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(73)专利权人 孟山都技术公司
地址 美国密苏里州
(72)发明人 J·A·鲍姆 A·G·埃维多基莫维 F·莫施里 T·J·里德尔 E·J·斯图尔曼 M·万瑞钦博格 H·伍 A·M·沃拉科特 郑美英
(74)专利代理机构 北京市金杜律师事务所 11256
代理人 陈文平 谢燕军
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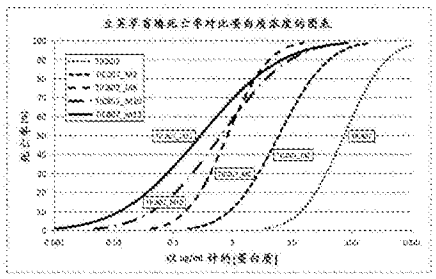
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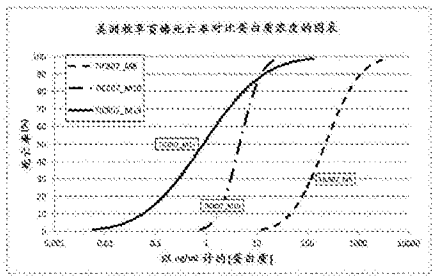
(54)发明名称

对半翅目昆虫种类有毒的蛋白质

(57)摘要

本发明公开半翅目昆虫抑制蛋白、使用此类蛋白的方法、编码此类蛋白的核苷酸序列、检测和分离此类蛋白的方法以及它们在农业系统中的用途。





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1.一种昆虫抑制多肽，包含如SEQ ID NO:34所示的氨基酸序列，其中所述多肽展示针对半翅目昆虫种类的抑制活性。

2.如权利要求1所述的昆虫抑制多肽，其中所述半翅目昆虫种类选自由以下组成的组：草盲蝽属、小绿叶蝉属和芒果叶蝉属种类。

3.如权利要求1所述的昆虫抑制多肽，其中所述半翅目昆虫种类选自由以下组成的组：豆荚草盲蝽、美洲牧草盲蝽以及苯甲醛对叶蝉。

4.一种编码如权利要求1-3任一项所述的昆虫抑制多肽的多核苷酸，其中所述多肽展示针对半翅目昆虫种类的抑制活性。

5.如权利要求4所述的多核苷酸，其中所述多核苷酸包含如SEQ ID NO:201所示的核苷酸序列并编码展示针对半翅目昆虫种类的抑制活性的多肽。

6.一种包含权利要求4或5所述的多核苷酸的宿主细胞，其中所述宿主细胞选自由以下组成的组：细菌宿主细胞和植物宿主细胞，其中所述植物宿主细胞是不可再生的细胞。

7.如权利要求所述6的宿主细胞，其中所述植物宿主细胞获得自由以下组成的组：转基因种子、圆荚、叶、花、茎和根。

8.如权利要求所述6的宿主细胞，其中所述细菌宿主细胞选自由以下组成的组：土壤杆菌属、根瘤菌属、芽孢杆菌属、埃希氏菌属、假单胞菌属和沙门氏菌属。

9.如权利要求所述6的宿主细胞，其中所述细菌宿主细胞是苏云金芽孢杆菌或大肠杆菌。

10.如权利要求所述6的宿主细胞，其中所述植物宿主细胞选自由以下组成的组：单子叶植物细胞和双子叶植物细胞。

11.一种昆虫抑制组合物，包含如权利要求1所述的昆虫抑制多肽和编码所述昆虫抑制多肽的多核苷酸。

12.如权利要求11所述的昆虫抑制组合物，其中所述组合物通过冻干、提取、过滤或离心制备。

13.如权利要求11所述的昆虫抑制组合物，其进一步包含不同于所述昆虫抑制多肽的至少一种昆虫抑制剂。

14.如权利要求13所述的昆虫抑制组合物，其中所述至少一种昆虫抑制剂选自由以下组成的组：昆虫抑制蛋白、昆虫抑制dsRNA分子以及昆虫抑制化学物质。

15.如权利要求13所述的昆虫抑制组合物，其中所述至少一种杀虫剂展示针对鳞翅目、鞘翅目、半翅目或同翅目的一种或多种害虫种类的活性。

16.一种控制半翅目害虫的方法，所述方法包括将抑制量的如权利要求1-3任一项所述的昆虫抑制多肽接触提供给所述半翅目害虫，其中所述半翅目害虫是选自草盲蝽属、小绿叶蝉属和芒果叶蝉属的半翅目昆虫种类。

17.如权利要求16的方法，其中所述提供经由在棉花植物中表达所述昆虫抑制多肽。

18.一种包含如权利要求1所述的昆虫抑制多肽的转基因植物细胞，其中所述植物宿主细胞是不可再生的细胞。

19.一种控制半翅目害虫的方法，包括将所述半翅目害虫暴露于如权利要求18所述的转基因植物细胞，其中所述植物细胞表达半翅目抑制量的所述昆虫抑制多肽，其中所述半翅目害虫是选自草盲蝽属、小绿叶蝉属和芒果叶蝉属的半翅目昆虫种类。

20.一种获自如权利要求18所述的转基因植物细胞的商品产品，其中所述商品产品包含可检测量的所述昆虫抑制多肽。

21.如权利要求20所述的商品产品，其中所述商品产品选自由以下组成的组：不可再生的植物生物质、油、膳食、动物饲料、糠、皮棉和果壳。

22.一种制备耐半翅目害虫侵染的植物的方法，其包括以下步骤：将编码eHTP的重组多核苷酸引入到植物细胞内，其中所述重组多核苷酸包含如SEQ ID NO:201所示的核苷酸序列；从所述植物细胞再生表达昆虫抑制量的所述eHTP的转基因植物；以及证明半翅目害虫侵害耐性为所述转基因植物的特性；

其中所述植物：

a.选自由双子叶植物和单子叶植物组成的组；或

b.包括选自由以下组成的组的补充剂：不同于所述eHTP的昆虫抑制蛋白、昆虫抑制dsRNA分子以及昆虫抑制化学物质；

其中不同于所述eHTP的所述昆虫抑制蛋白选自由以下组成的组：Cry1毒素、Cry2毒素、Cry 5毒素、Cry7毒素、Cry9毒素以及VIP3毒素；以及

其中所述昆虫抑制化学物质选自由以下组成的组：除虫菊素和合成的拟除虫菊酯；二嗪衍生物；氯代烟碱基；硝基胍衍生物；三唑；有机磷酸酯；吡咯；吡唑；苯基吡唑；双酰肼；生物产品；以及氨基甲酸酯。

23.如权利要求22所述的方法，其中所述植物选自由以下组成的组：巴旦杏、香蕉、大麦、西兰花菜、胡萝卜、木薯、蓖麻、菜花、芹菜、鹰嘴豆、椰子、咖啡、玉米、棉花、黄瓜、茄子、桉树、亚麻、大蒜、葡萄、瓜尔豆、啤酒花、韭葱、莴苣、粟、油桃、燕麦、秋葵、橄榄、洋葱、棕榈树、牧草、木瓜、胡椒、马铃薯、白杨树、南瓜、萝卜、油菜籽、稻、黑麦、红花、高粱、大豆、菠菜、西葫芦、草莓、糖甜菜、甘蔗、向日葵、香枫、甘薯、柳枝稷、茶、烟草、番茄、黑小麦、草坪草、西瓜以及小麦。

24.如权利要求22所述的方法，其中所述植物选自由以下组成的组：甜菜、芸苔、柑橘、葫芦、豆科植物、甜瓜、桃、和松树。

25.如权利要求22所述的方法，其中所述半翅目昆虫害虫选自由以下组成的组：草盲蝽属、小绿叶蝉属和芒果叶蝉属。

对半翅目昆虫种类有毒的蛋白质

[0001] 相关申请的交叉引用

[0002] 本申请要求2012年4月6日提交的美国临时申请序列号61/621,436的优先权,所述申请以引用的方式整体并入本文。

[0003] 序列表的并入

[0004] 序列表包含在名为“38_21_56191_APCT_Sequence Listing_ST25.txt”的文件中,所述文件大小为529,794字节(在操作系统MS-Windo ws中测量的)并且在2013年4月4日创建,所述序列表同时通过电子提交方式提交(使用美国专利局EFS-Web提交系统)并且以引用的方式整体并入本文。

发明领域

[0005] 本发明大体上涉及昆虫抑制蛋白领域。具体地说,本发明涉及展示针对农作物的农业相关害虫和昆虫、特别为半翅目种类昆虫害虫的昆虫抑制活性的蛋白质。

[0006] 发明背景

[0007] 源于苏云金芽孢杆菌(Bacillus thuringiensis)(Bt)的昆虫抑制蛋白对人、脊椎动物和植物为无毒的。这些蛋白质也为生物可降解的、安全的和有效于控制害虫昆虫的。这些蛋白质中的一些已经用于并且正在用于通过用包含这些蛋白质的制剂或者用表达它们的微生物喷雾、用包含这些蛋白质的处理法处理种子、或者在农作物和农作物种子中表达这些蛋白质作为并入植物的保护剂来控制农作物的农业相关的害虫。

[0008] 某些半翅目种类,特别是芒果叶蝉属(Amrasca)、小绿叶蝉属(Empoasca)和草盲蝽属(Lygus bug),为棉花和苜蓿的害虫并且通常仅使用可持续存在于环境中并且对环境有害的广谱化学物质例如硫丹、高灭磷和草氨酰来控制。已开发用于由农民商业使用以控制鞘翅目和鳞翅目害虫种类的制剂或者农作物中为转基因性状的一些Bt蛋白,但是没有开发用于商业控制半翅目害虫种类的Bt蛋白。

[0009] 本领域已报道半翅目特异性毒性蛋白。TIC807为美国专利申请公开号US 2008-0295207 A1中公开的对半翅目害虫种类有毒的苏云金芽孢杆菌蛋白。还已公开报道为对鳞翅目种类有毒的非常类似于TIC807的氨基酸序列的Cry51Aa1蛋白(Huang等人,(2007)J.Inverte br.Pathol.95(3),175-180),但是没有报道半翅目特异性活性。Baum等人公开TIC853,其据报道为对草盲蝽属害虫种类有毒的蛋白质(美国专利申请公开号US 2010-0064394A1)。据报道,称为AXMI-171的蛋白质展示对半翅目昆虫(美国专利申请公开号US2010-0298207A1,实施例18)、特别为豆荚草盲蝽(Lygus hesperus)的一些有限的抑制。

[0010] 所有这些蛋白质展示仅针对豆荚草盲蝽的窄范围的毒性并且仅在不认为能通过植物中的表达来实现的高剂量下展示针对其它草盲蝽属害虫种类的毒性作用。与现有技术的半翅目毒性蛋白相比,存在对可用于植物之上或之中、针对半翅目害虫种类并且以低浓度有效剂量展示广泛宿主范围的毒性蛋白的需要。

[0011] 发明简述

[0012] 本文所述的重组工程化的半翅目毒性蛋白(在本文中被称为“工程化毒素蛋白”、

“工程化毒性蛋白”、“工程化半翅目毒性蛋白”、“工程化半翅目毒素蛋白”，当指示两种或更多种此类蛋白质的组时在本文中也以截短形式称为“eHTP’s”，当指示异常时称为“eHTP”)为天然发生的苏云金芽孢杆菌杀昆虫毒素TIC807(SEQ ID NO:2)的衍生物，先前已描述TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)以及AXMI-171(SEQ ID NO:206)展示针对半翅目害虫种类，特别为豆荚草盲蝽昆虫种类的生物控制活性(本文任何其它部分引用的参考文献)。本发明的重组半翅目昆虫毒性蛋白特别为对昆虫害虫芒果叶蝉属、小绿叶蝉属和草盲蝽属种类的昆虫有毒并且对与这些昆虫害虫种类中的每一种系统发生地相关的其它昆虫害虫种类有毒，并且额外地对使用由半翅目害虫种类芒果叶蝉属、小绿叶蝉属和草盲蝽属种类所用的刺入和吸吮机制食用植物的昆虫害虫有毒的。与前体杀昆虫毒素TIC807(SEQ ID NO:2)不同，来源于它们的TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)以及AXMI-171(SEQ ID NO:206)各自需要适度高剂量至高剂量的蛋白质实现对草盲蝽属种类的毒性作用并且展示对第二紧密相关的草盲蝽属种类的极低或者事实上不能检测的毒性作用，本发明的eHTP蛋白质展示针对半翅目昆虫害虫的惊人且意外的低剂量作用，包括跨越所述半翅目内的害虫谱的宿主范围毒性作用。

[0013] 与在SEQ ID NO:2、SEQ ID NO:8、SEQ ID NO:182或SEQ ID NO:184中任一项所列出的毒素蛋白中的一种或多种的初始氨基酸序列相比，本发明的eHTP’s各自包含至少一个氨基酸取代、一个氨基酸添加或者一个氨基酸缺失。在某些实施方案中，提供包含针对草盲蝽属害虫种类的比SEQ ID NO:2(TIC807)、SEQ ID NO:8(TIC807_M2)、SEQ ID NO:182(Cry51Aa1)、SEQ ID NO:184(TIC853)和/或SEQ ID NO:206(AXMI-171)中任一种所列出的毒素中的任何一种或多种大至少约2倍至约260倍的抑制活性的eHTP。任选地，eHTP与选自由SEQ ID NO:2(TIC807)和SEQ ID NO:182(Cry51Aa1)组成的组的毒素蛋白展示至少约95％氨基酸序列同一性。在某些实施方案中，提供在与SEQ ID NO:2,SEQ ID NO:8、SEQ ID NO:182或SEQ ID NO:184中任一项的氨基酸序列相比时包含至少一个氨基酸取代、至少一个氨基酸添加或至少一个氨基酸缺失eHTP。与SEQ ID NO:2、SEQ ID NO:8、SEQ ID NO:182和SEQ ID NO:184中所列出的苏金云芽孢杆菌蛋白的活性和目标害虫种类谱相比，eHTP展示增大或更大的草盲蝽抑制活性和目标害虫种类谱。上述eHTP’s中的每一种均共同地或替代地包含至少：(i)在溶剂可及的SEQ ID NO:2氨基酸残基中的氨基酸取代、添加或缺失；(ii)在溶剂可及的SEQ ID NO:2氨基酸残基的3个连续残基内的氨基酸取代、添加或缺失；或者(iii)在SEQ ID NO:180中列出的氨基酸序列。上述eHTP’s将各种包含至少(参见根据TIC807的氨基酸位置编号的氨基酸序列位置)选自由以下组成的组的一个取代或缺失：在位置12处由天冬氨酸置换天冬酰胺、在位置46处由丝氨酸置换苯丙氨酸、在位置52处由甲硫氨酸置换异亮氨酸、在位置54处由组氨酸置换酪氨酸、在位置68处由丙氨酸置换苏氨酸、在位置70处由丙氨酸置换谷氨酰胺、在位置87处由丝氨酸置换丙氨酸、在位置93处由丙氨酸置换苏氨酸、在位置95处由丙氨酸置换丝氨酸、在位置105处由丙氨酸置换甘氨酸、在位置117处由丙氨酸置换丝氨酸、在位置119处由丙氨酸置换丝氨酸、在位置125处由半胱氨酸、组氨酸、精氨酸、苯丙氨酸、丝氨酸、谷氨酰胺、赖氨酸、苏氨酸、天冬酰胺、丙氨酸、亮氨酸、缬氨酸、甲硫氨酸、天冬氨酸或酪氨酸置换谷氨酸盐(glutamate)、在位置128处由丙氨酸置换甘氨酸、在位置133处由谷氨酸、酪氨酸或色氨酸置换苏氨酸、在位置134处由丙氨

