0255】 更具體而言，於一第八方面，其也是該第八方面之第一具體實施例，透過一種方法解決這些及其他問題，該方法係用於將海藻糖與無機磷酸鹽轉化為葡萄糖與α-D-葡萄糖-1磷酸鹽，其中該方法包括以如本文所揭露之本發明的第一、第二、第三、第四、第五、第十三、第十四、第十五及第十六方面的任何具體實施例中所定義之海藻糖磷酸化酶，使海藻糖與無機磷酸鹽反應為葡萄糖與α-D-葡萄糖-1磷酸鹽。

【0256】 於該第六方面之一第二具體實施例，以及該第七方面之一第二具體實施例，以及在該第八方面的一第二方面，其也是該第六方面之第一具體實

施例，以及該第七方面之第一具體實施例，以及該第八方面之第一具體實施例的具體實施例，該轉化為一可逆之轉化。

【0257】 更具體而言，於一第九方面，其也是該第九方面之第一具體實施例，透過一種用於製備海藻糖之方法解決這些及其他問題，該方法包括使葡萄糖與α-D-葡萄糖-1磷酸鹽在一海藻糖磷酸化酶存在下於至少40°C的溫度下進行反應，其中該海藻糖磷酸化酶

(i) 與未經熱處理之海藻糖磷酸化酶的活性相比，在含有1M蔗糖的緩衝液中於52°C作用15分鐘後保留其活性的至少30%，及/或

(ii) 與未經熱處理之海藻糖磷酸化酶的活性相比，在含有1M蔗糖的緩衝液中於52°C作用15分鐘後保留其活性的至少50%，及/或

(iii) 在100 mM葡萄糖下的活性與在500 mM葡萄糖下的活性的比率至少為0.65。

【0258】 於該第九方面之一第二具體實施例，其也是該第九方面之第一具體實施例之一具體實施例，該反應係於40至55°C下進行。

【0259】 於該第九方面之一第三具體實施例，其也是該第九方面之第一具體實施例之一具體實施例，該反應係於45至55°C下進行。

【0260】 於該第九方面之一第四具體實施例，其也是該第九方面之第一、第二及第三具體實施例之一具體實施例，該海藻糖磷酸化酶為一熱穩定之海藻糖磷酸化酶。

【0261】 於該第九方面之一第五具體實施例，其也是該第九方面之第一、第二、第三及第四具體實施例之一具體實施例，該海藻糖磷酸化酶為一突變之海藻糖磷酸化酶。

【0262】 於該第九方面之一第六具體實施例，其也是該第九方面之第一、第二、第三、第四及第五具體實施例之一具體實施例，該海藻糖磷酸化酶為一重組之海藻糖磷酸化酶。

【0263】 於該第九方面之一第七具體實施例，其也是該第九方面之第一、第二、第三、第四、第五及第六具體實施例之一具體實施例，該活性係以如本文所述，更具體而言係如第[0371]及[0372]段所述者決定。

【0264】 於該第六方面之另一具體實施例，其也是該第六方面之每個及任一個具體實施例之一具體實施例，於該第七方面之另一具體實施例，其也是該第七方面之每個及任一個具體實施例之一具體實施例，於該第八方面之另一具體實施例，其也是該第八方面之每個及任一個具體實施例之一具體實施例，以及於該第九方面之另一具體實施例，其也是該第九方面之每個及任一個具體實施例之一具體實施例，其中在該反應中唯一含有的穩定劑為蔗糖。

【0265】 於該第六方面之另一具體實施例，其也是該第六方面之每個及任一個具體實施例之一具體實施例，於該第七方面之另一具體實施例，其也是該第七方面之每個及任一個具體實施例之一具體實施例，於該第八方面之另一具體實施例，其也是該第八方面之每個及任一個具體實施例之一具體實施例，以及於該第九方面之另一具體實施例，其也是該第九方面之每個及任一個具體實施例之一具體實施例，該海藻糖磷酸化酶以非-固定化形式存在。

【0266】 於該第六方面之另一具體實施例，其也是該第六方面之每個及任一個具體實施例之一具體實施例，於該第七方面之另一具體實施例，其也是該第七方面之每個及任一個具體實施例之一具體實施例，於該第八方面之另一具體實施例，其也是該第八方面之每個及任一個具體實施例之一具體實施例，以及於該第九方面之另一具體實施例，其也是該第九方面之每個及任一個具體實施例之一具體實施例，該海藻糖磷酸化酶為一在如本文所述之該第一、第二、第三、第四、第五、第十三、第十四第十五，及第十六方面之任何具體實施例之一，包括其任何之具體實施例，所定義之海藻糖磷酸化酶。

【0267】 更具體而言，於一第十方面，其也是該第十方面之第一具體實施例，透過使用如本文所述之該第一、第二、第三、第四、第五、第十三、第十四、第十五及第十六個方面之任何具體實施例之一的用於生產海藻糖的一海藻糖磷酸化酶解決了這些及其他問題。

【0268】 更具體而言，於一第十一方面，其也是該第十一方面之第一具體實施例，係透過一方法解決了這些及其他問題，該方法係用於提高一海藻糖磷酸化酶的熱穩定性，其中該方法包括：

- 比對一第一海藻糖磷酸化酶的一胺基酸序列與一第二海藻糖磷酸化酶的一胺基酸序列，

- 鑑定對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基取代提高了該第一海藻糖磷酸化酶的熱穩定性，

- 取代對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的在該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的一胺基酸殘基，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基的取代提高了該第一海藻糖磷酸化酶的熱穩定性，

其中該第一海藻糖磷酸化酶為包含根據SEQ ID NO: 1或根據SEQ ID NO: 160的胺基酸序列，較佳根據SEQ ID NO: 1的胺基酸序列之海藻糖磷酸化酶。

【0269】 於該第 十一方面之第二具體實施例，其也是該第十一方面之第一具體實施例之一具體實施例，該方法還包括

- 測試該第二海藻糖磷酸化酶的該一個或多個胺基酸位置處的取代的胺基酸殘基是否對應於該第一海藻糖磷酸化酶的胺基酸序列的一個或多個胺基酸位置，

導致與該第一海藻糖磷酸化酶的熱穩定性相比，該第二海藻糖磷酸化酶的熱穩定性增加，較佳為熱穩定性係以如本文描述中所定義之方式確定。

【0270】 於該第十一方面之第三具體實施例，其也是該第十一方面之第一及第二具體實施例之一具體實施例， 對應於該第一海藻糖磷酸化酶的胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的胺基酸殘基被取代，使得取代的胺基酸殘基導致該第二海藻糖磷酸化酶的熱穩定性增加。

【0271】 於該第十一方面之第四具體實施例，其也是該第十一方面之第一、第二及第三具體實施例之一具體實施例，該第一海藻糖磷酸化酶的胺基酸序列與該第二海藻糖磷酸化酶的胺基酸序列的同源性為至少50%。

【0272】 於該第十一方面之第五具體實施例，其也是該第十一方面之第四具體實施例之一具體實施例，該同源性為至少51%、52%、53%、54%、55%、56%、57%、58%、59%、60%、61%、62%、63%、64%、65%、66%、67%、68%、69%、70、%、72%、73 %、74%、75%、76%、77%、78%、79%、80%、81%、82%、83%、84%、85%、86%、87%、88%、89%、90%、91%、92%、93%、94%、95%、96%、97%、98%或99%，較佳為該同源性為至少55%、60%、63%、65%、68%、70%、75%、77%或80%。

【0273】 於該第十一方面之第六具體實施例，其也是該第十一方面之第一、第二及第三具體實施例之一具體實施例，該第一海藻糖磷酸化酶的胺基酸序列與該第二海藻糖磷酸化酶的胺基酸序列的同一性為至少50%。

【0274】 於該第十一方面之第七具體實施例，其也是該第十一方面之第六具體實施例之一具體實施例，該同一性為至少51%、52%、53%、54%、55%、56%、57%、58%、59%、60%、61%、62%、63%、64%、65%、66%、67%、68%、69%、70、%、72%、73 %、74%、75%、76%、77%、78%、79%、80%、

81%、82%、83%、84%、85%、86%、87%、88%、89%、90%、91%、92%、93%、94%、95%、96%、97%、98%或99%，較佳為至少55%、60%、63%、65%、68%、70%、75%、77%或80%，更佳為至少68%、73 %、75 %、76 %、77%或78%。

【0275】 於該第十一方面之第八具體實施例，其也是該第十一方面之第一、第二、第三、第四、第五、第六及第七具體實施例之一具體實施例，該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置為：

【0276】 (A) 係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705，較佳為該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置係各別且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705，較佳為選自由下列胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、357、487、550、556、564、590與649，更佳為選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、487、550、556、564、590，以及649，甚至更佳為選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：383、114、118、225、304、323、487、550、556，以及564，以及甚至更佳為選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：383、114、225、323、487、556，以及564，或

【0277】 (B) 係選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的胺基酸位置所組成之群組：108、112、221、300、319、345、379、

483、544、550、558、584、643，以及707，較佳為該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置係各別且獨立地選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的胺基酸位置所組成之群組：108、112、221、300、319、345、379、483、544、550、558、584、643，以及707，更佳為選自由下列SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的胺基酸位置所組成之群組：108、221、319、379、483、550，以及558。

【0278】 於該第十一方面之第九具體實施例，其也是該第十一方面之第八具體實施例之一具體實施例，該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置為：

【0279】 (A) 係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703與K705，較佳為該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置係各別且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703與K705，較佳為選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、L114、I118、N225、A304、T323、F349、Q487、V550、S556、T564、D590，以及A649，更佳為選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：P383、L114、I118、N225、A304、T323、Q487、V550、S556，以及T564，且甚至更佳為選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：P383、L114、N225、A323、Q487、S556，以及T564。

【0280】 (B) 係選自由下列SEQ ID NO: 160的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、F345、P379、V483、V544、S550、Q558、N584、A643，以及L707，較佳為該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置係各別且獨立地選自由下列SEQ ID NO: 160的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、F345、P379、V483、V544、S550、Q558、N584、A643，以及L707，較佳為選自由下列SEQ ID NO: 160的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、P379、V483、V544、S550，以及Q558，更佳為選自由下列SEQ ID NO: 160的胺基酸位置所組成之群組：L108、V221、T319、P379、V483、S550，以及Q558。

【0281】 (C) 係選自由下列SEQ ID NO: 81的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、F345、P379、I483、V544、S550、Q558、N584、A643，以及L707，較佳為該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置係各別且獨立地選自由下列SEQ ID NO: 81的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、F345、P379、I483、V544、S550、Q558、N584、A643，以及L707，較佳為選自由下列SEQ ID NO: 81的胺基酸位置所組成之群組：L108、V112、N221、A300、T319、P379、I483、V544、S550，以及Q558，更佳為選自由下列SEQ ID NO: 81的胺基酸位置所組成之群組：L108、V221、T319、P379、I483、S550，以及Q558。

【0282】 於該第十一方面之第十具體實施例，其也是該第十一方面之第一、第二、第三、第四、第五、第六、第七、第八及第九具體實施例之一具體實施例，該取代的胺基酸殘基為

(A) 針對SEQ ID NO: 1：

A、G、I、M、P、V，較佳為M，代表對應於該第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置712的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、V、N、C、Q、S、T，較佳為A、G、M、V、N、C、Q、S、T、更佳為G、V、S或T，甚至更佳為V或T，以及最佳為V，代表對應於該第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置383的第二海藻糖磷酸酶的胺基酸位置；

R、H或K，較佳為R，代表對應於該第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置10的第二海藻糖磷酸酶的胺基酸位置；

A、G、I、M、P、V，較佳為I，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置114的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為V，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置118的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為V，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置192的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為G，代表與第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置197對應的第二海藻糖磷酸化酶的胺基酸位置；

F、W，較佳為F，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置220的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I、L、M或V，以及最佳為V，代表對應於SEQ ID NO: 1的胺基酸位置225的第二海藻糖磷酸化酶的胺基酸位置第一個海藻糖磷酸化酶；

G、I、L、M、P、V，較佳為I或L，以及更佳為I，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置304的第二海藻糖磷酸化酶的胺基酸位置；

R、H、K，較佳為H，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置306的第二海藻糖磷酸化酶的胺基酸位置；

R、H、K，較佳為H，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位

置318的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I或V、更佳為I，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置323的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置339的第二海藻糖磷酸化酶的胺基酸位置；

W或Y，較佳為Y，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置349的第二海藻糖磷酸化酶的胺基酸位置；

A、I、L、M、P、V，較佳為A，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置357的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置459的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為G，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的第476位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置481的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置484的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為A、M、G、V或L、更佳為A，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置487的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為A，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置488的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置506的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置511的第二海藻糖磷酸化酶的胺基酸位置；

D或E，較佳E，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置526所對應的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為V，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置530的第二海藻糖磷酸化酶的胺基酸位置；

R、H、K，較佳為R，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置532對應的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為G，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置533對應的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為M，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的第537位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P，較佳為I或P、更佳為I，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置550的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、T，較佳為T，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置556的第二海藻糖磷酸化酶的胺基酸位置；

D，E，較佳E，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的第564位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T、A、G、I、L、M、P、V，較佳為N或A、更佳為N，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的第590位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

D、E，較佳為E，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置649的第二海藻糖磷酸化酶的胺基酸位置；

D、E、R、H、K，較佳為E或K、更佳為E，代表對應於第一海藻糖磷酸酶的SEQ

ID NO: 1的第667位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

D、E，較佳為E，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置703的第二海藻糖磷酸化酶的胺基酸位置；以及

N、C、Q、S、T，較佳為N，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的第705位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；或者

(B) 針對SEQ ID NO: 81與SEQ ID NO: 160：

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置L108處的一個胺基酸取代，該取代為L108A、L108G、L108I、L108M、L108P或L108V，較佳為L108I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置V112處的一個胺基酸取代，該取代為V112A、V112G、V112L、V112M、V112P或V112I，較佳為V112I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置N221處的一個胺基酸取代，該取代為N221A、N221G、N221I、N221L、N221M、N221P或N221V，較佳為N221I、N221L、N221M或N221V，以及更佳為N221V；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置A300處的一個胺基酸取代，該取代為A300G、A300I、A300L、A300M、A300P或A300V，較佳為A300I或A300L，以及更佳為A300I

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置T319處的一個胺基酸取代，該取代為T319A、T319G、T319I、T319L、T319M、T319P，或T319V，較佳為T319I或T319V，以及更佳為T319I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置P379處的一個胺基酸取代，該取代為P379A、P379G、P379I、P379L、P379M、P379V、P379N、P379C、P379Q、P379S或P379T，較佳為P379A、P379G、P379M、P379V、

P379N、P379C、P379Q、P379S或P379T、更佳為P379G、P379V、P379C或P379S，或P379T，甚至更佳為P379V或P379T，以及最佳為P379V；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置I483處的一個胺基酸取代，該取代為I483A、I483G、I483I、I483L、I483M、I483P或I483V，較佳為I483A、I483G、I483L、I483M或I483V，更佳為I483A；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置Q483處的一個胺基酸取代，該取代為Q483A、Q483G、Q483I、Q483L、Q483M、Q483P或Q483V，較佳為Q483A、Q483G、Q483L、Q483M或Q483V、更佳為Q483A；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置V544處的一個胺基酸取代，該取代為V544A、V544G、V544I、V544L、V544M或V544P，較佳為V544I或V544P，以及更佳為V544I；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置S550處的一個胺基酸取代，該取代為S550N、S550C、S550Q或S550T，較佳為S550T；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置Q558處的一個胺基酸取代，該取代為Q558D或Q558E，較佳為Q558E；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置D558處的一個胺基酸取代，該取代為D558N、D558C、D558Q、D558S、D558T、D558A、D558G、D558I、D558L、D558M、D558P或D558V，較佳為D558N、D558G或D558A，以及更佳為D558N；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置A643處的一個胺基酸取代，該取代為A643D或A643E，較佳為A643E；

在SEQ ID NO: 81或SEQ ID NO: 160，較佳為SEQ ID NO: 160，的位置L707處的一個胺基酸取代，該取代為L707A、L707G、L707I、L707M、L707P或L707V，較佳為L707M。

【0283】 於第十一方面的第十一具體實施例中，其也是第十一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九及第十具體實施例的一具體實施例，若該對應於該第一海藻糖磷酸化酶胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的胺基酸殘基與該第一海藻糖磷酸化酶的取代的胺基酸殘基相同，則該第二海藻糖磷酸化酶的胺基酸殘基未被取代。

【0284】 於第十一方面的第十二具體實施例中，其也是第十一方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十及第十一具體實施例的一具體實施例，熱穩定性係表示為Tm30值或Tm50值，如在說明書中所定義的，更具體地如第[0367]與[0368]段中所公開的。

【0285】 更具體而言，於一第十二方面，其也是該第十二方面的第一具體實施例，透過用於增加海藻糖磷酸化酶的表現為100/500比率的相對活性之方法解決了這些及其他問題，其中該方法包括：

- 比對一第一海藻糖磷酸化酶的一胺基酸序列與一第二海藻糖磷酸化酶的一胺基酸序列，

- 鑑定對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基取代增加該第一海藻糖磷酸化酶的100/500比率，

- 取代對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的在該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的一胺基酸殘基，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基的取代增加該第一海藻糖磷酸化酶的100/500比活性；

其中該第一海藻糖磷酸化酶為包含根據SEQ ID NO: 1的胺基酸序列之海藻糖磷酸化酶。

【0286】 於第十二方面的第二具體實施例中，其也是第十二方面之第一具體實施例的一具體實施例，該方法包括

- 檢測對應於該第一海藻糖磷酸化酶的胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的取代的胺基酸殘基是否導致，相較於該第一海藻糖磷酸化酶的活性，該第二海藻糖磷酸化酶的活性增加。

【0287】 於第十二方面的第三具體實施例中，其也是第十二方面之第一及第二具體實施例的一具體實施例，對應於該第一海藻糖磷酸化酶的胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的胺基酸殘基被取代，使得該取代的胺基酸殘基導致該第二海藻糖磷酸化酶的活性增加。

【0288】 於第十二方面的第四具體實施例中，其也是第十二方面之第一、第二及第三具體實施例的一具體實施例，該第一海藻糖磷酸化酶的胺基酸序列與該第二海藻糖磷酸化酶的胺基酸序列的同源性為至少50%。

【0289】 於第十二方面的第五具體實施例中，其也是第十二方面之第四具體實施例的一具體實施例，該同源性為至少55%、56%、57%、58%、59%、60%、61%、62%、63%、64%、65%、66%、67%、68%、69%、70、%、72%、73 %、74%、75%、76%、77%、78%、79%、80%、81%、82%、83%、84%、85%、86%、87%、88%、89%、90%、91%、92%、93%、94%、95%、96%、97%、98%或99%，較佳為該同源性為至少55%、60%、65%、70%、75%或80%。

【0290】 於第十二方面的第六具體實施例中，其也是第十二方面之第一、第二及第三具體實施例的一具體實施例，該第一海藻糖磷酸化酶的胺基酸序列與該第二海藻糖磷酸化酶的胺基酸序列的同一性為至少50%。

【0291】 於第十二方面的第七具體實施例中，其也是第十二方面之第六具體實施例的一具體實施例，該同一性為至少55%、56%、57%、58%、59%、60%、

61%、62%、63%、64%、65%、66%、67%、68%、69%、70、%、72%、73 %、74%、75%、76%、77%、78%、79%、80%、81%、82%、83%、84%、85%、86%、87%、88%、89%、90%、91%、92%、93%、94%、95%、96%、97%、98%或99%，較佳為該同一性為至少55%、60%、65%、70%、75%或80%，以及更佳為該同一性為至少73 %、75 %、76 %，或78%.。

【0292】 於第十二方面的第八具體實施例中，其也是第十二方面之第一、第二、第三、第四、第五、第六及第七具體實施例的一具體實施例，該第一海藻糖磷酸化酶的胺基酸序列的一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705，較佳為該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置係各別且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705，且甚至更佳為選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、114、118、225、304、323、349、357、487、550、556、564、590與649。

【0293】 於第十二方面的第九具體實施例中，其也是第十二方面之第八具體實施例的一具體實施例，該第一海藻糖磷酸化酶的胺基酸序列的一個或多個胺基酸位置係選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、

A703與K705，較佳為該第一海藻糖磷酸化酶之胺基酸序列的一個或多個胺基酸位置係各別且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：L712、P383、V10、L114、I118、S192、S197、Y220、N225、A304、D306、P318、T323、L339、F349、G357、A459、Q476、E481、A484、Q487、K488、A506、A511、R526、E530、G532、D533、D537、V550、S556、T564、D590、A649、R667、A703與K705。

【0294】 於第十二方面的第十具體實施例中，其也是第十二方面之第一、第二、第三、第四、第五、第六、第七、第八及第九具體實施例的一具體實施例，該取代的胺基酸殘基為

A、G、I、M、P、V，較佳為M，代表對應於該第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置712的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、V、N、C、Q、S、T，較佳為A、G、M、V、N、C、Q、S、T、更佳為G、V、C、S或T，甚至更佳為V或T，以及最佳為V，代表對應於該第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置383的第二海藻糖磷酸酶的胺基酸位置；

R、H或K，較佳為R，代表對應於該第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置10的第二海藻糖磷酸酶的胺基酸位置；

A、G、I、M、P、V，較佳為I，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置114的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為V，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置118的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為V，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置192的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為G，代表與第一海藻糖磷酸化酶的SEQ ID NO:

1的胺基酸位置197對應的第二海藻糖磷酸化酶的胺基酸位置；

F、W，較佳為F，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置220的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I、L、M或V，以及最佳為V，代表對應於SEQ ID NO: 1的胺基酸位置225的第二海藻糖磷酸化酶的胺基酸位置第一個海藻糖磷酸化酶；

G、I、L、M、P、V，較佳為I或L，以及更佳為I，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置304的第二海藻糖磷酸化酶的胺基酸位置；

R、H、K，較佳為H，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置306的第二海藻糖磷酸化酶的胺基酸位置；

R、H、K，較佳為H，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置318的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I或V、更佳為I，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置323的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置339的第二海藻糖磷酸化酶的胺基酸位置；

W或Y，較佳為Y，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置349的第二海藻糖磷酸化酶的胺基酸位置；

A、I、L、M、P、V，較佳為A，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置357的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置459的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為G，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的第476位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為I，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置481的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置484的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為A、G、V或L、更佳為A，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置487的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為A，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置488的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置506的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T，較佳為S，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的胺基酸位置511的第二海藻糖磷酸化酶的胺基酸位置；

D或E，較佳E，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置526所對應的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為V，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置530的第二海藻糖磷酸化酶的胺基酸位置；

R、H、K，較佳為R，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置532對應的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為G，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置533對應的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P、V，較佳為M，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的第537位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

A、G、I、L、M、P，較佳為I或P、更佳為I，代表對應於第一海藻糖磷酸化酶

的SEQ ID NO: 1的胺基酸位置550的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、T，較佳為T，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置556的第二海藻糖磷酸化酶的胺基酸位置；

D，E，較佳E，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的第564位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

N、C、Q、S、T、A、G、I、L、M、P、V，較佳為N、G或A、更佳為N，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的第590位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

D、E，較佳為E，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置649的第二海藻糖磷酸化酶的胺基酸位置；

D、E、R、H、K，較佳為E或K、更佳為E，代表對應於第一海藻糖磷酸酶的SEQ ID NO: 1的第667位胺基酸的第二海藻糖磷酸化酶的胺基酸位置；

D、E，較佳為E，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的胺基酸位置703的第二海藻糖磷酸化酶的胺基酸位置；以及

N、C、Q、S、T，較佳為N，代表對應於第一海藻糖磷酸化酶的SEQ ID NO: 1的第705位胺基酸的第二海藻糖磷酸化酶的胺基酸位置。

【0295】 於第十二方面的第十一具體實施例中，其也是第十二方面之第一、第二、第三、第四、第五、第六、第七、第八、第九及第十具體實施例的一具體實施例，若對應於該第一海藻糖磷酸化酶胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的胺基酸殘基與該第一海藻糖磷酸化酶的取代的胺基酸殘基相同，則該第二海藻糖磷酸化酶的胺基酸殘基不被取代。

【0296】 於第十二方面的第十二具體實施例中，其也是第十二方面之第一、第二、第三、第四、第五、第六、第七、第八、第九、第十及第十一具體

實施例的一具體實施例，海藻糖磷酸化酶的活性為如本說明書中所定義之磷酸解活性與合成活性。

【0297】 更具體而言，於一第十三方面，也是該第十三方面的第一具體實施例，透過具有海藻糖磷酸化酶活性的一多胜肽解決了這些及其他問題，其中該多胜肽包含一胺基酸序列，其中該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少20%同源性，其中該多胜肽在選自由胺基酸位置712、383、114、118、225、304、323、349、357、487、550、556、564、590與649所組成之群組中的二個或多個位置包含有一胺基酸取代，其中

在胺基酸位置712處的胺基酸取代係選自由下列取代所組成之群組：712A、712G、712I、712M、712P或712V，較佳為712M，

在胺基酸位置383處的胺基酸取代係選自由下列取代所組成之群組：383A、383G、383I、383L、383M、383V、383N、383C、383Q、383S或383T，較佳為383A、383G、383M、383V、383N、383C、383Q、383S或383T，更佳為383G、383V、383C、383S或383T，甚至更佳為383V或383T，以及最佳為383V，

在胺基酸位置114處的胺基酸取代係選自由下列取代所組成之群組：114A、114G、114I、114M、114P或114V，較佳為114I，

在胺基酸位置118處的胺基酸取代係選自由下列取代所組成之群組：118A、118G、118I、118L、118M、118P或118V，較佳為118V，

在胺基酸位置225處的胺基酸取代係選自由下列取代所組成之群組：225A、225G、225I、225L、225M、225P或225V，較佳為225I、225L、225M或225V，以及更佳為225V，

在胺基酸位置304處的胺基酸取代係選自由下列取代所組成之群組：304G、304I、304L、304M、304P或304V，較佳為304I或304L，以及更佳為304I，

在胺基酸位置323處的胺基酸取代係選自由下列取代所組成之群組：323A、

323G、323I、323L、323M、323P，或323V，較佳為323I或323V，以及更佳為323I，

在胺基酸位置349處的胺基酸取代係選自由下列取代所組成之群組：349W或349Y，較佳為349Y，

在胺基酸位置357處的胺基酸取代係選自由下列取代所組成之群組：357A、357I、357L、357M、357P或357V，較佳為357A，

在胺基酸位置487處的胺基酸取代係選自由下列取代所組成之群組：487A、487G、487I、487L、487M、487P或487V，較佳為487A、487M、487G、487L或487V、更佳為487A，

在胺基酸位置550處的胺基酸取代係選自由下列取代所組成之群組：550A、550G、550I、550L、550M或550P，較佳為550I或550P，以及更佳為550I，

在胺基酸位置556處的胺基酸取代係選自由下列取代所組成之群組：556N、556C、556Q或S556T，較佳為556T，

在胺基酸位置564處的胺基酸取代係選自由下列取代所組成之群組：564D或564E，較佳為564E，

在胺基酸位置590處的胺基酸取代係選自由下列取代所組成之群組：590N、590C、590Q、590S、590T、590A、590G、590I、590L、590M、590P或590V，較佳為590N、590G或590A，更佳為590N，以及

在胺基酸位置649處的胺基酸取代係選自由下列取代所組成之群組：649D或649E，較佳為649E；

其中該胺基酸編號係指SEQ ID NO: 1中的比對位置。

在本發明的第十三方面的一較佳具體實施例中，其也是該第十三方面的任何其他前述具體實施例之一具體實施例，該多胜肽為一具有海藻糖磷酸化酶活性的多胜肽，其中該多胜肽包含一胺基酸序列，其係與SEQ ID NO: 1的胺基酸序列具有至少77%同源性，其中該多胜肽在選自由胺基酸位置383、114、225、304、323、

349、357、550、556、564與649處所組合之群組的二個或更多個包含一胺基酸取代，其中，

在胺基酸位置383處的胺基酸取代係選自由下列取代所組成之群組：383A、383G、383I、383L、383M、383V、383N、383C、383Q、383S或383T，較佳為383A、383G、383M、383V、383N、383C、383Q、383S或383T、更佳為383G、383V、383C、383S或383T，甚至更佳為383V或383T，以及最佳為383V，

在胺基酸位置114處的胺基酸取代係選自由下列取代所組成之群組：114A、114G、114I、114M、114P或114V，較佳為114I，

在胺基酸位置225處的胺基酸取代係選自由下列取代所組成之群組：225A、225G、225I、225L、225M、225P或225V，較佳為225I、225L、225M或225V，以及更佳為225V，

在胺基酸位置304處的胺基酸取代係選自由下列取代所組成之群組：304G、304I、304L、304M、304P或304V，較佳為304I或304L，以及更佳為304I，

在胺基酸位置323處的胺基酸取代係選自由下列取代所組成之群組：323A、323G、323I、323L、323M、323P，或323V，較佳為323I或323V，以及更佳為323I，

在胺基酸位置349處的胺基酸取代係選自由下列取代所組成之群組：349W或349Y，較佳為349Y，

在胺基酸位置357處的胺基酸取代係選自由下列取代所組成之群組：357A、357I、357L、357M、357P或357V，較佳為357A，

在胺基酸位置550處的胺基酸取代係選自由下列取代所組成之群組：550A、550G、550I、550L、550M或550P，較佳為550I或550P，以及更佳為550I，

在胺基酸位置556處的胺基酸取代係選自由下列取代所組成之群組：556N、556C、556Q或S556T，較佳為556T，

在胺基酸位置564處的胺基酸取代係選自由下列取代所組成之群組：564D或

564E，較佳為564E，以及

在胺基酸位置649處的胺基酸取代係選自由下列取代所組成之群組：649D或649E，較佳為649E，

其中該胺基酸編號係指SEQ ID NO: 1中的比對位置。

在本發明的第十三方面之另一較佳具體實施例中，其也是該第十三方面的任何其他前述具體實施例之一具體實施例，該多胜肽在選自胺基酸位置712、118、487與590處包含至少一個另外的胺基酸取代，其中：

在胺基酸位置712處的胺基酸取代係選自由下列取代所組成之群組：712A、712G、712I、712M、712P或712V，較佳為712M，

在胺基酸位置118處的胺基酸取代係選自由下列取代所組成之群組：118A、118G、118I、118L、118M、118P或118V，較佳為118V，

在胺基酸位置487處的胺基酸取代係選自由下列取代所組成之群組：487A、487G、487I、487L、487M、487P或487V，較佳為487A、487G、487L、487M或487V，更佳為487A，以及

在胺基酸位置590處的胺基酸取代係選自由下列取代所組成之群組：590N、590C、590Q、590S、590T、590A、590G、590I、590L、590M、590P或590V，較佳為590N、590G或590A，更佳為590N，

其中該胺基酸編號係指SEQ ID NO: 1中的比對位置。

在本發明的第十三方面之另一較佳具體實施例中，其也是該第十三方面的任何其他前述具體實施例之一具體實施例，該多胜肽為一具有海藻糖磷酸化酶活性的多胜肽，其中該多胜肽包含一胺基酸序列，其係與SEQ ID NO: 1的胺基酸序列具有至少68%同源性，其中該多胜肽在選自由胺基酸位置383、114、225、304、323、349、357、550、556與564處所組合之群組的二個或更多個包含一胺基酸取代，其中，

在胺基酸位置383處的胺基酸取代係選自由下列取代所組成之群組：383A、383G、383I、383L、383M、383V、383N、383C、383Q、383S或383T，較佳為383A、383G、383M、383V、383N、383C、383Q、383S或383T，更佳為383G、383V、383C、383S或383T，甚至更佳為383V或383T，以及最佳為383V，

在胺基酸位置114處的胺基酸取代係選自由下列取代所組成之群組：114A、114G、114I、114M、114P或114V，較佳為114I，

在胺基酸位置225處的胺基酸取代係選自由下列取代所組成之群組：225A、225G、225I、225L、225M、225P或225V，較佳為225I、225L、225M或225V，以及更佳為225V，

在胺基酸位置304處的胺基酸取代為304I，

在胺基酸位置323處的胺基酸取代係選自由下列取代所組成之群組：323A、323G、323I、323L、323M、323P，或323V，較佳為323I或323V，以及更佳為323I，

在胺基酸位置349處的胺基酸取代係選自由下列取代所組成之群組：349W或349Y，較佳為349Y，

在胺基酸位置357處的胺基酸取代係選自由下列取代所組成之群組：357A、357I、357L、357M、357P或357V，較佳為357A，

在胺基酸位置550處的胺基酸取代係選自由下列取代所組成之群組：550A、550G、550I、550L、550M或550P，較佳為550I或550P，以及更佳為550I，

在胺基酸位置556處的胺基酸取代係選自由下列取代所組成之群組：556N、556C、556Q或S556T，較佳為556T，以及

在胺基酸位置564處的胺基酸取代係選自由下列取代所組成之群組：564D或564E，較佳為564E，

其中該胺基酸編號係指SEQ ID NO: 1中的比對位置。

在本發明的第十三方面之另一較佳具體實施例中，其也是該第十三方面的任何

其他前述具體實施例之一具體實施例，本發明的多胜肽在選自由胺基酸位置712、118、487、590與649處所組成之群組中的至少一個包含至少一個另外的胺基酸取代，其中

