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發明專利說明書

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一、發明名稱：（中文/英文）

用於編碼精細化學品之代謝途徑之蛋白質之基因變異物

GENE VARIANTS CODING FOR PROTEINS OF THE METABOLIC PATHWAY OF FINE CHEMICALS

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四、聲明事項：

☐ 主張專利法第二十二條第二項☐第一款或☐第二款規定之事實，其事實發生日期為：　年　月　日。

☑ 申請前已向下列國家（地區）申請專利：

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☑ 有主張專利法第二十七條第一項國際優先權：

1. 德國；2003年12月18日；10359661.5

2.

☐ 無主張專利法第二十七條第一項國際優先權：

1.

2.

☐ 主張專利法第二十九條第一項國內優先權：

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☑ 主張專利法第三十條生物材料：

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☑ 不須寄存生物材料者：

所屬技術領域中具有通常知識者易於獲得時，不須寄存。

九、發明說明：

【發明所屬之技術領域】

本發明係關於精細化學品之代謝途徑之突變核酸及蛋白質、基因改質的生產者生物之製備方法、藉培養該基因改質的生物製備精細化學品之方法及該基因改質的生物本身。

【先前技術】

許多細胞中天然產生的代謝過程之產物及副產物被運用於許多種工業中，包括食品業、動物飼料業、化妝品業及製藥業。此等化合物統稱為「精細化學品」，其包含有例如有機酸(蛋白質形成的及非蛋白質形成的胺基酸兩者)、核苷酸及核苷、脂質及脂肪酸、二元醇類、碳水化合物、芳族化合物、維生素及輔因素以及酵素。

例如，藉由已發展製造及分泌大量一或多種理想精細化學品之微生物的大量發酵可將其製造。

特別適用於此目的的生物為麩胺酸棒狀桿菌(Corynebacterium glutamicum)，其為革蘭氏陽性非病源菌。利用品系選擇，已發展許多突變品系，其產生不同理想化合物。然而，關於特定化合物製造改良之品系選擇為費時及困難的過程。

藉由基因改質能夠增加生產者生物之生產力。例如，於生產者生物中特定基因的特殊突變可能造成理想精細化學品生產量增加。

歐洲專利EP 1 108 790 A2說明，由編碼麩胺酸棒狀桿菌

高絲胺酸脫氫酶之野生型序列開始，編碼高絲胺酸脫氫酶之突變核酸序列與野生型序列相較具有突變Val59Ala。再者，說明相較於麩胺酸棒狀桿菌野生型胺基酸序列編碼具有突變Pro458Ser之丙酮酸羧化酶(pyruvate carboxylase)之突變合酸序列。導入該突變至麩胺酸棒狀桿菌造成離胺酸產量增加。

世界專利WO 0063388更揭示一種突變的ask基因，其編碼具有突變T311I之天冬胺酸激酶。

於精細化學品之麩胺酸棒狀桿菌生合成途徑的基因及蛋白質中之其他突變係說明於世界專利WO 0340681、WO 0340357、WO 0340181、WO 0340293、WO 0340292、WO 0340291、WO 0340180、WO 0340290、WO 0346123、WO 0340289及WO 0342389中。

雖然先前技藝中已知的突變已造成具有最佳生產力之生產者生物，即理想精細化學品之最佳產量及最佳C產量，有持續的需要進一步改善該生物的生產力。

【發明內容】

本發明的一個目的為提供另外的突變的基因及蛋白質，其造成精細化學品之生產者生物生產力增加及因而改善製備精細化學品之生物工藝學製程。

吾人已發現藉由具有於表1/第7行中各例中指出的功能及具有胺基酸序列具有於至少一個胺基酸位置中(始自參照表1/第2行中各例中的胺基酸序列)相當於表1/第4行中該胺基酸序列指出的胺基酸位置之蛋白質形成的胺基酸不同

於於表1/第5行中相同列指出的特定胺基酸，其附帶條件為預期根據表2之蛋白質。

本發明提供新穎的核酸分子及蛋白質，其一方面可用於鑑定或分類麩胺酸棒狀桿菌或相關細菌品種，另一方面造成精細化學品之生產者生物生產力增加及因而改善製備精細化學品之生物工藝學製程。

麩胺酸棒狀桿菌為革蘭氏陽性好氧細菌，其廣泛運用於許多精細化學品之大量製造工業中，也用於分解碳氫化合物(如於原油洩漏的情況中)及用於氧化松烯類(Terpenoids)。所以可將核酸分子進一步用於鑑定可用於製造精細化學品之微生物(例如藉由發效製程)。雖然麩胺酸棒狀桿菌本身為非病源菌，然而，其有關於其他棒狀桿菌品種，如白喉桿菌(白喉病源菌)，其為人類主要病源菌。所以能夠鑑定棒狀桿菌品種之存在可能也為顯著臨床重要性，例如於診斷應用。再者，該核酸分子可擔任用以定位麩胺酸棒狀桿菌基因組或相關生物之基因組的參考點。

本發明之蛋白質(於下文中也稱為代謝途徑蛋白質或MP蛋白質)具有於表1/第7行中各例中指出的功能。再者，其於各例中具有胺基酸序列具有於至少一個胺基酸位置中(始自參照表1/第2行中各例中的胺基酸序列)相當於表1/第4行中該胺基酸序列指出的胺基酸位置之蛋白質形成的胺基酸不同於於表1/第5行中相同列指出的特定胺基酸。

「相對應」胺基酸位置較佳意指本發明之MP蛋白質的胺基酸序列之胺基酸位置，

a)藉由胺基酸序列之同源比較或

b)藉由該胺基酸序列之二級、三級及/或四級結構之結構比較

參照表1/第2行中各例及具有表1/第2行中各例對該胺基酸序列指出的胺基酸位置之胺基酸序列，熟悉本技藝者可輕易地發現。

比較胺基酸序列同源性之較佳方法為例如藉由來自DNASTAR, Inc. Madison, Wisconsin(USA)之雷射基因軟體，利用Clustal法(Higgins DG, Sharp PM. 快速及敏感多重序列比對於微電腦上Comput Appl. Biosci. 1989 Apr; 5(2): 151-1)，設定下列參數：

多重比對參數：

空隙罰分(Gap penalty)10

空隙長度罰分10

雙序列比對(pairwise alignment)參數：

k-重(k-tuple)1

空隙罰分3

視窗5

對角線保存5

於較佳具體實施例中，蛋白質具有於表1/第7行中各例中指出的功能及胺基酸序列具有於一個胺基酸位置中(始自參照表1/第2行中各例中的胺基酸序列)相當於表1/第4行中該胺基酸序列指出的胺基酸位置之蛋白質形成的胺基酸不同於於表1/第5行中相同列指出的特定胺基酸，其附帶條件

為預期根據表2之突變蛋白質。

於另一個較佳具體實施例中，本發明蛋白質具有參照表1/第2行中各例中的胺基酸序列，其中該蛋白質具有於至少一個於表1/第4行中該胺基酸序列指出的胺基酸位置之蛋白質形成的胺基酸不同於於表1/第5行中相同列指出的特定胺基酸。

於另一個較佳具體實施例中，本發明蛋白質具有參照表1/第2行中各例中的胺基酸序列，其中該蛋白質具有於一個於表1/第4行中該胺基酸序列指出的胺基酸位置之蛋白質形成的胺基酸不同於於表1/第5行中相同列指出的特定胺基酸。

表1/第2行中指出的胺基酸序列為麩胺酸棒狀桿菌野生型序列。表1/第4行指出特定野生型胺基酸序列至少一個胺基酸位置，其中本發明蛋白質之胺基酸序列具有一個蛋白質形成的胺基酸不同於於表1/第5行中相同列指出的特定胺基酸。

於另一個較佳具體實施例中，蛋白質具有於至少一個於表1/第4行中胺基酸序列指出的胺基酸位置中有於表1/第6行中相同列指出的胺基酸。

本發明的另一個觀點係關於分離的MP蛋白質或關於其一部分，例如其生物活性部分。於較佳具體實施例中，分離的MP蛋白質或其片段轉錄地、轉譯地或轉譯後地調控生物中一或多個代謝途徑，特別是於棒狀桿菌及短桿菌(Brevibacterium)。

可將MP多肽或其生物活性部分功能上連接至非MP多肽以產生融合蛋白質。於較佳具體實施例中，融合蛋白質的活性不同於單獨MP蛋白質的活性，於其他較佳具體實施例中，該融合蛋白質轉錄地、轉譯地或轉譯後地調控生物中一或多個代謝途徑，特別是於棒狀桿菌及短桿菌中，較佳於麩胺酸棒狀桿菌中。於特別較佳具體實施例中，插入該融合蛋白質進入宿主細胞調控由細胞製造研究的化合物。

本發明更關於編碼上述本發明蛋白質之分離的核酸。此等核酸於下文中也稱為代謝途徑核酸或MP核酸或MP基因。此等新穎MP核酸分子編碼本發明之MP蛋白質。此等MP蛋白質可例如行使關於轉錄、轉譯或轉譯後調控對細胞正常代謝功能為重要之蛋白質的功能。由於用於麩胺酸棒狀桿菌中選殖載體的可得性，如揭示例如於Sinskey等人，美國專利編號4,649,119及麩胺酸棒狀桿菌及相關短桿菌品種(如乳糖發酵短桿菌)之基因操作技術(Yoshihama等人，J. Bacteriol. 162(1985) 591-597; Katsumata等人，J. Bacteriol. 159(1984) 306-311;及Santamaria等人，J. Gen. Microbiol. 130(1984) 2237-2246)，可將本發明之核酸分子用於該生物的基因操作以便使其為一或多種精細化學品之更好及更有效率的生產者。

製備本發明核酸序列之適當起始點為，例如，麩胺酸棒狀桿菌品系之基因組，其由美國典型培養物保藏中心(American Type Culture Collection)之名稱ATCC 13032下可得。

可使用習慣的方法來由此等核酸序列製備本發明核酸序列，利用表1中列出的修改。較佳使用欲導入本發明MP核酸序列或本發明核酸存在於其中之該生物的密碼子使用法來將本發明MP蛋白質的胺基酸序列反轉譯成為MP基因之發明的核酸序列。例如，較佳使用麩胺酸棒狀桿菌之密碼子使用法於麩胺酸棒狀桿菌。特定生物之密碼子使用法可由說明至少一種蛋白質及編碼研究的生物之此蛋白質之一個基因之資料庫或專利申請案，由先前已知的方式決定。

藉由導入一或多個核苷酸替換、附加或缺失成為表1/第1行之核苷酸序列以使一或多個胺基酸替換、附加或缺失導入編碼的蛋白質中，可產生編碼MP蛋白質的分離核酸分子。藉由標準技術如定點基因突變法及PCR介導基因突變法可將突變導入表1/第1行的一個序列中。較佳的是，將保守胺基酸替換導入於一或多個預測非必需胺基酸殘基。「保守胺基酸替換」為將胺基酸殘基以具有類似側鏈的胺基酸殘基取代。具有類似側鏈的胺基酸殘基家族已於技藝中定義。此等家族包括具有鹼性側鏈之胺基酸(如離胺酸、精胺酸、組胺酸)、酸性側鏈(如天門冬胺酸、麩胺酸)、不帶電荷極性側鏈(如甘胺酸、天門冬醯胺酸、麩醯胺酸、絲胺酸、羥丁胺酸、酪胺酸、半胱胺酸)、非極性側鏈(如丙胺酸、纈胺酸、白胺酸、異白胺酸、脯胺酸、苯丙胺酸、甲硫胺酸、色胺酸)、β-分支的側鏈(如羥丁胺酸、纈胺酸、異白胺酸)及芳族側鏈(如酪胺酸、苯丙胺酸、色胺酸、組胺酸)。因此於MP蛋白質中預測非必需胺基酸殘基較佳由相同側鏈家

族之另一個胺基酸殘基取代。或者，於另一個具體實施例中，可將突變隨機導入沿著所有或部分MP編碼序列，例如，藉由飽和基因突變法，並可將形成的突變體測試本文中所述的MP活性，以便確認保持MP活性的突變體。在附錄A之一或多個序列基因突變後，可將編碼的蛋白質重組表現，利用例如說明於本文中的分析法(見實例部分之實例8)可決定該蛋白質之活性。

本發明係基於製造可獲得的新穎分子，其於本文中稱為MP核酸及MP蛋白質分子及其藉由轉錄、轉譯或轉譯後方式調控生物中一或多個代謝途徑，特別是於棒狀桿菌及短桿菌中，特別較佳於麩胺酸棒狀桿菌中。於一個具體實施例中，MP分子轉錄、轉譯或轉譯後調控生物中一個代謝途徑，特別是於棒狀桿菌及短桿菌中，特別較佳於麩胺酸棒狀桿菌中。於較佳具體實施例中，本發明MP分子調控生物中一或多個代謝途徑之活性，特別是於棒狀桿菌及短桿菌中，特別較佳於麩胺酸棒狀桿菌中具有效果於該生物生產研究的精細化學品。於特別較佳的具體實施例中，本發明MP分子具有調控的活性以使生物的代謝途徑，特別是於棒狀桿菌及短桿菌中，特別較佳於麩胺酸棒狀桿菌中，其途徑受本發明之MP蛋白質調控，關於其效率或其生產率受調控且此直接或間接調控由生物製造研究的精細化學品之產量及/或效率，特別是於棒狀桿菌及短桿菌中，特別較佳於麩胺酸棒狀桿菌中。

用詞「MP蛋白質」或「MP多肽」包含轉錄、轉譯或轉譯

後調控生物中代謝途徑之蛋白質，特別是於棒狀桿菌及短桿菌中，特別較佳於麩胺酸棒狀桿菌中。MP蛋白質之實例包含列於表1者。用詞「MP基因」及「MP核酸序列」包含編碼MP蛋白質之核酸序列，其包含編碼區域及相對應未轉譯5'及3'序列區域。將MP基因之實例列於表1中。

用詞「生產」及「生產力」為技藝中已知及包括於於定時間間隔及預定發酵體積內產生的發酵產物之濃度(例如研究的精細化學品)(如每升每小時幾公斤產物)。

用詞「生產效率」包含達到特定生產量所需的時間(例如細胞用以達到一種精細化學品之特定生產率所需的時間)。用詞「產量」或「產物/碳產量」為技藝中已知及包含轉換碳源成為產物(即精細化學品)之效率。例如，將此通常表示為每公斤碳源有幾公斤產物。增加化合物的產量或生產增加得到的分子或於特定培養體積於預定期間內此化合物之適當得到的分子之量。

用詞「生合成」及「生合成途徑」為技藝中已知及包括自細胞由中間體合成化合物，較佳的是有機化合物，例如於多步方法或高度調控的方法中。用詞「分解」及「分解途徑」為技藝中已知及包含由細胞切斷化合物(較佳為有機化合物)成為分解產物(以更通用的用詞：更小或較不複雜的分子)，例如於多步方法或高度調控的方法中。

用詞「代謝」為技藝中已知及包含發生於生物中之生化反應全體。特定化合物之代謝(如胺基酸如甘胺酸之代謝)則包含此化合物於細胞中之所有生合成、修飾及分解途徑。

用詞「調控」為技藝中已知及包含用以控制另一個蛋白質活性之蛋白質活性。用詞「轉錄調控」為技藝中已知及包含用以抑制或活化DNA編碼目標蛋白質轉變成為mRNA的蛋白質之活性。用詞「轉譯調控」為技藝中已知及包含用以抑制或活化mRNA編碼目標蛋白質轉變成為蛋白質分子的蛋白質之活性。用詞「轉譯後調控」為技藝中已知及包含藉由共價修飾該目標蛋白質(如藉甲基化、醣化或磷酸化)而用以抑制或改善目標蛋白質活性的蛋白質之活性。

藉由操作本發明的基因可直接或間接造成精細化學品之改善的產量、生產及/或製造效率。更明確而言，通常調控精細化學品代謝途徑之精細化學品產量、生產及/或製造效率之MP蛋白質之改質可能對由此生物之一或多種此等理想化合物之總產量或製造速率有直接影響。

涉及此等代謝途徑之彼等蛋白質的改質也可能對研究的精細化學品之產量、生產及/或製造效率有間接影響。代謝調控為不可避免地複雜及影響不同途徑之調控機制可能於許多地方重疊以致於根據特定細胞事件可快速地調整一個代謝途徑。此使得改質一個代謝途徑的調控蛋白質可能也影響許多其他代謝途徑，其部分可能關於研究的精細化學品之生合成或分解。以此間接方式，調控MP蛋白質作用可能對經由不同於由該MP蛋白質直接調控的代謝途徑產生之精細化學品之製造有影響。

可使用本發明之MP核酸及MP蛋白質分子以便直接改善來自非人生物之一或多種研究的精細化學品之產量、生產

及/或製造效率。

藉由技藝中已知的基因重組技術，能夠操作本發明一或多種調控蛋白質以使其功能能受調控。涉及抑制轉錄編碼胺基酸生合成所需酵素之基因之MP蛋白質的突變，使得該胺基酸不再能夠抑制該轉錄，可能造成例如該胺基酸製造的增加。

於是，MP蛋白質活性之改質，其造成涉及研究的精細化學品之生合成的MP蛋白質增加的轉譯或活化轉譯後修飾，可能因此增加該化學品之生產。相反的情況可能類似地有用：藉由增加涉及調控化合物分解途徑之MP蛋白質之轉錄或轉譯抑制或藉由轉譯後負修飾，能夠增加該化合物的生產。於任何情況，可將研究的精細化學品之總產量或製造速率增加。

類似地，可能於本發明蛋白質及核苷酸分子中的改質可能經由間接機制改善精細化學品之產量、生產及/或製造效率。特定化合物之代謝無可避免地連接至其他細胞中的生合成及分解途徑及於代謝途徑中的必需輔因素、中間體或受質大概由另一個代謝途徑提供或限制。所以調控本發明一或多個調控蛋白質可影響精細化學品之另一個生合成或分解途徑之活性效率。除此之外，操作一或多個調控蛋白質可能增加細胞整體於培養中之生長及繁殖的能力，特別是大量發酵培養中，其中生長條件可能為次佳。例如，藉由再突變本發明的MP蛋白質，其當回應次佳細胞外營養供應通常為抑制核苷之生合成(因而避免細胞分裂)，使得該蛋

白質具有較低抑制劑活性，能夠增加核苷酸的生合成及可能細胞分裂。彼等MP蛋白質之改質造成培養中增加的細胞生長及增加的分裂，可能造成增加來自培養中研究的一或多種精細化學品之產量、生產及/或製造效率，至少由於在培養中製造該化學品的細胞數量增加。

本發明提供新穎的核酸分子編碼能夠實施涉及轉錄、轉譯或轉譯後調控於非人生物中的代謝途徑之酵素步驟的蛋白質。編碼MP蛋白質的核酸分子於本文中稱為MP核酸分子。於較佳具體實施例中，MP蛋白質係涉及一或多個代謝途徑之轉錄、轉譯或轉譯後調控。此蛋白質之實例為由表1中列出的基因所編碼者。

因此，本發明的一個觀點係關於分離的核酸分子(如cDNAs)，包含有編碼MP蛋白質或其生物活性部分之核苷酸序列以及適於作為偵測或放大MP編碼的核酸(如DNA或mRNA)之引子或雜交探針的核酸片段。於其他較佳具體實施例中，分離的核酸分子編碼列於表1中任一個胺基酸序列。本發明較佳的MP蛋白質同樣較佳具有本文中說明的至少一種MP活性。

於另一個具體實施例中，分離的核酸分子為長度至少15個核苷酸及於嚴謹條件下雜交至本發明之核酸分子。分離的核酸分子較佳相對應於天然發生的核酸分子。分離的核酸更佳的是編碼天然發生的麩胺酸棒狀桿菌MP蛋白質或其生物活性部分。

所有活細胞具有複雜分解代謝及合成代謝的能力，有許

多代謝途徑連接至彼此。為了保持此極端複雜的代謝網路之不同部分之間的平衡，細胞利用細微調整的調控網路。藉由調控酵素合成及酵素活性，無論是獨立或同時地，細胞可調控完全不同代謝途徑之活性以符合細胞改變需要。

酵素合成的引發或抑制可發生於轉錄或轉譯階段或於兩者階段(回顧見Lewin, B.(1990)Gene IV, Part 3:"Controlling prokaryotic genes by transcription", Oxford University Press, Oxford, 213-301頁，及其中的參考文獻，及Michal, G.(1990)Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology, John Wiley & Sons)。涉及此類調控之蛋白質因子之實例包括轉錄因子。此等為結合至DNA的蛋白質，因而造成基因的表現增加(正調控如大腸桿菌的例子中之ara操縱子)或降低(負調控如大腸桿菌的例子中之lac操縱子)。此等表現調控轉錄因子本身可受到調控。其活性可受例如結合至DNA-結合蛋白質之低分子量化合物調控，藉以結合該蛋白質至DNA上的適當結合位置受刺激(如對ara操縱子的阿拉伯膠糖(arabinose)之情況)或抑制(如對lac操縱子的乳糖之情況)(見例如Helmann, J.D.及Chamberlin, M.J.(1988)"Structure and function of bacterial sigma factors" Ann. Rev. Biochem. 57:839-872;Adhya, S.(1995)"The lac and gal operons today"及Boos, W.等人，"The maltose system", 兩者皆於Regulation of Gene Expression in Escherichia coli(Lin, E.C.C.及Lynch, A.S.編者)Chapman & Hall: New York, 181-200頁及201-229頁；及

Moran, C.P.(1993)"RNA polymerase and transcription factors"於：Bacillus subtills and other gram-positve bacteria, Sonenshein, A.L.編者ASM: Washington, D.C. 653-667頁)。

蛋白質合成不僅於轉錄階段受調控，也常於轉譯階段。可將此調控經由許多機制實施，包括改質核醣體結合至一或多個mRNA之能力、結合核醣體制至mRNA、保持或移除mRNA二級結構、利用特定基因之常見或較不常見密碼子、一或多種tRNA之充足程度及特定調控機制如衰減(見Vellanoweth, R.I.(1993)Translation and its regulation in Bacillus subtills and other gram-positive bacteria, Sonenshein, A.L.等人編者ASM:Washington, D.C. 699-711頁及其中的參考文獻)。

可將轉錄及轉譯調控指向單一蛋白質(連續調控)或同時向不同代謝途徑中的多個蛋白質(協調調控)。表現以協調方式調控之基因位於基因組中常於操縱子或調控子之緊密鄰近處。此基因轉錄及基因轉譯之向上或向下調控受細胞或細胞外不同因子量如受質(用於一或多個代謝途徑中之前驅物及中間體)、代謝物(由伴隨自複雜有機分子如糖分解之能量產生之生化代謝途徑製造的分子)及最終產物(於代謝途徑終了得到的分子)而控制。編碼特定代謝途徑活性所需的酵素之基因表現係由該代謝途徑之大量受質分子而引發。相對應地，該基因表現係由途徑的終點產物大量細胞內存在而抑制(Snyder, L.及Champness, W.(1977) The Molecular Biology of Bacteria ASM:Washington)。基因表現

可類似地受其他外部及內部因子而調控，如環境條件(如熱、氧化壓力或飢餓)。此等總體環境改變引起表現特化調控基因之改變，其藉由結合至DNA直接或間接(經由其他基因或蛋白質)驅動基因表現及因而引發或抑制轉錄(見例如Lin, E.C.C.及Lynch, A.S.編者(1995)Regulation of Gene Expression in Escherichia coli, Chapman & Hall:New York)。

可調控細胞代謝的另一個機制發生於蛋白質階段。此調控係經由其他酵素的活性或經由結合低分子量成分避免或使得蛋白質正常作用而實施。由結合低分子量化合物之蛋白質調控實例包括結合GTP或NAD。低分子量化學品之結合通常為可逆，例如，於GTP-結合蛋白質的例子中。此等蛋白質發生兩種狀態(結合GTP或GDP)，一個狀態為蛋白質的活性形式而另一個為無活性形式。

蛋白質活性受其他酵素作用而調控通常經由共價修飾蛋白質(即磷酸化胺基酸殘基如組胺酸或天門冬胺酸或甲基化)。此共價修飾通常為可逆及此由具有相反活性之酵素實行。此之實例為於蛋白質磷酸化中激酶及磷解酶之相反活性：蛋白質激酶磷酸化目標蛋白質上的特定殘基(如絲胺酸或羥丁胺酸)而蛋白質磷解酶自該蛋白質移除磷酸基團。調控其他蛋白質活性的酵素通常藉外部刺激調控其本身。此等刺激受作用為感應器的蛋白質調控。由此等感應器蛋白質調控該外部訊號之已熟知機制為配對化(dimerization)，但其他機制也為已知(見例如Msadek, T.等人(1993)"Two-component Regulatory-Systems"於：Bacillius

subtills and Other Gram-Positive Bacteria, Sonenshein, A.L. 等人編者，ASM:Washington,729-745頁及其中參考文獻)。

詳細了解控制微生物中細胞代謝之調控網路對於藉發酵產生高產量化學品極為重要。可將用以向下調控代謝途徑之控制系統移除或減小以便改善研究的化學品之合成及，相對應地，可將用以向上調控研究產物之代謝途徑者組成性活化移除或對於活性最佳化(如Hirose, Y.及Okada, H.(1979)"Microbial Production of Amino Acids"於:Peppler, H.J.及Perlman, D.(編者)Microbial Technology第2版第1冊第7章Academic Press, New York中所示)。

本發明之另一個觀點液關於核酸構體如，例如，載體如重組表現載體，其含有至少一種本發明核酸。

此核酸構體較佳包含以功能上連接的方式之啟動子及視需要一個終結子。特別較佳為關於核酸為異源之啟動子及能夠表現該核酸於非人生物中。於較佳生物棒狀桿菌及短桿菌屬中特別較佳啟動子之實例為tac啟動子。

本發明更關於製備非人基因改質的生物之方法，藉由導入該母生物

a)至少一種上述本發明MP核酸或

b)至少一種上述本發明核酸構體或

c)一種啟動子對於上述內生本發明MP核酸為異源及其可使該內生本發明MP核酸表現於該生物中

而轉型非人母生物。

較佳的是，將根據具體實施例c)之啟動子導入生物中以

使啟動子於該生物中功能上連接至內生本發明MP核酸。「功能上連接」意指一種功能上的連接，即使得內生本發明MP核酸得以受導入的啟動子表現之連接。

用詞「母生物」意指相對應的非人生物，將其轉型至基因改質的生物。母生物在此可為野生型生物或已受基因改質的生物。再者，母生物可能已經能夠製造研究的精細化學品或藉本發明之轉型而能夠製造研究的精細化學品。

用詞「基因改質的生物」較佳意指與母生物相較基因改質的生物。

視上下文而定，用詞「生物」意指非人母生物或本發明之非人基因改質的生物或兩者。

可將本發明之MP核酸或本發明之核酸構體以染色體或以質體導入成為自身複製質體。較佳將本發明之MP核酸或本發明之核酸構體以染色體插入。

於較佳具體實施例中，使用的母生物為已能夠製造研究的精細化學品之生物。在棒狀桿菌屬細菌之特別較佳的生物及特別較佳精細化學品離胺酸、甲硫胺酸及羥丁胺酸之中，特別較佳為彼等母生物已能夠製造離胺酸。此等為特別較佳的棒狀桿菌，其中例如編碼天冬胺酸激酶的基因(ask基因)被解除調控或回饋抑制已被移除或降低。例如，此類細菌具有突變於ask基因，其造成回饋抑制之降低或去除，如例如突變T311I。

所以本發明尤關於由上述方法可得到的基因改質生物。

本發明更關於一種非人基因改質的生物，並已用

a)至少一種上述本發明MP核酸或

b)至少一種上述本發明核酸構體或

c)一種啟動子對於上述內生本發明MP核酸為異源及其可使該內生本發明MP核酸表現於該生物中

使其轉型。

於另一個具體實施例中，已將於母生物基因組中的內生MP基因藉由與經改質的MP基因同源重組而改質，例如功能上擾亂。

較佳的是，本發明核酸的表現造成與母生物相較由該生物的精細化學品製造之調控。

較佳非人生物為植物、海藻及微生物。較佳的微生物為細菌、酵母菌或黴菌。特別較佳的微生物為細菌，特別是棒狀桿菌或短桿菌屬細菌，特別較佳為麩胺酸棒狀桿菌。

作為母生物或生物或經基因改質的生物之棒狀桿菌或短桿菌屬之特別較佳細菌為列於下表3中的細菌。

表3

細菌		寄存編號							
屬	品種	ATCC	FERM	NRRL	CECT	NCIMB	CBS	NCTC	DSMZ
短桿菌	產氨短桿菌	21054							
短桿菌	產氨短桿菌	19350							
短桿菌	產氨短桿菌	19351							
短桿菌	產氨短桿菌	19352							
短桿菌	產氨短桿菌	19353							
短桿菌	產氨短桿菌	19354							
短桿菌	產氨短桿菌	19355							
短桿菌	產氨短桿菌	19356							
短桿菌	產氨短桿菌	21055							
短桿菌	產氨短桿菌	21077							
短桿菌	產氨短桿菌	21553							
短桿菌	產氨短桿菌	21580							
短桿菌	產氨短桿菌	39101							

短桿菌	Butanicum	21196							
短桿菌	Divaricatum	21792	P928						
短桿菌	黃色短桿菌	21474							
短桿菌	黃色短桿菌	21129							
短桿菌	黃色短桿菌	21518							
短桿菌	黃色短桿菌			B11474					
短桿菌	黃色短桿菌			B11472					
短桿菌	黃色短桿菌	21127							
短桿菌	黃色短桿菌	21128							
短桿菌	黃色短桿菌	21427							
短桿菌	黃色短桿菌	21475							
短桿菌	黃色短桿菌	21517							
短桿菌	黃色短桿菌	21528							
短桿菌	黃色短桿菌	21529							
短桿菌	黃色短桿菌			B11477					
短桿菌	黃色短桿菌			B11478					
短桿菌	黃色短桿菌	21127							
短桿菌	黃色短桿菌			B11474					
短桿菌	healii	15527							
短桿菌	ketoglutamicum	21004							
短桿菌	Ketoglutamicum	21089							
短桿菌	ketosoreductum	21914							
短桿菌	乳糖發酵短桿菌				70				
短桿菌	乳糖發酵短桿菌				74				
短桿菌	乳糖發酵短桿菌				77				
短桿菌	乳糖發酵短桿菌	21798							
短桿菌	乳糖發酵短桿菌	21799							
短桿菌	乳糖發酵短桿菌	21800							
短桿菌	乳糖發酵短桿菌	21801							
短桿菌	乳糖發酵短桿菌			B11470					
短桿菌	乳糖發酵短桿菌			B11471					
短桿菌	乳糖發酵短桿菌	21086							
短桿菌	乳糖發酵短桿菌	21420							
短桿菌	乳糖發酵短桿菌	21086							
短桿菌	乳糖發酵短桿菌	31269							
短桿菌	亞麻短桿菌	9174							
短桿菌	亞麻短桿菌	19391							
短桿菌	亞麻短桿菌	8377							
短桿菌	paraffinolyticum					11160			
短桿菌	Spec.						717.73		
短桿菌	Spec.						717.73		
短桿菌	Spec.	14604							
短桿菌	Spec.	21860							
短桿菌	Spec.	21864							

短桿菌	Spec.	21865							
短桿菌	Spec.	21866							
短桿菌	Spec.	19240							
棒狀桿菌	嗜乙醯乙酸棒狀桿菌	21476							
棒狀桿菌	嗜乙醯乙酸棒狀桿菌	13870							
棒狀桿菌	乙醯麩胺酸棒狀桿菌			B11473					
棒狀桿菌	乙醯麩胺酸棒狀桿菌			B11475					
棒狀桿菌	乙醯麩胺酸棒狀桿菌	15806							
棒狀桿菌	乙醯麩胺酸棒狀桿菌	21491							
棒狀桿菌	乙醯麩胺酸棒狀桿菌	31270							
棒狀桿菌	嗜乙醯棒狀桿菌			B3671					
棒狀桿菌	產氨棒狀桿菌	6872						2399	
棒狀桿菌	產氨棒狀桿菌	15511							
棒狀桿菌	fujiokense	21496							
棒狀桿菌	麩胺酸棒狀桿菌	14067							
棒狀桿菌	麩胺酸棒狀桿菌	39137							
棒狀桿菌	麩胺酸棒狀桿菌	21254							
棒狀桿菌	麩胺酸棒狀桿菌	21255							
棒狀桿菌	麩胺酸棒狀桿菌	31830							
棒狀桿菌	麩胺酸棒狀桿菌	13032							
棒狀桿菌	麩胺酸棒狀桿菌	14305							
棒狀桿菌	麩胺酸棒狀桿菌	15455							
棒狀桿菌	麩胺酸棒狀桿菌	13058							
棒狀桿菌	麩胺酸棒狀桿菌	13059							
棒狀桿菌	麩胺酸棒狀桿菌	13060							
棒狀桿菌	麩胺酸棒狀桿菌	21492							
棒狀桿菌	麩胺酸棒狀桿菌	21513							
棒狀桿菌	麩胺酸棒狀桿菌	21526							
棒狀桿菌	麩胺酸棒狀桿菌	21543							
棒狀桿菌	麩胺酸棒狀桿菌	13287							
棒狀桿菌	麩胺酸棒狀桿菌	21851							
棒狀桿菌	麩胺酸棒狀桿菌	21253							
棒狀桿菌	麩胺酸棒狀桿菌	21514							
棒狀桿菌	麩胺酸棒狀桿菌	21516							
棒狀桿菌	麩胺酸棒狀桿菌	21299							
棒狀桿菌	麩胺酸棒狀桿菌	21300							
棒狀桿菌	麩胺酸棒狀桿菌	39684							
棒狀桿菌	麩胺酸棒狀桿菌	21488							
棒狀桿菌	麩胺酸棒狀桿菌	21649							
棒狀桿菌	麩胺酸棒狀桿菌	21650							
棒狀桿菌	麩胺酸棒狀桿菌	19223							
棒狀桿菌	麩胺酸棒狀桿菌	13869							
棒狀桿菌	麩胺酸棒狀桿菌	21157							
棒狀桿菌	麩胺酸棒狀桿菌	21158							

棒狀桿菌	麩胺酸棒狀桿菌	21159							
棒狀桿菌	麩胺酸棒狀桿菌	21355							
棒狀桿菌	麩胺酸棒狀桿菌	31808							
棒狀桿菌	麩胺酸棒狀桿菌	21674							
棒狀桿菌	麩胺酸棒狀桿菌	21562							
棒狀桿菌	麩胺酸棒狀桿菌	21563							
棒狀桿菌	麩胺酸棒狀桿菌	21564							
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棒狀桿菌	麩胺酸棒狀桿菌	21566							
棒狀桿菌	麩胺酸棒狀桿菌	21567							
棒狀桿菌	麩胺酸棒狀桿菌	21568							
棒狀桿菌	麩胺酸棒狀桿菌	21569							
棒狀桿菌	麩胺酸棒狀桿菌	21570							
棒狀桿菌	麩胺酸棒狀桿菌	21571							
棒狀桿菌	麩胺酸棒狀桿菌	21572							
棒狀桿菌	麩胺酸棒狀桿菌	21573							
棒狀桿菌	麩胺酸棒狀桿菌	21579							
棒狀桿菌	麩胺酸棒狀桿菌	19049							
棒狀桿菌	麩胺酸棒狀桿菌	19050							
棒狀桿菌	麩胺酸棒狀桿菌	19051							
棒狀桿菌	麩胺酸棒狀桿菌	19052							
棒狀桿菌	麩胺酸棒狀桿菌	19053							
棒狀桿菌	麩胺酸棒狀桿菌	19054							
棒狀桿菌	麩胺酸棒狀桿菌	19055							
棒狀桿菌	麩胺酸棒狀桿菌	19056							
棒狀桿菌	麩胺酸棒狀桿菌	19057							
棒狀桿菌	麩胺酸棒狀桿菌	19058							
棒狀桿菌	麩胺酸棒狀桿菌	19059							
棒狀桿菌	麩胺酸棒狀桿菌	19060							
棒狀桿菌	麩胺酸棒狀桿菌	19185							
棒狀桿菌	麩胺酸棒狀桿菌	13286							
棒狀桿菌	麩胺酸棒狀桿菌	21515							
棒狀桿菌	麩胺酸棒狀桿菌	21527							
棒狀桿菌	麩胺酸棒狀桿菌	21544							
棒狀桿菌	麩胺酸棒狀桿菌	21492							
棒狀桿菌	麩胺酸棒狀桿菌			B8183					
棒狀桿菌	麩胺酸棒狀桿菌			B8182					
棒狀桿菌	麩胺酸棒狀桿菌			B12416					
棒狀桿菌	麩胺酸棒狀桿菌			B12417					
棒狀桿菌	麩胺酸棒狀桿菌			B12418					
棒狀桿菌	麩胺酸棒狀桿菌			B11476					
棒狀桿菌	麩胺酸棒狀桿菌	21608							
棒狀桿菌	百合棒狀桿菌		P973						
棒狀桿菌	Nitrilophilus	21419				11594			

棒狀桿菌	Spec.		P4445						
棒狀桿菌	Spec.		P4446						
棒狀桿菌	Spec.	31088							
棒狀桿菌	Spec.	31089							
棒狀桿菌	Spec.	31090							
棒狀桿菌	Spec.	31090							
棒狀桿菌	Spec.	31090							
棒狀桿菌	Spec.	15954							20145
棒狀桿菌	Spec.	21857							
棒狀桿菌	Spec.	21862							
棒狀桿菌	Spec.	21863							

縮寫具有下列意義：

ATCC:美國典型培養物保藏中心(American Type Culture Collection, Rockville, MD, 美國)

FERM:發酵研究所(Fermentation Research Institute, Chiba, 日本)

NRRL:美國農業部菌種中心，北部地區研究實驗室(Northern Regional Research Laboratory, Peoria, IL, 美國)

CECT:普通微生保藏中心(Coleccion Espanola de Cultivos Tipo, Valencia, 西班牙)

NCIMB:國家工業和海洋細菌保藏中心(National Collection of Industrial and Marine Bacteria Ltd., Aberdeen, 英國)

CBS:真菌保藏所(Centraalbureau voor Schimmelcultures, Baarn, 荷蘭)

NCTC:國家典型培養物保藏中心(National Collection of Type Cultures, London, 英國)

DSMZ:微生物保藏中心(Deutsche Sammlung von Mikroorganismen und Zellkulturen, Brunswick, 德國)

另一個較佳具體實施例為本發明基因改質的生物(於下文中也稱為「宿主細胞」)具有超過一個本發明之MP核酸分子。可將此宿主細胞以熟悉本技藝者已知的不同方式製備。例如，藉攜帶數個本發明核酸分子的載體可將其轉染。然而，也能夠使用一種載體於各例中導入本發明的一個核酸分子進入宿主細胞及所以同時或連續使用種種載體。因此能夠建造宿主細胞攜帶許多(高達數百個)本發明核酸序列。此累積常可對宿主細胞關於精細化學品生產力產生超加成性效果。

於較佳具體實施例中，基因改質的生物包含以染色體插入的方式至少兩個本發明MP核酸或一個異源啟動子功能上連接至內生本發明MP核酸。

於另一個具體實施例中，本發明之MP蛋白質及/或MP基因能夠於生物中調控研究的精細化學品生產，特別是於棒狀桿菌或短桿菌屬細菌中，特別較佳為於麩胺酸棒狀桿菌中。以基因重組技術之輔助，能夠操作一或多個發明的代謝途徑之調控蛋白質使其功能受調節。例如，能夠改良生合成酵素之效率或摧毀其異位調節控制區域以避免化合物製造之回饋抑制。同樣地，可將分解酵素刪除或藉替換、缺失或附加改質使得其對研究的化合物之分解活性降低，而不損害細胞生存力。於任何情況中，能夠增加任何該研究的精細化學品之總體產量或製造速率。

也可能本發明之蛋白質及核苷酸分子中的此等改質可間接改善精細化學品之製造。細胞中代謝途徑之調控機制無

可避免地連接及活化一個代謝途徑可以伴隨的方式造成另一個代謝途徑的抑制或活化。調控本發明一或多個蛋白質之活性可影響其他精細化學品生合成或分解途徑之製造或效率。降低MP蛋白質抑制編碼胺基酸生合成中特定蛋白質的基因轉錄之活性使其能夠同時去抑制其他胺基酸生合成途徑，因為此等代謝途徑彼此連接。藉由修飾本發明的MP蛋白質，能夠某程度分開(Decouple)細胞生長及細胞分裂與其細胞外環境；藉由影響MP蛋白質，當細胞外生長及細胞分裂條件為次佳時其通常抑制核苷酸之生合成使其現在缺少此功能，能夠使其生長，即使細胞外條件不佳。對於大規模發酵培養此為特別重要，因為培養條件關於溫度、營養供應或通氣常為次佳但在對此因子的細胞調控系統已去除後仍促進生長及細胞分裂。

所以本發明更關於藉由培養上述本發明基因改質的生物而製備精細化學品的方法。

再者，本發明係關於一種製備精細化學品之方法，藉由

A) 以下列轉型非人母生物

a)至少一種上述本發明MP核酸或

b)至少一種上述本發明核酸構體或

c)一種啟動子對於上述內生本發明MP核酸為異源及其可使該內生本發明MP核酸表現於該生物中，

及

B)培養根據A)項製備的基因改質生物。

將基因改質的生物用先前已知的方式及根據生物培養。

例如，將細菌培養於適當發酵培養基中之液體培養物中。

於較佳具體實施例中，將至少一種精細化學品由基因改質的生物及/或培養步驟後的培養基分離。

用詞「精細化學品」為技藝中已知及包括由生物製造的化合物，使用於許多種工業中如例如(但不限於)製藥業、農業、化妝品業、食品業及飼料業。此等化合物包含有機酸如，例如，酒石酸、衣康酸(Itaconic acid) 及二胺基庚二酸(diaminopimelic acid)、蛋白質形成的及非蛋白質形成的胺基酸兩者、嘌呤及嘧啶鹼基、核苷及核苷酸(如述於例如Kuninaka, A.(1996)Nucleotides and related compounds, 561-612頁，於Biotechnology第6冊, Rehm等人編者VCH:Weinheim 及其中的參考文獻)、脂質、飽和及不飽和脂肪酸(例如花生四烯酸(Arachidonic Acid))、二元醇類(如丙二醇及丁二醇)、碳水化合物(如玻尿酸及海藻糖)、芳族化合物(如芳族胺、香草醛(Vanillin) 及靛藍(Indigo))、維生素及輔因素(如說明於 Ullmann's Encyclopedia of Industrial Chemistry, A27冊, "Vitamins", 443-613頁(1996)VCH:Weinheim及其中的參考文獻；及Ong, A.S., Niki, E.及Packer, L.(1995)"Nutrition, Lipids, Health and Disease" Proceedings of the UNESCO/Confederation of Scientific and Technological Associations in Malaysia and the Society for Free Radical Research-Asia, 1994年9月1-3日於馬來西亞檳榔島舉行, AOCS Press(1995))、酵素及由Gutcho(1983)於Chemicals by Fermentation, Noyes Data Corporation, ISBN: 0818805086及其中指出的參考文獻所述之其他所有化合

物。將特定精細化學品之代謝及用途進一步說明於下。

I.胺基酸代謝及用途

胺基酸包含所有蛋白質之基礎結構單元及因此對於細胞的正常功能為必要。用詞「胺基酸」為技藝中已知。蛋白質形成的胺基酸有20種，擔任蛋白質的結構單元，其中藉胜肽鍵(peptide bond)將其連接，而非蛋白質形成的胺基酸(已知有數百種)通常不發生於蛋白質中(見Ullmann's Encyclopedia of Industrial Chemistry, A2冊, 57-97頁 VCH:Weinheim(1985))。胺基酸可以D或L構型存在，雖然L-胺基酸通常為見於天然發生蛋白質中的唯一類型。20個蛋白質形成的胺基酸各自的生合成及分解途徑於原核及真核細胞兩者中皆已完全清楚(見，例如，Stryer, L. Biochemistry, 第3版, 578-590頁(1988))。「必需」胺基酸(組胺酸、異白胺酸、白胺酸、離胺酸、甲硫胺酸、苯丙胺酸、羥丁胺酸、色胺酸及纈胺酸)，如此稱呼因為由於其生合成的複雜性，其必需於飲食中攝取，將其藉由簡單生合成途徑轉變成其他11種「非必需」胺基酸(丙胺酸、精胺酸、天門冬醯胺酸、天門冬胺酸、半胱胺酸、麩胺酸、麩醯胺酸、甘胺酸、脯胺酸、絲胺酸及酪胺酸)。高等動物能夠合成部分此等胺基酸，但是必須將必需胺基酸於食物中攝取以便使得正常蛋白質合成發生。

除了其於蛋白質生合成的功能外，此等胺基酸本身為有趣的化合物，已發現許多有不同應用於食品、動物飼料、化學品、化妝品、農業及製藥業。離胺酸為一個重要的胺

基酸，不僅對於人類營響重要，也對於單胃家畜如家禽及豬為重要。麩胺酸為最常使用作為調味添加劑(單鈉麩胺酸(MSG, monosodium glutamate)及於食品業中的其他地方，如同天門冬胺酸、苯丙胺酸、甘胺酸及半胱胺酸。甘胺酸、L-甲硫胺酸及色胺酸皆用於製藥業。麩胺酸、纈胺酸、白胺酸、異白胺酸、組胺酸、精胺酸、脯胺酸、絲胺酸及丙胺酸用於製藥業及化妝品業。羥丁胺酸、色胺酸及D/L-甲硫胺酸廣泛使用於動物飼料添加劑(Leuchtenberger, W.(1996)Amino acids-Technical production and use,466-502頁於Rehm等人(編者)Biotechnology第6冊14a章，VCH:Weinheim)。已發現此等胺基酸另外適合作為合成合成的胺基酸及蛋白質的前驅物，如N-乙醯半胱胺酸、S-羧甲基-L-半胱胺酸、(S)-5-羥基色胺酸及其他物質說明於Ullmann's Encyclopedia of Industrial Chemistry, A2冊，57-97頁VCH:Weinheim, 1985。

此等天然胺基酸之生合成於能夠製造之的生物中(例如細菌)已被完全了解(回顧細菌胺基酸生合成及其調控，見Umbarger, H.E.(1978)Ann. Rev. Biochem. 47:533-606)。麩胺酸係由α-酮戊二酸(於檸檬酸循環中的一種中間體產物)之還原性胺化反應合成。麩醯胺酸、脯胺酸及精胺酸各由麩胺酸相繼產生。絲胺酸之生合成發生於三步驟反應，開始於3-磷酸甘油酸(醣解之中間體產物)，及於氧化、轉胺基化及水解步驟後得到此胺基酸。半胱胺酸及甘胺酸各由絲胺酸製造，明確而言前者由同半胱胺酸與絲胺酸縮合，而

後者於由絲胺酸轉羥甲基酶催化的反應中藉由轉移側鏈β-碳原子至四氫葉酸而形成。苯丙胺酸及酪胺酸係由醣解及戊糖磷酸途徑之前驅物赤蘚糖-4-磷酸(erythrose-4-phosphate)及磷酸烯醇丙酮酸(phosphoenolpyruvate)於9步驟生合成途徑中合成，其僅於合成預苯酸(prephenate)後的最後兩步中分歧。色胺酸同樣由此兩個起始分子製造，但其由11步途徑合成。 酪胺酸也可由苯丙胺酸於由苯丙胺酸羥基酶催化的反應中製備。丙胺酸、纈胺酸及白胺酸各為衍生自丙酮酸(醣解的最終產物)之生合成產物。天門冬胺酸係由草醋酸(檸檬酸循環之中間體產物)形成。天門冬醯胺酸、甲硫胺酸、羥丁胺酸及離胺酸各由轉化天門冬胺酸而製造。異白胺酸係由羥丁胺酸形成。組胺酸係由5-磷酸核糖基-1-焦磷酸(一種活化的糖)於複雜的9步途徑中形成。

超過細胞蛋白質生合成所需之胺基酸量無法被儲存，而是被分解，所以提供中間產物於細胞中的主要代謝途徑(回顧見Stryer, L. Biochemistry, 第3版, 第21章"Amino Acid Degradation and the Urea Cycle",495-516頁(1988))。雖然細胞能夠轉變不需要的胺基酸成為有用的代謝中間產物，胺基酸的製造就其合成所需的能量、前驅分子及酵素而言為昂貴。所以無怪乎胺基酸生合成受回饋抑制調控，藉由特定胺基酸的出現減緩或完全停止其本身的製造(回顧胺基酸生合成途徑中回饋機制，見Stryer, L. Biochemistry, 第3版, 第24章"Biosynthesis of Amino Acids and Heme",575-600頁(1988))。所以特定胺基酸的產出受此胺基酸於細胞中的

量限制。

II.維生素、輔因素及營養科學品(Nutraceutical)代謝及用途

維生素、輔因素及營養科學品包含另一個分子族群。高等動物已喪失合成之的能力，所以必須攝取，雖然其可輕易地由其他生物如細菌合成。此等分子為本身有生物活性或為生物活性物質的前驅物，其擔任許多代謝途徑之電子攜帶者或中間體產物。除了其營養價值，此等化合物也具有顯著工業價值如著色劑、抗氧化劑及觸媒或其他加工輔料。(回顧此等化合物之結構、活性及工業應用，見例如Ullmann's Encyclopedia of Industrial Chemistry, A27冊,"Vitamins",443-613,VCH:Weinheim,1996)。用詞「維生素」為技藝中已知及包含生物正常功能所需的營養物但無法由此生物本身合成。維生素之族群可包括輔因素及營養科學品化合物。用詞「輔因素」包含有正常酵素活性出現所需之非蛋白質化合物。此等化合物可為有機或無機；本發明之輔因素分子較佳為有機。用詞「營養科學品」包含有食物添加劑其促進植物及動物的健康，特別是人類。此類分子的實例為維生素、抗氧化劑以及某些脂質(如多元不飽和脂肪酸)。

此等分子於能夠製造它們的生物(如細菌)中之生合成已被廣泛地了解(Ullmann's Encyclopedia of Industrial Chemistry, A27冊, "Vitamins", 443-613頁，VCH:Weinheim, 1996, Michal, G(1999) Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology, John Wilely & Sons；Ong, A.S., Niki, E. 及 Packer,

L.(1995)"Nutrition, Lipids, Health and Disease" Proceedings of the UNESCO/Confederation of Scientific and Technological Associations in Malaysia and the Society for Free Radical Research-Asia, 1994年9月1-3日於馬來西亞檳榔島舉行，AOCS Press, Champaign, IL X, 374 S)。

硫胺(thiamine)(維生素B_1)係由嘧啶及噻唑單元化學偶合而形成。核黃素(Riboflavin)(維生素B_2)係由鳥苷5'-三磷酸(GTP, guanosine 5'-triphosphate)及核糖-5'-磷酸合成。之後將核黃素用於合成黃素單核酸(FMN, Flavin mononucleotide)和黃素腺呤雙核酸(FAD, Flavin adenine dinucleotide)。此化合物家族統稱為「維生素B6」(例如吡哆醇(pyridoxine)、吡哆胺(pyridoxamine)、磷酸吡哆醛(pyridoxal 5'-phosphate)吡哆醛(pyridoxal)及市面上使用的鹽酸吡哆醇)，其皆為共同結構單元5-羥基-6-甲基吡啶的衍生物。可將泛酸(R-(+)-N-(2,4-二羥基-3,3-二甲基-1-氧丁基)-β-丙胺酸)藉化學合成或藉發酵而製備。於泛酸生合成中的最後步驟由β-丙胺酸及泛解酸之ATP驅動的縮合組成。負責轉變成泛解酸及轉變成β-丙胺酸與縮合成泛酸之生合成步驟的酵素為已知。泛酸的代謝活性形式為輔酶A，其生合成由5個酵素步驟產生。泛酸、磷酸吡哆醛、半胱氨酸及ATP為輔酶A的前驅物。此等酵素不僅催化泛酸的形成，也催化(R)-泛解酸、(R)-泛酸內酯(pantolactone)、(R)-泛醇(原維生素B_5)、泛醯巯基乙胺(pantetheine)(及其衍生物)及輔酶A的製造。

於微生物中自前驅物分子庚二醯-CoA生合成生物素已被

詳細研究，數個有關的基因也已被鑑定。已顯示許多相對應的蛋白質涉及於Fe簇團合成及屬於nifS蛋白質類別。硫辛酸(lipoic acid)係衍生自辛酸及作為能量代謝中的輔酶，於此其為丙酮酸脫氫酶複合物及α-酮戊二酸脫氫酶複合物之組成份。葉酸為全部衍生自葉酸的物質之族群，其依序衍生自L-麩胺酸、對-胺基苯甲酸及6-甲基喋呤。葉酸及其衍生物的生合成開始自代謝中間產物鳥苷5'-三磷酸(GTP, guanosine 5'-triphosphate)、L-麩胺酸及對-胺基苯甲酸於某些微生物中已詳細研究。

克瑞諾得(corrinoids)(如鈷胺素及，特別是維生素B_{12})及紫質(porphyrin)屬於由四吡咯(tetrapyrrole)環狀系統區別的化學品族群。維生素B_{12}之生合成太過複雜以至於尚未完全了解，但現已知許多有關的酵素及受質。菸鹼酸及菸鹼醯胺為吡啶衍生物，也稱為「菸鹼酸(niacin)」。菸鹼酸為重要輔酶菸鹼胺腺嘌呤雙核苷酸(NAD, Nicotinamide adenine dinucleotide)和菸鹼胺腺嘌呤雙核苷酸磷酸(NADP, Nicotinamide adenine dinucleotide phosphate)及其還原形式的前驅物。

此等化合物於工業規模上的生產主要係基於無細胞化學合成，雖然此等化合物有些已同樣藉大規模微生物培養而製造，如核黃素、維生素B_6、泛酸及生物素。僅有維生素B_{12}因為其合成的複雜性僅由發酵而製造。於試管中，製程需要相當花費於材料及時間，常為高成本。

III.嘌呤、嘧啶、核苷及核苷酸代謝及用途

嘌呤及嘧啶代謝用之基因及其相對應蛋白質對於腫瘤及病毒感染的治療為重要的目標。用詞「嘌呤」或「嘧啶」包含含氮鹼基，其形成核酸、輔酶及核苷酸之部分。用詞「核苷酸」包含核酸分子之基礎結構單元，其包含含氮鹼基、戊糖(在RNA的情況中此糖為核醣，在DNA的情況中此糖為D-去氧核醣)及磷酸。用詞「核苷」包含作為核苷酸前驅物的分子，但相對於核苷酸，其無磷酸單元。藉由抑制此等分子的生合成或其調動形成核酸分子，能夠抑制RNA及DNA合成；於癌細胞中目標抑制此活性使腫瘤細胞分裂及複製的能力得以受抑制。

也有核苷酸不形成核酸分子而是擔任能量儲存(即AMP)或輔酶(即FAD及NAD)。

數個文獻已說明利用此等化學品於嘌呤及/或嘧啶代謝受影響之此等醫藥指示(例如Christophrson, R.I.及Lyons, S.D. (1990) "Potent inhibitors of de novo pyrimidine and purine biosynthesis as chemotherapeutic agents", Med. Res. Reviews 10:505-548)。關於嘌呤及嘧啶代謝的酵素之研究集中於新穎藥物的發展，其可用於例如作為免疫抑制劑或抗增殖劑(Smith, J.L. "Enzymes in Nucleotide Synthesis" Curr. Opin. Struct. Biol. 5(1995) 752-757;Simmonds, H.A., Biochem. Soc. Transact. 23 (1995) 877-902)。然而，嘌呤及嘧啶鹼基、核苷及核苷酸也有其他可能的用途：作為許多精細化學品生合成中的中間產物(如硫胺、S-腺苷甲硫胺酸、葉酸或核黃素)、作為細胞的能量攜帶者(例如ATP或

GTP)及對於其化學品本身，通常使用作為味道增強劑(例如IMP或GMP)或於許多醫藥應用(見例如Kuninaka, A., (1996) "Nucleotides and Related Compounds in Biotechnology"第6冊，Rehm等人編者VCH:Weinheim, 561-612頁)。關於嘌呤、嘧啶、核苷或核苷酸代謝的酵素也日漸作為為作物保護發展的化學品(包括殺真菌劑、除草劑及殺蟲劑)所針對的目標。

此等化合物於細菌中的代謝已被了解(回顧見例如Zalkin, H.及Dixon, J.E. (1992) "De novo purine nucleotide biosynthesis" in Progress in Nucleic Acids Research and Molecular biology, 第42冊，Academic Press, 259-287頁；及Michal, G.(1999)"Nucleotides and Nucleosides"；第8章於：Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology, Wiley, New York)。嘌呤代謝為密集研究的目標，其為細胞正常作用的基礎。高等動物不正常的嘌呤代謝可能引起嚴重的疾病，例如痛風。嘌呤核苷酸係由核醣5-磷酸經由中間化合物肌苷5'-磷酸(IMP, inosine 5'-phosphate)藉由幾個步驟合成，導致生產鳥苷5'-單磷酸(GMP, guanosine 5'-monophosphate)或腺苷5'-單磷酸(AMP, adenosine 5'-monophosphate)，由此可輕易地製備使用作為核苷酸的三磷酸形式。將此等化合物使用為能量儲存，所以其分解提供能量於細胞中的許多不同生化流程。嘧啶生合成經由自核醣5-磷酸形成尿苷5'-單磷酸(UMP, uridine 5'-monophosphate)而產生。之後將UMP轉變成胞苷5'-三磷

酸(CTP, cytidine 5'-triphosphate)。所有核苷酸的去氧形式皆由核苷酸的二磷酸核醣形式於一步還原反應中製備而產生核苷酸的二磷酸去氧核醣形式。磷酸化後，此等分子可參與DNA合成。

IV.海藻糖(trehalose)代謝及用途

海藻糖由兩個葡萄糖分子以α,α-1,1連結連接在一起組成。一般將其使用於食品業作為增甜劑、作為添加劑於乾燥的或冷凍的食品及飲料中。然而，其也用於製藥業或於化妝品業及生技業(見例如Nishimoto等人(1998)美國專利編號5,759,610; Singer, M.A.及Lindquist, S. Trends Biotech. 16(1998)460-467; Paiva, C.L.A及Panek, A.D. Biotech Ann. Rev. 2(1996)293-314；及Shiosaka, M.J. Japan 172(1997) 97-102)。海藻糖係由許多微生物的酵素製造及自然釋放入周圍培養基，由此可將其藉技藝中已知的方法分離。

特別較佳的精細化學品為胺基酸，特別是由L-離胺酸、L-羥丁胺酸及L-甲硫胺酸組成的族群選出的胺基酸。

本發明的另一個觀點係關於自非人生物製造精細化學品之調控方法。此等方法包含使細胞與調控MP蛋白質活性或MP核酸表現的物質接觸使得相較於無該物質存在時之相同活性，細胞相關的活性受改質。於較佳具體實施例中，將細胞關於生物內代謝途徑之一或多個調節系統作調控，特別是棒狀桿菌或短桿菌屬細菌，特別較佳為麩胺酸棒狀桿菌，使得此宿主細胞產生改良的產量或改良的製造速率於研究的精細化學品。例如，調控MP蛋白質活性之物質刺

激MP蛋白質活性或MP核酸表現。刺激MP蛋白質或MP核酸表現之物質的實例包括小分子、活性MP蛋白質及編碼MP蛋白質及已被導入細胞內的核酸。抑制MP蛋白質或MP表現之物質的實例包括小分子及反意義MP核酸分子。

本發明之另一個觀點係關於用以調控來自細胞之研究化合物產量之方法，包含有導入MP基因進入細胞，此基因保持於分開的質體或插入宿主細胞的基因組內。插入基因組可能隨機發生或經由同源重組使得原本的基因被插入的複製體取代，導致來自細胞製造研究的化合物得以受調控。於較佳具體實施例中，此等產量增加。

於另一個較佳具體實施例中，精細化學品為胺基酸。於特別較佳具體實施例中，此胺基酸為L-離胺酸、L-甲硫胺酸及L-羥丁胺酸。

下面的部分更詳細說明本發明之各種觀點及較佳具體實施例。

【實施方式】

如本文中使用，用詞「核酸分子」用來包含DNA分子(如cDNA或基因組DNA)及RNA分子(如mRNA)以及由核苷酸類似物產生的DNA或RNA類似物。再者，此用詞包含位於編碼基因區域的3'及5'端之未轉譯序列：編碼區域之5'端上游序列至少約100個核苷酸及編碼區域之3'端下游序列至少約20個核苷酸。

核酸分子可為單股或雙股，但較佳為雙股DNA。「分離的」核酸分子係由存在於核酸天然來源中的其他核酸分子取

出。「分離的」核酸分子較佳不具有在核酸來源的生物之基因組DNA中自然在其兩側的任何序列(例如位於核酸5'或3'端之序列)。

於不同具體實施例中，分離的MP核酸分子可具有例如少於約5 kb、4 kb、3 kb、2 kb、1 kb、0.5 kb或0.1 kb核苷酸序列，其自然包圍在核酸來源的細胞(如麩胺酸棒狀桿菌細胞)之基因組DNA中的核酸分子兩側。除此之外，「分離的」核酸分子，如cDNA分子，若其係以重組技術製備，可為實質上無其他細胞材料或培養基，若其為化學合成，可為無化學前驅物或其他化學品。

再者，經由聚合酶鏈反應，利用基於此序列製造的寡核苷酸引子，可將核酸分子分離(例如，藉由利用已基於附錄A的相同序列製造的寡核苷酸引子，經由聚合酶鏈反應可分離含有來自附錄A的完整序列或其片段之核酸分子)。例如，可將mRNA自正常內皮細胞分離(例如經由Chirgwin等人 (1979)Biochemistry 18:5294-5299之硫氰酸胍(Guanidinium thiocyanate)萃取法)，及藉由反轉錄酶(如Moloney-MLV反轉錄酶，可購自Gibco/BRL, Bethesda, MD, 或AMV反轉錄酶，可購自Seikagaku America, Inc., St. Petersburg, FL)可製備cDNA。用於經聚合酶鏈反應放大的合成寡核苷酸引子可基於示於附錄A中任何核苷酸序列而製造。藉由cDNA或者基因組DNA作為模版與適當的寡核苷酸引子，根據標準PCR放大技術，可將本發明核酸放大。可將以此方式放大的核酸選殖入適當的載體及以DNA序列

分析定性。相當於MP核苷酸序列之寡核苷酸可藉標準合成法利用例如自動DNA合成儀而製備。

於較佳具體實施例中，本發明分離的核酸分子包含含有反轉譯突變相當於根據表1/第4行之胺基酸位置之列於表1/第1行中任何核苷酸序列。

於另一個較佳具體實施例中，本發明分離的核酸分子包含有互補於任何上述核苷酸序列之核酸分子，或其片段，該核酸分子為充分互補於任何上述核苷酸序列，因其能夠與任何上述核苷酸序列雜交，造成穩定的雙鏈。

由本發明MP核酸分子編碼的蛋白質片段較佳為任何MP蛋白質之生物活性片段。如本文中使用，用詞「MP蛋白質之生物活性片段」係用來包含MP蛋白質之一片段，例如一區塊或一基序(Motif)，其可轉錄地、轉譯地或轉譯後地調節麩胺酸棒狀桿菌中的代謝途徑或具有表1中指出的活性。為了決定是否MP蛋白質或其生物活性片段可轉錄地、轉譯地或轉譯後地調節麩胺酸棒狀桿菌中的代謝途徑，可實施酵素活性分析。此等分析方法，如實例8中詳細說明，對熟練本工作者為熟悉。

除了其他天然發生的MP序列變體可能存在於族群中，熟練的工作者也了解經由進一步突變可將其他改變導入表1的核苷酸序列，導致相較於野生型另外的改變於編碼的MP蛋白質之胺基酸序列，而無損害MP蛋白質的功能性。因此，可能例如製備表1序列中核苷酸替換，其導致胺基酸替換於「非必需」胺基酸殘基。可將於任何MP蛋白質之野生

型序列中之「非必需」胺基酸殘基(表1)改質而不改變該MP蛋白質之活性，而「必需」胺基酸殘基為MP蛋白質活性所必須。然而，其他胺基酸殘基(例如於具有MP活性之區塊中之非保守或僅半保守胺基酸基團)可為活性之非必需及所以可能被改質而不改變MP活性。

B.重組表現載體及宿主細胞

本發明之另一個觀點係關於核酸構體如，例如，載體，較佳為表現載體，含有編碼MP蛋白質之本發明核酸。如本文中使用，用詞「載體」係關於能夠傳送其連接的另一個核酸之核酸分子。

一類載體為「質體」，此用詞意指環形雙股DNA圈，可將其他DNA段黏接入其中。另一類載體為病毒載體，允許其他DNA段黏接入病毒基因組。一些載體能夠於將其導入其中的宿主細胞中獨立地複製(例如具有細菌複製源點的細菌載體及附加體(episomal)哺乳類載體)。

其他載體(如非附加體哺乳類載體)當導入該宿主細胞時，插入宿主細胞的基因組，及因而與宿主基因組一起複製。

再者，特定載體能夠控制其功能上連接的基因之表現。此等載體係稱為「表現載體」。通常，用於DNA重組技術中的表現載體為質體的形式。於本說明書中，可互換使用「質體」及「載體」，因為質體為載體最常使用的類型。本發明希望包含該其他類型表現載體，如病毒載體(例如無法自我複製的反轉錄病毒、腺病毒及腺相關病毒)，其發揮類似功

能。

本發明之重組表現載體包含有本發明之核酸以適合表現該核酸於宿主細胞的形式，意指重組表現載體包含一或多個調控序列，其係基於用於表現的宿主細胞選擇及將其功能上連接至欲表現的核酸序列。於重組表現載體中，用詞「功能上連接」意指研究的核苷酸序列係連接至調控序列使得該核苷酸序列之表現為可能(例如於試管中轉錄/轉譯系統或於宿主細胞中，若已將載體導入該宿主細胞中)。用詞「調控序列」係用來包含啟動子、促進子(enhancer)及其他表現控制元件(如多聚腺嘌呤訊號(polyadenylation signal))。此等調控序列係說明於例如Goeddel: Gene Expression Technology: Methods in Enzymology 185, Academic Press, San Diego, CA (1990)。調控序列包含控制持續性表現核苷酸序列於許多類型宿主細胞中者及控制直接表現該核苷酸序列僅於特定宿主細胞中者。熟練的工作者了解設計表現載體可能視因素如欲轉型的宿主細胞選擇、研究蛋白質之表現程度等而定。可將本發明的表現載體導入宿主細胞以便製備蛋白質或胜肽，包括融合蛋白質或融合胜肽，其係由如本文所述的核酸所編碼(如MP蛋白質、MP蛋白質之突變形式、融合蛋白質等)。

可將本發明之重組表現載體設計來於原核或真核細胞中表現MP蛋白質。例如，可將MP基因表現於細菌細胞如麩胺酸棒狀桿菌、昆蟲細胞(利用桿狀病毒表現載體)、酵母菌細胞及其他真菌細胞(見Romanos, M.A.等人(1992)"Foreign

gene expression in yeast: a review", Yeast 8:423-488; van den Hondel, C.A.M.J.J.等人(1991) " Heterologous gene expression in filamentous fungi" in: More Gene Manipulations in Fungi, J.W. Bennet & L.L.Lasure編者，396-428頁：Academic Press: San Diego；及van den Hondel, C.A.M.J.J. & Punt, P.J.(1991) "Gene transfer systems and vector development for filamentous fungi" in: Applied Molecular Genetics of Fungi, Peberdy, J.F.等人編，1-28頁，Cambridge University Press: Cambridge)、海藻及多細胞植物細胞(見Schmidt, R.及Willmitzer, L.(1988)" High efficiency Agrobacterium tumefaciens-mediated transformation of Arabidopsis thaliana leaf and cotyledon explants" Plant Cell Rep.: 583-586)或哺乳類細胞。適當的宿主細胞進一步討論於Goeddel, Gene Expression Technology: Methods in Enzymology 185, Academic Press, San Diego, CA (1990)。或者，可將重組表現載體於試管中轉錄及轉譯，例如藉由利用T7啟動子調控序列及T7聚合酶。

將蛋白質表現於原核生物中主要藉由利用含有持續性或可誘導的啟動子控制融合或非融合蛋白質表現之載體。融合載體提供許多胺基酸至於其中編碼的蛋白質，通常於重組蛋白質的胺基端。此等融合載體通常具有三個任務：1)增加重組蛋白質的表現；2)增加重組蛋白質的溶解度；及3)藉由作用為親合力純化中的配體支持重組蛋白質的純化。常將蛋白質裂解位置導入融合表現載體於融合單元及

重組蛋白質接合處使得在純化融合蛋白質後可將重組蛋白質與融合單元分開。此等酵素及其相對應的辨識序列包含Xa因子、凝血酶(Thrombin)及腸激酶(Enterokinase)。

一般融合表現載體包含pGEX(Pharmacia Biotech Inc; Smith, D.B.及Johnson, K.S.(1988)Gene 67:31-40)、pMAL (New England Biolabs, Beverly, MA)及pRIT 5(Pharmacia, Piscataway, NJ)，其中分別將麩胱甘肽硫轉移酶(GST, glutathione S-transferase)、麥芽糖E結合蛋白(maltose E-binding protein)及蛋白質A融合至重組目標蛋白質。於一個具體實施例中，將MP蛋白質之編碼序列選殖入pGEX表現載體使得產生一載體編碼融合蛋白質，其由N端至C端含有GST-凝血酶裂解位置-蛋白質X。經由親合層析法藉由麩胱甘肽瓊脂糖樹脂可將融合蛋白質純化。未融合至GST的重組MP蛋白質可由以凝血酶裂解融合蛋白質而得到。

適當可誘導非融合大腸桿菌載體之實例包括pTrc (Amann等人，(1988)Gene 69:301-315)及pET 11d (Studier等人Gene Expression Technology: Methods in Enzymology 185, Academic Press, San Diego, California (1990)60-89)。自pTrc載體之目標基因表現係基於以宿主RNA聚合酶自雜交trp-lac融合啟動子轉錄。自pET 11d載體之目標基因表現係基於自T7-gn10-lac融合啟動子轉錄，其係由共同表現的病毒RNA聚合酶(T7 gn1)介導。此病毒聚合酶係於BL 21 (DE3)或HMS174(DE3)宿主品種中由內在的λ前噬菌體(prophage)提供，其懷有T7 gn1基因於lacUV 5啟動子的轉

錄控制下。

最大化重組蛋白質表現的一個策略為表現該蛋白質於蛋白質裂解該重組蛋白質的能力受破壞的宿主細菌中(Gottesman, S. Gene Expression Technology: Methods in Enzymology 185, Academic Press, San Diego, California (1990) 119-128)。另一個策略為改質欲插入表現載體的核酸之核酸序列使得各胺基酸之個別密碼子為選擇做表現的細菌(如麩胺酸棒狀桿菌)中較佳使用者(Wada等人(1992) Nucleic Acid Res. 20:2111-2118)。藉由DNA合成的標準技術實施本發明核酸序列之此改質。

於另一個具體實施例中，MP蛋白質表現在為酵母菌的表現載體。於酵母菌釀酒酵母(S. cerevisiae)中表現載體之實例包括pYepSec1(Baldari等人(1987)Embo J. 6:229-234)、pMFa(Kurjan及Herskowitz(1982)Cell 30:933-943)、pJRY88 (Schultz等人(1987)Gene 54:113-123)及pYES2 (Invitrogen Corporation, San Diego, CA)。適用於其他真菌如絲狀真菌(filamentous fungi)之載體及用以建立此載體之方法包括詳細說明於：van den Hondel, C.A.M.J.J. & Punt, P.J. (1991) "Gene transfer systems and vector development for filamentous fungi"，於：Applied Molecular Genetics of fungi, J.F. Peberdy等人編，1-28頁，Cambridge University Press: Cambridge中者。

作為另一個替代方式，利用桿狀病毒表現載體能夠表現本發明MP蛋白質於昆蟲細胞。可獲得於培養的昆蟲細胞(如

Sf9細胞)中表現蛋白質之桿狀病毒載體包括pAc系列(Smith等人，(1983)Mol. Cell Biol. 3:2156-2165)及pVL系列(Lucklow及Summers(1989)Virology 170:31-39)。

於另一個具體實施例中，可將本發明MP蛋白質表現於單細胞植物細胞(如海藻)或於高等植物的細胞中(如種子植物如作物)。植物表現載體之實例包括詳述於Becker, D., Kemper, E., Schell, J.及Masterson, R.(1992) "New plant binary vectors with selectable markers located proximal to the left border", Plant Mol. Biol. 20:1195-1197；及Bevan, M.W.(1984) "Binary Agrobacterium vectors for plant transformation", Nucl. Acids Res. 12:8711-8721中者。

於另一個具體實施例中，將本發明之核酸利用哺乳類表現載體表現於哺乳類細胞中。哺乳類表現載體之實例包括pCDM8(Seed, B.(1987)Nature 329:840)及pMT2PC (Kaufman等人(1987)EMBO J. 6:187-195)。當使用於哺乳類細胞中，表現載體的控制功能常由病毒調控元件提供。例如，一般使用的啟動子係由多瘤病毒(Polyoma)、腺病毒2、巨細胞病毒(Cytomegalovirus)及猿病毒40(simian virus 40)起源。其他原核及真核細胞適當的表現系統可見於Sambrook, J., Fritsch, E.F.及Maniatis, T., Molecular cloning:A Laboratory Manual, 第2版, Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989之第16及17章。

於另一個具體實施例中，重組哺乳類表現載體可引起核

酸的表現，較佳於特定細胞類型中(例如，使用組織專一的調控元件來表現核酸)。組織專一的調控元件為技藝中已知。適當組織專一啟動子之非限制性實例包括白蛋白啟動子(肝臟專一；Pinkert等人(1987)Gene Dev. 1:268-277)、淋巴專一的啟動子(Calame及Eaton(1988) Adv. Immunol. 43:235-275)、T細胞受體之特定啟動子(Winoto及Baltimore (1989)EMBO J. 8:729-733)及免疫球蛋白(Banerji等人(1983) Cell 33:729-740; Queen及Baltimore (1983) Cell 33:741-748)、神經專一的啟動子(如神經蛋白纖維(neurofilament)啟動子；Byrne及Ruddle(1989) PNAS 86:5473-5477)、胰臟專一的啟動子(Edllund等人，(1985)Science 230:912-916)及母體專一的啟動子(如乳漿啟動子；美國專利編號4,873,316及歐洲專利申請案文獻編號264 166)。發育調控的啟動子，例如鼠hox啟動子(Kessel及Gruss(1990)Science 249:374-379)及α-胎兒蛋白啟動子(Campes及Tilghman(1989)Genes Dev. 3:537-546)也同樣包含。

此外，本發明提供重組表現載體，其包含有已被選殖入表現載體於反意義方向之本發明DNA分子。此意指將DNA分子功能上連接至調控序列使得可以表現為MP mRNA反意義之RNA分子(經由DNA分子的轉錄)。能夠選擇功能上連結至以反意義方向選殖的核酸之調控序列及其控制反意義RNA分子之連續表現於多種細胞類型中；例如能夠選擇病毒啟動子及/或促進子或調控序列，其控制持續性組織專一或細胞類型專一的反意義RNA表現。反意義表現載體可

為重組質體、噬粒(phagemid)或減毒病毒的形式，其於高度有效的調控區域之控制下製造反意義核酸，其活性係由載體導入的細胞類型所決定。藉由反意義基因之基因表現調控係討論於Weintraub, H.等人，Antisense RAN as a molecular tool for genetic analysis, Reviews-Trends in Genetics, Vol.1(1) 1986。

本發明的另一個觀點係關於已將本發明重組表現載體導入其中的宿主細胞。用詞「宿主細胞」及「重組宿主細胞」於本文中可互相交換地使用。當然，此等用詞不僅關於特定目標細胞，也同時關於此細胞的後代或可能後代。因為特定改質可能出現於連續的世代，由於突變或環境因子，此後代不一定與母細胞完全一致但仍包含於本文中使用的用詞之範圍內。

宿主細胞可為原核或真核細胞。例如，可將MP蛋白質表現於細菌細胞如麩胺酸棒狀桿菌、昆蟲細胞、酵母菌或哺乳類細胞(如中國倉鼠卵巢(CHO, Chinese hamster ovary)細胞或COS細胞)。其他適當的宿主細胞對於熟練的工作者為熟悉。有關於麩胺酸棒狀桿菌及可以適當的方式使用作為本發明核酸及蛋白質分子之宿主細胞的微生物係列於表3中。

可使用習見轉化或轉染方法來將載體DNA導入原核或真核細胞中。如本文中使用，用詞「轉化」及「轉染」係用來包含技藝中已知的多種方法導入外來核酸(如DNA)進入宿主細胞，包括磷酸鈣或氯化鈣共沉澱、DEAE葡聚糖介導

轉染(DEAE dextran-mediated transfection)、脂質體轉染(lipofectin)或電穿孔。轉化或轉染宿主細胞的適當方法可見於Sambrook等人(Molecular Cloning:A Laboratory Manual, 第2版，Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989)及其他實驗室手冊。

於穩定轉染哺乳類細胞的情況中，已知視使用的表現載體及使用的轉染技術，僅有少部分細胞將外來DNA插入其基因組內。藉由將編碼可選擇標記(如對抗生素有耐受性)之基因與研究的基因一起導入宿主細胞，通常可將此等插入者鑑定及選擇。較佳的可選擇標記包括賦予對藥物如G418、效高黴素(hygromycin)及甲氨蝶呤(methotrexate)耐受性者。可將編碼可選擇標記的核酸於編碼MP蛋白質的相同載體上導入宿主細胞或可於不同載體上導入。已受導入的核酸穩定轉染的細胞可藉藥物選擇而鑑定(例如，已插入可選擇標記的細胞存活，而其他細胞死亡)。

藉由製備一載體，其含有至少一個MP基因段落已導入缺失、附加或替換於其中以便改質或功能上破壞MP基因，可產生同源重組的微生物。該MP基因較佳為麩胺酸棒狀桿菌MP基因，但其也能夠使用來自相關細菌或甚至來自哺乳類、酵母菌或昆蟲來源的同源體。於較佳具體實施例中，設計載體使得同源重組功能上破壞內生的MP基因(即基因不再編碼有功能的蛋白質；也稱為「剔除」載體)。作為另一個方式，可將載體設計為使得同源重組突變或以其它方

式改質內生MP基因，然而其仍編碼有功能的蛋白質(例如，可將位於上游的調控區域改質使得藉此將內生MP蛋白質的表現改變)。於同源重組載體中的改質的MP基因段落於其5'及3'端受其他MP基因的核酸包夾，其使得由載體攜帶的外生MP基因及微生物中的內生MP基因之間能夠同源重組。其他側翼MP核酸長度足以與內生基因做成功的同源重組。通常，載體含有數千個鹼基之側翼DNA(於5'及3'端兩者)(見例如Thomas, K.R.及Capecchi, M.R.(1987)Cell 51:503說明同源重組載體)。將載體導如微生物(如藉由電穿孔)及將導入的MP基因已與內生MP基因同源地重組之細胞利用技藝中已知的方法選擇。

於另一個具體實施例中，能夠產生含有選擇的系統之重組微生物，其得以調控表現導入的基因。例如，於lac操作子的控制下包含MP基因於載體中能夠使MP基因僅在IPTG存在中表現。此等調控系統為技藝中已知。

本發明之宿主細胞(如培養的真核或原核宿主細胞)可用於製造(即表現)MP蛋白質。此外，本發明提供藉由利用本發明之宿主細胞製造MP蛋白質之方法。於一個具體實施例中，方法包含培養本發明宿主細胞(已將編碼MP蛋白質的重組表現載體導入其中或已將編碼野生或改質的MP蛋白質之基因導入於其基因組中)於適當培養基中直到已製造MP蛋白質。於另一個具體實施例中，方法包含有自培養基或宿主細胞分離MP蛋白質。

C.本發明之用途及方法

本文中所述的核酸、蛋白質、融合蛋白質、引子、載體及宿主細胞可用於下列一或多種方法中：鑑定麩胺酸棒狀桿菌及相關生物、定位麩胺酸棒狀桿菌相關的生物之基因組、鑑定及定位麩胺酸棒狀桿菌研究的序列、演化研究、決定MP蛋白質功能所需的區域、調控MP蛋白質活性；調控MP途徑之活性；及調控細胞製造研究的化合物，如精細化學品。本發明MP核酸分子具有多種用途。首先，可將其用於鑑定生物如麩胺酸棒狀桿菌或其相近的親屬。也可將其用於在混合微生物群體中鑑定麩胺酸棒狀桿菌或其親屬。本發明提供許多麩胺酸棒狀桿菌基因之核酸序列。於嚴謹條件下，用含有於此生物中獨特的麩胺酸棒狀桿菌基因的一區域之探針探測單一或混合的微生物族群培養的萃取基因組DNA能夠決定該生物是否存在。雖然麩胺酸棒狀桿菌本身為非病源菌，其有關於病源菌品種如白喉桿菌。此生物之偵測有確實的臨床重要性。

本發明之核酸及蛋白質分子可作為基因組特定區域的標記。此不僅有用於定位基因組，也有用於對麩胺酸棒狀桿菌蛋白質的功能研究。例如藉由切斷麩胺酸棒狀桿菌基因組及培養此片段及DNA-結合蛋白質，可鑑定特定麩胺酸棒狀桿菌DNA結合蛋白質結合的基因組位置。此外可將結合蛋白質之彼等片段用本發明之核酸分子偵測，較佳藉由利用立即可偵測的標記；結合此核酸分子至基因組片段使得能夠定位此片段於麩胺酸棒狀桿菌基因組的圖譜上，及利用不同酵素實施此步驟數次促進快速決定蛋白質結合的核

酸序列。再者，本發明核酸可為充分同源於此等核酸分子之相關品種的序列以作為建立基因圖譜於相近細菌如乳糖發酵短桿菌之標記。

本發明之MP核酸分子同樣地適合做演化研究及蛋白質結構研究。許多原核及真核細胞利用本發明分子涉及的代謝程序；藉由比較本發明核酸分子的序列與來自其他生物編碼類似酵素的彼等序列，能夠決定該生物演化關係的程度。因此，此比較使得能夠決定何者序列區域為保守性及何者不是，此可能有用於決定蛋白質的何者區域對酵素功用為必需。此類型決定對於蛋白質工程研究為有用的及可能給予指示對於何蛋白質可容忍基因突變而不喪失其功能。

本發明MP核酸分子的操作可造成具有功能不同於野生型MP蛋白質之MP蛋白質的製造。此等蛋白質可對其效率或活性改善，可以比正常更大量存在於細胞中或可對其效率或活性減弱。

活性上的此等改變可為使得一或多種精細化學品來自麩胺酸棒狀桿菌之產量、製造及/或生產效率改善。藉由最佳化MP蛋白質之活性，其活化編碼研究的精細化學品生合成之蛋白質之基因的轉錄或轉譯或藉由影響或消除MP蛋白質活性，其抑制此基因的轉錄或轉譯，例如由於限制酵素增加量之存在能夠增加此生合成途徑的活性或活性速率。相對應地，藉由改質MP蛋白質活性使其持續地轉譯後去活化涉及研究的精細化學品分解途徑中的蛋白質或藉由改質

MP蛋白質活性使其持續性抑制此基因的轉錄或轉譯，由於降低化合物分解，能夠增加該精細化學品自細胞的產量及/或製造速率。

由於不同代謝途徑的連結，調控一或多個MP蛋白質之活性使其能夠間接刺激來自細胞之一或多種精細化學品之生產或改善製造效率。例如，藉由活化離胺酸生合成中的一或多種酵素表現增加產量、生產及/或製造效率能夠同時增加其他化合物如其他胺基酸(當需要較大量離胺酸時細胞通常需要較大量者)之表現。也能夠於整個細胞中改變代謝調控使得細胞於發酵培養的環境條件下(其中營養物及氧氣的供應可能不良及可能的毒性廢棄產物可能以大量存在於環境中)可具有改善的生長或複製。例如藉由突變一種MP蛋白質，其抑制回應於細胞外培養基中高濃度廢棄產物之細胞膜製造所需分子之合成(以便於次佳生長條件中阻擋細胞生長及細胞分裂)使得該蛋白質不再能夠抑制該合成，因此，即使生長條件為次佳，也能夠於培養中改善細胞的生長及繁殖。此增加的生長或此增加的存活力應同樣地增加來自發酵培養之研究精細化學品之產量及/或製造速率，由於培養中較大量製造此化合物之細胞。

上述基因突變MP蛋白質之策略，其應增加於麩胺酸棒狀桿菌中研究的精細化合物之產量，並非僅限於此；此等策略之變化對於熟練的工作者為相當明顯。於本文中皆述的此等策略及機制使得能夠利用本發明之核酸及蛋白質分子以便產生表現突變的MP核酸及蛋白質分子之麩胺酸棒狀

桿菌或相關細菌品種，以改善研究的化合物之產量、製造及/或生產效率。研究的化合物可為天然麩胺酸棒狀桿菌產物，其包含生合成途徑之最終產物及天然發生的代謝途徑之中間體以及於麩胺酸棒狀桿菌代謝中非天然發生但由本發明之麩胺酸棒狀桿菌品種產生的分子。

下列實例(不應將其視為限制性)進一步說明本發明。於本專利申請案中引述的所有參考資料、專利申請案、專利及公告的專利申請案之內容皆以參考資料併於本文中。

實例

實例1：由麩胺酸棒狀桿菌ATCC 13032製備全部基因組DNA

將麩胺酸棒狀桿菌(ATCC13032)於BHI培養基(Difco)中劇烈搖動於30℃培養隔夜。藉離心將細胞收集，將上層清液丟棄並將細胞重新懸浮於5 ml緩衝液I (5%原始培養體積-所有敘述的體積皆已對培養體積100 ml計算)。緩衝液I之組成份：140.34 g/l蔗糖，2.46 g/l $MgSO_4 \cdot 7H_2O$，10 ml/l KH_2PO_4溶液(100 g/l，用KOH調整至pH 6.7)，50 ml/l M12濃縮液(10 g/l $(NH_4)_2SO_4$, 1 g/l NaCl, 2 g/l $MgSO_4 \cdot 7H_2O$, 0.2 g/l $CaCl_2$, 0.5 g/l酵母菌萃取物(Difco), 10 ml/l微量元素混合物(200 mg/l $FeSO_4 \cdot H_2O$, 10 mg/l $ZnSO_4 \cdot 7H_2O$, 3 mg/l $MnCl_2 \cdot 4H_2O$, 30 mg/l H_3BO_3, 20 mg/l $CoCl_2 \cdot 6H_2O$, 1 mg/l $NiCl_2 \cdot 6H_2O$, 3 mg/l $Na_2MoO_4 \cdot 2H_2O$)，500 mg/l複合劑(EDTA或檸檬酸)，100 ml/l維生素混合物(0.2 ml/l生物素，0.2 mg/l葉酸，20 mg/l對胺基苯甲酸，20 mg/l核黃素，40 mg/l泛酸鈣，140 mg/l菸鹼酸，40 mg/l鹽酸吡哆醇，200 mg/l

肌醇(myoinositol))。將溶菌酶(lysozyme)以最終濃度2.5 mg/ml加至懸浮液。於37℃大約培養4小時後，細胞壁被分解並藉離心收集得到的原生質體(protoplast)。將沉澱以5 ml緩衝液I清洗一次，再以5 ml TE緩衝液(10 mM Tris-HCl, 1 mM EDTA, pH 8)清洗一次。將沉澱重新懸浮於4 ml TE緩衝液中，並將0.5 ml SDS溶液(10%)及0.5 ml NaCl溶液(5 M)加入。在以最終濃度200微克/ml加入蛋白酶K後，將懸浮液於37℃培養大約18小時。藉由標準方法將DNA經由以酚、酚/氯仿/異戊醇及氯仿/異戊醇萃取而純化。而後藉由加入1/50體積之3 M 醋酸鈉及2體積之乙醇，隨後於-20℃培養30分鐘及利用SS34轉子(Sorvall)於高速離心機中以12000 rpm離心30分鐘將DNA沉澱。將DNA溶解於含有20微克/ml RNase A的1 ml TE緩衝液中並對1000 ml TE緩衝液於4℃透析至少3小時。於此時期間將緩衝液更換3次。將0.4 ml 2M LiCl及0.8 ml乙醇加至0.4 ml透析後DNA溶液。於-20℃培養30分鐘後，藉離心(13000 rpm, Biofuge Fresco, Heraecus, Hanau, Germany)將DNA收集。將DNA沉澱溶解於TE緩衝液。能夠為各種目的使用藉此方法製備的DNA，包括南方轉漬分析(Southern blotting)及建立基因組資料庫。

實例2：於大腸桿菌中建立組麩胺酸棒狀桿菌(ATCC13032)基因庫

開始自如實例1中所述製備的DNA，將黏接質體(cosmid)及質體基因庫根據已知及已建立的方法製備(見例如Sambrook, J.等人(1989) "Molecular cloning:A Laboratory

Manual". Cold Spring Harbor Laboratory Press或Ausubel, F.M.等人(1994) "Current Protocols in Molecular Biology", John Wiley & Sons)。

能夠使用任何質體或黏接質體。特別較佳為利用質體pBR332(Sutcliffe, J.G.(1979)Proc. Natl. Acad. Sci. USA, 75: 3737-3741); pACYC177(Change & Cohen(1987)J. Bacteriol. 134:1141-1156);pBS系列質體(pBSSK+, pBSSK-及其他；Stratagene, La Jolla, USA)或黏接質體如SuperCos1 (Stratagene, La Jolla, USA)或Lorist6(Gibson, T.J. Rosenthal, A.,及Waterson, R.H.(1987)Gene 53:283- 286)。

實例3：DNA定序及功能電腦分析

根據標準方法使用實例2中說明的基因庫作為DNA定序，特別是利用AB1377定序儀之鏈終止法(見例如Fleischman, R.D. 等人(1995) "Whole-genome Random Sequencing and Assembly of Haemophilus Influenzae Rd.", Science 269:496-512)。使用具有下列核苷酸序列之定序引子：5'-GGAAACAGTATGACCATG-3'或5'-GTAAAACGACGGCCAGT-3'。

實例4：活體內基因突變

藉由將質體(或其他載體)DNA通過無法保持其基因資訊之完整性之大腸桿菌或其他微生物(如枯草桿菌(Bacillus spp.)或酵母菌如釀酒酵母)，可將麩胺酸棒狀桿菌之活體內基因突變實施。一般突變者品種含有突變於DNA修復系統之基因(如mutHLS, mutD, mutT等，比較見Rupp, W.D.

(1996)DNA repair mechanisms in Escherichia coli and Salmonella, 2277-2294頁, ASM: Washington)。此等品種對熟練的工作者為已知。此等品中之使用係說明於例如Greener, A.及Callahan, M.(1994) Strategies 7;32-34。

實例5：於大腸桿菌及麩胺酸棒狀桿菌之間的DNA轉移

多種棒狀桿菌及短桿菌品種含有內生質體(如例如pHM1519或pBL1)，其獨立地複製(回顧見例如Martin, J.F.等人(1987)Biotechnology 5:137-146)。藉由標準大腸桿菌載體可輕易地將大腸桿菌及麩胺酸棒狀桿菌之穿梭載體建立(Sambrook等人(1989) "Molecular cloning:A Laboratory Manual" Cold Spring Harbor Laboratory Press或Ausubel, F.M.等人(1994) "Current Protocols in Molecular Biology" John Wiley & Sons)，其中將麩胺酸棒狀桿菌之複製起點及適當的標記加入。此複製起點較佳採自由棒狀桿菌及短桿菌品種分離之內生質體。此等品種之特別有用的轉化標記為抗康黴素(Kanamycin)基因(如衍生自Tn5或Tn903轉位子(transposon)者)或抗氯黴素(chloramphenicol)基因(Winnacker, E.L.(1987) "From Genes to Clones-Introduction to Gene Technology", VCH, Winheim)。文獻中有許多實例製備大量重複穿梭載體，其可於大腸桿菌及麩胺酸棒狀桿菌中複製及可用於許多目的，包括基因的過度表現(見例如Yoshihama, M.等人(1985) J. Bacteriol. 162:591-597, Martin, J.F.等人(1987) Biotechnology, 5:137-146及Eikmanns,B.J.等人(1992) Gene 102:93-98)。

標準方法使得能夠轉殖研究的基因進入一種上述穿梭載體內及導入此雜交載體進入麩胺酸棒狀桿菌品種中。經由原生質體轉形系統(protoplast transformation)(Kastsumata, R.等人(1984)J. Bacteriol. 159, 306-311)、電穿孔(Liebl, E.等人(1989)FEMS Microbiol. Letters, 53:399-303)及在使用特定載體的情況中，也可經由接合(conjugation)(如說明於例如Schäfer, A.等人(1990)J. Bacteriol. 172:1663-1666)，可將麩胺酸棒狀桿菌轉化。同樣地，藉由自麩胺酸棒狀桿菌製備質體DNA能夠轉移麩胺酸棒狀桿菌的穿梭載體至大腸桿菌(藉由技藝中已知的標準方法)及將之轉化入大腸桿菌。利用標準方法可實施此轉化步驟，但較佳使用Mcr缺乏的大腸桿菌品種，如NM552(Gough & Murray(1983)J. Mol. Biol. 166:1-19)。

實例6：決定突變的蛋白質之表現

於轉化的宿主細胞中突變蛋白質活性之觀察係基於將突變的蛋白質以野生型蛋白質之類似方式及類似量表現之事實。決定突變基因之轉錄之適當方法(指示轉譯基因產物可得到的mRNA量)為實施北方轉漬分析(見例如Ausubel等人(1998) "Current Protocols in Molecular Biology" Wiley : New York)，用設計使得其結合至具有可偵測的(通常為放射性或化學發光的)標記之研究的基因之引子，使得當生物培養之全部RNA被萃取、於膠體上分離、轉移至穩定的基質及與此探針培養時，探針的結合及結合量代表該基因的存在以及mRNA的量。此資訊為突變的基因已被轉錄的程度

之指示。可將全部細胞RNA自麩胺酸棒狀桿菌由技藝中已知的不同方法分離，如說明於Bormann, E.R.等人(1992)Mol. Microbiol. 6:317 -326。

藉由利用標準技術如西方轉漬分析(見例如Ausubel等人(1998) "Current Protocols in Molecular Biology" Wiley:New York)，可決定由該mRNA轉譯的蛋白質之存在或相對量。於此方法中，將全部細胞蛋白質萃取、藉膠體電泳分離、轉移至基質如硝化纖維及與探針培養，例如專一地結合至研究的蛋白質之抗體。通常探針具有化學發光或呈色標記，可將其輕易地偵測。標記之存在及觀察到的量代表細胞中理想突變的蛋白質之存在及量。

實例7：基因改質的麩胺酸棒狀桿菌之生長-培養基及培養條件

將基因改質的棒狀桿菌培養於合成或天然的生長培養基中。許多棒狀桿菌的不同生長培養基為已知及可輕易地取得(Lieb等人(1989)Appl. Microbiol. Biotechnol. 32:205-210; von der Osten等人(1998)Biotechnology Letters 11:11-16;德國專利4 120 867; Liebl(1992) "The Genus Corynebacterium" 於：The Procaryotes第二冊，Balows, A.編Springer-Verlag)。此等培養基包含一或多個碳源、氮源、無機鹽、維生素及微量元素。較佳的碳源為醣類如單、雙或多醣。非常好的碳源之實例為葡萄糖、果糖、甘露糖、半乳糖、核糖、山梨糖、核酮糖、乳糖、麥芽糖、蔗糖、棉子糖、澱粉及纖維素。也可將糖類經由複合化合物加至培養基如糖蜜或來

自糖精製之其他副產物。也可為較佳加入不同碳源之混合物。其他可能的碳源為醇類及有機酸，如甲醇、乙醇、醋酸或乳酸。氮源通常為有機或無機氮化合物或含有此等化合物之材料。氮源之實例包括氨氣及銨鹽如NH_4Cl或$(NH_4)_2SO_4$、NH_4OH、硝酸鹽、尿素、胺基酸及複合氮源如玉米漿、黃豆粉、黃豆蛋白質、酵母菌萃取、肉萃取及其他。

可存在於培養基中的無機鹽化合物包括鈣、鎂、鈉、鈷、鉬、鉀、錳、鋅、銅及鐵的氯化物、磷或硫酸鹽。可將螯合劑加至培養基以便保持金屬離子於溶液中。特別適當的螯合劑包括二羥基酚類如苯鄰二酚(catechol)或原兒茶酸(protocatechuate)及有機酸如檸檬酸。培養基通常也含有其他生長因子如維生素或生長促進劑，其實例包括生物素、核黃素、硫胺、葉酸、菸鹼酸、泛酸及吡哆醇。生長因子及鹽類常來自複雜的培養基成分如酵母萃取物、糖蜜、玉米漿等。培養基的確實組成份強烈視特定實驗而定及個別視各情況而決定。培養基的最佳化之資訊可見於教科書"Applied Microbiol. Physiology, A Practical Approach"(編者P.M. Rhodes, P.F. Stanbury, IRL Press(1997)53-73頁, ISBN 0 19963577 3)。生長培養基也可得自市售供應商，例如標準1(Merck)或腦心浸出液(BHI, brain-heart infusion, DIFCO)等。

將所有培養基成分滅菌，藉由加熱(於1.5巴(bar)及121℃下20分鐘)或藉由無菌過濾。可將成分一起或視需要分開滅

菌。所有培養基成分可於培養一開始即存在或視需要連續或批次地加入。

培養條件對各實驗分別地限定。溫度應為15℃及45℃之間及可保持固定或可於實驗期間改變。培養基的pH應於5至8.5之範圍內，較佳約7.0，及可由加入緩衝液至培養機而保持。為此目的之緩衝液的實例為磷酸鉀緩衝液。可擇一或同時使用合成的緩衝液如MOPS、HEPES、ACES等。加入NaOH或NH_4OH也可於培養期間保持pH固定。若使用複雜培養基成分如酵母菌萃取物，額外緩衝液的需要減少，因為許多複合化合物具有高緩衝能力。在利用發酵槽做培養微生物的情況中，利用氨氣也可調控pH。

培養期間通常為數小時至數天之範圍內。選擇此時間使得產物的最大量累積於培養液中。可將揭示的生長實驗實施於多個容器中如微量滴定盤、玻璃試管、玻璃瓶或不同大小之玻璃或金屬發酵槽。為了篩選大量生殖系，應將微生物生長於微量滴定盤、玻璃試管或具有或不具有檔板的搖動瓶。較佳為利用100毫升搖動瓶，將其填入10%(基於體積)所需的生長培養基。應將瓶子於迴轉式振盪器(Orbital Shaker)(振幅25 mm)上以速度100-300 rpm之範圍搖動。由於蒸發之損失可由保持潮濕的大氣而減少；或者，應將由於蒸發的損失數學上校正。

若觀察基因改質的生殖系，也應分析未改質的控制組生殖系或含有無插入之基本質體的控制組生殖系。將培養基接種至OD_{600}為0.5-1.5，使用的細胞為已生長於瓊脂盤如

CM盤(10 g/l葡萄糖，2.5 g/l NaCl，2 g/l尿素，10 g/l聚蛋白 (Polypeptone)，5 g/l酵母菌萃取物，5 g/l肉萃取物，22 g/l瓊脂用2 M NaOH調pH 6.8)於30℃培養。藉由自CM盤導入麩胺酸棒狀桿菌細胞的鹽水溶液或藉由加入該細菌的液體預培養而將培養基接種。

實例8：試管中分析突變的蛋白質之功能

酵素的之活性及動力學之決定為技藝中已熟知。用來決定特定經改質的酵素之活性的實驗必需適合野生型酵素之特定活性，及此為熟練的工作者之能力範圍內。關於酵素一般以及關於結構、動力學、原理、方法、應用及決定許多酵素活性之實例等特定細節之概要可見於例如下列參考資料：Dixon, M.,及Webb, E.C.(1979)Enzymes, Longmans, London; Fersht(1985)Enzyme Structure and Mechanism, Freeman, New York; Walsh(1979)Enzymatic Reaction Mechanisms. Freeman, San Francisco; Price, N.C., Stevens, L.(1982)Fundamentals of Enzymology. Oxford Univ. Press: Oxford; Boyer, P.D編(1983)The Enzymes, 第3版，Academic Press, New York; Bisswanger, H.(1994)Enzymkinetik, 第2版VCH, Weinheim (ISBN 3527300325); Bergmeyer, H.U., Bergmeyer, J., Grabl, M. 編 (1983-1986)Methods of Enzymatic Analysis第3版I-XII冊, Verlag Chemie:Weinheim; 及Ullmann's Encyclopedia of Industrial Chemistry(1987), A9冊，"Enzymes", VCH, Weinheim, 352-363頁。

蛋白質結合至DNA之活性可由許多已建立的方法測量，

如DNA條帶轉移(BandShift)分析法(其也稱為凝膠阻滯分析(gel retardation assay))。此等蛋白質於其他分子表現上的作用可利用報導者基因分析法測量(如說明於Kolmar, H.等人(1995)EMBO J. 14:3895-3904及其中的參考資料)。報導者基因分析法系統為已熟知及建立運用於原核及真核細胞中，使用酵素如β-半乳糖苷酶、綠螢光蛋白質及數種其他酵素。

根據說明於Gennis, R.B.(1989) "Pores, Channels and Transporters"，於Biomembranes, Molecular Structure and Function, Springer:Heidelberg, 85-137頁；199-234頁及270-322頁，可決定膜傳送蛋白質之活性。

實例9：分析突變的蛋白質對研究的產物之製造的影響

於麩胺酸棒狀桿菌中基因改質對研究的化合物(如胺基酸)製造之影響可藉於適當條件下(如上述者)生長經改質的微生物及測試培養基及/或細胞成分看研究的產物之增加的製造而決定。此分析技術對熟練的工作者為已熟知，包括光譜學、薄層層析法、不同種類之染色方法、酵素及微生物方法及分析層析法如高效液體層析法(見例如Ullmann's Encyclopedia of Industrial Chemistry, A2冊，89-90頁及443-613頁，VCH:Weinheim(1985); Fallon, A.等人(1987) "Applications of HPLC in Biochemistry"於：Laboratory Techniques in Biochemistry and Molecular Biology, 第17冊；Rehm等人(1993)Biotechnology, 第3冊第III章："Product recovery and purification" 469-714頁，

VCH:Weinheim; Belter, P.A. 等人 (1988)Bioseparations: downstream processing for Biotechnology, John Wiley and Sons; Kennedy, J.F. 及 Cabral, J.M.S.(1992)Recovery processes for biological Materials, John Wiley and Sons; Shaeiwitz, J.A.及Henry, J.D.(1988) Biochemical Separations, 於Ullmann's Encyclopedia of Industrial Chemistry, B3冊，11章，1-27頁，VCH: Weinheim；及 Dechow, F.J.(1989) Separation and purification techniques in biotechnology, Noyes Publications)。

除了測量發酵的最終產物，同樣能夠分析代謝途徑之其他成分，使用其來製造研究的化合物，如中間體及副產物，以便決定生物之整體生產力、化合物之產量及/或製造效率。分析方法包括測量培養基中營養物的量(例如糖、碳氫化合物、氮源、磷酸鹽及其他離子)、測量生物量組合物及生長、分析由生合成途徑共同代謝物之製造及測量發酵期間產生的氣體。此等測量之標準方法係說明於Applied Microbial Physiology; A Practical Approach, P.M. Rhodes及P.F. Stanbury編IRL Press, 103-129頁、131-163頁及165-192頁(ISBN:0199635773)及其中的參考資料。

實例10：由麩胺酸棒狀桿菌培養純化研究的產物

藉由技藝中已知的不同方法由麩胺酸棒狀桿菌細胞或由上述培養的上層清液可得到研究的產物。若研究的產物不被細胞分泌，藉由慢速離心可將細胞由培養收集，藉標準技術如機械力或超音波可將細胞溶解。藉離心將細胞碎片

去除並得到含有可溶性蛋白質的上層清液部分做研究的化合物之進一步純化。若產物被麩胺酸棒狀桿菌細胞分泌，藉由慢速離心將細胞去除及將上層清液部分保留做進一步純化。

將來自兩種純化方法的上層清液部分利用適當樹脂經過層析，研究的分子留在層析樹脂上而許多樣品中的污染物不留在樹脂上，亦或污染物留在樹脂上而樣品不留在樹脂上。視需要，可將此等層析步驟利用相同或不同層析樹脂重複數次。熟練的工作者熟悉適當層析樹脂之選擇及最有效運用於欲純化的特定分子。藉由過濾或超過濾可將純化的產物濃縮及儲存於產物穩定性最高的溫度。

於技藝中，許多純化方法為已知，不限於上述純化方法，其說明於例如 Bailey, J.E. & Ollis, D.F. Biochemical Engineering Fundamentals, McGraw-Hill: New York (1986)。

藉由技藝之標準技術可決定分離的化合物之身分及純度。此等技術包括高效液體層析(HPLC, high performance liquid chromatography)、光譜方法、著色法、薄層層析、NIRS、酵素分析或微生物分析。此等分析法係遵照於：Patek 等人 (1994)Appl. Environ. Microbiol. 60:133-140; Malakhova等人(1996)Biotekhnologiya 11:27-32;；及Schmidt 等人 (1998)Bioprocess Engineer. 19:67-70; Ullmann's Encyclopedia of Industrial Chemistry(1996), A27冊 VCH: Weinheim, 89-90頁，521-540頁，540-547頁，559-566頁，575-581 頁及 581-587 頁；Michal, G.(1999)Biochemical

Pathways: An Atlas of Biochemistry and Molecular Biology, John Wiley and Sons; Fallon, A.等人(1987)Application of HPLC in Biochemistry in: Laboratory Techniques in Biochemistry and Molecular Biology, 17冊。

相等件

藉由利用簡單例行方法，熟練的工作者知道或可確認本發明明確具體實施例之大量相等件。應將此等相等件包含於下述專利申請範圍內。

應將表1及表2中的資訊了解如下：

於第1行，「DNA ID」，有關的數字於各例中意指隨附的序列表之SEQ ID NO。因此，於「DNA ID」行中的「5」意指SEQ ID NO:5。

於第2行，「AA ID」，有關的數字於各例中意指隨附的序列表之SEQ ID NO。因此，於「AA ID」行中的「6」意指SEQ ID NO:6。

於第3行，「確認」，列出各序列之清楚內部名稱。

於第4行，「AA位置」，有關的數字於各例中意指於相同排中「AA ID」多肽序列之胺基酸位置。因此，於「AA位置」行中的「26」為對應指出的多肽序列之胺基酸位置26。位置計算係自N端以+1開始。

於第5行，「AA野生型」，有關的字母於各例中意指於相對應的野生型品種中於第4行中指示的位置處之胺基酸，其以一個字母碼呈現。

於第6行，「AA突變體」，有關的字母於各例中意指於相

對應的突變體品種中於第4行中指示的位置處之胺基酸，其以一個字母碼呈現。

於第7行，「功能」，列出相對應的多肽序列之生理功能。

第4、5及6行說明對於具有特定功能(第7行)及特定起始胺基酸序列(第2行)之MP蛋白質的至少一個突變，於一些序列的情況中也有數個突變。該數個突變永遠意指最接近起始胺基酸序列，於各例中列於最頂端(第2行)。特定胺基酸序列之用詞「至少一個胺基酸位置」較佳意指於第4、5及6行說明的此胺基酸序列之至少一個突變。

蛋白質形成的胺基酸之一個字母碼：

A丙胺酸

C半胱胺酸

D天門冬胺酸

E麩胺酸

F苯丙胺酸

G甘胺酸

H組胺酸

I異白胺酸

K離胺酸

L白胺酸

M甲硫胺酸

N天門冬醯胺酸

P脯胺酸

Q麩醯胺酸

R精胺酸

S絲胺酸

T羥丁胺酸

V纈胺酸

W色胺酸

Y酪胺酸

序列表

<110> 德商巴地斯顏料化工廠

<120> 用於編碼精細化學品之代謝途徑之蛋白質之基因變異物

<140> TW 093138481

<141> 2004-12-10

<150> DE 10359661.5
<151> 2003-12-18

<160> 142

<210> 1
<211> 1848

<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1848)
<223> RXA00149K

<400> 1

```
ttg act gat ctc aca aag act gcg gtg ccc gag gaa ctt tca gag aac   48
Met Thr Asp Leu Thr Lys Thr Ala Val Pro Glu Glu Leu Ser Glu Asn
  1               5                  10                  15

ctc gaa act tgg tac aag gct gtg gcc ggt gtt ttc gcg cgc aca cag   96
Leu Glu Thr Trp Tyr Lys Ala Val Ala Gly Val Phe Ala Arg Thr Gln
             20                  25                  30

aaa aaa gac atc ggc gac att gcc gta gat gtg tgg aag aaa ctc atc   144
Lys Lys Asp Ile Gly Asp Ile Ala Val Asp Val Trp Lys Lys Leu Ile
         35                  40                  45

gtc act aca ccg gat ggt gtt gat atc aat ccg ctg tac acc aga gca   192
Val Thr Thr Pro Asp Gly Val Asp Ile Asn Pro Leu Tyr Thr Arg Ala
     50                  55                  60

gat gag tcc cag agg aaa ttc act gag gtt cct ggt gag ttt ccc ttc   240
Asp Glu Ser Gln Arg Lys Phe Thr Glu Val Pro Gly Glu Phe Pro Phe
 65                  70                  75                  80

act agg gga acc act gtt gat ggt gaa cgc gtt ggt tgg ggt gtt act   288
Thr Arg Gly Thr Thr Val Asp Gly Glu Arg Val Gly Trp Gly Val Thr
                 85                  90                  95

gag act ttc gga cat gac agc ccg aag aat atc aac gct gcg gtg ctg   336
Glu Thr Phe Gly His Asp Ser Pro Lys Asn Ile Asn Ala Ala Val Leu
            100                 105                 110

aat gct ctg aat tct ggc acc acc aca ttg ggt ttt gag ttc tct gag   384
Asn Ala Leu Asn Ser Gly Thr Thr Thr Leu Gly Phe Glu Phe Ser Glu
        115                 120                 125
```

```
gaa ttc acg gca gct gat ctt aaa gtt gct ctc gaa ggc gtg tat ctc   432
Glu Phe Thr Ala Ala Asp Leu Lys Val Ala Leu Glu Gly Val Tyr Leu
    130                 135                 140

aac atg gct ccg ttg ctg att cat gcg ggt gga tcc acg tca gag gtt   480
Asn Met Ala Pro Leu Leu Ile His Ala Gly Gly Ser Thr Ser Glu Val
145                 150                 155                 160

gca gcg gcg ttg tat acg ttg gcg gag gaa gcc gga acg ttt ttt gct   528
Ala Ala Ala Leu Tyr Thr Leu Ala Glu Glu Ala Gly Thr Phe Phe Ala
                165                 170                 175

gcg ttg acc ttg ggt tct cgt cct ttg acg gcg cag gtt gat ggt tcg   576
Ala Leu Thr Leu Gly Ser Arg Pro Leu Thr Ala Gln Val Asp Gly Ser
            180                 185                 190

cac agt gac acc att gaa gaa gca gtt cag ttg gca gtg aat gct tcc   624
His Ser Asp Thr Ile Glu Glu Ala Val Gln Leu Ala Val Asn Ala Ser
        195                 200                 205

aag cgt gcg aat gtg cgc gct atc ttg gtg gat ggt tcc agt ttt tcc   672
Lys Arg Ala Asn Val Arg Ala Ile Leu Val Asp Gly Ser Ser Phe Ser
    210                 215                 220

aac cag ggc gcg tcg gat gct caa gaa att ggt cta agt atc gcc gcc   720
Asn Gln Gly Ala Ser Asp Ala Gln Glu Ile Gly Leu Ser Ile Ala Ala
225                 230                 235                 240

ggt gtg gat tat gtc cgt cgc ttg gtc gat gca ggc ctt tcc acg gaa   768
Gly Val Asp Tyr Val Arg Arg Leu Val Asp Ala Gly Leu Ser Thr Glu
                245                 250                 255

gct gca ctt aag cag gtg gcg ttc cgt ttt gcg gtc acc gat gag cag   816
Ala Ala Leu Lys Gln Val Ala Phe Arg Phe Ala Val Thr Asp Glu Gln
            260                 265                 270

ttc gcg cag att tct aag ctg cgt gtg gct cga cgt ctg tgg gcc agg   864
Phe Ala Gln Ile Ser Lys Leu Arg Val Ala Arg Arg Leu Trp Ala Arg
        275                 280                 285

gtg tgt gag gtg ctt ggt ttt cca gag ctg gcc gta gca cca cag cat   912
Val Cys Glu Val Leu Gly Phe Pro Glu Leu Ala Val Ala Pro Gln His
    290                 295                 300

gcg gtg act gca cga gcg atg ttt agc cag cgt gat ccg tgg gtg aat   960
Ala Val Thr Ala Arg Ala Met Phe Ser Gln Arg Asp Pro Trp Val Asn
305                 310                 315                 320

atg ctg cgc agt act gtt gca gct ttc gct gca ggc gtc ggt gga gca  1008
Met Leu Arg Ser Thr Val Ala Ala Phe Ala Ala Gly Val Gly Gly Ala
                325                 330                 335

acc gat gtg gag gtt cgt act ttt gat gat gcg atc cca gat gga gtt  1056
Thr Asp Val Glu Val Arg Thr Phe Asp Asp Ala Ile Pro Asp Gly Val
            340                 345                 350

cct gga gtg tcg agg aat ttc gct cac cgc atc gcg cgc aat act aat  1104
Pro Gly Val Ser Arg Asn Phe Ala His Arg Ile Ala Arg Asn Thr Asn
```

```
        355                 360                 365

ttg ttg ttg cta gaa gag tca cat ctt ggt cac gtg gtt gat cct gct   1152
Leu Leu Leu Leu Glu Glu Ser His Leu Gly His Val Val Asp Pro Ala
    370                 375                 380

ggt gga tca tat ttc gtg gag agc ttc acc gat gat cta gcg gag aag   1200
Gly Gly Ser Tyr Phe Val Glu Ser Phe Thr Asp Asp Leu Ala Glu Lys
385                 390                 395                 400

gcg tgg gct gtg ttc agt ggc atc gaa gct gag ggc gga tac agt gca   1248
Ala Trp Ala Val Phe Ser Gly Ile Glu Ala Glu Gly Gly Tyr Ser Ala
                405                 410                 415

gct tgt gca tcc ggc acg gtg act gcc atg ctt gat cag acg tgg gag   1296
Ala Cys Ala Ser Gly Thr Val Thr Ala Met Leu Asp Gln Thr Trp Glu
            420                 425                 430

cag act cgc gct gat gtg gcg tcg aga aag aag aag ctc act gga att   1344
Gln Thr Arg Ala Asp Val Ala Ser Arg Lys Lys Lys Leu Thr Gly Ile
        435                 440                 445

aat gag ttc ccg aac ttg gcg gag tct ccg ctg cca gct gat cgt cgg   1392
Asn Glu Phe Pro Asn Leu Ala Glu Ser Pro Leu Pro Ala Asp Arg Arg
    450                 455                 460

gta gaa cct gca ggt gtg cgt cga tgg gca gcg gat ttt gaa gcg ctg   1440
Val Glu Pro Ala Gly Val Arg Arg Trp Ala Ala Asp Phe Glu Ala Leu
465                 470                 475                 480

cgc aat cgt tcg gat gct ttc ttg gaa aag aac ggc gcg agg cca cag   1488
Arg Asn Arg Ser Asp Ala Phe Leu Glu Lys Asn Gly Ala Arg Pro Gln
                485                 490                 495

atc acg atg att cct ctg gga ccg ttg tcc aag cac aat att cgc act   1536
Ile Thr Met Ile Pro Leu Gly Pro Leu Ser Lys His Asn Ile Arg Thr
            500                 505                 510

ggt ttt act tcc aac ctg ttg gct tcc ggt ggc att gaa gca atc aac   1584
Gly Phe Thr Ser Asn Leu Leu Ala Ser Gly Gly Ile Glu Ala Ile Asn
        515                 520                 525

ccg ggt caa ctt gtt ccc ggc act gac gct ttt gca gaa gct gca cag   1632
Pro Gly Gln Leu Val Pro Gly Thr Asp Ala Phe Ala Glu Ala Ala Gln
    530                 535                 540

gcc gca ggc att gta gtg gtg tgt gga acg gac caa gag tat gcc gaa   1680
Ala Ala Gly Ile Val Val Val Cys Gly Thr Asp Gln Glu Tyr Ala Glu
545                 550                 555                 560

acg ggg gag gga gcc gtc gaa aag ctc cgc gaa gcg ggc gtt gag cgc   1728
Thr Gly Glu Gly Ala Val Glu Lys Leu Arg Glu Ala Gly Val Glu Arg
                565                 570                 575

atc ctg ctt gct ggc gcg ccg aag agc ttt gag ggc agc gcg cat gcg   1776
Ile Leu Leu Ala Gly Ala Pro Lys Ser Phe Glu Gly Ser Ala His Ala
            580                 585                 590

ccc gat ggt tat ttg aac atg aca att gat gcc gcg gcg acg ctg gct   1824
```

```
Pro Asp Gly Tyr Leu Asn Met Thr Ile Asp Ala Ala Ala Thr Leu Ala
        595                 600                 605

gac ctg cta gat gct ttg gga gct                                    1848
Asp Leu Leu Asp Ala Leu Gly Ala
    610                 615
```

<210> 2
<211> 616
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 2

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Met Thr Asp Leu Thr Lys Thr Ala Val Pro Glu Glu Leu Ser Glu Asn
  1               5                  10                  15

Leu Glu Thr Trp Tyr Lys Ala Val Ala Gly Val Phe Ala Arg Thr Gln
             20                  25                  30

Lys Lys Asp Ile Gly Asp Ile Ala Val Asp Val Trp Lys Lys Leu Ile
         35                  40                  45

Val Thr Thr Pro Asp Gly Val Asp Ile Asn Pro Leu Tyr Thr Arg Ala
     50                  55                  60

Asp Glu Ser Gln Arg Lys Phe Thr Glu Val Pro Gly Glu Phe Pro Phe
 65                  70                  75                  80

Thr Arg Gly Thr Thr Val Asp Gly Glu Arg Val Gly Trp Gly Val Thr
                 85                  90                  95

Glu Thr Phe Gly His Asp Ser Pro Lys Asn Ile Asn Ala Ala Val Leu
            100                 105                 110

Asn Ala Leu Asn Ser Gly Thr Thr Thr Leu Gly Phe Glu Phe Ser Glu
        115                 120                 125

Glu Phe Thr Ala Ala Asp Leu Lys Val Ala Leu Glu Gly Val Tyr Leu
    130                 135                 140

Asn Met Ala Pro Leu Leu Ile His Ala Gly Gly Ser Thr Ser Glu Val
145                 150                 155                 160

Ala Ala Ala Leu Tyr Thr Leu Ala Glu Glu Ala Gly Thr Phe Phe Ala
                165                 170                 175

Ala Leu Thr Leu Gly Ser Arg Pro Leu Thr Ala Gln Val Asp Gly Ser
            180                 185                 190

His Ser Asp Thr Ile Glu Glu Ala Val Gln Leu Ala Val Asn Ala Ser
        195                 200                 205

Lys Arg Ala Asn Val Arg Ala Ile Leu Val Asp Gly Ser Ser Phe Ser
    210                 215                 220

Asn Gln Gly Ala Ser Asp Ala Gln Glu Ile Gly Leu Ser Ile Ala Ala
225                 230                 235                 240
```

```
Gly Val Asp Tyr Val Arg Arg Leu Val Asp Ala Gly Leu Ser Thr Glu
                245                 250                 255

Ala Ala Leu Lys Gln Val Ala Phe Arg Phe Ala Val Thr Asp Glu Gln
            260                 265                 270

Phe Ala Gln Ile Ser Lys Leu Arg Val Ala Arg Arg Leu Trp Ala Arg
        275                 280                 285

Val Cys Glu Val Leu Gly Phe Pro Glu Leu Ala Val Ala Pro Gln His
    290                 295                 300

Ala Val Thr Ala Arg Ala Met Phe Ser Gln Arg Asp Pro Trp Val Asn
305                 310                 315                 320

Met Leu Arg Ser Thr Val Ala Ala Phe Ala Ala Gly Val Gly Gly Ala
                325                 330                 335

Thr Asp Val Glu Val Arg Thr Phe Asp Asp Ala Ile Pro Asp Gly Val
            340                 345                 350

Pro Gly Val Ser Arg Asn Phe Ala His Arg Ile Ala Arg Asn Thr Asn
        355                 360                 365

Leu Leu Leu Leu Glu Glu Ser His Leu Gly His Val Val Asp Pro Ala
    370                 375                 380

Gly Gly Ser Tyr Phe Val Glu Ser Phe Thr Asp Asp Leu Ala Glu Lys
385                 390                 395                 400

Ala Trp Ala Val Phe Ser Gly Ile Glu Ala Glu Gly Gly Tyr Ser Ala
                405                 410                 415

Ala Cys Ala Ser Gly Thr Val Thr Ala Met Leu Asp Gln Thr Trp Glu
            420                 425                 430

Gln Thr Arg Ala Asp Val Ala Ser Arg Lys Lys Lys Leu Thr Gly Ile
        435                 440                 445

Asn Glu Phe Pro Asn Leu Ala Glu Ser Pro Leu Pro Ala Asp Arg Arg
    450                 455                 460

Val Glu Pro Ala Gly Val Arg Arg Trp Ala Ala Asp Phe Glu Ala Leu
465                 470                 475                 480

Arg Asn Arg Ser Asp Ala Phe Leu Glu Lys Asn Gly Ala Arg Pro Gln
                485                 490                 495

Ile Thr Met Ile Pro Leu Gly Pro Leu Ser Lys His Asn Ile Arg Thr
            500                 505                 510

Gly Phe Thr Ser Asn Leu Leu Ala Ser Gly Gly Ile Glu Ala Ile Asn
        515                 520                 525

Pro Gly Gln Leu Val Pro Gly Thr Asp Ala Phe Ala Glu Ala Ala Gln
    530                 535                 540