酸、缬氨酸、亮氨酸、苯丙氨酸、赖氨酸、半胱氨酸或甲硫氨酸置换异亮氨酸、在位置135处由丝氨酸、丙氨酸、缬氨酸、色氨酸或苏氨酸置换谷氨酰胺、在位置137处由组氨酸、酪氨酸、苏氨酸、谷氨酸、丝氨酸、丙氨酸、谷氨酰胺、甘氨酸、异亮氨酸、色氨酸、赖氨酸、半胱氨酸、甲硫氨酸、天冬氨酸、苯丙氨酸或精氨酸置换天冬酰胺、在位置138处由缬氨酸置换苯丙氨酸、由丝氨酸置换Ala139、由丙氨酸置换Thr145、由丝氨酸、缬氨酸、苏氨酸、半光氨酸、亮氨酸、天冬氨酸、丙氨酸、氨基乙酸、谷氨酸、异亮氨酸、酪氨酸、甲硫氨酸、天冬酰胺、谷胺酰胺、组氨酸、丙氨酸、精氨酸、色氨酸或脯氨酸置换Phe147、在位置148处由丙氨酸置换谷氨酸盐、在位置149处由天冬氨酸、谷氨酸、半胱氨酸、丙氨酸或苯丙氨酸置换谷氨酸盐、在位置150处由亮氨酸、缬氨酸、甘氨酸、丝氨酸、天冬氨酸、色氨酸、谷氨酸、天冬酰胺、酪氨酸、苯丙氨酸、脯氨酸、赖氨酸、苏氨酸、谷氨酰胺或精氨酸置换丙氨酸、在位置151处由丙氨酸置换丝氨酸、在位置153处由丙氨酸置换天冬氨酸、在位置155处由半胱氨酸、异亮氨酸、赖氨酸、天冬氨酸、组氨酸、酪氨酸、谷氨酰胺、赖氨酸，天冬酰胺、苏氨酸、丙氨酸、苯丙氨酸、精氨酸、甲硫氨酸、脯氨酸、色氨酸、丝氨酸或缬氨酸置换谷氨酸盐、在位置157处由半胱氨酸、天冬氨酸、色氨酸、酪氨酸、甲硫氨酸、丙氨酸、苯丙氨酸、缬氨酸、亮氨酸、脯氨酸、谷氨酸、苏氨酸、甘氨酸、异亮氨酸或精氨酸置换天冬酰胺、在位置158处由丙氨酸置换异亮氨酸、在位置159处由丙氨酸或苏氨酸置换丝氨酸、在位置167处由精氨酸或丙氨酸置换丝氨酸、在位置175处由丙氨酸置换缬氨酸、在位置177处由丙氨酸置换甲硫氨酸、在位置180处由天冬氨酸置换天冬酰胺、在位置182处由丙氨酸置换苏氨酸、在位置187处由丙氨酸置换亮氨酸、在位置196处缺失组氨酸、在位置197处缺失酪氨酸、在位置198处缺失丝氨酸、在位置199处缺失组氨酸、在位置200处由丙氨酸置换酪氨酸、在位置200处缺失酪氨酸、由丙氨酸置换Ser201、在位置201处缺失丝氨酸、在位置208处由丙氨酸置换色氨酸、在位置217处由天冬酰胺置换丝氨酸、在位置219处由精氨酸置换脯氨酸、在位置223处由酪氨酸置换色氨酸、在位置235处由丙氨酸置换苯丙氨酸、在位置239处由丙氨酸置换天冬酰胺、在位置241处由丙氨酸置换天冬氨酸、在位置243处由丙氨酸置换苏氨酸、在位置244处由异亮氨酸置换缬氨酸、在位置245处由丙氨酸置换苏氨酸、在位置246处由苯丙氨酸置换酪氨酸、在位置247处由丙氨酸或赖氨酸置换苏氨酸、在位置249处由丙氨酸或精氨酸置换丝氨酸、在位置250处由丙氨酸置换缬氨酸、在位置251处由丙氨酸置换缬氨酸、在位置252处由丙氨酸置换丝氨酸、在位置273处由色氨酸置换精氨酸、在位置274处由丙氨酸置换苏氨酸、在位置275处由丙氨酸置换异亮氨酸、在位置282处由丙氨酸置换精氨酸、在位置287处由丙氨酸或苯丙氨酸置换组氨酸、在位置293处由丙氨酸置换丝氨酸、在位置295处由丙氨酸置换天冬酰胺、在位置299处由由丙氨酸置换谷氨酸盐、在位置300处由丙氨酸置换甲硫氨酸、在位置303处由丙氨酸置换苏氨酸、在位置305处由丙氨酸置换脯氨酸、在位置306处由丙氨酸置换异亮氨酸、以及在位置308处由丙氨酸置换苏氨酸，或者其中所述蛋白质包括所引用的取代和/或缺失的任何组合。eHTP’s在SEQ ID NO:2的氨基酸残基或者在SEQ ID NO:8、SEQ ID NO:182或SEQ ID NO:184的对应氨基酸位置处包含至少一个氨基酸取代、一个氨基酸添加或一个氨基酸缺失，所述对应氨基酸位置选自由以下组成的组：(i)具有至少约15％到至少约36％的相对溶剂可及性(solvent-accessibility)的氨基酸残基；以及(ii)位于来自具有至少约15％到至少约36％相对溶剂可及性的氨基酸的约3个连续残基距离内的氨基酸残基。本发明的eHTP在选自由SEQ ID NO:2的以下组成的组的氨基酸残基处包含至少一个氨基酸取

代、添加或缺失：Thr93、Ser95、Ser97、Phe147、Gln149、Ser151、Asn180、Thr182、Val251、Gln253以及Ser255。任何上述eHTP's可在选自由SEQ ID NO:2的以下各项组成的组的氨基酸残基或者SEQ ID NO:8、SEQ ID NO:182或SEQ ID NO:184的对应氨基酸残基位置处包含至少一个额外的氨基酸取代、添加或缺失：Val10、Ile14、Asn22、Asn23、Gly24、Ile25、Gln26、Gly27、Phe30、Gln38、Ile39、Asp40、Thr41、Ile43、Ser193、Thr194、Glu195、His196、Tyr197、Ser198、His199、Tyr200、Ser201、Gly202、Tyr203、Pro204、Ile205、Leu206、Thr207、Trp208、Ile209、Ser210、Tyr216、Ser217、Gly218、Pro219、Pro220、Met221、Ser222、Trp223、Tyr224、Phe225、Asn239以及Val244。任何上述eHTP's可包含选自由以下组成的组的一个或多个修饰：S95A、F147A、Q149E、V251A、P219R、以及来自SEQ ID NO:2中所列出的氨基酸残基196-201的任何三个连续氨基酸的缺失。可进一步修饰本发明的任何eHTP's，以与SEQ ID NO:2、SEQ ID NO:8、SEQ ID NO:182或SEQ ID NO:184中任一项所列出的潜在天然发生的苏云金芽孢杆菌蛋白相比展示增加的溶解度，其中eHTP相对于SEQ ID NO:2中所列出的氨基酸序列包含至少一个或多个氨基酸序列修饰。一个或多个修饰在限定为SEQ ID NO:2中的58、59、198、199、201或202的一个或多个氨基酸位置处包含至少一个赖氨酸取代；在限定为SEQ ID NO:2中的198、248或301的一个或多个氨基酸位置处包含谷氨酸残基取代；或者在限定为SEQ ID NO:2的246、250或253的一个或多个氨基酸处包含精氨酸残基取代。具有选自由以下组成的组的氨基酸序列的eHTP为本发明的优选实施方案：SEQ ID NO:6、SEQ ID NO:8、SEQ ID NO:10、SEQ ID NO:12、SEQ ID NO:14、SEQ ID NO:16、SEQ ID NO:18、SEQ ID NO:20、SEQ ID NO:28、SEQ ID NO:30、SEQ ID NO:32、SEQ ID NO:34、SEQ ID NO:36、SEQ ID NO:37、SEQ ID NO:38、SEQ ID NO:39、SEQ ID NO:40、SEQ ID NO:41、SEQ ID NO:42、SEQ ID NO:43、SEQ ID NO:44、SEQ ID NO:45、SEQ ID NO:46、SEQ ID NO:47、SEQ ID NO:48、SEQ ID NO:49、SEQ ID NO:50、SEQ ID NO:51、SEQ ID NO:52、SEQ ID NO:53、SEQ ID NO:54、SEQ ID NO:55、SEQ ID NO:56、SEQ ID NO:57、SEQ ID NO:58、SEQ ID NO:59、SEQ ID NO:60、SEQ ID NO:61、SEQ ID NO:62、SEQ ID NO:63、SEQ ID NO:64、SEQ ID NO:65、SEQ ID NO:66、SEQ ID NO:67、SEQ ID NO:68、SEQ ID NO:69、SEQ ID NO:70、SEQ ID NO:71、SEQ ID NO:72、SEQ ID NO:73、SEQ ID NO:74、SEQ ID NO:75、SEQ ID NO:76、SEQ ID NO:77、SEQ ID NO:78、SEQ ID NO:79、SEQ ID NO:80、SEQ ID NO:81、SEQ ID NO:82、SEQ ID NO:83、SEQ ID NO:84、SEQ ID NO:85、SEQ ID NO:86、SEQ ID NO:87、SEQ ID NO:88、SEQ ID NO:89、SEQ ID NO:90、SEQ ID NO:91、SEQ ID NO:92、SEQ ID NO:93、SEQ ID NO:94、SEQ ID NO:95、SEQ ID NO:96、SEQ ID NO:97、SEQ ID NO:98、SEQ ID NO:99、SEQ ID NO:100、SEQ ID NO:101、SEQ ID NO:102、SEQ ID NO:103、SEQ ID NO:104、SEQ ID NO:105、SEQ ID NO:106、SEQ ID NO:107、SEQ ID NO:108、SEQ ID NO:109、SEQ ID NO:110、SEQ ID NO:111、SEQ ID NO:112、SEQ ID NO:113、SEQ ID NO:114、SEQ ID NO:115、SEQ ID NO:116、SEQ ID NO:117、SEQ ID NO:118、SEQ ID NO:119、SEQ ID NO:120、SEQ ID NO:121、SEQ ID NO:122、SEQ ID NO:13、SEQ ID NO:124、SEQ ID NO:125、SEQ ID NO:126、SEQ ID NO:127、SEQ ID NO:128、SEQ ID NO:129、SEQ ID NO:130、SEQ ID NO:131、SEQ ID NO:132、SEQ ID NO:133、SEQ ID NO:134、SEQ ID NO:135、SEQ ID NO:136、SEQ ID NO:137、SEQ ID NO:138、SEQ ID NO:139、SEQ ID NO:140、SEQ ID NO:141、SEQ ID NO:142、SEQ ID NO:143、SEQ ID NO:144、SEQ ID NO:145、SEQ ID NO:146、SEQ ID NO:147、SEQ ID NO:148、SEQ ID NO:149、SEQ ID NO:150、SEQ ID NO:151、SEQ ID NO:

152、SEQ ID NO:153、SEQ ID NO:154、SEQ ID NO:155、SEQ ID NO:156、SEQ ID NO:157、SEQ ID NO:158、SEQ ID NO:159、SEQ ID NO:160、SEQ ID NO:161、SEQ ID NO:162、SEQ ID NO:163、SEQ ID NO:164、SEQ ID NO:165、SEQ ID NO:166、SEQ ID NO:167、SEQ ID NO:168、SEQ ID NO:169、SEQ ID NO:170、SEQ ID NO:171、SEQ ID NO:172、SEQ ID NO:173、SEQ ID NO:174、SEQ ID NO:175、SEQ ID NO:176、SEQ ID NO:177、SEQ ID NO:178、SEQ ID NO:179、SEQ ID NO:202以及SEQ ID NO:204,或者其昆虫抑制片段。通过本发明的eHTP's抑制的目标半翅目害虫种类包括至少豆荚草盲蝽、美国牧草盲蝽(Lygus lineolaris)、马铃薯小绿叶蝉(Empoasca fabae)和苯甲醛对叶蝉(Amrasca devastans)、以及系统发生地彼此相关或者使用刺入和吸吮方法摄食植物的半翅目内的其它害虫。

[0014] 还提供通过使害虫与半翅目抑制量的本发明的eHTP以及包含至少半翅目控制量(或半翅目抑制量)的一种或多种本发明的eHTP's的昆虫抑制组合物接触来控制半翅目害虫的方法。在某些实施方案中,提供包含任何本文所公开的eHTP's的昆虫抑制组合物。在这些方法的某些实施方案中,半翅目害虫处于棉田、大豆田或者苜蓿田中。半翅目毒性或者半翅目控制组合物可包含至少一种或多种eHTP连同选自由以下组成的组的补充剂:昆虫抑制蛋白、昆虫抑制dsRNA分子和昆虫抑制化学物质。这些试剂中的每一种均可展示半翅目控制特性,可展示用于控制与半翅目种类无关的害虫如鳞翅目种类或鞘翅目种类的特性,或者可展示双重模式的作用特性,在所述作用特性中能同时控制一种或多种半翅目种类和一种或多种鳞翅目或鞘翅目种类。

[0015] 提供编码本发明的eHTP's的重组多核苷酸。还提供包含本发明的多核苷酸的微生物,并且此类微生物内的此类多核苷酸官能定位于设计成从可操作地连接的官能基因调控元件表达本发明的eHTP's的表达盒中。微生物意图包括细菌细胞以及转基因植物细胞。此类转基因植物细胞可再生到全株植物或者也包含重组多核苷酸的植物部分中。提供通过使害虫暴露于微生物(无论细菌细胞或转基因植物细胞、植物或植物部分,每一种均表达半翅目抑制量的eHTP)来控制半翅目害虫的方法。重组多核苷酸可包含选自由以下组成的组的核苷酸序列:SEQ ID NO:1、SEQ ID NO:3、SEQ ID NO:5、SEQ ID NO:7、SEQ ID NO:9、SEQ ID NO:11、SEQ ID NO:13、SEQ ID NO:15、SEQ ID NO:17、SEQ ID NO:19、SEQ ID NO:21、SEQ ID NO:23、SEQ ID NO:25、SEQ ID NO:27、SEQ ID NO:29、SEQ ID NO:31、SEQ ID NO:33、SEQ ID NO:35、SEQ ID NO:186、SEQ ID NO:187、SEQ ID NO:188、SEQ ID NO:189、SEQ ID NO:190、SEQ ID NO:191、SEQ ID NO:192、SEQ ID NO:193、SEQ ID NO:194、SEQ ID NO:195、SEQ ID NO:196、SEQ ID NO:197、SEQ ID NO:198、SEQ ID NO:199、SEQ ID NO:200、SEQ ID NO:201以及SEQ ID NO:203,或者可组装来编码本发明的一种或多种蛋白质的其它序列。在某些实施方案中,重组多核苷酸可进一步包含编码与由重组多核苷酸编码的eHTP不同的一种或多种昆虫抑制试剂的核苷酸序列。转基因植物部分为种子、圆荚、叶、花、花粉、茎、根或其任何部分。转基因植物部分可为种子、圆荚、叶、花、茎或根的不可再生部分。还提供控制半翅目害虫的方法,所述方法包括将转基因微生物、细菌、植物细胞、植物或植物部分暴露于目标害虫,其中所述微生物、细菌、植物细胞、植物或植物部分表达半翅目抑制量的由重组多核苷酸编码的eHTP。

[0016] 还提供包含可检测量的编码eHTP或其任何区分的半翅目控制部分的重组多核苷酸的处理的植物产品。此类处理的产品包括但不限于植物生物质、油、膳食、动物饲料、面

粉、玉米片、糠、皮棉、果壳以及处理的种子。处理的产品可为不可再生的。

[0017] 还提供通过将重组多核苷酸引入植物细胞中并且选择表达昆虫抑制量的由所述重组多核苷酸编码的eHTP的转基因植物来制备转基因植物的方法。所述方法包括将编码本文所提供的任何eHTP's的重组多核苷酸引入到植物细胞中以及选择表达昆虫抑制量的由所述重组多核苷酸编码的eHTP的转基因植物。

[0018] 本发明的其它实施方案、特征和优点通过以下详述、实施例和权利要求书将为显而易见。

[0019] 附图简述

[0020] 图1示出针对eHTP蛋白质浓度绘图的草盲蝽属种类的死亡率。图1A示出与包含天然发生的TIC807蛋白质的对照样品相比，响应于各种浓度的四种不同eHTP's的豆荚草盲蝽群体的死亡率。图1B示出与包含天然发生的TIC807蛋白质的对照样品相比，响应于各种蛋白质浓度的三种不同eHTP's的美国牧草盲蝽群体的死亡率。

[0021] 图2示出本发明的半翅目毒性蛋白的原子结构的带状图，其显示所得有效变化的相对位置与TIC807或相关蛋白质内的相同氨基酸位置的相对位置相比，增大毒性作用和/或扩大宿主范围特异性。两个曲面片(surface patch)由带状图的原子结构内的球体环绕的特定残基位置所示出：[1]一个球体相对于S95的β碳原子(相对于SEQ ID NO:2中所列出的S95位置)具有约9.2埃至约12.2埃的原子半径；[2]另一个球体相对于P219的β碳原子(相对于SEQ ID NO:2中所列出的P219位置)具有约9.2埃至约12.2埃的原子半径。与在特定位置具有天然发生的氨基酸的蛋白质相比，对属于这些球体内的带状结构中的氨基酸的变化有效地引起毒性特性增强和宿主范围毒性作用扩大。

[0022] 图3为示出彼此相比并且与天然发生的TIC807蛋白质相比，对于十三种不同eHTP's，草盲蝽属种类的群体死亡率的图表视图。

[0023] 详述

[0024] 本申请描述eHTP's(工程化半翅目种类毒性蛋白)。本发明的eHTP's区别于蛋白质如TIC807、TIC853、Cry51Aa1和AXMI-171，这些蛋白质为本领域已知的并且并不被认为处于术语eHTP的范围或定义中，因为现有技术蛋白质未工程化为展示针对一种或多种半翅目害虫种类的改进的毒性特性并且没有展示广泛宿主范围水平的抑制活性。eHTP's惊人地且意外地展示针对半翅目和相关害虫种类的高水平毒性活性。发现这些eHTP's甚至更意外和惊人的额外特征为，与为本发明的eHTP's提供基本基础的祖蛋白相比，这些蛋白质展示更广泛的宿主范围的毒性特征。基础或基线支架毒素蛋白如TIC807(SEQ ID NO:2)、Cry51Aa1(SEQ ID NO:8)、TIC853(SEQ ID NO:184)以及AXMI-171(SEQ ID NO:206)不展示生物抗半翅目活性的宽度和范围或者本发明的eHTP蛋白质的宿主范围。