在胺基酸位置712處的胺基酸取代係選自由下列取代所組成之群組：712A、712G、712I、712M、712P或712V，較佳為712M，

在胺基酸位置118處的胺基酸取代係選自由下列取代所組成之群組：118A、118G、118I、118L、118M、118P或118V，較佳為118V，

在胺基酸位置487處的胺基酸取代係選自由下列取代所組成之群組：487A、487G、487I、487L、487M、487P或487V，較佳為487A、487G、487L、487M或487V，更佳為487A，

在胺基酸位置590處的胺基酸取代係選自由下列取代所組成之群組：590N、590C、590Q、590S、590T、590A、590G、590I、590L、590M、590P或590V，較佳為590N、590G或590A，更佳為590N，以及

在胺基酸位置649處的胺基酸取代係選自由下列取代所組成之群組：649D或649E，較佳為649E，

其中該胺基酸編號係指SEQ ID NO: 1中的比對位置。

在本發明的第十三方面之另一較佳具體實施例中，其也是該第十三方面的任何其他前述具體實施例之一具體實施例，該多胜肽為一具有海藻糖磷酸化酶活性的多胜肽，其中該多胜肽包含一胺基酸序列，其係與SEQ ID NO: 1的胺基酸序列具有至少63%同源性，其中該多胜肽在選自由胺基酸位置383、114、225、304、323、349、357、556與564處所組合之群組的二個或更多個包含一胺基酸取代，其中，

在胺基酸位置383處的胺基酸取代係選自由下列取代所組成之群組：383A、383G、383I、383L、383M、383V、383N、383C、383Q、383S或383T，較佳為

383A、383G、383M、383V、383N、383C、383Q、383S或383T、更佳為383G、383V、383C、383S或383T，甚至更佳為383V或383T，以及最佳為383V，

在胺基酸位置114處的胺基酸取代係選自由下列取代所組成之群組：114A、114G、114I、114M、114P或114V，較佳為114I，

在胺基酸位置225處的胺基酸取代係選自由下列取代所組成之群組：225A、225G、225I、225L、225M、225P或225V，較佳為225I、225L、225M或225V，以及更佳為225V，

在胺基酸位置304處的胺基酸取代為304I，

在胺基酸位置323處的胺基酸取代係選自由下列取代所組成之群組：323A、323G、323I、323L、323M、323P，或323V，較佳為323I或323V，以及更佳為323I，

在胺基酸位置349處的胺基酸取代係選自由下列取代所組成之群組：349W或349Y，較佳為349Y，

在胺基酸位置357處的胺基酸取代係選自由下列取代所組成之群組：357A、357I、357L、357M、357P或357V，較佳為357A，

在胺基酸位置556處的胺基酸取代係選自由下列取代所組成之群組：556N、556C、556Q或S556T，較佳為556T，以及

在胺基酸位置564處的胺基酸取代係選自由下列取代所組成之群組：564D或564E，較佳為564E，

其中該胺基酸編號係指SEQ ID NO: 1中的比對位置。

在本發明的第十三方面之另一較佳具體實施例中，其也是該第十三方面的任何其他前述具體實施例之一具體實施例，本發明的多胜肽在選自由胺基酸位置712、118、487、550、590與649處所組成之群組中的至少一個包含至少一個另外的胺基酸取代，其中

在胺基酸位置712處的胺基酸取代係選自由下列取代所組成之群組：712A、

712G、712I、712M、712P或712V，較佳為712M，

在胺基酸位置118處的胺基酸取代係選自由下列取代所組成之群組：118A、118G、118I、118L、118M、118P或118V，較佳為118V，

在胺基酸位置487處的胺基酸取代係選自由下列取代所組成之群組：487A、487G、487I、487L、487M、487P或487V，較佳為487A、487G、487L、487M或487V，更佳為487A，

在胺基酸位置550處的胺基酸取代係選自由下列取代所組成之群組：550A、550G、550I、550L、550M或550P，較佳為550I或550P，以及更佳為550I，

在胺基酸位置590處的胺基酸取代係選自由下列取代所組成之群組：590N、590C、590Q、590S、590T、590A、590G、590I、590L、590M、590P或590V，較佳為590N、590G或590A，更佳為590N，以及

在胺基酸位置649處的胺基酸取代係選自由下列取代所組成之群組：649D或649E，較佳為649E，

其中該胺基酸編號係指SEQ ID NO: 1中的比對位置。

【0298】 於第十三方面的第二具體實施例中，其也是第十三方面之第一具體實施例或第十三個方面的任何其他具體實施例的的一具體實施例，該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少50%同源性。

【0299】 於第十三方面的第三具體實施例中，其也是第十三方面之第二具體實施例或第十三個方面的任何其他具體實施例的的一具體實施例，該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少51%、52%、53%、54%、55%、56%、57%、58%、59%、60%、61%、62%、63%、64%、65%、66%、67%、68%、69%、70%、71%、72%、73%、74%、75%、76%、77%、78%、79%或80%的同源性。

【0300】 於第十三方面的第四具體實施例中，其也是第十三方面之第一、第二及第三具體實施例或第十三個方面的任何其他具體實施例的的一具體實施例，該胺基酸序列在選自由胺基酸位置712、383、114、118、225、304、323、349、357、487、550、556、564、590與649所組成之群組的二、三、四、五、六、七、八、九、十、十一、十二、十三、十四或十五個處包含一胺基酸取代。

【0301】 於第十三方面的另一較佳具體實施例中，其也是第十三方面之第一、第二、第三及第四具體實施例或第十三個方面的任何其他具體實施例的的一具體實施例，該具有海藻糖磷酸化酶活性的多胜肽為一野生型海藻糖磷酸化酶及/或來自一野生型海藻糖磷酸化酶的變異體，該變體係衍生自屬於擔子菌門(Basidomycota)的一生物體，較佳來自屬於傘菌綱(Agaricomycetes)的一生物體，且更佳來自屬於由裂褶菌屬(Schizophyllum)、側耳屬(Pleurotus)、奇果菌屬(Grifola)、蘑菇屬(Agaricus)、栓菌屬(Trametes)、革蓋菌屬(Coriolus)、栓菌屬(Trametes)、附毛菌屬(Trichaptum)，以及摺孔菌屬(Lenzites)所組成之群組的屬的一生物體。於第十三方面的另一較佳具體實施例中，其也是第十三方面之第一、第二、第三及第四具體實施例或第十三個方面的任何其他具體實施例的的一具體實施例，該海藻糖磷酸化酶活性以如本文所公開，更具體地如在第[0371]與[0372]段中所公開的方法測定。

【0302】 應該理解的是，在本文各個方面及具體實施例中所述的海藻糖磷酸化酶也可以稱為本發明之海藻糖磷酸化酶。

【0303】 本發明基於令人驚訝的發現，即EC編號為EC 2.4.1.231的海藻糖磷酸化酶，其也被稱為“TP”，可透過酶工程改進。作為這種酶工程的起點，使用具有根據如SEQ ID NO: 1所示之胺基酸序列的海藻糖磷酸化酶。該具有根據SEQ ID NO: 1的胺基酸序列的海藻糖磷酸化酶可由Eis等人描述的從裂褶菌(*Shizophyllum commune*)製備(FEBS Letters 440, 440-443 (1998))。UniProt:

D8PWQ7 (GenBank：EFJ00254.1)公開了一各別的裂褶菌(*Shizophyllum commune*)分離株H4-8的野生型蛋白質序列(99.1%同一性)。該序列在SEQ ID NO: 1的7個位置上與SEQ ID NO: 1不同，其中該分離物H4-8在與SEQ ID NO: 1的位置10同源的位置上帶有離胺酸(lysine)胺基酸殘基，在與SEQ ID NO: 1的位置32同源的位置上帶有絲胺酸(serine)胺基酸殘基，在與SEQ ID NO: 1的位置374同源的位置上帶有纈胺酸(valine)胺基酸殘基，在與SEQ ID NO: 1的位置535同源的位置上帶有麩胺酸(glutamic acid)胺基酸殘基，在與SEQ ID NO: 1的位置536同源的位置上帶有脯胺酸(proline)胺基酸殘基，在與SEQ ID NO: 1的位置616同源的位置上帶有異白胺酸(isoleucine)胺基酸殘基，以及在與SEQ ID NO: 1的位置649同源的位置上帶有纈胺酸(valine)胺基酸殘基。UniProt: A0A151VW19 (GenBank: KYQ39707.1)公開了來自生物體鴻禧菇(*Hypsizygus marmoreus*)的海藻糖磷酸化酶的野生型蛋白質序列，其與SEQ ID NO: 1具有77.9%的同一性。除了裂褶菌(*Shizophyllum commune*)TP之外，其他源於真菌的TP已被描述，例如環柄香菇(*Lentinus sajor-caju*) (73.2%同源性)、秀珍菇(*Pleurotus ostreatus*) (75.8%同源性)，或舞菇(*Grifola frondosa*) (76.7%同源性)。針對舞菇(*Grifola frondosa*)，已經描述了源自不同分離株的蛋白質序列，其中包括序列SEQ ID NO: 160 (UniProtKB/Swiss-Prot: 登錄號: O75003.1)以及SEQ ID NO: 81 (Genbank登錄號: ADM15725.1)。

【0304】 本案發明人已驚訝地發現，在SEQ ID NO: 1的胺基酸序列的一個或幾個下列胺基酸位置替換胺基酸殘基，適合於改進SEQ ID NO: 1的海藻糖磷酸化酶的反應特徵：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705。於這些SEQ ID NO: 1的胺基酸位置中，胺基酸位置712、383、10、114、118、220、225、304、318、323、349、357、481、487、488、506、511、550、556、564、590、649、

703與705為特別合適的，且SEQ ID NO: 1中的胺基酸位置712、383、114、118、225、304、323、349、357、487、550、556、564、590與649中的每一個甚至更為合適。

【0305】 據此，本發明於第一方面涉及包含一胺基酸序列的一多胜肽，其中該海藻糖磷酸酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少80%同一性及/或至少80%同源性，其中該海藻糖磷酸化酶的胺基酸序列包含在一個或多個胺基酸位置處的一胺基酸取代，其中該一個或多個胺基酸位置係各自且獨立地選自由下列SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705。

【0306】 在一較佳具體實施例中，SEQ ID NO: 1的胺基酸序列為一多胜肽的胺基酸序列，其中較佳地該多胜肽為一海藻糖磷酸化酶。

【0307】 據此，本發明於第一方面同樣涉及包含一胺基酸序列的海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少80%同一性及/或至少80%同源性，其中該海藻糖磷酸化酶的胺基酸序列包含在一個或多個胺基酸位置處的一胺基酸取代，其中該一個或多個胺基酸位置係選自由以下的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705。

【0308】 於一具體實施例中，該第一方面的多胜肽為一海藻糖磷酸化酶，較佳為一具有本文所公開之一個或多個特徵的海藻糖磷酸化酶。據此，本發明之海藻糖磷酸化酶的公開內容，特別是根據每一個及任何方面，同樣適用於本

發明的多胜肽，反之亦然。此外，於一具體實施例中，本發明之多胜肽為具有海藻糖磷酸化酶活性的一多胜肽。較佳地，海藻糖活性為本文定義的活性。

【0309】 一包含一胺基酸序列的海藻糖磷酸化酶之措辭，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少80%同一性及/或至少80%同源性，其中該海藻糖磷酸化酶的胺基酸序列包含在一個或多個胺基酸位置處的胺基酸取代，其中該一個或多個胺基酸位置係選自由以下胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705，以及，於一具體實施例中，與該措辭一海藻糖磷酸化酶與SEQ ID NO: 1具有至少80%同源性具有相同含義，其中該海藻糖磷酸化酶在選自以下一個或多個位置處具有一取代：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705，其中每個位置對應SEQ ID NO: 1的胺基酸序列的一個位置。

【0310】 迄今為止，本發明之海藻糖磷酸化酶，較佳包括本發明的任何方面，為一突變的海藻糖磷酸化酶，更具體為具有SEQ ID NO: 1的胺基酸序列的一海藻糖磷酸化酶之突變的海藻糖磷酸化酶。於一具體實施例中，本發明之海藻糖磷酸化酶為一具有與SEQ ID NO: 1的胺基酸序列不同的胺基酸序列之海藻糖磷酸化酶。於另一具體實施例中，本發明的海藻糖磷酸化酶為一海藻糖磷酸化酶，其不同於由SEQ ID NO: 1的胺基酸序列組成的海藻糖磷酸化酶。

【0311】 根據本發明之第一方面，本發明之海藻糖磷酸化酶在SEQ ID NO: 1的至少一個胺基酸位置上包含至少一個胺基酸取代。值得注意的是，原則上，這種取代的胺基酸位置及取代的胺基酸的種類都是重要的。據此，於本發

明的海藻糖磷酸化酶的一個具體實施例中，該胺基酸取代在SEQ ID NO: 1的特定的指定胺基酸位置之一處進行，其中，任選地，存在於SEQ ID NO: 1的這種位置上的胺基酸殘基對本發明之海藻糖磷酸化酶中存在的取代胺基酸殘基的種類沒有任何影響；或者，任選地，存在於SEQ ID NO: 1的這種位置上的非常胺基酸殘基與存在於本發明的海藻糖磷酸化酶中的取代的胺基酸殘基的種類有關。替代可能是非保守或保守的。為了本發明之目的，保守意指將胺基酸G換為A；A換為G、S；V換為I、L、A、T、S；I換為V、L、M；L換為I、M、V；M換為L、I、V；P換為A、S、N；F換為Y、W、H；Y換為F、W、H；W換為Y、F、H；R換為K、E、D；K換為R、E、D；H換為Q、N、S；D換為N、E、K、R、Q；E換為Q、D、K、R、N；S換為T、A；T換為S、V、A；C換為S、T、A；N換為D、Q、H、S；Q換為E、N、H、K、R。

【0312】 還據此，於本發明之海藻糖磷酸化酶的一個具體實施例中，該胺基酸取代為其中SEQ ID NO: 1的任何所示胺基酸位置的非常胺基酸殘基被取代之胺基酸取代，任選地，取代的胺基酸殘基的胺基酸位置不完全如參照SEQ ID NO: 1所示的那樣；相反地，於一具體實施例中，取代的胺基酸殘基的胺基酸位置與SEQ ID NO: 1的相應位置不同，較佳為1至5個，較佳為1至3個，更佳為1至2個，最佳為1個胺基酸位置。

【0313】 就本發明之海藻糖磷酸化酶的特徵在於包含在一個或多個特定胺基酸位置處的胺基酸取代而言，應當理解的是，本發明之海藻糖磷酸化酶係為在一個所示的胺基酸位置之一具有單一取代的海藻糖磷酸化酶；然而，也應該理解的是，如此描述的本發明之海藻糖磷酸化酶也包括其中多於一個胺基酸殘基被取代的那些海藻糖磷酸化酶，例如二個、三個等胺基酸殘基。在後一種情況下，被取代的胺基酸殘基的數目為介於1及指定及定義為被取代的胺基酸殘基數目之間的任何整數。據此，本發明之海藻糖磷酸化酶為任何具有或實現一

胺基酸取代，或具有或實現指定及定義為被取代的胺基酸殘基的任何組合，實際上為每個及任何的排列，的海藻糖磷酸化酶。

【0314】 據此，該海藻糖磷酸化酶可以包含一胺基酸取代，所述胺基酸取代分別在胺基酸位置712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705的一個或任何組合處。因此，於一具體實施例中，本發明之海藻糖磷酸化酶在SEQ ID NO: 1的該胺基酸位置的一個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少二個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少三個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少四個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少五個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少六個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少七個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少八個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少九個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少十個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少十一個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少十二個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少十三個上包含至少一個胺基酸取代，在SEQ ID NO: 1的該胺基酸位置的至少十四個上包含至少一個胺基酸取代。

【0315】 然而，也在本發明之範圍內的是本發明之海藻糖磷酸化酶在SEQ ID NO: 1所示的胺基酸位置處包含甚至多於上述取代，較佳為在該海藻糖磷酸化酶的胺基酸序列符合本發明之海藻糖磷酸化酶的最小結構特徵及/或最小功能特徵中的至少一個的條件下。這樣的最小結構特徵為該海藻糖磷酸化酶包含一胺

基酸序列，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序具有列至少80%同一性及/或至少80%同源性，其中該海藻糖磷酸化酶的胺基酸序列包含在一個或多個胺基酸位置處的一胺基酸取代，其中該一個或多個胺基酸位置各自且獨立地選自由以下SEQ ID NO: 1的胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705。這樣的最小功能特徵為包括本文公開的任何其他的說明書的特徵(A)、(B)、(C)、(D)與(E)中的至少一個或其任何組合，其中特徵(A)為於52°C作用15分鐘後的熱穩定性，其由 (i) 至少30%至90%；或 (ii) 至少55%至100%的剩餘活性定義，特徵(B)為於52°C作用15分鐘後的熱穩定性，其特徵在於(i) Tm30值至少為52°C及/或Tm50值至少為52°C，特徵(C)為以52°C至90°C之間的Tm30值及/或52°C至90°C之間的Tm50值為特徵的熱穩定性，特徵(D)為以以下為特徵的熱穩定性：(i) 於45°C半衰期為至少3小時至9天的製程穩定性，(ii) 於45°C半衰期為24小時至9天的製程穩定性，及/或於45°C半衰期為4天至9天的製程穩定性，以及特徵(E)為相對活性，表示為介於0.65和1.0之間的100/500-比率，其中該100/500-比率被定義為[100 mM葡萄糖與100 mM α-葡萄糖-1磷酸鹽的海藻糖活性] / [500 mM葡萄糖與100 mM α-葡萄糖-1-磷酸鹽的海藻糖活性] 的比率。在本發明中，本發明之海藻糖磷酸化酶展現特徵(A)、特徵(B)、特徵(C)、特徵(D)、特徵(E)、特徵(A)及(B)、特徵(A)及(C)、特徵(A)及(D)、特徵(A)及(E)、特徵(B)及(C)、特徵(B)及(D)、特徵(B)及(E)、特徵(C)及(D)、特徵(C)及(E)、特徵(D)及(E)、特徵(A)、(B)及(C)、特徵(A)、(B)及(D)、特徵(A)、(B)及(E)、特徵(B)、(C)及(D)、特徵(B)、(C)及(E)、特徵(C)、(D)及(E)、特徵(A)、(B)、(C)及(D)、特徵(A)、(B)、(C)及(E)、特徵(B)、(C)、(D)及(E)、特徵(A)、(C)、(D)及(E)，或特徵(A)、(B)、(C)、(D)及(E)。

【0316】 在本發明之海藻糖磷酸化酶的一具體實施例中，該海藻糖磷酸化酶的胺基酸序列在SEQ ID NO: 1的胺基酸序列的至少二個胺基酸位置處包含一胺基酸取代。這些至少二個胺基酸位置在本文中也稱為二個胺基酸對位置。在本發明之海藻糖磷酸化酶的一具體實施例中，該二個胺基酸對位置係選自由下列所組成之群組：V10與L114、V10與I118、V10與Y220、V10與N225、V10與A304、V10與T323、V10與F349、V10與G357、V10與P383、V10與Q487、V10與A506、V10與V550、V10與S556、V10與T564、V10與D590、V10與A649、V10與K705、V10與L712、L114與I118、L114與Y220、L114與N225、L114與A304、L114與T323、V10與F349、L114與G357、L114與P383、L114與Q487、L114與A506、L114與V550、L114與S556、L114與T564、L114與D590、L114與A649、L114與K705、L114與L712、I118 an Y220、I118與N225、I118與A304、I118與T323、V10與F349、I118與G357、I118與P383、I118與Q487、I118與A506、I118與V550、I118與S556、I118與T564、I118與D590、118與A649、L118與K705、I118與L712、Y220與N225、Y220與A304、Y220與T323、V10與F349、Y220與G357、Y220與P383、Y220與Q487、Y220與A506、Y220與V550、Y220與S556、Y220與T564、Y220與D590、Y220與A649、Y220與K705、Y220與L712、N225與A304、N225與T323、V10與F349、N225與G357、N225與P383、N225與Q487、N225與A506、N225與V550、N225與S556、N225與T564、N225與D590、N225與A649、N225與K705、N225與L712、A304與T323、V10與F349、A304與G357、A304與P383、A304與Q487、A304與A506、A304與V550、A304與S556、A304與T564、A304與D590、A304與A649、A304與K705、A304與L712、T323與F349、T323與G357、T323與P383、T323與Q487、T323與A506、T323與V550、T323與S556、T323與T564、T323與D590、T323與A649、T323與K705、T323與L712、F349與G357、F349與P383、F349與Q487、F349與A506、F349與V550、F349與

S556、F349與T564、F349與D590、F349與A649、F349與K705、F349與L712、G357與P383、G357與Q487、G357與A506、G357與V550、G357與S556、G357與T564、G357與D590、G357與A649、G357與K705、G357與L712、P383與Q487、P383與A506、P383與V550、P383與S556、P383與T564、P383與D590、P383與A649、P383與K705、P383與L712、Q487與A506、Q487與V550、Q487與S556、Q487與T564、Q487與D590、Q487與A649、Q487與K705、Q487與L712、A506與V550、A506與S556、A506與T564、A506與D590、A506與A649、A506與K705、A506與L712、V550與S556、V550與T564、V550與D590、V550與A649、V550與K705、V550與L712、S556與T564、S556與D590、S556與A649、S556與K705、S556與L712、T564與D590、T564與A649、T564與K705、T564與L712、D590與A649、D590與K705、D590與L712、A649與L712、A649與K705，以及K705與L712。本發明之海藻糖磷酸化酶的另外的具體實施例為其中該二個胺基酸對位置係選自更有限的群組，包括本文具體公開的二個胺基酸對位置的更有限群組的那些。在本發明的範圍內，一海藻糖磷酸化酶在SEQ ID NO: 1的這二對胺基酸對位置之一處包含一胺基酸取代。

【0317】 如本文所公開的，於另一具體實施例中，該海藻糖磷酸化酶除了在SEQ ID NO: 1的二個胺基酸對位置的胺基酸取代之外，還包含在SEQ ID NO: 1的至少一個或多個另外的胺基酸位置處的一胺基酸取代。SEQ ID NO: 1的這樣的一個或多個另外的胺基酸位置係各別且獨立地選自以下SEQ ID NO: 1的每個胺基酸位置所組成之群組：712、383、10、114、118、192、197、220、225、304、306、318、323、339、349、357、459、476、481、484、487、488、506、511、526、530、532、533、537、550、556、564、590、649、667、703與705。本發明之海藻糖磷酸化酶的其他具體實施例為其中一個或多個另外的胺基酸位置，係選自於一更受限制的群組的那些，包括那些如本文具體公開之另外的胺基酸

位置的更有限的群組。在本發明之範圍內，一海藻糖磷酸化酶在SEQ ID NO: 1的二個胺基酸對位置的這些對之一處以及在該另外的胺基酸序列之一處包含一胺基酸取代。據此，本發明的海藻糖磷酸化酶各別在一具體實施例中為，在至少三個胺基酸位置，亦即在SEQ ID NO: 1的該二個胺基酸對位置與一個該另外的胺基酸位置處，具有一胺基酸取代之海藻糖磷酸化酶，在至少四個胺基酸位置，亦即在SEQ ID NO: 1的該二個胺基酸對位置與二個該另外的胺基酸位置處，具有一胺基酸取代之海藻糖磷酸化酶，在至少五個胺基酸位置，亦即在SEQ ID NO: 1的該二個胺基酸對位置與三個該另外的胺基酸位置處，具有一胺基酸取代之海藻糖磷酸化酶，或在至少六個胺基酸位置，亦即在SEQ ID NO: 1的該二個胺基酸對位置與四個該另外的胺基酸位置處，具有一胺基酸取代之海藻糖磷酸化酶。本發明之海藻糖磷酸的一具體實施例，其中該海藻糖磷酸化酶在至少四個胺基酸位置上包含一胺基酸取代，為在SEQ ID NO: 1的每個胺基酸位置712、383、114及118處包含一胺基酸取代的海藻糖磷酸化酶。本發明之海藻糖磷酸的一具體實施例，其中該海藻糖磷酸化酶在至少五個胺基酸位置上包含一胺基酸取代，為在SEQ ID NO: 1的每個胺基酸位置712、383、114、118與304處，及/或在SEQ ID NO: 1的每個胺基酸位置712、383、114、118與357處包含一胺基酸取代的海藻糖磷酸化酶。本發明之海藻糖磷酸的一具體實施例，其中該海藻糖磷酸化酶在至少六個胺基酸位置上包含一胺基酸取代，為在SEQ ID NO: 1的每個胺基酸位置712、383、114、118、304與357處包含一胺基酸取代的海藻糖磷酸化酶。

【0318】 於又一具體實施例中，該海藻糖磷酸化酶除了包含在SEQ ID NO: 1的二個胺基酸對位置上的該胺基酸取代以及在SEQ ID NO: 1的至少另外一個胺基酸位置上的該胺基酸取代，並帶有SEQ ID NO: 1的一個或多個另外的胺基酸位置，較佳為本文公開的SEQ ID NO: 1的一個、二個、三個或四個胺基酸位置之外，仍可包含在SEQ ID NO: 1的更進一步的一個或多個胺基酸位置上的一胺基

酸取代。 SEQ ID NO: 1的這種一個或多個更進一步的胺基酸位置係各別並獨立地選自由下列SEQ IS NO: 1的每個胺基酸位置所組成之群組：10、192、197、220、225、306、318、323、339、349、459、476、481、484、487、488、506、511、526、530、532、 533、537、550、556、564、649、667、703與705。本發明之海藻糖磷酸化酶的另外的具體實施例為該一個或多個更進一步的胺基酸位置係選自一更有限的群組的那些，包括本文中具體公開的另外的胺基酸位置的更有限的群組。

【0319】 關於本文公開的具體取代，應該注意的是，根據胺基酸取代領域中的常規做法，取代係指進行取代的胺基酸位置的編號，其中左側的數字在兩側由胺基酸殘基指示，其左側的胺基酸殘基是存在於未取代的胺基酸序列中的胺基酸殘基，而右側的胺基酸殘基是存在於取代的胺基酸序列中的胺基酸殘基。因此，僅為了說明之目的，取代V10R表示在胺基酸位置10，纈胺酸殘基被精胺酸所取代。

【0320】 在本發明之範圍內，如本文所公開之SEQ ID NO: 1的胺基酸位置處的任何突變係以單獨或以任何組合之形式，產生仍為海藻糖磷酸化酶活性的蛋白質，更具體而言，係以根據EC 2.4.1.213之海藻糖磷酸化酶。較佳地，在EC號為EC 2.4.1.213的海藻糖磷酸化酶中的任何該突變結果，不論是單獨或任何組合，如本文所公開，具有特徵(A)、(B)、(C)、(D)與(E)中的至少一個，或這樣的特徵的任何組合。

【0321】 應當理解的是，除了本文具體公開的取代之外，本發明之海藻糖磷酸化酶較佳為如本文所公開的SEQ ID NO: 1的胺基酸位置上的該取代，進一步及/或不同的取代是可以被製造的。較佳地，這樣的進一步取代在與SEQ ID NO: 1的胺基酸位置D379、H403、R507與K512不同的位置處進行，該位置被描述為正確的反應催化所必需的。

【0322】 已知如何分別確定胺基酸殘基的聚合物的同一性及同源性。同源性較佳係使用BLASTP (參見，例如，Stephen F. Altschul, Thomas L. Madden, Alejandro A. Schäffer, Jinghui Zhang, Zheng Zhang, Webb Miller，以及David J. Lipman (1997年) "Gapped BLAST and PSI-BLAST: a new generation of protein database search programs", Nucleic Acids Res. 25:3389-3402；或 Stephen F. Altschul, John C. Wootton, E. Michael Gertz, Richa Agarwala, Aleksandr Morgulis, Alejandro A. Schäffer，以及Yi-Kuo Yu (2005年) “Protein database searches using compositionally adjusted substitution matrices.” FEBS J. 272:5101-5109)。

【0323】 於一具體實施例中，本發明之海藻糖為一分類為EC2.4.1.231的磷酸化酶，其催化海藻糖的磷酸鹽裂解，並使用無機磷酸鹽作為葡糖基受體，將端基異構構象淨保留在葡萄糖與α-D-葡萄糖-1磷酸鹽(aG1P)。這樣的反應是可逆的，因此，本發明之海藻糖磷酸化酶將葡萄糖與α-D-葡萄糖-1磷酸鹽(aG1P)轉化為海藻糖與無機磷酸鹽。海藻糖為二糖α-D-吡喃葡萄糖基α-D-吡喃葡萄糖苷(α,α-海藻糖)，其特徵在於具有如IUPAC定義的分子結構為任何物理形式的(2R,3S,4S,5R,6R)-2-(羥甲基)-6-[(2R,3R,4S,5S,6R)-3,4,5-三羥基-6-(羥基甲基)氧雜環戊烷-2-基]氧基噁唑-3,4,5-三醇。

【0324】 於又一具體實施例中，基於胺基酸序列的相似性，本發明之海藻糖磷酸化酶在碳水化合物-活性酶資料庫中被歸類為糖基轉移酶家族GT4的成員(CAZy，Lombard等人(2014年) Nucleic Acids Res 42: D490-D495，http://www.cazy.org/)。

【0325】 於一具體實施例中，本發明之海藻糖磷酸化酶與葡糖基單醣及α-D-葡萄糖-1磷酸鹽反應。於一較佳具體實施例中，該葡糖基單醣為葡萄糖，其中反應產物較佳為海藻糖。

【0326】 於又一具體實施例中，本發明之海藻糖磷酸化酶與不同於葡萄糖的單醣反應。這種不同於葡萄糖的單醣較佳為選自D-甘露糖、2-去氧D-葡萄糖、2-氟D-葡萄糖2-去氧-2-氟-D-葡萄糖、5-硫代-D-葡萄糖與2-酮-D-葡萄糖，其係被描述為適合用於被分類為EP 2.4.1.231的磷酸化酶之單醣，參閱，例如，(Schwarz等人，J Biotechnol 129, 140-150 (2007年), Nidetzky 2001等人，Biochem J (2001年) 360, 727-736)。

【0327】 於又一具體實施例中，本發明之海藻糖磷酸化酶不與β-D-葡萄糖-1-磷酸鹽、α-D-半乳糖1-磷酸鹽、α-D-甘露糖1-磷酸鹽，或α-木糖1-磷酸鹽反應而作為取代αG1P的替代糖基供體(Schwarz等人，J Biotechnol 129, 140-150 (2007年)，Saito等人，Appl Microbiol Biotechnol 64: 4340-4345 (1998年))。

【0328】 根據另一具體實施例，本發明之海藻糖磷酸化酶較佳為分類為EC 2.4.1.231的磷酸化酶，不磷酸裂解其他二糖，例如α,β-海藻糖、β,β-海藻糖、蔗糖、纖維二糖、乳糖、麥芽糖、異麥芽酮糖、異麥芽糖、乳果糖或蜜二糖(參見，例如，Schwarz等人，J Biotechnol 129, 140-150 (2007年)，Eis等人，FEBS Letters 440 (1998年) 440-443，Saito等人，Appl Microbiol Biotechnol 64: 4340-4345 (1998年))。

【0329】 於第二方面，本發明涉及一具有某些功能特徵的多胜肽。較佳地，該多胜肽為具有海藻糖磷酸化酶活性的多胜肽。更佳地，該多胜肽為一海藻糖磷酸化酶。

【0330】 於第二方面之一較佳具體實施例中，其也是第二方面的任何先前具體實施例的一具體實施例，並且也是本發明之另一方面，該多胜肽包含一胺基酸序列，其中該胺基酸序列的多胜肽，較佳為海藻糖磷酸化酶的多胜肽，係與SEQ ID NO: 1的胺基酸序列具有至少80%同一性及/或至少80%同源性，其中該多胜肽，較佳為海藻糖磷酸化酶，具有特徵(A)、(B)、(C)、(D)與(E)中的至少一

個或其任何組合，特徵(A)為於52°C作用15分鐘後的熱穩定性，其係由一殘餘活性所定義，特徵(B)為於52°C作用15分鐘後的熱穩定性，由此這種熱穩定性由最小Tm30值及/或最小Tm50值所定義，其中Tm30值與Tm50值如本文所定義，特徵(C)為由一特定溫度範圍內的Tm30值及/或Tm50值所定義之熱穩定性，特徵(D)為熱穩定性，其中熱穩定性由製程穩定性定義，製程穩定性定義為半衰期，較佳為海藻糖磷酸化酶活性於45°C一段時間的半衰期，特徵(E)為相對活性表示為100/500比率。

【0331】 於第二方面之另一較佳具體實施例中，其也是第二方面的任何前述具體實施例的一具體實施例，並且也是本發明之另一方面，本發明涉及一熱穩定的海藻糖磷酸化酶變體，其中在含有1 M蔗糖的緩衝液中於52°C作用15分鐘後保留其初始活性的至少30%，且在室溫作用15分鐘後測定其初始活性。較佳地，這樣的海藻糖變體為一熱穩定的海藻糖磷酸化酶變體，更佳為根據本發明之第一方面的海藻糖磷酸化酶。