Ala Ala Gly Ile Val Val Val Cys Gly Thr Asp Gln Glu Tyr Ala Glu
```

```
545                 550                 555                 560

Thr Gly Glu Gly Ala Val Glu Lys Leu Arg Glu Ala Gly Val Glu Arg
                565                 570                 575

Ile Leu Leu Ala Gly Ala Pro Lys Ser Phe Glu Gly Ser Ala His Ala
            580                 585                 590

Pro Asp Gly Tyr Leu Asn Met Thr Ile Asp Ala Ala Ala Thr Leu Ala
        595                 600                 605

Asp Leu Leu Asp Ala Leu Gly Ala
    610                 615
```

<210> 3
<211> 1890
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1890)
<223> RXA00157E

<400> 3

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gtg gcc aat cta gat tca gtt cgc cct ggg gtg cgg gca gct ctt cga   48
Met Ala Asn Leu Asp Ser Val Arg Pro Gly Val Arg Ala Ala Leu Arg
  1               5                  10                  15

cgt acc cat acc cag gta aaa ggt gtc acg ttg acc agg gcg ttg att   96
Arg Thr His Thr Gln Val Lys Gly Val Thr Leu Thr Arg Ala Leu Ile
             20                  25                  30

gcg ctt gca gta agc gga gct ttg ctt agt tcc atg act ccg gcg gtg   144
Ala Leu Ala Val Ser Gly Ala Leu Leu Ser Ser Met Thr Pro Ala Val
         35                  40                  45

gcg cag cca cag aat ccg gat gac gca gcc att gca cag gca gag gaa   192
Ala Gln Pro Gln Asn Pro Asp Asp Ala Ala Ile Ala Gln Ala Glu Glu
     50                  55                  60

aat gtt tcg gcg ggc gat ggg gaa gtc gcc cgc ctg gca gga tct ttg   240
Asn Val Ser Ala Gly Asp Gly Glu Val Ala Arg Leu Ala Gly Ser Leu
 65                  70                  75                  80

tcc agc act gac gcg gaa att aac cgc gtc gag ctg gaa atg ggt gct   288
Ser Ser Thr Asp Ala Glu Ile Asn Arg Val Glu Leu Glu Met Gly Ala
                 85                  90                  95

ctg cgt gaa gaa gtg aac aag tcc ctc gtg gat ttg cat gat gcg cag   336
Leu Arg Glu Glu Val Asn Lys Ser Leu Val Asp Leu His Asp Ala Gln
            100                 105                 110

gca atc gcc gag cag gcc cgc caa gat gca ctt gca gcc aag aag gat   384
Ala Ile Ala Glu Gln Ala Arg Gln Asp Ala Leu Ala Ala Lys Lys Asp
        115                 120                 125

ctc gat gat tct caa gcg cag atc gaa gca gcc caa gag cgc ctt gat   432
```

```
Leu Asp Asp Ser Gln Ala Gln Ile Glu Ala Ala Gln Glu Arg Leu Asp
    130                 135                 140

gag att tca cgt gca gcg tat cgc caa aac gga acc tcc aag ggg ctt   480
Glu Ile Ser Arg Ala Ala Tyr Arg Gln Asn Gly Thr Ser Lys Gly Leu
145                 150                 155                 160

tca ggc atc tcg ggc aat gga aat tct gaa gat gcg cta gat cgt cag   528
Ser Gly Ile Ser Gly Asn Gly Asn Ser Glu Asp Ala Leu Asp Arg Gln
                165                 170                 175

act tac ctg cga acc agt gcg gaa aag cag cag gca gct gtt gaa gag   576
Thr Tyr Leu Arg Thr Ser Ala Glu Lys Gln Gln Ala Ala Val Glu Glu
            180                 185                 190

ctt gat cgc ctc cgt acg gaa aac gcc aac aag gaa tcg gtg ttg cgc   624
Leu Asp Arg Leu Arg Thr Glu Asn Ala Asn Lys Glu Ser Val Leu Arg
        195                 200                 205

cag gcc cgc atc gtt gct gag cag cgt gag gcg gaa gcc gtc gaa aag   672
Gln Ala Arg Ile Val Ala Glu Gln Arg Glu Ala Glu Ala Val Glu Lys
    210                 215                 220

caa gtc cag acc gag gct gca att gcc gca aac agc gag cag ctc aat   720
Gln Val Gln Thr Glu Ala Ala Ile Ala Ala Asn Ser Glu Gln Leu Asn
225                 230                 235                 240

gtc ttg act aac aat cgc agt acc ttg gtt gcc cag cgt gat ggg gct   768
Val Leu Thr Asn Asn Arg Ser Thr Leu Val Ala Gln Arg Asp Gly Ala
                245                 250                 255

gag cgc aac ttg gcc atc gct cgt gcg cag gcg gat aat ctg caa ggt   816
Glu Arg Asn Leu Ala Ile Ala Arg Ala Gln Ala Asp Asn Leu Gln Gly
            260                 265                 270

cag cgt gct gag tac gag gaa ttc cag cag gca gag cag gct cgc atc   864
Gln Arg Ala Glu Tyr Glu Glu Phe Gln Gln Ala Glu Gln Ala Arg Ile
        275                 280                 285

cag gcg gaa gcg gaa gct cag gct gct gcg gag gag aag cgt cgt gcc   912
Gln Ala Glu Ala Glu Ala Gln Ala Ala Ala Glu Glu Lys Arg Arg Ala
    290                 295                 300

gat gag gct gct gca cag gca gcc gct gaa gct caa gaa gct gcc cag   960
Asp Glu Ala Ala Ala Gln Ala Ala Ala Glu Ala Gln Glu Ala Ala Gln
305                 310                 315                 320

caa gct cag gcg gcg gag gaa gcc caa gcc gcg caa gca gct gag aca  1008
Gln Ala Gln Ala Ala Glu Glu Ala Gln Ala Ala Gln Ala Ala Glu Thr
                325                 330                 335

gca caa gcc caa gcc gcg caa gct gcg gaa acc caa gct gca caa gcc  1056
Ala Gln Ala Gln Ala Ala Gln Ala Ala Glu Thr Gln Ala Ala Gln Ala
            340                 345                 350

gcg caa gct cag gca gaa gcg aat gat cgt gcc gcc gcg caa cag cgt  1104
Ala Gln Ala Gln Ala Glu Ala Asn Asp Arg Ala Ala Ala Gln Gln Arg
        355                 360                 365
```

```
gct gca gag gct caa gca gca gcg gaa cag gcg caa cgt gag gct gac   1152
Ala Ala Glu Ala Gln Ala Ala Ala Glu Gln Ala Gln Arg Glu Ala Asp
    370                 375                 380

gct cag gcg gcc aac gat gcc caa gct cag gca ctg cgt gaa cag gcg   1200
Ala Gln Ala Ala Asn Asp Ala Gln Ala Gln Ala Leu Arg Glu Gln Ala
385                 390                 395                 400

ctc acc gca gcc tcc atc gct gcg gct gct cta att gcg gcg agc cag   1248
Leu Thr Ala Ala Ser Ile Ala Ala Ala Ala Leu Ile Ala Ala Ser Gln
                405                 410                 415

tcc agc cat gcc act act caa aat cct tac cca act gat gaa gac gcg   1296
Ser Ser His Ala Thr Thr Gln Asn Pro Tyr Pro Thr Asp Glu Asp Ala
            420                 425                 430

gat ccg acc gat att gcg gac atc caa ggc cca acg cag cca ggt acg   1344
Asp Pro Thr Asp Ile Ala Asp Ile Gln Gly Pro Thr Gln Pro Gly Thr
        435                 440                 445

ggt gag tct gga gat tcc cag agc aac tcc agc gac aac gat tcc aca   1392
Gly Glu Ser Gly Asp Ser Gln Ser Asn Ser Ser Asp Asn Asp Ser Thr
    450                 455                 460

ggc aac gat tcc aca ggc tct gac tct tca gat tca gat tcc tcc ggc   1440
Gly Asn Asp Ser Thr Gly Ser Asp Ser Ser Asp Ser Asp Ser Ser Gly
465                 470                 475                 480

aac gat tct tca gag gtt att tcc ggc gat cgt tcc gct cag att gag   1488
Asn Asp Ser Ser Glu Val Ile Ser Gly Asp Arg Ser Ala Gln Ile Glu
                485                 490                 495

act gtg att gcg cgc gcc atg agc cag ttg ggt gtg cag tac gca tgg   1536
Thr Val Ile Ala Arg Ala Met Ser Gln Leu Gly Val Gln Tyr Ala Trp
            500                 505                 510

ggt ggc ggt aac gct aat ggc cca act ctg ggt atc cgt gac ggt ggc   1584
Gly Gly Gly Asn Ala Asn Gly Pro Thr Leu Gly Ile Arg Asp Gly Gly
        515                 520                 525

gtg gcg gac tct tac ggc gat tac aac aag gtt ggc ttc gac tgc tct   1632
Val Ala Asp Ser Tyr Gly Asp Tyr Asn Lys Val Gly Phe Asp Cys Ser
    530                 535                 540

gga ctg acc ttg tat gcg ttt gcg ggt gtg gga att tca ctt cct cac   1680
Gly Leu Thr Leu Tyr Ala Phe Ala Gly Val Gly Ile Ser Leu Pro His
545                 550                 555                 560

tac acg ggc tac cag tac cag cac ggc acc aag gtg tcg cct tct gag   1728
Tyr Thr Gly Tyr Gln Tyr Gln His Gly Thr Lys Val Ser Pro Ser Glu
                565                 570                 575

atg caa cgt ggc gat ctg atc ttc tat ggt ccg gga gcg tct cag cac   1776
Met Gln Arg Gly Asp Leu Ile Phe Tyr Gly Pro Gly Ala Ser Gln His
            580                 585                 590

gtg gca att tac ctc ggt gat ggt cag atg att gag gct ccg aat tcg   1824
Val Ala Ile Tyr Leu Gly Asp Gly Gln Met Ile Glu Ala Pro Asn Ser
        595                 600                 605
```

```
ggt tct gtc gtg aag att tct cct gtt cgc tgg agc gga atg acc gag   1872
Gly Ser Val Val Lys Ile Ser Pro Val Arg Trp Ser Gly Met Thr Glu
    610                 615                 620

agc gtg gta cgc ctc att                                       1890
Ser Val Val Arg Leu Ile
625                 630
```

<210> 4
<211> 630
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 4

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Met Ala Asn Leu Asp Ser Val Arg Pro Gly Val Arg Ala Ala Leu Arg
  1               5                  10                  15

Arg Thr His Thr Gln Val Lys Gly Val Thr Leu Thr Arg Ala Leu Ile
             20                  25                  30

Ala Leu Ala Val Ser Gly Ala Leu Leu Ser Ser Met Thr Pro Ala Val
         35                  40                  45

Ala Gln Pro Gln Asn Pro Asp Asp Ala Ala Ile Ala Gln Ala Glu Glu
     50                  55                  60

Asn Val Ser Ala Gly Asp Gly Glu Val Ala Arg Leu Ala Gly Ser Leu
 65                  70                  75                  80

Ser Ser Thr Asp Ala Glu Ile Asn Arg Val Glu Leu Glu Met Gly Ala
                 85                  90                  95

Leu Arg Glu Glu Val Asn Lys Ser Leu Val Asp Leu His Asp Ala Gln
            100                 105                 110

Ala Ile Ala Glu Gln Ala Arg Gln Asp Ala Leu Ala Ala Lys Lys Asp
        115                 120                 125

Leu Asp Asp Ser Gln Ala Gln Ile Glu Ala Ala Gln Glu Arg Leu Asp
    130                 135                 140

Glu Ile Ser Arg Ala Ala Tyr Arg Gln Asn Gly Thr Ser Lys Gly Leu
145                 150                 155                 160

Ser Gly Ile Ser Gly Asn Gly Asn Ser Glu Asp Ala Leu Asp Arg Gln
                165                 170                 175

Thr Tyr Leu Arg Thr Ser Ala Glu Lys Gln Gln Ala Ala Val Glu Glu
            180                 185                 190

Leu Asp Arg Leu Arg Thr Glu Asn Ala Asn Lys Glu Ser Val Leu Arg
        195                 200                 205

Gln Ala Arg Ile Val Ala Glu Gln Arg Glu Ala Glu Ala Val Glu Lys
    210                 215                 220
```

```
Gln Val Gln Thr Glu Ala Ala Ile Ala Ala Asn Ser Glu Gln Leu Asn
225                 230                 235                 240

Val Leu Thr Asn Asn Arg Ser Thr Leu Val Ala Gln Arg Asp Gly Ala
                245                 250                 255

Glu Arg Asn Leu Ala Ile Ala Arg Ala Gln Ala Asp Asn Leu Gln Gly
            260                 265                 270

Gln Arg Ala Glu Tyr Glu Glu Phe Gln Gln Ala Glu Gln Ala Arg Ile
        275                 280                 285

Gln Ala Glu Ala Glu Ala Gln Ala Ala Ala Glu Glu Lys Arg Arg Ala
    290                 295                 300

Asp Glu Ala Ala Ala Gln Ala Ala Ala Glu Ala Gln Glu Ala Ala Gln
305                 310                 315                 320

Gln Ala Gln Ala Ala Glu Glu Ala Gln Ala Ala Gln Ala Ala Glu Thr
                325                 330                 335

Ala Gln Ala Gln Ala Ala Gln Ala Ala Glu Thr Gln Ala Ala Gln Ala
            340                 345                 350

Ala Gln Ala Gln Ala Glu Ala Asn Asp Arg Ala Ala Ala Gln Gln Arg
        355                 360                 365

Ala Ala Glu Ala Gln Ala Ala Ala Glu Gln Ala Gln Arg Glu Ala Asp
    370                 375                 380

Ala Gln Ala Ala Asn Asp Ala Gln Ala Gln Ala Leu Arg Glu Gln Ala
385                 390                 395                 400

Leu Thr Ala Ala Ser Ile Ala Ala Ala Ala Leu Ile Ala Ala Ser Gln
                405                 410                 415

Ser Ser His Ala Thr Thr Gln Asn Pro Tyr Pro Thr Asp Glu Asp Ala
            420                 425                 430

Asp Pro Thr Asp Ile Ala Asp Ile Gln Gly Pro Thr Gln Pro Gly Thr
        435                 440                 445

Gly Glu Ser Gly Asp Ser Gln Ser Asn Ser Ser Asp Asn Asp Ser Thr
    450                 455                 460

Gly Asn Asp Ser Thr Gly Ser Asp Ser Ser Asp Ser Asp Ser Ser Gly
465                 470                 475                 480

Asn Asp Ser Ser Glu Val Ile Ser Gly Asp Arg Ser Ala Gln Ile Glu
                485                 490                 495

Thr Val Ile Ala Arg Ala Met Ser Gln Leu Gly Val Gln Tyr Ala Trp
            500                 505                 510

Gly Gly Gly Asn Ala Asn Gly Pro Thr Leu Gly Ile Arg Asp Gly Gly
        515                 520                 525

Val Ala Asp Ser Tyr Gly Asp Tyr Asn Lys Val Gly Phe Asp Cys Ser
    530                 535                 540
```

```
Gly Leu Thr Leu Tyr Ala Phe Ala Gly Val Gly Ile Ser Leu Pro His
545                 550                 555                 560

Tyr Thr Gly Tyr Gln Tyr Gln His Gly Thr Lys Val Ser Pro Ser Glu
                565                 570                 575

Met Gln Arg Gly Asp Leu Ile Phe Tyr Gly Pro Gly Ala Ser Gln His
            580                 585                 590

Val Ala Ile Tyr Leu Gly Asp Gly Gln Met Ile Glu Ala Pro Asn Ser
        595                 600                 605

Gly Ser Val Val Lys Ile Ser Pro Val Arg Trp Ser Gly Met Thr Glu
    610                 615                 620

Ser Val Val Arg Leu Ile
625                 630


<210> 5
<211> 1800
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1800)
<223> RXA00157K

<400> 5
ttg att gcg ctt gca gta agc gga gct ttg ctt agt tcc atg act ccg   48
Met Ile Ala Leu Ala Val Ser Gly Ala Leu Leu Ser Ser Met Thr Pro
  1               5                  10                  15

gcg gtg gcg cag cca cag aat ccg gat gac gca gcc att gca cag gca   96
Ala Val Ala Gln Pro Gln Asn Pro Asp Asp Ala Ala Ile Ala Gln Ala
             20                  25                  30

gag gaa aat gtt tcg gcg ggc gat ggg gaa gtc gcc cgc ctg gca gga   144
Glu Glu Asn Val Ser Ala Gly Asp Gly Glu Val Ala Arg Leu Ala Gly
         35                  40                  45

tct ttg tcc agc act gac gcg gaa att aac cgc gtc gag ctg gaa atg   192
Ser Leu Ser Ser Thr Asp Ala Glu Ile Asn Arg Val Glu Leu Glu Met
     50                  55                  60

ggt gct ctg cgt gaa gaa gtg aac aag tcc ctc gtg gat ttg cat gat   240
Gly Ala Leu Arg Glu Glu Val Asn Lys Ser Leu Val Asp Leu His Asp
 65                  70                  75                  80

gcg cag gca atc gcc gag cag gcc cgc caa gat gca ctt gca gcc aag   288
Ala Gln Ala Ile Ala Glu Gln Ala Arg Gln Asp Ala Leu Ala Ala Lys
                 85                  90                  95

aag gat ctc gat gat tct caa gcg cag atc gaa gca gcc caa gag cgc   336
Lys Asp Leu Asp Asp Ser Gln Ala Gln Ile Glu Ala Ala Gln Glu Arg
            100                 105                 110
```

```
ctt gat gag att tca cgt gca gcg tat cgc caa aac gga acc tcc aag   384
Leu Asp Glu Ile Ser Arg Ala Ala Tyr Arg Gln Asn Gly Thr Ser Lys
        115                 120                 125

ggg ctt tca ggc atc tcg ggc aat gga aat tct gaa gat gcg cta gat   432
Gly Leu Ser Gly Ile Ser Gly Asn Gly Asn Ser Glu Asp Ala Leu Asp
    130                 135                 140

cgt cag act tac ctg cga acc agt gcg gaa aag cag cag gca gct gtt   480
Arg Gln Thr Tyr Leu Arg Thr Ser Ala Glu Lys Gln Gln Ala Ala Val
145                 150                 155                 160

gaa gag ctt gat cgc ctc cgt acg gaa aac gcc aac aag gaa tcg gtg   528
Glu Glu Leu Asp Arg Leu Arg Thr Glu Asn Ala Asn Lys Glu Ser Val
                165                 170                 175

ttg cgc cag gcc cgc atc gtt gct gag cag cgt gag gcg gaa gcc gtc   576
Leu Arg Gln Ala Arg Ile Val Ala Glu Gln Arg Glu Ala Glu Ala Val
            180                 185                 190

gaa aag caa gtc cag acc gag gct gca att gcc gca aac agc gag cag   624
Glu Lys Gln Val Gln Thr Glu Ala Ala Ile Ala Ala Asn Ser Glu Gln
        195                 200                 205

ctc aat gtc ttg act aac aat cgc agt acc ttg gtt gcc cag cgt gat   672
Leu Asn Val Leu Thr Asn Asn Arg Ser Thr Leu Val Ala Gln Arg Asp
    210                 215                 220

ggg gct gag cgc aac ttg gcc atc gct cgt gcg cag gcg gat aat ctg   720
Gly Ala Glu Arg Asn Leu Ala Ile Ala Arg Ala Gln Ala Asp Asn Leu
225                 230                 235                 240

caa ggt cag cgt gct gag tac gag gaa ttc cag cag gca gag cag gct   768
Gln Gly Gln Arg Ala Glu Tyr Glu Glu Phe Gln Gln Ala Glu Gln Ala
                245                 250                 255

cgc atc cag gcg gaa gcg gaa gct cag gct gct gcg gag gag aag cgt   816
Arg Ile Gln Ala Glu Ala Glu Ala Gln Ala Ala Ala Glu Glu Lys Arg
            260                 265                 270

cgt gcc gat gag gct gct gca cag gca gcc gct gaa gct caa gaa gct   864
Arg Ala Asp Glu Ala Ala Ala Gln Ala Ala Ala Glu Ala Gln Glu Ala
        275                 280                 285

gcc cag caa gct cag gcg gcg gag gaa gcc caa gcc gcg caa gca gct   912
Ala Gln Gln Ala Gln Ala Ala Glu Glu Ala Gln Ala Ala Gln Ala Ala
    290                 295                 300

gag aca gca caa gcc caa gcc gcg caa gct gcg gaa acc caa gct gca   960
Glu Thr Ala Gln Ala Gln Ala Ala Gln Ala Ala Glu Thr Gln Ala Ala
305                 310                 315                 320

caa gcc gcg caa gct cag gca gaa gcg aat gat cgt gcc gcc gcg caa  1008
Gln Ala Ala Gln Ala Gln Ala Glu Ala Asn Asp Arg Ala Ala Ala Gln
                325                 330                 335

cag cgt gct gca gag gct caa gca gca gcg gaa cag gcg caa cgt gag  1056
Gln Arg Ala Ala Glu Ala Gln Ala Ala Ala Glu Gln Ala Gln Arg Glu
            340                 345                 350
```

```
gct gac gct cag gcg gcc aac gat gcc caa gct cag gca ctg cgt gaa   1104
Ala Asp Ala Gln Ala Ala Asn Asp Ala Gln Ala Gln Ala Leu Arg Glu
        355                 360                 365

cag gcg ctc acc gca gcc tcc atc gct gcg gct gct cta att gcg gcg   1152
Gln Ala Leu Thr Ala Ala Ser Ile Ala Ala Ala Ala Leu Ile Ala Ala
    370                 375                 380

agc cag tcc agc cat gcc act act caa aat cct tac cca act gat gaa   1200
Ser Gln Ser Ser His Ala Thr Thr Gln Asn Pro Tyr Pro Thr Asp Glu
385                 390                 395                 400

gac gcg gat ccg acc gat att gcg gac atc caa ggc cca acg cag cca   1248
Asp Ala Asp Pro Thr Asp Ile Ala Asp Ile Gln Gly Pro Thr Gln Pro
                405                 410                 415

ggt acg ggt gag tct gga gat tcc cag agc aac tcc agc gac aac gat   1296
Gly Thr Gly Glu Ser Gly Asp Ser Gln Ser Asn Ser Ser Asp Asn Asp
            420                 425                 430

tcc aca ggc aac gat tcc aca ggc tct gac tct tca gat tca gat tcc   1344
Ser Thr Gly Asn Asp Ser Thr Gly Ser Asp Ser Ser Asp Ser Asp Ser
        435                 440                 445

tcc ggc aac gat tct tca gag gtt att tcc ggc gat cgt tcc gct cag   1392
Ser Gly Asn Asp Ser Ser Glu Val Ile Ser Gly Asp Arg Ser Ala Gln
    450                 455                 460

att gag act gtg att gcg cgc gcc atg agc cag ttg ggt gtg cag tac   1440
Ile Glu Thr Val Ile Ala Arg Ala Met Ser Gln Leu Gly Val Gln Tyr
465                 470                 475                 480

gca tgg ggt ggc ggt aac gct aat ggc cca act ctg ggt atc cgt gac   1488
Ala Trp Gly Gly Gly Asn Ala Asn Gly Pro Thr Leu Gly Ile Arg Asp
                485                 490                 495

ggt ggc gtg gcg gac tct tac ggc gat tac aac aag gtt ggc ttc gac   1536
Gly Gly Val Ala Asp Ser Tyr Gly Asp Tyr Asn Lys Val Gly Phe Asp
            500                 505                 510

tgc tct gga ctg acc ttg tat gcg ttt gcg ggt gtg gga att tca ctt   1584
Cys Ser Gly Leu Thr Leu Tyr Ala Phe Ala Gly Val Gly Ile Ser Leu
        515                 520                 525

cct cac tac acg ggc tac cag tac cag cac ggc acc aag gtg tcg cct   1632
Pro His Tyr Thr Gly Tyr Gln Tyr Gln His Gly Thr Lys Val Ser Pro
    530                 535                 540

tct gag atg caa cgt ggc gat ctg atc ttc tat ggt ccg gga gcg tct   1680
Ser Glu Met Gln Arg Gly Asp Leu Ile Phe Tyr Gly Pro Gly Ala Ser
545                 550                 555                 560

cag cac gtg gca att tac ctc ggt gat ggt cag atg att gag gct ccg   1728
Gln His Val Ala Ile Tyr Leu Gly Asp Gly Gln Met Ile Glu Ala Pro
                565                 570                 575

aat tcg ggt tct gtc gtg aag att tct cct gtt cgc tgg agc gga atg   1776
Asn Ser Gly Ser Val Val Lys Ile Ser Pro Val Arg Trp Ser Gly Met
```

```
            580                 585                 590

acc gag agc gtg gta cgc ctc att                                     1800
Thr Glu Ser Val Val Arg Leu Ile
        595                 600
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<210> 6
<211> 600
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 6

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Met Ile Ala Leu Ala Val Ser Gly Ala Leu Leu Ser Ser Met Thr Pro
  1               5                  10                  15

Ala Val Ala Gln Pro Gln Asn Pro Asp Asp Ala Ala Ile Ala Gln Ala
             20                  25                  30

Glu Glu Asn Val Ser Ala Gly Asp Gly Glu Val Ala Arg Leu Ala Gly
         35                  40                  45

Ser Leu Ser Ser Thr Asp Ala Glu Ile Asn Arg Val Glu Leu Glu Met
     50                  55                  60

Gly Ala Leu Arg Glu Glu Val Asn Lys Ser Leu Val Asp Leu His Asp
 65                  70                  75                  80

Ala Gln Ala Ile Ala Glu Gln Ala Arg Gln Asp Ala Leu Ala Ala Lys
                 85                  90                  95

Lys Asp Leu Asp Asp Ser Gln Ala Gln Ile Glu Ala Ala Gln Glu Arg
            100                 105                 110

Leu Asp Glu Ile Ser Arg Ala Ala Tyr Arg Gln Asn Gly Thr Ser Lys
        115                 120                 125

Gly Leu Ser Gly Ile Ser Gly Asn Gly Asn Ser Glu Asp Ala Leu Asp
    130                 135                 140

Arg Gln Thr Tyr Leu Arg Thr Ser Ala Glu Lys Gln Gln Ala Ala Val
145                 150                 155                 160

Glu Glu Leu Asp Arg Leu Arg Thr Glu Asn Ala Asn Lys Glu Ser Val
                165                 170                 175

Leu Arg Gln Ala Arg Ile Val Ala Glu Gln Arg Glu Ala Glu Ala Val
            180                 185                 190

Glu Lys Gln Val Gln Thr Glu Ala Ala Ile Ala Ala Asn Ser Glu Gln
        195                 200                 205

Leu Asn Val Leu Thr Asn Asn Arg Ser Thr Leu Val Ala Gln Arg Asp
    210                 215                 220

Gly Ala Glu Arg Asn Leu Ala Ile Ala Arg Ala Gln Ala Asp Asn Leu
225                 230                 235                 240
```

```
Gln Gly Gln Arg Ala Glu Tyr Glu Glu Phe Gln Gln Ala Glu Gln Ala
                245                 250                 255

Arg Ile Gln Ala Glu Ala Glu Ala Gln Ala Ala Ala Glu Glu Lys Arg
            260                 265                 270

Arg Ala Asp Glu Ala Ala Ala Gln Ala Ala Ala Glu Ala Gln Glu Ala
        275                 280                 285

Ala Gln Gln Ala Gln Ala Ala Glu Glu Ala Gln Ala Ala Gln Ala Ala
    290                 295                 300

Glu Thr Ala Gln Ala Gln Ala Ala Gln Ala Ala Glu Thr Gln Ala Ala
305                 310                 315                 320

Gln Ala Ala Gln Ala Gln Ala Glu Ala Asn Asp Arg Ala Ala Ala Gln
                325                 330                 335

Gln Arg Ala Ala Glu Ala Gln Ala Ala Ala Glu Gln Ala Gln Arg Glu
            340                 345                 350

Ala Asp Ala Gln Ala Ala Asn Asp Ala Gln Ala Gln Ala Leu Arg Glu
        355                 360                 365

Gln Ala Leu Thr Ala Ala Ser Ile Ala Ala Ala Ala Leu Ile Ala Ala
    370                 375                 380

Ser Gln Ser Ser His Ala Thr Thr Gln Asn Pro Tyr Pro Thr Asp Glu
385                 390                 395                 400

Asp Ala Asp Pro Thr Asp Ile Ala Asp Ile Gln Gly Pro Thr Gln Pro
                405                 410                 415

Gly Thr Gly Glu Ser Gly Asp Ser Gln Ser Asn Ser Ser Asp Asn Asp
            420                 425                 430

Ser Thr Gly Asn Asp Ser Thr Gly Ser Asp Ser Ser Asp Ser Asp Ser
        435                 440                 445

Ser Gly Asn Asp Ser Ser Glu Val Ile Ser Gly Asp Arg Ser Ala Gln
    450                 455                 460

Ile Glu Thr Val Ile Ala Arg Ala Met Ser Gln Leu Gly Val Gln Tyr
465                 470                 475                 480

Ala Trp Gly Gly Gly Asn Ala Asn Gly Pro Thr Leu Gly Ile Arg Asp
                485                 490                 495

Gly Gly Val Ala Asp Ser Tyr Gly Asp Tyr Asn Lys Val Gly Phe Asp
            500                 505                 510

Cys Ser Gly Leu Thr Leu Tyr Ala Phe Ala Gly Val Gly Ile Ser Leu
        515                 520                 525

Pro His Tyr Thr Gly Tyr Gln Tyr Gln His Gly Thr Lys Val Ser Pro
    530                 535                 540

Ser Glu Met Gln Arg Gly Asp Leu Ile Phe Tyr Gly Pro Gly Ala Ser
```

```
545                 550                 555                 560

Gln His Val Ala Ile Tyr Leu Gly Asp Gly Gln Met Ile Glu Ala Pro
                565                 570                 575

Asn Ser Gly Ser Val Val Lys Ile Ser Pro Val Arg Trp Ser Gly Met
            580                 585                 590

Thr Glu Ser Val Val Arg Leu Ile
        595                 600
```

<210> 7
<211> 1485
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1485)
<223> RXA00330W

<400> 7

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gtg ggg gag tat tgt gtc acc cct tgg gat agg gtt ata tcc gtg gac   48
Met Gly Glu Tyr Cys Val Thr Pro Trp Asp Arg Val Ile Ser Val Asp
  1               5                  10                  15

tac att tcg acg cgt gat gcc agc cgt acc cct gcc cgc ttc agt gat   96
Tyr Ile Ser Thr Arg Asp Ala Ser Arg Thr Pro Ala Arg Phe Ser Asp
             20                  25                  30

att ttg ctg ggc ggt cta gca cca gac ggc ggc ctg tac ctg cct gca   144
Ile Leu Leu Gly Gly Leu Ala Pro Asp Gly Gly Leu Tyr Leu Pro Ala
         35                  40                  45

acc tac cct caa cta gat gat gcc cag ctg agt aaa tgg cgt gag gta   192
Thr Tyr Pro Gln Leu Asp Asp Ala Gln Leu Ser Lys Trp Arg Glu Val
     50                  55                  60

tta gcc aac gaa gga tac gca gct ttg gct gct gaa gtt atc tcc ctg   240
Leu Ala Asn Glu Gly Tyr Ala Ala Leu Ala Ala Glu Val Ile Ser Leu
 65                  70                  75                  80

ttt gtt gat gac atc cca gta gaa gac atc aag gcg atc acc gca cgc   288
Phe Val Asp Asp Ile Pro Val Glu Asp Ile Lys Ala Ile Thr Ala Arg
                 85                  90                  95

gcc tac acc tac ccg aag ttc aac agc gaa gac atc gtt cct gtc acc   336
Ala Tyr Thr Tyr Pro Lys Phe Asn Ser Glu Asp Ile Val Pro Val Thr
            100                 105                 110

gaa ctc gag gac aac att tac ctg ggc cac ctt tcc gaa ggc cca acc   384
Glu Leu Glu Asp Asn Ile Tyr Leu Gly His Leu Ser Glu Gly Pro Thr
        115                 120                 125

gct gca ttc aaa gac atg gcc atg cag ctg ctc ggc gaa ctt ttc gaa   432
Ala Ala Phe Lys Asp Met Ala Met Gln Leu Leu Gly Glu Leu Phe Glu
    130                 135                 140
```

```
tac gag ctt cgc cgc cgc aac gaa acc atc aac atc ctg ggc gct acc   480
Tyr Glu Leu Arg Arg Arg Asn Glu Thr Ile Asn Ile Leu Gly Ala Thr
145                 150                 155                 160

tct ggc gat acc ggc tcc tct gcg gaa tac gcc atg cgc ggc cgc gag   528
Ser Gly Asp Thr Gly Ser Ser Ala Glu Tyr Ala Met Arg Gly Arg Glu
                165                 170                 175

gga atc cgc gta ttc atg ctg acc cca gct ggc cgc atg acc cca ttc   576
Gly Ile Arg Val Phe Met Leu Thr Pro Ala Gly Arg Met Thr Pro Phe
            180                 185                 190

cag caa gca cag atg ttt ggc ctt gac gat cca aac atc ttc aac atc   624
Gln Gln Ala Gln Met Phe Gly Leu Asp Asp Pro Asn Ile Phe Asn Ile
        195                 200                 205

gcc ctc gac ggc gtt ttc gac gat tgc caa gac gta gtc aag gct gtc   672
Ala Leu Asp Gly Val Phe Asp Asp Cys Gln Asp Val Val Lys Ala Val
    210                 215                 220

tcc gcc gac gca gaa ttc aaa aaa gac aac cgc atc ggt gcc gtg aac   720
Ser Ala Asp Ala Glu Phe Lys Lys Asp Asn Arg Ile Gly Ala Val Asn
225                 230                 235                 240

tcc atc aac tgg gca cgc ctt atg gca cag gtt gtg tac tac gtt tcc   768
Ser Ile Asn Trp Ala Arg Leu Met Ala Gln Val Val Tyr Tyr Val Ser
                245                 250                 255

tca tgg atc cgc acc aca acc agc aat gac caa aag gtc agc ttc tcc   816
Ser Trp Ile Arg Thr Thr Thr Ser Asn Asp Gln Lys Val Ser Phe Ser
            260                 265                 270

gta cca acc ggc aac ttc ggt gac att tgc gca ggc cac atc gcc cgc   864
Val Pro Thr Gly Asn Phe Gly Asp Ile Cys Ala Gly His Ile Ala Arg
        275                 280                 285

caa atg gga ctt ccc atc gat cgc ctc atc gtg gcc acc aac gaa aac   912
Gln Met Gly Leu Pro Ile Asp Arg Leu Ile Val Ala Thr Asn Glu Asn
    290                 295                 300

gat gtg ctc gac gag ttc ttc cgt acc ggc gac tac cga gtc cgc agc   960
Asp Val Leu Asp Glu Phe Phe Arg Thr Gly Asp Tyr Arg Val Arg Ser
305                 310                 315                 320

tcc gca gac acc cac gag acc tcc tca cct tcg atg gat atc tcc cgc  1008
Ser Ala Asp Thr His Glu Thr Ser Ser Pro Ser Met Asp Ile Ser Arg
                325                 330                 335

gcc tcc aac ttc gag cgt ttc atc ttc gac ctg ctc ggc cgc gac gcc  1056
Ala Ser Asn Phe Glu Arg Phe Ile Phe Asp Leu Leu Gly Arg Asp Ala
            340                 345                 350

acc cgc gtc aac gat cta ttt ggt acc cag gtt cgc caa ggc gga ttc  1104
Thr Arg Val Asn Asp Leu Phe Gly Thr Gln Val Arg Gln Gly Gly Phe
        355                 360                 365

tca ctg gct gat gac gcc aac ttt gag aag gct gca gca gaa tac ggt  1152
Ser Leu Ala Asp Asp Ala Asn Phe Glu Lys Ala Ala Ala Glu Tyr Gly
    370                 375                 380
```

```
ttc gcc tcc gga cga tcc acc cat gct gac cgt gtg gca acc atc gct   1200
Phe Ala Ser Gly Arg Ser Thr His Ala Asp Arg Val Ala Thr Ile Ala
385                 390                 395                 400

gac gtg cat tcc cgc ctc gac gta cta atc gat ccc cac acc gcc gac   1248
Asp Val His Ser Arg Leu Asp Val Leu Ile Asp Pro His Thr Ala Asp
                405                 410                 415

ggc gtt cac gtg gca cgc cag tgg agg gac gag gtc aac acc cca atc   1296
Gly Val His Val Ala Arg Gln Trp Arg Asp Glu Val Asn Thr Pro Ile
            420                 425                 430

atc gtc cta gaa act gca ctc cca gtg aaa ttt gcc gac acc atc gtc   1344
Ile Val Leu Glu Thr Ala Leu Pro Val Lys Phe Ala Asp Thr Ile Val
        435                 440                 445

gaa gca att ggt gaa gca cct caa act cca gag cgt ttc gcc gcg atc   1392
Glu Ala Ile Gly Glu Ala Pro Gln Thr Pro Glu Arg Phe Ala Ala Ile
    450                 455                 460

atg gat gct cca ttc aag gtt tcc gac cta cca aac gac acc gat gca   1440
Met Asp Ala Pro Phe Lys Val Ser Asp Leu Pro Asn Asp Thr Asp Ala
465                 470                 475                 480

gtt aag cag tac ata gtc gat gcg att gca aac act tcc gtg aag       1485
Val Lys Gln Tyr Ile Val Asp Ala Ile Ala Asn Thr Ser Val Lys
                485                 490                 495
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<210> 8
<211> 495
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 8

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Met Gly Glu Tyr Cys Val Thr Pro Trp Asp Arg Val Ile Ser Val Asp
  1               5                  10                  15

Tyr Ile Ser Thr Arg Asp Ala Ser Arg Thr Pro Ala Arg Phe Ser Asp
             20                  25                  30

Ile Leu Leu Gly Gly Leu Ala Pro Asp Gly Gly Leu Tyr Leu Pro Ala
         35                  40                  45

Thr Tyr Pro Gln Leu Asp Asp Ala Gln Leu Ser Lys Trp Arg Glu Val
     50                  55                  60

Leu Ala Asn Glu Gly Tyr Ala Ala Leu Ala Ala Glu Val Ile Ser Leu
 65                  70                  75                  80

Phe Val Asp Asp Ile Pro Val Glu Asp Ile Lys Ala Ile Thr Ala Arg
                 85                  90                  95

Ala Tyr Thr Tyr Pro Lys Phe Asn Ser Glu Asp Ile Val Pro Val Thr
            100                 105                 110
```

```
Glu Leu Glu Asp Asn Ile Tyr Leu Gly His Leu Ser Glu Gly Pro Thr
        115                 120                 125

Ala Ala Phe Lys Asp Met Ala Met Gln Leu Leu Gly Glu Leu Phe Glu
    130                 135                 140

Tyr Glu Leu Arg Arg Arg Asn Glu Thr Ile Asn Ile Leu Gly Ala Thr
145                 150                 155                 160

Ser Gly Asp Thr Gly Ser Ser Ala Glu Tyr Ala Met Arg Gly Arg Glu
                165                 170                 175

Gly Ile Arg Val Phe Met Leu Thr Pro Ala Gly Arg Met Thr Pro Phe
            180                 185                 190

Gln Gln Ala Gln Met Phe Gly Leu Asp Asp Pro Asn Ile Phe Asn Ile
        195                 200                 205

Ala Leu Asp Gly Val Phe Asp Asp Cys Gln Asp Val Val Lys Ala Val
    210                 215                 220

Ser Ala Asp Ala Glu Phe Lys Lys Asp Asn Arg Ile Gly Ala Val Asn
225                 230                 235                 240

Ser Ile Asn Trp Ala Arg Leu Met Ala Gln Val Val Tyr Tyr Val Ser
                245                 250                 255

Ser Trp Ile Arg Thr Thr Thr Ser Asn Asp Gln Lys Val Ser Phe Ser
            260                 265                 270

Val Pro Thr Gly Asn Phe Gly Asp Ile Cys Ala Gly His Ile Ala Arg
        275                 280                 285

Gln Met Gly Leu Pro Ile Asp Arg Leu Ile Val Ala Thr Asn Glu Asn
    290                 295                 300

Asp Val Leu Asp Glu Phe Phe Arg Thr Gly Asp Tyr Arg Val Arg Ser
305                 310                 315                 320

Ser Ala Asp Thr His Glu Thr Ser Ser Pro Ser Met Asp Ile Ser Arg
                325                 330                 335

Ala Ser Asn Phe Glu Arg Phe Ile Phe Asp Leu Leu Gly Arg Asp Ala
            340                 345                 350

Thr Arg Val Asn Asp Leu Phe Gly Thr Gln Val Arg Gln Gly Gly Phe
        355                 360                 365

Ser Leu Ala Asp Asp Ala Asn Phe Glu Lys Ala Ala Ala Glu Tyr Gly
    370                 375                 380

Phe Ala Ser Gly Arg Ser Thr His Ala Asp Arg Val Ala Thr Ile Ala
385                 390                 395                 400

Asp Val His Ser Arg Leu Asp Val Leu Ile Asp Pro His Thr Ala Asp
                405                 410                 415
```

```
Gly Val His Val Ala Arg Gln Trp Arg Asp Glu Val Asn Thr Pro Ile
            420                 425                 430

Ile Val Leu Glu Thr Ala Leu Pro Val Lys Phe Ala Asp Thr Ile Val
        435                 440                 445

Glu Ala Ile Gly Glu Ala Pro Gln Thr Pro Glu Arg Phe Ala Ala Ile
    450                 455                 460

Met Asp Ala Pro Phe Lys Val Ser Asp Leu Pro Asn Asp Thr Asp Ala
465                 470                 475                 480

Val Lys Gln Tyr Ile Val Asp Ala Ile Ala Asn Thr Ser Val Lys
                485                 490                 495


<210> 9
<211> 1092
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1092)
<223> RXA00683W

<400> 9
atg acc aac agt ttg aac atc ccg ttt gtc cag cgc ttc gat gaa ggc   48
Met Thr Asn Ser Leu Asn Ile Pro Phe Val Gln Arg Phe Asp Glu Gly
  1               5                  10                  15

ctg gat cct gtt cta gaa gta ctc ggt ggc aag ggc gct tca cta gtc   96
Leu Asp Pro Val Leu Glu Val Leu Gly Gly Lys Gly Ala Ser Leu Val
             20                  25                  30

acc atg aca gat gct gga atg ccc gtt cca cct gga ttt gtg gtc act   144
Thr Met Thr Asp Ala Gly Met Pro Val Pro Pro Gly Phe Val Val Thr
         35                  40                  45

act gcc agc ttt gat gaa ttc atc cgt gaa gca ggg gtt gct gaa cac   192
Thr Ala Ser Phe Asp Glu Phe Ile Arg Glu Ala Gly Val Ala Glu His
     50                  55                  60

atc gat aaa ttc cta aac gat ctc gat gca gaa gat gtt aag gaa gtg   240
Ile Asp Lys Phe Leu Asn Asp Leu Asp Ala Glu Asp Val Lys Glu Val
 65                  70                  75                  80

gat cga gtt tct gcg atc atc cgc gat gag ctg tgc agt ctt gac gtt   288
Asp Arg Val Ser Ala Ile Ile Arg Asp Glu Leu Cys Ser Leu Asp Val
                 85                  90                  95

cca gag aat gct cgt ttc gca gtg cac cag gct tat cgc gat ctc atg   336
Pro Glu Asn Ala Arg Phe Ala Val His Gln Ala Tyr Arg Asp Leu Met
            100                 105                 110

gaa cga tgc ggt ggc gac gtc ccg gtt gct gtc cgg tca tcg gcc act   384
Glu Arg Cys Gly Gly Asp Val Pro Val Ala Val Arg Ser Ser Ala Thr
        115                 120                 125
```

```
gcc gaa gat ctg ccc gat gct tcc ttc gca ggg caa cag gac acc tat   432
Ala Glu Asp Leu Pro Asp Ala Ser Phe Ala Gly Gln Gln Asp Thr Tyr
    130                 135                 140

ctg tgg caa gtc ggt ttg agc gct gtc act gaa cac atc cgt aaa tgc   480
Leu Trp Gln Val Gly Leu Ser Ala Val Thr Glu His Ile Arg Lys Cys
145                 150                 155                 160

tgg gct tcg ctg ttc act tcc cgt gcc att atc tac cgt ctg aaa aac   528
Trp Ala Ser Leu Phe Thr Ser Arg Ala Ile Ile Tyr Arg Leu Lys Asn
                165                 170                 175

aac atc ccc aat gag ggc ctc tcc atg gcg gta gtt gtt caa aaa atg   576
Asn Ile Pro Asn Glu Gly Leu Ser Met Ala Val Val Val Gln Lys Met
            180                 185                 190

gtc aac tct cgt gtc gca ggc gtg gca atc act atg aat cct tcc aac   624
Val Asn Ser Arg Val Ala Gly Val Ala Ile Thr Met Asn Pro Ser Asn
        195                 200                 205

ggc gac cgc tcg aag atc acc atc gat tcc tca tgg ggt gtt ggt gaa   672
Gly Asp Arg Ser Lys Ile Thr Ile Asp Ser Ser Trp Gly Val Gly Glu
    210                 215                 220

atg gtg gtc tca ggt gaa gtg aca cca gac aat atc ttg ctg gac aag   720
Met Val Val Ser Gly Glu Val Thr Pro Asp Asn Ile Leu Leu Asp Lys
225                 230                 235                 240

atc acg ctg cag gtt gtc tcc gaa cac att gga agc aaa cac gct gaa   768
Ile Thr Leu Gln Val Val Ser Glu His Ile Gly Ser Lys His Ala Glu
                245                 250                 255

ctc atc ccc gat gcc acc agt gga agc ctc gtg gaa aag ccc gtt gat   816
Leu Ile Pro Asp Ala Thr Ser Gly Ser Leu Val Glu Lys Pro Val Asp
            260                 265                 270

gaa gaa cgc gca aac cgc cgc agt ctg act gat gag gaa atg ctc gct   864
Glu Glu Arg Ala Asn Arg Arg Ser Leu Thr Asp Glu Glu Met Leu Ala
        275                 280                 285

gtg gca caa atg gct aag cgt gca gaa aaa cac tac aag tgc cca caa   912
Val Ala Gln Met Ala Lys Arg Ala Glu Lys His Tyr Lys Cys Pro Gln
    290                 295                 300

gat atc gaa tgg gcg ctg gac gct gat ctg cca gat gga gaa aac ctt   960
Asp Ile Glu Trp Ala Leu Asp Ala Asp Leu Pro Asp Gly Glu Asn Leu
305                 310                 315                 320

ctg tta ttg caa tcc cgc ccg gaa act atc cac tcc aac ggt gtg aag  1008
Leu Leu Leu Gln Ser Arg Pro Glu Thr Ile His Ser Asn Gly Val Lys
                325                 330                 335

aag gaa acc cca act ccg cag gct gcc aaa acc ata ggc acc ttc gat  1056
Lys Glu Thr Pro Thr Pro Gln Ala Ala Lys Thr Ile Gly Thr Phe Asp
            340                 345                 350

ttc agc tca atc acc gtc gca atg acc ggc acg aag                 1092
Phe Ser Ser Ile Thr Val Ala Met Thr Gly Thr Lys
        355                 360
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<210> 10
<211> 364
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 10

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Met Thr Asn Ser Leu Asn Ile Pro Phe Val Gln Arg Phe Asp Glu Gly
  1               5                  10                  15

Leu Asp Pro Val Leu Glu Val Leu Gly Gly Lys Gly Ala Ser Leu Val
             20                  25                  30

Thr Met Thr Asp Ala Gly Met Pro Val Pro Pro Gly Phe Val Val Thr
         35                  40                  45

Thr Ala Ser Phe Asp Glu Phe Ile Arg Glu Ala Gly Val Ala Glu His
     50                  55                  60

Ile Asp Lys Phe Leu Asn Asp Leu Asp Ala Glu Asp Val Lys Glu Val
 65                  70                  75                  80

Asp Arg Val Ser Ala Ile Ile Arg Asp Glu Leu Cys Ser Leu Asp Val
                 85                  90                  95

Pro Glu Asn Ala Arg Phe Ala Val His Gln Ala Tyr Arg Asp Leu Met
            100                 105                 110

Glu Arg Cys Gly Gly Asp Val Pro Val Ala Val Arg Ser Ser Ala Thr
        115                 120                 125

Ala Glu Asp Leu Pro Asp Ala Ser Phe Ala Gly Gln Gln Asp Thr Tyr
    130                 135                 140

Leu Trp Gln Val Gly Leu Ser Ala Val Thr Glu His Ile Arg Lys Cys
145                 150                 155                 160

Trp Ala Ser Leu Phe Thr Ser Arg Ala Ile Ile Tyr Arg Leu Lys Asn
                165                 170                 175

Asn Ile Pro Asn Glu Gly Leu Ser Met Ala Val Val Val Gln Lys Met
            180                 185                 190

Val Asn Ser Arg Val Ala Gly Val Ala Ile Thr Met Asn Pro Ser Asn
        195                 200                 205

Gly Asp Arg Ser Lys Ile Thr Ile Asp Ser Ser Trp Gly Val Gly Glu
    210                 215                 220

Met Val Val Ser Gly Glu Val Thr Pro Asp Asn Ile Leu Leu Asp Lys
225                 230                 235                 240

Ile Thr Leu Gln Val Val Ser Glu His Ile Gly Ser Lys His Ala Glu
                245                 250                 255

Leu Ile Pro Asp Ala Thr Ser Gly Ser Leu Val Glu Lys Pro Val Asp
            260                 265                 270
```

```
Glu Glu Arg Ala Asn Arg Arg Ser Leu Thr Asp Glu Glu Met Leu Ala
        275                 280                 285

Val Ala Gln Met Ala Lys Arg Ala Glu Lys His Tyr Lys Cys Pro Gln
    290                 295                 300

Asp Ile Glu Trp Ala Leu Asp Ala Asp Leu Pro Asp Gly Glu Asn Leu
305                 310                 315                 320

Leu Leu Leu Gln Ser Arg Pro Glu Thr Ile His Ser Asn Gly Val Lys
                325                 330                 335

Lys Glu Thr Pro Thr Pro Gln Ala Ala Lys Thr Ile Gly Thr Phe Asp
            340                 345                 350

Phe Ser Ser Ile Thr Val Ala Met Thr Gly Thr Lys
        355                 360
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<210> 11
<211> 1272
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1272)
<223> RXA00783E

<400> 11

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ttg aaa cac tta ctt tta cgg gaa gac ttt gtt aaa gac gca gaa ggc   48
Met Lys His Leu Leu Leu Arg Glu Asp Phe Val Lys Asp Ala Glu Gly
  1               5                  10                  15

tct aag cat ggg ccg gaa atg gaa ttg gca gtg gat ctt ttt gaa tac   96
Ser Lys His Gly Pro Glu Met Glu Leu Ala Val Asp Leu Phe Glu Tyr
            20                  25                  30

caa gca cgg gac ctc ttt gaa acc cat ggt gtg cca gtg ttg aag gga   144
Gln Ala Arg Asp Leu Phe Glu Thr His Gly Val Pro Val Leu Lys Gly
        35                  40                  45

att gtg gca tca aca cca gag gcg gcg agg aaa gcg gct gag gaa atc   192
Ile Val Ala Ser Thr Pro Glu Ala Ala Arg Lys Ala Ala Glu Glu Ile
    50                  55                  60

ggc gga ctg acc gtc gtc aag gct cag gtc aag gtg ggc gga cgt ggc   240
Gly Gly Leu Thr Val Val Lys Ala Gln Val Lys Val Gly Gly Arg Gly
65                  70                  75                  80

aag gcg ggt ggc gtc cgt gtg gca ccg acg tcg gct cag gct ttt gat   288
Lys Ala Gly Gly Val Arg Val Ala Pro Thr Ser Ala Gln Ala Phe Asp
                85                  90                  95

gct gcg gat gcg att ctc ggc atg gat atc aaa gga cac act gtt aat   336
Ala Ala Asp Ala Ile Leu Gly Met Asp Ile Lys Gly His Thr Val Asn
            100                 105                 110
```

```
cag gtg atg gtg gcg cag ggc gct gac att gct gag gaa tac tat ttc   384
Gln Val Met Val Ala Gln Gly Ala Asp Ile Ala Glu Glu Tyr Tyr Phe
        115                 120                 125

tcc att ttg ttg gat cgc gcg aat cgt tcg tat ctg gct atg tgc tct   432
Ser Ile Leu Leu Asp Arg Ala Asn Arg Ser Tyr Leu Ala Met Cys Ser
    130                 135                 140

gtt gaa ggt ggc atg gag atc gag atc ctg gcg aag gaa aag cct gaa   480
Val Glu Gly Gly Met Glu Ile Glu Ile Leu Ala Lys Glu Lys Pro Glu
145                 150                 155                 160

gct ttg gca aag gtg gaa gtg gat ccc ctc act ggt att gat gag gac   528
Ala Leu Ala Lys Val Glu Val Asp Pro Leu Thr Gly Ile Asp Glu Asp
                165                 170                 175

aaa gcg cgg gag att gtc act gct gct ggc ttt gaa act gag gtg gca   576
Lys Ala Arg Glu Ile Val Thr Ala Ala Gly Phe Glu Thr Glu Val Ala
            180                 185                 190

gag aaa gtc att ccg gtg ctg atc aag atc tgg cag gtg tat tac gaa   624
Glu Lys Val Ile Pro Val Leu Ile Lys Ile Trp Gln Val Tyr Tyr Glu
        195                 200                 205

gag gaa gca aca ctc gtt gag gtg aac ccg ttg gtg ctc acg gat gac   672
Glu Glu Ala Thr Leu Val Glu Val Asn Pro Leu Val Leu Thr Asp Asp
    210                 215                 220

ggc gat gtg att gcg ctt gat ggc aag atc acg ctg gat gat aac gct   720
Gly Asp Val Ile Ala Leu Asp Gly Lys Ile Thr Leu Asp Asp Asn Ala
225                 230                 235                 240

gat ttc cgc cat gat aac cgt ggt gcg ttg gct gaa tct gcc ggt ggc   768
Asp Phe Arg His Asp Asn Arg Gly Ala Leu Ala Glu Ser Ala Gly Gly
                245                 250                 255

ttg gac att ttg gaa ctg aag gcc aag aag aat gat ctg aac tac gtg   816
Leu Asp Ile Leu Glu Leu Lys Ala Lys Lys Asn Asp Leu Asn Tyr Val
            260                 265                 270

aaa ctt gat ggc tct gtg ggc atc att ggc aat ggt gca ggt ttg gtg   864
Lys Leu Asp Gly Ser Val Gly Ile Ile Gly Asn Gly Ala Gly Leu Val
        275                 280                 285

atg tcc acg ttg gat atc gtg gct gca gct ggt gaa cgc cat ggt ggg   912
Met Ser Thr Leu Asp Ile Val Ala Ala Ala Gly Glu Arg His Gly Gly
    290                 295                 300

cag cgc ccc gcg aac ttc cta gac att ggt ggc gga gca tca gct gaa   960
Gln Arg Pro Ala Asn Phe Leu Asp Ile Gly Gly Gly Ala Ser Ala Glu
305                 310                 315                 320

tcg atg gct gct ggt ctc gat gtg atc ctt ggg gat agc cag gta cgc   1008
Ser Met Ala Ala Gly Leu Asp Val Ile Leu Gly Asp Ser Gln Val Arg
                325                 330                 335

agt gtg ttt gtg aat gtg ttt ggt ggc atc acc gcg tgt gat gtg gtg   1056
Ser Val Phe Val Asn Val Phe Gly Gly Ile Thr Ala Cys Asp Val Val
            340                 345                 350
```

```
gca aag gga atc gtt gga gct ttg gat gtg ctc ggc gat caa gca acg   1104
Ala Lys Gly Ile Val Gly Ala Leu Asp Val Leu Gly Asp Gln Ala Thr
        355                 360                 365

aag cct ctt gtg gtg cgc ctt gat ggc aac aac gtg gtg gaa ggc aga   1152
Lys Pro Leu Val Val Arg Leu Asp Gly Asn Asn Val Val Glu Gly Arg
    370                 375                 380

cga atc ctc gcg gaa tat aac cac cct ttg gtc acc gtt gtg gag ggt   1200
Arg Ile Leu Ala Glu Tyr Asn His Pro Leu Val Thr Val Val Glu Gly
385                 390                 395                 400

atg gat gca gcg gct gat cac gct gcc cat ttg gcc aat ctt gcc cag   1248
Met Asp Ala Ala Ala Asp His Ala Ala His Leu Ala Asn Leu Ala Gln
                405                 410                 415

cac ggc cag ttc gca acc gct aat                                  1272
His Gly Gln Phe Ala Thr Ala Asn
            420
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<210> 12
<211> 424
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 12

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Met Lys His Leu Leu Leu Arg Glu Asp Phe Val Lys Asp Ala Glu Gly
  1               5                  10                  15

Ser Lys His Gly Pro Glu Met Glu Leu Ala Val Asp Leu Phe Glu Tyr
             20                  25                  30

Gln Ala Arg Asp Leu Phe Glu Thr His Gly Val Pro Val Leu Lys Gly
         35                  40                  45

Ile Val Ala Ser Thr Pro Glu Ala Ala Arg Lys Ala Ala Glu Glu Ile
     50                  55                  60

Gly Gly Leu Thr Val Val Lys Ala Gln Val Lys Val Gly Gly Arg Gly
 65                  70                  75                  80

Lys Ala Gly Gly Val Arg Val Ala Pro Thr Ser Ala Gln Ala Phe Asp
                 85                  90                  95

Ala Ala Asp Ala Ile Leu Gly Met Asp Ile Lys Gly His Thr Val Asn
            100                 105                 110

Gln Val Met Val Ala Gln Gly Ala Asp Ile Ala Glu Glu Tyr Tyr Phe
        115                 120                 125

Ser Ile Leu Leu Asp Arg Ala Asn Arg Ser Tyr Leu Ala Met Cys Ser
    130                 135                 140

Val Glu Gly Gly Met Glu Ile Glu Ile Leu Ala Lys Glu Lys Pro Glu
145                 150                 155                 160
```

```
Ala Leu Ala Lys Val Glu Val Asp Pro Leu Thr Gly Ile Asp Glu Asp
                165                 170                 175

Lys Ala Arg Glu Ile Val Thr Ala Ala Gly Phe Glu Thr Glu Val Ala
            180                 185                 190

Glu Lys Val Ile Pro Val Leu Ile Lys Ile Trp Gln Val Tyr Tyr Glu
        195                 200                 205

Glu Glu Ala Thr Leu Val Glu Val Asn Pro Leu Val Leu Thr Asp Asp
    210                 215                 220

Gly Asp Val Ile Ala Leu Asp Gly Lys Ile Thr Leu Asp Asp Asn Ala
225                 230                 235                 240

Asp Phe Arg His Asp Asn Arg Gly Ala Leu Ala Glu Ser Ala Gly Gly
                245                 250                 255

Leu Asp Ile Leu Glu Leu Lys Ala Lys Lys Asn Asp Leu Asn Tyr Val
            260                 265                 270

Lys Leu Asp Gly Ser Val Gly Ile Ile Gly Asn Gly Ala Gly Leu Val
        275                 280                 285

Met Ser Thr Leu Asp Ile Val Ala Ala Ala Gly Glu Arg His Gly Gly
    290                 295                 300

Gln Arg Pro Ala Asn Phe Leu Asp Ile Gly Gly Gly Ala Ser Ala Glu
305                 310                 315                 320

Ser Met Ala Ala Gly Leu Asp Val Ile Leu Gly Asp Ser Gln Val Arg
                325                 330                 335

Ser Val Phe Val Asn Val Phe Gly Gly Ile Thr Ala Cys Asp Val Val
            340                 345                 350

Ala Lys Gly Ile Val Gly Ala Leu Asp Val Leu Gly Asp Gln Ala Thr
        355                 360                 365

Lys Pro Leu Val Val Arg Leu Asp Gly Asn Asn Val Val Glu Gly Arg
    370                 375                 380

Arg Ile Leu Ala Glu Tyr Asn His Pro Leu Val Thr Val Val Glu Gly
385                 390                 395                 400

Met Asp Ala Ala Ala Asp His Ala Ala His Leu Ala Asn Leu Ala Gln
                405                 410                 415

His Gly Gln Phe Ala Thr Ala Asn
            420
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<210> 13
<211> 1194
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS

<222> (1)..(1194)
<223> RXA00783K

<400> 13

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gtg gat ctt ttt gaa tac caa gca cgg gac ctc ttt gaa acc cat ggt   48
Met Asp Leu Phe Glu Tyr Gln Ala Arg Asp Leu Phe Glu Thr His Gly
  1               5                  10                  15

gtg cca gtg ttg aag gga att gtg gca tca aca cca gag gcg gcg agg   96
Val Pro Val Leu Lys Gly Ile Val Ala Ser Thr Pro Glu Ala Ala Arg
             20                  25                  30

aaa gcg gct gag gaa atc ggc gga ctg acc gtc gtc aag gct cag gtc   144
Lys Ala Ala Glu Glu Ile Gly Gly Leu Thr Val Val Lys Ala Gln Val
         35                  40                  45

aag gtg ggc gga cgt ggc aag gcg ggt ggc gtc cgt gtg gca ccg acg   192
Lys Val Gly Gly Arg Gly Lys Ala Gly Gly Val Arg Val Ala Pro Thr
     50                  55                  60

tcg gct cag gct ttt gat gct gcg gat gcg att ctc ggc atg gat atc   240
Ser Ala Gln Ala Phe Asp Ala Ala Asp Ala Ile Leu Gly Met Asp Ile
 65                  70                  75                  80

aaa gga cac act gtt aat cag gtg atg gtg gcg cag ggc gct gac att   288
Lys Gly His Thr Val Asn Gln Val Met Val Ala Gln Gly Ala Asp Ile
                 85                  90                  95

gct gag gaa tac tat ttc tcc att ttg ttg gat cgc gcg aat cgt tcg   336
Ala Glu Glu Tyr Tyr Phe Ser Ile Leu Leu Asp Arg Ala Asn Arg Ser
            100                 105                 110

tat ctg gct atg tgc tct gtt gaa ggt ggc atg gag atc gag atc ctg   384
Tyr Leu Ala Met Cys Ser Val Glu Gly Gly Met Glu Ile Glu Ile Leu
        115                 120                 125

gcg aag gaa aag cct gaa gct ttg gca aag gtg gaa gtg gat ccc ctc   432
Ala Lys Glu Lys Pro Glu Ala Leu Ala Lys Val Glu Val Asp Pro Leu
    130                 135                 140

act ggt att gat gag gac aaa gcg cgg gag att gtc act gct gct ggc   480
Thr Gly Ile Asp Glu Asp Lys Ala Arg Glu Ile Val Thr Ala Ala Gly
145                 150                 155                 160

ttt gaa act gag gtg gca gag aaa gtc att ccg gtg ctg atc aag atc   528
Phe Glu Thr Glu Val Ala Glu Lys Val Ile Pro Val Leu Ile Lys Ile
                165                 170                 175

tgg cag gtg tat tac gaa gag gaa gca aca ctc gtt gag gtg aac ccg   576
Trp Gln Val Tyr Tyr Glu Glu Glu Ala Thr Leu Val Glu Val Asn Pro
            180                 185                 190

ttg gtg ctc acg gat gac ggc gat gtg att gcg ctt gat ggc aag atc   624
Leu Val Leu Thr Asp Asp Gly Asp Val Ile Ala Leu Asp Gly Lys Ile
        195                 200                 205

acg ctg gat gat aac gct gat ttc cgc cat gat aac cgt ggt gcg ttg   672
Thr Leu Asp Asp Asn Ala Asp Phe Arg His Asp Asn Arg Gly Ala Leu
    210                 215                 220
```

```
gct gaa tct gcc ggt ggc ttg gac att ttg gaa ctg aag gcc aag aag   720
Ala Glu Ser Ala Gly Gly Leu Asp Ile Leu Glu Leu Lys Ala Lys Lys
225                 230                 235                 240

aat gat ctg aac tac gtg aaa ctt gat ggc tct gtg ggc atc att ggc   768
Asn Asp Leu Asn Tyr Val Lys Leu Asp Gly Ser Val Gly Ile Ile Gly
                245                 250                 255

aat ggt gca ggt ttg gtg atg tcc acg ttg gat atc gtg gct gca gct   816
Asn Gly Ala Gly Leu Val Met Ser Thr Leu Asp Ile Val Ala Ala Ala
            260                 265                 270

ggt gaa cgc cat ggt ggg cag cgc ccc gcg aac ttc cta gac att ggt   864
Gly Glu Arg His Gly Gly Gln Arg Pro Ala Asn Phe Leu Asp Ile Gly
        275                 280                 285

ggc gga gca tca gct gaa tcg atg gct gct ggt ctc gat gtg atc ctt   912
Gly Gly Ala Ser Ala Glu Ser Met Ala Ala Gly Leu Asp Val Ile Leu
    290                 295                 300

ggg gat agc cag gta cgc agt gtg ttt gtg aat gtg ttt ggt ggc atc   960
Gly Asp Ser Gln Val Arg Ser Val Phe Val Asn Val Phe Gly Gly Ile
305                 310                 315                 320

acc gcg tgt gat gtg gtg gca aag gga atc gtt gga gct ttg gat gtg   1008
Thr Ala Cys Asp Val Val Ala Lys Gly Ile Val Gly Ala Leu Asp Val
                325                 330                 335

ctc ggc gat caa gca acg aag cct ctt gtg gtg cgc ctt gat ggc aac   1056
Leu Gly Asp Gln Ala Thr Lys Pro Leu Val Val Arg Leu Asp Gly Asn
            340                 345                 350

aac gtg gtg gaa ggc aga cga atc ctc gcg gaa tat aac cac cct ttg   1104
Asn Val Val Glu Gly Arg Arg Ile Leu Ala Glu Tyr Asn His Pro Leu
        355                 360                 365

gtc acc gtt gtg gag ggt atg gat gca gcg gct gat cac gct gcc cat   1152
Val Thr Val Val Glu Gly Met Asp Ala Ala Ala Asp His Ala Ala His
    370                 375                 380

ttg gcc aat ctt gcc cag cac ggc cag ttc gca acc gct aat           1194
Leu Ala Asn Leu Ala Gln His Gly Gln Phe Ala Thr Ala Asn
385                 390                 395
```

<210> 14
<211> 398
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 14

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Met Asp Leu Phe Glu Tyr Gln Ala Arg Asp Leu Phe Glu Thr His Gly
  1               5                  10                  15

Val Pro Val Leu Lys Gly Ile Val Ala Ser Thr Pro Glu Ala Ala Arg
             20                  25                  30
```

```
Lys Ala Ala Glu Glu Ile Gly Gly Leu Thr Val Val Lys Ala Gln Val
         35                  40                  45

Lys Val Gly Gly Arg Gly Lys Ala Gly Gly Val Arg Val Ala Pro Thr
     50                  55                  60

Ser Ala Gln Ala Phe Asp Ala Ala Asp Ala Ile Leu Gly Met Asp Ile
 65                  70                  75                  80

Lys Gly His Thr Val Asn Gln Val Met Val Ala Gln Gly Ala Asp Ile
                 85                  90                  95

Ala Glu Glu Tyr Tyr Phe Ser Ile Leu Leu Asp Arg Ala Asn Arg Ser
            100                 105                 110

Tyr Leu Ala Met Cys Ser Val Glu Gly Gly Met Glu Ile Glu Ile Leu
        115                 120                 125

Ala Lys Glu Lys Pro Glu Ala Leu Ala Lys Val Glu Val Asp Pro Leu
    130                 135                 140

Thr Gly Ile Asp Glu Asp Lys Ala Arg Glu Ile Val Thr Ala Ala Gly
145                 150                 155                 160

Phe Glu Thr Glu Val Ala Glu Lys Val Ile Pro Val Leu Ile Lys Ile
                165                 170                 175

Trp Gln Val Tyr Tyr Glu Glu Glu Ala Thr Leu Val Glu Val Asn Pro
            180                 185                 190

Leu Val Leu Thr Asp Asp Gly Asp Val Ile Ala Leu Asp Gly Lys Ile
        195                 200                 205

Thr Leu Asp Asp Asn Ala Asp Phe Arg His Asp Asn Arg Gly Ala Leu
    210                 215                 220

Ala Glu Ser Ala Gly Gly Leu Asp Ile Leu Glu Leu Lys Ala Lys Lys
225                 230                 235                 240

Asn Asp Leu Asn Tyr Val Lys Leu Asp Gly Ser Val Gly Ile Ile Gly
                245                 250                 255

Asn Gly Ala Gly Leu Val Met Ser Thr Leu Asp Ile Val Ala Ala Ala
            260                 265                 270

Gly Glu Arg His Gly Gly Gln Arg Pro Ala Asn Phe Leu Asp Ile Gly
        275                 280                 285

Gly Gly Ala Ser Ala Glu Ser Met Ala Ala Gly Leu Asp Val Ile Leu
    290                 295                 300

Gly Asp Ser Gln Val Arg Ser Val Phe Val Asn Val Phe Gly Gly Ile
305                 310                 315                 320

Thr Ala Cys Asp Val Val Ala Lys Gly Ile Val Gly Ala Leu Asp Val
                325                 330                 335

Leu Gly Asp Gln Ala Thr Lys Pro Leu Val Val Arg Leu Asp Gly Asn
            340                 345                 350
```

```
Asn Val Val Glu Gly Arg Arg Ile Leu Ala Glu Tyr Asn His Pro Leu
        355                 360                 365

Val Thr Val Val Glu Gly Met Asp Ala Ala Ala Asp His Ala Ala His
    370                 375                 380

Leu Ala Asn Leu Ala Gln His Gly Gln Phe Ala Thr Ala Asn
385                 390                 395


<210> 15
<211> 1335
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1335)
<223> RXA00969K

<400> 15
atg acc tca gca tct gcc cca agc ttt aac ccc ggc aag ggt ccc ggc   48
Met Thr Ser Ala Ser Ala Pro Ser Phe Asn Pro Gly Lys Gly Pro Gly
  1               5                  10                  15

tca gca gtc gga att gcc ctt tta gga ttc gga aca gtc ggc act gag   96
Ser Ala Val Gly Ile Ala Leu Leu Gly Phe Gly Thr Val Gly Thr Glu
             20                  25                  30

gtg atg cgt ctg atg acc gag tac ggt gat gaa ctt gcg cac cgc att   144
Val Met Arg Leu Met Thr Glu Tyr Gly Asp Glu Leu Ala His Arg Ile
         35                  40                  45

ggt ggc cca ctg gag gtt cgt ggc att gct gtt tct gat atc tca aag   192
Gly Gly Pro Leu Glu Val Arg Gly Ile Ala Val Ser Asp Ile Ser Lys
     50                  55                  60

cca cgt gaa ggc gtt gca cct gag ctg ctc act gag gac gct ttt gca   240
Pro Arg Glu Gly Val Ala Pro Glu Leu Leu Thr Glu Asp Ala Phe Ala
 65                  70                  75                  80

ctc atc gag cgc gag gat gtt gac atc gtc gtt gag gtt atc ggc ggc   288
Leu Ile Glu Arg Glu Asp Val Asp Ile Val Val Glu Val Ile Gly Gly
                 85                  90                  95

att gag tac cca cgt gag gta gtt ctc gca gct ctg aag gcc ggc aag   336
Ile Glu Tyr Pro Arg Glu Val Val Leu Ala Ala Leu Lys Ala Gly Lys
            100                 105                 110

tct gtt gtt acc gcc aat aag gct ctt gtt gca gct cac tct gct gag   384
Ser Val Val Thr Ala Asn Lys Ala Leu Val Ala Ala His Ser Ala Glu
        115                 120                 125

ctt gct gat gca gcg gaa gcc gca aac gtt gac ctg tac ttc gag gct   432
Leu Ala Asp Ala Ala Glu Ala Ala Asn Val Asp Leu Tyr Phe Glu Ala
    130                 135                 140

gct gtt gca ggc gca att cca gtg gtt ggc cca ctg cgt cgc tcc ctg   480
```

```
Ala Val Ala Gly Ala Ile Pro Val Val Gly Pro Leu Arg Arg Ser Leu
145                 150                 155                 160

gct ggc gat cag atc cag tct gtg atg ggc atc gtt aac ggc acc acc   528
Ala Gly Asp Gln Ile Gln Ser Val Met Gly Ile Val Asn Gly Thr Thr
                165                 170                 175

aac ttc atc ttg gac gcc atg gat tcc acc ggc gct gac tat gca gat   576
Asn Phe Ile Leu Asp Ala Met Asp Ser Thr Gly Ala Asp Tyr Ala Asp
            180                 185                 190

tct ttg gct gag gca act cgt ttg ggt tac gcc gaa gct gat cca act   624
Ser Leu Ala Glu Ala Thr Arg Leu Gly Tyr Ala Glu Ala Asp Pro Thr
        195                 200                 205

gca gac gtc gaa ggc cat gac gcc gca tcc aag gct gca att ttg gca   672
Ala Asp Val Glu Gly His Asp Ala Ala Ser Lys Ala Ala Ile Leu Ala
    210                 215                 220

tcc atc gct ttc cac acc cgt gtt acc gcg gat gat gtg tac tgc gaa   720
Ser Ile Ala Phe His Thr Arg Val Thr Ala Asp Asp Val Tyr Cys Glu
225                 230                 235                 240

ggt atc agc aac atc agc gct gcc gac att gag gca gca cag cag gca   768
Gly Ile Ser Asn Ile Ser Ala Ala Asp Ile Glu Ala Ala Gln Gln Ala
                245                 250                 255

ggc cac acc atc aag ttg ttg gcc atc tgt gag aag ttc acc aac aag   816
Gly His Thr Ile Lys Leu Leu Ala Ile Cys Glu Lys Phe Thr Asn Lys
            260                 265                 270

gaa gga aag tcg gct att tct gct cgc gtg cac ccg act cta tta cct   864
Glu Gly Lys Ser Ala Ile Ser Ala Arg Val His Pro Thr Leu Leu Pro
        275                 280                 285

gtg tcc cac cca ctg gcg tcg gta aac aag tcc ttt aat gca atc ttt   912
Val Ser His Pro Leu Ala Ser Val Asn Lys Ser Phe Asn Ala Ile Phe
    290                 295                 300

gtt gaa gca gaa gca gct ggt cgc ctg atg ttc tac gga aac ggt gca   960
Val Glu Ala Glu Ala Ala Gly Arg Leu Met Phe Tyr Gly Asn Gly Ala
305                 310                 315                 320

ggt ggc gcg cca acc gcg tct gct gtg ctt ggc gac gtc gtt ggt gcc  1008
Gly Gly Ala Pro Thr Ala Ser Ala Val Leu Gly Asp Val Val Gly Ala
                325                 330                 335

gca cga aac aag gtg cac ggt ggc cgt gct cca ggt gag tcc acc tac  1056
Ala Arg Asn Lys Val His Gly Gly Arg Ala Pro Gly Glu Ser Thr Tyr
            340                 345                 350

gct aac ctg ccg atc gct gat ttc ggt gag acc acc act cgt tac cac  1104
Ala Asn Leu Pro Ile Ala Asp Phe Gly Glu Thr Thr Thr Arg Tyr His
        355                 360                 365

ctc gac atg gat gtg gaa gat cgc gtg ggg gtt ttg gct gaa ttg gct  1152
Leu Asp Met Asp Val Glu Asp Arg Val Gly Val Leu Ala Glu Leu Ala
    370                 375                 380
```

```
agc ctg ttc tct gag caa gga atc tcc ctg cgt aca atc cga cag gaa   1200
Ser Leu Phe Ser Glu Gln Gly Ile Ser Leu Arg Thr Ile Arg Gln Glu
385                 390                 395                 400

gag cgc gat gat gat gca cgt ctg atc gtg gtc acc cac tct gcg ctg   1248
Glu Arg Asp Asp Asp Ala Arg Leu Ile Val Val Thr His Ser Ala Leu
                405                 410                 415

gaa tct gat ctt tcc cgc acc gtt gaa ctg ctg aag gct aag cct gtt   1296
Glu Ser Asp Leu Ser Arg Thr Val Glu Leu Leu Lys Ala Lys Pro Val
            420                 425                 430

gtt aag gca atc aac agt gtg atc cgc ctc gaa agg gac               1335
Val Lys Ala Ile Asn Ser Val Ile Arg Leu Glu Arg Asp
        435                 440                 445
```

<210> 16
<211> 445
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 16

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Met Thr Ser Ala Ser Ala Pro Ser Phe Asn Pro Gly Lys Gly Pro Gly
  1               5                  10                  15

Ser Ala Val Gly Ile Ala Leu Leu Gly Phe Gly Thr Val Gly Thr Glu
             20                  25                  30

Val Met Arg Leu Met Thr Glu Tyr Gly Asp Glu Leu Ala His Arg Ile
         35                  40                  45

Gly Gly Pro Leu Glu Val Arg Gly Ile Ala Val Ser Asp Ile Ser Lys
     50                  55                  60

Pro Arg Glu Gly Val Ala Pro Glu Leu Leu Thr Glu Asp Ala Phe Ala
 65                  70                  75                  80

Leu Ile Glu Arg Glu Asp Val Asp Ile Val Val Glu Val Ile Gly Gly
                 85                  90                  95

Ile Glu Tyr Pro Arg Glu Val Val Leu Ala Ala Leu Lys Ala Gly Lys
            100                 105                 110

Ser Val Val Thr Ala Asn Lys Ala Leu Val Ala Ala His Ser Ala Glu
        115                 120                 125

Leu Ala Asp Ala Ala Glu Ala Ala Asn Val Asp Leu Tyr Phe Glu Ala
    130                 135                 140

Ala Val Ala Gly Ala Ile Pro Val Val Gly Pro Leu Arg Arg Ser Leu
145                 150                 155                 160

Ala Gly Asp Gln Ile Gln Ser Val Met Gly Ile Val Asn Gly Thr Thr
                165                 170                 175

Asn Phe Ile Leu Asp Ala Met Asp Ser Thr Gly Ala Asp Tyr Ala Asp
            180                 185                 190
```

```
Ser Leu Ala Glu Ala Thr Arg Leu Gly Tyr Ala Glu Ala Asp Pro Thr
        195                 200                 205

Ala Asp Val Glu Gly His Asp Ala Ala Ser Lys Ala Ala Ile Leu Ala
    210                 215                 220

Ser Ile Ala Phe His Thr Arg Val Thr Ala Asp Asp Val Tyr Cys Glu
225                 230                 235                 240

Gly Ile Ser Asn Ile Ser Ala Ala Asp Ile Glu Ala Ala Gln Gln Ala
                245                 250                 255

Gly His Thr Ile Lys Leu Leu Ala Ile Cys Glu Lys Phe Thr Asn Lys
            260                 265                 270

Glu Gly Lys Ser Ala Ile Ser Ala Arg Val His Pro Thr Leu Leu Pro
        275                 280                 285

Val Ser His Pro Leu Ala Ser Val Asn Lys Ser Phe Asn Ala Ile Phe
    290                 295                 300

Val Glu Ala Glu Ala Ala Gly Arg Leu Met Phe Tyr Gly Asn Gly Ala
305                 310                 315                 320

Gly Gly Ala Pro Thr Ala Ser Ala Val Leu Gly Asp Val Val Gly Ala
                325                 330                 335

Ala Arg Asn Lys Val His Gly Gly Arg Ala Pro Gly Glu Ser Thr Tyr
            340                 345                 350

Ala Asn Leu Pro Ile Ala Asp Phe Gly Glu Thr Thr Thr Arg Tyr His
        355                 360                 365

Leu Asp Met Asp Val Glu Asp Arg Val Gly Val Leu Ala Glu Leu Ala
    370                 375                 380

Ser Leu Phe Ser Glu Gln Gly Ile Ser Leu Arg Thr Ile Arg Gln Glu
385                 390                 395                 400

Glu Arg Asp Asp Asp Ala Arg Leu Ile Val Val Thr His Ser Ala Leu
                405                 410                 415

Glu Ser Asp Leu Ser Arg Thr Val Glu Leu Leu Lys Ala Lys Pro Val
            420                 425                 430

Val Lys Ala Ile Asn Ser Val Ile Arg Leu Glu Arg Asp
        435                 440                 445
```

<210> 17
<211> 690
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(690)
<223> RCGL01443K

<400> 17

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gtg acc aca caa acc gcc cct acc gca gcc tcc gat ctt ttt gcc gag   48
Met Thr Thr Gln Thr Ala Pro Thr Ala Ala Ser Asp Leu Phe Ala Glu
  1               5                  10                  15

tcc tac aaa ctc agc cca aag cag cgc gaa gtt tta gat gcc cta caa   96
Ser Tyr Lys Leu Ser Pro Lys Gln Arg Glu Val Leu Asp Ala Leu Gln
             20                  25                  30


acc ttc cct gac ggt gcc cgc gcg atc gat gtc gcc aaa aaa ctc gac   144
Thr Phe Pro Asp Gly Ala Arg Ala Ile Asp Val Ala Lys Lys Leu Asp
         35                  40                  45

ctt cac gtc aac acc gcc cgc ggc cac ctc gaa gaa ctc gta gca aaa   192
Leu His Val Asn Thr Ala Arg Gly His Leu Glu Glu Leu Val Ala Lys
     50                  55                  60

gaa gcc atc cga gta gtc acc gca gca gcc aaa ggt cgc gga cgc ccc   240
Glu Ala Ile Arg Val Val Thr Ala Ala Ala Lys Gly Arg Gly Arg Pro
 65                  70                  75                  80

tcc ctc atc ttc caa aca cgc gtc ccc gac aac cgc gct gtc gcc aaa   288
Ser Leu Ile Phe Gln Thr Arg Val Pro Asp Asn Arg Ala Val Ala Lys
                 85                  90                  95

gaa tac atc acc ctg atc gaa ctc atg gcc aac atg ctc ggc gat gtc   336
Glu Tyr Ile Thr Leu Ile Glu Leu Met Ala Asn Met Leu Gly Asp Val
            100                 105                 110

gac gat gac gca atg cac aac ccc gac ctc cgc gcc aaa gca ctt tcc   384
Asp Asp Asp Ala Met His Asn Pro Asp Leu Arg Ala Lys Ala Leu Ser
        115                 120                 125

atc gga acc cag tgg gca cac gtc atg ggc att aac cac gcc gaa gcc   432
Ile Gly Thr Gln Trp Ala His Val Met Gly Ile Asn His Ala Glu Ala
    130                 135                 140

gaa gaa ctc gac gaa gcc ctc tcc ccg ctc att aac cgc ctc cgc gaa   480
Glu Glu Leu Asp Glu Ala Leu Ser Pro Leu Ile Asn Arg Leu Arg Glu
145                 150                 155                 160

atg ggc ttt gac ccc acc gaa acc gaa gaa gca aac tcc ctc gct cta   528
Met Gly Phe Asp Pro Thr Glu Thr Glu Glu Ala Asn Ser Leu Ala Leu
                165                 170                 175

cac agc tgc cca ttt gtg gtc aac gac aaa cgc cca tca gcc ttc gtc   576
His Ser Cys Pro Phe Val Val Asn Asp Lys Arg Pro Ser Ala Phe Val
            180                 185                 190

tgc gcc atc cac gcc gga ttc atc caa gaa agc ctc ggt gaa aac aac   624
Cys Ala Ile His Ala Gly Phe Ile Gln Glu Ser Leu Gly Glu Asn Asn
        195                 200                 205

cgc atc cag ctg gaa ctc aaa cca ctc aac gcg ccg ggc acc tgt aag   672
Arg Ile Gln Leu Glu Leu Lys Pro Leu Asn Ala Pro Gly Thr Cys Lys
    210                 215                 220
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gtt cac gtg ttc agc gaa 690
Val His Val Phe Ser Glu
225 230

<210> 18
<211> 230
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 18
Met Thr Thr Gln Thr Ala Pro Thr Ala Ala Ser Asp Leu Phe Ala Glu
1 5 10 15

Ser Tyr Lys Leu Ser Pro Lys Gln Arg Glu Val Leu Asp Ala Leu Gln
20 25 30

Thr Phe Pro Asp Gly Ala Arg Ala Ile Asp Val Ala Lys Lys Leu Asp
35 40 45

Leu His Val Asn Thr Ala Arg Gly His Leu Glu Glu Leu Val Ala Lys
50 55 60

Glu Ala Ile Arg Val Val Thr Ala Ala Ala Lys Gly Arg Gly Arg Pro
65 70 75 80

Ser Leu Ile Phe Gln Thr Arg Val Pro Asp Asn Arg Ala Val Ala Lys
85 90 95

Glu Tyr Ile Thr Leu Ile Glu Leu Met Ala Asn Met Leu Gly Asp Val
100 105 110

Asp Asp Asp Ala Met His Asn Pro Asp Leu Arg Ala Lys Ala Leu Ser
115 120 125

Ile Gly Thr Gln Trp Ala His Val Met Gly Ile Asn His Ala Glu Ala
130 135 140

Glu Glu Leu Asp Glu Ala Leu Ser Pro Leu Ile Asn Arg Leu Arg Glu
145 150 155 160

Met Gly Phe Asp Pro Thr Glu Thr Glu Glu Ala Asn Ser Leu Ala Leu
165 170 175

His Ser Cys Pro Phe Val Val Asn Asp Lys Arg Pro Ser Ala Phe Val
180 185 190

Cys Ala Ile His Ala Gly Phe Ile Gln Glu Ser Leu Gly Glu Asn Asn
195 200 205

Arg Ile Gln Leu Glu Leu Lys Pro Leu Asn Ala Pro Gly Thr Cys Lys
210 215 220

Val His Val Phe Ser Glu
225 230

<210> 19

<211> 1476
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1476)
<223> RXA00999K

<400> 19

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atg ccg tca agt acg atc aat aac atg act aat gga gat aat ctc gca   48
Met Pro Ser Ser Thr Ile Asn Asn Met Thr Asn Gly Asp Asn Leu Ala
  1               5                  10                  15

cag atc ggc gtt gta ggc cta gca gta atg ggc tca aac ctc gcc cgc   96
Gln Ile Gly Val Val Gly Leu Ala Val Met Gly Ser Asn Leu Ala Arg
             20                  25                  30

aac ttc gcc cgc aac ggc aac act gtc gct gtc tac aac cgc agc act   144
Asn Phe Ala Arg Asn Gly Asn Thr Val Ala Val Tyr Asn Arg Ser Thr
         35                  40                  45

gac aaa acc gac aag ctc atc gcc gat cac ggc tcc gaa ggc aac ttc   192
Asp Lys Thr Asp Lys Leu Ile Ala Asp His Gly Ser Glu Gly Asn Phe
     50                  55                  60

atc cct tct gca acc gtc gaa gag ttc gta gca tcc ctg gaa aag cca   240
Ile Pro Ser Ala Thr Val Glu Glu Phe Val Ala Ser Leu Glu Lys Pro
 65                  70                  75                  80

cgc cgc gcc atc atc atg gtt cag gct ggt aac gcc acc gac gca gtc   288
Arg Arg Ala Ile Ile Met Val Gln Ala Gly Asn Ala Thr Asp Ala Val
                 85                  90                  95

atc aac cag ctg gca gat gcc atg gac gaa ggc gac atc atc atc gac   336
Ile Asn Gln Leu Ala Asp Ala Met Asp Glu Gly Asp Ile Ile Ile Asp
            100                 105                 110

ggc ggc aac gcc ctc tac acc gac acc att cgt cgc gag aag gaa atc   384
Gly Gly Asn Ala Leu Tyr Thr Asp Thr Ile Arg Arg Glu Lys Glu Ile
        115                 120                 125

tcc gca cgc ggt ctc cac ttc gtc ggt gct ggt atc tcc ggc ggc gaa   432
Ser Ala Arg Gly Leu His Phe Val Gly Ala Gly Ile Ser Gly Gly Glu
    130                 135                 140

gaa ggc gca ctc aac ggc cca tcc atc atg cct ggt ggc cca gca aag   480
Glu Gly Ala Leu Asn Gly Pro Ser Ile Met Pro Gly Gly Pro Ala Lys
145                 150                 155                 160

tcc tac gag tcc ctc gga cca ctg ctt gag tcc atc gct gcc aac gtt   528
Ser Tyr Glu Ser Leu Gly Pro Leu Leu Glu Ser Ile Ala Ala Asn Val
                165                 170                 175

gac ggc acc cca tgt gtc acc cac atc ggc cca gac ggc gcc ggc cac   576
Asp Gly Thr Pro Cys Val Thr His Ile Gly Pro Asp Gly Ala Gly His
            180                 185                 190

ttc gtc aag atg gtc cac aac ggc atc gag tac gcc gac atg cag gtc   624
```

```
Phe Val Lys Met Val His Asn Gly Ile Glu Tyr Ala Asp Met Gln Val
        195                 200                 205

atc ggc gag gca tac cac ctt ctc cgc tac gca gca ggc atg cag cca   672
Ile Gly Glu Ala Tyr His Leu Leu Arg Tyr Ala Ala Gly Met Gln Pro
    210                 215                 220

gct gaa atc gct gag gtt ttc aag gaa tgg aac gca ggc gac ctg gat   720
Ala Glu Ile Ala Glu Val Phe Lys Glu Trp Asn Ala Gly Asp Leu Asp
225                 230                 235                 240

tcc tac ctc atc gaa atc acc gca gag gtt ctc tcc cag gtg gat gct   768
Ser Tyr Leu Ile Glu Ile Thr Ala Glu Val Leu Ser Gln Val Asp Ala
                245                 250                 255

gaa acc ggc aag cca cta atc gac gtc atc gtt gac gct gca ggt cag   816
Glu Thr Gly Lys Pro Leu Ile Asp Val Ile Val Asp Ala Ala Gly Gln
            260                 265                 270

aag ggc acc gga cgt tgg acc gtc aag gct gct ctt gat ctg ggt att   864
Lys Gly Thr Gly Arg Trp Thr Val Lys Ala Ala Leu Asp Leu Gly Ile
        275                 280                 285

gct acc acc ggc atc ggc gaa gct gtt ttc gca cgt gca ctc tcc ggc   912
Ala Thr Thr Gly Ile Gly Glu Ala Val Phe Ala Arg Ala Leu Ser Gly
    290                 295                 300

gca acc agc cag cgc gct gca gca cag ggc aac cta cct gca ggt gtc   960
Ala Thr Ser Gln Arg Ala Ala Ala Gln Gly Asn Leu Pro Ala Gly Val
305                 310                 315                 320

ctc acc gat ctg gaa gca ctt ggc gtg gac aag gca cag ttc gtc gaa  1008
Leu Thr Asp Leu Glu Ala Leu Gly Val Asp Lys Ala Gln Phe Val Glu
                325                 330                 335

gac gtt cgc cgt gca ctg tac gca tcc aag ctt gtt gct tac gca cag  1056
Asp Val Arg Arg Ala Leu Tyr Ala Ser Lys Leu Val Ala Tyr Ala Gln
            340                 345                 350

ggc ttc gac gag atc aag gct ggc tcc gac gag aac aac tgg gac gtt  1104
Gly Phe Asp Glu Ile Lys Ala Gly Ser Asp Glu Asn Asn Trp Asp Val
        355                 360                 365

gac cct cgc gac ctc gct acc atc tgg cgc ggc ggc tgc atc att cgc  1152
Asp Pro Arg Asp Leu Ala Thr Ile Trp Arg Gly Gly Cys Ile Ile Arg
    370                 375                 380

gct aag ttc ctc aac cgc atc gtc gaa gca tac gat gca aac gct gaa  1200
Ala Lys Phe Leu Asn Arg Ile Val Glu Ala Tyr Asp Ala Asn Ala Glu
385                 390                 395                 400


ctt gag tcc ctg ctg ctc gat cct tac ttc aag agc gag ctc ggc gac  1248
Leu Glu Ser Leu Leu Leu Asp Pro Tyr Phe Lys Ser Glu Leu Gly Asp
                405                 410                 415

ctc atc gat tca tgg cgt cgc gtg att gtc acc gcc acc cag ctt ggc  1296
Leu Ile Asp Ser Trp Arg Arg Val Ile Val Thr Ala Thr Gln Leu Gly
            420                 425                 430
```

```
ctg cca atc cca gtg ttc gct tcc tcc ctg tcc tac tac gac agc ctg   1344
Leu Pro Ile Pro Val Phe Ala Ser Ser Leu Ser Tyr Tyr Asp Ser Leu
        435                 440                 445

cgt gca gag cgt ctg cca gca gcc ctg atc caa gga cag cgc gac ttc   1392
Arg Ala Glu Arg Leu Pro Ala Ala Leu Ile Gln Gly Gln Arg Asp Phe
    450                 455                 460

ttc ggt gcg cac acc tac aag cgc atc gac aag gat ggc tcc ttc cac   1440
Phe Gly Ala His Thr Tyr Lys Arg Ile Asp Lys Asp Gly Ser Phe His
465                 470                 475                 480

acc gag tgg tcc ggc gac cgc tcc gag gtt gaa gct                   1476
Thr Glu Trp Ser Gly Asp Arg Ser Glu Val Glu Ala
                485                 490
```

<210> 20
<211> 492
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 20

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Met Pro Ser Ser Thr Ile Asn Asn Met Thr Asn Gly Asp Asn Leu Ala
  1               5                  10                  15

Gln Ile Gly Val Val Gly Leu Ala Val Met Gly Ser Asn Leu Ala Arg
             20                  25                  30

Asn Phe Ala Arg Asn Gly Asn Thr Val Ala Val Tyr Asn Arg Ser Thr
         35                  40                  45

Asp Lys Thr Asp Lys Leu Ile Ala Asp His Gly Ser Glu Gly Asn Phe
     50                  55                  60

Ile Pro Ser Ala Thr Val Glu Glu Phe Val Ala Ser Leu Glu Lys Pro
 65                  70                  75                  80

Arg Arg Ala Ile Ile Met Val Gln Ala Gly Asn Ala Thr Asp Ala Val
                 85                  90                  95

Ile Asn Gln Leu Ala Asp Ala Met Asp Glu Gly Asp Ile Ile Ile Asp
            100                 105                 110

Gly Gly Asn Ala Leu Tyr Thr Asp Thr Ile Arg Arg Glu Lys Glu Ile
        115                 120                 125

Ser Ala Arg Gly Leu His Phe Val Gly Ala Gly Ile Ser Gly Gly Glu
    130                 135                 140

Glu Gly Ala Leu Asn Gly Pro Ser Ile Met Pro Gly Gly Pro Ala Lys
145                 150                 155                 160

Ser Tyr Glu Ser Leu Gly Pro Leu Leu Glu Ser Ile Ala Ala Asn Val
                165                 170                 175

Asp Gly Thr Pro Cys Val Thr His Ile Gly Pro Asp Gly Ala Gly His
```

```
            180                 185                 190

Phe Val Lys Met Val His Asn Gly Ile Glu Tyr Ala Asp Met Gln Val
        195                 200                 205

Ile Gly Glu Ala Tyr His Leu Leu Arg Tyr Ala Ala Gly Met Gln Pro
    210                 215                 220

Ala Glu Ile Ala Glu Val Phe Lys Glu Trp Asn Ala Gly Asp Leu Asp
225                 230                 235                 240

Ser Tyr Leu Ile Glu Ile Thr Ala Glu Val Leu Ser Gln Val Asp Ala
                245                 250                 255

Glu Thr Gly Lys Pro Leu Ile Asp Val Ile Val Asp Ala Ala Gly Gln
            260                 265                 270

Lys Gly Thr Gly Arg Trp Thr Val Lys Ala Ala Leu Asp Leu Gly Ile
        275                 280                 285

Ala Thr Thr Gly Ile Gly Glu Ala Val Phe Ala Arg Ala Leu Ser Gly
    290                 295                 300

Ala Thr Ser Gln Arg Ala Ala Ala Gln Gly Asn Leu Pro Ala Gly Val
305                 310                 315                 320

Leu Thr Asp Leu Glu Ala Leu Gly Val Asp Lys Ala Gln Phe Val Glu
                325                 330                 335

Asp Val Arg Arg Ala Leu Tyr Ala Ser Lys Leu Val Ala Tyr Ala Gln
            340                 345                 350

Gly Phe Asp Glu Ile Lys Ala Gly Ser Asp Glu Asn Asn Trp Asp Val
        355                 360                 365

Asp Pro Arg Asp Leu Ala Thr Ile Trp Arg Gly Gly Cys Ile Ile Arg
    370                 375                 380

Ala Lys Phe Leu Asn Arg Ile Val Glu Ala Tyr Asp Ala Asn Ala Glu
385                 390                 395                 400

Leu Glu Ser Leu Leu Leu Asp Pro Tyr Phe Lys Ser Glu Leu Gly Asp
                405                 410                 415

Leu Ile Asp Ser Trp Arg Arg Val Ile Val Thr Ala Thr Gln Leu Gly
            420                 425                 430

Leu Pro Ile Pro Val Phe Ala Ser Ser Leu Ser Tyr Tyr Asp Ser Leu
        435                 440                 445

Arg Ala Glu Arg Leu Pro Ala Ala Leu Ile Gln Gly Gln Arg Asp Phe
    450                 455                 460

Phe Gly Ala His Thr Tyr Lys Arg Ile Asp Lys Asp Gly Ser Phe His
465                 470                 475                 480

Thr Glu Trp Ser Gly Asp Arg Ser Glu Val Glu Ala
                485                 490
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<210> 21
<211> 1431
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1431)
<223> RXA01093W

<400> 21

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atg ggc gtg gat aga cga act aag att gta tgt acc cta ggc cca gcg   48
Met Gly Val Asp Arg Arg Thr Lys Ile Val Cys Thr Leu Gly Pro Ala
  1               5                  10                  15

gtg gct agt gca gat gga att ctg cgt ttg gta gaa gac ggc atg gat   96
Val Ala Ser Ala Asp Gly Ile Leu Arg Leu Val Glu Asp Gly Met Asp
             20                  25                  30

gtt gct cgc ctc aac ttc tcc cat ggt gac cac cca gat cat gag caa   144
Val Ala Arg Leu Asn Phe Ser His Gly Asp His Pro Asp His Glu Gln
         35                  40                  45

aac tac aag tgg gtc cgc gag gcg gcg gag aag act ggc cgt gca gtc   192
Asn Tyr Lys Trp Val Arg Glu Ala Ala Glu Lys Thr Gly Arg Ala Val
     50                  55                  60

ggt att ctc gca gac ctc caa gga ccg aag atc cgt ctt ggc cgt ttc   240
Gly Ile Leu Ala Asp Leu Gln Gly Pro Lys Ile Arg Leu Gly Arg Phe
 65                  70                  75                  80

act gac ggc gca acc gtg tgg gaa aac ggc gag acc att cgg atc acc   288
Thr Asp Gly Ala Thr Val Trp Glu Asn Gly Glu Thr Ile Arg Ile Thr
                 85                  90                  95

gtt gac gat gta gag gga acg cac gat cgt gtg tcc acc acc tac aag   336
Val Asp Asp Val Glu Gly Thr His Asp Arg Val Ser Thr Thr Tyr Lys
            100                 105                 110

aat ctg gca aaa gac gcg aag cca ggc gac cgc ctg ctc gtt gat gac   384
Asn Leu Ala Lys Asp Ala Lys Pro Gly Asp Arg Leu Leu Val Asp Asp
        115                 120                 125

ggc aag gtt ggc ctc gtc tgc gtt tcc gtc gaa ggt aac gac gtc atc   432
Gly Lys Val Gly Leu Val Cys Val Ser Val Glu Gly Asn Asp Val Ile
    130                 135                 140

tgt gag gtt gtt gag ggc gga cca gtc tcc aac aac aag ggt gtt tcc   480
Cys Glu Val Val Glu Gly Gly Pro Val Ser Asn Asn Lys Gly Val Ser
145                 150                 155                 160

ctg cca ggt atg gat att tcc gta cct gca ctg tcc gaa aag gat atc   528
Leu Pro Gly Met Asp Ile Ser Val Pro Ala Leu Ser Glu Lys Asp Ile
                165                 170                 175

cgt gac ctg cgc ttc gcc ctg aag ctc ggc gtg gac ttt att gca ctg   576
Arg Asp Leu Arg Phe Ala Leu Lys Leu Gly Val Asp Phe Ile Ala Leu
            180                 185                 190
```

```
tcc ttc gta cgt tcc cca gca gat gct gaa ctc gtt cac aag atc atg   624
Ser Phe Val Arg Ser Pro Ala Asp Ala Glu Leu Val His Lys Ile Met
        195                 200                 205

gac gaa gaa ggt cgt cgt gtt cct gtg atc gcc aag ctg gaa aag cca   672
Asp Glu Glu Gly Arg Arg Val Pro Val Ile Ala Lys Leu Glu Lys Pro
    210                 215                 220

gag gct gtc acc tcc ctc gag cca atc gtg ttg gca ttc gac gcc gtc   720
Glu Ala Val Thr Ser Leu Glu Pro Ile Val Leu Ala Phe Asp Ala Val
225                 230                 235                 240

atg gtt gct cgt ggt gac ctc ggc gtt gag gtt cct ctg gag gag gtt   768
Met Val Ala Arg Gly Asp Leu Gly Val Glu Val Pro Leu Glu Glu Val
                245                 250                 255

cca ctg gtt cag aag cgc gca atc cag att gcc cgt gag aac gca aag   816
Pro Leu Val Gln Lys Arg Ala Ile Gln Ile Ala Arg Glu Asn Ala Lys
            260                 265                 270

cca gtt atc gtg gca acc cag atg ctg gat tcc atg att gag aac tcc   864
Pro Val Ile Val Ala Thr Gln Met Leu Asp Ser Met Ile Glu Asn Ser
        275                 280                 285

cgc cca acc cgt gcg gaa gct tct gac gtg gca aac gct gtg ctc gat   912
Arg Pro Thr Arg Ala Glu Ala Ser Asp Val Ala Asn Ala Val Leu Asp
    290                 295                 300

ggc gca gat gct gtc atg ctt tct ggt gaa act tca gtg ggc aaa gat   960
Gly Ala Asp Ala Val Met Leu Ser Gly Glu Thr Ser Val Gly Lys Asp
305                 310                 315                 320

ccg cac aac gtt gtg cgc acc atg tct cgc att gtt cgc ttc gct gaa  1008
Pro His Asn Val Val Arg Thr Met Ser Arg Ile Val Arg Phe Ala Glu
                325                 330                 335

acc gac ggt cgc gtc cca gac ctg acc cac atc cct cgc act aag cgt  1056
Thr Asp Gly Arg Val Pro Asp Leu Thr His Ile Pro Arg Thr Lys Arg
            340                 345                 350

ggc gtt att tcc tac tct gca cgt gat atc gcc gag cgc ctc aac gct  1104
Gly Val Ile Ser Tyr Ser Ala Arg Asp Ile Ala Glu Arg Leu Asn Ala
        355                 360                 365

cgt gca ttg gtt gcg ttc acc acc tct ggt gat acc gca aag cgt gtg  1152
Arg Ala Leu Val Ala Phe Thr Thr Ser Gly Asp Thr Ala Lys Arg Val
    370                 375                 380

gct cgt ctg cac agc cac ctg cca ctg ctc gtg ttc act cca aat gag  1200
Ala Arg Leu His Ser His Leu Pro Leu Leu Val Phe Thr Pro Asn Glu
385                 390                 395                 400

gca gtt cgc tct gag ctg gcg ctg acc tgg ggt gca acc acc ttc ctg  1248
Ala Val Arg Ser Glu Leu Ala Leu Thr Trp Gly Ala Thr Thr Phe Leu
                405                 410                 415

tgt cca cct gtc agc gat acc gat gac atg atg cgc gaa gtc gac cgt  1296
Cys Pro Pro Val Ser Asp Thr Asp Asp Met Met Arg Glu Val Asp Arg
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```
            420                 425                 430

gct ctt tta gca atg cct gag tac aac aag ggt gac atg atg gtt gtt   1344
Ala Leu Leu Ala Met Pro Glu Tyr Asn Lys Gly Asp Met Met Val Val
        435                 440                 445

gtt gca ggt tcc cct cct ggt gtt acc ggt aac acc aac atg att cac   1392
Val Ala Gly Ser Pro Pro Gly Val Thr Gly Asn Thr Asn Met Ile His
    450                 455                 460

gtc cac ctt ctt ggt gac gac aca agg att gca aag ctc               1431
Val His Leu Leu Gly Asp Asp Thr Arg Ile Ala Lys Leu
465                 470                 475
```

<210> 22
<211> 477
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 22

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Met Gly Val Asp Arg Arg Thr Lys Ile Val Cys Thr Leu Gly Pro Ala
  1               5                  10                  15

Val Ala Ser Ala Asp Gly Ile Leu Arg Leu Val Glu Asp Gly Met Asp
             20                  25                  30

Val Ala Arg Leu Asn Phe Ser His Gly Asp His Pro Asp His Glu Gln
         35                  40                  45

Asn Tyr Lys Trp Val Arg Glu Ala Ala Glu Lys Thr Gly Arg Ala Val
     50                  55                  60

Gly Ile Leu Ala Asp Leu Gln Gly Pro Lys Ile Arg Leu Gly Arg Phe
 65                  70                  75                  80

Thr Asp Gly Ala Thr Val Trp Glu Asn Gly Glu Thr Ile Arg Ile Thr
                 85                  90                  95

Val Asp Asp Val Glu Gly Thr His Asp Arg Val Ser Thr Thr Tyr Lys
            100                 105                 110

Asn Leu Ala Lys Asp Ala Lys Pro Gly Asp Arg Leu Leu Val Asp Asp
        115                 120                 125

Gly Lys Val Gly Leu Val Cys Val Ser Val Glu Gly Asn Asp Val Ile
    130                 135                 140

Cys Glu Val Val Glu Gly Gly Pro Val Ser Asn Asn Lys Gly Val Ser
145                 150                 155                 160

Leu Pro Gly Met Asp Ile Ser Val Pro Ala Leu Ser Glu Lys Asp Ile
                165                 170                 175

Arg Asp Leu Arg Phe Ala Leu Lys Leu Gly Val Asp Phe Ile Ala Leu
            180                 185                 190

Ser Phe Val Arg Ser Pro Ala Asp Ala Glu Leu Val His Lys Ile Met
```

```
        195                 200                 205

Asp Glu Glu Gly Arg Arg Val Pro Val Ile Ala Lys Leu Glu Lys Pro
    210                 215                 220

Glu Ala Val Thr Ser Leu Glu Pro Ile Val Leu Ala Phe Asp Ala Val
225                 230                 235                 240

Met Val Ala Arg Gly Asp Leu Gly Val Glu Val Pro Leu Glu Glu Val
                245                 250                 255

Pro Leu Val Gln Lys Arg Ala Ile Gln Ile Ala Arg Glu Asn Ala Lys
            260                 265                 270

Pro Val Ile Val Ala Thr Gln Met Leu Asp Ser Met Ile Glu Asn Ser
        275                 280                 285

Arg Pro Thr Arg Ala Glu Ala Ser Asp Val Ala Asn Ala Val Leu Asp
    290                 295                 300

Gly Ala Asp Ala Val Met Leu Ser Gly Glu Thr Ser Val Gly Lys Asp
305                 310                 315                 320

Pro His Asn Val Val Arg Thr Met Ser Arg Ile Val Arg Phe Ala Glu
                325                 330                 335

Thr Asp Gly Arg Val Pro Asp Leu Thr His Ile Pro Arg Thr Lys Arg
            340                 345                 350

Gly Val Ile Ser Tyr Ser Ala Arg Asp Ile Ala Glu Arg Leu Asn Ala
        355                 360                 365

Arg Ala Leu Val Ala Phe Thr Thr Ser Gly Asp Thr Ala Lys Arg Val
    370                 375                 380

Ala Arg Leu His Ser His Leu Pro Leu Leu Val Phe Thr Pro Asn Glu
385                 390                 395                 400

Ala Val Arg Ser Glu Leu Ala Leu Thr Trp Gly Ala Thr Thr Phe Leu
                405                 410                 415

Cys Pro Pro Val Ser Asp Thr Asp Asp Met Met Arg Glu Val Asp Arg
            420                 425                 430

Ala Leu Leu Ala Met Pro Glu Tyr Asn Lys Gly Asp Met Met Val Val
        435                 440                 445

Val Ala Gly Ser Pro Pro Gly Val Thr Gly Asn Thr Asn Met Ile His
    450                 455                 460