[0025] 测试超过2000种源于苏云金芽孢杆菌的半翅目毒性蛋白的不同氨基酸序列变体，以确定本文所述的特定氨基酸插入、取代或缺失，这些与基线支架蛋白TIC807、TIC853和Cry51Aa1的谱和活性相比，赋予扩大半翅目种类宿主范围抑制谱并且还提供显著增大的半翅目种类抑制活性。确定基线支架蛋白内的氨基酸残基以使得：(a)可进行修饰以相对于一种或多种支架蛋白产生增大的半翅目抑制谱和/或提高的草盲蝽抑制活性；(b)在展示一种或多种支架蛋白的折叠结构的折叠昆虫抑制蛋白的曲面片中积累；和/或(c)在一种或多种支架蛋白氨基酸序列的特定位置中发生，这有效引起用于控制半翅目种类和扩大由eHTP蛋

白质影响的半翅目种类的范围的所得eHTP蛋白平均有效剂量减小。

[0026] 半翅目害虫种类意图意指通过划破或刺入目标植物的表面来摄食植物和植物组织，并且然后通过吸吮或吸入合并的渗出物来消耗在划破或刺入位置合并的浸渍的植物渗出物的昆虫。此类昆虫包括成虫和蛹，包括但不限于以下列出的植物臭虫：盲蝽科族、来自蝉科族的蝉、来自叶蝉科族的叶蝉(例如，小绿叶蝉某些种(Empoasca spp.)芒果叶蝉某些种(Amrasca spp.))、来自蜡蝉总科和飞虱科族的飞虱、来自角蝉科族的角蝉、来自木虱科族的木虱、来自粉虱科族的粉虱、来自蚜科族的蚜虫、来自根瘤蚜科的葡萄根瘤蚜、来自粉蚧科族的粉蚧、来自介壳虫科、盾蚧科和硕介壳虫科族的介壳虫、来自网蝽科族的网蝽、来自椿象科族的椿象、来自长蝽科族的美洲谷长蝽(cinch bug)(例如，土长蝽属某些种(Blissus spp.))和其它长春、来自沫蝉科族的沫蝉、来自缘蝽科族的南瓜虫、以及来自红蝽科族的红蝽和污棉虫。来自半翅目的其它害虫包括拟绿蝽(Acrosternum hilare)(稻绿蝽)、南瓜缘蝽(Anasa tristis)(南瓜虫)、美洲毛谷杆长蝽(Blissus leucopterus leucopterus)(美洲谷长蝽)、棉方翅网蝽(Corythuca gossypii)(棉网椿)、Cyrtopeltis modesta(番茄椿)、Dysdercus suturellus(污棉虫)、Euschistus servus(布朗椿象)、Euschistus variolarius(单点椿象(one-spotted stink bug))、红腺长椿象某些种(Graptostethus spp.)(长蝽复合体)、Leptoglossus corculus(缘蝽松子科(leaf-footed pine seed bug))、美国牧草盲蝽(美国牧草盲蝽)、豆荚草盲蝽(豆荚草盲蝽(Western tarnish plant bug))、稻绿蝽(Nezara viridula)(稻绿蝽(southern green stink bug))、美洲稻蝽(Oebalus pugnax)(麦蝽(rice stink bug))、马利筋长蝽(Oncopeltus fasciatus)(大马利筋长蝽)以及棉跳盲蝽(Pseudatomoscelis seriatus)(棉跳盲蝽(cotton fleahopper))。更确切地说，叶蝉科族包括但不限于小绿叶蝉族族，例如二点小绿叶蝉(Amrasca biguttula)、苯甲醛对叶蝉、Austroasca viridigrisea、Asymmetrasca decedens、Empoasca decipiens、Empoasca distinguenda、Empoasca dolichi、马铃薯小绿叶蝉(Empoasca fabae)、Empoasca kerri、Empoasca kraemeri、Empoasca onukii、Empoasca sakaii、Empoasca smithi、假眼小绿叶蝉(Empoasca vitis)、Jacobiasca lybica、Sonasasca Solana；斑叶蝉族，例如，Empoascanara nagpurensis、Thaiaassamensis、Zygnidia quyumi；Nirvaniae族，例如，Sophonia rufofascia；飞虱科族，例如，褐飞虱科(Nilapoarvata lugens)、白背飞虱(Sogatella furcifera)、白脊飞虱(Unkanodes sapporonus)；以及短足蜡蝉科族，例如，Zophiuma lobulata。

[0027] 本发明的eHTP's与一种或多种支架蛋白相比在七十二(72)个不同氨基酸位置上包含氨基酸残基的一个或多个氨基酸序列修饰，包括取代和缺失。此类修饰提供在与一种或多种支架蛋白相比时针对半翅目昆虫具有增加的毒性和/或增大的抑制谱的eHTP's，所述支架蛋白包括但不限于TIC807(SEQ ID NO:2)或者相关蛋白如TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)以及TIC853(SEQ ID NO:184)。eHTP's包括但不限于在任何这七十二个位置上的至少一个氨基酸取代或一个氨基酸缺失的修饰(在SEQ ID NO:180所列出的氨基酸序列中被称为“X”)，但是不包括SEQ ID NO:2、SEQ ID NO:8、SEQ ID NO:182或SEQ ID NO:184的氨基酸序列。本发明的eHTP's在与基线蛋白或者支架蛋白的谱和活性相比时还展示增大的半翅目抑制谱和/或提高的半翅目抑制活性。

[0028] eHTP's包括TIC807(SEQ ID NO:2)的相对位置的至少一个氨基酸修饰，如以上段

落[0009]所列出的。eHTP's还可包括上述这些氨基酸取代和/或缺失中的至少两个、三个、四个或更多个并且还可包括这些氨基酸取代和/或缺失中的至少两个、三个、四个或更多个以及在SEQ ID NO:2残基196-201内的任何三个连续氨基酸的缺失。因此，eHTP's包括如下所列出的蛋白质：SEQ ID NO:6、SEQ ID NO:8、SEQ ID NO:10、SEQ ID NO:12、SEQ ID NO:14、SEQ ID NO:16、SEQ ID NO:18、SEQ ID NO:20、SEQ ID NO:28、SEQ ID NO:30、SEQ ID NO:32、SEQ ID NO:34、SEQ ID NO:36、SEQ ID NO:37、SEQ ID NO:38、SEQ ID NO:39、SEQ ID NO:40、SEQ ID NO:41、SEQ ID NO:42、SEQ ID NO:43、SEQ ID NO:44、SEQ ID NO:45、SEQ ID NO:46、SEQ ID NO:47、SEQ ID NO:48、SEQ ID NO:49、SEQ ID NO:50、SEQ ID NO:51、SEQ ID NO:52、SEQ ID NO:53、SEQ ID NO:54、SEQ ID NO:55、SEQ ID NO:56、SEQ ID NO:57、SEQ ID NO:58、SEQ ID NO:59、SEQ ID NO:60、SEQ ID NO:61、SEQ ID NO:62、SEQ ID NO:63、SEQ ID NO:64、SEQ ID NO:65、SEQ ID NO:66、SEQ ID NO:67、SEQ ID NO:68、SEQ ID NO:69、SEQ ID NO:70、SEQ ID NO:71、SEQ ID NO:72、SEQ ID NO:73、SEQ ID NO:74、SEQ ID NO:75、SEQ ID NO:76、SEQ ID NO:77、SEQ ID NO:78、SEQ ID NO:79、SEQ ID NO:80、SEQ ID NO:81、SEQ ID NO:82、SEQ ID NO:83、SEQ ID NO:84、SEQ ID NO:85、SEQ ID NO:86、SEQ ID NO:87、SEQ ID NO:88、SEQ ID NO:89、SEQ ID NO:90、SEQ ID NO:91、SEQ ID NO:92、SEQ ID NO:93、SEQ ID NO:94、SEQ ID NO:95、SEQ ID NO:96、SEQ ID NO:97、SEQ ID NO:98、SEQ ID NO:99、SEQ ID NO:100、SEQ ID NO:101、SEQ ID NO:102、SEQ ID NO:103、SEQ ID NO:104、SEQ ID NO:105、SEQ ID NO:106、SEQ ID NO:107、SEQ ID NO:108、SEQ ID NO:109、SEQ ID NO:110、SEQ ID NO:111、SEQ ID NO:112、SEQ ID NO:113、SEQ ID NO:114、SEQ ID NO:115、SEQ ID NO:116、SEQ ID NO:117、SEQ ID NO:118、SEQ ID NO:119、SEQ ID NO:120、SEQ ID NO:121、SEQ ID NO:122、SEQ ID NO:123、SEQ ID NO:124、SEQ ID NO:125、SEQ ID NO:126、SEQ ID NO:127、SEQ ID NO:128、SEQ ID NO:129、SEQ ID NO:130、SEQ ID NO:131、SEQ ID NO:132、SEQ ID NO:133、SEQ ID NO:134、SEQ ID NO:135、SEQ ID NO:136、SEQ ID NO:137、SEQ ID NO:138、SEQ ID NO:139、SEQ ID NO:140、SEQ ID NO:141、SEQ ID NO:142、SEQ ID NO:143、SEQ ID NO:144、SEQ ID NO:145、SEQ ID NO:146、SEQ ID NO:147、SEQ ID NO:148、SEQ ID NO:149、SEQ ID NO:150、SEQ ID NO:151、SEQ ID NO:152、SEQ ID NO:153、SEQ ID NO:154、SEQ ID NO:155、SEQ ID NO:156、SEQ ID NO:157、SEQ ID NO:158、SEQ ID NO:159、SEQ ID NO:160、SEQ ID NO:161、SEQ ID NO:162、SEQ ID NO:163、SEQ ID NO:164、SEQ ID NO:165、SEQ ID NO:166、SEQ ID NO:167、SEQ ID NO:168、SEQ ID NO:169、SEQ ID NO:170、SEQ ID NO:171、SEQ ID NO:172、SEQ ID NO:173、SEQ ID NO:174、SEQ ID NO:175、SEQ ID NO:176、SEQ ID NO:177、SEQ ID NO:178、SEQ ID NO:179、SEQ ID NO:202以及SEQ ID NO:204，或者其昆虫抑制片段。

[0029] 本发明的eHTP's展示在至少一个氨基酸位置上不同于一种或多种支架蛋白(包括SEQ ID NO:2(TIC807))的任何氨基酸序列，其中不同氨基酸残基(i)与任何一种或多种支架蛋白中的相同残基位置相比具有至少从约15％到至少约36％的相对氨基酸溶剂可及性；和/或(ii)位于从与一种或多种支架蛋白的初始氨基酸序列内的对应氨基酸残基位置相比具有至少从约15％到至少约36％相对溶剂可及性的氨基酸的约3个连续氨基酸残基的距离内，并且在与一种或多种支架蛋白相关联的活性相比时展示扩大的半翅目抑制谱和/或增大的半翅目抑制活性。单词“增大的谱”意图意指，参照展示对特定单一害虫的毒性作用的

两种不同蛋白质，展示增大的谱的蛋白质展示对该特定单一害虫以及处于相同系统发生目的一种或多种其它害虫以及在不同于特定单一害虫所属的目的一种或多种不同系统发生目中的一种或多种其它害虫的毒性作用。单词“增大的半翅目抑制活性”意图意指在标准条件下，展示此类增大的活性的特定蛋白质需要比对照蛋白质更低量的该蛋白质实现特定的影响，如死亡率、生长缓慢、发病率、进食停止或者对特定单一害虫的另一种可测量的表型作用。

[0030] eHTP’s展示在位于折叠昆虫抑制蛋白的两个不同曲面片中的至少一个内的至少一个氨基酸残基中不同于一种或多种支架蛋白(具体包括TIC807)的氨基酸序列(参见图2和表3数据)。一个曲面片被限定为包括涵盖于球体(图2，球[1])内的氨基酸残基，所述球体在该蛋白质在生理条件下被折叠到三维结构中时相对于SEQ ID NO:2所列出的Ser95β碳(Cb)原子具有约9.2埃至约12.2埃的原子半径；所述氨基酸残基包括残基Thr93、Ser95、Ser97、Phe147、Gln149、Ser151、Asn180、Thr182、Val251、Gln253以及Ser255。如本文所用短语“Cb原子”是指氨基酸残基侧链上的β碳原子。因此，所述Cb原子为蛋白质侧链中的第一个碳，其存在于所有氨基酸残基中，除Glycyl残基之外。参照图1，eHTP’s可包括但不限于一种或多种支架蛋白、具体为SEQ ID NO:2(TIC807)内的曲面片[1]氨基酸残基T93、S95、S97、F147、Q149、S151、N180、T182、V251、Q253以及S255或者等效氨基酸的一个或多个保守或非保守的取代。eHTP’s可包括但不限于曲面片[1]氨基酸残基的一个或多个取代，如：T93A；S95A、S95V、S95L或S95I；F147T、F147C、F147D、F147G、F147E、F147Y、F147M、F147N、F147Q、F147H、F147R、F147W、F147P、F147A、F147V、F147L或F147I；Q149A、Q149C、Q149F、Q149E或Q149D；S151A；N180D；T182A；V251E或V251A；和/或Q253R。其它或第二曲面片已确定为接受有效地赋予提高的半翅目抑制生物活性的修饰的氨基酸残基(本发明的eHTP’s形式)，所述第二曲面片当在生理条件下可应用的支架蛋白中任一种折叠到三维结构中时，被限定为包括涵盖于球体内的氨基酸残基，所述球体相对于一种或多种支架蛋白(具体地为SEQ ID NO:2所列出的)的Pro219β碳原子或等效氨基酸位置具有约9.2埃到约12.2埃的原子半径(图2，球体[2])，所述氨基酸残基包括残基Val10、Ile14、Asn22、Asn23、Gly24、Ile25、Gln26、Gly27、Phe30、Gln38、Ile39、Asp40、Thr41、Ile43、Ser193、Thr194、Glu195、His196、Tyr197、Ser198、His199、Tyr200、Ser201、Gly202、Tyr203、Pro204、Ile205、Leu206、Thr207、Trp208、Ile209、Ser210、Tyr216、Ser217、Gly218、Pro219、Pro220、Met221、Ser222、Trp223、Tyr224、Phe225、Asn239以及Val244。此类eHTP’s可包括但不限于在SEQ ID NO:2(TIC807)的曲面片[2]内的一个或多个保守或非保守的氨基酸残基取代和/或一个或多个氨基酸缺失，包括Val10、Ile14、Asn22、Asn23、Gly24、Ile25、Gln26、Gly27、Phe30、Gln38、Ile39、Asp40、Thr41、Ile43、Ser193、Thr194、Glu195、His196、Tyr197、Ser198、His199、Tyr200、Ser201、Gly202、Tyr203、Pro204、Ile205、Leu206、Thr207、Trp208、Ile209、Ser210、Tyr216、Ser217、Gly218、Pro219、Pro220、Met221、Ser222、Trp223、Tyr224、Phe225、Asn239以及Val244。eHTP’s可包括但不限于位于曲面片[2]内的氨基酸残基的一个或多个取代和/或缺失，如：序列中的任何三个连续氨基酸残基的缺失His196、Tyr197、Ser198、His199、Tyr200、Ser201；Ser217Asn、Ser217Gln、Ser217Arg；和/或Pro219Arg、Pro219Asn、Pro219Gln。eHTP’s可包括但不限于曲面片[2]内的一个或多个氨基酸残基取代和/或缺失，如：序列中的任何三个连续HisTyrSer残基的缺失His196、Tyr197、Ser198、His199、Tyr200、Ser201；

Ser217Asn、Ser217Gln、Ser217Arg;和/或Pro219Arg、Pro219Asn、Pro219Gln。eHTP可在折叠昆虫抑制蛋白的两个上述曲面片中的每一个中具有至少一个氨基酸修饰。eHTP可在相对于SEQ ID NO:2(TIC807)的残基T93、S95、F147、Q149、S151、N180、T182、H196、Y197、S198、H199、Y200、S201、W208、S217、P219、W223、N239、V244或V251处具有一个修饰或者多于一个修饰的组合。可通过用相同类型的另一种氨基酸取代酸性、碱性、中性极性或中性非极性类型的氨基酸进行保守氨基酸改变。可通过用不同类型的氨基酸取代酸性、碱性、中性极性或中性非极性氨基酸类型进行非保守氨基酸改变。此外,在表4B所列出的eHTP蛋白质中,所有267都为在与一种或多种支架蛋白、包括支架蛋白TIC807比较时对草盲蝽属某些种展示增大的毒性的氨基酸序列变体。与位于两个参考曲面片之外的一种或多种支架蛋白相比,这些氨基酸序列变体中仅十种展示修饰的氨基酸残基。