【0332】 於第二方面之另一較佳具體實施例中，其也是第二方面的任何前述具體實施例的一具體實施例，並且也是本發明之另一方面，本發明涉及一來自裂褶菌(*Schizophyllum commune*)的海藻糖磷酸化酶之熱穩定變體，其中該變體於52°C作用15分鐘後具有至少30%的殘餘活性。較佳地，這樣的海藻糖變體為一熱穩定的海藻糖磷酸化酶變體，更佳為根據本發明之第一方面的海藻糖磷酸化酶。

【0333】 於第二方面之另一較佳具體實施例中，其也是第二方面的任何前述具體實施例的一具體實施例，並且也是本發明之另一方面，本發明涉及一包含SEQ ID NO: 1胺基酸序列之海藻糖磷酸化酶的變體，其中該變體於52°C作用15分鐘後具有至少30%的殘餘活性。較佳地，這樣的海藻糖變體為一熱穩定的海藻糖磷酸化酶變體，更佳為根據本發明之第一方面的海藻糖磷酸化酶。

【0334】 於第二方面之另一較佳具體實施例中，其也是第二方面的任何前述具體實施例的一具體實施例，並且也是本發明之另一方面，本發明涉及一來自舞菇(*Grifola frondosa*)之海藻糖磷酸化酶的熱穩定變體，其中該變體於52°C作用15分鐘後具有至少30%的殘餘活性。較佳地，這樣的海藻糖變體為一熱穩定的海藻糖磷酸化酶變體，更佳為根據本發明之第十四方面的海藻糖磷酸化酶。

【0335】 於第二方面之另一較佳具體實施例中，其也是第二方面的任何先前具體實施例的一具體實施例，並且也是本發明之另一方面，本發明涉及一多胜肽，較佳為海藻糖酸化酶的多胜肽，其為一如本文所述的任何方面或任何較佳具體實施例中所定之多胜肽的酶促活性片段，較佳海藻糖磷酸化酶的片段，更佳為根據本發明之第一、第三、第四、第五，或第十四方面之海藻糖磷酸化酶。

【0336】 於第二方面之另一較佳具體實施例中，其也是第二方面的任何前述具體實施例的一具體實施例，並且也是本發明之另一方面，本發明涉及一具有海藻糖磷酸化酶活性的多胜肽，其中該多胜肽包含一胺基酸序列，其中該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少20%的同源性，其中該多胜肽包含選自下列胺基酸位置的二個或更多個：712A、712G、712I、712M、712P或712V、較佳為712M、383A、383G、383I、383L、383M、383V、383N、383C、383Q、383S或383T、較佳為383V或383S、最佳為383V、114A、114G、114I、114M、114P或114V、較佳為114I、118A、118G、118I、118L、118M、118P或118V、較佳為118V、225A、225G、225I、225L、225M、225P或225V、較佳為225V、304G、304I、304L、304M、304P或304V、較佳為304I 323A、323G、323I、323L、323M、323P、或323V、較佳為323I、349W或349Y、較佳為349Y、357A、357I、357L、357M、357P或357V、較佳為357A、487A、487G、487I、487L、487M、487P或487V、較佳為487A、487G、487L或487V、更佳為487A、550A、

550G、550I、550L、550M或550P、較佳為550I、556N、556C、556Q或S556T、較佳為556T、564D或564E、較佳為564E、590N、590C、590Q、590S、590T、590A、590G、590I、590L、590M、590P或590V、較佳為590N或590A、更佳為590N、and 649D或649E、較佳為649E，編號係指SEQ ID NO: 1中的比對位置。

【0337】 本領域技術人員將理解如何鑑定對應於SEQ ID NO: 1中的上述位置的任何海藻糖磷酸酶的野生型序列的胺基酸位置。為了澄清，且不限制ㄋ本發明的公開內容，圖3顯示了SEQ ID NO: 1與本領域已知的幾種野生型海藻糖磷酸化酶的完全比對。此外，表5顯示了另外的野生型海藻糖磷酸化酶的序列位置中的編號及胺基酸，其對應於SEQ ID NO: 1的位置114、118、225、304、323、349、383、487、550、556、564、590、649，以及712。

【0338】 於另一較佳具體實施例中，其亦為該第二方面之任何先前具體實施例的一具體實施例，本發明涉及根據下表的多胜肽A_1-A_{10}至N_1-N_{10} (具有表示位置數目的列與代表同源性百分比的排)，其中具有根據本發明之具有與SEQ ID NO: 1不同的同源性的具有海藻糖磷酸化酶活性之多胜肽包含選自以下胺基酸位置之不同數目的組合：712A、712G、712I、712M、712P或712V、較佳為712M、383A、383G、383I、383L、383M、383V、383N、383C、383Q、383S或383T、較佳為383V或383S、最佳為383V、114A、114G、114I、114M、114P或114V、較佳為114I、118A、118G、118I、118L、118M、118P或118V、較佳為118V、225A、225G、225I、225L、225M、225P或225V、較佳為225V、304G、304I、304L、304M、304P或304V、較佳為304I 323A、323G、323I、323L、323M、323P、或323V、較佳為323I、349W或349Y、較佳為349Y、357A、357I、357L、357M、357P或357V、較佳為357A、487A、487G、487I、487L、487M、487P或487V、較佳為487A、487G、487L或487V、更佳為487A、550A、550G、550I、550L、550M或550P、較佳為550I、556N、556C、556Q或S556T、較佳為556T、564D

或564E、較佳為564E、590N、590C、590Q、590S、590T、590A、590G、590I、590L、590M、590P或590V、較佳為590N或590A、更佳為590N、and 649D或649E、較佳為649E，編號係指SEQ ID NO: 1中的比對位置。例如位置712M/118V的組合描述了在與SEQ ID NO: 1的位置712對齊的位置具有甲硫胺酸，以及在與SEQ ID NO: 1的位置118對齊的位置處具有纈胺酸之多胜肽。

【0339】 表1

編號	與 SEQ ID NO:1 的同源性	結合的取代位置之數目													
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	≥ 20% < 30%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	≥ 30% < 40%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3	≥ 40% < 50%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4	≥ 50% < 55%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5	≥ 55% < 60%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	≥ 60% < 65%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
7	≥ 65% < 70%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
8	≥ 70% < 75%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
9	≥ 75% < 80%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10	≥ 80%	2	3	4	5	6	7	8	9	10	11	12	13	14	15

【0340】 例如，D_4係指多胜肽與SEQ ID NO: 1具有至少50%的同源性，並且在選自712A、712G、712I、712M、712P或712V、較佳為712M、383A、383G、383I、383L、383M、383V、383N、383C、383Q、383S或383T、較佳為383V或

383S、最佳為383V、114A、114G、114I、114M、114P或114V、較佳為114I、118A、118G、118I、118L、118M、118P或118V、較佳為118V、225A、225G、225I、225L、225M、225P或225V、較佳為225V、304G、304I、304L、304M、304P或304V、較佳為304I 323A、323G、323I、323L、323M、323P、or 323V、較佳為323I、349W或349Y、較佳為349Y、357A、357I、357L、357M、357P或357V、較佳為357A、487A、487G、487I、487L、487M、487P或487V、較佳為487A、487G、487L或487V、更佳為487A、550A、550G、550I、550L、550M或550P、較佳為550I、556N、556C、556Q或S556T、較佳為556T、564D或564E、較佳為564E、590N、590C、590Q、590S、590T、590A、590G、590I、590L、590M、590P或590V、較佳為590N或590A、更佳為590N、以及649D或649E、較佳為649E的5個位置包含取代。

【0341】 於另一較佳具體實施例中，其亦為該第二方面之任何先前具體實施例的一具體實施例，本發明涉及具有海藻糖磷酸化酶活性的多胜肽，其中該多胜肽包含一胺基酸序列，其中該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少77%的同源性，其中該多胜肽在選自胺基酸位置383、114、225、304、323、349、357、550、556、564以及649的二個或多個處包含一胺基酸取代，其中該胺基酸編號係指在SEQ ID NO: 1中的比對位置。

【0342】 於另一較佳具體實施例中，其亦為該第二方面之任何先前具體實施例的一具體實施例，本發明涉及具有海藻糖磷酸化酶活性的多胜肽，其中該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少68%的同源性，其中該多胜肽在選自胺基酸位置383、114、225、304、323、349、357、550、556以及564的二個或多個處包含一胺基酸取代，其中該胺基酸編號係指在SEQ ID NO: 1中的比對位置。

【0343】 於另一較佳具體實施例中，其亦為該第二方面之任何先前具體實施例的一具體實施例，本發明涉及具有海藻糖磷酸化酶活性的多胜肽，其中該多胜肽包含一胺基酸序列，其中該胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少63%的同源性，其中該多胜肽在選自胺基酸位置383、114、225、304、323、349、357、556以及564的二個或多個處包含一胺基酸取代，其中該胺基酸編號係指在SEQ ID NO: 1中的比對位置。

【0344】 於另一較佳具體實施例中，其亦為該第二方面之任何先前具體實施例的一具體實施例，本發明涉及具有海藻糖磷酸化酶活性的多胜肽，其中胺基酸序列與SEQ ID NO: 1的胺基酸序列至少具有50%同源性。

【0345】 於另一較佳具體實施例中，本發明涉及具有海藻糖磷酸化酶活性之多胜肽，其中胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少51%、52%、53%、54%、55%、56%、57%、58%、59%、60%、61%、62%、63%、64%、65%、66%、67%、68%、69%、70%、71%、72%、73%、74%、75%、76%、77%、78%、79%或80%的同源性。

【0346】 還將理解的是，該多胜肽且較佳為該第一方面之海藻糖磷酸化酶以及其任何具體實施例的多胜肽可為該第二方面之一具體實施例以及其任何具體實施例的多胜肽。還應理解的是，該多胜肽且較佳為該第二方面之海藻糖磷酸化酶以及其任何具體實施例的多胜肽可為該第一方面之一具體實施例以及其任何具體實施例的多胜肽。

【0347】 於第六方面，本發明涉及一種使葡糖基單醣與α-D-葡萄糖-1-磷酸鹽反應之方法，其中該方法包括使葡糖基單醣與α-D-葡萄糖-1磷酸鹽與本發明之一海藻糖磷酸化酶反應，較佳為根據第一及/或第二方面之海藻糖磷酸化酶。

【0348】 於第七方面，本發明涉及將葡萄糖與α-D-葡萄糖-1磷酸轉化為海藻糖與無機磷酸鹽之方法，其中該方法包括以本發明之一海藻糖磷酸化酶，較

佳為根據第一及/或第二方面之海藻糖磷酸化酶，使葡萄糖與α-D-葡萄糖-1-磷酸海藻糖反應為海藻糖及無機磷酸鹽。

【0349】 於第八方面，本發明涉及將海藻糖與無機磷酸鹽轉化為葡萄糖與α-D-葡萄糖-1-磷酸之方法，且其中該方法包括以本發明之一海藻糖磷酸化酶，較佳為根據第一及/或第二方面之海藻糖磷酸化酶，使海藻糖及無機磷酸鹽反應為葡萄糖與α-D-葡萄糖-1磷酸鹽。

【0350】 於第九方面，本發明涉及根據第一及/或第二方面之海藻糖磷酸化酶用於生產海藻糖之用途。

【0351】 於第十方面，本發明涉及一種製備海藻糖之方法，包括在一海藻糖磷酸化酶存在下，在至少40°C的溫度下使葡萄糖與α-D-葡萄糖-1磷酸鹽反應，其中該海藻糖磷酸化酶

(i) 在含有1M蔗糖的一緩衝液中於52°C下作用15分鐘，與沒有熱處理的活性相比，保留至少30%的活性；及/或(ii) 在100 mM葡萄糖下的活性與在500 mM葡萄糖下的活性之比率至少為0.65。

【0352】 於一具體實施例中，該海藻糖磷酸化酶為根據第一及/或第二方面之海藻糖磷酸化酶。

【0353】 於第十一方面，本發明涉及一種提高一海藻糖磷酸化酶之熱穩定性的方法，其中該方法包括：

- 比對一第一海藻糖磷酸化酶的一胺基酸序列與一第二海藻糖磷酸化酶的一胺基酸序列，

- 鑑定對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基取代提高了該第一海藻糖磷酸化酶的熱穩定性，

- 取代對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的在該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的一胺基酸殘基，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基的取代提高了該第一海藻糖磷酸化酶的熱穩定性，

其中該第一海藻糖磷酸化酶為包含根據SEQ ID NO: 1的胺基酸序列之海藻糖磷酸化酶。

【0354】 在本發明範圍內，本發明之海藻糖磷酸化酶係以全長酶之形式存在。本發明之海藻糖磷酸化酶作為片段存在也在本發明之範圍內。較佳地，所述片段保留海藻糖磷酸化酶活性，較佳為如本文分別對本發明之海藻糖磷酸化酶所定義及分別公開的海藻糖磷酸化酶活性。

【0355】 於另一方面，本發明涉及編碼本發明之海藻糖磷酸化酶的核酸分子。通常已知基於本文公開的胺基酸序列衍生此類核酸分子。較佳地，核酸序列取決於用於表現本發明之海藻糖磷酸化酶的表現系統。用於表現本發明之海藻糖磷酸化酶的較佳表現系統為大腸桿菌(*E. coli*)、芽孢桿菌(*Bacillus sp*)、巴斯德畢赤酵母菌(*P. pastoris*)及真菌表現系統如麴菌屬(*Aspergillus sp.*)。

【0356】 於另一方面，本發明涉及含有編碼本發明之海藻糖磷酸化酶之核酸分子的載體。較佳地，該載體是表現載體。適用於表現酶的合適載體已經在現有技術中被描述。

【0357】 於另一方面，本發明涉及含有本發明載體之宿主生物體。已經描述了含有用於表現酶的載體之合適宿主，且較佳地，該宿主生物體為大腸桿菌(*E. coli*)、芽孢桿菌(*Bacillus sp*)、巴斯德畢赤酵母菌(*P. pastoris*)或真菌表現系統如麴菌屬(*Aspergillus sp.*)，較佳為大腸桿菌及巴斯德畢赤酵母菌。將這種載體整合到該宿主生物體中的方法也是已知的。

【0358】 於另一方面，本發明涉及用於表現海藻糖磷酸化酶之方法。所述方法包括培養如該說明書中所揭露之宿主生物體，其中該宿主生物體包含一表現載體，其中該表現載體包含一編碼根據本發明之海藻糖磷酸化酶的核酸分子，在允許所述核酸分子表現的條件下進行培養，並收穫該海藻糖磷酸化酶。

【0359】 在本發明的每個及任何方面，包括其任何具體實施例，的具體實施例中，使用如本文所公開之分析I測定Tm30值。

【0360】 在本發明的每個及任何方面，包括其任何具體實施例，的具體實施例中，使用如本文所公開之分析II測定Tm30值。

【0361】 在本發明的每個及任何方面，包括其任何具體實施例，的具體實施例中，使用如本文所公開之分析I測定Tm50值。

【0362】 在本發明的每個及任何方面，包括其任何具體實施例，的具體實施例中，使用如本文所公開之分析II測定Tm50值。

【0363】 在本發明的範圍內，本發明的每個及任何方面，包括其任何具體實施例，的海藻糖磷酸化酶以下列形式之一存在：液體溶液、乾燥粉末、冷凍乾燥的粉末、以一固定之形式。

【0364】 在本發明的每個及任何方面，包括其任何實施例，的實施例中，適用以下定義。

【0365】 **定義熱穩定性：**熱穩定性為酶在給定的時間段內暴露於特定的高溫後抵抗不可逆不活化的能力。計算在升高的溫度下作用一定時間的酶的殘餘活性作為酶活性與未在高溫下作用的酶樣品之相對關係。原則上可以使用任何活性測定來確定酶活性。為了本發明之目的，如下所述之分析1或分析2已經按照實施例中的規定使用。

【0366】 測量與描述熱穩定性有許多方法。為了本發明之目的，透過測量及描述一個或多個以下特徵來確定熱穩定性：

【0367】 *Tm30值*：就本發明之目的而言，Tm30值是在含有1 M蔗糖的緩衝液中在該溫度下作用15分鐘後，酶具有其初始活性的30%的溫度。初始活性為沒有溫度處理的各種酶的活性，即在室溫下作用15分鐘。原則上可以使用任何活性測定來確定酶活性；為了本發明之目的，已經使用如下所述之分析1或分析2，如實施例中所指定的。

【0368】 *Tm50值*：對於本發明之目的而言，Tm50值為在含有1 M蔗糖的緩衝液中在該溫度下作用15分鐘後酶具有其初始活性的50%時的溫度。初始活性為沒有溫度處理的各種酶的活性，即在室溫下作用15分鐘。原則上可以使用任何活性測定來確定酶活性；為了本發明之目的，已經使用如下所述之分析1或分析2，如實施例中所指定的。

【0369】 *製程穩定性/半衰期*: 對於本發明之目的而言，如實施例中所示，分別在40或45°C下，在具有1 M蔗糖的50 mM磷酸鉀緩衝液p H7中測定長期穩定性。半衰期定義為在t = 0分鐘時酶具有50%活性的期間。原則上可以使用任何活性測定來確定酶活性；為了本發明之目的，已經使用如下所述之分析1或分析2，如實施例中所指定的。

【0370】 **磷酸解活性與合成活性之定義：**由於TP催化海藻糖的可逆磷酸化裂解，因此可以在海藻糖磷酸解或合成的方向上測定活性。為了本發明之目的，將磷酸解活性定義為在如下所述之分析1的條件下，在無機磷酸鹽存在下將海藻糖切割成αG1P與葡萄糖的活性。合成活性定義為在如下所述之分析2的條件下由αG1P與葡萄糖合成海藻糖之活性。在本發明內，任何活性與該海藻糖磷酸化酶的任何活性於一具體實施例中為催化活性。

【0371】 分析I：使用連續偶聯分析於30°C下常規測定磷酸解活性，其中由海藻糖產生的aG1P透過磷葡萄糖變位酶轉化為葡萄糖-6-磷酸鹽。透過葡萄糖-6-磷酸脫氫酶將葡萄糖-6-磷酸鹽與NADP轉化為6-磷酸葡萄糖酸與NADPH。檢

測係基於在340 nm波長處測量NADPH的吸光度。測定溶液含有：75 mM的磷酸鉀緩衝液pH 7、2.5 mM的NADP、10 μM葡萄糖-1,6-二磷酸鹽、10 mM $MgCl_2$、225 mM海藻糖、3 U/mL的磷葡萄糖變位酶與3.4 U/mL葡萄糖-6-磷酸脫氫酶。

【0372】 分析II：使用以下條件於40°C下常規測定合成活性：50 mM鈉MES緩衝液pH 7、100 mM aG1P與100或500 mM葡萄糖濃度，如給出的濃度。反應程序係透過基於在酸性條件下與鉬酸鹽的錯合物形成之測定來測量釋放之磷酸鹽而不連續地測定。鉬酸鹽錯合物被硫酸亞鐵還原並產生藍色，在750 nm波長處以分光光度法分析。為了分析，將250 μL樣品與250 μL 0.5M HCl與500 μL鉬酸鹽試劑(73.2 g/L $Fe(II)SO_4*7H_2O$及10 g/L鉬酸銨$*4H_2O$於3.5% 硫酸中)。在室溫作用15-30分鐘後，在750 nm波長處測量吸光度。樣品中無機磷酸鹽的量以外部標準品量化。

【0373】 定義S/P比率：就本發明而言，S/P比率定義為如實施例中所述，使用500 mM葡萄糖分別以分析1與分析2測量之磷酸解活性與合成活性之間的比率。

【0374】 **定義100/500比率：**就本發明而言，根據*分析*2，100/500比率係為使用100 mM葡萄糖的TP變體的活性與使用500 mM葡萄糖與100 mM aG1P的TP變體的活性之間的比率。 與野生型酶相比，酶變體的100/500比率的增加表示葡萄糖的K_M值降低。

【0375】 於一具體實施例中，若無相反之說明，透過該多胜肽被展示或將被展示的，且較佳為任何海藻糖磷酸化酶的，本發明之酶活性、磷酸解活性以及合成活性由本文所述之方法及分析所各別定義及各別確定。

【0376】 表2：序列編號的概述：野生型海藻糖磷酸化酶

序列編號 (SEQ ID)	**來源**
SEQ ID NO: 1	野生型，裂褶菌(*S. commune*)

SEQ ID NO: 80	野生型，簇生垂幕菇(*Hypholoma sublateritium*) FD-334 SS-4, Genbank: KJA27491.1
SEQ ID NO: 81	野生型，舞菇(*Grifola frondosa*), Genbank: ADM15725
SEQ ID NO: 82	野生型，秀珍菇(*Pleurotus ostreatus*), Genbank: KDQ33172.1
SEQ ID NO: 83	野生型，環柄香菇(*Lentinus sajor-caju*), UniProtKB/Swiss-Prot: Q9UV63.1
SEQ ID NO: 160	野生型，舞菇(*Grifola frondosa*), UniProtKB/Swiss-Prot: O75003.1
SEQ ID NO: 191	裂褶菌(*Schizophyllum commune*) H4-8, NCBI 參考序列：XP_003035156.1
SEQ ID NO: 192	朱紅菌(*Trametes cinnabarina*), Genbank: CDO74881.1
SEQ ID NO: 193	鴻禧菇(*Hypsizygus marmoreus*), Genbank: KYQ39707.1
SEQ ID NO: 194	彩絨栓菌(*Trametes versicolor*) FP-101664 SS1, NCBI 參考序列：XP_008036133.1
SEQ ID NO: 195	肺形側耳(*Pleurotus pulmonarius*), UniProtKB/Swiss-Prot: A6YRN9.1
SEQ ID NO: 196	雙孢蘑菇變種蘑菇(*Agaricus bisporus* var. bisporus) H97, NCBI 參考序列：XP_006458503.1
SEQ ID NO: 197	雙孢蘑菇(*Agaricus bisporus*)變種 burnettii JB137-S8, NCBI 參考序列：XP_007326883.1
SEQ ID NO: 198	硫色絢孔菌(*Laetiporus sulphureus*) 93-53, Genbank: KZT11205.1
SEQ ID NO: 199	密褐褶菌(*Gloeophyllum trabeum*) ATCC 11539, NCBI 參考序列：XP_007863746.1
SEQ ID NO: 200	舞菇(*Grifola frondosa*), Genbank: OBZ75413.1
SEQ ID NO: 201	絨毛栓菌(*Trametes pubescens*), Genbank: OJT04097.1

【0377】 表3：序列編號的概述：SEQ ID NO: 1的海藻糖磷酸化酶的變體

序列編號 (SEQ ID)	**來源**	**在變體中的突變數**	**對 SEQ ID NO: 1 的突變**
SEQ ID NO: 2	SEQ ID NO: 1 的變體	1	K705N
SEQ ID NO:	SEQ ID NO: 1	2	P383S、L712M

3	的變體		
SEQ ID NO: 4	SEQ ID NO: 1 的變體	2	K705N、L712M
SEQ ID NO: 5	SEQ ID NO: 1 的變體	3	V10R、A506S、L712M
SEQ ID NO: 6	SEQ ID NO: 1 的變體	4	V10R、Y220F、A506S、L712M
SEQ ID NO: 7	SEQ ID NO: 1 的變體	4	V10R、L114I、Y220F、L712M
SEQ ID NO: 8	SEQ ID NO: 1 的變體	4	Y220F、A506S、K705N、L712M
SEQ ID NO: 9	SEQ ID NO: 1 的變體	6	V10R、L114I、Y220F、A506S、K705N、L712M
SEQ ID NO: 10	SEQ ID NO: 1 的變體	2	P383V、L712M
SEQ ID NO: 11	SEQ ID NO: 1 的變體	8	L114I、I118V、P383V、Q476G、K488A、A506S、A511S、L712M
SEQ ID NO: 12	SEQ ID NO: 1 的變體	9	L114I、I118V、A304I、F349Y、G357A、P383V、A506S、A511S、L712M
SEQ ID NO: 13	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、F349Y、P383V、E481I、L712M
SEQ ID NO: 14	SEQ ID NO: 1 的變體	6	L114I、I118V、A304I、G357A、P383V、L712M
SEQ ID NO: 15	SEQ ID NO: 1 的變體	8	L114I、I118V、F349Y、G357A、P383V、E481I、K488A、L712M
SEQ ID NO: 16	SEQ ID NO: 1 的變體	8	L114I、I118V、A304I、P383V、E481I、A506S、A511S、L712M
SEQ ID NO: 17	SEQ ID NO: 1 的變體	7	L114I、I118V、P383V、K488A、A506S、A511S、L712M
SEQ ID NO: 18	SEQ ID NO: 1 的變體	9	L114I、I118V、A304I、G357A、P383V、K488A、A506S、A511S、L712M
SEQ ID NO: 19	SEQ ID NO: 1 的變體	5	L114I、I118V、P383V、E481I、L712M
SEQ ID NO: 20	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、F349Y、P383V、K488A、L712M
SEQ ID NO: 21	SEQ ID NO: 1 的變體	7	L114I、I118V、P383V、E481I、A506S、A511S、L712M
SEQ ID NO:	SEQ ID NO: 1	7	L114I、I118V、S192V、A304I、

22	的變體		G357A、P383V、L712M
SEQ ID NO: 23	SEQ ID NO: 1 的變體	7	L114I、I118V、S197G、A304I、G357A、P383V、L712M
SEQ ID NO: 24	SEQ ID NO: 1 的變體	7	L114I、I118V、N225V、A304I、G357A、P383V、L712M
SEQ ID NO: 25	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、D306H、G357A、P383V、L712M
SEQ ID NO: 26	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、P318H、G357A、P383V、L712M
SEQ ID NO: 27	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、T323I、G357A、P383V、L712M
SEQ ID NO: 28	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、L339I、G357A、P383V、L712M
SEQ ID NO: 29	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、F349Y、G357A、P383V、L712M
SEQ ID NO: 30	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、A459S、L712M
SEQ ID NO: 31	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、E481I、L712M
SEQ ID NO: 32	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、A484S、L712M
SEQ ID NO: 33	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、Q487V、L712M
SEQ ID NO: 34	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、Q487A、L712M
SEQ ID NO: 35	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、Q487L、L712M
SEQ ID NO: 36	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、R526E、L712M
SEQ ID NO: 37	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、E530V、L712M
SEQ ID NO: 38	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、G532R、L712M
SEQ ID NO: 39	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、D533G、L712M
SEQ ID NO: 40	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、D537M、L712M
SEQ ID NO: 41	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、V550I、L712M

SEQ ID NO: 42	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、S556T、L712M
SEQ ID NO: 43	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、T564E、L712M
SEQ ID NO: 44	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、D590N、L712M
SEQ ID NO: 45	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、D590A、L712M
SEQ ID NO: 46	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、A649E、L712M
SEQ ID NO: 47	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、R667E、L712M
SEQ ID NO: 48	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、R667K、L712M
SEQ ID NO: 49	SEQ ID NO: 1 的變體	7	L114I、I118V、A304I、G357A、P383V、A703E、L712M
SEQ ID NO: 50	SEQ ID NO: 1 的變體	9	L114I、118V、A304I、 G357A、P383V、V550I、S556T、D590N、L712M
SEQ ID NO: 51	SEQ ID NO: 1 的變體	10	L114I、118V、N225V、A304I、G357A、 P383V、Q487L、T564E、D590N、 L712M
SEQ ID NO: 52	SEQ ID NO: 1 的變體	10	L114I、118V、A304I、T323I、G357A、 P383V、V550I、T564E、D590N、 L712M
SEQ ID NO: 53	SEQ ID NO: 1 的變體	10	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487L、D590N、 L712M
SEQ ID NO: 54	SEQ ID NO: 1 的變體	11	L114I、118V、N225V、A304I、G357A、P383V、Q487L、V550I、S556T、D590N、 L712M
SEQ ID NO: 55	SEQ ID NO: 1 的變體	11	L114I、118V、N225V、A304I、G357A、P383V、Q487L、V550I、T564E、D590N、 L712M
SEQ ID NO: 56	SEQ ID NO: 1 的變體	11	L114I、118V、N225V、A304I、G357A、P383V、V550I、S556T、T564E、D590N、 L712M
SEQ ID NO: 57	SEQ ID NO: 1 的變體	11	L114I、118V、N225V、A304I、G357A、P383V、V550I、T564E、

			D590N、A649E、 L712M
SEQ ID NO: 58	SEQ ID NO: 1 的變體	11	L114I、118V、A304I、T323I、G357A、 P383V、V550I、S556T、T564E、D590N、 L712M
SEQ ID NO: 59	SEQ ID NO: 1 的變體	11	L114I、118V、A304I、T323I、G357A、 P383V、Q487L、V550I、D590N、A649E、 L712M
SEQ ID NO: 60	SEQ ID NO: 1 的變體	12	L114I、118V、N225V、A304I、G357A、 P383V、Q487A、V550I、S556T、T564E、D590N、 L712M
SEQ ID NO: 61	SEQ ID NO: 1 的變體	12	L114I、118V、N225V、A304I、G357A、 P383V、V550I、S556T、T564E、D590N、A649E、 L712M
SEQ ID NO: 62	SEQ ID NO: 1 的變體	12	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487L、V550I、T564E、D590N、 L712M
SEQ ID NO: 63	SEQ ID NO: 1 的變體	12	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487L、V550I、D590N、A649E、 L712M
SEQ ID NO: 64	SEQ ID NO: 1 的變體	12	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487A、V550I、S556T、D590N、 L712M
SEQ ID NO: 65	SEQ ID NO: 1 的變體	12	L114I、118V、N225V、A304I、T323I、G357A、P383V、V550I、S556T、T564E、D590N、 L712M
SEQ ID NO: 66	SEQ ID NO: 1 的變體	12	L114I、118V、A304I、T323I、F349Y、G357A、P383V、Q487L、V550I、D590N、A649E、 L712M
SEQ ID NO: 67	SEQ ID NO: 1 的變體	12	L114I、118V、A304I、T323I、G357A、P383V、Q487A、V550I、S556T、T564E、D590N、 L712M
SEQ ID NO: 68	SEQ ID NO: 1 的變體	12	L114I、118V、A304I、 G357A、P383V、Q487A、V550I、S556T、T564E、D590N、A649E、 L712M
SEQ ID NO: 69	SEQ ID NO: 1 的變體	12	L114I、118V、A304I、 G357A、P383V、Q487L、V550I、S556T、T564E、D590N、A649E、 L712M
SEQ ID NO: 70	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、T323I、F349Y、G357A、P383V、

			V550I、S556T、D590N、A649E、L712M
SEQ ID NO: 71	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487L、V550I、S556T、D590N、A649E、L712M
SEQ ID NO: 72	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、F349Y、G357A、P383V、Q487A、V550I、S556T、T564E、D590N、L712M
SEQ ID NO: 73	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、F349Y、G357A、P383V、Q487L、V550I、T564E、D590N、A649E、L712M
SEQ ID NO: 74	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、G357A、P383V、Q487L、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 75	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、G357A、P383V、Q487A、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 76	SEQ ID NO: 1 的變體	13	L114I、118V、A304I、T323I、G357A、P383V、Q487L、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 77	SEQ ID NO: 1 的變體	13	L114I、118V、A304I、T323I、G357A、P383V、Q487L、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 78	SEQ ID NO: 1 的變體	14	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487A、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 79	SEQ ID NO: 1 的變體	14	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487G、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO:	SEQ ID NO: 1	1	N225V

84	的變體		
SEQ ID NO: 85	SEQ ID NO: 1 的變體	1	A304I
SEQ ID NO: 86	SEQ ID NO: 1 的變體	1	T323I
SEQ ID NO: 87	SEQ ID NO: 1 的變體	1	P383V
SEQ ID NO: 88	SEQ ID NO: 1 的變體	1	Q487A
SEQ ID NO: 89	SEQ ID NO: 1 的變體	1	S556T
SEQ ID NO: 90	SEQ ID NO: 1 的變體	1	T564E
SEQ ID NO: 91	SEQ ID NO: 1 的變體	1	D590N
SEQ ID NO: 92	SEQ ID NO: 1 的變體	1	N225I
SEQ ID NO: 93	SEQ ID NO: 1 的變體	1	N225L
SEQ ID NO: 94	SEQ ID NO: 1 的變體	1	N225M
SEQ ID NO: 95	SEQ ID NO: 1 的變體	1	A304L
SEQ ID NO: 96	SEQ ID NO: 1 的變體	1	T323V
SEQ ID NO: 97	SEQ ID NO: 1 的變體	1	P383A
SEQ ID NO: 98	SEQ ID NO: 1 的變體	1	P383G
SEQ ID NO: 99	SEQ ID NO: 1 的變體	1	P383M
SEQ ID NO: 100	SEQ ID NO: 1 的變體	1	P383N
SEQ ID NO: 101	SEQ ID NO: 1 的變體	1	P383C
SEQ ID NO: 102	SEQ ID NO: 1 的變體	1	P383Q
SEQ ID NO: 103	SEQ ID NO: 1 的變體	1	P383S
SEQ ID NO: 104	SEQ ID NO: 1 的變體	1	P383T