Val His Leu Leu Gly Asp Asp Thr Arg Ile Ala Lys Leu
465                 470                 475
```

<210> 23
<211> 1704
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1704)
<223> RXA01244W

<400> 23

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gtg gct act gtg gct gat gtg aat caa gac act gta ctg aag ggc acc   48
Met Ala Thr Val Ala Asp Val Asn Gln Asp Thr Val Leu Lys Gly Thr
  1               5                  10                  15

ggc gtt gtc ggt gga gtc cgt tat gca agc gcg gtg tgg att acc cca   96
Gly Val Val Gly Gly Val Arg Tyr Ala Ser Ala Val Trp Ile Thr Pro
             20                  25                  30

cgc ccc gaa cta ccc caa gca ggc gaa gtc gtc gcc gaa gaa aac cgt   144
Arg Pro Glu Leu Pro Gln Ala Gly Glu Val Val Ala Glu Glu Asn Arg
         35                  40                  45

gaa gca gag cag gag cgt ttc gac gcc gct gca gcc aca gtc tct tct   192
Glu Ala Glu Gln Glu Arg Phe Asp Ala Ala Ala Ala Thr Val Ser Ser
     50                  55                  60

cgt ttg ctt gag cgc tcc gaa gct gct gaa gga cca gca gct gag gtg   240
Arg Leu Leu Glu Arg Ser Glu Ala Ala Glu Gly Pro Ala Ala Glu Val
 65                  70                  75                  80

ctt aaa gct act gct ggc atg gtc aat gac cgt ggc tgg cgt aag gct   288
Leu Lys Ala Thr Ala Gly Met Val Asn Asp Arg Gly Trp Arg Lys Ala
                 85                  90                  95

gtc atc aag ggt gtc aag ggt ggt cac cct gcg gaa tac gcc gtg gtt   336
Val Ile Lys Gly Val Lys Gly Gly His Pro Ala Glu Tyr Ala Val Val
            100                 105                 110

gca gca aca acc aag ttc atc tcc atg ttc gaa gcc gca ggc ggc ctg   384
Ala Ala Thr Thr Lys Phe Ile Ser Met Phe Glu Ala Ala Gly Gly Leu
        115                 120                 125

atc gcg gag cgc acc aca gac ttg cgc gac atc cgc gac cgc gtc atc   432
Ile Ala Glu Arg Thr Thr Asp Leu Arg Asp Ile Arg Asp Arg Val Ile
    130                 135                 140

gca gaa ctt cgt ggc gat gaa gag cca ggt ctg cca gct gtt tcc gga   480
Ala Glu Leu Arg Gly Asp Glu Glu Pro Gly Leu Pro Ala Val Ser Gly
145                 150                 155                 160

cag gtc att ctc ttt gca gat gac ctc tcc cca gca gac acc gcg gca   528
Gln Val Ile Leu Phe Ala Asp Asp Leu Ser Pro Ala Asp Thr Ala Ala
                165                 170                 175

cta gac aca gat ctc ttt gtg gga ctt gtc act gag ctg ggt ggc cca   576
Leu Asp Thr Asp Leu Phe Val Gly Leu Val Thr Glu Leu Gly Gly Pro
            180                 185                 190

acg agc cac acc gcg atc atc gca cgc cag ctc aac gtg cct tgc atc   624
Thr Ser His Thr Ala Ile Ile Ala Arg Gln Leu Asn Val Pro Cys Ile
        195                 200                 205

gtc gca tcc ggc gcc ggc atc aag gac atc aag tcc ggc gaa aag gtg   672
```

```
Val Ala Ser Gly Ala Gly Ile Lys Asp Ile Lys Ser Gly Glu Lys Val
    210                 215                 220

ctt atc gac ggc agc ctc ggc acc att gac cgc aac gcg gac gaa gct   720
Leu Ile Asp Gly Ser Leu Gly Thr Ile Asp Arg Asn Ala Asp Glu Ala
225                 230                 235                 240

gaa gca acc aag ctc gtc tcc gag tcc ctc gag cgc gct gct cgc atc   768
Glu Ala Thr Lys Leu Val Ser Glu Ser Leu Glu Arg Ala Ala Arg Ile
                245                 250                 255

gcc gag tgg aag ggt cct gca caa acc aag gac ggc tac cgc gtt cag   816

Ala Glu Trp Lys Gly Pro Ala Gln Thr Lys Asp Gly Tyr Arg Val Gln
            260                 265                 270

ctg ttg gcc aac gtc caa gac ggc aac tct gca cag cag gct gca cag   864
Leu Leu Ala Asn Val Gln Asp Gly Asn Ser Ala Gln Gln Ala Ala Gln
        275                 280                 285

acc gaa gca gaa ggc atc ggc ctg ttc cgc acc gaa ctg tgc ttc ctt   912
Thr Glu Ala Glu Gly Ile Gly Leu Phe Arg Thr Glu Leu Cys Phe Leu
    290                 295                 300

tcc gcc acc gaa gag cca agc gtt gat gag cag gct gcg gtc tac tca   960
Ser Ala Thr Glu Glu Pro Ser Val Asp Glu Gln Ala Ala Val Tyr Ser
305                 310                 315                 320

aag gtg ctt gaa gca ttc cca gag tcc aag gtc gtt gtc cgc tcc ctc  1008
Lys Val Leu Glu Ala Phe Pro Glu Ser Lys Val Val Val Arg Ser Leu
                325                 330                 335

gac gca ggt tct gac aag cca gtt cca ttc gca tcg atg gct gat gag  1056
Asp Ala Gly Ser Asp Lys Pro Val Pro Phe Ala Ser Met Ala Asp Glu
            340                 345                 350

atg aac cca gca ctg ggt gtt cgt ggc ctg cgt atc gca cgt gga cag  1104
Met Asn Pro Ala Leu Gly Val Arg Gly Leu Arg Ile Ala Arg Gly Gln
        355                 360                 365

gtt gat ctg ctg act cgc cag ctc gac gca att gcg aag gcc agc gaa  1152
Val Asp Leu Leu Thr Arg Gln Leu Asp Ala Ile Ala Lys Ala Ser Glu
    370                 375                 380

gaa ctc ggc cgt ggc gac gac gcc cca acc tgg gtt atg gct cca atg  1200
Glu Leu Gly Arg Gly Asp Asp Ala Pro Thr Trp Val Met Ala Pro Met
385                 390                 395                 400

gtg gct acc gct tat gaa gca aag tgg ttt gct gac atg tgc cgt gag  1248
Val Ala Thr Ala Tyr Glu Ala Lys Trp Phe Ala Asp Met Cys Arg Glu
                405                 410                 415

cgt ggc cta atc gcc ggc gcc atg atc gaa gtt cca gca gca tcc ctg  1296
Arg Gly Leu Ile Ala Gly Ala Met Ile Glu Val Pro Ala Ala Ser Leu
            420                 425                 430

atg gca gac aag atc atg cct cac ctg gac ttt gtt tcc atc ggt acc  1344
Met Ala Asp Lys Ile Met Pro His Leu Asp Phe Val Ser Ile Gly Thr
        435                 440                 445
```

```
aac gac ctg acc cag tac acc atg gca gcg gac cgc atg tct cct gag   1392
Asn Asp Leu Thr Gln Tyr Thr Met Ala Ala Asp Arg Met Ser Pro Glu
    450                 455                 460

ctt gcc tac ctg acc gat cct tgg cag cca gca gtc ctg cgc ctg atc   1440
Leu Ala Tyr Leu Thr Asp Pro Trp Gln Pro Ala Val Leu Arg Leu Ile
465                 470                 475                 480

aag cac acc tgt gac gaa ggt gct cgc ttt aac acc ccg gtc ggt gtt   1488
Lys His Thr Cys Asp Glu Gly Ala Arg Phe Asn Thr Pro Val Gly Val
                485                 490                 495

tgt ggt gaa gca gca gca gac cca ctg ttg gca act gtc ctc acc ggt   1536
Cys Gly Glu Ala Ala Ala Asp Pro Leu Leu Ala Thr Val Leu Thr Gly
            500                 505                 510

ctt ggc gtg aac tcc ctg tcc gca gca tcc act gct ctc gca gca gtc   1584
Leu Gly Val Asn Ser Leu Ser Ala Ala Ser Thr Ala Leu Ala Ala Val
        515                 520                 525

ggt gca aag ctg tca gag gtc acc ctg gaa acc tgt aag aag gca gca   1632
Gly Ala Lys Leu Ser Glu Val Thr Leu Glu Thr Cys Lys Lys Ala Ala
    530                 535                 540

gaa gca gca ctt gac gct gaa ggt gca act gaa gca cgc gat gct gta   1680
Glu Ala Ala Leu Asp Ala Glu Gly Ala Thr Glu Ala Arg Asp Ala Val
545                 550                 555                 560

cgc gca gtg atc gac gca gca gtc                                  1704
Arg Ala Val Ile Asp Ala Ala Val
                565
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<210> 24
<211> 568
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 24

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Met Ala Thr Val Ala Asp Val Asn Gln Asp Thr Val Leu Lys Gly Thr
  1               5                  10                  15

Gly Val Val Gly Gly Val Arg Tyr Ala Ser Ala Val Trp Ile Thr Pro
             20                  25                  30

Arg Pro Glu Leu Pro Gln Ala Gly Glu Val Val Ala Glu Glu Asn Arg
         35                  40                  45

Glu Ala Glu Gln Glu Arg Phe Asp Ala Ala Ala Ala Thr Val Ser Ser
     50                  55                  60

Arg Leu Leu Glu Arg Ser Glu Ala Ala Glu Gly Pro Ala Ala Glu Val
 65                  70                  75                  80

Leu Lys Ala Thr Ala Gly Met Val Asn Asp Arg Gly Trp Arg Lys Ala
                 85                  90                  95
```

```
Val Ile Lys Gly Val Lys Gly Gly His Pro Ala Glu Tyr Ala Val Val
            100                 105                 110

Ala Ala Thr Thr Lys Phe Ile Ser Met Phe Glu Ala Ala Gly Gly Leu
        115                 120                 125

Ile Ala Glu Arg Thr Thr Asp Leu Arg Asp Ile Arg Asp Arg Val Ile
    130                 135                 140

Ala Glu Leu Arg Gly Asp Glu Glu Pro Gly Leu Pro Ala Val Ser Gly
145                 150                 155                 160

Gln Val Ile Leu Phe Ala Asp Asp Leu Ser Pro Ala Asp Thr Ala Ala
                165                 170                 175

Leu Asp Thr Asp Leu Phe Val Gly Leu Val Thr Glu Leu Gly Gly Pro
            180                 185                 190

Thr Ser His Thr Ala Ile Ile Ala Arg Gln Leu Asn Val Pro Cys Ile
        195                 200                 205

Val Ala Ser Gly Ala Gly Ile Lys Asp Ile Lys Ser Gly Glu Lys Val
    210                 215                 220

Leu Ile Asp Gly Ser Leu Gly Thr Ile Asp Arg Asn Ala Asp Glu Ala
225                 230                 235                 240

Glu Ala Thr Lys Leu Val Ser Glu Ser Leu Glu Arg Ala Ala Arg Ile
                245                 250                 255

Ala Glu Trp Lys Gly Pro Ala Gln Thr Lys Asp Gly Tyr Arg Val Gln
            260                 265                 270

Leu Leu Ala Asn Val Gln Asp Gly Asn Ser Ala Gln Gln Ala Ala Gln
        275                 280                 285

Thr Glu Ala Glu Gly Ile Gly Leu Phe Arg Thr Glu Leu Cys Phe Leu
    290                 295                 300

Ser Ala Thr Glu Glu Pro Ser Val Asp Glu Gln Ala Ala Val Tyr Ser
305                 310                 315                 320

Lys Val Leu Glu Ala Phe Pro Glu Ser Lys Val Val Val Arg Ser Leu
                325                 330                 335

Asp Ala Gly Ser Asp Lys Pro Val Pro Phe Ala Ser Met Ala Asp Glu
            340                 345                 350

Met Asn Pro Ala Leu Gly Val Arg Gly Leu Arg Ile Ala Arg Gly Gln
        355                 360                 365

Val Asp Leu Leu Thr Arg Gln Leu Asp Ala Ile Ala Lys Ala Ser Glu
    370                 375                 380

Glu Leu Gly Arg Gly Asp Asp Ala Pro Thr Trp Val Met Ala Pro Met
385                 390                 395                 400

Val Ala Thr Ala Tyr Glu Ala Lys Trp Phe Ala Asp Met Cys Arg Glu
                405                 410                 415
```

```
Arg Gly Leu Ile Ala Gly Ala Met Ile Glu Val Pro Ala Ala Ser Leu
            420                 425                 430

Met Ala Asp Lys Ile Met Pro His Leu Asp Phe Val Ser Ile Gly Thr
        435                 440                 445

Asn Asp Leu Thr Gln Tyr Thr Met Ala Ala Asp Arg Met Ser Pro Glu
    450                 455                 460

Leu Ala Tyr Leu Thr Asp Pro Trp Gln Pro Ala Val Leu Arg Leu Ile
465                 470                 475                 480

Lys His Thr Cys Asp Glu Gly Ala Arg Phe Asn Thr Pro Val Gly Val
                485                 490                 495

Cys Gly Glu Ala Ala Ala Asp Pro Leu Leu Ala Thr Val Leu Thr Gly
            500                 505                 510

Leu Gly Val Asn Ser Leu Ser Ala Ala Ser Thr Ala Leu Ala Ala Val
        515                 520                 525

Gly Ala Lys Leu Ser Glu Val Thr Leu Glu Thr Cys Lys Lys Ala Ala
    530                 535                 540

Glu Ala Ala Leu Asp Ala Glu Gly Ala Thr Glu Ala Arg Asp Ala Val
545                 550                 555                 560

Arg Ala Val Ile Asp Ala Ala Val
                565
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<210> 25
<211> 3327
<212> DNA
<213> 麩胺酸棒狀桿菌

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<222> (1)..(3249)
<223> RXA01434E

<400> 25

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gtg agt tct tcg ctt tcg aat aat tcg gag cag tcc ggc ctg cgt ggc   48
Met Ser Ser Ser Leu Ser Asn Asn Ser Glu Gln Ser Gly Leu Arg Gly
  1               5                  10                  15

agg atc gtt gct cca gca ccg ccg gcg cct gtg ccc gag gcg cgc aag   96
Arg Ile Val Ala Pro Ala Pro Pro Ala Pro Val Pro Glu Ala Arg Lys
             20                  25                  30

aag gct gtc gca cgc acg gat ggt gat cgc tcg agt ttg aaa aac tcg   144
Lys Ala Val Ala Arg Thr Asp Gly Asp Arg Ser Ser Leu Lys Asn Ser
         35                  40                  45

cct acg gca tcc gcc acc cag gca gcc cag acg cgc ccg gca gaa ccg   192
Pro Thr Ala Ser Ala Thr Gln Ala Ala Gln Thr Arg Pro Ala Glu Pro
     50                  55                  60
```

```
gaa cca aaa aag cac acc tcc gat tct gat gtg gtg cgc tcg act ggc   240
Glu Pro Lys Lys His Thr Ser Asp Ser Asp Val Val Arg Ser Thr Gly
 65                  70                  75                  80

tcc atg gca ata gcc acg ctg ctg agt cgt atc acc ggt ttc ctg cgc   288
Ser Met Ala Ile Ala Thr Leu Leu Ser Arg Ile Thr Gly Phe Leu Arg
                 85                  90                  95

acc gtg atg att ggt gcg gcg ctg tcg ccg gcc atc gct tcg gcg ttc   336
Thr Val Met Ile Gly Ala Ala Leu Ser Pro Ala Ile Ala Ser Ala Phe
            100                 105                 110

aac act gcc aac acg ctg ccc aac ctg atc act gaa atc gtg ttg ggt   384
Asn Thr Ala Asn Thr Leu Pro Asn Leu Ile Thr Glu Ile Val Leu Gly
        115                 120                 125

gcg gtg ctg aca tcg ctg gtt att ccg gtc ctt acc cgc gcg gaa aaa   432
Ala Val Leu Thr Ser Leu Val Ile Pro Val Leu Thr Arg Ala Glu Lys
    130                 135                 140

gaa gac gcc gac ggc ggt tcc ggg ttc ttc agg cgg ctg ctc acc ctg   480
Glu Asp Ala Asp Gly Gly Ser Gly Phe Phe Arg Arg Leu Leu Thr Leu
145                 150                 155                 160

tcg gtg acg ctg ctg ggt ggt gtc acc atc ctg tcg att atc ggc gcg   528

Ser Val Thr Leu Leu Gly Gly Val Thr Ile Leu Ser Ile Ile Gly Ala
                165                 170                 175

ccg ctg ctg aca cgg atg atg ctg tcc tct gag gga caa gtc aac gtg   576
Pro Leu Leu Thr Arg Met Met Leu Ser Ser Glu Gly Gln Val Asn Val
            180                 185                 190

gtc atg tcc acg gcc ttt gcg tat tgg ctg ctg cca cag att ttc ttc   624
Val Met Ser Thr Ala Phe Ala Tyr Trp Leu Leu Pro Gln Ile Phe Phe
        195                 200                 205

tac ggc ctg ttt gcc ctg ttc atg gct gtg ttg aac acc cgt gaa gtg   672
Tyr Gly Leu Phe Ala Leu Phe Met Ala Val Leu Asn Thr Arg Glu Val
    210                 215                 220

ttc aaa ccc ggc gcg tgg gca cct gtt gtc aac aat gtg atc acc ttg   720
Phe Lys Pro Gly Ala Trp Ala Pro Val Val Asn Asn Val Ile Thr Leu
225                 230                 235                 240

acc gtg ctg ggc gtg tac atg gtg ctg cct gcg cgt ttg cac ccg cat   768
Thr Val Leu Gly Val Tyr Met Val Leu Pro Ala Arg Leu His Pro His
                245                 250                 255

gag cag gtg ggc att ttt gat ccg cag atc att ttc ctc ggc gtg ggc   816
Glu Gln Val Gly Ile Phe Asp Pro Gln Ile Ile Phe Leu Gly Val Gly
            260                 265                 270

acc acc ctt ggt gtg gtt gca cag tgt cta atc atg att ccg tac ctg   864
Thr Thr Leu Gly Val Val Ala Gln Cys Leu Ile Met Ile Pro Tyr Leu
        275                 280                 285

cgt cgc gcg ggc att gat atg cgc cct ctg tgg ggt atc gat gcg cgt   912
Arg Arg Ala Gly Ile Asp Met Arg Pro Leu Trp Gly Ile Asp Ala Arg
```

```
    290                 295                 300

ttg aag caa ttc ggt ggc atg gcg atg gcg atc atc gtg tac gtg gca   960
Leu Lys Gln Phe Gly Gly Met Ala Met Ala Ile Ile Val Tyr Val Ala
305                 310                 315                 320

atc tcc cag ttc ggt tac atc atc acc act cgc att gcg tcg att gca   1008
Ile Ser Gln Phe Gly Tyr Ile Ile Thr Thr Arg Ile Ala Ser Ile Ala
                325                 330                 335

gac gat gct gcg ccg ttt att tat cag cag cac tgg atg ttg ctg caa   1056
Asp Asp Ala Ala Pro Phe Ile Tyr Gln Gln His Trp Met Leu Leu Gln
            340                 345                 350

gtt cct tat ggc atc atc ggc gtc acc ttg ctc acc gcg att atg ccg   1104
Val Pro Tyr Gly Ile Ile Gly Val Thr Leu Leu Thr Ala Ile Met Pro
        355                 360                 365

cga ctg tcc cgc aac gcg gca gac ggc gat gat agg gca gta gtc tct   1152
Arg Leu Ser Arg Asn Ala Ala Asp Gly Asp Asp Arg Ala Val Val Ser
    370                 375                 380

gac ctt cag ttg ggt tcc aag cta acc ttc atc gca ctg atc ccc atc   1200
Asp Leu Gln Leu Gly Ser Lys Leu Thr Phe Ile Ala Leu Ile Pro Ile
385                 390                 395                 400

gtg gtg ttc ttc acc gcc ttc ggt gtc cct att gcc aat ggc ctt ttt   1248
Val Val Phe Phe Thr Ala Phe Gly Val Pro Ile Ala Asn Gly Leu Phe
                405                 410                 415

gcc tac ggc caa ttc gat gcc aac gcc gcc aac atc ctt ggt tgg act   1296
Ala Tyr Gly Gln Phe Asp Ala Asn Ala Ala Asn Ile Leu Gly Trp Thr
            420                 425                 430

ctg agc ttc tct gct ttc acg ctg att cct tac gct ttg gtg ctg cta   1344
Leu Ser Phe Ser Ala Phe Thr Leu Ile Pro Tyr Ala Leu Val Leu Leu
        435                 440                 445

cat ctg cgt gtg ttt tat gcg cgt gaa gag gtc tgg acc cca acc ttc   1392
His Leu Arg Val Phe Tyr Ala Arg Glu Glu Val Trp Thr Pro Thr Phe
    450                 455                 460

atc atc gcc ggc atc acc gcc acc aag gtc gtg ctt tcc ctg ttg gca   1440
Ile Ile Ala Gly Ile Thr Ala Thr Lys Val Val Leu Ser Leu Leu Ala
465                 470                 475                 480

ccg ctg ctg tcg agc tcc ccg gag cgt gtg gtg gtg ctt ctt ggt gcg   1488
Pro Leu Leu Ser Ser Ser Pro Glu Arg Val Val Val Leu Leu Gly Ala
                485                 490                 495

gcc aac ggt ttc agt ttc atc acc ggc gcg gtc atc ggc gcg tat ctg   1536
Ala Asn Gly Phe Ser Phe Ile Thr Gly Ala Val Ile Gly Ala Tyr Leu
            500                 505                 510

ttg cgc aac aaa ctc ggc ctg ttg ggt atg cgc tct ttg gct aaa acc   1584
Leu Arg Asn Lys Leu Gly Leu Leu Gly Met Arg Ser Leu Ala Lys Thr
        515                 520                 525

tcc ctg tgg gcg ttg ggc tct gcg gcg gtt ggt gca gca gca gca tgg   1632
```

```
Ser Leu Trp Ala Leu Gly Ser Ala Ala Val Gly Ala Ala Ala Ala Trp
    530                 535                 540

gcg ttg ggg tgg ctg att caa gcc gtc gtg ggc gat ttc ttg ctg ggc   1680
Ala Leu Gly Trp Leu Ile Gln Ala Val Val Gly Asp Phe Leu Leu Gly
545                 550                 555                 560

act cta agc tcc gta ggc tac ttg ttg aac ctg gct gtg ttg ggt gtc   1728
Thr Leu Ser Ser Val Gly Tyr Leu Leu Asn Leu Ala Val Leu Gly Val
                565                 570                 575

ttc ttc atc ttc gtc acc ggc atc gtg ttg tca cgt tct ggt ttg ccg   1776
Phe Phe Ile Phe Val Thr Gly Ile Val Leu Ser Arg Ser Gly Leu Pro
            580                 585                 590

gag gtc caa aac ttg ggc cag gca ctg acc cgc atc cca ggt ttg agc   1824
Glu Val Gln Asn Leu Gly Gln Ala Leu Thr Arg Ile Pro Gly Leu Ser
        595                 600                 605

cgg ttt att cgc ccg aat acc aag atc tct ttg gat gtc ggc gaa gtc   1872
Arg Phe Ile Arg Pro Asn Thr Lys Ile Ser Leu Asp Val Gly Glu Val
    610                 615                 620

tcc gag cag gat ttc tcc acc cag ctg gtc gcg cca agc gag ttc gca   1920
Ser Glu Gln Asp Phe Ser Thr Gln Leu Val Ala Pro Ser Glu Phe Ala
625                 630                 635                 640

gca acc cct gtg ccg cca ccg atg tcc gcc ggt att gtc cgc gga cct   1968
Ala Thr Pro Val Pro Pro Pro Met Ser Ala Gly Ile Val Arg Gly Pro
                645                 650                 655

cgc ctg gtt ccc ggc gcc cca gtc ggc gac ggt cgt ttc cgt ctg ctc   2016
Arg Leu Val Pro Gly Ala Pro Val Gly Asp Gly Arg Phe Arg Leu Leu
            660                 665                 670

gcc gat cac ggc ggc gtc caa ggc gcg cgt ttc tgg cag gcc cgc gag   2064
Ala Asp His Gly Gly Val Gln Gly Ala Arg Phe Trp Gln Ala Arg Glu
        675                 680                 685

atc gcc acc ggc aag gaa gtc gcg ctg atc ttt gtg gat act tcc ggc   2112
Ile Ala Thr Gly Lys Glu Val Ala Leu Ile Phe Val Asp Thr Ser Gly
    690                 695                 700

aac gcc cca ttt gcg cca ctg tct tcg gca gcc gca gcg ggc atc gcc   2160
Asn Ala Pro Phe Ala Pro Leu Ser Ser Ala Ala Ala Ala Gly Ile Ala
705                 710                 715                 720

tac gag gtg cag cgc cgc acc aag aag ctg gcc agc ttg ggc agc ttg   2208
Tyr Glu Val Gln Arg Arg Thr Lys Lys Leu Ala Ser Leu Gly Ser Leu
                725                 730                 735

gcg gta gcc ccc aac atc cac tcc gag gcg tac cgc aac ggt tgc ctc   2256
Ala Val Ala Pro Asn Ile His Ser Glu Ala Tyr Arg Asn Gly Cys Leu
            740                 745                 750

att gtg gcc gat tgg gtg cct ggc tcc agc ttg agc gcc gtc gcg gaa   2304
Ile Val Ala Asp Trp Val Pro Gly Ser Ser Leu Ser Ala Val Ala Glu
        755                 760                 765
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tcc ggt gcc gat ccc cgc gcc gcc gcg ttc gcg ctc gcg gaa cta act   2352
Ser Gly Ala Asp Pro Arg Ala Ala Ala Phe Ala Leu Ala Glu Leu Thr
    770                 775                 780

gaa acc atc ggc gag gcc cac gag atg ggt atc ccg gcc ggc ttg gac   2400
Glu Thr Ile Gly Glu Ala His Glu Met Gly Ile Pro Ala Gly Leu Asp
785                 790                 795                 800

aac aag tgc cgc atc cgc atc aac acc gac ggc cat gcc gtc ctc gcc   2448
Asn Lys Cys Arg Ile Arg Ile Asn Thr Asp Gly His Ala Val Leu Ala
                805                 810                 815

ttc ccg gcg att ttg ccc gat gcc tca gag ctc cgc gac gcc aag tcc   2496
Phe Pro Ala Ile Leu Pro Asp Ala Ser Glu Leu Arg Asp Ala Lys Ser
            820                 825                 830

ctg gcc tcg gcc gcc gag atg ctt atc gac gcg acc ctc gct ccc agc   2544
Leu Ala Ser Ala Ala Glu Met Leu Ile Asp Ala Thr Leu Ala Pro Ser
        835                 840                 845

gac gtc aag gca atg gtc act gaa gcc cag ggg cta gct aca gaa gac   2592
Asp Val Lys Ala Met Val Thr Glu Ala Gln Gly Leu Ala Thr Glu Asp
    850                 855                 860

aat ccc gat tac gca tca ctt gcc atg gcg atg cgc acc tgc gga ctg   2640
Asn Pro Asp Tyr Ala Ser Leu Ala Met Ala Met Arg Thr Cys Gly Leu
865                 870                 875                 880

ttc acc gag gaa cca acc cac ctt gtg gtg aag aag gaa aag aca cca   2688
Phe Thr Glu Glu Pro Thr His Leu Val Val Lys Lys Glu Lys Thr Pro
                885                 890                 895

aag cct gcg aca cgt gat ggt ttc ggt gcc tcc gac tac acc gtc aag   2736
Lys Pro Ala Thr Arg Asp Gly Phe Gly Ala Ser Asp Tyr Thr Val Lys
            900                 905                 910

ggc atg gca gcc atc gcc gct gtg gtg atc atc ttg gtt tcc ctg gtg   2784
Gly Met Ala Ala Ile Ala Ala Val Val Ile Ile Leu Val Ser Leu Val
        915                 920                 925

gcc gcc ggt acc gcg ttc ctc acc agc ttc ttc ggc agc agc acc aac   2832
Ala Ala Gly Thr Ala Phe Leu Thr Ser Phe Phe Gly Ser Ser Thr Asn
    930                 935                 940

gaa caa tcc ccg ttg gcc tct gtt gaa gcc acc acc tct gca aca cca   2880
Glu Gln Ser Pro Leu Ala Ser Val Glu Ala Thr Thr Ser Ala Thr Pro
945                 950                 955                 960

gaa cct gtg ggg cca ccg gtc tac ctg gat ctg gat caa gcc cgc acg   2928
Glu Pro Val Gly Pro Pro Val Tyr Leu Asp Leu Asp Gln Ala Arg Thr
                965                 970                 975

tgg gat gac ggt gca gga aca gat gtc acc gac gtc acc gac ggc aac   2976
Trp Asp Asp Gly Ala Gly Thr Asp Val Thr Asp Val Thr Asp Gly Asn
            980                 985                 990

acc tcc acc gca tgg acc tcc acc ggc ggc gac ggc ctc cta gtt gac   3024
Thr Ser Thr Ala Trp Thr Ser Thr Gly Gly Asp Gly Leu Leu Val Asp
        995                1000                1005
```

```
ctg tcc acg cct gcc cgc ctc gac cgc gtc atc ttg acc acc ggc acc   3072
Leu Ser Thr Pro Ala Arg Leu Asp Arg Val Ile Leu Thr Thr Gly Thr
   1010                1015                1020

ggc tcc gac agc aac gtg acc tcg acc gtg aag atc tac gca ttc aac   3120
Gly Ser Asp Ser Asn Val Thr Ser Thr Val Lys Ile Tyr Ala Phe Asn
1025                1030                1035                1040

gac gcc tca cca cac tcc ctg tcg gaa ggc atc gag atc ggc acc gtg   3168
Asp Ala Ser Pro His Ser Leu Ser Glu Gly Ile Glu Ile Gly Thr Val
               1045                1050                1055

gat tat tcc ggc cgc agt ctc agc cac agc atc cgc gat tcc tcc aag   3216
Asp Tyr Ser Gly Arg Ser Leu Ser His Ser Ile Arg Asp Ser Ser Lys
          1060                1065                1070

ctt ccg ggt cag gtg gaa tcc gtg gtg att ctg gtcgatgagg ttcgttcctc 3269
Leu Pro Gly Gln Val Glu Ser Val Val Ile Leu
       1075                1080

acaaacctca gacaccaatc cacagatgca gatcgctgaa gtacaacttg ttggttgg   3327
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<210> 26
<211> 1083
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 26

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Met Ser Ser Ser Leu Ser Asn Asn Ser Glu Gln Ser Gly Leu Arg Gly
  1               5                  10                  15

Arg Ile Val Ala Pro Ala Pro Pro Ala Pro Val Pro Glu Ala Arg Lys
             20                  25                  30

Lys Ala Val Ala Arg Thr Asp Gly Asp Arg Ser Ser Leu Lys Asn Ser
         35                  40                  45

Pro Thr Ala Ser Ala Thr Gln Ala Ala Gln Thr Arg Pro Ala Glu Pro
     50                  55                  60

Glu Pro Lys Lys His Thr Ser Asp Ser Asp Val Val Arg Ser Thr Gly
 65                  70                  75                  80

Ser Met Ala Ile Ala Thr Leu Leu Ser Arg Ile Thr Gly Phe Leu Arg
                 85                  90                  95

Thr Val Met Ile Gly Ala Ala Leu Ser Pro Ala Ile Ala Ser Ala Phe
            100                 105                 110

Asn Thr Ala Asn Thr Leu Pro Asn Leu Ile Thr Glu Ile Val Leu Gly
        115                 120                 125

Ala Val Leu Thr Ser Leu Val Ile Pro Val Leu Thr Arg Ala Glu Lys
    130                 135                 140

Glu Asp Ala Asp Gly Gly Ser Gly Phe Phe Arg Arg Leu Leu Thr Leu
```

```
145                 150                 155                 160

Ser Val Thr Leu Leu Gly Gly Val Thr Ile Leu Ser Ile Ile Gly Ala
                165                 170                 175

Pro Leu Leu Thr Arg Met Met Leu Ser Ser Glu Gly Gln Val Asn Val
            180                 185                 190

Val Met Ser Thr Ala Phe Ala Tyr Trp Leu Leu Pro Gln Ile Phe Phe
        195                 200                 205

Tyr Gly Leu Phe Ala Leu Phe Met Ala Val Leu Asn Thr Arg Glu Val
    210                 215                 220

Phe Lys Pro Gly Ala Trp Ala Pro Val Val Asn Asn Val Ile Thr Leu
225                 230                 235                 240

Thr Val Leu Gly Val Tyr Met Val Leu Pro Ala Arg Leu His Pro His
                245                 250                 255

Glu Gln Val Gly Ile Phe Asp Pro Gln Ile Ile Phe Leu Gly Val Gly
            260                 265                 270

Thr Thr Leu Gly Val Val Ala Gln Cys Leu Ile Met Ile Pro Tyr Leu
        275                 280                 285

Arg Arg Ala Gly Ile Asp Met Arg Pro Leu Trp Gly Ile Asp Ala Arg
    290                 295                 300

Leu Lys Gln Phe Gly Gly Met Ala Met Ala Ile Ile Val Tyr Val Ala
305                 310                 315                 320

Ile Ser Gln Phe Gly Tyr Ile Ile Thr Thr Arg Ile Ala Ser Ile Ala
                325                 330                 335

Asp Asp Ala Ala Pro Phe Ile Tyr Gln Gln His Trp Met Leu Leu Gln
            340                 345                 350

Val Pro Tyr Gly Ile Ile Gly Val Thr Leu Leu Thr Ala Ile Met Pro
        355                 360                 365

Arg Leu Ser Arg Asn Ala Ala Asp Gly Asp Asp Arg Ala Val Val Ser
    370                 375                 380

Asp Leu Gln Leu Gly Ser Lys Leu Thr Phe Ile Ala Leu Ile Pro Ile
385                 390                 395                 400

Val Val Phe Phe Thr Ala Phe Gly Val Pro Ile Ala Asn Gly Leu Phe
                405                 410                 415

Ala Tyr Gly Gln Phe Asp Ala Asn Ala Ala Asn Ile Leu Gly Trp Thr
            420                 425                 430

Leu Ser Phe Ser Ala Phe Thr Leu Ile Pro Tyr Ala Leu Val Leu Leu
        435                 440                 445

His Leu Arg Val Phe Tyr Ala Arg Glu Glu Val Trp Thr Pro Thr Phe
    450                 455                 460
```

```
Ile Ile Ala Gly Ile Thr Ala Thr Lys Val Val Leu Ser Leu Leu Ala
465                 470                 475                 480

Pro Leu Leu Ser Ser Ser Pro Glu Arg Val Val Val Leu Leu Gly Ala
                485                 490                 495

Ala Asn Gly Phe Ser Phe Ile Thr Gly Ala Val Ile Gly Ala Tyr Leu
            500                 505                 510

Leu Arg Asn Lys Leu Gly Leu Leu Gly Met Arg Ser Leu Ala Lys Thr
        515                 520                 525

Ser Leu Trp Ala Leu Gly Ser Ala Ala Val Gly Ala Ala Ala Ala Trp
    530                 535                 540

Ala Leu Gly Trp Leu Ile Gln Ala Val Val Gly Asp Phe Leu Leu Gly
545                 550                 555                 560

Thr Leu Ser Ser Val Gly Tyr Leu Leu Asn Leu Ala Val Leu Gly Val
                565                 570                 575

Phe Phe Ile Phe Val Thr Gly Ile Val Leu Ser Arg Ser Gly Leu Pro
            580                 585                 590

Glu Val Gln Asn Leu Gly Gln Ala Leu Thr Arg Ile Pro Gly Leu Ser
        595                 600                 605

Arg Phe Ile Arg Pro Asn Thr Lys Ile Ser Leu Asp Val Gly Glu Val
    610                 615                 620

Ser Glu Gln Asp Phe Ser Thr Gln Leu Val Ala Pro Ser Glu Phe Ala
625                 630                 635                 640

Ala Thr Pro Val Pro Pro Pro Met Ser Ala Gly Ile Val Arg Gly Pro
                645                 650                 655

Arg Leu Val Pro Gly Ala Pro Val Gly Asp Gly Arg Phe Arg Leu Leu
            660                 665                 670

Ala Asp His Gly Gly Val Gln Gly Ala Arg Phe Trp Gln Ala Arg Glu
        675                 680                 685

Ile Ala Thr Gly Lys Glu Val Ala Leu Ile Phe Val Asp Thr Ser Gly
    690                 695                 700

Asn Ala Pro Phe Ala Pro Leu Ser Ser Ala Ala Ala Ala Gly Ile Ala
705                 710                 715                 720

Tyr Glu Val Gln Arg Arg Thr Lys Lys Leu Ala Ser Leu Gly Ser Leu
                725                 730                 735

Ala Val Ala Pro Asn Ile His Ser Glu Ala Tyr Arg Asn Gly Cys Leu
            740                 745                 750

Ile Val Ala Asp Trp Val Pro Gly Ser Ser Leu Ser Ala Val Ala Glu
        755                 760                 765

Ser Gly Ala Asp Pro Arg Ala Ala Ala Phe Ala Leu Ala Glu Leu Thr
    770                 775                 780
```

```
Glu Thr Ile Gly Glu Ala His Glu Met Gly Ile Pro Ala Gly Leu Asp
785                 790                 795                 800

Asn Lys Cys Arg Ile Arg Ile Asn Thr Asp Gly His Ala Val Leu Ala
                805                 810                 815

Phe Pro Ala Ile Leu Pro Asp Ala Ser Glu Leu Arg Asp Ala Lys Ser
            820                 825                 830

Leu Ala Ser Ala Ala Glu Met Leu Ile Asp Ala Thr Leu Ala Pro Ser
        835                 840                 845

Asp Val Lys Ala Met Val Thr Glu Ala Gln Gly Leu Ala Thr Glu Asp
    850                 855                 860

Asn Pro Asp Tyr Ala Ser Leu Ala Met Ala Met Arg Thr Cys Gly Leu
865                 870                 875                 880

Phe Thr Glu Glu Pro Thr His Leu Val Val Lys Lys Glu Lys Thr Pro
                885                 890                 895

Lys Pro Ala Thr Arg Asp Gly Phe Gly Ala Ser Asp Tyr Thr Val Lys
            900                 905                 910

Gly Met Ala Ala Ile Ala Ala Val Val Ile Ile Leu Val Ser Leu Val
        915                 920                 925

Ala Ala Gly Thr Ala Phe Leu Thr Ser Phe Phe Gly Ser Ser Thr Asn
    930                 935                 940

Glu Gln Ser Pro Leu Ala Ser Val Glu Ala Thr Thr Ser Ala Thr Pro
945                 950                 955                 960

Glu Pro Val Gly Pro Pro Val Tyr Leu Asp Leu Asp Gln Ala Arg Thr
                965                 970                 975

Trp Asp Asp Gly Ala Gly Thr Asp Val Thr Asp Val Thr Asp Gly Asn
            980                 985                 990

Thr Ser Thr Ala Trp Thr Ser Thr Gly Gly Asp Gly Leu Leu Val Asp
        995                1000                1005

Leu Ser Thr Pro Ala Arg Leu Asp Arg Val Ile Leu Thr Thr Gly Thr
   1010                1015                1020

Gly Ser Asp Ser Asn Val Thr Ser Thr Val Lys Ile Tyr Ala Phe Asn
1025                1030                1035                1040

Asp Ala Ser Pro His Ser Leu Ser Glu Gly Ile Glu Ile Gly Thr Val
               1045                1050                1055

Asp Tyr Ser Gly Arg Ser Leu Ser His Ser Ile Arg Asp Ser Ser Lys
           1060                1065                1070

Leu Pro Gly Gln Val Glu Ser Val Val Ile Leu
       1075                1080
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<210> 27
<211> 3249
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(3249)
<223> RXA01434K

<400> 27

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gtg ccc gag gcg cgc aag aag gct gtc gca cgc acg gat ggt gat cgc   48
Met Pro Glu Ala Arg Lys Lys Ala Val Ala Arg Thr Asp Gly Asp Arg
  1               5                  10                  15

tcg agt ttg aaa aac tcg cct acg gca tcc gcc acc cag gca gcc cag   96
Ser Ser Leu Lys Asn Ser Pro Thr Ala Ser Ala Thr Gln Ala Ala Gln
             20                  25                  30

acg cgc ccg gca gaa ccg gaa cca gaa aag cac acc tcc gat tct gat   144
Thr Arg Pro Ala Glu Pro Glu Pro Glu Lys His Thr Ser Asp Ser Asp
         35                  40                  45

gtg gtg cgc tcg act ggc tcc atg gca ata gcc acg ctg ctg agt cgt   192
Val Val Arg Ser Thr Gly Ser Met Ala Ile Ala Thr Leu Leu Ser Arg
     50                  55                  60

atc acc ggt ttc ctg cgc acc gtg atg att ggt gcg gcg ctg tcg ccg   240
Ile Thr Gly Phe Leu Arg Thr Val Met Ile Gly Ala Ala Leu Ser Pro
 65                  70                  75                  80

gcc atc gct tcg gcg ttc aac act gcc aac acg ctg ccc aac ctg atc   288
Ala Ile Ala Ser Ala Phe Asn Thr Ala Asn Thr Leu Pro Asn Leu Ile
                 85                  90                  95

act gaa atc gtg ttg ggt gcg gtg ctg aca tcg ctg gtt att ccg gtc   336
Thr Glu Ile Val Leu Gly Ala Val Leu Thr Ser Leu Val Ile Pro Val
            100                 105                 110


ctt acc cgc gcg gaa aaa gaa gac gcc gac ggc ggt tcc ggg ttc ttc   384
Leu Thr Arg Ala Glu Lys Glu Asp Ala Asp Gly Gly Ser Gly Phe Phe
        115                 120                 125

agg cgg ctg ctc acc ctg tcg gtg acg ctg ctg ggt ggt gtc acc atc   432
Arg Arg Leu Leu Thr Leu Ser Val Thr Leu Leu Gly Gly Val Thr Ile
    130                 135                 140

ctg tcg att atc ggc gcg ccg ctg ctg aca cgg atg atg ctg tcc tct   480
Leu Ser Ile Ile Gly Ala Pro Leu Leu Thr Arg Met Met Leu Ser Ser
145                 150                 155                 160

gag gga caa gtc aac gtg gtc atg tcc acg gcc ttt gcg tat tgg ctg   528
Glu Gly Gln Val Asn Val Val Met Ser Thr Ala Phe Ala Tyr Trp Leu
                165                 170                 175

ctg cca cag att ttc ttc tac ggc ctg ttt gcc ctg ttc atg gct gtg   576
Leu Pro Gln Ile Phe Phe Tyr Gly Leu Phe Ala Leu Phe Met Ala Val
            180                 185                 190
```

```
ttg aac acc cgt gaa gtg ttc aaa ccc ggc gcg tgg gca cct gtt gtc   624
Leu Asn Thr Arg Glu Val Phe Lys Pro Gly Ala Trp Ala Pro Val Val
        195                 200                 205

aac aat gtg atc acc ttg acc gtg ctg ggc gtg tac atg gtg ctg cct   672
Asn Asn Val Ile Thr Leu Thr Val Leu Gly Val Tyr Met Val Leu Pro
    210                 215                 220

gcg cgt ttg cac ccg cat gag cag gtg ggc att ttt gat ccg cag atc   720
Ala Arg Leu His Pro His Glu Gln Val Gly Ile Phe Asp Pro Gln Ile
225                 230                 235                 240

att ttc ctc ggc gtg ggc acc acc ctt ggt gtg gtt gca cag tgt cta   768
Ile Phe Leu Gly Val Gly Thr Thr Leu Gly Val Val Ala Gln Cys Leu
                245                 250                 255

atc atg att ccg tac ctg cgt cgc gcg ggc att gat atg cgc cct ctg   816
Ile Met Ile Pro Tyr Leu Arg Arg Ala Gly Ile Asp Met Arg Pro Leu
            260                 265                 270

tgg ggt atc gat gcg cgt ttg aag caa ttc ggt ggc atg gcg atg gcg   864
Trp Gly Ile Asp Ala Arg Leu Lys Gln Phe Gly Gly Met Ala Met Ala
        275                 280                 285

atc atc gtg tac gtg gca atc tcc cag ttc ggt tac atc atc acc act   912
Ile Ile Val Tyr Val Ala Ile Ser Gln Phe Gly Tyr Ile Ile Thr Thr
    290                 295                 300

cgc att gcg tcg att gca gac gat gct gcg ccg ttt att tat cag cag   960
Arg Ile Ala Ser Ile Ala Asp Asp Ala Ala Pro Phe Ile Tyr Gln Gln
305                 310                 315                 320

cac tgg atg ttg ctg caa gtt cct tat ggc atc atc ggc gtc acc ttg  1008
His Trp Met Leu Leu Gln Val Pro Tyr Gly Ile Ile Gly Val Thr Leu
                325                 330                 335

ctc acc gcg att atg ccg cga ctg tcc cgc aac gcg gca gac ggc gat  1056
Leu Thr Ala Ile Met Pro Arg Leu Ser Arg Asn Ala Ala Asp Gly Asp
            340                 345                 350

gat agg gca gta gtc tct gac ctt cag ttg ggt tcc aag cta acc ttc  1104
Asp Arg Ala Val Val Ser Asp Leu Gln Leu Gly Ser Lys Leu Thr Phe
        355                 360                 365

atc gca ctg atc ccc atc gtg gtg ttc ttc acc gcc ttc ggt gtc cct  1152
Ile Ala Leu Ile Pro Ile Val Val Phe Phe Thr Ala Phe Gly Val Pro
    370                 375                 380

att gcc aat ggc ctt ttt gcc tac ggc caa ttc gat gcc aac gcc gcc  1200
Ile Ala Asn Gly Leu Phe Ala Tyr Gly Gln Phe Asp Ala Asn Ala Ala
385                 390                 395                 400

aac atc ctt ggt tgg act ctg agc ttc tct gct ttc acg ctg att cct  1248
Asn Ile Leu Gly Trp Thr Leu Ser Phe Ser Ala Phe Thr Leu Ile Pro
                405                 410                 415

tac gct ttg gtg ctg cta cat ctg cgt gtg ttt tat gcg cgt gaa gag  1296
Tyr Ala Leu Val Leu Leu His Leu Arg Val Phe Tyr Ala Arg Glu Glu
```

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            420                 425                 430

gtc tgg acc cca acc ttc atc atc gcc ggc atc acc gcc acc aag gtc   1344
Val Trp Thr Pro Thr Phe Ile Ile Ala Gly Ile Thr Ala Thr Lys Val
        435                 440                 445

gtg ctt tcc ctg ttg gca ccg ctg ctg tcg agc tcc ccg gag cgt gtg   1392
Val Leu Ser Leu Leu Ala Pro Leu Leu Ser Ser Ser Pro Glu Arg Val
    450                 455                 460

gtg gtg ctt ctt ggt gcg gcc aac ggt ttc agt ttc atc acc ggc gcg   1440
Val Val Leu Leu Gly Ala Ala Asn Gly Phe Ser Phe Ile Thr Gly Ala
465                 470                 475                 480

gtc atc ggc gcg tat ctg ttg cgc aac aaa ctc ggc ctg ttg ggt atg   1488
Val Ile Gly Ala Tyr Leu Leu Arg Asn Lys Leu Gly Leu Leu Gly Met
                485                 490                 495

cgc tct ttg gct aaa acc tcc ctg tgg gcg ttg ggc tct gcg gcg gtt   1536
Arg Ser Leu Ala Lys Thr Ser Leu Trp Ala Leu Gly Ser Ala Ala Val
            500                 505                 510

ggt gca gca gca gca tgg gcg ttg ggg tgg ctg att caa gcc gtc gtg   1584
Gly Ala Ala Ala Ala Trp Ala Leu Gly Trp Leu Ile Gln Ala Val Val
        515                 520                 525

ggc gat ttc ttg ctg ggc act cta agc tcc gta ggc tac ttg ttg tac   1632
Gly Asp Phe Leu Leu Gly Thr Leu Ser Ser Val Gly Tyr Leu Leu Tyr
    530                 535                 540

ctg gct gtg ttg ggt gtc ttc ttc atc ttc gtc acc ggc atc gtg ttg   1680
Leu Ala Val Leu Gly Val Phe Phe Ile Phe Val Thr Gly Ile Val Leu
545                 550                 555                 560

tca cgt tct ggt ttg ccg gag gtc caa aac ttg ggc cag gca ctg acc   1728
Ser Arg Ser Gly Leu Pro Glu Val Gln Asn Leu Gly Gln Ala Leu Thr
                565                 570                 575

cgc atc cca ggt ttg agc cgg ttt att cgc ccg aat acc aag atc tct   1776
Arg Ile Pro Gly Leu Ser Arg Phe Ile Arg Pro Asn Thr Lys Ile Ser
            580                 585                 590

ttg gat gtc ggc gaa gtc tcc gag cag gat ttc tcc acc cag ctg gtc   1824
Leu Asp Val Gly Glu Val Ser Glu Gln Asp Phe Ser Thr Gln Leu Val
        595                 600                 605

gcg cca agc gag ttc gca gca acc cct gtg ccg cca ccg atg tcc gcc   1872
Ala Pro Ser Glu Phe Ala Ala Thr Pro Val Pro Pro Pro Met Ser Ala
    610                 615                 620

ggt att gtc cgc gga cct cgc ctg gtt ccc ggc gcc cca gtc ggc gac   1920
Gly Ile Val Arg Gly Pro Arg Leu Val Pro Gly Ala Pro Val Gly Asp
625                 630                 635                 640

ggt cgt ttc cgt ctg ctc gcc gat cac ggc ggc gtc caa ggc gcg cgt   1968
Gly Arg Phe Arg Leu Leu Ala Asp His Gly Gly Val Gln Gly Ala Arg
                645                 650                 655

ttc tgg cag gcc cgc gag atc gcc acc ggc aag gaa gtc gcg ctg atc   2016
```

```
Phe Trp Gln Ala Arg Glu Ile Ala Thr Gly Lys Glu Val Ala Leu Ile
            660                 665                 670

ttt gtg gat act tcc ggc aac gcc cca ttt gcg cca ctg tct tcg gca   2064
Phe Val Asp Thr Ser Gly Asn Ala Pro Phe Ala Pro Leu Ser Ser Ala
        675                 680                 685

gcc gca gcg ggc atc gcc tac gag gtg cag cgc cgc acc aag aag ctg   2112
Ala Ala Ala Gly Ile Ala Tyr Glu Val Gln Arg Arg Thr Lys Lys Leu
    690                 695                 700

gcc agc ttg ggc agc ttg gcg gta gcc ccc aac atc cac tcc gag gcg   2160
Ala Ser Leu Gly Ser Leu Ala Val Ala Pro Asn Ile His Ser Glu Ala
705                 710                 715                 720

tac cgc aac ggt tgc ctc att gtg gcc gat tgg gtg cct ggc tcc agc   2208
Tyr Arg Asn Gly Cys Leu Ile Val Ala Asp Trp Val Pro Gly Ser Ser
                725                 730                 735

ttg agc gcc gtc gcg gaa tcc ggt gcc gat ccc cgc gcc gcc gcg ttc   2256
Leu Ser Ala Val Ala Glu Ser Gly Ala Asp Pro Arg Ala Ala Ala Phe
            740                 745                 750

gcg ctc gcg gaa cta act gaa acc atc ggc gag gcc cac gag atg ggt   2304
Ala Leu Ala Glu Leu Thr Glu Thr Ile Gly Glu Ala His Glu Met Gly
        755                 760                 765

atc ccg gcc ggc ttg gac aac aag tgc cgc atc cgc atc aac acc gac   2352
Ile Pro Ala Gly Leu Asp Asn Lys Cys Arg Ile Arg Ile Asn Thr Asp
    770                 775                 780

ggc cat gcc gtc ctc gcc ttc ccg gcg att ttg ccc gat gcc tca gag   2400
Gly His Ala Val Leu Ala Phe Pro Ala Ile Leu Pro Asp Ala Ser Glu
785                 790                 795                 800

ctc cgc gac gcc aag tcc ctg gcc tcg gcc gcc gag atg ctt atc gac   2448
Leu Arg Asp Ala Lys Ser Leu Ala Ser Ala Ala Glu Met Leu Ile Asp
                805                 810                 815

gcg acc ctc gct ccc agc gac gtc aag gca atg gtc act gaa gcc cag   2496
Ala Thr Leu Ala Pro Ser Asp Val Lys Ala Met Val Thr Glu Ala Gln
            820                 825                 830

ggg cta gct aca gaa gac aat ccc gat tac gca tca ctt gcc atg gcg   2544
Gly Leu Ala Thr Glu Asp Asn Pro Asp Tyr Ala Ser Leu Ala Met Ala
        835                 840                 845

atg cgc acc tgc gga ctg ttc acc gag gaa cca acc cac ctt gtg gtg   2592
Met Arg Thr Cys Gly Leu Phe Thr Glu Glu Pro Thr His Leu Val Val
    850                 855                 860

aag aag gaa aag aca cca aag cct gcg aca cgt gat ggt ttc ggt gcc   2640
Lys Lys Glu Lys Thr Pro Lys Pro Ala Thr Arg Asp Gly Phe Gly Ala
865                 870                 875                 880

tcc gac tac acc gtc aag ggc atg gca gcc atc gcc gct gtg gtg atc   2688
Ser Asp Tyr Thr Val Lys Gly Met Ala Ala Ile Ala Ala Val Val Ile
                885                 890                 895
```

```
atc ttg gtt tcc ctg gtg gcc gcc ggt acc gcg ttc ctc acc agc ttc   2736
Ile Leu Val Ser Leu Val Ala Ala Gly Thr Ala Phe Leu Thr Ser Phe
            900                 905                 910

ttc ggc agc agc acc aac gaa caa tcc ccg ttg gcc tct gtt gaa gcc   2784
Phe Gly Ser Ser Thr Asn Glu Gln Ser Pro Leu Ala Ser Val Glu Ala
        915                 920                 925

acc acc tct gca aca cca gaa cct gtg ggg cca ccg gtc tac ctg gat   2832
Thr Thr Ser Ala Thr Pro Glu Pro Val Gly Pro Pro Val Tyr Leu Asp
    930                 935                 940

ctg gat caa gcc cgc acg tgg gat gac ggt gca gga aca gat gtc acc   2880
Leu Asp Gln Ala Arg Thr Trp Asp Asp Gly Ala Gly Thr Asp Val Thr
945                 950                 955                 960

gac gtc acc gac ggc aac acc tcc acc gca tgg acc tcc acc ggc ggc   2928
Asp Val Thr Asp Gly Asn Thr Ser Thr Ala Trp Thr Ser Thr Gly Gly
                965                 970                 975

gac ggc ctc cta gtt gac ctg tcc acg cct gcc cgc ctc gac cgc gtc   2976
Asp Gly Leu Leu Val Asp Leu Ser Thr Pro Ala Arg Leu Asp Arg Val
            980                 985                 990

atc ttg acc acc ggc acc ggc tcc gac agc aac gtg acc tcg acc gtg   3024
Ile Leu Thr Thr Gly Thr Gly Ser Asp Ser Asn Val Thr Ser Thr Val
        995                1000                1005

aag atc tac gca ttc aac gac gcc tca cca cac tcc ctg tcg gaa ggc   3072
Lys Ile Tyr Ala Phe Asn Asp Ala Ser Pro His Ser Leu Ser Glu Gly
   1010                1015                1020

atc gag atc ggc acc gtg gat tat tcc ggc cgc agt ctc agc cac agc   3120
Ile Glu Ile Gly Thr Val Asp Tyr Ser Gly Arg Ser Leu Ser His Ser
1025                1030                1035                1040

atc cgc gat tcc tcc aag ctt ccg ggt cag gtg gaa tcc gtg gtg att   3168
Ile Arg Asp Ser Ser Lys Leu Pro Gly Gln Val Glu Ser Val Val Ile
               1045                1050                1055

ctg gtc gat gag gtt cgt tcc tca caa acc tca gac acc aat cca cag   3216
Leu Val Asp Glu Val Arg Ser Ser Gln Thr Ser Asp Thr Asn Pro Gln
           1060                1065                1070

atg cag atc gct gaa gta caa ctt gtt ggt tgg                      3249
Met Gln Ile Ala Glu Val Gln Leu Val Gly Trp
       1075                1080
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<210> 28
<211> 1083
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 28

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Met Pro Glu Ala Arg Lys Lys Ala Val Ala Arg Thr Asp Gly Asp Arg
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Ser Ser Leu Lys Asn Ser Pro Thr Ala Ser Ala Thr Gln Ala Ala Gln
            20                  25                  30

Thr Arg Pro Ala Glu Pro Glu Pro Glu Lys His Thr Ser Asp Ser Asp
        35                  40                  45

Val Val Arg Ser Thr Gly Ser Met Ala Ile Ala Thr Leu Leu Ser Arg
    50                  55                  60

Ile Thr Gly Phe Leu Arg Thr Val Met Ile Gly Ala Ala Leu Ser Pro
65                  70                  75                  80

Ala Ile Ala Ser Ala Phe Asn Thr Ala Asn Thr Leu Pro Asn Leu Ile
                85                  90                  95

Thr Glu Ile Val Leu Gly Ala Val Leu Thr Ser Leu Val Ile Pro Val
            100                 105                 110

Leu Thr Arg Ala Glu Lys Glu Asp Ala Asp Gly Gly Ser Gly Phe Phe
        115                 120                 125

Arg Arg Leu Leu Thr Leu Ser Val Thr Leu Leu Gly Gly Val Thr Ile
    130                 135                 140

Leu Ser Ile Ile Gly Ala Pro Leu Leu Thr Arg Met Met Leu Ser Ser
145                 150                 155                 160

Glu Gly Gln Val Asn Val Val Met Ser Thr Ala Phe Ala Tyr Trp Leu
                165                 170                 175

Leu Pro Gln Ile Phe Phe Tyr Gly Leu Phe Ala Leu Phe Met Ala Val
            180                 185                 190

Leu Asn Thr Arg Glu Val Phe Lys Pro Gly Ala Trp Ala Pro Val Val
        195                 200                 205

Asn Asn Val Ile Thr Leu Thr Val Leu Gly Val Tyr Met Val Leu Pro
    210                 215                 220

Ala Arg Leu His Pro His Glu Gln Val Gly Ile Phe Asp Pro Gln Ile
225                 230                 235                 240

Ile Phe Leu Gly Val Gly Thr Thr Leu Gly Val Val Ala Gln Cys Leu
                245                 250                 255

Ile Met Ile Pro Tyr Leu Arg Arg Ala Gly Ile Asp Met Arg Pro Leu
            260                 265                 270

Trp Gly Ile Asp Ala Arg Leu Lys Gln Phe Gly Gly Met Ala Met Ala
        275                 280                 285

Ile Ile Val Tyr Val Ala Ile Ser Gln Phe Gly Tyr Ile Ile Thr Thr
    290                 295                 300

Arg Ile Ala Ser Ile Ala Asp Asp Ala Ala Pro Phe Ile Tyr Gln Gln
305                 310                 315                 320

His Trp Met Leu Leu Gln Val Pro Tyr Gly Ile Ile Gly Val Thr Leu
                325                 330                 335
```

```
Leu Thr Ala Ile Met Pro Arg Leu Ser Arg Asn Ala Ala Asp Gly Asp
            340                 345                 350

Asp Arg Ala Val Val Ser Asp Leu Gln Leu Gly Ser Lys Leu Thr Phe
        355                 360                 365

Ile Ala Leu Ile Pro Ile Val Val Phe Phe Thr Ala Phe Gly Val Pro
    370                 375                 380

Ile Ala Asn Gly Leu Phe Ala Tyr Gly Gln Phe Asp Ala Asn Ala Ala
385                 390                 395                 400

Asn Ile Leu Gly Trp Thr Leu Ser Phe Ser Ala Phe Thr Leu Ile Pro
                405                 410                 415

Tyr Ala Leu Val Leu Leu His Leu Arg Val Phe Tyr Ala Arg Glu Glu
            420                 425                 430

Val Trp Thr Pro Thr Phe Ile Ile Ala Gly Ile Thr Ala Thr Lys Val
        435                 440                 445

Val Leu Ser Leu Leu Ala Pro Leu Leu Ser Ser Ser Pro Glu Arg Val
    450                 455                 460

Val Val Leu Leu Gly Ala Ala Asn Gly Phe Ser Phe Ile Thr Gly Ala
465                 470                 475                 480

Val Ile Gly Ala Tyr Leu Leu Arg Asn Lys Leu Gly Leu Leu Gly Met
                485                 490                 495

Arg Ser Leu Ala Lys Thr Ser Leu Trp Ala Leu Gly Ser Ala Ala Val
            500                 505                 510

Gly Ala Ala Ala Ala Trp Ala Leu Gly Trp Leu Ile Gln Ala Val Val
        515                 520                 525

Gly Asp Phe Leu Leu Gly Thr Leu Ser Ser Val Gly Tyr Leu Leu Tyr
    530                 535                 540

Leu Ala Val Leu Gly Val Phe Phe Ile Phe Val Thr Gly Ile Val Leu
545                 550                 555                 560

Ser Arg Ser Gly Leu Pro Glu Val Gln Asn Leu Gly Gln Ala Leu Thr
                565                 570                 575

Arg Ile Pro Gly Leu Ser Arg Phe Ile Arg Pro Asn Thr Lys Ile Ser
            580                 585                 590

Leu Asp Val Gly Glu Val Ser Glu Gln Asp Phe Ser Thr Gln Leu Val
        595                 600                 605

Ala Pro Ser Glu Phe Ala Ala Thr Pro Val Pro Pro Pro Met Ser Ala
    610                 615                 620

Gly Ile Val Arg Gly Pro Arg Leu Val Pro Gly Ala Pro Val Gly Asp
625                 630                 635                 640

Gly Arg Phe Arg Leu Leu Ala Asp His Gly Gly Val Gln Gly Ala Arg
```

```
                645                 650                 655

Phe Trp Gln Ala Arg Glu Ile Ala Thr Gly Lys Glu Val Ala Leu Ile
            660                 665                 670

Phe Val Asp Thr Ser Gly Asn Ala Pro Phe Ala Pro Leu Ser Ser Ala
        675                 680                 685

Ala Ala Ala Gly Ile Ala Tyr Glu Val Gln Arg Arg Thr Lys Lys Leu
    690                 695                 700

Ala Ser Leu Gly Ser Leu Ala Val Ala Pro Asn Ile His Ser Glu Ala
705                 710                 715                 720

Tyr Arg Asn Gly Cys Leu Ile Val Ala Asp Trp Val Pro Gly Ser Ser
                725                 730                 735

Leu Ser Ala Val Ala Glu Ser Gly Ala Asp Pro Arg Ala Ala Ala Phe
            740                 745                 750

Ala Leu Ala Glu Leu Thr Glu Thr Ile Gly Glu Ala His Glu Met Gly
        755                 760                 765

Ile Pro Ala Gly Leu Asp Asn Lys Cys Arg Ile Arg Ile Asn Thr Asp
    770                 775                 780

Gly His Ala Val Leu Ala Phe Pro Ala Ile Leu Pro Asp Ala Ser Glu
785                 790                 795                 800

Leu Arg Asp Ala Lys Ser Leu Ala Ser Ala Ala Glu Met Leu Ile Asp
                805                 810                 815

Ala Thr Leu Ala Pro Ser Asp Val Lys Ala Met Val Thr Glu Ala Gln
            820                 825                 830

Gly Leu Ala Thr Glu Asp Asn Pro Asp Tyr Ala Ser Leu Ala Met Ala
        835                 840                 845

Met Arg Thr Cys Gly Leu Phe Thr Glu Glu Pro Thr His Leu Val Val
    850                 855                 860

Lys Lys Glu Lys Thr Pro Lys Pro Ala Thr Arg Asp Gly Phe Gly Ala
865                 870                 875                 880

Ser Asp Tyr Thr Val Lys Gly Met Ala Ala Ile Ala Ala Val Val Ile
                885                 890                 895

Ile Leu Val Ser Leu Val Ala Ala Gly Thr Ala Phe Leu Thr Ser Phe
            900                 905                 910

Phe Gly Ser Ser Thr Asn Glu Gln Ser Pro Leu Ala Ser Val Glu Ala
        915                 920                 925

Thr Thr Ser Ala Thr Pro Glu Pro Val Gly Pro Pro Val Tyr Leu Asp
    930                 935                 940

Leu Asp Gln Ala Arg Thr Trp Asp Asp Gly Ala Gly Thr Asp Val Thr
945                 950                 955                 960
```

```
Asp Val Thr Asp Gly Asn Thr Ser Thr Ala Trp Thr Ser Thr Gly Gly
                965                 970                 975

Asp Gly Leu Leu Val Asp Leu Ser Thr Pro Ala Arg Leu Asp Arg Val
            980                 985                 990

Ile Leu Thr Thr Gly Thr Gly Ser Asp Ser Asn Val Thr Ser Thr Val
        995                1000                1005

Lys Ile Tyr Ala Phe Asn Asp Ala Ser Pro His Ser Leu Ser Glu Gly
   1010                1015                1020

Ile Glu Ile Gly Thr Val Asp Tyr Ser Gly Arg Ser Leu Ser His Ser
1025                1030                1035                1040

Ile Arg Asp Ser Ser Lys Leu Pro Gly Gln Val Glu Ser Val Val Ile
               1045                1050                1055

Leu Val Asp Glu Val Arg Ser Ser Gln Thr Ser Asp Thr Asn Pro Gln
           1060                1065                1070

Met Gln Ile Ala Glu Val Gln Leu Val Gly Trp
       1075                1080
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<210> 29
<211> 3723
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(3723)
<223> RXA02056E

<400> 29

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gtg gat aaa aca aag ctc aat aaa ccc tca aga agc aag gaa aag agg   48
Met Asp Lys Thr Lys Leu Asn Lys Pro Ser Arg Ser Lys Glu Lys Arg
  1               5                  10                  15

cga gta cct gcc gtg agc agc gct agt act ttc ggc cag aat gcg tgg   96
Arg Val Pro Ala Val Ser Ser Ala Ser Thr Phe Gly Gln Asn Ala Trp
             20                  25                  30

ctg gta gac gag atg ttc cag cag ttc cag aag gac ccc aag tcc gtg   144
Leu Val Asp Glu Met Phe Gln Gln Phe Gln Lys Asp Pro Lys Ser Val
         35                  40                  45

gac aag gaa tgg aga gaa ctc ttt gag gcg cag ggg gga cca aat act   192
Asp Lys Glu Trp Arg Glu Leu Phe Glu Ala Gln Gly Gly Pro Asn Thr
     50                  55                  60

acc ccc gct aca aca gaa gca cag cct tca gcg ccc aag gag tct gcg   240
Thr Pro Ala Thr Thr Glu Ala Gln Pro Ser Ala Pro Lys Glu Ser Ala
 65                  70                  75                  80

aaa cca gca cca aag gct gcc cct gca gcc aag gca gca ccg cgc gta   288
Lys Pro Ala Pro Lys Ala Ala Pro Ala Ala Lys Ala Ala Pro Arg Val
                 85                  90                  95
```

```
gaa acc aag ccg gcc gac aag acc gcc cct aag gcc aag gag tcc tca   336
Glu Thr Lys Pro Ala Asp Lys Thr Ala Pro Lys Ala Lys Glu Ser Ser
            100                 105                 110

gtg cca cag caa cct aag ctt ccg gag cca gga caa acc cca atc agg   384
Val Pro Gln Gln Pro Lys Leu Pro Glu Pro Gly Gln Thr Pro Ile Arg
        115                 120                 125

ggt att ttc aag tcc atc gcg aag aac atg gat atc tcc ctg gaa atc   432
Gly Ile Phe Lys Ser Ile Ala Lys Asn Met Asp Ile Ser Leu Glu Ile
    130                 135                 140

cca acc gca acc tcg gtt cgc gat atg cca gct cgc ctc atg ttc gaa   480
Pro Thr Ala Thr Ser Val Arg Asp Met Pro Ala Arg Leu Met Phe Glu
145                 150                 155                 160

aac cgc gcg atg gtc aac gat cag ctc aag cgc acc cgc ggt ggc aag   528
Asn Arg Ala Met Val Asn Asp Gln Leu Lys Arg Thr Arg Gly Gly Lys
                165                 170                 175

atc tcc ttc acc cac atc att ggc tac gcc atg gtg aag gca gtc atg   576
Ile Ser Phe Thr His Ile Ile Gly Tyr Ala Met Val Lys Ala Val Met
            180                 185                 190

gct cac ccg gac atg aac aac tcc tac gac gtc atc gac ggc aag cca   624
Ala His Pro Asp Met Asn Asn Ser Tyr Asp Val Ile Asp Gly Lys Pro
        195                 200                 205

acc ctg atc gtg cct gag cac atc aac ctg ggc ctt gct atc gac ctt   672
Thr Leu Ile Val Pro Glu His Ile Asn Leu Gly Leu Ala Ile Asp Leu
    210                 215                 220

cct cag aag gac ggc tcc cgc gca ctt gtc gta gca gcc atc aag gaa   720
Pro Gln Lys Asp Gly Ser Arg Ala Leu Val Val Ala Ala Ile Lys Glu
225                 230                 235                 240

acc gag aag atg aac ttc tcc gag ttc ctc gca gcc tac gaa gac atc   768
Thr Glu Lys Met Asn Phe Ser Glu Phe Leu Ala Ala Tyr Glu Asp Ile
                245                 250                 255

gtg gca cgc tcc cgc aag ggc aag ctc acc atg gat gac tac cag ggc   816
Val Ala Arg Ser Arg Lys Gly Lys Leu Thr Met Asp Asp Tyr Gln Gly
            260                 265                 270

gtt acc gtt tcc ttg acc aac cca ggt ggc atc ggt acc cgc cac tct   864
Val Thr Val Ser Leu Thr Asn Pro Gly Gly Ile Gly Thr Arg His Ser
        275                 280                 285

gtt cca cgt cta acc aag ggc cag ggc acc atc atc ggt gtc ggt tcc   912
Val Pro Arg Leu Thr Lys Gly Gln Gly Thr Ile Ile Gly Val Gly Ser
    290                 295                 300

atg gat tac cca gca gag ttc cag ggc gct tca gaa gac cgc ctt gca   960
Met Asp Tyr Pro Ala Glu Phe Gln Gly Ala Ser Glu Asp Arg Leu Ala
305                 310                 315                 320

gag ctc ggc gtt ggc aaa ctt gtc acc atc acc tcc acc tac gat cac  1008
Glu Leu Gly Val Gly Lys Leu Val Thr Ile Thr Ser Thr Tyr Asp His
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                  325                 330                 335

cgc gtg atc cag ggt gct gtg tcc ggt gaa ttc ctg cgc acc atg tct   1056
Arg Val Ile Gln Gly Ala Val Ser Gly Glu Phe Leu Arg Thr Met Ser
            340                 345                 350

cgc ctg ctc acc gat gat tcc ttc tgg gat gag atc ttc gac gca atg   1104
Arg Leu Leu Thr Asp Asp Ser Phe Trp Asp Glu Ile Phe Asp Ala Met
        355                 360                 365

aac gtt cct tac acc cca atg cgt tgg gca cag gac gtt cca aac acc   1152
Asn Val Pro Tyr Thr Pro Met Arg Trp Ala Gln Asp Val Pro Asn Thr
    370                 375                 380

ggt gtt gat aag aac acc cgc gtc atg cag ctc att gag gca tac cgc   1200
Gly Val Asp Lys Asn Thr Arg Val Met Gln Leu Ile Glu Ala Tyr Arg
385                 390                 395                 400

tcc cgt gga cac ctc atc gct gac acc aac cca ctt tca tgg gtt cag   1248
Ser Arg Gly His Leu Ile Ala Asp Thr Asn Pro Leu Ser Trp Val Gln
                405                 410                 415

cct ggc atg cca gtt cca gac cac cgc gac ctc gac atc gag acc cac   1296
Pro Gly Met Pro Val Pro Asp His Arg Asp Leu Asp Ile Glu Thr His
            420                 425                 430

aac ctg acc atc tgg gat ctg gac cgt acc ttc aac gtc ggt ggc ttc   1344
Asn Leu Thr Ile Trp Asp Leu Asp Arg Thr Phe Asn Val Gly Gly Phe
        435                 440                 445

ggc ggc aag gag acc atg acc ctg cgc gag gta ctg tcc cgc ctc cgc   1392
Gly Gly Lys Glu Thr Met Thr Leu Arg Glu Val Leu Ser Arg Leu Arg
    450                 455                 460

gct gcg tac acc ctc aag gtc ggc tcc gaa tac acc cac atc ctg gac   1440
Ala Ala Tyr Thr Leu Lys Val Gly Ser Glu Tyr Thr His Ile Leu Asp
465                 470                 475                 480

cgc gac gag cgc acc tgg ctg cag gac cgc ctc gag gcc gga atg cca   1488
Arg Asp Glu Arg Thr Trp Leu Gln Asp Arg Leu Glu Ala Gly Met Pro
                485                 490                 495

aag cca acc cag gca gag cag aag tac atc ctg cag aag ctg aac gcc   1536
Lys Pro Thr Gln Ala Glu Gln Lys Tyr Ile Leu Gln Lys Leu Asn Ala
            500                 505                 510

gcg gag gct ttc gag aac ttc ctg cag acc aag tac gtc ggc cag aag   1584
Ala Glu Ala Phe Glu Asn Phe Leu Gln Thr Lys Tyr Val Gly Gln Lys
        515                 520                 525

cgc ttc tcc ctc gaa ggt gca gaa gca ctt atc cca ctg atg gac tcc   1632
Arg Phe Ser Leu Glu Gly Ala Glu Ala Leu Ile Pro Leu Met Asp Ser
    530                 535                 540

gcc atc gac acc gcc gca ggc caa ggc ctc gac gaa gtt gtc atc ggt   1680
Ala Ile Asp Thr Ala Ala Gly Gln Gly Leu Asp Glu Val Val Ile Gly
545                 550                 555                 560

atg cca cac cgt ggt cgc ctc aac gtg ctg ttc aac atc gtg ggc aag   1728
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Met Pro His Arg Gly Arg Leu Asn Val Leu Phe Asn Ile Val Gly Lys
                565                 570                 575

cca ctg gca tcc atc ttc aac gag ttt gaa ggc caa atg gag cag ggc   1776
Pro Leu Ala Ser Ile Phe Asn Glu Phe Glu Gly Gln Met Glu Gln Gly
            580                 585                 590

cag atc ggt ggc tcc ggt gac gtg aag tac cac ctc ggt tcc gaa ggc   1824
Gln Ile Gly Gly Ser Gly Asp Val Lys Tyr His Leu Gly Ser Glu Gly
        595                 600                 605

cag cac ctg cag atg ttc ggc gac ggc gag atc aag gtc tcc ctg act   1872
Gln His Leu Gln Met Phe Gly Asp Gly Glu Ile Lys Val Ser Leu Thr
    610                 615                 620

gct aac ccg tcc cac ctg gaa gct gtt aac cca gtg atg gaa ggt atc   1920
Ala Asn Pro Ser His Leu Glu Ala Val Asn Pro Val Met Glu Gly Ile
625                 630                 635                 640

gtc cgc gca aag cag gac tac ctg gac aag ggc gta gac ggc aag act   1968
Val Arg Ala Lys Gln Asp Tyr Leu Asp Lys Gly Val Asp Gly Lys Thr
                645                 650                 655

gtt gtg cca ctg ctg ctc cac ggt gac gct gca ttc gca ggc ctg ggc   2016
Val Val Pro Leu Leu Leu His Gly Asp Ala Ala Phe Ala Gly Leu Gly
            660                 665                 670

atc gtg cca gaa acc atc aac ctg gct aag ctg cgt ggc tac gac gtc   2064
Ile Val Pro Glu Thr Ile Asn Leu Ala Lys Leu Arg Gly Tyr Asp Val
        675                 680                 685

ggc ggc acc atc cac atc gtg gtg aac aac cag atc ggc ttc acc acc   2112
Gly Gly Thr Ile His Ile Val Val Asn Asn Gln Ile Gly Phe Thr Thr
    690                 695                 700

acc cca gac tcc agc cgc tcc atg cac tac gca acc gac tac gcc aag   2160
Thr Pro Asp Ser Ser Arg Ser Met His Tyr Ala Thr Asp Tyr Ala Lys
705                 710                 715                 720

gca ttc ggc tgc cca gtc ttc cac gtc aac ggc gac gac cca gag gca   2208
Ala Phe Gly Cys Pro Val Phe His Val Asn Gly Asp Asp Pro Glu Ala
                725                 730                 735

gtt gtc tgg gtt ggc cag ctg gcc acc gag tac cgt cgt cgc ttc ggc   2256
Val Val Trp Val Gly Gln Leu Ala Thr Glu Tyr Arg Arg Arg Phe Gly
            740                 745                 750

aag gac gtc ttc atc gac ctc gtc tgc tac cgc ctc cgc ggc cac aac   2304
Lys Asp Val Phe Ile Asp Leu Val Cys Tyr Arg Leu Arg Gly His Asn
        755                 760                 765

gaa gct gat gat cct tcc atg acc cag cca aag atg tat gag ctc atc   2352
Glu Ala Asp Asp Pro Ser Met Thr Gln Pro Lys Met Tyr Glu Leu Ile
    770                 775                 780

acc ggc cgc gag acc gtt cgt gct cag tac acc gaa gac ctg ctc gga   2400
Thr Gly Arg Glu Thr Val Arg Ala Gln Tyr Thr Glu Asp Leu Leu Gly
785                 790                 795                 800
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cgt gga gac ctc tcc aac gaa gat gca gaa gca gtc gtc cgc gac ttc   2448
Arg Gly Asp Leu Ser Asn Glu Asp Ala Glu Ala Val Val Arg Asp Phe
                805                 810                 815

cac gac cag atg gaa tct gtg ttc aac gaa gtc aag gaa ggc ggc aag   2496
His Asp Gln Met Glu Ser Val Phe Asn Glu Val Lys Glu Gly Gly Lys
            820                 825                 830

aag cag gct gag gca cag acc ggc atc acc ggc tcc cag aag ctt cca   2544
Lys Gln Ala Glu Ala Gln Thr Gly Ile Thr Gly Ser Gln Lys Leu Pro
        835                 840                 845

cac ggc ctt gag acc aac atc tcc cgt gaa gag ctc ctg gaa ctg gga   2592
His Gly Leu Glu Thr Asn Ile Ser Arg Glu Glu Leu Leu Glu Leu Gly
    850                 855                 860

cag gct ttc gcc aac acc cca gaa ggc ttc aac tac cac cca cgt gtg   2640
Gln Ala Phe Ala Asn Thr Pro Glu Gly Phe Asn Tyr His Pro Arg Val
865                 870                 875                 880

gct ccc gtt gct aag aag cgc gtc tcc tct gtc acc gaa ggt ggc atc   2688
Ala Pro Val Ala Lys Lys Arg Val Ser Ser Val Thr Glu Gly Gly Ile
                885                 890                 895

gac tgg gca tgg ggc gag ctc ctc gcc ttc ggt tcc ctg gct aac tcc   2736
Asp Trp Ala Trp Gly Glu Leu Leu Ala Phe Gly Ser Leu Ala Asn Ser
            900                 905                 910

ggc cgc ttg gtt cgc ctt gca ggt gaa gat tcc cgc cgc ggt acc ttc   2784
Gly Arg Leu Val Arg Leu Ala Gly Glu Asp Ser Arg Arg Gly Thr Phe
        915                 920                 925

acc cag cgc cac gca gtt gcc atc gac cca gcg acc gct gaa gag ttc   2832
Thr Gln Arg His Ala Val Ala Ile Asp Pro Ala Thr Ala Glu Glu Phe
    930                 935                 940

aac cca ctc cac gag ctt gca cag tcc aag ggc aac aac ggt aag ttc   2880
Asn Pro Leu His Glu Leu Ala Gln Ser Lys Gly Asn Asn Gly Lys Phe
945                 950                 955                 960

ctg gtc tac aac tcc gca ctg acc gag tac gca ggc atg ggc ttc gag   2928
Leu Val Tyr Asn Ser Ala Leu Thr Glu Tyr Ala Gly Met Gly Phe Glu
                965                 970                 975

tac ggc tac tcc gta gga aac gaa gac tcc atc gtt gca tgg gaa gca   2976
Tyr Gly Tyr Ser Val Gly Asn Glu Asp Ser Ile Val Ala Trp Glu Ala
            980                 985                 990

cag ttc ggc gac ttc gcc aac ggc gct cag acc atc atc gat gag tac   3024
Gln Phe Gly Asp Phe Ala Asn Gly Ala Gln Thr Ile Ile Asp Glu Tyr
        995                1000                1005

gtc tcc tca ggc gaa gct aag tgg ggc cag acc tcc aag ctg atc ctt   3072
Val Ser Ser Gly Glu Ala Lys Trp Gly Gln Thr Ser Lys Leu Ile Leu
   1010                1015                1020

ctg ctg cct cac ggc tac gaa ggc cag ggc cca gac cac tct tcc gca   3120
Leu Leu Pro His Gly Tyr Glu Gly Gln Gly Pro Asp His Ser Ser Ala
1025                1030                1035                1040
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cgt atc gag cgc ttc ctg cag ctg tgc gct gag ggt tcc atg act gtt   3168
Arg Ile Glu Arg Phe Leu Gln Leu Cys Ala Glu Gly Ser Met Thr Val
               1045                1050                1055

gct cag cca tcc acc cca gca aac cac ttc cac cta ctg cgt cgt cac   3216
Ala Gln Pro Ser Thr Pro Ala Asn His Phe His Leu Leu Arg Arg His
           1060                1065                1070

gct ctg tcc gac ctg aag cgt cca ctg gtt atc ttc acc ccg aag tcc   3264
Ala Leu Ser Asp Leu Lys Arg Pro Leu Val Ile Phe Thr Pro Lys Ser
       1075                1080                1085

atg ctg cgt aac aag gct gct gcc tcc gca cca gaa gac ttc act gag   3312
Met Leu Arg Asn Lys Ala Ala Ala Ser Ala Pro Glu Asp Phe Thr Glu
   1090                1095                1100

gtc acc aag ttc cag tcc gtg atc aac gat cca aac gtt gca gat gca   3360
Val Thr Lys Phe Gln Ser Val Ile Asn Asp Pro Asn Val Ala Asp Ala
1105                1110                1115                1120

gcc aag gtg aag aag gtc atg ctg gtc tcc ggc aag ctg tac tac gaa   3408
Ala Lys Val Lys Lys Val Met Leu Val Ser Gly Lys Leu Tyr Tyr Glu
               1125                1130                1135

ttg gca aag cgc aag gag aag gac gga cgc gac gac atc gcg atc gtt   3456
Leu Ala Lys Arg Lys Glu Lys Asp Gly Arg Asp Asp Ile Ala Ile Val
           1140                1145                1150

cgt atc gaa atg ctc cac cca att ccg ttc aac cgc atc tcc gag gct   3504
Arg Ile Glu Met Leu His Pro Ile Pro Phe Asn Arg Ile Ser Glu Ala
       1155                1160                1165

ctt gcc ggc tac cct aac gct gag gaa gtc ctc ttc gtt cag gat gag   3552
Leu Ala Gly Tyr Pro Asn Ala Glu Glu Val Leu Phe Val Gln Asp Glu
   1170                1175                1180

cca gca aac cag ggc cca tgg ccg ttc tac cag gag cac ctc cca gag   3600
Pro Ala Asn Gln Gly Pro Trp Pro Phe Tyr Gln Glu His Leu Pro Glu
1185                1190                1195                1200

ctg atc ccg aac atg cca aag atg cgc cgc gtt tcc cgc cgc gct cag   3648
Leu Ile Pro Asn Met Pro Lys Met Arg Arg Val Ser Arg Arg Ala Gln
               1205                1210                1215

tcc tcc acc gca act ggt gtt gcc aag gtg cac cag ctg gag gag aag   3696
Ser Ser Thr Ala Thr Gly Val Ala Lys Val His Gln Leu Glu Glu Lys
           1220                1225                1230

cag ctt atc gac gag gct ttc gag gct                              3723
Gln Leu Ile Asp Glu Ala Phe Glu Ala
       1235                1240
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Arg Val Pro Ala Val Ser Ser Ala Ser Thr Phe Gly Gln Asn Ala Trp
             20                  25                  30

Leu Val Asp Glu Met Phe Gln Gln Phe Gln Lys Asp Pro Lys Ser Val
         35                  40                  45

Asp Lys Glu Trp Arg Glu Leu Phe Glu Ala Gln Gly Gly Pro Asn Thr
     50                  55                  60

Thr Pro Ala Thr Thr Glu Ala Gln Pro Ser Ala Pro Lys Glu Ser Ala
 65                  70                  75                  80

Lys Pro Ala Pro Lys Ala Ala Pro Ala Ala Lys Ala Ala Pro Arg Val
                 85                  90                  95

Glu Thr Lys Pro Ala Asp Lys Thr Ala Pro Lys Ala Lys Glu Ser Ser
            100                 105                 110

Val Pro Gln Gln Pro Lys Leu Pro Glu Pro Gly Gln Thr Pro Ile Arg
        115                 120                 125

Gly Ile Phe Lys Ser Ile Ala Lys Asn Met Asp Ile Ser Leu Glu Ile
    130                 135                 140

Pro Thr Ala Thr Ser Val Arg Asp Met Pro Ala Arg Leu Met Phe Glu
145                 150                 155                 160

Asn Arg Ala Met Val Asn Asp Gln Leu Lys Arg Thr Arg Gly Gly Lys
                165                 170                 175

Ile Ser Phe Thr His Ile Ile Gly Tyr Ala Met Val Lys Ala Val Met
            180                 185                 190

Ala His Pro Asp Met Asn Asn Ser Tyr Asp Val Ile Asp Gly Lys Pro
        195                 200                 205

Thr Leu Ile Val Pro Glu His Ile Asn Leu Gly Leu Ala Ile Asp Leu
    210                 215                 220

Pro Gln Lys Asp Gly Ser Arg Ala Leu Val Val Ala Ala Ile Lys Glu
225                 230                 235                 240

Thr Glu Lys Met Asn Phe Ser Glu Phe Leu Ala Ala Tyr Glu Asp Ile
                245                 250                 255

Val Ala Arg Ser Arg Lys Gly Lys Leu Thr Met Asp Asp Tyr Gln Gly
            260                 265                 270

Val Thr Val Ser Leu Thr Asn Pro Gly Gly Ile Gly Thr Arg His Ser
        275                 280                 285

Val Pro Arg Leu Thr Lys Gly Gln Gly Thr Ile Ile Gly Val Gly Ser
    290                 295                 300
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Met Asp Tyr Pro Ala Glu Phe Gln Gly Ala Ser Glu Asp Arg Leu Ala
305                 310                 315                 320

Glu Leu Gly Val Gly Lys Leu Val Thr Ile Thr Ser Thr Tyr Asp His
                325                 330                 335

Arg Val Ile Gln Gly Ala Val Ser Gly Glu Phe Leu Arg Thr Met Ser
            340                 345                 350

Arg Leu Leu Thr Asp Asp Ser Phe Trp Asp Glu Ile Phe Asp Ala Met
        355                 360                 365

Asn Val Pro Tyr Thr Pro Met Arg Trp Ala Gln Asp Val Pro Asn Thr
    370                 375                 380

Gly Val Asp Lys Asn Thr Arg Val Met Gln Leu Ile Glu Ala Tyr Arg
385                 390                 395                 400

Ser Arg Gly His Leu Ile Ala Asp Thr Asn Pro Leu Ser Trp Val Gln
                405                 410                 415

Pro Gly Met Pro Val Pro Asp His Arg Asp Leu Asp Ile Glu Thr His
            420                 425                 430

Asn Leu Thr Ile Trp Asp Leu Asp Arg Thr Phe Asn Val Gly Gly Phe
        435                 440                 445

Gly Gly Lys Glu Thr Met Thr Leu Arg Glu Val Leu Ser Arg Leu Arg
    450                 455                 460

Ala Ala Tyr Thr Leu Lys Val Gly Ser Glu Tyr Thr His Ile Leu Asp
465                 470                 475                 480

Arg Asp Glu Arg Thr Trp Leu Gln Asp Arg Leu Glu Ala Gly Met Pro
                485                 490                 495

Lys Pro Thr Gln Ala Glu Gln Lys Tyr Ile Leu Gln Lys Leu Asn Ala
            500                 505                 510

Ala Glu Ala Phe Glu Asn Phe Leu Gln Thr Lys Tyr Val Gly Gln Lys
        515                 520                 525

Arg Phe Ser Leu Glu Gly Ala Glu Ala Leu Ile Pro Leu Met Asp Ser
    530                 535                 540

Ala Ile Asp Thr Ala Ala Gly Gln Gly Leu Asp Glu Val Val Ile Gly
545                 550                 555                 560

Met Pro His Arg Gly Arg Leu Asn Val Leu Phe Asn Ile Val Gly Lys
                565                 570                 575

Pro Leu Ala Ser Ile Phe Asn Glu Phe Glu Gly Gln Met Glu Gln Gly
            580                 585                 590

Gln Ile Gly Gly Ser Gly Asp Val Lys Tyr His Leu Gly Ser Glu Gly
        595                 600                 605

Gln His Leu Gln Met Phe Gly Asp Gly Glu Ile Lys Val Ser Leu Thr
    610                 615                 620
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Ala Asn Pro Ser His Leu Glu Ala Val Asn Pro Val Met Glu Gly Ile
625                 630                 635                 640

Val Arg Ala Lys Gln Asp Tyr Leu Asp Lys Gly Val Asp Gly Lys Thr
                645                 650                 655

Val Val Pro Leu Leu Leu His Gly Asp Ala Ala Phe Ala Gly Leu Gly
            660                 665                 670

Ile Val Pro Glu Thr Ile Asn Leu Ala Lys Leu Arg Gly Tyr Asp Val
        675                 680                 685

Gly Gly Thr Ile His Ile Val Val Asn Asn Gln Ile Gly Phe Thr Thr
    690                 695                 700

Thr Pro Asp Ser Ser Arg Ser Met His Tyr Ala Thr Asp Tyr Ala Lys
705                 710                 715                 720

Ala Phe Gly Cys Pro Val Phe His Val Asn Gly Asp Asp Pro Glu Ala
                725                 730                 735

Val Val Trp Val Gly Gln Leu Ala Thr Glu Tyr Arg Arg Arg Phe Gly
            740                 745                 750

Lys Asp Val Phe Ile Asp Leu Val Cys Tyr Arg Leu Arg Gly His Asn
        755                 760                 765

Glu Ala Asp Asp Pro Ser Met Thr Gln Pro Lys Met Tyr Glu Leu Ile
    770                 775                 780

Thr Gly Arg Glu Thr Val Arg Ala Gln Tyr Thr Glu Asp Leu Leu Gly
785                 790                 795                 800

Arg Gly Asp Leu Ser Asn Glu Asp Ala Glu Ala Val Val Arg Asp Phe
                805                 810                 815

His Asp Gln Met Glu Ser Val Phe Asn Glu Val Lys Glu Gly Gly Lys
            820                 825                 830

Lys Gln Ala Glu Ala Gln Thr Gly Ile Thr Gly Ser Gln Lys Leu Pro
        835                 840                 845

His Gly Leu Glu Thr Asn Ile Ser Arg Glu Glu Leu Leu Glu Leu Gly
    850                 855                 860

Gln Ala Phe Ala Asn Thr Pro Glu Gly Phe Asn Tyr His Pro Arg Val
865                 870                 875                 880

Ala Pro Val Ala Lys Lys Arg Val Ser Ser Val Thr Glu Gly Gly Ile
                885                 890                 895

Asp Trp Ala Trp Gly Glu Leu Leu Ala Phe Gly Ser Leu Ala Asn Ser
            900                 905                 910

Gly Arg Leu Val Arg Leu Ala Gly Glu Asp Ser Arg Arg Gly Thr Phe
        915                 920                 925

Thr Gln Arg His Ala Val Ala Ile Asp Pro Ala Thr Ala Glu Glu Phe
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    930                 935                 940

Asn Pro Leu His Glu Leu Ala Gln Ser Lys Gly Asn Asn Gly Lys Phe
945                 950                 955                 960

Leu Val Tyr Asn Ser Ala Leu Thr Glu Tyr Ala Gly Met Gly Phe Glu
                965                 970                 975

Tyr Gly Tyr Ser Val Gly Asn Glu Asp Ser Ile Val Ala Trp Glu Ala
            980                 985                 990

Gln Phe Gly Asp Phe Ala Asn Gly Ala Gln Thr Ile Ile Asp Glu Tyr
        995                1000                1005

Val Ser Ser Gly Glu Ala Lys Trp Gly Gln Thr Ser Lys Leu Ile Leu
   1010                1015                1020

Leu Leu Pro His Gly Tyr Glu Gly Gln Gly Pro Asp His Ser Ser Ala
1025                1030                1035                1040

Arg Ile Glu Arg Phe Leu Gln Leu Cys Ala Glu Gly Ser Met Thr Val
                1045                1050                1055

Ala Gln Pro Ser Thr Pro Ala Asn His Phe His Leu Leu Arg Arg His
           1060                1065                1070

Ala Leu Ser Asp Leu Lys Arg Pro Leu Val Ile Phe Thr Pro Lys Ser
       1075                1080                1085

Met Leu Arg Asn Lys Ala Ala Ala Ser Ala Pro Glu Asp Phe Thr Glu
   1090                1095                1100

Val Thr Lys Phe Gln Ser Val Ile Asn Asp Pro Asn Val Ala Asp Ala
1105                1110                1115                1120

Ala Lys Val Lys Lys Val Met Leu Val Ser Gly Lys Leu Tyr Tyr Glu
                1125                1130                1135

Leu Ala Lys Arg Lys Glu Lys Asp Gly Arg Asp Asp Ile Ala Ile Val
           1140                1145                1150

Arg Ile Glu Met Leu His Pro Ile Pro Phe Asn Arg Ile Ser Glu Ala
       1155                1160                1165

Leu Ala Gly Tyr Pro Asn Ala Glu Glu Val Leu Phe Val Gln Asp Glu
   1170                1175                1180

Pro Ala Asn Gln Gly Pro Trp Pro Phe Tyr Gln Glu His Leu Pro Glu
1185                1190                1195                1200

Leu Ile Pro Asn Met Pro Lys Met Arg Arg Val Ser Arg Arg Ala Gln
                1205                1210                1215

Ser Ser Thr Ala Thr Gly Val Ala Lys Val His Gln Leu Glu Glu Lys
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Gln Leu Ile Asp Glu Ala Phe Glu Ala
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  1               5                  10                  15

gtg gat aaa aca aag ctc aat aaa ccc tca aga agc aag gaa aag agg   96
Val Asp Lys Thr Lys Leu Asn Lys Pro Ser Arg Ser Lys Glu Lys Arg
             20                  25                  30

cga gta cct gcc gtg agc agc gct agt act ttc ggc cag aat gcg tgg   144
Arg Val Pro Ala Val Ser Ser Ala Ser Thr Phe Gly Gln Asn Ala Trp
         35                  40                  45

ctg gta gac gag atg ttc cag cag ttc cag aag gac ccc aag tcc gtg   192
Leu Val Asp Glu Met Phe Gln Gln Phe Gln Lys Asp Pro Lys Ser Val
     50                  55                  60

gac aag gaa tgg aga gaa ctc ttt gag gcg cag ggg gga cca aat act   240
Asp Lys Glu Trp Arg Glu Leu Phe Glu Ala Gln Gly Gly Pro Asn Thr
 65                  70                  75                  80

acc ccc gct aca aca gaa gca cag cct tca gcg ccc aag gag tct gcg   288
Thr Pro Ala Thr Thr Glu Ala Gln Pro Ser Ala Pro Lys Glu Ser Ala
                 85                  90                  95

aaa cca gca cca aag gct gcc cct gca gcc aag gca gca ccg cgc gta   336
Lys Pro Ala Pro Lys Ala Ala Pro Ala Ala Lys Ala Ala Pro Arg Val
            100                 105                 110

gaa acc aag ccg gcc gac aag acc gcc cct aag gcc aag gag tcc tca   384
Glu Thr Lys Pro Ala Asp Lys Thr Ala Pro Lys Ala Lys Glu Ser Ser
        115                 120                 125

gtg cca cag caa cct aag ctt ccg gag cca gga caa acc cca atc agg   432
Val Pro Gln Gln Pro Lys Leu Pro Glu Pro Gly Gln Thr Pro Ile Arg
    130                 135                 140

ggt att ttc aag tcc atc gcg aag aac atg gat atc tcc ctg gaa atc   480
Gly Ile Phe Lys Ser Ile Ala Lys Asn Met Asp Ile Ser Leu Glu Ile
145                 150                 155                 160

cca acc gca acc tcg gtt cgc gat atg cca gct cgc ctc atg ttc gaa   528
Pro Thr Ala Thr Ser Val Arg Asp Met Pro Ala Arg Leu Met Phe Glu
                165                 170                 175

aac cgc gcg atg gtc aac gat cag ctc aag cgc acc cgc ggt ggc aag   576
Asn Arg Ala Met Val Asn Asp Gln Leu Lys Arg Thr Arg Gly Gly Lys
            180                 185                 190
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atc tcc ttc acc cac atc att ggc tac gcc atg gtg aag gca gtc atg   624
Ile Ser Phe Thr His Ile Ile Gly Tyr Ala Met Val Lys Ala Val Met
        195                 200                 205

gct cac ccg gac atg aac aac tcc tac gac gtc atc gac ggc aag cca   672
Ala His Pro Asp Met Asn Asn Ser Tyr Asp Val Ile Asp Gly Lys Pro
    210                 215                 220

acc ctg atc gtg cct gag cac atc aac ctg ggc ctt gct atc gac ctt   720
Thr Leu Ile Val Pro Glu His Ile Asn Leu Gly Leu Ala Ile Asp Leu
225                 230                 235                 240

cct cag aag gac ggc tcc cgc gca ctt gtc gta gca gcc atc aag gaa   768
Pro Gln Lys Asp Gly Ser Arg Ala Leu Val Val Ala Ala Ile Lys Glu
                245                 250                 255

acc gag aag atg aac ttc tcc gag ttc ctc gca gcc tac gaa gac atc   816
Thr Glu Lys Met Asn Phe Ser Glu Phe Leu Ala Ala Tyr Glu Asp Ile
            260                 265                 270

gtg gca cgc tcc cgc aag ggc aag ctc acc atg gat gac tac cag ggc   864
Val Ala Arg Ser Arg Lys Gly Lys Leu Thr Met Asp Asp Tyr Gln Gly
        275                 280                 285

gtt acc gtt tcc ttg acc aac cca ggt ggc atc ggt acc cgc cac tct   912
Val Thr Val Ser Leu Thr Asn Pro Gly Gly Ile Gly Thr Arg His Ser
    290                 295                 300

gtt cca cgt cta acc aag ggc cag ggc acc atc atc ggt gtc ggt tcc   960
Val Pro Arg Leu Thr Lys Gly Gln Gly Thr Ile Ile Gly Val Gly Ser
305                 310                 315                 320

atg gat tac cca gca gag ttc cag ggc gct tca gaa gac cgc ctt gca  1008
Met Asp Tyr Pro Ala Glu Phe Gln Gly Ala Ser Glu Asp Arg Leu Ala
                325                 330                 335

gag ctc ggc gtt ggc aaa ctt gtc acc atc acc tcc acc tac gat cac  1056
Glu Leu Gly Val Gly Lys Leu Val Thr Ile Thr Ser Thr Tyr Asp His
            340                 345                 350

cgc gtg atc cag ggt gct gtg tcc ggt gaa ttc ctg cgc acc atg tct  1104
Arg Val Ile Gln Gly Ala Val Ser Gly Glu Phe Leu Arg Thr Met Ser
        355                 360                 365

cgc ctg ctc acc gat gat tcc ttc tgg gat gag atc ttc gac gca atg  1152
Arg Leu Leu Thr Asp Asp Ser Phe Trp Asp Glu Ile Phe Asp Ala Met
    370                 375                 380

aac gtt cct tac acc cca atg cgt tgg gca cag gac gtt cca aac acc  1200
Asn Val Pro Tyr Thr Pro Met Arg Trp Ala Gln Asp Val Pro Asn Thr
385                 390                 395                 400

ggt gtt gat aag aac acc cgc gtc atg cag ctc att gag gca tac cgc  1248
Gly Val Asp Lys Asn Thr Arg Val Met Gln Leu Ile Glu Ala Tyr Arg
                405                 410                 415

tcc cgt gga cac ctc atc gct gac acc aac cca ctt tca tgg gtt cag  1296
Ser Arg Gly His Leu Ile Ala Asp Thr Asn Pro Leu Ser Trp Val Gln
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                420                 425                 430

cct ggc atg cca gtt cca gac cac cgc gac ctc gac atc gag acc cac   1344
Pro Gly Met Pro Val Pro Asp His Arg Asp Leu Asp Ile Glu Thr His
        435                 440                 445

aac ctg acc atc tgg gat ctg gac cgt acc ttc aac gtc ggt ggc ttc   1392
Asn Leu Thr Ile Trp Asp Leu Asp Arg Thr Phe Asn Val Gly Gly Phe
    450                 455                 460

ggc ggc aag gag acc atg acc ctg cgc gag gta ctg tcc cgc ctc cgc   1440
Gly Gly Lys Glu Thr Met Thr Leu Arg Glu Val Leu Ser Arg Leu Arg
465                 470                 475                 480

gct gcg tac acc ctc aag gtc ggc tcc gaa tac acc cac atc ctg gac   1488
Ala Ala Tyr Thr Leu Lys Val Gly Ser Glu Tyr Thr His Ile Leu Asp
                485                 490                 495

cgc gac gag cgc acc tgg ctg cag gac cgc ctc gag gcc gga atg cca   1536
Arg Asp Glu Arg Thr Trp Leu Gln Asp Arg Leu Glu Ala Gly Met Pro
            500                 505                 510

aag cca acc cag gca gag cag aag tac atc ctg cag aag ctg aac gcc   1584
Lys Pro Thr Gln Ala Glu Gln Lys Tyr Ile Leu Gln Lys Leu Asn Ala
        515                 520                 525

gcg gag gct ttc gag aac ttc ctg cag acc aag tac gtc ggc cag aag   1632
Ala Glu Ala Phe Glu Asn Phe Leu Gln Thr Lys Tyr Val Gly Gln Lys
    530                 535                 540

cgc ttc tcc ctc gaa ggt gca gaa gca ctt atc cca ctg atg gac tcc   1680
Arg Phe Ser Leu Glu Gly Ala Glu Ala Leu Ile Pro Leu Met Asp Ser
545                 550                 555                 560

gcc atc gac acc gcc gca ggc caa ggc ctc gac gaa gtt gtc atc ggt   1728
Ala Ile Asp Thr Ala Ala Gly Gln Gly Leu Asp Glu Val Val Ile Gly
                565                 570                 575

atg cca cac cgt ggt cgc ctc aac gtg ctg ttc aac atc gtg ggc aag   1776
Met Pro His Arg Gly Arg Leu Asn Val Leu Phe Asn Ile Val Gly Lys
            580                 585                 590

cca ctg gca tcc atc ttc aac gag ttt gaa ggc caa atg gag cag ggc   1824
Pro Leu Ala Ser Ile Phe Asn Glu Phe Glu Gly Gln Met Glu Gln Gly
        595                 600                 605

cag atc ggt ggc tcc ggt gac gtg aag tac cac ctc ggt tcc gaa ggc   1872
Gln Ile Gly Gly Ser Gly Asp Val Lys Tyr His Leu Gly Ser Glu Gly
    610                 615                 620

cag cac ctg cag atg ttc ggc gac ggc gag atc aag gtc tcc ctg act   1920
Gln His Leu Gln Met Phe Gly Asp Gly Glu Ile Lys Val Ser Leu Thr
625                 630                 635                 640

gct aac ccg tcc cac ctg gaa gct gtt aac cca gtg atg gaa ggt atc   1968
Ala Asn Pro Ser His Leu Glu Ala Val Asn Pro Val Met Glu Gly Ile
                645                 650                 655

gtc cgc gca aag cag gac tac ctg gac aag ggc gta gac ggc aag act   2016
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Val Arg Ala Lys Gln Asp Tyr Leu Asp Lys Gly Val Asp Gly Lys Thr
            660                 665                 670

gtt gtg cca ctg ctg ctc cac ggt gac gct gca ttc gca ggc ctg ggc   2064
Val Val Pro Leu Leu Leu His Gly Asp Ala Ala Phe Ala Gly Leu Gly
        675                 680                 685

atc gtg cca gaa acc atc aac ctg gct aag ctg cgt ggc tac gac gtc   2112
Ile Val Pro Glu Thr Ile Asn Leu Ala Lys Leu Arg Gly Tyr Asp Val
    690                 695                 700

ggc ggc acc atc cac atc gtg gtg aac aac cag atc ggc ttc acc acc   2160
Gly Gly Thr Ile His Ile Val Val Asn Asn Gln Ile Gly Phe Thr Thr
705                 710                 715                 720

acc cca gac tcc agc cgc tcc atg cac tac gca acc gac tac gcc aag   2208
Thr Pro Asp Ser Ser Arg Ser Met His Tyr Ala Thr Asp Tyr Ala Lys
                725                 730                 735

gca ttc ggc tgc cca gtc ttc cac gtc aac ggc gac gac cca gag gca   2256
Ala Phe Gly Cys Pro Val Phe His Val Asn Gly Asp Asp Pro Glu Ala
            740                 745                 750

gtt gtc tgg gtt ggc cag ctg gcc acc gag tac cgt cgt cgc ttc ggc   2304
Val Val Trp Val Gly Gln Leu Ala Thr Glu Tyr Arg Arg Arg Phe Gly
        755                 760                 765

aag gac gtc ttc atc gac ctc gtc tgc tac cgc ctc cgc ggc cac aac   2352
Lys Asp Val Phe Ile Asp Leu Val Cys Tyr Arg Leu Arg Gly His Asn
    770                 775                 780

gaa gct gat gat cct tcc atg acc cag cca aag atg tat gag ctc atc   2400
Glu Ala Asp Asp Pro Ser Met Thr Gln Pro Lys Met Tyr Glu Leu Ile
785                 790                 795                 800

acc ggc cgc gag acc gtt cgt gct cag tac acc gaa gac ctg ctc gga   2448
Thr Gly Arg Glu Thr Val Arg Ala Gln Tyr Thr Glu Asp Leu Leu Gly
                805                 810                 815

cgt gga gac ctc tcc aac gaa gat gca gaa gca gtc gtc cgc gac ttc   2496
Arg Gly Asp Leu Ser Asn Glu Asp Ala Glu Ala Val Val Arg Asp Phe
            820                 825                 830

cac gac cag atg gaa tct gtg ttc aac gaa gtc aag gaa ggc ggc aag   2544
His Asp Gln Met Glu Ser Val Phe Asn Glu Val Lys Glu Gly Gly Lys
        835                 840                 845

aag cag gct gag gca cag acc ggc atc acc ggc tcc cag aag ctt cca   2592
Lys Gln Ala Glu Ala Gln Thr Gly Ile Thr Gly Ser Gln Lys Leu Pro
    850                 855                 860

cac ggc ctt gag acc aac atc tcc cgt gaa gag ctc ctg gaa ctg gga   2640
His Gly Leu Glu Thr Asn Ile Ser Arg Glu Glu Leu Leu Glu Leu Gly
865                 870                 875                 880

cag gct ttc gcc aac acc cca gaa ggc ttc aac tac cac cca cgt gtg   2688
Gln Ala Phe Ala Asn Thr Pro Glu Gly Phe Asn Tyr His Pro Arg Val
                885                 890                 895
```

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gct ccc gtt gct aag aag cgc gtc tcc tct gtc acc gaa ggt ggc atc   2736
Ala Pro Val Ala Lys Lys Arg Val Ser Ser Val Thr Glu Gly Gly Ile
            900                 905                 910

gac tgg gca tgg ggc gag ctc ctc gcc ttc ggt tcc ctg gct aac tcc   2784
Asp Trp Ala Trp Gly Glu Leu Leu Ala Phe Gly Ser Leu Ala Asn Ser
        915                 920                 925

ggc cgc ttg gtt cgc ctt gca ggt gaa gat tcc cgc cgc ggt acc ttc   2832
Gly Arg Leu Val Arg Leu Ala Gly Glu Asp Ser Arg Arg Gly Thr Phe
    930                 935                 940

acc cag cgc cac gca gtt gcc atc gac cca gcg acc gct gaa gag ttc   2880
Thr Gln Arg His Ala Val Ala Ile Asp Pro Ala Thr Ala Glu Glu Phe
945                 950                 955                 960

aac cca ctc cac gag ctt gca cag tcc aag ggc aac aac ggt aag ttc   2928
Asn Pro Leu His Glu Leu Ala Gln Ser Lys Gly Asn Asn Gly Lys Phe
                965                 970                 975

ctg gtc tac aac tcc gca ctg acc gag tac gca ggc atg ggc ttc gag   2976
Leu Val Tyr Asn Ser Ala Leu Thr Glu Tyr Ala Gly Met Gly Phe Glu
            980                 985                 990

tac ggc tac tcc gta gga aac gaa gac tcc atc gtt gca tgg gaa gca   3024
Tyr Gly Tyr Ser Val Gly Asn Glu Asp Ser Ile Val Ala Trp Glu Ala
        995                1000                1005

cag ttc ggc gac ttc gcc aac ggc gct cag acc atc atc gat gag tac   3072
Gln Phe Gly Asp Phe Ala Asn Gly Ala Gln Thr Ile Ile Asp Glu Tyr
   1010                1015                1020

gtc tcc tca ggc gaa gct aag tgg ggc cag acc tcc aag ctg atc ctt   3120
Val Ser Ser Gly Glu Ala Lys Trp Gly Gln Thr Ser Lys Leu Ile Leu
1025                1030                1035                1040

ctg ctg cct cac ggc tac gaa ggc cag ggc cca gac cac tct tcc gca   3168
Leu Leu Pro His Gly Tyr Glu Gly Gln Gly Pro Asp His Ser Ser Ala
               1045                1050                1055

cgt atc gag cgc ttc ctg cag ctg tgc gct gag ggt tcc atg act gtt   3216
Arg Ile Glu Arg Phe Leu Gln Leu Cys Ala Glu Gly Ser Met Thr Val
           1060                1065                1070

gct cag cca tcc acc cca gca aac cac ttc cac cta ctg cgt cgt cac   3264
Ala Gln Pro Ser Thr Pro Ala Asn His Phe His Leu Leu Arg Arg His
       1075                1080                1085

gct ctg tcc gac ctg aag cgt cca ctg gtt atc ttc acc ccg aag tcc   3312
Ala Leu Ser Asp Leu Lys Arg Pro Leu Val Ile Phe Thr Pro Lys Ser
   1090                1095                1100

atg ctg cgt aac aag gct gct gcc tcc gca cca gaa gac ttc act gag   3360
Met Leu Arg Asn Lys Ala Ala Ala Ser Ala Pro Glu Asp Phe Thr Glu
1105                1110                1115                1120

gtc acc aag ttc cag tcc gtg atc aac gat cca aac gtt gca gat gca   3408
Val Thr Lys Phe Gln Ser Val Ile Asn Asp Pro Asn Val Ala Asp Ala
               1125                1130                1135
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gcc aag gtg aag aag gtc atg ctg gtc tcc ggc aag ctg tac tac gaa   3456
Ala Lys Val Lys Lys Val Met Leu Val Ser Gly Lys Leu Tyr Tyr Glu
          1140                1145                1150

ttg gca aag cgc aag gag aag gac gga cgc gac gac atc gcg atc gtt   3504
Leu Ala Lys Arg Lys Glu Lys Asp Gly Arg Asp Asp Ile Ala Ile Val
       1155                1160                1165

cgt atc gaa atg ctc cac cca att ccg ttc aac cgc atc tcc gag gct   3552
Arg Ile Glu Met Leu His Pro Ile Pro Phe Asn Arg Ile Ser Glu Ala
   1170                1175                1180

ctt gcc ggc tac cct aac gct gag gaa gtc ctc ttc gtt cag gat gag   3600
Leu Ala Gly Tyr Pro Asn Ala Glu Glu Val Leu Phe Val Gln Asp Glu
1185                1190                1195                1200

cca gca aac cag ggc cca tgg ccg ttc tac cag gag cac ctc cca gag   3648
Pro Ala Asn Gln Gly Pro Trp Pro Phe Tyr Gln Glu His Leu Pro Glu
               1205                1210                1215

ctg atc ccg aac atg cca aag atg cgc cgc gtt tcc cgc cgc gct cag   3696
Leu Ile Pro Asn Met Pro Lys Met Arg Arg Val Ser Arg Arg Ala Gln
          1220                1225                1230

tcc tcc acc gca act ggt gtt gcc aag gtg cac cag ctg gag gag aag   3744
Ser Ser Thr Ala Thr Gly Val Ala Lys Val His Gln Leu Glu Glu Lys
       1235                1240                1245

cag ctt atc gac gag gct ttc gag gct                              3771

Gln Leu Ile Asp Glu Ala Phe Glu Ala
   1250                1255
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Met Leu Gln Leu Gly Leu Arg His Asn Gln Pro Thr Thr Asn Val Thr
  1               5                  10                  15

Val Asp Lys Thr Lys Leu Asn Lys Pro Ser Arg Ser Lys Glu Lys Arg
             20                  25                  30

Arg Val Pro Ala Val Ser Ser Ala Ser Thr Phe Gly Gln Asn Ala Trp
         35                  40                  45

Leu Val Asp Glu Met Phe Gln Gln Phe Gln Lys Asp Pro Lys Ser Val
     50                  55                  60

Asp Lys Glu Trp Arg Glu Leu Phe Glu Ala Gln Gly Gly Pro Asn Thr
 65                  70                  75                  80

Thr Pro Ala Thr Thr Glu Ala Gln Pro Ser Ala Pro Lys Glu Ser Ala
                 85                  90                  95
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Lys Pro Ala Pro Lys Ala Ala Pro Ala Ala Lys Ala Ala Pro Arg Val
            100                 105                 110

Glu Thr Lys Pro Ala Asp Lys Thr Ala Pro Lys Ala Lys Glu Ser Ser
        115                 120                 125

Val Pro Gln Gln Pro Lys Leu Pro Glu Pro Gly Gln Thr Pro Ile Arg
    130                 135                 140

Gly Ile Phe Lys Ser Ile Ala Lys Asn Met Asp Ile Ser Leu Glu Ile
145                 150                 155                 160

Pro Thr Ala Thr Ser Val Arg Asp Met Pro Ala Arg Leu Met Phe Glu
                165                 170                 175

Asn Arg Ala Met Val Asn Asp Gln Leu Lys Arg Thr Arg Gly Gly Lys
            180                 185                 190

Ile Ser Phe Thr His Ile Ile Gly Tyr Ala Met Val Lys Ala Val Met
        195                 200                 205

Ala His Pro Asp Met Asn Asn Ser Tyr Asp Val Ile Asp Gly Lys Pro
    210                 215                 220

Thr Leu Ile Val Pro Glu His Ile Asn Leu Gly Leu Ala Ile Asp Leu
225                 230                 235                 240

Pro Gln Lys Asp Gly Ser Arg Ala Leu Val Val Ala Ala Ile Lys Glu
                245                 250                 255

Thr Glu Lys Met Asn Phe Ser Glu Phe Leu Ala Ala Tyr Glu Asp Ile
            260                 265                 270

Val Ala Arg Ser Arg Lys Gly Lys Leu Thr Met Asp Asp Tyr Gln Gly
        275                 280                 285

Val Thr Val Ser Leu Thr Asn Pro Gly Gly Ile Gly Thr Arg His Ser
    290                 295                 300

Val Pro Arg Leu Thr Lys Gly Gln Gly Thr Ile Ile Gly Val Gly Ser
305                 310                 315                 320

Met Asp Tyr Pro Ala Glu Phe Gln Gly Ala Ser Glu Asp Arg Leu Ala
                325                 330                 335

Glu Leu Gly Val Gly Lys Leu Val Thr Ile Thr Ser Thr Tyr Asp His
            340                 345                 350

Arg Val Ile Gln Gly Ala Val Ser Gly Glu Phe Leu Arg Thr Met Ser
        355                 360                 365

Arg Leu Leu Thr Asp Asp Ser Phe Trp Asp Glu Ile Phe Asp Ala Met
    370                 375                 380

Asn Val Pro Tyr Thr Pro Met Arg Trp Ala Gln Asp Val Pro Asn Thr
385                 390                 395                 400

Gly Val Asp Lys Asn Thr Arg Val Met Gln Leu Ile Glu Ala Tyr Arg
```

```
                405                 410                 415

Ser Arg Gly His Leu Ile Ala Asp Thr Asn Pro Leu Ser Trp Val Gln
            420                 425                 430

Pro Gly Met Pro Val Pro Asp His Arg Asp Leu Asp Ile Glu Thr His
        435                 440                 445

Asn Leu Thr Ile Trp Asp Leu Asp Arg Thr Phe Asn Val Gly Gly Phe
    450                 455                 460

Gly Gly Lys Glu Thr Met Thr Leu Arg Glu Val Leu Ser Arg Leu Arg
465                 470                 475                 480

Ala Ala Tyr Thr Leu Lys Val Gly Ser Glu Tyr Thr His Ile Leu Asp
                485                 490                 495

Arg Asp Glu Arg Thr Trp Leu Gln Asp Arg Leu Glu Ala Gly Met Pro
            500                 505                 510

Lys Pro Thr Gln Ala Glu Gln Lys Tyr Ile Leu Gln Lys Leu Asn Ala
        515                 520                 525

Ala Glu Ala Phe Glu Asn Phe Leu Gln Thr Lys Tyr Val Gly Gln Lys
    530                 535                 540

Arg Phe Ser Leu Glu Gly Ala Glu Ala Leu Ile Pro Leu Met Asp Ser
545                 550                 555                 560

Ala Ile Asp Thr Ala Ala Gly Gln Gly Leu Asp Glu Val Val Ile Gly
                565                 570                 575

Met Pro His Arg Gly Arg Leu Asn Val Leu Phe Asn Ile Val Gly Lys
            580                 585                 590

Pro Leu Ala Ser Ile Phe Asn Glu Phe Glu Gly Gln Met Glu Gln Gly
        595                 600                 605

Gln Ile Gly Gly Ser Gly Asp Val Lys Tyr His Leu Gly Ser Glu Gly
    610                 615                 620

Gln His Leu Gln Met Phe Gly Asp Gly Glu Ile Lys Val Ser Leu Thr
625                 630                 635                 640

Ala Asn Pro Ser His Leu Glu Ala Val Asn Pro Val Met Glu Gly Ile
                645                 650                 655

Val Arg Ala Lys Gln Asp Tyr Leu Asp Lys Gly Val Asp Gly Lys Thr
            660                 665                 670

Val Val Pro Leu Leu Leu His Gly Asp Ala Ala Phe Ala Gly Leu Gly
        675                 680                 685

Ile Val Pro Glu Thr Ile Asn Leu Ala Lys Leu Arg Gly Tyr Asp Val
    690                 695                 700

Gly Gly Thr Ile His Ile Val Val Asn Asn Gln Ile Gly Phe Thr Thr
705                 710                 715                 720
```

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Thr Pro Asp Ser Ser Arg Ser Met His Tyr Ala Thr Asp Tyr Ala Lys
                725                 730                 735

Ala Phe Gly Cys Pro Val Phe His Val Asn Gly Asp Asp Pro Glu Ala
            740                 745                 750

Val Val Trp Val Gly Gln Leu Ala Thr Glu Tyr Arg Arg Arg Phe Gly
        755                 760                 765

Lys Asp Val Phe Ile Asp Leu Val Cys Tyr Arg Leu Arg Gly His Asn
    770                 775                 780

Glu Ala Asp Asp Pro Ser Met Thr Gln Pro Lys Met Tyr Glu Leu Ile
785                 790                 795                 800

Thr Gly Arg Glu Thr Val Arg Ala Gln Tyr Thr Glu Asp Leu Leu Gly
                805                 810                 815

Arg Gly Asp Leu Ser Asn Glu Asp Ala Glu Ala Val Val Arg Asp Phe
            820                 825                 830

His Asp Gln Met Glu Ser Val Phe Asn Glu Val Lys Glu Gly Gly Lys
        835                 840                 845

Lys Gln Ala Glu Ala Gln Thr Gly Ile Thr Gly Ser Gln Lys Leu Pro
    850                 855                 860

His Gly Leu Glu Thr Asn Ile Ser Arg Glu Glu Leu Leu Glu Leu Gly
865                 870                 875                 880

Gln Ala Phe Ala Asn Thr Pro Glu Gly Phe Asn Tyr His Pro Arg Val
                885                 890                 895

Ala Pro Val Ala Lys Lys Arg Val Ser Ser Val Thr Glu Gly Gly Ile
            900                 905                 910

Asp Trp Ala Trp Gly Glu Leu Leu Ala Phe Gly Ser Leu Ala Asn Ser
        915                 920                 925

Gly Arg Leu Val Arg Leu Ala Gly Glu Asp Ser Arg Arg Gly Thr Phe
    930                 935                 940

Thr Gln Arg His Ala Val Ala Ile Asp Pro Ala Thr Ala Glu Glu Phe
945                 950                 955                 960

Asn Pro Leu His Glu Leu Ala Gln Ser Lys Gly Asn Asn Gly Lys Phe
                965                 970                 975

Leu Val Tyr Asn Ser Ala Leu Thr Glu Tyr Ala Gly Met Gly Phe Glu
            980                 985                 990

Tyr Gly Tyr Ser Val Gly Asn Glu Asp Ser Ile Val Ala Trp Glu Ala
        995                1000                1005

Gln Phe Gly Asp Phe Ala Asn Gly Ala Gln Thr Ile Ile Asp Glu Tyr
   1010                1015                1020

Val Ser Ser Gly Glu Ala Lys Trp Gly Gln Thr Ser Lys Leu Ile Leu
1025                1030                1035                1040
```

```
Leu Leu Pro His Gly Tyr Glu Gly Gln Gly Pro Asp His Ser Ser Ala
               1045                1050                1055

Arg Ile Glu Arg Phe Leu Gln Leu Cys Ala Glu Gly Ser Met Thr Val
           1060                1065                1070

Ala Gln Pro Ser Thr Pro Ala Asn His Phe His Leu Leu Arg Arg His
       1075                1080                1085

Ala Leu Ser Asp Leu Lys Arg Pro Leu Val Ile Phe Thr Pro Lys Ser
   1090                1095                1100

Met Leu Arg Asn Lys Ala Ala Ala Ser Ala Pro Glu Asp Phe Thr Glu
1105                1110                1115                1120

Val Thr Lys Phe Gln Ser Val Ile Asn Asp Pro Asn Val Ala Asp Ala
               1125                1130                1135

Ala Lys Val Lys Lys Val Met Leu Val Ser Gly Lys Leu Tyr Tyr Glu
           1140                1145                1150

Leu Ala Lys Arg Lys Glu Lys Asp Gly Arg Asp Asp Ile Ala Ile Val
       1155                1160                1165

Arg Ile Glu Met Leu His Pro Ile Pro Phe Asn Arg Ile Ser Glu Ala
   1170                1175                1180

Leu Ala Gly Tyr Pro Asn Ala Glu Glu Val Leu Phe Val Gln Asp Glu
1185                1190                1195                1200

Pro Ala Asn Gln Gly Pro Trp Pro Phe Tyr Gln Glu His Leu Pro Glu
               1205                1210                1215

Leu Ile Pro Asn Met Pro Lys Met Arg Arg Val Ser Arg Arg Ala Gln
           1220                1225                1230

Ser Ser Thr Ala Thr Gly Val Ala Lys Val His Gln Leu Glu Glu Lys
       1235                1240                1245

Gln Leu Ile Asp Glu Ala Phe Glu Ala
   1250                1255
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<223> RXA02063E

<400> 33

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Met Arg Asp Ser Tyr Phe Ala Phe Met Val Lys Gly Val Lys Gly Arg
  1               5                  10                  15
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cca aat gtt cta gca atc gtt ctc gca ggt ggc gag ggc aaa cga ctt   96
Pro Asn Val Leu Ala Ile Val Leu Ala Gly Gly Glu Gly Lys Arg Leu
             20                  25                  30

ttt ccg ttg acg gag gac cga gct aag cct gcg gtc cca ttc ggc gga  144
Phe Pro Leu Thr Glu Asp Arg Ala Lys Pro Ala Val Pro Phe Gly Gly
         35                  40                  45

act tac aga ttg atc gac ttt gtt ttg tcg aac ctg gtg aac tcc gga  192
Thr Tyr Arg Leu Ile Asp Phe Val Leu Ser Asn Leu Val Asn Ser Gly
     50                  55                  60

ttc ctc aag atc gcg gta ctg act cag tac aag tcg cat tca ttg gat  240
Phe Leu Lys Ile Ala Val Leu Thr Gln Tyr Lys Ser His Ser Leu Asp
 65                  70                  75                  80

agg cat att tca ttg tcg tgg aac gtg tct ggt cca acg ggg cag tac  288
Arg His Ile Ser Leu Ser Trp Asn Val Ser Gly Pro Thr Gly Gln Tyr
                 85                  90                  95

att gct tct gtt cct gcg cag cag cgc ctg ggc aag cga tgg ttc act  336
Ile Ala Ser Val Pro Ala Gln Gln Arg Leu Gly Lys Arg Trp Phe Thr
            100                 105                 110

ggt tcc gcg gat gca att ttg cag tct ctg aac ttg atc tct gat gag  384
Gly Ser Ala Asp Ala Ile Leu Gln Ser Leu Asn Leu Ile Ser Asp Glu
        115                 120                 125

aaa ccg gat tat gtc atc gtt ttc ggc gcg gac cac gtg tat cgc atg  432
Lys Pro Asp Tyr Val Ile Val Phe Gly Ala Asp His Val Tyr Arg Met
    130                 135                 140

gac cca agc cag atg cta gat gag cac att gca tct ggt cgc gcg gtg  480
Asp Pro Ser Gln Met Leu Asp Glu His Ile Ala Ser Gly Arg Ala Val
145                 150                 155                 160

tct gtg gca ggt att cgc gtt cca cgt gag gaa gca act gcg ttt ggt  528
Ser Val Ala Gly Ile Arg Val Pro Arg Glu Glu Ala Thr Ala Phe Gly
                165                 170                 175

tgc atc cag tcc gat gtc gac ggc aac ata acc gag ttc ttg gaa aag  576
Cys Ile Gln Ser Asp Val Asp Gly Asn Ile Thr Glu Phe Leu Glu Lys
            180                 185                 190

cca gct gac cct ccg gga acc cct gat gat cct gac atg act tac gcg  624
Pro Ala Asp Pro Pro Gly Thr Pro Asp Asp Pro Asp Met Thr Tyr Ala
        195                 200                 205

tcg atg ggt aac tac att ttc acc act gaa gcc ctg atc cag gcg ctg  672
Ser Met Gly Asn Tyr Ile Phe Thr Thr Glu Ala Leu Ile Gln Ala Leu
    210                 215                 220

aaa gat gat gaa aat aac gag aac agt gat cat gac atg ggc gga gac  720
Lys Asp Asp Glu Asn Asn Glu Asn Ser Asp His Asp Met Gly Gly Asp
225                 230                 235                 240

atc att ccg tac ttc gtc tct cgc aat gat gcg cat gtt tat gat ttc  768
Ile Ile Pro Tyr Phe Val Ser Arg Asn Asp Ala His Val Tyr Asp Phe
                245                 250                 255
```

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tcc gga aac att gtt cct ggc gca act gag cgt gac aag ggc tac tgg   816
Ser Gly Asn Ile Val Pro Gly Ala Thr Glu Arg Asp Lys Gly Tyr Trp
            260                 265                 270

cgc gac gtc ggt acc att gat gcg ttc tac gag tgc cac atg gac ctg   864
Arg Asp Val Gly Thr Ile Asp Ala Phe Tyr Glu Cys His Met Asp Leu
        275                 280                 285

att tcc gtg cac cca atc ttc aat ctg tat aac tct gag tgg cca atc   912
Ile Ser Val His Pro Ile Phe Asn Leu Tyr Asn Ser Glu Trp Pro Ile
    290                 295                 300

cac acg acc tct gaa ggt aac ttg cct ccg gct aag ttc gtt cgg ggc   960
His Thr Thr Ser Glu Gly Asn Leu Pro Pro Ala Lys Phe Val Arg Gly
305                 310                 315                 320

ggt atc gcg cag tcg tcg atg gtg tct tca ggt tcc atc att tct gct  1008
Gly Ile Ala Gln Ser Ser Met Val Ser Ser Gly Ser Ile Ile Ser Ala
                325                 330                 335

ggg act gtt cgc aac tcc gtg ctg tcc aac aac gtt gtc gtc gaa gag  1056
Gly Thr Val Arg Asn Ser Val Leu Ser Asn Asn Val Val Val Glu Glu
            340                 345                 350

ggc gca acg gtg gaa ggt gca gtg ctg atg cca ggc gtg cgc atc ggt  1104
Gly Ala Thr Val Glu Gly Ala Val Leu Met Pro Gly Val Arg Ile Gly
        355                 360                 365

aag ggt gct gtt gtc cgc cat gcg att ctg gac aag aac gtg gtt gtc  1152
Lys Gly Ala Val Val Arg His Ala Ile Leu Asp Lys Asn Val Val Val
    370                 375                 380

cgc gac gga gag ctc atc ggt gtc gac caa gtg cgc gat gcg cag cgc  1200
Arg Asp Gly Glu Leu Ile Gly Val Asp Gln Val Arg Asp Ala Gln Arg
385                 390                 395                 400

ttc aag gtg agc gcc ggc ggc gtc gtg gtt gtc ggt aag aac cag gta  1248
Phe Lys Val Ser Ala Gly Gly Val Val Val Val Gly Lys Asn Gln Val
                405                 410                 415

gtc                                                             1251
Val
```

<210> 34
<211> 417
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 34

```
Met Arg Asp Ser Tyr Phe Ala Phe Met Val Lys Gly Val Lys Gly Arg
  1               5                  10                  15

Pro Asn Val Leu Ala Ile Val Leu Ala Gly Gly Glu Gly Lys Arg Leu
             20                  25                  30
```

```
Phe Pro Leu Thr Glu Asp Arg Ala Lys Pro Ala Val Pro Phe Gly Gly
         35                  40                  45

Thr Tyr Arg Leu Ile Asp Phe Val Leu Ser Asn Leu Val Asn Ser Gly
     50                  55                  60

Phe Leu Lys Ile Ala Val Leu Thr Gln Tyr Lys Ser His Ser Leu Asp
 65                  70                  75                  80

Arg His Ile Ser Leu Ser Trp Asn Val Ser Gly Pro Thr Gly Gln Tyr
                 85                  90                  95

Ile Ala Ser Val Pro Ala Gln Gln Arg Leu Gly Lys Arg Trp Phe Thr
            100                 105                 110

Gly Ser Ala Asp Ala Ile Leu Gln Ser Leu Asn Leu Ile Ser Asp Glu
        115                 120                 125

Lys Pro Asp Tyr Val Ile Val Phe Gly Ala Asp His Val Tyr Arg Met
    130                 135                 140

Asp Pro Ser Gln Met Leu Asp Glu His Ile Ala Ser Gly Arg Ala Val
145                 150                 155                 160

Ser Val Ala Gly Ile Arg Val Pro Arg Glu Glu Ala Thr Ala Phe Gly
                165                 170                 175

Cys Ile Gln Ser Asp Val Asp Gly Asn Ile Thr Glu Phe Leu Glu Lys
            180                 185                 190

Pro Ala Asp Pro Pro Gly Thr Pro Asp Asp Pro Asp Met Thr Tyr Ala
        195                 200                 205

Ser Met Gly Asn Tyr Ile Phe Thr Thr Glu Ala Leu Ile Gln Ala Leu
    210                 215                 220

Lys Asp Asp Glu Asn Asn Glu Asn Ser Asp His Asp Met Gly Gly Asp
225                 230                 235                 240

Ile Ile Pro Tyr Phe Val Ser Arg Asn Asp Ala His Val Tyr Asp Phe
                245                 250                 255

Ser Gly Asn Ile Val Pro Gly Ala Thr Glu Arg Asp Lys Gly Tyr Trp
            260                 265                 270

Arg Asp Val Gly Thr Ile Asp Ala Phe Tyr Glu Cys His Met Asp Leu
        275                 280                 285

Ile Ser Val His Pro Ile Phe Asn Leu Tyr Asn Ser Glu Trp Pro Ile
    290                 295                 300

His Thr Thr Ser Glu Gly Asn Leu Pro Pro Ala Lys Phe Val Arg Gly
305                 310                 315                 320

Gly Ile Ala Gln Ser Ser Met Val Ser Ser Gly Ser Ile Ile Ser Ala
                325                 330                 335

Gly Thr Val Arg Asn Ser Val Leu Ser Asn Asn Val Val Val Glu Glu
            340                 345                 350
```

```
Gly Ala Thr Val Glu Gly Ala Val Leu Met Pro Gly Val Arg Ile Gly
        355                 360                 365

Lys Gly Ala Val Val Arg His Ala Ile Leu Asp Lys Asn Val Val Val
    370                 375                 380

Arg Asp Gly Glu Leu Ile Gly Val Asp Gln Val Arg Asp Ala Gln Arg
385                 390                 395                 400

Phe Lys Val Ser Ala Gly Gly Val Val Val Val Gly Lys Asn Gln Val
                405                 410                 415

Val
```

<210> 35
<211> 1227
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1227)
<223> RXA02063W