[0031] 现有技术教导与支架蛋白有关的溶解性问题。eHTP's与支架蛋白相比展示提高的溶解度并且与观察到的一种或多种支架蛋白的溶解度特性相比,大体上在小于9.0的pH下展示增大的溶解度。当eHTP在大肠杆菌、植物细胞、植物细胞细胞质、植物细胞质外体或在植物细胞的质体内表达或者靶向输入到植物细胞的质体中时,在更生理的pH下,此增大的溶解度为明显的。相对于一种或多种支架蛋白、包括SEQ ID NO:2(TIC807)提高溶解度的氨基酸修饰包括但不限于,在一个TIC807的以下氨基酸位置中的一个或多个位置上的赖氨酸氨基酸残基或者在任何其它支架蛋白中可应用的残基的取代:58、59、198、199、201或202;或者在氨基酸位置198、248或301中的一个或多个位置上的谷氨酸氨基酸残基的取代;或者在氨基酸位置246、250或253中的一个或多个位置处的精氨酸氨基酸残基的取代。

[0032] 还提供包含上述eHTP's的昆虫抑制组合物。此类组合物可进一步包括至少一种不同于组合物所包含的eHTP的另外的昆虫抑制剂。昆虫抑制剂选自任何数目的昆虫抑制剂,包括昆虫抑制蛋白、昆虫抑制dsRNA分子以及适用于控制昆虫害虫的一种或多种化学剂。另外的抑制剂实例包括但不限于,TIC1415蛋白质、针对半翅目直系同源的褐飞虱V-ATP酶-E的dsRNA、21E01、针对半翅目直系同源的肌动蛋白直系同源的dsRNA、ADP/ATP移位酶、α-微管蛋白、核糖体蛋白L9(RPL9)或者V-ATP酶A亚基、AXMI-171(US20100298207A1)、Cry3A、Cry4Aa、Cry11Aa以及Cyt1Aa、DIG11、DIG5、Cry7、eCry3.1Ab、mCry3A、Cry8、Cry34/Cry35、Cry3、DIG2、Cry1、Cry1A.105、Cry2、Cry1F、VIP3、5307以及Cry9。适用于控制半翅目种类的化学剂包括但不限于,除虫菊素和合成的除虫菊素;二嗪衍生物;氯代烟碱基;硝基胍衍生物;三唑;有机磷酸酯;吡咯;吡唑;苯基吡唑;双酰肼;生物/发酵产品;以及氨基甲酸酯。属于这些类别的已知杀虫剂列出在The Pesticide Manual,第11版,C.D.S.Tomlin,Ed.,British Crop Protection Council,Farnham,Surry,UK(1997)中。

[0033] 适用于本组合物的拟除虫菊酯包括除虫菊素和合成的除虫菊素。优选用于本方法中的除虫菊素包括而不限于,2,2-二甲基-3-(2甲基丙烯基)-环丙烷羧酸的2-烯丙基-4-羟基-3-甲基-2-环戊烯-1-酮酯和/或(2-甲基-1-丙烯基)-2-甲氧基-4-氧代-3-(2丙烯基)-2-环戊烯-1-基酯以及其顺式和反式异构体的混合物(化学文摘社登记号("CAS RN")8003-34-7)。

[0034] 优选用于本发明的合成的拟除虫菊酯包括4-氯α(1-甲基乙基)苯乙酸(s)-氰基(3-苯氧基苯基)甲酯(氰戊菊酯,CAS RN 51630-58-1)、(S)-4-氯-α-(1-甲基乙基)苯乙酸(S)-氰基(3-苯氧基苯基)甲酯(高氰戊菊酯,CAS RN 66230-04-4)、(+)顺式-反式-3-(2,2-

二氯乙烯基)-2,2-二甲基环丙烷羧酸(3-苯氧基苯基)-甲酯(苄氯菊酯,CAS RN 52645-53-1)、(+)-顺式,反式-3-(2,2-二氯乙烯基)-2,2-二甲基-环丙烷羧酸(±)α-氰基-(3-苯氧基苯基)甲酯(氯氰菊酯,CAS RN 52315-07-8)、(β-氯氰菊酯,CAS RN 65731-84-2)、(θ氯氰菊酯,CAS RN 71697-59-1)、(±)顺式/反式3-(2,2-二氯乙烯基)2,2二甲基环丙烷羧酸S-氰基(3-苯氧基苯基)甲酯(ζ-氯氰菊酯,CAS RN 52315-07-8)、(1R,3R)-3-(2,2-二溴乙烯基)-2,2-二甲基环丙烷羧酸(s)-α-氰基-3-苯氧基苄酯(溴氰菊酯,CAS RN 52918-63-5)、2,2,3,3,-四甲基环丙烷羧酸α-氰基-3-苯氧基苄酯(甲氰菊酯,CAS RN 64257-84-7)、(R)-2-[2-氯-4-(三氟甲基)苯胺基]-3-甲基丁酸(RS)-α-氰基-3-苯氧基苄酯(τ-氟胺氰菊酯,CAS RN102851-06-9)、(2,3,5,6-四氟-4-甲基苯基)-甲基-(1α,3α)-(Z)-(±)-3-(2-氯-3,3,3-三氟-1-丙烯基)-2,2-二甲基环丙烷羧酸酯(七氟菊酯,CAS RN79538-32-2)、(±)-4-(二氟甲氧基)-α-(1-甲基乙基)苯乙酸(±)-氰基(3-苯氧基苯基)甲酯(氟氰戊菊酯,CAS RN 70124-77-5)、3-[2-氯-2-(4-氯苯基)乙烯基]-2,2-二甲基环丙烷羧酸氰基(4-氟-3-苯氧基苯基)甲酯(氟氯苯菊酯,CAS RN 69770-45-2)、3-(2,2-二氯乙烯基)-2,2-二甲基-环丙烷羧酸氰基(4-氟-3-苯氧基苯基)甲酯(氟氯氰菊酯,CAS RN68359-37-5)、(β氟氯氰菊酯,CAS RN 68359-37-5)、(四氟苯菊酯,CAS RN 118712-89-3)、(Z)-(IR-顺式)-2,2-二甲基-3-[2-(2,2,2-三氟-三氟甲基-乙氧基羰基)乙烯基]环丙烷羧酸(S)-α-氰基-3-苯氧基苄酯(氟丙菊酯,CAS RN 101007-06-1)、-3-(2,2二氯乙烯基)-2,2-二甲基环丙烷羧酸α-氰基-3-苯氧基苄酯(α-氯氰菊酯,CAS RN 67375-30-8)的(IR顺式)S和(IS顺式)R对映体异构体对、[IR,3S)3(1'RS)(1',2',2',2'-四溴乙基)]-2,2-二甲基环丙烷羧酸(s)-α-氰基-3-苯氧基苄酯(四溴菊酯,CAS RN 66841-25-6)、2,2-二氯-1-(4-乙氧基苯基)环丙烷羧酸氰基-(3-苯氧基苯基)甲酯(乙氰菊酯,CAS RN 63935-38-6)、3-(2-氯-3,3,3-三氟-1-丙烯基)-2,2-二甲基环丙烷羧酸[1α,3α(Z)]-(±)-氰基-(3-苯氧基苯基)甲酯(氯氟氰菊酯,CAS RN 68085-85-8)、3-(2-氯-3,3,3-三氟-1-丙烯基)-2,2-二甲基环丙烷羧酸[1α(s),3α(z)]-氰基(3-苯氧基苯基)甲酯(λ氯氟氰菊酯,CAS RN 91465-08-6)、3-(2-氯-3,3,3-三氟-1-丙烯基)-2,2-二甲基-环丙烷羧酸(2-甲基[1,1'-二苯基]-3-基)甲酯(联苯菊酯,CAS RN 82657-04-3)、5-1-苄基-3-呋喃基甲基-d-顺式(1R,3S,E)2,2-二甲基-3-(2-氧代-2,2,4,5四氢硫代亚环己二烯基甲基)环丙烷羧酸酯(噻嗯菊酯,RU15525,CAS RN 58769-20-3)、2,2-二甲基-3-(2-甲基-1-丙烯基)环丙烷羧酸[5-(苯甲基)-3-呋喃基]-3-呋喃酯(苄呋菊酯,CAS RN10453-86-8)、2,2-二甲基-3-(2-甲基-1-丙烯基)环丙烷羧酸(1R-反式)-[5-(苯基甲基)-3-呋喃基]甲酯(生物苄呋菊酯,CAS RN28434-01-7)、3,4,5,6-四氢-苯二甲酰亚氨基甲基-(IRS)-顺式-反式-菊酸酯(胺菊酯,CAS RN 7696-12-0)、3-苯氧基苄基-d,1-顺式,反式2,2-二甲基-3-(2-甲基丙烯基)环丙烷羧酸酯(苯醚菊酯,CAS RN26002-80-2);(烯炔菊酯,CAS RN 54406-48-3);(苯氰菊酯;CAS RN39515-40-7)、(炔丙菊酯,CAS RN 23031-36-9)、(炔咪菊酯,CAS RN72963-72-5)、(RS)-3-烯丙基-2-甲基-4-氧代环戊-2-烯基-(1A,3R;1R,3S)-2,2-二甲基-3-(2-甲基丙-1-烯基)环丙烷羧酸酯(丙烯菊酯,CAS RN 584-79-2)、(生物丙烯菊酯,CAS RN 584-79-2)以及(ZXI8901,CAS RN 160791-64-0)。认为一种或多种上述合成的拟除虫菊酯的混合物也可用于本发明。特别优选的合成的拟除虫菊酯为七氟菊酯、λ氯氟氰菊酯、联苯菊酯、苄氯菊酯以及氟氯氰菊酯。甚至更优选的合成的拟除虫菊酯为七氟菊酯和λ氯氟氰菊酯,并且更优选为七氟菊酯。

[0035] 噁二嗪衍生物的杀昆虫剂适用于本发明。优选用于本发明的噁二嗪衍生物为美国专利号5,852,012中所确定的那些衍生物。更优选的噁二嗪衍生物为5-(2-氯吡啶-5-基甲基)-3-甲基-4-硝基亚氨基全氢化-1,3,5-噁二嗪、5-(2-氯噻唑-5-基甲基)-3-甲基-4-硝基亚氨基全氢化-1,3,5-噁二嗪、3-甲基-4-硝基亚氨基-5-(1-氧化-3-吡啶基甲基)全氢化-1,3,5-噁二嗪、5-(2-氯-1-氧化-5-吡啶剂甲基)-3-甲基-4-硝基亚氨基全氢化-1,3,5-噁二嗪;以及3-甲基-5-(2-甲基吡啶-5-基甲基)-4-硝基亚氨基全氢化-1,3,5-噁二嗪。甚至更优选为噻虫嗪(CAS RN 153719-23-4)。

[0036] 氯烟酰杀昆虫剂也适用于本发明。优选用于主题组合物中的氯烟酰描述于美国专利号5,952,358中并且包括啶虫脒((E)-N-[(6-氯-3-吡啶基)甲基]-N'-氰基-N-亚甲基咪唑酰胺(imidamide),CAS RN135410-20-7)、吡虫啉(1-[(6-氯-3-吡啶基)甲基]-N-硝基-2-咪唑二胺,CAS RN 138261-41-3)以及烯啶虫胺(N-[(6-氯-3-吡啶)甲基]-N-乙基-N'-甲基-2-硝基-1,1-乙二胺,CAS RN 120738-89-8)。

[0037] 硝基胍杀昆虫剂适用于本发明。此类硝基胍可包括美国专利号5,633,375、5,034,404和5,245,040所述的那些。

[0038] 适用于本发明的吡咯、吡唑和苯基吡唑包括美国专利5,952,358所述的那些。优选的吡唑包括溴虫腈(4-溴-2-(4-氯苯基)-1-乙氧基甲基-5-三氟甲基吡咯-3-甲腈,CAS RN 122453-73-0)、唑螨酯((E)-1,1-二甲基乙基-4[[[[(1,3-二甲基-5-苯氧基-1H-吡唑-4-基)亚甲基]氨基]氧代]甲基]苯甲酸酯,CAS RN 111812-58-9)以及吡螨胺(4-氯-N[[4-1,1-二甲基乙基)苯基]甲基]-3-乙基-1-甲基-1H-吡唑-5-甲酰胺,CAS RN119168-77-3)。优选的苯基吡唑为氟虫腈(5-氨基-[2,6-二氯-4-(三氟甲基)苯基]-4-[(1R,S)-(三氟甲基)亚磺酰基]-1H-吡唑-3-甲腈,CAS RN120068-37-3)。

[0039] 适用于本发明的双酰肼包括氯虫酰肼(4-氯苯甲酸酯-2-苯甲酰-2-(1,1-二甲基乙基)-酰肼,CAS RN 112226-61-6)、甲氧虫酰肼(RH-2485;N-叔-丁基-N'-(3-甲氧基-邻-甲苯酰)-3,5-木酰肼,CAS RN161050-58-4)以及虫酰肼(3,5-二甲基苯甲酸1-(1,1-二甲基乙基)-2,(4-乙基苯甲酰)酰肼,CAS RN 112410-23-8)。

[0040] 三唑如氨基三唑(CAS RN 61-82-5)和唑蚜威适用于本发明的方法。优选的三唑为唑蚜威([[1-[(二甲基氨基)羰基]-3-(1,1-二甲基乙基)-1H-1,2,4-三唑-5-基]硫代]乙酸乙酯,CAS RN 112143-82-5)。

[0041] 生物/发酵产品如阿维菌素(阿巴克丁,CAS RN 71751-41-2)和多杀菌素(XDE-105,CAS RN 131929-60-7)适用于本发明。

[0042] 有机磷酸酯杀昆虫剂也适用作本发明的组分之一。优选的有机磷酸酯杀昆虫剂包括乙酰甲胺磷(CAS RN 30560-19-1)、毒死蜱(CAS RN2921-88-2)、甲基毒死蜱(CAS RN 5598-13-0)、二嗪农(CAS RN333-41-5)、苯线磷(CAS RN 22224-92-6)以及马拉硫磷(CAS RN121-75-5)。

[0043] 此外,氨基甲酸酯杀昆虫剂适用于本发明。优选的氨基甲酸酯杀昆虫剂为涕灭威(CAS RN 116-06-3)、甲萘威(CAS RN 63-25-2)、卡巴呋喃(CAS RN 1563-66-2)、杀线威(CAS RN 23135-22-0)以及硫双威(CAS RN 59669-26-0)。

[0044] 在本文描述化学杀昆虫剂时,应理解,该描述意图包括杀昆虫剂的盐形式以及展示与所述杀昆虫剂形式相同的杀昆虫活性的杀昆虫剂任何同分异构和/或互变异构形式。

[0045] 适用于本发明的化学杀昆虫剂可为市场上销售的此类杀昆虫剂的任何级别或纯度。在本发明和组合物中可容忍在商用制剂中作为杂质伴随着杀昆虫剂的其它材料，只要此类材料不会使组合物不稳定或者不会显著减少或损害任何杀昆虫剂组分或转基因事件对一种或多种目标害虫的活性。杀昆虫剂生产领域的普通技术人员可容易确定可容忍的那些杂质和不可容忍的那些杂质。

[0046] eHTP's与氨基酸修饰有关，以使得修饰的蛋白质与母本蛋白质TIC807相比展示针对草盲蝽属某些种、小绿叶蝉属某些种和/或芒果叶蝉属某些种的增大的半翅目抑制谱和/或提高的半翅目抑制活性。短语“更大活性的”、“提高的活性”、“增大的特异性”、“增加的毒性效力”、“增加的毒性”、“提高的半翅目抑制活性”、“增大的半翅目抑制活性”、“提高的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制活性”、“更大的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制活性”、“更大的半翅目抑制活性”以及“增大的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制谱”和“增大的半翅目抑制谱”是指eHTP针对半翅目害虫的活性与TIC807(SEQ ID NO:2)、TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)和/或AXMI-171(SEQ ID NO:206)蛋白质的活性比较，其中归因于本发明的eHTP的活性大于归因于由TIC807蛋白质(SEQ ID NO:2)、TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184和/或AXMI-171(SEQ ID NO:206)蛋白质的活性。本文所提供的eHTP's在与SEQ ID NO:2、SEQ ID NO:8、SEQ ID NO:182和SEQ ID NO:184的苏云金芽孢杆菌蛋白相比时，展示增大的半翅目抑制谱和/或提高的或更大的半翅目抑制活性，其中半翅目害虫种类包括豆荚草盲蝽、美国牧草盲蝽、马铃薯小绿叶蝉以及苯甲醛对叶蝉。苯甲醛对叶蝉也被称为Amrasca biguttula biguttula。可通过很多不同方法确定与TIC807相比展示增大的昆虫抑制谱和/或提高的昆虫抑制活性的eHTP's。通常，用于确定eHTP蛋白质的示例性和非限制性方法可包括：

[0047] (1)在控制的测定条件下向测试昆虫施用相同量的测试eHTP和对照TIC807(SEQ ID NO:2)、TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)和/或AXMI-171(SEQ ID NO:206)蛋白质；以及测量和比较测试蛋白与对照蛋白的效力；和/或，

[0048] (2)确定在控制的测定条件下引出等效昆虫群体响应的测试eHTP和对照TIC807(SEQ-ID NO:2)、TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)和/或AXMI-171(SEQ ID NO:206)蛋白质的蛋白质剂量(例如，食物中的蛋白质浓度)(即，获得剂量响应曲线)。