SEQ ID NO: 105	SEQ ID NO: 1 的變體	1	Q487G
SEQ ID NO: 106	SEQ ID NO: 1 的變體	1	Q487L
SEQ ID NO: 107	SEQ ID NO: 1 的變體	1	Q487M
SEQ ID NO: 108	SEQ ID NO: 1 的變體	1	V550P
SEQ ID NO: 109	SEQ ID NO: 1 的變體	1	D590G
SEQ ID NO: 110	SEQ ID NO: 1 的變體	2	I118V、P383V
SEQ ID NO: 111	SEQ ID NO: 1 的變體	2	I118V、S556T
SEQ ID NO: 112	SEQ ID NO: 1 的變體	2	I118V、T564E
SEQ ID NO: 113	SEQ ID NO: 1 的變體	2	I118V、D590N
SEQ ID NO: 114	SEQ ID NO: 1 的變體	2	N225V、A304I
SEQ ID NO: 115	SEQ ID NO: 1 的變體	2	N225V、P383V
SEQ ID NO: 116	SEQ ID NO: 1 的變體	2	N225V、Q487A
SEQ ID NO: 117	SEQ ID NO: 1 的變體	2	N225V、V550I
SEQ ID NO: 118	SEQ ID NO: 1 的變體	2	N225V、S556T
SEQ ID NO: 119	SEQ ID NO: 1 的變體	2	N225V、D590N
SEQ ID NO: 120	SEQ ID NO: 1 的變體	2	A304I、T323I
SEQ ID NO: 121	SEQ ID NO: 1 的變體	2	A304I、P383V
SEQ ID NO: 122	SEQ ID NO: 1 的變體	2	A304I、Q487A
SEQ ID NO: 123	SEQ ID NO: 1 的變體	2	A304I、S556T
SEQ ID NO: 124	SEQ ID NO: 1 的變體	2	A304I、T564E
SEQ ID NO:	SEQ ID NO: 1	2	A304I、D590N

125	的變體		
SEQ ID NO: 126	SEQ ID NO: 1 的變體	2	T323I、G357A
SEQ ID NO: 127	SEQ ID NO: 1 的變體	2	T323I、Q487A
SEQ ID NO: 128	SEQ ID NO: 1 的變體	2	T323I、S556T
SEQ ID NO: 129	SEQ ID NO: 1 的變體	2	T323I、T564E
SEQ ID NO: 130	SEQ ID NO: 1 的變體	2	T323I、D590N
SEQ ID NO: 131	SEQ ID NO: 1 的變體	2	T323I、A649E
SEQ ID NO: 132	SEQ ID NO: 1 的變體	2	F349Y、P383V
SEQ ID NO: 133	SEQ ID NO: 1 的變體	2	F349Y、D590N
SEQ ID NO: 134	SEQ ID NO: 1 的變體	2	G357A、P383V
SEQ ID NO: 135	SEQ ID NO: 1 的變體	2	G357A、D590N
SEQ ID NO: 136	SEQ ID NO: 1 的變體	2	P383V、Q487A
SEQ ID NO: 137	SEQ ID NO: 1 的變體	2	P383V、V550I
SEQ ID NO: 138	SEQ ID NO: 1 的變體	2	P383V、S556T
SEQ ID NO: 139	SEQ ID NO: 1 的變體	2	P383V、T564E
SEQ ID NO: 140	SEQ ID NO: 1 的變體	2	P383V、D590N
SEQ ID NO: 141	SEQ ID NO: 1 的變體	2	P383V、A649E
SEQ ID NO: 142	SEQ ID NO: 1 的變體	2	Q487A、T564E
SEQ ID NO: 143	SEQ ID NO: 1 的變體	2	Q487A、D590N
SEQ ID NO: 144	SEQ ID NO: 1 的變體	2	Q487A、A649E
SEQ ID NO: 145	SEQ ID NO: 1 的變體	2	V550I、D590N

SEQ ID NO: 146	SEQ ID NO: 1 的變體	2	S556T、T564E
SEQ ID NO: 147	SEQ ID NO: 1 的變體	2	S556T、D590N
SEQ ID NO: 148	SEQ ID NO: 1 的變體	2	S556T、A649E
SEQ ID NO: 149	SEQ ID NO: 1 的變體	2	T564E、D590N
SEQ ID NO: 150	SEQ ID NO: 1 的變體	2	T564E、L712M
SEQ ID NO: 151	SEQ ID NO: 1 的變體	2	D590N、A649E
SEQ ID NO: 152	SEQ ID NO: 1 的變體	2	D590N、L712M
SEQ ID NO: 153	SEQ ID NO: 1 的變體	2	A649E、L712M
SEQ ID NO: 154	SEQ ID NO: 1 的變體	13	L114I、N225V、A304I、T323I、G357A、P383V、Q487A、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 155	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、T323I、G357A、P383V、Q487A、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 156	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、T323I、P383V、Q487A、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 157	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、T323I、G357A、Q487A、V550I、S556T、T564E、D590N、A649E、L712M
SEQ ID NO: 158	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487A、V550I、S556T、T564E、A649E、L712M
SEQ ID NO: 159	SEQ ID NO: 1 的變體	13	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487A、V550I、S556T、T564E、D590N、A649E

SEQ ID NO: 190	SEQ ID NO: 1 的變體	14	L114I、118V、N225V、A304I、T323I、G357A、P383V、Q487L、V550I、S556T、T564E、D590N、A649E、L712M

【0378】 表4：序列編號的概述：SEQ ID NO: 160的變體海藻糖磷酸化酶

序列編號 (SEQ ID)	來源	在變體中的突變數	對 SEQ ID NO: 160 的突變
SEQ ID NO: 161	SEQ ID NO: 160 的變體	1	L108I
SEQ ID NO: 162	SEQ ID NO: 160 的變體	1	V112I
SEQ ID NO: 163	SEQ ID NO: 160 的變體	1	N221V
SEQ ID NO: 164	SEQ ID NO: 160 的變體	1	A300I
SEQ ID NO: 165	SEQ ID NO: 160 的變體	1	T319I
SEQ ID NO: 166	SEQ ID NO: 160 的變體	1	P379V
SEQ ID NO: 167	SEQ ID NO: 160 的變體	1	S550T
SEQ ID NO: 168	SEQ ID NO: 160 的變體	1	Q558E
SEQ ID NO: 169	SEQ ID NO: 160 的變體	1	A643E
SEQ ID NO: 170	SEQ ID NO: 160 的變體	1	L707M
SEQ ID NO: 171	SEQ ID NO: 160 的變體	2	L108I、N221V
SEQ ID NO: 172	SEQ ID NO: 160 的變體	2	L108I、A300I
SEQ ID NO: 173	SEQ ID NO: 160 的變體	2	L108I、T319I
SEQ ID NO: 174	SEQ ID NO: 160 的變體	2	L108I、V483A
SEQ ID NO: 175	SEQ ID NO: 160 的變體	2	L108I、S550T
SEQ ID NO:	SEQ ID NO:	2	P379V、L108I

176	160的變體		
SEQ ID NO: 177	SEQ ID NO: 160的變體	2	P379V、V112I
SEQ ID NO: 178	SEQ ID NO: 160的變體	2	P379V、N221V
SEQ ID NO: 179	SEQ ID NO: 160的變體	2	P379V、A300I
SEQ ID NO: 180	SEQ ID NO: 160的變體	2	P379V、T319I
SEQ ID NO: 181	SEQ ID NO: 160的變體	2	P379V、F345Y
SEQ ID NO: 182	SEQ ID NO: 160的變體	2	P379V、V483A
SEQ ID NO: 183	SEQ ID NO: 160的變體	2	P379V、V544I
SEQ ID NO: 184	SEQ ID NO: 160的變體	2	P379V、S550T
SEQ ID NO: 185	SEQ ID NO: 160的變體	3	P379V、V483A、Q558E
SEQ ID NO: 186	SEQ ID NO: 160的變體	3	P379V、V544I、S550T
SEQ ID NO: 187	SEQ ID NO: 160的變體	3	P379V、V544I、Q558E
SEQ ID NO: 188	SEQ ID NO: 160的變體	3	P379V、S550T、Q558E
SEQ ID NO: 189	SEQ ID NO: 160的變體	4	P379V、V483A、V544I、Q558E

【0379】 表5：在與不同野生型TP的SEQ ID NO: 1比對後，在SEQ ID NO: 1的位置114、118、225、304、323、349、383、487、550、556、564、590、649、712處的胺基酸及對應位置(該比對係以Clustal omega (Goujon M, McWilliam H, Li W, Valentin F, Squizzato S, Paern J, Lopez R Nucleic acids research 2010 Jul, 38 Suppl: W695-9)進行)。

序列編號 (SEQ ID)	來源	Genbank/ Uniprot															
SEQ ID NO: 1	裂褶菌 (*Schizophyllum commune*)	ABC84380.1	位置	114	118	225	304	323	349	383	487	550	556	564	590	649	712
			胺基酸	L	I	N	A	T	F	P	Q	V	S	T	D	A	L
SEQ ID NO: 191	裂褶菌	XP_003035156.1	位置	114	118	225	304	323	349	383	487	550	556	564	590	649	712

	(*Schizophyllum commune*) H4-8		胺基酸	L	I	N	A	T	F	P	Q	V	S	T	D	V	L
SEQ ID NO: 80	裂褶菌 (*Schizophyllum commune*) FD-334 SS-4	KJA27491.1	位置	70	74	183	262	281	307	341	445	509	515	523	550	609	672
			胺基酸	L	V	N	A	T	F	P	T	V	S	Q	N	A	M
SEQ ID NO: 192	朱紅菌 (*Trametes cinnabarina*)	CDO74881.1	位置	108	112	221	300	319	345	379	483	546	552	560	587	646	709
			胺基酸	L	V	N	A	T	F	P	A	V	S	Q	N	A	M
SEQ ID NO: 193	鴻禧菇 (*Hypsizygus marmoreus*)	KYQ39707.1	位置	2	6	115	194	213	239	273	377	438	444	452	478	537	601
			胺基酸	P	S	N	L	T	F	P	V	V	S	Q	N	A	L
SEQ ID NO: 160	舞菇(*Grifola frondosa*)	O75003.1	位置	108	112	221	300	319	345	379	483	544	550	558	584	643	707
			胺基酸	L	V	N	A	T	F	P	V	V	S	Q	N	A	L
SEQ ID NO: 81	舞菇(*Grifola frondosa*)	ADM15725.1	位置	108	112	221	300	319	345	379	483	544	550	558	584	643	707
			胺基酸	L	V	N	A	T	F	P	I	V	S	Q	N	A	L
SEQ ID NO: 194	彩絨栓菌 (*Trametes versicolor*) FP-101664 SS1	XP_008036133.1	位置	110	114	223	302	321	347	381	485	549	555	563	590	649	712
			胺基酸	L	I	N	A	T	F	P	A	V	S	A	N	D	L
SEQ ID NO: 82	秀珍菇 (*Pleurotus ostreatus*) PC15	KDQ33172.1	位置	112	116	225	304	323	349	383	487	551	557	565	592	651	714
			胺基酸	L	I	N	A	T	F	P	A	V	S	A	N	D	L
SEQ ID NO: 195	肺形側耳 (*Pleurotus pulmonarius*)	A6YRN9.1	位置	111	115	224	303	322	348	382	486	547	553	561	587	646	710
			胺基酸	L	V	N	L	T	F	P	V	V	S	Q	N	A	L
SEQ ID NO: 196	雙孢蘑菇 (*Agaricus bisporus*) var. bisporus H97	XP_006458503.1	位置	110	114	223	302	321	347	381	485	549	555	563	590	649	712
			胺基酸	L	V	N	A	T	F	P	A	V	S	Q	N	E	L
SEQ ID NO: 197	雙孢蘑菇 (*Agaricus bisporus*) var. burnettii JB137-S8	XP_007326883.1	位置	110	114	223	302	321	347	381	485	549	555	563	590	649	712
			胺基酸	L	V	N	A	T	F	P	A	V	S	Q	N	E	L
SEQ ID NO: 198	硫色絢孔菌 (*Laetiporus sulphureus*) 93-53	KZT11205.1	位置	108	112	221	300	319	345	380	484	545	551	559	585	644	708
			胺基酸	L	V	N	A	T	F	P	A	V	S	A	N	E	M
SEQ ID NO: 83	環柄香菇 (*Lentinus sajor-caju*) 鳳尾菇 (*Pleurotus sajor-caju*)	Q9UV63.1	位置	112	116	225	304	323	349	383	499	563	569	577	604	663	726
			胺基酸	L	I	N	A	T	F	P	A	V	S	A	N	D	F
SEQ ID NO: 199	密褐褶菌 (*Gloeophyllum trabeum*) ATCC 11539	XP_007863746.1	位置	106	110	227	306	325	351	385	489	552	558	566	592	651	715
			胺基酸	L	V	N	L	T	F	P	V	V	S	G	N	E	L
SEQ ID NO: 200	舞菇(*Grifola frondosa*)	OBZ75413.1	位置	108	112	221	300	319	345	379	483	505	511	519	545	604	668
			胺基酸	L	V	N	V	T	F	P	S	V	S	Q	N	A	L
SEQ ID NO: 201	絨毛栓菌 (*Trametes pubescens*)	OJT04097.1	位置	70	74	183			263	297	401	462	468	476	502	561	625
			胺基酸	L	V	N	-	-	F	P	V	V	S	Q	N	A	L

【圖式簡單說明】

【0380】 本發明進一步透過圖式、實施例以及序列表說明，來自其中的進一步特徵、具體實施例及優點可以被擷取，其中

【0381】 圖1為顯示在存在與不存在1M蔗糖加入穩定劑的情況下，對於SEQ ID NO: 1的野生型海藻糖磷酸化酶，作為溫度函數的殘餘活性百分比之圖；以及

【0382】 圖2為顯示對於SEQ ID NO: 1的野生型海藻糖磷酸化酶與本發明之各種海藻糖磷酸化酶，作為時間函數的殘餘活性百分比之圖；以及

【0383】 圖3所示為來自舞菇(*Grifola frondosa*)的野生型TPs (UniProtKB/Swiss-Prot：登錄號：O75003.1以及Genebank登錄號：ADM15725.1)，來自秀珍菇(*Pleurotus ostreatus*)的野生型TPs (Genurbank登錄號：KDQ33172.1)，來自環柄香菇(*Lentinus sajor-caju*) (別名：鳳尾菇(*Pleurotus sajor-caju*))的野生型TPs (Genebank登錄號：Q9UV63.1)。使用Clustal omega (Goujon M, McWilliam H, Li W, Valentin F, Squizzato S, Paern J, Lopez R Nucleic acids research 2010 Jul, 38 Suppl: W695-9)進行序列比對。

【0384】 在說明書、申請專利範圍、序列表及/或圖式中公開之本發明的特徵可為單獨地並且以其任何組合用於以其各種形式實現本發明之材料。

【實施方式】

實施例

<u>實施例1：一般方法</u>

【0385】 野生型TP之選殖：來自裂褶菌(*S. communune*)的海藻糖磷酸化酶基因針對在大腸桿菌中表現進行密碼子優化，並由Eurofins MWG操縱子合成。將該基因選殖至表現載體pLE1A17 (pRSF-1b，Novagen公司，的衍生物)中。所得之質體用於大腸桿菌BL21(DE3)細胞之轉型作用。

【0386】 分子生物學方法：透過本領域已知之標準點突變技術創造TP酶之突變體。

【0387】 重組TP之表現：透過接種培養基I (4.6 g/L酵母萃取物、9.3 g/L蛋白腖、25 mM $Na_2HPO_4*12H_2O$、25 mM KH_2PO_4、50 mM NH_4Cl_2、Na_2SO_4、5 g/L甘油、0.5 g/L葡萄糖*$1H_2O$、2 mM $MgSO_4$、50 μg/mL康黴素)與新鮮的過夜培養物常規表現重組TPs。培養物在37°C下生長至在600 nm波長的光密度為0.6-0.8。以終濃度為0.1 mM的IPTG誘導培養物。表現在24-25°C過夜進行。

【0388】 TP酶製劑之製備：使用其它地方所述習知的方法製備無細胞萃取物。透過離心收穫細胞並懸浮於含有50 mM磷酸鉀 – pH 7、2 mM $MgCl_2$、0.5 mg/mL溶菌酶與20 U/mL核酸酶的緩衝液中。有時加入1M蔗糖作為穩定劑。透過超音波處理或反覆冷凍/解凍循環達到細胞破碎。含有可溶性酶的無細胞萃取物透過離心由碎片中分離出來。

【0389】 活性測量：如分析I與分析II中所述，可以在海藻糖切割(磷酸解活性)與合成(合成的活性)的方向上測定海藻糖磷酸化酶的活性：

【0390】 分析I：使用連續偶聯分析於30°C下常規測定磷酸解活性，其中由海藻糖產生的aG1P透過磷葡萄糖變位酶轉化為葡萄糖-6-磷酸鹽。透過葡萄糖-6-磷酸脫氫酶將葡萄糖-6-磷酸鹽與NADP轉化為6-磷酸葡萄糖酸與NADPH。檢測係基於在340 nm波長處測量NADPH的吸光度。測定溶液含有：75 mM的磷酸鉀緩衝液pH 7、2.5 mM的NADP、10 μM葡萄糖-1,6-二磷酸鹽、10 mM $MgCl_2$、225 mM海藻糖、3 U/mL的磷葡萄糖變位酶與3.4 U/mL葡萄糖-6-磷酸脫氫酶。

【0391】 分析II：使用以下條件於40°C下常規測定合成活性：50 mM鈉MES緩衝液pH 7、100 mM aG1P與100或500 mM葡萄糖濃度，如給出的濃度。反應程序係透過基於在酸性條件下與鉬酸鹽的錯合物形成之測定來測量釋放之磷酸鹽而不連續地測定。鉬酸鹽錯合物被硫酸亞鐵還原並產生藍色，在750 nm波

長處以分光光度法分析。為了分析，將250 μL樣品與250 μL 0.5M HCl與500 μL鉬酸鹽試劑(73.2 g/L Fe(II)SO_4*7H_2O及10 g/L鉬酸銨*4H_2O於3.5% 硫酸中)。在室溫作用15-30分鐘後，在750 nm波長處測量吸光度。樣品中無機磷酸鹽的量以外部標準品量化。

實施例2：蔗糖對熱穩定性之影響

【0392】 重組TPs的表現：透過接種培養基I (4.6 g/L酵母萃取物、9.3 g/L蛋白胨、25 mM Na_2HPO_4*12H_2O、25 mM KH_2PO_4、50 mM NH_4Cl_2、Na_2SO_4、5 g/L甘油、0.5 g/L葡萄糖*1H_2O、2 mM $MgSO_4$、50 μg/mL康黴素) 與新鮮的過夜培養物，在搖瓶中表現野生型酶SEQ ID NO: 1。在對數期以0.1 mM IPTG誘導培養物，並在24-25°C下表現過夜。

【0393】 TP酶製劑之製備：為了製備不含蔗糖的細胞萃取物，透過離心收穫細胞並懸浮於含有50 mM磷酸鉀緩衝液pH 7、2 mM $MgCl_2$、0.5 mg/mL溶菌酶以及20 U/mL核酸酶。以超音波破碎細胞。含有可溶性酶的無細胞萃取物係透過離心從碎片中分離出來。為了製備以蔗糖作為穩定劑的細胞萃取物，透過離心收集細胞並懸浮於含有100 mM磷酸鉀 – pH 7、2 mM $MgCl_2$、0.5 mg/mL溶菌酶以及20 U/mL核酸酶的緩衝液中。以超音波破碎細胞。透過離心將含有可溶性酶的無細胞萃取物與碎片分離，並以2 M蔗糖溶液以1:2倍數稀釋。

【0394】 變性圖譜之測定：將50 μL具有及不具有1 M蔗糖之酶製劑的等分試樣於36至53.7°C的溫度範圍下作用15分鐘。透過離心分離變性的蛋白質。所得之上清液以及未經熱不活化步驟的細胞萃取物的活性以分析I測定。圖1為具有及不具有1 M蔗糖作為穩定劑的SEQ ID NO: 1的變性圖譜，顯示與未經熱不活化之酶製劑相比之所獲得的殘餘活性。添加1 M蔗糖導致Tm50從大約40°C增加至47.5°C。因此選擇1M蔗糖作為TP的穩定劑。

實施例3：於52°C作用15分鐘後TP變體之殘餘活性

【0395】 重組TPs的表現：透過接種培養基I (4.6 g/L酵母萃取物、9.3 g/L蛋白胨、25 mM $Na_2HPO_4*12H_2O$、25 mM KH_2PO_4、50 mM NH_4Cl_2、Na_2SO_4、5 g/L甘油、0.5 g/L葡萄糖*$1H_2O$、2 mM $MgSO_4$、50 μg/mL康黴素) 與新鮮的過夜培養物，在深孔盤中表現重組TP。培養物於37°C下生長至在600 nm波長下的光密度為0.6-0.8。以終濃度為0.1 mM IPTG誘導培養物。於24-25°C表現過夜。

【0396】 TP酶製劑之製備：透過離心收穫細胞並懸浮於100 mM磷酸鉀緩衝液pH7、2 mM $MgCl_2$、0.5 mg/mL溶菌酶與20 U/mL核酸酶中。細胞透過反覆的冷凍/解凍循環被破壞。含有可溶性酶的無細胞萃取物透過離心從碎片中分離出來。無細胞萃取物以2M蔗糖溶液以1:2倍數稀釋。

【0397】 熱不活化與活性測量：將每種TP的50 μL等分試樣於52°C作用15分鐘。透過離心分離變性的蛋白質。使用以500 mM葡萄糖的分析II測定上清液的活性。使用以500 mM葡萄糖的分析II直接測定每個TP的另一等分試樣的活性而不進行熱不活化。所得殘餘活性列於表6中。所有變體顯示比野生型酶具有更高的殘餘活性，這表示與野生型相比，它們具有改善的熱穩定性。

【0398】 表6：於52°C下作用15分鐘後TP變體之殘餘活性

序列編號(SEQ ID)	於 52°C 下作用 15 分鐘後 TP 變體之殘餘活性百分比[%]
SEQ ID NO: 1	19
SEQ ID NO: 2	30
SEQ ID NO: 3	64
SEQ ID NO: 4	30
SEQ ID NO: 5	39
SEQ ID NO: 6	54
SEQ ID NO: 7	55
SEQ ID NO: 8	42
SEQ ID NO: 9	63
SEQ ID NO: 10	68
SEQ ID NO: 11	39

SEQ ID NO: 12	55
SEQ ID NO: 13	61
SEQ ID NO: 14	30
SEQ ID NO: 15	75
SEQ ID NO: 16	43
SEQ ID NO: 17	50
SEQ ID NO: 18	41
SEQ ID NO: 19	48
SEQ ID NO: 20	75
SEQ ID NO: 21	52
SEQ ID NO: 22	37
SEQ ID NO: 23	36
SEQ ID NO: 24	47
SEQ ID NO: 25	41
SEQ ID NO: 26	45
SEQ ID NO: 27	42
SEQ ID NO: 28	31
SEQ ID NO: 29	55
SEQ ID NO: 30	38
SEQ ID NO: 31	33
SEQ ID NO: 32	39
SEQ ID NO: 33	31
SEQ ID NO: 34	53
SEQ ID NO: 35	51
SEQ ID NO: 36	34
SEQ ID NO: 37	37
SEQ ID NO: 38	39
SEQ ID NO: 39	35
SEQ ID NO: 40	46
SEQ ID NO: 41	51
SEQ ID NO: 42	43
SEQ ID NO: 43	42
SEQ ID NO: 44	55
SEQ ID NO: 45	32
SEQ ID NO: 46	43
SEQ ID NO: 47	41
SEQ ID NO: 48	35
SEQ ID NO: 49	53
SEQ ID NO: 50	96
SEQ ID NO: 51	106
SEQ ID NO: 52	99
SEQ ID NO: 53	105
SEQ ID NO: 54	105

SEQ ID NO: 55	77
SEQ ID NO: 56	106
SEQ ID NO: 57	84
SEQ ID NO: 58	88
SEQ ID NO: 59	86
SEQ ID NO: 60	113
SEQ ID NO: 61	117
SEQ ID NO: 62	101
SEQ ID NO: 63	79
SEQ ID NO: 64	101
SEQ ID NO: 65	99
SEQ ID NO: 66	105
SEQ ID NO: 67	99
SEQ ID NO: 68	92
SEQ ID NO: 69	104
SEQ ID NO: 70	76
SEQ ID NO: 71	97
SEQ ID NO: 72	90
SEQ ID NO: 73	105
SEQ ID NO: 74	108
SEQ ID NO: 75	107
SEQ ID NO: 76	97
SEQ ID NO: 78	109
SEQ ID NO: 79	97
SEQ ID NO: 84	29
SEQ ID NO: 85	23
SEQ ID NO: 86	28
SEQ ID NO: 87	38
SEQ ID NO: 88	38
SEQ ID NO: 89	42
SEQ ID NO: 90	28
SEQ ID NO: 91	40
SEQ ID NO: 92	25
SEQ ID NO: 93	35
SEQ ID NO: 94	31
SEQ ID NO: 95	35
SEQ ID NO: 96	29
SEQ ID NO: 97	38
SEQ ID NO: 98	64
SEQ ID NO: 99	22
SEQ ID NO: 100	22
SEQ ID NO: 101	54
SEQ ID NO: 102	26

SEQ ID NO: 103	41
SEQ ID NO: 104	78
SEQ ID NO: 105	33
SEQ ID NO: 106	29
SEQ ID NO: 107	30
SEQ ID NO: 108	26
SEQ ID NO: 109	33
SEQ ID NO: 110	56
SEQ ID NO: 111	43
SEQ ID NO: 112	25
SEQ ID NO: 113	63
SEQ ID NO: 114	32
SEQ ID NO: 115	72
SEQ ID NO: 116	24
SEQ ID NO: 117	37
SEQ ID NO: 118	25
SEQ ID NO: 119	32
SEQ ID NO: 120	29
SEQ ID NO: 121	72
SEQ ID NO: 122	27
SEQ ID NO: 123	32
SEQ ID NO: 124	27
SEQ ID NO: 125	55
SEQ ID NO: 126	25
SEQ ID NO: 127	23
SEQ ID NO: 128	30
SEQ ID NO: 129	23
SEQ ID NO: 130	51
SEQ ID NO: 131	31
SEQ ID NO: 132	64
SEQ ID NO: 133	67
SEQ ID NO: 134	61
SEQ ID NO: 135	59
SEQ ID NO: 136	63
SEQ ID NO: 137	56
SEQ ID NO: 138	70
SEQ ID NO: 139	62
SEQ ID NO: 140	69
SEQ ID NO: 141	62
SEQ ID NO: 142	26
SEQ ID NO: 143	28
SEQ ID NO: 144	23
SEQ ID NO: 145	29

SEQ ID NO: 146	34
SEQ ID NO: 147	55
SEQ ID NO: 148	26
SEQ ID NO: 149	43
SEQ ID NO: 150	34
SEQ ID NO: 151	40
SEQ ID NO: 152	56
SEQ ID NO: 153	26
SEQ ID NO: 154	81
SEQ ID NO: 155	68
SEQ ID NO: 156	94
SEQ ID NO: 157	69
SEQ ID NO: 158	74
SEQ ID NO: 159	87
SEQ ID NO: 190	100

實施例4：TP變體的100/500比率

【0399】 如實施例2所述製備TP-變體的細胞萃取物。分別使用以500 mM葡萄糖的分析II以及以100 mM葡萄糖的分析II來測定活性，並計算每個變體的100/500比率。表7中列出了所得到的100/500比率。可以看出，除了改善的熱穩定性之外，一些變體顯示出與野生型相比也具有更高的100/500比率。這是改善葡萄糖Km值的一個指標。

【0400】 表7：TP變體之100/500比率

序列編號(SEQ ID)	100/500 比率
SEQ ID NO: 1	0.6
SEQ ID NO: 5	0.7
SEQ ID NO: 6	0.8
SEQ ID NO: 8	0.7
SEQ ID NO: 22	0.7
SEQ ID NO: 24	0.8
SEQ ID NO: 26	0.7
SEQ ID NO: 27	0.9
SEQ ID NO: 29	0.7
SEQ ID NO: 34	0.7
SEQ ID NO: 36	0.7
SEQ ID NO: 37	0.9

SEQ ID NO: 38	0.8
SEQ ID NO: 41	1.0
SEQ ID NO: 42	0.8
SEQ ID NO: 52	0.8
SEQ ID NO: 53	0.9
SEQ ID NO: 56	0.7
SEQ ID NO: 57	0.9
SEQ ID NO: 60	1.0
SEQ ID NO: 61	1.0
SEQ ID NO: 62	0.8
SEQ ID NO: 63	0.9
SEQ ID NO: 64	0.8
SEQ ID NO: 65	0.8
SEQ ID NO: 66	0.9
SEQ ID NO: 68	0.7
SEQ ID NO: 69	0.7
SEQ ID NO: 75	0.9
SEQ ID NO: 76	0.7
SEQ ID NO: 190	0.9

實施例5：TP變體的變性圖譜

【0401】 選擇在實施例3中顯示出高度熱穩定性改進的14種TP變體以用於測定其Tm30-與Tm50-值。如實施例2中所述，在含有1 M蔗糖的50 mM磷酸鉀緩衝液pH7中測定變性圖譜。從變性圖譜外推以下Tm30-與Tm-50-值：

【0402】 表8：在含有1M蔗糖的50 mM磷酸鉀緩衝液pH 7中的TP-變體之Tm30-與Tm50-值

序列編號(SEQ ID)	Tm30 值	Tm50 值
SEQ ID NO: 1	49.5	47.5
SEQ ID NO: 44	53.5	52
SEQ ID NO: 50	54.5	53.5
SEQ ID NO: 54	55.5	54.5
SEQ ID NO: 57	55.5	54.5
SEQ ID NO: 58	56	54.5
SEQ ID NO: 62	57.5	56
SEQ ID NO: 64	57.5	56

SEQ ID NO: 65	57.5	56
SEQ ID NO: 71	57	56
SEQ ID NO: 72	58	56.5
SEQ ID NO: 73	58.5	57.5
SEQ ID NO: 74	57.5	56
SEQ ID NO: 78	58	56
SEQ ID NO: 79	57.5	56

實施例6：S/P比率

【0403】 選擇野生型酶與23個TP-變體以用於測定S/P比率。如實施例2中所述製備細胞萃取物。以海藻糖磷酸解(分析I)與海藻糖合成(分析II，500mM葡萄糖)的方向測定活性。野生型酶的合成與磷酸解活性比率(S/P比率)為0.3，表示該酶在海藻糖切割的方向上顯示出較高的反應速率。測試的TP變體都顯現出S/P比率高於0.3。與野生型酶相比，SEQ ID NO: 42與SEQ ID NO: 43顯現出最高的改善，其S/P比率高3倍以上。

【0404】 表9：S/P比率

序列編號(SEQ ID)	S/P-比率
SEQ ID NO: 1	0.3
SEQ ID NO: 14	0.5
SEQ ID NO: 24	0.4
SEQ ID NO: 27	0.5
SEQ ID NO: 29	0.7
SEQ ID NO: 34	0.6
SEQ ID NO: 41	0.5
SEQ ID NO: 42	0.9
SEQ ID NO: 43	0.9
SEQ ID NO: 44	0.5
SEQ ID NO: 46	0.8
SEQ ID NO: 50	0.6
SEQ ID NO: 54	0.5
SEQ ID NO: 57	0.4
SEQ ID NO: 58	0.5
SEQ ID NO: 62	0.5
SEQ ID NO: 64	0.5
SEQ ID NO: 65	0.5
SEQ ID NO: 71	0.5

SEQ ID NO: 72	0.5
SEQ ID NO: 73	0.6
SEQ ID NO: 74	0.5
SEQ ID NO: 78	0.5
SEQ ID NO: 79	0.5

實施例7：於45°C下的製程穩定性

【0405】 野生型酶與TP變體SEQ ID NO: 14、SEQ ID NO: 44、SEQ ID NO: 62、SEQ ID NO: 64、SEQ ID NO: 65以及SEQ ID NO: 78的製程穩定性於45°C下，在含有1 M蔗糖的50 mM磷酸鉀緩衝液pH 7中測定。如實施例2中所述製備細胞萃取物。將樣品於45°C作用16天。隨時間採集樣品，並使用分析I測量活性。結果顯示在圖2中SEQ ID NO: 1在前3個小時內顯現出快速的活性喪失，且其半衰期約1小時。正如從Tm50值預期的那樣，新的變體顯現出極大改進的製程穩定性。SEQ ID NO: 62、SEQ ID NO: 65以及SEQ ID NO: 78的半衰期顯現出最高的改善，具有約8.8天的半衰期。與野生型酶相比，這構成了超過200倍的改善。

實施例8：替代的TP酶

【0406】 鑑定具有海藻糖磷酸化酶活性的替代野生型酶的可能性是將已知的海藻糖磷酸化酶與保藏在序列資料庫如GenBank中的序列進行比較。為了鑑定替代的TP酶，將SEQ ID NO: 1針對GenBank (NCBI)的不含重複性的資訊的資料庫進行了序列比對(blast)。替代的海藻糖磷酸化酶可以選自與SEQ ID：1具有高度序列相似性的資料庫序列，例如來自簇生垂幕菇(*Hypholoma sublateritium*) FD-334 SS-4 (GenBank登錄號：KJA27491.1)的推定的海藻糖磷酸化酶或以功能性為特徵的海藻糖磷酸化酶，例如，來自環柄香菇(*Lentinus sajor-caju*)的酶(Genbank登錄號：Q9UV63.1)、舞菇(*Grifola frondosa*)的酶(Genbank登錄號：