<400> 35

```
atg gtt aag ggt gtg aag ggt aga cca aat gtt cta gca atc gtt ctc   48
Met Val Lys Gly Val Lys Gly Arg Pro Asn Val Leu Ala Ile Val Leu
  1               5                  10                  15

gca ggt ggc gag ggc aaa cga ctt ttt ccg ttg acg gag gac cga gct   96
Ala Gly Gly Glu Gly Lys Arg Leu Phe Pro Leu Thr Glu Asp Arg Ala
             20                  25                  30

aag cct gcg gtc cca ttc ggc gga act tac aga ttg atc gac ttt gtt   144
Lys Pro Ala Val Pro Phe Gly Gly Thr Tyr Arg Leu Ile Asp Phe Val
         35                  40                  45

ttg tcg aac ctg gtg aac tcc gga ttc ctc aag atc gcg gta ctg act   192
Leu Ser Asn Leu Val Asn Ser Gly Phe Leu Lys Ile Ala Val Leu Thr
     50                  55                  60

cag tac aag tcg cat tca ttg gat agg cat att tca ttg tcg tgg aac   240
Gln Tyr Lys Ser His Ser Leu Asp Arg His Ile Ser Leu Ser Trp Asn
 65                  70                  75                  80

gtg tct ggt cca acg ggg cag tac att gct tct gtt cct gcg cag cag   288
Val Ser Gly Pro Thr Gly Gln Tyr Ile Ala Ser Val Pro Ala Gln Gln
                 85                  90                  95

cgc ctg ggc aag cga tgg ttc act ggt tcc gcg gat gca att ttg cag   336
Arg Leu Gly Lys Arg Trp Phe Thr Gly Ser Ala Asp Ala Ile Leu Gln
            100                 105                 110

tct ctg aac ttg atc tct gat gag aaa ccg gat tat gtc atc gtt ttc   384
Ser Leu Asn Leu Ile Ser Asp Glu Lys Pro Asp Tyr Val Ile Val Phe
        115                 120                 125
```

```
ggc gcg gac cac gtg tat cgc atg gac cca agc cag atg cta gat gag   432
Gly Ala Asp His Val Tyr Arg Met Asp Pro Ser Gln Met Leu Asp Glu
    130                 135                 140

cac att gca tct ggt cgc gcg gtg tct gtg gca ggt att cgc gtt cca   480
His Ile Ala Ser Gly Arg Ala Val Ser Val Ala Gly Ile Arg Val Pro
145                 150                 155                 160

cgt gag gaa gca act gcg ttt ggt tgc atc cag tcc gat gtc gac ggc   528
Arg Glu Glu Ala Thr Ala Phe Gly Cys Ile Gln Ser Asp Val Asp Gly
                165                 170                 175

aac ata acc gag ttc ttg gaa aag cca gct gac cct ccg gga acc cct   576
Asn Ile Thr Glu Phe Leu Glu Lys Pro Ala Asp Pro Pro Gly Thr Pro
            180                 185                 190

gat gat cct gac atg act tac gcg tcg atg ggt aac tac att ttc acc   624
Asp Asp Pro Asp Met Thr Tyr Ala Ser Met Gly Asn Tyr Ile Phe Thr
        195                 200                 205

act gaa gcc ctg atc cag gcg ctg aaa gat gat gaa aat aac gag aac   672
Thr Glu Ala Leu Ile Gln Ala Leu Lys Asp Asp Glu Asn Asn Glu Asn
    210                 215                 220

agt gat cat gac atg ggc gga gac atc att ccg tac ttc gtc tct cgc   720
Ser Asp His Asp Met Gly Gly Asp Ile Ile Pro Tyr Phe Val Ser Arg
225                 230                 235                 240

aat gat gcg cat gtt tat gat ttc tcc gga aac att gtt cct ggc gca   768
Asn Asp Ala His Val Tyr Asp Phe Ser Gly Asn Ile Val Pro Gly Ala
                245                 250                 255

act gag cgt gac aag ggc tac tgg cgc gac gtc ggt acc att gat gcg   816
Thr Glu Arg Asp Lys Gly Tyr Trp Arg Asp Val Gly Thr Ile Asp Ala
            260                 265                 270

ttc tac gag tgc cac atg gac ctg att tcc gtg cac cca atc ttc aat   864
Phe Tyr Glu Cys His Met Asp Leu Ile Ser Val His Pro Ile Phe Asn
        275                 280                 285

ctg tat aac tct gag tgg cca atc cac acg acc tct gaa ggt aac ttg   912
Leu Tyr Asn Ser Glu Trp Pro Ile His Thr Thr Ser Glu Gly Asn Leu
    290                 295                 300

cct ccg gct aag ttc gtt cgg ggc ggt atc gcg cag tcg tcg atg gtg   960
Pro Pro Ala Lys Phe Val Arg Gly Gly Ile Ala Gln Ser Ser Met Val
305                 310                 315                 320

tct tca ggt tcc atc att tct gct ggg act gtt cgc aac tcc gtg ctg  1008
Ser Ser Gly Ser Ile Ile Ser Ala Gly Thr Val Arg Asn Ser Val Leu
                325                 330                 335

tcc aac aac gtt gtc gtc gaa gag ggc gca acg gtg gaa ggt gca gtg  1056
Ser Asn Asn Val Val Val Glu Glu Gly Ala Thr Val Glu Gly Ala Val
            340                 345                 350

ctg atg cca ggc gtg cgc atc ggt aag ggt gct gtt gtc cgc cat gcg  1104
Leu Met Pro Gly Val Arg Ile Gly Lys Gly Ala Val Val Arg His Ala
```

```
        355                 360                 365

att ctg gac aag aac gtg gtt gtc cgc gac gga gag ctc atc ggt gtc   1152
Ile Leu Asp Lys Asn Val Val Val Arg Asp Gly Glu Leu Ile Gly Val
    370                 375                 380

gac caa gtg cgc gat gcg cag cgc ttc aag gtg agc gcc ggc ggc gtc   1200
Asp Gln Val Arg Asp Ala Gln Arg Phe Lys Val Ser Ala Gly Gly Val
385                 390                 395                 400

gtg gtt gtc ggt aag aac cag gta gtc                               1227
Val Val Val Gly Lys Asn Gln Val Val
                405
```

<210> 36
<211> 409
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 36

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Met Val Lys Gly Val Lys Gly Arg Pro Asn Val Leu Ala Ile Val Leu
  1               5                  10                  15

Ala Gly Gly Glu Gly Lys Arg Leu Phe Pro Leu Thr Glu Asp Arg Ala
             20                  25                  30

Lys Pro Ala Val Pro Phe Gly Gly Thr Tyr Arg Leu Ile Asp Phe Val
         35                  40                  45

Leu Ser Asn Leu Val Asn Ser Gly Phe Leu Lys Ile Ala Val Leu Thr
     50                  55                  60

Gln Tyr Lys Ser His Ser Leu Asp Arg His Ile Ser Leu Ser Trp Asn
 65                  70                  75                  80

Val Ser Gly Pro Thr Gly Gln Tyr Ile Ala Ser Val Pro Ala Gln Gln
                 85                  90                  95

Arg Leu Gly Lys Arg Trp Phe Thr Gly Ser Ala Asp Ala Ile Leu Gln
            100                 105                 110

Ser Leu Asn Leu Ile Ser Asp Glu Lys Pro Asp Tyr Val Ile Val Phe
        115                 120                 125

Gly Ala Asp His Val Tyr Arg Met Asp Pro Ser Gln Met Leu Asp Glu
    130                 135                 140

His Ile Ala Ser Gly Arg Ala Val Ser Val Ala Gly Ile Arg Val Pro
145                 150                 155                 160

Arg Glu Glu Ala Thr Ala Phe Gly Cys Ile Gln Ser Asp Val Asp Gly
                165                 170                 175

Asn Ile Thr Glu Phe Leu Glu Lys Pro Ala Asp Pro Pro Gly Thr Pro
            180                 185                 190

Asp Asp Pro Asp Met Thr Tyr Ala Ser Met Gly Asn Tyr Ile Phe Thr
```

```
        195                 200                 205

Thr Glu Ala Leu Ile Gln Ala Leu Lys Asp Asp Glu Asn Asn Glu Asn
    210                 215                 220

Ser Asp His Asp Met Gly Gly Asp Ile Ile Pro Tyr Phe Val Ser Arg
225                 230                 235                 240

Asn Asp Ala His Val Tyr Asp Phe Ser Gly Asn Ile Val Pro Gly Ala
                245                 250                 255

Thr Glu Arg Asp Lys Gly Tyr Trp Arg Asp Val Gly Thr Ile Asp Ala
            260                 265                 270

Phe Tyr Glu Cys His Met Asp Leu Ile Ser Val His Pro Ile Phe Asn
        275                 280                 285

Leu Tyr Asn Ser Glu Trp Pro Ile His Thr Thr Ser Glu Gly Asn Leu
    290                 295                 300

Pro Pro Ala Lys Phe Val Arg Gly Gly Ile Ala Gln Ser Ser Met Val
305                 310                 315                 320

Ser Ser Gly Ser Ile Ile Ser Ala Gly Thr Val Arg Asn Ser Val Leu
                325                 330                 335

Ser Asn Asn Val Val Val Glu Glu Gly Ala Thr Val Glu Gly Ala Val
            340                 345                 350

Leu Met Pro Gly Val Arg Ile Gly Lys Gly Ala Val Val Arg His Ala
        355                 360                 365

Ile Leu Asp Lys Asn Val Val Val Arg Asp Gly Glu Leu Ile Gly Val
    370                 375                 380

Asp Gln Val Arg Asp Ala Gln Arg Phe Lys Val Ser Ala Gly Gly Val
385                 390                 395                 400

Val Val Val Gly Lys Asn Gln Val Val
                405
```

<210> 37
<211> 3465
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(3465)
<223> RXA02082K

<400> 37

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atg tat ttg aaa tcg ttg acg ctc aag ggg ttt aag tct ttc gcg tct   48
Met Tyr Leu Lys Ser Leu Thr Leu Lys Gly Phe Lys Ser Phe Ala Ser
  1               5                  10                  15

gcg acg acc ctg aaa ttt gag cca ggc att tgt gcc gtg gtg ggt ccg   96
Ala Thr Thr Leu Lys Phe Glu Pro Gly Ile Cys Ala Val Val Gly Pro
```

```
                20                  25                  30

aat ggt tca ggc aaa tcc aat gtg gtt gat gcg ctg gcc tgg gtg atg   144
Asn Gly Ser Gly Lys Ser Asn Val Val Asp Ala Leu Ala Trp Val Met
         35                  40                  45

ggt gaa ggt tct gcg aag acc ttg cgt ggc ggc aaa atg gaa gat gtc   192
Gly Glu Gly Ser Ala Lys Thr Leu Arg Gly Gly Lys Met Glu Asp Val
     50                  55                  60

att ttt gct ggc gcg ggc gat cgt aaa ccg ttg ggt cgc gca gaa gtc   240
Ile Phe Ala Gly Ala Gly Asp Arg Lys Pro Leu Gly Arg Ala Glu Val
 65                  70                  75                  80

acg ctg acc att gat aac tct gat ggc gca ctg ccc att gag tac acc   288
Thr Leu Thr Ile Asp Asn Ser Asp Gly Ala Leu Pro Ile Glu Tyr Thr
                 85                  90                  95

gaa gtg tcg gtg acc aga cgg atg ttc cgt gat ggt gca agt gaa tat   336
Glu Val Ser Val Thr Arg Arg Met Phe Arg Asp Gly Ala Ser Glu Tyr
            100                 105                 110

gag atc aat ggg gcg aaa gct cga ttg atg gat atc cag gag ctg ttg   384
Glu Ile Asn Gly Ala Lys Ala Arg Leu Met Asp Ile Gln Glu Leu Leu
        115                 120                 125

tcg gat acc ggt att ggc cgt gaa atg cac atc atg gtg ggg cag gga   432
Ser Asp Thr Gly Ile Gly Arg Glu Met His Ile Met Val Gly Gln Gly
    130                 135                 140

aag ctc gca gag att ttg gag tcc cgc ccc gaa gag cgc cga gcg tat   480
Lys Leu Ala Glu Ile Leu Glu Ser Arg Pro Glu Glu Arg Arg Ala Tyr
145                 150                 155                 160

atc gaa gaa gct gcg ggt gtg ctc aag cac cgg cgc agg aaa gaa aag   528
Ile Glu Glu Ala Ala Gly Val Leu Lys His Arg Arg Arg Lys Glu Lys
                165                 170                 175

gcg cag cgc aaa ctt cag ggc atg cag gtc aat ctt gat cgt ttg cag   576
Ala Gln Arg Lys Leu Gln Gly Met Gln Val Asn Leu Asp Arg Leu Gln
            180                 185                 190

gat ctg acc cat gag ttg gcc aag cag ctc aag ccg ttg gct agg cag   624
Asp Leu Thr His Glu Leu Ala Lys Gln Leu Lys Pro Leu Ala Arg Gln
        195                 200                 205

gcg gaa gca gcg cag cgt gcg gcg acg gtg cag gct gat ttg cgt gat   672
Ala Glu Ala Ala Gln Arg Ala Ala Thr Val Gln Ala Asp Leu Arg Asp
    210                 215                 220

gcg cgt ttc cag att gct ggc ttt gag atc gtg aag ctc tcg gaa aag   720
Ala Arg Phe Gln Ile Ala Gly Phe Glu Ile Val Lys Leu Ser Glu Lys
225                 230                 235                 240

ctg gaa acc tct act gag cgc gag aaa atg att cgt gag cag gcg gaa   768
Leu Glu Thr Ser Thr Glu Arg Glu Lys Met Ile Arg Glu Gln Ala Glu
                245                 250                 255

gca gca caa gag cag ctg gaa gaa gcc acc aca act cag atg gaa gtg   816
```

```
Ala Ala Gln Glu Gln Leu Glu Glu Ala Thr Thr Thr Gln Met Glu Val
            260                 265                 270

gag atg gag ttg gcg gag atc act ccg cag gct gaa gct gcg caa cag   864
Glu Met Glu Leu Ala Glu Ile Thr Pro Gln Ala Glu Ala Ala Gln Gln
        275                 280                 285

ttg tgg ttt gat ttg tct tcg ctg gct gag cgg gtg tcg gca acg atg   912
Leu Trp Phe Asp Leu Ser Ser Leu Ala Glu Arg Val Ser Ala Thr Met
    290                 295                 300

cgt att gct gca gac cgt gcg agt tca ggt gcc gcg gat gtg ccg tat   960
Arg Ile Ala Ala Asp Arg Ala Ser Ser Gly Ala Ala Asp Val Pro Tyr
305                 310                 315                 320

gcg ggc cag gat cct gat gag ttg ctt ggt cgg gcc gaa act gct gac  1008
Ala Gly Gln Asp Pro Asp Glu Leu Leu Gly Arg Ala Glu Thr Ala Asp
                325                 330                 335

aaa gaa tta gaa gaa ctc gag atg gcc gtg gaa atg acc acc gag cgt  1056
Lys Glu Leu Glu Glu Leu Glu Met Ala Val Glu Met Thr Thr Glu Arg
            340                 345                 350

ttg acc tcc att caa gag gaa gcc gag gat aag gcc gcg cag gct cgt  1104
Leu Thr Ser Ile Gln Glu Glu Ala Glu Asp Lys Ala Ala Gln Ala Arg
        355                 360                 365

gag gct gag cgt gaa cac ttg gcg cag gtc agg gcg att tct gat cgt  1152
Glu Ala Glu Arg Glu His Leu Ala Gln Val Arg Ala Ile Ser Asp Arg
    370                 375                 380

cgt gaa ggt gtt gtg cgc ctg ctt gca tct gag gaa tct ttg cgc acc  1200
Arg Glu Gly Val Val Arg Leu Leu Ala Ser Glu Glu Ser Leu Arg Thr
385                 390                 395                 400

cag cac acg tca gca gag gag gaa gct gag cga ctc agt gag cag ctt  1248
Gln His Thr Ser Ala Glu Glu Glu Ala Glu Arg Leu Ser Glu Gln Leu
                405                 410                 415

gag gag ttc atc ggc cgc att ttg gat gtg gaa cgt gaa cgt cgc ctc  1296
Glu Glu Phe Ile Gly Arg Ile Leu Asp Val Glu Arg Glu Arg Arg Leu
            420                 425                 430

acc gat gag cgt aaa cag ggc gtt gac acg gat cgt gcg ccc ttg gaa  1344
Thr Asp Glu Arg Lys Gln Gly Val Asp Thr Asp Arg Ala Pro Leu Glu
        435                 440                 445

gaa gcc ctc aaa cag gca aaa cat gaa gcc gaa gca gca gag act cgt  1392
Glu Ala Leu Lys Gln Ala Lys His Glu Ala Glu Ala Ala Glu Thr Arg
    450                 455                 460

ctt gag gag ctt cgt act aag cgc agc gat ctg gaa aaa gaa gta tcc  1440
Leu Glu Glu Leu Arg Thr Lys Arg Ser Asp Leu Glu Lys Glu Val Ser
465                 470                 475                 480

agg ttg cag tcg cgc att gag acg ctt aac caa aat agg cca cgt tcc  1488
Arg Leu Gln Ser Arg Ile Glu Thr Leu Asn Gln Asn Arg Pro Arg Ser
                485                 490                 495
```

```
gat gct gct gat gtg gtg gat tac ccg cag ctg gcc acg ttg att cga   1536
Asp Ala Ala Asp Val Val Asp Tyr Pro Gln Leu Ala Thr Leu Ile Arg
            500                 505                 510

ccg caa cga aac gtc gat aag gct ctc gct gcc gcc ctg ggt gcg cat   1584
Pro Gln Arg Asn Val Asp Lys Ala Leu Ala Ala Ala Leu Gly Ala His
        515                 520                 525

gcc gag gcg ctg gct ggc gag gct gcg gaa ggg ctc gtc gag aag ctt   1632
Ala Glu Ala Leu Ala Gly Glu Ala Ala Glu Gly Leu Val Glu Lys Leu
    530                 535                 540

atc gac gcc ggc gtt gca cgc acc atc atc gtt gat ggc acg cag gct   1680
Ile Asp Ala Gly Val Ala Arg Thr Ile Ile Val Asp Gly Thr Gln Ala
545                 550                 555                 560

ggc ggc gca tgg cgc ctg gac gcg aac att ccg gcc ggg gcg agc tgg   1728
Gly Gly Ala Trp Arg Leu Asp Ala Asn Ile Pro Ala Gly Ala Ser Trp
                565                 570                 575

ctg ctc gac cat gtt gat ctg gat ccg gcg att gcc ggc ccg gta aac   1776
Leu Leu Asp His Val Asp Leu Asp Pro Ala Ile Ala Gly Pro Val Asn
            580                 585                 590

cgg ctg ctt gcc gac gtt gtg ctt gtc gac gac ccc tcc ctc ggc cgc   1824
Arg Leu Leu Ala Asp Val Val Leu Val Asp Asp Pro Ser Leu Gly Arg
        595                 600                 605

caa gca atc gag gat gat ccc cgt ctg cgt gcc gtt gac cgc aat ggt   1872
Gln Ala Ile Glu Asp Asp Pro Arg Leu Arg Ala Val Asp Arg Asn Gly
    610                 615                 620

gtg ctc atc ggc gct ggg tgg att cag gtc ggc acc gaa acc tcg act   1920
Val Leu Ile Gly Ala Gly Trp Ile Gln Val Gly Thr Glu Thr Ser Thr
625                 630                 635                 640

gtg gaa atc aca gct caa att gag gaa gca gaa gct caa ctt gct gcg   1968
Val Glu Ile Thr Ala Gln Ile Glu Glu Ala Glu Ala Gln Leu Ala Ala
                645                 650                 655

gcc tct gcc gcc ttg gac gac att gcc ggc act ttt gat ggc gcc ctc   2016
Ala Ser Ala Ala Leu Asp Asp Ile Ala Gly Thr Phe Asp Gly Ala Leu
            660                 665                 670

cac gct gcc gac aac act cgc gtc gag gtg gct gcc cgc acc gca gcc   2064
His Ala Ala Asp Asn Thr Arg Val Glu Val Ala Ala Arg Thr Ala Ala
        675                 680                 685

ctg cgc gaa ctc gac atg acc agg gat tcc atc acc cgc gat ctc gcg   2112
Leu Arg Glu Leu Asp Met Thr Arg Asp Ser Ile Thr Arg Asp Leu Ala
    690                 695                 700

cgc ttg gac aaa caa cat gag gcc gcc gaa tcc gag cgc gtc cgc cat   2160
Arg Leu Asp Lys Gln His Glu Ala Ala Glu Ser Glu Arg Val Arg His
705                 710                 715                 720

gtt gga cgc ctg cat gct gcg gaa aca cgc cgt gaa gag ctg cgc gaa   2208
Val Gly Arg Leu His Ala Ala Glu Thr Arg Arg Glu Glu Leu Arg Glu
                725                 730                 735
```

```
cag tta gaa gac atc gtc gat cga ctc tcc cgc gtg gaa gac gaa gaa   2256
Gln Leu Glu Asp Ile Val Asp Arg Leu Ser Arg Val Glu Asp Glu Glu
            740                 745                 750

gac gct gac gaa ccc tca acc acc gcc cgc gac caa gca aat gcc gag   2304
Asp Ala Asp Glu Pro Ser Thr Thr Ala Arg Asp Gln Ala Asn Ala Glu
        755                 760                 765

ctg caa caa atc cgc gcc atg gaa atg gaa gca cgc ctt gcc caa cgc   2352
Leu Gln Gln Ile Arg Ala Met Glu Met Glu Ala Arg Leu Ala Gln Arg
    770                 775                 780

acc gcc gaa gag cgc gcc ggg cag cag cgg ggc aag ggc gat agt ctg   2400
Thr Ala Glu Glu Arg Ala Gly Gln Gln Arg Gly Lys Gly Asp Ser Leu
785                 790                 795                 800

cga cgc cag gcc gag cat gag cgc caa gcc aaa atc cgg cat gaa caa   2448
Arg Arg Gln Ala Glu His Glu Arg Gln Ala Lys Ile Arg His Glu Gln
                805                 810                 815

gcc atg gaa gcc cgt cgc agg cgc acc caa ttg gct gca gcc gtg caa   2496
Ala Met Glu Ala Arg Arg Arg Arg Thr Gln Leu Ala Ala Ala Val Gln
            820                 825                 830

aat ggc gca cgc gat gtg gcc gag cgt gtc tca gct gcc ctt gcc caa   2544
Asn Gly Ala Arg Asp Val Ala Glu Arg Val Ser Ala Ala Leu Ala Gln
        835                 840                 845

gca gcc atc gaa aga gat cag cac aac cgc gac aaa gcg ctg ctg acc   2592
Ala Ala Ile Glu Arg Asp Gln His Asn Arg Asp Lys Ala Leu Leu Thr
    850                 855                 860

tca cac tta gcg cgc gcc aaa gat gct gtg agt gct gca cgc cag cac   2640
Ser His Leu Ala Arg Ala Lys Asp Ala Val Ser Ala Ala Arg Gln His
865                 870                 875                 880

ctc aat cga ctc agc gac aac gcc cac tcc atg gaa ctt gcg cgc agc   2688
Leu Asn Arg Leu Ser Asp Asn Ala His Ser Met Glu Leu Ala Arg Ser
                885                 890                 895

caa gct caa gtg cgc atg gag gaa gcc gtt gcc aaa atc acc gag caa   2736
Gln Ala Gln Val Arg Met Glu Glu Ala Val Ala Lys Ile Thr Glu Gln
            900                 905                 910

ctt ggc att ccg gtc gca gaa ttg ctg cgc gat tac acc cca gat gaa   2784
Leu Gly Ile Pro Val Ala Glu Leu Leu Arg Asp Tyr Thr Pro Asp Glu
        915                 920                 925

aac ttt gat gaa aag ttc caa cgg gca cgc ctc aaa caa gcc gaa aaa   2832
Asn Phe Asp Glu Lys Phe Gln Arg Ala Arg Leu Lys Gln Ala Glu Lys
    930                 935                 940

gac ctc gcc gca cta ggc aaa gtc aac ccc ctg gcc ttg gaa gaa ttc   2880
Asp Leu Ala Ala Leu Gly Lys Val Asn Pro Leu Ala Leu Glu Glu Phe
945                 950                 955                 960

aaa gcc ttg gaa gag cgc tac gag ttc ctc tcc acc caa ttg gcc gat   2928
Lys Ala Leu Glu Glu Arg Tyr Glu Phe Leu Ser Thr Gln Leu Ala Asp
```

```
                965                 970                 975

gtg gaa caa gcc cgc gcc gat ctg agc ggc gtg att gaa gaa gtc gat   2976
Val Glu Gln Ala Arg Ala Asp Leu Ser Gly Val Ile Glu Glu Val Asp
            980                 985                 990

gcg aaa att ctg cag ctt ttc acc gat gcc tgg aac gac gtg gaa gca   3024
Ala Lys Ile Leu Gln Leu Phe Thr Asp Ala Trp Asn Asp Val Glu Ala
        995                1000                1005

gaa ttc cca cgc gtg ttc aac acc ttg ttc cca ggt ggc gaa ggc aaa   3072
Glu Phe Pro Arg Val Phe Asn Thr Leu Phe Pro Gly Gly Glu Gly Lys
   1010                1015                1020

ctg atc ctc acc gag ccc gat gat ttg ctg gca acc ggc atc gaa gtg   3120
Leu Ile Leu Thr Glu Pro Asp Asp Leu Leu Ala Thr Gly Ile Glu Val
1025                1030                1035                1040

gaa gcc cgc cca cca gga aaa cgc gtc aag cgc cta tcg ctg cta tcc   3168
Glu Ala Arg Pro Pro Gly Lys Arg Val Lys Arg Leu Ser Leu Leu Ser
               1045                1050                1055

ggt ggc gaa aaa tcc ctc acc gca cta gcc atg ctc gtc gcg att ttc   3216
Gly Gly Glu Lys Ser Leu Thr Ala Leu Ala Met Leu Val Ala Ile Phe
           1060                1065                1070

cgc gcc cga ccc agc cct ttc tac gtg atg gat gag gtg gaa gca gca   3264
Arg Ala Arg Pro Ser Pro Phe Tyr Val Met Asp Glu Val Glu Ala Ala
       1075                1080                1085

ctc gat gat gtc aac ctt cgc cga ctt atc gca ctg ttt gaa gag ttg   3312
Leu Asp Asp Val Asn Leu Arg Arg Leu Ile Ala Leu Phe Glu Glu Leu
   1090                1095                1100

cgc cgc gac tcc cag ctc att gtg atc acc cac caa aaa ccc acc atg   3360
Arg Arg Asp Ser Gln Leu Ile Val Ile Thr His Gln Lys Pro Thr Met
1105                1110                1115                1120

gat gtg gct aac gta ctc tac ggc gtc acc atg cgt ggc gat ggc gtt   3408
Asp Val Ala Asn Val Leu Tyr Gly Val Thr Met Arg Gly Asp Gly Val
               1125                1130                1135

acc cgc gtg atc tcc caa cgc atg gaa cct gct tct gca atg gaa act   3456
Thr Arg Val Ile Ser Gln Arg Met Glu Pro Ala Ser Ala Met Glu Thr
           1140                1145                1150

gtg gcg ggg                                                      3465
Val Ala Gly
       1155
```

<210> 38
<211> 1155
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 38
Met Tyr Leu Lys Ser Leu Thr Leu Lys Gly Phe Lys Ser Phe Ala Ser

```
  1               5                  10                  15

Ala Thr Thr Leu Lys Phe Glu Pro Gly Ile Cys Ala Val Val Gly Pro
             20                  25                  30

Asn Gly Ser Gly Lys Ser Asn Val Val Asp Ala Leu Ala Trp Val Met
         35                  40                  45

Gly Glu Gly Ser Ala Lys Thr Leu Arg Gly Gly Lys Met Glu Asp Val
     50                  55                  60

Ile Phe Ala Gly Ala Gly Asp Arg Lys Pro Leu Gly Arg Ala Glu Val
 65                  70                  75                  80

Thr Leu Thr Ile Asp Asn Ser Asp Gly Ala Leu Pro Ile Glu Tyr Thr
                 85                  90                  95

Glu Val Ser Val Thr Arg Arg Met Phe Arg Asp Gly Ala Ser Glu Tyr
            100                 105                 110

Glu Ile Asn Gly Ala Lys Ala Arg Leu Met Asp Ile Gln Glu Leu Leu
        115                 120                 125

Ser Asp Thr Gly Ile Gly Arg Glu Met His Ile Met Val Gly Gln Gly
    130                 135                 140

Lys Leu Ala Glu Ile Leu Glu Ser Arg Pro Glu Glu Arg Arg Ala Tyr
145                 150                 155                 160

Ile Glu Glu Ala Ala Gly Val Leu Lys His Arg Arg Arg Lys Glu Lys
                165                 170                 175

Ala Gln Arg Lys Leu Gln Gly Met Gln Val Asn Leu Asp Arg Leu Gln
            180                 185                 190

Asp Leu Thr His Glu Leu Ala Lys Gln Leu Lys Pro Leu Ala Arg Gln
        195                 200                 205

Ala Glu Ala Ala Gln Arg Ala Ala Thr Val Gln Ala Asp Leu Arg Asp
    210                 215                 220

Ala Arg Phe Gln Ile Ala Gly Phe Glu Ile Val Lys Leu Ser Glu Lys
225                 230                 235                 240

Leu Glu Thr Ser Thr Glu Arg Glu Lys Met Ile Arg Glu Gln Ala Glu
                245                 250                 255

Ala Ala Gln Glu Gln Leu Glu Glu Ala Thr Thr Thr Gln Met Glu Val
            260                 265                 270

Glu Met Glu Leu Ala Glu Ile Thr Pro Gln Ala Glu Ala Ala Gln Gln
        275                 280                 285

Leu Trp Phe Asp Leu Ser Ser Leu Ala Glu Arg Val Ser Ala Thr Met
    290                 295                 300

Arg Ile Ala Ala Asp Arg Ala Ser Ser Gly Ala Ala Asp Val Pro Tyr
305                 310                 315                 320
```

```
Ala Gly Gln Asp Pro Asp Glu Leu Leu Gly Arg Ala Glu Thr Ala Asp
                325                 330                 335

Lys Glu Leu Glu Glu Leu Glu Met Ala Val Glu Met Thr Thr Glu Arg
            340                 345                 350

Leu Thr Ser Ile Gln Glu Glu Ala Glu Asp Lys Ala Ala Gln Ala Arg
        355                 360                 365

Glu Ala Glu Arg Glu His Leu Ala Gln Val Arg Ala Ile Ser Asp Arg
    370                 375                 380

Arg Glu Gly Val Val Arg Leu Leu Ala Ser Glu Glu Ser Leu Arg Thr
385                 390                 395                 400

Gln His Thr Ser Ala Glu Glu Glu Ala Glu Arg Leu Ser Glu Gln Leu
                405                 410                 415

Glu Glu Phe Ile Gly Arg Ile Leu Asp Val Glu Arg Glu Arg Arg Leu
            420                 425                 430

Thr Asp Glu Arg Lys Gln Gly Val Asp Thr Asp Arg Ala Pro Leu Glu
        435                 440                 445

Glu Ala Leu Lys Gln Ala Lys His Glu Ala Glu Ala Ala Glu Thr Arg
    450                 455                 460

Leu Glu Glu Leu Arg Thr Lys Arg Ser Asp Leu Glu Lys Glu Val Ser
465                 470                 475                 480

Arg Leu Gln Ser Arg Ile Glu Thr Leu Asn Gln Asn Arg Pro Arg Ser
                485                 490                 495

Asp Ala Ala Asp Val Val Asp Tyr Pro Gln Leu Ala Thr Leu Ile Arg
            500                 505                 510

Pro Gln Arg Asn Val Asp Lys Ala Leu Ala Ala Ala Leu Gly Ala His
        515                 520                 525

Ala Glu Ala Leu Ala Gly Glu Ala Ala Glu Gly Leu Val Glu Lys Leu
    530                 535                 540

Ile Asp Ala Gly Val Ala Arg Thr Ile Ile Val Asp Gly Thr Gln Ala
545                 550                 555                 560

Gly Gly Ala Trp Arg Leu Asp Ala Asn Ile Pro Ala Gly Ala Ser Trp
                565                 570                 575

Leu Leu Asp His Val Asp Leu Asp Pro Ala Ile Ala Gly Pro Val Asn
            580                 585                 590

Arg Leu Leu Ala Asp Val Val Leu Val Asp Asp Pro Ser Leu Gly Arg
        595                 600                 605

Gln Ala Ile Glu Asp Asp Pro Arg Leu Arg Ala Val Asp Arg Asn Gly
    610                 615                 620

Val Leu Ile Gly Ala Gly Trp Ile Gln Val Gly Thr Glu Thr Ser Thr
625                 630                 635                 640
```

```
Val Glu Ile Thr Ala Gln Ile Glu Glu Ala Glu Ala Gln Leu Ala Ala
                645                 650                 655

Ala Ser Ala Ala Leu Asp Asp Ile Ala Gly Thr Phe Asp Gly Ala Leu
            660                 665                 670

His Ala Ala Asp Asn Thr Arg Val Glu Val Ala Ala Arg Thr Ala Ala
        675                 680                 685

Leu Arg Glu Leu Asp Met Thr Arg Asp Ser Ile Thr Arg Asp Leu Ala
    690                 695                 700

Arg Leu Asp Lys Gln His Glu Ala Ala Glu Ser Glu Arg Val Arg His
705                 710                 715                 720

Val Gly Arg Leu His Ala Ala Glu Thr Arg Arg Glu Glu Leu Arg Glu
                725                 730                 735

Gln Leu Glu Asp Ile Val Asp Arg Leu Ser Arg Val Glu Asp Glu Glu
            740                 745                 750

Asp Ala Asp Glu Pro Ser Thr Thr Ala Arg Asp Gln Ala Asn Ala Glu
        755                 760                 765

Leu Gln Gln Ile Arg Ala Met Glu Met Glu Ala Arg Leu Ala Gln Arg
    770                 775                 780

Thr Ala Glu Glu Arg Ala Gly Gln Gln Arg Gly Lys Gly Asp Ser Leu
785                 790                 795                 800

Arg Arg Gln Ala Glu His Glu Arg Gln Ala Lys Ile Arg His Glu Gln
                805                 810                 815

Ala Met Glu Ala Arg Arg Arg Arg Thr Gln Leu Ala Ala Ala Val Gln
            820                 825                 830

Asn Gly Ala Arg Asp Val Ala Glu Arg Val Ser Ala Ala Leu Ala Gln
        835                 840                 845

Ala Ala Ile Glu Arg Asp Gln His Asn Arg Asp Lys Ala Leu Leu Thr
    850                 855                 860

Ser His Leu Ala Arg Ala Lys Asp Ala Val Ser Ala Ala Arg Gln His
865                 870                 875                 880

Leu Asn Arg Leu Ser Asp Asn Ala His Ser Met Glu Leu Ala Arg Ser
                885                 890                 895

Gln Ala Gln Val Arg Met Glu Glu Ala Val Ala Lys Ile Thr Glu Gln
            900                 905                 910

Leu Gly Ile Pro Val Ala Glu Leu Leu Arg Asp Tyr Thr Pro Asp Glu
        915                 920                 925

Asn Phe Asp Glu Lys Phe Gln Arg Ala Arg Leu Lys Gln Ala Glu Lys
    930                 935                 940

Asp Leu Ala Ala Leu Gly Lys Val Asn Pro Leu Ala Leu Glu Glu Phe
```

```
945                 950                 955                 960

Lys Ala Leu Glu Glu Arg Tyr Glu Phe Leu Ser Thr Gln Leu Ala Asp
                965                 970                 975

Val Glu Gln Ala Arg Ala Asp Leu Ser Gly Val Ile Glu Glu Val Asp
            980                 985                 990

Ala Lys Ile Leu Gln Leu Phe Thr Asp Ala Trp Asn Asp Val Glu Ala
        995                1000                1005

Glu Phe Pro Arg Val Phe Asn Thr Leu Phe Pro Gly Gly Glu Gly Lys
   1010                1015                1020

Leu Ile Leu Thr Glu Pro Asp Asp Leu Leu Ala Thr Gly Ile Glu Val
1025                1030                1035                1040

Glu Ala Arg Pro Pro Gly Lys Arg Val Lys Arg Leu Ser Leu Leu Ser
               1045                1050                1055

Gly Gly Glu Lys Ser Leu Thr Ala Leu Ala Met Leu Val Ala Ile Phe
           1060                1065                1070

Arg Ala Arg Pro Ser Pro Phe Tyr Val Met Asp Glu Val Glu Ala Ala
       1075                1080                1085


Leu Asp Asp Val Asn Leu Arg Arg Leu Ile Ala Leu Phe Glu Glu Leu
   1090                1095                1100

Arg Arg Asp Ser Gln Leu Ile Val Ile Thr His Gln Lys Pro Thr Met
1105                1110                1115                1120

Asp Val Ala Asn Val Leu Tyr Gly Val Thr Met Arg Gly Asp Gly Val
               1125                1130                1135

Thr Arg Val Ile Ser Gln Arg Met Glu Pro Ala Ser Ala Met Glu Thr
           1140                1145                1150

Val Ala Gly
       1155


<210> 39
<211> 777
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(777)
<223> RXA02016W

<400> 39
atg tca aac ttt gaa acg ttc ctc tgg gtt gcc tac ccc tgg ctg tgt   48
Met Ser Asn Phe Glu Thr Phe Leu Trp Val Ala Tyr Pro Trp Leu Cys
  1               5                  10                  15

atc gcc gcc tac atc atc ggc att tct tgg cgc tgg cgc gcc gac caa   96
```

```
Ile Ala Ala Tyr Ile Ile Gly Ile Ser Trp Arg Trp Arg Ala Asp Gln
             20                  25                  30

ttc ggt tgg acc acc cac tcc tcc caa atc tac gaa tcc aaa ctc ctc   144
Phe Gly Trp Thr Thr His Ser Ser Gln Ile Tyr Glu Ser Lys Leu Leu
         35                  40                  45

cgc atc gcc tcc cca ctc ttc cac tgg ggc atg gtg ttc gtg gtg atc   192
Arg Ile Ala Ser Pro Leu Phe His Trp Gly Met Val Phe Val Val Ile
     50                  55                  60

ggc cac ctc atg gga ctt gcc atc ccc aag agc tgg acc caa gct gta   240
Gly His Leu Met Gly Leu Ala Ile Pro Lys Ser Trp Thr Gln Ala Val
 65                  70                  75                  80

gga att tct gac gcc gct tac cac ctc atc gcc acc atc cca ggc acc   288
Gly Ile Ser Asp Ala Ala Tyr His Leu Ile Ala Thr Ile Pro Gly Thr
                 85                  90                  95

att gcc ggc atc gct gca gtc ctt gga ctc atc ggc ttg att atc cgt   336
Ile Ala Gly Ile Ala Ala Val Leu Gly Leu Ile Gly Leu Ile Ile Arg
            100                 105                 110

cgc gtg atc aac aaa acc gtc ttc ctg tcc acc tca cgc tcc gac aaa   384
Arg Val Ile Asn Lys Thr Val Phe Leu Ser Thr Ser Arg Ser Asp Lys
        115                 120                 125

gtg atg tat gtg cta ctc ggc gct gca att ttg tcc ggt ttc atc gcc   432
Val Met Tyr Val Leu Leu Gly Ala Ala Ile Leu Ser Gly Phe Ile Ala
    130                 135                 140

acc gtc tcc acc cag gtc ttc ggc ggc gca cac ggc tac gac tac cgc   480
Thr Val Ser Thr Gln Val Phe Gly Gly Ala His Gly Tyr Asp Tyr Arg
145                 150                 155                 160

gaa acc atc tcc cca tgg gtg cgc caa ctg ctc atc ttc aac gct caa   528
Glu Thr Ile Ser Pro Trp Val Arg Gln Leu Leu Ile Phe Asn Ala Gln
                165                 170                 175

cca gag ctc atg gct gat gtc cct tgg gaa ttc aag gtc cac atc gtc   576
Pro Glu Leu Met Ala Asp Val Pro Trp Glu Phe Lys Val His Ile Val
            180                 185                 190

gct gga ttc acc ctc atc gca ctg tgg cca ttc acc cgc cta gtc cac   624
Ala Gly Phe Thr Leu Ile Ala Leu Trp Pro Phe Thr Arg Leu Val His
        195                 200                 205

gcg ttc tcc gca cca gtt gga tac gtc acc cgc ccc tac gtg gtc tat   672
Ala Phe Ser Ala Pro Val Gly Tyr Val Thr Arg Pro Tyr Val Val Tyr
    210                 215                 220

cgc acc cgc gac acc acc tct gaa ccg gca cgc caa aac gtc gcc tgg   720
Arg Thr Arg Asp Thr Thr Ser Glu Pro Ala Arg Gln Asn Val Ala Trp
225                 230                 235                 240

gaa ccg atc cgc tcg gtc aaa aat cag ctc gac aat gac tcg aaa tgg   768
Glu Pro Ile Arg Ser Val Lys Asn Gln Leu Asp Asn Asp Ser Lys Trp
                245                 250                 255
```

cac ggc gcc 777
His Gly Ala

<210> 40
<211> 259
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 40
Met Ser Asn Phe Glu Thr Phe Leu Trp Val Ala Tyr Pro Trp Leu Cys
1 5 10 15

Ile Ala Ala Tyr Ile Ile Gly Ile Ser Trp Arg Trp Arg Ala Asp Gln
20 25 30

Phe Gly Trp Thr Thr His Ser Ser Gln Ile Tyr Glu Ser Lys Leu Leu
35 40 45

Arg Ile Ala Ser Pro Leu Phe His Trp Gly Met Val Phe Val Val Ile
50 55 60

Gly His Leu Met Gly Leu Ala Ile Pro Lys Ser Trp Thr Gln Ala Val
65 70 75 80

Gly Ile Ser Asp Ala Ala Tyr His Leu Ile Ala Thr Ile Pro Gly Thr
85 90 95

Ile Ala Gly Ile Ala Ala Val Leu Gly Leu Ile Gly Leu Ile Ile Arg
100 105 110

Arg Val Ile Asn Lys Thr Val Phe Leu Ser Thr Ser Arg Ser Asp Lys
115 120 125

Val Met Tyr Val Leu Leu Gly Ala Ala Ile Leu Ser Gly Phe Ile Ala
130 135 140

Thr Val Ser Thr Gln Val Phe Gly Gly Ala His Gly Tyr Asp Tyr Arg
145 150 155 160

Glu Thr Ile Ser Pro Trp Val Arg Gln Leu Leu Ile Phe Asn Ala Gln
165 170 175

Pro Glu Leu Met Ala Asp Val Pro Trp Glu Phe Lys Val His Ile Val
180 185 190

Ala Gly Phe Thr Leu Ile Ala Leu Trp Pro Phe Thr Arg Leu Val His
195 200 205

Ala Phe Ser Ala Pro Val Gly Tyr Val Thr Arg Pro Tyr Val Val Tyr
210 215 220

Arg Thr Arg Asp Thr Thr Ser Glu Pro Ala Arg Gln Asn Val Ala Trp
225 230 235 240

Glu Pro Ile Arg Ser Val Lys Asn Gln Leu Asp Asn Asp Ser Lys Trp
245 250 255

His Gly Ala

<210> 41
<211> 969
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(969)
<223> RXA02149W

<400> 41

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atg cca caa aaa ccg gcc agt ttc gcg gtg ggc ttt gac atc ggc ggc   48
Met Pro Gln Lys Pro Ala Ser Phe Ala Val Gly Phe Asp Ile Gly Gly
  1               5                  10                  15

acc aac atg cga gcc ggg ctt gtc gac gaa tcc ggg cgc atc gtg acc   96
Thr Asn Met Arg Ala Gly Leu Val Asp Glu Ser Gly Arg Ile Val Thr
             20                  25                  30

agt ttg tcg gcg ccg tcg ccg cgc acg acg cag gca atg gaa cag ggg   144
Ser Leu Ser Ala Pro Ser Pro Arg Thr Thr Gln Ala Met Glu Gln Gly
         35                  40                  45

att ttt gat cta gtc gaa cag ctc aag gcc gaa tac ccg gtt ggt gct   192
Ile Phe Asp Leu Val Glu Gln Leu Lys Ala Glu Tyr Pro Val Gly Ala
     50                  55                  60

gtg gga ctt gcc gtc gcg gga ttt ttg gat cct gag tgc gag gtt gtt   240
Val Gly Leu Ala Val Ala Gly Phe Leu Asp Pro Glu Cys Glu Val Val
 65                  70                  75                  80

cga ttt gcc ccg cac ctt cct tgg cgc gat gag cca gtg cgt gaa aag   288
Arg Phe Ala Pro His Leu Pro Trp Arg Asp Glu Pro Val Arg Glu Lys
                 85                  90                  95

ttg gaa aac ctt ttg ggc ctg cct gtt cgt ttg gaa cat gat gcc aac   336
Leu Glu Asn Leu Leu Gly Leu Pro Val Arg Leu Glu His Asp Ala Asn
            100                 105                 110

tca gca gcg tgg ggt gag cat cgt ttt ggt gca gct caa ggc gct gac   384
Ser Ala Ala Trp Gly Glu His Arg Phe Gly Ala Ala Gln Gly Ala Asp
        115                 120                 125

aac tgg gtt ttg ttg gca ctc ggc act gga att ggt gca gcg ctg att   432
Asn Trp Val Leu Leu Ala Leu Gly Thr Gly Ile Gly Ala Ala Leu Ile
    130                 135                 140

gaa aaa ggc gaa att tac cgt ggt gca tat ggc acg gca cca gaa ttt   480
Glu Lys Gly Glu Ile Tyr Arg Gly Ala Tyr Gly Thr Ala Pro Glu Phe
145                 150                 155                 160

ggt cat ttg cgt gtt gtt cgt ggc gga cgc gca tgt gcg tgt ggc aaa   528
Gly His Leu Arg Val Val Arg Gly Gly Arg Ala Cys Ala Cys Gly Lys
                165                 170                 175
```

```
gaa ggc tgc ctg gag cgt tac tgt tcc ggt act gcc ttg gtt tac act   576
Glu Gly Cys Leu Glu Arg Tyr Cys Ser Gly Thr Ala Leu Val Tyr Thr
            180                 185                 190

gcg cgt gaa ttg gct tcg cat ggc tca ttc cgc aac agc ggg ctg ttt   624
Ala Arg Glu Leu Ala Ser His Gly Ser Phe Arg Asn Ser Gly Leu Phe
        195                 200                 205

gac aag atc aaa gcc gat ccg aat tcc atc aat gga aaa acg atc act   672
Asp Lys Ile Lys Ala Asp Pro Asn Ser Ile Asn Gly Lys Thr Ile Thr
    210                 215                 220

gcg gca gcg cgc caa gaa gac cca ctt gct ctc gcc gtt ctg gaa gat   720
Ala Ala Ala Arg Gln Glu Asp Pro Leu Ala Leu Ala Val Leu Glu Asp
225                 230                 235                 240

ttc agc gag tgg ctg ggc gaa act ttg gcg atc att gct gat gtc ctt   768
Phe Ser Glu Trp Leu Gly Glu Thr Leu Ala Ile Ile Ala Asp Val Leu
                245                 250                 255

gac cca ggc atg atc atc att ggt ggc gga ctg tcc aat gct gcc gac   816
Asp Pro Gly Met Ile Ile Ile Gly Gly Gly Leu Ser Asn Ala Ala Asp
            260                 265                 270

ctt tat ttg gat cgc tcg gtc aac cac tat tcc acc cgc atc gtc ggc   864
Leu Tyr Leu Asp Arg Ser Val Asn His Tyr Ser Thr Arg Ile Val Gly
        275                 280                 285

gca gga tat cgc cct ttg gca cgc gtt gcc aca gct cag ttg ggt gcg   912
Ala Gly Tyr Arg Pro Leu Ala Arg Val Ala Thr Ala Gln Leu Gly Ala
    290                 295                 300

gat gct ggc atg atc ggt gtc gct gat cta gct cga cgc tct gta gtg   960
Asp Ala Gly Met Ile Gly Val Ala Asp Leu Ala Arg Arg Ser Val Val
305                 310                 315                 320

gaa gcc aac                                                      969
Glu Ala Asn
```

<210> 42
<211> 323
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 42

```
Met Pro Gln Lys Pro Ala Ser Phe Ala Val Gly Phe Asp Ile Gly Gly
  1               5                  10                  15

Thr Asn Met Arg Ala Gly Leu Val Asp Glu Ser Gly Arg Ile Val Thr
             20                  25                  30

Ser Leu Ser Ala Pro Ser Pro Arg Thr Thr Gln Ala Met Glu Gln Gly
         35                  40                  45

Ile Phe Asp Leu Val Glu Gln Leu Lys Ala Glu Tyr Pro Val Gly Ala
```

```
     50                  55                  60

Val Gly Leu Ala Val Ala Gly Phe Leu Asp Pro Glu Cys Glu Val Val
 65                  70                  75                  80

Arg Phe Ala Pro His Leu Pro Trp Arg Asp Glu Pro Val Arg Glu Lys
                 85                  90                  95

Leu Glu Asn Leu Leu Gly Leu Pro Val Arg Leu Glu His Asp Ala Asn
            100                 105                 110

Ser Ala Ala Trp Gly Glu His Arg Phe Gly Ala Ala Gln Gly Ala Asp
        115                 120                 125

Asn Trp Val Leu Leu Ala Leu Gly Thr Gly Ile Gly Ala Ala Leu Ile
    130                 135                 140

Glu Lys Gly Glu Ile Tyr Arg Gly Ala Tyr Gly Thr Ala Pro Glu Phe
145                 150                 155                 160

Gly His Leu Arg Val Val Arg Gly Gly Arg Ala Cys Ala Cys Gly Lys
                165                 170                 175

Glu Gly Cys Leu Glu Arg Tyr Cys Ser Gly Thr Ala Leu Val Tyr Thr
            180                 185                 190

Ala Arg Glu Leu Ala Ser His Gly Ser Phe Arg Asn Ser Gly Leu Phe
        195                 200                 205

Asp Lys Ile Lys Ala Asp Pro Asn Ser Ile Asn Gly Lys Thr Ile Thr
    210                 215                 220

Ala Ala Ala Arg Gln Glu Asp Pro Leu Ala Leu Ala Val Leu Glu Asp
225                 230                 235                 240

Phe Ser Glu Trp Leu Gly Glu Thr Leu Ala Ile Ile Ala Asp Val Leu
                245                 250                 255

Asp Pro Gly Met Ile Ile Ile Gly Gly Gly Leu Ser Asn Ala Ala Asp
            260                 265                 270

Leu Tyr Leu Asp Arg Ser Val Asn His Tyr Ser Thr Arg Ile Val Gly
        275                 280                 285

Ala Gly Tyr Arg Pro Leu Ala Arg Val Ala Thr Ala Gln Leu Gly Ala
    290                 295                 300

Asp Ala Gly Met Ile Gly Val Ala Asp Leu Ala Arg Arg Ser Val Val
305                 310                 315                 320

Glu Ala Asn
```

<210> 43
<211> 1068
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1068)
<223> RXA02206E

<400> 43

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atg gtt tgt acc cag cca ata ttt tca gtt gcg gca gga tct gct gct   48
Met Val Cys Thr Gln Pro Ile Phe Ser Val Ala Ala Gly Ser Ala Ala
  1               5                  10                  15

gcg gct agg agg gtt atc tct tca ttc acc cga tct acc gta cta cct   96
Ala Ala Arg Arg Val Ile Ser Ser Phe Thr Arg Ser Thr Val Leu Pro
             20                  25                  30

tat gac ctc agt agt gtg gtg ggc gtg aaa cag cga atg gtc ggt tca   144
Tyr Asp Leu Ser Ser Val Val Gly Val Lys Gln Arg Met Val Gly Ser
         35                  40                  45

agt ggt ttg cgg gta tcc agg ctc ggt ttg ggc acc tca aca tgg ggc   192
Ser Gly Leu Arg Val Ser Arg Leu Gly Leu Gly Thr Ser Thr Trp Gly
     50                  55                  60

tcg ggc acc gag ctg gct gag gca ggc gat atc ttt aag gcg ttc atc   240
Ser Gly Thr Glu Leu Ala Glu Ala Gly Asp Ile Phe Lys Ala Phe Ile
 65                  70                  75                  80

aat tct ggt ggc acg ctt atc gac gtc tcc ccc aac tac acc acc ggc   288
Asn Ser Gly Gly Thr Leu Ile Asp Val Ser Pro Asn Tyr Thr Thr Gly
                 85                  90                  95

gtc gcg gaa gaa atg ctc ggc acg atg ttg gat gcg gaa gtc tct cgt   336
Val Ala Glu Glu Met Leu Gly Thr Met Leu Asp Ala Glu Val Ser Arg
            100                 105                 110

tcg gct gtc gtc att tcc tcc agc gca ggt gtc aac ccc gct ctg ccg   384
Ser Ala Val Val Ile Ser Ser Ser Ala Gly Val Asn Pro Ala Leu Pro
        115                 120                 125

ctc ggc cga cgt gtg gat tgc tcc cgc cgc aat ttg att gcc caa tta   432
Leu Gly Arg Arg Val Asp Cys Ser Arg Arg Asn Leu Ile Ala Gln Leu
    130                 135                 140

gat gtc acc ctg cgg gca tta aac act gac tat ttg gat ttg tgg tct   480
Asp Val Thr Leu Arg Ala Leu Asn Thr Asp Tyr Leu Asp Leu Trp Ser
145                 150                 155                 160

gtg ggc tat tgg gat gag ggc acc cca ccg cat gag gtg gcc gat act   528
Val Gly Tyr Trp Asp Glu Gly Thr Pro Pro His Glu Val Ala Asp Thr
                165                 170                 175

ttg gat tac gcc gtg cgc acc ggc cga gtc cga tat gcc ggt gtc cga   576
Leu Asp Tyr Ala Val Arg Thr Gly Arg Val Arg Tyr Ala Gly Val Arg
            180                 185                 190

gga tat tcc ggt tgg cag tta gcg gtc acc cac gct gca tcc aat cat   624
Gly Tyr Ser Gly Trp Gln Leu Ala Val Thr His Ala Ala Ser Asn His
        195                 200                 205

gca gcg gcc tcc gcc cgc ccc gtg gtc gtt gca caa aat gaa tac agc   672
```

```
Ala Ala Ala Ser Ala Arg Pro Val Val Val Ala Gln Asn Glu Tyr Ser
    210                 215                 220

ctg ctg gaa cgc cgc gca gaa caa gaa ctc ctc cct gcc acc caa cac   720
Leu Leu Glu Arg Arg Ala Glu Gln Glu Leu Leu Pro Ala Thr Gln His
225                 230                 235                 240

cta ggt gtc gga ttc ttt gct ggc gct ccg ctg ggg caa ggc gtg ctg   768
Leu Gly Val Gly Phe Phe Ala Gly Ala Pro Leu Gly Gln Gly Val Leu
                245                 250                 255

act gct aaa tac cgc tcc gaa att ccc cat gat tcc aga gct gca tcc   816
Thr Ala Lys Tyr Arg Ser Glu Ile Pro His Asp Ser Arg Ala Ala Ser

            260                 265                 270

aca gga cgc gac gca gaa gtc caa agc tac cta gat aat cga ggc cgc   864
Thr Gly Arg Asp Ala Glu Val Gln Ser Tyr Leu Asp Asn Arg Gly Arg
        275                 280                 285

atc att gtc gat gct ctt gat act gca gcc aaa gga tta ggc att agc   912
Ile Ile Val Asp Ala Leu Asp Thr Ala Ala Lys Gly Leu Gly Ile Ser
    290                 295                 300

ccc gct gtc aca gcc acc acc tgg gtg cgt gat cgt ccc gga gtg aca   960
Pro Ala Val Thr Ala Thr Thr Trp Val Arg Asp Arg Pro Gly Val Thr
305                 310                 315                 320

gct gtc atc gtg ggc gct cgc aca cat gaa cag ctg tca cat ctt ctc  1008
Ala Val Ile Val Gly Ala Arg Thr His Glu Gln Leu Ser His Leu Leu
                325                 330                 335

aag gcg gaa tcg gtg act ttg cca aca cca atc aca caa gcc ctt gat  1056
Lys Ala Glu Ser Val Thr Leu Pro Thr Pro Ile Thr Gln Ala Leu Asp
            340                 345                 350

gat gtc tcc ctg                                                 1068
Asp Val Ser Leu
        355
```

<210> 44
<211> 356
<212> PRT
<213> 麩胺酸棒狀桿菌

```
<400> 44
Met Val Cys Thr Gln Pro Ile Phe Ser Val Ala Ala Gly Ser Ala Ala
  1               5                  10                  15

Ala Ala Arg Arg Val Ile Ser Ser Phe Thr Arg Ser Thr Val Leu Pro
             20                  25                  30

Tyr Asp Leu Ser Ser Val Val Gly Val Lys Gln Arg Met Val Gly Ser
         35                  40                  45

Ser Gly Leu Arg Val Ser Arg Leu Gly Leu Gly Thr Ser Thr Trp Gly
     50                  55                  60
```

```
Ser Gly Thr Glu Leu Ala Glu Ala Gly Asp Ile Phe Lys Ala Phe Ile
 65                  70                  75                  80

Asn Ser Gly Gly Thr Leu Ile Asp Val Ser Pro Asn Tyr Thr Thr Gly
                 85                  90                  95

Val Ala Glu Glu Met Leu Gly Thr Met Leu Asp Ala Glu Val Ser Arg
            100                 105                 110

Ser Ala Val Val Ile Ser Ser Ser Ala Gly Val Asn Pro Ala Leu Pro
        115                 120                 125

Leu Gly Arg Arg Val Asp Cys Ser Arg Arg Asn Leu Ile Ala Gln Leu
    130                 135                 140

Asp Val Thr Leu Arg Ala Leu Asn Thr Asp Tyr Leu Asp Leu Trp Ser
145                 150                 155                 160

Val Gly Tyr Trp Asp Glu Gly Thr Pro Pro His Glu Val Ala Asp Thr
                165                 170                 175

Leu Asp Tyr Ala Val Arg Thr Gly Arg Val Arg Tyr Ala Gly Val Arg
            180                 185                 190

Gly Tyr Ser Gly Trp Gln Leu Ala Val Thr His Ala Ala Ser Asn His
        195                 200                 205

Ala Ala Ala Ser Ala Arg Pro Val Val Val Ala Gln Asn Glu Tyr Ser
    210                 215                 220

Leu Leu Glu Arg Arg Ala Glu Gln Glu Leu Leu Pro Ala Thr Gln His
225                 230                 235                 240

Leu Gly Val Gly Phe Phe Ala Gly Ala Pro Leu Gly Gln Gly Val Leu
                245                 250                 255

Thr Ala Lys Tyr Arg Ser Glu Ile Pro His Asp Ser Arg Ala Ala Ser
            260                 265                 270

Thr Gly Arg Asp Ala Glu Val Gln Ser Tyr Leu Asp Asn Arg Gly Arg
        275                 280                 285

Ile Ile Val Asp Ala Leu Asp Thr Ala Ala Lys Gly Leu Gly Ile Ser
    290                 295                 300

Pro Ala Val Thr Ala Thr Thr Trp Val Arg Asp Arg Pro Gly Val Thr
305                 310                 315                 320

Ala Val Ile Val Gly Ala Arg Thr His Glu Gln Leu Ser His Leu Leu
                325                 330                 335

Lys Ala Glu Ser Val Thr Leu Pro Thr Pro Ile Thr Gln Ala Leu Asp
            340                 345                 350

Asp Val Ser Leu
        355
```

<210> 45
<211> 948
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(948)
<223> RXA02206K

<400> 45

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gtg aaa cag cga atg gtc ggt tca agt ggt ttg cgg gta tcc agg ctc   48
Met Lys Gln Arg Met Val Gly Ser Ser Gly Leu Arg Val Ser Arg Leu
  1               5                  10                  15

ggt ttg ggc acc tca aca tgg ggc tcg ggc acc gag ctg gct gag gca   96
Gly Leu Gly Thr Ser Thr Trp Gly Ser Gly Thr Glu Leu Ala Glu Ala
             20                  25                  30

ggc gat atc ttt aag gcg ttc atc aat tct ggt ggc acg ctt atc gac   144
Gly Asp Ile Phe Lys Ala Phe Ile Asn Ser Gly Gly Thr Leu Ile Asp
         35                  40                  45

gtc tcc ccc aac tac acc acc ggc gtc gcg gaa gaa atg ctc ggc acg   192
Val Ser Pro Asn Tyr Thr Thr Gly Val Ala Glu Glu Met Leu Gly Thr
     50                  55                  60

atg ttg gat gcg gaa gtc tct cgt tcg gct gtc gtc att tcc tcc agc   240
Met Leu Asp Ala Glu Val Ser Arg Ser Ala Val Val Ile Ser Ser Ser
 65                  70                  75                  80

gca ggt gtc aac ccc gct ctg ccg ctc ggc cga cgt gtg gat tgc tcc   288
Ala Gly Val Asn Pro Ala Leu Pro Leu Gly Arg Arg Val Asp Cys Ser
                 85                  90                  95

cgc cgc aat ttg att gcc caa tta gat gtc acc ctg cgg gca tta aac   336
Arg Arg Asn Leu Ile Ala Gln Leu Asp Val Thr Leu Arg Ala Leu Asn
            100                 105                 110

act gac tat ttg gat ttg tgg tct gtg ggc tat tgg gat gag ggc acc   384
Thr Asp Tyr Leu Asp Leu Trp Ser Val Gly Tyr Trp Asp Glu Gly Thr
        115                 120                 125

cca ccg cat gag gtg gcc gat act ttg gat tac gcc gtg cgc acc ggc   432
Pro Pro His Glu Val Ala Asp Thr Leu Asp Tyr Ala Val Arg Thr Gly
    130                 135                 140

cga gtc cga tat gcc ggt gtc cga gga tat tcc ggt tgg cag tta gcg   480
Arg Val Arg Tyr Ala Gly Val Arg Gly Tyr Ser Gly Trp Gln Leu Ala
145                 150                 155                 160

gtc acc cac gct gca tcc aat cat gca gcg gcc tcc gcc cgc ccc gtg   528
Val Thr His Ala Ala Ser Asn His Ala Ala Ala Ser Ala Arg Pro Val
                165                 170                 175

gtc gtt gca caa aat gaa tac agc ctg ctg gaa cgc cgc gca gaa caa   576
Val Val Ala Gln Asn Glu Tyr Ser Leu Leu Glu Arg Arg Ala Glu Gln
            180                 185                 190
```

```
gaa ctc ctc cct gcc acc caa cac cta ggt gtc gga ttc ttt gct ggc   624
Glu Leu Leu Pro Ala Thr Gln His Leu Gly Val Gly Phe Phe Ala Gly
        195                 200                 205

gct ccg ctg ggg caa ggc gtg ctg act gct aaa tac cgc tcc gaa att   672
Ala Pro Leu Gly Gln Gly Val Leu Thr Ala Lys Tyr Arg Ser Glu Ile
    210                 215                 220

ccc cat gat tcc aga gct gca tcc aca gga cgc gac gca gaa gtc caa   720
Pro His Asp Ser Arg Ala Ala Ser Thr Gly Arg Asp Ala Glu Val Gln
225                 230                 235                 240

agc tac cta gat aat cga ggc cgc atc att gtc gat gct ctt gat act   768
Ser Tyr Leu Asp Asn Arg Gly Arg Ile Ile Val Asp Ala Leu Asp Thr
                245                 250                 255

gca gcc aaa gga tta ggc att agc ccc gct gtc aca gcc acc acc tgg   816
Ala Ala Lys Gly Leu Gly Ile Ser Pro Ala Val Thr Ala Thr Thr Trp
            260                 265                 270

gtg cgt gat cgt ccc gga gtg aca gct gtc atc gtg ggc gct cgc aca   864
Val Arg Asp Arg Pro Gly Val Thr Ala Val Ile Val Gly Ala Arg Thr
        275                 280                 285

cat gaa cag ctg tca cat ctt ctc aag gcg gaa tcg gtg act ttg cca   912
His Glu Gln Leu Ser His Leu Leu Lys Ala Glu Ser Val Thr Leu Pro
    290                 295                 300

aca cca atc aca caa gcc ctt gat gat gtc tcc ctg                   948
Thr Pro Ile Thr Gln Ala Leu Asp Asp Val Ser Leu
305                 310                 315
```

<210> 46
<211> 316
<212> PRT
<213> 麩胺酸棒狀桿菌

```
<400> 46
Met Lys Gln Arg Met Val Gly Ser Ser Gly Leu Arg Val Ser Arg Leu
  1               5                  10                  15

Gly Leu Gly Thr Ser Thr Trp Gly Ser Gly Thr Glu Leu Ala Glu Ala
             20                  25                  30

Gly Asp Ile Phe Lys Ala Phe Ile Asn Ser Gly Gly Thr Leu Ile Asp
         35                  40                  45

Val Ser Pro Asn Tyr Thr Thr Gly Val Ala Glu Glu Met Leu Gly Thr
     50                  55                  60

Met Leu Asp Ala Glu Val Ser Arg Ser Ala Val Val Ile Ser Ser Ser
 65                  70                  75                  80

Ala Gly Val Asn Pro Ala Leu Pro Leu Gly Arg Arg Val Asp Cys Ser
                 85                  90                  95

Arg Arg Asn Leu Ile Ala Gln Leu Asp Val Thr Leu Arg Ala Leu Asn
```

```
            100                 105                 110

Thr Asp Tyr Leu Asp Leu Trp Ser Val Gly Tyr Trp Asp Glu Gly Thr
        115                 120                 125

Pro Pro His Glu Val Ala Asp Thr Leu Asp Tyr Ala Val Arg Thr Gly
    130                 135                 140

Arg Val Arg Tyr Ala Gly Val Arg Gly Tyr Ser Gly Trp Gln Leu Ala
145                 150                 155                 160

Val Thr His Ala Ala Ser Asn His Ala Ala Ala Ser Ala Arg Pro Val
                165                 170                 175

Val Val Ala Gln Asn Glu Tyr Ser Leu Leu Glu Arg Arg Ala Glu Gln
            180                 185                 190

Glu Leu Leu Pro Ala Thr Gln His Leu Gly Val Gly Phe Phe Ala Gly
        195                 200                 205

Ala Pro Leu Gly Gln Gly Val Leu Thr Ala Lys Tyr Arg Ser Glu Ile
    210                 215                 220

Pro His Asp Ser Arg Ala Ala Ser Thr Gly Arg Asp Ala Glu Val Gln
225                 230                 235                 240

Ser Tyr Leu Asp Asn Arg Gly Arg Ile Ile Val Asp Ala Leu Asp Thr
                245                 250                 255

Ala Ala Lys Gly Leu Gly Ile Ser Pro Ala Val Thr Ala Thr Thr Trp
            260                 265                 270

Val Arg Asp Arg Pro Gly Val Thr Ala Val Ile Val Gly Ala Arg Thr
        275                 280                 285

His Glu Gln Leu Ser His Leu Leu Lys Ala Glu Ser Val Thr Leu Pro
    290                 295                 300

Thr Pro Ile Thr Gln Ala Leu Asp Asp Val Ser Leu
305                 310                 315
```

<210> 47
<211> 408
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(408)
<223> RXA02299W

<400> 47

```
atg ctg cgc acc atc ctc gga agt aag att cac cga gcc act gtc act   48
Met Leu Arg Thr Ile Leu Gly Ser Lys Ile His Arg Ala Thr Val Thr
  1               5                  10                  15

caa gct gat cta gat tat gtt ggc tct gta acc atc gac gcc gac ctg   96
Gln Ala Asp Leu Asp Tyr Val Gly Ser Val Thr Ile Asp Ala Asp Leu
```

```
            20                  25                  30

gtt cac gcc gcc gga ttg atc gaa ggc gaa aaa gtt gcc atc gta gac   144
Val His Ala Ala Gly Leu Ile Glu Gly Glu Lys Val Ala Ile Val Asp
         35                  40                  45

atc acc aac ggc gct cgt ctg gaa act tat gtc att gtg ggc gac gcc   192
Ile Thr Asn Gly Ala Arg Leu Glu Thr Tyr Val Ile Val Gly Asp Ala
     50                  55                  60


gga acg ggc aat att tgc atc aat ggt gcc gct gca cac ctt att aat   240
Gly Thr Gly Asn Ile Cys Ile Asn Gly Ala Ala Ala His Leu Ile Asn
 65                  70                  75                  80

cct ggc gat ctt gtg atc atc atg agc tac ctt cag gca act gat gcg   288
Pro Gly Asp Leu Val Ile Ile Met Ser Tyr Leu Gln Ala Thr Asp Ala
                 85                  90                  95

gaa gcc aag gcg tat gag cca aag att gtg cac gtg gac gcc gac aac   336
Glu Ala Lys Ala Tyr Glu Pro Lys Ile Val His Val Asp Ala Asp Asn
            100                 105                 110

cgc atc gtt gcg ctc ggc aac gat ctt gcg gaa gca cta cct gga tcc   384
Arg Ile Val Ala Leu Gly Asn Asp Leu Ala Glu Ala Leu Pro Gly Ser
        115                 120                 125

ggg ctt ttg acg tcg aga agc att                                  408
Gly Leu Leu Thr Ser Arg Ser Ile
    130                 135
```

<210> 48
<211> 136
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 48

```
Met Leu Arg Thr Ile Leu Gly Ser Lys Ile His Arg Ala Thr Val Thr
  1               5                  10                  15

Gln Ala Asp Leu Asp Tyr Val Gly Ser Val Thr Ile Asp Ala Asp Leu
             20                  25                  30

Val His Ala Ala Gly Leu Ile Glu Gly Glu Lys Val Ala Ile Val Asp
         35                  40                  45

Ile Thr Asn Gly Ala Arg Leu Glu Thr Tyr Val Ile Val Gly Asp Ala
     50                  55                  60

Gly Thr Gly Asn Ile Cys Ile Asn Gly Ala Ala Ala His Leu Ile Asn
 65                  70                  75                  80

Pro Gly Asp Leu Val Ile Ile Met Ser Tyr Leu Gln Ala Thr Asp Ala
                 85                  90                  95

Glu Ala Lys Ala Tyr Glu Pro Lys Ile Val His Val Asp Ala Asp Asn
            100                 105                 110
```

```
Arg Ile Val Ala Leu Gly Asn Asp Leu Ala Glu Ala Leu Pro Gly Ser
        115                 120                 125

Gly Leu Leu Thr Ser Arg Ser Ile
    130                 135


<210> 49
<211> 669
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(669)
<223> RXA02390W

<400> 49
gtg gag tgg acc gct ttt ggc acc ctg att ctg ctc aat ttg gtg ggc   48
Met Glu Trp Thr Ala Phe Gly Thr Leu Ile Leu Leu Asn Leu Val Gly
  1               5                  10                  15

agt tta tcc ccg ggg cct gat acc ttt ttc ctc ctc cgc tta gcc acc   96
Ser Leu Ser Pro Gly Pro Asp Thr Phe Phe Leu Leu Arg Leu Ala Thr
             20                  25                  30

cgc tcc aga gcg cac gcg atc gct ggc gtc gcc ggc atc gtc acc gga   144
Arg Ser Arg Ala His Ala Ile Ala Gly Val Ala Gly Ile Val Thr Gly
         35                  40                  45

ctc acg gtg tgg gtg acg ctg acg gtc gtg gga gca gcg gcg ctg ctc   192
Leu Thr Val Trp Val Thr Leu Thr Val Val Gly Ala Ala Ala Leu Leu
     50                  55                  60

acc act tat ccg tcg att ctc gga atc atc cag ctc gtc ggc ggc acg   240
Thr Thr Tyr Pro Ser Ile Leu Gly Ile Ile Gln Leu Val Gly Gly Thr
 65                  70                  75                  80

tac cta agc ttc att ggg tac aag ttg ctg cgc tcg gcg tcg aga gag   288
Tyr Leu Ser Phe Ile Gly Tyr Lys Leu Leu Arg Ser Ala Ser Arg Glu
                 85                  90                  95

ctt atc gac gcc cgc cag ttc cgt ttc aac gcc gat gcc cga cct atc   336
Leu Ile Asp Ala Arg Gln Phe Arg Phe Asn Ala Asp Ala Arg Pro Ile
            100                 105                 110

ccg gat gcg gta gaa gca ctg gga acc cgc act cag gta tat cga caa   384
Pro Asp Ala Val Glu Ala Leu Gly Thr Arg Thr Gln Val Tyr Arg Gln
        115                 120                 125

ggt ttg gcc acc aac ctg tca aac cct aaa gtt gtc atg tac ttc gcg   432
Gly Leu Ala Thr Asn Leu Ser Asn Pro Lys Val Val Met Tyr Phe Ala
    130                 135                 140

gca att ctg gct ccg ttg atg cca gcg cac cca tca ccg gtg ctg gcg   480
Ala Ile Leu Ala Pro Leu Met Pro Ala His Pro Ser Pro Val Leu Ala
145                 150                 155                 160
```

```
ttc tct atc atc gtg gcg att tta gtg cag acc ttt gtt acc ttc tct   528
Phe Ser Ile Ile Val Ala Ile Leu Val Gln Thr Phe Val Thr Phe Ser
                165                 170                 175

gct gtg tgc ctc att gtc tct acg gag cgt gtg cgc aaa gca atg ctg   576
Ala Val Cys Leu Ile Val Ser Thr Glu Arg Val Arg Lys Ala Met Leu
            180                 185                 190

cgt gca ggt ccc tgg ttt gac ctg ctt gct ggc gtt gtc ttc ctc gtt   624
Arg Ala Gly Pro Trp Phe Asp Leu Leu Ala Gly Val Val Phe Leu Val
        195                 200                 205

gtg ggt gtg act ctg ctg tat gaa ggc ctg acc ggt tta ctc ggg       669
Val Gly Val Thr Leu Leu Tyr Glu Gly Leu Thr Gly Leu Leu Gly
    210                 215                 220
```

<210> 50
<211> 223
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 50

```
Met Glu Trp Thr Ala Phe Gly Thr Leu Ile Leu Leu Asn Leu Val Gly
  1               5                  10                  15

Ser Leu Ser Pro Gly Pro Asp Thr Phe Phe Leu Leu Arg Leu Ala Thr
             20                  25                  30

Arg Ser Arg Ala His Ala Ile Ala Gly Val Ala Gly Ile Val Thr Gly
         35                  40                  45

Leu Thr Val Trp Val Thr Leu Thr Val Val Gly Ala Ala Ala Leu Leu
     50                  55                  60

Thr Thr Tyr Pro Ser Ile Leu Gly Ile Ile Gln Leu Val Gly Gly Thr
 65                  70                  75                  80

Tyr Leu Ser Phe Ile Gly Tyr Lys Leu Leu Arg Ser Ala Ser Arg Glu
                 85                  90                  95

Leu Ile Asp Ala Arg Gln Phe Arg Phe Asn Ala Asp Ala Arg Pro Ile
            100                 105                 110

Pro Asp Ala Val Glu Ala Leu Gly Thr Arg Thr Gln Val Tyr Arg Gln
        115                 120                 125

Gly Leu Ala Thr Asn Leu Ser Asn Pro Lys Val Val Met Tyr Phe Ala
    130                 135                 140

Ala Ile Leu Ala Pro Leu Met Pro Ala His Pro Ser Pro Val Leu Ala
145                 150                 155                 160

Phe Ser Ile Ile Val Ala Ile Leu Val Gln Thr Phe Val Thr Phe Ser
                165                 170                 175

Ala Val Cys Leu Ile Val Ser Thr Glu Arg Val Arg Lys Ala Met Leu
            180                 185                 190
```

```
Arg Ala Gly Pro Trp Phe Asp Leu Leu Ala Gly Val Val Phe Leu Val
        195                 200                 205

Val Gly Val Thr Leu Leu Tyr Glu Gly Leu Thr Gly Leu Leu Gly
    210                 215                 220


<210> 51
<211> 1344
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1344)
<223> RXA02399E

<400> 51
gtg gtc ggc acc gcc cat tgc gaa tca gca ctt aag gaa gtg act ttg   48
Met Val Gly Thr Ala His Cys Glu Ser Ala Leu Lys Glu Val Thr Leu
  1               5                  10                  15

atg tca aac gtt gga aag cca cgt acc gca cag gaa atc cag cag gat   96
Met Ser Asn Val Gly Lys Pro Arg Thr Ala Gln Glu Ile Gln Gln Asp
             20                  25                  30

tgg gac acc aac cct cgt tgg aac ggc atc acc cgc gac tac acc gca   144
Trp Asp Thr Asn Pro Arg Trp Asn Gly Ile Thr Arg Asp Tyr Thr Ala
         35                  40                  45

gac cag gta gct gat ctg cag ggt tcc gtc atc gag gag cac act ctt   192
Asp Gln Val Ala Asp Leu Gln Gly Ser Val Ile Glu Glu His Thr Leu
     50                  55                  60

gct cgc cgc ggc tca gag atc ctc tgg gac gca gtc acc cag gaa ggt   240
Ala Arg Arg Gly Ser Glu Ile Leu Trp Asp Ala Val Thr Gln Glu Gly
 65                  70                  75                  80

gac gga tac atc aac gcg ctt ggc gca ctc acc ggt aac cag gct gtt   288
Asp Gly Tyr Ile Asn Ala Leu Gly Ala Leu Thr Gly Asn Gln Ala Val
                 85                  90                  95

cag cag gtt cgt gca ggc ctg aag gct gtc tac ctg tcc ggt tgg cag   336
Gln Gln Val Arg Ala Gly Leu Lys Ala Val Tyr Leu Ser Gly Trp Gln
            100                 105                 110

gtc gca ggt gac gcc aac ctc tcc ggc cac acc tac cct gac cag tcc   384
Val Ala Gly Asp Ala Asn Leu Ser Gly His Thr Tyr Pro Asp Gln Ser
        115                 120                 125

ctc tac cca gcg aac tcc gtt cca agc gtc gtt cgt cgc atc aac aac   432
Leu Tyr Pro Ala Asn Ser Val Pro Ser Val Val Arg Arg Ile Asn Asn
    130                 135                 140

gca ctg ctg cgt tcc gat gaa atc gca cgc acc gaa ggc gac acc tcc   480
Ala Leu Leu Arg Ser Asp Glu Ile Ala Arg Thr Glu Gly Asp Thr Ser
145                 150                 155                 160
```

```
gtt gac aac tgg gtt gtc cca atc gtc gcg gac ggc gaa gct ggc ttc   528
Val Asp Asn Trp Val Val Pro Ile Val Ala Asp Gly Glu Ala Gly Phe
                165                 170                 175

ggt gga gca ctc aac gtc tac gaa ctc cag aag gca atg atc gca gct   576
Gly Gly Ala Leu Asn Val Tyr Glu Leu Gln Lys Ala Met Ile Ala Ala
            180                 185                 190

ggc gct gca ggc acc cac tgg gaa gac cag ctc gct tct gaa aag aag   624
Gly Ala Ala Gly Thr His Trp Glu Asp Gln Leu Ala Ser Glu Lys Lys
        195                 200                 205

tgt ggc cac ctc ggc ggc aag gtt ctg atc cca acc cag cag cac atc   672
Cys Gly His Leu Gly Gly Lys Val Leu Ile Pro Thr Gln Gln His Ile
    210                 215                 220

cgc acc ctg aac tct gcc cgc ctt gca gca gac gtt gca aac acc cca   720
Arg Thr Leu Asn Ser Ala Arg Leu Ala Ala Asp Val Ala Asn Thr Pro
225                 230                 235                 240

act gtt gtt atc gca cgt acc gac gct gag gca gca acc ctg atc acc   768
Thr Val Val Ile Ala Arg Thr Asp Ala Glu Ala Ala Thr Leu Ile Thr
                245                 250                 255

tct gac gtt gat gag cgc gac caa cca ttc atc acc ggt gag cgc acc   816
Ser Asp Val Asp Glu Arg Asp Gln Pro Phe Ile Thr Gly Glu Arg Thr
            260                 265                 270

gca gaa ggc tac tac cac gtc aag aat ggt ctc gag cca tgt atc gca   864
Ala Glu Gly Tyr Tyr His Val Lys Asn Gly Leu Glu Pro Cys Ile Ala
        275                 280                 285

cgt gca aag tcc tac gca cca tac gca gat atg atc tgg atg gag acc   912
Arg Ala Lys Ser Tyr Ala Pro Tyr Ala Asp Met Ile Trp Met Glu Thr
    290                 295                 300

ggc acc cct gac ctg gag ctc gct aag aag ttc gct gaa ggc gtt cgc   960
Gly Thr Pro Asp Leu Glu Leu Ala Lys Lys Phe Ala Glu Gly Val Arg
305                 310                 315                 320

tct gag ttc cca gac cag ctg ctg tcc tac aac tgc tcc cca tcc ttc  1008
Ser Glu Phe Pro Asp Gln Leu Leu Ser Tyr Asn Cys Ser Pro Ser Phe
                325                 330                 335

aac tgg tct gca cac ctc gag gca gat gag atc gct aag ttc cag aag  1056
Asn Trp Ser Ala His Leu Glu Ala Asp Glu Ile Ala Lys Phe Gln Lys
            340                 345                 350

gaa ctc ggc gca atg ggc ttc aag ttc cag ttc atc acc ctc gca ggc  1104
Glu Leu Gly Ala Met Gly Phe Lys Phe Gln Phe Ile Thr Leu Ala Gly
        355                 360                 365


ttc cac tcc ctc aac tac ggc atg ttc gac ctg gct tac gga tac gct  1152
Phe His Ser Leu Asn Tyr Gly Met Phe Asp Leu Ala Tyr Gly Tyr Ala
    370                 375                 380

cgc gaa ggc atg acc tcc ttc gtt gac ctg cag aac cgt gag ttc aag  1200
Arg Glu Gly Met Thr Ser Phe Val Asp Leu Gln Asn Arg Glu Phe Lys
```

```
385                 390                 395                 400

gca gct gaa gag cgt ggc ttc acc gct gtt aag cac cag cgt gag gtt   1248
Ala Ala Glu Glu Arg Gly Phe Thr Ala Val Lys His Gln Arg Glu Val
                405                 410                 415

ggc gca ggc tac ttc gac cag atc gca acc acc gtt gac ccg aac tct   1296
Gly Ala Gly Tyr Phe Asp Gln Ile Ala Thr Thr Val Asp Pro Asn Ser
            420                 425                 430

tct acc acc gct ttg aag ggt tcc act gaa gaa ggc cag ttc cac aac   1344
Ser Thr Thr Ala Leu Lys Gly Ser Thr Glu Glu Gly Gln Phe His Asn
        435                 440                 445
```

<210> 52
<211> 448
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 52

```
Met Val Gly Thr Ala His Cys Glu Ser Ala Leu Lys Glu Val Thr Leu
  1               5                  10                  15

Met Ser Asn Val Gly Lys Pro Arg Thr Ala Gln Glu Ile Gln Gln Asp
             20                  25                  30

Trp Asp Thr Asn Pro Arg Trp Asn Gly Ile Thr Arg Asp Tyr Thr Ala
         35                  40                  45

Asp Gln Val Ala Asp Leu Gln Gly Ser Val Ile Glu Glu His Thr Leu
     50                  55                  60

Ala Arg Arg Gly Ser Glu Ile Leu Trp Asp Ala Val Thr Gln Glu Gly
 65                  70                  75                  80

Asp Gly Tyr Ile Asn Ala Leu Gly Ala Leu Thr Gly Asn Gln Ala Val
                 85                  90                  95

Gln Gln Val Arg Ala Gly Leu Lys Ala Val Tyr Leu Ser Gly Trp Gln
            100                 105                 110

Val Ala Gly Asp Ala Asn Leu Ser Gly His Thr Tyr Pro Asp Gln Ser
        115                 120                 125

Leu Tyr Pro Ala Asn Ser Val Pro Ser Val Val Arg Arg Ile Asn Asn
    130                 135                 140

Ala Leu Leu Arg Ser Asp Glu Ile Ala Arg Thr Glu Gly Asp Thr Ser
145                 150                 155                 160

Val Asp Asn Trp Val Val Pro Ile Val Ala Asp Gly Glu Ala Gly Phe
                165                 170                 175

Gly Gly Ala Leu Asn Val Tyr Glu Leu Gln Lys Ala Met Ile Ala Ala
            180                 185                 190

Gly Ala Ala Gly Thr His Trp Glu Asp Gln Leu Ala Ser Glu Lys Lys
```

```
        195                 200                 205

Cys Gly His Leu Gly Gly Lys Val Leu Ile Pro Thr Gln Gln His Ile
    210                 215                 220

Arg Thr Leu Asn Ser Ala Arg Leu Ala Ala Asp Val Ala Asn Thr Pro
225                 230                 235                 240

Thr Val Val Ile Ala Arg Thr Asp Ala Glu Ala Ala Thr Leu Ile Thr
                245                 250                 255

Ser Asp Val Asp Glu Arg Asp Gln Pro Phe Ile Thr Gly Glu Arg Thr
            260                 265                 270

Ala Glu Gly Tyr Tyr His Val Lys Asn Gly Leu Glu Pro Cys Ile Ala
        275                 280                 285

Arg Ala Lys Ser Tyr Ala Pro Tyr Ala Asp Met Ile Trp Met Glu Thr
    290                 295                 300

Gly Thr Pro Asp Leu Glu Leu Ala Lys Lys Phe Ala Glu Gly Val Arg
305                 310                 315                 320

Ser Glu Phe Pro Asp Gln Leu Leu Ser Tyr Asn Cys Ser Pro Ser Phe
                325                 330                 335

Asn Trp Ser Ala His Leu Glu Ala Asp Glu Ile Ala Lys Phe Gln Lys
            340                 345                 350

Glu Leu Gly Ala Met Gly Phe Lys Phe Gln Phe Ile Thr Leu Ala Gly
        355                 360                 365

Phe His Ser Leu Asn Tyr Gly Met Phe Asp Leu Ala Tyr Gly Tyr Ala
    370                 375                 380

Arg Glu Gly Met Thr Ser Phe Val Asp Leu Gln Asn Arg Glu Phe Lys
385                 390                 395                 400

Ala Ala Glu Glu Arg Gly Phe Thr Ala Val Lys His Gln Arg Glu Val
                405                 410                 415

Gly Ala Gly Tyr Phe Asp Gln Ile Ala Thr Thr Val Asp Pro Asn Ser
            420                 425                 430

Ser Thr Thr Ala Leu Lys Gly Ser Thr Glu Glu Gly Gln Phe His Asn
        435                 440                 445
```

<210> 53
<211> 1296
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1296)

<223> RXA02399W

<400> 53

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atg tca aac gtt gga aag cca cgt acc gca cag gaa atc cag cag gat   48
Met Ser Asn Val Gly Lys Pro Arg Thr Ala Gln Glu Ile Gln Gln Asp
  1               5                  10                  15

tgg gac acc aac cct cgt tgg aac ggc atc acc cgc gac tac acc gca   96
Trp Asp Thr Asn Pro Arg Trp Asn Gly Ile Thr Arg Asp Tyr Thr Ala
             20                  25                  30

gac cag gta gct gat ctg cag ggt tcc gtc atc gag gag cac act ctt   144
Asp Gln Val Ala Asp Leu Gln Gly Ser Val Ile Glu Glu His Thr Leu
         35                  40                  45

gct cgc cgc ggc tca gag atc ctc tgg gac gca gtc acc cag gaa ggt   192
Ala Arg Arg Gly Ser Glu Ile Leu Trp Asp Ala Val Thr Gln Glu Gly
     50                  55                  60

gac gga tac atc aac gcg ctt ggc gca ctc acc ggt aac cag gct gtt   240
Asp Gly Tyr Ile Asn Ala Leu Gly Ala Leu Thr Gly Asn Gln Ala Val
 65                  70                  75                  80

cag cag gtt cgt gca ggc ctg aag gct gtc tac ctg tcc ggt tgg cag   288
Gln Gln Val Arg Ala Gly Leu Lys Ala Val Tyr Leu Ser Gly Trp Gln
                 85                  90                  95

gtc gca ggt gac gcc aac ctc tcc ggc cac acc tac cct gac cag tcc   336
Val Ala Gly Asp Ala Asn Leu Ser Gly His Thr Tyr Pro Asp Gln Ser
            100                 105                 110

ctc tac cca gcg aac tcc gtt cca agc gtc gtt cgt cgc atc aac aac   384
Leu Tyr Pro Ala Asn Ser Val Pro Ser Val Val Arg Arg Ile Asn Asn
        115                 120                 125

gca ctg ctg cgt tcc gat gaa atc gca cgc acc gaa ggc gac acc tcc   432
Ala Leu Leu Arg Ser Asp Glu Ile Ala Arg Thr Glu Gly Asp Thr Ser
    130                 135                 140

gtt gac aac tgg gtt gtc cca atc gtc gcg gac ggc gaa gct ggc ttc   480
Val Asp Asn Trp Val Val Pro Ile Val Ala Asp Gly Glu Ala Gly Phe
145                 150                 155                 160

ggt gga gca ctc aac gtc tac gaa ctc cag aag gca atg atc gca gct   528
Gly Gly Ala Leu Asn Val Tyr Glu Leu Gln Lys Ala Met Ile Ala Ala
                165                 170                 175

ggc gct gca ggc acc cac tgg gaa gac cag ctc gct tct gaa aag aag   576
Gly Ala Ala Gly Thr His Trp Glu Asp Gln Leu Ala Ser Glu Lys Lys
            180                 185                 190

tgt ggc cac ctc ggc ggc aag gtt ctg atc cca acc cag cag cac atc   624
Cys Gly His Leu Gly Gly Lys Val Leu Ile Pro Thr Gln Gln His Ile
        195                 200                 205

cgc acc ctg aac tct gcc cgc ctt gca gca gac gtt gca aac acc cca   672
Arg Thr Leu Asn Ser Ala Arg Leu Ala Ala Asp Val Ala Asn Thr Pro
    210                 215                 220
```

```
act gtt gtt atc gca cgt acc gac gct gag gca gca acc ctg atc acc   720
Thr Val Val Ile Ala Arg Thr Asp Ala Glu Ala Ala Thr Leu Ile Thr
225                 230                 235                 240

tct gac gtt gat gag cgc gac caa cca ttc atc acc ggt gag cgc acc   768
Ser Asp Val Asp Glu Arg Asp Gln Pro Phe Ile Thr Gly Glu Arg Thr
                245                 250                 255

gca gaa ggc tac tac cac gtc aag aat ggt ctc gag cca tgt atc gca   816
Ala Glu Gly Tyr Tyr His Val Lys Asn Gly Leu Glu Pro Cys Ile Ala
            260                 265                 270

cgt gca aag tcc tac gca cca tac gca gat atg atc tgg atg gag acc   864
Arg Ala Lys Ser Tyr Ala Pro Tyr Ala Asp Met Ile Trp Met Glu Thr
        275                 280                 285

ggc acc cct gac ctg gag ctc gct aag aag ttc gct gaa ggc gtt cgc   912
Gly Thr Pro Asp Leu Glu Leu Ala Lys Lys Phe Ala Glu Gly Val Arg
    290                 295                 300

tct gag ttc cca gac cag ctg ctg tcc tac aac tgc tcc cca tcc ttc   960
Ser Glu Phe Pro Asp Gln Leu Leu Ser Tyr Asn Cys Ser Pro Ser Phe
305                 310                 315                 320

aac tgg tct gca cac ctc gag gca gat gag atc gct aag ttc cag aag  1008
Asn Trp Ser Ala His Leu Glu Ala Asp Glu Ile Ala Lys Phe Gln Lys
                325                 330                 335

gaa ctc ggc gca atg ggc ttc aag ttc cag ttc atc acc ctc gca ggc  1056
Glu Leu Gly Ala Met Gly Phe Lys Phe Gln Phe Ile Thr Leu Ala Gly
            340                 345                 350

ttc cac tcc ctc aac tac ggc atg ttc gac ctg gct tac gga tac gct  1104
Phe His Ser Leu Asn Tyr Gly Met Phe Asp Leu Ala Tyr Gly Tyr Ala
        355                 360                 365

cgc gaa ggc atg acc tcc ttc gtt gac ctg cag aac cgt gag ttc aag  1152
Arg Glu Gly Met Thr Ser Phe Val Asp Leu Gln Asn Arg Glu Phe Lys
    370                 375                 380

gca gct gaa gag cgt ggc ttc acc gct gtt aag cac cag cgt gag gtt  1200
Ala Ala Glu Glu Arg Gly Phe Thr Ala Val Lys His Gln Arg Glu Val
385                 390                 395                 400

ggc gca ggc tac ttc gac cag atc gca acc acc gtt gac ccg aac tct  1248
Gly Ala Gly Tyr Phe Asp Gln Ile Ala Thr Thr Val Asp Pro Asn Ser
                405                 410                 415

tct acc acc gct ttg aag ggt tcc act gaa gaa ggc cag ttc cac aac  1296
Ser Thr Thr Ala Leu Lys Gly Ser Thr Glu Glu Gly Gln Phe His Asn
            420                 425                 430
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<210> 54
<211> 432
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 54

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Met Ser Asn Val Gly Lys Pro Arg Thr Ala Gln Glu Ile Gln Gln Asp
  1               5                  10                  15

Trp Asp Thr Asn Pro Arg Trp Asn Gly Ile Thr Arg Asp Tyr Thr Ala
             20                  25                  30

Asp Gln Val Ala Asp Leu Gln Gly Ser Val Ile Glu Glu His Thr Leu
         35                  40                  45

Ala Arg Arg Gly Ser Glu Ile Leu Trp Asp Ala Val Thr Gln Glu Gly
     50                  55                  60

Asp Gly Tyr Ile Asn Ala Leu Gly Ala Leu Thr Gly Asn Gln Ala Val
 65                  70                  75                  80

Gln Gln Val Arg Ala Gly Leu Lys Ala Val Tyr Leu Ser Gly Trp Gln
                 85                  90                  95

Val Ala Gly Asp Ala Asn Leu Ser Gly His Thr Tyr Pro Asp Gln Ser
            100                 105                 110

Leu Tyr Pro Ala Asn Ser Val Pro Ser Val Val Arg Arg Ile Asn Asn
        115                 120                 125

Ala Leu Leu Arg Ser Asp Glu Ile Ala Arg Thr Glu Gly Asp Thr Ser
    130                 135                 140

Val Asp Asn Trp Val Val Pro Ile Val Ala Asp Gly Glu Ala Gly Phe
145                 150                 155                 160

Gly Gly Ala Leu Asn Val Tyr Glu Leu Gln Lys Ala Met Ile Ala Ala
                165                 170                 175

Gly Ala Ala Gly Thr His Trp Glu Asp Gln Leu Ala Ser Glu Lys Lys
            180                 185                 190

Cys Gly His Leu Gly Gly Lys Val Leu Ile Pro Thr Gln Gln His Ile
        195                 200                 205

Arg Thr Leu Asn Ser Ala Arg Leu Ala Ala Asp Val Ala Asn Thr Pro
    210                 215                 220

Thr Val Val Ile Ala Arg Thr Asp Ala Glu Ala Ala Thr Leu Ile Thr
225                 230                 235                 240

Ser Asp Val Asp Glu Arg Asp Gln Pro Phe Ile Thr Gly Glu Arg Thr
                245                 250                 255

Ala Glu Gly Tyr Tyr His Val Lys Asn Gly Leu Glu Pro Cys Ile Ala
            260                 265                 270

Arg Ala Lys Ser Tyr Ala Pro Tyr Ala Asp Met Ile Trp Met Glu Thr
        275                 280                 285

Gly Thr Pro Asp Leu Glu Leu Ala Lys Lys Phe Ala Glu Gly Val Arg
    290                 295                 300

Ser Glu Phe Pro Asp Gln Leu Leu Ser Tyr Asn Cys Ser Pro Ser Phe
```

```
305                 310                 315                 320

Asn Trp Ser Ala His Leu Glu Ala Asp Glu Ile Ala Lys Phe Gln Lys
                325                 330                 335

Glu Leu Gly Ala Met Gly Phe Lys Phe Gln Phe Ile Thr Leu Ala Gly
            340                 345                 350

Phe His Ser Leu Asn Tyr Gly Met Phe Asp Leu Ala Tyr Gly Tyr Ala
        355                 360                 365

Arg Glu Gly Met Thr Ser Phe Val Asp Leu Gln Asn Arg Glu Phe Lys
    370                 375                 380

Ala Ala Glu Glu Arg Gly Phe Thr Ala Val Lys His Gln Arg Glu Val
385                 390                 395                 400

Gly Ala Gly Tyr Phe Asp Gln Ile Ala Thr Thr Val Asp Pro Asn Ser
                405                 410                 415

Ser Thr Thr Ala Leu Lys Gly Ser Thr Glu Glu Gly Gln Phe His Asn
            420                 425                 430
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<210> 55
<211> 2217
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(2217)
<223> RXA02404K

<400> 55

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atg act gaa cag gaa ctg ttg tct gct cag act gcc gac aac gct gga   48
Met Thr Glu Gln Glu Leu Leu Ser Ala Gln Thr Ala Asp Asn Ala Gly
  1               5                  10                  15

act gac agc acc gaa cgc gtt gac gcg ggc gga atg cag gtt gca aaa   96
Thr Asp Ser Thr Glu Arg Val Asp Ala Gly Gly Met Gln Val Ala Lys
             20                  25                  30

gtt ctc tac gac ttt gta acc gaa gcg gta ctc cct cgc gtg ggt gtg   144
Val Leu Tyr Asp Phe Val Thr Glu Ala Val Leu Pro Arg Val Gly Val
         35                  40                  45

gat gcg gaa aag ttc tgg tcc gga ttc gcc gcc atc gcc cgg gac ctc   192
Asp Ala Glu Lys Phe Trp Ser Gly Phe Ala Ala Ile Ala Arg Asp Leu
     50                  55                  60

acc cca cgc aac cgc gag ctg ctt gct cgc cgc gat gaa ctg cag atg   240
Thr Pro Arg Asn Arg Glu Leu Leu Ala Arg Arg Asp Glu Leu Gln Met
 65                  70                  75                  80

ctt atc gac gac tac cac cgc aac aac tcc ggc acc atc gac caa gag   288
```

```
Leu Ile Asp Asp Tyr His Arg Asn Asn Ser Gly Thr Ile Asp Gln Glu
                 85                  90                  95

gcg tac gag gat ttc ctc aaa gaa atc gga tac ttg gtt gag gag cca   336
Ala Tyr Glu Asp Phe Leu Lys Glu Ile Gly Tyr Leu Val Glu Glu Pro
            100                 105                 110

gaa gct gca gaa atc cgt acc caa aac gtc gat acg gaa atc tcc agc   384
Glu Ala Ala Glu Ile Arg Thr Gln Asn Val Asp Thr Glu Ile Ser Ser
        115                 120                 125

acc gca gga cct cag ctg gtt gtt cca att ctg aac gca cgc ttc gcg   432
Thr Ala Gly Pro Gln Leu Val Val Pro Ile Leu Asn Ala Arg Phe Ala
    130                 135                 140

ctg aac gct gcc aat gct cgc tgg ggt tcc ctc tac gat gcg ttg tac   480
Leu Asn Ala Ala Asn Ala Arg Trp Gly Ser Leu Tyr Asp Ala Leu Tyr
145                 150                 155                 160

ggc acc aac gcc atc cca gaa act gat ggc gct gaa aag ggc aag gag   528
Gly Thr Asn Ala Ile Pro Glu Thr Asp Gly Ala Glu Lys Gly Lys Glu
                165                 170                 175

tac aac ccg gtc cgc ggc cag aag gtc atc gag tgg ggt cgt gaa ttc   576
Tyr Asn Pro Val Arg Gly Gln Lys Val Ile Glu Trp Gly Arg Glu Phe
            180                 185                 190

ctc gac agc gtt gtc cca ctg gac ggt gct tcg cat gcc gat gtt gag   624
Leu Asp Ser Val Val Pro Leu Asp Gly Ala Ser His Ala Asp Val Glu
        195                 200                 205

aag tac aac atc acc gat gga aag ctt gca gcc cac att gga gat agc   672
Lys Tyr Asn Ile Thr Asp Gly Lys Leu Ala Ala His Ile Gly Asp Ser
    210                 215                 220

gtc tac cga ctg aaa aac cgt gaa tcc tac cgt ggc ttc acc ggc aac   720
Val Tyr Arg Leu Lys Asn Arg Glu Ser Tyr Arg Gly Phe Thr Gly Asn
225                 230                 235                 240

ttc ctt gat cca gaa gca atc ctg ctg gaa acc aac ggc ctg cac atc   768
Phe Leu Asp Pro Glu Ala Ile Leu Leu Glu Thr Asn Gly Leu His Ile
                245                 250                 255

gag ctg cag atc gat cct gtc cac cca atc ggc aag gca gac aag act   816
Glu Leu Gln Ile Asp Pro Val His Pro Ile Gly Lys Ala Asp Lys Thr
            260                 265                 270

ggt ctc aaa gac atc gtt ttg gaa tct gcg atc acc acg atc atg gac   864
Gly Leu Lys Asp Ile Val Leu Glu Ser Ala Ile Thr Thr Ile Met Asp
        275                 280                 285

ttc gaa gac tcc gtt gca gct gtt gat gct gaa gac aag acc tta ggt   912
Phe Glu Asp Ser Val Ala Ala Val Asp Ala Glu Asp Lys Thr Leu Gly
    290                 295                 300

tac tct aac tgg ttc gga ctc aac acc ggc gaa ctg aaa gaa gag atg   960
Tyr Ser Asn Trp Phe Gly Leu Asn Thr Gly Glu Leu Lys Glu Glu Met
305                 310                 315                 320
```

```
tcc aag aac gga cgc atc ttc acc cgt gag ctc aac aag gac cgc gtc   1008
Ser Lys Asn Gly Arg Ile Phe Thr Arg Glu Leu Asn Lys Asp Arg Val
                325                 330                 335

tac att ggc cgc aat ggt acc gag ctg gtt ctg cac ggt cgt tcc ctg   1056
Tyr Ile Gly Arg Asn Gly Thr Glu Leu Val Leu His Gly Arg Ser Leu
            340                 345                 350

ctg ttc gtc cgc aac gtt ggt cac ctc atg caa aac cca tcc atc ttg   1104
Leu Phe Val Arg Asn Val Gly His Leu Met Gln Asn Pro Ser Ile Leu
        355                 360                 365

att gat ggc gag gag atc ttc gaa ggc atc atg gat gct gtc ttg acc   1152
Ile Asp Gly Glu Glu Ile Phe Glu Gly Ile Met Asp Ala Val Leu Thr
    370                 375                 380

act gtt tgt gcc atc cca gga att gct ccg cag aac aag atg cgc aat   1200
Thr Val Cys Ala Ile Pro Gly Ile Ala Pro Gln Asn Lys Met Arg Asn
385                 390                 395                 400

tcc cgc aag ggc tcc atc tac atc gtg aag cct aag cag cac ggc cct   1248
Ser Arg Lys Gly Ser Ile Tyr Ile Val Lys Pro Lys Gln His Gly Pro
                405                 410                 415

gaa gaa gtc gcg ttc acc aac gag ctc ttc ggc cgc gtt gag gat ctg   1296
Glu Glu Val Ala Phe Thr Asn Glu Leu Phe Gly Arg Val Glu Asp Leu
            420                 425                 430

ctt gat ctg cca cgc cac acc ttg aag gtt ggt gtt atg gat gag gag   1344
Leu Asp Leu Pro Arg His Thr Leu Lys Val Gly Val Met Asp Glu Glu
        435                 440                 445

cgt cgc acg tcc gtg aac ctg gat gcc agc atc atg gaa gtt gct gac   1392
Arg Arg Thr Ser Val Asn Leu Asp Ala Ser Ile Met Glu Val Ala Asp
    450                 455                 460

cgc ttg gca ttc atc aac act ggc ttc ctg gac cgc acc ggc gat gaa   1440
Arg Leu Ala Phe Ile Asn Thr Gly Phe Leu Asp Arg Thr Gly Asp Glu
465                 470                 475                 480

atc cac acc tcc atg gaa gca ggc gcc atg gtg cgc aag gct gat atg   1488
Ile His Thr Ser Met Glu Ala Gly Ala Met Val Arg Lys Ala Asp Met
                485                 490                 495

cag acc gca ccg tgg aag cag gcc tac gag aac aac aac gtt gat gca   1536
Gln Thr Ala Pro Trp Lys Gln Ala Tyr Glu Asn Asn Asn Val Asp Ala
            500                 505                 510

ggt att cag cgt ggt ctt cct ggc aag gct cag atc ggt aag ggc atg   1584
Gly Ile Gln Arg Gly Leu Pro Gly Lys Ala Gln Ile Gly Lys Gly Met
        515                 520                 525

tgg gcg atg act gaa ctc atg gca gaa atg ctg gag aag aag atc ggc   1632
Trp Ala Met Thr Glu Leu Met Ala Glu Met Leu Glu Lys Lys Ile Gly
    530                 535                 540

cag cca cgc gaa ggc gcc aac act gca tgg gtt cct tca cca act ggt   1680
Gln Pro Arg Glu Gly Ala Asn Thr Ala Trp Val Pro Ser Pro Thr Gly
545                 550                 555                 560
```

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gcg acg ctg cac gca acg cac tac cac ttg gtt gat gtg ttc aag gtt   1728
Ala Thr Leu His Ala Thr His Tyr His Leu Val Asp Val Phe Lys Val
                565                 570                 575

caa gac gaa ctg cgt gct gcc ggc cgc cgc gac agc ctg cgc aac att   1776
Gln Asp Glu Leu Arg Ala Ala Gly Arg Arg Asp Ser Leu Arg Asn Ile
            580                 585                 590

ctc acc att cca acc gca cca aac acc aat tgg tct gag gaa gag aag   1824
Leu Thr Ile Pro Thr Ala Pro Asn Thr Asn Trp Ser Glu Glu Glu Lys
        595                 600                 605

aag gaa gag atg gac aac aac tgc cag tcc atc ctc gga tac gtt gtg   1872
Lys Glu Glu Met Asp Asn Asn Cys Gln Ser Ile Leu Gly Tyr Val Val
    610                 615                 620

cgc tgg gtt gag cac ggt gtt ggt tgc tcc aag gtt cca gac atc cat   1920
Arg Trp Val Glu His Gly Val Gly Cys Ser Lys Val Pro Asp Ile His
625                 630                 635                 640

gac atc gac ctc atg gaa gac cgc gca acg ctg cgt att tcc tcg cag   1968
Asp Ile Asp Leu Met Glu Asp Arg Ala Thr Leu Arg Ile Ser Ser Gln
                645                 650                 655

atg ctg gcc aac tgg atc cgc cat gat gtt gtc tcg aag gag cag gtc   2016
Met Leu Ala Asn Trp Ile Arg His Asp Val Val Ser Lys Glu Gln Val
            660                 665                 670

ttg gag tca ctg gaa cga atg gca gtg gtc gtc gac aag caa aat gcg   2064
Leu Glu Ser Leu Glu Arg Met Ala Val Val Val Asp Lys Gln Asn Ala
        675                 680                 685

ggc gac gag gcc tac cgc gat atg gcg ccg aac tac gac gcc tcc ctc   2112
Gly Asp Glu Ala Tyr Arg Asp Met Ala Pro Asn Tyr Asp Ala Ser Leu
    690                 695                 700

gcc ttc cag gcg gct aag gac ttg att ttc gaa ggc acc aag tcc cca   2160
Ala Phe Gln Ala Ala Lys Asp Leu Ile Phe Glu Gly Thr Lys Ser Pro
705                 710                 715                 720

tcg ggc tac acc gag ccc atc ttg cac gca cgc cgc cgc gag ttc aaa   2208
Ser Gly Tyr Thr Glu Pro Ile Leu His Ala Arg Arg Arg Glu Phe Lys
                725                 730                 735

gca aaa aac                                                      2217
Ala Lys Asn
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<210> 56
<211> 739
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 56

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Met Thr Glu Gln Glu Leu Leu Ser Ala Gln Thr Ala Asp Asn Ala Gly
  1               5                  10                  15
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Thr Asp Ser Thr Glu Arg Val Asp Ala Gly Gly Met Gln Val Ala Lys
            20                  25                  30

Val Leu Tyr Asp Phe Val Thr Glu Ala Val Leu Pro Arg Val Gly Val
        35                  40                  45

Asp Ala Glu Lys Phe Trp Ser Gly Phe Ala Ala Ile Ala Arg Asp Leu
    50                  55                  60

Thr Pro Arg Asn Arg Glu Leu Leu Ala Arg Arg Asp Glu Leu Gln Met
65                  70                  75                  80

Leu Ile Asp Asp Tyr His Arg Asn Asn Ser Gly Thr Ile Asp Gln Glu
                85                  90                  95

Ala Tyr Glu Asp Phe Leu Lys Glu Ile Gly Tyr Leu Val Glu Glu Pro
            100                 105                 110

Glu Ala Ala Glu Ile Arg Thr Gln Asn Val Asp Thr Glu Ile Ser Ser
        115                 120                 125

Thr Ala Gly Pro Gln Leu Val Val Pro Ile Leu Asn Ala Arg Phe Ala
    130                 135                 140

Leu Asn Ala Ala Asn Ala Arg Trp Gly Ser Leu Tyr Asp Ala Leu Tyr
145                 150                 155                 160

Gly Thr Asn Ala Ile Pro Glu Thr Asp Gly Ala Glu Lys Gly Lys Glu
                165                 170                 175

Tyr Asn Pro Val Arg Gly Gln Lys Val Ile Glu Trp Gly Arg Glu Phe
            180                 185                 190

Leu Asp Ser Val Val Pro Leu Asp Gly Ala Ser His Ala Asp Val Glu
        195                 200                 205

Lys Tyr Asn Ile Thr Asp Gly Lys Leu Ala Ala His Ile Gly Asp Ser
    210                 215                 220

Val Tyr Arg Leu Lys Asn Arg Glu Ser Tyr Arg Gly Phe Thr Gly Asn
225                 230                 235                 240

Phe Leu Asp Pro Glu Ala Ile Leu Leu Glu Thr Asn Gly Leu His Ile
                245                 250                 255

Glu Leu Gln Ile Asp Pro Val His Pro Ile Gly Lys Ala Asp Lys Thr
            260                 265                 270

Gly Leu Lys Asp Ile Val Leu Glu Ser Ala Ile Thr Thr Ile Met Asp
        275                 280                 285

Phe Glu Asp Ser Val Ala Ala Val Asp Ala Glu Asp Lys Thr Leu Gly
    290                 295                 300

Tyr Ser Asn Trp Phe Gly Leu Asn Thr Gly Glu Leu Lys Glu Glu Met
305                 310                 315                 320

Ser Lys Asn Gly Arg Ile Phe Thr Arg Glu Leu Asn Lys Asp Arg Val
```

```
                325                 330                 335

Tyr Ile Gly Arg Asn Gly Thr Glu Leu Val Leu His Gly Arg Ser Leu
            340                 345                 350

Leu Phe Val Arg Asn Val Gly His Leu Met Gln Asn Pro Ser Ile Leu
        355                 360                 365

Ile Asp Gly Glu Glu Ile Phe Glu Gly Ile Met Asp Ala Val Leu Thr
    370                 375                 380

Thr Val Cys Ala Ile Pro Gly Ile Ala Pro Gln Asn Lys Met Arg Asn
385                 390                 395                 400

Ser Arg Lys Gly Ser Ile Tyr Ile Val Lys Pro Lys Gln His Gly Pro
                405                 410                 415

Glu Glu Val Ala Phe Thr Asn Glu Leu Phe Gly Arg Val Glu Asp Leu
            420                 425                 430

Leu Asp Leu Pro Arg His Thr Leu Lys Val Gly Val Met Asp Glu Glu
        435                 440                 445

Arg Arg Thr Ser Val Asn Leu Asp Ala Ser Ile Met Glu Val Ala Asp
    450                 455                 460

Arg Leu Ala Phe Ile Asn Thr Gly Phe Leu Asp Arg Thr Gly Asp Glu
465                 470                 475                 480

Ile His Thr Ser Met Glu Ala Gly Ala Met Val Arg Lys Ala Asp Met
                485                 490                 495

Gln Thr Ala Pro Trp Lys Gln Ala Tyr Glu Asn Asn Asn Val Asp Ala
            500                 505                 510

Gly Ile Gln Arg Gly Leu Pro Gly Lys Ala Gln Ile Gly Lys Gly Met
        515                 520                 525

Trp Ala Met Thr Glu Leu Met Ala Glu Met Leu Glu Lys Lys Ile Gly
    530                 535                 540

Gln Pro Arg Glu Gly Ala Asn Thr Ala Trp Val Pro Ser Pro Thr Gly
545                 550                 555                 560

Ala Thr Leu His Ala Thr His Tyr His Leu Val Asp Val Phe Lys Val
                565                 570                 575

Gln Asp Glu Leu Arg Ala Ala Gly Arg Arg Asp Ser Leu Arg Asn Ile
            580                 585                 590

Leu Thr Ile Pro Thr Ala Pro Asn Thr Asn Trp Ser Glu Glu Glu Lys
        595                 600                 605

Lys Glu Glu Met Asp Asn Asn Cys Gln Ser Ile Leu Gly Tyr Val Val
    610                 615                 620

Arg Trp Val Glu His Gly Val Gly Cys Ser Lys Val Pro Asp Ile His
625                 630                 635                 640
```

```
Asp Ile Asp Leu Met Glu Asp Arg Ala Thr Leu Arg Ile Ser Ser Gln
                645                 650                 655

Met Leu Ala Asn Trp Ile Arg His Asp Val Val Ser Lys Glu Gln Val
            660                 665                 670

Leu Glu Ser Leu Glu Arg Met Ala Val Val Val Asp Lys Gln Asn Ala
        675                 680                 685

Gly Asp Glu Ala Tyr Arg Asp Met Ala Pro Asn Tyr Asp Ala Ser Leu
    690                 695                 700

Ala Phe Gln Ala Ala Lys Asp Leu Ile Phe Glu Gly Thr Lys Ser Pro
705                 710                 715                 720

Ser Gly Tyr Thr Glu Pro Ile Leu His Ala Arg Arg Arg Glu Phe Lys
                725                 730                 735

Ala Lys Asn
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<210> 57
<211> 1830
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1830)
<223> RXA02591W

<400> 57

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atg act act gct gca atc agg ggc ctt cag ggc gag gcg ccg acc aag   48
Met Thr Thr Ala Ala Ile Arg Gly Leu Gln Gly Glu Ala Pro Thr Lys
  1               5                  10                  15

aat aag gaa ctg ctg aac tgg atc gca gac gcc gtc gag ctc ttc cag   96
Asn Lys Glu Leu Leu Asn Trp Ile Ala Asp Ala Val Glu Leu Phe Gln
             20                  25                  30

cct gag gct gtt gtg ttc gtt gat gga tcc cag gct gag tgg gat cgc   144
Pro Glu Ala Val Val Phe Val Asp Gly Ser Gln Ala Glu Trp Asp Arg
         35                  40                  45

atg gcg gag gat ctt gtt gaa gcc ggt acc ctc atc aag ctc aac gag   192
Met Ala Glu Asp Leu Val Glu Ala Gly Thr Leu Ile Lys Leu Asn Glu
     50                  55                  60

gaa aag cgt ccg aac agc tac cta gct cgt tcc aac cca tct gac gtt   240
Glu Lys Arg Pro Asn Ser Tyr Leu Ala Arg Ser Asn Pro Ser Asp Val
 65                  70                  75                  80

gcg cgc gtt gag tcc cgc acc ttc atc tgc tcc gag aag gaa gaa gat   288
Ala Arg Val Glu Ser Arg Thr Phe Ile Cys Ser Glu Lys Glu Glu Asp
                 85                  90                  95

gct ggc cca acc aac aac tgg gct cca cca cag gca atg aag gac gaa   336
Ala Gly Pro Thr Asn Asn Trp Ala Pro Pro Gln Ala Met Lys Asp Glu
```

```
                100                 105                 110

atg tcc aag cat tac gct ggt tcc atg aag ggg cgc acc atg tac gtc   384
Met Ser Lys His Tyr Ala Gly Ser Met Lys Gly Arg Thr Met Tyr Val
        115                 120                 125

gtg cct ttc tgc atg ggt cca atc agc gat ccg gac cct aag ctt ggt   432
Val Pro Phe Cys Met Gly Pro Ile Ser Asp Pro Asp Pro Lys Leu Gly
    130                 135                 140

gtg cag ctc act gac tcc gag tac gtt gtc atg tcc atg cgc atc atg   480
Val Gln Leu Thr Asp Ser Glu Tyr Val Val Met Ser Met Arg Ile Met
145                 150                 155                 160

acc cgc atg ggt att gaa gcg ctg gac aag atc ggc gcg aac ggc agc   528
Thr Arg Met Gly Ile Glu Ala Leu Asp Lys Ile Gly Ala Asn Gly Ser
                165                 170                 175

ttc gtc agg tgc ctc cac tcc gtt ggt gct cct ttg gag cca ggc cag   576
Phe Val Arg Cys Leu His Ser Val Gly Ala Pro Leu Glu Pro Gly Gln
            180                 185                 190

gaa gac gtt gca tgg cct tgc aac gac acc aag tac atc acc cag ttc   624
Glu Asp Val Ala Trp Pro Cys Asn Asp Thr Lys Tyr Ile Thr Gln Phe
        195                 200                 205

cca gag acc aag gaa att tgg tcc tac ggt tcc ggc tac ggc gga aac   672
Pro Glu Thr Lys Glu Ile Trp Ser Tyr Gly Ser Gly Tyr Gly Gly Asn
    210                 215                 220

gca atc ctg gca aag aag tgc tac gca ctg cgt atc gca tct gtc atg   720
Ala Ile Leu Ala Lys Lys Cys Tyr Ala Leu Arg Ile Ala Ser Val Met
225                 230                 235                 240

gct cgc gaa gaa gga tgg atg gct gag cac atg ctc atc ctg aag ctg   768
Ala Arg Glu Glu Gly Trp Met Ala Glu His Met Leu Ile Leu Lys Leu
                245                 250                 255

atc aac cca gag ggc aag gcg tac cac atc gca gca gca ttc cca tct   816
Ile Asn Pro Glu Gly Lys Ala Tyr His Ile Ala Ala Ala Phe Pro Ser
            260                 265                 270

gct tgt ggc aag acc aac ctc gcc atg atc act cca acc atc cca ggc   864
Ala Cys Gly Lys Thr Asn Leu Ala Met Ile Thr Pro Thr Ile Pro Gly
        275                 280                 285

tgg acc gct cag gtt gtt ggc gac gac atc gct tgg ctg aag ctg cgc   912
Trp Thr Ala Gln Val Val Gly Asp Asp Ile Ala Trp Leu Lys Leu Arg
    290                 295                 300

gag gac ggc ctc tac gca gtt aac cca gaa aat ggt ttc ttc ggt gtt   960
Glu Asp Gly Leu Tyr Ala Val Asn Pro Glu Asn Gly Phe Phe Gly Val
305                 310                 315                 320

gct cca ggc acc aac tac gca tcc aac cca atc gcg atg aag acc atg   1008
Ala Pro Gly Thr Asn Tyr Ala Ser Asn Pro Ile Ala Met Lys Thr Met
                325                 330                 335

gaa cca ggc aac acc ctg ttc acc aac gtg gca ctc acc gac gac ggc   1056
```

```
Glu Pro Gly Asn Thr Leu Phe Thr Asn Val Ala Leu Thr Asp Asp Gly
            340                 345                 350

gac atc tgg tgg gaa ggc atg gac ggc gac gcc cca gct cac ctc att   1104
Asp Ile Trp Trp Glu Gly Met Asp Gly Asp Ala Pro Ala His Leu Ile
        355                 360                 365

gac tgg atg ggc aac gac tgg acc cca gag tcc gac gaa aac gct gct   1152
Asp Trp Met Gly Asn Asp Trp Thr Pro Glu Ser Asp Glu Asn Ala Ala
    370                 375                 380

cac cct aac tcc cgt tac tgc gta gca atc gac cag tcc cca gca gca   1200
His Pro Asn Ser Arg Tyr Cys Val Ala Ile Asp Gln Ser Pro Ala Ala
385                 390                 395                 400

gca cct gag ttc aac gac tgg gaa ggc gtc aag atc gac gca atc ctc   1248
Ala Pro Glu Phe Asn Asp Trp Glu Gly Val Lys Ile Asp Ala Ile Leu
                405                 410                 415

ttc ggt gga cgt cgc gca gac acc gtc cca ctg gtt acc cag acc tac   1296
Phe Gly Gly Arg Arg Ala Asp Thr Val Pro Leu Val Thr Gln Thr Tyr
            420                 425                 430

gac tgg gag cac ggc acc atg gtt ggt gca ctg ctc gca tcc ggt cag   1344
Asp Trp Glu His Gly Thr Met Val Gly Ala Leu Leu Ala Ser Gly Gln
        435                 440                 445

acc gca gct tcc gca gaa gca aag gtc ggc aca ctc cgc cac gac cca   1392
Thr Ala Ala Ser Ala Glu Ala Lys Val Gly Thr Leu Arg His Asp Pro
    450                 455                 460

atg gca atg ctc cca ttc att ggc tac aac gct ggt gaa tac ctg cag   1440
Met Ala Met Leu Pro Phe Ile Gly Tyr Asn Ala Gly Glu Tyr Leu Gln
465                 470                 475                 480

aac tgg att gac atg ggt aac aag ggt ggc gac aag atg cca tcc atc   1488
Asn Trp Ile Asp Met Gly Asn Lys Gly Gly Asp Lys Met Pro Ser Ile
                485                 490                 495

ttc ctg gtc aac tgg ttc cgc cgt ggc gaa gat gga cgc ttc ctg tgg   1536
Phe Leu Val Asn Trp Phe Arg Arg Gly Glu Asp Gly Arg Phe Leu Trp
            500                 505                 510

cct ggc ttc ggc gac aac tct cgc gtt ctg aag tgg gtc atc gac cgc   1584
Pro Gly Phe Gly Asp Asn Ser Arg Val Leu Lys Trp Val Ile Asp Arg
        515                 520                 525

atc gaa ggc cac gtt ggc gca gac gag acc gtt gtt gga cac acc gct   1632
Ile Glu Gly His Val Gly Ala Asp Glu Thr Val Val Gly His Thr Ala
    530                 535                 540

aag gcc gaa gac ctc gac ctc gac ggc ctc gac acc cca att gag gat   1680
Lys Ala Glu Asp Leu Asp Leu Asp Gly Leu Asp Thr Pro Ile Glu Asp
545                 550                 555                 560

gtc aag gaa gca ctg acc gct cct gca gag cag tgg gca aac gac gtt   1728
Val Lys Glu Ala Leu Thr Ala Pro Ala Glu Gln Trp Ala Asn Asp Val
                565                 570                 575
```