[0049] 在第二种方法中，用于比较的统计学上强剂量响应值可为杀死50％测试群体所需要的半数致死浓度(LC50)。然而，在某些实施方案中，可使用其它值，包括但不限于引起50％测试群体生长抑制所需要的中间抑制浓度(“IC50”)。在此背景下，“生长抑制”可包括使半翅目发育生长缓慢和/或抑制半翅目发育。

[0050] 如本文所用短语“昆虫抑制量”是指包含一种药剂的组合物的量，所述量有效于实现任何可测量的昆虫生存力、生长、昆虫发育、昆虫繁殖、昆虫进食行为、昆虫交配行为的抑制和/或任何可测量的由昆虫摄食包含所述药剂的组合物所引起的副作用的减少。类似地，“半翅目抑制量”是指单独或者与其它药剂一起靶向可应用的半翅目种类以进行控制的本发明的蛋白质的量，所述量引起任何可测量的属于半翅目的涉及生存力、生长、发育、繁殖、

进食行为、交配行为的目标昆虫的抑制和或任何可测量的由半翅目昆虫摄食植物所引起的副作用的减少。同样地，“草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制量”是指包含一种或多种本发明的蛋白质即eHTP’s或其它药剂的组合物的量，所述量引起任何可测量的抑制、生存力、生长、发育、繁殖、进食行为、交配行为和/或任何可测量的由草盲蝽属、小绿叶蝉属和/或芒果叶蝉属摄食包含该eHTP的组合物所引起的副作用的减少。如本文在eHTP背景下所用的，“增大的半翅目抑制活性”或“更大的增大的半翅目抑制活性”相对于使用一种或多种支架蛋白、包括TIC807、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)和/或AXMI-171(SEQ ID NO:206)蛋白质观察到的对应抑制活性，是指任何可测量的半翅目生存力、生长、发育、繁殖、进食行为、交配行为的抑制的增加和/或任何可测量的通过半翅目摄食包含该eHTP的组合物所引起的副作用的减少。同样地，“增大的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制活性”或者“更大的增大的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制活性”相对于使用仅包含可应用量的一种或多种支架蛋白(包括但不限于TIC807(SEQ ID NO:2)、Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)和/或AXMI-171(SEQ ID NO:206)蛋白质)的等效组合物或植物所观察到的对应抑制活性，是指任何可测量的生存力、生长、发育、繁殖、进食行为、交配行为的抑制的增加和/或任何可测量的由一种或多种本发明的eHTP在提供于草盲蝽属、小绿叶蝉属和/或芒果叶蝉属食物中的组合物或植物中的存在所引起的副作用的减少。

[0051] 如本文在eHTP背景下所用的，“增大的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制谱”相对于使用TIC807蛋白质所观察到的特定草盲蝽属某些种、小绿叶蝉属某些种和/或芒果叶蝉属某些种的对应抑制，是指任何可测量的特定草盲蝽属某些种、小绿叶蝉属某些种和/或芒果叶蝉属某些种生存力、生长、发育、繁殖、进食行为、交配行为的抑制的增加和/或任何可测量的由草盲蝽属某些种、小绿叶蝉属某些种和/或芒果叶蝉属某些种摄食植物所引起的副作用的减少。在某些实施方案中，本文所提供的eHTP相对于TIC807展示增大的草盲蝽属抑制谱，即那些eHTP’s可提供增加的美国牧草盲蝽抑制。

[0052] 本文所提供的eHTP可展示比SEQ ID NO:2(TIC807)、SEQ ID NO:8(TIC807_M2)、SEQ ID NO:182(Cry51Aa1)、SEQ ID NO:184(TIC853)和SEQ ID NO:206(AXMI-171)蛋白质大约2倍至约260倍的针对草盲蝽属、小绿叶蝉属和/或芒果叶蝉属害虫种类的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制活性。本文所提供的eHTP可展示比SEQ ID NO:2(TIC807)、SEQ ID NO:8(TIC807_M2)、SEQ ID NO:182(Cry51Aa1)、SEQ ID NO:184(TIC853)和SEQ ID NO:206(AXMI-171)蛋白质大约3倍、4倍、5倍、7倍、8倍、10倍、12倍、15倍、20倍、25倍、27倍、30倍、38倍、46倍、50倍、52倍、54倍、66倍、91倍、122倍、186倍、243倍或262倍的针对草盲蝽属、小绿叶蝉属和/或芒果叶蝉属害虫种类的草盲蝽属、小绿叶蝉属和/或芒果叶蝉属抑制活性。

[0053] eHTP’s可通过引起以下死亡率展示超过SEQ ID NO:2(TIC807)、SEQ ID NO:8(TIC807_M2)、SEQ ID NO:182(Cry51Aa1)、SEQ ID NO:184(TIC853)和/或SEQ ID NO:206(AXMI-171)的增大的目标害虫抑制谱和/或提高的目标害虫抑制活性：

[0054] (i)在约0.3μg/mL至约70μg/mL剂量下，针对豆荚草盲蝽昆虫种类；

[0055] (ii)在约0.85μg/mL至约100μg/mL剂量下，针对美洲牧草盲蝽昆虫种类；

[0056] (iii)在约0.3μg/mL至约70μg/mL的LC50值下，针对豆荚草盲蝽测量；

[0057] (iv)在约0.85μg/mL至约100μg/mL的LC50值下，针对美洲牧草盲蝽测量；或者

[0058] (v)在低于TIC807、SEQ ID NO:8、SEQ ID NO:182(Cry51Aa1)、SEQ ID NO:184(TIC853)和/或SEQ ID NO:206(AXMI-171)的LC50值超过两倍的LC50值下，针对草盲蝽属某些种、小绿叶蝉属某些种和/或芒果叶蝉属某些种测量；或者

[0059] (vi)在约0.69μg/mL至约500μ/mL的剂量下，针对苯甲醛对叶蝉或马铃薯小绿叶蝉昆虫种类；或者

[0060] (vii)在约3.5μg/mL至约15μg/mL的LC50值下，针对苯甲醛对叶蝉和/或马铃薯小绿叶蝉测量。

[0061] 表4A和表4B用芒果叶蝉属和草盲蝽某些种死亡率数据将本发明的示例性eHTP's制成表格。可用于草盲蝽某些种和芒果叶蝉属某些种的死亡率数据被报道为(a)μg/mL LC50值或者(b)%死亡率，对于豆荚草盲蝽为在约1μg/mL至约3μg/mL剂量下，或者对于美洲牧草盲蝽为在约100μg/mL蛋白质下并且对于苯甲醛对叶蝉为约0.69μg/mL至500μg/mL。为示例性eHTP's提供与TIC807(SEQ ID NO:2)和TIC807_M2(SEQ ID NO:8)相比成倍增加的毒性，其中LC50值为确定的。

[0062] 本发明的eHTP's与支架蛋白相比特别适用于控制半翅目昆虫。美洲牧草盲蝽需要高剂量的TIC807蛋白质(例如，超过100μg/mL)以引起死亡率。本发明的一种eHTP的剂量反应曲线，TIC807_M8(SEQ ID NO:16)为展示针对美洲牧草盲蝽和豆荚草盲蝽二者的显著提高的毒性作用的eHTP，但是针对美洲牧草盲蝽，所述eHTP展示计算的223μg/mL的LC50值。以前不可能实现针对美洲牧草盲蝽种类可引起大于50%死亡率的蛋白质浓度毒性剂量，因为在食物中提供超过1000μg/mL的相当大剂量的TIC807和TIC807_M2蛋白质为不可能的。因此，没有确定TIC807和TIC807_M2(SEQ ID NO:8)蛋白质针对美洲牧草盲蝽的LC50值，而是估计为大于(>)223μg/mL(参见表1和表3、实施例4和图1B)。

[0063] 迭代设计是指用于开发和选择eHTP's的半随机方法，包括工程化、测试和选择的组合(不需要以该顺序)(参见实施例1至4)。单词“工程化”意图包括确定修饰的相关残基、克隆和表达本文所述的eHTP's。单词“测试”意图是指比较eHTP的半翅目活性与支架蛋白如TIC807(SEQ ID NO:2)、TIC807_M2(SEQ ID NO:8)、Cry51Aa1(SEQ ID NO:182)和/或TIC853(SEQ ID NO:184)的活性；或者比较本发明的eHTP与另一种蛋白质如AXMI-171(SEQ ID NO:206)。单词“选择”意图是指识别本发明的改进的变体蛋白(即eHTP's)和可应用的氨基酸残基以进行工程化的行为。

[0064] 迭代设计包括说明本发明的蛋白质的原子结构(例如，如图2所列出的)和使用原子结构引导并补充“选择”氨基酸残基进行修饰以“工程化”的半随机方法，并且在此情况下，包括识别在折叠的昆虫抑制支架蛋白如TIC807、TIC853和Cry51Aa1的环和表面暴露区域内的氨基酸残基，所述支架蛋白可进行修饰以赋予提高的昆虫抑制谱和活性。选择在环内和表面暴露区域内的此类氨基酸残基用于“工程化”。在此情况下，迭代设计包括识别在具有相关氨基酸残基积累的支架蛋白的三维结构内的两个不同区域，所述支架蛋白在修饰成包含不同于出现在天然发生的支架蛋白的那些位置上的那些氨基酸残基的氨基酸残基时形成本发明的一种或多种eHTP蛋白质。

[0065] 最初，将支架蛋白TIC807(SEQ ID NO:2)用于此迭代设计的过程中，并且发现267种不同eHTP's与支架蛋白TIC807相比展示增加的草盲蝽属某些种的抑制活性。在设计过程

的早期轮次发现TIC807_M8(SEQ ID NO:16)。随后轮次的迭代工程化测试选择引起其它eHTP蛋白质的发现,这些eHTP蛋白质在与支架蛋白相比时展示针对草盲蝽属种类的更大水平的毒性并且也展示更广泛的毒性作用宿主范围。七种变体(eHTP's)在与TIC807相比时展示针对草盲蝽属种类(豆荚草盲蝽和美洲牧草盲蝽)的显著更高水平的增加的毒性。确定针对豆荚草盲蝽和美洲牧草盲蝽的这七种和本文所构建的其它eHTP's的LC50值,并且将其与支架蛋白、特别为TIC807的LC50值进行比较。表1示出结果并且图3为以图表方式示出表1所列出的结果的条形图。

[0066] 表1.选择的eHTP's与TIC807相比的LC50值

[0067]

		豆荚草盲蝽		美洲牧草盲蝽	
SEQ ID NO:	毒素	LC50 值 (μg/mL)	毒性 (成倍增加)	LC50 值 (μg/mL)	毒性 (成倍增加)
2	TIC807	73	1	>223*	1
6	TIC807_M1	23	3	100	≥2
8	TIC807_M2	5.9	12	>223*	~1
10	TIC807_M3	2.9	25	ND	-
12	TIC807_M4	2.4	30	ND	-
14	TIC807_M5	1.1	66	ND	-
18	TIC807_M6	1.45	50	ND	-
20	TIC807_M7	1.4	52	ND	-
16	TIC807_M8	0.8	91	223	≥1
28	TIC807_M9	9.9	7	8.3	≥27
30	TIC807_M10	0.6	122	4.8	≥46
32	TIC807_M11	1.35	54	5.9	≥38
36	TIC807_M12	0.4	182	1.2	≥186
34	TIC807_M13	0.3	243	0.85	≥262

[0068] ND=未确定。通过向新孵化的草盲蝽若虫群体提供8至10种不同蛋白质浓度,允许若虫进食5天并且然后对超过所提供的剂量范围的死亡率进行评分来确定LC50值。

[0069] *毒性使用观察到的TIC807 LD50作为基线值1,根据与针对豆荚草盲蝽观察到的水平相比多个增加的活性显示。超过1000μg/mL的显著大量的蛋白质不能提供在草盲蝽属食物中,以便完成响应于豆荚草盲蝽的高毒性剂量范围。因此,没有确定TIC807或TIC807_M2的LC50值。相反,在低范围内进行4-剂量LC50评估,证明预期的TIC807和TIC807_M2的LC50值大于223μg/mL。

[0070] 参照表1,迭代设计过程提供用于识别展示不仅针对豆荚草盲蝽而且针对美洲牧草盲蝽的提高的毒性特征的蛋白质的手段。

[0071] 还提供编码eHTP's的重组多核苷酸组合物。在某些实施方案中,可用重组DNA构建体表达eHTP's,在所述构建体内具有开放阅读框的多核苷酸分子可操作地连接至在所述构建体意图的系统内的表达中起作用的元件如启动子和任何其它调节元件。例如,植物功能启动子可以可操作地连接至可应用的eHTP编码序列,以使蛋白质在植物中表达。在细菌内起作用的启动子也涵盖用于表达盒内。在可应用细菌例如大肠杆菌或苏云金芽孢杆菌种类中起作用的启动子可以可操作地连接至eHTP编码序列中,以使可应用蛋白质在可应用细菌菌株内表达。可以可操作地连接至eHTP编码序列的其它有用元件包括但不限于,增强子、内

含子、前导序列、编码的蛋白质固定标签(HIS-标签)、编码的亚细胞易位肽(即,质体转运肽、信号肽)、翻译后修饰酶的编码的多肽位点、核糖体结合位点以及设计用作RNAi触发物以抑制植物或特定目标害虫种类内的一种或多种基因的区段。

[0072] 本文所提供的示例性重组多核苷酸分子包括但不限于,SEQ ID NO:186、SEQ ID NO:187、SEQ ID NO:188、SEQ ID NO:189、SEQ ID NO:190、SEQ ID NO:191、SEQ ID NO:192、SEQ ID NO:193、SEQ ID NO:194、SEQ ID NO:195、SEQ ID NO:196、SEQ ID NO:197、SEQ ID NO:198、SEQ ID NO:199、SEQ ID NO:200、SEQ ID NO:35以及SEQ ID NO:201。这些序列编码各自具有以下所列出的氨基酸序列的对应蛋白质:SEQ ID NO:4(TIC807_4)、SEQ ID NO:6(TIC807_M1)、SEQ ID NO:8(TIC807_M2)、SEQ ID NO:10(TIC807_M3)、SEQ ID NO:12(TIC807_M4)、SEQ ID NO:14(TIC807_M5)、SEQ ID NO:16(TIC807_M8)、SEQ ID NO:18(TIC807_M6)、SEQ ID NO:20(TIC807_M7)、SEQ ID NO:22(TIC807_22)、SEQ ID NO:24(TIC807_24)、SEQ ID NO:26(TIC807_26)、SEQ ID NO:28(TIC807_M9)、SEQ ID NO:30(TIC807_M10)、SEQ ID NO:32(TIC807_M11)、SEQ ID NO:36(TIC807_M12)以及SEQ ID NO:34(TIC807_M13)。由于遗传密码的冗余性,编码本发明的蛋白质的重组多核苷酸分子的密码子可被同义密码子取代(也称为沉默取代);并且处于本发明的范围内。因此提供编码本文所公开的任何eHTP's的重组多核苷酸。

[0073] 包含eHTP编码序列的重组DNA构建体还可进一步包括编码一种或多种昆虫抑制剂的DNA区域,所述昆虫抑制剂可配置成连同编码可应用eHTP(为不同于eHTP的蛋白质)或者昆虫或植物基因抑制dsRNA分子的DNA序列共表达。可组装重组DNA构建体,以使得设计成从特定构建体表达的所有药剂从一个启动子表达或者以使得单独的药剂各自处于单独的启动子控制下或者其一些组合。本发明的蛋白质可由多基因表达系统表达,在所述表达系统中一种或多种蛋白质由共同核苷酸区段表达,在所述核苷酸区段上根据所选择的表达系统类型也包含其它开放阅读框和/或启动子。

[0074] 可通过载体例如质粒、杆状病毒、人工染色体、病毒体、粘粒、噬菌粒、噬菌体或病毒载体将包含eHTP编码序列的重组核苷酸或重组DNA构建体递送到宿主细胞内。此类载体可用于实现eHTP编码序列在宿主细胞内的稳定或瞬时表达;并且如果可能,随后表达成多肽。包含eHTP编码序列并且引入到宿主细胞内的外源性重组多核苷酸或重组DNA构建体在本文中也被称为"转基因"。

[0075] 因此还提供包含任何重组多核苷酸(即,转基因)的表达任何一种或多种eHTP编码序列的转基因细菌、转基因植物细胞、转基因植物以及转基因植物部分。意图在于,"细菌细胞"或"细菌"可包括但不限于,土壤杆菌属(Agrobacterium)、芽孢杆菌属、埃希氏菌属(Escherichia)、沙门氏菌属(Salmonella)、假单胞菌属(Pseudomonas)或者根瘤菌属(Rhizobium)细胞。意图在于,"植物细胞"或"植物"包括苜蓿、巴旦杏(almont),香蕉、大麦、豆、甜菜、西兰花菜、包菜、芸苔、茄子、胡萝卜、木薯、蓖麻、菜花、芹菜、鹰嘴豆、大白菜、芹菜、柑橘、椰子、咖啡、玉米、三叶草、棉花、葫芦、黄瓜、花旗松、茄子、桉树、亚麻、大蒜、葡萄、瓜尔豆、啤酒花、韭葱、豆科植物、莴苣、火炬松、粟、甜瓜、油桃、坚果、燕麦、秋葵、橄榄、洋葱、观赏植物、棕榈树、牧草、木瓜、豌豆、桃、花生、胡椒、木豆、松树、马铃薯、白杨树、南瓜、辐射松、萝卜、油菜籽、稻、根茎、黑麦、红花、灌木、高粱、南方松、大豆、菠菜、南瓜、草莓、糖甜菜、甘蔗、向日葵、甜玉米、香枫、甘薯、柳枝稷、茶、烟草、番茄、黑小麦、草坪草、西瓜以及小麦植