O75003.1或ADM15725.1)或秀珍菇的酶(Genbank登錄號：KDQ33172.1)。這四種酶的序列與圖3中的SEQ ID NO: 1進行比對。

【0407】 使用實施例1中描述的方法創造替代的野生型海藻糖磷酸化酶的變體。該變體在對應於SEQ ID NO: 1中的位置L114、I118、G357、P383、N225、A304、T323、S556、T564、A649以及L712含有一個或多個突變。如實施例3所述測試變體的熱穩定性。熱不活化步驟在相應的野生型作用15分鐘後保留約20%殘餘活性的溫度下進行。預期新的變體將顯現出與實施例3中的變體相似的改進。可在對應於SEQ ID NO: 1中的位置L114、I118、G357、P383、N225、A304、T323、F349、Q487、V550、S556、T564、A649以及L712添加更多的突變。預期加入這些突變中的一個或多個將導致熱穩定性的進一步改善。

【0408】 表10：於52.5°C作用15分鐘後的殘餘活性

序列編號(SEQ ID)	於 52.5 °C 作用 15 分鐘後的殘餘活性百分比 [%]
SEQ ID NO: 160	9
SEQ ID NO: 161	14
SEQ ID NO: 162	22
SEQ ID NO: 163	33
SEQ ID NO: 164	26
SEQ ID NO: 165	37
SEQ ID NO: 166	37
SEQ ID NO: 167	20
SEQ ID NO: 168	34
SEQ ID NO: 169	12
SEQ ID NO: 170	15
SEQ ID NO: 171	37
SEQ ID NO: 172	29
SEQ ID NO: 173	42
SEQ ID NO: 174	12
SEQ ID NO: 175	25
SEQ ID NO: 176	57
SEQ ID NO: 177	42
SEQ ID NO: 178	56
SEQ ID NO: 179	38
SEQ ID NO: 180	74
SEQ ID NO: 181	16

SEQ ID NO: 182	28
SEQ ID NO: 183	21
SEQ ID NO: 184	43
SEQ ID NO: 185	58
SEQ ID NO: 186	42
SEQ ID NO: 187	49
SEQ ID NO: 188	70
SEQ ID NO: 189	41

【符號說明】

【0409】

【生物材料寄存】

【0410】

序列表
SEQUENCE LISTING

<110> 德商 C-樂克塔股份有限公司(c-LEcta GmbH New) 美商紐馬塔宏有限公司
(Matterhorn LLC)

<120> 海藻糖磷酸化酶

<130> C71105TW

<150> 16002528.4
<151> 20161128

<160> 201

<170> BiSSAP 1.3.6

<210> 1
<211> 737
<212> 蛋白質
<213> 裂褶菌(Schizophyllum commune)

<220>
<223> >SEQ ID NO:1

<400> 1

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
```

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 2
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:2

<400> 2
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Asn Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 3

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:3

<400> 3

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
```

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Ser Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 4
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:4

<400> 4
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

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1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
```

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Asn Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 5
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:5

<400> 5
Met Ser Pro Pro His Gly Phe Ser Ser Arg Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 6
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:6

<400> 6
Met Ser Pro Pro His Gly Phe Ser Ser Arg Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Phe Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 7

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:7

<400> 7

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Met Ser Pro Pro His Gly Phe Ser Ser Arg Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Phe Gly Pro Asn Asn
    210                 215                 220
```

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 8
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:8

<400> 8

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Phe Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Asn Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 9
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:9

<400> 9
Met Ser Pro Pro His Gly Phe Ser Ser Arg Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Phe Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Asn Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 10
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:10

<400> 10
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

```
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
```

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 11

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:11

<400> 11

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
```

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gly Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Ala Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ser Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 12
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> >SEQ ID NO:12

<400> 12

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
```

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ser Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

```
          580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
              645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
          660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
       675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
              725                 730                 735
Asp
```

<210> 13
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:13

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<400> 13
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
          20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
```

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Ile Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 14
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:14

<400> 14
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

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       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
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          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
              485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
          500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
   530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
              565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
          580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
   610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
              645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
          660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
       675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
   690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
```

725 730 735

Asp

<210> 15

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:15

<400> 15

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Ile Phe Arg Ala Leu Cys Gln Ala Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 16
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> >SEQ ID NO:16

<400> 16

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
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260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Ile Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ser Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 17

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:17

<400> 17

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

```
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340               345               350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355               360               365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370               375               380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385               390               395               400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405               410               415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420               425               430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435               440               445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450               455               460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465               470               475               480
Glu Phe Arg Ala Leu Cys Gln Ala Asp Lys Met Asn Thr Leu Asp Trp
             485               490               495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ser Lys
          500               505               510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
       515               520               525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
   530               535               540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545               550               555               560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
             565               570               575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
          580               585               590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595               600               605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
   610               615               620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625               630               635               640
```

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 18
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:18

<400> 18
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Ala Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ser Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 19

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:19

<400> 19

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Ile Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 20
<211> 737
<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:20

<400> 20

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
```

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Ala Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 21

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:21

<400> 21

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Ile Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ser Arg Phe Asp Pro Ser Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 22
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:22

<400> 22
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Val

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 23
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:23

<400> 23

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

```
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Gly Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
```

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 24

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:24

<400> 24

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
```

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

```
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 25
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:25

<400> 25

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
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Leu His Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 26
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:26

<400> 26
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser His Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 27

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:27

<400> 27

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 28

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:28

<400> 28

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
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210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Ile Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 29

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:29

<400> 29

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 30
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:30

<400> 30
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ser Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 31

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:31

<400> 31

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Ile Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 32
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:32

<400> 32

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
```

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       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ser Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
```

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 33

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:33

<400> 33

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
```

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Val Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 34
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:34

<400> 34
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

```
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
             85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
```

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 35

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:35

<400> 35

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 36
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:36

<400> 36
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

```
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
              325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
              405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
```

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Glu Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 37

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:37

<400> 37

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
```

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Val Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 38
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:38

<400> 38
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

```
          20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
              85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
              165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
```

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Arg Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 39

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:39

<400> 39

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

```
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100               105               110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115               120               125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130               135               140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145               150               155               160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
              165               170               175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180               185               190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195               200               205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210               215               220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225               230               235               240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245               250               255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260               265               270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275               280               285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290               295               300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305               310               315               320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
              325               330               335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340               345               350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355               360               365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370               375               380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385               390               395               400
```

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Gly Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 40
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:40

<400> 40
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

```
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
```

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Met Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 41

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:41

<400> 41

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
```

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 42
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:42

<400> 42
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

```
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
```

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 43
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:43

<400> 43
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 44
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:44

<400> 44
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

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    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
        515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 45

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:45

<400> 45

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Ala Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 46
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:46

<400> 46

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 47
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:47

<400> 47
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Glu Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 48
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:48

<400> 48
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

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    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
```

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Lys Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 49

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:49

<400> 49

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
```

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Glu Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 50
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> >SEQ ID NO:50

<400> 50

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
```

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 51

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:51

<400> 51

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 52
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:52

<400> 52
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

```
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
```

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 53

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:53

<400> 53

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 54
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> >SEQ ID NO:54

<400> 54

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
```

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 55

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:55

<400> 55

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

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Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
           100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
           180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
           260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
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Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 56
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:56

<400> 56
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 57

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:57

<400> 57

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 58
<211> 737
<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:58

<400> 58

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
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245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 59

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:59

<400> 59

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 60
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:60

<400> 60
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 61
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:61

<400> 61

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

```
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
```

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 62

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:62

<400> 62

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
```

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

```
    530                 535                 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 63
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:63

<400> 63

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
```

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 64
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:64

<400> 64
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 65

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:65

<400> 65

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 66

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:66

<400> 66

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
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    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
```

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       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
```

<210> 67
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:67

<400> 67

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 68
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:68

<400> 68
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

```
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
           100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
           180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
           260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
           340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
```

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 69

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:69

<400> 69

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 70
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:70

<400> 70

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
```

```
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
```

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 71

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:71

<400> 71

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
```

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 72
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:72

<400> 72
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

```
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
             85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
```

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 73

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:73

<400> 73

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 74
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:74

<400> 74
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

```
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
              325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
              405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
```

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 75

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:75

<400> 75

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
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Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 76
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:76

<400> 76
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

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          20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
              85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
              165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
```

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 77

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:77

<400> 77

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 78
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> >SEQ ID NO:78

<400> 78
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 79

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> >SEQ ID NO:79

<400> 79

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
```

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gly Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 80
<211> 696
<212> 蛋白質
<213> 簇生垂幕菇(Hypholoma sublateritium) FD-334 SS-4

<220>
<223> >KJA27491.1

<400> 80
Met Trp Ala Ala Val Ala Gly Ala Val Ile Asn Asn Asn Thr Gln Tyr

```
1               5                  10                  15
Glu Ile Ala Val Ser Ile His Asp Ser Val Tyr Ser Thr Asp Phe Ala
            20                  25                  30
Ser Ser Val Leu Ser Phe Asn Pro Asn Asn Pro Asp Lys Asn Ala Lys
        35                  40                  45
Glu Ile Glu Gln Tyr Val Leu Gln Thr Leu Arg Met Phe Ser Val Gly
    50                  55                  60
His Leu Cys Lys Phe Leu Gly Ala Gly Val Thr Leu Leu Leu Leu Lys
65                  70                  75                  80
Glu Ser Pro Asn Leu Cys Thr Arg Leu Trp Leu Asp Met Asp Ile Val
                85                  90                  95
Pro Phe Val Phe Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg
            100                 105                 110
Pro Asn Ile Lys His Arg Ile Ser Ser Thr Thr Gly Ser Tyr Val Pro
        115                 120                 125
Ser Gly Ala Asp Thr Pro Thr Val Tyr Val Asp Ser Ala His Leu Thr
    130                 135                 140
Ala Met Ser Gly Leu Gln Thr Gly Val Ser Gly Arg Leu Pro Ile Pro
145                 150                 155                 160
Arg Thr Leu Asp Glu Gln Ala Asp Ser Ala Ala Arg Lys Cys Leu Met
                165                 170                 175
Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu Ser Ile Gly Pro Arg Asn
            180                 185                 190
Gln Val Thr Val Asp Ser Ala Gly Lys Ala His Leu Ile Asp Asp Ile
        195                 200                 205
Asp Glu Tyr Lys Ala Thr Val Gly Pro Arg Thr Trp Asn Ala Val Val
    210                 215                 220
Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys Val Lys Ile Gly Phe Phe
225                 230                 235                 240
Ser Ser Thr Pro Gln Gly Gly Gly Val Ala Leu Met Arg His Ala Leu
                245                 250                 255
Ile Arg Phe Leu Thr Ala Leu Asp Val Asp Ala Ala Trp Tyr Val Pro
            260                 265                 270
Asn Pro Ser Pro Ser Val Phe Arg Thr Thr Lys Asn Asn His Asn Ile
        275                 280                 285
Leu Gln Gly Val Ala Ala Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys
    290                 295                 300
Asp Asn Phe Asp Ala Trp Ile Leu Lys Asn Gly Leu Arg Trp Thr Ala
```

305 310 315 320
Glu Gly Gly Pro Leu Ala Pro Gly Gly Val Asp Ile Ala Phe Ile Asp
325 330 335
Asp Pro Gln Met Pro Gly Leu Ile Pro Leu Ile Lys Lys Ile Arg Pro
340 345 350
Asp Leu Pro Ile Val Tyr Arg Ser His Ile Glu Ile Arg Ser Asp Leu
355 360 365
Val His Val Pro Gly Ser Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp
370 375 380
Asn Asn Ile Gln Leu Ala Asp Leu Phe Ile Ser His Pro Val Asn Lys
385 390 395 400
Phe Val Pro Ser Asp Val Pro Ile Glu Lys Leu Ala Leu Leu Gly Ala
405 410 415
Ala Thr Asp Trp Leu Asp Gly Leu Asn Lys Glu Leu Asp Pro Trp Asp
420 425 430
Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn Leu Cys Thr Lys Glu Lys
435 440 445
Met His Thr Leu Asn Trp Pro Glu Arg Asp Tyr Val Val Gln Ile Ala
450 455 460
Arg Phe Asp Pro Ala Lys Gly Ile Asn Asn Val Ile Asp Ser Tyr Tyr
465 470 475 480
Lys Phe Arg Asn Met Leu Lys Glu Lys Ser Pro Asp Leu Thr Glu Glu
485 490 495
Glu His Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val Asp Asp Pro
500 505 510
Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Val Glu Ser Glu
515 520 525
Pro Tyr Lys Thr Tyr Ala Lys Asp Ile Val Val Met Arg Leu Pro Pro
530 535 540
Ser Asp Gln Leu Leu Asn Ala Leu Met Ala Asn Ser Arg Ile Ala Leu
545 550 555 560
Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu Ala Leu
565 570 575
His Ala Gly Lys Pro Val Ile Ala Ser Arg Thr Gly Gly Ile Pro Leu
580 585 590
Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Thr Thr Ala Gly Asp Asn
595 600 605
Ala Ala Val Ala Asn His Leu Tyr Glu Leu Tyr Thr Asp Glu Ala Leu

610 615 620

Tyr Arg Lys Met Ser Gln Tyr Ala Lys Thr His Val Ser Asp Glu Val
625 630 635 640

Gly Thr Val Gly Asn Ala Ala Ser Trp Leu Tyr Leu Ala Val Met Tyr
645 650 655

His Arg Gly Ile Lys Ile Lys Pro Asn Gly Ala Trp Leu Asn Asp Met
660 665 670

Leu Arg Glu Glu Thr Gly Glu Glu Tyr Val Glu Gly Glu Pro Arg Leu
675 680 685

Pro Arg Gly Gly Leu Thr Met Gln
690 695

<210> 81
<211> 732
<212> 蛋白質
<213> 舞菇(Grifola frondosa)

<220>
<223> ADM15725.1 trehalose synthase

<400> 81
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Val Pro Gly
20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45

Asn Asn Asn Ser Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Ile Val Pro Tyr Ser Pro Asn Glu
65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125

```
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
            260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
        275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
                325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
            340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
        355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Val Pro Gly Leu Ile Pro Leu
    370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
                405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
            420                 425                 430
```

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ala Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Ile Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Asp
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Ala Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 82

<211> 737

<212> 蛋白質

<213> 秀珍菇(Pleurotus ostreatus)

<220>

<223> KDQ33172.1

<400> 82

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Met Ser Thr His His Gln Phe Glu Ser Lys Pro Ser Thr Ala Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ser Val Ser Ser Lys Gln Arg Pro Asn Met Thr
            20                  25                  30
Thr Thr Phe Ala Ser Leu Thr Pro Met Trp Ala Gly Val Ala Gly Thr
        35                  40                  45
Leu Val Asn Asn Asn Thr Gln Tyr Glu Ile Ala Val Thr Val His Asp
    50                  55                  60
Gly Val Tyr Ser Thr Asp Phe Ala Ser Val Ile Ile Pro Val Thr Pro
65                  70                  75                  80
Gly Asp Thr Ala Lys Asn Ser Lys Asp Ile Glu Ala Gln Val Leu Asn
                85                  90                  95
Leu Ile Arg Lys Phe Ser Ala Glu His Leu Cys Lys Phe Leu Gly Ala
            100                 105                 110
Gly Ile Thr Leu Ala Leu Leu Lys Glu Cys Pro Asn Leu Cys Thr Arg
        115                 120                 125
Leu Trp Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro
    130                 135                 140
Phe His Thr Asp Ser Val Thr Arg Pro Asn Ile Lys His Arg Ile Ser
145                 150                 155                 160
Ser Thr Thr Gly Ser Tyr Val Pro Ser Gly Ser Glu Thr Pro Thr Val
                165                 170                 175
Tyr Val Glu Ala Ala His Leu Gly Asp Pro Ser His Leu Ser Pro Asn
            180                 185                 190
Ala Ala Gln Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln Ser Asp
        195                 200                 205
Ser Ala Ala Arg Lys Cys Leu Met Tyr Phe Gly Pro Asn Asn Asn Pro
```

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    210                 215                 220
Arg Leu Ser Ile Gly Ala Arg Asn Gln Val Thr Val Asp Ala Gly Gly
225                 230                 235                 240
Lys Ile His Leu Ile Asp Asp Leu Glu Glu Tyr Arg Lys Thr Val Gly
                245                 250                 255
Thr Gly Thr Trp Asn Ala Val Ile Lys Leu Ala Asp Glu Leu Arg Glu
            260                 265                 270
Lys Lys Val Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly
        275                 280                 285
Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu Thr Ala Leu Asp
    290                 295                 300
Val Asp Val Ala Trp Tyr Val Pro Asn Pro Ser Pro Gln Val Phe Arg
305                 310                 315                 320
Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ala Pro Asp
                325                 330                 335
Leu Arg Leu Thr Gln Asp Ala Lys Asp Ala Phe Asp Ala Trp Ile Leu
            340                 345                 350
Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly
        355                 360                 365
Gly Val Asp Val Val Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile
    370                 375                 380
Pro Leu Ile Lys Lys Val Arg Pro Glu Val Pro Ile Val Tyr Arg Ser
385                 390                 395                 400
His Ile Glu Ile Arg Ser Asp Leu Val His Val Ala Gly Ser Pro Gln
                405                 410                 415
Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala Asp Leu
            420                 425                 430
Phe Ile Ser His Pro Val Ser Lys Phe Val Pro Ser Asp Val Pro Ile
        435                 440                 445
Glu Lys Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu
    450                 455                 460
Asn Lys Asp Leu Asp Pro Trp Asp Ser Gln Phe Tyr Met Gly Glu Phe
465                 470                 475                 480
Arg Ser Leu Cys Ala Lys Glu Lys Met Val Glu Leu Asp Trp Pro Thr
                485                 490                 495
Arg Asp Tyr Ile Val Gln Val Ala Arg Phe Asp Pro Ser Lys Gly Ile
            500                 505                 510
Pro Asn Val Val Asp Ser Tyr Tyr Lys Phe Arg Asn Leu Leu Arg Thr
```

```
       515                 520                 525
Arg Ser Pro Glu Met Glu Leu Ser Asp His Pro Gln Leu Leu Ile Cys
    530                 535                 540
Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln
545                 550                 555                 560
Ile Met Ala Leu Val Asn Ser Asp Pro Tyr Lys Glu Tyr Ala His Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Glu Leu Leu Asn Ala Met
            580                 585                 590
Met Ala Asn Ser Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Leu His Thr Gly Lys Pro Val Ile Ala
    610                 615                 620
Cys Arg Thr Gly Gly Ile Pro Leu Gln Ile Gln His Gly Lys Ser Gly
625                 630                 635                 640
Tyr Leu Thr Thr Pro Gly Asp Asn Asp Ala Val Ala Gly Tyr Leu Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Glu Ala Leu Tyr Arg Arg Met Ser Asp Phe Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Val Met Tyr Ser Arg Gly Glu Lys Ile Lys Pro
    690                 695                 700
Asn Gly Ala Trp Ile Asn Asp Leu Leu Arg Glu Glu Thr Gly Glu Pro
705                 710                 715                 720
Tyr Lys Glu Gly Glu Thr Lys Leu Pro Arg Thr Lys Leu Asp Met Gln
                725                 730                 735
Gly
```

<210> 83
<211> 751
<212> 蛋白質
<213> 環柄香菇(Lentinus sajor-caju)

<220>
<223> Q9UV63.1

<400> 83

Met Ser Thr Pro His His Gln Phe Glu Ser Lys Ser Ser Thr Ala Ile
1 5 10 15

Arg Arg Arg Leu Ser Ser Ser Val Ser Ser Lys Gln Arg Pro Asn Ile
20 25 30

Met Thr Thr Thr Phe Ala Ser Leu Thr Pro Met Trp Ala Gly Val Ala
35 40 45

Gly Thr Leu Val Asn Asn Asn Thr Gln Tyr Glu Ile Ala Val Thr Val
50 55 60

His Asp Gly Val Tyr Ser Thr Asp Phe Ala Ser Val Ile Ile Pro Val
65 70 75 80

Thr Pro Gly Asp Thr Val Lys Asn Ser Lys Asp Ile Glu Ala Gln Val
85 90 95

Leu Asn Leu Ile Arg Lys Phe Ser Ala Glu His Leu Cys Lys Phe Leu
100 105 110

Gly Ala Gly Ile Thr Leu Ala Leu Leu Lys Glu Cys Pro Asn Leu Cys
115 120 125

Thr Arg Leu Trp Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile
130 135 140

Lys Pro Phe His Thr Asp Ser Val Thr Arg Pro Asn Ile Lys His Arg
145 150 155 160

Ile Ser Ser Thr Thr Gly Ser Tyr Val Pro Ser Gly Ser Glu Thr Pro
165 170 175

Thr Val Tyr Val Glu Ala Ser His Leu Gly Asp Pro Ser His Leu Ser
180 185 190

Pro Asn Ala Ala Gln Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ser Asp Ser Ala Ala Arg Lys Cys Leu Met Tyr Phe Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Ser Ile Gly Ala Arg Asn Pro Val Thr Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Leu Glu Glu Tyr Arg Met Thr
245 250 255

Val Gly Ala Gly Thr Trp Asn Ala Val Ile Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Lys Lys Val Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

```
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu Thr Ala
   290               295               300
Leu Asp Val Asp Val Ala Trp Tyr Val Pro Asn Pro Ser Pro Gln Val
305               310               315               320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ala
             325               330               335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Ala Phe Asp Ala Trp
          340               345               350
Ile Leu Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355               360               365
Pro Gly Gly Val Asp Val Val Phe Ile Asp Asp Pro Gln Met Pro Gly
   370               375               380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Val Pro Ile Val Tyr
385               390               395               400
Arg Ser His Ile Glu Ile Arg Asn Asp Leu Val His Val Ala Trp Ser
             405               410               415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420               425               430
Asp Leu Phe Ile Ser His Pro Val Ser Lys Phe Val Pro Ser Asp Val
       435               440               445
Pro Thr Glu Lys Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp
   450               455               460
Gly Leu Asn Lys Asp Leu Asp Pro Trp Asp Ser Pro Phe Tyr Met Gly
465               470               475               480
Glu Phe Arg Pro Arg Gly Ser His Leu Asn Arg Gly Glu Phe Arg Ser
             485               490               495
Leu Cys Ala Lys Glu Lys Met His Glu Leu Asn Trp Pro Ala Arg Asp
          500               505               510
Tyr Ile Val Gln Val Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
       515               520               525
Val Val Asp Ser Tyr Tyr Lys Phe Arg Asn Leu Leu Arg Thr Arg Ser
   530               535               540
Pro Asp Met Asp Glu Ser Glu His Pro Gln Leu Leu Ile Cys Gly His
545               550               555               560
Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Ile Met
             565               570               575
Ala Leu Val Asn Ser Asp Pro Tyr Lys Glu Tyr Ala His Asp Ile Val
          580               585               590
```

Val Met Arg Leu Pro Pro Ser Asp Glu Leu Leu Asn Ala Met Met Ala
595 600 605
Asn Ser Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val
610 615 620
Lys Val Ser Glu Ala Leu His Thr Gly Lys Pro Val Ile Ala Cys Arg
625 630 635 640
Thr Gly Gly Ile Pro Leu Gln Ile Gln His Gly Lys Ser Gly Tyr Leu
645 650 655
Thr Thr Pro Gly Glu Lys Asp Ala Val Ala Gly His Phe Tyr Asp Phe
660 665 670
Tyr Thr Asp Glu Ala Leu Tyr Arg Lys Met Ser Asp Phe Ala Arg Thr
675 680 685
His Val Ser Asn Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Leu
690 695 700
Tyr Leu Ala Val Met Tyr Ser Arg Gly Glu Lys Ile Lys Pro Asn Gly
705 710 715 720
Ala Trp Ile Asn Asp Phe Phe Arg Glu Glu Thr Gly Glu Pro Tyr Lys
725 730 735
Glu Gly Glu Thr Lys Leu Pro Arg Thr Lys Leu Asp Met Gln Gly
740 745 750

<210> 84
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 84

<400> 84
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

```
          660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
       675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
             725                 730                 735
Asp
```

<210> 85
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 85

<400> 85

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
          20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
```

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 86
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 86

<400> 86

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
```

```
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
```

```
          500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
   530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
              565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
          580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
   610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
              645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
          660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
       675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
   690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
              725                 730                 735
Asp
```

<210> 87

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 87

<400> 87

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
```

```
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275               280               285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290               295               300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305               310               315               320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
              325               330               335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340               345               350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355               360               365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370               375               380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385               390               395               400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
              405               410               415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420               425               430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435               440               445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450               455               460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465               470               475               480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
              485               490               495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
          500               505               510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
       515               520               525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530               535               540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545               550               555               560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
              565               570               575
```

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 88
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 88

<400> 88
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

```
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
           100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
           180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
           260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
```

```
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
             485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
          500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
   530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
             565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
          580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
   610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
```

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 89

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 89

<400> 89

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

```
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115               120               125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130               135               140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145               150               155               160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
              165               170               175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
           180               185               190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195               200               205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210               215               220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225               230               235               240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245               250               255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
           260               265               270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275               280               285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290               295               300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305               310               315               320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
              325               330               335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
           340               345               350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355               360               365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
    370               375               380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385               390               395               400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
              405               410               415
```

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 90
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 90

<400> 90
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

```
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
              325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
              405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
```

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 91

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 91

<400> 91

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
```

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 92
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 92

<400> 92
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

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          20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
              85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
              165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Ile Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
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325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 93

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 93

<400> 93

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Leu Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 94
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 94

<400> 94
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

```
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Met Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
```

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 95

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 95

<400> 95

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
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Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Leu
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 96
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 96

<400> 96
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

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1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
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305 310 315 320
Phe Arg Val Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 97
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 97

<400> 97
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Ala Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 98
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 98

<400> 98
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Gly Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

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    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
        515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 99

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 99

<400> 99

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
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Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
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Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Met Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 100
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 100

<400> 100

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
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Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Asn Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 101
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 101

<400> 101
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

```
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Cys Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
        515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
```

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 102
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 102

<400> 102
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

```
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Gln Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
```

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 103

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 103

<400> 103

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
```

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Ser Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 104
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> SEQ ID NO: 104

<400> 104

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
```

```
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Thr Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
        515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
```

```
          580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
              645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
          660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
       675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
              725                 730                 735
Asp
```

<210> 105
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 105

<400> 105

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
          20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
```

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gly Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 106
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 106

<400> 106
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

```
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
```

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 107

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 107

<400> 107

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Met Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 108
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> SEQ ID NO: 108

<400> 108

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
```

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Pro Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 109

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 109

<400> 109

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

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Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
           100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
           180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
           260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
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Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Gly Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 110
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 110

<400> 110
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

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          100                 105                 110
Phe Leu Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
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405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 111

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 111

<400> 111

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Leu Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 112
<211> 737
<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 112

<400> 112

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
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245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 113

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 113

<400> 113

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 114
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 114

<400> 114
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 115
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 115

<400> 115

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

```
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
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Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 116

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 116

<400> 116

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

```
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 117
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 117

<400> 117

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
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Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 118
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 118

<400> 118
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

```
       675               680               685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690               695               700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705               710               715               720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
              725               730               735
Asp
```

<210> 119
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 119

<400> 119

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1             5                10                15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
          20                25                30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                40                45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                55                60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                70                75                80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
              85                90                95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100               105               110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115               120               125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130               135               140
```

```
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145              150              155              160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165              170              175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
         180              185              190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
     195              200              205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
 210              215              220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225              230              235              240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245              250              255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
         260              265              270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
     275              280              285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
 290              295              300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305              310              315              320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325              330              335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
         340              345              350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
     355              360              365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
 370              375              380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385              390              395              400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405              410              415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
         420              425              430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
     435              440              445
```

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 120

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 120

<400> 120

```
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
```

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   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
```

```
       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 121
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 121

<400> 121

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 122
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 122

<400> 122
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 123

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 123

<400> 123

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 124
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 124

<400> 124

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
```

```
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
```

```
          500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
   530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
              565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
          580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
   610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
              645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
          660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
       675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
   690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
              725                 730                 735
Asp
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<210> 125

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 125

<400> 125

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
```

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 126
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 126

<400> 126
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

```
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
           100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
           180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
           260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
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340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 127

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 127

<400> 127

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 128
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 128

<400> 128
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

```
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
              325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
              405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
```

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 129

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 129

<400> 129

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
```

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 130
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 130

<400> 130
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

```
          20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
       35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
   50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
              85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
              165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
              245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
```

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 131

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 131

<400> 131

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 132
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 132

<400> 132
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

```
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
```

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 133

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 133

<400> 133

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
```

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Tyr Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 134
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 134

<400> 134
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

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1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
```

305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 135
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 135

<400> 135
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 136
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 136

<400> 136
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser

180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln

195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn

210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

```
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
        515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 137

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 137

<400> 137

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
```

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 138
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 138

<400> 138

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 139
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 139

<400> 139
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 140
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 140

<400> 140
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

```
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
```

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       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
        515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 141

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 141

<400> 141

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
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Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 142
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> SEQ ID NO: 142

<400> 142

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
```

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 143

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 143

<400> 143

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 144
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 144

<400> 144
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

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       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
```

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          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
             485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
          500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
   530                 535                 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
             565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
          580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
       595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
   610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
             645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
          660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
       675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
   690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
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725 730 735

Asp

<210> 145

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 145

<400> 145

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 146
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> SEQ ID NO: 146

<400> 146

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
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260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 147

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 147

<400> 147

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 148
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 148

<400> 148
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

```
          100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
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405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 149

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 149

<400> 149

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys

145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu

165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 150
<211> 737
<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 150

<400> 150

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
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245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 151

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 151

<400> 151

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 152
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 152

<400> 152
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

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             85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
          100                 105                 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
       115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
   130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
```

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Ala Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 153
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 153

<400> 153

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

```
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
          180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
   290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
          340                 345                 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
          420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
       435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
   450                 455                 460
```

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 154

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQIDNO:154

<400> 154

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
```

225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr

245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

```
    530                 535                 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 155
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQIDNO:155

<400> 155

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
    290                 295                 300
```

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 156
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQIDNO:156

<400> 156
Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350

Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 157

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQIDNO:157

<400> 157

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr

20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly

35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile

50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile

65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys

85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys

100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn

115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe

130 135 140

```
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145              150              155              160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
             165              170              175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
         180              185              190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
     195              200              205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
 210              215              220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225              230              235              240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
             245              250              255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
         260              265              270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
     275              280              285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
 290              295              300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305              310              315              320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
             325              330              335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
         340              345              350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
     355              360              365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
 370              375              380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385              390              395              400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
             405              410              415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
         420              425              430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
     435              440              445
```

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480

Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735

Asp

<210> 158

<211> 737

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQIDNO:158

<400> 158

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
```

```
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
            260                 265                 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
        275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
    290                 295                 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305                 310                 315                 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
                325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
            340                 345                 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
        355                 360                 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
    370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
                405                 410                 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
            420                 425                 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
        435                 440                 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
    450                 455                 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465                 470                 475                 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
                485                 490                 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
            500                 505                 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
```

```
       515                 520                 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
    530                 535                 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545                 550                 555                 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
                565                 570                 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
            580                 585                 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
        595                 600                 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
    610                 615                 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625                 630                 635                 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
                645                 650                 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
            660                 665                 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
        675                 680                 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
    690                 695                 700
Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro
705                 710                 715                 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
                725                 730                 735
Asp
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<210> 159
<211> 737
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQIDNO:159

<400> 159

Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
20 25 30

Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45

Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60

Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80

Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95

His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110

Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125

Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140

Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160

His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175

Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190

Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205

Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220

Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240

Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255

Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320
Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Ala Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu
580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala
610 615 620
Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 160
<211> 732
<212> 蛋白質
<213> 舞菇(Grifola frondosa)

<220>
<223> SEQ ID NO: 160

<400> 160
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val

```
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
            260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
        275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
                325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
            340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
```

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       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
    370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
                405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
            420                 425                 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
        435                 440                 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
    450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465                 470                 475                 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
                485                 490                 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
            500                 505                 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
        515                 520                 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
    530                 535                 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545                 550                 555                 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
                565                 570                 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
            580                 585                 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
        595                 600                 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
    610                 615                 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625                 630                 635                 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
                645                 650                 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
```

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 161

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 161

<400> 161

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg

1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly

20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val

35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val

50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu

65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu

85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Ile Gly Ala Gly Val

100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp

115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His

130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 162

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 162

<400> 162

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Ile
100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175

Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190

Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220

Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile

225 230 235 240

His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly

245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys

260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala

275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp

290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr

305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile

385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

```
    530                 535                 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545                 550                 555                 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
                565                 570                 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
            580                 585                 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
        595                 600                 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
    610                 615                 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625                 630                 635                 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
                645                 650                 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
            660                 665                 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
        675                 680                 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
    690                 695                 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705                 710                 715                 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
                725                 730
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<210> 163
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 163

<400> 163

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                   10                  15
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Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
          20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
       35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
   50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
             85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
          100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
       115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
   130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
             165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
          180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Val Pro Arg Leu
   210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
             245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
          260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
   290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
```

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 164
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 164

<400> 164
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val