```
gaa gac aac gcc gag tac ctc act ttc ctc gga cca cgt gtt cct gca   1776
Glu Asp Asn Ala Glu Tyr Leu Thr Phe Leu Gly Pro Arg Val Pro Ala
            580                 585                 590

gag gtt cac agc cag ttc gat gct ctg aag gcc cgc att tca gca gct   1824
Glu Val His Ser Gln Phe Asp Ala Leu Lys Ala Arg Ile Ser Ala Ala
        595                 600                 605

cac gct                                                          1830
His Ala
    610
```

<210> 58
<211> 610
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 58

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Met Thr Thr Ala Ala Ile Arg Gly Leu Gln Gly Glu Ala Pro Thr Lys
  1               5                  10                  15

Asn Lys Glu Leu Leu Asn Trp Ile Ala Asp Ala Val Glu Leu Phe Gln
             20                  25                  30

Pro Glu Ala Val Val Phe Val Asp Gly Ser Gln Ala Glu Trp Asp Arg
         35                  40                  45

Met Ala Glu Asp Leu Val Glu Ala Gly Thr Leu Ile Lys Leu Asn Glu
     50                  55                  60

Glu Lys Arg Pro Asn Ser Tyr Leu Ala Arg Ser Asn Pro Ser Asp Val
 65                  70                  75                  80

Ala Arg Val Glu Ser Arg Thr Phe Ile Cys Ser Glu Lys Glu Glu Asp
                 85                  90                  95

Ala Gly Pro Thr Asn Asn Trp Ala Pro Pro Gln Ala Met Lys Asp Glu
            100                 105                 110

Met Ser Lys His Tyr Ala Gly Ser Met Lys Gly Arg Thr Met Tyr Val
        115                 120                 125

Val Pro Phe Cys Met Gly Pro Ile Ser Asp Pro Asp Pro Lys Leu Gly
    130                 135                 140

Val Gln Leu Thr Asp Ser Glu Tyr Val Val Met Ser Met Arg Ile Met
145                 150                 155                 160

Thr Arg Met Gly Ile Glu Ala Leu Asp Lys Ile Gly Ala Asn Gly Ser
                165                 170                 175

Phe Val Arg Cys Leu His Ser Val Gly Ala Pro Leu Glu Pro Gly Gln
            180                 185                 190

Glu Asp Val Ala Trp Pro Cys Asn Asp Thr Lys Tyr Ile Thr Gln Phe
        195                 200                 205
```

```
Pro Glu Thr Lys Glu Ile Trp Ser Tyr Gly Ser Gly Tyr Gly Gly Asn
    210                 215                 220

Ala Ile Leu Ala Lys Lys Cys Tyr Ala Leu Arg Ile Ala Ser Val Met
225                 230                 235                 240

Ala Arg Glu Glu Gly Trp Met Ala Glu His Met Leu Ile Leu Lys Leu
                245                 250                 255

Ile Asn Pro Glu Gly Lys Ala Tyr His Ile Ala Ala Ala Phe Pro Ser
            260                 265                 270

Ala Cys Gly Lys Thr Asn Leu Ala Met Ile Thr Pro Thr Ile Pro Gly
        275                 280                 285


Trp Thr Ala Gln Val Val Gly Asp Asp Ile Ala Trp Leu Lys Leu Arg
    290                 295                 300

Glu Asp Gly Leu Tyr Ala Val Asn Pro Glu Asn Gly Phe Phe Gly Val
305                 310                 315                 320

Ala Pro Gly Thr Asn Tyr Ala Ser Asn Pro Ile Ala Met Lys Thr Met
                325                 330                 335

Glu Pro Gly Asn Thr Leu Phe Thr Asn Val Ala Leu Thr Asp Asp Gly
            340                 345                 350

Asp Ile Trp Trp Glu Gly Met Asp Gly Asp Ala Pro Ala His Leu Ile
        355                 360                 365

Asp Trp Met Gly Asn Asp Trp Thr Pro Glu Ser Asp Glu Asn Ala Ala
    370                 375                 380

His Pro Asn Ser Arg Tyr Cys Val Ala Ile Asp Gln Ser Pro Ala Ala
385                 390                 395                 400

Ala Pro Glu Phe Asn Asp Trp Glu Gly Val Lys Ile Asp Ala Ile Leu
                405                 410                 415

Phe Gly Gly Arg Arg Ala Asp Thr Val Pro Leu Val Thr Gln Thr Tyr
            420                 425                 430

Asp Trp Glu His Gly Thr Met Val Gly Ala Leu Leu Ala Ser Gly Gln
        435                 440                 445

Thr Ala Ala Ser Ala Glu Ala Lys Val Gly Thr Leu Arg His Asp Pro
    450                 455                 460

Met Ala Met Leu Pro Phe Ile Gly Tyr Asn Ala Gly Glu Tyr Leu Gln
465                 470                 475                 480

Asn Trp Ile Asp Met Gly Asn Lys Gly Gly Asp Lys Met Pro Ser Ile
                485                 490                 495

Phe Leu Val Asn Trp Phe Arg Arg Gly Glu Asp Gly Arg Phe Leu Trp
            500                 505                 510

Pro Gly Phe Gly Asp Asn Ser Arg Val Leu Lys Trp Val Ile Asp Arg
```

```
        515                 520                 525

Ile Glu Gly His Val Gly Ala Asp Glu Thr Val Val Gly His Thr Ala
    530                 535                 540

Lys Ala Glu Asp Leu Asp Leu Asp Gly Leu Asp Thr Pro Ile Glu Asp
545                 550                 555                 560

Val Lys Glu Ala Leu Thr Ala Pro Ala Glu Gln Trp Ala Asn Asp Val
                565                 570                 575

Glu Asp Asn Ala Glu Tyr Leu Thr Phe Leu Gly Pro Arg Val Pro Ala
            580                 585                 590

Glu Val His Ser Gln Phe Asp Ala Leu Lys Ala Arg Ile Ser Ala Ala
        595                 600                 605

His Ala
    610
```

<210> 59
<211> 825
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(825)
<223> RXA02735E

<400> 59

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gtg agt ccg act gct tgt ctg agg agc ttc gcc aca tgg atc cag att   48
Met Ser Pro Thr Ala Cys Leu Arg Ser Phe Ala Thr Trp Ile Gln Ile
  1               5                  10                  15

tgg gct acc agc acg cac tat ccg gct tgt cca gcg tca agc tgg aaa   96
Trp Ala Thr Ser Thr His Tyr Pro Ala Cys Pro Ala Ser Ser Trp Lys
             20                  25                  30

ccg tct aag gag aaa tac aac act atg gtt gat gta gta cgc gca cgc   144
Pro Ser Lys Glu Lys Tyr Asn Thr Met Val Asp Val Val Arg Ala Arg
         35                  40                  45

gat act gaa gat ttg gtt gca cag gct gcc tcc aaa ttc att gag gtt   192
Asp Thr Glu Asp Leu Val Ala Gln Ala Ala Ser Lys Phe Ile Glu Val
     50                  55                  60

gtt gaa gca gca act gcc aat aat ggc acc gca cag gta gtg ctc acc   240
Val Glu Ala Ala Thr Ala Asn Asn Gly Thr Ala Gln Val Val Leu Thr
 65                  70                  75                  80

ggt ggt ggc gcc ggc atc aag ttg ctg gaa aag ctc agc gtt gat gcg   288
Gly Gly Gly Ala Gly Ile Lys Leu Leu Glu Lys Leu Ser Val Asp Ala
                 85                  90                  95

gct gac ctt gcc tgg gat cgc att cat gtg ttc ttc ggc gat gag cgc   336
Ala Asp Leu Ala Trp Asp Arg Ile His Val Phe Phe Gly Asp Glu Arg
            100                 105                 110
```

```
aat gtc cct gtc agt gat tct gag tcc aat gag ggc cag gct cgt gag   384
Asn Val Pro Val Ser Asp Ser Glu Ser Asn Glu Gly Gln Ala Arg Glu
        115                 120                 125

gca ctg ttg tcc aag gtt tct atc cct gaa gcc aac att cac gga tat   432
Ala Leu Leu Ser Lys Val Ser Ile Pro Glu Ala Asn Ile His Gly Tyr
    130                 135                 140

ggt ctc ggc gac gta gat ctt gca gag gca gcc cgc gct tac gaa gct   480
Gly Leu Gly Asp Val Asp Leu Ala Glu Ala Ala Arg Ala Tyr Glu Ala
145                 150                 155                 160

gtg ttg gat gaa ttc gca cca aac ggc ttt gat ctt cac ctg ctc ggc   528
Val Leu Asp Glu Phe Ala Pro Asn Gly Phe Asp Leu His Leu Leu Gly
                165                 170                 175

atg ggt ggc gaa ggc cat atc aac tcc ctg ttc cct cac acc gat gca   576
Met Gly Gly Glu Gly His Ile Asn Ser Leu Phe Pro His Thr Asp Ala
            180                 185                 190

gtc aag gaa tcc tcc gca aag gtc atc gcg gtg ttt gat tcc cct aag   624
Val Lys Glu Ser Ser Ala Lys Val Ile Ala Val Phe Asp Ser Pro Lys
        195                 200                 205

cct cct tca gag cgt gca act cta acc ctt cct gcg gtt cac tcc gca   672
Pro Pro Ser Glu Arg Ala Thr Leu Thr Leu Pro Ala Val His Ser Ala
    210                 215                 220

aag cgc gtg tgg ttg ctg gtt tct ggt gcg gag aag gct gag gca gct   720
Lys Arg Val Trp Leu Leu Val Ser Gly Ala Glu Lys Ala Glu Ala Ala
225                 230                 235                 240

gcg gcg atc gtc aac ggt gag cct gct gtt gag tgg cct gct gct gga   768
Ala Ala Ile Val Asn Gly Glu Pro Ala Val Glu Trp Pro Ala Ala Gly
                245                 250                 255

gct acc gga tct gag gaa acg gta ttg ttc ttg gct gat gat gct gca   816
Ala Thr Gly Ser Glu Glu Thr Val Leu Phe Leu Ala Asp Asp Ala Ala
            260                 265                 270

gga aat ctc                                                      825
Gly Asn Leu
        275
```

<210> 60
<211> 275
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 60

```
Met Ser Pro Thr Ala Cys Leu Arg Ser Phe Ala Thr Trp Ile Gln Ile
  1               5                  10                  15

Trp Ala Thr Ser Thr His Tyr Pro Ala Cys Pro Ala Ser Ser Trp Lys
             20                  25                  30
```

```
Pro Ser Lys Glu Lys Tyr Asn Thr Met Val Asp Val Val Arg Ala Arg
         35                  40                  45

Asp Thr Glu Asp Leu Val Ala Gln Ala Ala Ser Lys Phe Ile Glu Val
     50                  55                  60

Val Glu Ala Ala Thr Ala Asn Asn Gly Thr Ala Gln Val Val Leu Thr
 65                  70                  75                  80

Gly Gly Gly Ala Gly Ile Lys Leu Leu Glu Lys Leu Ser Val Asp Ala
                 85                  90                  95

Ala Asp Leu Ala Trp Asp Arg Ile His Val Phe Phe Gly Asp Glu Arg
            100                 105                 110

Asn Val Pro Val Ser Asp Ser Glu Ser Asn Glu Gly Gln Ala Arg Glu
        115                 120                 125

Ala Leu Leu Ser Lys Val Ser Ile Pro Glu Ala Asn Ile His Gly Tyr
    130                 135                 140

Gly Leu Gly Asp Val Asp Leu Ala Glu Ala Ala Arg Ala Tyr Glu Ala
145                 150                 155                 160

Val Leu Asp Glu Phe Ala Pro Asn Gly Phe Asp Leu His Leu Leu Gly
                165                 170                 175

Met Gly Gly Glu Gly His Ile Asn Ser Leu Phe Pro His Thr Asp Ala
            180                 185                 190

Val Lys Glu Ser Ser Ala Lys Val Ile Ala Val Phe Asp Ser Pro Lys
        195                 200                 205

Pro Pro Ser Glu Arg Ala Thr Leu Thr Leu Pro Ala Val His Ser Ala
    210                 215                 220

Lys Arg Val Trp Leu Leu Val Ser Gly Ala Glu Lys Ala Glu Ala Ala
225                 230                 235                 240

Ala Ala Ile Val Asn Gly Glu Pro Ala Val Glu Trp Pro Ala Ala Gly
                245                 250                 255

Ala Thr Gly Ser Glu Glu Thr Val Leu Phe Leu Ala Asp Asp Ala Ala
            260                 265                 270

Gly Asn Leu
        275
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<210> 61
<211> 705
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(705)
<223> RXA02735W

<400> 61

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atg gtt gat gta gta cgc gca cgc gat act gaa gat ttg gtt gca cag   48
Met Val Asp Val Val Arg Ala Arg Asp Thr Glu Asp Leu Val Ala Gln
  1               5                  10                  15

gct gcc tcc aaa ttc att gag gtt gtt gaa gca gca act gcc aat aat   96
Ala Ala Ser Lys Phe Ile Glu Val Val Glu Ala Ala Thr Ala Asn Asn
            20                  25                  30

ggc acc gca cag gta gtg ctc acc ggt ggt ggc gcc ggc atc aag ttg   144
Gly Thr Ala Gln Val Val Leu Thr Gly Gly Gly Ala Gly Ile Lys Leu
         35                  40                  45

ctg gaa aag ctc agc gtt gat gcg gct gac ctt gcc tgg gat cgc att   192
Leu Glu Lys Leu Ser Val Asp Ala Ala Asp Leu Ala Trp Asp Arg Ile
     50                  55                  60

cat gtg ttc ttc ggc gat gag cgc aat gtc cct gtc agt gat tct gag   240
His Val Phe Phe Gly Asp Glu Arg Asn Val Pro Val Ser Asp Ser Glu
 65                  70                  75                  80

tcc aat gag ggc cag gct cgt gag gca ctg ttg tcc aag gtt tct atc   288
Ser Asn Glu Gly Gln Ala Arg Glu Ala Leu Leu Ser Lys Val Ser Ile
                85                  90                  95

cct gaa gcc aac att cac gga tat ggt ctc ggc gac gta gat ctt gca   336
Pro Glu Ala Asn Ile His Gly Tyr Gly Leu Gly Asp Val Asp Leu Ala
            100                 105                 110

gag gca gcc cgc gct tac gaa gct gtg ttg gat gaa ttc gca cca aac   384
Glu Ala Ala Arg Ala Tyr Glu Ala Val Leu Asp Glu Phe Ala Pro Asn
        115                 120                 125

ggc ttt gat ctt cac ctg ctc ggc atg ggt ggc gaa ggc cat atc aac   432
Gly Phe Asp Leu His Leu Leu Gly Met Gly Gly Glu Gly His Ile Asn
    130                 135                 140

tcc ctg ttc cct cac acc gat gca gtc aag gaa tcc tcc gca aag gtc   480
Ser Leu Phe Pro His Thr Asp Ala Val Lys Glu Ser Ser Ala Lys Val
145                 150                 155                 160

atc gcg gtg ttt gat tcc cct aag cct cct tca gag cgt gca act cta   528
Ile Ala Val Phe Asp Ser Pro Lys Pro Pro Ser Glu Arg Ala Thr Leu
                165                 170                 175

acc ctt cct gcg gtt cac tcc gca aag cgc gtg tgg ttg ctg gtt tct   576
Thr Leu Pro Ala Val His Ser Ala Lys Arg Val Trp Leu Leu Val Ser
            180                 185                 190

ggt gcg gag aag gct gag gca gct gcg gcg atc gtc aac ggt gag cct   624
Gly Ala Glu Lys Ala Glu Ala Ala Ala Ala Ile Val Asn Gly Glu Pro
        195                 200                 205

gct gtt gag tgg cct gct gct gga gct acc gga tct gag gaa acg gta   672
Ala Val Glu Trp Pro Ala Ala Gly Ala Thr Gly Ser Glu Glu Thr Val
    210                 215                 220

ttg ttc ttg gct gat gat gct gca gga aat ctc                      705
Leu Phe Leu Ala Asp Asp Ala Ala Gly Asn Leu
```

225 230 235

<210> 62
<211> 235
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 62
Met Val Asp Val Val Arg Ala Arg Asp Thr Glu Asp Leu Val Ala Gln
1 5 10 15

Ala Ala Ser Lys Phe Ile Glu Val Val Glu Ala Ala Thr Ala Asn Asn
20 25 30

Gly Thr Ala Gln Val Val Leu Thr Gly Gly Gly Ala Gly Ile Lys Leu
35 40 45

Leu Glu Lys Leu Ser Val Asp Ala Ala Asp Leu Ala Trp Asp Arg Ile
50 55 60

His Val Phe Phe Gly Asp Glu Arg Asn Val Pro Val Ser Asp Ser Glu
65 70 75 80

Ser Asn Glu Gly Gln Ala Arg Glu Ala Leu Leu Ser Lys Val Ser Ile
85 90 95

Pro Glu Ala Asn Ile His Gly Tyr Gly Leu Gly Asp Val Asp Leu Ala
100 105 110

Glu Ala Ala Arg Ala Tyr Glu Ala Val Leu Asp Glu Phe Ala Pro Asn
115 120 125

Gly Phe Asp Leu His Leu Leu Gly Met Gly Gly Glu Gly His Ile Asn
130 135 140

Ser Leu Phe Pro His Thr Asp Ala Val Lys Glu Ser Ser Ala Lys Val
145 150 155 160

Ile Ala Val Phe Asp Ser Pro Lys Pro Pro Ser Glu Arg Ala Thr Leu
165 170 175

Thr Leu Pro Ala Val His Ser Ala Lys Arg Val Trp Leu Leu Val Ser
180 185 190

Gly Ala Glu Lys Ala Glu Ala Ala Ala Ala Ile Val Asn Gly Glu Pro
195 200 205

Ala Val Glu Trp Pro Ala Ala Gly Ala Thr Gly Ser Glu Glu Thr Val
210 215 220

Leu Phe Leu Ala Asp Asp Ala Ala Gly Asn Leu
225 230 235

<210> 63
<211> 957

<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(957)
<223> RXA02736W

<400> 63

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atg atc ttt gaa ctt ccg gat acc acc acc cag caa att tcc aag acc   48
Met Ile Phe Glu Leu Pro Asp Thr Thr Thr Gln Gln Ile Ser Lys Thr
  1               5                  10                  15

cta act cga ctg cgt gaa tcg ggc acc cag gtc acc acc ggc cga gtg   96
Leu Thr Arg Leu Arg Glu Ser Gly Thr Gln Val Thr Thr Gly Arg Val
             20                  25                  30

ctc acc ctc atc gtg gtc act gac tcc gaa agc gat gtc gct gca gtt   144
Leu Thr Leu Ile Val Val Thr Asp Ser Glu Ser Asp Val Ala Ala Val
         35                  40                  45

acc gag tcc acc aat gaa gcc tcg cgc gag cac cca tct cgc gtg atc   192
Thr Glu Ser Thr Asn Glu Ala Ser Arg Glu His Pro Ser Arg Val Ile
     50                  55                  60

att ttg gtg gtt ggc gat aaa act gca gaa aac aaa gtt gac gca gaa   240

Ile Leu Val Val Gly Asp Lys Thr Ala Glu Asn Lys Val Asp Ala Glu
 65                  70                  75                  80

gtc cgt atc ggt ggc gac gct ggt gct tcc gag atg atc atc atg cat   288
Val Arg Ile Gly Gly Asp Ala Gly Ala Ser Glu Met Ile Ile Met His
                 85                  90                  95

ctc aac gga cct gtc gct gac aag ctc cag tat gtc gtc aca cca ctg   336
Leu Asn Gly Pro Val Ala Asp Lys Leu Gln Tyr Val Val Thr Pro Leu
            100                 105                 110

ttg ctt cct gac acc ccc atc gtt gct tgg tgg cca ggt gaa tca cca   384
Leu Leu Pro Asp Thr Pro Ile Val Ala Trp Trp Pro Gly Glu Ser Pro
        115                 120                 125

aag aat cct tcc cag gac cca att gga cgc atc gca caa cga cgc atc   432
Lys Asn Pro Ser Gln Asp Pro Ile Gly Arg Ile Ala Gln Arg Arg Ile
    130                 135                 140

act gat gct ttg tac gac cgt gat gac gca cta gaa gat cgt gtt gag   480
Thr Asp Ala Leu Tyr Asp Arg Asp Asp Ala Leu Glu Asp Arg Val Glu
145                 150                 155                 160

aac tat cac cca ggt gat acc gac atg acg tgg gcg cgc ctt acc cag   528
Asn Tyr His Pro Gly Asp Thr Asp Met Thr Trp Ala Arg Leu Thr Gln
                165                 170                 175

tgg cgg gga ctt gtt gcc tcc tca ttg gat cac cca cca cac agc gaa   576
Trp Arg Gly Leu Val Ala Ser Ser Leu Asp His Pro Pro His Ser Glu
            180                 185                 190

atc act tcc gtg agg ctg acc ggt gca agc ggc agt acc tcg gtg gat   624
```

```
Ile Thr Ser Val Arg Leu Thr Gly Ala Ser Gly Ser Thr Ser Val Asp
        195                 200                 205

ttg gct gca ggc tgg ttg gcg cgg agg ctg aaa gtg cct gtg atc cgc   672
Leu Ala Ala Gly Trp Leu Ala Arg Arg Leu Lys Val Pro Val Ile Arg
    210                 215                 220

gag gtg aca gat gct ccc acc gtg cca acc gat gag ttt ggt act cca   720
Glu Val Thr Asp Ala Pro Thr Val Pro Thr Asp Glu Phe Gly Thr Pro
225                 230                 235                 240

ctg ctg gct atc cag cgc ctg gag atc gtt cgc acc acc ggc tcg atc   768
Leu Leu Ala Ile Gln Arg Leu Glu Ile Val Arg Thr Thr Gly Ser Ile
                245                 250                 255

atc atc acc atc tat gac gct cat acc ctt cag gta gag atg ccg gaa   816
Ile Ile Thr Ile Tyr Asp Ala His Thr Leu Gln Val Glu Met Pro Glu
            260                 265                 270

tcc ggc aat gcc cca tcg ctg gtg gct att ggt cgt cga agt gag tcc   864
Ser Gly Asn Ala Pro Ser Leu Val Ala Ile Gly Arg Arg Ser Glu Ser
        275                 280                 285

gac tgc ttg tct gag gag ctt cgc cac atg gat cca gat ttg ggc tac   912
Asp Cys Leu Ser Glu Glu Leu Arg His Met Asp Pro Asp Leu Gly Tyr
    290                 295                 300

cag cac gca cta tcc ggc ttg tcc agc gtc aag ctg gaa acc gtc       957
Gln His Ala Leu Ser Gly Leu Ser Ser Val Lys Leu Glu Thr Val
305                 310                 315
```

<210> 64
<211> 319
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 64

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Met Ile Phe Glu Leu Pro Asp Thr Thr Thr Gln Gln Ile Ser Lys Thr
  1               5                  10                  15

Leu Thr Arg Leu Arg Glu Ser Gly Thr Gln Val Thr Thr Gly Arg Val
             20                  25                  30

Leu Thr Leu Ile Val Val Thr Asp Ser Glu Ser Asp Val Ala Ala Val
         35                  40                  45

Thr Glu Ser Thr Asn Glu Ala Ser Arg Glu His Pro Ser Arg Val Ile
     50                  55                  60

Ile Leu Val Val Gly Asp Lys Thr Ala Glu Asn Lys Val Asp Ala Glu

 65                  70                  75                  80

Val Arg Ile Gly Gly Asp Ala Gly Ala Ser Glu Met Ile Ile Met His
                 85                  90                  95

Leu Asn Gly Pro Val Ala Asp Lys Leu Gln Tyr Val Val Thr Pro Leu
```

```
            100                 105                 110

Leu Leu Pro Asp Thr Pro Ile Val Ala Trp Trp Pro Gly Glu Ser Pro
        115                 120                 125

Lys Asn Pro Ser Gln Asp Pro Ile Gly Arg Ile Ala Gln Arg Arg Ile
    130                 135                 140

Thr Asp Ala Leu Tyr Asp Arg Asp Asp Ala Leu Glu Asp Arg Val Glu
145                 150                 155                 160

Asn Tyr His Pro Gly Asp Thr Asp Met Thr Trp Ala Arg Leu Thr Gln
                165                 170                 175

Trp Arg Gly Leu Val Ala Ser Ser Leu Asp His Pro Pro His Ser Glu
            180                 185                 190

Ile Thr Ser Val Arg Leu Thr Gly Ala Ser Gly Ser Thr Ser Val Asp
        195                 200                 205

Leu Ala Ala Gly Trp Leu Ala Arg Arg Leu Lys Val Pro Val Ile Arg
    210                 215                 220

Glu Val Thr Asp Ala Pro Thr Val Pro Thr Asp Glu Phe Gly Thr Pro
225                 230                 235                 240

Leu Leu Ala Ile Gln Arg Leu Glu Ile Val Arg Thr Thr Gly Ser Ile
                245                 250                 255

Ile Ile Thr Ile Tyr Asp Ala His Thr Leu Gln Val Glu Met Pro Glu
            260                 265                 270

Ser Gly Asn Ala Pro Ser Leu Val Ala Ile Gly Arg Arg Ser Glu Ser
        275                 280                 285

Asp Cys Leu Ser Glu Glu Leu Arg His Met Asp Pro Asp Leu Gly Tyr
    290                 295                 300

Gln His Ala Leu Ser Gly Leu Ser Ser Val Lys Leu Glu Thr Val
305                 310                 315


<210> 65
<211> 1542
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1542)
<223> RXA02737W

<400> 65
gtg agc aca aac acg acc ccc tcc agc tgg aca aac cca ctg cgc gac   48
Met Ser Thr Asn Thr Thr Pro Ser Ser Trp Thr Asn Pro Leu Arg Asp
  1               5                  10                  15

ccg cag gat aaa cga ctc ccc cgc atc gct ggc cct tcc ggc atg gtg   96
Pro Gln Asp Lys Arg Leu Pro Arg Ile Ala Gly Pro Ser Gly Met Val
```

```
                20                  25                  30

atc ttc ggt gtc act ggc gac ttg gct cga aag aag ctg ctc ccc gcc   144
Ile Phe Gly Val Thr Gly Asp Leu Ala Arg Lys Lys Leu Leu Pro Ala
         35                  40                  45

att tat gat cta gca aac cgc gga ttg ctg ccc cca gga ttc tcg ttg   192
Ile Tyr Asp Leu Ala Asn Arg Gly Leu Leu Pro Pro Gly Phe Ser Leu
     50                  55                  60

gta ggt tac ggc cgc cgc gaa tgg tcc aaa gaa gac ttt gaa aaa tac   240
Val Gly Tyr Gly Arg Arg Glu Trp Ser Lys Glu Asp Phe Glu Lys Tyr
 65                  70                  75                  80

gta cgc gat gcc gca agt gct ggt gct cgt acg gaa ttc cgt gaa aat   288
Val Arg Asp Ala Ala Ser Ala Gly Ala Arg Thr Glu Phe Arg Glu Asn
                 85                  90                  95

gtt tgg gag cgc ctc gcc gag ggt atg gaa ttt gtt cgc ggc aac ttt   336
Val Trp Glu Arg Leu Ala Glu Gly Met Glu Phe Val Arg Gly Asn Phe
            100                 105                 110

gat gat gat gca gct ttc gac aac ctc gct gca aca ctc aag cgc atc   384
Asp Asp Asp Ala Ala Phe Asp Asn Leu Ala Ala Thr Leu Lys Arg Ile
        115                 120                 125

gac aaa acc cgc ggc acc gcc ggc aac tgg gct tac tac ctg tcc att   432
Asp Lys Thr Arg Gly Thr Ala Gly Asn Trp Ala Tyr Tyr Leu Ser Ile
    130                 135                 140

cca cca gat tcc ttc aca gcg gtc tgc cac cag ctg gag cgt tcc ggc   480
Pro Pro Asp Ser Phe Thr Ala Val Cys His Gln Leu Glu Arg Ser Gly
145                 150                 155                 160

atg gct gaa tcc acc gaa gaa gca tgg cgc cgc gtg atc atc gag aag   528
Met Ala Glu Ser Thr Glu Glu Ala Trp Arg Arg Val Ile Ile Glu Lys
                165                 170                 175

cct ttc ggc cac aac ctc gaa tcc gca cac gag ctc aac cag ctg gtc   576
Pro Phe Gly His Asn Leu Glu Ser Ala His Glu Leu Asn Gln Leu Val
            180                 185                 190

aac gca gtc ttc cca gaa tct tct gtg ttc cgc atc gac cac tat ttg   624
Asn Ala Val Phe Pro Glu Ser Ser Val Phe Arg Ile Asp His Tyr Leu
        195                 200                 205

ggc aag gaa aca gtt caa aac atc ctg gct ctg cgt ttt gct aac cag   672
Gly Lys Glu Thr Val Gln Asn Ile Leu Ala Leu Arg Phe Ala Asn Gln
    210                 215                 220

ctg ttt gag cca ctg tgg aac tcc aac tac gtt gac cac gtc cag atc   720
Leu Phe Glu Pro Leu Trp Asn Ser Asn Tyr Val Asp His Val Gln Ile
225                 230                 235                 240

acc atg gct gaa gat att ggc ttg ggt gga cgt gct ggt tac tac gac   768
Thr Met Ala Glu Asp Ile Gly Leu Gly Gly Arg Ala Gly Tyr Tyr Asp
                245                 250                 255

ggc atc ggc gca gcc cgc gac gtc atc cag aac cac ctg atc cag ctc   816
```

```
Gly Ile Gly Ala Ala Arg Asp Val Ile Gln Asn His Leu Ile Gln Leu
            260                 265                 270

ttg gct ctg gtt gcc atg gaa gaa cca att tct ttc gtg cca gcg cag   864
Leu Ala Leu Val Ala Met Glu Glu Pro Ile Ser Phe Val Pro Ala Gln
        275                 280                 285

ctg cag gca gaa aag atc aag gtg ctc tct gcg aca aag ccg tgc tac   912
Leu Gln Ala Glu Lys Ile Lys Val Leu Ser Ala Thr Lys Pro Cys Tyr
    290                 295                 300

cca ttg gat aaa acc tcc gct cgt ggt cag tac gct gcc ggt tgg cag   960
Pro Leu Asp Lys Thr Ser Ala Arg Gly Gln Tyr Ala Ala Gly Trp Gln
305                 310                 315                 320

ggc tct gag tta gtc aag gga ctt cgc gaa gaa gat ggc ttc aac cct   1008
Gly Ser Glu Leu Val Lys Gly Leu Arg Glu Glu Asp Gly Phe Asn Pro
                325                 330                 335

gag tcc acc act gag act ttt gcg gct tgt acc tta gag atc acg tct   1056
Glu Ser Thr Thr Glu Thr Phe Ala Ala Cys Thr Leu Glu Ile Thr Ser
            340                 345                 350

cgt cgc tgg gct ggt gtg ccg ttc tac ctg cgc acc ggt aag cgt ctt   1104
Arg Arg Trp Ala Gly Val Pro Phe Tyr Leu Arg Thr Gly Lys Arg Leu
        355                 360                 365

ggt cgc cgt gtt act gag att gcc gtg gtg ttt aaa gac gca cca cac   1152
Gly Arg Arg Val Thr Glu Ile Ala Val Val Phe Lys Asp Ala Pro His
    370                 375                 380

cag cct ttc gac ggc gac atg act gta tcc ctt ggc caa aac gcc atc   1200
Gln Pro Phe Asp Gly Asp Met Thr Val Ser Leu Gly Gln Asn Ala Ile
385                 390                 395                 400

gtg att cgc gtg cag cct gat gaa ggt gtg ctc atc cgc ttc ggt tcc   1248
Val Ile Arg Val Gln Pro Asp Glu Gly Val Leu Ile Arg Phe Gly Ser
                405                 410                 415

aag gtt cca ggt tct gcc atg gaa gtc cgt gac gtc aac atg gac ttc   1296
Lys Val Pro Gly Ser Ala Met Glu Val Arg Asp Val Asn Met Asp Phe
            420                 425                 430

tcc tac tca gaa tcc ttc act gaa gaa tca cct gaa gca tac gag cgc   1344
Ser Tyr Ser Glu Ser Phe Thr Glu Glu Ser Pro Glu Ala Tyr Glu Arg
        435                 440                 445

ctc att ttg gat gcg ctg tta gat gaa tcc agc ctc ttc cct acc aac   1392
Leu Ile Leu Asp Ala Leu Leu Asp Glu Ser Ser Leu Phe Pro Thr Asn
    450                 455                 460

gag gaa gtg gaa ctg agc tgg aag att ctg gat cca att ctt gaa gca   1440
Glu Glu Val Glu Leu Ser Trp Lys Ile Leu Asp Pro Ile Leu Glu Ala
465                 470                 475                 480

tgg gat gcc gat gga gaa cca gag gat tac cca gcg ggt acg tgg ggt   1488
Trp Asp Ala Asp Gly Glu Pro Glu Asp Tyr Pro Ala Gly Thr Trp Gly
                485                 490                 495
```

```
cca aag agc gct gat gaa atg ctt tcc cgc aac ggt cac acc tgg cgc   1536
Pro Lys Ser Ala Asp Glu Met Leu Ser Arg Asn Gly His Thr Trp Arg
            500                 505                 510

agg cca                                                          1542
Arg Pro
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<210> 66
<211> 514
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 66

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Met Ser Thr Asn Thr Thr Pro Ser Ser Trp Thr Asn Pro Leu Arg Asp
  1               5                  10                  15

Pro Gln Asp Lys Arg Leu Pro Arg Ile Ala Gly Pro Ser Gly Met Val
             20                  25                  30

Ile Phe Gly Val Thr Gly Asp Leu Ala Arg Lys Lys Leu Leu Pro Ala
         35                  40                  45

Ile Tyr Asp Leu Ala Asn Arg Gly Leu Leu Pro Pro Gly Phe Ser Leu
     50                  55                  60

Val Gly Tyr Gly Arg Arg Glu Trp Ser Lys Glu Asp Phe Glu Lys Tyr
 65                  70                  75                  80

Val Arg Asp Ala Ala Ser Ala Gly Ala Arg Thr Glu Phe Arg Glu Asn
                 85                  90                  95

Val Trp Glu Arg Leu Ala Glu Gly Met Glu Phe Val Arg Gly Asn Phe
            100                 105                 110

Asp Asp Asp Ala Ala Phe Asp Asn Leu Ala Ala Thr Leu Lys Arg Ile
        115                 120                 125

Asp Lys Thr Arg Gly Thr Ala Gly Asn Trp Ala Tyr Tyr Leu Ser Ile
    130                 135                 140

Pro Pro Asp Ser Phe Thr Ala Val Cys His Gln Leu Glu Arg Ser Gly
145                 150                 155                 160

Met Ala Glu Ser Thr Glu Glu Ala Trp Arg Arg Val Ile Ile Glu Lys
                165                 170                 175

Pro Phe Gly His Asn Leu Glu Ser Ala His Glu Leu Asn Gln Leu Val
            180                 185                 190

Asn Ala Val Phe Pro Glu Ser Ser Val Phe Arg Ile Asp His Tyr Leu
        195                 200                 205

Gly Lys Glu Thr Val Gln Asn Ile Leu Ala Leu Arg Phe Ala Asn Gln
    210                 215                 220

Leu Phe Glu Pro Leu Trp Asn Ser Asn Tyr Val Asp His Val Gln Ile
```

225 230 235 240

Thr Met Ala Glu Asp Ile Gly Leu Gly Gly Arg Ala Gly Tyr Tyr Asp
245 250 255

Gly Ile Gly Ala Ala Arg Asp Val Ile Gln Asn His Leu Ile Gln Leu
260 265 270

Leu Ala Leu Val Ala Met Glu Glu Pro Ile Ser Phe Val Pro Ala Gln
275 280 285

Leu Gln Ala Glu Lys Ile Lys Val Leu Ser Ala Thr Lys Pro Cys Tyr
290 295 300

Pro Leu Asp Lys Thr Ser Ala Arg Gly Gln Tyr Ala Ala Gly Trp Gln
305 310 315 320

Gly Ser Glu Leu Val Lys Gly Leu Arg Glu Glu Asp Gly Phe Asn Pro
325 330 335

Glu Ser Thr Thr Glu Thr Phe Ala Ala Cys Thr Leu Glu Ile Thr Ser
340 345 350

Arg Arg Trp Ala Gly Val Pro Phe Tyr Leu Arg Thr Gly Lys Arg Leu
355 360 365

Gly Arg Arg Val Thr Glu Ile Ala Val Val Phe Lys Asp Ala Pro His
370 375 380

Gln Pro Phe Asp Gly Asp Met Thr Val Ser Leu Gly Gln Asn Ala Ile
385 390 395 400

Val Ile Arg Val Gln Pro Asp Glu Gly Val Leu Ile Arg Phe Gly Ser
405 410 415

Lys Val Pro Gly Ser Ala Met Glu Val Arg Asp Val Asn Met Asp Phe
420 425 430

Ser Tyr Ser Glu Ser Phe Thr Glu Glu Ser Pro Glu Ala Tyr Glu Arg
435 440 445

Leu Ile Leu Asp Ala Leu Leu Asp Glu Ser Ser Leu Phe Pro Thr Asn
450 455 460

Glu Glu Val Glu Leu Ser Trp Lys Ile Leu Asp Pro Ile Leu Glu Ala
465 470 475 480

Trp Asp Ala Asp Gly Glu Pro Glu Asp Tyr Pro Ala Gly Thr Trp Gly
485 490 495

Pro Lys Ser Ala Asp Glu Met Leu Ser Arg Asn Gly His Thr Trp Arg
500 505 510

Arg Pro

<210> 67
<211> 1080

<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1080)
<223> RXA02738W

<400> 67

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atg tct cac att gat gat ctt gca cag ctc ggc act tcc act tgg ctc   48
Met Ser His Ile Asp Asp Leu Ala Gln Leu Gly Thr Ser Thr Trp Leu
  1               5                  10                  15

gac gac ctc tcc cgc gag cgc att act tcc ggc aat ctc agc cag gtt   96
Asp Asp Leu Ser Arg Glu Arg Ile Thr Ser Gly Asn Leu Ser Gln Val
             20                  25                  30

att gag gaa aag tct gta gtc ggt gtc acc acc aac cca gct att ttc  144
Ile Glu Glu Lys Ser Val Val Gly Val Thr Thr Asn Pro Ala Ile Phe
         35                  40                  45

gca gca gca atg tcc aag ggc gat tcc tac gac gct cag atc gca gag  192
Ala Ala Ala Met Ser Lys Gly Asp Ser Tyr Asp Ala Gln Ile Ala Glu
     50                  55                  60

ctc aag gcc gct ggc gca tct gtt gac cag gct gtt tac gcc atg agc  240
Leu Lys Ala Ala Gly Ala Ser Val Asp Gln Ala Val Tyr Ala Met Ser
 65                  70                  75                  80

atc gac gac gtt cgc aat gct tgt gat ctg ttc acc ggc atc ttc gag  288
Ile Asp Asp Val Arg Asn Ala Cys Asp Leu Phe Thr Gly Ile Phe Glu
                 85                  90                  95

tcc tcc aac ggc tac gac ggc cgc gtg tcc atc gag gtt gac cca cgt  336
Ser Ser Asn Gly Tyr Asp Gly Arg Val Ser Ile Glu Val Asp Pro Arg
            100                 105                 110

atc tct gct gac cgc gac gca acc ctg gct cag gcc aag gag ctg tgg  384
Ile Ser Ala Asp Arg Asp Ala Thr Leu Ala Gln Ala Lys Glu Leu Trp
        115                 120                 125

gca aag gtt gat cgt cca aac gtc atg atc aag atc cct gca acc cca  432
Ala Lys Val Asp Arg Pro Asn Val Met Ile Lys Ile Pro Ala Thr Pro
    130                 135                 140

ggt tct ttg cca gca atc acc gac gct ttg gct gag ggc atc agc gtt  480
Gly Ser Leu Pro Ala Ile Thr Asp Ala Leu Ala Glu Gly Ile Ser Val
145                 150                 155                 160

aac gtc acc ttg atc ttc tcc gtt gct cgc tac cgc gag gtc atc gct  528
Asn Val Thr Leu Ile Phe Ser Val Ala Arg Tyr Arg Glu Val Ile Ala
                165                 170                 175

gcg ttc atc gag ggc atc aag cag gct gct gca aac ggc cac gac gtc  576
Ala Phe Ile Glu Gly Ile Lys Gln Ala Ala Ala Asn Gly His Asp Val
            180                 185                 190

tcc aag atc cac tct gtg gct tcc ttc ttc gtc tcc cgc gtc gac gtt  624
Ser Lys Ile His Ser Val Ala Ser Phe Phe Val Ser Arg Val Asp Val
```

```
        195                 200                 205

gag atc gac aag cgc ctc gag gca atc gga tcc gat gag gct ttg gct   672
Glu Ile Asp Lys Arg Leu Glu Ala Ile Gly Ser Asp Glu Ala Leu Ala
    210                 215                 220

ctg cgc ggc aag gca ggc gtt gcc aac gct cag cgc gct tac gct gtg   720
Leu Arg Gly Lys Ala Gly Val Ala Asn Ala Gln Arg Ala Tyr Ala Val
225                 230                 235                 240

tac aag gag ctt ttc gac gcc gcc gag ctg cct gaa ggt gcc aac act   768
Tyr Lys Glu Leu Phe Asp Ala Ala Glu Leu Pro Glu Gly Ala Asn Thr
                245                 250                 255

cag cgc cca ctg tgg gca tcc acc ggc gtg aag aac cct gcg tac gct   816
Gln Arg Pro Leu Trp Ala Ser Thr Gly Val Lys Asn Pro Ala Tyr Ala
            260                 265                 270

gca act ctt tac gtt tcc gag ctg gct ggt cca aac acc gtc aac acc   864
Ala Thr Leu Tyr Val Ser Glu Leu Ala Gly Pro Asn Thr Val Asn Thr
        275                 280                 285

atg cca gaa ggc acc atc gac gcg gtt ctg gag cag ggc aac ctg cac   912
Met Pro Glu Gly Thr Ile Asp Ala Val Leu Glu Gln Gly Asn Leu His
    290                 295                 300

ggt gac acc ctg tcc aac tcc gcg gca gaa gct gac gct gtg ttc tcc   960
Gly Asp Thr Leu Ser Asn Ser Ala Ala Glu Ala Asp Ala Val Phe Ser
305                 310                 315                 320

cag ctt gag gct ctg ggc gtt gac ttg gca gat gtc ttc cag gtc ctg  1008
Gln Leu Glu Ala Leu Gly Val Asp Leu Ala Asp Val Phe Gln Val Leu
                325                 330                 335

gag acc gag ggt gtg gac aag ttc gtt gct tct tgg agc gaa ctg ctt  1056
Glu Thr Glu Gly Val Asp Lys Phe Val Ala Ser Trp Ser Glu Leu Leu
            340                 345                 350

gag tcc atg gaa gct cgc ctg aag                                 1080
Glu Ser Met Glu Ala Arg Leu Lys
        355                 360


<210> 68
<211> 360
<212> PRT
<213> 麩胺酸棒狀桿菌


<400> 68
Met Ser His Ile Asp Asp Leu Ala Gln Leu Gly Thr Ser Thr Trp Leu
  1               5                  10                  15

Asp Asp Leu Ser Arg Glu Arg Ile Thr Ser Gly Asn Leu Ser Gln Val
             20                  25                  30

Ile Glu Glu Lys Ser Val Val Gly Val Thr Thr Asn Pro Ala Ile Phe
         35                  40                  45
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Ala Ala Ala Met Ser Lys Gly Asp Ser Tyr Asp Ala Gln Ile Ala Glu
     50                  55                  60

Leu Lys Ala Ala Gly Ala Ser Val Asp Gln Ala Val Tyr Ala Met Ser
 65                  70                  75                  80

Ile Asp Asp Val Arg Asn Ala Cys Asp Leu Phe Thr Gly Ile Phe Glu
                 85                  90                  95

Ser Ser Asn Gly Tyr Asp Gly Arg Val Ser Ile Glu Val Asp Pro Arg
            100                 105                 110

Ile Ser Ala Asp Arg Asp Ala Thr Leu Ala Gln Ala Lys Glu Leu Trp
        115                 120                 125

Ala Lys Val Asp Arg Pro Asn Val Met Ile Lys Ile Pro Ala Thr Pro
    130                 135                 140

Gly Ser Leu Pro Ala Ile Thr Asp Ala Leu Ala Glu Gly Ile Ser Val
145                 150                 155                 160

Asn Val Thr Leu Ile Phe Ser Val Ala Arg Tyr Arg Glu Val Ile Ala
                165                 170                 175

Ala Phe Ile Glu Gly Ile Lys Gln Ala Ala Ala Asn Gly His Asp Val
            180                 185                 190

Ser Lys Ile His Ser Val Ala Ser Phe Phe Val Ser Arg Val Asp Val
        195                 200                 205

Glu Ile Asp Lys Arg Leu Glu Ala Ile Gly Ser Asp Glu Ala Leu Ala
    210                 215                 220

Leu Arg Gly Lys Ala Gly Val Ala Asn Ala Gln Arg Ala Tyr Ala Val
225                 230                 235                 240

Tyr Lys Glu Leu Phe Asp Ala Ala Glu Leu Pro Glu Gly Ala Asn Thr
                245                 250                 255

Gln Arg Pro Leu Trp Ala Ser Thr Gly Val Lys Asn Pro Ala Tyr Ala
            260                 265                 270

Ala Thr Leu Tyr Val Ser Glu Leu Ala Gly Pro Asn Thr Val Asn Thr
        275                 280                 285

Met Pro Glu Gly Thr Ile Asp Ala Val Leu Glu Gln Gly Asn Leu His
    290                 295                 300

Gly Asp Thr Leu Ser Asn Ser Ala Ala Glu Ala Asp Ala Val Phe Ser
305                 310                 315                 320

Gln Leu Glu Ala Leu Gly Val Asp Leu Ala Asp Val Phe Gln Val Leu
                325                 330                 335

Glu Thr Glu Gly Val Asp Lys Phe Val Ala Ser Trp Ser Glu Leu Leu
            340                 345                 350

Glu Ser Met Glu Ala Arg Leu Lys
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355 360

<210> 69
<211> 2100
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(2100)
<223> RXA02739K

<400> 69

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ttg acc acc ttg acg ctg tca cct gaa ctt cag gcg ctc act gta cgc   48
Met Thr Thr Leu Thr Leu Ser Pro Glu Leu Gln Ala Leu Thr Val Arg
  1               5                  10                  15

aat tac ccc tct gat tgg tcc gat gtg gac acc aag gct gta gac act   96
Asn Tyr Pro Ser Asp Trp Ser Asp Val Asp Thr Lys Ala Val Asp Thr
             20                  25                  30

gtt cgt gtc ctc gct gca gac gct gta gaa aac tgt ggc tcc ggc cac   144
Val Arg Val Leu Ala Ala Asp Ala Val Glu Asn Cys Gly Ser Gly His
         35                  40                  45

cca ggc acc gca atg agc ctg gct ccc ctt gca tac acc ttg tac cag   192
Pro Gly Thr Ala Met Ser Leu Ala Pro Leu Ala Tyr Thr Leu Tyr Gln
     50                  55                  60

cgg gtt atg aac gta gat cca cag gac acc aac tgg gca ggc cgt gac   240
Arg Val Met Asn Val Asp Pro Gln Asp Thr Asn Trp Ala Gly Arg Asp
 65                  70                  75                  80

cgc ttc gtt ctt tct tgt ggc cac tcc tct ttg acc cag tac atc cag   288
Arg Phe Val Leu Ser Cys Gly His Ser Ser Leu Thr Gln Tyr Ile Gln
                 85                  90                  95

ctt tac ttg ggt gga ttc ggc ctt gag atg gat gac ctg aag gct ctg   336
Leu Tyr Leu Gly Gly Phe Gly Leu Glu Met Asp Asp Leu Lys Ala Leu
            100                 105                 110

cgc acc tgg gat tcc ttg acc cca gga cac cct gag tac cgc cac acc   384
Arg Thr Trp Asp Ser Leu Thr Pro Gly His Pro Glu Tyr Arg His Thr
        115                 120                 125

aag ggc gtt gag atc acc act ggc cct ctt ggc cag ggt ctt gca tct   432
Lys Gly Val Glu Ile Thr Thr Gly Pro Leu Gly Gln Gly Leu Ala Ser
    130                 135                 140

gca gtt ggt atg gcc atg gct gct cgt cgt gag cgt ggc cta ttc gac   480
Ala Val Gly Met Ala Met Ala Ala Arg Arg Glu Arg Gly Leu Phe Asp
145                 150                 155                 160

cca acc gct gct gag ggc gaa tcc cca ttc gac cac cac atc tac gtc   528
Pro Thr Ala Ala Glu Gly Glu Ser Pro Phe Asp His His Ile Tyr Val
                165                 170                 175

att gct tct gat ggt gac ctg cag gaa ggt gtc acc tct gag gca tcc   576
```

```
Ile Ala Ser Asp Gly Asp Leu Gln Glu Gly Val Thr Ser Glu Ala Ser
            180                 185                 190

tcc atc gct ggc acc cag cag ctg ggc aac ctc atc gtg ttc tgg gat   624
Ser Ile Ala Gly Thr Gln Gln Leu Gly Asn Leu Ile Val Phe Trp Asp
        195                 200                 205

gac aac cgc atc tcc atc gaa gac aac act gag atc gct ttc aac gag   672
Asp Asn Arg Ile Ser Ile Glu Asp Asn Thr Glu Ile Ala Phe Asn Glu
    210                 215                 220

gac gtt gtt gct cgt tac aag gct tac ggc tgg cag acc att gag gtt   720
Asp Val Val Ala Arg Tyr Lys Ala Tyr Gly Trp Gln Thr Ile Glu Val
225                 230                 235                 240

gag gct ggc gag gac gtt gca gca atc gaa gct gca gtg gct gag gct   768
Glu Ala Gly Glu Asp Val Ala Ala Ile Glu Ala Ala Val Ala Glu Ala
                245                 250                 255

aag aag gac acc aag cga cct acc ttc atc cgc gtt cgc acc atc atc   816
Lys Lys Asp Thr Lys Arg Pro Thr Phe Ile Arg Val Arg Thr Ile Ile
            260                 265                 270

ggc ttc cca gct cca act atg atg aac acc ggt gct gtg cac ggt gct   864
Gly Phe Pro Ala Pro Thr Met Met Asn Thr Gly Ala Val His Gly Ala
        275                 280                 285

gct ctt ggc gca gct gag gtt gca gca acc aag act gag ctt gga ttc   912
Ala Leu Gly Ala Ala Glu Val Ala Ala Thr Lys Thr Glu Leu Gly Phe
    290                 295                 300

gat cct gag gct cac ttc gcg atc gac gat gag gtt atc gct cac acc   960
Asp Pro Glu Ala His Phe Ala Ile Asp Asp Glu Val Ile Ala His Thr
305                 310                 315                 320

cgc tcc ctc gca gag cgc gct gca cag aag aag gct gca tgg cag gtc   1008
Arg Ser Leu Ala Glu Arg Ala Ala Gln Lys Lys Ala Ala Trp Gln Val
                325                 330                 335

aag ttc gat gag tgg gca gct gcc aac cct gag aac aag gct ctg ttc   1056
Lys Phe Asp Glu Trp Ala Ala Ala Asn Pro Glu Asn Lys Ala Leu Phe
            340                 345                 350

gat cgc ctg aac tcc cgt gag ctt cca gcg ggc tac gct gac gag ctc   1104
Asp Arg Leu Asn Ser Arg Glu Leu Pro Ala Gly Tyr Ala Asp Glu Leu
        355                 360                 365

cca aca tgg gat gca gat gag aag ggc gtc gca act cgt aag gct tcc   1152
Pro Thr Trp Asp Ala Asp Glu Lys Gly Val Ala Thr Arg Lys Ala Ser
    370                 375                 380

gag gct gca ctt cag gca ctg ggc aag acc ctt cct gag ctg tgg ggc   1200
Glu Ala Ala Leu Gln Ala Leu Gly Lys Thr Leu Pro Glu Leu Trp Gly
385                 390                 395                 400

ggt tcc gct gac ctc gca ggt tcc aac aac acc gtg atc aag ggc tcc   1248
Gly Ser Ala Asp Leu Ala Gly Ser Asn Asn Thr Val Ile Lys Gly Ser
                405                 410                 415
```

```
cct tcc ttc ggc cct gag tcc atc tcc acc gag acc tgg tct gct gag   1296
Pro Ser Phe Gly Pro Glu Ser Ile Ser Thr Glu Thr Trp Ser Ala Glu
            420                 425                 430

cct tac ggc cgt aac ctg cac ttc ggt atc cgt gag cac gct atg gga   1344
Pro Tyr Gly Arg Asn Leu His Phe Gly Ile Arg Glu His Ala Met Gly
        435                 440                 445

tcc atc ctc aac ggc att tcc ctc cac ggt ggc acc cgc cca tac ggc   1392
Ser Ile Leu Asn Gly Ile Ser Leu His Gly Gly Thr Arg Pro Tyr Gly
    450                 455                 460

gga acc ttc ctc atc ttc tcc gac tac atg cgt cct gca gtt cgt ctt   1440
Gly Thr Phe Leu Ile Phe Ser Asp Tyr Met Arg Pro Ala Val Arg Leu
465                 470                 475                 480

gca gct ctc atg gag acc gac gct tac tac gtc tgg acc cac gac tcc   1488
Ala Ala Leu Met Glu Thr Asp Ala Tyr Tyr Val Trp Thr His Asp Ser
                485                 490                 495

atc ggt ctg ggc gaa gat ggc cca acc cac cag cct gtt gaa acc ttg   1536
Ile Gly Leu Gly Glu Asp Gly Pro Thr His Gln Pro Val Glu Thr Leu
            500                 505                 510

gct gca ctg cgc gcc atc cca ggt ctg tcc gtc ctg cgt cct gca gat   1584
Ala Ala Leu Arg Ala Ile Pro Gly Leu Ser Val Leu Arg Pro Ala Asp
        515                 520                 525

gcg aac gag acc gcc cag gct tgg gct gca gca ctt gag tac aag gaa   1632
Ala Asn Glu Thr Ala Gln Ala Trp Ala Ala Ala Leu Glu Tyr Lys Glu
    530                 535                 540

ggc cct aag ggt ctt gca ctg acc cgc cag aac gtt cct gtt ctg gaa   1680
Gly Pro Lys Gly Leu Ala Leu Thr Arg Gln Asn Val Pro Val Leu Glu
545                 550                 555                 560

ggc acc aag gag aag gct gct gaa ggc gtt cgc cgc ggt ggc tac gtc   1728
Gly Thr Lys Glu Lys Ala Ala Glu Gly Val Arg Arg Gly Gly Tyr Val
                565                 570                 575

ctg gtt gag ggt tcc aag gaa acc cca gat gtg atc ctc atg ggc tcc   1776
Leu Val Glu Gly Ser Lys Glu Thr Pro Asp Val Ile Leu Met Gly Ser
            580                 585                 590

ggc tcc gag gtt cag ctt gca gtt aac gct gcg aag gct ctg gaa gct   1824
Gly Ser Glu Val Gln Leu Ala Val Asn Ala Ala Lys Ala Leu Glu Ala
        595                 600                 605

gag ggc gtt gca gct cgc gtt gtt tcc gtt cct tgc atg gat tgg ttc   1872
Glu Gly Val Ala Ala Arg Val Val Ser Val Pro Cys Met Asp Trp Phe
    610                 615                 620

cag gag cag gac gca gag tac atc gag tcc gtt ctg cct gca gct gtg   1920
Gln Glu Gln Asp Ala Glu Tyr Ile Glu Ser Val Leu Pro Ala Ala Val
625                 630                 635                 640

acc gct cgt gtg tct gtt gaa gct ggc atc gca atg cct tgg tac cgc   1968
Thr Ala Arg Val Ser Val Glu Ala Gly Ile Ala Met Pro Trp Tyr Arg
                645                 650                 655
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ttc ttg ggc acc cag ggc cgt gct gtc tcc ctt gag cac ttc ggt gct   2016
Phe Leu Gly Thr Gln Gly Arg Ala Val Ser Leu Glu His Phe Gly Ala
            660                 665                 670

tct gcg gat tac cag acc ctg ttt gag aag ttc ggc atc acc acc gat   2064
Ser Ala Asp Tyr Gln Thr Leu Phe Glu Lys Phe Gly Ile Thr Thr Asp
        675                 680                 685

gca gtc gtg gca gcg gcc aag gac tcc att aac ggt                   2100
Ala Val Val Ala Ala Ala Lys Asp Ser Ile Asn Gly
    690                 695                 700
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<210> 70
<211> 700
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 70

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Met Thr Thr Leu Thr Leu Ser Pro Glu Leu Gln Ala Leu Thr Val Arg
  1               5                  10                  15

Asn Tyr Pro Ser Asp Trp Ser Asp Val Asp Thr Lys Ala Val Asp Thr
             20                  25                  30

Val Arg Val Leu Ala Ala Asp Ala Val Glu Asn Cys Gly Ser Gly His
         35                  40                  45

Pro Gly Thr Ala Met Ser Leu Ala Pro Leu Ala Tyr Thr Leu Tyr Gln
     50                  55                  60

Arg Val Met Asn Val Asp Pro Gln Asp Thr Asn Trp Ala Gly Arg Asp
 65                  70                  75                  80

Arg Phe Val Leu Ser Cys Gly His Ser Ser Leu Thr Gln Tyr Ile Gln
                 85                  90                  95

Leu Tyr Leu Gly Gly Phe Gly Leu Glu Met Asp Asp Leu Lys Ala Leu
            100                 105                 110

Arg Thr Trp Asp Ser Leu Thr Pro Gly His Pro Glu Tyr Arg His Thr
        115                 120                 125

Lys Gly Val Glu Ile Thr Thr Gly Pro Leu Gly Gln Gly Leu Ala Ser
    130                 135                 140

Ala Val Gly Met Ala Met Ala Ala Arg Arg Glu Arg Gly Leu Phe Asp
145                 150                 155                 160

Pro Thr Ala Ala Glu Gly Glu Ser Pro Phe Asp His His Ile Tyr Val
                165                 170                 175

Ile Ala Ser Asp Gly Asp Leu Gln Glu Gly Val Thr Ser Glu Ala Ser
            180                 185                 190

Ser Ile Ala Gly Thr Gln Gln Leu Gly Asn Leu Ile Val Phe Trp Asp
        195                 200                 205
```

```
Asp Asn Arg Ile Ser Ile Glu Asp Asn Thr Glu Ile Ala Phe Asn Glu
    210                 215                 220

Asp Val Val Ala Arg Tyr Lys Ala Tyr Gly Trp Gln Thr Ile Glu Val
225                 230                 235                 240

Glu Ala Gly Glu Asp Val Ala Ala Ile Glu Ala Ala Val Ala Glu Ala
                245                 250                 255

Lys Lys Asp Thr Lys Arg Pro Thr Phe Ile Arg Val Arg Thr Ile Ile
            260                 265                 270

Gly Phe Pro Ala Pro Thr Met Met Asn Thr Gly Ala Val His Gly Ala
        275                 280                 285

Ala Leu Gly Ala Ala Glu Val Ala Ala Thr Lys Thr Glu Leu Gly Phe
    290                 295                 300

Asp Pro Glu Ala His Phe Ala Ile Asp Asp Glu Val Ile Ala His Thr
305                 310                 315                 320

Arg Ser Leu Ala Glu Arg Ala Ala Gln Lys Lys Ala Ala Trp Gln Val
                325                 330                 335

Lys Phe Asp Glu Trp Ala Ala Ala Asn Pro Glu Asn Lys Ala Leu Phe
            340                 345                 350

Asp Arg Leu Asn Ser Arg Glu Leu Pro Ala Gly Tyr Ala Asp Glu Leu
        355                 360                 365

Pro Thr Trp Asp Ala Asp Glu Lys Gly Val Ala Thr Arg Lys Ala Ser
    370                 375                 380

Glu Ala Ala Leu Gln Ala Leu Gly Lys Thr Leu Pro Glu Leu Trp Gly
385                 390                 395                 400

Gly Ser Ala Asp Leu Ala Gly Ser Asn Asn Thr Val Ile Lys Gly Ser
                405                 410                 415

Pro Ser Phe Gly Pro Glu Ser Ile Ser Thr Glu Thr Trp Ser Ala Glu
            420                 425                 430

Pro Tyr Gly Arg Asn Leu His Phe Gly Ile Arg Glu His Ala Met Gly
        435                 440                 445

Ser Ile Leu Asn Gly Ile Ser Leu His Gly Gly Thr Arg Pro Tyr Gly
    450                 455                 460

Gly Thr Phe Leu Ile Phe Ser Asp Tyr Met Arg Pro Ala Val Arg Leu
465                 470                 475                 480

Ala Ala Leu Met Glu Thr Asp Ala Tyr Tyr Val Trp Thr His Asp Ser
                485                 490                 495

Ile Gly Leu Gly Glu Asp Gly Pro Thr His Gln Pro Val Glu Thr Leu
            500                 505                 510

Ala Ala Leu Arg Ala Ile Pro Gly Leu Ser Val Leu Arg Pro Ala Asp
```

```
        515                 520                 525

Ala Asn Glu Thr Ala Gln Ala Trp Ala Ala Ala Leu Glu Tyr Lys Glu
    530                 535                 540

Gly Pro Lys Gly Leu Ala Leu Thr Arg Gln Asn Val Pro Val Leu Glu
545                 550                 555                 560

Gly Thr Lys Glu Lys Ala Ala Glu Gly Val Arg Arg Gly Gly Tyr Val
                565                 570                 575

Leu Val Glu Gly Ser Lys Glu Thr Pro Asp Val Ile Leu Met Gly Ser
            580                 585                 590

Gly Ser Glu Val Gln Leu Ala Val Asn Ala Ala Lys Ala Leu Glu Ala
        595                 600                 605

Glu Gly Val Ala Ala Arg Val Val Ser Val Pro Cys Met Asp Trp Phe
    610                 615                 620

Gln Glu Gln Asp Ala Glu Tyr Ile Glu Ser Val Leu Pro Ala Ala Val
625                 630                 635                 640

Thr Ala Arg Val Ser Val Glu Ala Gly Ile Ala Met Pro Trp Tyr Arg
                645                 650                 655

Phe Leu Gly Thr Gln Gly Arg Ala Val Ser Leu Glu His Phe Gly Ala
            660                 665                 670

Ser Ala Asp Tyr Gln Thr Leu Phe Glu Lys Phe Gly Ile Thr Thr Asp
        675                 680                 685

Ala Val Val Ala Ala Ala Lys Asp Ser Ile Asn Gly
    690                 695                 700


<210> 71
<211> 705
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(705)

<223> RXA02910K

<400> 71
gtg gag att cgt tgg ttg gaa ggc ttt atc gcg gtc gcg gaa gaa ttg   48
Met Glu Ile Arg Trp Leu Glu Gly Phe Ile Ala Val Ala Glu Glu Leu
  1               5                  10                  15

cac ttt agt aat gct gcg att cgt ttg ggg atg ccg caa tcg ccg ttg   96
His Phe Ser Asn Ala Ala Ile Arg Leu Gly Met Pro Gln Ser Pro Leu
             20                  25                  30

agt cag ttg atc cgg cgg ttg gag tcg gag ttg ggg cag aag ctt ttt   144
Ser Gln Leu Ile Arg Arg Leu Glu Ser Glu Leu Gly Gln Lys Leu Phe
         35                  40                  45
```

```
gat cgc agt acc cgg tcg gtg gag tta act gcc gcg ggt cgg gcg ttt   192
Asp Arg Ser Thr Arg Ser Val Glu Leu Thr Ala Ala Gly Arg Ala Phe
     50                  55                  60

ttg cca cat gcc agg ggg att gtg gcg agc gct gcg gtg gcg agg gaa   240
Leu Pro His Ala Arg Gly Ile Val Ala Ser Ala Ala Val Ala Arg Glu
 65                  70                  75                  80

gct gtg aat gct gcc gag ggg gag atc gtt ggt gtt gtt cgc att ggt   288
Ala Val Asn Ala Ala Glu Gly Glu Ile Val Gly Val Val Arg Ile Gly
                 85                  90                  95

ttt tct ggt gtg ctg aac tat tcc acg ctg ccg ctt ttg acc agt gag   336
Phe Ser Gly Val Leu Asn Tyr Ser Thr Leu Pro Leu Leu Thr Ser Glu
            100                 105                 110

gtg cat aaa cgg ctt cct aat gtg gag ttg gag ctc gtt ggt cag aag   384
Val His Lys Arg Leu Pro Asn Val Glu Leu Glu Leu Val Gly Gln Lys
        115                 120                 125

ttg acg agg gaa gcg gta agt ttg ctg cgc ttg ggg gcg ttg gat att   432
Leu Thr Arg Glu Ala Val Ser Leu Leu Arg Leu Gly Ala Leu Asp Ile
    130                 135                 140

acg ttg atg ggt ttg ccc att gag gat cca gag att gag act cgg ctg   480
Thr Leu Met Gly Leu Pro Ile Glu Asp Pro Glu Ile Glu Thr Arg Leu
145                 150                 155                 160

att agt ttg gaa gag ttt tgc gtg gtg ttg ccg aag gat cat cgt ctt   528
Ile Ser Leu Glu Glu Phe Cys Val Val Leu Pro Lys Asp His Arg Leu
                165                 170                 175

gcg ggg gaa gga gtg gtg gat ttg gtg gat ctg gct aaa gat ggg ttt   576
Ala Gly Glu Gly Val Val Asp Leu Val Asp Leu Ala Lys Asp Gly Phe
            180                 185                 190

gtg acg acg ccg gag ttt gcg ggg tct gtg ttt agg aat tcc acc ttt   624
Val Thr Thr Pro Glu Phe Ala Gly Ser Val Phe Arg Asn Ser Thr Phe
        195                 200                 205

cag ttg tgt gct gag gct ggt ttt gtg ccg agg atc agc cag caa gtt   672
Gln Leu Cys Ala Glu Ala Gly Phe Val Pro Arg Ile Ser Gln Gln Val
    210                 215                 220

aat gat cct tac atg gcg ctg ttg ttg gcg cgg                      705
Asn Asp Pro Tyr Met Ala Leu Leu Leu Ala Arg
225                 230                 235
```

<210> 72
<211> 235
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 72

```
Met Glu Ile Arg Trp Leu Glu Gly Phe Ile Ala Val Ala Glu Glu Leu
  1               5                  10                  15
```

```
His Phe Ser Asn Ala Ala Ile Arg Leu Gly Met Pro Gln Ser Pro Leu
             20                  25                  30

Ser Gln Leu Ile Arg Arg Leu Glu Ser Glu Leu Gly Gln Lys Leu Phe
         35                  40                  45

Asp Arg Ser Thr Arg Ser Val Glu Leu Thr Ala Ala Gly Arg Ala Phe

     50                  55                  60

Leu Pro His Ala Arg Gly Ile Val Ala Ser Ala Ala Val Ala Arg Glu
 65                  70                  75                  80

Ala Val Asn Ala Ala Glu Gly Glu Ile Val Gly Val Val Arg Ile Gly
                 85                  90                  95

Phe Ser Gly Val Leu Asn Tyr Ser Thr Leu Pro Leu Leu Thr Ser Glu
            100                 105                 110

Val His Lys Arg Leu Pro Asn Val Glu Leu Glu Leu Val Gly Gln Lys
        115                 120                 125

Leu Thr Arg Glu Ala Val Ser Leu Leu Arg Leu Gly Ala Leu Asp Ile
    130                 135                 140

Thr Leu Met Gly Leu Pro Ile Glu Asp Pro Glu Ile Glu Thr Arg Leu
145                 150                 155                 160

Ile Ser Leu Glu Glu Phe Cys Val Val Leu Pro Lys Asp His Arg Leu
                165                 170                 175

Ala Gly Glu Gly Val Val Asp Leu Val Asp Leu Ala Lys Asp Gly Phe
            180                 185                 190

Val Thr Thr Pro Glu Phe Ala Gly Ser Val Phe Arg Asn Ser Thr Phe
        195                 200                 205

Gln Leu Cys Ala Glu Ala Gly Phe Val Pro Arg Ile Ser Gln Gln Val
    210                 215                 220

Asn Asp Pro Tyr Met Ala Leu Leu Leu Ala Arg
225                 230                 235


<210> 73
<211> 849
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(846)
<223> RXA02910E

<400> 73
atg gca ttt ccg ctt cta gcg gtt gct ggc aca gtt gcc ccc gtt gca   48
Met Ala Phe Pro Leu Leu Ala Val Ala Gly Thr Val Ala Pro Val Ala
  1               5                  10                  15
```

```
gca gga tgg gca aaa gat aag ttt ctc agc aac tct cag aat aat cag   96
Ala Gly Trp Ala Lys Asp Lys Phe Leu Ser Asn Ser Gln Asn Asn Gln
             20                  25                  30

cag gcc cag aat cag cag atg agt ttt gga cag gtc aac aac agc gca  144
Gln Ala Gln Asn Gln Gln Met Ser Phe Gly Gln Val Asn Asn Ser Ala
         35                  40                  45

cag aat tct gga tca gaa aac agc ggt ttc atg ggt caa tac ggc aat  192
Gln Asn Ser Gly Ser Glu Asn Ser Gly Phe Met Gly Gln Tyr Gly Asn
     50                  55                  60

ctg ggt gca ggt ttg gca ggt gct gct aca ggc gca ggg ctt gcg tat  240
Leu Gly Ala Gly Leu Ala Gly Ala Ala Thr Gly Ala Gly Leu Ala Tyr
 65                  70                  75                  80

agc gat ttt gaa gat ggt caa agt ttg tcc tcg aag gcc cgc aac atg  288
Ser Asp Phe Glu Asp Gly Gln Ser Leu Ser Ser Lys Ala Arg Asn Met
                 85                  90                  95

gtc ggc aaa ggg ctc gct ggt gcc gga gct ggt gtg ttc acc aag ctt  336
Val Gly Lys Gly Leu Ala Gly Ala Gly Ala Gly Val Phe Thr Lys Leu
            100                 105                 110

gcc aat gat gca att cag gcc gag ggt ggc tcg atg aag gct agt gct  384
Ala Asn Asp Ala Ile Gln Ala Glu Gly Gly Ser Met Lys Ala Ser Ala
        115                 120                 125

tat tct gcc att gca ggc ggc ttg gga tcg tat ctc aaa gac ggc ggt  432
Tyr Ser Ala Ile Ala Gly Gly Leu Gly Ser Tyr Leu Lys Asp Gly Gly
    130                 135                 140

ccg ggt gtg att aaa tcc gcg atg gcc agc ggt gca gcc ggt ttt ggt  480
Pro Gly Val Ile Lys Ser Ala Met Ala Ser Gly Ala Ala Gly Phe Gly
145                 150                 155                 160

gcg gat aaa gtg cac gat aaa tta gct gag tct ggt cat gag ggg ttg  528
Ala Asp Lys Val His Asp Lys Leu Ala Glu Ser Gly His Glu Gly Leu
                165                 170                 175

gct gat tcc ttg tcg ggc gct att caa gga ggt ggt ctt ggt tac tcc  576
Ala Asp Ser Leu Ser Gly Ala Ile Gln Gly Gly Gly Leu Gly Tyr Ser
            180                 185                 190

acg ctt ggc ggt gtc act ggt gct ggt att ggc ggt gcg acg ggc ggt  624
Thr Leu Gly Gly Val Thr Gly Ala Gly Ile Gly Gly Ala Thr Gly Gly
        195                 200                 205

ctc gca gga cta gca caa aac tac ttt ggt ggt ggc gat gac tac agc  672
Leu Ala Gly Leu Ala Gln Asn Tyr Phe Gly Gly Gly Asp Asp Tyr Ser
    210                 215                 220

aac gct ggg gca tct gca tcg ggg ttt agt gcc aac cag gtt aat agt  720
Asn Ala Gly Ala Ser Ala Ser Gly Phe Ser Ala Asn Gln Val Asn Ser
225                 230                 235                 240

gag atc agc acc gag att ccg cag ttt gcg aat ctt ggt caa cca cag  768
Glu Ile Ser Thr Glu Ile Pro Gln Phe Ala Asn Leu Gly Gln Pro Gln
```

```
                245                 250                 255

cga tcc gag ctt gaa caa tta gcg cta cct caa gaa tca cgg tct gta   816
Arg Ser Glu Leu Glu Gln Leu Ala Leu Pro Gln Glu Ser Arg Ser Val
            260                 265                 270

gat aag agc tac gac caa ggc tac gaa gcg taa                       849
Asp Lys Ser Tyr Asp Gln Gly Tyr Glu Ala
        275                 280
```

<210> 74
<211> 282
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 74

```
Met Ala Phe Pro Leu Leu Ala Val Ala Gly Thr Val Ala Pro Val Ala
  1               5                  10                  15

Ala Gly Trp Ala Lys Asp Lys Phe Leu Ser Asn Ser Gln Asn Asn Gln
             20                  25                  30

Gln Ala Gln Asn Gln Gln Met Ser Phe Gly Gln Val Asn Asn Ser Ala
         35                  40                  45

Gln Asn Ser Gly Ser Glu Asn Ser Gly Phe Met Gly Gln Tyr Gly Asn
     50                  55                  60

Leu Gly Ala Gly Leu Ala Gly Ala Ala Thr Gly Ala Gly Leu Ala Tyr
 65                  70                  75                  80

Ser Asp Phe Glu Asp Gly Gln Ser Leu Ser Ser Lys Ala Arg Asn Met
                 85                  90                  95

Val Gly Lys Gly Leu Ala Gly Ala Gly Ala Gly Val Phe Thr Lys Leu
            100                 105                 110

Ala Asn Asp Ala Ile Gln Ala Glu Gly Gly Ser Met Lys Ala Ser Ala
        115                 120                 125

Tyr Ser Ala Ile Ala Gly Gly Leu Gly Ser Tyr Leu Lys Asp Gly Gly
    130                 135                 140

Pro Gly Val Ile Lys Ser Ala Met Ala Ser Gly Ala Ala Gly Phe Gly
145                 150                 155                 160

Ala Asp Lys Val His Asp Lys Leu Ala Glu Ser Gly His Glu Gly Leu
                165                 170                 175

Ala Asp Ser Leu Ser Gly Ala Ile Gln Gly Gly Gly Leu Gly Tyr Ser
            180                 185                 190

Thr Leu Gly Gly Val Thr Gly Ala Gly Ile Gly Gly Ala Thr Gly Gly
        195                 200                 205

Leu Ala Gly Leu Ala Gln Asn Tyr Phe Gly Gly Gly Asp Asp Tyr Ser
    210                 215                 220
```

```
Asn Ala Gly Ala Ser Ala Ser Gly Phe Ser Ala Asn Gln Val Asn Ser
225                 230                 235                 240

Glu Ile Ser Thr Glu Ile Pro Gln Phe Ala Asn Leu Gly Gln Pro Gln
                245                 250                 255

Arg Ser Glu Leu Glu Gln Leu Ala Leu Pro Gln Glu Ser Arg Ser Val
            260                 265                 270

Asp Lys Ser Tyr Asp Gln Gly Tyr Glu Ala

        275                 280
```

<210> 75
<211> 1407
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1407)
<223> RXA03083W

<220>
<221> 不確定
<222> 903 .. 903
<223> 所有出現代表任意核苷酸之 n 者

<400> 75

```
atg gca aag agg atc gta att atc ggc ggt gga cct gca ggc tat gaa   48
Met Ala Lys Arg Ile Val Ile Ile Gly Gly Gly Pro Ala Gly Tyr Glu
  1               5                  10                  15

gcc gca ctc gca ggc gct aaa tac ggt gca gaa gtt acc gtt att gaa   96
Ala Ala Leu Ala Gly Ala Lys Tyr Gly Ala Glu Val Thr Val Ile Glu
             20                  25                  30

gat gtc gga gtt ggc gga tcc gca gtc acc atg gac tgt gta cct tca   144
Asp Val Gly Val Gly Gly Ser Ala Val Thr Met Asp Cys Val Pro Ser
         35                  40                  45

aag tcc ttc atc gct ggt acc ggt atc aaa acc gac ctc cga cgt gct   192
Lys Ser Phe Ile Ala Gly Thr Gly Ile Lys Thr Asp Leu Arg Arg Ala
     50                  55                  60

gat gac atg gga ctt aac cgt ggg ctt gga aaa gca cac cta gaa atc   240
Asp Asp Met Gly Leu Asn Arg Gly Leu Gly Lys Ala His Leu Glu Ile
 65                  70                  75                  80

gat gca ctg aac atc cgt gtg aag gac ctt gcg aaa gca cag tcc gaa   288
Asp Ala Leu Asn Ile Arg Val Lys Asp Leu Ala Lys Ala Gln Ser Glu
                85                  90                  95

gat atc ttg ggc cag ctg cag cgc tca gat gtc cgc atg att aac ggt   336
Asp Ile Leu Gly Gln Leu Gln Arg Ser Asp Val Arg Met Ile Asn Gly
            100                 105                 110
```

```
gtg ggc cgc ttt gat gat tac aac acc aag caa acc acc cac tac att   384
Val Gly Arg Phe Asp Asp Tyr Asn Thr Lys Gln Thr Thr His Tyr Ile
        115                 120                 125

aaa gtc acc cac agc gat ggc tcc gaa gaa acc gtt gag tgc gat ctg   432
Lys Val Thr His Ser Asp Gly Ser Glu Glu Thr Val Glu Cys Asp Leu
    130                 135                 140

gtg ctg gtt gca act ggt gca acc ccc cgc att ctt aaa ggt gca gag   480
Val Leu Val Ala Thr Gly Ala Thr Pro Arg Ile Leu Lys Gly Ala Glu
145                 150                 155                 160

cca gac ggc gag cgc atc ttg acc tgg cgt cag gtc tac gac att gaa   528
Pro Asp Gly Glu Arg Ile Leu Thr Trp Arg Gln Val Tyr Asp Ile Glu
                165                 170                 175

gaa ctc ccc acc cac ctt atc gtg gtt ggt tcc ggt gtg acc ggt gcg   576
Glu Leu Pro Thr His Leu Ile Val Val Gly Ser Gly Val Thr Gly Ala
            180                 185                 190

gaa ttt gtc tct gcg ttt gct gaa ctc ggc gtc aaa gtc acc atg gtg   624
Glu Phe Val Ser Ala Phe Ala Glu Leu Gly Val Lys Val Thr Met Val
        195                 200                 205

gca tcc cgt gac cgc att ttg cct cac gat gac gca gat gcc gca gac   672
Ala Ser Arg Asp Arg Ile Leu Pro His Asp Asp Ala Asp Ala Ala Asp
    210                 215                 220

gtg ctg gaa acc gtt ctg gct gag cgc gga gta tcc ctg gaa aag cat   720
Val Leu Glu Thr Val Leu Ala Glu Arg Gly Val Ser Leu Glu Lys His
225                 230                 235                 240

gcc cgc gtg gag tct gtc acc cgc acc gaa gac ggt ggc gtg tgt gtt   768
Ala Arg Val Glu Ser Val Thr Arg Thr Glu Asp Gly Gly Val Cys Val
                245                 250                 255

cgc act gct gac gga cga gaa atc tac ggt tct cac gcg ttg atg act   816
Arg Thr Ala Asp Gly Arg Glu Ile Tyr Gly Ser His Ala Leu Met Thr
            260                 265                 270

gtt ggt tcc att cca aac acg gca gat ctt ggc ctg gag aac atc ggt   864
Val Gly Ser Ile Pro Asn Thr Ala Asp Leu Gly Leu Glu Asn Ile Gly
        275                 280                 285

gtt gag ctg gca cca tcc ggc cat atc aag gtt gac cgn gtc tcc cgc   912
Val Glu Leu Ala Pro Ser Gly His Ile Lys Val Asp Arg Val Ser Arg
    290                 295                 300

acc aac atc ccc ggt gtg tac gca gca ggt gac tgt act gac cta ttc   960
Thr Asn Ile Pro Gly Val Tyr Ala Ala Gly Asp Cys Thr Asp Leu Phe
305                 310                 315                 320

cca ctg gcg tcc gtt gca gcg atg cag ggc cgt atc gcc atg tat cac  1008
Pro Leu Ala Ser Val Ala Ala Met Gln Gly Arg Ile Ala Met Tyr His
                325                 330                 335

gca ctc ggt gaa ggc gtg agc ccc atc cgt ttg aag act gtt gcc acc  1056
Ala Leu Gly Glu Gly Val Ser Pro Ile Arg Leu Lys Thr Val Ala Thr
            340                 345                 350
```

```
gca gtg ttt acc cgc cca gag atc gca gca gta ggt atc acc cat gca   1104
Ala Val Phe Thr Arg Pro Glu Ile Ala Ala Val Gly Ile Thr His Ala
        355                 360                 365

caa gtt gat tcc ggc gaa gtg tct gct cgc gtg att gtg ctt cct ttg   1152
Gln Val Asp Ser Gly Glu Val Ser Ala Arg Val Ile Val Leu Pro Leu
    370                 375                 380

gct act aac cca cgc gcc aag atg cgt tcc ctg cgc cac ggt ttt gtg   1200
Ala Thr Asn Pro Arg Ala Lys Met Arg Ser Leu Arg His Gly Phe Val
385                 390                 395                 400

aag ctg ttc tgc cgc cgt aac tct ggc ctg atc atc ggt ggt gtc gtg   1248
Lys Leu Phe Cys Arg Arg Asn Ser Gly Leu Ile Ile Gly Gly Val Val
                405                 410                 415

gtg gca ccg acc gcg tct gag ctg atc cta ccg atc gct gtg gca gtg   1296
Val Ala Pro Thr Ala Ser Glu Leu Ile Leu Pro Ile Ala Val Ala Val
            420                 425                 430

acc aac cgt ctg aca gtt gct gat ctg gct gat acc ttc gcg gtg tac   1344
Thr Asn Arg Leu Thr Val Ala Asp Leu Ala Asp Thr Phe Ala Val Tyr
        435                 440                 445

cca tca ttg tca ggt tcg att act gaa gca gca cgt cag ctg gtt caa   1392
Pro Ser Leu Ser Gly Ser Ile Thr Glu Ala Ala Arg Gln Leu Val Gln
    450                 455                 460

cat gat gat cta ggc                                             1407
His Asp Asp Leu Gly
465
```

<210> 76
<211> 469
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 76

```
Met Ala Lys Arg Ile Val Ile Ile Gly Gly Gly Pro Ala Gly Tyr Glu
  1               5                  10                  15

Ala Ala Leu Ala Gly Ala Lys Tyr Gly Ala Glu Val Thr Val Ile Glu
             20                  25                  30

Asp Val Gly Val Gly Gly Ser Ala Val Thr Met Asp Cys Val Pro Ser
         35                  40                  45

Lys Ser Phe Ile Ala Gly Thr Gly Ile Lys Thr Asp Leu Arg Arg Ala
     50                  55                  60

Asp Asp Met Gly Leu Asn Arg Gly Leu Gly Lys Ala His Leu Glu Ile
 65                  70                  75                  80

Asp Ala Leu Asn Ile Arg Val Lys Asp Leu Ala Lys Ala Gln Ser Glu
                 85                  90                  95
```

```
Asp Ile Leu Gly Gln Leu Gln Arg Ser Asp Val Arg Met Ile Asn Gly
            100                 105                 110

Val Gly Arg Phe Asp Asp Tyr Asn Thr Lys Gln Thr Thr His Tyr Ile
        115                 120                 125

Lys Val Thr His Ser Asp Gly Ser Glu Glu Thr Val Glu Cys Asp Leu
    130                 135                 140

Val Leu Val Ala Thr Gly Ala Thr Pro Arg Ile Leu Lys Gly Ala Glu
145                 150                 155                 160

Pro Asp Gly Glu Arg Ile Leu Thr Trp Arg Gln Val Tyr Asp Ile Glu
                165                 170                 175

Glu Leu Pro Thr His Leu Ile Val Val Gly Ser Gly Val Thr Gly Ala
            180                 185                 190

Glu Phe Val Ser Ala Phe Ala Glu Leu Gly Val Lys Val Thr Met Val
        195                 200                 205

Ala Ser Arg Asp Arg Ile Leu Pro His Asp Asp Ala Asp Ala Ala Asp
    210                 215                 220

Val Leu Glu Thr Val Leu Ala Glu Arg Gly Val Ser Leu Glu Lys His
225                 230                 235                 240

Ala Arg Val Glu Ser Val Thr Arg Thr Glu Asp Gly Gly Val Cys Val
                245                 250                 255

Arg Thr Ala Asp Gly Arg Glu Ile Tyr Gly Ser His Ala Leu Met Thr
            260                 265                 270

Val Gly Ser Ile Pro Asn Thr Ala Asp Leu Gly Leu Glu Asn Ile Gly
        275                 280                 285

Val Glu Leu Ala Pro Ser Gly His Ile Lys Val Asp Arg Val Ser Arg
    290                 295                 300

Thr Asn Ile Pro Gly Val Tyr Ala Ala Gly Asp Cys Thr Asp Leu Phe
305                 310                 315                 320

Pro Leu Ala Ser Val Ala Ala Met Gln Gly Arg Ile Ala Met Tyr His
                325                 330                 335

Ala Leu Gly Glu Gly Val Ser Pro Ile Arg Leu Lys Thr Val Ala Thr
            340                 345                 350

Ala Val Phe Thr Arg Pro Glu Ile Ala Ala Val Gly Ile Thr His Ala
        355                 360                 365

Gln Val Asp Ser Gly Glu Val Ser Ala Arg Val Ile Val Leu Pro Leu
    370                 375                 380

Ala Thr Asn Pro Arg Ala Lys Met Arg Ser Leu Arg His Gly Phe Val
385                 390                 395                 400

Lys Leu Phe Cys Arg Arg Asn Ser Gly Leu Ile Ile Gly Gly Val Val
                405                 410                 415
```

```
Val Ala Pro Thr Ala Ser Glu Leu Ile Leu Pro Ile Ala Val Ala Val
            420                 425                 430

Thr Asn Arg Leu Thr Val Ala Asp Leu Ala Asp Thr Phe Ala Val Tyr
        435                 440                 445

Pro Ser Leu Ser Gly Ser Ile Thr Glu Ala Ala Arg Gln Leu Val Gln
    450                 455                 460

His Asp Asp Leu Gly
465
```

<210> 77
<211> 792
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(792)
<223> RXA03802K

<400> 77

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atg gtc agc caa acg gaa aga cag cat gca att gct tct tta ctg gca   48
Met Val Ser Gln Thr Glu Arg Gln His Ala Ile Ala Ser Leu Leu Ala
  1               5                  10                  15

cca act ggt gcg gtg tct gta gga gat tta gcc gag cat ttc cat gtg   96
Pro Thr Gly Ala Val Ser Val Gly Asp Leu Ala Glu His Phe His Val
             20                  25                  30

aca acc gaa aca gtg cga cgt gat ctt cgg atc atg gag tca ctg ggt   144
Thr Thr Glu Thr Val Arg Arg Asp Leu Arg Ile Met Glu Ser Leu Gly
         35                  40                  45

ttg ttg caa cga gtt cac ggt ggc gcc att agc cca gag ccc atg ggt   192
Leu Leu Gln Arg Val His Gly Gly Ala Ile Ser Pro Glu Pro Met Gly
     50                  55                  60

acg tct ccc cct cgg ctg aaa cct gcc ttg ggt aaa gga atg cca ccg   240
Thr Ser Pro Pro Arg Leu Lys Pro Ala Leu Gly Lys Gly Met Pro Pro
 65                  70                  75                  80

gaa ccc cgt gtt tta gaa ctt gca gaa act gca gtt tcc ctc atc aca   288
Glu Pro Arg Val Leu Glu Leu Ala Glu Thr Ala Val Ser Leu Ile Thr
                 85                  90                  95

cct cta gca cgc agc att ttc ctg gat tca ggt tta gcg tgc acg gcg   336
Pro Leu Ala Arg Ser Ile Phe Leu Asp Ser Gly Leu Ala Cys Thr Ala
            100                 105                 110

att gcc acg gtg ttg ggg gat cct cca gaa gat gcc agg tgg act gtt   384
Ile Ala Thr Val Leu Gly Asp Pro Pro Glu Asp Ala Arg Trp Thr Val
        115                 120                 125

gtt aca agt tcc ccc ggc gct gtg att gcc ttg tcc gcg aca gat gcc   432
Val Thr Ser Ser Pro Gly Ala Val Ile Ala Leu Ser Ala Thr Asp Ala
```

```
    130                 135                 140

acc tcc acg gtg gtg ctg cac ggg cag gtt cac ggt aat tgt tct tca   480
Thr Ser Thr Val Val Leu His Gly Gln Val His Gly Asn Cys Ser Ser
145                 150                 155                 160

atc att ggg tcc acg gca gta gac atg att tcg cag ttg cgc gct gat   528
Ile Ile Gly Ser Thr Ala Val Asp Met Ile Ser Gln Leu Arg Ala Asp
                165                 170                 175

atc gcc ttc gtg gag gtt gat gcg att caa tcc gat aca agt ctg tgc   576
Ile Ala Phe Val Glu Val Asp Ala Ile Gln Ser Asp Thr Ser Leu Cys
            180                 185                 190

acg ttt ttc ccg gag acg att ccc atc aag caa gcc atg atc aaa aac   624
Thr Phe Phe Pro Glu Thr Ile Pro Ile Lys Gln Ala Met Ile Lys Asn
        195                 200                 205

gcg gct ttc aca gtt gct gtt ctc agc ccg aga tct ccc caa gat caa   672
Ala Ala Phe Thr Val Ala Val Leu Ser Pro Arg Ser Pro Gln Asp Gln
    210                 215                 220

gaa ctt caa ctt ttg aag cac cct ttt tcc acc ttg gct gat ttt gat   720
Glu Leu Gln Leu Leu Lys His Pro Phe Ser Thr Leu Ala Asp Phe Asp
225                 230                 235                 240

gcc ctt gtt acc gat gac cac acg cta gat ttt cca gtt ttg ccc gac   768
Ala Leu Val Thr Asp Asp His Thr Leu Asp Phe Pro Val Leu Pro Asp
                245                 250                 255

cac aac ttt cag gtg gta acc cca                                  792
His Asn Phe Gln Val Val Thr Pro
            260
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<210> 78
<211> 264
<212> PRT
<213> 麩胺酸棒狀桿菌

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<400> 78
Met Val Ser Gln Thr Glu Arg Gln His Ala Ile Ala Ser Leu Leu Ala
  1               5                  10                  15

Pro Thr Gly Ala Val Ser Val Gly Asp Leu Ala Glu His Phe His Val
             20                  25                  30

Thr Thr Glu Thr Val Arg Arg Asp Leu Arg Ile Met Glu Ser Leu Gly
         35                  40                  45

Leu Leu Gln Arg Val His Gly Gly Ala Ile Ser Pro Glu Pro Met Gly
     50                  55                  60

Thr Ser Pro Pro Arg Leu Lys Pro Ala Leu Gly Lys Gly Met Pro Pro
 65                  70                  75                  80

Glu Pro Arg Val Leu Glu Leu Ala Glu Thr Ala Val Ser Leu Ile Thr
                 85                  90                  95
```

```
Pro Leu Ala Arg Ser Ile Phe Leu Asp Ser Gly Leu Ala Cys Thr Ala
            100                 105                 110

Ile Ala Thr Val Leu Gly Asp Pro Pro Glu Asp Ala Arg Trp Thr Val
        115                 120                 125

Val Thr Ser Ser Pro Gly Ala Val Ile Ala Leu Ser Ala Thr Asp Ala
    130                 135                 140

Thr Ser Thr Val Val Leu His Gly Gln Val His Gly Asn Cys Ser Ser
145                 150                 155                 160

Ile Ile Gly Ser Thr Ala Val Asp Met Ile Ser Gln Leu Arg Ala Asp
                165                 170                 175

Ile Ala Phe Val Glu Val Asp Ala Ile Gln Ser Asp Thr Ser Leu Cys
            180                 185                 190

Thr Phe Phe Pro Glu Thr Ile Pro Ile Lys Gln Ala Met Ile Lys Asn
        195                 200                 205

Ala Ala Phe Thr Val Ala Val Leu Ser Pro Arg Ser Pro Gln Asp Gln
    210                 215                 220

Glu Leu Gln Leu Leu Lys His Pro Phe Ser Thr Leu Ala Asp Phe Asp
225                 230                 235                 240

Ala Leu Val Thr Asp Asp His Thr Leu Asp Phe Pro Val Leu Pro Asp
                245                 250                 255

His Asn Phe Gln Val Val Thr Pro
            260
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<210> 79
<211> 3420
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(3420)
<223> RXA04031K

<400> 79

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gtg tcg act cac aca tct tca acg ctt cca gca ttc aaa aag atc ttg   48
Met Ser Thr His Thr Ser Ser Thr Leu Pro Ala Phe Lys Lys Ile Leu
  1               5                  10                  15

gta gca aac cgc ggc gaa atc gcg gtc cgt gct ttc cgt gca gca ctc   96
Val Ala Asn Arg Gly Glu Ile Ala Val Arg Ala Phe Arg Ala Ala Leu
             20                  25                  30

gaa acc ggt gca gcc acg gta gct att tac ccc cgt gaa gat cgg gga  144
Glu Thr Gly Ala Ala Thr Val Ala Ile Tyr Pro Arg Glu Asp Arg Gly
         35                  40                  45

tca ttc cac cgc tct ttt gct tct gaa gct gtc cgc att ggt acc gaa  192
```

```
Ser Phe His Arg Ser Phe Ala Ser Glu Ala Val Arg Ile Gly Thr Glu
     50                  55                  60

ggc tca cca gtc aag gcg tac ctg gac atc gat gaa att atc ggt gca   240
Gly Ser Pro Val Lys Ala Tyr Leu Asp Ile Asp Glu Ile Ile Gly Ala
 65                  70                  75                  80

gct aaa aaa gtt aaa gca gat gcc att tac ccg gga tac ggc ttc ctg   288
Ala Lys Lys Val Lys Ala Asp Ala Ile Tyr Pro Gly Tyr Gly Phe Leu
                 85                  90                  95

tct gaa aat gcc cag ctt gcc cgc gag tgt gcg gaa aac ggc att act   336
Ser Glu Asn Ala Gln Leu Ala Arg Glu Cys Ala Glu Asn Gly Ile Thr
            100                 105                 110

ttt att ggc cca acc cca gag gtt ctt gat ctc acc ggt gat aag tct   384
Phe Ile Gly Pro Thr Pro Glu Val Leu Asp Leu Thr Gly Asp Lys Ser
        115                 120                 125

cgc gcg gta acc gcc gcg aag aag gct ggt ctg cca gtt ttg gcg gaa   432
Arg Ala Val Thr Ala Ala Lys Lys Ala Gly Leu Pro Val Leu Ala Glu
    130                 135                 140

tcc acc ccg agc aaa aac atc gat gag atc gtt aaa agc gct gaa ggc   480
Ser Thr Pro Ser Lys Asn Ile Asp Glu Ile Val Lys Ser Ala Glu Gly
145                 150                 155                 160

cag act tac ccc atc ttt gtg aag gca gtt gcc ggt ggt ggc gga cgc   528
Gln Thr Tyr Pro Ile Phe Val Lys Ala Val Ala Gly Gly Gly Gly Arg
                165                 170                 175

ggt atg cgt ttt gtt gct tca cct gat gag ctt cgc aaa tta gca aca   576
Gly Met Arg Phe Val Ala Ser Pro Asp Glu Leu Arg Lys Leu Ala Thr
            180                 185                 190

gaa gca tct cgt gaa gct gaa gcg gct ttc ggc gat ggc gcg gta tat   624
Glu Ala Ser Arg Glu Ala Glu Ala Ala Phe Gly Asp Gly Ala Val Tyr
        195                 200                 205

gtc gaa cgt gct gtg att aac cct cag cat att gaa gtg cag atc ctt   672
Val Glu Arg Ala Val Ile Asn Pro Gln His Ile Glu Val Gln Ile Leu
    210                 215                 220

ggc gat cac act gga gaa gtt gta cac ctt tat gaa cgt gac tgc tca   720
Gly Asp His Thr Gly Glu Val Val His Leu Tyr Glu Arg Asp Cys Ser
225                 230                 235                 240

ctg cag cgt cgt cac caa aaa gtt gtc gaa att gcg cca gca cag cat   768
Leu Gln Arg Arg His Gln Lys Val Val Glu Ile Ala Pro Ala Gln His
                245                 250                 255

ttg gat cca gaa ctg cgt gat cgc att tgt gcg gat gca gta aag ttc   816
Leu Asp Pro Glu Leu Arg Asp Arg Ile Cys Ala Asp Ala Val Lys Phe
            260                 265                 270

tgc cgc tcc att ggt tac cag ggc gcg gga acc gtg gaa ttc ttg gtc   864
Cys Arg Ser Ile Gly Tyr Gln Gly Ala Gly Thr Val Glu Phe Leu Val
        275                 280                 285
```

```
gat gaa aag ggc aac cac gtc ttc atc gaa atg aac cca cgt atc cag   912
Asp Glu Lys Gly Asn His Val Phe Ile Glu Met Asn Pro Arg Ile Gln
    290                 295                 300

gtt gag cac acc gtg act gaa gaa gtc acc gag gtg gac ctg gtg aag   960
Val Glu His Thr Val Thr Glu Glu Val Thr Glu Val Asp Leu Val Lys
305                 310                 315                 320

gcg cag atg cgc ttg gct gct ggt gca acc ttg aag gaa ttg ggt ctg   1008
Ala Gln Met Arg Leu Ala Ala Gly Ala Thr Leu Lys Glu Leu Gly Leu
                325                 330                 335

acc caa gat aag atc aag acc cac ggt gca gca ctg cag tgc cgc atc   1056
Thr Gln Asp Lys Ile Lys Thr His Gly Ala Ala Leu Gln Cys Arg Ile
            340                 345                 350

acc acg gaa gat cca aac aac ggc ttc cgc cca gat acc gga act atc   1104
Thr Thr Glu Asp Pro Asn Asn Gly Phe Arg Pro Asp Thr Gly Thr Ile
        355                 360                 365

acc gcg tac cgc tca cca ggc gga gct ggc gtt cgt ctt gac ggt gca   1152
Thr Ala Tyr Arg Ser Pro Gly Gly Ala Gly Val Arg Leu Asp Gly Ala
    370                 375                 380

gct cag ctc ggt ggc gaa atc acc gca cac ttt gac tcc atg ctg gtg   1200
Ala Gln Leu Gly Gly Glu Ile Thr Ala His Phe Asp Ser Met Leu Val
385                 390                 395                 400

aaa atg acc tgc cgt ggt tcc gac ttt gaa act gct gtt gct cgt gca   1248
Lys Met Thr Cys Arg Gly Ser Asp Phe Glu Thr Ala Val Ala Arg Ala
                405                 410                 415

cag cgc gcg ttg gct gag ttc acc gtg tct ggt gtt gca acc aac att   1296
Gln Arg Ala Leu Ala Glu Phe Thr Val Ser Gly Val Ala Thr Asn Ile
            420                 425                 430

ggt ttc ttg cgt gcg ttg ctg cgg gaa gag gac ttc act tcc aag cgc   1344
Gly Phe Leu Arg Ala Leu Leu Arg Glu Glu Asp Phe Thr Ser Lys Arg
        435                 440                 445

atc gcc acc gga ttc att gcc gat cac ccg cac ctc ctt cag gct cca   1392
Ile Ala Thr Gly Phe Ile Ala Asp His Pro His Leu Leu Gln Ala Pro
    450                 455                 460

cct gct gat gat gag cag gga cgc atc ctg gat tac ttg gca gat gtc   1440
Pro Ala Asp Asp Glu Gln Gly Arg Ile Leu Asp Tyr Leu Ala Asp Val
465                 470                 475                 480

acc gtg aac aag cct cat ggt gtg cgt cca aag gat gtt gca gct cct   1488
Thr Val Asn Lys Pro His Gly Val Arg Pro Lys Asp Val Ala Ala Pro
                485                 490                 495

atc gat aag ctg cct aac atc aag gat ctg cca ctg cca cgc ggt tcc   1536
Ile Asp Lys Leu Pro Asn Ile Lys Asp Leu Pro Leu Pro Arg Gly Ser
            500                 505                 510

cgt gac cgc ctg aag cag ctt ggc cca gcc gcg ttt gct cgt gat ctc   1584
Arg Asp Arg Leu Lys Gln Leu Gly Pro Ala Ala Phe Ala Arg Asp Leu
        515                 520                 525
```

```
cgt gag cag gac gca ctg gca gtt act gat acc acc ttc cgc gat gca   1632
Arg Glu Gln Asp Ala Leu Ala Val Thr Asp Thr Thr Phe Arg Asp Ala
    530                 535                 540

cac cag tct ttg ctt gcg acc cga gtc cgc tca ttc gca ctg aag cct   1680
His Gln Ser Leu Leu Ala Thr Arg Val Arg Ser Phe Ala Leu Lys Pro
545                 550                 555                 560

gcg gca gag gcc gtc gca aag ctg act cct gag ctt ttg tcc gtg gag   1728
Ala Ala Glu Ala Val Ala Lys Leu Thr Pro Glu Leu Leu Ser Val Glu
                565                 570                 575

gcc tgg ggc ggc gcg acc tac gat gtg gcg atg cgt ttc ctc ttt gag   1776
Ala Trp Gly Gly Ala Thr Tyr Asp Val Ala Met Arg Phe Leu Phe Glu
            580                 585                 590

gat ccg tgg gac agg ctc gac gag ctg cgc gag gcg atg ccg aat gta   1824
Asp Pro Trp Asp Arg Leu Asp Glu Leu Arg Glu Ala Met Pro Asn Val
        595                 600                 605

aac att cag atg ctg ctt cgc ggc cgc aac acc gtg gga tac acc ccg   1872
Asn Ile Gln Met Leu Leu Arg Gly Arg Asn Thr Val Gly Tyr Thr Pro
    610                 615                 620

tac cca gac tcc gtc tgc cgc gcg ttt gtt aag gaa gct gcc agc tcc   1920
Tyr Pro Asp Ser Val Cys Arg Ala Phe Val Lys Glu Ala Ala Ser Ser
625                 630                 635                 640

ggc gtg gac atc ttc cgc atc ttc gac gcg ctt aac gac gtc tcc cag   1968
Gly Val Asp Ile Phe Arg Ile Phe Asp Ala Leu Asn Asp Val Ser Gln
                645                 650                 655


atg cgt cca gca atc gac gca gtc ctg gag acc aac acc gcg gta gcc   2016
Met Arg Pro Ala Ile Asp Ala Val Leu Glu Thr Asn Thr Ala Val Ala
            660                 665                 670

gag gtg gct atg gct tat tct ggt gat ctc tct gat cca aat gaa aag   2064
Glu Val Ala Met Ala Tyr Ser Gly Asp Leu Ser Asp Pro Asn Glu Lys
        675                 680                 685

ctc tac acc ctg gat tac tac cta aag atg gca gag gag atc gtc aag   2112
Leu Tyr Thr Leu Asp Tyr Tyr Leu Lys Met Ala Glu Glu Ile Val Lys
    690                 695                 700

tct ggc gct cac atc ttg gcc att aag gat atg gct ggt ctg ctt cgc   2160
Ser Gly Ala His Ile Leu Ala Ile Lys Asp Met Ala Gly Leu Leu Arg
705                 710                 715                 720

cca gct gcg gta acc aag ctg gtc acc gca ctg cgc cgt gaa ttc gat   2208
Pro Ala Ala Val Thr Lys Leu Val Thr Ala Leu Arg Arg Glu Phe Asp
                725                 730                 735

ctg cca gtg cac gtg cac acc cac gac act gcg ggt ggc cag ctg gca   2256
Leu Pro Val His Val His Thr His Asp Thr Ala Gly Gly Gln Leu Ala
            740                 745                 750

acc tac ttt gct gca gct caa gct ggt gca gat gct gtt gac ggt gct   2304
```

```
Thr Tyr Phe Ala Ala Ala Gln Ala Gly Ala Asp Ala Val Asp Gly Ala
        755                 760                 765

tcc gca cca ctg tct ggc acc acc tcc cag cca tcc ctg tct gcc att   2352
Ser Ala Pro Leu Ser Gly Thr Thr Ser Gln Pro Ser Leu Ser Ala Ile
    770                 775                 780

gtt gct gca ttc gcg cac acc cgt cgc gat acc ggt ttg agc ctc gag   2400
Val Ala Ala Phe Ala His Thr Arg Arg Asp Thr Gly Leu Ser Leu Glu
785                 790                 795                 800

gct gtt tct gac ctc gag ccg tac tgg gaa gca gtg cgc gga ctg tac   2448
Ala Val Ser Asp Leu Glu Pro Tyr Trp Glu Ala Val Arg Gly Leu Tyr
                805                 810                 815

ctg cca ttt gag tct gga acc cca ggc cca acc ggt cgc gtc tac cgc   2496
Leu Pro Phe Glu Ser Gly Thr Pro Gly Pro Thr Gly Arg Val Tyr Arg
            820                 825                 830

cac gaa atc cca ggc gga cag ttg tcc aac ctg cgt gca cag gcc acc   2544
His Glu Ile Pro Gly Gly Gln Leu Ser Asn Leu Arg Ala Gln Ala Thr
        835                 840                 845

gca ctg ggc ctt gcg gat cgt ttc gaa ctc atc gaa gac aac tac gca   2592
Ala Leu Gly Leu Ala Asp Arg Phe Glu Leu Ile Glu Asp Asn Tyr Ala
    850                 855                 860

gcc gtt aat gag atg ctg gga cgc cca acc aag gtc acc cca tcc tcc   2640
Ala Val Asn Glu Met Leu Gly Arg Pro Thr Lys Val Thr Pro Ser Ser
865                 870                 875                 880

aag gtt gtt ggc gac ctc gca ctc cac ctc gtt ggt gcg ggt gtg gat   2688
Lys Val Val Gly Asp Leu Ala Leu His Leu Val Gly Ala Gly Val Asp
                885                 890                 895

cca gca gac ttt gct gcc gat cca caa aag tac gac atc cca gac tct   2736
Pro Ala Asp Phe Ala Ala Asp Pro Gln Lys Tyr Asp Ile Pro Asp Ser
            900                 905                 910

gtc atc gcg ttc ctg cgc ggc gag ctt ggt aac cct cca ggt ggc tgg   2784
Val Ile Ala Phe Leu Arg Gly Glu Leu Gly Asn Pro Pro Gly Gly Trp
        915                 920                 925

cca gag cca ctg cgc acc cgc gca ctg gaa ggc cgc tcc gaa ggc aag   2832
Pro Glu Pro Leu Arg Thr Arg Ala Leu Glu Gly Arg Ser Glu Gly Lys
    930                 935                 940

gca cct ctg acg gaa gtt cct gag gaa gag cag gcg cac ctc gac gct   2880
Ala Pro Leu Thr Glu Val Pro Glu Glu Glu Gln Ala His Leu Asp Ala
945                 950                 955                 960

gat gat tcc aag gaa cgt cgc aat agc ctc aac cgc ctg ctg ttc ccg   2928
Asp Asp Ser Lys Glu Arg Arg Asn Ser Leu Asn Arg Leu Leu Phe Pro
                965                 970                 975

aag cca acc gaa gag ttc ctc gag cac cgt cgc cgc ttc ggc aac acc   2976
Lys Pro Thr Glu Glu Phe Leu Glu His Arg Arg Arg Phe Gly Asn Thr
            980                 985                 990
```

```
tct gcg ctg gat gat cgt gaa ttc ttc tac ggc ctg gtc gaa ggc cgc   3024
Ser Ala Leu Asp Asp Arg Glu Phe Phe Tyr Gly Leu Val Glu Gly Arg
        995                1000                1005

gag act ttg atc cgc ctg cca gat gtg cgc acc cca ctg ctt gtt cgc   3072
Glu Thr Leu Ile Arg Leu Pro Asp Val Arg Thr Pro Leu Leu Val Arg
   1010                1015                1020

ctg gat gcg atc tct gag cca gac gat aag ggt atg cgc aat gtt gtg   3120
Leu Asp Ala Ile Ser Glu Pro Asp Asp Lys Gly Met Arg Asn Val Val
1025                1030                1035                1040

gcc aac gtc aac ggc cag atc cgc cca atg cgt gtg cgt gac cgc tcc   3168
Ala Asn Val Asn Gly Gln Ile Arg Pro Met Arg Val Arg Asp Arg Ser
               1045                1050                1055

gtt gag tct gtc acc gca acc gca gaa aag gca gat tcc tcc aac aag   3216
Val Glu Ser Val Thr Ala Thr Ala Glu Lys Ala Asp Ser Ser Asn Lys
          1060                1065                1070

ggc cat gtt gct gca cca ttc gct ggt gtt gtc acc gtg act gtt gct   3264
Gly His Val Ala Ala Pro Phe Ala Gly Val Val Thr Val Thr Val Ala
       1075                1080                1085

gaa ggt gat gag gtc aag gct gga gat gca gtc gca atc atc gag gct   3312
Glu Gly Asp Glu Val Lys Ala Gly Asp Ala Val Ala Ile Ile Glu Ala
   1090                1095                1100

atg aag atg gaa gca aca atc act gct tct gtt gac ggc aaa atc gat   3360
Met Lys Met Glu Ala Thr Ile Thr Ala Ser Val Asp Gly Lys Ile Asp
1105                1110                1115                1120

cgc gtt gtg gtt cct gct gca acg aag gtg gaa ggt ggc gac ttg atc   3408
Arg Val Val Val Pro Ala Ala Thr Lys Val Glu Gly Gly Asp Leu Ile
               1125                1130                1135

gtc gtc gtt tcc                                                  3420
Val Val Val Ser
          1140
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<210> 80
<211> 1140
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 80

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Met Ser Thr His Thr Ser Ser Thr Leu Pro Ala Phe Lys Lys Ile Leu
  1               5                  10                  15

Val Ala Asn Arg Gly Glu Ile Ala Val Arg Ala Phe Arg Ala Ala Leu
             20                  25                  30

Glu Thr Gly Ala Ala Thr Val Ala Ile Tyr Pro Arg Glu Asp Arg Gly
         35                  40                  45

Ser Phe His Arg Ser Phe Ala Ser Glu Ala Val Arg Ile Gly Thr Glu
     50                  55                  60
```

```
Gly Ser Pro Val Lys Ala Tyr Leu Asp Ile Asp Glu Ile Ile Gly Ala
 65                  70                  75                  80

Ala Lys Lys Val Lys Ala Asp Ala Ile Tyr Pro Gly Tyr Gly Phe Leu
                 85                  90                  95

Ser Glu Asn Ala Gln Leu Ala Arg Glu Cys Ala Glu Asn Gly Ile Thr
            100                 105                 110

Phe Ile Gly Pro Thr Pro Glu Val Leu Asp Leu Thr Gly Asp Lys Ser
        115                 120                 125

Arg Ala Val Thr Ala Ala Lys Lys Ala Gly Leu Pro Val Leu Ala Glu
    130                 135                 140

Ser Thr Pro Ser Lys Asn Ile Asp Glu Ile Val Lys Ser Ala Glu Gly
145                 150                 155                 160

Gln Thr Tyr Pro Ile Phe Val Lys Ala Val Ala Gly Gly Gly Gly Arg
                165                 170                 175

Gly Met Arg Phe Val Ala Ser Pro Asp Glu Leu Arg Lys Leu Ala Thr
            180                 185                 190

Glu Ala Ser Arg Glu Ala Glu Ala Ala Phe Gly Asp Gly Ala Val Tyr
        195                 200                 205

Val Glu Arg Ala Val Ile Asn Pro Gln His Ile Glu Val Gln Ile Leu
    210                 215                 220

Gly Asp His Thr Gly Glu Val Val His Leu Tyr Glu Arg Asp Cys Ser
225                 230                 235                 240

Leu Gln Arg Arg His Gln Lys Val Val Glu Ile Ala Pro Ala Gln His
                245                 250                 255

Leu Asp Pro Glu Leu Arg Asp Arg Ile Cys Ala Asp Ala Val Lys Phe
            260                 265                 270

Cys Arg Ser Ile Gly Tyr Gln Gly Ala Gly Thr Val Glu Phe Leu Val
        275                 280                 285

Asp Glu Lys Gly Asn His Val Phe Ile Glu Met Asn Pro Arg Ile Gln
    290                 295                 300

Val Glu His Thr Val Thr Glu Glu Val Thr Glu Val Asp Leu Val Lys
305                 310                 315                 320

Ala Gln Met Arg Leu Ala Ala Gly Ala Thr Leu Lys Glu Leu Gly Leu
                325                 330                 335

Thr Gln Asp Lys Ile Lys Thr His Gly Ala Ala Leu Gln Cys Arg Ile
            340                 345                 350

Thr Thr Glu Asp Pro Asn Asn Gly Phe Arg Pro Asp Thr Gly Thr Ile
        355                 360                 365

Thr Ala Tyr Arg Ser Pro Gly Gly Ala Gly Val Arg Leu Asp Gly Ala
```

```
    370                 375                 380

Ala Gln Leu Gly Gly Glu Ile Thr Ala His Phe Asp Ser Met Leu Val
385                 390                 395                 400

Lys Met Thr Cys Arg Gly Ser Asp Phe Glu Thr Ala Val Ala Arg Ala
                405                 410                 415

Gln Arg Ala Leu Ala Glu Phe Thr Val Ser Gly Val Ala Thr Asn Ile
            420                 425                 430

Gly Phe Leu Arg Ala Leu Leu Arg Glu Glu Asp Phe Thr Ser Lys Arg
        435                 440                 445

Ile Ala Thr Gly Phe Ile Ala Asp His Pro His Leu Leu Gln Ala Pro
    450                 455                 460

Pro Ala Asp Asp Glu Gln Gly Arg Ile Leu Asp Tyr Leu Ala Asp Val
465                 470                 475                 480

Thr Val Asn Lys Pro His Gly Val Arg Pro Lys Asp Val Ala Ala Pro
                485                 490                 495

Ile Asp Lys Leu Pro Asn Ile Lys Asp Leu Pro Leu Pro Arg Gly Ser
            500                 505                 510

Arg Asp Arg Leu Lys Gln Leu Gly Pro Ala Ala Phe Ala Arg Asp Leu
        515                 520                 525

Arg Glu Gln Asp Ala Leu Ala Val Thr Asp Thr Thr Phe Arg Asp Ala
    530                 535                 540

His Gln Ser Leu Leu Ala Thr Arg Val Arg Ser Phe Ala Leu Lys Pro
545                 550                 555                 560

Ala Ala Glu Ala Val Ala Lys Leu Thr Pro Glu Leu Leu Ser Val Glu
                565                 570                 575

Ala Trp Gly Gly Ala Thr Tyr Asp Val Ala Met Arg Phe Leu Phe Glu
            580                 585                 590

Asp Pro Trp Asp Arg Leu Asp Glu Leu Arg Glu Ala Met Pro Asn Val
        595                 600                 605

Asn Ile Gln Met Leu Leu Arg Gly Arg Asn Thr Val Gly Tyr Thr Pro
    610                 615                 620

Tyr Pro Asp Ser Val Cys Arg Ala Phe Val Lys Glu Ala Ala Ser Ser
625                 630                 635                 640

Gly Val Asp Ile Phe Arg Ile Phe Asp Ala Leu Asn Asp Val Ser Gln
                645                 650                 655

Met Arg Pro Ala Ile Asp Ala Val Leu Glu Thr Asn Thr Ala Val Ala
            660                 665                 670

Glu Val Ala Met Ala Tyr Ser Gly Asp Leu Ser Asp Pro Asn Glu Lys
        675                 680                 685
```

```
Leu Tyr Thr Leu Asp Tyr Tyr Leu Lys Met Ala Glu Glu Ile Val Lys
    690                 695                 700

Ser Gly Ala His Ile Leu Ala Ile Lys Asp Met Ala Gly Leu Leu Arg
705                 710                 715                 720

Pro Ala Ala Val Thr Lys Leu Val Thr Ala Leu Arg Arg Glu Phe Asp
                725                 730                 735

Leu Pro Val His Val His Thr His Asp Thr Ala Gly Gly Gln Leu Ala
            740                 745                 750

Thr Tyr Phe Ala Ala Ala Gln Ala Gly Ala Asp Ala Val Asp Gly Ala
        755                 760                 765

Ser Ala Pro Leu Ser Gly Thr Thr Ser Gln Pro Ser Leu Ser Ala Ile
    770                 775                 780

Val Ala Ala Phe Ala His Thr Arg Arg Asp Thr Gly Leu Ser Leu Glu
785                 790                 795                 800

Ala Val Ser Asp Leu Glu Pro Tyr Trp Glu Ala Val Arg Gly Leu Tyr
                805                 810                 815

Leu Pro Phe Glu Ser Gly Thr Pro Gly Pro Thr Gly Arg Val Tyr Arg
            820                 825                 830

His Glu Ile Pro Gly Gly Gln Leu Ser Asn Leu Arg Ala Gln Ala Thr
        835                 840                 845

Ala Leu Gly Leu Ala Asp Arg Phe Glu Leu Ile Glu Asp Asn Tyr Ala
    850                 855                 860

Ala Val Asn Glu Met Leu Gly Arg Pro Thr Lys Val Thr Pro Ser Ser
865                 870                 875                 880

Lys Val Val Gly Asp Leu Ala Leu His Leu Val Gly Ala Gly Val Asp
                885                 890                 895

Pro Ala Asp Phe Ala Ala Asp Pro Gln Lys Tyr Asp Ile Pro Asp Ser
            900                 905                 910

Val Ile Ala Phe Leu Arg Gly Glu Leu Gly Asn Pro Pro Gly Gly Trp
        915                 920                 925

Pro Glu Pro Leu Arg Thr Arg Ala Leu Glu Gly Arg Ser Glu Gly Lys
    930                 935                 940

Ala Pro Leu Thr Glu Val Pro Glu Glu Glu Gln Ala His Leu Asp Ala
945                 950                 955                 960

Asp Asp Ser Lys Glu Arg Arg Asn Ser Leu Asn Arg Leu Leu Phe Pro
                965                 970                 975

Lys Pro Thr Glu Glu Phe Leu Glu His Arg Arg Arg Phe Gly Asn Thr
            980                 985                 990

Ser Ala Leu Asp Asp Arg Glu Phe Phe Tyr Gly Leu Val Glu Gly Arg
        995                1000                1005
```

```
Glu Thr Leu Ile Arg Leu Pro Asp Val Arg Thr Pro Leu Leu Val Arg
   1010               1015               1020

Leu Asp Ala Ile Ser Glu Pro Asp Asp Lys Gly Met Arg Asn Val Val
1025               1030               1035               1040

Ala Asn Val Asn Gly Gln Ile Arg Pro Met Arg Val Arg Asp Arg Ser
               1045               1050               1055

Val Glu Ser Val Thr Ala Thr Ala Glu Lys Ala Asp Ser Ser Asn Lys
           1060               1065               1070

Gly His Val Ala Ala Pro Phe Ala Gly Val Val Thr Val Thr Val Ala
       1075               1080               1085

Glu Gly Asp Glu Val Lys Ala Gly Asp Ala Val Ala Ile Ile Glu Ala
   1090               1095               1100

Met Lys Met Glu Ala Thr Ile Thr Ala Ser Val Asp Gly Lys Ile Asp
1105               1110               1115               1120

Arg Val Val Val Pro Ala Ala Thr Lys Val Glu Gly Gly Asp Leu Ile
               1125               1130               1135