物细胞或植物。在某些实施方案中：提供由转基因植物细胞生成的转基因植物和转基因植物部分；转基因植物可从转基因种子获得；转基因植物部分可通过切割、咬断、磨碎或以其它方式使所述部分从植物中分离来获得；所述植物部分可为种子、圆荚、叶子、花、茎、根或其任何部分；并且本文所提供的转基因植物部分为转基因植物部分的不可再生部分。如在此背景下所用的，转基因植物部分的“不可再生”部分为不能诱导来形成全植物或者不能诱导来形成能够有性和/或无性繁殖的全植物的部分。植物部分的不可再生部分为转基因花粉、胚珠、种子、圆荚、叶、花、茎或根的部分。

[0076] 本文还提供制备包含昆虫或草盲蝽属和/或芒果叶蝉属抑制量的eHTP的转基因植物的方法。此类植物可通过将编码本文所提供的任何eHTP的重组多核苷酸引入到植物细胞内并且选择源于所述植物细胞的表达昆虫或半翅目抑制量的eHTP’s的植物来制备。植物可通过再生、种子、花粉或分生组织转化技术而来源于植物细胞。

[0077] 提供表达昆虫或半翅目抑制量的eHTP以控制昆虫或半翅目侵染的转基因植物和宿主细胞。任何上述植物种类可用于保护植物使其免于本文所提供的昆虫或半翅目侵染的影响，只要用设计为表达可应用的eHTP的多核苷酸构建体转化所述植物。

[0078] 本发明的其它方面包括抗体、试剂盒、用于检测编码eHTP’s或其区分片段的多核苷酸或者eHTP’s或其区分片段的方法、用于识别本发明的蛋白质属的其它昆虫抑制成分的方法、用于控制昆虫生长和/或侵染的制剂和方法以及用于对植物和其它受体宿主提供此类控制的方法。每种组合物、构建体、细胞、植物、制剂、方法或试剂盒例如通过经由商业使用任何这些蛋白质抑制昆虫来增大植物产量，从而提供本发明的蛋白质的工业应用。

[0079] 除种子或果实或蔬菜之外的植物产品意图用作通过商业移动并且源于转基因植物或转基因植物部分的商品或其它产品，其中所述商品或其它产品可通过检测与本发明的eHTP对应并且产生于或者保持于从中获得所述商品或其它产品的植物或植物组织或部分中的核苷酸区段、RNA或蛋白质进行商业追踪。此类商业商品或其它产品包括但不限于，植物部分、生物质、油、膳食、糖、动物饲料、面粉、玉米片、糠、皮棉、处理的种子以及种子。植物部分包括但不限于，植物种子、圆荚、叶、花、茎、花粉或根。在某些实施方案中，植物部分可为所述种子、圆荚、叶、花、茎、花粉或根的不可再生部分。还提供包含eHTP’s的棉花和亚麻树花粉以及其不可再生部分。

[0080] 因此还提供包含可检测量的eHTP、其昆虫抑制片段或其任何区分部分的处理的植物产品。在不希望受到理论约束的情况下，认为在某些实施方案中，包含可检测量的一种或多种本文所提供的eHTP’s的此类处理的植物产品显示可由半翅目传送的不希望的微生物的减少和/或此类微生物的不希望的副产品的减少。在某些实施方案中，其区分部分可包括SEQ ID NO:180所列出的至少约20个至约100个或更多个连续氨基酸的任何多肽，具体地为其中所述多肽不包含存在于SEQ ID NO:2、SEQ ID NO:8、SEQ ID NO:182或SEQ ID NO:184中的连续氨基酸的对应多肽，并且其中所述多肽在SEQ ID NO:2所列出的对应氨基酸序列中包含至少一个氨基酸取代、添加或缺失。此类取代、缺失或添加为以上段落[0009]中所列出的那些。

[0081] 提供包含可检测量的编码eHTP的重组多核苷酸、eHTP或其昆虫抑制片段或其任何区分部分的处理的植物产品。所述处理的产品选自由以下组成的组：植物生物质、油、膳食、动物饲料、面粉、玉米片、糠、皮棉、果壳以及处理的种子。

[0082] 通过在农作物中提供编码本发明的一种或多种eHTP's的重组多核苷酸序列来控制农作物的半翅目侵染。此类转基因作物产生或者经过处理来包含昆虫或半翅目抑制量的可应用eHTP,并且通过以下各项用足够的eHTP渗透此类作物:(i)将包含或编码eHTP的任何组合物应用于植物或生成植物的种子;和/或(ii)用编码eHTP的多核苷酸转化植物或者生成种子并最终生成植物的植物细胞。所述植物可为包含表达昆虫或半翅目抑制量的eHTP的转基因的瞬时或稳定转化的转基因植物。所述植物可为包含eHTP的组合物所应用的非转基因植物。在此类方法中,所述植物为双子叶植物,并且更确切地说可为棉花、大豆或苜蓿植物。半翅目昆虫包括成虫和若虫,例如但不限于以上段落[0020]所列出的臭虫列表。

[0083] 优选地,草盲蝽属某些种为豆荚草盲蝽或美洲牧草盲蝽,小绿叶蝉属某些种为马铃薯小绿叶蝉并且芒果叶蝉属某些种为苯甲醛对叶蝉。

[0084] 本发明的其它特征和优点通过以下详述、实施例和权利要求书将为显而易见。

实施例

[0085] 根据上述内容,本领域技术人员应了解,在不脱离本发明的精神和范围的情况下可以在已公开并仍获得类似或相似结果的特定方面中做出改变。因此,本文所公开的特定详情将不被解释为限制性的。本申请要求其优先权的权益的美国临时申请序列号61/621,436、段落[0002]中引用的序列表、以及本发明公开和要求保护的所有参考材料、具体地为本申请中引用的参考文献和公开的专利申请以引用的方式整体并入本文。

[0086] 实施例1:迭代工程化-测试-选择方法

[0087] 此实施例示出用于识别和描述昆虫抑制蛋白的迭代工程化-测试-选择方法的随机、组合和发明方面(也可称为"递归"),所述昆虫抑制蛋白与TIC807(SEQ ID NO:2)相比展示半翅目和/或杀线虫活性或者增加的对半翅目昆虫种类的毒性。若干种设计方法用于工程化具有较大针对草盲蝽属种类的抑制活性的eHTP's;方法包括但不限于半随机修饰、在TIC807与其它天然Bt蛋白质的比对中变异的定向修饰以及结构/功能辅助设计。进行多轮工程化和测试(连续地和同时地)以选择展示增加的毒性的TIC807蛋白质变体。在收集数据时调整设计方法。此迭代工程化-测试-选择方法还包括但不限于包括以下的步骤:克隆、表达、纯化以及生物测定测试与eHTP's相比的TIC807对照蛋白。

[0088] 大约267种示例性的与TIC807相比展示增加的草盲蝽属毒性的eHTP's从超过2000组测定提高的昆虫抑制活性的候选eHTP's(即"测试"蛋白)中获得。测试的候选eHTP's的实际总数目远远超过2000,因为测试包括编码多种源于库诱变(在选择过程中没有测序)的候选eHTP's的重组核苷酸区段。

[0089] 根据测试目的和所需测试生产量制备不同数量和纯度的蛋白质储备。例如,制备较低量和较低纯度的蛋白质制剂以用于在生物测定中选择较高数目的变体。为高能生物测定制备大量的和较高纯度的蛋白质储备。说明作为改进的变体的主要相关的残基位置的倾向于高能生物测定的测试。最初,对豆荚草盲蝽测试约2000种变体。基于来自豆荚草盲蝽的数据,设计大约600种变体并且然后对美洲牧草盲蝽进行进一步测试。这些变体中约267种变体(表4B)在与TIC807相比时证明针对豆荚草盲蝽和/或美洲牧草盲蝽的增加的毒性。这267种变体包括已确认实针对两种草盲蝽属种类的增加的毒性的二十二种(22)变体。另外的确认和剂量反应测试使选择变窄至七种(7)变体,这些变体随后使用8-剂量重复生物测

定确定针对两种草盲蝽属种类的LC50值来表征。

[0090] 选择方法包括动态更新测试数据、不断调整工程化方法以及进行迭代轮次。同时地，采用劳动密集型克隆、蛋白质表达、蛋白质纯化以及生物测定实验来测试候选eHTP's。

[0091] 实施例2:工程化方法

[0092] 基于比对的方法

[0093] Cry51的蛋白质组成的多个序列比对:Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)和TIC807(SEQ ID NO:2)用于确定可变性区域，例如相对于SEQ ID NO:2(TIC807)的位置195至201和位置211至219。这些区域通过使用编码这些区域内的任意氨基酸残基的简并寡核苷酸引物来靶向饱和诱变。制备构建体库以用于随后在宿主细胞内进行蛋白质表达。

[0094] Cry51Aa1(SEQ ID NO:182)、TIC853(SEQ ID NO:184)和TIC807(SEQ ID NO:2)的多次序列比对与BLOSUM 80替代矩阵结合来用于计算TIC807的每个位置变体的平均成对距离。使用编码特定氨基酸残基的简并寡核苷酸引物使具有较低平均成对距离的残基位置用替代氨基酸残基取代，所述替代氨基酸残基例如G28X、G31X、F46X、E125X、F138X、F147X、S167X、Y216X、P218X、G234X、T247X、D268X以及T308X，。制备构建体库以用于随后在宿主细胞内进行蛋白质表达。

[0095] 扫描方法

[0096] 多核苷酸构建体被工程化为在SEQ ID NO:2(TIC807)全长的每个可能的位置上表达单一丙氨酸取代或双丙氨酸取代(丙氨酸-<母本丙氨酸>-丙氨酸)。对于假设的实施例，参见表2。

[0097] 表2.单一丙氨酸和双丙氨酸的假设实施例在包含氨基酸序列XXXXAXX的支架蛋白上扫描。

[0098]

	单一丙氨酸扫描	双丙氨酸扫描
1	AXXXaXX	AXAXaXX
2	XAXXaXX	XAXAaXX
3	XXAXaXX	XXAXSXX
4	XXXAaXX	XXXAaAX
5	XXXXSXX	XXXXSXA
6	XXXXaAX	-
7	XXXXaXA	-

[0099] X＝母本残基

[0100] a＝母本残基为丙氨酸残基

[0101] A＝对丙氨酸残基进行修饰

[0102] S＝对丝氨酸残基进行修饰

[0103] 在丙氨酸残基已存在于TIC807中的情况下，反而取代丝氨酸。通过在赋予增加的毒性的那些丙氨酸取代的残基中组合诱变和饱和诱变来进一步测试与TIC807相比展示增加的毒性的蛋白质变体。还在具有来自先前迭代轮次的工程化-测试-选择的积累的修饰的改进的组合变体、例如具有突变F46S、Y54H、S167R、S217N的TIC807_M2(SEQ ID NO:8)上进

行扫描方法，并且通过另一轮次的单一丙氨酸取代对残基范围196-201内的连续三重缺失进行进一步工程化，以对改进的TIC807_M2进行进一步改进。确定主要相关的残基并且通过组合诱变和饱和诱变进行进一步测试(例如，A150X、E125X、E155X、F147X、I134X、N157X、Q149X、T133X、E135X以及N137X)。通过这些组合方法工程化的变体与TIC807相比展示对增加的毒性的进一步提高并且与利用TIC807(SEQ ID NO:2)原子结构的其它设计方法进一步组合。

[0104] 表面暴露的残基

[0105] 在迭代工程化-测试-选择方法中间确定本发明的蛋白质的原子结构；并且使用Molsoft's ICM-Browser(Molsoft L.L.C.,11199Sorrento Valley Road,S209,San Diego,CA 92121)确定每个残基的相对溶剂可及性(%SA)。在表3的列(A)和列(B)中显示，对具有SEQ ID NO:185(TIC807_L11M)和SEQ ID NO:8(TIC807_M2)所列出的相对氨基酸序列的蛋白质计算实际%SA。预测的TIC807和TIC853残基的%SA分别列出在表3的列(A)和列(C)中。总之，表3中报道的%SA值被计算为通过水分子探测的溶剂可及表面区域的百分比，所述溶剂可及表面区域大于在原子结构的每个位置上的每个残基的标准伸展构造(Gly-XXX-Gly)中的最大溶剂可及区域。表3通过在Clustal W比对中的比对的残基比对每种蛋白质的残基。在每种残基的标准伸展构造(Gly-XXX-Gly)的最大溶剂可及区域小于由水分子探测的实际溶剂可及区域时，可出现大于100的%SA。在表中大于100的%SA被报道为100%。

[0106] 本文所述的组合工程化-测试-选择方法引起多种主要相关的残基，所述残基累积于在SEQ ID NO:2(TIC807)的P219的Cb原子周围具有约9.2埃-12.2埃半径的残基的曲面片(图2的[2])中：SEQ ID NO:2(TIC807)的V10、I14、N22、N23、G24、I25、Q26、G27、F30、Q38、I39、D40、T41、I43、S193、T194、E195、H196、Y197、S198、H199、Y200、S201、G202、Y203、P204、I205、L206、T207、W208、I209、S210、Y216、S217、G218、P219、F220、M221、S222、W223、Y224、F225、N239以及V244。至少这些残基的一半展示大于或等于十五(15)的%SA值。

[0107] 表3.eHTP's和支架蛋白的氨基酸的相对%溶剂可及性(SA)。

[0108]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC853 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	估算的每个残基的%SA
2ALA	82.1#	2ALA	64.8#	2ALA	60.9#

[0109]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC853 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的 %SA	位置和氨基酸残基	计算的每个残基的 %SA	位置和氨基酸残基	估算的每个残基的 %SA
3ILE	23.3	3ILE	28.9	3ILE	24.3
4LEU	26.4	4LEU	31.9	4LEU	27.9
5ASP	26.0	5ASP	22.7	5ASP	29.8
6LEU	1.0	6LEU	3.4	6LEU	3.7
7LYS	25.1	7LYS	16.2	7LYS	17.1
8SER	46.4#	8SER	37.6#	8SER	44.9#
9LEU	8.9	9LEU	5.2	9LEU	6.3
10VAL[B]	0.3	10VAL	0.6	10VAL	0.0
11MET	25.0	11LEU	17.0	11LEU	16.6
12ASN*	49.8#	12ASN	43.2#	12ASP	39.7#
13ALA	0.0	13ALA	0.0	13ALA	0.0
14ILE[B]	0.0	14ILE	0.0	14ILE	0.0
15ASN	23.7	15ASN	24.9	15ASN	19.2
16TYR	29.5	16TYR	47.1#	16TYR	52.5#
17TRP	14.1	17TRP	18.2	17TRP	20.1
18GLY	4.3	18GLY	1.4	18GLY	1.0
19PRO	63.6#	19PRO	57.3#	19PRO	59.0#
20LYS	57.3#	20LYS	77.2#	20LYS	100#
21ASN	36.3#	21ASN	28.4	21ASN	61.5#
22ASN[B]	16.9	22ASN	10.1	22ASN	15.2
23ASN[B]	0.3	23ASN	0.8	23ASN	0.0
24GLY[B]	42.0#	24GLY	43.2#	24GLY	43.3#
25ILE[B]	10.1	25ILE	13.8	25ILE	7.6
26GLN[B]	92.4#	26GLN	86.2#	26GLN	94.7#
27GLY[B]	62.0#	27GLY	73.9#	27GLY	62.8#
28GLY	49.0#	28GLY	50.6#	28TYR	47.7#
29ASP	66.0#	29ASP	68.1#	29ASN	80.7#
30PHE[B]	4.5	30PHE	4.1	30PHE	1.5
31GLY	37.2#	31GLY	41.4#	31ASN	61.1#
32TYR	25.2	32TYR	25.3	32TYR	21.5
33PRO	70.7#	33PRO	76.0#	33PRO	78.5#
34ILE	4.8	34ILE	5.5	34ILE	2.6
35SER	42.2#	35SER	29.1	35SER	27.0
36GLU	54.2#	36GLU	47.2#	36GLU	50.2#
37LYS	81.0#	37LYS	79.5#	37ARG	87.5#
38GLN[B]	12.8	38GLN	14.5#	38GLN	9.0
39ILE[B]	7.8	39ILE	7.9	39ILE	5.1
40ASP[B]	52.4#	40ASP	55.3#	40ASP	49.8#
41THR[B]	0.3	41THR	0.0	41THR	0.2
42SER	53.1#	42SER	56.0#	42SER	53.0#
43ILE[B]	13.1	43ILE	23.5	43ILE	25.1
44ILE	8.3	44ILE	12.0	44ILE	8.1
45THR	30.7	45THR	37.8#	45THR	45.7#
46PHE*	20.0	46SER	43.7#	46SER	40.5#
47THR	48.1#	47THR	45.2#	47THR	43.7#
48HIS	73.5#	48HIS	65.3#	48HIS	78.3#
49PRO	9.4	49PRO	12.6	49SER	9.0