```
          100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
       115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
   130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
             165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
          180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
   210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
             245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
          260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ile Leu Asp Val Asp
   290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
             325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
          340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
   370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
```

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile

610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly

625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu

645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 165

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 165

<400> 165

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg

1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly

20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val

35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val

50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu

65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu

85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val

100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp

115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His

130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr

145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr

165 170 175

Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln

180 185 190

Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Ile Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 166
<211> 732
<212> 蛋白質
<213> 人工序列

<220>

<223> SEQ ID NO: 166

<400> 166

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
            20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
        35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
            260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
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275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp

290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr

305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile

385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile

610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly

625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu

645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 167

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 167

<400> 167

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg

1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly

20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val

35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val

50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 168
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 168

<400> 168
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr

145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr

165 170 175

Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln

180 185 190

Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala

195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu

210 215 220

Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile

225 230 235 240

His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly

245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys

260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala

275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp

290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr

305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile

385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

```
    450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465                 470                 475                 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
                485                 490                 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
            500                 505                 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
        515                 520                 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
    530                 535                 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Glu Leu Ile
545                 550                 555                 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
                565                 570                 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
            580                 585                 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
        595                 600                 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
    610                 615                 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625                 630                 635                 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
                645                 650                 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
            660                 665                 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
        675                 680                 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
    690                 695                 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705                 710                 715                 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
                725                 730
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<210> 169

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 169

<400> 169

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
            20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
        35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
```

His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Glu Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 170
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 170

<400> 170
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly

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          20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
       35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
              85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
          100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
       115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
              165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
          180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
              245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
          260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
```

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile

385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile

610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly

625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Met Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 171
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 171

<400> 171
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Ile Gly Ala Gly Val
100 105 110

```
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
       115              120              125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130              135              140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145              150              155              160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
              165              170              175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
          180              185              190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195              200              205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Val Pro Arg Leu
    210              215              220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225              230              235              240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
              245              250              255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
          260              265              270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275              280              285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290              295              300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305              310              315              320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
              325              330              335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
          340              345              350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355              360              365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
    370              375              380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385              390              395              400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
              405              410              415
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Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 172
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 172

<400> 172
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Ile Gly Ala Gly Val
100 105 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala

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       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
   210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
            260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ile Leu Asp Val Asp
   290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
                325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
            340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
   370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
                405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
            420                 425                 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
       435                 440                 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
   450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465                 470                 475                 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
                485                 490                 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
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          500                 505                 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
       515                 520                 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
    530                 535                 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545                 550                 555                 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
                565                 570                 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
          580                 585                 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
       595                 600                 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
    610                 615                 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625                 630                 635                 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
                645                 650                 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
          660                 665                 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
       675                 680                 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
    690                 695                 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705                 710                 715                 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
                725                 730
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<210> 173
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 173

<400> 173

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Ile Gly Ala Gly Val
100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175

Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190

Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220

Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240

His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Ile Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 174
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 174

<400> 174
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu

65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu

85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Ile Gly Ala Gly Val

100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp

115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His

130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr

145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr

165 170 175

Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln

180 185 190

Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala

195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu

210 215 220

Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile

225 230 235 240

His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly

245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys

260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala

275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp

290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr

305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480

Leu Cys Ala Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 175

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 175

<400> 175

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg

1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly

20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val

35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val

50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu

65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu

85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Ile Gly Ala Gly Val

100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp

115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His

130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr

145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 176
<211> 732
<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 176

<400> 176

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
            20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
        35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Ile Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
```

245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys

260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala

275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp

290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr

305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile

385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile

610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly

625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu

645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 177

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 177

<400> 177

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg

1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly

20 25 30

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Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
       35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Ile
           100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
       115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
           180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
           260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
                325                 330                 335
```

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Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
          340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
   370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
             405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
          420                 425                 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
       435                 440                 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
   450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465                 470                 475                 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
             485                 490                 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
          500                 505                 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
       515                 520                 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
   530                 535                 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545                 550                 555                 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
             565                 570                 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
          580                 585                 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
       595                 600                 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
   610                 615                 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625                 630                 635                 640
```

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 178
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 178

<400> 178
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp

```
       115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Val Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
            260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
        275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
                325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
            340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
        355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
    370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
                405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
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420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile

610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly

625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu

645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 179
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 179

<400> 179

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
            20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
        35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
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Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ile Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 180
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 180

<400> 180

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175

Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190

Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220

Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240

His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp

290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Ile Thr

305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile

385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 181
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 181

<400> 181
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Tyr Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 182
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 182

<400> 182
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr

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             165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
          180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
   210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
             245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
          260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
   290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
             325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
          340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
   370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
             405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
          420                 425                 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
       435                 440                 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
   450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
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465 470 475 480

Leu Cys Ala Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile

610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly

625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu

645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 183

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 183

<400> 183

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
            20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
        35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
```

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Ile
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 184
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 184

<400> 184
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val

```
       35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
           100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
       115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
           180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
           260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
                325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
```

```
          340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
    370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
              405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
          420                 425                 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
       435                 440                 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
    450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465                 470                 475                 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
              485                 490                 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
          500                 505                 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
       515                 520                 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
    530                 535                 540
Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545                 550                 555                 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
              565                 570                 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
          580                 585                 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
       595                 600                 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
    610                 615                 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625                 630                 635                 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
```

645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu

705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly

725 730

<210> 185

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 185

<400> 185

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg

1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly

20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val

35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val

50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu

65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu

85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val

100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp

115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
180 185 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225 230 235 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
245 250 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Ala Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Glu Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 186

<211> 732

<212> 蛋白質

<213> 人工序列

<220>

<223> SEQ ID NO: 186

<400> 186

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
            20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
        35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
```

```
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
            260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
        275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
                325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
            340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
        355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
    370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
                405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
            420                 425                 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
        435                 440                 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
    450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465                 470                 475                 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
                485                 490                 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
            500                 505                 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
```

```
       515                 520                 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Ile
    530                 535                 540
Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp Gln Val Leu Gln Leu Ile
545                 550                 555                 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
                565                 570                 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
            580                 585                 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
        595                 600                 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
    610                 615                 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625                 630                 635                 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
                645                 650                 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
            660                 665                 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
        675                 680                 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
    690                 695                 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705                 710                 715                 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
                725                 730
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<210> 187
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 187

<400> 187

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Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
            20                  25                  30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
        35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65                  70                  75                  80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
                85                  90                  95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
            100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
        115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
    130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
                165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
            180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
        195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
    210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
                245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
            260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
        275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
    290                 295                 300
```

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
420 425 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
450 455 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465 470 475 480
Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Ile
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Glu Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 188
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 188

<400> 188
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu

85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val

100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp

115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His

130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr

145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr

165 170 175

Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln

180 185 190

Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala

195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu

210 215 220

Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile

225 230 235 240

His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly

245 250 255

Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys

260 265 270

Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala

275 280 285

Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp

290 295 300

Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr

305 310 315 320

Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg

325 330 335

Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn

340 345 350

Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val

355 360 365

Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu

370 375 380

Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile

385 390 395 400

Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn

465 470 475 480

Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu

485 490 495

Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn

500 505 510

Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val

515 520 525

Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Val

530 535 540

Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp Gln Val Leu Glu Leu Ile

545 550 555 560

His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys

565 570 575

Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe

580 585 590

Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu

595 600 605

Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile

610 615 620

Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly

625 630 635 640

Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu

645 650 655

Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp

660 665 670

Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val

675 680 685

Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile

690 695 700

Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720

Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 189
<211> 732
<212> 蛋白質
<213> 人工序列

<220>
<223> SEQ ID NO: 189

<400> 189

Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15

Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30

Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45

Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80

Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95

Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val
100 105 110

Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
165 170 175

```
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
          180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
   210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
              245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
          260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Ala Leu Asp Val Asp
   290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
              325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
          340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly Leu Ile Pro Leu
   370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
              405                 410                 415
Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile
          420                 425                 430
Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys
       435                 440                 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys
   450                 455                 460
His Leu Asp Ala Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe Arg Asn
465                 470                 475                 480
```

Leu Cys Ala Lys Glu Lys Met Asn Glu Leu Gly Trp Pro Ala Arg Glu
485 490 495
Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Cys Val Asp Lys Val
515 520 525
Met Glu Asp Asp Ile Pro Gln Leu Leu Leu Cys Gly His Gly Ala Ile
530 535 540
Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Leu Glu Leu Ile
545 550 555 560
His Ala Lys Tyr Lys Glu Tyr Ala Pro Asp Ile Val Val Met Arg Cys
565 570 575
Pro Pro Ser Asp Gln Leu Leu Asn Thr Leu Met Ala Asn Ala Lys Phe
580 585 590
Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu
595 600 605
Ala Leu His Ala Gly Lys Pro Val Ile Ala Cys Arg Thr Gly Gly Ile
610 615 620
Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly
625 630 635 640
Asp Asn Ala Ala Val Ala Gln His Met Leu Asp Leu Tyr Thr Asp Glu
645 650 655
Asp Leu Tyr Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp
660 665 670
Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val
675 680 685
Met Tyr Val Ser Arg Gly Val Lys Leu Arg Pro His Gly Ala Trp Ile
690 695 700
Asn Asp Leu Met Arg Thr Glu Met Gly Glu Pro Tyr Arg Pro Gly Glu
705 710 715 720
Pro Arg Leu Pro Arg Gly Glu Leu His Val Gln Gly
725 730

<210> 190
<211> 737
<212> 蛋白質
<213> 人工序列

<220>

<223> >SEQ ID NO:190

<400> 190

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Met Ser Pro Pro His Gly Phe Ser Ser Val Pro Ser Thr Ala Ala Arg
1               5                  10                  15
Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Thr
            20                  25                  30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
        35                  40                  45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
    50                  55                  60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65                  70                  75                  80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
                85                  90                  95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
            100                 105                 110
Phe Ile Gly Ala Gly Val Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
        115                 120                 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
    130                 135                 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145                 150                 155                 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
                165                 170                 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
            180                 185                 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
        195                 200                 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
    210                 215                 220
Val Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
                245                 250                 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
```

260 265 270

Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly

275 280 285

Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ile

290 295 300

Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val

305 310 315 320

Phe Arg Ile Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser

325 330 335

Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp

340 345 350

Ile Thr Lys Asn Ala Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala

355 360 365

Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Val Gly

370 375 380

Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr

385 390 395 400

Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val

435 440 445

Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly

465 470 475 480

Glu Phe Arg Ala Leu Cys Leu Lys Asp Lys Met Asn Thr Leu Asp Trp

485 490 495

Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys

500 505 510

Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu

515 520 525

Asn Glu Ala Gly Asp Val Asp Ala Asp Asp Gln Pro Gln Leu Leu Ile

530 535 540

Cys Gly His Gly Ala Ile Asp Asp Pro Asp Ala Thr Ile Ile Tyr Asp

545 550 555 560

Gln Val Leu Glu Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp

565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Cys Leu

580 585 590

Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

595 600 605

Glu Val Lys Val Ser Glu Ala Val His Ala Gly Lys Pro Ile Ile Ala

610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly

625 630 635 640

Phe Leu Thr Glu Pro Gly Asp Asn Glu Gln Val Ala Arg His Met Tyr

645 650 655

Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala

660 665 670

Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala

675 680 685

Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro

690 695 700

Lys Gly Ala Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Thr Pro

705 710 715 720

Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln

725 730 735

Asp

<210> 191

<211> 737

<212> 蛋白質

<213> 裂褶菌(Schizophyllum commune) H4-8

<220>

<223> >XP_003035156.1 糖基轉移酶家族 4 蛋白 [裂褶菌(Schizophyllum commune) H4-8] >EFJ00254.1 糖基轉移酶家族 4 蛋白[裂褶菌(Schizophyllum commune) H4-8]

<400> 191

Met Ser Pro Pro His Gly Phe Ser Ser Lys Pro Ser Thr Ala Ala Arg

1 5 10 15

Arg Arg Leu Ser Ser Lys Ala Ser Leu Thr Asn Arg Pro Thr Phe Ser
20 25 30
Lys Ile Thr Thr Gln Thr Tyr Ala Ser Leu Thr Pro Met Trp Ala Gly
35 40 45
Ile Ala Gly Ala Pro Ile Asn Asn Gly Ser Gln Phe Glu Leu Ala Ile
50 55 60
Ser Val His Asp Ser Val Tyr Ser Thr Asp Phe Ala Ser Phe Val Ile
65 70 75 80
Asp His Thr Pro Leu Asp Pro Glu Lys Ala Ala Lys Glu Ile Glu Lys
85 90 95
His Val Leu Asp Ala Leu Arg Lys Phe Ser Gln Glu His Leu Cys Lys
100 105 110
Phe Leu Gly Ala Gly Ile Thr Leu Ala Leu Leu Arg Glu Ser Pro Asn
115 120 125
Ile Cys Thr Arg Leu Trp Leu Asp Leu Asp Ile Val Pro Ile Val Phe
130 135 140
Asn Ile Lys Pro Phe His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys
145 150 155 160
His Arg Ile Ser Ser Thr Ser Gly Ser Tyr Val Pro Ser Gly Ala Glu
165 170 175
Thr Pro Thr Val Tyr Val Glu Ala Ser His Leu Gly Asn Asn Leu Ser
180 185 190
Ala Gly Thr Ala Ser Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
195 200 205
Ala Asp Ser Ala Ala Arg Lys Ala Ile Met Tyr Tyr Gly Pro Asn Asn
210 215 220
Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala
225 230 235 240
Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr
245 250 255
Val Gly Pro Ser Thr Trp Thr Ala Val Asn Lys Leu Ala Asp Glu Leu
260 265 270
Arg Glu Arg Gln Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
275 280 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Phe Ser Ala
290 295 300
Leu Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val
305 310 315 320

Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ser
325 330 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Asn Phe Asp Ala Trp
340 345 350
Ile Thr Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
355 360 365
Pro Gly Gly Val Asp Val Ala Phe Ile Asp Asp Pro Gln Met Pro Gly
370 375 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Leu Pro Ile Ile Tyr
385 390 395 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Ile Ala Gly Ser
405 410 415
Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala
420 425 430
Asp Leu Phe Ile Ser His Pro Val Lys Ala Phe Val Pro Glu Asp Val
435 440 445
Pro Ile Glu Arg Val Ala Leu Leu Pro Ala Ala Thr Asp Trp Leu Asp
450 455 460
Gly Leu Asn Lys Glu Leu Ser Asp Trp Asp Arg Gln Tyr Tyr Met Gly
465 470 475 480
Glu Phe Arg Ala Leu Cys Gln Lys Asp Lys Met Asn Thr Leu Asp Trp
485 490 495
Pro Asn Arg Glu Tyr Cys Ile Gln Ile Ala Arg Phe Asp Pro Ala Lys
500 505 510
Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Leu Leu
515 520 525
Asn Glu Ala Gly Asp Val Glu Pro Asp Asp Gln Pro Gln Leu Leu Ile
530 535 540
Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp
545 550 555 560
Gln Val Leu Thr Leu Ile His Glu Lys Tyr Ala Glu Phe Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asp Cys Leu
580 585 590
Met Ala Asn Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Ile His Ala Gly Lys Pro Ile Ile Ala
610 615 620

Ala Thr Thr Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly
625 630 635 640
Phe Leu Thr Glu Pro Gly Asp Asn Val Gln Val Ala Arg His Met Tyr
645 650 655
Asp Leu Tyr Thr Asp Val Ala Leu Tyr Asp Arg Met Ser Gln Tyr Ala
660 665 670
Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Ala Val Tyr Thr Arg Gly Gln Lys Leu Ala Pro
690 695 700
Lys Gly Ala Trp Leu Asn Asp Leu Leu Arg Glu Glu Thr Gly Thr Pro
705 710 715 720
Tyr Val Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Ile Lys Val Gln
725 730 735
Asp

<210> 192
<211> 626
<212> 蛋白質
<213> 朱紅菌(Trametes cinnabarina)

<220>
<223> >CDO74881.1 糖基轉移酶家族 4 蛋白 [朱紅菌(Trametes cinnabarina)]

<400> 192
Met Pro Ala Ile Gly Ser Arg Gln Ala Asn Leu Ala Gln Ala Pro Asn
1 5 10 15
Leu Cys Thr Arg Leu Trp Leu Glu Leu Asp Ile Val Pro Ile Val Phe
20 25 30
Asn Ile Lys Pro Tyr His Thr Asp Ser Ile Thr Arg Pro Asn Ile Arg
35 40 45
His Arg Ile Ser Ser Thr Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu
50 55 60
Thr Pro Thr Val Tyr Tyr Asp Pro Ser Gln Leu Pro Gly Ala Gln Ala
65 70 75 80
Asn Leu Thr Ala Thr Gln Asn Lys Leu Pro Ile Pro Arg Thr Val Asp

85 90 95

Glu Gln Ala Asp Ser Ala Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro

100 105 110

Ser Asn Asn Pro Arg Leu Thr Ile Gly Pro Arg Asn Gln Val Ala Val

115 120 125

Asp Ala Gly Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg

130 135 140

Lys Gly Val Gly Lys Gly Thr Trp Asn Cys Val Asn Lys Leu Ala Asp

145 150 155 160

Glu Leu Arg Glu Lys Lys Ile Lys Met Ala Phe Phe Ser Ser Thr Pro

165 170 175

Gln Gly Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu

180 185 190

Asn Leu Leu Asp Val Asp Cys Ala Trp Tyr Val Pro Asn Pro Ser Pro

195 200 205

Thr Val Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val

210 215 220

Ala Asp Pro Asn Leu Arg Leu Thr Lys Glu Ala Lys Asp Asn Phe Asp

225 230 235 240

Ala Trp Ile Leu Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro

245 250 255

Leu Ala Pro Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met

260 265 270

Pro Gly Leu Ile Pro Leu Ile Arg Arg Val Arg Pro Asp Leu Pro Ile

275 280 285

Ile Tyr Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Val Ala

290 295 300

Gly Ser Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln

305 310 315 320

His Ala Asp Met Phe Ile Ser His Pro Val Asn Lys Phe Val Pro Ser

325 330 335

Asp Val Pro Thr Asp Lys Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp

340 345 350

Leu Asp Gly Leu Asn Lys Pro Leu Asp Gln Trp Asp Leu Gln Tyr Tyr

355 360 365

Met Gly Glu Phe Arg Ser Leu Cys Val Lys Glu Lys Met Thr Glu Leu

370 375 380

Gly Trp Pro Ala Arg Glu Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro

385 390 395 400

Ser Lys Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys

405 410 415

Leu Leu Ala Glu Lys Glu Pro Asp Ile Glu Pro Pro Gln Met Leu Ile

420 425 430

Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp

435 440 445

Gln Thr Met Gln Leu Ile His Asn Lys Tyr Ala Gln Tyr Ala Gly Asp

450 455 460

Phe Val Val Met Arg Cys Pro Pro Ser Asp Gln Leu Leu Asn Ala Leu

465 470 475 480

Met Glu Asn Ser Lys Phe Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe

485 490 495

Glu Val Lys Val Ser Glu Ala Leu His Ala Gly Lys Pro Val Ile Ala

500 505 510

Ser Arg Thr Gly Gly Ile Pro Leu Gln Ile Glu His Gly Lys Ser Gly

515 520 525

Tyr Leu Cys Glu Pro Gly Asp Asn Ala Ala Val Ala Gln His Met Phe

530 535 540

Asp Leu Tyr Thr Asp Asp Asp Leu Phe Asp Gln Met Ser Glu Tyr Ala

545 550 555 560

Arg Thr His Val Ser Asp Glu Val Ser Thr Val Gly Asn Ala Thr Ala

565 570 575

Trp Met Tyr Leu Ala Val Met Tyr Cys Ser Arg Gly Val Arg Leu Gln

580 585 590

Pro Asn Gly Ala Trp Leu Asn Asp Leu Met Arg Thr Glu Cys Gly Glu

595 600 605

Pro Tyr Gln Pro Gly Glu Pro Arg Leu Pro Arg Gly Gly Leu Asn Val

610 615 620

Gln Gly

625

<210> 193

<211> 735

<212> 蛋白質

<213> 鴻禧菇(Hypsizygus marmoreus)

<220>

<223> >KYQ39707.1 海藻糖磷酸化酶[鴻禧菇(Hypsizygus marmoreus)]

<400> 193

Met Ala Pro Tyr His Gln Phe Glu Ser Lys Pro Ser Leu Ala Met Arg
1 5 10 15

Arg Arg Leu Ser Ser Ser Val Ser Thr Arg Pro Glu Val Thr Ala Thr
20 25 30

Phe Ala Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Asn Pro Ile
35 40 45

Ser Asn Asn Thr His Tyr Glu Ile Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Ser Thr Asp Phe Ser Ser Thr Val Ile Ser Tyr Phe Pro Asp Glu
65 70 75 80

Pro Glu Lys Thr Ala Lys Ser Ile Gln Ala His Val Leu Glu Thr Leu
85 90 95

Arg Lys Phe Ser Lys Glu His Leu Cys Lys Phe Leu Gly Ala Gly Val
100 105 110

Thr Leu Ser Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125

Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Tyr His
130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Ile Lys His Arg Ile Ser Ser Thr
145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Ile
165 170 175

Asp Ser Ala Gln Leu Thr Ala Ala Gly Leu Leu Pro Thr Gly Leu Ser
180 185 190

Asp Arg Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln Ala Asp Ser Ala
195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Asn Asn Asn Pro Arg Leu
210 215 220

Ser Ile Gly Pro Arg Asn Gln Val Thr Val Asp Ala Ala Gly Lys Ile
225 230 235 240

His Leu Ile Asp Asp Leu Asp Glu Tyr Lys Lys Thr Val Gly Pro Gly
245 250 255

Thr Trp Asn Ala Val Val Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270

Val Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Leu Ile Arg Phe Leu Thr Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Pro Pro Asp Leu Arg
325 330 335
Leu Thr Lys Glu Ala Lys Glu Asn Phe Asp Ala Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
370 375 380
Ile Lys Arg Val Arg Pro Gly Met Pro Ile Val Tyr Arg Ser His Ile
385 390 395 400
Glu Ile Arg Ser Asp Leu Val His Val Pro Gly Ser Pro Gln Glu Glu
405 410 415
Val Trp Lys Tyr Leu Trp Asn Asn Ile Lys Leu Ala Asp Leu Phe Ile
420 425 430
Ser His Pro Val Ser Lys Phe Val Pro Ser Asp Val Pro Glu Ala Lys
435 440 445
Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Asn Lys
450 455 460
His Leu Asp Pro Trp Asp Ala Gln Phe Tyr Met Gly Glu Phe Arg Ser
465 470 475 480
Leu Cys Ala Lys Glu Lys Met Asn Glu Leu Gln Trp Pro Gln Arg Asp
485 490 495
Tyr Val Ile Gln Val Ala Arg Phe Asp Pro Ala Lys Gly Ile Pro Asn
500 505 510
Val Ile Asp Ser Tyr Cys Lys Phe Arg His Leu Leu Thr Gln Pro Pro
515 520 525
Val Leu Thr Ser Asp Glu Tyr Pro Gln Leu Leu Ile Cys Gly His Gly
530 535 540
Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Val Met Gln
545 550 555 560
Leu Ile Asn Ser Glu Lys Tyr Ala Glu Tyr Ala Gln Asp Ile Val Val
565 570 575

Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Ala Leu Met Ala Asn
580 585 590
Ala Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys
595 600 605
Val Ser Glu Ala Val His Ala Gly Ile Pro Val Ile Ala Ser Gln Thr
610 615 620
Gly Gly Ile Pro Leu Gln Val Glu His Gly Lys Ser Gly Tyr Leu Thr
625 630 635 640
Ala Pro Gly Asp Asn Ala Ala Val Ala Gln His Leu Tyr Glu Leu Tyr
645 650 655
Thr Asp Glu Gly Leu Tyr Arg Arg Ile Ser Ala Tyr Ala Lys Thr His
660 665 670
Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Leu Tyr
675 680 685
Leu Ala Val Met Tyr His Arg Gly Val Lys Ile Arg Pro Gln Gly Ala
690 695 700
Trp Leu Asn Asp Met Leu Arg Glu Glu Thr Gly Glu Ala Tyr Val Glu
705 710 715 720
Gly Glu Pro Arg Leu Pro Arg Gly Gly Leu Val Val Gln Gly Asn
725 730 735

<210> 194
<211> 735
<212> 蛋白質
<213> 彩絨栓菌(Trametes versicolor)

<220>
<223> >XP_008036133.1 海藻糖合成酶[彩絨栓菌(Trametes versicolor) FP-101664
SS1] >EIW60750.1 海藻糖合成酶[彩絨栓菌(Trametes versicolor) FP-101664 SS1]

<400> 194
Met Ala Pro Ser Ser Pro His His Gln Phe Gln Ser Lys Thr Ser Asp
1 5 10 15
Ala Ile Arg Arg Arg Leu Ser Ser Val Val Ser Ser Lys Arg Pro Asn
20 25 30

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Val Gln Ala Tyr Ser Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly
       35                  40                  45
Thr Val Ile Asn Asn Asn Thr Ala Leu Glu Leu Ala Ile Ser Ile His
    50                  55                  60
Asp Ser Val Tyr Asn Thr Asp Phe Ala Ser Ser Thr Val Pro Tyr Asn
65                  70                  75                  80
Pro Asn Asn Pro Glu Glu Gln Ala Ser Asn Val Glu Lys His Val Leu
                85                  90                  95
Glu Leu Leu Arg Lys Phe Ala Thr Glu His Met Cys Lys Phe Leu Gly
           100                 105                 110
Ala Gly Val Thr Val Ser Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr
       115                 120                 125
Arg Leu Trp Phe Asp Leu Asp Ile Val Pro Ile Val Phe Asn Ile Lys
    130                 135                 140
Pro Phe His Thr Asp Ser Val Thr Arg Pro Asn Ile Lys His Arg Ile
145                 150                 155                 160
Ser Ser Thr Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr
                165                 170                 175
Val Tyr Tyr Asp Pro Ala Gln Leu Pro Ala Gly Gln Ala Asn Val Thr
           180                 185                 190
Ala Thr Gln Asn Lys Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala
       195                 200                 205
Asp Ser Ala Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn
    210                 215                 220
Pro Arg Leu Ser Ile Gly Ala Arg Asn Gln Val Thr Val Asp Ala Gly
225                 230                 235                 240
Gly Lys Ile His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Gly Asn
                245                 250                 255
Ser Lys Gly Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg
           260                 265                 270
Glu Lys Lys Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly
       275                 280                 285
Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu Asn Leu Leu
    290                 295                 300
Asp Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe
305                 310                 315                 320
Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro
                325                 330                 335
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Asn Leu Arg Leu Ser Lys Glu Ala Lys Asp Asn Phe Asp Ala Trp Ile
340 345 350
Leu Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro
355 360 365
Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu
370 375 380
Ile Pro Leu Ile Lys Arg Val Arg Pro Asp Leu Pro Ile Ile Tyr Arg
385 390 395 400
Ser His Ile Glu Ile Arg Ser Asp Leu Val His Val Ala Gly Ser Pro
405 410 415
Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln His Ala Asp
420 425 430
Leu Phe Ile Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro
435 440 445
Pro Glu Lys Leu Thr Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly
450 455 460
Leu Asn Lys Pro Leu Gly Asp Trp Asp Leu Gln Tyr Tyr Met Gly Glu
465 470 475 480
Phe Arg Gln Leu Cys Val Lys Glu Lys Met Asn Glu Leu Gly Trp Pro
485 490 495
Leu Arg Asp Tyr Ile Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly
500 505 510
Ile Pro Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Lys Leu Leu Ala
515 520 525
Glu Lys Glu Pro Ala Thr Glu Pro Pro Gln Met Leu Ile Cys Gly His
530 535 540
Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Glu Thr Met
545 550 555 560
Gln Leu Ile His Thr Lys Tyr Ala Glu Tyr Ala Lys Asp Phe Val Val
565 570 575
Met Arg Cys Pro Pro Ser Asp Gln Leu Leu Asn Ala Leu Met Glu Asn
580 585 590
Ser Lys Phe Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys
595 600 605
Val Ser Glu Ala Leu His Ala Gly Lys Pro Val Ile Ala Ser Arg Thr
610 615 620
Gly Gly Ile Pro Leu Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys
625 630 635 640

Glu Pro Gly Asp Asn Ala Ala Val Ala Ser His Met Phe Asp Leu Tyr
645 650 655
Thr Asp Asp Asp Leu Phe Asp Thr Met Ser Glu Tyr Ala Arg Thr His
660 665 670
Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr
675 680 685
Leu Ala Val Met Tyr Cys Ser Arg Gly Val Arg Leu Gln Pro Lys Gly
690 695 700
Ala Trp Leu Asn Asp Leu Met Arg Thr Glu Cys Gly Glu Pro Tyr Ala
705 710 715 720
Pro Asn Glu Pro Arg Leu Pro Arg Ala Gly Leu Asn Val Gln Gly
725 730 735

<210> 195
<211> 739
<212> 蛋白質
<213> 肺形側耳(Pleurotus pulmonarius)

<220>
<223> >A6YRN9.1 原名: 全長=海藻糖磷酸化酶; 替換名:
全長=海藻糖合成酶; 縮短=TSase; 標誌: 前驅物
>ABR88135.1 海藻糖磷酸化酶[肺形側耳(Pleurotus pulmonarius)]

<400> 195
Met Ser Thr Pro His His Gln Phe Glu Ser Lys Ser Ser Thr Ala Ile
1 5 10 15
Arg Arg Arg Leu Ser Ser Ser Val Ser Ser Lys Gln Arg Pro Asn Ile
20 25 30
Met Thr Thr Thr Phe Ala Ser Leu Thr Pro Met Trp Ala Gly Val Ala
35 40 45
Gly Thr Leu Val Asn Asn Asn Thr Gln Tyr Glu Ile Ala Val Thr Val
50 55 60
His Asp Gly Val Tyr Ser Thr Asp Phe Ala Ser Val Ile Ile Pro Val
65 70 75 80
Thr Pro Gly Asp Thr Val Lys Asn Ser Lys Asp Ile Glu Ala Gln Val
85 90 95
Leu Asn Leu Ile Arg Lys Phe Ser Ala Glu His Leu Cys Lys Phe Leu

```
          100                 105                 110
Gly Ala Gly Ile Thr Leu Ala Leu Leu Lys Glu Cys Pro Asn Leu Cys
       115                 120                 125
Thr Arg Leu Trp Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile
   130                 135                 140
Lys Pro Phe His Thr Asp Ser Val Thr Arg Pro Asn Ile Lys His Arg
145                 150                 155                 160
Ile Ser Ser Thr Thr Gly Ser Tyr Val Pro Ser Gly Ser Glu Thr Pro
             165                 170                 175
Thr Val Tyr Val Glu Ala Ser His Leu Asp Asp Pro Ser His Leu Ser
          180                 185                 190
Pro Asn Ala Ala Gln Lys Leu Pro Ile Pro Arg Thr Leu Asp Glu Gln
       195                 200                 205
Ser Asp Ser Ala Ala Arg Lys Cys Leu Met Tyr Phe Gly Pro Asn Asn
   210                 215                 220
Asn Pro Arg Leu Ser Ile Gly Ala Arg Asn Gln Val Thr Val Asp Ala
225                 230                 235                 240
Gly Gly Lys Ile His Leu Ile Asp Asp Leu Glu Glu Tyr Arg Glu Thr
             245                 250                 255
Val Gly Ala Gly Thr Trp Asn Ala Val Ile Lys Leu Ala Asp Glu Leu
          260                 265                 270
Arg Glu Lys Lys Val Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly
       275                 280                 285
Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu Thr Ala
   290                 295                 300
Leu Asp Val Asp Val Ala Trp Tyr Val Pro Asn Pro Ser Pro Gln Val
305                 310                 315                 320
Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ala
             325                 330                 335
Pro Asp Leu Arg Leu Thr Gln Glu Ala Lys Asp Ala Phe Asp Ala Trp
          340                 345                 350
Ile Leu Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala
       355                 360                 365
Pro Gly Gly Val Asp Val Val Phe Ile Asp Asp Pro Gln Met Pro Gly
   370                 375                 380
Leu Ile Pro Leu Ile Lys Lys Val Arg Pro Glu Val Pro Ile Val Tyr
385                 390                 395                 400
Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Val Ala Gly Ser
```

405 410 415

Pro Gln Glu Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Leu Ala

420 425 430

Asp Leu Phe Ile Ser His Pro Val Ser Lys Phe Val Pro Ser Asp Val

435 440 445

Pro Thr Glu Lys Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp

450 455 460

Gly Leu Asn Lys Asp Leu Asp Pro Trp Asp Ser Gln Phe Tyr Met Gly

465 470 475 480

Glu Phe Arg Ser Pro Cys Ala Lys Glu Lys Met His Glu Leu Asn Trp

485 490 495

Pro Ala Arg Asp Tyr Ile Val Gln Val Ala Arg Phe Asp Pro Ser Lys

500 505 510

Gly Ile Pro Asn Val Val Asp Ser Tyr Tyr Lys Phe Arg Asn Leu Leu

515 520 525

Arg Thr Arg Ser Pro Asp Met Asp Glu Ser Glu His Pro Gln Leu Leu

530 535 540

Ile Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr

545 550 555 560

Asp Gln Ile Met Ala Leu Val Asn Ser Asp Pro Tyr Lys Glu Tyr Ala

565 570 575

His Asp Ile Val Val Met Arg Leu Pro Pro Ser Asp Glu Leu Leu Asn

580 585 590

Ala Met Met Ala Asn Ser Arg Ile Ala Leu Gln Leu Ser Thr Arg Glu

595 600 605

Gly Phe Glu Val Lys Val Ser Glu Ala Leu His Thr Gly Lys Pro Val

610 615 620

Ile Ala Cys Arg Thr Gly Gly Ile Pro Leu Gln Ile Gln His Gly Lys

625 630 635 640

Ser Gly Tyr Leu Thr Thr Pro Gly Asp Asn Asp Ala Val Ala Gly His

645 650 655

Leu Tyr Asp Leu Tyr Thr Asp Glu Ala Leu Tyr Arg Lys Met Ser Asp

660 665 670

Phe Ala Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala

675 680 685

Ala Ala Trp Leu Tyr Leu Ala Val Met Tyr Ser Arg Gly Glu Lys Ile

690 695 700

Lys Pro Asn Gly Ala Trp Ile Asn Asp Leu Leu Arg Glu Glu Thr Gly

705 710 715 720

Glu Pro Tyr Lys Glu Gly Glu Thr Lys Leu Pro Arg Thr Lys Leu Asp

725 730 735

Met Gln Gly

<210> 196

<211> 737

<212> 蛋白質

<213> 雙孢蘑菇(Agaricus bisporus)