Val Val Val Ser
           1140


<210> 81
<211> 366
<212> DNA
<213> 麩胺酸棒狀桿菌


<220>
<221> CDS
<222> (1)..(366)
<223> RXA04073K

<400> 81
gtg ttt ggc gat gtg atc aga cta agt gat cac cgt cac cag caa aag   48
Met Phe Gly Asp Val Ile Arg Leu Ser Asp His Arg His Gln Gln Lys
  1               5                  10                  15

ggg ttt gcg aac ttt act aag tca tta ccc ccg cct aac ccc gac ttt   96
Gly Phe Ala Asn Phe Thr Lys Ser Leu Pro Pro Pro Asn Pro Asp Phe
             20                  25                  30

tat cta ggt cac acc ttc gaa acc tac gga acg ttg cgg tgc ctg cat   144
Tyr Leu Gly His Thr Phe Glu Thr Tyr Gly Thr Leu Arg Cys Leu His
         35                  40                  45

ttt ccc att tca gag cat ttg ccc agt aca tcc gta cta gca act ccc   192
Phe Pro Ile Ser Glu His Leu Pro Ser Thr Ser Val Leu Ala Thr Pro
     50                  55                  60

ccg ccc act ttt tct gcg aag cca gaa ctt tgc aaa ctt cac aac agg   240
Pro Pro Thr Phe Ser Ala Lys Pro Glu Leu Cys Lys Leu His Asn Arg
```

65 70 75 80

ggt gac cac ccc cgc aca aaa ctt aaa aac cca aac cga ttg acg cac 288
Gly Asp His Pro Arg Thr Lys Leu Lys Asn Pro Asn Arg Leu Thr His
85 90 95

caa tgc ccg atg gag caa tgt gtg aac cac gcc acc acg caa acc gat 336
Gln Cys Pro Met Glu Gln Cys Val Asn His Ala Thr Thr Gln Thr Asp
100 105 110

gca cat cac gtc gaa aca gtg aca gtg cat 366
Ala His His Val Glu Thr Val Thr Val His
115 120

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<211> 122
<212> PRT
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<400> 82
Met Phe Gly Asp Val Ile Arg Leu Ser Asp His Arg His Gln Gln Lys
1 5 10 15

Gly Phe Ala Asn Phe Thr Lys Ser Leu Pro Pro Pro Asn Pro Asp Phe
20 25 30

Tyr Leu Gly His Thr Phe Glu Thr Tyr Gly Thr Leu Arg Cys Leu His
35 40 45

Phe Pro Ile Ser Glu His Leu Pro Ser Thr Ser Val Leu Ala Thr Pro
50 55 60

Pro Pro Thr Phe Ser Ala Lys Pro Glu Leu Cys Lys Leu His Asn Arg
65 70 75 80

Gly Asp His Pro Arg Thr Lys Leu Lys Asn Pro Asn Arg Leu Thr His
85 90 95

Gln Cys Pro Met Glu Gln Cys Val Asn His Ala Thr Thr Gln Thr Asp
100 105 110

Ala His His Val Glu Thr Val Thr Val His
115 120

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Met Glu Leu Thr Val Thr Glu Ser Lys Asn Ser Phe Asn Ala Lys Ser
  1               5                  10                  15

acc ctt gaa gtt ggc gac aag tcc tat gac tac ttc gcc ctc tct gca   96
Thr Leu Glu Val Gly Asp Lys Ser Tyr Asp Tyr Phe Ala Leu Ser Ala
             20                  25                  30

gtg cct ggc atg gag aag ctg ccg tac tcc ctc aag gtt ctc gga gag   144
Val Pro Gly Met Glu Lys Leu Pro Tyr Ser Leu Lys Val Leu Gly Glu
         35                  40                  45

aac ctt ctt cgt acc gaa gac ggc gca aac atc acc aac gag cac att   192
Asn Leu Leu Arg Thr Glu Asp Gly Ala Asn Ile Thr Asn Glu His Ile
     50                  55                  60

gag gct atc gcc aac tgg gat gca tct tcc gat cca agc atc gaa atc   240
Glu Ala Ile Ala Asn Trp Asp Ala Ser Ser Asp Pro Ser Ile Glu Ile
 65                  70                  75                  80

cag ttc acc cca gcc cgt gtt ctc atg cag gac ttc acc ggt gtc cct   288
Gln Phe Thr Pro Ala Arg Val Leu Met Gln Asp Phe Thr Gly Val Pro
                 85                  90                  95

tgt gta gtt gac ctc gca acc atg cgt gag gca gtt gct gca ctc ggt   336
Cys Val Val Asp Leu Ala Thr Met Arg Glu Ala Val Ala Ala Leu Gly
            100                 105                 110

ggc gac cct aac gac gtc aac cca ctg aac cca gcc gag atg gtc att   384
Gly Asp Pro Asn Asp Val Asn Pro Leu Asn Pro Ala Glu Met Val Ile
        115                 120                 125

gac cac tcc gtc atc gtg gag gct ttc ggc cgc cca gat gca ctg gct   432
Asp His Ser Val Ile Val Glu Ala Phe Gly Arg Pro Asp Ala Leu Ala

    130                 135                 140

aag aac gtt gag atc gag tac gag cgc aac gag gag cgt tac cag ttc   480
Lys Asn Val Glu Ile Glu Tyr Glu Arg Asn Glu Glu Arg Tyr Gln Phe
145                 150                 155                 160

ctg cgt tgg ggt tcc gag tcc ttc tcc aac ttc cgc gtt gtt cct cca   528
Leu Arg Trp Gly Ser Glu Ser Phe Ser Asn Phe Arg Val Val Pro Pro
                165                 170                 175

gga acc ggt atc gtc cac cag gtc aac att gag tac ttg gct cgc gtc   576
Gly Thr Gly Ile Val His Gln Val Asn Ile Glu Tyr Leu Ala Arg Val
            180                 185                 190

gtc ttc gac aac gag ggc ctt gca tac cca gat acc tgc atc ggt acc   624
Val Phe Asp Asn Glu Gly Leu Ala Tyr Pro Asp Thr Cys Ile Gly Thr
        195                 200                 205

gac tcc cac acc acc atg gaa aac ggc ctg ggc atc ctg ggc tgg ggc   672
Asp Ser His Thr Thr Met Glu Asn Gly Leu Gly Ile Leu Gly Trp Gly
    210                 215                 220

gtt ggt ggc att gag gct gaa gca gca atg ctc ggc cag cca gtg tcc   720
Val Gly Gly Ile Glu Ala Glu Ala Ala Met Leu Gly Gln Pro Val Ser
225                 230                 235                 240
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atg ctg atc cct cgc gtt gtt ggc ttc aag ttg acc ggc gag atc cca   768
Met Leu Ile Pro Arg Val Val Gly Phe Lys Leu Thr Gly Glu Ile Pro
                245                 250                 255

gta ggc gtt acc gca act gac gtt gtg ctg acc atc acc gaa atg ctg   816
Val Gly Val Thr Ala Thr Asp Val Val Leu Thr Ile Thr Glu Met Leu
            260                 265                 270

cgc gac cac ggc gtc gtc cag aag ttc gtt gag ttc tac ggc tcc ggt   864
Arg Asp His Gly Val Val Gln Lys Phe Val Glu Phe Tyr Gly Ser Gly
        275                 280                 285

gtt aag gct gtt cca ctg gct aac cgt gca acc atc ggc aac atg tcc   912
Val Lys Ala Val Pro Leu Ala Asn Arg Ala Thr Ile Gly Asn Met Ser
    290                 295                 300

cca gag ttc ggc tcc acc tgt gcg atg ttc cca atc gac gag gag acc   960
Pro Glu Phe Gly Ser Thr Cys Ala Met Phe Pro Ile Asp Glu Glu Thr
305                 310                 315                 320

acc aag tac ctg cgc ctc acc ggc cgc cca gaa gag cag gtt gca ctg   1008
Thr Lys Tyr Leu Arg Leu Thr Gly Arg Pro Glu Glu Gln Val Ala Leu
                325                 330                 335

gtc gag gct tac gcc aag gcg cag ggc atg tgg ctc gac gag gac acc   1056
Val Glu Ala Tyr Ala Lys Ala Gln Gly Met Trp Leu Asp Glu Asp Thr
            340                 345                 350

gtt gaa gct gag tac tcc gag tac ctc gag ctg gac ctg tcc acc gtt   1104
Val Glu Ala Glu Tyr Ser Glu Tyr Leu Glu Leu Asp Leu Ser Thr Val
        355                 360                 365

gtt cct tcc atc gct ggc cct aag cgc cca cag gac cgc atc ctt ctc   1152
Val Pro Ser Ile Ala Gly Pro Lys Arg Pro Gln Asp Arg Ile Leu Leu
    370                 375                 380

tcc gag gca aag gag cag ttc cgt aag gat ctg cca acc tac acc gac   1200
Ser Glu Ala Lys Glu Gln Phe Arg Lys Asp Leu Pro Thr Tyr Thr Asp
385                 390                 395                 400

gac gct gtt tcc gta gac acc tcc atc cct gca acc cgc atg gtt aac   1248
Asp Ala Val Ser Val Asp Thr Ser Ile Pro Ala Thr Arg Met Val Asn
                405                 410                 415

gaa ggt ggc gga cag cct gaa ggc ggc gtc gaa gct gac aac tac aac   1296
Glu Gly Gly Gly Gln Pro Glu Gly Gly Val Glu Ala Asp Asn Tyr Asn
            420                 425                 430

gct tcc tgg gct ggc tcc ggc gag tcc ttg gct act ggc gca gaa gga   1344
Ala Ser Trp Ala Gly Ser Gly Glu Ser Leu Ala Thr Gly Ala Glu Gly
        435                 440                 445

cgt cct tcc aag cca gtc acc gtt gca tcc cca cag ggt ggc gag tac   1392
Arg Pro Ser Lys Pro Val Thr Val Ala Ser Pro Gln Gly Gly Glu Tyr
    450                 455                 460

acc atc gac cac ggc atg gtt gca att gca tcc atc acc tct tgc acc   1440
Thr Ile Asp His Gly Met Val Ala Ile Ala Ser Ile Thr Ser Cys Thr
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465                 470                 475                 480

aac acc tct aac cca tcc gtg atg atc ggc gct ggc ctg atc gca cgt   1488
Asn Thr Ser Asn Pro Ser Val Met Ile Gly Ala Gly Leu Ile Ala Arg
                485                 490                 495

aag gca gca gaa aag ggc ctc aag tcc aag cct tgg gtt aag acc atc   1536
Lys Ala Ala Glu Lys Gly Leu Lys Ser Lys Pro Trp Val Lys Thr Ile
            500                 505                 510

tgt gca cca ggt tcc cag gtt gtc gac ggc tac tac cag cgc gca gac   1584
Cys Ala Pro Gly Ser Gln Val Val Asp Gly Tyr Tyr Gln Arg Ala Asp
        515                 520                 525

ctc tgg aag gac ctt gag gcc atg ggc ttc tac ctc tcc ggc ttc ggc   1632
Leu Trp Lys Asp Leu Glu Ala Met Gly Phe Tyr Leu Ser Gly Phe Gly
    530                 535                 540

tgc acc acc tgt att ggt aac tcc ggc cca ctg cca gag gaa atc tcc   1680
Cys Thr Thr Cys Ile Gly Asn Ser Gly Pro Leu Pro Glu Glu Ile Ser
545                 550                 555                 560

gct gcg atc aac gag cac gac ctg acc gca acc gca gtt ttg tcc ggt   1728
Ala Ala Ile Asn Glu His Asp Leu Thr Ala Thr Ala Val Leu Ser Gly
                565                 570                 575

aac cgt aac ttc gag gga cgt atc tcc cct gac gtt aag atg aac tac   1776
Asn Arg Asn Phe Glu Gly Arg Ile Ser Pro Asp Val Lys Met Asn Tyr
            580                 585                 590

ctg gca tcc cca atc atg gtc att gct tac gca atc gct ggc acc atg   1824
Leu Ala Ser Pro Ile Met Val Ile Ala Tyr Ala Ile Ala Gly Thr Met
        595                 600                 605

gac ttc gac ttc gag aac gaa gct ctt gga cag gac cag gac ggc aac   1872
Asp Phe Asp Phe Glu Asn Glu Ala Leu Gly Gln Asp Gln Asp Gly Asn
    610                 615                 620

gac gtc ttc ctg aag gac atc tgg cct tcc acc gag gaa atc gaa gac   1920
Asp Val Phe Leu Lys Asp Ile Trp Pro Ser Thr Glu Glu Ile Glu Asp
625                 630                 635                 640

acc atc cag cag gca atc tcc cgt gag ctt tac gaa gct gac tac gca   1968
Thr Ile Gln Gln Ala Ile Ser Arg Glu Leu Tyr Glu Ala Asp Tyr Ala
                645                 650                 655

gat gtc ttc aag ggt gac aag cag tgg cag gaa ctc gat gtt cct acc   2016
Asp Val Phe Lys Gly Asp Lys Gln Trp Gln Glu Leu Asp Val Pro Thr
            660                 665                 670

ggt gac acc ttc gag tgg gac gag aac tcc acc tac atc cgc aag gca   2064
Gly Asp Thr Phe Glu Trp Asp Glu Asn Ser Thr Tyr Ile Arg Lys Ala
        675                 680                 685

cct tac ttc gac ggc atg cct gtc gag cca gtg gca gtc acc gac atc   2112
Pro Tyr Phe Asp Gly Met Pro Val Glu Pro Val Ala Val Thr Asp Ile
    690                 695                 700

cag ggc gca cgc gtt ctg gct aag ctc ggc gac tct gtc acc acc gac   2160
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Gln Gly Ala Arg Val Leu Ala Lys Leu Gly Asp Ser Val Thr Thr Asp
705                 710                 715                 720

cac atc tcc cct gct tcc tcc att aag cca ggt acc cct gca gct cag   2208
His Ile Ser Pro Ala Ser Ser Ile Lys Pro Gly Thr Pro Ala Ala Gln
                725                 730                 735

tac ttg gat gag cac ggt gtg gaa cgc cac gac tac aac tcc ctg ggt   2256
Tyr Leu Asp Glu His Gly Val Glu Arg His Asp Tyr Asn Ser Leu Gly
            740                 745                 750

tcc agg cgt ggt aac cac gag gtc atg atg cgc ggc acc ttc gcc aac   2304
Ser Arg Arg Gly Asn His Glu Val Met Met Arg Gly Thr Phe Ala Asn
        755                 760                 765

atc cgc ctc cag aac cag ctg gtt gac atc gca ggt ggc tac acc cgc   2352
Ile Arg Leu Gln Asn Gln Leu Val Asp Ile Ala Gly Gly Tyr Thr Arg
    770                 775                 780

gac ttc acc cag gag ggt gct cca cag gcg ttc atc tac gac gct tcc   2400
Asp Phe Thr Gln Glu Gly Ala Pro Gln Ala Phe Ile Tyr Asp Ala Ser
785                 790                 795                 800

gtc aac tac aag gct gct ggc att ccg ctg gtc gtc ttg ggc ggc aag   2448
Val Asn Tyr Lys Ala Ala Gly Ile Pro Leu Val Val Leu Gly Gly Lys
                805                 810                 815

gag tac ggc acc ggt tct tcc cgt gac tgg gca gct aag ggc act aac   2496
Glu Tyr Gly Thr Gly Ser Ser Arg Asp Trp Ala Ala Lys Gly Thr Asn
            820                 825                 830

ctg ctc gga att cgc gca gtt atc acc gag tcc ttc gag cgt att cac   2544
Leu Leu Gly Ile Arg Ala Val Ile Thr Glu Ser Phe Glu Arg Ile His
        835                 840                 845

cgc tcc aac ctc atc ggt atg ggc gtt gtc cca ctg cag ttc cct gca   2592
Arg Ser Asn Leu Ile Gly Met Gly Val Val Pro Leu Gln Phe Pro Ala
    850                 855                 860

ggc gaa tcc cac gag tcc ctg ggc ctt gac ggc acc gag acc ttc gac   2640
Gly Glu Ser His Glu Ser Leu Gly Leu Asp Gly Thr Glu Thr Phe Asp
865                 870                 875                 880

atc acc gga ctg acc gca ctc aac gag ggc gag act cct aag act gtc   2688
Ile Thr Gly Leu Thr Ala Leu Asn Glu Gly Glu Thr Pro Lys Thr Val
                885                 890                 895

aag gtc acc gca acc aag gag aac ggc gac gtc gtc gag ttc gac gca   2736
Lys Val Thr Ala Thr Lys Glu Asn Gly Asp Val Val Glu Phe Asp Ala
            900                 905                 910

gtt gtc cgc atc gac acc cca ggt gag gct gac tac tac cgc cac ggc   2784
Val Val Arg Ile Asp Thr Pro Gly Glu Ala Asp Tyr Tyr Arg His Gly
        915                 920                 925

ggc atc ctg cag tac gtg ctg cgt cag atg gct gct tct tct aag       2829
Gly Ile Leu Gln Tyr Val Leu Arg Gln Met Ala Ala Ser Ser Lys
    930                 935                 940
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<210> 84
<211> 943
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 84

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Met Glu Leu Thr Val Thr Glu Ser Lys Asn Ser Phe Asn Ala Lys Ser
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Thr Leu Glu Val Gly Asp Lys Ser Tyr Asp Tyr Phe Ala Leu Ser Ala
            20                  25                  30

Val Pro Gly Met Glu Lys Leu Pro Tyr Ser Leu Lys Val Leu Gly Glu
        35                  40                  45

Asn Leu Leu Arg Thr Glu Asp Gly Ala Asn Ile Thr Asn Glu His Ile
    50                  55                  60

Glu Ala Ile Ala Asn Trp Asp Ala Ser Ser Asp Pro Ser Ile Glu Ile
65                  70                  75                  80

Gln Phe Thr Pro Ala Arg Val Leu Met Gln Asp Phe Thr Gly Val Pro
                85                  90                  95

Cys Val Val Asp Leu Ala Thr Met Arg Glu Ala Val Ala Ala Leu Gly
            100                 105                 110

Gly Asp Pro Asn Asp Val Asn Pro Leu Asn Pro Ala Glu Met Val Ile
        115                 120                 125

Asp His Ser Val Ile Val Glu Ala Phe Gly Arg Pro Asp Ala Leu Ala
    130                 135                 140

Lys Asn Val Glu Ile Glu Tyr Glu Arg Asn Glu Glu Arg Tyr Gln Phe
145                 150                 155                 160

Leu Arg Trp Gly Ser Glu Ser Phe Ser Asn Phe Arg Val Val Pro Pro
                165                 170                 175

Gly Thr Gly Ile Val His Gln Val Asn Ile Glu Tyr Leu Ala Arg Val
            180                 185                 190

Val Phe Asp Asn Glu Gly Leu Ala Tyr Pro Asp Thr Cys Ile Gly Thr
        195                 200                 205

Asp Ser His Thr Thr Met Glu Asn Gly Leu Gly Ile Leu Gly Trp Gly
    210                 215                 220

Val Gly Gly Ile Glu Ala Glu Ala Ala Met Leu Gly Gln Pro Val Ser
225                 230                 235                 240

Met Leu Ile Pro Arg Val Val Gly Phe Lys Leu Thr Gly Glu Ile Pro
                245                 250                 255

Val Gly Val Thr Ala Thr Asp Val Val Leu Thr Ile Thr Glu Met Leu
            260                 265                 270
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Arg Asp His Gly Val Val Gln Lys Phe Val Glu Phe Tyr Gly Ser Gly
        275                 280                 285

Val Lys Ala Val Pro Leu Ala Asn Arg Ala Thr Ile Gly Asn Met Ser
    290                 295                 300

Pro Glu Phe Gly Ser Thr Cys Ala Met Phe Pro Ile Asp Glu Glu Thr
305                 310                 315                 320

Thr Lys Tyr Leu Arg Leu Thr Gly Arg Pro Glu Glu Gln Val Ala Leu
                325                 330                 335

Val Glu Ala Tyr Ala Lys Ala Gln Gly Met Trp Leu Asp Glu Asp Thr
            340                 345                 350

Val Glu Ala Glu Tyr Ser Glu Tyr Leu Glu Leu Asp Leu Ser Thr Val
        355                 360                 365

Val Pro Ser Ile Ala Gly Pro Lys Arg Pro Gln Asp Arg Ile Leu Leu
    370                 375                 380

Ser Glu Ala Lys Glu Gln Phe Arg Lys Asp Leu Pro Thr Tyr Thr Asp
385                 390                 395                 400

Asp Ala Val Ser Val Asp Thr Ser Ile Pro Ala Thr Arg Met Val Asn
                405                 410                 415

Glu Gly Gly Gly Gln Pro Glu Gly Gly Val Glu Ala Asp Asn Tyr Asn
            420                 425                 430

Ala Ser Trp Ala Gly Ser Gly Glu Ser Leu Ala Thr Gly Ala Glu Gly
        435                 440                 445

Arg Pro Ser Lys Pro Val Thr Val Ala Ser Pro Gln Gly Gly Glu Tyr
    450                 455                 460

Thr Ile Asp His Gly Met Val Ala Ile Ala Ser Ile Thr Ser Cys Thr
465                 470                 475                 480

Asn Thr Ser Asn Pro Ser Val Met Ile Gly Ala Gly Leu Ile Ala Arg
                485                 490                 495

Lys Ala Ala Glu Lys Gly Leu Lys Ser Lys Pro Trp Val Lys Thr Ile
            500                 505                 510

Cys Ala Pro Gly Ser Gln Val Val Asp Gly Tyr Tyr Gln Arg Ala Asp
        515                 520                 525

Leu Trp Lys Asp Leu Glu Ala Met Gly Phe Tyr Leu Ser Gly Phe Gly
    530                 535                 540

Cys Thr Thr Cys Ile Gly Asn Ser Gly Pro Leu Pro Glu Glu Ile Ser
545                 550                 555                 560

Ala Ala Ile Asn Glu His Asp Leu Thr Ala Thr Ala Val Leu Ser Gly
                565                 570                 575

Asn Arg Asn Phe Glu Gly Arg Ile Ser Pro Asp Val Lys Met Asn Tyr
```

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            580                 585                 590

Leu Ala Ser Pro Ile Met Val Ile Ala Tyr Ala Ile Ala Gly Thr Met
        595                 600                 605

Asp Phe Asp Phe Glu Asn Glu Ala Leu Gly Gln Asp Gln Asp Gly Asn
    610                 615                 620

Asp Val Phe Leu Lys Asp Ile Trp Pro Ser Thr Glu Glu Ile Glu Asp
625                 630                 635                 640

Thr Ile Gln Gln Ala Ile Ser Arg Glu Leu Tyr Glu Ala Asp Tyr Ala
                645                 650                 655

Asp Val Phe Lys Gly Asp Lys Gln Trp Gln Glu Leu Asp Val Pro Thr
            660                 665                 670

Gly Asp Thr Phe Glu Trp Asp Glu Asn Ser Thr Tyr Ile Arg Lys Ala
        675                 680                 685

Pro Tyr Phe Asp Gly Met Pro Val Glu Pro Val Ala Val Thr Asp Ile
    690                 695                 700

Gln Gly Ala Arg Val Leu Ala Lys Leu Gly Asp Ser Val Thr Thr Asp
705                 710                 715                 720

His Ile Ser Pro Ala Ser Ser Ile Lys Pro Gly Thr Pro Ala Ala Gln
                725                 730                 735

Tyr Leu Asp Glu His Gly Val Glu Arg His Asp Tyr Asn Ser Leu Gly
            740                 745                 750

Ser Arg Arg Gly Asn His Glu Val Met Met Arg Gly Thr Phe Ala Asn
        755                 760                 765

Ile Arg Leu Gln Asn Gln Leu Val Asp Ile Ala Gly Gly Tyr Thr Arg
    770                 775                 780

Asp Phe Thr Gln Glu Gly Ala Pro Gln Ala Phe Ile Tyr Asp Ala Ser
785                 790                 795                 800

Val Asn Tyr Lys Ala Ala Gly Ile Pro Leu Val Val Leu Gly Gly Lys
                805                 810                 815

Glu Tyr Gly Thr Gly Ser Ser Arg Asp Trp Ala Ala Lys Gly Thr Asn
            820                 825                 830

Leu Leu Gly Ile Arg Ala Val Ile Thr Glu Ser Phe Glu Arg Ile His
        835                 840                 845

Arg Ser Asn Leu Ile Gly Met Gly Val Val Pro Leu Gln Phe Pro Ala
    850                 855                 860

Gly Glu Ser His Glu Ser Leu Gly Leu Asp Gly Thr Glu Thr Phe Asp
865                 870                 875                 880

Ile Thr Gly Leu Thr Ala Leu Asn Glu Gly Glu Thr Pro Lys Thr Val
                885                 890                 895
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Lys Val Thr Ala Thr Lys Glu Asn Gly Asp Val Val Glu Phe Asp Ala
            900                 905                 910

Val Val Arg Ile Asp Thr Pro Gly Glu Ala Asp Tyr Tyr Arg His Gly
        915                 920                 925

Gly Ile Leu Gln Tyr Val Leu Arg Gln Met Ala Ala Ser Ser Lys
    930                 935                 940


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Met Ala Thr Asp Asn Asn Lys Ala Val Leu His Tyr Pro Gly Gly Glu
  1               5                  10                  15

ttc gaa atg gac atc atc gag gct tct gag ggt aac aac ggt gtt gtc   96
Phe Glu Met Asp Ile Ile Glu Ala Ser Glu Gly Asn Asn Gly Val Val
             20                  25                  30

ctg ggc aag atg ctg tct gag act gga ctg atc act ttt gac cca ggt   144
Leu Gly Lys Met Leu Ser Glu Thr Gly Leu Ile Thr Phe Asp Pro Gly
         35                  40                  45

tat gtg agc act ggc tcc acc gag tcg aag atc acc tac atc gat ggc   192
Tyr Val Ser Thr Gly Ser Thr Glu Ser Lys Ile Thr Tyr Ile Asp Gly
     50                  55                  60

gat gcg gga atc ctg cgt tac cgc ggc tat gac atc gct gat ctg gct   240
Asp Ala Gly Ile Leu Arg Tyr Arg Gly Tyr Asp Ile Ala Asp Leu Ala
 65                  70                  75                  80

gag aat gcc acc ttc aac gag gtt tct tac cta ctt atc aac ggt gag   288
Glu Asn Ala Thr Phe Asn Glu Val Ser Tyr Leu Leu Ile Asn Gly Glu
                 85                  90                  95

cta cca acc cca gat gag ctt cac aag ttt aac gac gag att cgc cac   336
Leu Pro Thr Pro Asp Glu Leu His Lys Phe Asn Asp Glu Ile Arg His
            100                 105                 110

cac acc ctt ctg gac gag gac ttc aag tcc cag ttc aac gtg ttc cca   384
His Thr Leu Leu Asp Glu Asp Phe Lys Ser Gln Phe Asn Val Phe Pro
        115                 120                 125

cgc gac gct cac cca atg gca acc ttg gct tcc tcg gtt aac att ttg   432
Arg Asp Ala His Pro Met Ala Thr Leu Ala Ser Ser Val Asn Ile Leu
    130                 135                 140

tct acc tac tac cag gac cag ctg aac cca ctc gat gag gca cag ctt   480
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Ser Thr Tyr Tyr Gln Asp Gln Leu Asn Pro Leu Asp Glu Ala Gln Leu
145                 150                 155                 160

gat aag gca acc gtt cgc ctc atg gca aag gtt cca atg ctg gct gcg   528
Asp Lys Ala Thr Val Arg Leu Met Ala Lys Val Pro Met Leu Ala Ala
                165                 170                 175

tac gca cac cgc gca cgc aag ggt gct cct tac atg tac cca gac aac   576
Tyr Ala His Arg Ala Arg Lys Gly Ala Pro Tyr Met Tyr Pro Asp Asn
            180                 185                 190

tcc ctc aat gcg cgt gag aac ttc ctg cgc atg atg ttc ggt tac cca   624
Ser Leu Asn Ala Arg Glu Asn Phe Leu Arg Met Met Phe Gly Tyr Pro
        195                 200                 205

acc gag cca tac gag atc gac cca atc atg gtc aag gct ctg gac aag   672
Thr Glu Pro Tyr Glu Ile Asp Pro Ile Met Val Lys Ala Leu Asp Lys
    210                 215                 220

ctg ctc atc ctg cac gct gac cac gag cag aac tgc tcc acc tcc acc   720
Leu Leu Ile Leu His Ala Asp His Glu Gln Asn Cys Ser Thr Ser Thr
225                 230                 235                 240

gtt cgt atg atc ggt tcc gca cag gcc aac atg ttt gtc tcc atc gct   768
Val Arg Met Ile Gly Ser Ala Gln Ala Asn Met Phe Val Ser Ile Ala
                245                 250                 255

ggt ggc atc aac gct ctg tcc ggc cca ctg cac ggt ggc gca aac cag   816
Gly Gly Ile Asn Ala Leu Ser Gly Pro Leu His Gly Gly Ala Asn Gln
            260                 265                 270

gct gtt ctg gag atg ctc gaa gac atc aag agc aac cac ggt ggc gac   864
Ala Val Leu Glu Met Leu Glu Asp Ile Lys Ser Asn His Gly Gly Asp
        275                 280                 285

gca acc gag ttc atg aac aag gtc aag aac aag gaa gac ggc gtc cgc   912
Ala Thr Glu Phe Met Asn Lys Val Lys Asn Lys Glu Asp Gly Val Arg
    290                 295                 300

ctc atg ggc ttc gga cac cgc gtt tac aag aac tac gat cca cgt gca   960
Leu Met Gly Phe Gly His Arg Val Tyr Lys Asn Tyr Asp Pro Arg Ala
305                 310                 315                 320

gca atc gtc aag gag acc gca cac gag atc ctc gag cac ctc ggt ggc  1008
Ala Ile Val Lys Glu Thr Ala His Glu Ile Leu Glu His Leu Gly Gly
                325                 330                 335

gac gat ctt ctg gat ctg gca atc aag ctg gaa gaa att gca ctg gct  1056
Asp Asp Leu Leu Asp Leu Ala Ile Lys Leu Glu Glu Ile Ala Leu Ala
            340                 345                 350

gat gat tac ttc atc tcc cgc aag ctc tac ccg aac gta gac ttc tac  1104
Asp Asp Tyr Phe Ile Ser Arg Lys Leu Tyr Pro Asn Val Asp Phe Tyr
        355                 360                 365

acc ggc ctg atc tac cgc gca atg ggc ttc cca act gac ttc ttc acc  1152
Thr Gly Leu Ile Tyr Arg Ala Met Gly Phe Pro Thr Asp Phe Phe Thr
    370                 375                 380
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```
gta ttg ttc gca atc ggt cgt ctg cca gga tgg atc gct cac tac cgc   1200
Val Leu Phe Ala Ile Gly Arg Leu Pro Gly Trp Ile Ala His Tyr Arg
385                 390                 395                 400

gag cag ctc ggt gca gca ggc aac aag atc aac cgc cca cgc cag gtc   1248
Glu Gln Leu Gly Ala Ala Gly Asn Lys Ile Asn Arg Pro Arg Gln Val
                405                 410                 415

tac acc ggc aac gaa tcc cgc aag ttg gtt cct cgc gag gag cgc       1293
Tyr Thr Gly Asn Glu Ser Arg Lys Leu Val Pro Arg Glu Glu Arg
            420                 425                 430
```

<210> 86
<211> 431
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 86

```
Met Ala Thr Asp Asn Asn Lys Ala Val Leu His Tyr Pro Gly Gly Glu
  1               5                  10                  15

Phe Glu Met Asp Ile Ile Glu Ala Ser Glu Gly Asn Asn Gly Val Val
             20                  25                  30

Leu Gly Lys Met Leu Ser Glu Thr Gly Leu Ile Thr Phe Asp Pro Gly
         35                  40                  45

Tyr Val Ser Thr Gly Ser Thr Glu Ser Lys Ile Thr Tyr Ile Asp Gly
     50                  55                  60

Asp Ala Gly Ile Leu Arg Tyr Arg Gly Tyr Asp Ile Ala Asp Leu Ala
 65                  70                  75                  80

Glu Asn Ala Thr Phe Asn Glu Val Ser Tyr Leu Leu Ile Asn Gly Glu
                 85                  90                  95

Leu Pro Thr Pro Asp Glu Leu His Lys Phe Asn Asp Glu Ile Arg His
            100                 105                 110

His Thr Leu Leu Asp Glu Asp Phe Lys Ser Gln Phe Asn Val Phe Pro
        115                 120                 125

Arg Asp Ala His Pro Met Ala Thr Leu Ala Ser Ser Val Asn Ile Leu
    130                 135                 140

Ser Thr Tyr Tyr Gln Asp Gln Leu Asn Pro Leu Asp Glu Ala Gln Leu
145                 150                 155                 160

Asp Lys Ala Thr Val Arg Leu Met Ala Lys Val Pro Met Leu Ala Ala
                165                 170                 175

Tyr Ala His Arg Ala Arg Lys Gly Ala Pro Tyr Met Tyr Pro Asp Asn
            180                 185                 190

Ser Leu Asn Ala Arg Glu Asn Phe Leu Arg Met Met Phe Gly Tyr Pro
        195                 200                 205
```

```
Thr Glu Pro Tyr Glu Ile Asp Pro Ile Met Val Lys Ala Leu Asp Lys
    210                 215                 220

Leu Leu Ile Leu His Ala Asp His Glu Gln Asn Cys Ser Thr Ser Thr
225                 230                 235                 240

Val Arg Met Ile Gly Ser Ala Gln Ala Asn Met Phe Val Ser Ile Ala
                245                 250                 255

Gly Gly Ile Asn Ala Leu Ser Gly Pro Leu His Gly Gly Ala Asn Gln
            260                 265                 270

Ala Val Leu Glu Met Leu Glu Asp Ile Lys Ser Asn His Gly Gly Asp
        275                 280                 285

Ala Thr Glu Phe Met Asn Lys Val Lys Asn Lys Glu Asp Gly Val Arg
    290                 295                 300

Leu Met Gly Phe Gly His Arg Val Tyr Lys Asn Tyr Asp Pro Arg Ala
305                 310                 315                 320

Ala Ile Val Lys Glu Thr Ala His Glu Ile Leu Glu His Leu Gly Gly
                325                 330                 335

Asp Asp Leu Leu Asp Leu Ala Ile Lys Leu Glu Glu Ile Ala Leu Ala
            340                 345                 350

Asp Asp Tyr Phe Ile Ser Arg Lys Leu Tyr Pro Asn Val Asp Phe Tyr
        355                 360                 365

Thr Gly Leu Ile Tyr Arg Ala Met Gly Phe Pro Thr Asp Phe Phe Thr
    370                 375                 380

Val Leu Phe Ala Ile Gly Arg Leu Pro Gly Trp Ile Ala His Tyr Arg
385                 390                 395                 400

Glu Gln Leu Gly Ala Ala Gly Asn Lys Ile Asn Arg Pro Arg Gln Val
                405                 410                 415

Tyr Thr Gly Asn Glu Ser Arg Lys Leu Val Pro Arg Glu Glu Arg
            420                 425                 430
```

<210> 87
<211> 1311
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1311)
<223> RXA02175E

<400> 87

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atg ttt gaa agg gat atc gtg gct act gat aac aac aag gct gtc ctg   48
Met Phe Glu Arg Asp Ile Val Ala Thr Asp Asn Asn Lys Ala Val Leu
  1               5                  10                  15

cac tac ccc ggt ggc gag ttc gaa atg gac atc atc gag gct tct gag   96
```

```
His Tyr Pro Gly Gly Glu Phe Glu Met Asp Ile Ile Glu Ala Ser Glu
             20                  25                  30

ggt aac aac ggt gtt gtc ctg ggc aag atg ctg tct gag act gga ctg   144
Gly Asn Asn Gly Val Val Leu Gly Lys Met Leu Ser Glu Thr Gly Leu
         35                  40                  45

atc act ttt gac cca ggt tat gtg agc act ggc tcc acc gag tcg aag   192
Ile Thr Phe Asp Pro Gly Tyr Val Ser Thr Gly Ser Thr Glu Ser Lys
     50                  55                  60

atc acc tac atc gat ggc gat gcg gga atc ctg cgt tac cgc ggc tat   240
Ile Thr Tyr Ile Asp Gly Asp Ala Gly Ile Leu Arg Tyr Arg Gly Tyr
 65                  70                  75                  80

gac atc gct gat ctg gct gag aat gcc acc ttc aac gag gtt tct tac   288
Asp Ile Ala Asp Leu Ala Glu Asn Ala Thr Phe Asn Glu Val Ser Tyr
                 85                  90                  95

cta ctt atc aac ggt gag cta cca acc cca gat gag ctt cac aag ttt   336
Leu Leu Ile Asn Gly Glu Leu Pro Thr Pro Asp Glu Leu His Lys Phe
            100                 105                 110

aac gac gag att cgc cac cac acc ctt ctg gac gag gac ttc aag tcc   384
Asn Asp Glu Ile Arg His His Thr Leu Leu Asp Glu Asp Phe Lys Ser
        115                 120                 125

cag ttc aac gtg ttc cca cgc gac gct cac cca atg gca acc ttg gct   432
Gln Phe Asn Val Phe Pro Arg Asp Ala His Pro Met Ala Thr Leu Ala
    130                 135                 140

tcc tcg gtt aac att ttg tct acc tac tac cag gac cag ctg aac cca   480
Ser Ser Val Asn Ile Leu Ser Thr Tyr Tyr Gln Asp Gln Leu Asn Pro
145                 150                 155                 160

ctc gat gag gca cag ctt gat aag gca acc gtt cgc ctc atg gca aag   528
Leu Asp Glu Ala Gln Leu Asp Lys Ala Thr Val Arg Leu Met Ala Lys
                165                 170   .             175

gtt cca atg ctg gct gcg tac gca cac cgc gca cgc aag ggt gct cct   576
Val Pro Met Leu Ala Ala Tyr Ala His Arg Ala Arg Lys Gly Ala Pro
            180                 185                 190

tac atg tac cca gac aac tcc ctc aat gcg cgt gag aac ttc ctg cgc   624
Tyr Met Tyr Pro Asp Asn Ser Leu Asn Ala Arg Glu Asn Phe Leu Arg
        195                 200                 205

atg atg ttc ggt tac cca acc gag cca tac gag atc gac cca atc atg   672
Met Met Phe Gly Tyr Pro Thr Glu Pro Tyr Glu Ile Asp Pro Ile Met
    210                 215                 220

gtc aag gct ctg gac aag ctg ctc atc ctg cac gct gac cac gag cag   720
Val Lys Ala Leu Asp Lys Leu Leu Ile Leu His Ala Asp His Glu Gln
225                 230                 235                 240

aac tgc tcc acc tcc acc gtt cgt atg atc ggt tcc gca cag gcc aac   768
Asn Cys Ser Thr Ser Thr Val Arg Met Ile Gly Ser Ala Gln Ala Asn
                245                 250                 255
```

```
atg ttt gtc tcc atc gct ggt ggc atc aac gct ctg tcc ggc cca ctg   816
Met Phe Val Ser Ile Ala Gly Gly Ile Asn Ala Leu Ser Gly Pro Leu
            260                 265                 270

cac ggt ggc gca aac cag gct gtt ctg gag atg ctc gaa gac atc aag   864
His Gly Gly Ala Asn Gln Ala Val Leu Glu Met Leu Glu Asp Ile Lys
        275                 280                 285

agc aac cac ggt ggc gac gca acc gag ttc atg aac aag gtc aag aac   912
Ser Asn His Gly Gly Asp Ala Thr Glu Phe Met Asn Lys Val Lys Asn
    290                 295                 300

aag gaa gac ggc gtc cgc ctc atg ggc ttc gga cac cgc gtt tac aag   960
Lys Glu Asp Gly Val Arg Leu Met Gly Phe Gly His Arg Val Tyr Lys
305                 310                 315                 320

aac tac gat cca cgt gca gca atc gtc aag gag acc gca cac gag atc   1008
Asn Tyr Asp Pro Arg Ala Ala Ile Val Lys Glu Thr Ala His Glu Ile
                325                 330                 335

ctc gag cac ctc ggt ggc gac gat ctt ctg gat ctg gca atc aag ctg   1056
Leu Glu His Leu Gly Gly Asp Asp Leu Leu Asp Leu Ala Ile Lys Leu
            340                 345                 350

gaa gaa att gca ctg gct gat gat tac ttc atc tcc cgc aag ctc tac   1104
Glu Glu Ile Ala Leu Ala Asp Asp Tyr Phe Ile Ser Arg Lys Leu Tyr
        355                 360                 365

ccg aac gta gac ttc tac acc ggc ctg atc tac cgc gca atg ggc ttc   1152
Pro Asn Val Asp Phe Tyr Thr Gly Leu Ile Tyr Arg Ala Met Gly Phe
    370                 375                 380

cca act gac ttc ttc acc gta ttg ttc gca atc ggt cgt ctg cca gga   1200
Pro Thr Asp Phe Phe Thr Val Leu Phe Ala Ile Gly Arg Leu Pro Gly
385                 390                 395                 400

tgg atc gct cac tac cgc gag cag ctc ggt gca gca ggc aac aag atc   1248
Trp Ile Ala His Tyr Arg Glu Gln Leu Gly Ala Ala Gly Asn Lys Ile
                405                 410                 415

aac cgc cca cgc cag gtc tac acc ggc aac gaa tcc cgc aag ttg gtt   1296
Asn Arg Pro Arg Gln Val Tyr Thr Gly Asn Glu Ser Arg Lys Leu Val
            420                 425                 430

cct cgc gag gag cgc                                              1311
Pro Arg Glu Glu Arg
        435
```

<210> 88
<211> 437
<212> PRT
<213> 麩胺酸棒狀桿菌

```
<400> 88
Met Phe Glu Arg Asp Ile Val Ala Thr Asp Asn Asn Lys Ala Val Leu
  1               5                  10                  15
```

```
His Tyr Pro Gly Gly Glu Phe Glu Met Asp Ile Ile Glu Ala Ser Glu
             20                  25                  30

Gly Asn Asn Gly Val Val Leu Gly Lys Met Leu Ser Glu Thr Gly Leu
         35                  40                  45

Ile Thr Phe Asp Pro Gly Tyr Val Ser Thr Gly Ser Thr Glu Ser Lys
     50                  55                  60

Ile Thr Tyr Ile Asp Gly Asp Ala Gly Ile Leu Arg Tyr Arg Gly Tyr
 65                  70                  75                  80

Asp Ile Ala Asp Leu Ala Glu Asn Ala Thr Phe Asn Glu Val Ser Tyr
                 85                  90                  95

Leu Leu Ile Asn Gly Glu Leu Pro Thr Pro Asp Glu Leu His Lys Phe
            100                 105                 110

Asn Asp Glu Ile Arg His His Thr Leu Leu Asp Glu Asp Phe Lys Ser
        115                 120                 125

Gln Phe Asn Val Phe Pro Arg Asp Ala His Pro Met Ala Thr Leu Ala
    130                 135                 140

Ser Ser Val Asn Ile Leu Ser Thr Tyr Tyr Gln Asp Gln Leu Asn Pro
145                 150                 155                 160

Leu Asp Glu Ala Gln Leu Asp Lys Ala Thr Val Arg Leu Met Ala Lys
                165                 170                 175

Val Pro Met Leu Ala Ala Tyr Ala His Arg Ala Arg Lys Gly Ala Pro
            180                 185                 190

Tyr Met Tyr Pro Asp Asn Ser Leu Asn Ala Arg Glu Asn Phe Leu Arg
        195                 200                 205

Met Met Phe Gly Tyr Pro Thr Glu Pro Tyr Glu Ile Asp Pro Ile Met
    210                 215                 220

Val Lys Ala Leu Asp Lys Leu Leu Ile Leu His Ala Asp His Glu Gln
225                 230                 235                 240

Asn Cys Ser Thr Ser Thr Val Arg Met Ile Gly Ser Ala Gln Ala Asn
                245                 250                 255

Met Phe Val Ser Ile Ala Gly Gly Ile Asn Ala Leu Ser Gly Pro Leu
            260                 265                 270

His Gly Gly Ala Asn Gln Ala Val Leu Glu Met Leu Glu Asp Ile Lys
        275                 280                 285

Ser Asn His Gly Gly Asp Ala Thr Glu Phe Met Asn Lys Val Lys Asn
    290                 295                 300

Lys Glu Asp Gly Val Arg Leu Met Gly Phe Gly His Arg Val Tyr Lys
305                 310                 315                 320

Asn Tyr Asp Pro Arg Ala Ala Ile Val Lys Glu Thr Ala His Glu Ile
                325                 330                 335
```

```
Leu Glu His Leu Gly Gly Asp Asp Leu Leu Asp Leu Ala Ile Lys Leu
            340                 345                 350

Glu Glu Ile Ala Leu Ala Asp Asp Tyr Phe Ile Ser Arg Lys Leu Tyr
        355                 360                 365

Pro Asn Val Asp Phe Tyr Thr Gly Leu Ile Tyr Arg Ala Met Gly Phe
    370                 375                 380

Pro Thr Asp Phe Phe Thr Val Leu Phe Ala Ile Gly Arg Leu Pro Gly
385                 390                 395                 400

Trp Ile Ala His Tyr Arg Glu Gln Leu Gly Ala Ala Gly Asn Lys Ile
                405                 410                 415

Asn Arg Pro Arg Gln Val Tyr Thr Gly Asn Glu Ser Arg Lys Leu Val
            420                 425                 430

Pro Arg Glu Glu Arg
        435
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<210> 89
<211> 3663
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(3663)
<223> RXA04186K

<400> 89

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atg tct act tca gtt act tca cca gcc cac aac aac gca cat tcc tcc   48
Met Ser Thr Ser Val Thr Ser Pro Ala His Asn Asn Ala His Ser Ser
  1               5                  10                  15

gaa ttt ttg gat gcg ttg gca aac cat gtg ttg atc ggc gac ggc gcc   96
Glu Phe Leu Asp Ala Leu Ala Asn His Val Leu Ile Gly Asp Gly Ala
             20                  25                  30

atg ggc acc cag ctc caa ggc ttt gac ctg gac gtg gaa aag gat ttc   144
Met Gly Thr Gln Leu Gln Gly Phe Asp Leu Asp Val Glu Lys Asp Phe
         35                  40                  45

ctt gat ctg gag ggg tgt aat gag att ctc aac gac acc cgc cct gat   192
Leu Asp Leu Glu Gly Cys Asn Glu Ile Leu Asn Asp Thr Arg Pro Asp
     50                  55                  60

gtg ttg agg cag att cac cgc gcc tac ttt gag gcg gga gct gac ttg   240
Val Leu Arg Gln Ile His Arg Ala Tyr Phe Glu Ala Gly Ala Asp Leu
 65                  70                  75                  80

gtt gag acc aat act ttt ggt tgc aac ctg ccg aac ttg gcg gat tat   288
Val Glu Thr Asn Thr Phe Gly Cys Asn Leu Pro Asn Leu Ala Asp Tyr
                 85                  90                  95
```

```
gac atc gct gat cgt tgc cgt gag ctt gcc tac aag ggc act gca gtg   336
Asp Ile Ala Asp Arg Cys Arg Glu Leu Ala Tyr Lys Gly Thr Ala Val
            100                 105                 110

gct agg gaa gtg gct gat gag atg ggg ccg ggc cga aac ggc atg cgg   384
Ala Arg Glu Val Ala Asp Glu Met Gly Pro Gly Arg Asn Gly Met Arg
        115                 120                 125

cgt ttc gtg gtt ggt tcc ctg gga cct gga acg aag ctt cca tcg ctg   432
Arg Phe Val Val Gly Ser Leu Gly Pro Gly Thr Lys Leu Pro Ser Leu
    130                 135                 140

ggc cat gca ccg tat gca gat ttg cgt ggg cac tac aag gaa gca gcg   480
Gly His Ala Pro Tyr Ala Asp Leu Arg Gly His Tyr Lys Glu Ala Ala
145                 150                 155                 160

ctt ggc atc atc gac ggt ggt ggc gat gcc ttt ttg att gag act gct   528
Leu Gly Ile Ile Asp Gly Gly Gly Asp Ala Phe Leu Ile Glu Thr Ala
                165                 170                 175

cag gac ttg ctt cag gtc aag gct gcg gtt cac ggc gtt caa gat gcc   576
Gln Asp Leu Leu Gln Val Lys Ala Ala Val His Gly Val Gln Asp Ala
            180                 185                 190

atg gct gaa ctt gat aca ttc ttg ccc att att tgc cac gtc acc gta   624
Met Ala Glu Leu Asp Thr Phe Leu Pro Ile Ile Cys His Val Thr Val
        195                 200                 205

gag acc acc ggc acc atg ctc atg ggt tct gag atc ggt gcc gcg ttg   672
Glu Thr Thr Gly Thr Met Leu Met Gly Ser Glu Ile Gly Ala Ala Leu
    210                 215                 220

aca gcg ctg cag cca ctg ggt atc gac atg att ggt ctg aac tgc gcc   720
Thr Ala Leu Gln Pro Leu Gly Ile Asp Met Ile Gly Leu Asn Cys Ala
225                 230                 235                 240

acc ggc cca gat gag atg agc gag cac ctg cgt tac ctg tcc aag cac   768
Thr Gly Pro Asp Glu Met Ser Glu His Leu Arg Tyr Leu Ser Lys His
                245                 250                 255

gcc gat att cct gtg tcg gtg atg cct aac gca ggt ctt cct gtc ctg   816
Ala Asp Ile Pro Val Ser Val Met Pro Asn Ala Gly Leu Pro Val Leu
            260                 265                 270

ggt aaa aac ggt gca gaa tac cca ctt gag gct gag gat ttg gcg cag   864
Gly Lys Asn Gly Ala Glu Tyr Pro Leu Glu Ala Glu Asp Leu Ala Gln
        275                 280                 285

gcg ctg gct gga ttc gtc tcc gaa tat ggc ctg tcc atg gtg ggt ggt   912
Ala Leu Ala Gly Phe Val Ser Glu Tyr Gly Leu Ser Met Val Gly Gly
    290                 295                 300

tgt tgt ggc acc aca cct gag cac atc cgt gcg gtc cgc gat gcg gtg   960
Cys Cys Gly Thr Thr Pro Glu His Ile Arg Ala Val Arg Asp Ala Val
305                 310                 315                 320

gtt ggt gtt cca gag cag gaa acc tcc aca ctg acc aag atc cct gca  1008
Val Gly Val Pro Glu Gln Glu Thr Ser Thr Leu Thr Lys Ile Pro Ala
                325                 330                 335
```

```
ggc cct gtt gag cag gcc tcc cgc gag gtg gag aaa gag gac tcc gtc   1056
Gly Pro Val Glu Gln Ala Ser Arg Glu Val Glu Lys Glu Asp Ser Val
            340                 345                 350

gcg tcg ctg tac acc tcg gtg cca ttg tcc cag gaa acc ggc att tcc   1104
Ala Ser Leu Tyr Thr Ser Val Pro Leu Ser Gln Glu Thr Gly Ile Ser
        355                 360                 365

atg atc ggt gag cgc acc aac tcc aac ggt tcc aag gca ttc cgt gag   1152
Met Ile Gly Glu Arg Thr Asn Ser Asn Gly Ser Lys Ala Phe Arg Glu
    370                 375                 380

gca atg ctg tct ggc gat tgg gaa aag tgt gtg gat att gcc aag cag   1200
Ala Met Leu Ser Gly Asp Trp Glu Lys Cys Val Asp Ile Ala Lys Gln
385                 390                 395                 400

caa acc cgc gat ggt gca cac atg ctg gat ctt tgt gtg gat tac gtg   1248
Gln Thr Arg Asp Gly Ala His Met Leu Asp Leu Cys Val Asp Tyr Val
                405                 410                 415

gga cga gac ggc acc gcc gat atg gcg acc ttg gca gca ctt ctt gct   1296
Gly Arg Asp Gly Thr Ala Asp Met Ala Thr Leu Ala Ala Leu Leu Ala
            420                 425                 430

acc agc tcc act ttg cca atc atg att gac tcc acc gag cca gag gtt   1344
Thr Ser Ser Thr Leu Pro Ile Met Ile Asp Ser Thr Glu Pro Glu Val
        435                 440                 445

att cgc aca ggc ctt gag cac ttg ggt gga cga agc atc gtt aac tcc   1392
Ile Arg Thr Gly Leu Glu His Leu Gly Gly Arg Ser Ile Val Asn Ser
    450                 455                 460

gtc aac ttt gaa gac ggc gat ggc cct gag tcc cgc tac cag cgc atc   1440
Val Asn Phe Glu Asp Gly Asp Gly Pro Glu Ser Arg Tyr Gln Arg Ile
465                 470                 475                 480

atg aaa ctg gta aag cag cac ggt gcg gcc gtg gtt gcg ctg acc att   1488
Met Lys Leu Val Lys Gln His Gly Ala Ala Val Val Ala Leu Thr Ile
                485                 490                 495

gat gag gaa ggc cag gca cgt acc gct gag cac aag gtg cgc att gct   1536
Asp Glu Glu Gly Gln Ala Arg Thr Ala Glu His Lys Val Arg Ile Ala
            500                 505                 510

aaa cga ctg att gac gat atc acc ggc agc tac ggc ctg gat atc aaa   1584
Lys Arg Leu Ile Asp Asp Ile Thr Gly Ser Tyr Gly Leu Asp Ile Lys
        515                 520                 525

gac atc gtt gtg gac tgc ctg acc ttc ccg atc tct act ggc cag gaa   1632
Asp Ile Val Val Asp Cys Leu Thr Phe Pro Ile Ser Thr Gly Gln Glu
    530                 535                 540

gaa acc agg cga gat ggc att gaa acc atc gaa gcc atc cgc gag ctg   1680
Glu Thr Arg Arg Asp Gly Ile Glu Thr Ile Glu Ala Ile Arg Glu Leu
545                 550                 555                 560

aag aag ctc tac cca gaa atc cac acc acc ctg ggt ctg tcc aat att   1728
Lys Lys Leu Tyr Pro Glu Ile His Thr Thr Leu Gly Leu Ser Asn Ile
```

```
                565                 570                 575

tcc ttc ggc ctg aac cct gct gca cgc cag gtt ctt aac tct gtg ttc   1776
Ser Phe Gly Leu Asn Pro Ala Ala Arg Gln Val Leu Asn Ser Val Phe
            580                 585                 590

ctc aat gag tgc att gag gct ggt ctg gac tct gcg att gcg cac agc   1824
Leu Asn Glu Cys Ile Glu Ala Gly Leu Asp Ser Ala Ile Ala His Ser
        595                 600                 605

tcc aag att ttg ccg atg aac cgc att gat gat cgc cag cgc gaa gtg   1872
Ser Lys Ile Leu Pro Met Asn Arg Ile Asp Asp Arg Gln Arg Glu Val
    610                 615                 620

gcg ttg gat atg gtc tat gat cgc cgc acc gag gat tac gat ccg ctg   1920
Ala Leu Asp Met Val Tyr Asp Arg Arg Thr Glu Asp Tyr Asp Pro Leu
625                 630                 635                 640

cag gaa ttc atg cag ctg ttt gag ggc gtt tct gct gcc gat gcc aag   1968
Gln Glu Phe Met Gln Leu Phe Glu Gly Val Ser Ala Ala Asp Ala Lys
                645                 650                 655

gat gct cgc gct gaa cag ctg gcc gct atg cct ttg ttt gag cgt ttg   2016
Asp Ala Arg Ala Glu Gln Leu Ala Ala Met Pro Leu Phe Glu Arg Leu
            660                 665                 670

gca cag cgc atc atc gac ggc gat aag aat ggc ctt gag gat gat ctg   2064
Ala Gln Arg Ile Ile Asp Gly Asp Lys Asn Gly Leu Glu Asp Asp Leu
        675                 680                 685

gaa gca ggc atg aag gag aag tct cct att gcg atc atc aac gag gac   2112
Glu Ala Gly Met Lys Glu Lys Ser Pro Ile Ala Ile Ile Asn Glu Asp
    690                 695                 700

ctt ctc aac ggc atg aag acc gtg ggt gag ctg ttt ggt tcc gga cag   2160
Leu Leu Asn Gly Met Lys Thr Val Gly Glu Leu Phe Gly Ser Gly Gln
705                 710                 715                 720

atg cag ctg cca ttc gtg ctg caa tcg gca gaa acc atg aaa act gcg   2208
Met Gln Leu Pro Phe Val Leu Gln Ser Ala Glu Thr Met Lys Thr Ala
                725                 730                 735

gtg gcc tat ttg gaa ccg ttc atg gaa gag gaa gca gaa gct acc gga   2256
Val Ala Tyr Leu Glu Pro Phe Met Glu Glu Glu Ala Glu Ala Thr Gly
            740                 745                 750

tct gcg cag gca gag ggc aag ggc aaa atc gtc gtg gcc acc gtc aag   2304
Ser Ala Gln Ala Glu Gly Lys Gly Lys Ile Val Val Ala Thr Val Lys
        755                 760                 765

ggt gac gtg cac gat atc ggc aag aac ttg gtg gac atc att ttg tcc   2352
Gly Asp Val His Asp Ile Gly Lys Asn Leu Val Asp Ile Ile Leu Ser
    770                 775                 780

aac aac ggt tac gac gtg gtg aac ttg ggc atc aag cag cca ctg tcc   2400
Asn Asn Gly Tyr Asp Val Val Asn Leu Gly Ile Lys Gln Pro Leu Ser
785                 790                 795                 800

gcc atg ttg gaa gca gcg gaa gaa cac aaa gca gac gtc atc ggc atg   2448
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Ala Met Leu Glu Ala Ala Glu Glu His Lys Ala Asp Val Ile Gly Met
                805                 810                 815

tcg gga ctt ctt gtg aag tcc acc gtg gtg atg aag gaa aac ctt gag   2496
Ser Gly Leu Leu Val Lys Ser Thr Val Val Met Lys Glu Asn Leu Glu
            820                 825                 830

gag atg aac aac gcc ggc gca tcc aat tac cca gtc att ttg ggt ggc   2544
Glu Met Asn Asn Ala Gly Ala Ser Asn Tyr Pro Val Ile Leu Gly Gly
        835                 840                 845

gct gcg ctg acg cgt acc tac gtg gaa aac gat ctc aac gag gtg tac   2592
Ala Ala Leu Thr Arg Thr Tyr Val Glu Asn Asp Leu Asn Glu Val Tyr
    850                 855                 860

acc ggt gag gtg tac tac gcc cgt gat gct ttc gag ggc ctg cgc ctg   2640
Thr Gly Glu Val Tyr Tyr Ala Arg Asp Ala Phe Glu Gly Leu Arg Leu
865                 870                 875                 880

atg gat gag gtg atg gca gaa aag cgt ggt gaa gga ctt gat ccc aac   2688
Met Asp Glu Val Met Ala Glu Lys Arg Gly Glu Gly Leu Asp Pro Asn
                885                 890                 895

tca cca gaa gct att gag cag gcg aag aag aag gcg gaa cgt aag gct   2736
Ser Pro Glu Ala Ile Glu Gln Ala Lys Lys Lys Ala Glu Arg Lys Ala
            900                 905                 910

cgt aat gag cgt tcc cgc aag att gcc gcg gag cgt aaa gct aat gcg   2784
Arg Asn Glu Arg Ser Arg Lys Ile Ala Ala Glu Arg Lys Ala Asn Ala
        915                 920                 925

gct ccc gtg att gtt ccg gag cgt tct gat gtc tcc acc gat act cca   2832
Ala Pro Val Ile Val Pro Glu Arg Ser Asp Val Ser Thr Asp Thr Pro
    930                 935                 940

acc gcg gca cca ccg ttc tgg gga acc cgc att gtc aag ggt ctg ccc   2880
Thr Ala Ala Pro Pro Phe Trp Gly Thr Arg Ile Val Lys Gly Leu Pro
945                 950                 955                 960

ttg gcg gag ttc ttg ggc aac ctt gat gag cgc gcc ttg ttc atg ggg   2928
Leu Ala Glu Phe Leu Gly Asn Leu Asp Glu Arg Ala Leu Phe Met Gly
                965                 970                 975

cag tgg ggt ctg aaa tcc acc cgc ggc aac gag ggt cca agc tat gag   2976
Gln Trp Gly Leu Lys Ser Thr Arg Gly Asn Glu Gly Pro Ser Tyr Glu
            980                 985                 990

gat ttg gtg gaa act gaa ggc cga cca cgc ctg cgc tac tgg ctg gat   3024
Asp Leu Val Glu Thr Glu Gly Arg Pro Arg Leu Arg Tyr Trp Leu Asp
        995                1000                1005

cgc ctg aag tct gag ggc att ttg gac cac gtg gcc ttg gtg tat ggc   3072
Arg Leu Lys Ser Glu Gly Ile Leu Asp His Val Ala Leu Val Tyr Gly
   1010                1015                1020

tac ttc cca gcg gtc gcg gaa ggc gat gac gtg gtg atc ttg gaa tcc   3120
Tyr Phe Pro Ala Val Ala Glu Gly Asp Asp Val Val Ile Leu Glu Ser
1025                1030                1035                1040
```

```
ccg gat cca cac gca gcc gaa cgc atg cgc ttt agc ttc cca cgc cag   3168
Pro Asp Pro His Ala Ala Glu Arg Met Arg Phe Ser Phe Pro Arg Gln
               1045                1050                1055

cag cgc ggc agg ttc ttg tgc atc gcg gat ttc att cgc cca cgc gag   3216
Gln Arg Gly Arg Phe Leu Cys Ile Ala Asp Phe Ile Arg Pro Arg Glu
           1060                1065                1070

caa gct gtc aag gac ggc caa gtg gac gtc atg cca ttc cag ctg gtc   3264
Gln Ala Val Lys Asp Gly Gln Val Asp Val Met Pro Phe Gln Leu Val
       1075                1080                1085

acc atg ggt aat cct att gct gat ttc gcc aac gag ttg ttc gca gcc   3312
Thr Met Gly Asn Pro Ile Ala Asp Phe Ala Asn Glu Leu Phe Ala Ala
   1090                1095                1100

aat gaa tac cgc gag tac ttg gaa gtt cac ggc atc ggc gtg cag ctc   3360
Asn Glu Tyr Arg Glu Tyr Leu Glu Val His Gly Ile Gly Val Gln Leu
1105                1110                1115                1120

acc gaa gca ttg gcc gag tac tgg cac tcc cga gtg cgc agc gaa ctc   3408
Thr Glu Ala Leu Ala Glu Tyr Trp His Ser Arg Val Arg Ser Glu Leu
               1125                1130                1135

aag ctg aac gac ggt gga tct gtc gct gat ttt gat cca gaa gac aag   3456
Lys Leu Asn Asp Gly Gly Ser Val Ala Asp Phe Asp Pro Glu Asp Lys
           1140                1145                1150

acc aag ttc ttc gac ctg gat tac cgc ggc gcc cgc ttc tcc ttt ggt   3504
Thr Lys Phe Phe Asp Leu Asp Tyr Arg Gly Ala Arg Phe Ser Phe Gly
       1155                1160                1165

tac ggt tct tgc cct gat ctg gaa gac cgc gca aag ctg gtg gaa ttg   3552
Tyr Gly Ser Cys Pro Asp Leu Glu Asp Arg Ala Lys Leu Val Glu Leu
   1170                1175                1180

ctc gag cca ggc cgt atc ggc gtg gag ttg tcc gag gaa ctc cag ctg   3600
Leu Glu Pro Gly Arg Ile Gly Val Glu Leu Ser Glu Glu Leu Gln Leu
1185                1190                1195                1200

cac cca gag cag tcc aca gac gcg ttt gtg ctc tac cac cca gag gca   3648
His Pro Glu Gln Ser Thr Asp Ala Phe Val Leu Tyr His Pro Glu Ala
               1205                1210                1215

aag tac ttt aac gtc                                              3663
Lys Tyr Phe Asn Val
           1220
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<210> 90
<211> 1221
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 90

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Met Ser Thr Ser Val Thr Ser Pro Ala His Asn Asn Ala His Ser Ser
  1               5                  10                  15
```

```
Glu Phe Leu Asp Ala Leu Ala Asn His Val Leu Ile Gly Asp Gly Ala
            20                  25                  30

Met Gly Thr Gln Leu Gln Gly Phe Asp Leu Asp Val Glu Lys Asp Phe
        35                  40                  45

Leu Asp Leu Glu Gly Cys Asn Glu Ile Leu Asn Asp Thr Arg Pro Asp
    50                  55                  60

Val Leu Arg Gln Ile His Arg Ala Tyr Phe Glu Ala Gly Ala Asp Leu
65                  70                  75                  80

Val Glu Thr Asn Thr Phe Gly Cys Asn Leu Pro Asn Leu Ala Asp Tyr
                85                  90                  95

Asp Ile Ala Asp Arg Cys Arg Glu Leu Ala Tyr Lys Gly Thr Ala Val
            100                 105                 110

Ala Arg Glu Val Ala Asp Glu Met Gly Pro Gly Arg Asn Gly Met Arg
        115                 120                 125

Arg Phe Val Val Gly Ser Leu Gly Pro Gly Thr Lys Leu Pro Ser Leu
    130                 135                 140

Gly His Ala Pro Tyr Ala Asp Leu Arg Gly His Tyr Lys Glu Ala Ala
145                 150                 155                 160

Leu Gly Ile Ile Asp Gly Gly Gly Asp Ala Phe Leu Ile Glu Thr Ala
                165                 170                 175

Gln Asp Leu Leu Gln Val Lys Ala Ala Val His Gly Val Gln Asp Ala
            180                 185                 190

Met Ala Glu Leu Asp Thr Phe Leu Pro Ile Ile Cys His Val Thr Val
        195                 200                 205

Glu Thr Thr Gly Thr Met Leu Met Gly Ser Glu Ile Gly Ala Ala Leu
    210                 215                 220

Thr Ala Leu Gln Pro Leu Gly Ile Asp Met Ile Gly Leu Asn Cys Ala
225                 230                 235                 240

Thr Gly Pro Asp Glu Met Ser Glu His Leu Arg Tyr Leu Ser Lys His
                245                 250                 255

Ala Asp Ile Pro Val Ser Val Met Pro Asn Ala Gly Leu Pro Val Leu
            260                 265                 270

Gly Lys Asn Gly Ala Glu Tyr Pro Leu Glu Ala Glu Asp Leu Ala Gln
        275                 280                 285

Ala Leu Ala Gly Phe Val Ser Glu Tyr Gly Leu Ser Met Val Gly Gly
    290                 295                 300

Cys Cys Gly Thr Thr Pro Glu His Ile Arg Ala Val Arg Asp Ala Val
305                 310                 315                 320

Val Gly Val Pro Glu Gln Glu Thr Ser Thr Leu Thr Lys Ile Pro Ala
                325                 330                 335
```

```
Gly Pro Val Glu Gln Ala Ser Arg Glu Val Glu Lys Glu Asp Ser Val
            340                 345                 350

Ala Ser Leu Tyr Thr Ser Val Pro Leu Ser Gln Glu Thr Gly Ile Ser
        355                 360                 365

Met Ile Gly Glu Arg Thr Asn Ser Asn Gly Ser Lys Ala Phe Arg Glu
    370                 375                 380

Ala Met Leu Ser Gly Asp Trp Glu Lys Cys Val Asp Ile Ala Lys Gln
385                 390                 395                 400

Gln Thr Arg Asp Gly Ala His Met Leu Asp Leu Cys Val Asp Tyr Val
                405                 410                 415

Gly Arg Asp Gly Thr Ala Asp Met Ala Thr Leu Ala Ala Leu Leu Ala
            420                 425                 430

Thr Ser Ser Thr Leu Pro Ile Met Ile Asp Ser Thr Glu Pro Glu Val
        435                 440                 445

Ile Arg Thr Gly Leu Glu His Leu Gly Gly Arg Ser Ile Val Asn Ser
    450                 455                 460

Val Asn Phe Glu Asp Gly Asp Gly Pro Glu Ser Arg Tyr Gln Arg Ile
465                 470                 475                 480

Met Lys Leu Val Lys Gln His Gly Ala Ala Val Val Ala Leu Thr Ile
                485                 490                 495

Asp Glu Glu Gly Gln Ala Arg Thr Ala Glu His Lys Val Arg Ile Ala
            500                 505                 510

Lys Arg Leu Ile Asp Asp Ile Thr Gly Ser Tyr Gly Leu Asp Ile Lys
        515                 520                 525

Asp Ile Val Val Asp Cys Leu Thr Phe Pro Ile Ser Thr Gly Gln Glu
    530                 535                 540

Glu Thr Arg Arg Asp Gly Ile Glu Thr Ile Glu Ala Ile Arg Glu Leu
545                 550                 555                 560

Lys Lys Leu Tyr Pro Glu Ile His Thr Thr Leu Gly Leu Ser Asn Ile
                565                 570                 575

Ser Phe Gly Leu Asn Pro Ala Ala Arg Gln Val Leu Asn Ser Val Phe
            580                 585                 590

Leu Asn Glu Cys Ile Glu Ala Gly Leu Asp Ser Ala Ile Ala His Ser
        595                 600                 605

Ser Lys Ile Leu Pro Met Asn Arg Ile Asp Asp Arg Gln Arg Glu Val
    610                 615                 620

Ala Leu Asp Met Val Tyr Asp Arg Arg Thr Glu Asp Tyr Asp Pro Leu
625                 630                 635                 640

Gln Glu Phe Met Gln Leu Phe Glu Gly Val Ser Ala Ala Asp Ala Lys
```

645 650 655

Asp Ala Arg Ala Glu Gln Leu Ala Ala Met Pro Leu Phe Glu Arg Leu
660 665 670

Ala Gln Arg Ile Ile Asp Gly Asp Lys Asn Gly Leu Glu Asp Asp Leu
675 680 685

Glu Ala Gly Met Lys Glu Lys Ser Pro Ile Ala Ile Ile Asn Glu Asp
690 695 700

Leu Leu Asn Gly Met Lys Thr Val Gly Glu Leu Phe Gly Ser Gly Gln
705 710 715 720

Met Gln Leu Pro Phe Val Leu Gln Ser Ala Glu Thr Met Lys Thr Ala
725 730 735

Val Ala Tyr Leu Glu Pro Phe Met Glu Glu Glu Ala Glu Ala Thr Gly
740 745 750

Ser Ala Gln Ala Glu Gly Lys Gly Lys Ile Val Val Ala Thr Val Lys
755 760 765

Gly Asp Val His Asp Ile Gly Lys Asn Leu Val Asp Ile Ile Leu Ser
770 775 780

Asn Asn Gly Tyr Asp Val Val Asn Leu Gly Ile Lys Gln Pro Leu Ser
785 790 795 800

Ala Met Leu Glu Ala Ala Glu Glu His Lys Ala Asp Val Ile Gly Met
805 810 815

Ser Gly Leu Leu Val Lys Ser Thr Val Val Met Lys Glu Asn Leu Glu
820 825 830

Glu Met Asn Asn Ala Gly Ala Ser Asn Tyr Pro Val Ile Leu Gly Gly
835 840 845

Ala Ala Leu Thr Arg Thr Tyr Val Glu Asn Asp Leu Asn Glu Val Tyr
850 855 860

Thr Gly Glu Val Tyr Tyr Ala Arg Asp Ala Phe Glu Gly Leu Arg Leu
865 870 875 880

Met Asp Glu Val Met Ala Glu Lys Arg Gly Glu Gly Leu Asp Pro Asn
885 890 895

Ser Pro Glu Ala Ile Glu Gln Ala Lys Lys Lys Ala Glu Arg Lys Ala
900 905 910

Arg Asn Glu Arg Ser Arg Lys Ile Ala Ala Glu Arg Lys Ala Asn Ala
915 920 925

Ala Pro Val Ile Val Pro Glu Arg Ser Asp Val Ser Thr Asp Thr Pro
930 935 940

Thr Ala Ala Pro Pro Phe Trp Gly Thr Arg Ile Val Lys Gly Leu Pro
945 950 955 960

```
Leu Ala Glu Phe Leu Gly Asn Leu Asp Glu Arg Ala Leu Phe Met Gly
                965                 970                 975

Gln Trp Gly Leu Lys Ser Thr Arg Gly Asn Glu Gly Pro Ser Tyr Glu
            980                 985                 990

Asp Leu Val Glu Thr Glu Gly Arg Pro Arg Leu Arg Tyr Trp Leu Asp
        995                1000                1005

Arg Leu Lys Ser Glu Gly Ile Leu Asp His Val Ala Leu Val Tyr Gly
   1010                1015                1020

Tyr Phe Pro Ala Val Ala Glu Gly Asp Asp Val Val Ile Leu Glu Ser
1025                1030                1035                1040

Pro Asp Pro His Ala Ala Glu Arg Met Arg Phe Ser Phe Pro Arg Gln
               1045                1050                1055

Gln Arg Gly Arg Phe Leu Cys Ile Ala Asp Phe Ile Arg Pro Arg Glu
           1060                1065                1070

Gln Ala Val Lys Asp Gly Gln Val Asp Val Met Pro Phe Gln Leu Val
       1075                1080                1085

Thr Met Gly Asn Pro Ile Ala Asp Phe Ala Asn Glu Leu Phe Ala Ala
   1090                1095                1100

Asn Glu Tyr Arg Glu Tyr Leu Glu Val His Gly Ile Gly Val Gln Leu
1105                1110                1115                1120

Thr Glu Ala Leu Ala Glu Tyr Trp His Ser Arg Val Arg Ser Glu Leu
               1125                1130                1135

Lys Leu Asn Asp Gly Gly Ser Val Ala Asp Phe Asp Pro Glu Asp Lys
           1140                1145                1150

Thr Lys Phe Phe Asp Leu Asp Tyr Arg Gly Ala Arg Phe Ser Phe Gly
       1155                1160                1165

Tyr Gly Ser Cys Pro Asp Leu Glu Asp Arg Ala Lys Leu Val Glu Leu
   1170                1175                1180

Leu Glu Pro Gly Arg Ile Gly Val Glu Leu Ser Glu Glu Leu Gln Leu
1185                1190                1195                1200

His Pro Glu Gln Ser Thr Asp Ala Phe Val Leu Tyr His Pro Glu Ala
               1205                1210                1215

Lys Tyr Phe Asn Val
           1220
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<210> 91
<211> 1758
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS

<222> (1)..(1755)
<223> RXA00098E

<400> 91

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atg gcc acg tcg aaa agc agc cca ata aac gca cct aaa ttt gtc gtg   48
Met Ala Thr Ser Lys Ser Ser Pro Ile Asn Ala Pro Lys Phe Val Val
  1               5                  10                  15

ttt ccc act ttg aac act ctt cga tgc gct tgg cca caa aag caa gct   96
Phe Pro Thr Leu Asn Thr Leu Arg Cys Ala Trp Pro Gln Lys Gln Ala
             20                  25                  30

aac ctg aag atg tta ttt aac gac aat aaa gga gtt ttc atg gcg gac   144
Asn Leu Lys Met Leu Phe Asn Asp Asn Lys Gly Val Phe Met Ala Asp
         35                  40                  45

att tcg acc acc cag gtt tgg caa gac ctg acc gat cat tac tca aac   192
Ile Ser Thr Thr Gln Val Trp Gln Asp Leu Thr Asp His Tyr Ser Asn
     50                  55                  60

ttc cag gca acc act ctg cgt gaa ctt ttc aag gaa gaa aac cgc gcc   240
Phe Gln Ala Thr Thr Leu Arg Glu Leu Phe Lys Glu Glu Asn Arg Ala
 65                  70                  75                  80

gag aag tac acc ttc tcc gcg gct ggc ctc cac gtc gac ctg tcg aag   288
Glu Lys Tyr Thr Phe Ser Ala Ala Gly Leu His Val Asp Leu Ser Lys
                 85                  90                  95

aat ctg ctt gac gac gcc acc ctc acc aag ctc ctt gca ctg acc gaa   336
Asn Leu Leu Asp Asp Ala Thr Leu Thr Lys Leu Leu Ala Leu Thr Glu
            100                 105                 110

gaa tct ggc ctt cgc gaa cgc att gac gcg atg ttt gcc ggt gaa cac   384
Glu Ser Gly Leu Arg Glu Arg Ile Asp Ala Met Phe Ala Gly Glu His
        115                 120                 125

ctc aac aac acc gaa gac cgc gct gtc ctc cac acc gcg ctg cgc ctt   432
Leu Asn Asn Thr Glu Asp Arg Ala Val Leu His Thr Ala Leu Arg Leu
    130                 135                 140

cct gcc gaa gct gat ctg tca gta gat ggc caa gat gtt gct gct gat   480
Pro Ala Glu Ala Asp Leu Ser Val Asp Gly Gln Asp Val Ala Ala Asp
145                 150                 155                 160

gtc cac gaa gtt ttg gga cgc atg cgt gac ttc gct act gcg ctg cgc   528
Val His Glu Val Leu Gly Arg Met Arg Asp Phe Ala Thr Ala Leu Arg
                165                 170                 175

tca ggc aac tgg ttg gga cac acc ggc cac acg atc aag aag atc gtc   576
Ser Gly Asn Trp Leu Gly His Thr Gly His Thr Ile Lys Lys Ile Val
            180                 185                 190

aac att ggt atc ggt ggc tct gac ctc gga cca gcc atg gct acg aag   624
Asn Ile Gly Ile Gly Gly Ser Asp Leu Gly Pro Ala Met Ala Thr Lys
        195                 200                 205

gct ctg cgt gca tac gcg acc gct ggt atc tca gca gaa ttc gtc tcc   672
Ala Leu Arg Ala Tyr Ala Thr Ala Gly Ile Ser Ala Glu Phe Val Ser
    210                 215                 220
```

```
aac gtc gac cca gca gac ctc gtt tct gtg ttg gaa gac ctc gat gca   720
Asn Val Asp Pro Ala Asp Leu Val Ser Val Leu Glu Asp Leu Asp Ala
225                 230                 235                 240

gaa tcc aca ttg ttc gtg atc gct tcg aaa act ttc acc acc cag gag   768
Glu Ser Thr Leu Phe Val Ile Ala Ser Lys Thr Phe Thr Thr Gln Glu
                245                 250                 255

acg ctg tcc aac gct cgt gca gct cgt gct tgg ctg gta gag aag ctc   816
Thr Leu Ser Asn Ala Arg Ala Ala Arg Ala Trp Leu Val Glu Lys Leu
            260                 265                 270

ggt gaa gag gct gtc gcg aag cac ttc gtc gca gtg tcc acc aat gct   864
Gly Glu Glu Ala Val Ala Lys His Phe Val Ala Val Ser Thr Asn Ala
        275                 280                 285

gaa aag gtc gca gag ttc ggt atc gac acg gac aac atg ttc ggc ttc   912
Glu Lys Val Ala Glu Phe Gly Ile Asp Thr Asp Asn Met Phe Gly Phe
    290                 295                 300

tgg gac tgg gtc gga ggt cgt tac tcc gtg gac tcc gca gtt ggt ctt   960
Trp Asp Trp Val Gly Gly Arg Tyr Ser Val Asp Ser Ala Val Gly Leu
305                 310                 315                 320

tcc ctc atg gca gtg atc ggc cct cgc gac ttc atg cgt ttc ctc ggt  1008
Ser Leu Met Ala Val Ile Gly Pro Arg Asp Phe Met Arg Phe Leu Gly
                325                 330                 335

gga ttc cac gcg atg gat gaa cac ttc cgc acc acc aag ttc gaa gag  1056
Gly Phe His Ala Met Asp Glu His Phe Arg Thr Thr Lys Phe Glu Glu
            340                 345                 350

aac gtt cca atc ttg atg gct ctg ctc ggt gtc tgg tac tcc gat ttc  1104
Asn Val Pro Ile Leu Met Ala Leu Leu Gly Val Trp Tyr Ser Asp Phe
        355                 360                 365

tat ggt gca gaa acc cac gct gtc cta cct tat tcc gag gat ctc agc  1152
Tyr Gly Ala Glu Thr His Ala Val Leu Pro Tyr Ser Glu Asp Leu Ser
    370                 375                 380

cgt ttt gct gct tac ctc cag cag ctg acc atg gaa tca aat ggc aag  1200
Arg Phe Ala Ala Tyr Leu Gln Gln Leu Thr Met Glu Ser Asn Gly Lys
385                 390                 395                 400

tca gtc cac cgc gac ggc tcc cct gtt tcc act ggc act ggc gaa att  1248
Ser Val His Arg Asp Gly Ser Pro Val Ser Thr Gly Thr Gly Glu Ile
                405                 410                 415

tac tgg ggt gag cct ggc aca aat ggc cag cac gct ttc ttc cag ctg  1296
Tyr Trp Gly Glu Pro Gly Thr Asn Gly Gln His Ala Phe Phe Gln Leu
            420                 425                 430

atc cac cag ggc act cgc ctt gtt cca gct gat ttc att ggt ttc gct  1344
Ile His Gln Gly Thr Arg Leu Val Pro Ala Asp Phe Ile Gly Phe Ala
        435                 440                 445

cgt cca aag cag gat ctt cct gcc ggt gag cgc acc atg cat gac ctt  1392
Arg Pro Lys Gln Asp Leu Pro Ala Gly Glu Arg Thr Met His Asp Leu
```

```
    450                 455                 460

ttg atg agc aac ttc ttc gca cag acc aag gtt ttg gct ttc ggt aag   1440
Leu Met Ser Asn Phe Phe Ala Gln Thr Lys Val Leu Ala Phe Gly Lys
465                 470                 475                 480

aac gct gaa gag atc gct gcg gaa ggt gtc gca cct gag ctg gtc aac   1488
Asn Ala Glu Glu Ile Ala Ala Glu Gly Val Ala Pro Glu Leu Val Asn
                485                 490                 495

cac aag gtc atg cca ggt aat cgc cca acc acc acc att ttg gcg gag   1536
His Lys Val Met Pro Gly Asn Arg Pro Thr Thr Thr Ile Leu Ala Glu
            500                 505                 510

gaa ctt acc cct tct att ctc ggt gcg ttg atc gct ttg tac gaa cac   1584
Glu Leu Thr Pro Ser Ile Leu Gly Ala Leu Ile Ala Leu Tyr Glu His
        515                 520                 525

atc gtg atg gtt cag ggc gtg att tgg gac atc aac tcc ttc gac caa   1632
Ile Val Met Val Gln Gly Val Ile Trp Asp Ile Asn Ser Phe Asp Gln
    530                 535                 540

tgg ggt gtt gaa ctg ggc aaa cag cag gca aat gac ctc gct ccg gct   1680
Trp Gly Val Glu Leu Gly Lys Gln Gln Ala Asn Asp Leu Ala Pro Ala
545                 550                 555                 560

gtc tct ggt gaa gag gat gtt gac tcg gga gat tct tcc act gat tca   1728
Val Ser Gly Glu Glu Asp Val Asp Ser Gly Asp Ser Ser Thr Asp Ser
                565                 570                 575

ctg att aag tgg tac cgc gca aat agg tag                          1758
Leu Ile Lys Trp Tyr Arg Ala Asn Arg
            580                 585
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<210> 92
<211> 585
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 92

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Met Ala Thr Ser Lys Ser Ser Pro Ile Asn Ala Pro Lys Phe Val Val
  1               5                  10                  15

Phe Pro Thr Leu Asn Thr Leu Arg Cys Ala Trp Pro Gln Lys Gln Ala
             20                  25                  30

Asn Leu Lys Met Leu Phe Asn Asp Asn Lys Gly Val Phe Met Ala Asp
         35                  40                  45

Ile Ser Thr Thr Gln Val Trp Gln Asp Leu Thr Asp His Tyr Ser Asn
     50                  55                  60

Phe Gln Ala Thr Thr Leu Arg Glu Leu Phe Lys Glu Glu Asn Arg Ala
 65                  70                  75                  80

Glu Lys Tyr Thr Phe Ser Ala Ala Gly Leu His Val Asp Leu Ser Lys
                 85                  90                  95
```

```
Asn Leu Leu Asp Asp Ala Thr Leu Thr Lys Leu Leu Ala Leu Thr Glu
            100                 105                 110

Glu Ser Gly Leu Arg Glu Arg Ile Asp Ala Met Phe Ala Gly Glu His
        115                 120                 125

Leu Asn Asn Thr Glu Asp Arg Ala Val Leu His Thr Ala Leu Arg Leu
    130                 135                 140

Pro Ala Glu Ala Asp Leu Ser Val Asp Gly Gln Asp Val Ala Ala Asp
145                 150                 155                 160

Val His Glu Val Leu Gly Arg Met Arg Asp Phe Ala Thr Ala Leu Arg
                165                 170                 175

Ser Gly Asn Trp Leu Gly His Thr Gly His Thr Ile Lys Lys Ile Val
            180                 185                 190

Asn Ile Gly Ile Gly Gly Ser Asp Leu Gly Pro Ala Met Ala Thr Lys
        195                 200                 205

Ala Leu Arg Ala Tyr Ala Thr Ala Gly Ile Ser Ala Glu Phe Val Ser
    210                 215                 220

Asn Val Asp Pro Ala Asp Leu Val Ser Val Leu Glu Asp Leu Asp Ala
225                 230                 235                 240

Glu Ser Thr Leu Phe Val Ile Ala Ser Lys Thr Phe Thr Thr Gln Glu
                245                 250                 255

Thr Leu Ser Asn Ala Arg Ala Ala Arg Ala Trp Leu Val Glu Lys Leu
            260                 265                 270

Gly Glu Glu Ala Val Ala Lys His Phe Val Ala Val Ser Thr Asn Ala
        275                 280                 285

Glu Lys Val Ala Glu Phe Gly Ile Asp Thr Asp Asn Met Phe Gly Phe
    290                 295                 300

Trp Asp Trp Val Gly Gly Arg Tyr Ser Val Asp Ser Ala Val Gly Leu
305                 310                 315                 320

Ser Leu Met Ala Val Ile Gly Pro Arg Asp Phe Met Arg Phe Leu Gly
                325                 330                 335

Gly Phe His Ala Met Asp Glu His Phe Arg Thr Thr Lys Phe Glu Glu
            340                 345                 350

Asn Val Pro Ile Leu Met Ala Leu Leu Gly Val Trp Tyr Ser Asp Phe
        355                 360                 365

Tyr Gly Ala Glu Thr His Ala Val Leu Pro Tyr Ser Glu Asp Leu Ser
    370                 375                 380

Arg Phe Ala Ala Tyr Leu Gln Gln Leu Thr Met Glu Ser Asn Gly Lys
385                 390                 395                 400

Ser Val His Arg Asp Gly Ser Pro Val Ser Thr Gly Thr Gly Glu Ile
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```
                405                 410                 415

Tyr Trp Gly Glu Pro Gly Thr Asn Gly Gln His Ala Phe Phe Gln Leu
            420                 425                 430

Ile His Gln Gly Thr Arg Leu Val Pro Ala Asp Phe Ile Gly Phe Ala
        435                 440                 445

Arg Pro Lys Gln Asp Leu Pro Ala Gly Glu Arg Thr Met His Asp Leu
    450                 455                 460

Leu Met Ser Asn Phe Phe Ala Gln Thr Lys Val Leu Ala Phe Gly Lys
465                 470                 475                 480

Asn Ala Glu Glu Ile Ala Ala Glu Gly Val Ala Pro Glu Leu Val Asn
                485                 490                 495

His Lys Val Met Pro Gly Asn Arg Pro Thr Thr Thr Ile Leu Ala Glu
            500                 505                 510

Glu Leu Thr Pro Ser Ile Leu Gly Ala Leu Ile Ala Leu Tyr Glu His
        515                 520                 525

Ile Val Met Val Gln Gly Val Ile Trp Asp Ile Asn Ser Phe Asp Gln
    530                 535                 540

Trp Gly Val Glu Leu Gly Lys Gln Gln Ala Asn Asp Leu Ala Pro Ala
545                 550                 555                 560

Val Ser Gly Glu Glu Asp Val Asp Ser Gly Asp Ser Ser Thr Asp Ser
                565                 570                 575

Leu Ile Lys Trp Tyr Arg Ala Asn Arg
            580                 585


<210> 93
<211> 1503
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1503)
<223> RXA00241K

<400> 93
gtg aat act caa tca gat tct gcg ggg tct caa ggt gca gcg gcc aca   48
Met Asn Thr Gln Ser Asp Ser Ala Gly Ser Gln Gly Ala Ala Ala Thr
  1               5                  10                  15

agt cgt act gta tct att aga acc ctc atc gcg ctg atc atc gga tcg   96
Ser Arg Thr Val Ser Ile Arg Thr Leu Ile Ala Leu Ile Ile Gly Ser
             20                  25                  30

acc gtc ggc gcg gga att ttc tcc atc cct caa aac atc ggc tca gtc   144
Thr Val Gly Ala Gly Ile Phe Ser Ile Pro Gln Asn Ile Gly Ser Val
         35                  40                  45
```

```
gca ggt ccc ggc gcg atg ctc atc ggc tgg ctg atc gcc ggt gtg ggc   192
Ala Gly Pro Gly Ala Met Leu Ile Gly Trp Leu Ile Ala Gly Val Gly
     50                  55                  60

atg ttg tcc gta gcg ttc gtg ttc cat gtt ctt gcc cgc cgt aaa cct   240
Met Leu Ser Val Ala Phe Val Phe His Val Leu Ala Arg Arg Lys Pro
 65                  70                  75                  80

cac ctc gat tct ggc gtc tac gca tat gcg cgt gtt gga ttg ggc gat   288
His Leu Asp Ser Gly Val Tyr Ala Tyr Ala Arg Val Gly Leu Gly Asp
                85                  90                  95

tat gta ggt ttc tcc tcc gct tgg ggt tat tgg ctg ggt tca gtc atc   336
Tyr Val Gly Phe Ser Ser Ala Trp Gly Tyr Trp Leu Gly Ser Val Ile
            100                 105                 110

gcc caa gtt ggc tac gca acg tta ttt ttc tcc acg ttg ggc cac tac   384
Ala Gln Val Gly Tyr Ala Thr Leu Phe Phe Ser Thr Leu Gly His Tyr
        115                 120                 125

gta ccg ctg ttt tcc caa gat cat cca ttt gtg tca gcg ttg gca gtt   432
Val Pro Leu Phe Ser Gln Asp His Pro Phe Val Ser Ala Leu Ala Val
    130                 135                 140

agc gct ttg acc tgg ctg gtg ttt gga gtt gtt tcc cga gga att agc   480
Ser Ala Leu Thr Trp Leu Val Phe Gly Val Val Ser Arg Gly Ile Ser
145                 150                 155                 160

caa gct gct ttc ttg aca acg gtc acc acc gtg gcc aaa att ctg cct   528
Gln Ala Ala Phe Leu Thr Thr Val Thr Thr Val Ala Lys Ile Leu Pro
                165                 170                 175

ctg ttg tgc ttc atc atc ctt gtt gca ttc ttg ggc ttt agc tgg gag   576
Leu Leu Cys Phe Ile Ile Leu Val Ala Phe Leu Gly Phe Ser Trp Glu
            180                 185                 190

aag ttc act gtt gat tta tgg gcg cgt gat ggt ggc gtg ggc agc att   624
Lys Phe Thr Val Asp Leu Trp Ala Arg Asp Gly Gly Val Gly Ser Ile
        195                 200                 205

ttt gat cag gtg cgc ggc atc atg gtg tac acc gtg tgg gtg ttc atc   672
Phe Asp Gln Val Arg Gly Ile Met Val Tyr Thr Val Trp Val Phe Ile
    210                 215                 220

ggt atc gaa ggt gca tcg gta tat tcc cgc cag gca cgc tca cgc agt   720
Gly Ile Glu Gly Ala Ser Val Tyr Ser Arg Gln Ala Arg Ser Arg Ser
225                 230                 235                 240

gat gtc agc cga gct acc gtg att ggt ttt gtg gct gtt ctc ctt ttg   768
Asp Val Ser Arg Ala Thr Val Ile Gly Phe Val Ala Val Leu Leu Leu
                245                 250                 255

ctg gtg tcg att tct tcg ctg agc ttc ggt gta ctg acc caa caa gag   816
Leu Val Ser Ile Ser Ser Leu Ser Phe Gly Val Leu Thr Gln Gln Glu
            260                 265                 270

ctc gct gcg tta cca gat aat tcc atg gcg tcg gtg ctc gaa gct gtt   864
Leu Ala Ala Leu Pro Asp Asn Ser Met Ala Ser Val Leu Glu Ala Val
        275                 280                 285
```

```
gtt ggt cca tgg ggt gcc gca ttg att tcg ttg ggt ctg tgt ctt tcg   912
Val Gly Pro Trp Gly Ala Ala Leu Ile Ser Leu Gly Leu Cys Leu Ser
    290                 295                 300

gtt ctt ggg gcc tat gtg tcc tgg cag atg ctc tgc gca gaa cca ctg   960
Val Leu Gly Ala Tyr Val Ser Trp Gln Met Leu Cys Ala Glu Pro Leu
305                 310                 315                 320

gcg ttg atg gca atg gat ggc ctc att cca agc aaa atc ggg gcc atc   1008
Ala Leu Met Ala Met Asp Gly Leu Ile Pro Ser Lys Ile Gly Ala Ile
                325                 330                 335

aac agc cgc ggt gct gcc tgg atg gct cag ctg atc tcc acc atc gtg   1056
Asn Ser Arg Gly Ala Ala Trp Met Ala Gln Leu Ile Ser Thr Ile Val
            340                 345                 350

att cag att ttc atc atc att ttc ttc ctc aac gag acc acc tac gtc   1104
Ile Gln Ile Phe Ile Ile Ile Phe Phe Leu Asn Glu Thr Thr Tyr Val
        355                 360                 365

tcc atg gtg caa ttg gct acc aac cta tac ttg gtg cct tac ctg ttc   1152
Ser Met Val Gln Leu Ala Thr Asn Leu Tyr Leu Val Pro Tyr Leu Phe
    370                 375                 380

tct gcc ttt tat ctg gtc atg ctg gca aca cgt gga aaa gga atc acc   1200
Ser Ala Phe Tyr Leu Val Met Leu Ala Thr Arg Gly Lys Gly Ile Thr
385                 390                 395                 400

cac cca cat gcc ggc aca cgt ttt gat gat tcc ggt cca gag ata tcc   1248
His Pro His Ala Gly Thr Arg Phe Asp Asp Ser Gly Pro Glu Ile Ser
                405                 410                 415

cgc cga gaa aac cgc aaa cac ctc atc gtc ggt tta gta gca acg gtg   1296
Arg Arg Glu Asn Arg Lys His Leu Ile Val Gly Leu Val Ala Thr Val
            420                 425                 430

tat tca gtg tgg ctg ttt tac gct gca gaa ccg cag ttt gtc ctc ttc   1344
Tyr Ser Val Trp Leu Phe Tyr Ala Ala Glu Pro Gln Phe Val Leu Phe
        435                 440                 445

gga gcc atg gcg atg ctt ccc ggc tta atc ccc tat gtg tgg aca agg   1392
Gly Ala Met Ala Met Leu Pro Gly Leu Ile Pro Tyr Val Trp Thr Arg
    450                 455                 460

att tat cgt ggc gaa cag gtg ttt aac cgc ttt gaa atc ggc gtg gtt   1440
Ile Tyr Arg Gly Glu Gln Val Phe Asn Arg Phe Glu Ile Gly Val Val
465                 470                 475                 480

gtt gtc ctg gtc gtt gct gcc agc gcg ggc gtt att ggt ttg gtc aac   1488
Val Val Leu Val Val Ala Ala Ser Ala Gly Val Ile Gly Leu Val Asn
                485                 490                 495

gga tca cta tcg ctt                                             1503
Gly Ser Leu Ser Leu
            500
```

<210> 94

<211> 501
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 94

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Met Asn Thr Gln Ser Asp Ser Ala Gly Ser Gln Gly Ala Ala Ala Thr
  1               5                  10                  15

Ser Arg Thr Val Ser Ile Arg Thr Leu Ile Ala Leu Ile Ile Gly Ser
             20                  25                  30

Thr Val Gly Ala Gly Ile Phe Ser Ile Pro Gln Asn Ile Gly Ser Val
         35                  40                  45

Ala Gly Pro Gly Ala Met Leu Ile Gly Trp Leu Ile Ala Gly Val Gly
     50                  55                  60

Met Leu Ser Val Ala Phe Val Phe His Val Leu Ala Arg Arg Lys Pro
 65                  70                  75                  80

His Leu Asp Ser Gly Val Tyr Ala Tyr Ala Arg Val Gly Leu Gly Asp
                 85                  90                  95

Tyr Val Gly Phe Ser Ser Ala Trp Gly Tyr Trp Leu Gly Ser Val Ile
            100                 105                 110

Ala Gln Val Gly Tyr Ala Thr Leu Phe Phe Ser Thr Leu Gly His Tyr
        115                 120                 125

Val Pro Leu Phe Ser Gln Asp His Pro Phe Val Ser Ala Leu Ala Val
    130                 135                 140

Ser Ala Leu Thr Trp Leu Val Phe Gly Val Val Ser Arg Gly Ile Ser
145                 150                 155                 160

Gln Ala Ala Phe Leu Thr Thr Val Thr Thr Val Ala Lys Ile Leu Pro
                165                 170                 175

Leu Leu Cys Phe Ile Ile Leu Val Ala Phe Leu Gly Phe Ser Trp Glu
            180                 185                 190

Lys Phe Thr Val Asp Leu Trp Ala Arg Asp Gly Gly Val Gly Ser Ile
        195                 200                 205

Phe Asp Gln Val Arg Gly Ile Met Val Tyr Thr Val Trp Val Phe Ile
    210                 215                 220

Gly Ile Glu Gly Ala Ser Val Tyr Ser Arg Gln Ala Arg Ser Arg Ser
225                 230                 235                 240

Asp Val Ser Arg Ala Thr Val Ile Gly Phe Val Ala Val Leu Leu Leu
                245                 250                 255

Leu Val Ser Ile Ser Ser Leu Ser Phe Gly Val Leu Thr Gln Gln Glu
            260                 265                 270

Leu Ala Ala Leu Pro Asp Asn Ser Met Ala Ser Val Leu Glu Ala Val
```

```
        275                 280                 285

Val Gly Pro Trp Gly Ala Ala Leu Ile Ser Leu Gly Leu Cys Leu Ser
    290                 295                 300

Val Leu Gly Ala Tyr Val Ser Trp Gln Met Leu Cys Ala Glu Pro Leu
305                 310                 315                 320

Ala Leu Met Ala Met Asp Gly Leu Ile Pro Ser Lys Ile Gly Ala Ile
                325                 330                 335

Asn Ser Arg Gly Ala Ala Trp Met Ala Gln Leu Ile Ser Thr Ile Val
            340                 345                 350

Ile Gln Ile Phe Ile Ile Ile Phe Phe Leu Asn Glu Thr Thr Tyr Val
        355                 360                 365

Ser Met Val Gln Leu Ala Thr Asn Leu Tyr Leu Val Pro Tyr Leu Phe
    370                 375                 380

Ser Ala Phe Tyr Leu Val Met Leu Ala Thr Arg Gly Lys Gly Ile Thr
385                 390                 395                 400

His Pro His Ala Gly Thr Arg Phe Asp Asp Ser Gly Pro Glu Ile Ser
                405                 410                 415

Arg Arg Glu Asn Arg Lys His Leu Ile Val Gly Leu Val Ala Thr Val
            420                 425                 430

Tyr Ser Val Trp Leu Phe Tyr Ala Ala Glu Pro Gln Phe Val Leu Phe
        435                 440                 445

Gly Ala Met Ala Met Leu Pro Gly Leu Ile Pro Tyr Val Trp Thr Arg
    450                 455                 460

Ile Tyr Arg Gly Glu Gln Val Phe Asn Arg Phe Glu Ile Gly Val Val
465                 470                 475                 480

Val Val Leu Val Val Ala Ala Ser Ala Gly Val Ile Gly Leu Val Asn
                485                 490                 495

Gly Ser Leu Ser Leu
            500


<210> 95
<211> 1086
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1086)
<223> RXA00517E

<400> 95
ttg ctg gta tac att tcg gta tac cta aac cga att gag gga ttc atg   48
Met Leu Val Tyr Ile Ser Val Tyr Leu Asn Arg Ile Glu Gly Phe Met
  1               5                  10                  15
```

```
cca gaa gtc act gtc aac gcc caa caa ctc act gtt ctc tgc aca gac   96
Pro Glu Val Thr Val Asn Ala Gln Gln Leu Thr Val Leu Cys Thr Asp
             20                  25                  30

atc ctc acc aaa act gga gta cct gca gca gac gcc cat ctt gtc ggt  144
Ile Leu Thr Lys Thr Gly Val Pro Ala Ala Asp Ala His Leu Val Gly
         35                  40                  45

gat agt ttg gtg cag gct gat ctt tgg ggt cac ccc tcc cac ggt gtg  192
Asp Ser Leu Val Gln Ala Asp Leu Trp Gly His Pro Ser His Gly Val
     50                  55                  60

ctt cga ctg cct tgg tat gtg cgc aga ctc cac agt ggc gcg atg act  240
Leu Arg Leu Pro Trp Tyr Val Arg Arg Leu His Ser Gly Ala Met Thr
 65                  70                  75                  80

aca cat gca cac gtg gag gtt ctc aat gat ttg ggt gcc gtg ttg gcg  288
Thr His Ala His Val Glu Val Leu Asn Asp Leu Gly Ala Val Leu Ala
                 85                  90                  95

ttg gat gga cac aat gga atc ggc caa gtt tta gct gat cat gct cgt  336
Leu Asp Gly His Asn Gly Ile Gly Gln Val Leu Ala Asp His Ala Arg
            100                 105                 110

aaa gaa gca gtg act agg gca atg atg ttc ggc atc ggt gcg gtg tcg  384
Lys Glu Ala Val Thr Arg Ala Met Met Phe Gly Ile Gly Ala Val Ser
        115                 120                 125

gtg cgc aac tcc aat cat ttt gga act gcc atg tac tac acc cgg aaa  432
Val Arg Asn Ser Asn His Phe Gly Thr Ala Met Tyr Tyr Thr Arg Lys
    130                 135                 140

gcg gca gcg caa gga tgt gtt tcc att ctc acc acc aat gca tct ccg  480
Ala Ala Ala Gln Gly Cys Val Ser Ile Leu Thr Thr Asn Ala Ser Pro
145                 150                 155                 160

gcg atg gcg ccc tgg ggt ggc aga gaa aaa cgg atc ggt acc aac cca  528
Ala Met Ala Pro Trp Gly Gly Arg Glu Lys Arg Ile Gly Thr Asn Pro
                165                 170                 175

tgg tct att gcg gca cct ttt gga gaa acg gct acg gta gtc gat ata  576
Trp Ser Ile Ala Ala Pro Phe Gly Glu Thr Ala Thr Val Val Asp Ile
            180                 185                 190

gcc aat act gcg gtt gcg cgc gga aag atc tac cac gca cga cag aca  624
Ala Asn Thr Ala Val Ala Arg Gly Lys Ile Tyr His Ala Arg Gln Thr
        195                 200                 205

aac atg ccc att cct gag act tgg gcg atc acg agt gag ggc gca ccc  672
Asn Met Pro Ile Pro Glu Thr Trp Ala Ile Thr Ser Glu Gly Ala Pro
    210                 215                 220

acc acg gat cct gct gag gca atc aac ggt gtc gtc ctt ccc atg gct  720
Thr Thr Asp Pro Ala Glu Ala Ile Asn Gly Val Val Leu Pro Met Ala
225                 230                 235                 240

ggt cac aaa ggt tat gcg att agc ttc atg atg gat gtg ctt tct gga  768
Gly His Lys Gly Tyr Ala Ile Ser Phe Met Met Asp Val Leu Ser Gly
```

```
                245                 250                 255

gtt ctc act ggt tcc cag cac agc acc aag gta cat ggt ccg tat gat   816
Val Leu Thr Gly Ser Gln His Ser Thr Lys Val His Gly Pro Tyr Asp
            260                 265                 270

ccc act ccc cca ggt gga gct ggc cac ttg ttc atc gcg ttg gat gtt   864
Pro Thr Pro Pro Gly Gly Ala Gly His Leu Phe Ile Ala Leu Asp Val
        275                 280                 285

gca gcg ttt cgc gat cca caa gat ttc gat gac gca ctc agc gat ctg   912
Ala Ala Phe Arg Asp Pro Gln Asp Phe Asp Asp Ala Leu Ser Asp Leu
    290                 295                 300

gtt ggg gaa gtt aaa tcc act ccg aaa gca caa aac acc gag gag att   960
Val Gly Glu Val Lys Ser Thr Pro Lys Ala Gln Asn Thr Glu Glu Ile
305                 310                 315                 320

ttc tac ccc ggt gaa tcg gaa gac cgt gcg cat cgg aaa aac tct gcg   1008
Phe Tyr Pro Gly Glu Ser Glu Asp Arg Ala His Arg Lys Asn Ser Ala
                325                 330                 335

cac ggt att tca ttg cct gaa aaa acg tgg atg gaa ctg caa gaa ctg   1056
His Gly Ile Ser Leu Pro Glu Lys Thr Trp Met Glu Leu Gln Glu Leu
            340                 345                 350

gca atc gag aac cat gtt gta act cac cgt                           1086
Ala Ile Glu Asn His Val Val Thr His Arg
        355                 360
```

<210> 96
<211> 362
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 96

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Met Leu Val Tyr Ile Ser Val Tyr Leu Asn Arg Ile Glu Gly Phe Met
  1               5                  10                  15

Pro Glu Val Thr Val Asn Ala Gln Gln Leu Thr Val Leu Cys Thr Asp
             20                  25                  30

Ile Leu Thr Lys Thr Gly Val Pro Ala Ala Asp Ala His Leu Val Gly
         35                  40                  45

Asp Ser Leu Val Gln Ala Asp Leu Trp Gly His Pro Ser His Gly Val
     50                  55                  60

Leu Arg Leu Pro Trp Tyr Val Arg Arg Leu His Ser Gly Ala Met Thr
 65                  70                  75                  80

Thr His Ala His Val Glu Val Leu Asn Asp Leu Gly Ala Val Leu Ala
                 85                  90                  95

Leu Asp Gly His Asn Gly Ile Gly Gln Val Leu Ala Asp His Ala Arg
            100                 105                 110
```

```
Lys Glu Ala Val Thr Arg Ala Met Met Phe Gly Ile Gly Ala Val Ser
        115                 120                 125

Val Arg Asn Ser Asn His Phe Gly Thr Ala Met Tyr Tyr Thr Arg Lys
    130                 135                 140

Ala Ala Ala Gln Gly Cys Val Ser Ile Leu Thr Thr Asn Ala Ser Pro
145                 150                 155                 160

Ala Met Ala Pro Trp Gly Gly Arg Glu Lys Arg Ile Gly Thr Asn Pro
                165                 170                 175

Trp Ser Ile Ala Ala Pro Phe Gly Glu Thr Ala Thr Val Val Asp Ile
            180                 185                 190

Ala Asn Thr Ala Val Ala Arg Gly Lys Ile Tyr His Ala Arg Gln Thr
        195                 200                 205

Asn Met Pro Ile Pro Glu Thr Trp Ala Ile Thr Ser Glu Gly Ala Pro
    210                 215                 220

Thr Thr Asp Pro Ala Glu Ala Ile Asn Gly Val Val Leu Pro Met Ala
225                 230                 235                 240

Gly His Lys Gly Tyr Ala Ile Ser Phe Met Met Asp Val Leu Ser Gly
                245                 250                 255

Val Leu Thr Gly Ser Gln His Ser Thr Lys Val His Gly Pro Tyr Asp
            260                 265                 270

Pro Thr Pro Pro Gly Gly Ala Gly His Leu Phe Ile Ala Leu Asp Val
        275                 280                 285

Ala Ala Phe Arg Asp Pro Gln Asp Phe Asp Asp Ala Leu Ser Asp Leu
    290                 295                 300

Val Gly Glu Val Lys Ser Thr Pro Lys Ala Gln Asn Thr Glu Glu Ile
305                 310                 315                 320

Phe Tyr Pro Gly Glu Ser Glu Asp Arg Ala His Arg Lys Asn Ser Ala
                325                 330                 335

His Gly Ile Ser Leu Pro Glu Lys Thr Trp Met Glu Leu Gln Glu Leu
            340                 345                 350

Ala Ile Glu Asn His Val Val Thr His Arg
        355                 360
```

<210> 97
<211> 1041
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1041)
<223> RXA00517W

<400> 97

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atg cca gaa gtc act gtc aac gcc caa caa ctc act gtt ctc tgc aca   48
Met Pro Glu Val Thr Val Asn Ala Gln Gln Leu Thr Val Leu Cys Thr
  1               5                  10                  15

gac atc ctc acc aaa act gga gta cct gca gca gac gcc cat ctt gtc   96
Asp Ile Leu Thr Lys Thr Gly Val Pro Ala Ala Asp Ala His Leu Val
             20                  25                  30

ggt gat agt ttg gtg cag gct gat ctt tgg ggt cac ccc tcc cac ggt   144
Gly Asp Ser Leu Val Gln Ala Asp Leu Trp Gly His Pro Ser His Gly
         35                  40                  45

gtg ctt cga ctg cct tgg tat gtg cgc aga ctc cac agt ggc gcg atg   192
Val Leu Arg Leu Pro Trp Tyr Val Arg Arg Leu His Ser Gly Ala Met
     50                  55                  60

act aca cat gca cac gtg gag gtt ctc aat gat ttg ggt gcc gtg ttg   240
Thr Thr His Ala His Val Glu Val Leu Asn Asp Leu Gly Ala Val Leu
 65                  70                  75                  80

gcg ttg gat gga cac aat gga atc ggc caa gtt tta gct gat cat gct   288
Ala Leu Asp Gly His Asn Gly Ile Gly Gln Val Leu Ala Asp His Ala
                 85                  90                  95

cgt aaa gaa gca gtg act agg gca atg atg ttc ggc atc ggt gcg gtg   336
Arg Lys Glu Ala Val Thr Arg Ala Met Met Phe Gly Ile Gly Ala Val
            100                 105                 110

tcg gtg cgc aac tcc aat cat ttt gga act gcc atg tac tac acc cgg   384
Ser Val Arg Asn Ser Asn His Phe Gly Thr Ala Met Tyr Tyr Thr Arg
        115                 120                 125

aaa gcg gca gcg caa gga tgt gtt tcc att ctc acc acc aat gca tct   432
Lys Ala Ala Ala Gln Gly Cys Val Ser Ile Leu Thr Thr Asn Ala Ser
    130                 135                 140

ccg gcg atg gcg ccc tgg ggt ggc aga gaa aaa cgg atc ggt acc aac   480
Pro Ala Met Ala Pro Trp Gly Gly Arg Glu Lys Arg Ile Gly Thr Asn
145                 150                 155                 160

cca tgg tct att gcg gca cct ttt gga gaa acg gct acg gta gtc gat   528
Pro Trp Ser Ile Ala Ala Pro Phe Gly Glu Thr Ala Thr Val Val Asp
                165                 170                 175

ata gcc aat act gcg gtt gcg cgc gga aag atc tac cac gca cga cag   576
Ile Ala Asn Thr Ala Val Ala Arg Gly Lys Ile Tyr His Ala Arg Gln
            180                 185                 190

aca aac atg ccc att cct gag act tgg gcg atc acg agt gag ggc gca   624
Thr Asn Met Pro Ile Pro Glu Thr Trp Ala Ile Thr Ser Glu Gly Ala
        195                 200                 205

ccc acc acg gat cct gct gag gca atc aac ggt gtc gtc ctt ccc atg   672
Pro Thr Thr Asp Pro Ala Glu Ala Ile Asn Gly Val Val Leu Pro Met
    210                 215                 220

gct ggt cac aaa ggt tat gcg att agc ttc atg atg gat gtg ctt tct   720
Ala Gly His Lys Gly Tyr Ala Ile Ser Phe Met Met Asp Val Leu Ser
```

```
225                 230                 235                 240

gga gtt ctc act ggt tcc cag cac agc acc aag gta cat ggt ccg tat   768
Gly Val Leu Thr Gly Ser Gln His Ser Thr Lys Val His Gly Pro Tyr
                245                 250                 255

gat ccc act ccc cca ggt gga gct ggc cac ttg ttc atc gcg ttg gat   816
Asp Pro Thr Pro Pro Gly Gly Ala Gly His Leu Phe Ile Ala Leu Asp
            260                 265                 270

gtt gca gcg ttt cgc gat cca caa gat ttc gat gac gca ctc agc gat   864
Val Ala Ala Phe Arg Asp Pro Gln Asp Phe Asp Asp Ala Leu Ser Asp
        275                 280                 285

ctg gtt ggg gaa gtt aaa tcc act ccg aaa gca caa aac acc gag gag   912
Leu Val Gly Glu Val Lys Ser Thr Pro Lys Ala Gln Asn Thr Glu Glu
    290                 295                 300

att ttc tac ccc ggt gaa tcg gaa gac cgt gcg cat cgg aaa aac tct   960
Ile Phe Tyr Pro Gly Glu Ser Glu Asp Arg Ala His Arg Lys Asn Ser
305                 310                 315                 320

gcg cac ggt att tca ttg cct gaa aaa acg tgg atg gaa ctg caa gaa   1008
Ala His Gly Ile Ser Leu Pro Glu Lys Thr Trp Met Glu Leu Gln Glu
                325                 330                 335

ctg gca atc gag aac cat gtt gta act cac cgt                       1041
Leu Ala Ile Glu Asn His Val Val Thr His Arg
            340                 345
```

<210> 98
<211> 347
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 98

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Met Pro Glu Val Thr Val Asn Ala Gln Gln Leu Thr Val Leu Cys Thr
  1               5                  10                  15

Asp Ile Leu Thr Lys Thr Gly Val Pro Ala Ala Asp Ala His Leu Val
             20                  25                  30

Gly Asp Ser Leu Val Gln Ala Asp Leu Trp Gly His Pro Ser His Gly
         35                  40                  45

Val Leu Arg Leu Pro Trp Tyr Val Arg Arg Leu His Ser Gly Ala Met
     50                  55                  60

Thr Thr His Ala His Val Glu Val Leu Asn Asp Leu Gly Ala Val Leu
 65                  70                  75                  80

Ala Leu Asp Gly His Asn Gly Ile Gly Gln Val Leu Ala Asp His Ala
                 85                  90                  95

Arg Lys Glu Ala Val Thr Arg Ala Met Met Phe Gly Ile Gly Ala Val
            100                 105                 110
```

```
Ser Val Arg Asn Ser Asn His Phe Gly Thr Ala Met Tyr Tyr Thr Arg
        115                 120                 125

Lys Ala Ala Ala Gln Gly Cys Val Ser Ile Leu Thr Thr Asn Ala Ser
    130                 135                 140

Pro Ala Met Ala Pro Trp Gly Gly Arg Glu Lys Arg Ile Gly Thr Asn
145                 150                 155                 160

Pro Trp Ser Ile Ala Ala Pro Phe Gly Glu Thr Ala Thr Val Val Asp
                165                 170                 175

Ile Ala Asn Thr Ala Val Ala Arg Gly Lys Ile Tyr His Ala Arg Gln
            180                 185                 190

Thr Asn Met Pro Ile Pro Glu Thr Trp Ala Ile Thr Ser Glu Gly Ala
        195                 200                 205

Pro Thr Thr Asp Pro Ala Glu Ala Ile Asn Gly Val Val Leu Pro Met
    210                 215                 220

Ala Gly His Lys Gly Tyr Ala Ile Ser Phe Met Met Asp Val Leu Ser
225                 230                 235                 240

Gly Val Leu Thr Gly Ser Gln His Ser Thr Lys Val His Gly Pro Tyr
                245                 250                 255

Asp Pro Thr Pro Pro Gly Gly Ala Gly His Leu Phe Ile Ala Leu Asp
            260                 265                 270

Val Ala Ala Phe Arg Asp Pro Gln Asp Phe Asp Asp Ala Leu Ser Asp
        275                 280                 285

Leu Val Gly Glu Val Lys Ser Thr Pro Lys Ala Gln Asn Thr Glu Glu
    290                 295                 300

Ile Phe Tyr Pro Gly Glu Ser Glu Asp Arg Ala His Arg Lys Asn Ser
305                 310                 315                 320

Ala His Gly Ile Ser Leu Pro Glu Lys Thr Trp Met Glu Leu Gln Glu
                325                 330                 335

Leu Ala Ile Glu Asn His Val Val Thr His Arg
            340                 345
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<210> 99
<211> 2214
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(2214)
<223> RXA00519W

<400> 99
atg gct aag atc atc tgg acc cgc acc gac gaa gca ccg ctg ctc gcg 48
Met Ala Lys Ile Ile Trp Thr Arg Thr Asp Glu Ala Pro Leu Leu Ala

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  1               5                  10                  15

acc tac tcg ctg aag ccg gtc gtc gag gca ttt gct gct acc gcg ggc   96
Thr Tyr Ser Leu Lys Pro Val Val Glu Ala Phe Ala Ala Thr Ala Gly
            20                  25                  30

att gag gtc gag acc cgg gac att tca ctc gct gga cgc atc ctc gcc   144
Ile Glu Val Glu Thr Arg Asp Ile Ser Leu Ala Gly Arg Ile Leu Ala
        35                  40                  45

cag ttc cca gag cgc ctc acc gaa gat cag aag gta ggc aac gca ctc   192
Gln Phe Pro Glu Arg Leu Thr Glu Asp Gln Lys Val Gly Asn Ala Leu
    50                  55                  60

gca gaa ctc ggc gag ctt gct aag act cct gaa gca aac atc att aag   240
Ala Glu Leu Gly Glu Leu Ala Lys Thr Pro Glu Ala Asn Ile Ile Lys
65                  70                  75                  80

ctt cca aac atc tcc gct tct gtt cca cag ctc aag gct gct att aag   288
Leu Pro Asn Ile Ser Ala Ser Val Pro Gln Leu Lys Ala Ala Ile Lys
                85                  90                  95

gaa ctg cag gac cag ggc tac gac atc cca gaa ctg cct gat aac gcc   336
Glu Leu Gln Asp Gln Gly Tyr Asp Ile Pro Glu Leu Pro Asp Asn Ala
            100                 105                 110

acc acc gac gag gaa aaa gac atc ctc gca cgc tac aac gct gtt aag   384
Thr Thr Asp Glu Glu Lys Asp Ile Leu Ala Arg Tyr Asn Ala Val Lys
        115                 120                 125

ggt tcc gct gtg aac cca gtg ctg cgt gaa ggc aac tct gac cgc cgc   432
Gly Ser Ala Val Asn Pro Val Leu Arg Glu Gly Asn Ser Asp Arg Arg
    130                 135                 140

gca cca atc gct gtc aag aac ttt gtt aag aag ttc cca cac cgc atg   480
Ala Pro Ile Ala Val Lys Asn Phe Val Lys Lys Phe Pro His Arg Met
145                 150                 155                 160

ggc gag tgg tct gca gat tcc aag acc aac gtt gca acc atg gat gca   528
Gly Glu Trp Ser Ala Asp Ser Lys Thr Asn Val Ala Thr Met Asp Ala
                165                 170                 175

aac gac ttc cgc cac aac gag aag tcc atc atc ctc gac gct gct gat   576
Asn Asp Phe Arg His Asn Glu Lys Ser Ile Ile Leu Asp Ala Ala Asp
            180                 185                 190

gaa gtt cag atc aag cac atc gca gct gac ggc acc gag acc atc ctc   624
Glu Val Gln Ile Lys His Ile Ala Ala Asp Gly Thr Glu Thr Ile Leu
        195                 200                 205

aag gac agc ctc aag ctt ctt gaa ggc gaa gtt cta gac gga acc gtt   672
Lys Asp Ser Leu Lys Leu Leu Glu Gly Glu Val Leu Asp Gly Thr Val
    210                 215                 220

ctg tcc gca aag gca ctg gac gca ttc ctt ctc gag cag gtc gct cgc   720
Leu Ser Ala Lys Ala Leu Asp Ala Phe Leu Leu Glu Gln Val Ala Arg
225                 230                 235                 240

gca aag gca gaa ggt atc ctc ttc tcc gca cac ctg aag gcc acc atg   768
```

```
Ala Lys Ala Glu Gly Ile Leu Phe Ser Ala His Leu Lys Ala Thr Met
                245                 250                 255

atg aag gtc tcc gac cca atc atc ttc ggc cac gtt gtg cgc gct tac   816
Met Lys Val Ser Asp Pro Ile Ile Phe Gly His Val Val Arg Ala Tyr
            260                 265                 270

ttc gca gac gtt ttc gca cag tac ggt gag cag ctg ctc gca gct ggc   864
Phe Ala Asp Val Phe Ala Gln Tyr Gly Glu Gln Leu Leu Ala Ala Gly
        275                 280                 285

ctc aac ggc gaa aac ggc ctc gct gca atc ctc tcc ggc ttg gag tcc   912
Leu Asn Gly Glu Asn Gly Leu Ala Ala Ile Leu Ser Gly Leu Glu Ser
    290                 295                 300

ctg gac aac ggc gaa gaa atc aag gct gca ttc gag aag ggc ttg gaa   960
Leu Asp Asn Gly Glu Glu Ile Lys Ala Ala Phe Glu Lys Gly Leu Glu
305                 310                 315                 320

gac ggc cca gac ctg gcc atg gtt aac tcc gct cgc ggc atc acc aac  1008
Asp Gly Pro Asp Leu Ala Met Val Asn Ser Ala Arg Gly Ile Thr Asn
                325                 330                 335

ctg cat gtc cct tcc gat gtc atc gtg gac gct tcc atg cca gca atg  1056
Leu His Val Pro Ser Asp Val Ile Val Asp Ala Ser Met Pro Ala Met
            340                 345                 350

att cgt acc tcc ggc cac atg tgg aac aaa gac gac cag gag cag gac  1104
Ile Arg Thr Ser Gly His Met Trp Asn Lys Asp Asp Gln Glu Gln Asp
        355                 360                 365

acc ctg gca atc atc cca gac tcc tcc tac gct ggc gtc tac cag acc  1152
Thr Leu Ala Ile Ile Pro Asp Ser Ser Tyr Ala Gly Val Tyr Gln Thr
    370                 375                 380

gtt atc gaa gac tgc cgc aag aac ggc gca ttc gat cca acc acc atg  1200
Val Ile Glu Asp Cys Arg Lys Asn Gly Ala Phe Asp Pro Thr Thr Met
385                 390                 395                 400

ggt acc gtc cct aac gtt ggt ctg atg gct cag aag gct gaa gag tac  1248
Gly Thr Val Pro Asn Val Gly Leu Met Ala Gln Lys Ala Glu Glu Tyr
                405                 410                 415

ggc tcc cat gac aag acc ttc cgc atc gaa gca gac ggt gtg gtt cag  1296
Gly Ser His Asp Lys Thr Phe Arg Ile Glu Ala Asp Gly Val Val Gln
            420                 425                 430

gtt gtt tcc tcc aac ggc gac gtt ctc atc gag cac gac gtt gag gca  1344
Val Val Ser Ser Asn Gly Asp Val Leu Ile Glu His Asp Val Glu Ala
        435                 440                 445

aat gac atc tgg cgt gca tgc cag gtc aag gat gcc cca atc cag gat  1392
Asn Asp Ile Trp Arg Ala Cys Gln Val Lys Asp Ala Pro Ile Gln Asp
    450                 455                 460

tgg gta aag ctt gct gtc acc cgc tcc cgt ctc tcc gga atg cct gca  1440
Trp Val Lys Leu Ala Val Thr Arg Ser Arg Leu Ser Gly Met Pro Ala
465                 470                 475                 480
```

```
gtg ttc tgg ttg gat cca gag cgc gca cac gac cgc aac ctg gct tcc   1488
Val Phe Trp Leu Asp Pro Glu Arg Ala His Asp Arg Asn Leu Ala Ser
                485                 490                 495

ctc gtt gag aag tac ctg gct gac cac gac acc gag ggc ctg gac atc   1536
Leu Val Glu Lys Tyr Leu Ala Asp His Asp Thr Glu Gly Leu Asp Ile
            500                 505                 510

cag atc ctc tcc cct gtt gag gca acc cag ctc tcc atc gac cgc atc   1584
Gln Ile Leu Ser Pro Val Glu Ala Thr Gln Leu Ser Ile Asp Arg Ile
        515                 520                 525

cgc cgt ggc gag gac acc atc tct gtc acc ggt aac gtt ctg cgt gac   1632
Arg Arg Gly Glu Asp Thr Ile Ser Val Thr Gly Asn Val Leu Arg Asp
    530                 535                 540

tac aac acc gac ctc ttc cca atc ctg gag ctg ggc acc tct gca aag   1680
Tyr Asn Thr Asp Leu Phe Pro Ile Leu Glu Leu Gly Thr Ser Ala Lys
545                 550                 555                 560

atg ctg tct gtc gtt cct ttg atg gct ggc ggc gga ctg ttc gag acc   1728
Met Leu Ser Val Val Pro Leu Met Ala Gly Gly Gly Leu Phe Glu Thr
                565                 570                 575

ggt gct ggt gga tct gct cct aag cac gtc cag cag gtt cag gaa gaa   1776
Gly Ala Gly Gly Ser Ala Pro Lys His Val Gln Gln Val Gln Glu Glu
            580                 585                 590

aac cac ctg cgt tgg gat tcc ctc ggt gag ttc ctc gca ctg gct gag   1824
Asn His Leu Arg Trp Asp Ser Leu Gly Glu Phe Leu Ala Leu Ala Glu
        595                 600                 605

tcc ttc cgc cac gag ctc aac aac aac ggc aac acc aag gcc ggc gtt   1872
Ser Phe Arg His Glu Leu Asn Asn Asn Gly Asn Thr Lys Ala Gly Val
    610                 615                 620

ctg gct gac gct ctg gac aag gca act gag aag ctg ctg aac gaa gag   1920
Leu Ala Asp Ala Leu Asp Lys Ala Thr Glu Lys Leu Leu Asn Glu Glu
625                 630                 635                 640

aag tcc cca tcc cgc aag gtt ggc gag atc gac aac cgt ggc tcc cac   1968
Lys Ser Pro Ser Arg Lys Val Gly Glu Ile Asp Asn Arg Gly Ser His
                645                 650                 655

ttc tgg ctg acc aag ttc tgg gct gac gag ctc gct gct cag acc gag   2016
Phe Trp Leu Thr Lys Phe Trp Ala Asp Glu Leu Ala Ala Gln Thr Glu
            660                 665                 670

gac gca gat ctg gct gct acc ttc gca cca gtc gca gaa gca ctg aac   2064
Asp Ala Asp Leu Ala Ala Thr Phe Ala Pro Val Ala Glu Ala Leu Asn
        675                 680                 685

aca ggc gct gca gac atc gat gct gca ctg ctc gca gtt cag ggt gga   2112
Thr Gly Ala Ala Asp Ile Asp Ala Ala Leu Leu Ala Val Gln Gly Gly
    690                 695                 700

gca act gac ctt ggt ggc tac tac tcc cct aac gag gag aag ctc acc   2160
Ala Thr Asp Leu Gly Gly Tyr Tyr Ser Pro Asn Glu Glu Lys Leu Thr
705                 710                 715                 720
```

```
aac atc atg cgc cca gtc gca cag ttc aac gag atc gtt gac gca ctg   2208
Asn Ile Met Arg Pro Val Ala Gln Phe Asn Glu Ile Val Asp Ala Leu
                725                 730                 735

aag aag                                                          2214
Lys Lys
```