[0110]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC353 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	估算的每个残基的%SA
50ARG	58.7#	50ARG	53.7#	50ARG	61.5#
51LEU	13.7	51LEU	8.1	51LEU	3.0
52ILE*	32.4	52ILE	31.5	52MET	43.7#
53PRO	22.2	53PRO	26.5	53PRO	22.8
54TYR*	52.7#	54HIS	42.2#	54HIS	45.5#
55ASP	57.5#	55ASP	59.2#	55ASP	55.5#
56LEU	15.0	56LEU	18.6	56LEU	15.1
57THR	62.0#	57THR	73.2#	57THR	80.0#
58ILE	67.6#	58ILE	60.9#	58ILE	68.0#
59PRO	26.6	59PRO	21.9	59PRO	20.7
60GLN	28.8	60GLN	20.7	60GLN	21.3
61ASN	71.9#	61ASN	73.6#	61ASN	74.6#
62LEU	13.4	62LEU	11.7	62LEU	10.0
63GLU	62.2#	63GLU	66.0#	63GLU	66.4#
64THR	51.2#	64THR	51.1#	64THR	49.0#
65ILE	46.1#	65ILE	41.5#	65ILE	38.4#
66PHE	27.0	66PHE	26.3	66PHE	29.6
67THR	52.5#	67THR	55.5#	67THR	62.2#
68THR*	31.6	68THR	35.8#	68THR	35.3
69THR	54.3#	69THR	51.1#	69THR	50.3#
70GLN*	31.0	70GLN	36.5#	70GLN	34.3
71VAL	53.4#	71VAL	53.2#	71VAL	53.1#
72LEU	7.9	72LEU	11.8	72LEU	8.1
73THR	40.5#	73THR	44.0#	73THR	47.0#
74ASN	0.6	74ASN	0.0	74ASN	0.0
75ASN	69.8#	75ASN	63.2#	75ASN	65.9#
76THR	36.7#	76THR	40.5#	76THR	44.0#
77ASP	80.2#	77ASP	63.0#	77ASP	62.1#
78LEU	62.6#	78LEU	62.5#	78VAL	63.8#
79GLN	74.4#	79GLN	54.7#	79GLN	43.5#
80GLN	33.3	80GLN	32.1	80GLN	40.1#
81SER	81.0#	81SER	68.6#	81SER	75.2#
82GLN	19.0	82GLN	23.9	82GLN	24.6
83THR	62.7#	83THR	63.6#	83THR	63.7#
84VAL	1.8	84VAL	0.9	84VAL	0.0
85SER	50.8#	85SER	55.7#	85SER	54.0#
86PHE	7.2	86PHE	5.8	86PHE	4.0
87ALA*	58.5#	87ALA	61.9#	87SER	68.0#
88LYS	30.5	88LYS	30.6	88LYS	32.6
89LYS	69.8#	89LYS	67.8#	89LYS	67.9#
90THR	19.9	90THR	23.1	90THR	16.7
91THR	54.1#	91THR	55.1#	91THR	48.1#
92THR	1.8	92THR	1.8	92THR	0.0
93THR#*	40.3#	93THR	36.4#	93THR	29.4
94THR	0.0	94THR	0.6	94THR	0.2
95SER#*	14.4	95SER	15.7	95SER	18.1
96THR	5.5	96THR	1.5	96THR	0.0

[0111]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC853 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	估算的每个残基的%SA
97SER[#]	16.6	97SER	18.5	97SER	29.9
98THR	8.2	98THR	5.9	98THR	1.9
99THR	41.8#	99THR	46.4#	99THR	49.3#
100ASN	37.7#	100ASN	34.1	100ASP	20.1
101GLY	1.0	101GLY	1.9	101GLY	0.0
102TRP	3.6	102TRP	10.4	102TRP	6.6
103THR	8.1	103THR	8.1	103THR	3.9
104GLU	9.7	104GLU	21.9	104GLU	14.8
105GLY[*]	35.3	105GLY	46.8#	105GLY	31.4
106GLY	57.0#	106GLY	68.6#	106GLY	61.8#
107LYS	52.4#	107LYS	57.2#	107ARG	54.6#
108ILE	61.8#	108ILE	63.5#	108ILE	67.1#
109SER	43.5#	109SER	47.9#	109SER	47.7#
110ASP	83.1#	110ASP	83.5#	110ASP	65.7#
111THR	43.4#	111THR	41.3#	111THR	39.9#
112LEU	26.7	112LEU	29.6	112LEU	31.3
113GLU	53.8#	113GLU	64.1#	113GLU	62.5#
114GLU	34.8	114GLU	30.9	114GLU	32.6
115LYS	62.2#	115LYS	55.2#	115ASN	54.6#
116VAL	6.4	116VAL	8.6	116VAL	10.4
117SER[*]	46.6#	117SER	48.9#	117SER	51.2#
118VAL	0.9	118VAL	2.5	118VAL	1.3
119SER[*]	20.2	119SER	23.4	119SER	23.7
120ILE	0.8	120ILE	0.3	120ILE	0.0
121PRO	5.9	121PRO	10.7	121PRO	8.0
122PHE	0.2	122PHE	1.4	122PHE	0.3
123ILE	19.1	123ILE	20.8	123ILE	18.3
124GLY	4.3	124GLY	6.2	124GLY	3.3
125GLU[*]	59.7#	125GLU	56.2#	125ALA	57.8#
126GLY	50.0#	126GLY	52.5#	126GLY	49.6#
127GLY	47.2#	127GLY	56.7#	127GLY	38.6#
128GLY[*]	34.7	128GLY	30.3	128ALA	23.0
129LYS	68.8#	129LYS	73.9#	129LYS	78.4#
130ASN	16.2	130ASN	14.6	130ASN	10.1
131SER	78.2#	131SER	77.9#	131SER	80.3#
132THR	9.8	132THR	10.3	132THR	12.3
133THR[*]	45.7#	133THR	42.0#	133THR	44.3#
134ILE[*]	1.1	134ILE	0.8	134ILE	0.0
135GLU[*]	51.5#	135GLU	45.2#	135GLU	48.5#
136ALA	0.0	136ALA	1.3	136ALA	2.4
137ASN[*]	18.1	137ASN	15.5	137ASN	15.6
138PHE[*]	1.9	138PHE	0.9	138VAL	2.5
139ALA[*]	2.8	139ALA	6.3	139ALA	4.1
140HIS	2.3	140HIS	2.1	140HIS	0.0
141ASN	5.3	141ASN	6.5	141ASN	2.8
142SER	5.4	142SER	4.4	142SER	6.6
143SER	7.7	143SER	10.6	143SER	7.0

[0112]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC853 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	估算的每个残基的%SA
144THR	23.5	144THR	17.3	144THR	16.6
145THR*	48.3#	145THR	52.7#	145THR	55.2#
146THR	50.2#	146THR	49.7#	146THR	53.6#
147PHE#2*	49.9#	147PHE	61.6#	147SER	51.7#
148GLN*	12.9	148GLN	17.8	148GLN	18.4
149GLN#2*	59.5#	149GLN	65.1#	149GLN	69.1#
150ALA*	6.9	150ALA	8.7	150ALA	9.1
151SER#2*	51.0#	151SER	51.7#	151SER	57.9#
152THR	9.9	152THR	8.7	152THR	12.3
153ASP*	83.5#	153ASP	84.5#	153GLU	63.3#
154ILE	11.2	154ILE	6.1	154ILE	6.3
155GLU*	49.5#	155GLU	63.9#	155GLU	49.7#
156TRP	1.7	156TRP	3.8	156TRP	1.8
157ASN*	59.1#	157ASN	59.1#	157ASN	53.4#
158ILE*	13.1	158ILE	5.9	158ILE	0.8
159SER*	60.2#	159SER	52.9#	159SER	52.2#
160GLN	29.2	160GLN	19.3	160GLN	9.3
161PRO	54.0#	161PRO	63.6#	161PRO	62.6#
162VAL	0.6	162VAL	4.0	162VAL	2.4
163LEU	53.8#	163LEU	56.6#	163LEU	64.5#
164VAL	0.0	164VAL	0.0	164VAL	0.0
165PRO	22.8	165PRO	22.1	165PRO	26.9
166PRO	30.7	166PRO	36.1#	166PRO	39.7#
167SER*	31.0	167ARG	32.8	167ARG	36.7#
168LYS	18.2	168LYS	18.5	168LYS	19.9
169GLN	17.4	169GLN	15.1	169GLN	10.7
170VAL	0.0	170VAL	0.0	170VAL	0.0
171VAL	13.2	171VAL	13.8	171VAL	12.2
172ALA	0.0	172ALA	0.0	172ALA	0.0
173THR	9.8	173THR	9.2	173THR	6.5
174LEU	1.3	174LEU	2.6	174LEU	0.2
175VAL*	17.2	175VAL	17.8	175VAL	13.4
176ILE	0.0	176ILE	0.0	176ILE	0.0
177MET*	7.0	177MET	7.7	177MET	17.3
178GLY	1.6	178GLY	0.5	178GLY	0.0
179GLY	15.9	179GLY	22.2	179GLY	16.5
180ASN#2*	60.0#	180ASN	60.1#	180ASP	44.9#
181PHE	0.7	181PHE	2.8	181PHE	1.8
182THR#2*	50.6#	182THR	44.3#	182THR	40.8#
183ILE	0.0	183ILE	1.1	183VAL	0.0
184PRO	36.6#	184PRO	34.2	184PRO	34.5
185MET	4.8	185MET	2.1	185MET	1.8
186ASP	52.4#	186ASP	23.5	186ASP	20.3
187LEU*	0.8	187LEU	0.0	187LEU	0.0
188MET	25.9	188MET	12.7	188ILE	24.9
189THR	1.4	189THR	2.9	189THR	0.5
190THR	26.1	190THR	26.2	190THR	24.1

[0113]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC853 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	估算的每个残基的%SA
191ILE	4.0	191ILE	6.2	191ILE	1.8
192ASP	25.9	192ASP	29.2	192ASP	21.4
193SER[B]	7.4	193SER	7.7	193SER	2.7
194THR[B]	66.2#	194THR	60.2#	194THR	59.9#
195GLU[B]	38.5#	195GLU	35.0	195GLN	35.5#
196HIS[*]	37.7#	-	100	-	100#
197TYR[*]	32.2	-	100#	-	100#
198SER[*]	35.5#	-	100#	-	100#
199HIS[B][*]	64.3#	196HIS	55.5#	196HIS	51.7#
200TYR[B][*]	85.3#	197TYR	56.2#	197PHE	45.8#
201SER[B][*]	50.3#	198SER	68.3#	198THR	64.5#
202GLY[B]	32.8	199GLY	50.0#	199GLY	51.1#
203TYR[B]	21.5	200TYR	22.6	200TYR	26.0
204PRO[B]	1.4	201PRO	1.0	201PRO	1.0
205ILE[B]	1.1	202ILE	0.3	202ILE	0.0
206LEU[B]	1.8	203LEU	2.6	203LEU	0.0
207THR[B]	0.0	204THR	0.0	204THR	0.0
208TRP[B][*]	38.8#	205TRP	35.6#	205TRP	22.5
209ILE[A]	0.0	206ILE	0.0	206ILE	0.0
210SER[B]	22.5	207SER	20.1	207GLU	17.0
211SER	3.1	208SER	3.4	208ASN	4.6
212PRO	56.5#	209PRO	58.4#	209PRO	56.2#
213ASP	68.0#	210ASP	55.2#	210GLU	60.5#
214ASN	65.5#	211ASN	66.4#	211HIS	64.4#
215SER	67.2#	212SER	74.1#	212ASN	74.2#
216TYR[B]	42.5#	213TYR	39.8#	213VAL	29.4
217SER[B][*]	43.2#	214ASN	46.3#	214ARG	57.1#
218GLY[B]	1.2	215GLY	4.1	215GLY	6.1
219PRO[B][*]	14.4	216PRO	14.7	216ARG	33.7
220PHE[B]	0.0	217PHE	0.0	217PHE	0.0
221MET[B]	15.2	218MET	16.1	218LEU	8.4
222SER[B]	3.3	219SER	3.3	219SER	0.0
223TRP[B][*]	35.6#	220TRP	34.3	220TRP	42.5#
224TYR[B]	13.5	221TYR	15.9	221PHE	11.3
225PHE[B]	0.9	222PHE	1.4	222PHE	0.0
226ALA	15.9	223ALA	13.1	223ALA	7.8
227ASN	40.7#	224ASN	41.9#	224ASN	43.2#
228TRP	9.0	225TRP	8.9	225TRP	7.3
229PRO	56.3#	226PRO	61.5#	226PRO	63.5#
230ASN	67.6#	227ASN	67.3#	227ASN	67.3#
231LEU	21.1	228LEU	16.1	228LEU	16.1
232PRO	33.7	229PRO	23.0	229PRO	23.6
233SER	97.0#	230SER	95.8#	230SER	88.1#
234GLY	23.0	231GLY	19.5	231GLU	13.0
235PHE[*]	8.3	232PHE	9.0	232PHE	6.1
236GLY	26.1	233GLY	18.3	233GLY	28.5
237PRO	72.6#	234PRO	70.8#	234SER	81.9#

[0114]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC853 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	估算的每个残基的%SA
238LEU	27.7	235LEU	28.1	235LEU	25.9
239ASN*	33.2	236ASN	26.5	236ASN	42.2#
240SER	100#	237SER	100#	237SER	100#
241ASP*	62.2#	238ASP	61.7#	238ASP	55.2#
242ASN	15.1	239ASN	20.8	239ASN	21.7
243THR*	3.3	240THR	2.4	240THR	2.6
244VAL*	1.8	241VAL	3.1	241ILE	0.0
245THR*	19.0	242THR	23.8	242THR	30.1
246TYR*	8.6	243TYR	4.8	243TYR	0.4
247THR*	36.8#	244THR	40.8#	244LYS	58.8#
248GLY	2.5	245GLY	1.4	245GLY	0.0
249SER*	20.7	246SER	23.9	246SER	27.0
250VAL*	6.0	247VAL	1.4	247VAL	0.0
251VAL[X]*	32.6	248VAL	30.0	248VAL	29.7
252SER*	0.0	249SER	0.0	249SER	0.0
253GLN[X]	40.2#	250GLN	37.6#	250ARG	51.3#
254VAL	1.2	251VAL	1.5	251ILE	2.7
255SER[X]	35.3	252SER	37.3#	252SER	43.7#
256ALA	6.1	253ALA	2.4	253ALA	2.1
257GLY	4.1	254GLY	6.1	254GLY	1.2
258VAL	0.3	255VAL	0.0	255VAL	0.0
259TYR	2.2	256TYR	1.1	256TYR	1.0
260ALA	0.7	257ALA	0.7	257ALA	0.0
261THR	9.2	258THR	9.3	258THR	5.0
262VAL	3.6	259VAL	1.5	259VAL	0.2
263ARG	26.6	260ARG	29.8	260ARG	26.9
264PHE	0.5	261PHE	3.8	261PHE	1.5
265ASP	6.9	262ASP	7.2	262ASP	10.8
266GLN	5.6	263GLN	5.8	263GLN	2.6
267TYR	16.1	264TYR	14.5	264TYR	12.4
268ASP	29.8	265ASP	31.4	265ALA	19.3
269ILE	25.4	266ILE	18.2	266ILE	14.5
270HIS	85.5#	267HIS	72.2#	267ASN	92.0#
271ASN	43.4#	268ASN	46.9#	268ASN	64.0#
272LEU	40.3#	269LEU	43.1#	269LEU	39.8#
273ARG*	86.3#	270ARG	63.1#	270ARG	84.4#
274THR*	52.0#	271THR	66.1#	271THR	76.8#
275ILE*	41.0#	272ILE	37.9#	272ILE	32.4
276GLU	47.9#	273GLU	50.1#	273GLU	53.0#
277LYS	49.8#	274LYS	47.2#	274LYS	70.3#
278THR	46.3#	275THR	51.2#	275THR	53.7#
279TRP	25.2	276TRP	25.0	276TRP	33.4
280TYR	35.5	277TYR	30.7	277TYR	21.3
281ALA	6.6	278ALA	7.9	278ALA	4.4
282ARG*	77.6#	279ARG	80.6#	279ARG	86.1#
283HIS	45.2#	280HIS	36.6#	280HIS	35.8#
284ALA	0.8	281ALA	0.8	281GLY	0.6

[0115]