<220>

<223> >XP_006458503.1 假設蛋白 AGABI2DRAFT_190782 [雙孢蘑菇(Agaricus bisporus) 變種蘑菇 H97] >EKV50461.1 假設蛋白 AGABI2DRAFT_190782 [雙孢蘑菇(Agaricus bisporus) 變種蘑菇 H97]

<400> 196

Met Ala His Thr Ala His Pro Phe Ser Ser Val Pro Ser Ala Ala Val

1 5 10 15

Arg Arg Arg Leu Ser Ser Ser Val Ser Ala Lys Lys Pro Leu Val Thr

20 25 30

Ala Thr Phe Ser Ser Leu Thr Pro Met Trp Ala Gly Val Ala Gly Val

35 40 45

Ile Ile Asn Asn Asn Thr Glu Phe Glu Val Ala Val Ser Val His Asp

50 55 60

Ser Val Tyr Ser Thr Asp Phe Ala Ser Val Val Leu Pro Tyr Asp Pro

65 70 75 80

Asn Asp Pro Glu Lys Asn Ala Lys Thr Ile Glu Gln Tyr Ile Leu Gln

85 90 95

Val Leu Arg Arg Phe Ser Val Glu His Leu Cys Lys Phe Leu Gly Ala

100 105 110

Gly Val Thr Leu Thr Leu Leu Arg Glu Val Pro Asn Val Cys Thr Arg

115 120 125

Leu Trp Leu Asp Leu Asp Ile Val Pro Phe Val Phe Asn Ile Lys Gln

130 135 140

Tyr His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys His Arg Ile Ser

145 150 155 160

```
Ser Thr Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val
             165                 170                 175
Tyr Val Asp Ser Ala His Leu Lys Ala Met Ser Gly Leu Gln Thr Gly
         180                 185                 190
Val Ser Gly Arg Leu Pro Ile Gln Arg Thr Leu Asp Glu Gln Ala Asp
     195                 200                 205
Ser Ala Ala Arg Lys Cys Leu Met Asn Phe Gly Pro Gly Asn Asn Pro
 210                 215                 220
Arg Leu Asn Ile Gly Pro Arg Asn Gln Val Leu Val Asp Asp Gly Gly
225                 230                 235                 240
Arg Val His Leu Leu Asp Asp Leu Asp Glu Tyr Arg Asn Thr Val Gly
             245                 250                 255
Pro Arg Thr Trp Asn Ala Val Ile Lys Leu Ala Asp Glu Leu Arg Glu
         260                 265                 270
Lys Lys Val Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly
     275                 280                 285
Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu Thr Ala Leu Asp
 290                 295                 300
Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ala Val Phe Arg
305                 310                 315                 320
Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ala Pro Asp
             325                 330                 335
Leu Arg Leu Thr Glu Glu Ala Arg Asp Ala Phe Asp Ala Trp Ile Leu
         340                 345                 350
Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Arg Gly
     355                 360                 365
Gly Val Asp Val Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile
 370                 375                 380
Pro Leu Ile Lys Lys Ile Arg Pro Glu Leu Pro Ile Val Tyr Arg Ser
385                 390                 395                 400
His Ile Glu Ile Arg Ser Asp Leu Val His Val Pro Gly Ser Pro Gln
             405                 410                 415
Glu Glu Val Trp Lys Tyr Leu Trp Lys Asn Ile Gln Leu Ala Asp Leu
         420                 425                 430
Phe Ile Ser His Pro Val Ser Lys Phe Val Pro Gln Asp Val Pro Leu
     435                 440                 445
Glu Lys Val Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu
 450                 455                 460
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Asn Lys Asp Leu Asp Pro Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe
465 470 475 480
Arg Ala Leu Cys Ala Arg Glu Arg Met Leu Glu Leu Arg Trp Pro Gln
485 490 495
Arg Asp Tyr Ile Ile Gln Val Ala Arg Phe Asp Pro Ser Lys Gly Ile
500 505 510
Pro Asn Val Ile Asp Ser Tyr Val Lys Phe Arg Glu Leu Leu Lys Leu
515 520 525
Lys Ser Pro Glu Leu Asp Asp Glu Asp His Pro Gln Leu Leu Val Cys
530 535 540
Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln
545 550 555 560
Ile Met Gln Ile Ile Asn Ser Glu Gln Tyr Glu Ala Tyr Ala Lys Asp
565 570 575
Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Ser Leu
580 585 590
Met Ser Asn Ala Lys Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605
Glu Val Lys Val Ser Glu Ala Leu His Thr Gly Lys Pro Val Ile Ala
610 615 620
Ser Arg Thr Gly Gly Ile Pro Leu Gln Ile Glu His Gly Lys Ser Gly
625 630 635 640
Tyr Leu Cys Thr Pro Gly Asp Asn Glu Ala Val Ala Gly His Leu Tyr
645 650 655
Asp Leu Tyr Thr Asp Glu Ile Leu Tyr Lys Thr Met Ser Asp Tyr Ala
660 665 670
Lys Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Thr Ala Ala
675 680 685
Trp Leu Tyr Leu Ala Val Met Tyr Asn Arg Gly Ile Lys Ile Lys Pro
690 695 700
Asn Gly Ala Trp Leu Asn Asp Leu Leu Arg Thr Glu Thr Gly Glu Asp
705 710 715 720
Tyr Glu Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Leu Lys Met Gln
725 730 735
Gly

<210> 197

<211> 737

<212> 蛋白質

<213> 雙孢蘑菇(Agaricus bisporus)

<220>

<223> >XP_007326883.1 假設蛋白 AGABI1DRAFT_111552 [Agaricus bisporus var. burnettii JB137-S8] >EKM83027.1 假設蛋白 AGABI1DRAFT_111552 [雙孢蘑菇(Agaricus bisporus)變種 burnettii JB137-S8]

<400> 197

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Met Ala His Thr Ala His Pro Phe Tyr Ser Val Pro Ser Ala Ala Val
1               5                  10                  15
Arg Arg Arg Leu Ser Ser Ser Val Ser Ala Lys Lys Pro Leu Val Thr
            20                  25                  30
Ala Thr Phe Ser Ser Leu Thr Pro Met Trp Ala Gly Val Ala Gly Val
        35                  40                  45
Ile Ile Asn Asn Asn Thr Glu Phe Glu Val Ala Val Ser Val His Asp
    50                  55                  60
Ser Val Tyr Ser Thr Asp Phe Ala Ser Val Val Leu Pro Tyr Asp Pro
65                  70                  75                  80
Asn Asp Pro Glu Lys Asn Ala Lys Thr Ile Glu Gln Tyr Ile Leu Gln
                85                  90                  95
Val Leu Arg Arg Phe Ser Val Glu His Leu Cys Lys Phe Leu Gly Ala
            100                 105                 110
Gly Val Thr Leu Thr Leu Leu Arg Glu Val Pro Asn Val Cys Thr Arg
        115                 120                 125
Leu Trp Leu Asp Leu Asp Ile Val Pro Phe Val Phe Asn Ile Lys Gln
    130                 135                 140
Tyr His Thr Asp Ser Leu Thr Arg Pro Asn Ile Lys His Arg Leu Ser
145                 150                 155                 160
Ser Ala Thr Gly Ser Tyr Val Ala Ser Gly Ala Glu Thr Pro Thr Val
                165                 170                 175
Tyr Val Asp Ser Ala His Leu Lys Ala Met Ser Gly Leu Gln Thr Gly
            180                 185                 190
Val Ser Gly Arg Leu Pro Ile Gln Arg Thr Leu Asp Glu Gln Ala Asp
        195                 200                 205
```

Ser Ala Ala Arg Lys Cys Leu Met Asn Phe Gly Pro Gly Asn Asn Pro
210 215 220
Arg Leu Asn Ile Gly Pro Arg Asn Gln Val Leu Val Asp Asp Gly Gly
225 230 235 240
Arg Val His Leu Leu Asp Asp Leu Asp Glu Tyr Arg Asn Thr Val Gly
245 250 255
Pro Arg Thr Trp Asn Ala Val Ile Lys Leu Ala Asp Glu Leu Arg Glu
260 265 270
Lys Lys Val Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly
275 280 285
Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu Thr Ala Leu Asp
290 295 300
Val Asp Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ala Val Phe Arg
305 310 315 320
Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Ala Pro Asp
325 330 335
Leu Arg Leu Thr Glu Glu Ala Arg Asp Ala Phe Asp Ala Trp Ile Leu
340 345 350
Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Arg Gly
355 360 365
Gly Val Asp Val Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile
370 375 380
Pro Leu Ile Lys Lys Ile Arg Pro Glu Leu Pro Ile Val Tyr Arg Ser
385 390 395 400
His Ile Glu Ile Arg Ser Asp Leu Val His Val Pro Gly Ser Pro Gln
405 410 415
Glu Glu Val Trp Lys Tyr Leu Trp Lys Asn Ile Gln Leu Ala Asp Leu
420 425 430
Phe Ile Ser His Pro Val Ser Lys Phe Val Pro Gln Asp Val Pro Leu
435 440 445
Glu Lys Val Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu
450 455 460
Asn Lys Asp Leu Asp Pro Trp Asp Ser Gln Tyr Tyr Met Gly Glu Phe
465 470 475 480
Arg Ala Leu Cys Ala Arg Glu Arg Met Leu Glu Leu Arg Trp Pro Gln
485 490 495
Arg Asp Tyr Ile Ile Gln Val Ala Arg Phe Asp Pro Ser Lys Gly Ile
500 505 510

Pro Asn Val Ile Asp Ser Tyr Val Lys Phe Arg Glu Leu Leu Lys Leu
515 520 525

Lys Ser Pro Glu Leu Glu Asp Glu Asp His Pro Gln Leu Leu Val Cys
530 535 540

Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln
545 550 555 560

Ile Met Gln Ile Val Asn Ser Glu Pro Tyr Glu Ala Tyr Ala Lys Asp
565 570 575

Ile Val Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn Ser Leu
580 585 590

Met Ser Asn Ala Lys Ile Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe
595 600 605

Glu Val Lys Val Ser Glu Ala Leu His Thr Gly Lys Pro Val Ile Ala
610 615 620

Ser Arg Thr Gly Gly Ile Pro Leu Gln Ile Glu His Gly Lys Ser Gly
625 630 635 640

Tyr Leu Cys Thr Pro Gly Asp Asn Glu Ala Val Ala Gly His Leu Tyr
645 650 655

Asp Leu Tyr Thr Asp Glu Ile Leu Tyr Lys Thr Met Ser Asp Tyr Ala
660 665 670

Lys Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Thr Ala Ala
675 680 685

Trp Leu Tyr Leu Ala Val Met Tyr Asn Arg Gly Ile Lys Ile Lys Pro
690 695 700

Asn Gly Ala Trp Leu Asn Asp Leu Leu Arg Thr Glu Thr Gly Glu Asp
705 710 715 720

Tyr Glu Glu Gly Glu Pro Arg Leu Pro Arg Gly Gly Leu Lys Met Gln
725 730 735

Gly

<210> 198
<211> 733
<212> 蛋白質
<213> 硫色絢孔菌(Laetiporus sulphureus

<220>

<223> >KZT11205.1 糖基轉移酶家族 4 蛋白[硫色絢孔菌(Laetiporus sulphureus) 93-53]

<400> 198

Met Ala Pro Pro His Ser Phe Thr Ser Lys Pro Ser Val Ala Thr Arg
1 5 10 15

Arg Arg Leu Ser Ser Val Val Thr Pro Asn Arg Pro Asn Val Pro Gly
20 25 30

Phe Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Thr Ile Ile
35 40 45

Asn Asp Asn Thr Ala Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60

Tyr Cys Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Asp Ala Thr Asp
65 70 75 80

Pro Glu Lys Gln Ser Val Ala Ile Glu Lys His Val Leu Asp Thr Leu
85 90 95

Arg Lys Phe Ser Asn Glu His Leu Cys Lys Phe Leu Gly Ala Gly Val
100 105 110

Thr Leu Ser Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
115 120 125

Leu Glu Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Tyr His
130 135 140

Thr Asp Ser Ile Thr Arg Pro Asn Val Lys His Arg Ile Ser Ser Thr
145 150 155 160

Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Val
165 170 175

Asp Ala Ser Gln Leu Gln Asp Gln Ser Lys Leu Thr Thr Gly Ala Gln
180 185 190

Gln Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
195 200 205

Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
210 215 220

Ser Ile Ala Pro Arg Asn Gln Val Ala Val Asp Ser Gly Gly Lys Ile
225 230 235 240

His Leu Ile Asp Asp Leu Asp Glu Tyr Arg Lys Thr Val His Lys Gly
245 250 255

Thr Trp Asn Ala Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
260 265 270

Ile Arg Phe Ala Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
275 280 285
Leu Met Arg His Ala Leu Ile Arg Phe Phe Gln Ala Leu Asp Val Asp
290 295 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305 310 315 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
325 330 335
Leu Thr Gln Asp Gln Lys Glu Asn Phe Asp Ala Trp Ile Leu Lys Asn
340 345 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Lys Gly Gly Val
355 360 365
Asp Ile Ala Phe Ile Val Asp Asp Pro Gln Met Pro Gly Leu Ile Pro
370 375 380
Leu Ile Lys Arg Val Arg Pro Asp Met Pro Ile Val Tyr Arg Ser His
385 390 395 400
Ile Glu Ile Arg Ser Asp Leu Val Ser Val Ala Gly Ser Pro Gln Glu
405 410 415
Glu Val Trp Lys Tyr Leu Trp Asn Asn Ile Gln Tyr Ala Asp Met Phe
420 425 430
Ile Ser His Pro Val Asn Lys Phe Val Pro Thr Asp Val Pro Leu Glu
435 440 445
Lys Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Asn
450 455 460
Lys His Leu His Pro Trp Asp Thr Gln Tyr Tyr Met Gly Glu Phe Arg
465 470 475 480
Gln Leu Cys Ala Arg Glu Lys Met His Glu Leu Leu Trp Pro Val Arg
485 490 495
Asp Tyr Val Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro
500 505 510
Asn Val Ile Asp Ser Tyr Ala Arg Phe Arg Arg Met Met Lys Ser Asn
515 520 525
Ala Pro Asn Glu Asp Pro Pro Gln Leu Leu Val Cys Gly His Gly Ala
530 535 540
Val Asp Asp Pro Asp Ala Ser Ile Ile Tyr Asp Gln Ile Ile Ala Leu
545 550 555 560
Val Thr Gly Pro Tyr Lys Glu Tyr Glu Gln Asp Met Ile Val Met Arg
565 570 575

Cys Pro Pro Ser Asp Gln Leu Leu Asn Val Leu Met Ala Asn Ser Arg
580 585 590
Val Ala Leu Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser
595 600 605
Glu Ala Leu His Ala Gly Lys Pro Val Ile Ala Ser Arg Thr Gly Gly
610 615 620
Ile Pro Leu Gln Ile Glu His Gly Lys Ser Gly Phe Leu Cys Asp Ala
625 630 635 640
Gly Asp Asn Glu Ala Val Ala Lys His Met Phe Asp Leu Ile Thr Asn
645 650 655
Glu Asp Leu Tyr Glu Glu Met Ser Glu Tyr Ala Arg Thr His Val Ser
660 665 670
Asp Glu Val Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala
675 680 685
Val Met Tyr Cys Ser Arg Gly Val Lys Leu Gln Pro Lys Gly Ala Trp
690 695 700
Val Asn Asp Met Met Arg Glu Glu Thr Gly Glu Pro Tyr Glu Pro Gly
705 710 715 720
Glu Pro Arg Leu Pro Arg Gly His Ile His Val Gln Gly
725 730

<210> 199
<211> 736
<212> 蛋白質
<213> 密褐褶菌(Gloeophyllum trabeum)

<220>
<223> >XP_007863746.1 海藻糖合成酶 [密褐褶菌(Gloeophyllum trabeum) ATCC 11539] >EPQ58616.1 海藻糖合成酶 [密褐褶菌(Gloeophyllum trabeum) ATCC 11539]

<400> 199
Met Ser Pro Thr Gln His Phe Gln Ser Lys Pro Pro Asp Ser Tyr Arg
1 5 10 15
Arg Arg Leu Ser Ser Val Ile Ser Arg Arg Arg Pro Asn Val Pro Gln
20 25 30

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Phe Ser Ser Leu Gln Ala Met Trp Ala Gly Ile Ala Gly Gly Val Val
       35                  40                  45
Asn Asn Asn Thr Gln Phe Glu Ile Ala Ile Ser Ile His Asp Ser Val
    50                  55                  60
Tyr Ala Thr Asp Tyr Ala Ser Met Gln Ile Pro Tyr Ser Pro Asn Gly
65                  70                  75                  80
Asp Asn Gly Asp Lys Ile Glu Gln Gln Ile Leu Ser Thr Leu Arg Lys
                85                  90                  95
Phe Ser Ala Asp His Leu Cys Lys Phe Leu Gly Ala Gly Val Thr Leu
           100                 105                 110
Ser Leu Leu Lys Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp Leu Thr
       115                 120                 125
Leu Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Tyr His Thr Asp
    130                 135                 140
Ser Val Thr Arg Pro Asn Ile Lys His Arg Leu Tyr Ser Gln Thr Gly
145                 150                 155                 160
Ser Phe Ala Pro Ser Gly Ala Asp Thr Pro Thr Val Tyr Val Asp Pro
                165                 170                 175
Thr Pro Leu Ala Lys Asn Asn Val Leu Ala Pro Gly Thr Ala Ala Asn
           180                 185                 190
Leu Gly Thr Pro Thr Thr Lys Gly Leu Pro Ile Pro Arg Thr Met Asp
       195                 200                 205
Glu Gln Ala Asp Ser Ala Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro
    210                 215                 220
Gly Asn Asn Pro Arg Leu Ser Ile Gly Pro Arg Asn Gln Val Leu Val
225                 230                 235                 240
Asp Ser Ala Gly Lys Ile His Leu Ile Asp Asp Leu Asp Glu Tyr Arg
                245                 250                 255
Lys Thr Val Ser Ser Gly Thr Trp Asn Ala Val Asn Lys Leu Ala Asp
           260                 265                 270
Glu Leu Arg Glu Lys Lys Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro
       275                 280                 285
Gln Gly Gly Gly Val Ala Leu Met Arg His Ala Leu Ile Arg Phe Leu
    290                 295                 300
Thr Leu Leu Asp Val Asp Ala Ser Trp Tyr Val Pro Asn Pro Ser Pro
305                 310                 315                 320
Ser Val Phe Arg Thr Thr Lys Asn Asn His Asn Ile Leu Gln Gly Val
                325                 330                 335
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Ala Ala Pro Ser Leu Arg Leu Thr Gln Asp Gln Lys Asp Asn Phe Asp
          340                 345                 350
Ala Trp Ile Gln Lys Asn Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro
       355                 360                 365
Leu Ala Gln Gly Gly Val Asp Ile Ala Phe Ile Asp Asp Pro Gln Met
   370                 375                 380
Pro Gly Leu Ile Pro Leu Ile Lys Gln Val Arg Pro Asp Met Pro Ile
385                 390                 395                 400
Ile Tyr Arg Ser His Ile Glu Ile Arg Ser Asp Leu Val His Val Lys
             405                 410                 415
Gly Ser Pro Gln Glu Glu Val Trp Asn Tyr Leu Trp Lys Asn Ile Gln
          420                 425                 430
Leu Ala Asp Met Phe Ile Ser His Pro Val Lys Lys Phe Val Pro Ser
       435                 440                 445
Asp Val Pro Thr Glu Lys Leu Ala Phe Leu Gly Ala Ala Thr Asp Trp
   450                 455                 460
Leu Asp Gly Leu Asn Lys Pro Leu Asp Thr Trp Asp Ser Gln Tyr Tyr
465                 470                 475                 480
Met Gly Glu Phe Arg Ser Leu Cys Val Arg Glu Lys Met His Glu Leu
             485                 490                 495
Lys Trp Pro Ala Arg Glu Tyr Val Val Gln Ile Ala Arg Phe Asp Pro
          500                 505                 510
Ser Lys Gly Ile Pro Asn Val Ile Asp Ser Tyr Ala Lys Phe Arg Lys
       515                 520                 525
Met Leu Ala Glu Lys Thr Glu Leu Glu Glu Asp Ile Met Pro Gln Leu
   530                 535                 540
Leu Ile Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile Ile
545                 550                 555                 560
Tyr Asp Gln Val Thr Gly Leu Ile His Ser Gln Tyr Ser Gln Tyr Ser
             565                 570                 575
Asn Asp Ile Ile Val Met Arg Leu Pro Pro Ser Asp Gln Leu Leu Asn
          580                 585                 590
Ala Leu Met Asp Asn Ala Lys Ile Ala Leu Gln Leu Ser Thr Arg Glu
       595                 600                 605
Gly Phe Glu Val Lys Val Ser Glu Ala Leu His Thr Gly Lys Pro Val
   610                 615                 620
Val Ala Ser Arg Thr Gly Gly Ile Pro Leu Gln Ile Glu His Gly Lys
625                 630                 635                 640
```

Ser Gly Tyr Leu Val Glu Val Gly Asp Asn Glu Thr Val Ala Lys His
645 650 655
Leu Phe Asp Leu Tyr Thr Asp Glu Lys Leu Tyr Asp Thr Met Ser Glu
660 665 670
Tyr Ala Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn Ala
675 680 685
Ala Ala Trp Leu Tyr Leu Ala Met Met Tyr Cys Ser Arg Gly Glu Lys
690 695 700
Val Lys Pro Asn Gly Ala Trp Leu Asn Asp Leu Met Arg Glu Val Thr
705 710 715 720
Gly Glu Pro Tyr Ala Pro Asp Glu Pro Lys Leu Pro Arg Val Val Asn
725 730 735

<210> 200
<211> 693
<212> 蛋白質
<213> 舞菇(Grifola frondosa)

<220>
<223> >OBZ75413.1 海藻糖磷酸化酶[舞菇(Grifola frondosa)]

<400> 200
Met Ala Pro Pro His Gln Phe Gln Ser Lys Pro Ser Asp Val Ile Arg
1 5 10 15
Arg Arg Leu Ser Ser Ala Val Ser Ser Lys Arg Pro Asn Ile Pro Gly
20 25 30
Tyr Thr Ser Leu Thr Pro Met Trp Ala Gly Ile Ala Gly Ala Val Val
35 40 45
Asn Asn Asn Thr Gln Phe Glu Val Ala Ile Ser Ile His Asp Ser Val
50 55 60
Tyr Asn Thr Asp Phe Ala Ser Ser Val Val Pro Tyr Ser Pro Asn Glu
65 70 75 80
Pro Glu Ala Gln Ala Gly Ile Ile Glu Lys His Val Leu Glu Thr Leu
85 90 95
Arg Lys Phe Ser Thr Glu His Met Cys Lys Phe Leu Gly Ala Gly Val