<210> 100
<211> 738
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 100

```
Met Ala Lys Ile Ile Trp Thr Arg Thr Asp Glu Ala Pro Leu Leu Ala
  1               5                  10                  15

Thr Tyr Ser Leu Lys Pro Val Val Glu Ala Phe Ala Ala Thr Ala Gly
             20                  25                  30

Ile Glu Val Glu Thr Arg Asp Ile Ser Leu Ala Gly Arg Ile Leu Ala
         35                  40                  45

Gln Phe Pro Glu Arg Leu Thr Glu Asp Gln Lys Val Gly Asn Ala Leu
     50                  55                  60

Ala Glu Leu Gly Glu Leu Ala Lys Thr Pro Glu Ala Asn Ile Ile Lys
 65                  70                  75                  80

Leu Pro Asn Ile Ser Ala Ser Val Pro Gln Leu Lys Ala Ala Ile Lys
                 85                  90                  95

Glu Leu Gln Asp Gln Gly Tyr Asp Ile Pro Glu Leu Pro Asp Asn Ala
            100                 105                 110

Thr Thr Asp Glu Glu Lys Asp Ile Leu Ala Arg Tyr Asn Ala Val Lys
        115                 120                 125

Gly Ser Ala Val Asn Pro Val Leu Arg Glu Gly Asn Ser Asp Arg Arg
    130                 135                 140

Ala Pro Ile Ala Val Lys Asn Phe Val Lys Lys Phe Pro His Arg Met
145                 150                 155                 160

Gly Glu Trp Ser Ala Asp Ser Lys Thr Asn Val Ala Thr Met Asp Ala
                165                 170                 175

Asn Asp Phe Arg His Asn Glu Lys Ser Ile Ile Leu Asp Ala Ala Asp
            180                 185                 190

Glu Val Gln Ile Lys His Ile Ala Ala Asp Gly Thr Glu Thr Ile Leu
        195                 200                 205

Lys Asp Ser Leu Lys Leu Leu Glu Gly Glu Val Leu Asp Gly Thr Val
    210                 215                 220
```

```
Leu Ser Ala Lys Ala Leu Asp Ala Phe Leu Leu Glu Gln Val Ala Arg
225                 230                 235                 240

Ala Lys Ala Glu Gly Ile Leu Phe Ser Ala His Leu Lys Ala Thr Met
                245                 250                 255

Met Lys Val Ser Asp Pro Ile Ile Phe Gly His Val Val Arg Ala Tyr
            260                 265                 270

Phe Ala Asp Val Phe Ala Gln Tyr Gly Glu Gln Leu Leu Ala Ala Gly
        275                 280                 285

Leu Asn Gly Glu Asn Gly Leu Ala Ala Ile Leu Ser Gly Leu Glu Ser
    290                 295                 300

Leu Asp Asn Gly Glu Glu Ile Lys Ala Ala Phe Glu Lys Gly Leu Glu
305                 310                 315                 320

Asp Gly Pro Asp Leu Ala Met Val Asn Ser Ala Arg Gly Ile Thr Asn
                325                 330                 335

Leu His Val Pro Ser Asp Val Ile Val Asp Ala Ser Met Pro Ala Met
            340                 345                 350

Ile Arg Thr Ser Gly His Met Trp Asn Lys Asp Asp Gln Glu Gln Asp
        355                 360                 365

Thr Leu Ala Ile Ile Pro Asp Ser Ser Tyr Ala Gly Val Tyr Gln Thr
    370                 375                 380

Val Ile Glu Asp Cys Arg Lys Asn Gly Ala Phe Asp Pro Thr Thr Met
385                 390                 395                 400

Gly Thr Val Pro Asn Val Gly Leu Met Ala Gln Lys Ala Glu Glu Tyr
                405                 410                 415

Gly Ser His Asp Lys Thr Phe Arg Ile Glu Ala Asp Gly Val Val Gln
            420                 425                 430

Val Val Ser Ser Asn Gly Asp Val Leu Ile Glu His Asp Val Glu Ala
        435                 440                 445

Asn Asp Ile Trp Arg Ala Cys Gln Val Lys Asp Ala Pro Ile Gln Asp
    450                 455                 460

Trp Val Lys Leu Ala Val Thr Arg Ser Arg Leu Ser Gly Met Pro Ala
465                 470                 475                 480

Val Phe Trp Leu Asp Pro Glu Arg Ala His Asp Arg Asn Leu Ala Ser
                485                 490                 495

Leu Val Glu Lys Tyr Leu Ala Asp His Asp Thr Glu Gly Leu Asp Ile
            500                 505                 510

Gln Ile Leu Ser Pro Val Glu Ala Thr Gln Leu Ser Ile Asp Arg Ile
        515                 520                 525

Arg Arg Gly Glu Asp Thr Ile Ser Val Thr Gly Asn Val Leu Arg Asp
    530                 535                 540
```

```
Tyr Asn Thr Asp Leu Phe Pro Ile Leu Glu Leu Gly Thr Ser Ala Lys
545                 550                 555                 560

Met Leu Ser Val Val Pro Leu Met Ala Gly Gly Gly Leu Phe Glu Thr
                565                 570                 575

Gly Ala Gly Gly Ser Ala Pro Lys His Val Gln Gln Val Gln Glu Glu
            580                 585                 590

Asn His Leu Arg Trp Asp Ser Leu Gly Glu Phe Leu Ala Leu Ala Glu
        595                 600                 605

Ser Phe Arg His Glu Leu Asn Asn Asn Gly Asn Thr Lys Ala Gly Val
    610                 615                 620

Leu Ala Asp Ala Leu Asp Lys Ala Thr Glu Lys Leu Leu Asn Glu Glu
625                 630                 635                 640

Lys Ser Pro Ser Arg Lys Val Gly Glu Ile Asp Asn Arg Gly Ser His
                645                 650                 655

Phe Trp Leu Thr Lys Phe Trp Ala Asp Glu Leu Ala Ala Gln Thr Glu
            660                 665                 670

Asp Ala Asp Leu Ala Ala Thr Phe Ala Pro Val Ala Glu Ala Leu Asn
        675                 680                 685

Thr Gly Ala Ala Asp Ile Asp Ala Ala Leu Leu Ala Val Gln Gly Gly
    690                 695                 700

Ala Thr Asp Leu Gly Gly Tyr Tyr Ser Pro Asn Glu Glu Lys Leu Thr
705                 710                 715                 720

Asn Ile Met Arg Pro Val Ala Gln Phe Asn Glu Ile Val Asp Ala Leu
                725                 730                 735

Lys Lys
```

<210> 101
<211> 984
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(984)
<223> RXA00533E

<400> 101

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atg cgc acc ctt ttg gaa gag cgc aat ttc cca gct gac act gtt cgt   48
Met Arg Thr Leu Leu Glu Glu Arg Asn Phe Pro Ala Asp Thr Val Arg
  1               5                  10                  15

ttc ttt gct tcc cca cgt tcc gca ggc cgt aag att gaa ttc cgt ggc   96
Phe Phe Ala Ser Pro Arg Ser Ala Gly Arg Lys Ile Glu Phe Arg Gly
             20                  25                  30
```

```
acg gaa atc gag gta gaa gac att act cag gca acc gag gag tcc ctc   144
Thr Glu Ile Glu Val Glu Asp Ile Thr Gln Ala Thr Glu Glu Ser Leu
         35                  40                  45

aag gac atc gac gtt gcg ttg ttc tcc gct gga ggc acc gct tcc aag   192
Lys Asp Ile Asp Val Ala Leu Phe Ser Ala Gly Gly Thr Ala Ser Lys
     50                  55                  60

cag tac gct cca ctg ttc gct gct gca ggc gcg act gtt gtg gat aac   240
Gln Tyr Ala Pro Leu Phe Ala Ala Ala Gly Ala Thr Val Val Asp Asn
 65                  70                  75                  80

tct tct gct tgg cgc aag gac gac gag gtt cca cta atc gtc tct gag   288
Ser Ser Ala Trp Arg Lys Asp Asp Glu Val Pro Leu Ile Val Ser Glu
                85                  90                  95

gtg aac cct tcc gac aag gat tcc ctg gtc aag ggc att att gcg aac   336
Val Asn Pro Ser Asp Lys Asp Ser Leu Val Lys Gly Ile Ile Ala Asn
            100                 105                 110

cct aac tgc acc acc atg gct gcg atg cca gtg ctg aag cca ctt cac   384
Pro Asn Cys Thr Thr Met Ala Ala Met Pro Val Leu Lys Pro Leu His
        115                 120                 125

gat gcc gct ggt ctt gta aag ctt cac gtt tcc tct tac cag gct gtt   432
Asp Ala Ala Gly Leu Val Lys Leu His Val Ser Ser Tyr Gln Ala Val
    130                 135                 140

tcc ggt tct ggt ctt gca ggt gtg gaa acc ttg gca aag cag gtt gct   480
Ser Gly Ser Gly Leu Ala Gly Val Glu Thr Leu Ala Lys Gln Val Ala
145                 150                 155                 160

gca gtt gga gac cac aac gtt gag ttc gtc cat gat gga cag gct gct   528
Ala Val Gly Asp His Asn Val Glu Phe Val His Asp Gly Gln Ala Ala
                165                 170                 175

gac gca ggc gat gtc gga cct tat gtt tca cca atc gct tac aac gtg   576
Asp Ala Gly Asp Val Gly Pro Tyr Val Ser Pro Ile Ala Tyr Asn Val
            180                 185                 190

ctg cca ttc gcc gga aac ctc gtc gat gac ggc acc ttc gaa acc gat   624
Leu Pro Phe Ala Gly Asn Leu Val Asp Asp Gly Thr Phe Glu Thr Asp
        195                 200                 205

gaa gag cag aag ctg cgc aac gaa tcc cgc aag att ctc ggt ctc cca   672
Glu Glu Gln Lys Leu Arg Asn Glu Ser Arg Lys Ile Leu Gly Leu Pro
    210                 215                 220

gac ctc aag gtc tca ggc acc tgc gtc cgc gtg ccg gtt ttc acc ggc   720
Asp Leu Lys Val Ser Gly Thr Cys Val Arg Val Pro Val Phe Thr Gly
225                 230                 235                 240

cac acg ctg acc att cac gcc gaa ttc gac aag gca atc acc gtg gac   768
His Thr Leu Thr Ile His Ala Glu Phe Asp Lys Ala Ile Thr Val Asp
                245                 250                 255

cag gcg cag gag atc ttg ggt gcc gct tca ggc gtc aag ctt gtc gac   816
Gln Ala Gln Glu Ile Leu Gly Ala Ala Ser Gly Val Lys Leu Val Asp
```

```
            260                 265                 270

gtc cca acc cca ctt gca gct gcc ggc att gac gaa tcc ctc gtt gga   864
Val Pro Thr Pro Leu Ala Ala Ala Gly Ile Asp Glu Ser Leu Val Gly
        275                 280                 285

cgc atc cgt cag gac tcc act gtc gac gat aac cgc ggt ctg gtt ctc   912
Arg Ile Arg Gln Asp Ser Thr Val Asp Asp Asn Arg Gly Leu Val Leu
    290                 295                 300

gtc gta tct ggc gac aac ctc cgc aag ggt gct gcg cta aac acc atc   960
Val Val Ser Gly Asp Asn Leu Arg Lys Gly Ala Ala Leu Asn Thr Ile
305                 310                 315                 320

cag atc gct gag ctg ctg gtt aag                                  984
Gln Ile Ala Glu Leu Leu Val Lys
                325
```

<210> 102
<211> 328
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 102

```
Met Arg Thr Leu Leu Glu Glu Arg Asn Phe Pro Ala Asp Thr Val Arg
  1               5                  10                  15

Phe Phe Ala Ser Pro Arg Ser Ala Gly Arg Lys Ile Glu Phe Arg Gly
             20                  25                  30

Thr Glu Ile Glu Val Glu Asp Ile Thr Gln Ala Thr Glu Glu Ser Leu
         35                  40                  45

Lys Asp Ile Asp Val Ala Leu Phe Ser Ala Gly Gly Thr Ala Ser Lys
     50                  55                  60

Gln Tyr Ala Pro Leu Phe Ala Ala Ala Gly Ala Thr Val Val Asp Asn
 65                  70                  75                  80

Ser Ser Ala Trp Arg Lys Asp Asp Glu Val Pro Leu Ile Val Ser Glu
                 85                  90                  95

Val Asn Pro Ser Asp Lys Asp Ser Leu Val Lys Gly Ile Ile Ala Asn
            100                 105                 110

Pro Asn Cys Thr Thr Met Ala Ala Met Pro Val Leu Lys Pro Leu His
        115                 120                 125

Asp Ala Ala Gly Leu Val Lys Leu His Val Ser Ser Tyr Gln Ala Val
    130                 135                 140

Ser Gly Ser Gly Leu Ala Gly Val Glu Thr Leu Ala Lys Gln Val Ala
145                 150                 155                 160

Ala Val Gly Asp His Asn Val Glu Phe Val His Asp Gly Gln Ala Ala
                165                 170                 175
```

```
Asp Ala Gly Asp Val Gly Pro Tyr Val Ser Pro Ile Ala Tyr Asn Val
            180                 185                 190

Leu Pro Phe Ala Gly Asn Leu Val Asp Asp Gly Thr Phe Glu Thr Asp
        195                 200                 205

Glu Glu Gln Lys Leu Arg Asn Glu Ser Arg Lys Ile Leu Gly Leu Pro
    210                 215                 220

Asp Leu Lys Val Ser Gly Thr Cys Val Arg Val Pro Val Phe Thr Gly
225                 230                 235                 240

His Thr Leu Thr Ile His Ala Glu Phe Asp Lys Ala Ile Thr Val Asp
                245                 250                 255

Gln Ala Gln Glu Ile Leu Gly Ala Ala Ser Gly Val Lys Leu Val Asp
            260                 265                 270

Val Pro Thr Pro Leu Ala Ala Ala Gly Ile Asp Glu Ser Leu Val Gly
        275                 280                 285

Arg Ile Arg Gln Asp Ser Thr Val Asp Asp Asn Arg Gly Leu Val Leu
    290                 295                 300

Val Val Ser Gly Asp Asn Leu Arg Lys Gly Ala Ala Leu Asn Thr Ile
305                 310                 315                 320

Gln Ile Ala Glu Leu Leu Val Lys
                325
```

<210> 103
<211> 1032
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1032)
<223> RXA00533K

<400> 103

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atg acc acc atc gca gtt gtt ggt gca acc ggc cag gtc ggc cag gtt   48
Met Thr Thr Ile Ala Val Val Gly Ala Thr Gly Gln Val Gly Gln Val
  1               5                  10                  15

atg cgc acc ctt ttg gaa gag cgc aat ttc cca gct gac act gtt cgt   96
Met Arg Thr Leu Leu Glu Glu Arg Asn Phe Pro Ala Asp Thr Val Arg
             20                  25                  30

ttc ttt gct tcc cca cgt tcc gca ggc cgt aag att gaa ttc cgt ggc   144
Phe Phe Ala Ser Pro Arg Ser Ala Gly Arg Lys Ile Glu Phe Arg Gly
         35                  40                  45

acg gaa atc gag gta gaa gac att act cag gca acc gag gag tcc ctc   192
Thr Glu Ile Glu Val Glu Asp Ile Thr Gln Ala Thr Glu Glu Ser Leu
     50                  55                  60
```

```
aag gac atc gac gtt gcg ttg ttc tcc gct gga ggc acc gct tcc aag   240
Lys Asp Ile Asp Val Ala Leu Phe Ser Ala Gly Gly Thr Ala Ser Lys
 65                  70                  75                  80

cag tac gct cca ctg ttc gct gct gca ggc gcg act gtt gtg gat aac   288
Gln Tyr Ala Pro Leu Phe Ala Ala Ala Gly Ala Thr Val Val Asp Asn
                85                  90                  95

tct tct gct tgg cgc aag gac gac gag gtt cca cta atc gtc tct gag   336
Ser Ser Ala Trp Arg Lys Asp Asp Glu Val Pro Leu Ile Val Ser Glu
            100                 105                 110

gtg aac cct tcc gac aag gat tcc ctg gtc aag ggc att att gcg aac   384
Val Asn Pro Ser Asp Lys Asp Ser Leu Val Lys Gly Ile Ile Ala Asn
        115                 120                 125

cct aac tgc acc acc atg gct gcg atg cca gtg ctg aag cca ctt cac   432
Pro Asn Cys Thr Thr Met Ala Ala Met Pro Val Leu Lys Pro Leu His
    130                 135                 140

gat gcc gct ggt ctt gta aag ctt cac gtt tcc tct tac cag gct gtt   480
Asp Ala Ala Gly Leu Val Lys Leu His Val Ser Ser Tyr Gln Ala Val
145                 150                 155                 160

tcc ggt tct ggt ctt gca ggt gtg gaa acc ttg gca aag cag gtt gct   528
Ser Gly Ser Gly Leu Ala Gly Val Glu Thr Leu Ala Lys Gln Val Ala
                165                 170                 175

gca gtt gga gac cac aac gtt gag ttc gtc cat gat gga cag gct gct   576
Ala Val Gly Asp His Asn Val Glu Phe Val His Asp Gly Gln Ala Ala
            180                 185                 190

gac gca ggc gat gtc gga cct tat gtt tca cca atc gct tac aac gtg   624
Asp Ala Gly Asp Val Gly Pro Tyr Val Ser Pro Ile Ala Tyr Asn Val
        195                 200                 205

ctg cca ttc gcc gga aac ctc gtc gat gac ggc acc ttc gaa acc gat   672
Leu Pro Phe Ala Gly Asn Leu Val Asp Asp Gly Thr Phe Glu Thr Asp
    210                 215                 220

gaa gag cag aag ctg cgc aac gaa tcc cgc aag att ctc ggt ctc cca   720
Glu Glu Gln Lys Leu Arg Asn Glu Ser Arg Lys Ile Leu Gly Leu Pro
225                 230                 235                 240

gac ctc aag gtc tca ggc acc tgc gtc cgc gtg ccg gtt ttc acc ggc   768
Asp Leu Lys Val Ser Gly Thr Cys Val Arg Val Pro Val Phe Thr Gly
                245                 250                 255

cac acg ctg acc att cac gcc gaa ttc gac aag gca atc acc gtg gac   816
His Thr Leu Thr Ile His Ala Glu Phe Asp Lys Ala Ile Thr Val Asp
            260                 265                 270

cag gcg cag gag atc ttg ggt gcc gct tca ggc gtc aag ctt gtc gac   864
Gln Ala Gln Glu Ile Leu Gly Ala Ala Ser Gly Val Lys Leu Val Asp
        275                 280                 285

gtc cca acc cca ctt gca gct gcc ggc att gac gaa tcc ctc gtt gga   912
Val Pro Thr Pro Leu Ala Ala Ala Gly Ile Asp Glu Ser Leu Val Gly
    290                 295                 300
```

```
cgc atc cgt cag gac tcc act gtc gac gat aac cgc ggt ctg gtt ctc   960
Arg Ile Arg Gln Asp Ser Thr Val Asp Asp Asn Arg Gly Leu Val Leu
305                 310                 315                 320

gtc gta tct ggc gac aac ctc cgc aag ggt gct gcg cta aac acc atc   1008
Val Val Ser Gly Asp Asn Leu Arg Lys Gly Ala Ala Leu Asn Thr Ile
                325                 330                 335

cag atc gct gag ctg ctg gtt aag                                  1032
Gln Ile Ala Glu Leu Leu Val Lys
            340
```

<210> 104
<211> 344
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 104

```
Met Thr Thr Ile Ala Val Val Gly Ala Thr Gly Gln Val Gly Gln Val
  1               5                  10                  15

Met Arg Thr Leu Leu Glu Glu Arg Asn Phe Pro Ala Asp Thr Val Arg
             20                  25                  30

Phe Phe Ala Ser Pro Arg Ser Ala Gly Arg Lys Ile Glu Phe Arg Gly
         35                  40                  45

Thr Glu Ile Glu Val Glu Asp Ile Thr Gln Ala Thr Glu Glu Ser Leu
     50                  55                  60

Lys Asp Ile Asp Val Ala Leu Phe Ser Ala Gly Gly Thr Ala Ser Lys
 65                  70                  75                  80

Gln Tyr Ala Pro Leu Phe Ala Ala Ala Gly Ala Thr Val Val Asp Asn
                 85                  90                  95

Ser Ser Ala Trp Arg Lys Asp Asp Glu Val Pro Leu Ile Val Ser Glu
            100                 105                 110

Val Asn Pro Ser Asp Lys Asp Ser Leu Val Lys Gly Ile Ile Ala Asn
        115                 120                 125

Pro Asn Cys Thr Thr Met Ala Ala Met Pro Val Leu Lys Pro Leu His
    130                 135                 140

Asp Ala Ala Gly Leu Val Lys Leu His Val Ser Ser Tyr Gln Ala Val
145                 150                 155                 160

Ser Gly Ser Gly Leu Ala Gly Val Glu Thr Leu Ala Lys Gln Val Ala
                165                 170                 175

Ala Val Gly Asp His Asn Val Glu Phe Val His Asp Gly Gln Ala Ala
            180                 185                 190

Asp Ala Gly Asp Val Gly Pro Tyr Val Ser Pro Ile Ala Tyr Asn Val
        195                 200                 205
```

```
Leu Pro Phe Ala Gly Asn Leu Val Asp Asp Gly Thr Phe Glu Thr Asp
    210                 215                 220

Glu Glu Gln Lys Leu Arg Asn Glu Ser Arg Lys Ile Leu Gly Leu Pro
225                 230                 235                 240

Asp Leu Lys Val Ser Gly Thr Cys Val Arg Val Pro Val Phe Thr Gly
                245                 250                 255

His Thr Leu Thr Ile His Ala Glu Phe Asp Lys Ala Ile Thr Val Asp
            260                 265                 270

Gln Ala Gln Glu Ile Leu Gly Ala Ala Ser Gly Val Lys Leu Val Asp
        275                 280                 285

Val Pro Thr Pro Leu Ala Ala Ala Gly Ile Asp Glu Ser Leu Val Gly
    290                 295                 300

Arg Ile Arg Gln Asp Ser Thr Val Asp Asp Asn Arg Gly Leu Val Leu
305                 310                 315                 320

Val Val Ser Gly Asp Asn Leu Arg Lys Gly Ala Ala Leu Asn Thr Ile
                325                 330                 335

Gln Ile Ala Glu Leu Leu Val Lys
            340
```

<210> 105
<211> 882
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(882)
<223> RXA00782W

<400> 105

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atg tct att ttt ctc aat tca gat tcc cgc atc atc att cag ggc att   48
Met Ser Ile Phe Leu Asn Ser Asp Ser Arg Ile Ile Ile Gln Gly Ile
  1               5                  10                  15

acc ggt tcg gaa ggt tca gag cat gcg cgt cga att tta gcc tct ggt   96
Thr Gly Ser Glu Gly Ser Glu His Ala Arg Arg Ile Leu Ala Ser Gly
             20                  25                  30

gcg aag ctc gtg ggt ggc acc aac ccc cgc aaa gct ggg caa acc att   144
Ala Lys Leu Val Gly Gly Thr Asn Pro Arg Lys Ala Gly Gln Thr Ile
         35                  40                  45

ttg atc aat gac act gag ttg cct gta ttt ggc act gtt aag gaa gca   192
Leu Ile Asn Asp Thr Glu Leu Pro Val Phe Gly Thr Val Lys Glu Ala
     50                  55                  60

atg gag gaa acg ggt gcg gat gtc acc gta att ttc gtt cct cca gcc   240
Met Glu Glu Thr Gly Ala Asp Val Thr Val Ile Phe Val Pro Pro Ala
 65                  70                  75                  80
```

```
ttt gcc aaa gct gcg atc att gaa gct atc gac gct cac atc cca ctg   288
Phe Ala Lys Ala Ala Ile Ile Glu Ala Ile Asp Ala His Ile Pro Leu
                 85                  90                  95

tgc gtg att att act gag ggc atc cca gtg cgt gac gct tct gag gcg   336
Cys Val Ile Ile Thr Glu Gly Ile Pro Val Arg Asp Ala Ser Glu Ala
            100                 105                 110

tgg gct tat gcc aag aag gtg gga cac acc cgc atc att ggc cct aac   384
Trp Ala Tyr Ala Lys Lys Val Gly His Thr Arg Ile Ile Gly Pro Asn
        115                 120                 125

tgc cca ggc att att act ccc ggc gaa tct ctt gcg gga att acg ccg   432
Cys Pro Gly Ile Ile Thr Pro Gly Glu Ser Leu Ala Gly Ile Thr Pro
    130                 135                 140

gca aac att gca ggt tcc ggc ccg atc ggg ttg atc tca aag tcg gga   480
Ala Asn Ile Ala Gly Ser Gly Pro Ile Gly Leu Ile Ser Lys Ser Gly
145                 150                 155                 160

aca ctg act tat cag atg atg tac gaa ctt tca gat att ggc att tct   528
Thr Leu Thr Tyr Gln Met Met Tyr Glu Leu Ser Asp Ile Gly Ile Ser
                165                 170                 175

acg gcg att ggt att ggc ggt gac cca atc atc ggt aca acc cat atc   576
Thr Ala Ile Gly Ile Gly Gly Asp Pro Ile Ile Gly Thr Thr His Ile
            180                 185                 190

gac gct ctg gag gcc ttt gaa gct gat cct gag acc aag gca atc gtc   624
Asp Ala Leu Glu Ala Phe Glu Ala Asp Pro Glu Thr Lys Ala Ile Val
        195                 200                 205

atg atc ggt gag atc ggt gga gat gca gag gaa cgc gct gct gac ttc   672
Met Ile Gly Glu Ile Gly Gly Asp Ala Glu Glu Arg Ala Ala Asp Phe
    210                 215                 220

att tct aag cac gtg aca aaa cca gtt gtg ggt tac gtg gca ggc ttt   720
Ile Ser Lys His Val Thr Lys Pro Val Val Gly Tyr Val Ala Gly Phe
225                 230                 235                 240

acc gcc cct gaa gga aag acc atg ggg cat gct ggc gcc atc gtg aca   768
Thr Ala Pro Glu Gly Lys Thr Met Gly His Ala Gly Ala Ile Val Thr
                245                 250                 255

ggt tca gaa ggc act gcg cga gca aag aag cat gca ttg gag gcc gtg   816
Gly Ser Glu Gly Thr Ala Arg Ala Lys Lys His Ala Leu Glu Ala Val
            260                 265                 270

ggt gtt cgc gtg gga aca act ccg agt gaa acc gcg aag ctt atg cgt   864
Gly Val Arg Val Gly Thr Thr Pro Ser Glu Thr Ala Lys Leu Met Arg
        275                 280                 285

gag gta gtt gca gct ttg                                          882
Glu Val Val Ala Ala Leu
    290
```

<210> 106

<211> 294
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 106

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Met Ser Ile Phe Leu Asn Ser Asp Ser Arg Ile Ile Ile Gln Gly Ile
  1               5                  10                  15

Thr Gly Ser Glu Gly Ser Glu His Ala Arg Arg Ile Leu Ala Ser Gly
             20                  25                  30

Ala Lys Leu Val Gly Gly Thr Asn Pro Arg Lys Ala Gly Gln Thr Ile
         35                  40                  45

Leu Ile Asn Asp Thr Glu Leu Pro Val Phe Gly Thr Val Lys Glu Ala
     50                  55                  60

Met Glu Glu Thr Gly Ala Asp Val Thr Val Ile Phe Val Pro Pro Ala
 65                  70                  75                  80

Phe Ala Lys Ala Ala Ile Ile Glu Ala Ile Asp Ala His Ile Pro Leu
                 85                  90                  95

Cys Val Ile Ile Thr Glu Gly Ile Pro Val Arg Asp Ala Ser Glu Ala
            100                 105                 110

Trp Ala Tyr Ala Lys Lys Val Gly His Thr Arg Ile Ile Gly Pro Asn
        115                 120                 125

Cys Pro Gly Ile Ile Thr Pro Gly Glu Ser Leu Ala Gly Ile Thr Pro
    130                 135                 140

Ala Asn Ile Ala Gly Ser Gly Pro Ile Gly Leu Ile Ser Lys Ser Gly
145                 150                 155                 160

Thr Leu Thr Tyr Gln Met Met Tyr Glu Leu Ser Asp Ile Gly Ile Ser
                165                 170                 175

Thr Ala Ile Gly Ile Gly Gly Asp Pro Ile Ile Gly Thr Thr His Ile
            180                 185                 190

Asp Ala Leu Glu Ala Phe Glu Ala Asp Pro Glu Thr Lys Ala Ile Val
        195                 200                 205

Met Ile Gly Glu Ile Gly Gly Asp Ala Glu Glu Arg Ala Ala Asp Phe
    210                 215                 220

Ile Ser Lys His Val Thr Lys Pro Val Val Gly Tyr Val Ala Gly Phe
225                 230                 235                 240

Thr Ala Pro Glu Gly Lys Thr Met Gly His Ala Gly Ala Ile Val Thr
                245                 250                 255

Gly Ser Glu Gly Thr Ala Arg Ala Lys Lys His Ala Leu Glu Ala Val
            260                 265                 270

Gly Val Arg Val Gly Thr Thr Pro Ser Glu Thr Ala Lys Leu Met Arg
        275                 280                 285
```

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Glu Val Val Ala Ala Leu
    290


<210> 107
<211> 681
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(681)
<223> RXA00822K

<400> 107
gtg gaa ggt gta cag gag atc ctg tcg cgc gcc gga att ttt caa ggc   48
Met Glu Gly Val Gln Glu Ile Leu Ser Arg Ala Gly Ile Phe Gln Gly
  1               5                  10                  15

gtt gac cca acg gca gtc aat aac ctc atc cag gat atg gag acc gtt   96
Val Asp Pro Thr Ala Val Asn Asn Leu Ile Gln Asp Met Glu Thr Val
             20                  25                  30

cgc ttc cca cgc gga gca acc atc ttc gac gag ggc gag cca ggt gac   144
Arg Phe Pro Arg Gly Ala Thr Ile Phe Asp Glu Gly Glu Pro Gly Asp
         35                  40                  45

cgc ctt tac atc atc acc tcc ggc aaa gtg aag ctt gcg cgc cac gca   192
Arg Leu Tyr Ile Ile Thr Ser Gly Lys Val Lys Leu Ala Arg His Ala
     50                  55                  60

ccg gac ggc cgc gaa aac ctg ctg acc atc atg ggt cct tcc gac atg   240
Pro Asp Gly Arg Glu Asn Leu Leu Thr Ile Met Gly Pro Ser Asp Met
 65                  70                  75                  80

ttc ggt gag ctc tcc atc ttc gac cca ggc cca cgc acc tcc tct gca   288
Phe Gly Glu Leu Ser Ile Phe Asp Pro Gly Pro Arg Thr Ser Ser Ala
                 85                  90                  95

gtg tgt gtc acc gaa gtt cat gca gca acc atg aac tct gac atg ctg   336
Val Cys Val Thr Glu Val His Ala Ala Thr Met Asn Ser Asp Met Leu
            100                 105                 110

cgc aac tgg gta gct gac cac cca gct atc gct gag cag ctc ctg cgc   384
Arg Asn Trp Val Ala Asp His Pro Ala Ile Ala Glu Gln Leu Leu Arg
        115                 120                 125

gtt ctg gct cgt cgt ctg cgt cgc acc aac gct tcc ctg gct gac ctc   432
Val Leu Ala Arg Arg Leu Arg Arg Thr Asn Ala Ser Leu Ala Asp Leu
    130                 135                 140

atc ttc acc gac gtc cca ggc cgc gtt gct aag acc ctt ctg cag ctg   480
Ile Phe Thr Asp Val Pro Gly Arg Val Ala Lys Thr Leu Leu Gln Leu
145                 150                 155                 160

gct aac cgc ttc ggc acc caa gaa gct ggc gcg ctg cgc gtg aac cac   528
Ala Asn Arg Phe Gly Thr Gln Glu Ala Gly Ala Leu Arg Val Asn His
                165                 170                 175
```

```
gac ctc act cag gaa gaa atc gca cag ctc gtc ggt gct tcc cgt gaa   576
Asp Leu Thr Gln Glu Glu Ile Ala Gln Leu Val Gly Ala Ser Arg Glu
            180                 185                 190

act gtg aat aag gct ctt gca acg ttc gca cac cgt ggc tgg att cgc   624
Thr Val Asn Lys Ala Leu Ala Thr Phe Ala His Arg Gly Trp Ile Arg
        195                 200                 205

ctc gag ggc aag tcc gtc ctc att gtg gac acc gag cat ttg gca cgt   672
Leu Glu Gly Lys Ser Val Leu Ile Val Asp Thr Glu His Leu Ala Arg
    210                 215                 220

cgc gct cga                                                      681
Arg Ala Arg
225
```

<210> 108
<211> 227
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 108

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Met Glu Gly Val Gln Glu Ile Leu Ser Arg Ala Gly Ile Phe Gln Gly
  1               5                  10                  15

Val Asp Pro Thr Ala Val Asn Asn Leu Ile Gln Asp Met Glu Thr Val
             20                  25                  30

Arg Phe Pro Arg Gly Ala Thr Ile Phe Asp Glu Gly Glu Pro Gly Asp
         35                  40                  45

Arg Leu Tyr Ile Ile Thr Ser Gly Lys Val Lys Leu Ala Arg His Ala
     50                  55                  60

Pro Asp Gly Arg Glu Asn Leu Leu Thr Ile Met Gly Pro Ser Asp Met
 65                  70                  75                  80

Phe Gly Glu Leu Ser Ile Phe Asp Pro Gly Pro Arg Thr Ser Ser Ala
                 85                  90                  95

Val Cys Val Thr Glu Val His Ala Ala Thr Met Asn Ser Asp Met Leu
            100                 105                 110

Arg Asn Trp Val Ala Asp His Pro Ala Ile Ala Glu Gln Leu Leu Arg
        115                 120                 125

Val Leu Ala Arg Arg Leu Arg Arg Thr Asn Ala Ser Leu Ala Asp Leu
    130                 135                 140

Ile Phe Thr Asp Val Pro Gly Arg Val Ala Lys Thr Leu Leu Gln Leu
145                 150                 155                 160

Ala Asn Arg Phe Gly Thr Gln Glu Ala Gly Ala Leu Arg Val Asn His
                165                 170                 175

Asp Leu Thr Gln Glu Glu Ile Ala Gln Leu Val Gly Ala Ser Arg Glu
```

```
            180                 185                 190

Thr Val Asn Lys Ala Leu Ala Thr Phe Ala His Arg Gly Trp Ile Arg
        195                 200                 205

Leu Glu Gly Lys Ser Val Leu Ile Val Asp Thr Glu His Leu Ala Arg
    210                 215                 220

Arg Ala Arg
225
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<210> 109
<211> 1650
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1650)
<223> RXA00975K

<400> 109

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atg aca cca gct gat ctc gca aca ttg att aaa gag acc gcg gta gag   48
Met Thr Pro Ala Asp Leu Ala Thr Leu Ile Lys Glu Thr Ala Val Glu
  1               5                  10                  15

gtt ttg acc tcc cgc gag ctc gat act tct gtt ctt ccg gag cag gta   96
Val Leu Thr Ser Arg Glu Leu Asp Thr Ser Val Leu Pro Glu Gln Val
             20                  25                  30

gtt gtg gag cgt ccg cgt aac cca gag cac ggc gat tac gcc acc aac   144
Val Val Glu Arg Pro Arg Asn Pro Glu His Gly Asp Tyr Ala Thr Asn
         35                  40                  45

att gca ttg cag gtg gct aaa aag gtc ggt cag aac cct cgg gat ttg   192
Ile Ala Leu Gln Val Ala Lys Lys Val Gly Gln Asn Pro Arg Asp Leu
     50                  55                  60

gct acc tgg ctg gca gag gca ttg gct gca gat gac gcc att gat tct   240
Ala Thr Trp Leu Ala Glu Ala Leu Ala Ala Asp Asp Ala Ile Asp Ser
 65                  70                  75                  80

gct gaa att gct ggc cca ggc ttt ttg aac att cgc ctt gct gca gca   288
Ala Glu Ile Ala Gly Pro Gly Phe Leu Asn Ile Arg Leu Ala Ala Ala
                 85                  90                  95

gca cag ggt gaa att gtg gcc aag att ctg gca cag ggc gag act ttc   336
Ala Gln Gly Glu Ile Val Ala Lys Ile Leu Ala Gln Gly Glu Thr Phe
            100                 105                 110

gga aac tcc gat cac ctt tcc cac ttg gac gtg aac ctc gag ttc gtt   384
Gly Asn Ser Asp His Leu Ser His Leu Asp Val Asn Leu Glu Phe Val
        115                 120                 125

tct gca aac cca acc gga cct att cac ctt ggc gga acc cgc tgg gct   432
Ser Ala Asn Pro Thr Gly Pro Ile His Leu Gly Gly Thr Arg Trp Ala
    130                 135                 140
```

```
gcc gtg ggt gac tct ttg ggt cgt gtg ctg gag gct tcc ggc gcg aaa   480
Ala Val Gly Asp Ser Leu Gly Arg Val Leu Glu Ala Ser Gly Ala Lys
145                 150                 155                 160

gtg acc cgc gaa tac tac ttc aac gat cac ggt cgc cag atc gat cgt   528
Val Thr Arg Glu Tyr Tyr Phe Asn Asp His Gly Arg Gln Ile Asp Arg
                165                 170                 175

ttc gct ttg tcc ctt ctt gca gcg gcg aag ggc gag cca acg cca gaa   576
Phe Ala Leu Ser Leu Leu Ala Ala Ala Lys Gly Glu Pro Thr Pro Glu
            180                 185                 190

gac ggt tat ggc ggc gaa tac att aag gaa att gcg gag gca atc gtc   624
Asp Gly Tyr Gly Gly Glu Tyr Ile Lys Glu Ile Ala Glu Ala Ile Val
        195                 200                 205

gaa aag cat cct gaa gcg ttg gct ttg gag cct gcc gca acc cag gag   672
Glu Lys His Pro Glu Ala Leu Ala Leu Glu Pro Ala Ala Thr Gln Glu
    210                 215                 220

ctt ttc cgc gct gaa ggc gtg gag atg atg ttc gag cac atc aaa tct   720
Leu Phe Arg Ala Glu Gly Val Glu Met Met Phe Glu His Ile Lys Ser
225                 230                 235                 240

tcc ctg cat gag ttc ggc acc gat ttc gat gtc tac tac cac gag aac   768
Ser Leu His Glu Phe Gly Thr Asp Phe Asp Val Tyr Tyr His Glu Asn
                245                 250                 255

tcc ctg ttc gag tcc ggt gcg gtg gac aag gcc gtg cag gtg ctg aag   816
Ser Leu Phe Glu Ser Gly Ala Val Asp Lys Ala Val Gln Val Leu Lys
            260                 265                 270

gac aac ggc aac ctg tac gaa aac gag ggc gct tgg tgg ctg cgt tcc   864
Asp Asn Gly Asn Leu Tyr Glu Asn Glu Gly Ala Trp Trp Leu Arg Ser
        275                 280                 285

acc gaa ttc ggc gat gac aaa gac cgc gtg gtg atc aag tct gac ggc   912
Thr Glu Phe Gly Asp Asp Lys Asp Arg Val Val Ile Lys Ser Asp Gly
    290                 295                 300

gac gca gcc tac atc gct ggc gat atc gcg tac gtg gct gat aag ttc   960
Asp Ala Ala Tyr Ile Ala Gly Asp Ile Ala Tyr Val Ala Asp Lys Phe
305                 310                 315                 320

tcc cgc gga cac aac cta aac atc tac atg ttg ggt gct gac cac cat  1008
Ser Arg Gly His Asn Leu Asn Ile Tyr Met Leu Gly Ala Asp His His
                325                 330                 335

ggt tac atc gcg cgc ctg aag gca gcg gcg gcg gca ctt ggc tac aag  1056
Gly Tyr Ile Ala Arg Leu Lys Ala Ala Ala Ala Ala Leu Gly Tyr Lys
            340                 345                 350

cca gaa ggc gtt gaa gtc ctg att ggc cag atg gtg aac ctg ctt cgc  1104
Pro Glu Gly Val Glu Val Leu Ile Gly Gln Met Val Asn Leu Leu Arg
        355                 360                 365

gac ggc aag gca gtg cgt atg tcc aag cgt gca ggc acc gtg gtc acc  1152
Asp Gly Lys Ala Val Arg Met Ser Lys Arg Ala Gly Thr Val Val Thr
    370                 375                 380
```

```
cta gat gac ctc gtt gaa gca atc ggc atc gat gcg gcg cgt tac tcc   1200
Leu Asp Asp Leu Val Glu Ala Ile Gly Ile Asp Ala Ala Arg Tyr Ser
385                 390                 395                 400

ctg atc cgt tcc tcc gtg gat tct tcc ctg gat atc gat ctc ggc ctg   1248
Leu Ile Arg Ser Ser Val Asp Ser Ser Leu Asp Ile Asp Leu Gly Leu
                405                 410                 415

tgg gaa tcc cag tcc tcc gac aac cct gtg tac tac gtg cag tac gga   1296
Trp Glu Ser Gln Ser Ser Asp Asn Pro Val Tyr Tyr Val Gln Tyr Gly
            420                 425                 430

cac gct cgt ctg tgc tcc atc gcg cgc aag gca gag acc ttg ggt gtc   1344
His Ala Arg Leu Cys Ser Ile Ala Arg Lys Ala Glu Thr Leu Gly Val
        435                 440                 445

acc gag gaa ggc gca gac cta tct cta ctg acc cac gac cgc gaa ggc   1392
Thr Glu Glu Gly Ala Asp Leu Ser Leu Leu Thr His Asp Arg Glu Gly
    450                 455                 460

gat ctc atc cgc aca ctc gga gag ttc cca gca gtg gtg aag gct gcc   1440
Asp Leu Ile Arg Thr Leu Gly Glu Phe Pro Ala Val Val Lys Ala Ala
465                 470                 475                 480

gct gac cta cgt gaa cca cac cgc att gcc cgc tat gct gag gaa tta   1488
Ala Asp Leu Arg Glu Pro His Arg Ile Ala Arg Tyr Ala Glu Glu Leu
                485                 490                 495

gct gga act ttc cac cgc ttc tac gat tcc tgc cac atc ctt cca aag   1536
Ala Gly Thr Phe His Arg Phe Tyr Asp Ser Cys His Ile Leu Pro Lys
            500                 505                 510

gtt gat gag gat acg gca cca atc cac aca gca cgt ctg gca ctt gca   1584
Val Asp Glu Asp Thr Ala Pro Ile His Thr Ala Arg Leu Ala Leu Ala
        515                 520                 525

gca gca acc cgc cag acc ctc gct aac gcc ctg cac ctg gtt ggc gtt   1632
Ala Ala Thr Arg Gln Thr Leu Ala Asn Ala Leu His Leu Val Gly Val
    530                 535                 540

tcc gca ccg gag aag atg                                          1650
Ser Ala Pro Glu Lys Met
545                 550
```

<210> 110
<211> 550
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 110

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Met Thr Pro Ala Asp Leu Ala Thr Leu Ile Lys Glu Thr Ala Val Glu
  1               5                  10                  15

Val Leu Thr Ser Arg Glu Leu Asp Thr Ser Val Leu Pro Glu Gln Val
             20                  25                  30
```

```
Val Val Glu Arg Pro Arg Asn Pro Glu His Gly Asp Tyr Ala Thr Asn
         35                  40                  45

Ile Ala Leu Gln Val Ala Lys Lys Val Gly Gln Asn Pro Arg Asp Leu
     50                  55                  60

Ala Thr Trp Leu Ala Glu Ala Leu Ala Ala Asp Asp Ala Ile Asp Ser
 65                  70                  75                  80

Ala Glu Ile Ala Gly Pro Gly Phe Leu Asn Ile Arg Leu Ala Ala Ala
                 85                  90                  95

Ala Gln Gly Glu Ile Val Ala Lys Ile Leu Ala Gln Gly Glu Thr Phe
            100                 105                 110

Gly Asn Ser Asp His Leu Ser His Leu Asp Val Asn Leu Glu Phe Val
        115                 120                 125

Ser Ala Asn Pro Thr Gly Pro Ile His Leu Gly Gly Thr Arg Trp Ala
    130                 135                 140

Ala Val Gly Asp Ser Leu Gly Arg Val Leu Glu Ala Ser Gly Ala Lys
145                 150                 155                 160

Val Thr Arg Glu Tyr Tyr Phe Asn Asp His Gly Arg Gln Ile Asp Arg
                165                 170                 175

Phe Ala Leu Ser Leu Leu Ala Ala Ala Lys Gly Glu Pro Thr Pro Glu
            180                 185                 190

Asp Gly Tyr Gly Gly Glu Tyr Ile Lys Glu Ile Ala Glu Ala Ile Val
        195                 200                 205

Glu Lys His Pro Glu Ala Leu Ala Leu Glu Pro Ala Ala Thr Gln Glu
    210                 215                 220

Leu Phe Arg Ala Glu Gly Val Glu Met Met Phe Glu His Ile Lys Ser
225                 230                 235                 240

Ser Leu His Glu Phe Gly Thr Asp Phe Asp Val Tyr Tyr His Glu Asn
                245                 250                 255

Ser Leu Phe Glu Ser Gly Ala Val Asp Lys Ala Val Gln Val Leu Lys
            260                 265                 270

Asp Asn Gly Asn Leu Tyr Glu Asn Glu Gly Ala Trp Trp Leu Arg Ser
        275                 280                 285

Thr Glu Phe Gly Asp Asp Lys Asp Arg Val Val Ile Lys Ser Asp Gly
    290                 295                 300

Asp Ala Ala Tyr Ile Ala Gly Asp Ile Ala Tyr Val Ala Asp Lys Phe
305                 310                 315                 320

Ser Arg Gly His Asn Leu Asn Ile Tyr Met Leu Gly Ala Asp His His
                325                 330                 335

Gly Tyr Ile Ala Arg Leu Lys Ala Ala Ala Ala Ala Leu Gly Tyr Lys
            340                 345                 350
```

```
Pro Glu Gly Val Glu Val Leu Ile Gly Gln Met Val Asn Leu Leu Arg
        355                 360                 365

Asp Gly Lys Ala Val Arg Met Ser Lys Arg Ala Gly Thr Val Val Thr
    370                 375                 380

Leu Asp Asp Leu Val Glu Ala Ile Gly Ile Asp Ala Ala Arg Tyr Ser
385                 390                 395                 400

Leu Ile Arg Ser Ser Val Asp Ser Ser Leu Asp Ile Asp Leu Gly Leu
                405                 410                 415

Trp Glu Ser Gln Ser Ser Asp Asn Pro Val Tyr Tyr Val Gln Tyr Gly
            420                 425                 430

His Ala Arg Leu Cys Ser Ile Ala Arg Lys Ala Glu Thr Leu Gly Val
        435                 440                 445

Thr Glu Glu Gly Ala Asp Leu Ser Leu Leu Thr His Asp Arg Glu Gly
    450                 455                 460

Asp Leu Ile Arg Thr Leu Gly Glu Phe Pro Ala Val Val Lys Ala Ala
465                 470                 475                 480

Ala Asp Leu Arg Glu Pro His Arg Ile Ala Arg Tyr Ala Glu Glu Leu
                485                 490                 495

Ala Gly Thr Phe His Arg Phe Tyr Asp Ser Cys His Ile Leu Pro Lys
            500                 505                 510

Val Asp Glu Asp Thr Ala Pro Ile His Thr Ala Arg Leu Ala Leu Ala
        515                 520                 525

Ala Ala Thr Arg Gln Thr Leu Ala Asn Ala Leu His Leu Val Gly Val
    530                 535                 540

Ser Ala Pro Glu Lys Met
545                 550


<210> 111
<211> 750
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(747)
<223> RXA01311E

<400> 111
atg aaa ctt aca ctt gag atc tgg cgt caa gca ggc cca act gcg gaa   48
Met Lys Leu Thr Leu Glu Ile Trp Arg Gln Ala Gly Pro Thr Ala Glu
  1               5                  10                  15

ggc aag ttc gaa acc gtc cag gtt gac gac gcc gtc gcg cag atg tcc   96
Gly Lys Phe Glu Thr Val Gln Val Asp Asp Ala Val Ala Gln Met Ser
             20                  25                  30
```

```
atc ctg gag ctg ctt gac cac gta aac aac aag ttc atc gaa gaa ggc   144
Ile Leu Glu Leu Leu Asp His Val Asn Asn Lys Phe Ile Glu Glu Gly
         35                  40                  45

aaa gaa cca ttc gcg ttc gcc tct gac tgc cgc gaa ggc att tgt ggt   192
Lys Glu Pro Phe Ala Phe Ala Ser Asp Cys Arg Glu Gly Ile Cys Gly
     50                  55                  60

acc tgt ggt ctc ctc gtg aac ggt cgc cct cac ggc gcc gac cag aac   240
Thr Cys Gly Leu Leu Val Asn Gly Arg Pro His Gly Ala Asp Gln Asn
 65                  70                  75                  80

aag cct gcc tgt gcg cag cgc ctg gtc agc tac aag gaa ggc gac acc   288
Lys Pro Ala Cys Ala Gln Arg Leu Val Ser Tyr Lys Glu Gly Asp Thr
                 85                  90                  95

ctc aag atc gaa cca ctg cgt tcc gcc gca tac cca gtg atc aag gac   336
Leu Lys Ile Glu Pro Leu Arg Ser Ala Ala Tyr Pro Val Ile Lys Asp
            100                 105                 110

atg gtc gtc gac cgc tcc gca ctg gac cgt gtc atg gaa cag ggt ggc   384
Met Val Val Asp Arg Ser Ala Leu Asp Arg Val Met Glu Gln Gly Gly
        115                 120                 125

tac gtg acc atc aac gca ggt acc gca cct gac gct gat acc ctc cac   432
Tyr Val Thr Ile Asn Ala Gly Thr Ala Pro Asp Ala Asp Thr Leu His
    130                 135                 140

gtc aac cac gaa acc gca gaa ctc gca ctt gac cac gca gcc tgc atc   480
Val Asn His Glu Thr Ala Glu Leu Ala Leu Asp His Ala Ala Cys Ile
145                 150                 155                 160

ggc tgt ggc gca tgt gtt gct gcc tgc cct aac ggc gca gca cac ctg   528
Gly Cys Gly Ala Cys Val Ala Ala Cys Pro Asn Gly Ala Ala His Leu
                165                 170                 175

ttc acc ggc gca aag ctt gtt cac ctc tcc ctc ctc cca ctg ggt aag   576
Phe Thr Gly Ala Lys Leu Val His Leu Ser Leu Leu Pro Leu Gly Lys
            180                 185                 190

gaa gag cgc gga ctg cgt gca cgt aag atg gtt gat gaa atg gaa acc   624
Glu Glu Arg Gly Leu Arg Ala Arg Lys Met Val Asp Glu Met Glu Thr
        195                 200                 205

aac ttc gga cac tgc tcc ctc tac ggc gag tgc gca gat gtc tgc ccc   672
Asn Phe Gly His Cys Ser Leu Tyr Gly Glu Cys Ala Asp Val Cys Pro
    210                 215                 220

gca ggc atc cca ctg acc gct gtg gca gct gtc acc aag gaa cgt gcg   720
Ala Gly Ile Pro Leu Thr Ala Val Ala Ala Val Thr Lys Glu Arg Ala
225                 230                 235                 240

cgt gca gct ttc cga ggc aaa gac gac tag                          750
Arg Ala Ala Phe Arg Gly Lys Asp Asp
                245
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<210> 112

<211> 249
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 112
Met Lys Leu Thr Leu Glu Ile Trp Arg Gln Ala Gly Pro Thr Ala Glu
1 5 10 15

Gly Lys Phe Glu Thr Val Gln Val Asp Asp Ala Val Ala Gln Met Ser
20 25 30

Ile Leu Glu Leu Leu Asp His Val Asn Asn Lys Phe Ile Glu Glu Gly
35 40 45

Lys Glu Pro Phe Ala Phe Ala Ser Asp Cys Arg Glu Gly Ile Cys Gly
50 55 60

Thr Cys Gly Leu Leu Val Asn Gly Arg Pro His Gly Ala Asp Gln Asn
65 70 75 80

Lys Pro Ala Cys Ala Gln Arg Leu Val Ser Tyr Lys Glu Gly Asp Thr
85 90 95

Leu Lys Ile Glu Pro Leu Arg Ser Ala Ala Tyr Pro Val Ile Lys Asp
100 105 110

Met Val Val Asp Arg Ser Ala Leu Asp Arg Val Met Glu Gln Gly Gly
115 120 125

Tyr Val Thr Ile Asn Ala Gly Thr Ala Pro Asp Ala Asp Thr Leu His
130 135 140

Val Asn His Glu Thr Ala Glu Leu Ala Leu Asp His Ala Ala Cys Ile
145 150 155 160

Gly Cys Gly Ala Cys Val Ala Ala Cys Pro Asn Gly Ala Ala His Leu
165 170 175

Phe Thr Gly Ala Lys Leu Val His Leu Ser Leu Leu Pro Leu Gly Lys
180 185 190

Glu Glu Arg Gly Leu Arg Ala Arg Lys Met Val Asp Glu Met Glu Thr
195 200 205

Asn Phe Gly His Cys Ser Leu Tyr Gly Glu Cys Ala Asp Val Cys Pro
210 215 220

Ala Gly Ile Pro Leu Thr Ala Val Ala Ala Val Thr Lys Glu Arg Ala
225 230 235 240

Arg Ala Ala Phe Arg Gly Lys Asp Asp
245

<210> 113
<211> 837
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(837)
<223> RXA01311K

<400> 113

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atg gga acc agg cga gaa cgg aac ctt cgt ccg cca cgc aga acc act   48
Met Gly Thr Arg Arg Glu Arg Asn Leu Arg Pro Pro Arg Arg Thr Thr
  1               5                  10                  15

gtt ctt cga atc cgt ccc act gca gac aag gaa cta caa gta atg aaa   96
Val Leu Arg Ile Arg Pro Thr Ala Asp Lys Glu Leu Gln Val Met Lys
             20                  25                  30

ctt aca ctt gag atc tgg cgt caa gca ggc cca act gcg gaa ggc aag   144
Leu Thr Leu Glu Ile Trp Arg Gln Ala Gly Pro Thr Ala Glu Gly Lys
         35                  40                  45

ttc gaa acc gtc cag gtt gac gac gcc gtc gcg cag atg tcc atc ctg   192
Phe Glu Thr Val Gln Val Asp Asp Ala Val Ala Gln Met Ser Ile Leu
     50                  55                  60

gag ctg ctt gac cac gta aac aac aag ttc atc gaa gaa ggc aaa gaa   240
Glu Leu Leu Asp His Val Asn Asn Lys Phe Ile Glu Glu Gly Lys Glu
 65                  70                  75                  80

cca ttc gcg ttc gcc tct gac tgc cgc gaa ggc att tgt ggt acc tgt   288
Pro Phe Ala Phe Ala Ser Asp Cys Arg Glu Gly Ile Cys Gly Thr Cys
                 85                  90                  95

ggt ctc ctc gtg aac ggt cgc cct cac ggc gcc gac cag aac aag cct   336
Gly Leu Leu Val Asn Gly Arg Pro His Gly Ala Asp Gln Asn Lys Pro
            100                 105                 110

gcc tgt gcg cag cgc ctg gtc agc tac aag gaa ggc gac acc ctc aag   384
Ala Cys Ala Gln Arg Leu Val Ser Tyr Lys Glu Gly Asp Thr Leu Lys
        115                 120                 125

atc gaa cca ctg cgt tcc gcc gca tac cca gtg atc aag gac atg gtc   432
Ile Glu Pro Leu Arg Ser Ala Ala Tyr Pro Val Ile Lys Asp Met Val
    130                 135                 140

gtc gac cgc tcc gca ctg gac cgt gtc atg gaa cag ggt ggc tac gtg   480
Val Asp Arg Ser Ala Leu Asp Arg Val Met Glu Gln Gly Gly Tyr Val
145                 150                 155                 160

acc atc aac gca ggt acc gca cct gac gct gat acc ctc cac gtc aac   528
Thr Ile Asn Ala Gly Thr Ala Pro Asp Ala Asp Thr Leu His Val Asn
                165                 170                 175

cac gaa acc gca gaa ctc gca ctt gac cac gca gcc tgc atc ggc tgt   576
His Glu Thr Ala Glu Leu Ala Leu Asp His Ala Ala Cys Ile Gly Cys
            180                 185                 190

ggc gca tgt gtt gct gcc tgc cct aac ggc gca gca cac ctg ttc acc   624
Gly Ala Cys Val Ala Ala Cys Pro Asn Gly Ala Ala His Leu Phe Thr
        195                 200                 205
```

```
ggc gca aag ctt gtt cac ctc tcc ctc ctc cca ctg ggt aag gaa gag   672
Gly Ala Lys Leu Val His Leu Ser Leu Leu Pro Leu Gly Lys Glu Glu
    210                 215                 220

cgc gga ctg cgt gca cgt aag atg gtt gat gaa atg gaa acc aac ttc   720
Arg Gly Leu Arg Ala Arg Lys Met Val Asp Glu Met Glu Thr Asn Phe
225                 230                 235                 240

gga cac tgc tcc ctc tac ggc gag tgc gca gat gtc tgc ccc gca ggc   768
Gly His Cys Ser Leu Tyr Gly Glu Cys Ala Asp Val Cys Pro Ala Gly
                245                 250                 255

atc cca ctg acc gct gtg gca gct gtc acc aag gaa cgt gcg cgt gca   816
Ile Pro Leu Thr Ala Val Ala Ala Val Thr Lys Glu Arg Ala Arg Ala
            260                 265                 270

gct ttc cga ggc aaa gac gac                                      837
Ala Phe Arg Gly Lys Asp Asp
        275
```

<210> 114
<211> 279
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 114

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Met Gly Thr Arg Arg Glu Arg Asn Leu Arg Pro Pro Arg Arg Thr Thr
  1               5                  10                  15

Val Leu Arg Ile Arg Pro Thr Ala Asp Lys Glu Leu Gln Val Met Lys
             20                  25                  30

Leu Thr Leu Glu Ile Trp Arg Gln Ala Gly Pro Thr Ala Glu Gly Lys
         35                  40                  45

Phe Glu Thr Val Gln Val Asp Asp Ala Val Ala Gln Met Ser Ile Leu
     50                  55                  60

Glu Leu Leu Asp His Val Asn Asn Lys Phe Ile Glu Glu Gly Lys Glu
 65                  70                  75                  80

Pro Phe Ala Phe Ala Ser Asp Cys Arg Glu Gly Ile Cys Gly Thr Cys
                 85                  90                  95

Gly Leu Leu Val Asn Gly Arg Pro His Gly Ala Asp Gln Asn Lys Pro
            100                 105                 110

Ala Cys Ala Gln Arg Leu Val Ser Tyr Lys Glu Gly Asp Thr Leu Lys
        115                 120                 125

Ile Glu Pro Leu Arg Ser Ala Ala Tyr Pro Val Ile Lys Asp Met Val
    130                 135                 140

Val Asp Arg Ser Ala Leu Asp Arg Val Met Glu Gln Gly Gly Tyr Val
145                 150                 155                 160

Thr Ile Asn Ala Gly Thr Ala Pro Asp Ala Asp Thr Leu His Val Asn
```

```
                165                 170                 175

His Glu Thr Ala Glu Leu Ala Leu Asp His Ala Ala Cys Ile Gly Cys
            180                 185                 190

Gly Ala Cys Val Ala Ala Cys Pro Asn Gly Ala Ala His Leu Phe Thr
        195                 200                 205

Gly Ala Lys Leu Val His Leu Ser Leu Leu Pro Leu Gly Lys Glu Glu
    210                 215                 220

Arg Gly Leu Arg Ala Arg Lys Met Val Asp Glu Met Glu Thr Asn Phe
225                 230                 235                 240

Gly His Cys Ser Leu Tyr Gly Glu Cys Ala Asp Val Cys Pro Ala Gly
                245                 250                 255

Ile Pro Leu Thr Ala Val Ala Ala Val Thr Lys Glu Arg Ala Arg Ala
            260                 265                 270

Ala Phe Arg Gly Lys Asp Asp
        275
```

<210> 115
<211> 2019
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(2019)
<223> RXA01312E

<400> 115

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atg agc act cac tct gaa acc acc cgc cca gag ttc atc cac cca gtc   48
Met Ser Thr His Ser Glu Thr Thr Arg Pro Glu Phe Ile His Pro Val
  1               5                  10                  15

tca gtc ctc cca gag gtc tca gct ggt acg gtc ctt gac gct gca gag   96
Ser Val Leu Pro Glu Val Ser Ala Gly Thr Val Leu Asp Ala Ala Glu
             20                  25                  30

cca gca ggc gtt ccc acc aaa gat atg tgg gaa tac caa aaa gac cac   144
Pro Ala Gly Val Pro Thr Lys Asp Met Trp Glu Tyr Gln Lys Asp His
         35                  40                  45

atg aac ctg gtc tcc cca ctg aac cga cgc aag ttc cgt gtc ctc gtc   192
Met Asn Leu Val Ser Pro Leu Asn Arg Arg Lys Phe Arg Val Leu Val
     50                  55                  60

gtt ggc acc ggc ctg tcc ggt ggt gct gca gca gca gcc ctc ggc gaa   240
Val Gly Thr Gly Leu Ser Gly Gly Ala Ala Ala Ala Ala Leu Gly Glu
 65                  70                  75                  80

ctc gga tac gac gtc aag gcg ttc acc tac cac gac gca cct cgc cgt   288
Leu Gly Tyr Asp Val Lys Ala Phe Thr Tyr His Asp Ala Pro Arg Arg
                 85                  90                  95
```

```
gcg cac tcc att gct gca cag ggt ggc gtt aac tcc gcc cgc ggc aag   336
Ala His Ser Ile Ala Ala Gln Gly Gly Val Asn Ser Ala Arg Gly Lys
            100                 105                 110

aag gta gac aac gac ggc gca tac cgc cac gtc aag gac acc gtc aag   384
Lys Val Asp Asn Asp Gly Ala Tyr Arg His Val Lys Asp Thr Val Lys
        115                 120                 125

ggc ggc gac tac cgt ggt cgc gag tcc gac tgc tgg cgt ctc gcc gtc   432
Gly Gly Asp Tyr Arg Gly Arg Glu Ser Asp Cys Trp Arg Leu Ala Val
    130                 135                 140

gag tcc gtc cgc gtc atc gac cac atg aac gcc atc ggt gca cca ttc   480
Glu Ser Val Arg Val Ile Asp His Met Asn Ala Ile Gly Ala Pro Phe
145                 150                 155                 160

gcc cgc gaa tac ggt ggc gcc ttg gca acc cgt tcc ttc ggt ggt gtg   528
Ala Arg Glu Tyr Gly Gly Ala Leu Ala Thr Arg Ser Phe Gly Gly Val
                165                 170                 175

cag gtc tcc cgt acc tac tac acc cgt gga caa acc gga cag cag ctg   576
Gln Val Ser Arg Thr Tyr Tyr Thr Arg Gly Gln Thr Gly Gln Gln Leu
            180                 185                 190

cag ctc tcc acc gca tcc gca cta cag cgc cag atc cac ctc ggc tcc   624
Gln Leu Ser Thr Ala Ser Ala Leu Gln Arg Gln Ile His Leu Gly Ser
        195                 200                 205

gta gaa atc ttc acc cat aac gaa atg gtt gac gtc att gtc acc gaa   672
Val Glu Ile Phe Thr His Asn Glu Met Val Asp Val Ile Val Thr Glu
    210                 215                 220

cgt aac ggt gaa aag cgc tgc gaa ggc ctg atc atg cgc aac ctg atc   720
Arg Asn Gly Glu Lys Arg Cys Glu Gly Leu Ile Met Arg Asn Leu Ile
225                 230                 235                 240

acc ggc gag ctc acc gca cac acc ggc cat gcc gtt atc ctg gca acc   768
Thr Gly Glu Leu Thr Ala His Thr Gly His Ala Val Ile Leu Ala Thr
                245                 250                 255

ggt ggc tac ggc aac gtg tac cac atg tcc acc ctg gcc aag aac tcc   816
Gly Gly Tyr Gly Asn Val Tyr His Met Ser Thr Leu Ala Lys Asn Ser
            260                 265                 270

aac gcc tcg gcc atc atg cgt gca tac gaa gcc ggc gca tac ttc gcg   864
Asn Ala Ser Ala Ile Met Arg Ala Tyr Glu Ala Gly Ala Tyr Phe Ala
        275                 280                 285

tcc cca tcg ttc atc cag ttc cac cca acc ggc ctg cct gtg aac tcc   912
Ser Pro Ser Phe Ile Gln Phe His Pro Thr Gly Leu Pro Val Asn Ser
    290                 295                 300

acc tgg cag tcc aag acc att ctg atg tcc gag tcg ctg cgt aac gac   960
Thr Trp Gln Ser Lys Thr Ile Leu Met Ser Glu Ser Leu Arg Asn Asp
305                 310                 315                 320

ggc cgc atc tgg tcc cct aag gaa ccg aac gat aac cgc gat cca aac  1008
Gly Arg Ile Trp Ser Pro Lys Glu Pro Asn Asp Asn Arg Asp Pro Asn
                325                 330                 335
```

```
acc atc cct gag gat gag cgc gac tac ttc ctg gag cgc cgc tac cca   1056
Thr Ile Pro Glu Asp Glu Arg Asp Tyr Phe Leu Glu Arg Arg Tyr Pro
            340                 345                 350

gca ttc ggt aac ctc gtc cca cgt gac gtt gct tcc cgt gcg atc tcc   1104
Ala Phe Gly Asn Leu Val Pro Arg Asp Val Ala Ser Arg Ala Ile Ser
        355                 360                 365

cag cag atc aat gct ggt ctc ggt gtt gga cct ctg aac aac gct gca   1152
Gln Gln Ile Asn Ala Gly Leu Gly Val Gly Pro Leu Asn Asn Ala Ala
    370                 375                 380

tac ctg gac ttc cgc gac gcc acc gag cgc ctc gga cag gac acc atc   1200
Tyr Leu Asp Phe Arg Asp Ala Thr Glu Arg Leu Gly Gln Asp Thr Ile
385                 390                 395                 400

cgc gag cgt tac tcc aac ctc ttc acc atg tac gaa gag gca att ggc   1248
Arg Glu Arg Tyr Ser Asn Leu Phe Thr Met Tyr Glu Glu Ala Ile Gly
                405                 410                 415

gag gac cca tac tcc agc cca atg cgt att gca ccg acc tgc cac ttc   1296
Glu Asp Pro Tyr Ser Ser Pro Met Arg Ile Ala Pro Thr Cys His Phe
            420                 425                 430

acc atg ggt ggc ctc tgg act gac ttc aac gaa atg acg tca ctc cca   1344
Thr Met Gly Gly Leu Trp Thr Asp Phe Asn Glu Met Thr Ser Leu Pro
        435                 440                 445

ggt ctg ttc tgc gca ggc gaa gca tcc tgg acc tac cac ggt gca aac   1392
Gly Leu Phe Cys Ala Gly Glu Ala Ser Trp Thr Tyr His Gly Ala Asn
    450                 455                 460

cgt ctg ggc gca aac tcc ctg ctc tcc gct tcc gtc gat ggc tgg ttc   1440
Arg Leu Gly Ala Asn Ser Leu Leu Ser Ala Ser Val Asp Gly Trp Phe
465                 470                 475                 480

acc ctg cca ttc acc atc cct aac tac ctc ggc cca ttg ctt ggc tcc   1488
Thr Leu Pro Phe Thr Ile Pro Asn Tyr Leu Gly Pro Leu Leu Gly Ser
                485                 490                 495

gag cgt ctg tca gag gat gca cca gaa gca cag gca gcg att gcg cgt   1536
Glu Arg Leu Ser Glu Asp Ala Pro Glu Ala Gln Ala Ala Ile Ala Arg
            500                 505                 510

gca cag gct cgc att gac cgc ctc atg ggc aac cgc cca gag tgg gtc   1584
Ala Gln Ala Arg Ile Asp Arg Leu Met Gly Asn Arg Pro Glu Trp Val
        515                 520                 525

ggt gac aac gtt cac gga cct gag tac tac cac cgc cag ctt ggc gat   1632
Gly Asp Asn Val His Gly Pro Glu Tyr Tyr His Arg Gln Leu Gly Asp
    530                 535                 540

atc ctg tac ttc tcc tgt ggc gtt tcc cga aac gta gaa gac ctc cag   1680
Ile Leu Tyr Phe Ser Cys Gly Val Ser Arg Asn Val Glu Asp Leu Gln
545                 550                 555                 560

gat ggc atc aac aag atc cgt gcc ctc cgc gat gac ttc tgg aag aac   1728
Asp Gly Ile Asn Lys Ile Arg Ala Leu Arg Asp Asp Phe Trp Lys Asn
```

```
                565                 570                 575

atg cgc atc acc ggc agc acc gat gag atg aac cag gtt ctc gaa tac   1776
Met Arg Ile Thr Gly Ser Thr Asp Glu Met Asn Gln Val Leu Glu Tyr
            580                 585                 590

gca gca cgc gta gcc gac tac atc gac ctc ggc gaa ctc atg tgt gtc   1824
Ala Ala Arg Val Ala Asp Tyr Ile Asp Leu Gly Glu Leu Met Cys Val
        595                 600                 605

gac gcc ctc gac cgc gac gag tcc tgt ggc gct cac ttc cgc gac gac   1872
Asp Ala Leu Asp Arg Asp Glu Ser Cys Gly Ala His Phe Arg Asp Asp
    610                 615                 620

cac ctc tcc gaa gat ggc gaa gca gaa cgt gac gac gaa aac tgg tgc   1920
His Leu Ser Glu Asp Gly Glu Ala Glu Arg Asp Asp Glu Asn Trp Cys
625                 630                 635                 640

ttc gtc tcc gca tgg gaa cca ggc gag aac gga acc ttc gtc cgc cac   1968
Phe Val Ser Ala Trp Glu Pro Gly Glu Asn Gly Thr Phe Val Arg His
                645                 650                 655

gca gaa cca ctg ttc ttc gaa tcc gtc cca ctg cag aca agg aac tac   2016
Ala Glu Pro Leu Phe Phe Glu Ser Val Pro Leu Gln Thr Arg Asn Tyr
            660                 665                 670

aag                                                               2019
Lys
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<210> 116
<211> 673
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 116

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Met Ser Thr His Ser Glu Thr Thr Arg Pro Glu Phe Ile His Pro Val
  1               5                  10                  15

Ser Val Leu Pro Glu Val Ser Ala Gly Thr Val Leu Asp Ala Ala Glu
             20                  25                  30

Pro Ala Gly Val Pro Thr Lys Asp Met Trp Glu Tyr Gln Lys Asp His
         35                  40                  45

Met Asn Leu Val Ser Pro Leu Asn Arg Arg Lys Phe Arg Val Leu Val
     50                  55                  60

Val Gly Thr Gly Leu Ser Gly Gly Ala Ala Ala Ala Ala Leu Gly Glu
 65                  70                  75                  80

Leu Gly Tyr Asp Val Lys Ala Phe Thr Tyr His Asp Ala Pro Arg Arg
                 85                  90                  95

Ala His Ser Ile Ala Ala Gln Gly Gly Val Asn Ser Ala Arg Gly Lys
            100                 105                 110
```

```
Lys Val Asp Asn Asp Gly Ala Tyr Arg His Val Lys Asp Thr Val Lys
        115                 120                 125

Gly Gly Asp Tyr Arg Gly Arg Glu Ser Asp Cys Trp Arg Leu Ala Val
    130                 135                 140

Glu Ser Val Arg Val Ile Asp His Met Asn Ala Ile Gly Ala Pro Phe
145                 150                 155                 160

Ala Arg Glu Tyr Gly Gly Ala Leu Ala Thr Arg Ser Phe Gly Gly Val
                165                 170                 175

Gln Val Ser Arg Thr Tyr Tyr Thr Arg Gly Gln Thr Gly Gln Gln Leu
            180                 185                 190

Gln Leu Ser Thr Ala Ser Ala Leu Gln Arg Gln Ile His Leu Gly Ser
        195                 200                 205

Val Glu Ile Phe Thr His Asn Glu Met Val Asp Val Ile Val Thr Glu
    210                 215                 220

Arg Asn Gly Glu Lys Arg Cys Glu Gly Leu Ile Met Arg Asn Leu Ile
225                 230                 235                 240

Thr Gly Glu Leu Thr Ala His Thr Gly His Ala Val Ile Leu Ala Thr
                245                 250                 255

Gly Gly Tyr Gly Asn Val Tyr His Met Ser Thr Leu Ala Lys Asn Ser
            260                 265                 270

Asn Ala Ser Ala Ile Met Arg Ala Tyr Glu Ala Gly Ala Tyr Phe Ala
        275                 280                 285

Ser Pro Ser Phe Ile Gln Phe His Pro Thr Gly Leu Pro Val Asn Ser
    290                 295                 300

Thr Trp Gln Ser Lys Thr Ile Leu Met Ser Glu Ser Leu Arg Asn Asp
305                 310                 315                 320

Gly Arg Ile Trp Ser Pro Lys Glu Pro Asn Asp Asn Arg Asp Pro Asn
                325                 330                 335

Thr Ile Pro Glu Asp Glu Arg Asp Tyr Phe Leu Glu Arg Arg Tyr Pro
            340                 345                 350

Ala Phe Gly Asn Leu Val Pro Arg Asp Val Ala Ser Arg Ala Ile Ser
        355                 360                 365

Gln Gln Ile Asn Ala Gly Leu Gly Val Gly Pro Leu Asn Asn Ala Ala
    370                 375                 380

Tyr Leu Asp Phe Arg Asp Ala Thr Glu Arg Leu Gly Gln Asp Thr Ile
385                 390                 395                 400

Arg Glu Arg Tyr Ser Asn Leu Phe Thr Met Tyr Glu Glu Ala Ile Gly
                405                 410                 415

Glu Asp Pro Tyr Ser Ser Pro Met Arg Ile Ala Pro Thr Cys His Phe
            420                 425                 430
```

```
Thr Met Gly Gly Leu Trp Thr Asp Phe Asn Glu Met Thr Ser Leu Pro
        435                 440                 445

Gly Leu Phe Cys Ala Gly Glu Ala Ser Trp Thr Tyr His Gly Ala Asn
    450                 455                 460

Arg Leu Gly Ala Asn Ser Leu Leu Ser Ala Ser Val Asp Gly Trp Phe
465                 470                 475                 480

Thr Leu Pro Phe Thr Ile Pro Asn Tyr Leu Gly Pro Leu Leu Gly Ser
                485                 490                 495

Glu Arg Leu Ser Glu Asp Ala Pro Glu Ala Gln Ala Ala Ile Ala Arg
            500                 505                 510

Ala Gln Ala Arg Ile Asp Arg Leu Met Gly Asn Arg Pro Glu Trp Val
        515                 520                 525

Gly Asp Asn Val His Gly Pro Glu Tyr Tyr His Arg Gln Leu Gly Asp
    530                 535                 540

Ile Leu Tyr Phe Ser Cys Gly Val Ser Arg Asn Val Glu Asp Leu Gln
545                 550                 555                 560

Asp Gly Ile Asn Lys Ile Arg Ala Leu Arg Asp Asp Phe Trp Lys Asn
                565                 570                 575

Met Arg Ile Thr Gly Ser Thr Asp Glu Met Asn Gln Val Leu Glu Tyr
            580                 585                 590

Ala Ala Arg Val Ala Asp Tyr Ile Asp Leu Gly Glu Leu Met Cys Val
        595                 600                 605

Asp Ala Leu Asp Arg Asp Glu Ser Cys Gly Ala His Phe Arg Asp Asp
    610                 615                 620

His Leu Ser Glu Asp Gly Glu Ala Glu Arg Asp Asp Glu Asn Trp Cys
625                 630                 635                 640

Phe Val Ser Ala Trp Glu Pro Gly Glu Asn Gly Thr Phe Val Arg His
                645                 650                 655

Ala Glu Pro Leu Phe Phe Glu Ser Val Pro Leu Gln Thr Arg Asn Tyr
            660                 665                 670

Lys
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<210> 117
<211> 1875
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1875)
<223> RXA01312K

<400> 117

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atg aac ctg gtc tcc cca ctg aac cga cgc aag ttc cgt gtc ctc gtc   48
Met Asn Leu Val Ser Pro Leu Asn Arg Arg Lys Phe Arg Val Leu Val
  1               5                  10                  15

gtt ggc acc ggc ctg tcc ggt ggt gct gca gca gca gcc ctc ggc gaa   96
Val Gly Thr Gly Leu Ser Gly Gly Ala Ala Ala Ala Ala Leu Gly Glu
             20                  25                  30

ctc gga tac gac gtc aag gcg ttc acc tac cac gac gca cct cgc cgt  144
Leu Gly Tyr Asp Val Lys Ala Phe Thr Tyr His Asp Ala Pro Arg Arg
         35                  40                  45

gcg cac tcc att gct gca cag ggt ggc gtt aac tcc gcc cgc ggc aag  192
Ala His Ser Ile Ala Ala Gln Gly Gly Val Asn Ser Ala Arg Gly Lys
     50                  55                  60

aag gta gac aac gac ggc gca tac cgc cac gtc aag gac acc gtc aag  240
Lys Val Asp Asn Asp Gly Ala Tyr Arg His Val Lys Asp Thr Val Lys
 65                  70                  75                  80

ggc ggc gac tac cgt ggt cgc gag tcc gac tgc tgg cgt ctc gcc gtc  288
Gly Gly Asp Tyr Arg Gly Arg Glu Ser Asp Cys Trp Arg Leu Ala Val
                 85                  90                  95

gag tcc gtc cgc gtc atc gac cac atg aac gcc atc ggt gca cca ttc  336
Glu Ser Val Arg Val Ile Asp His Met Asn Ala Ile Gly Ala Pro Phe
            100                 105                 110

gcc cgc gaa tac ggt ggc gcc ttg gca acc cgt tcc ttc ggt ggt gtg  384
Ala Arg Glu Tyr Gly Gly Ala Leu Ala Thr Arg Ser Phe Gly Gly Val
        115                 120                 125

cag gtc tcc cgt acc tac tac acc cgt gga caa acc gga cag cag ctg  432
Gln Val Ser Arg Thr Tyr Tyr Thr Arg Gly Gln Thr Gly Gln Gln Leu
    130                 135                 140

cag ctc tcc acc gca tcc gca cta cag cgc cag atc cac ctc ggc tcc  480
Gln Leu Ser Thr Ala Ser Ala Leu Gln Arg Gln Ile His Leu Gly Ser
145                 150                 155                 160

gta gaa atc ttc acc cat aac gaa atg gtt gac gtc att gtc acc gaa  528
Val Glu Ile Phe Thr His Asn Glu Met Val Asp Val Ile Val Thr Glu
                165                 170                 175

cgt aac ggt gaa aag cgc tgc gaa ggc ctg atc atg cgc aac ctg atc  576
Arg Asn Gly Glu Lys Arg Cys Glu Gly Leu Ile Met Arg Asn Leu Ile
            180                 185                 190

acc ggc gag ctc acc gca cac acc ggc cat gcc gtt atc ctg gca acc  624
Thr Gly Glu Leu Thr Ala His Thr Gly His Ala Val Ile Leu Ala Thr
        195                 200                 205

ggt ggc tac ggc aac gtg tac cac atg tcc acc ctg gcc aag aac tcc  672
Gly Gly Tyr Gly Asn Val Tyr His Met Ser Thr Leu Ala Lys Asn Ser
    210                 215                 220

aac gcc tcg gcc atc atg cgt gca tac gaa gcc ggc gca tac ttc gcg  720
```

```
Asn Ala Ser Ala Ile Met Arg Ala Tyr Glu Ala Gly Ala Tyr Phe Ala
225                 230                 235                 240

tcc cca tcg ttc atc cag ttc cac cca acc ggc ctg cct gtg aac tcc   768
Ser Pro Ser Phe Ile Gln Phe His Pro Thr Gly Leu Pro Val Asn Ser
                245                 250                 255

acc tgg cag tcc aag acc att ctg atg tcc gag tcg ctg cgt aac gac   816
Thr Trp Gln Ser Lys Thr Ile Leu Met Ser Glu Ser Leu Arg Asn Asp
            260                 265                 270

ggc cgc atc tgg tcc cct aag gaa ccg aac gat aac cgc gat cca aac   864
Gly Arg Ile Trp Ser Pro Lys Glu Pro Asn Asp Asn Arg Asp Pro Asn
        275                 280                 285

acc atc cct gag gat gag cgc gac tac ttc ctg gag cgc cgc tac cca   912
Thr Ile Pro Glu Asp Glu Arg Asp Tyr Phe Leu Glu Arg Arg Tyr Pro
    290                 295                 300

gca ttc ggt aac ctc gtc cca cgt gac gtt gct tcc cgt gcg atc tcc   960
Ala Phe Gly Asn Leu Val Pro Arg Asp Val Ala Ser Arg Ala Ile Ser
305                 310                 315                 320

cag cag atc aat gct ggt ctc ggt gtt gga cct ctg aac aac gct gca  1008
Gln Gln Ile Asn Ala Gly Leu Gly Val Gly Pro Leu Asn Asn Ala Ala
                325                 330                 335

tac ctg gac ttc cgc gac gcc acc gag cgc ctc gga cag gac acc atc  1056
Tyr Leu Asp Phe Arg Asp Ala Thr Glu Arg Leu Gly Gln Asp Thr Ile
            340                 345                 350

cgc gag cgt tac tcc aac ctc ttc acc atg tac gaa gag gca att ggc  1104
Arg Glu Arg Tyr Ser Asn Leu Phe Thr Met Tyr Glu Glu Ala Ile Gly
        355                 360                 365

gag gac cca tac tcc agc cca atg cgt att gca ccg acc tgc cac ttc  1152
Glu Asp Pro Tyr Ser Ser Pro Met Arg Ile Ala Pro Thr Cys His Phe
    370                 375                 380

acc atg ggt ggc ctc tgg act gac ttc aac gaa atg acg tca ctc cca  1200
Thr Met Gly Gly Leu Trp Thr Asp Phe Asn Glu Met Thr Ser Leu Pro
385                 390                 395                 400

ggt ctg ttc tgc gca ggc gaa gca tcc tgg acc tac cac ggt gca aac  1248
Gly Leu Phe Cys Ala Gly Glu Ala Ser Trp Thr Tyr His Gly Ala Asn
                405                 410                 415

cgt ctg ggc gca aac tcc ctg ctc tcc gct tcc gtc gat ggc tgg ttc  1296
Arg Leu Gly Ala Asn Ser Leu Leu Ser Ala Ser Val Asp Gly Trp Phe
            420                 425                 430

acc ctg cca ttc acc atc cct aac tac ctc ggc cca ttg ctt ggc tcc  1344
Thr Leu Pro Phe Thr Ile Pro Asn Tyr Leu Gly Pro Leu Leu Gly Ser
        435                 440                 445

gag cgt ctg tca gag gat gca cca gaa gca cag gca gcg att gcg cgt  1392
Glu Arg Leu Ser Glu Asp Ala Pro Glu Ala Gln Ala Ala Ile Ala Arg
    450                 455                 460
```

```
gca cag gct cgc att gac cgc ctc atg ggc aac cgc cca gag tgg gtc   1440
Ala Gln Ala Arg Ile Asp Arg Leu Met Gly Asn Arg Pro Glu Trp Val
465                 470                 475                 480

ggt gac aac gtt cac gga cct gag tac tac cac cgc cag ctt ggc gat   1488
Gly Asp Asn Val His Gly Pro Glu Tyr Tyr His Arg Gln Leu Gly Asp
                485                 490                 495

atc ctg tac ttc tcc tgt ggc gtt tcc cga aac gta gaa gac ctc cag   1536
Ile Leu Tyr Phe Ser Cys Gly Val Ser Arg Asn Val Glu Asp Leu Gln
            500                 505                 510

gat ggc atc aac aag atc cgt gcc ctc cgc gat gac ttc tgg aag aac   1584
Asp Gly Ile Asn Lys Ile Arg Ala Leu Arg Asp Asp Phe Trp Lys Asn
        515                 520                 525

atg cgc atc acc ggc agc acc gat gag atg aac cag gtt ctc gaa tac   1632
Met Arg Ile Thr Gly Ser Thr Asp Glu Met Asn Gln Val Leu Glu Tyr
    530                 535                 540

gca gca cgc gta gcc gac tac atc gac ctc ggc gaa ctc atg tgt gtc   1680
Ala Ala Arg Val Ala Asp Tyr Ile Asp Leu Gly Glu Leu Met Cys Val
545                 550                 555                 560

gac gcc ctc gac cgc gac gag tcc tgt ggc gct cac ttc cgc gac gac   1728
Asp Ala Leu Asp Arg Asp Glu Ser Cys Gly Ala His Phe Arg Asp Asp
                565                 570                 575

cac ctc tcc gaa gat ggc gaa gca gaa cgt gac gac gaa aac tgg tgc   1776
His Leu Ser Glu Asp Gly Glu Ala Glu Arg Asp Asp Glu Asn Trp Cys
            580                 585                 590

ttc gtc tcc gca tgg gaa cca ggc gag aac gga acc ttc gtc cgc cac   1824
Phe Val Ser Ala Trp Glu Pro Gly Glu Asn Gly Thr Phe Val Arg His
        595                 600                 605

gca gaa cca ctg ttc ttc gaa tcc gtc cca ctg cag aca agg aac tac   1872
Ala Glu Pro Leu Phe Phe Glu Ser Val Pro Leu Gln Thr Arg Asn Tyr
    610                 615                 620

aag                                                               1875
Lys
625
```

<210> 118
<211> 625
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 118

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Met Asn Leu Val Ser Pro Leu Asn Arg Arg Lys Phe Arg Val Leu Val
  1               5                  10                  15

Val Gly Thr Gly Leu Ser Gly Gly Ala Ala Ala Ala Ala Leu Gly Glu
             20                  25                  30

Leu Gly Tyr Asp Val Lys Ala Phe Thr Tyr His Asp Ala Pro Arg Arg
```

```
         35                  40                  45

Ala His Ser Ile Ala Ala Gln Gly Gly Val Asn Ser Ala Arg Gly Lys
     50                  55                  60

Lys Val Asp Asn Asp Gly Ala Tyr Arg His Val Lys Asp Thr Val Lys
 65                  70                  75                  80

Gly Gly Asp Tyr Arg Gly Arg Glu Ser Asp Cys Trp Arg Leu Ala Val
                 85                  90                  95

Glu Ser Val Arg Val Ile Asp His Met Asn Ala Ile Gly Ala Pro Phe
            100                 105                 110

Ala Arg Glu Tyr Gly Gly Ala Leu Ala Thr Arg Ser Phe Gly Gly Val
        115                 120                 125

Gln Val Ser Arg Thr Tyr Tyr Thr Arg Gly Gln Thr Gly Gln Gln Leu
    130                 135                 140

Gln Leu Ser Thr Ala Ser Ala Leu Gln Arg Gln Ile His Leu Gly Ser
145                 150                 155                 160

Val Glu Ile Phe Thr His Asn Glu Met Val Asp Val Ile Val Thr Glu
                165                 170                 175

Arg Asn Gly Glu Lys Arg Cys Glu Gly Leu Ile Met Arg Asn Leu Ile
            180                 185                 190

Thr Gly Glu Leu Thr Ala His Thr Gly His Ala Val Ile Leu Ala Thr
        195                 200                 205

Gly Gly Tyr Gly Asn Val Tyr His Met Ser Thr Leu Ala Lys Asn Ser
    210                 215                 220

Asn Ala Ser Ala Ile Met Arg Ala Tyr Glu Ala Gly Ala Tyr Phe Ala
225                 230                 235                 240

Ser Pro Ser Phe Ile Gln Phe His Pro Thr Gly Leu Pro Val Asn Ser
                245                 250                 255

Thr Trp Gln Ser Lys Thr Ile Leu Met Ser Glu Ser Leu Arg Asn Asp
            260                 265                 270

Gly Arg Ile Trp Ser Pro Lys Glu Pro Asn Asp Asn Arg Asp Pro Asn
        275                 280                 285

Thr Ile Pro Glu Asp Glu Arg Asp Tyr Phe Leu Glu Arg Arg Tyr Pro
    290                 295                 300

Ala Phe Gly Asn Leu Val Pro Arg Asp Val Ala Ser Arg Ala Ile Ser
305                 310                 315                 320

Gln Gln Ile Asn Ala Gly Leu Gly Val Gly Pro Leu Asn Asn Ala Ala
                325                 330                 335

Tyr Leu Asp Phe Arg Asp Ala Thr Glu Arg Leu Gly Gln Asp Thr Ile
            340                 345                 350
```

```
Arg Glu Arg Tyr Ser Asn Leu Phe Thr Met Tyr Glu Glu Ala Ile Gly
        355                 360                 365

Glu Asp Pro Tyr Ser Ser Pro Met Arg Ile Ala Pro Thr Cys His Phe
    370                 375                 380

Thr Met Gly Gly Leu Trp Thr Asp Phe Asn Glu Met Thr Ser Leu Pro
385                 390                 395                 400

Gly Leu Phe Cys Ala Gly Glu Ala Ser Trp Thr Tyr His Gly Ala Asn
                405                 410                 415

Arg Leu Gly Ala Asn Ser Leu Leu Ser Ala Ser Val Asp Gly Trp Phe
            420                 425                 430

Thr Leu Pro Phe Thr Ile Pro Asn Tyr Leu Gly Pro Leu Leu Gly Ser
        435                 440                 445

Glu Arg Leu Ser Glu Asp Ala Pro Glu Ala Gln Ala Ala Ile Ala Arg
    450                 455                 460

Ala Gln Ala Arg Ile Asp Arg Leu Met Gly Asn Arg Pro Glu Trp Val
465                 470                 475                 480

Gly Asp Asn Val His Gly Pro Glu Tyr Tyr His Arg Gln Leu Gly Asp
                485                 490                 495

Ile Leu Tyr Phe Ser Cys Gly Val Ser Arg Asn Val Glu Asp Leu Gln
            500                 505                 510

Asp Gly Ile Asn Lys Ile Arg Ala Leu Arg Asp Asp Phe Trp Lys Asn
        515                 520                 525

Met Arg Ile Thr Gly Ser Thr Asp Glu Met Asn Gln Val Leu Glu Tyr
    530                 535                 540

Ala Ala Arg Val Ala Asp Tyr Ile Asp Leu Gly Glu Leu Met Cys Val
545                 550                 555                 560

Asp Ala Leu Asp Arg Asp Glu Ser Cys Gly Ala His Phe Arg Asp Asp
                565                 570                 575

His Leu Ser Glu Asp Gly Glu Ala Glu Arg Asp Asp Glu Asn Trp Cys
            580                 585                 590

Phe Val Ser Ala Trp Glu Pro Gly Glu Asn Gly Thr Phe Val Arg His
        595                 600                 605

Ala Glu Pro Leu Phe Phe Glu Ser Val Pro Leu Gln Thr Arg Asn Tyr
    610                 615                 620

Lys
625
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<210> 119
<211> 1107
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1107)
<223> RXA01350E

<400> 119

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ttg ggg caa ttc ggg ggt aat ttt gca gta tcg tca aga tca ccc aaa   48
Met Gly Gln Phe Gly Gly Asn Phe Ala Val Ser Ser Arg Ser Pro Lys
  1               5                  10                  15

act ggt ggc tgt tct ctt tta agc ggg ata gca tgg gtt ctt aga gga   96
Thr Gly Gly Cys Ser Leu Leu Ser Gly Ile Ala Trp Val Leu Arg Gly
             20                  25                  30

ccc cct aca agg att gag gat tgt tta atg aat tcc ccg cag aac gtc   144
Pro Pro Thr Arg Ile Glu Asp Cys Leu Met Asn Ser Pro Gln Asn Val
         35                  40                  45

tcc acc aag aag gtc acc gtc acc ggc gca gct ggt caa atc tct tat   192
Ser Thr Lys Lys Val Thr Val Thr Gly Ala Ala Gly Gln Ile Ser Tyr
     50                  55                  60

tca ctg ttg tgg cgc atc gcc aac ggt gaa gta ttc ggc acc gac acc   240
Ser Leu Leu Trp Arg Ile Ala Asn Gly Glu Val Phe Gly Thr Asp Thr
 65                  70                  75                  80

cct gta gaa ctg aaa ctt ctg gag atc cct cag gct ctt ggc ggg gca   288
Pro Val Glu Leu Lys Leu Leu Glu Ile Pro Gln Ala Leu Gly Gly Ala
                 85                  90                  95

gag ggt gtg gct atg gaa ctt ctg gat tct gcc ttc ccc ctc ctg cga   336
Glu Gly Val Ala Met Glu Leu Leu Asp Ser Ala Phe Pro Leu Leu Arg
            100                 105                 110

aac atc acc atc acc gcg gat gcc aat gag gca ttc gac ggc gct aat   384
Asn Ile Thr Ile Thr Ala Asp Ala Asn Glu Ala Phe Asp Gly Ala Asn
        115                 120                 125

gcg gcg ttt ttg gtc ggt gcg aag cct cgc gga aaa ggc gaa gag cgc   432
Ala Ala Phe Leu Val Gly Ala Lys Pro Arg Gly Lys Gly Glu Glu Arg
    130                 135                 140

gca gat ttg ctg gct aac aac ggc aag att ttc gga cct caa ggt aaa   480
Ala Asp Leu Leu Ala Asn Asn Gly Lys Ile Phe Gly Pro Gln Gly Lys
145                 150                 155                 160

gct atc aat gac aac gcc gca gat gac att cgt gtc cta gtt gtt gga   528
Ala Ile Asn Asp Asn Ala Ala Asp Asp Ile Arg Val Leu Val Val Gly
                165                 170                 175

aac cca gcg aac acc aac gcg ttg att gct tca gct gcg gcc cca gat   576
Asn Pro Ala Asn Thr Asn Ala Leu Ile Ala Ser Ala Ala Ala Pro Asp
            180                 185                 190

gtt cca gca tcc cgc ttc aac gca atg atg cgc ctt gat cac aac cgt   624
Val Pro Ala Ser Arg Phe Asn Ala Met Met Arg Leu Asp His Asn Arg
        195                 200                 205
```

```
gcg atc tcc cag ctg gcc acc aag ctt ggc cgt gga tct gcg gaa ttt   672
Ala Ile Ser Gln Leu Ala Thr Lys Leu Gly Arg Gly Ser Ala Glu Phe
    210                 215                 220

aac aac att gtg gtc tgg gga aat cac tcc gca acc cag ttc cca gac   720
Asn Asn Ile Val Val Trp Gly Asn His Ser Ala Thr Gln Phe Pro Asp
225                 230                 235                 240

atc acc tac gca acc gtt ggt gga gaa aag gtc act gac ctg gtt gat   768
Ile Thr Tyr Ala Thr Val Gly Gly Glu Lys Val Thr Asp Leu Val Asp
                245                 250                 255

cac gat tgg tat gtg gag gag ttc att cct cgc gtg gct aac cgt ggc   816
His Asp Trp Tyr Val Glu Glu Phe Ile Pro Arg Val Ala Asn Arg Gly
            260                 265                 270

gct gaa atc att gag gtc cgt gga aag tct tct gca gct tct gca gca   864
Ala Glu Ile Ile Glu Val Arg Gly Lys Ser Ser Ala Ala Ser Ala Ala
        275                 280                 285

tcc tct gcg att gat cac atg cgc gat tgg gta cag ggc acc gag gcg   912
Ser Ser Ala Ile Asp His Met Arg Asp Trp Val Gln Gly Thr Glu Ala
    290                 295                 300

tgg tcc tct gcg gca att cct tcc acc ggt gca tac ggc att cct gag   960
Trp Ser Ser Ala Ala Ile Pro Ser Thr Gly Ala Tyr Gly Ile Pro Glu
305                 310                 315                 320

ggc att ttt gtc ggt ctg cca acc gta tcc cgc aac ggt gag tgg gaa   1008
Gly Ile Phe Val Gly Leu Pro Thr Val Ser Arg Asn Gly Glu Trp Glu
                325                 330                 335

atc gtt gaa ggc ctg gag att tcc gat ttc cag cgc gcc cgc atc gac   1056
Ile Val Glu Gly Leu Glu Ile Ser Asp Phe Gln Arg Ala Arg Ile Asp
            340                 345                 350

gcg aat gct cag gaa ttg cag gcc gag cgc gag gca gtg cgc gac ttg   1104
Ala Asn Ala Gln Glu Leu Gln Ala Glu Arg Glu Ala Val Arg Asp Leu
        355                 360                 365

ctc                                                               1107
Leu
```

<210> 120
<211> 369
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 120

```
Met Gly Gln Phe Gly Gly Asn Phe Ala Val Ser Ser Arg Ser Pro Lys
  1               5                  10                  15

Thr Gly Gly Cys Ser Leu Leu Ser Gly Ile Ala Trp Val Leu Arg Gly
             20                  25                  30

Pro Pro Thr Arg Ile Glu Asp Cys Leu Met Asn Ser Pro Gln Asn Val
```

```
         35                  40                  45

Ser Thr Lys Lys Val Thr Val Thr Gly Ala Ala Gly Gln Ile Ser Tyr
     50                  55                  60

Ser Leu Leu Trp Arg Ile Ala Asn Gly Glu Val Phe Gly Thr Asp Thr
 65                  70                  75                  80

Pro Val Glu Leu Lys Leu Leu Glu Ile Pro Gln Ala Leu Gly Gly Ala
                 85                  90                  95

Glu Gly Val Ala Met Glu Leu Leu Asp Ser Ala Phe Pro Leu Leu Arg
            100                 105                 110

Asn Ile Thr Ile Thr Ala Asp Ala Asn Glu Ala Phe Asp Gly Ala Asn
        115                 120                 125

Ala Ala Phe Leu Val Gly Ala Lys Pro Arg Gly Lys Gly Glu Glu Arg
    130                 135                 140

Ala Asp Leu Leu Ala Asn Asn Gly Lys Ile Phe Gly Pro Gln Gly Lys
145                 150                 155                 160

Ala Ile Asn Asp Asn Ala Ala Asp Asp Ile Arg Val Leu Val Val Gly
                165                 170                 175

Asn Pro Ala Asn Thr Asn Ala Leu Ile Ala Ser Ala Ala Ala Pro Asp
            180                 185                 190

Val Pro Ala Ser Arg Phe Asn Ala Met Met Arg Leu Asp His Asn Arg
        195                 200                 205

Ala Ile Ser Gln Leu Ala Thr Lys Leu Gly Arg Gly Ser Ala Glu Phe
    210                 215                 220

Asn Asn Ile Val Val Trp Gly Asn His Ser Ala Thr Gln Phe Pro Asp
225                 230                 235                 240

Ile Thr Tyr Ala Thr Val Gly Gly Glu Lys Val Thr Asp Leu Val Asp
                245                 250                 255

His Asp Trp Tyr Val Glu Glu Phe Ile Pro Arg Val Ala Asn Arg Gly
            260                 265                 270

Ala Glu Ile Ile Glu Val Arg Gly Lys Ser Ser Ala Ala Ser Ala Ala
        275                 280                 285

Ser Ser Ala Ile Asp His Met Arg Asp Trp Val Gln Gly Thr Glu Ala
    290                 295                 300

Trp Ser Ser Ala Ala Ile Pro Ser Thr Gly Ala Tyr Gly Ile Pro Glu
305                 310                 315                 320

Gly Ile Phe Val Gly Leu Pro Thr Val Ser Arg Asn Gly Glu Trp Glu
                325                 330                 335

Ile Val Glu Gly Leu Glu Ile Ser Asp Phe Gln Arg Ala Arg Ile Asp
            340                 345                 350
```

```
Ala Asn Ala Gln Glu Leu Gln Ala Glu Arg Glu Ala Val Arg Asp Leu
        355                 360                 365

Leu
```

<210> 121
<211> 984
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(984)
<223> RXA01350W

<400> 121

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atg aat tcc ccg cag aac gtc tcc acc aag aag gtc acc gtc acc ggc   48
Met Asn Ser Pro Gln Asn Val Ser Thr Lys Lys Val Thr Val Thr Gly
  1               5                  10                  15

gca gct ggt caa atc tct tat tca ctg ttg tgg cgc atc gcc aac ggt   96
Ala Ala Gly Gln Ile Ser Tyr Ser Leu Leu Trp Arg Ile Ala Asn Gly
             20                  25                  30

gaa gta ttc ggc acc gac acc cct gta gaa ctg aaa ctt ctg gag atc   144
Glu Val Phe Gly Thr Asp Thr Pro Val Glu Leu Lys Leu Leu Glu Ile
         35                  40                  45

cct cag gct ctt ggc ggg gca gag ggt gtg gct atg gaa ctt ctg gat   192
Pro Gln Ala Leu Gly Gly Ala Glu Gly Val Ala Met Glu Leu Leu Asp
     50                  55                  60

tct gcc ttc ccc ctc ctg cga aac atc acc atc acc gcg gat gcc aat   240
Ser Ala Phe Pro Leu Leu Arg Asn Ile Thr Ile Thr Ala Asp Ala Asn
 65                  70                  75                  80

gag gca ttc gac ggc gct aat gcg gcg ttt ttg gtc ggt gcg aag cct   288
Glu Ala Phe Asp Gly Ala Asn Ala Ala Phe Leu Val Gly Ala Lys Pro
                 85                  90                  95

cgc gga aaa ggc gaa gag cgc gca gat ttg ctg gct aac aac ggc aag   336
Arg Gly Lys Gly Glu Glu Arg Ala Asp Leu Leu Ala Asn Asn Gly Lys
            100                 105                 110

att ttc gga cct caa ggt aaa gct atc aat gac aac gcc gca gat gac   384
Ile Phe Gly Pro Gln Gly Lys Ala Ile Asn Asp Asn Ala Ala Asp Asp
        115                 120                 125

att cgt gtc cta gtt gtt gga aac cca gcg aac acc aac gcg ttg att   432
Ile Arg Val Leu Val Val Gly Asn Pro Ala Asn Thr Asn Ala Leu Ile
    130                 135                 140

gct tca gct gcg gcc cca gat gtt cca gca tcc cgc ttc aac gca atg   480
Ala Ser Ala Ala Ala Pro Asp Val Pro Ala Ser Arg Phe Asn Ala Met
145                 150                 155                 160

atg cgc ctt gat cac aac cgt gcg atc tcc cag ctg gcc acc aag ctt   528
```

```
Met Arg Leu Asp His Asn Arg Ala Ile Ser Gln Leu Ala Thr Lys Leu
                165                 170                 175

ggc cgt gga tct gcg gaa ttt aac aac att gtg gtc tgg gga aat cac   576
Gly Arg Gly Ser Ala Glu Phe Asn Asn Ile Val Val Trp Gly Asn His
            180                 185                 190

tcc gca acc cag ttc cca gac atc acc tac gca acc gtt ggt gga gaa   624
Ser Ala Thr Gln Phe Pro Asp Ile Thr Tyr Ala Thr Val Gly Gly Glu
        195                 200                 205

aag gtc act gac ctg gtt gat cac gat tgg tat gtg gag gag ttc att   672
Lys Val Thr Asp Leu Val Asp His Asp Trp Tyr Val Glu Glu Phe Ile
    210                 215                 220

cct cgc gtg gct aac cgt ggc gct gaa atc att gag gtc cgt gga aag   720
Pro Arg Val Ala Asn Arg Gly Ala Glu Ile Ile Glu Val Arg Gly Lys
225                 230                 235                 240

tct tct gca gct tct gca gca tcc tct gcg att gat cac atg cgc gat   768
Ser Ser Ala Ala Ser Ala Ala Ser Ser Ala Ile Asp His Met Arg Asp
                245                 250                 255

tgg gta cag ggc acc gag gcg tgg tcc tct gcg gca att cct tcc acc   816
Trp Val Gln Gly Thr Glu Ala Trp Ser Ser Ala Ala Ile Pro Ser Thr
            260                 265                 270

ggt gca tac ggc att cct gag ggc att ttt gtc ggt ctg cca acc gta   864
Gly Ala Tyr Gly Ile Pro Glu Gly Ile Phe Val Gly Leu Pro Thr Val
        275                 280                 285

tcc cgc aac ggt gag tgg gaa atc gtt gaa ggc ctg gag att tcc gat   912
Ser Arg Asn Gly Glu Trp Glu Ile Val Glu Gly Leu Glu Ile Ser Asp
    290                 295                 300

ttc cag cgc gcc cgc atc gac gcg aat gct cag gaa ttg cag gcc gag   960
Phe Gln Arg Ala Arg Ile Asp Ala Asn Ala Gln Glu Leu Gln Ala Glu
305                 310                 315                 320

cgc gag gca gtg cgc gac ttg ctc                                  984
Arg Glu Ala Val Arg Asp Leu Leu
                325
```

<210> 122
<211> 328
<212> PRT
<213> 麩胺酸棒狀桿菌

```
<400> 122
Met Asn Ser Pro Gln Asn Val Ser Thr Lys Lys Val Thr Val Thr Gly
  1               5                  10                  15

Ala Ala Gly Gln Ile Ser Tyr Ser Leu Leu Trp Arg Ile Ala Asn Gly
             20                  25                  30

Glu Val Phe Gly Thr Asp Thr Pro Val Glu Leu Lys Leu Leu Glu Ile
         35                  40                  45
```

```
Pro Gln Ala Leu Gly Gly Ala Glu Gly Val Ala Met Glu Leu Leu Asp
     50                  55                  60

Ser Ala Phe Pro Leu Leu Arg Asn Ile Thr Ile Thr Ala Asp Ala Asn
 65                  70                  75                  80

Glu Ala Phe Asp Gly Ala Asn Ala Ala Phe Leu Val Gly Ala Lys Pro
                 85                  90                  95

Arg Gly Lys Gly Glu Glu Arg Ala Asp Leu Leu Ala Asn Asn Gly Lys
            100                 105                 110

Ile Phe Gly Pro Gln Gly Lys Ala Ile Asn Asp Asn Ala Ala Asp Asp
        115                 120                 125

Ile Arg Val Leu Val Val Gly Asn Pro Ala Asn Thr Asn Ala Leu Ile
    130                 135                 140

Ala Ser Ala Ala Ala Pro Asp Val Pro Ala Ser Arg Phe Asn Ala Met
145                 150                 155                 160

Met Arg Leu Asp His Asn Arg Ala Ile Ser Gln Leu Ala Thr Lys Leu
                165                 170                 175

Gly Arg Gly Ser Ala Glu Phe Asn Asn Ile Val Val Trp Gly Asn His
            180                 185                 190

Ser Ala Thr Gln Phe Pro Asp Ile Thr Tyr Ala Thr Val Gly Gly Glu
        195                 200                 205

Lys Val Thr Asp Leu Val Asp His Asp Trp Tyr Val Glu Glu Phe Ile
    210                 215                 220

Pro Arg Val Ala Asn Arg Gly Ala Glu Ile Ile Glu Val Arg Gly Lys
225                 230                 235                 240

Ser Ser Ala Ala Ser Ala Ala Ser Ser Ala Ile Asp His Met Arg Asp
                245                 250                 255

Trp Val Gln Gly Thr Glu Ala Trp Ser Ser Ala Ala Ile Pro Ser Thr
            260                 265                 270

Gly Ala Tyr Gly Ile Pro Glu Gly Ile Phe Val Gly Leu Pro Thr Val
        275                 280                 285

Ser Arg Asn Gly Glu Trp Glu Ile Val Glu Gly Leu Glu Ile Ser Asp
    290                 295                 300

Phe Gln Arg Ala Arg Ile Asp Ala Asn Ala Gln Glu Leu Gln Ala Glu
305                 310                 315                 320

Arg Glu Ala Val Arg Asp Leu Leu
                325
```

<210> 123
<211> 870
<212> DNA

<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(870)
<223> RXA01393W

<400> 123

```
atg aac ccc att caa ctg gac act ttg ctc tca atc att gat gaa ggc   48
Met Asn Pro Ile Gln Leu Asp Thr Leu Leu Ser Ile Ile Asp Glu Gly
  1               5                  10                  15

agc ttc gaa ggc gcc tcc tta gcc ctt tcc att tcc ccc tcg gcg gtg   96
Ser Phe Glu Gly Ala Ser Leu Ala Leu Ser Ile Ser Pro Ser Ala Val
             20                  25                  30

agt cag cgc gtt aaa gct ctc gag cat cac gtg ggt cga gtg ttg gta   144
Ser Gln Arg Val Lys Ala Leu Glu His His Val Gly Arg Val Leu Val
         35                  40                  45

tcg cgc acc caa ccg gcc aaa gca acc gaa gcg ggt gaa gtc ctt gtg   192
Ser Arg Thr Gln Pro Ala Lys Ala Thr Glu Ala Gly Glu Val Leu Val
     50                  55                  60

caa gca gcg cgg aaa atg gtg ttg ctg caa gca gaa act aaa gcg caa   240
Gln Ala Ala Arg Lys Met Val Leu Leu Gln Ala Glu Thr Lys Ala Gln
 65                  70                  75                  80

cta tct gga cgc ctt gct gaa atc ccg tta acc atc gcc atc aac gca   288
Leu Ser Gly Arg Leu Ala Glu Ile Pro Leu Thr Ile Ala Ile Asn Ala
                 85                  90                  95

gat tcg cta tcc aca tgg ttt cct ccc gtg ttc aac gag gta gct tct   336
Asp Ser Leu Ser Thr Trp Phe Pro Pro Val Phe Asn Glu Val Ala Ser
            100                 105                 110

tgg ggt gga gca acg ctc acg ctg cgc ttg gaa gat gaa gcg cac aca   384
Trp Gly Gly Ala Thr Leu Thr Leu Arg Leu Glu Asp Glu Ala His Thr
        115                 120                 125

tta tcc ttg ctg cgg cgt gga gat gtt tta gga gcg gta acc cgt gaa   432
Leu Ser Leu Leu Arg Arg Gly Asp Val Leu Gly Ala Val Thr Arg Glu
    130                 135                 140

gct aat ccc gtg gcg gga tgt gaa gta gta gaa ctt gga acc atg cgc   480
Ala Asn Pro Val Ala Gly Cys Glu Val Val Glu Leu Gly Thr Met Arg
145                 150                 155                 160

cac ttg gcc att gca acc ccc tca ttg cgg gat gcc tac atg gtt gat   528
His Leu Ala Ile Ala Thr Pro Ser Leu Arg Asp Ala Tyr Met Val Asp
                165                 170                 175

ggg aaa cta gat tgg gct gcg atg ccc gtc tta cgc ttc ggt ccc aaa   576
Gly Lys Leu Asp Trp Ala Ala Met Pro Val Leu Arg Phe Gly Pro Lys
            180                 185                 190

gat gtg ctt caa gac cgt gac ctg gac ggg cgc gtc gat ggt cct gtg   624
Asp Val Leu Gln Asp Arg Asp Leu Asp Gly Arg Val Asp Gly Pro Val
        195                 200                 205
```

```
ggg cgc agg cgc gta tcc att gtc ccg tcg gcg gaa ggt ttt ggt gag   672
Gly Arg Arg Arg Val Ser Ile Val Pro Ser Ala Glu Gly Phe Gly Glu
    210                 215                 220

gca att cgc cga ggc ctt ggt tgg gga ctt ctt ccc gaa acc caa gct   720
Ala Ile Arg Arg Gly Leu Gly Trp Gly Leu Leu Pro Glu Thr Gln Ala
225                 230                 235                 240

gct ccc atg cta aaa gca gga gaa gtg atc ctc ctc gat gag ata ccc   768
Ala Pro Met Leu Lys Ala Gly Glu Val Ile Leu Leu Asp Glu Ile Pro
                245                 250                 255

att gac aca ccg atg tat tgg caa cga tgg cgc ctg gaa tct aga tct   816
Ile Asp Thr Pro Met Tyr Trp Gln Arg Trp Arg Leu Glu Ser Arg Ser
            260                 265                 270

cta gct aga ctc aca gac gcc gtc gtt gat gca gca atc gag gga ttg   864
Leu Ala Arg Leu Thr Asp Ala Val Val Asp Ala Ala Ile Glu Gly Leu
        275                 280                 285

cgg cct                                                          870
Arg Pro
    290
```

<210> 124
<211> 290
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 124

```
Met Asn Pro Ile Gln Leu Asp Thr Leu Leu Ser Ile Ile Asp Glu Gly
  1               5                  10                  15

Ser Phe Glu Gly Ala Ser Leu Ala Leu Ser Ile Ser Pro Ser Ala Val
             20                  25                  30

Ser Gln Arg Val Lys Ala Leu Glu His His Val Gly Arg Val Leu Val
         35                  40                  45

Ser Arg Thr Gln Pro Ala Lys Ala Thr Glu Ala Gly Glu Val Leu Val
     50                  55                  60

Gln Ala Ala Arg Lys Met Val Leu Leu Gln Ala Glu Thr Lys Ala Gln
 65                  70                  75                  80

Leu Ser Gly Arg Leu Ala Glu Ile Pro Leu Thr Ile Ala Ile Asn Ala
                 85                  90                  95

Asp Ser Leu Ser Thr Trp Phe Pro Pro Val Phe Asn Glu Val Ala Ser
            100                 105                 110

Trp Gly Gly Ala Thr Leu Thr Leu Arg Leu Glu Asp Glu Ala His Thr
        115                 120                 125

Leu Ser Leu Leu Arg Arg Gly Asp Val Leu Gly Ala Val Thr Arg Glu
    130                 135                 140
```

```
Ala Asn Pro Val Ala Gly Cys Glu Val Val Glu Leu Gly Thr Met Arg
145                 150                 155                 160

His Leu Ala Ile Ala Thr Pro Ser Leu Arg Asp Ala Tyr Met Val Asp
                165                 170                 175

Gly Lys Leu Asp Trp Ala Ala Met Pro Val Leu Arg Phe Gly Pro Lys
            180                 185                 190

Asp Val Leu Gln Asp Arg Asp Leu Asp Gly Arg Val Asp Gly Pro Val
        195                 200                 205

Gly Arg Arg Arg Val Ser Ile Val Pro Ser Ala Glu Gly Phe Gly Glu
    210                 215                 220

Ala Ile Arg Arg Gly Leu Gly Trp Gly Leu Leu Pro Glu Thr Gln Ala
225                 230                 235                 240

Ala Pro Met Leu Lys Ala Gly Glu Val Ile Leu Leu Asp Glu Ile Pro
                245                 250                 255

Ile Asp Thr Pro Met Tyr Trp Gln Arg Trp Arg Leu Glu Ser Arg Ser
            260                 265                 270

Leu Ala Arg Leu Thr Asp Ala Val Val Asp Ala Ala Ile Glu Gly Leu
        275                 280                 285

Arg Pro
    290
```

<210> 125
<211> 948
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(948)
<223> RXA02021W

<400> 125

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atg agt gaa aac att cgc gga gcc caa gca gtt gga atc gca aat atc   48
Met Ser Glu Asn Ile Arg Gly Ala Gln Ala Val Gly Ile Ala Asn Ile
  1               5                  10                  15

gcc atg gac ggg acc atc ctg gac acg tgg tac cca gaa ccc caa att   96
Ala Met Asp Gly Thr Ile Leu Asp Thr Trp Tyr Pro Glu Pro Gln Ile
             20                  25                  30

ttc aac ccg gat cag tgg gct gaa cgc tac cca ttg gaa gtg ggc acc   144
Phe Asn Pro Asp Gln Trp Ala Glu Arg Tyr Pro Leu Glu Val Gly Thr
         35                  40                  45

aca cgc ctc gga gca aac gaa ctc acc cca cgg atg ctg cag ttg gta   192
Thr Arg Leu Gly Ala Asn Glu Leu Thr Pro Arg Met Leu Gln Leu Val
     50                  55                  60
```

```
aaa ctg gac caa gat cgc ctc gtc gaa cag gta gca gtc cgc acc gtt   240
Lys Leu Asp Gln Asp Arg Leu Val Glu Gln Val Ala Val Arg Thr Val
 65                  70                  75                  80

atc ccc gat ctg tct caa cct cca gta gac gcg cac gat gtt tac ctg   288
Ile Pro Asp Leu Ser Gln Pro Pro Val Asp Ala His Asp Val Tyr Leu
                85                  90                  95

cgc ctc cac ctg ctt tcc cac cgg ctg gtc cgc ccc cac gaa atg cac   336
Arg Leu His Leu Leu Ser His Arg Leu Val Arg Pro His Glu Met His
            100                 105                 110

atg caa aac acc ttg gag ctg ctg tcc gac gtg gtg tgg aca aac aag   384
Met Gln Asn Thr Leu Glu Leu Leu Ser Asp Val Val Trp Thr Asn Lys
        115                 120                 125

ggc cct tgc ctt cct gaa aac ttt gag tgg gtg cgt ggt gct ctg cgg   432
Gly Pro Cys Leu Pro Glu Asn Phe Glu Trp Val Arg Gly Ala Leu Arg
    130                 135                 140

tcc cgc gga ctc atc cac gtc tac tgt gtg gac cgt ctt ccc cgc atg   480
Ser Arg Gly Leu Ile His Val Tyr Cys Val Asp Arg Leu Pro Arg Met
145                 150                 155                 160

gtc gac tat gtg gtt ccc cct gga gtc cgc atc tcc gaa gca gaa cgc   528
Val Asp Tyr Val Val Pro Pro Gly Val Arg Ile Ser Glu Ala Glu Arg
                165                 170                 175

gtg cgc cta ggt gca tac ctt gct ccg ggt acc tct gtg ctg cgt gaa   576
Val Arg Leu Gly Ala Tyr Leu Ala Pro Gly Thr Ser Val Leu Arg Glu
            180                 185                 190

ggt ttc gtg tct ttc aac tcc ggc acc ttg ggt gcc gca aag gtg gaa   624
Gly Phe Val Ser Phe Asn Ser Gly Thr Leu Gly Ala Ala Lys Val Glu
        195                 200                 205

ggc cgc ctg agt tcc ggt gtg gtc atc ggt gaa ggt tcc gag att gga   672
Gly Arg Leu Ser Ser Gly Val Val Ile Gly Glu Gly Ser Glu Ile Gly
    210                 215                 220

ctg tct tct act att cag tcc ccg aga gat gaa cag cgc cgc cgt ttg   720
Leu Ser Ser Thr Ile Gln Ser Pro Arg Asp Glu Gln Arg Arg Arg Leu
225                 230                 235                 240

ccg ttg agc atc ggc caa aac tgc aac ttt ggt gtc agc tcc gga atc   768
Pro Leu Ser Ile Gly Gln Asn Cys Asn Phe Gly Val Ser Ser Gly Ile
                245                 250                 255

atc gga gtc agt ctg gga gac aat tgc gac atc gga aat aac att gtc   816
Ile Gly Val Ser Leu Gly Asp Asn Cys Asp Ile Gly Asn Asn Ile Val
            260                 265                 270

ttg gat gga gat acc ccc att tgg ttc gca gcc gat gag gag tta cgc   864
Leu Asp Gly Asp Thr Pro Ile Trp Phe Ala Ala Asp Glu Glu Leu Arg
        275                 280                 285

act atc gac tcc atc gaa ggc caa gca aat tgg tca atc aag cgt gaa   912
Thr Ile Asp Ser Ile Glu Gly Gln Ala Asn Trp Ser Ile Lys Arg Glu
    290                 295                 300
```

```
tcc ggc ttc cat gag cca gtt gcc cgc ctc aaa gct                    948
Ser Gly Phe His Glu Pro Val Ala Arg Leu Lys Ala
305                 310                 315
```

<210> 126
<211> 316
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 126

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Met Ser Glu Asn Ile Arg Gly Ala Gln Ala Val Gly Ile Ala Asn Ile
  1               5                  10                  15

Ala Met Asp Gly Thr Ile Leu Asp Thr Trp Tyr Pro Glu Pro Gln Ile
             20                  25                  30

Phe Asn Pro Asp Gln Trp Ala Glu Arg Tyr Pro Leu Glu Val Gly Thr
         35                  40                  45

Thr Arg Leu Gly Ala Asn Glu Leu Thr Pro Arg Met Leu Gln Leu Val
     50                  55                  60

Lys Leu Asp Gln Asp Arg Leu Val Glu Gln Val Ala Val Arg Thr Val
 65                  70                  75                  80

Ile Pro Asp Leu Ser Gln Pro Pro Val Asp Ala His Asp Val Tyr Leu
                 85                  90                  95

Arg Leu His Leu Leu Ser His Arg Leu Val Arg Pro His Glu Met His
            100                 105                 110

Met Gln Asn Thr Leu Glu Leu Leu Ser Asp Val Val Trp Thr Asn Lys
        115                 120                 125