```
          100                 105                 110
Thr Val Ile Leu Leu Arg Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp
       115                 120                 125
Leu Asp Met Asp Ile Val Pro Ile Val Phe Asn Ile Lys Pro Phe His
   130                 135                 140
Thr Asp Ser Ile Thr Arg Pro Asn Val Arg His Arg Ile Ser Ser Thr
145                 150                 155                 160
Thr Gly Ser Tyr Val Pro Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr
              165                 170                 175
Asp Pro Ala Gln Leu Gln Asp Pro Asn Lys Leu Ser Ala Asn Val Gln
          180                 185                 190
Thr Arg Leu Pro Ile Pro Arg Thr Val Asp Glu Gln Ala Asp Ser Ala
       195                 200                 205
Ala Arg Lys Cys Ile Met Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu
   210                 215                 220
Gln Ile Gly Pro Arg Asn Gln Val Ala Val Asp Ala Gly Gly Lys Ile
225                 230                 235                 240
His Leu Ile Asp Asp Ile Asp Glu Tyr Arg Lys Thr Val Gly Lys Gly
              245                 250                 255
Thr Trp Asn Ser Val Ile Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys
          260                 265                 270
Ile Lys Ile Gly Phe Phe Ser Ser Thr Pro Gln Gly Gly Gly Val Ala
       275                 280                 285
Leu Met Arg His Ala Ile Ile Arg Phe Phe Thr Val Leu Asp Val Asp
   290                 295                 300
Ala Ala Trp Tyr Val Pro Asn Pro Ser Pro Ser Val Phe Arg Thr Thr
305                 310                 315                 320
Lys Asn Asn His Asn Ile Leu Gln Gly Val Ala Asp Pro Ser Leu Arg
              325                 330                 335
Leu Thr Lys Glu Ala Ala Asp Asn Phe Asp Ser Trp Ile Leu Lys Asn
          340                 345                 350
Gly Leu Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val
       355                 360                 365
Asp Ile Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu
   370                 375                 380
Ile Lys Arg Ile Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile
385                 390                 395                 400
Glu Ile Arg Ser Asp Leu Val His Val Lys Gly Ser Pro Gln Glu Glu
```

405 410 415

Val Trp Asn Tyr Leu Trp Asn Asn Ile Gln His Ser Asp Leu Phe Ile

420 425 430

Ser His Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Leu Glu Lys

435 440 445

Leu Ala Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Ser Lys

450 455 460

His Leu Asp Ala Trp Asp Ala Gln Tyr Tyr Met Gly Ser Ser Ala Thr

465 470 475 480

Tyr Arg Ser Leu Arg Pro Val Gln Gly Tyr Pro Glu Arg Asp Arg Leu

485 490 495

Leu Leu Leu Cys Gly His Gly Ala Val Asp Asp Pro Asp Ala Ser Ile

500 505 510

Ile Tyr Asp Gln Val Leu Gln Leu Ile His Ala Lys Tyr Lys Glu Tyr

515 520 525

Ala Pro Asp Ile Val Val Met Arg Cys Pro Pro Ser Asp Gln Leu Leu

530 535 540

Asn Thr Leu Met Ala Asn Ala Lys Phe Ala Leu Gln Leu Ser Thr Arg

545 550 555 560

Glu Gly Phe Glu Val Lys Val Ser Glu Ala Leu His Ala Gly Lys Pro

565 570 575

Val Ile Ala Cys Arg Thr Gly Gly Ile Pro Leu Gln Ile Glu His Gly

580 585 590

Lys Ser Gly Tyr Leu Cys Glu Pro Gly Asp Asn Ala Ala Val Ala Gln

595 600 605

His Met Leu Asp Leu Tyr Thr Asp Glu Asp Leu Tyr Asp Thr Met Ser

610 615 620

Glu Tyr Ala Arg Thr His Val Ser Asp Glu Val Gly Thr Val Gly Asn

625 630 635 640

Ala Ala Ala Trp Met Tyr Leu Ala Val Met Tyr Val Ser Arg Gly Val

645 650 655

Lys Leu Arg Pro His Gly Ala Trp Ile Asn Asp Leu Met Arg Thr Glu

660 665 670

Met Gly Glu Pro Tyr Arg Ala Gly Glu Pro Arg Leu Pro Arg Gly Glu

675 680 685

Leu His Val Gln Gly

690

<210> 201

<211> 650

<212> 蛋白質

<213> 絨毛栓菌(Trametes pubescens)

<220>

<223> >OJT04097.1 海藻糖磷酸化酶[絨毛栓菌(Trametes pubescens)]

<400> 201

Met Trp Ala Gly Ile Ala Gly Thr Val Ile Asn Asn Asn Thr Ala Leu
1 5 10 15

Glu Leu Ala Ile Ser Ile His Asp Ser Val Tyr Asn Thr Asp Phe Ala
20 25 30

Ser Ser Thr Val Pro Tyr Asn Pro Asn Asn Pro Glu Glu Gln Ala Ser
35 40 45

Asn Val Glu Lys His Val Leu Glu Leu Leu Arg Lys Phe Ala Thr Glu
50 55 60

His Met Cys Lys Phe Leu Gly Ala Gly Val Thr Val Ser Leu Leu Arg
65 70 75 80

Glu Ala Pro Asn Leu Cys Thr Arg Leu Trp Phe Asp Leu Asp Ile Val
85 90 95

Pro Ile Val Phe Asn Ile Lys Pro Phe His Thr Asp Ser Val Thr Arg
100 105 110

Pro Asn Ile Lys His Arg Ile Ser Ser Thr Thr Gly Ser Tyr Val Pro
115 120 125

Ser Gly Ala Glu Thr Pro Thr Val Tyr Tyr Asp Pro Ala Gln Leu Pro
130 135 140

Ala Gly Gln Ala Asn Val Ala Ala Thr Gln Asn Lys Leu Pro Ile Pro
145 150 155 160

Arg Thr Val Asp Glu Gln Ala Asp Ser Ala Ala Arg Lys Cys Ile Met
165 170 175

Tyr Phe Gly Pro Gly Asn Asn Pro Arg Leu Ser Ile Gly Ala Arg Asn
180 185 190

Gln Val Thr Val Asp Ala Gly Gly Lys Ile His Leu Ile Asp Asp Ile
195 200 205

Asp Glu Tyr Arg Lys Gly Asn Ser Lys Gly Thr Trp Asn Ser Val Ile
210 215 220

Lys Leu Ala Asp Glu Leu Arg Glu Lys Lys Ile Lys Ile Gly Phe Phe
225 230 235 240
Ser Ser Thr Pro Gln Gly Gly Val Ala Asp Pro Asn Leu Arg Leu Ser
245 250 255
Lys Glu Ala Lys Asp Asn Phe Asp Ala Trp Ile Leu Lys Asn Gly Leu
260 265 270
Arg Trp Thr Ala Glu Gly Gly Pro Leu Ala Pro Gly Gly Val Asp Ile
275 280 285
Ala Phe Ile Asp Asp Pro Gln Met Pro Gly Leu Ile Pro Leu Ile Lys
290 295 300
Arg Val Arg Pro Asp Leu Pro Ile Ile Tyr Arg Ser His Ile Glu Ile
305 310 315 320
Arg Ser Asp Leu Val His Val Ala Gly Ser Pro Gln Glu Glu Val Trp
325 330 335
Lys Tyr Leu Trp Asn Asn Ile Gln His Ala Asp Leu Phe Ile Ser His
340 345 350
Pro Val Asn Lys Phe Val Pro Ser Asp Val Pro Pro Glu Lys Leu Thr
355 360 365
Leu Leu Gly Ala Ala Thr Asp Trp Leu Asp Gly Leu Asn Lys Pro Leu
370 375 380
Gly Asp Trp Asp Leu Gln Tyr Tyr Met Gly Glu Phe Arg Gln Leu Cys
385 390 395 400
Val Lys Glu Lys Met Thr Glu Leu Gly Trp Pro Leu Arg Asp Tyr Ile
405 410 415
Val Gln Ile Ala Arg Phe Asp Pro Ser Lys Gly Ile Pro Asn Val Ile
420 425 430
Asp Ser Tyr Ala Arg Phe Arg Lys Leu Leu Ala Glu Lys Glu Pro Gly
435 440 445
Thr Glu Pro Pro Gln Met Leu Ile Cys Gly His Gly Ala Val Asp Asp
450 455 460
Pro Asp Ala Ser Ile Ile Tyr Asp Glu Thr Met Gln Leu Ile His Thr
465 470 475 480
Lys Tyr Ala Glu Tyr Ala Lys Asp Phe Val Val Met Arg Cys Pro Pro
485 490 495
Ser Asp Gln Leu Leu Asn Ala Leu Met Glu Asn Ser Lys Phe Ala Leu
500 505 510
Gln Leu Ser Thr Arg Glu Gly Phe Glu Val Lys Val Ser Glu Ala Leu
515 520 525

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His Ala Gly Lys Pro Val Ile Ala Ser Arg Thr Gly Gly Ile Pro Leu
    530                 535                 540
Gln Ile Glu His Gly Lys Ser Gly Tyr Leu Cys Glu Pro Gly Asp Asn
545                 550                 555                 560
Ala Ala Val Ala Ser His Met Phe Asp Leu Tyr Thr Asp Asp Asp Leu
                565                 570                 575
Phe Asp Thr Met Ser Glu Tyr Ala Arg Thr His Val Ser Asp Glu Val
            580                 585                 590
Gly Thr Val Gly Asn Ala Ala Ala Trp Met Tyr Leu Ala Val Met Tyr
        595                 600                 605
Val Ser Arg Gly Val Arg Leu Gln Pro Lys Gly Ala Trp Leu Asn Asp
    610                 615                 620
Leu Met Arg Thr Glu Cys Gly Glu Pro Tyr Ala Pro Asn Glu Pro Arg
625                 630                 635                 640
Leu Pro Arg Ala Gly Leu Asn Val Gln Gly
                645                 650
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【發明申請專利範圍】

【第1項】 一種海藻糖磷酸化酶，其包含一胺基酸序列，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列具有至少80%同一性，其中該海藻糖磷酸化酶的胺基酸序列在第383個胺基酸位置處包含一胺基酸取代，該胺基酸取代係選自由以下所組成之群組：

P383A、P383G、P383M、P383V、P383N、P383C、P383Q、P383S及P383T。

【第2項】 如申請專利範圍第1項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列進一步包含於一個或多個胺基酸位置的一胺基酸取代，其中該一個或多個胺基酸位置係選自由以下SEQ ID NO: 1的位置所組成之群組：

第225個位置處，其中該取代係選自由以下所組成之群組：N225V、N225L、N225I 及N225M；

第304個位置處，其中該取代係選自由以下所組成之群組：A304I及A304L；

第323個位置處，其中該取代係選自由以下所組成之群組：T323I及T323V；

第487個位置處，其中該取代係選自由以下所組成之群組：Q487A、Q487G、Q487L及Q487M；

第550個位置處，其中該取代為V550P；

第556個位置處，其中該取代為S556T；

第564個位置處，其中該取代為T564E；

第590個位置處，其中該取代係選自由以下所組成之群組：D590N及D590G；及

第705個位置處，其中該取代為K705N。

【第3項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列進一步包含一個或多個胺基酸位置選自由以下SEQ ID NO: 1的胺基酸位置所組成之群組的一胺基酸取代：712、114、118、192、197、220、306、318、339、349、357、459、476、481、484、488、506、511、526、530、532、533、537、667、以及703。

【第4項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該一個或多個胺基酸位置選自由以下SEQ ID NO: 1的胺基酸位置所組成之群組：225、487、556以及590。

【第5項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該一個或多個胺基酸位置選自由以下SEQ ID NO: 1的胺基酸位置所組成之群組：225、487以及556。

【第6項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該一個或多個胺基酸位置選自由以下SEQ ID NO: 1的胺基酸位置所組成之群組： P383G、P383V、P383C、P383S、P383T、N225L、N225M、Q487A、Q487G、Q487M、S556T、D590N、D590G以及K705N。

【第7項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該一個或多個胺基酸位置選自由以下SEQ ID NO: 1的胺基酸位置所組成之群組： N225L、N225M、Q487A、Q487G、Q487M、S556T、D590N、D590G、以及K705N。

【第8項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶在二個或更多個胺基酸位置處包含胺基酸取代，其中該二個或更多個胺基酸位置選自由以下所組成之群組： 114與304、114與383、114與590、118與304、118與383、118與556、118與564、118與590、225與304、225與383、225與487、225與550、225與556、225與590、304與323、304與357、304與383、304與487、304與556、304與564、304與590、304與712、323與357、323與487、323與556、323與564、323與590、323與649、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383與590、383與649、383與712、487與564、487與590、487與649、550與590、556與564、556與590、556與649、564與590、564與712、590與649，以及590與712。

【第9項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶在二個或更多個胺基酸位置處包含胺基酸取代，其中該二個或更多個胺基酸位置選自由以下所組成之群組：118與383、118與556、118與564、118與590、225與304、225與383、225與487、225與550、225與556、225與590、304與323、304與383、304與487、304與556、304與564、304與590、323與357、323與487、323與556、323與564、323與590、323與649、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383

與590、383與649、383與712、487與564、487與590、487與649、550與590、556與564、556與590、556與649、564與590、564與712、590與649，以及590與712 。

【第10項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶在二個或更多個胺基酸位置處包含胺基酸取代，其中該二個或更多個胺基酸位置選自由以下所組成之群組：118與383、118與590、225與383、225與590、304與383、304與590、323與590、349與383、349與590、357與383、357與590、383與487、383與550、383與556、383與564、383與590、383與649、383與712、487與590、550與590、556與590、564與590、590與649、590與712。

【第11項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列進一步包含一個或多個取代，其中該一個或多個取代選自由以下所組成之群組：

在SEQ ID NO: 1的第712個位置處的一胺基酸取代，該取代為L712A、L712G、L712I、L712M、L712P或L712V；

在SEQ ID NO: 1的第10個位置處的一胺基酸取代，該取代為V10R或V10H；

在SEQ ID NO: 1的第114個位置處的一胺基酸取代，該取代為L114A、L114G、L114I、L114M、L114P或L114V；

在SEQ ID NO: 1的第118個位置處的一胺基酸取代，該取代為I118A、I118G、I118L、I118M、I118P或I118V；

在SEQ ID NO: 1的第192個位置處的一胺基酸取代，該取代為S192A、S192G、S192I、S192L、S192M、S192P或S192V；

在SEQ ID NO: 1的第197個位置處的一胺基酸取代，該取代為S197A、S197G、S197I、S197L、S197M、S197P 或 S197V；

在SEQ ID NO: 1的第220個位置處的一胺基酸取代，該取代為Y220F 或Y220W；

在SEQ ID NO: 1的第306個位置處的一胺基酸取代，該取代為D306R、D306H 或D306K；

在SEQ ID NO: 1的第318個位置處的一胺基酸取代，該取代為P318R、P318H或P318K；

在SEQ ID NO: 1的第339個位置處的一胺基酸取代，該取代為L339A、L339G、L339I、L339M、L339P或L339V；

在SEQ ID NO: 1的第349個位置處的一胺基酸取代，該取代為F349W或F349Y；

在SEQ ID NO: 1的第357個位置處的一胺基酸取代，該取代為G357A、G357I、G357L、G357M、G357P或G357V；

在SEQ ID NO: 1的第459個位置處的一胺基酸取代，該取代為A459N、A459C、A459Q、A459S、或A459T；

在SEQ ID NO: 1的第476個位置處的一胺基酸取代，該取代為Q476A、Q476G、Q476I、Q476L、Q476M、Q476P或Q476V；

在SEQ ID NO: 1的第481個位置處的一胺基酸取代，該取代為E481A、E481G、E481I、E481L、E481M、E481P或E481V；

在SEQ ID NO: 1的第484個位置處的一胺基酸取代，該取代為A484N、A484C、A484Q、A484S或A484T；

在SEQ ID NO: 1的第488個位置處的一胺基酸取代，該取代為K488A、K488G、K488I、K488L、K488M、K488P或K488V；

在SEQ ID NO: 1的第506個位置處的一胺基酸取代，該取代為A506N、A506C、A506Q、A506S 或A506T；

在SEQ ID NO: 1的第511個位置處的一胺基酸取代，該取代為A511N、A511C、A511Q、A511S或A511T；

在SEQ ID NO: 1的第526個位置處的一胺基酸取代，該取代為R526D或R526E；

在SEQ ID NO: 1的第530個位置處的一胺基酸取代，該取代為E530A、E530G、E530I、E530L、E530M、E530P、E530V；

在SEQ ID NO: 1的第532個位置處的一胺基酸取代，該取代為G532R、G532H或G532K；

在SEQ ID NO: 1的第533個位置處的一胺基酸取代，該取代為D533A、D533G、D533I、D533L、D533M、D533P或D533V；

在SEQ ID NO: 1的第537個位置處的一胺基酸取代，該取代為D537A、D537G、D537I、D537L、D537M、D537P或D537V；

在SEQ ID NO: 1的第649個位置處的一胺基酸取代，該取代為A649E或A649D；

在SEQ ID NO: 1的第667個位置處的一胺基酸取代，該取代為R667D、R667E、R667R、R667H或R667K；及

在SEQ ID NO: 1的第703個位置處的一胺基酸取代，該取代為A703D或A703E。

【第12項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列包含在SEQ ID NO: 1的三個胺基酸位置383、556和590處各有一胺基酸取代 。

【第13項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列包含在SEQ ID NO: 1的四個胺基酸位置712、383、114和118處各有一胺基酸取代；SEQ ID NO: 1的四個胺基酸位置383、487、556和590處；或SEQ ID NO: 1的四個胺基酸位置383、225、556和590處各有一胺基酸取代。

【第14項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列包含在SEQ ID NO: 1的五個胺基酸位置712、383、114、I188和304處各有一胺基酸取代；SEQ ID NO: 1的五個胺基酸位置712、383、114、118和357處各有一胺基酸取代；SEQ ID NO: 1的五個胺基酸位置383、225、304、556和590處各有一胺基酸取代；或SEQ ID NO: 1的五個胺基酸位置383、225、487、556和590處各有一胺基酸取代。

【第15項】 如申請專利範圍第2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列包含在SEQ ID NO: 1的六個胺基酸位置712、383、114、118、304和357處各有一胺基酸取代；或SEQ ID NO: 1的六個胺基酸位置383、225、304、487、556和590各有一胺基酸取代。

【第16項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列與SEQ ID NO: 1的胺基酸序列之同一性為至少81%，或至少82%，或至少83 %，或至少84%，或至少85%，或至少86%，或至少87%，或至少88%，或至少89%，或至少90%，或至少91%，或至少92%，或至

少93%，或至少94%，或至少95%，或至少96%，或至少97%，或至少98%，或至少99%，至少99.1%，或至少99.2%，或至少99.3%，或至少99.4%，或至少99.5%，或至少99.6%，或至少99.7%，或至少99.8%，或至少99.9%。

【第17項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列包含或由下列任一胺基酸序列所組成：SEQ ID NO: 2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49、50、51、52、53、54、55、56、57、58、59、60、61、62、63、64、65、66、67、68、69、70、71、72、73、74、75、76、77、78、79、84、85、86、87、88、89、90、91、92、93、94、95、96、97、98、99、100、101、102、103、104、105、106、107、108、109、110、111、112、113、114、115、116、117、118、119、120、121、122、123、124、125、126、127、128、129、130、131、132、133、134、135、136、137、138、139、140、141、142、143、144、145、146、147、148、149、150、151、152、153、154、155、156、157、158、159，或190。

【第18項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶的胺基酸序列包含或由下列任一胺基酸序列所組成：SEQ ID NO: 84、85、86、90、92、96、99、100、102、106，或108。

【第19項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶能夠催化

葡萄糖與α-D-葡萄糖-1磷酸鹽轉化為海藻糖與無機磷酸鹽

及/或

海藻糖與無機磷酸鹽轉化為葡萄糖與α-D-葡萄糖-1磷酸鹽。

【第20項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，其中該海藻糖磷酸化酶具有特徵(A)、(B)、(C)、(D)與(E)中的至少一個或其任何組合，其中，

特徵(A)為於52°C作用15分鐘後的熱穩定性，其由30%至100%的殘餘活性所定義；

特徵(B)為於52°C作用15分鐘後的熱穩定性，其特徵在於 i) 至少52°C的Tm30值，及/或 ii) 至少52°C的Tm50值；

特徵(C)為以以下為特徵的熱穩定性：i) 於52°C和90°C之間的Tm30值，及/或ii) 於52°C和90°C之間的Tm50值；以及

特徵(D)為以以下為特徵的熱穩定性：i) 於45°C半衰期為3小時至9天或更長的製程穩定性，ii) 於45°C半衰期為24小時至9天或更長的製程穩定性，或iii) 於45°C半衰期為4天至9天或更長的製程穩定性；以及

特徵(E)為相對活性，表示為介於0.65和1.0之間的100/500-比率，其中該100/500-比率被定義為[100 mM葡萄糖與100 mM α-葡萄糖-1磷酸鹽的海藻糖活性] /[500 mM葡萄糖與100 mM α-葡萄糖-1-磷酸鹽的海藻糖活性] 的比率。

【第21項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，，其中該海藻糖磷酸化酶在含有1M蔗糖的一緩衝液中於52°C作用15分鐘後保留其初始活性的至少30%，且該初始活性係在室溫下作用15分鐘後測定，及/或其中在含有1M蔗糖的一緩衝液中於52°C作用15分鐘後，該變體保留其初始活性的至少50%，且該初始活性係在室溫作用15分鐘後測定。

【第22項】 如申請專利範圍第1或2項所述之海藻糖磷酸化酶，，其中該海藻糖磷酸化酶在含有1M蔗糖的一緩衝液中於52°C作用15分鐘後具有至少30%的殘餘活性，且該初始活性係在室溫作用15分鐘後測定。

【第23項】 一種使葡糖基單醣與α-D-葡萄糖-1-磷酸鹽反應之方法，其中該方法包括使葡糖基單醣與α-D-葡萄糖-1磷酸鹽與一如申請專利範圍第1或2項所述之海藻糖磷酸化酶反應。

【第24項】 一種製備海藻糖之方法，包括在一海藻糖磷酸化酶存在下，在至少40°C的溫度下使葡萄糖與α-D-葡萄糖-1磷酸鹽反應，其中該海藻糖磷酸化酶

(i) 在含有1M蔗糖的一緩衝液中於52°C下作用15分鐘，與沒有熱處理的活性相比，保留至少30%的活性；及/或

(ii) 在含有1M蔗糖的一緩衝液中於52°C下作用15分鐘，與沒有熱處理的活性相比，保留至少50%的活性；及/或

(iii) 在100 mM葡萄糖下的活性與在500 mM葡萄糖下的活性之比率至少為0.65；

其中該海藻糖磷酸化酶為一如申請專利範圍第1或2項所述之海藻糖磷酸化酶。

【第25項】 一種提高海藻糖磷酸化酶的熱穩定性之方法，其中該方法包括：

- 比對一第一海藻糖磷酸化酶的一胺基酸序列與一第二海藻糖磷酸化酶的一胺基酸序列，

- 鑑定對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基取代提高了該第一海藻糖磷酸化酶的熱穩定性，

- 取代對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的在該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的一胺基酸殘基，其中

在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基的取代提高了該第一海藻糖磷酸化酶的熱穩定性，
其中該第一海藻糖磷酸化酶為包含根據SEQ ID NO: 1的胺基酸序列之海藻糖磷酸化酶；

其中該第二海藻糖磷酸化酶為一如申請專利範圍第1或2項所述之海藻糖磷酸化酶。

【第26項】 一種提高一海藻糖磷酸化酶的表示為100/500-比率的相對活性之方法，其中該方法包括：
- 比對一第一海藻糖磷酸化酶的一胺基酸序列與一第二海藻糖磷酸化酶的一胺基酸序列，
- 鑑定對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的該第二海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基的取代提高了該第一海藻糖磷酸化酶的表示為100/500-比率的相對活性，
- 取代對應於該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的在該第二海藻糖磷酸化酶的一個或多個胺基酸位置處的胺基酸殘基，其中在該第一海藻糖磷酸化酶的該胺基酸序列的一個或多個胺基酸位置的一胺基酸殘基的取代提高了該第一海藻糖磷酸化酶的表示為100/500-比率的相對活性；
其中該第一海藻糖磷酸化酶為包含根據SEQ ID NO: 1的胺基酸序列之海藻糖磷酸化酶；

其中該第二海藻糖磷酸化酶為一如申請專利範圍第1或2項所述之海藻糖磷酸化酶。

【第27項】 一種利用如申請專利範圍第1或2項所述之海藻糖磷酸化酶於生產海藻糖之用途。

【發明圖式】

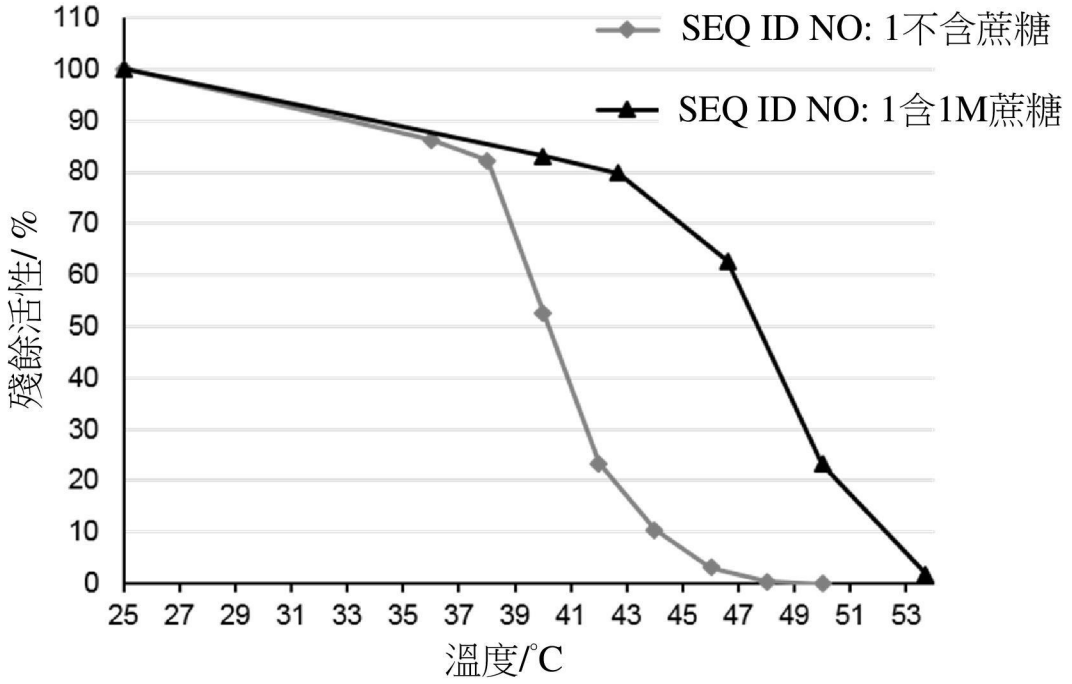

SEQ ID NO: 1不含蔗糖
SEQ ID NO: 1含1M蔗糖
殘餘活性/ %
溫度/℃
110
100
90
80
70
60
50
40
30
20
10
0
25 27 29 31 33 35 37 39 41 43 45 47 49 51 53

圖 1

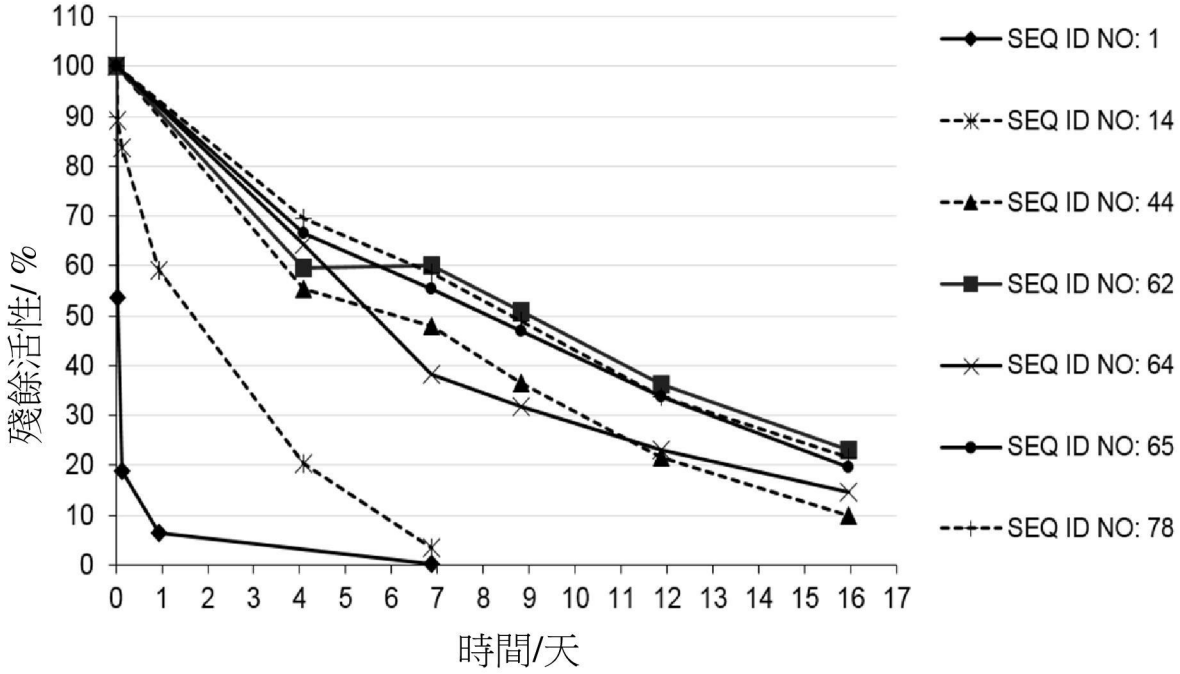

SEQ ID NO: 1
SEQ ID NO: 14
SEQ ID NO: 44
SEQ ID NO: 62
SEQ ID NO: 64
SEQ ID NO: 65
SEQ ID NO: 78
殘餘活性/ %
時間/天
110
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

圖 2

```
SEQ_ID_NO:1                -MSPPHGFSSVPSTAARRRLSSKASLTNRPTFTKITTQTYASLTPMWAGIAGAPINNGSQ 59
KJA27491.1_H_sublateritium ----------------------------------------MWAAVAGAVINNNTQ 15
ADM15725.1_G_frondosa      -MAPPHQFQSKPSDVIRRRLSSAVSSKR-PN-----VPGYTSLTPMWAGIAGAVVNNNSQ 53
KDQ33172.1_P_ostreatus     -MSTHHQFESKPSTAIRRRLSSSVSSKQRPN---M-TTTFASLTPMWAGVAGTLVNNNTQ 55
Q9UV63.1_L_sajor-caju      MSTPHHQFESKSSTAIRRRLSSSVSSKQRPN---IMTTTFASLTPMWAGVAGTLVNNNTQ 57
                                                              ***.:**: :**.:*

SEQ_ID_NO:1                FELAISVHDSVYSTDFASFVIDHTPLDPEKAAKEIEKHVLDALRKFSQEHLCKFLGAGIT 119
KJA27491.1_H_sublateritium YEIAVSIHDSVYSTDFASSVLSFNPNNPDKNAKEIEQYVLQTLRMFSVGHLCKFLGAGVT 75
ADM15725.1_G_frondosa      FEVAISIHDSVYNTDFASSIVPYSPNEPEAQAGIIEKHVLETLRKFSTEHMCKFLGAGVT 113
KDQ33172.1_P_ostreatus     YEIAVTVHDGVYSTDFASVIIPVTPGDTAKNSKDIEAQVLNLIRKFSAEHLCKFLGAGIT 115
Q9UV63.1_L_sajor-caju      YEIAVTVHDGVYSTDFASVIIPVTPGDTVKNSKDIEAQVLNLIRKFSAEHLCKFLGAGIT 117
                           :*:*:::**.**.***** ::  .* :    :  **  **: :* **  *:*******:*

SEQ_ID_NO:1                LALLRESPNICTRLWLDLDIVPIVFNIKPFHTDSLTRPNIKHRISSTSGSYVPSGAETPT 179
KJA27491.1_H_sublateritium LLLLKESPNLCTRLWLDMDIVPFVFNIKPFHTDSLTRPNIKHRISSTTGSYVPSGADTPT 135
ADM15725.1_G_frondosa      VILLREAPNLCTRLWLDMDIVPIVFNIKPFHTDSITRPNVRHRISSTTGSYVPSGAETPT 173
KDQ33172.1_P_ostreatus     LALLKECPNLCTRLWLDMDIVPIVFNIKPFHTDSVTRPNIKHRISSTTGSYVPSGSETPT 175
Q9UV63.1_L_sajor-caju      LALLKECPNLCTRLWLDMDIVPIVFNIKPFHTDSVTRPNIKHRISSTTGSYVPSGSETPT 177
                           : **:*.**:*******:****:**********:****::******:*******::***

SEQ_ID_NO:1                VYVEASHLGN--NLSAGTASKLPIPRTLDEQADSAARKAIMYYGPNNNPRLTIGPRNQVA 237
KJA27491.1_H_sublateritium VYVDSAHLTAMSGLQTGVSGRLPIPRTLDEQADSAARKCLMYFGPGNNPRLSIGPRNQVT 195
ADM15725.1_G_frondosa      VYYDPAQLQDPNKLSANVQTRLPIPRTVDEQADSAARKCIMYFGPGNNPRLQIGPRNQVA 233
KDQ33172.1_P_ostreatus     VYVEAAHLGDPSHLSPNAAQKLPIPRTLDEQSDSAARKCLMYFGPNNNPRLSIGARNQVT 235
Q9UV63.1_L_sajor-caju      VYVEASHLGDPSHLSPNAAQKLPIPRTLDEQSDSAARKCLMYFGPNNNPRLSIGARNPVT 237
                           ** : ::*     *. ..  :******:***:******.:**:**.***** ** ** *:
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圖 3

```
SEQ_ID_NO:1                 VDAGGKIHLIDDIDEYRKTVGPSTWTAVNKLADELRERQIKIGFFSSTPQGGGVALMRHA 297
KJA27491.1_H_sublateritium  VDSAGKAHLIDDIDEYKATVGPRTWNAVVKLADELREKKVKIGFFSSTPQGGGVALMRHA 255
ADM15725.1_G_frondosa       VDAGGKIHLIDDIDEYRKTVGKGTWNSVIKLADELREKKIKIGFFSSTPQGGGVALMRHA 293
KDQ33172.1_P_ostreatus      VDAGGKIHLIDDLEEYRKTVGTGTWNAVIKLADELREKKVKIGFFSSTPQGGGVALMRHA 295
Q9UV63.1_L_sajor-caju       VDAGGKIHLIDDLEEYRMTVGAGTWNAVIKLADELREKKVKIGFFSSTPQGGGVALMRHA 297
                            **:.** *****::**: ***  **.:* ********:::********************

SEQ_ID_NO:1                 LIRFFSALDVDAAWYVPNPSPSVFRTTKNNHNILQGVASPDLRLTQEAKDNFDAWITKNG 357
KJA27491.1_H_sublateritium  LIRFLTALDVDAAWYVPNPSPSVFRTTKNNHNILQGVAAPDLRLTQEAKDNFDAWILKNG 315
ADM15725.1_G_frondosa       IIRFFTALDVDAAWYVPNPSPSVFRTTKNNHNILQGVADPSLRLTKEAADNFDSWILKNG 353
KDQ33172.1_P_ostreatus      LIRFLTALDVDVAWYVPNPSPQVFRTTKNNHNILQGVAAPDLRLTQDAKDAFDAWILKNG 355
Q9UV63.1_L_sajor-caju       LIRFLTALDVDVAWYVPNPSPQVFRTTKNNHNILQGVAAPDLRLTQEAKDAFDAWILKNG 357
                            :***::*****.*********.*************** *.****::* * **:** ***

SEQ_ID_NO:1                 LRWTAEGGPLAPGGVDIAFIDDPQMPGLIPLIKKVRPELPIIYRSHIEIRSDLVHIAGSP 417
KJA27491.1_H_sublateritium  LRWTAEGGPLAPGGVDIAFIDDPQMPGLIPLIKKIRPDLPIVYRSHIEIRSDLVHVPGSP 375
ADM15725.1_G_frondosa       LRWTAEGGPLAPGGVDIAFIDDPQVPGLIPLIKRIRPDLPIIYRSHIEIRSDLVHVKGSP 413
KDQ33172.1_P_ostreatus      LRWTAEGGPLAPGGVDVVFIDDPQMPGLIPLIKKVRPEVPIVYRSHIEIRSDLVHVAGSP 415
Q9UV63.1_L_sajor-caju       LRWTAEGGPLAPGGVDVVFIDDPQMPGLIPLIKKVRPEVPIVYRSHIEIRNDLVHVAWSP 417
                            ****************:.******:********::**::**:********.****:  **

SEQ_ID_NO:1                 QEEVWKYLWNNIQLADLFISHPVKAFVPEDVPIERVALLPAATDWLDGLNKELSDWDRQY 477
KJA27491.1_H_sublateritium  QEEVWKYLWNNIQLADLFISHPVNKFVPSDVPIEKLALLGAATDWLDGLNKELDPWDSQY 435
ADM15725.1_G_frondosa       QEEVWNYLWNNIQHSDLFISHPVNKFVPSDVPLEKLALLGAATDWLDGLSKHLDAWDAQY 473
KDQ33172.1_P_ostreatus      QEEVWKYLWNNIQLADLFISHPVSKFVPSDVPIEKLALLGAATDWLDGLNKDLDPWDSQF 475
Q9UV63.1_L_sajor-caju       QEEVWKYLWNNIQLADLFISHPVSKFVPSDVPTEKLALLGAATDWLDGLNKDLDPWDSPF 477
                            *****:******* :********. ***.*** *::*** *********.*.*. **  :
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圖 3 (續)

```
SEQ_ID_NO:1                 YMGE------------FRALCQKDKMNTLDWPNREYCIQIARFDPAKGIPNVIDSYARFR 525
KJA27491.1_H_sublateritium  YMGE------------FRNLCTKEKMHTLNWPERDYVVQIARFDPAKGINNVIDSYYKFR 483
ADM15725.1_G_frondosa       YMGE------------FRNLCIKEKMNELGWPARDYIVQIARFDPSKGIPNVIDSYARFR 521
KDQ33172.1_P_ostreatus      YMGE------------FRSLCAKEKMVELDWPTRDYIVQVARFDPSKGIPNVVDSYYKFR 523
Q9UV63.1_L_sajor-caju       YMGEFRPRGSHLNRGEFRSLCAKEKMHELNWPARDYIVQVARFDPSKGIPNVVDSYYKFR 537
                            ****            ** ** *:**  *.** *:* :*:*****:*** **:*** :**

SEQ_ID_NO:1                 RLLNE-AGDVDADDQPQLLICGHGAVDDPDASIIYDQVLTLIH-EKYAEFAKDIVVMRLP 583
KJA27491.1_H_sublateritium  NMLKEKSPDLTEEEHPQLLLCGHGAVDDPDASIIYDQVLQLVESEPYKTYAKDIVVMRLP 543
ADM15725.1_G_frondosa       KLCVDK---VMEDDIPQLLLCGHGAVDDPDASIIYDQVLQLIH-AKYKEYAPDIVVMRCP 577
KDQ33172.1_P_ostreatus      NLLRTRSPEMELSDHPQLLICGHGAVDDPDASIIYDQIMALVNSDPYKEYAHDIVVMRLP 583
Q9UV63.1_L_sajor-caju       NLLRTRSPDMDESEHPQLLICGHGAVDDPDASIIYDQIMALVNSDPYKEYAHDIVVMRLP 597
                            .:       :  .: ****:******************:: *:.   *  :* ****** *

SEQ_ID_NO:1                 PSDQLLDCLMANARIALQLSTREGFEVKVSEAVHAGKPIIAATTGGIPLQVEHGKSGFLT 643
KJA27491.1_H_sublateritium  PSDQLLNALMANSRIALQLSTREGFEVKVSEALHAGKPVIASRTGGIPLQIEHGKSGYLT 603
ADM15725.1_G_frondosa       PSDQLLNTLMANAKFALQLSTREGFEVKVSEALHAGKPVIACRTGGIPLQIEHGKSGYLC 637
KDQ33172.1_P_ostreatus      PSDELLNAMMANSRIALQLSTREGFEVKVSEALHTGKPVIACRTGGIPLQIQHGKSGYLT 643
Q9UV63.1_L_sajor-caju       PSDELLNAMMANSRIALQLSTREGFEVKVSEALHTGKPVIACRTGGIPLQIQHGKSGYLT 657
                            ***:**: :***:::*****************:*:***:**. *******::*****:*

SEQ_ID_NO:1                 EPGDNAQVARHMYDLYTDVALYDRMSQYARTHVSDEVGTVGNAAAWLYLAAVY-TRGQKL 702
KJA27491.1_H_sublateritium  TAGDNAAVANHLYELYTDEALYRKMSQYAKTHVSDEVGTVGNAASWLYLAVMY-HRGIKI 662
ADM15725.1_G_frondosa       EPGDNAAVAQHMLDLYTDEDLYDTMSEYARTHVSDEVGTVGNAAAWMYLAVMYVSRGVKL 697
KDQ33172.1_P_ostreatus      TPGDNDAVAGYLYDLYTDEALYRRMSDFARTHVSDEVGTVGNAAAWLYLAVMY-SRGEKI 702
Q9UV63.1_L_sajor-caju       TPGEKDAVAGHFYDFYTDEALYRKMSDFARTHVSNEVGTVGNAAAWLYLAVMY-SRGEKI 716
                              *::  ** :: ::***  **  **::*:****:*********:*:***.:*  ** *:
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圖 3 (續)

```
SEQ_ID_NO:1                 APKGAWLNDLLREETGTPYVEGEPRLPRGGIKVQD   737
KJA27491.1_H_sublateritium  KPNGAWLNDMLREETGEEYVEGEPRLPRGGLTMQ-   696
ADM15725.1_G_frondosa       RPHGAWINDLMRTEMGEPYRAGEPRLPRGELHVQG   732
KDQ33172.1_P_ostreatus      KPNGAWINDLLREETGEPYKEGETKLPRTKLDMQG   737
Q9UV63.1_L_sajor-caju       KPNGAWINDFFREETGEPYKEGETKLPRTKLDMQG   751
                             *:***:**::* * *  *  ** :***  : :*
```

H_a sublateritium: 簇生垂幕菇
G_frondosa: 舞菇
P_ostreatus: 秀珍菇
L_sajor-caju: 環柄香菇

圖 3 (續)