Gly Pro Cys Leu Pro Glu Asn Phe Glu Trp Val Arg Gly Ala Leu Arg
    130                 135                 140

Ser Arg Gly Leu Ile His Val Tyr Cys Val Asp Arg Leu Pro Arg Met
145                 150                 155                 160

Val Asp Tyr Val Val Pro Pro Gly Val Arg Ile Ser Glu Ala Glu Arg
                165                 170                 175

Val Arg Leu Gly Ala Tyr Leu Ala Pro Gly Thr Ser Val Leu Arg Glu
            180                 185                 190

Gly Phe Val Ser Phe Asn Ser Gly Thr Leu Gly Ala Ala Lys Val Glu
        195                 200                 205

Gly Arg Leu Ser Ser Gly Val Val Ile Gly Glu Gly Ser Glu Ile Gly
    210                 215                 220

Leu Ser Ser Thr Ile Gln Ser Pro Arg Asp Glu Gln Arg Arg Arg Leu
225                 230                 235                 240

Pro Leu Ser Ile Gly Gln Asn Cys Asn Phe Gly Val Ser Ser Gly Ile
```

```
                245                 250                 255

Ile Gly Val Ser Leu Gly Asp Asn Cys Asp Ile Gly Asn Asn Ile Val
            260                 265                 270

Leu Asp Gly Asp Thr Pro Ile Trp Phe Ala Ala Asp Glu Glu Leu Arg
        275                 280                 285

Thr Ile Asp Ser Ile Glu Gly Gln Ala Asn Trp Ser Ile Lys Arg Glu
    290                 295                 300

Ser Gly Phe His Glu Pro Val Ala Arg Leu Lys Ala
305                 310                 315


<210> 127
<211> 1188
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1188)
<223> RXA02022E

<400> 127
ttg ggc tcc gcg aat gtt ttc act cat ttt tta atc gac cgc ttc cat   48
Met Gly Ser Ala Asn Val Phe Thr His Phe Leu Ile Asp Arg Phe His
  1               5                  10                  15

cat gtt tta act aag gtt tgt agg ctt aaa cct gtg aac tct gaa ctc   96
His Val Leu Thr Lys Val Cys Arg Leu Lys Pro Val Asn Ser Glu Leu
             20                  25                  30

aaa cca gga tta gat ctc ctc ggc gac cca att gtc ctt act caa cgt   144
Lys Pro Gly Leu Asp Leu Leu Gly Asp Pro Ile Val Leu Thr Gln Arg
         35                  40                  45

ttg gta gat ata ccg agt ccg tcg ggt cag gaa aag cag att gct gat   192
Leu Val Asp Ile Pro Ser Pro Ser Gly Gln Glu Lys Gln Ile Ala Asp
     50                  55                  60

gaa att gaa gat gcc ctt cgg aac ctt aat cta cct ggt gta gag gtc   240
Glu Ile Glu Asp Ala Leu Arg Asn Leu Asn Leu Pro Gly Val Glu Val
 65                  70                  75                  80

ttc cgc ttc aac aac aac gtt ctt gct cgc acg aac agg gga ttg gcc   288
Phe Arg Phe Asn Asn Asn Val Leu Ala Arg Thr Asn Arg Gly Leu Ala
                85                  90                  95

tcg agg gtc atg ctt gct ggt cat atc gat aca gtg ccg atc gcg gac   336
Ser Arg Val Met Leu Ala Gly His Ile Asp Thr Val Pro Ile Ala Asp
            100                 105                 110

aat ctg cca agc cgt gtg gaa gac ggc atc atg tat ggc tgt ggc acc   384
Asn Leu Pro Ser Arg Val Glu Asp Gly Ile Met Tyr Gly Cys Gly Thr
        115                 120                 125

gtc gat atg aaa tct ggg ttg gcg gtg tat ttg cat act ttt gcc acc   432
```

```
Val Asp Met Lys Ser Gly Leu Ala Val Tyr Leu His Thr Phe Ala Thr
    130                 135                 140

ttg gcc acg tcg act gag ctt aaa cat gat ctg acg ctg att gcg tat   480
Leu Ala Thr Ser Thr Glu Leu Lys His Asp Leu Thr Leu Ile Ala Tyr
145                 150                 155                 160

gag tgc gag gaa gtt gct gat cac ctc aat ggt ttg ggc cac att cgc   528
Glu Cys Glu Glu Val Ala Asp His Leu Asn Gly Leu Gly His Ile Arg
                165                 170                 175

gat gag cat ccg gag tgg ttg gcg gct gat ttg gcg ttg ttg ggt gag   576
Asp Glu His Pro Glu Trp Leu Ala Ala Asp Leu Ala Leu Leu Gly Glu
            180                 185                 190

cct act ggc ggc tgg att gag gcg ggc tgc cag ggc aat ctg cgc atc   624
Pro Thr Gly Gly Trp Ile Glu Ala Gly Cys Gln Gly Asn Leu Arg Ile
        195                 200                 205

aag gtg acg gcg cat ggt gtg cgt gcc cat tcg gcg aga agc tgg ttg   672
Lys Val Thr Ala His Gly Val Arg Ala His Ser Ala Arg Ser Trp Leu
    210                 215                 220

ggt gat aat gcg atg cat aag ttg tcg ccg atc att tcg aag gtt gct   720
Gly Asp Asn Ala Met His Lys Leu Ser Pro Ile Ile Ser Lys Val Ala
225                 230                 235                 240

gcg tat aag gcc gca gaa gtc aac att gat ggc ttg acc tac cgt gaa   768
Ala Tyr Lys Ala Ala Glu Val Asn Ile Asp Gly Leu Thr Tyr Arg Glu
                245                 250                 255

ggc ctc aac atc gtt ttc tgc gaa tcg ggc gtg gca aac aac gtc att   816
Gly Leu Asn Ile Val Phe Cys Glu Ser Gly Val Ala Asn Asn Val Ile
            260                 265                 270

cca gac ctc gcg tgg atg aac ctc aac ttc cgt ttc gcg ccg aat cgc   864
Pro Asp Leu Ala Trp Met Asn Leu Asn Phe Arg Phe Ala Pro Asn Arg
        275                 280                 285

gat ctc aac gag gcg atc gag cat gtc gtc gaa acg ctt gag ctt gac   912
Asp Leu Asn Glu Ala Ile Glu His Val Val Glu Thr Leu Glu Leu Asp
    290                 295                 300

ggt caa gac ggc atc gaa tgg gcc gta gaa gac ggg gca ggc ggt gcc   960
Gly Gln Asp Gly Ile Glu Trp Ala Val Glu Asp Gly Ala Gly Gly Ala
305                 310                 315                 320

ctt cca ggc ttg ggg cag cag gtg aca agc ggg ctt atc gac gcc gtc  1008
Leu Pro Gly Leu Gly Gln Gln Val Thr Ser Gly Leu Ile Asp Ala Val
                325                 330                 335

ggc cgc gaa aaa atc cgc gca aaa ttc ggc tgg acc gat gtc tca cgt  1056
Gly Arg Glu Lys Ile Arg Ala Lys Phe Gly Trp Thr Asp Val Ser Arg
            340                 345                 350

ttt tca gcc atg gga att cca gcc cta aac ttt ggc gct ggt gat cca  1104
Phe Ser Ala Met Gly Ile Pro Ala Leu Asn Phe Gly Ala Gly Asp Pro
        355                 360                 365
```

```
agt ttc gcg cat aaa cgc gac gag cag tgc cca gtg gag caa atc acg   1152
Ser Phe Ala His Lys Arg Asp Glu Gln Cys Pro Val Glu Gln Ile Thr
    370                 375                 380

gat gtg gca gca att ttg aag cag tac ctg agc gag                  1188
Asp Val Ala Ala Ile Leu Lys Gln Tyr Leu Ser Glu
385                 390                 395
```

<210> 128
<211> 396
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 128

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Met Gly Ser Ala Asn Val Phe Thr His Phe Leu Ile Asp Arg Phe His
  1               5                  10                  15

His Val Leu Thr Lys Val Cys Arg Leu Lys Pro Val Asn Ser Glu Leu
             20                  25                  30

Lys Pro Gly Leu Asp Leu Leu Gly Asp Pro Ile Val Leu Thr Gln Arg
         35                  40                  45

Leu Val Asp Ile Pro Ser Pro Ser Gly Gln Glu Lys Gln Ile Ala Asp
     50                  55                  60

Glu Ile Glu Asp Ala Leu Arg Asn Leu Asn Leu Pro Gly Val Glu Val
 65                  70                  75                  80

Phe Arg Phe Asn Asn Asn Val Leu Ala Arg Thr Asn Arg Gly Leu Ala
                 85                  90                  95

Ser Arg Val Met Leu Ala Gly His Ile Asp Thr Val Pro Ile Ala Asp
            100                 105                 110

Asn Leu Pro Ser Arg Val Glu Asp Gly Ile Met Tyr Gly Cys Gly Thr
        115                 120                 125

Val Asp Met Lys Ser Gly Leu Ala Val Tyr Leu His Thr Phe Ala Thr
    130                 135                 140

Leu Ala Thr Ser Thr Glu Leu Lys His Asp Leu Thr Leu Ile Ala Tyr
145                 150                 155                 160

Glu Cys Glu Glu Val Ala Asp His Leu Asn Gly Leu Gly His Ile Arg
                165                 170                 175

Asp Glu His Pro Glu Trp Leu Ala Ala Asp Leu Ala Leu Leu Gly Glu
            180                 185                 190

Pro Thr Gly Gly Trp Ile Glu Ala Gly Cys Gln Gly Asn Leu Arg Ile
        195                 200                 205

Lys Val Thr Ala His Gly Val Arg Ala His Ser Ala Arg Ser Trp Leu
    210                 215                 220

Gly Asp Asn Ala Met His Lys Leu Ser Pro Ile Ile Ser Lys Val Ala
```

```
225                 230                 235                 240

Ala Tyr Lys Ala Ala Glu Val Asn Ile Asp Gly Leu Thr Tyr Arg Glu
                245                 250                 255

Gly Leu Asn Ile Val Phe Cys Glu Ser Gly Val Ala Asn Asn Val Ile
            260                 265                 270

Pro Asp Leu Ala Trp Met Asn Leu Asn Phe Arg Phe Ala Pro Asn Arg
        275                 280                 285

Asp Leu Asn Glu Ala Ile Glu His Val Val Glu Thr Leu Glu Leu Asp
    290                 295                 300

Gly Gln Asp Gly Ile Glu Trp Ala Val Glu Asp Gly Ala Gly Gly Ala
305                 310                 315                 320

Leu Pro Gly Leu Gly Gln Gln Val Thr Ser Gly Leu Ile Asp Ala Val
                325                 330                 335

Gly Arg Glu Lys Ile Arg Ala Lys Phe Gly Trp Thr Asp Val Ser Arg
            340                 345                 350

Phe Ser Ala Met Gly Ile Pro Ala Leu Asn Phe Gly Ala Gly Asp Pro
        355                 360                 365

Ser Phe Ala His Lys Arg Asp Glu Gln Cys Pro Val Glu Gln Ile Thr
    370                 375                 380

Asp Val Ala Ala Ile Leu Lys Gln Tyr Leu Ser Glu
385                 390                 395


<210> 129
<211> 1107
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1107)
<223> RXA02022K

<400> 129
gtg aac tct gaa ctc aaa cca gga tta gat ctc ctc ggc gac cca att   48
Met Asn Ser Glu Leu Lys Pro Gly Leu Asp Leu Leu Gly Asp Pro Ile
  1               5                  10                  15

gtc ctt act caa cgt ttg gta gat ata ccg agt ccg tcg ggt cag gaa   96
Val Leu Thr Gln Arg Leu Val Asp Ile Pro Ser Pro Ser Gly Gln Glu
          .  20                  25                  30

aag cag att gct gat gaa att gaa gat gcc ctt cgg aac ctt aat cta   144
Lys Gln Ile Ala Asp Glu Ile Glu Asp Ala Leu Arg Asn Leu Asn Leu
         35                  40                  45

cct ggt gta gag gtc ttc cgc ttc aac aac aac gtt ctt gct cgc acg   192
Pro Gly Val Glu Val Phe Arg Phe Asn Asn Asn Val Leu Ala Arg Thr
     50                  55                  60
```

```
aac agg gga ttg gcc tcg agg gtc atg ctt gct ggt cat atc gat aca   240
Asn Arg Gly Leu Ala Ser Arg Val Met Leu Ala Gly His Ile Asp Thr
 65                  70                  75                  80

gtg ccg atc gcg gac aat ctg cca agc cgt gtg gaa gac ggc atc atg   288
Val Pro Ile Ala Asp Asn Leu Pro Ser Arg Val Glu Asp Gly Ile Met
                85                  90                  95

tat ggc tgt ggc acc gtc gat atg aaa tct ggg ttg gcg gtg tat ttg   336
Tyr Gly Cys Gly Thr Val Asp Met Lys Ser Gly Leu Ala Val Tyr Leu
            100                 105                 110

cat act ttt gcc acc ttg gcc acg tcg act gag ctt aaa cat gat ctg   384
His Thr Phe Ala Thr Leu Ala Thr Ser Thr Glu Leu Lys His Asp Leu
        115                 120                 125

acg ctg att gcg tat gag tgc gag gaa gtt gct gat cac ctc aat ggt   432
Thr Leu Ile Ala Tyr Glu Cys Glu Glu Val Ala Asp His Leu Asn Gly
    130                 135                 140

ttg ggc cac att cgc gat gag cat ccg gag tgg ttg gcg gct gat ttg   480
Leu Gly His Ile Arg Asp Glu His Pro Glu Trp Leu Ala Ala Asp Leu
145                 150                 155                 160

gcg ttg ttg ggt gag cct act ggc ggc tgg att gag gcg ggc tgc cag   528
Ala Leu Leu Gly Glu Pro Thr Gly Gly Trp Ile Glu Ala Gly Cys Gln
                165                 170                 175

ggc aat ctg cgc atc aag gtg acg gcg cat ggt gtg cgt gcc cat tcg   576
Gly Asn Leu Arg Ile Lys Val Thr Ala His Gly Val Arg Ala His Ser
            180                 185                 190

gcg aga agc tgg ttg ggt gat aat gcg atg cat aag ttg tcg ccg atc   624
Ala Arg Ser Trp Leu Gly Asp Asn Ala Met His Lys Leu Ser Pro Ile
        195                 200                 205

att tcg aag gtt gct gcg tat aag gcc gca gaa gtc aac att gat ggc   672
Ile Ser Lys Val Ala Ala Tyr Lys Ala Ala Glu Val Asn Ile Asp Gly
    210                 215                 220

ttg acc tac cgt gaa ggc ctc aac atc gtt ttc tgc gaa tcg ggc gtg   720
Leu Thr Tyr Arg Glu Gly Leu Asn Ile Val Phe Cys Glu Ser Gly Val
225                 230                 235                 240

gca aac aac gtc att cca gac ctc gcg tgg atg aac ctc aac ttc cgt   768
Ala Asn Asn Val Ile Pro Asp Leu Ala Trp Met Asn Leu Asn Phe Arg
                245                 250                 255

ttc gcg ccg aat cgc gat ctc aac gag gcg atc gag cat gtc gtc gaa   816
Phe Ala Pro Asn Arg Asp Leu Asn Glu Ala Ile Glu His Val Val Glu
            260                 265                 270

acg ctt gag ctt gac ggt caa gac ggc atc gaa tgg gcc gta gaa gac   864
Thr Leu Glu Leu Asp Gly Gln Asp Gly Ile Glu Trp Ala Val Glu Asp
        275                 280                 285

ggg gca ggc ggt gcc ctt cca ggc ttg ggg cag cag gtg aca agc ggg   912
Gly Ala Gly Gly Ala Leu Pro Gly Leu Gly Gln Gln Val Thr Ser Gly
```

```
    290                 295                 300

ctt atc gac gcc gtc ggc cgc gaa aaa atc cgc gca aaa ttc ggc tgg   960
Leu Ile Asp Ala Val Gly Arg Glu Lys Ile Arg Ala Lys Phe Gly Trp
305                 310                 315                 320

acc gat gtc tca cgt ttt tca gcc atg gga att cca gcc cta aac ttt   1008
Thr Asp Val Ser Arg Phe Ser Ala Met Gly Ile Pro Ala Leu Asn Phe
                325                 330                 335

ggc gct ggt gat cca agt ttc gcg cat aaa cgc gac gag cag tgc cca   1056
Gly Ala Gly Asp Pro Ser Phe Ala His Lys Arg Asp Glu Gln Cys Pro
            340                 345                 350

gtg gag caa atc acg gat gtg gca gca att ttg aag cag tac ctg agc   1104
Val Glu Gln Ile Thr Asp Val Ala Ala Ile Leu Lys Gln Tyr Leu Ser
        355                 360                 365

gag                                                               1107
Glu
```

<210> 130
<211> 369
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 130

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Met Asn Ser Glu Leu Lys Pro Gly Leu Asp Leu Leu Gly Asp Pro Ile
  1               5                  10                  15

Val Leu Thr Gln Arg Leu Val Asp Ile Pro Ser Pro Ser Gly Gln Glu
             20                  25                  30

Lys Gln Ile Ala Asp Glu Ile Glu Asp Ala Leu Arg Asn Leu Asn Leu
         35                  40                  45

Pro Gly Val Glu Val Phe Arg Phe Asn Asn Asn Val Leu Ala Arg Thr
     50                  55                  60

Asn Arg Gly Leu Ala Ser Arg Val Met Leu Ala Gly His Ile Asp Thr
 65                  70                  75                  80

Val Pro Ile Ala Asp Asn Leu Pro Ser Arg Val Glu Asp Gly Ile Met
                 85                  90                  95

Tyr Gly Cys Gly Thr Val Asp Met Lys Ser Gly Leu Ala Val Tyr Leu
            100                 105                 110

His Thr Phe Ala Thr Leu Ala Thr Ser Thr Glu Leu Lys His Asp Leu
        115                 120                 125

Thr Leu Ile Ala Tyr Glu Cys Glu Glu Val Ala Asp His Leu Asn Gly
    130                 135                 140

Leu Gly His Ile Arg Asp Glu His Pro Glu Trp Leu Ala Ala Asp Leu
145                 150                 155                 160
```

```
Ala Leu Leu Gly Glu Pro Thr Gly Gly Trp Ile Glu Ala Gly Cys Gln
                165                 170                 175

Gly Asn Leu Arg Ile Lys Val Thr Ala His Gly Val Arg Ala His Ser
            180                 185                 190

Ala Arg Ser Trp Leu Gly Asp Asn Ala Met His Lys Leu Ser Pro Ile
        195                 200                 205

Ile Ser Lys Val Ala Ala Tyr Lys Ala Ala Glu Val Asn Ile Asp Gly
    210                 215                 220

Leu Thr Tyr Arg Glu Gly Leu Asn Ile Val Phe Cys Glu Ser Gly Val
225                 230                 235                 240

Ala Asn Asn Val Ile Pro Asp Leu Ala Trp Met Asn Leu Asn Phe Arg
                245                 250                 255

Phe Ala Pro Asn Arg Asp Leu Asn Glu Ala Ile Glu His Val Val Glu
            260                 265                 270

Thr Leu Glu Leu Asp Gly Gln Asp Gly Ile Glu Trp Ala Val Glu Asp
        275                 280                 285

Gly Ala Gly Gly Ala Leu Pro Gly Leu Gly Gln Gln Val Thr Ser Gly
    290                 295                 300

Leu Ile Asp Ala Val Gly Arg Glu Lys Ile Arg Ala Lys Phe Gly Trp
305                 310                 315                 320

Thr Asp Val Ser Arg Phe Ser Ala Met Gly Ile Pro Ala Leu Asn Phe
                325                 330                 335

Gly Ala Gly Asp Pro Ser Phe Ala His Lys Arg Asp Glu Gln Cys Pro
            340                 345                 350

Val Glu Gln Ile Thr Asp Val Ala Ala Ile Leu Lys Gln Tyr Leu Ser
        355                 360                 365

Glu
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<210> 131
<211> 1920
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(1920)
<223> RXA02139K

<400> 131

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atg tgc ggc ctt ctt ggc ata ttg act gca aat ggg aac gct gaa gca   48
Met Cys Gly Leu Leu Gly Ile Leu Thr Ala Asn Gly Asn Ala Glu Ala
  1               5                  10                  15
```

```
ttc gtt cct gca ctc gag cgg gcc ttg cca tgc atg cgc cac cgt ggt   96
Phe Val Pro Ala Leu Glu Arg Ala Leu Pro Cys Met Arg His Arg Gly
            20                  25                  30

cct gac gat gcc ggc act tgg cat gac gcc gat gca gcg ttt gga ttc   144
Pro Asp Asp Ala Gly Thr Trp His Asp Ala Asp Ala Ala Phe Gly Phe
        35                  40                  45

aac cgc ctc tcc atc att gat att gca cac tcc cac caa cca ctg cgt   192
Asn Arg Leu Ser Ile Ile Asp Ile Ala His Ser His Gln Pro Leu Arg
    50                  55                  60

tgg gga cct gcg gat gaa ccc gac cgc tac gca atg act ttc aac ggt   240
Trp Gly Pro Ala Asp Glu Pro Asp Arg Tyr Ala Met Thr Phe Asn Gly
65                  70                  75                  80

gag atc tac aac tac gtt gag ctg cgt aaa gag ctc tcg gat ttg gga   288
Glu Ile Tyr Asn Tyr Val Glu Leu Arg Lys Glu Leu Ser Asp Leu Gly
                85                  90                  95

tat gcc ttt aat act tct ggc gat ggc gag cca att gtt gtc ggt ttc   336
Tyr Ala Phe Asn Thr Ser Gly Asp Gly Glu Pro Ile Val Val Gly Phe
            100                 105                 110

cac cac tgg ggc gag tcc gtg gtc gag cat ctc cgc gga atg ttc ggc   384
His His Trp Gly Glu Ser Val Val Glu His Leu Arg Gly Met Phe Gly
        115                 120                 125

att gcc att tgg gat aca aag gaa aag tcg ctt ttc ctt gcg cgt gat   432
Ile Ala Ile Trp Asp Thr Lys Glu Lys Ser Leu Phe Leu Ala Arg Asp
    130                 135                 140

cag ttc ggc att aag cca ctg ttc tac gca acc acc gag cat ggc acc   480
Gln Phe Gly Ile Lys Pro Leu Phe Tyr Ala Thr Thr Glu His Gly Thr
145                 150                 155                 160

gtg ttc tcc tca gag aag aag acc atc ttg gag atg gcc gag gag atg   528
Val Phe Ser Ser Glu Lys Lys Thr Ile Leu Glu Met Ala Glu Glu Met
                165                 170                 175

aat cta gat ctg ggc ctt gat aag cgc acc att gag cac tac gtg gac   576
Asn Leu Asp Leu Gly Leu Asp Lys Arg Thr Ile Glu His Tyr Val Asp
            180                 185                 190

ttg cag tac gtg ccc gag cca gat acc ctt cac gcg cag att tcc cgc   624
Leu Gln Tyr Val Pro Glu Pro Asp Thr Leu His Ala Gln Ile Ser Arg
        195                 200                 205

ttg gag tca ggc tgc acc gca aca gtt cgt ccg ggc ggc aag ctg gaa   672
Leu Glu Ser Gly Cys Thr Ala Thr Val Arg Pro Gly Gly Lys Leu Glu
    210                 215                 220

cag aag cgt tac ttc aag cct cag ttc cca gta cag aag gtc gta aag   720
Gln Lys Arg Tyr Phe Lys Pro Gln Phe Pro Val Gln Lys Val Val Lys
225                 230                 235                 240

ggt aag gag cag gac ctc ttc gat cgc att gcc cag gtg ttg gag gat   768
Gly Lys Glu Gln Asp Leu Phe Asp Arg Ile Ala Gln Val Leu Glu Asp
                245                 250                 255
```

```
agc gtc gaa aag cat atg cgt gcc gac gtg acc gta ggc tcg ttc ctt   816
Ser Val Glu Lys His Met Arg Ala Asp Val Thr Val Gly Ser Phe Leu
            260                 265                 270

tcc ggc ggc att gac tca acc gca att gcg gcg ctt gca aag cgc cac   864
Ser Gly Gly Ile Asp Ser Thr Ala Ile Ala Ala Leu Ala Lys Arg His
        275                 280                 285

aac cct gac ctg ctc acc ttc acc acc ggt ttc gag cgt gaa ggc tac   912
Asn Pro Asp Leu Leu Thr Phe Thr Thr Gly Phe Glu Arg Glu Gly Tyr
    290                 295                 300

tcg gag gtc gat gtg gct gcg gag tcc gcc gct gcg att ggc gct gag   960
Ser Glu Val Asp Val Ala Ala Glu Ser Ala Ala Ala Ile Gly Ala Glu
305                 310                 315                 320

cac atc gtg aag att gtc tcg cct gag gaa tac gcc aac gcg att cct  1008
His Ile Val Lys Ile Val Ser Pro Glu Glu Tyr Ala Asn Ala Ile Pro
                325                 330                 335

aag atc atg tgg tac ttg gat gat cct gta gct gac cca tca ttg gtc  1056
Lys Ile Met Trp Tyr Leu Asp Asp Pro Val Ala Asp Pro Ser Leu Val
            340                 345                 350

ccg ctg tac ttc gtg gca gcg gaa gca cgt aag cac gtc aag gtt gtg  1104
Pro Leu Tyr Phe Val Ala Ala Glu Ala Arg Lys His Val Lys Val Val
        355                 360                 365

ctg tct ggc gag ggc gca gat gag ctg ttc ggt gga tac acc att tac  1152
Leu Ser Gly Glu Gly Ala Asp Glu Leu Phe Gly Gly Tyr Thr Ile Tyr
    370                 375                 380

aag gag ccg cta tcg ctt gct cca ttt gag aag atc cct tcc cca cta  1200
Lys Glu Pro Leu Ser Leu Ala Pro Phe Glu Lys Ile Pro Ser Pro Leu
385                 390                 395                 400

cgt aaa ggc ctg gga aag ctc agc aag gtt ctg cca gac ggc atg aag  1248
Arg Lys Gly Leu Gly Lys Leu Ser Lys Val Leu Pro Asp Gly Met Lys
                405                 410                 415

ggc aag tcc ctt ctt gag cgt ggc tcc atg acc atg gaa gag cgc tac  1296
Gly Lys Ser Leu Leu Glu Arg Gly Ser Met Thr Met Glu Glu Arg Tyr
            420                 425                 430

tac ggc aac gct cgc tcc ttc aat ttc gag cag atg caa cgc gtt att  1344
Tyr Gly Asn Ala Arg Ser Phe Asn Phe Glu Gln Met Gln Arg Val Ile
        435                 440                 445

cca tgg gca aag cgc gaa tgg gac cac cgc gaa gtc act gcg ccg atc  1392

Pro Trp Ala Lys Arg Glu Trp Asp His Arg Glu Val Thr Ala Pro Ile
    450                 455                 460

tac gca cag tcc cgc aac ttt gat cca gta gcc cgc atg caa cac ctg  1440
Tyr Ala Gln Ser Arg Asn Phe Asp Pro Val Ala Arg Met Gln His Leu
465                 470                 475                 480

gat ctg ttc acc tgg atg cgc ggc gac atc ctg gtc aag gct gac aag  1488
```

```
Asp Leu Phe Thr Trp Met Arg Gly Asp Ile Leu Val Lys Ala Asp Lys
                485                 490                 495

atc aac atg gcg aac tcc ctt gag ctg cga gtt cca ttc ttg gat aag   1536
Ile Asn Met Ala Asn Ser Leu Glu Leu Arg Val Pro Phe Leu Asp Lys
            500                 505                 510

gaa gtt ttc aag gtt gca gag acc att cct tac gac ctg aag att gcc   1584
Glu Val Phe Lys Val Ala Glu Thr Ile Pro Tyr Asp Leu Lys Ile Ala
        515                 520                 525

aac ggt acc acc aag tac gcg ctg cgc agg gca ctc gag cag att gtt   1632
Asn Gly Thr Thr Lys Tyr Ala Leu Arg Arg Ala Leu Glu Gln Ile Val
    530                 535                 540

ccg cct cac gtt ttg cac cgc aag aag ctg ggc ttc cct gtt ccc atg   1680
Pro Pro His Val Leu His Arg Lys Lys Leu Gly Phe Pro Val Pro Met
545                 550                 555                 560

cgc cac tgg ctt gcc ggc gat gag ctg ttc ggt tgg gcg cag gac acc   1728
Arg His Trp Leu Ala Gly Asp Glu Leu Phe Gly Trp Ala Gln Asp Thr
                565                 570                 575

atc aag gaa tcc ggt act gaa gat atc ttc aac aag cag gct gtg ctg   1776
Ile Lys Glu Ser Gly Thr Glu Asp Ile Phe Asn Lys Gln Ala Val Leu
            580                 585                 590

gat atg ctg aac gag cac cgc gat ggc gtg tca gat cat tcc cgt cga   1824
Asp Met Leu Asn Glu His Arg Asp Gly Val Ser Asp His Ser Arg Arg
        595                 600                 605

ctg tgg act gtt ctg tca ttt atg gtg tgg cac ggc att ttt gtg gaa   1872
Leu Trp Thr Val Leu Ser Phe Met Val Trp His Gly Ile Phe Val Glu
    610                 615                 620

aac cgc att gat cca cag att gag gac cgc tcc tac cca gtc gag ctt   1920
Asn Arg Ile Asp Pro Gln Ile Glu Asp Arg Ser Tyr Pro Val Glu Leu
625                 630                 635                 640
```

<210> 132
<211> 640
<212> PRT
<213> 麩胺酸棒狀桿菌

```
<400> 132
Met Cys Gly Leu Leu Gly Ile Leu Thr Ala Asn Gly Asn Ala Glu Ala
  1               5                  10                  15

Phe Val Pro Ala Leu Glu Arg Ala Leu Pro Cys Met Arg His Arg Gly
             20                  25                  30

Pro Asp Asp Ala Gly Thr Trp His Asp Ala Asp Ala Ala Phe Gly Phe
         35                  40                  45

Asn Arg Leu Ser Ile Ile Asp Ile Ala His Ser His Gln Pro Leu Arg
     50                  55                  60
```

```
Trp Gly Pro Ala Asp Glu Pro Asp Arg Tyr Ala Met Thr Phe Asn Gly
 65                  70                  75                  80

Glu Ile Tyr Asn Tyr Val Glu Leu Arg Lys Glu Leu Ser Asp Leu Gly
                 85                  90                  95

Tyr Ala Phe Asn Thr Ser Gly Asp Gly Glu Pro Ile Val Val Gly Phe
            100                 105                 110

His His Trp Gly Glu Ser Val Val Glu His Leu Arg Gly Met Phe Gly
        115                 120                 125

Ile Ala Ile Trp Asp Thr Lys Glu Lys Ser Leu Phe Leu Ala Arg Asp
    130                 135                 140

Gln Phe Gly Ile Lys Pro Leu Phe Tyr Ala Thr Thr Glu His Gly Thr
145                 150                 155                 160

Val Phe Ser Ser Glu Lys Lys Thr Ile Leu Glu Met Ala Glu Glu Met
                165                 170                 175

Asn Leu Asp Leu Gly Leu Asp Lys Arg Thr Ile Glu His Tyr Val Asp
            180                 185                 190

Leu Gln Tyr Val Pro Glu Pro Asp Thr Leu His Ala Gln Ile Ser Arg
        195                 200                 205

Leu Glu Ser Gly Cys Thr Ala Thr Val Arg Pro Gly Gly Lys Leu Glu
    210                 215                 220

Gln Lys Arg Tyr Phe Lys Pro Gln Phe Pro Val Gln Lys Val Val Lys
225                 230                 235                 240

Gly Lys Glu Gln Asp Leu Phe Asp Arg Ile Ala Gln Val Leu Glu Asp
                245                 250                 255

Ser Val Glu Lys His Met Arg Ala Asp Val Thr Val Gly Ser Phe Leu
            260                 265                 270

Ser Gly Gly Ile Asp Ser Thr Ala Ile Ala Ala Leu Ala Lys Arg His
        275                 280                 285

Asn Pro Asp Leu Leu Thr Phe Thr Thr Gly Phe Glu Arg Glu Gly Tyr
    290                 295                 300

Ser Glu Val Asp Val Ala Ala Glu Ser Ala Ala Ala Ile Gly Ala Glu
305                 310                 315                 320

His Ile Val Lys Ile Val Ser Pro Glu Glu Tyr Ala Asn Ala Ile Pro
                325                 330                 335

Lys Ile Met Trp Tyr Leu Asp Asp Pro Val Ala Asp Pro Ser Leu Val
            340                 345                 350

Pro Leu Tyr Phe Val Ala Ala Glu Ala Arg Lys His Val Lys Val Val
        355                 360                 365

Leu Ser Gly Glu Gly Ala Asp Glu Leu Phe Gly Gly Tyr Thr Ile Tyr
    370                 375                 380
```

```
Lys Glu Pro Leu Ser Leu Ala Pro Phe Glu Lys Ile Pro Ser Pro Leu
385                 390                 395                 400

Arg Lys Gly Leu Gly Lys Leu Ser Lys Val Leu Pro Asp Gly Met Lys
                405                 410                 415

Gly Lys Ser Leu Leu Glu Arg Gly Ser Met Thr Met Glu Glu Arg Tyr
            420                 425                 430

Tyr Gly Asn Ala Arg Ser Phe Asn Phe Glu Gln Met Gln Arg Val Ile
        435                 440                 445

Pro Trp Ala Lys Arg Glu Trp Asp His Arg Glu Val Thr Ala Pro Ile
    450                 455                 460

Tyr Ala Gln Ser Arg Asn Phe Asp Pro Val Ala Arg Met Gln His Leu
465                 470                 475                 480

Asp Leu Phe Thr Trp Met Arg Gly Asp Ile Leu Val Lys Ala Asp Lys
                485                 490                 495

Ile Asn Met Ala Asn Ser Leu Glu Leu Arg Val Pro Phe Leu Asp Lys
            500                 505                 510

Glu Val Phe Lys Val Ala Glu Thr Ile Pro Tyr Asp Leu Lys Ile Ala
        515                 520                 525

Asn Gly Thr Thr Lys Tyr Ala Leu Arg Arg Ala Leu Glu Gln Ile Val
    530                 535                 540

Pro Pro His Val Leu His Arg Lys Lys Leu Gly Phe Pro Val Pro Met
545                 550                 555                 560

Arg His Trp Leu Ala Gly Asp Glu Leu Phe Gly Trp Ala Gln Asp Thr
                565                 570                 575

Ile Lys Glu Ser Gly Thr Glu Asp Ile Phe Asn Lys Gln Ala Val Leu
            580                 585                 590

Asp Met Leu Asn Glu His Arg Asp Gly Val Ser Asp His Ser Arg Arg
        595                 600                 605

Leu Trp Thr Val Leu Ser Phe Met Val Trp His Gly Ile Phe Val Glu
    610                 615                 620

Asn Arg Ile Asp Pro Gln Ile Glu Asp Arg Ser Tyr Pro Val Glu Leu
625                 630                 635                 640
```

<210> 133
<211> 1173
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>

<221> CDS
<222> (1)..(1173)
<223> RXA02157W

<400> 133

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atg agc acg ctg gaa act tgg cca cag gtc att att aat acg tac ggc   48
Met Ser Thr Leu Glu Thr Trp Pro Gln Val Ile Ile Asn Thr Tyr Gly
  1               5                  10                  15

acc cca cca gtt gag ctg gtg tcc ggc aag ggc gca acc gtc act gat   96
Thr Pro Pro Val Glu Leu Val Ser Gly Lys Gly Ala Thr Val Thr Asp
             20                  25                  30

gac cag ggc aat gtc tac atc gac ttg ctc gcg ggc atc gca gtc aac   144
Asp Gln Gly Asn Val Tyr Ile Asp Leu Leu Ala Gly Ile Ala Val Asn
         35                  40                  45

gcg ttg ggc cac gcc cac ccg gcg atc atc gag gcg gtc acc aac cag   192
Ala Leu Gly His Ala His Pro Ala Ile Ile Glu Ala Val Thr Asn Gln
     50                  55                  60

atc ggc caa ctt ggt cac gtc tca aac ttg ttc gca tcc agg ccc gtc   240
Ile Gly Gln Leu Gly His Val Ser Asn Leu Phe Ala Ser Arg Pro Val
 65                  70                  75                  80

gtc gag gtc gcc gag gag ctc atc aag cgt ttt tcg ctt gac gac gcc   288
Val Glu Val Ala Glu Glu Leu Ile Lys Arg Phe Ser Leu Asp Asp Ala
                 85                  90                  95

acc ctc gcc gcg caa acc cgg gtt ttc ttc tgc aac tcg ggc gcc gaa   336
Thr Leu Ala Ala Gln Thr Arg Val Phe Phe Cys Asn Ser Gly Ala Glu
            100                 105                 110

gca aac gag gct gct ttc aag att gca cgc ttg act ggt cgt tcc cgg   384
Ala Asn Glu Ala Ala Phe Lys Ile Ala Arg Leu Thr Gly Arg Ser Arg
        115                 120                 125

att ctg gct gca gtt cat ggt ttc cac ggc cgc acc atg ggt tcc ctc   432
Ile Leu Ala Ala Val His Gly Phe His Gly Arg Thr Met Gly Ser Leu
    130                 135                 140

gcg ctg act ggc cag cca gac aag cgt gaa gcg ttc ctg cca atg cca   480
Ala Leu Thr Gly Gln Pro Asp Lys Arg Glu Ala Phe Leu Pro Met Pro
145                 150                 155                 160

agc ggt gtg gag ttc tac cct tac ggc gac acc gat tac ttg cgc aaa   528
Ser Gly Val Glu Phe Tyr Pro Tyr Gly Asp Thr Asp Tyr Leu Arg Lys
                165                 170                 175

atg gta gaa acc aac cca acg gat gtg gct gct atc ttc ctc gag cca   576
Met Val Glu Thr Asn Pro Thr Asp Val Ala Ala Ile Phe Leu Glu Pro
            180                 185                 190

atc cag ggt gaa acg ggc gtt gtt cca gca cct gaa gga ttc ctc aag   624
Ile Gln Gly Glu Thr Gly Val Val Pro Ala Pro Glu Gly Phe Leu Lys
        195                 200                 205

gca gtg cgc gag ctg tgc gat gag tac ggc atc ttg atg atc acc gat   672
Ala Val Arg Glu Leu Cys Asp Glu Tyr Gly Ile Leu Met Ile Thr Asp
```

```
    210                 215                 220

gaa gtc cag act ggc gtt ggc cgt acc ggc gat ttc ttt gca cat cag   720
Glu Val Gln Thr Gly Val Gly Arg Thr Gly Asp Phe Phe Ala His Gln
225                 230                 235                 240

cac gat ggc gtt gtt ccc gat gtg gtg acc atg gcc aag gga ctt ggc   768
His Asp Gly Val Val Pro Asp Val Val Thr Met Ala Lys Gly Leu Gly
                245                 250                 255

ggc ggt ctt ccc atc ggt gct tgt ttg gcc act ggc cgt gca gct gaa   816
Gly Gly Leu Pro Ile Gly Ala Cys Leu Ala Thr Gly Arg Ala Ala Glu
            260                 265                 270

ttg atg acc cca ggc aag cac ggc acc act ttc ggt ggc aac cca gtt   864
Leu Met Thr Pro Gly Lys His Gly Thr Thr Phe Gly Gly Asn Pro Val
        275                 280                 285

gct tgt gca gct gcc aag gca gtg ctg tct gtt gtc gat gac gct ttc   912
Ala Cys Ala Ala Ala Lys Ala Val Leu Ser Val Val Asp Asp Ala Phe
    290                 295                 300


tgc gca gaa gtt gcc cgc aag ggc gag ctg ttc aag gaa ctt ctt gcc   960
Cys Ala Glu Val Ala Arg Lys Gly Glu Leu Phe Lys Glu Leu Leu Ala
305                 310                 315                 320

aag gtt gac ggc gtt gta gac gtc cgt ggc agg ggc ttg atg ttg ggc   1008
Lys Val Asp Gly Val Val Asp Val Arg Gly Arg Gly Leu Met Leu Gly
                325                 330                 335

gtg gtg ctg gag cgc gac gtc gca aag caa gct gtt ctt gat ggt ttt   1056
Val Val Leu Glu Arg Asp Val Ala Lys Gln Ala Val Leu Asp Gly Phe
            340                 345                 350

aag cac ggc gtt att ttg aat gca ccg gcg gac aac att atc cgt ttg   1104
Lys His Gly Val Ile Leu Asn Ala Pro Ala Asp Asn Ile Ile Arg Leu
        355                 360                 365

acc ccg ccg ctg gtg atc acc gac gaa gaa atc gca gac gca gtc aag   1152
Thr Pro Pro Leu Val Ile Thr Asp Glu Glu Ile Ala Asp Ala Val Lys
    370                 375                 380

gct att gcc gag aca atc gca                                     1173
Ala Ile Ala Glu Thr Ile Ala
385                 390
```

<210> 134
<211> 391
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 134

```
Met Ser Thr Leu Glu Thr Trp Pro Gln Val Ile Ile Asn Thr Tyr Gly
  1               5                  10                  15

Thr Pro Pro Val Glu Leu Val Ser Gly Lys Gly Ala Thr Val Thr Asp
```

```
            20                  25                  30

Asp Gln Gly Asn Val Tyr Ile Asp Leu Leu Ala Gly Ile Ala Val Asn
         35                  40                  45

Ala Leu Gly His Ala His Pro Ala Ile Ile Glu Ala Val Thr Asn Gln
     50                  55                  60

Ile Gly Gln Leu Gly His Val Ser Asn Leu Phe Ala Ser Arg Pro Val
 65                  70                  75                  80

Val Glu Val Ala Glu Glu Leu Ile Lys Arg Phe Ser Leu Asp Asp Ala
                 85                  90                  95

Thr Leu Ala Ala Gln Thr Arg Val Phe Phe Cys Asn Ser Gly Ala Glu
            100                 105                 110

Ala Asn Glu Ala Ala Phe Lys Ile Ala Arg Leu Thr Gly Arg Ser Arg
        115                 120                 125

Ile Leu Ala Ala Val His Gly Phe His Gly Arg Thr Met Gly Ser Leu
    130                 135                 140

Ala Leu Thr Gly Gln Pro Asp Lys Arg Glu Ala Phe Leu Pro Met Pro
145                 150                 155                 160

Ser Gly Val Glu Phe Tyr Pro Tyr Gly Asp Thr Asp Tyr Leu Arg Lys
                165                 170                 175

Met Val Glu Thr Asn Pro Thr Asp Val Ala Ala Ile Phe Leu Glu Pro
            180                 185                 190

Ile Gln Gly Glu Thr Gly Val Val Pro Ala Pro Glu Gly Phe Leu Lys
        195                 200                 205

Ala Val Arg Glu Leu Cys Asp Glu Tyr Gly Ile Leu Met Ile Thr Asp
    210                 215                 220

Glu Val Gln Thr Gly Val Gly Arg Thr Gly Asp Phe Phe Ala His Gln
225                 230                 235                 240

His Asp Gly Val Val Pro Asp Val Val Thr Met Ala Lys Gly Leu Gly
                245                 250                 255

Gly Gly Leu Pro Ile Gly Ala Cys Leu Ala Thr Gly Arg Ala Ala Glu
            260                 265                 270

Leu Met Thr Pro Gly Lys His Gly Thr Thr Phe Gly Gly Asn Pro Val
        275                 280                 285

Ala Cys Ala Ala Ala Lys Ala Val Leu Ser Val Val Asp Asp Ala Phe
    290                 295                 300

Cys Ala Glu Val Ala Arg Lys Gly Glu Leu Phe Lys Glu Leu Leu Ala
305                 310                 315                 320

Lys Val Asp Gly Val Val Asp Val Arg Gly Arg Gly Leu Met Leu Gly
                325                 330                 335
```

```
Val Val Leu Glu Arg Asp Val Ala Lys Gln Ala Val Leu Asp Gly Phe
            340                 345                 350

Lys His Gly Val Ile Leu Asn Ala Pro Ala Asp Asn Ile Ile Arg Leu
        355                 360                 365

Thr Pro Pro Leu Val Ile Thr Asp Glu Glu Ile Ala Asp Ala Val Lys
    370                 375                 380

Ala Ile Ala Glu Thr Ile Ala
385                 390
```

<210> 135
<211> 831
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(831)
<223> RXA02229K

<400> 135

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gtg aat ttg acc atc ccc ttt gcc aaa ggc cac gcc acc gaa aac gac   48
Met Asn Leu Thr Ile Pro Phe Ala Lys Gly His Ala Thr Glu Asn Asp
  1               5                  10                  15

ttc atc atc atc ccc gat gag gat gcg cgc cta gat tta act cca gaa   96
Phe Ile Ile Ile Pro Asp Glu Asp Ala Arg Leu Asp Leu Thr Pro Glu
             20                  25                  30

atg gtg gtc acg ctg tgt gac cgc cgc gcc ggg atc ggt gct gat ggt   144
Met Val Val Thr Leu Cys Asp Arg Arg Ala Gly Ile Gly Ala Asp Gly
         35                  40                  45

atc ctc cgc gtg gtt aaa gct gca gac gta gaa ggc tcc acg gtc gac   192

Ile Leu Arg Val Val Lys Ala Ala Asp Val Glu Gly Ser Thr Val Asp
     50                  55                  60

cca tcg ctg tgg ttc atg gat tac cgc aac gcc gat gga tct ttg gct   240
Pro Ser Leu Trp Phe Met Asp Tyr Arg Asn Ala Asp Gly Ser Leu Ala
 65                  70                  75                  80

gaa atg tgc ggc aat ggt gtg cgc ctg ttc gcg cac tgg ctg tac tcc   288
Glu Met Cys Gly Asn Gly Val Arg Leu Phe Ala His Trp Leu Tyr Ser
                 85                  90                  95

cgc ggt ctt gtt gat aat acg agc ttt gat atc ggt acc cgc gcc ggt   336
Arg Gly Leu Val Asp Asn Thr Ser Phe Asp Ile Gly Thr Arg Ala Gly
            100                 105                 110

gtc cgc cac gtt gat att ttg cag gca gat caa cat tct gcg cag gtc   384
Val Arg His Val Asp Ile Leu Gln Ala Asp Gln His Ser Ala Gln Val
        115                 120                 125

cgc gtt gat atg ggc atc cct gac gtc acg gga tta tcc acc tgc gac   432
Arg Val Asp Met Gly Ile Pro Asp Val Thr Gly Leu Ser Thr Cys Asp
```

```
    130                 135                 140

atc aac ggc caa gta ttc gct ggc ctt ggc gtt gat atg ggt aac cca   480
Ile Asn Gly Gln Val Phe Ala Gly Leu Gly Val Asp Met Gly Asn Pro
145                 150                 155                 160

cac cta gcg tgc gtt gtg ccg ggc tta agt gcg tcg gct ctt gcc gat   528
His Leu Ala Cys Val Val Pro Gly Leu Ser Ala Ser Ala Leu Ala Asp
                165                 170                 175

atg gaa ctg cgc gca cct acg ttt gat cag gaa ttc ttc ccc cac ggt   576
Met Glu Leu Arg Ala Pro Thr Phe Asp Gln Glu Phe Phe Pro His Gly
            180                 185                 190

gtg aac gta gaa atc gtc aca gaa tta gaa gat gac gca gta tcg atg   624
Val Asn Val Glu Ile Val Thr Glu Leu Glu Asp Asp Ala Val Ser Met
        195                 200                 205

cgc gtg tgg gaa cgc gga gtg ggc gaa acc cgc tcc tgt ggc acg gga   672
Arg Val Trp Glu Arg Gly Val Gly Glu Thr Arg Ser Cys Gly Thr Gly
    210                 215                 220

acc gtt gct gca gcg tgt gct gct tta gct gat gct gga ttg gga gaa   720
Thr Val Ala Ala Ala Cys Ala Ala Leu Ala Asp Ala Gly Leu Gly Glu
225                 230                 235                 240

ggc aca gtt aaa gtg tgc gtt cca ggt ggg gaa gta gaa gtc cag atc   768
Gly Thr Val Lys Val Cys Val Pro Gly Gly Glu Val Glu Val Gln Ile
                245                 250                 255

ttt gac gac ggc tcc aca ctc acc ggc cca agc gcc atc atc gca ctc   816
Phe Asp Asp Gly Ser Thr Leu Thr Gly Pro Ser Ala Ile Ile Ala Leu
            260                 265                 270

ggt gag gtg cag atc                                              831
Gly Glu Val Gln Ile
        275
```

<210> 136
<211> 277
<212> PRT
<213> 麩胺酸棒狀桿菌

<400> 136

```
Met Asn Leu Thr Ile Pro Phe Ala Lys Gly His Ala Thr Glu Asn Asp
  1               5                  10                  15

Phe Ile Ile Ile Pro Asp Glu Asp Ala Arg Leu Asp Leu Thr Pro Glu
             20                  25                  30

Met Val Val Thr Leu Cys Asp Arg Arg Ala Gly Ile Gly Ala Asp Gly
         35                  40                  45

Ile Leu Arg Val Val Lys Ala Ala Asp Val Glu Gly Ser Thr Val Asp
     50                  55                  60

Pro Ser Leu Trp Phe Met Asp Tyr Arg Asn Ala Asp Gly Ser Leu Ala
```

```
 65                  70                  75                  80

Glu Met Cys Gly Asn Gly Val Arg Leu Phe Ala His Trp Leu Tyr Ser
                 85                  90                  95

Arg Gly Leu Val Asp Asn Thr Ser Phe Asp Ile Gly Thr Arg Ala Gly
            100                 105                 110

Val Arg His Val Asp Ile Leu Gln Ala Asp Gln His Ser Ala Gln Val
        115                 120                 125

Arg Val Asp Met Gly Ile Pro Asp Val Thr Gly Leu Ser Thr Cys Asp
    130                 135                 140

Ile Asn Gly Gln Val Phe Ala Gly Leu Gly Val Asp Met Gly Asn Pro
145                 150                 155                 160

His Leu Ala Cys Val Val Pro Gly Leu Ser Ala Ser Ala Leu Ala Asp
                165                 170                 175

Met Glu Leu Arg Ala Pro Thr Phe Asp Gln Glu Phe Phe Pro His Gly
            180                 185                 190

Val Asn Val Glu Ile Val Thr Glu Leu Glu Asp Asp Ala Val Ser Met
        195                 200                 205

Arg Val Trp Glu Arg Gly Val Gly Glu Thr Arg Ser Cys Gly Thr Gly
    210                 215                 220

Thr Val Ala Ala Ala Cys Ala Ala Leu Ala Asp Ala Gly Leu Gly Glu
225                 230                 235                 240

Gly Thr Val Lys Val Cys Val Pro Gly Gly Glu Val Glu Val Gln Ile
                245                 250                 255

Phe Asp Asp Gly Ser Thr Leu Thr Gly Pro Ser Ala Ile Ile Ala Leu
            260                 265                 270

Gly Glu Val Gln Ile
        275
```

<210> 137
<211> 2823
<212> DNA
<213> 麩胺酸棒狀桿菌

<220>
<221> CDS
<222> (1)..(2823)
<223> RXA02259E

<400> 137

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ttg ctg ggt gat ttt tta tct cat gca cgc caa cac cct caa tgt gaa   48

Met Leu Gly Asp Phe Leu Ser His Ala Arg Gln His Pro Gln Cys Glu
  1               5                  10                  15

aga gtg ttt aaa gta gtt atg act gat ttt tta cgc gat gac atc agg   96
```

```
Arg Val Phe Lys Val Val Met Thr Asp Phe Leu Arg Asp Asp Ile Arg
             20                  25                  30

ttc ctc ggt caa atc ctc ggt gag gta att gcg gaa caa gaa ggc cag   144
Phe Leu Gly Gln Ile Leu Gly Glu Val Ile Ala Glu Gln Glu Gly Gln
         35                  40                  45

gag gtt tat gaa ctg gtc gaa caa gcg cgc ctg act tct ttt gat atc   192
Glu Val Tyr Glu Leu Val Glu Gln Ala Arg Leu Thr Ser Phe Asp Ile
     50                  55                  60

gcc aag ggc aac gcc gaa atg gat agc ctg gtt cag gtt ttc gac ggc   240
Ala Lys Gly Asn Ala Glu Met Asp Ser Leu Val Gln Val Phe Asp Gly
 65                  70                  75                  80

att act cca gcc aag gca aca ccg att gct cgc gca ttt tcc cac ttc   288

Ile Thr Pro Ala Lys Ala Thr Pro Ile Ala Arg Ala Phe Ser His Phe
                85                  90                  95

gct ctg ctg gct aac ctg gcg gaa gac ctc tac gat gaa gag ctt cgt   336
Ala Leu Leu Ala Asn Leu Ala Glu Asp Leu Tyr Asp Glu Glu Leu Arg
            100                 105                 110

gaa cag gct ctc gat gca ggc gac acc cct ccg gac agc act ctt gat   384
Glu Gln Ala Leu Asp Ala Gly Asp Thr Pro Pro Asp Ser Thr Leu Asp
        115                 120                 125

gcc acc tgg ctg aaa ctc aat gag ggc aat gtt ggc gca gaa gct gtg   432
Ala Thr Trp Leu Lys Leu Asn Glu Gly Asn Val Gly Ala Glu Ala Val
    130                 135                 140

gcc gat gtg ctg cgc aat gct gag gtg gcg ccg gtt ctg act gcg cac   480
Ala Asp Val Leu Arg Asn Ala Glu Val Ala Pro Val Leu Thr Ala His
145                 150                 155                 160

cca act gag act cgc cgc cgc act gtt ttt gat gcg caa aag tgg atc   528
Pro Thr Glu Thr Arg Arg Arg Thr Val Phe Asp Ala Gln Lys Trp Ile
                165                 170                 175

acc acc cac atg cgt gaa cgc cac gct ttg cag tct gcg gag cct acc   576
Thr Thr His Met Arg Glu Arg His Ala Leu Gln Ser Ala Glu Pro Thr
            180                 185                 190

gct cgt acg caa agc aag ttg gat gag atc gag aag aac atc cgc cgt   624
Ala Arg Thr Gln Ser Lys Leu Asp Glu Ile Glu Lys Asn Ile Arg Arg
        195                 200                 205

cgc atc acc att ttg tgg cag acc gcg ttg att cgt gtg gcc cgc cca   672
Arg Ile Thr Ile Leu Trp Gln Thr Ala Leu Ile Arg Val Ala Arg Pro
    210                 215                 220

cgt atc gag gac gag atc gaa gta ggg ctg cgc tac tac aag ctg agc   720
Arg Ile Glu Asp Glu Ile Glu Val Gly Leu Arg Tyr Tyr Lys Leu Ser
225                 230                 235                 240

ctt ttg gaa gag att cca cgt atc aac cgt gat gtg gct gtt gag ctt   768
Leu Leu Glu Glu Ile Pro Arg Ile Asn Arg Asp Val Ala Val Glu Leu
                245                 250                 255
```

```
cgt gag cgt ttc ggc gag ggt gtt cct ttg aag ccc gtg gtc aag cca   816
Arg Glu Arg Phe Gly Glu Gly Val Pro Leu Lys Pro Val Val Lys Pro
            260                 265                 270

ggt tcc tgg att ggt gga gac cac gac ggt aac cct tat gtc acc gcg   864
Gly Ser Trp Ile Gly Gly Asp His Asp Gly Asn Pro Tyr Val Thr Ala
        275                 280                 285

gaa aca gtt gag tat tcc act cac cgc gct gcg gaa acc gtg ctc aag   912
Glu Thr Val Glu Tyr Ser Thr His Arg Ala Ala Glu Thr Val Leu Lys
    290                 295                 300

tac tat gca cgc cag ctg cat tcc ctc gag cat gag ctc agc ctg tcg   960
Tyr Tyr Ala Arg Gln Leu His Ser Leu Glu His Glu Leu Ser Leu Ser
305                 310                 315                 320

gac cgc atg aat aag gtc acc ccg cag ctg ctt gcg ctg gca gat gca   1008
Asp Arg Met Asn Lys Val Thr Pro Gln Leu Leu Ala Leu Ala Asp Ala
                325                 330                 335

ggg cac aac gac gtg cca agc cgc gtg gat gag cct tat cga cgc gcc   1056
Gly His Asn Asp Val Pro Ser Arg Val Asp Glu Pro Tyr Arg Arg Ala
            340                 345                 350

gtc cat ggc gtt cgc gga cgt atc ctc gcg acg acg gcc gag ctg atc   1104
Val His Gly Val Arg Gly Arg Ile Leu Ala Thr Thr Ala Glu Leu Ile
        355                 360                 365

ggc gag gac gcc gtt gag ggc gtg tgg ttc aag gtc ttt act cca tac   1152
Gly Glu Asp Ala Val Glu Gly Val Trp Phe Lys Val Phe Thr Pro Tyr
    370                 375                 380

gca tct ccg gaa gaa ttc tta aac gat gcg ttg acc att gat cat tct   1200
Ala Ser Pro Glu Glu Phe Leu Asn Asp Ala Leu Thr Ile Asp His Ser
385                 390                 395                 400

ctg cgt gaa tcc aag gac gtt ctc att gcc gat gat cgt ttg tct gtg   1248
Leu Arg Glu Ser Lys Asp Val Leu Ile Ala Asp Asp Arg Leu Ser Val
                405                 410                 415

ctg att tct gcc atc gag agc ttt gga ttc aac ctt tac gca ctg gat   1296
Leu Ile Ser Ala Ile Glu Ser Phe Gly Phe Asn Leu Tyr Ala Leu Asp
            420                 425                 430

ctg cgc caa aac tcc gaa agc tac gag gac gtc ctc acc gag ctt ttc   1344
Leu Arg Gln Asn Ser Glu Ser Tyr Glu Asp Val Leu Thr Glu Leu Phe
        435                 440                 445

gaa cgc gcc caa gtc acc gca aac tac cgc gag ctg tct gaa gca gag   1392
Glu Arg Ala Gln Val Thr Ala Asn Tyr Arg Glu Leu Ser Glu Ala Glu
    450                 455                 460

aag ctt gag gtg ctg ctg aag gaa ctg cgc agc cct cgt ccg ctg atc   1440
Lys Leu Glu Val Leu Leu Lys Glu Leu Arg Ser Pro Arg Pro Leu Ile
465                 470                 475                 480

ccg cac ggt tca gat gaa tac agc gag gtc acc gac cgc gag ctc ggc   1488
Pro His Gly Ser Asp Glu Tyr Ser Glu Val Thr Asp Arg Glu Leu Gly
```

```
                485                 490                 495

atc ttc cgc acc gcg tcg gag gct gtt aag aaa ttc ggg cca cgg atg   1536
Ile Phe Arg Thr Ala Ser Glu Ala Val Lys Lys Phe Gly Pro Arg Met
            500                 505                 510

gtg cct cac tgc atc atc tcc atg gca tca tcg gtc acc gat gtg ctc   1584
Val Pro His Cys Ile Ile Ser Met Ala Ser Ser Val Thr Asp Val Leu
        515                 520                 525

gag ccg atg gtg ttg ctc aag gaa ttc gga ctc atc gca gcc aac ggc   1632
Glu Pro Met Val Leu Leu Lys Glu Phe Gly Leu Ile Ala Ala Asn Gly
    530                 535                 540


gac aac cca cgc ggc acc gtc gat gtc atc cca ctg ttc gaa acc atc   1680
Asp Asn Pro Arg Gly Thr Val Asp Val Ile Pro Leu Phe Glu Thr Ile
545                 550                 555                 560

gaa gat ctc cag gcc ggc gcc gga atc ctc gac gaa ctg tgg aaa att   1728
Glu Asp Leu Gln Ala Gly Ala Gly Ile Leu Asp Glu Leu Trp Lys Ile
                565                 570                 575

gat ctc tac cgc aac tac ctc ctg cag cgc gac aac gtc cag gaa gtc   1776
Asp Leu Tyr Arg Asn Tyr Leu Leu Gln Arg Asp Asn Val Gln Glu Val
            580                 585                 590

atg ctc ggt tac tcc gat tcc aac aag gat ggc gga tat ttc tcc gca   1824
Met Leu Gly Tyr Ser Asp Ser Asn Lys Asp Gly Gly Tyr Phe Ser Ala
        595                 600                 605

aac tgg gcg ctt tac gac gcg gaa ctg cag ctc gtc gaa cta tgc cga   1872
Asn Trp Ala Leu Tyr Asp Ala Glu Leu Gln Leu Val Glu Leu Cys Arg
    610                 615                 620

tca gcc ggg gtc aag ctt cgc ctg ttc cac ggc cgt ggt ggc acc gtc   1920
Ser Ala Gly Val Lys Leu Arg Leu Phe His Gly Arg Gly Gly Thr Val
625                 630                 635                 640

ggc cgc ggt ggc gga cct tcc tac gac gcg att ctt gcc cag ccc agg   1968
Gly Arg Gly Gly Gly Pro Ser Tyr Asp Ala Ile Leu Ala Gln Pro Arg
                645                 650                 655

ggg gct gtc caa ggt tcc gtg cgc atc acc gag cag ggc gag atc atc   2016
Gly Ala Val Gln Gly Ser Val Arg Ile Thr Glu Gln Gly Glu Ile Ile
            660                 665                 670

tcc gct aag tac ggc aac ccc gaa acc gcg cgc cga aac ctc gaa gcc   2064
Ser Ala Lys Tyr Gly Asn Pro Glu Thr Ala Arg Arg Asn Leu Glu Ala
        675                 680                 685

ctg gtc tca gcc acg ctt gag gca tcg ctt ctc gac gtc tcc gaa ctc   2112
Leu Val Ser Ala Thr Leu Glu Ala Ser Leu Leu Asp Val Ser Glu Leu
    690                 695                 700

acc gat cac caa cgc gcg tac gac atc atg agt gag atc tct gag ctc   2160
Thr Asp His Gln Arg Ala Tyr Asp Ile Met Ser Glu Ile Ser Glu Leu
705                 710                 715                 720
```

```
agc ttg aag aag tac gcc tcc ttg gtg cac gag gat caa ggc ttc atc   2208
Ser Leu Lys Lys Tyr Ala Ser Leu Val His Glu Asp Gln Gly Phe Ile
                725                 730                 735

gat tac ttc acc cag tcc acg ccg ctg cag gag att gga tcc ctc aac   2256
Asp Tyr Phe Thr Gln Ser Thr Pro Leu Gln Glu Ile Gly Ser Leu Asn
            740                 745                 750

atc gga tcc agg cct tcc tca cgc aag cag acc tcc tcg gtg gaa gat   2304
Ile Gly Ser Arg Pro Ser Ser Arg Lys Gln Thr Ser Ser Val Glu Asp

        755                 760                 765

ttg cga gcc atc cca tgg gtg ctc agc tgg tca cag tct cgt gtc atg   2352
Leu Arg Ala Ile Pro Trp Val Leu Ser Trp Ser Gln Ser Arg Val Met
    770                 775                 780

ctg cca ggc tgg ttt ggt gtc gga acc gca tta gag cag tgg att ggc   2400
Leu Pro Gly Trp Phe Gly Val Gly Thr Ala Leu Glu Gln Trp Ile Gly
785                 790                 795                 800

gaa ggg gag cag gcc acc caa cgc att gcc gag ctg caa aca ctc aat   2448
Glu Gly Glu Gln Ala Thr Gln Arg Ile Ala Glu Leu Gln Thr Leu Asn
                805                 810                 815

gag tcc tgg cca ttt ttc acc tca gtg ttg gat aac atg gct cag gtg   2496
Glu Ser Trp Pro Phe Phe Thr Ser Val Leu Asp Asn Met Ala Gln Val
            820                 825                 830

atg tcc aag gca gag ctg cgt ttg gca aag ctc tac gca gac ctg atc   2544
Met Ser Lys Ala Glu Leu Arg Leu Ala Lys Leu Tyr Ala Asp Leu Ile
        835                 840                 845

cca gat acg gaa gta gcc gag cga gtc tat tcc gtc atc cgc gag gag   2592
Pro Asp Thr Glu Val Ala Glu Arg Val Tyr Ser Val Ile Arg Glu Glu
    850                 855                 860

tac ttc ctg acc aag aag atg ttc tgc gta atc acc ggc tct gat gat   2640
Tyr Phe Leu Thr Lys Lys Met Phe Cys Val Ile Thr Gly Ser Asp Asp
865                 870                 875                 880

ctg ctt gat gac aac cca ctt ctc gca cgc tct gtc cag cgc cga tac   2688
Leu Leu Asp Asp Asn Pro Leu Leu Ala Arg Ser Val Gln Arg Arg Tyr
                885                 890                 895

ccc tac ctg ctt cca ctc aac gtg atc cag gta gag atg atg cga cgc   2736
Pro Tyr Leu Leu Pro Leu Asn Val Ile Gln Val Glu Met Met Arg Arg
            900                 905                 910

tac cga aaa ggc gac caa agc gag caa gtg tcc cgc aac att cag ctg   2784
Tyr Arg Lys Gly Asp Gln Ser Glu Gln Val Ser Arg Asn Ile Gln Leu
        915                 920                 925

acc atg aac ggt ctt tcc act gcg ctg cgc aac tcc ggc               2823
Thr Met Asn Gly Leu Ser Thr Ala Leu Arg Asn Ser Gly
    930                 935                 940
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Met Leu Gly Asp Phe Leu Ser His Ala Arg Gln His Pro Gln Cys Glu
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Arg Val Phe Lys Val Val Met Thr Asp Phe Leu Arg Asp Asp Ile Arg
             20                  25                  30

Phe Leu Gly Gln Ile Leu Gly Glu Val Ile Ala Glu Gln Glu Gly Gln
         35                  40                  45

Glu Val Tyr Glu Leu Val Glu Gln Ala Arg Leu Thr Ser Phe Asp Ile
     50                  55                  60

Ala Lys Gly Asn Ala Glu Met Asp Ser Leu Val Gln Val Phe Asp Gly
 65                  70                  75                  80

Ile Thr Pro Ala Lys Ala Thr Pro Ile Ala Arg Ala Phe Ser His Phe
                 85                  90                  95

Ala Leu Leu Ala Asn Leu Ala Glu Asp Leu Tyr Asp Glu Glu Leu Arg
            100                 105                 110

Glu Gln Ala Leu Asp Ala Gly Asp Thr Pro Pro Asp Ser Thr Leu Asp
        115                 120                 125

Ala Thr Trp Leu Lys Leu Asn Glu Gly Asn Val Gly Ala Glu Ala Val
    130                 135                 140

Ala Asp Val Leu Arg Asn Ala Glu Val Ala Pro Val Leu Thr Ala His
145                 150                 155                 160

Pro Thr Glu Thr Arg Arg Arg Thr Val Phe Asp Ala Gln Lys Trp Ile
                165                 170                 175

Thr Thr His Met Arg Glu Arg His Ala Leu Gln Ser Ala Glu Pro Thr
            180                 185                 190

Ala Arg Thr Gln Ser Lys Leu Asp Glu Ile Glu Lys Asn Ile Arg Arg
        195                 200                 205

Arg Ile Thr Ile Leu Trp Gln Thr Ala Leu Ile Arg Val Ala Arg Pro
    210                 215                 220

Arg Ile Glu Asp Glu Ile Glu Val Gly Leu Arg Tyr Tyr Lys Leu Ser
225                 230                 235                 240

Leu Leu Glu Glu Ile Pro Arg Ile Asn Arg Asp Val Ala Val Glu Leu
                245                 250                 255

Arg Glu Arg Phe Gly Glu Gly Val Pro Leu Lys Pro Val Val Lys Pro
            260                 265                 270

Gly Ser Trp Ile Gly Gly Asp His Asp Gly Asn Pro Tyr Val Thr Ala
        275                 280                 285
```

```
Glu Thr Val Glu Tyr Ser Thr His Arg Ala Ala Glu Thr Val Leu Lys
    290                 295                 300

Tyr Tyr Ala Arg Gln Leu His Ser Leu Glu His Glu Leu Ser Leu Ser
305                 310                 315                 320

Asp Arg Met Asn Lys Val Thr Pro Gln Leu Leu Ala Leu Ala Asp Ala
                325                 330                 335

Gly His Asn Asp Val Pro Ser Arg Val Asp Glu Pro Tyr Arg Arg Ala
            340                 345                 350

Val His Gly Val Arg Gly Arg Ile Leu Ala Thr Thr Ala Glu Leu Ile
        355                 360                 365

Gly Glu Asp Ala Val Glu Gly Val Trp Phe Lys Val Phe Thr Pro Tyr
    370                 375                 380

Ala Ser Pro Glu Glu Phe Leu Asn Asp Ala Leu Thr Ile Asp His Ser
385                 390                 395                 400

Leu Arg Glu Ser Lys Asp Val Leu Ile Ala Asp Asp Arg Leu Ser Val
                405                 410                 415

Leu Ile Ser Ala Ile Glu Ser Phe Gly Phe Asn Leu Tyr Ala Leu Asp
            420                 425                 430

Leu Arg Gln Asn Ser Glu Ser Tyr Glu Asp Val Leu Thr Glu Leu Phe
        435                 440                 445

Glu Arg Ala Gln Val Thr Ala Asn Tyr Arg Glu Leu Ser Glu Ala Glu
    450                 455                 460

Lys Leu Glu Val Leu Leu Lys Glu Leu Arg Ser Pro Arg Pro Leu Ile
465                 470                 475                 480


Pro His Gly Ser Asp Glu Tyr Ser Glu Val Thr Asp Arg Glu Leu Gly
                485                 490                 495

Ile Phe Arg Thr Ala Ser Glu Ala Val Lys Lys Phe Gly Pro Arg Met
            500                 505                 510

Val Pro His Cys Ile Ile Ser Met Ala Ser Ser Val Thr Asp Val Leu
        515                 520                 525

Glu Pro Met Val Leu Leu Lys Glu Phe Gly Leu Ile Ala Ala Asn Gly
    530                 535                 540

Asp Asn Pro Arg Gly Thr Val Asp Val Ile Pro Leu Phe Glu Thr Ile
545                 550                 555                 560

Glu Asp Leu Gln Ala Gly Ala Gly Ile Leu Asp Glu Leu Trp Lys Ile
                565                 570                 575

Asp Leu Tyr Arg Asn Tyr Leu Leu Gln Arg Asp Asn Val Gln Glu Val
            580                 585                 590
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Met Leu Gly Tyr Ser Asp Ser Asn Lys Asp Gly Gly Tyr Phe Ser Ala
        595                 600                 605

Asn Trp Ala Leu Tyr Asp Ala Glu Leu Gln Leu Val Glu Leu Cys Arg
    610                 615                 620

Ser Ala Gly Val Lys Leu Arg Leu Phe His Gly Arg Gly Gly Thr Val
625                 630                 635                 640

Gly Arg Gly Gly Gly Pro Ser Tyr Asp Ala Ile Leu Ala Gln Pro Arg
                645                 650                 655

Gly Ala Val Gln Gly Ser Val Arg Ile Thr Glu Gln Gly Glu Ile Ile
            660                 665                 670

Ser Ala Lys Tyr Gly Asn Pro Glu Thr Ala Arg Arg Asn Leu Glu Ala
        675                 680                 685

Leu Val Ser Ala Thr Leu Glu Ala Ser Leu Leu Asp Val Ser Glu Leu
    690                 695                 700

Thr Asp His Gln Arg Ala Tyr Asp Ile Met Ser Glu Ile Ser Glu Leu
705                 710                 715                 720

Ser Leu Lys Lys Tyr Ala Ser Leu Val His Glu Asp Gln Gly Phe Ile
                725                 730                 735

Asp Tyr Phe Thr Gln Ser Thr Pro Leu Gln Glu Ile Gly Ser Leu Asn
            740                 745                 750

Ile Gly Ser Arg Pro Ser Ser Arg Lys Gln Thr Ser Ser Val Glu Asp
        755                 760                 765

Leu Arg Ala Ile Pro Trp Val Leu Ser Trp Ser Gln Ser Arg Val Met
    770                 775                 780

Leu Pro Gly Trp Phe Gly Val Gly Thr Ala Leu Glu Gln Trp Ile Gly
785                 790                 795                 800

Glu Gly Glu Gln Ala Thr Gln Arg Ile Ala Glu Leu Gln Thr Leu Asn
                805                 810                 815

Glu Ser Trp Pro Phe Phe Thr Ser Val Leu Asp Asn Met Ala Gln Val
            820                 825                 830

Met Ser Lys Ala Glu Leu Arg Leu Ala Lys Leu Tyr Ala Asp Leu Ile
        835                 840                 845

Pro Asp Thr Glu Val Ala Glu Arg Val Tyr Ser Val Ile Arg Glu Glu
    850                 855                 860

Tyr Phe Leu Thr Lys Lys Met Phe Cys Val Ile Thr Gly Ser Asp Asp
865                 870                 875                 880

Leu Leu Asp Asp Asn Pro Leu Leu Ala Arg Ser Val Gln Arg Arg Tyr
                885                 890                 895

Pro Tyr Leu Leu Pro Leu Asn Val Ile Gln Val Glu Met Met Arg Arg
            900                 905                 910
```

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Tyr Arg Lys Gly Asp Gln Ser Glu Gln Val Ser Arg Asn Ile Gln Leu
        915                 920                 925

Thr Met Asn Gly Leu Ser Thr Ala Leu Arg Asn Ser Gly
    930                 935                 940


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<223> RXA02259K

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Met Thr Asp Phe Leu Arg Asp Asp Ile Arg Phe Leu Gly Gln Ile Leu
  1               5                  10                  15

ggt gag gta att gcg gaa caa gaa ggc cag gag gtt tat gaa ctg gtc   96
Gly Glu Val Ile Ala Glu Gln Glu Gly Gln Glu Val Tyr Glu Leu Val
             20                  25                  30

gaa caa gcg cgc ctg act tct ttt gat atc gcc aag ggc aac gcc gaa   144
Glu Gln Ala Arg Leu Thr Ser Phe Asp Ile Ala Lys Gly Asn Ala Glu
         35                  40                  45

atg gat agc ctg gtt cag gtt ttc gac ggc att act cca gcc aag gca   192
Met Asp Ser Leu Val Gln Val Phe Asp Gly Ile Thr Pro Ala Lys Ala
     50                  55                  60

aca ccg att gct cgc gca ttt tcc cac ttc gct ctg ctg gct aac ctg   240
Thr Pro Ile Ala Arg Ala Phe Ser His Phe Ala Leu Leu Ala Asn Leu
 65                  70                  75                  80

gcg gaa gac ctc tac gat gaa gag ctt cgt gaa cag gct ctc gat gca   288
Ala Glu Asp Leu Tyr Asp Glu Glu Leu Arg Glu Gln Ala Leu Asp Ala
                 85                  90                  95

ggc gac acc cct ccg gac agc act ctt gat gcc acc tgg ctg aaa ctc   336
Gly Asp Thr Pro Pro Asp Ser Thr Leu Asp Ala Thr Trp Leu Lys Leu
            100                 105                 110

aat gag ggc aat gtt ggc gca gaa gct gtg gcc gat gtg ctg cgc aat   384
Asn Glu Gly Asn Val Gly Ala Glu Ala Val Ala Asp Val Leu Arg Asn
        115                 120                 125

gct gag gtg gcg ccg gtt ctg act gcg cac cca act gag act cgc cgc   432
Ala Glu Val Ala Pro Val Leu Thr Ala His Pro Thr Glu Thr Arg Arg
    130                 135                 140

cgc act gtt ttt gat gcg caa aag tgg atc acc acc cac atg cgt gaa   480
Arg Thr Val Phe Asp Ala Gln Lys Trp Ile Thr Thr His Met Arg Glu
145                 150                 155                 160
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cgc cac gct ttg cag tct gcg gag cct acc gct cgt acg caa agc aag   528
Arg His Ala Leu Gln Ser Ala Glu Pro Thr Ala Arg Thr Gln Ser Lys
                165                 170                 175

ttg gat gag atc gag aag aac atc cgc cgt cgc atc acc att ttg tgg   576
Leu Asp Glu Ile Glu Lys Asn Ile Arg Arg Arg Ile Thr Ile Leu Trp
            180                 185                 190

cag acc gcg ttg att cgt gtg gcc cgc cca cgt atc gag gac gag atc   624
Gln Thr Ala Leu Ile Arg Val Ala Arg Pro Arg Ile Glu Asp Glu Ile
        195                 200                 205

gaa gta ggg ctg cgc tac tac aag ctg agc ctt ttg gaa gag att cca   672
Glu Val Gly Leu Arg Tyr Tyr Lys Leu Ser Leu Leu Glu Glu Ile Pro
    210                 215                 220

cgt atc aac cgt gat gtg gct gtt gag ctt cgt gag cgt ttc ggc gag   720
Arg Ile Asn Arg Asp Val Ala Val Glu Leu Arg Glu Arg Phe Gly Glu
225                 230                 235                 240

ggt gtt cct ttg aag ccc gtg gtc aag cca ggt tcc tgg att ggt gga   768
Gly Val Pro Leu Lys Pro Val Val Lys Pro Gly Ser Trp Ile Gly Gly
                245                 250                 255

gac cac gac ggt aac cct tat gtc acc gcg gaa aca gtt gag tat tcc   816
Asp His Asp Gly Asn Pro Tyr Val Thr Ala Glu Thr Val Glu Tyr Ser
            260                 265                 270

act cac cgc gct gcg gaa acc gtg ctc aag tac tat gca cgc cag ctg   864
Thr His Arg Ala Ala Glu Thr Val Leu Lys Tyr Tyr Ala Arg Gln Leu
        275                 280                 285

cat tcc ctc gag cat gag ctc agc ctg tcg gac cgc atg aat aag gtc   912
His Ser Leu Glu His Glu Leu Ser Leu Ser Asp Arg Met Asn Lys Val
    290                 295                 300

acc ccg cag ctg ctt gcg ctg gca gat gca ggg cac aac gac gtg cca   960
Thr Pro Gln Leu Leu Ala Leu Ala Asp Ala Gly His Asn Asp Val Pro
305                 310                 315                 320

agc cgc gtg gat gag cct tat cga cgc gcc gtc cat ggc gtt cgc gga  1008
Ser Arg Val Asp Glu Pro Tyr Arg Arg Ala Val His Gly Val Arg Gly
                325                 330                 335

cgt atc ctc gcg acg acg gcc gag ctg atc ggc gag gac gcc gtt gag  1056
Arg Ile Leu Ala Thr Thr Ala Glu Leu Ile Gly Glu Asp Ala Val Glu
            340                 345                 350

ggc gtg tgg ttc aag gtc ttt act cca tac gca tct ccg gaa gaa ttc  1104
Gly Val Trp Phe Lys Val Phe Thr Pro Tyr Ala Ser Pro Glu Glu Phe
        355                 360                 365

tta aac gat gcg ttg acc att gat cat tct ctg cgt gaa tcc aag gac  1152
Leu Asn Asp Ala Leu Thr Ile Asp His Ser Leu Arg Glu Ser Lys Asp
    370                 375                 380

gtt ctc att gcc gat gat cgt ttg tct gtg ctg att tct gcc atc gag  1200
Val Leu Ile Ala Asp Asp Arg Leu Ser Val Leu Ile Ser Ala Ile Glu
385                 390                 395                 400
```

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agc ttt gga ttc aac ctt tac gca ctg gat ctg cgc caa aac tcc gaa   1248
Ser Phe Gly Phe Asn Leu Tyr Ala Leu Asp Leu Arg Gln Asn Ser Glu
                405                 410                 415

agc tac gag gac gtc ctc acc gag ctt ttc gaa cgc gcc caa gtc acc   1296
Ser Tyr Glu Asp Val Leu Thr Glu Leu Phe Glu Arg Ala Gln Val Thr
            420                 425                 430

gca aac tac cgc gag ctg tct gaa gca gag aag ctt gag gtg ctg ctg   1344
Ala Asn Tyr Arg Glu Leu Ser Glu Ala Glu Lys Leu Glu Val Leu Leu
        435                 440                 445

aag gaa ctg cgc agc cct cgt ccg ctg atc ccg cac ggt tca gat gaa   1392
Lys Glu Leu Arg Ser Pro Arg Pro Leu Ile Pro His Gly Ser Asp Glu
    450                 455                 460

tac agc gag gtc acc gac cgc gag ctc ggc atc ttc cgc acc gcg tcg   1440
Tyr Ser Glu Val Thr Asp Arg Glu Leu Gly Ile Phe Arg Thr Ala Ser
465                 470                 475                 480

gag gct gtt aag aaa ttc ggg cca cgg atg gtg cct cac tgc atc atc   1488
Glu Ala Val Lys Lys Phe Gly Pro Arg Met Val Pro His Cys Ile Ile
                485                 490                 495

tcc atg gca tca tcg gtc acc gat gtg ctc gag ccg atg gtg ttg ctc   1536
Ser Met Ala Ser Ser Val Thr Asp Val Leu Glu Pro Met Val Leu Leu
            500                 505                 510

aag gaa ttc gga ctc atc gca gcc aac ggc gac aac cca cgc ggc acc   1584
Lys Glu Phe Gly Leu Ile Ala Ala Asn Gly Asp Asn Pro Arg Gly Thr
        515                 520                 525

gtc gat gtc atc cca ctg ttc gaa acc atc gaa gat ctc cag gcc ggc   1632
Val Asp Val Ile Pro Leu Phe Glu Thr Ile Glu Asp Leu Gln Ala Gly
    530                 535                 540

gcc gga atc ctc gac gaa ctg tgg aaa att gat ctc tac cgc aac tac   1680
Ala Gly Ile Leu Asp Glu Leu Trp Lys Ile Asp Leu Tyr Arg Asn Tyr
545                 550                 555                 560

ctc ctg cag cgc gac aac gtc cag gaa gtc atg ctc ggt tac tcc gat   1728
Leu Leu Gln Arg Asp Asn Val Gln Glu Val Met Leu Gly Tyr Ser Asp
                565                 570                 575

tcc aac aag gat ggc gga tat ttc tcc gca aac tgg gcg ctt tac gac   1776
Ser Asn Lys Asp Gly Gly Tyr Phe Ser Ala Asn Trp Ala Leu Tyr Asp
            580                 585                 590

gcg gaa ctg cag ctc gtc gaa cta tgc cga tca gcc ggg gtc aag ctt   1824
Ala Glu Leu Gln Leu Val Glu Leu Cys Arg Ser Ala Gly Val Lys Leu
        595                 600                 605

cgc ctg ttc cac ggc cgt ggt ggc acc gtc ggc cgc ggt ggc gga cct   1872
Arg Leu Phe His Gly Arg Gly Gly Thr Val Gly Arg Gly Gly Gly Pro
    610                 615                 620

tcc tac gac gcg att ctt gcc cag ccc agg ggg gct gtc caa ggt tcc   1920
Ser Tyr Asp Ala Ile Leu Ala Gln Pro Arg Gly Ala Val Gln Gly Ser
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```
625                 630                 635                 640

gtg cgc atc acc gag cag ggc gag atc atc tcc gct aag tac ggc aac   1968
Val Arg Ile Thr Glu Gln Gly Glu Ile Ile Ser Ala Lys Tyr Gly Asn
                645                 650                 655

ccc gaa acc gcg cgc cga aac ctc gaa gcc ctg gtc tca gcc acg ctt   2016
Pro Glu Thr Ala Arg Arg Asn Leu Glu Ala Leu Val Ser Ala Thr Leu
            660                 665                 670

gag gca tcg ctt ctc gac gtc tcc gaa ctc acc gat cac caa cgc gcg   2064
Glu Ala Ser Leu Leu Asp Val Ser Glu Leu Thr Asp His Gln Arg Ala
        675                 680                 685

tac gac atc atg agt gag atc tct gag ctc agc ttg aag aag tac gcc   2112
Tyr Asp Ile Met Ser Glu Ile Ser Glu Leu Ser Leu Lys Lys Tyr Ala
    690                 695                 700

tcc ttg gtg cac gag gat caa ggc ttc atc gat tac ttc acc cag tcc   2160
Ser Leu Val His Glu Asp Gln Gly Phe Ile Asp Tyr Phe Thr Gln Ser
705                 710                 715                 720

acg ccg ctg cag gag att gga tcc ctc aac atc gga tcc agg cct tcc   2208
Thr Pro Leu Gln Glu Ile Gly Ser Leu Asn Ile Gly Ser Arg Pro Ser
                725                 730                 735

tca cgc aag cag acc tcc tcg gtg gaa gat ttg cga gcc atc cca tgg   2256
Ser Arg Lys Gln Thr Ser Ser Val Glu Asp Leu Arg Ala Ile Pro Trp
            740                 745                 750

gtg ctc agc tgg tca cag tct cgt gtc atg ctg cca ggc tgg ttt ggt   2304
Val Leu Ser Trp Ser Gln Ser Arg Val Met Leu Pro Gly Trp Phe Gly
        755                 760                 765

gtc gga acc gca tta gag cag tgg att ggc gaa ggg gag cag gcc acc   2352
Val Gly Thr Ala Leu Glu Gln Trp Ile Gly Glu Gly Glu Gln Ala Thr
    770                 775                 780

caa cgc att gcc gag ctg caa aca ctc aat gag tcc tgg cca ttt ttc   2400
Gln Arg Ile Ala Glu Leu Gln Thr Leu Asn Glu Ser Trp Pro Phe Phe
785                 790                 795                 800

acc tca gtg ttg gat aac atg gct cag gtg atg tcc aag gca gag ctg   2448
Thr Ser Val Leu Asp Asn Met Ala Gln Val Met Ser Lys Ala Glu Leu
                805                 810                 815

cgt ttg gca aag ctc tac gca gac ctg atc cca gat acg gaa gta gcc   2496
Arg Leu Ala Lys Leu Tyr Ala Asp Leu Ile Pro Asp Thr Glu Val Ala
            820                 825                 830

gag cga gtc tat tcc gtc atc cgc gag gag tac ttc ctg acc aag aag   2544
Glu Arg Val Tyr Ser Val Ile Arg Glu Glu Tyr Phe Leu Thr Lys Lys
        835                 840                 845

atg ttc tgc gta atc acc ggc tct gat gat ctg ctt gat gac aac cca   2592
Met Phe Cys Val Ile Thr Gly Ser Asp Asp Leu Leu Asp Asp Asn Pro
    850                 855                 860

ctt ctc gca cgc tct gtc cag cgc cga tac ccc tac ctg ctt cca ctc   2640
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Leu Leu Ala Arg Ser Val Gln Arg Arg Tyr Pro Tyr Leu Leu Pro Leu
865                 870                 875                 880

aac gtg atc cag gta gag atg atg cga cgc tac cga aaa ggc gac caa   2688
Asn Val Ile Gln Val Glu Met Met Arg Arg Tyr Arg Lys Gly Asp Gln
                885                 890                 895

agc gag caa gtg tcc cgc aac att cag ctg acc atg aac ggt ctt tcc   2736
Ser Glu Gln Val Ser Arg Asn Ile Gln Leu Thr Met Asn Gly Leu Ser
            900                 905                 910

act gcg ctg cgc aac tcc ggc                                      2757
Thr Ala Leu Arg Asn Ser Gly
        915
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<210> 140
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<400> 140

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Met Thr Asp Phe Leu Arg Asp Asp Ile Arg Phe Leu Gly Gln Ile Leu
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Gly Glu Val Ile Ala Glu Gln Glu Gly Gln Glu Val Tyr Glu Leu Val
             20                  25                  30

Glu Gln Ala Arg Leu Thr Ser Phe Asp Ile Ala Lys Gly Asn Ala Glu
         35                  40                  45

Met Asp Ser Leu Val Gln Val Phe Asp Gly Ile Thr Pro Ala Lys Ala
     50                  55                  60

Thr Pro Ile Ala Arg Ala Phe Ser His Phe Ala Leu Leu Ala Asn Leu
 65                  70                  75                  80

Ala Glu Asp Leu Tyr Asp Glu Glu Leu Arg Glu Gln Ala Leu Asp Ala
                 85                  90                  95

Gly Asp Thr Pro Pro Asp Ser Thr Leu Asp Ala Thr Trp Leu Lys Leu
            100                 105                 110

Asn Glu Gly Asn Val Gly Ala Glu Ala Val Ala Asp Val Leu Arg Asn
        115                 120                 125

Ala Glu Val Ala Pro Val Leu Thr Ala His Pro Thr Glu Thr Arg Arg
    130                 135                 140

Arg Thr Val Phe Asp Ala Gln Lys Trp Ile Thr Thr His Met Arg Glu
145                 150                 155                 160

Arg His Ala Leu Gln Ser Ala Glu Pro Thr Ala Arg Thr Gln Ser Lys
                165                 170                 175

Leu Asp Glu Ile Glu Lys Asn Ile Arg Arg Arg Ile Thr Ile Leu Trp
            180                 185                 190
```

```
Gln Thr Ala Leu Ile Arg Val Ala Arg Pro Arg Ile Glu Asp Glu Ile
        195                 200                 205

Glu Val Gly Leu Arg Tyr Tyr Lys Leu Ser Leu Leu Glu Glu Ile Pro
    210                 215                 220

Arg Ile Asn Arg Asp Val Ala Val Glu Leu Arg Glu Arg Phe Gly Glu
225                 230                 235                 240

Gly Val Pro Leu Lys Pro Val Val Lys Pro Gly Ser Trp Ile Gly Gly
                245                 250                 255

Asp His Asp Gly Asn Pro Tyr Val Thr Ala Glu Thr Val Glu Tyr Ser
            260                 265                 270

Thr His Arg Ala Ala Glu Thr Val Leu Lys Tyr Tyr Ala Arg Gln Leu
        275                 280                 285

His Ser Leu Glu His Glu Leu Ser Leu Ser Asp Arg Met Asn Lys Val
    290                 295                 300

Thr Pro Gln Leu Leu Ala Leu Ala Asp Ala Gly His Asn Asp Val Pro
305                 310                 315                 320

Ser Arg Val Asp Glu Pro Tyr Arg Arg Ala Val His Gly Val Arg Gly
                325                 330                 335

Arg Ile Leu Ala Thr Thr Ala Glu Leu Ile Gly Glu Asp Ala Val Glu
            340                 345                 350

Gly Val Trp Phe Lys Val Phe Thr Pro Tyr Ala Ser Pro Glu Glu Phe
        355                 360                 365

Leu Asn Asp Ala Leu Thr Ile Asp His Ser Leu Arg Glu Ser Lys Asp
    370                 375                 380

Val Leu Ile Ala Asp Asp Arg Leu Ser Val Leu Ile Ser Ala Ile Glu
385                 390                 395                 400

Ser Phe Gly Phe Asn Leu Tyr Ala Leu Asp Leu Arg Gln Asn Ser Glu
                405                 410                 415

Ser Tyr Glu Asp Val Leu Thr Glu Leu Phe Glu Arg Ala Gln Val Thr
            420                 425                 430

Ala Asn Tyr Arg Glu Leu Ser Glu Ala Glu Lys Leu Glu Val Leu Leu
        435                 440                 445

Lys Glu Leu Arg Ser Pro Arg Pro Leu Ile Pro His Gly Ser Asp Glu
    450                 455                 460

Tyr Ser Glu Val Thr Asp Arg Glu Leu Gly Ile Phe Arg Thr Ala Ser
465                 470                 475                 480

Glu Ala Val Lys Lys Phe Gly Pro Arg Met Val Pro His Cys Ile Ile
                485                 490                 495

Ser Met Ala Ser Ser Val Thr Asp Val Leu Glu Pro Met Val Leu Leu
            500                 505                 510
```

```
Lys Glu Phe Gly Leu Ile Ala Ala Asn Gly Asp Asn Pro Arg Gly Thr
        515                 520                 525

Val Asp Val Ile Pro Leu Phe Glu Thr Ile Glu Asp Leu Gln Ala Gly
    530                 535                 540

Ala Gly Ile Leu Asp Glu Leu Trp Lys Ile Asp Leu Tyr Arg Asn Tyr
545                 550                 555                 560

Leu Leu Gln Arg Asp Asn Val Gln Glu Val Met Leu Gly Tyr Ser Asp
                565                 570                 575

Ser Asn Lys Asp Gly Gly Tyr Phe Ser Ala Asn Trp Ala Leu Tyr Asp
            580                 585                 590

Ala Glu Leu Gln Leu Val Glu Leu Cys Arg Ser Ala Gly Val Lys Leu
        595                 600                 605

Arg Leu Phe His Gly Arg Gly Gly Thr Val Gly Arg Gly Gly Gly Pro
    610                 615                 620

Ser Tyr Asp Ala Ile Leu Ala Gln Pro Arg Gly Ala Val Gln Gly Ser
625                 630                 635                 640

Val Arg Ile Thr Glu Gln Gly Glu Ile Ile Ser Ala Lys Tyr Gly Asn
                645                 650                 655

Pro Glu Thr Ala Arg Arg Asn Leu Glu Ala Leu Val Ser Ala Thr Leu
            660                 665                 670

Glu Ala Ser Leu Leu Asp Val Ser Glu Leu Thr Asp His Gln Arg Ala
        675                 680                 685

Tyr Asp Ile Met Ser Glu Ile Ser Glu Leu Ser Leu Lys Lys Tyr Ala
    690                 695                 700

Ser Leu Val His Glu Asp Gln Gly Phe Ile Asp Tyr Phe Thr Gln Ser
705                 710                 715                 720

Thr Pro Leu Gln Glu Ile Gly Ser Leu Asn Ile Gly Ser Arg Pro Ser
                725                 730                 735

Ser Arg Lys Gln Thr Ser Ser Val Glu Asp Leu Arg Ala Ile Pro Trp
            740                 745                 750

Val Leu Ser Trp Ser Gln Ser Arg Val Met Leu Pro Gly Trp Phe Gly
        755                 760                 765

Val Gly Thr Ala Leu Glu Gln Trp Ile Gly Glu Gly Glu Gln Ala Thr
    770                 775                 780

Gln Arg Ile Ala Glu Leu Gln Thr Leu Asn Glu Ser Trp Pro Phe Phe
785                 790                 795                 800

Thr Ser Val Leu Asp Asn Met Ala Gln Val Met Ser Lys Ala Glu Leu
                805                 810                 815

Arg Leu Ala Lys Leu Tyr Ala Asp Leu Ile Pro Asp Thr Glu Val Ala
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            820                 825                 830

Glu Arg Val Tyr Ser Val Ile Arg Glu Glu Tyr Phe Leu Thr Lys Lys
        835                 840                 845

Met Phe Cys Val Ile Thr Gly Ser Asp Asp Leu Leu Asp Asp Asn Pro
    850                 855                 860

Leu Leu Ala Arg Ser Val Gln Arg Arg Tyr Pro Tyr Leu Leu Pro Leu
865                 870                 875                 880

Asn Val Ile Gln Val Glu Met Met Arg Arg Tyr Arg Lys Gly Asp Gln
                885                 890                 895

Ser Glu Gln Val Ser Arg Asn Ile Gln Leu Thr Met Asn Gly Leu Ser
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Thr Ala Leu Arg Asn Ser Gly
        915
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Met Ala Ile Glu Leu Asn Val Gly Arg Lys Val Thr Val Thr Val Pro
  1               5                  10                  15

gga tct tct gca aac ctc gga cct ggc ttt gac act tta ggt ttg gca   96
Gly Ser Ser Ala Asn Leu Gly Pro Gly Phe Asp Thr Leu Gly Leu Ala
             20                  25                  30

ctg tcg gta tac gac act gtc gaa gtg gaa att att cca tct ggc ttg   144
Leu Ser Val Tyr Asp Thr Val Glu Val Glu Ile Ile Pro Ser Gly Leu
         35                  40                  45

gaa gtg gaa gtt ttt ggc gaa ggc caa ggc gaa gtc cct ctt gat ggc   192
Glu Val Glu Val Phe Gly Glu Gly Gln Gly Glu Val Pro Leu Asp Gly
     50                  55                  60

tcc cac ctg gtg gtt aaa gct att cgt gct ggc ctg aag gca gct gac   240
Ser His Leu Val Val Lys Ala Ile Arg Ala Gly Leu Lys Ala Ala Asp
 65                  70                  75                  80

gct gaa gtt cct gga ttg cga gtg gtg tgc cac aac aac att ccg cag   288
Ala Glu Val Pro Gly Leu Arg Val Val Cys His Asn Asn Ile Pro Gln
                 85                  90                  95

tct cgt ggt ctt ggc tcc tct gct gca gcg gcg gtt gct ggt gtt gct   336
Ser Arg Gly Leu Gly Ser Ser Ala Ala Ala Ala Val Ala Gly Val Ala
            100                 105                 110
```

```
gca gct aat ggt ttg gcg gat ttc ccg ctg act caa gag cag att gtt   384
Ala Ala Asn Gly Leu Ala Asp Phe Pro Leu Thr Gln Glu Gln Ile Val
        115                 120                 125

cag ttg tcc tct gcc ttt gaa ggc cac cca gat aat gct gcg gct tct   432
Gln Leu Ser Ser Ala Phe Glu Gly His Pro Asp Asn Ala Ala Ala Ser
    130                 135                 140

gtg ctg ggt gga gca gtg gtg tcg tgg aca aat ctg tct atc gac ggc   480
Val Leu Gly Gly Ala Val Val Ser Trp Thr Asn Leu Ser Ile Asp Gly
145                 150                 155                 160

aag agc cag cca cag tat gct gct gta cca ctt gag gtg cag gac aat   528
Lys Ser Gln Pro Gln Tyr Ala Ala Val Pro Leu Glu Val Gln Asp Asn
                165                 170                 175

att cgt gcg act gcg ctg gtt cct aat ttc cac gca tcc acc gaa gct   576
Ile Arg Ala Thr Ala Leu Val Pro Asn Phe His Ala Ser Thr Glu Ala
            180                 185                 190

gtg cgc cga gtc ctt ccc act gaa gtc act cac atc gat gcg cga ttt   624
Val Arg Arg Val Leu Pro Thr Glu Val Thr His Ile Asp Ala Arg Phe
        195                 200                 205

aac gtg tcc cgc gtt gca gtg atg atc gtt gcg ttg cag cag cgt cct   672
Asn Val Ser Arg Val Ala Val Met Ile Val Ala Leu Gln Gln Arg Pro
    210                 215                 220

gat ttg ctg tgg gag ggt act cgt gac cgt ctg cac cag cct tat cgt   720
Asp Leu Leu Trp Glu Gly Thr Arg Asp Arg Leu His Gln Pro Tyr Arg
225                 230                 235                 240

gca gaa gtg ttg cct att acc tct gag tgg gta aac cgc ctg cgc aac   768
Ala Glu Val Leu Pro Ile Thr Ser Glu Trp Val Asn Arg Leu Arg Asn
                245                 250                 255

cgt ggc tac gcg gca tac ctt tcc ggt gcc ggc cca acc gcc atg gtg   816
Arg Gly Tyr Ala Ala Tyr Leu Ser Gly Ala Gly Pro Thr Ala Met Val
            260                 265                 270

ctg tcc act gag cca att cca gac aag gtt ttg gaa gat gct cgt gag   864
Leu Ser Thr Glu Pro Ile Pro Asp Lys Val Leu Glu Asp Ala Arg Glu
        275                 280                 285

tct ggc att aag gtg ctt gag ctt gag gtt gcg gga cca gtc aag gtt   912
Ser Gly Ile Lys Val Leu Glu Leu Glu Val Ala Gly Pro Val Lys Val
    290                 295                 300

gaa gtt aac caa cct                                              927
Glu Val Asn Gln Pro
305
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Met Ala Ile Glu Leu Asn Val Gly Arg Lys Val Thr Val Thr Val Pro
  1               5                  10                  15

Gly Ser Ser Ala Asn Leu Gly Pro Gly Phe Asp Thr Leu Gly Leu Ala
             20                  25                  30

Leu Ser Val Tyr Asp Thr Val Glu Val Glu Ile Ile Pro Ser Gly Leu
         35                  40                  45

Glu Val Glu Val Phe Gly Glu Gly Gln Gly Glu Val Pro Leu Asp Gly
     50                  55                  60

Ser His Leu Val Val Lys Ala Ile Arg Ala Gly Leu Lys Ala Ala Asp
 65                  70                  75                  80

Ala Glu Val Pro Gly Leu Arg Val Val Cys His Asn Asn Ile Pro Gln
                 85                  90                  95

Ser Arg Gly Leu Gly Ser Ser Ala Ala Ala Ala Val Ala Gly Val Ala
            100                 105                 110

Ala Ala Asn Gly Leu Ala Asp Phe Pro Leu Thr Gln Glu Gln Ile Val
        115                 120                 125

Gln Leu Ser Ser Ala Phe Glu Gly His Pro Asp Asn Ala Ala Ala Ser
    130                 135                 140

Val Leu Gly Gly Ala Val Val Ser Trp Thr Asn Leu Ser Ile Asp Gly
145                 150                 155                 160

Lys Ser Gln Pro Gln Tyr Ala Ala Val Pro Leu Glu Val Gln Asp Asn
                165                 170                 175

Ile Arg Ala Thr Ala Leu Val Pro Asn Phe His Ala Ser Thr Glu Ala
            180                 185                 190

Val Arg Arg Val Leu Pro Thr Glu Val Thr His Ile Asp Ala Arg Phe
        195                 200                 205

Asn Val Ser Arg Val Ala Val Met Ile Val Ala Leu Gln Gln Arg Pro
    210                 215                 220

Asp Leu Leu Trp Glu Gly Thr Arg Asp Arg Leu His Gln Pro Tyr Arg
225                 230                 235                 240

Ala Glu Val Leu Pro Ile Thr Ser Glu Trp Val Asn Arg Leu Arg Asn
                245                 250                 255

Arg Gly Tyr Ala Ala Tyr Leu Ser Gly Ala Gly Pro Thr Ala Met Val
            260                 265                 270

Leu Ser Thr Glu Pro Ile Pro Asp Lys Val Leu Glu Asp Ala Arg Glu
        275                 280                 285

Ser Gly Ile Lys Val Leu Glu Leu Glu Val Ala Gly Pro Val Lys Val
    290                 295                 300
```

Glu Val Asn Gln Pro
305

五、中文發明摘要：

本發明係關於精細化學品之代謝途徑之突變核酸及蛋白質、基因改質的生產者生物之製備方法、藉培養該基因改質的生物製備精細化學品之方法及該基因改質的生物本身。

六、英文發明摘要：

十、申請專利範圍：

1. 一種蛋白質，其具有於表1/第7行中各例指出的功能及具有於至少一個胺基酸位置(始自關於表1/第2行中各例之胺基酸序列)相當於表1/第4行中為該胺基酸序列指出的胺基酸位置具有形成蛋白質的胺基酸不同於表1/第5行中相同排指出的特定胺基酸之胺基酸序列，其限制條件為排除根據表2之蛋白質。

表1

第1行	第2行	第3行	第4行	第5行	第6行	第7行
DNA ID	AA ID	確認	AA 位置	AA 野生型	AA 突變體	功能
1	2	RXA00149K	85	T	S	甲基丙二酸醯輔酶A變位酶
			166	T	A	甲基丙二酸醯輔酶A變位酶
			174	F	P	甲基丙二酸醯輔酶A變位酶
			350	D	G	甲基丙二酸醯輔酶A變位酶
			436	A	T	甲基丙二酸醯輔酶A變位酶
			538	A	S	甲基丙二酸醯輔酶A變位酶
3	4	RXA00157E	26	T	A	侵入蛋白(invasin)1
			247	S	T	侵入蛋白(invasin)1
			255	G	E	侵入蛋白(invasin)1
			336	T	A	侵入蛋白(invasin)1
			342	A	T	侵入蛋白(invasin)1
			395	A	V	侵入蛋白(invasin)1
			448	T	A	侵入蛋白(invasin)1
			456	S	N	侵入蛋白(invasin)1
			457	N	D	侵入蛋白(invasin)1
5	6	RX00157K	217	S	T	侵入蛋白(invasin)1
			225	G	E	侵入蛋白(invasin)1
			306	T	A	侵入蛋白(invasin)1
			312	A	T	侵入蛋白(invasin)1
			365	A	V	侵入蛋白(invasin)1

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			418	T	A	侵入蛋白(invasin)1
5	6	RXA00157K	426	S	N	侵入蛋白(invasin)1
			427	N	D	侵入蛋白(invasin)1
			60	V	I	侵入蛋白(invasin)1
			129	G	R	侵入蛋白(invasin)1
			419	G	D	侵入蛋白(invasin)1
			424	S	F	侵入蛋白(invasin)1
			560	S	F	侵入蛋白(invasin)1
7	8	RXA00300W	69	G	R	羥丁胺酸合成酶
9	10	RXA00683W	95	D	E	PEP合成酶
			119	V	I	PEP合成酶
			348	I	T	PEP合成酶
11	12	RXA00783E	2	K	E	琥珀醯輔酶A合成酶
			13	D	G	琥珀醯輔酶A合成酶
			66	G	E	琥珀醯輔酶A合成酶
			112	N	D	琥珀醯輔酶A合成酶
			171	T	I	琥珀醯輔酶A合成酶
			189	T	A	琥珀醯輔酶A合成酶
			224	D	G	琥珀醯輔酶A合成酶
			334	Q	H	琥珀醯輔酶A合成酶
			364	G	D	琥珀醯輔酶A合成酶
13	14	RXA00783K	40	G	E	琥珀醯輔酶A合成酶
			86	N	D	琥珀醯輔酶A合成酶
			145	T	I	琥珀醯輔酶A合成酶

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			163	T	A	琥珀醯輔酶A合成酶
			198	D	G	琥珀醯輔酶A合成酶
13	14	RX00783K	308	Q	H	琥珀醯輔酶A合成酶
			338	G	D	琥珀醯輔酶A合成酶
			18	P	S	琥珀醯輔酶A合成酶
			166	A	T	琥珀醯輔酶A合成酶
15	16	RXA00969K	104	V	I	高絲胺酸脫氫酶
			116	T	I	高絲胺酸脫氫酶
17	18	RCGL01443K	11	S	A	轉錄調控因子
			140	N	K	轉錄調控因子
			228	F	M	轉錄調控因子
19	20	RXA00999K	329	V	M	6-磷酸鹽葡萄糖去氫酶
21	22	RXA01093W	329	S	A	丙酮酸激酶
			436	A	T	丙酮酸激酶
23	24	RXA01244W	178	D	E	磷酸烯醇丙酮酸蛋白質磷酸轉移酶
			384	E	K	磷酸烯醇丙酮酸蛋白質磷酸轉移酶
25	26	RXA01434E	61	P	L	致病因子MVIN
			515	N	K	致病因子MVIN
			580	F	I	致病因子MVIN
			581	V	I	致病因子MVIN
			607	L	M	致病因子MVIN
			626	E	Q	致病因子MVIN
			640	A	S	致病因子MVIN
			743	H	Y	致病因子MVIN

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			1080	V	M	致病因子MVIN
			1088	R	H	致病因子MVIN
27	28	RXA01434K	35	P	L	致病因子MVIN
			489	N	K	致病因子MVIN
			554	F	I	致病因子MVIN
			555	V	I	致病因子MVIN
			581	L	M	致病因子MVIN
			600	E	Q	致病因子MVIN
			614	A	S	致病因子MVIN
			717	H	Y	致病因子MVIN
			1054	V	M	致病因子MVIN
			1062	R	H	致病因子MVIN
			931	S	F	致病因子MVIN
			986	P	S	致病因子MVIN
29	30	RXA02056E	4	T	I	2-氧基戊二酸去氫酶
			64	T	A	2-氧基戊二酸去氫酶
			102	D	A	2-氧基戊二酸去氫酶
			258	A	T	2-氧基戊二酸去氫酶
			398	A	T	2-氧基戊二酸去氫酶
			987	I	V	2-氧基戊二酸去氫酶
			1113	N	D	2-氧基戊二酸去氫酶
31	32	RXA02056K	20	T	I	2-氧基戊二酸去氫酶
			80	T	A	2-氧基戊二酸去氫酶
			118	D	A	2-氧基戊二酸去氫酶

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			274	A	T	2-氧基戊二酸去氫酶
			414	A	T	2-氧基戊二酸去氫酶
			1075	P	L	2-氧基戊二酸去氫酶
31	32	RXA02056K	1137	A	V	2-氧基戊二酸去氫酶
33	34	RXA02063E	394	Q	R	葡萄糖1-磷酸腺苷醯轉移酶
35	36	RXA02063W	386	Q	R	葡萄糖1-磷酸腺苷醯轉移酶
			129	G	D	葡萄糖1-磷酸腺苷醯轉移酶
37	38	RXA02082K	156	E	D	SMC2
			316	A	T	SMC2
			349	T	A	SMC2
			682	V	A	SMC2
			832	Q	H	SMC2
39	40	RXA02016W	20	T	S	硝酸還原酶
			49	A	T	硝酸還原酶
			58	N	H	硝酸還原酶
			59	T	A	硝酸還原酶
			131	S	I	硝酸還原酶
			166	N	D	硝酸還原酶
			317	A	S	硝酸還原酶
41	42	RXA02149W	63	G	D	六碳醣激酶
			99	N	D	六碳醣激酶
43	44	RXA02206E	114	A	S	氧化還原酶
			126	A	V	氧化還原酶
45	46	RXA02206K	74	A	S	氧化還原酶

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			86	A	V	氧化還原酶
			33	G	D	氧化還原酶
			74	A	T	氧化還原酶
			274	R	C	氧化還原酶
47	48	RXA02299W	65	G	R	天門冬胺酸1-去羧基酶
49	50	RXA02390W	85	I	M	羥丁胺酸流出蛋白
			161	F	I	羥丁胺酸流出蛋白
51	52	RXA02399E	109	S	F	異檸檬酸裂解酶
			155	T	S	異檸檬酸裂解酶
			290	A	T	異檸檬酸裂解酶
53	54	RXA02399W	93	S	F	異檸檬酸裂解酶
			139	T	S	異檸檬酸裂解酶
			274	A	T	異檸檬酸裂解酶
			332	A	T	異檸檬酸裂解酶
55	56	RXA02404K	80	M	T	蘋果酸合成酶
			96	E	D	蘋果酸合成酶
			221	I	V	蘋果酸合成酶
			232	E	D	蘋果酸合成酶
			246	A	V	蘋果酸合成酶
			300	D	N	蘋果酸合成酶
			326	I	T	蘋果酸合成酶
			371	G	D	蘋果酸合成酶
57	58	RXA02591W	586	L	F	PEP羧化激酶
59	60	RXA02735E	73	G	S	6-磷酸葡萄糖酸內酯酶

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61	62	RXA02735W	33	G	S	6-磷酸葡萄糖酸內酯酶
63	64	RXA02736W	107	Y	H	OPCA
			219	K	N	OPCA
			233	P	S	OPCA
			261	Y	H	OPCA
65	66	RXA02737W	8	S	T	葡萄糖6-磷酸去氫酶
			321	G	S	葡萄糖6-磷酸去氫酶
67	68	RXA02738W	242	K	M	轉醛酶
69	70	RXA02739K	75	N	D	轉酮酶
			332	A	T	轉酮酶
			556	V	I	轉酮酶
71	72	RXA02910K	108	L	I	轉錄調控因子
			152	E	G	轉錄調控因子
			183	D	N	轉錄調控因子
73	74	RXA02910E	111	L	I	轉錄調控因子
			155	E	G	轉錄調控因子
75	76	RXA03083W	140	V	I	二氫硫辛醯胺去氫酶
77	78	RXA03802K	149	V	A	轉錄調控因子
			157	N	K	轉錄調控因子
			158	C	S	轉錄調控因子
			190	S	G	轉錄調控因子
79	80	RXA04031K	7	S	L	丙酮酸羧化酶
			639	S	T	丙酮酸羧化酶
			1008	R	H	丙酮酸羧化酶

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			1059	S	P	丙酮酸羧化酶
			1120	D	E	丙酮酸羧化酶
81	82	RXA04073K	39	E	K	未知功能
83	84	RXA04174K	75	D	N	順烏頭酸酶
			790	G	S	順烏頭酸酶
			892	T	I	順烏頭酸酶
85	86	RXA02175W	8	A	T	檸檬酸合成酶
			283	S	N	檸檬酸合成酶
			291	E	A	檸檬酸合成酶
			420	N	K	檸檬酸合成酶
87	88	RXA02175E	14	A	T	檸檬酸合成酶
89	90	RXA04186K	348	K	E	5-甲基四氫葉酸同半胱胺酸甲基轉移酶
			474	E	D	5-甲基四氫葉酸同半胱胺酸甲基轉移酶
			731	E	K	5-甲基四氫葉酸同半胱胺酸甲基轉移酶
			747	E	K	5-甲基四氫葉酸同半胱胺酸甲基轉移酶
91	92	RXA00098E	54	V	A	葡萄糖6-P異構酶
			146	A	P	葡萄糖6-P異構酶
93	94	RXA00241K	5	S	T	離胺酸專一性通透酶
			501	F	L	離胺酸專一性通透酶
95	96	RXA00517E	110	H	Y	蘋果酸去氫酶
			229	A	S	蘋果酸去氫酶
			236	V	I	蘋果酸去氫酶
			272	D	E	蘋果酸去氫酶
			306	G	T	蘋果酸去氫酶

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		307	E	Q	蘋果酸去氫酶
		326	S	L	蘋果酸去氫酶
97	98	RXA00517W	95	H	Y	蘋果酸去氫酶
97	98	RXA00517W	214	A	S	蘋果酸去氫酶
			221	V	I	蘋果酸去氫酶
			257	D	E	蘋果酸去氫酶
			291	G	T	蘋果酸去氫酶
			292	E	Q	蘋果酸去氫酶
			311	S	L	蘋果酸去氫酶
99	100	RXA00519W	111	N	T	異檸檬酸去氫酶
			120	I	T	異檸檬酸去氫酶
			306	D	N	異檸檬酸去氫酶
			321	D	E	異檸檬酸去氫酶
101	102	RXA00533E	50	D	G	天門冬胺酸半醛去氫酶
			218	R	H	天門冬胺酸半醛去氫酶
			256	D	E	天門冬胺酸半醛去氫酶
			269	K	E	天門冬胺酸半醛去氫酶
103	104	RXA00533K	234	R	H	天門冬胺酸半醛去氫酶
105	106	RXA00782W	181	I	V	琥珀酸硫激酶
107	108	RXA00822K	6	E	D	調控蛋白質
109	110	RXA00975K	355	G	D	精胺醯-tRNA合成酶
			513	V	A	精胺醯-tRNA合成酶
			540	H	R	精胺醯-tRNA合成酶
111	112	RXA01311E	92	K	N	琥珀酸去氫酶

113	114	RXA01311K	122	K	N	琥珀酸去氫酶
115	116	RXA01312E	328	E	V	琥珀酸去氫酶
			329	P	K	琥珀酸去氫酶
			330	N	G	琥珀酸去氫酶
115	116	RXA01312E	332	N	D	琥珀酸去氫酶
			496	S	A	琥珀酸去氫酶
			500	S	A	琥珀酸去氫酶
			507	Q	V	琥珀酸去氫酶
			508	A	Q	琥珀酸去氫酶
			511	A	E	琥珀酸去氫酶
			557	E	K	琥珀酸去氫酶
			564	N	D	琥珀酸去氫酶
			571	D	E	琥珀酸去氫酶
117	118	RXA01312K	280	E	V	琥珀酸去氫酶
			281	P	K	琥珀酸去氫酶
			282	N	G	琥珀酸去氫酶
			284	N	D	琥珀酸去氫酶
			448	S	A	琥珀酸去氫酶
			452	S	A	琥珀酸去氫酶
			459	Q	V	琥珀酸去氫酶
			460	A	Q	琥珀酸去氫酶
			463	A	E	琥珀酸去氫酶
			509	E	K	琥珀酸去氫酶
			516	N	D	琥珀酸去氫酶

			523	D	E	琥珀酸去氫酶
119	120	RXA01350E	109	P	S	蘋果酸去氫酶
			196	S	F	蘋果酸去氫酶
			315	A	G	蘋果酸去氫酶
121	122	RXA01350W	68	P	S	蘋果酸去氫酶
121	122	RXA01350W	155	S	F	蘋果酸去氫酶
			274	A	G	蘋果酸去氫酶
			272	T	I	蘋果酸去氫酶
123	124	RXA01393W	5	Q	H	調控因子lysG
125	126	RXA02021W	45	E	V	2,3,4,5-四氫吡啶-2-羧酸N-琥珀醯基轉移酶
			68	Q	H	2,3,4,5-四氫吡啶-2-羧酸N-琥珀醯基轉移酶
			122	D	N	2,3,4,5-四氫吡啶-2-羧酸N-琥珀醯基轉移酶
			275	G	E	2,3,4,5-四氫吡啶-2-羧酸N-琥珀醯基轉移酶
			283	A	D	2,3,4,5-四氫吡啶-2-羧酸N-琥珀醯基轉移酶
127	128	RXA02022E	141	T	I	2,3,4,5-四氫吡啶-2-羧酸N-琥珀醯基轉移酶
129	130	RXA02022K	114	T	I	2,3,4,5-四氫吡啶-2-羧酸N-琥珀醯基轉移酶
131	132	RXA02139K	319	A	T	天門冬醯胺合成酶
			576	T	A	天門冬醯胺合成酶
133	134	RXA02157W	36	N	K	乙醯鳥胺酸胺基轉移酶/N-琥珀醯基-L,L-DAP胺基轉移酶
			309	A	T	乙醯鳥胺酸胺基轉移酶/N-琥珀醯基-L,L-DAP胺基轉移酶
135	136	RXA02229K	158	G	S	二胺基庚二酸表異構酶
137	138	RXA02259E	184	H	Y	PEP羧化酶

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			263	G	D	PEP羧化酶
			851	T	R	PEP羧化酶
139	140	RXA02259K	162	H	Y	PEP羧化酶
141	142	RXA00970W	103	S	A	高絲胺酸激酶
			190	T	A	高絲胺酸激酶

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表2

第1行	第2行	第3行	第4行	第5行	第6行	第7行
DNA ID	AA ID	確認	AA 位置	AA 野生型	AA 突變體	功能
3	4	RXA00157E	90	V	I	侵入蛋白1
			159	G	R	侵入蛋白1
			449	G	D	侵入蛋白1
			454	S	F	侵入蛋白1
			590	S	F	侵入蛋白1
11	12	RXA00783E	66	G	E	琥珀醯輔酶A合成酶
			44	P	S	琥珀醯輔酶A合成酶
			192	A	T	琥珀醯輔酶A合成酶
25	26	RXA01434E	957	S	F	致病因子MVIN
			1012	P	S	致病因子MVIN
29	30	RXA02056E	1059	P	L	2-氧基戊二酸去氫酶
			1121	A	V	2-氧基戊二酸去氫酶
33	34	RXA02063E	137	G	D	葡萄糖1-磷酸腺苷醯轉移酶
43	44	RXA02206E	73	G	D	氧化還原酶
			114	A	T	氧化還原酶
			314	R	C	氧化還原酶
51	52	RXA02399E	348	A	T	異檸檬酸裂解酶
73	74	RXA02910E	186	D	N	轉錄調控因子
119	120	RXA01350E	313	T	I	蘋果酸去氫酶

2. 如請求項1之蛋白質，其中該蛋白質具有於表1/第2行中各例所指的胺基酸序列，其中該蛋白質於表1/第4行中為該胺基酸序列指出的至少一個胺基酸位置具有形成蛋白質的胺基酸不同於表1/第5行中相同排指出的特定胺基酸。

3. 如請求項2之蛋白質，其中該蛋白質於表1/第4行中該胺基酸序列指出的至少一個胺基酸位置具有於表1/第6行中相同排指出的胺基酸。

4. 一種分離的核酸，其編碼如請求項1至3任一項之蛋白質。

5. 一種分離的核酸構體，其包含至少一種如請求項4之核酸。

6. 如請求項5之核酸構體，其包含功能上連接形式之啟動子及視需要之終結子。

7. 一種藉轉型非人母生物而製備非人基因改質的生物之方法，其藉由導入該母生物

a)至少一種如請求項4之核酸或

b)至少一種如請求項5或6之核酸構體或

c)啟動子，其對於如請求項4之內生核酸為異源及其可使如請求項4之該內生核酸表現於該生物中。

8. 如請求項7之方法，其中將如請求項7態樣a)之核酸或如請求項7態樣b)之核酸構體導入作為複製質體或以染色體插入。

9. 如請求項7之方法，其中將如請求項7態樣c)之啟動子於該生物中功能上連接至如請求項4之內生核酸。

10. 一種經基因改質的微生物，其由如請求項7至9任一項之

方法可得。

11. 一種經基因改質的微生物，其以下列轉型：

a)至少一種如請求項4之核酸或

b)至少一種如請求項5或6之核酸構體或

c)啟動子，其對於如請求項4之內生核酸為異源及其可使如請求項4之該內生核酸表現於該生物中。

12. 如請求項10或11之經基因改質的微生物，其中使用的母微生物為已經能夠製造精細化學品之微生物。

13. 如請求項10或11之經基因改質的微生物，其中相較於母微生物，該核酸的表現造成由該微生物製造精細化學品之調控。

14. 一種製備精細化學品之方法，其藉由培養如請求項10至13任一項之經基因改質的微生物。

15. 一種製備精細化學品之方法，其藉由

A)以下列轉型非人母生物

a)至少一種如請求項4之核酸或

b)至少一種如請求項5或6之核酸構體或

c)啟動子，其對於如請求項4之內生核酸為異源及其可使如請求項4之該內生核酸表現於該生物中，及

B)培養根據A)項製備的經基因改質生物。

16. 如請求項14或15之方法，其中在培養後，將至少一種精細化學品由經基因改質的生物及/或培養基分離。

17. 如請求項14或15之方法，其中經基因改質的生物為微生物。

18. 如請求項17之方法，其中微生物係由棒狀桿菌屬細菌或短桿菌屬細菌組成的族群選出。

19. 如請求項14或15之方法，其中精細化學品為胺基酸。

20. 如請求項19之方法，其中胺基酸係由L-離胺酸、L-羥丁胺酸及L-甲硫胺酸組成的族群選出。

七、指定代表圖：

(一)本案指定代表圖為：(無)

(二)本代表圖之元件符號簡單說明:

八、本案若有化學式時，請揭示最能顯示發明特徵的化學式：

(無)