(A) TIC807_L11M (SEQ ID NO:185)		(B) TIC807_M2 (SEQ ID NO:8)		(C) TIC853 (SEQ ID NO:184)	
位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	计算的每个残基的%SA	位置和氨基酸残基	估算的每个残基的%SA
285THR	14.7	282THR	8.6	282THR	2.0
286LEU	3.6	283LEU	5.9	283LEU	2.3
287HIS*	8.4	284HIS	16.5	284HIS	11.9
288ASN	40.4#	285ASN	43.9#	285ASN	38.7#
289GLY	61.0#	286GLY	53.3#	286GLY	61.1#
290LYS	61.7#	287LYS	61.6#	287LYS	73.8#
291LYS	68.4#	288LYS	66.2#	288LYS	51.9#
292ILE	19.2	289ILE	19.5	289ILE	21.0
293SER*	40.3#	290SER	47.9#	290SER	45.7#
294ILE	3.4	291ILE	4.8	291ILE	5.1
295ASN*	29.3	292ASN	21.9	292ASN	18.0
296ASN	38.2#	293ASN	40.4#	293ASN	37.4#
297VAL	1.3	294VAL	1.4	294VAL	0.7
298THR	10.1	295THR	9.5#	295THR	4.3
299GLU*	77.1#	296GLU	72.7#	296GLU	68.8#
300MET*	48.6#	297MET	46.4#	297MET	42.8#
301ALA	65.3#	298ALA	54.1#	298ALA	60.4#
302PRO	66.0#	299PRO	73.0#	299PRO	77.8#
303THR*	83.7#	300THR	85.8#	300THR	94.1#
304SER	77.4#	301SER	76.1#	301SER	84.9#
305PRO*	81.1#	302PRO	65.7#	302PRO	83.4#
306ILE*	78.1#	303ILE	81.6#	303ILE	91.3#
307LYS	81.9#	304LYS	99.3#	304GLU	100#
308THR*	89.4#	305THR	100#	305ARG	100#
309ASN	100#	306ASN	100#	306ASN	100#

[0116] P1指示图2的曲面片[1]中的氨基酸。

[0117] P2指示图2的曲面片[2]中的氨基酸。

[0118] *指示本文所述的72个主要相关的氨基酸之一(参见图2)。

[0119] 示出通过Clustal W比对的TIC807_L11M、TIC807_M2和TIC853的残基。

[0120] 用#标记的数字代表至少约36%的%SA。

[0121] 受体结合

[0122] 具有大于36%的%SA值的残基或者处于具有大于36%的%SA的残基的3个残基内的曲面片(图2的[1])(半径相对于SEQ ID NO:2(TIC807)的S95的Cb原子为约9.2埃至12.2埃)被确定为包含TIC807蛋白质的区域,所述TIC807蛋白质可进行取代以提供展示增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性的eHTP's,此曲面片可能与目标昆虫受体结合活性相关联;并且包括SEQ ID NO:2(TIC807)的残基T93、S95、S97、F147、Q149、S151、N180、T182、V251、Q253以及S255。eHTP's可包括但不限于,曲面片1氨基酸残基的一个或多个取代,如S95A、F147A、Q149E和/或V251A。

[0123] 本文所述的组合工程化-测试-选择方法确定位于曲面片1中的残基,所述曲面片1在取代或以其它方式修饰时可提供eHTP's。这些残基对于eHTP's与草盲蝽昆虫肠道内的受体的产生性结合以提供与TIC807相比增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性可为重要的。可提供eHTP's的曲面片1氨基酸残基的修饰包括提供偏好结合可见于昆虫糖基化受体中的糖基的芳香基和/或氢键基的取代。

[0124] 膜结合

[0125] 从TIC807的原子结构中确定位于蛋白质的β折叠区域中的某些氨基酸并且用芳香族残基取代。更确切地说，折叠的TIC807β折叠区域的氨基酸L78、I123、H270、R273、I275用苯丙氨酸、酪氨酸或色氨酸取代。R273和I275的芳香族氨基酸取代处于提供增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性的那些残基中(参见表4，SEQ ID NO:32、34、68、92和122的数据)。在这些位置中的氨基酸侧链残基可能与目标害虫的膜相互作用。

[0126] 蛋白水解活化位点

[0127] 用丝氨酸取代通常认为涉及蛋白水解的甘氨酸残基，以改变蛋白水解裂解动力学。甘氨酸残基在环区域内的存在可给予更大的灵活性和因此对蛋白水解的敏感性，这可增加昆虫抑制活性或者减小昆虫抑制活性。用甘氨酸残基取代结构确定的区域内的残基，并且没有观察到改进。用丝氨酸(小残基)取代已为甘氨酸的环中的位置(例如，G18、G24、G27)，以试图减少蛋白水解的敏感性，并且没有观察到改进。

[0128] 组合的结构设计方法

[0129] TIC807(SEQ ID NO:2)的原子结构用于确定用于库诱变的环区域，随后测试工程化的变体。对SEQ ID NO:2(TIC807)的氨基酸位置211-216处的环进行库诱变和测试。对紧密靠近SEQ ID NO:2(TIC807)的氨基酸位置75-83、161-167和267-276的连续环进行库诱变和测试。

[0130] TIC807的原子结构的分析表明在SEQ ID NO:2的残基113-138处的结构环残基被工程化为使所述环稳定和不稳定。

[0131] 在跨越由短环连接的两条β链的另一个区域中，两条β链在相对于SEQ ID NO:2的位置116至121和位置133至138处展示疏水性和亲水性氨基酸残基的交替模式，其特征为成孔环。对表达库进行工程化，以用所述库中总计288种可能的变体的对应组合116V/Y/L/H/F/D、118V/Y/L/H/F/D和120I/D/F/H/L/N/V/Y修饰两条β链区段置换残基V116、V118和I120。重复此程序：用243种可能的变体的对应组合117S/A/D/E/G/K/N/R/T、119S/A/D/E/G/K/N/R/T和121P/S/T修饰残基S117、S119和P121；用252种可能的变体的对应组合133I/D/F/N/V/Y、135A/D/F/H/L/V/Y和137F/D/H/L/V/Y修饰残基I133、A135和F137；以及用486种可能的变体的对应组合134T/A/D/E/G/K/N/R/S、136E/A/D/G/K/N/R/S/T和138N/A/D/G/S/T修饰残基T134、E136和N138。增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性与表4所示出的这些取代中的一些取代相关。

[0132] 结构-功能关系

[0133] 总之，对超过2000种表达TIC807的变体的克隆(包括混合的库克隆)测试与TIC807相比针对草盲蝽某些种的增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性。半随机修饰、定向修饰和预测性结构-功能修饰(包括结构模型、受体结合可能性、金属结合可能性、低聚反应可能性、表面电荷分布、孔形成可能性、离子通道功能以及曲面暴露片的识别)的目的在于确定与TIC807相比具有增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性的eHTP's。对这些克隆进行表达以用于生物测定测试。

[0134] 实施例3：TIC807(包括变体和片段)的蛋白质表达和纯化

[0135] 对照蛋白质TIC807为全长309个氨基酸的蛋白质，所述蛋白质可以结晶形式在苏云金芽孢杆菌(Bt)中表达或者以聚集体形式在大肠杆菌中表达。其测试变体在Bt中重组表

达。TIC807和TIC807的变体的表达特征分别为从Bt和大肠杆菌细胞中提取的主要结晶和聚集体形式。为了测试草盲蝽生物活性，通过将样品溶解于25mM碳酸钠缓冲液中并且经由离心作用去除不溶的材料来制备适用于草盲蝽生物测定的测试样品和对照样品。使用总蛋白质方法，例如Bradford测定、ELISA方法或类似方法测量测试样品和对照样品中的蛋白质的量。将凝胶电泳用于确定稳定的重组蛋白质的纯度和储备浓度。对C-末端HIS-标记的TIC807蛋白质进行工程化，以促进大量TIC807对照蛋白质的检测、纯化和定量。单独地测定C-末端HIS-标记的TIC807和未标记的TIC807测试样品并且确认具有针对草盲蝽的等效活性(参见实施例4、5和6)。

[0136] 对TIC807_M13(SEQ ID NO:34)进行定点氨基酸取代，以提高可溶形式的表达。发明人假定本发明的更容易溶解的蛋白质变体可促进表达和纯化，例如在大肠杆菌宿主细胞表达；并且在植物宿主细胞内表达时可增加昆虫抑制效力。以三种不同方式对编码TIC807_M13(SEQ ID NO:34)的重组DNA构建体进行工程化，以反映三种不同的变体：相对于TIC807_M13，对于变体#1的修饰为：I58K和P59K，对于变体#2为：S198K和G199K，并且对于变体#3为：S246R、V248E和Q250R。相对于TIC807(SEQ ID NO:2)，对于变体#1，修饰可以可选地为如以下所述的：I58K和P59K，对于变体#2为：S201K和G202K，并且对于变体#3为：S249R、V251E和Q253R；此位置差异由于在TIC807_M13(SEQ ID NO:34)所反映的SEQ ID NO:2(TIC807)残基范围196-201中的连续三重缺失而为叠合的。各自对四种工程化重组DNA构建体进行克隆并且在大肠杆菌内表达。通过coomassie染色的SDS-PAGE评价来自四种大肠杆菌制备物的可溶部分，这显示TIC807_M13(SEQ ID NO:34)在可溶部分中为不可检测的；但是，相反地，变体#1、#2和#3为可溶的。对本发明的蛋白质单独地或者组合地进行类似氨基酸取代，以提高它们在非-Bt或植物宿主细胞内的溶解度。对重组DNA构建体进行工程化以编码和表达TIC807_M13变体#3(改名为TIC807_M14；核苷酸SEQ ID NO:203和氨基酸SEQ ID NO:204)。阐明制备的大肠杆菌裂解物，并且在一系列柱(包括离子交换法和凝胶过滤法)上纯化和富集重组蛋白。对合并的蛋白质部分进行定量并且确定具有针对半翅目昆虫的活性(参见实施例4，表4B)。

[0137] 本发明的蛋白质包括但不限于，具有如SEQ ID NO:28、SEQ ID NO:30、SEQ ID NO:32或SEQ ID NO:36所列出的氨基酸序列的蛋白质，对本发明的蛋白质进行工程化以在宿主细胞内表达时，例如在Bt、大肠杆菌或植物细胞或者植物细胞隔间内表达时，提高可溶形式的表达。工程化包括在以下位置58、59、198、199、201或202中的一个或多个位置处取代赖氨酸氨基酸残基；或者在以下位置198、248或301中的一个或多个位置处取代谷氨酸；或者，在以下位置246、250或253中的一个或多个位置处取代精氨酸。

[0138] C-末端区域从蛋白质的单体核心突出(参见图2)。对重组DNA构建体进行工程化以编码和表达具有氨基酸序列SEQ ID NO:202的蛋白质，所述氨基酸序列为TIC807_M8(SEQ ID NO:16)的蛋白质片段(氨基酸1至301)；并且对表达的蛋白质进行纯化、定量并且确定具有针对草盲蝽昆虫的活性(参见实施例4，表4B)。设计重组DNA构建体以编码和表达TIC807片段，所述片段在对应TIC807位置A281、G289、S293、A301和S304展示本发明的蛋白质的不同C-末端截短。对蛋白质片段进行工程化以编码和表达具有如SEQ ID NO:28、SEQ ID NO:30、SEQ ID NO:32、SEQ ID NO:34和SEQ ID NO:36所列出的氨基酸序列的蛋白质；并且将表达的蛋白质片段用作针对草盲蝽昆虫的测试样品。

[0139] 实施例4:工程化蛋白质的半翅目活性

[0140] 此实施例说明在提供于半翅目食物中时具有针对半翅目昆虫的提高的杀昆虫活性和增大的杀昆虫特异性的eHTP's,所述半翅目昆虫包括但不限于半翅目盲蝽科的成员,包括草盲蝽属,例如豆荚草盲蝽和美洲牧草盲蝽;以及叶蝉科,包括芒果叶蝉属,例如苯甲醛对叶蝉,和小绿叶蝉属,例如马铃薯小绿叶蝉。此实施例用表4B说明用于确定本发明的Bt表达的重组蛋白针对豆荚草盲蝽和美洲牧草盲蝽二者的的增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性的进食测定。将重组细菌宿主细胞内表达的蛋白质溶解于碳酸盐缓冲液中并且通过SDS聚丙烯酰胺凝胶电泳(SDS-PAGE)进行分析;并且通过密度测定法使用牛血清白蛋白(BSA)作为标准确定蛋白质浓度。将以这种方式制备的蛋白质储备液(2X)与食物混合以用于进食测定。

[0141] 使用半翅目种类豆荚草盲蝽和美洲牧草盲蝽的进食测定基于具有在伸展的Parafilm®与聚酯薄膜之间包囊化的草盲蝽食物的96孔微滴定板形式。从Bio-Serv®(Bio-Serv® Diet F9644B,Frenchtown,NJ)获得人工食物。在表面无菌的搅拌器中,将高压蒸汽处理的沸水(518mL)与156.3克Bio-Serv®食物F9644B混合。添加四个表面无菌的鸡蛋中的内容物并且搅拌混合物直到平滑,然后调节至一升总体积并且允许冷却至室温,这为2X食物。通过以1:1比率混合2X食物和2X样品来制备测试样品。将Parafilm®片(Pechiney Plastic Packing,Chicago,IL)置于设计用于96孔形式的真空歧管(Analytical Research Systems,Gainesville,FL)上并且应用大约-20毫米汞柱的真空,以足以引起Parafilm®挤压到孔中。将二十至四十微升的测试样品添加到Parafilm®挤出物中。将聚酯薄膜片(Clear Lam Packaging,Inc.,Elk Grove Village,IL)置于样品填充的Parafilm®挤出物上并且用粘合烙铁(Bienfang Sealector II,Hunt Corporation,Philadelphia,PA)密封,因此形成食物填充的Parafilm®袋。将这些Parafilm®袋定位于包含悬浮于稀释琼脂糖溶液中的草盲蝽卵的平底96-孔板上。孵化之后,草盲蝽若虫通过刺穿食物填充的Parafilm®袋摄食食物。可选地,将新孵化的草盲蝽若虫而不是卵手动侵染到每个孔中。在第5天确定生长缓慢和死亡率并且与对照进行比较。使用JMP4统计软件分析数据。对于测试浓度的每种蛋白质,使三个群体的八只若虫经历此生物测定并且在表4B中报道死亡率得分。

[0142] 对于表1和表4B所列出的LC50测定,以8至10个浓度将蛋白质提供给新孵化的若虫并且允许若虫在剂量范围内在对死亡率评分之前进食持续5天。对于每个浓度,使三个群体的八只若虫经历此生物测定,并且将表1和表4B中的所有LC50测定重复至少一次。

[0143] 对于LC50评估,以4个浓度将蛋白质提供给新孵化的美洲牧草盲蝽若虫并且允许若虫在剂量范围内在对死亡率评分之前进食持续5天。对TIC807和TIC807_M2进行美洲牧草盲蝽LC50评估,因为超过1000μg/mL的显著大量的这些蛋白质不能提供在草盲蝽食物中以便对美洲牧草盲蝽实现高毒性剂量反应范围,并且因此没有确定TIC807或TIC807_M2的LC50值。相反,以低范围进行4个剂量的LC50评估,并且在表1和表4B中报道。评估的TIC807_M14的美洲牧草盲蝽LC50为4.4μg/mL。对于每个浓度,使三个群体的八只若虫经历此生物测

定。

[0144] 此实施例用表4A和表4B说明用于确定本文所公开的Bt表达的重组蛋白针对苯甲醛对叶蝉的增大的抑制谱和/或提高的抑制活性的进食测定。针对豆荚草盲蝽和/或美洲牧草盲蝽具有提高的杀昆虫活性或增大的杀昆虫特异性的TIC807变体展示针对苯甲醛对叶蝉的提高的杀昆虫活性。

[0145] 将TIC807和TIC807_M13溶解于25mM pH 10碳酸钠缓冲液中。将苯甲醛对叶蝉卵收集在秋葵叶子上并且在包含2%琼脂的陪替氏培养皿中孵育。在孵化之后，使用稀释的(1:5)草盲蝽食物将新生虫用于生物测定。以相等比例混合蛋白质和食物(使蛋白质最终浓度为500μg/mL)并且将其分配到测试场所。通过将缓冲液与食物混合来制备未处理的对照。将单个新生虫侵染到测试场地中，在25℃、60%RH下孵育测定物。对每个浓度的蛋白质测试二十只新生若虫并且以2次重复进行。用25mM pH 10碳酸钠缓冲液将对照维持在1:5稀释的草盲蝽食物中。在第五天确定昆虫的死亡率。通过以下公式计算死亡率值：(处理的%死亡率-对照的%死亡率)/(100-对照的%死亡率)x 100。表4A将5种不同浓度的TIC807和TIC807_M13的芒果叶蝉属活性制成表格。

[0146] 表4A.针对芒果叶蝉属种类的TIC807和TIC807_M13死亡率百分比

[0147]

SEQ ID NO:	蛋白质名称	死亡率(%)				
		500 μg/mL	166.66 μg/mL	55.55 μg/mL	18.51 μg/mL	6.17 μg/mL
2	TIC807	100 %	55.88 %	17.64 %	0	0
34	TIC807_M13	100 %	88.23 %	73.52 %	44.11 %	26.47 %

[0148] 在单独的测试中确定TIC807和TIC807_M13的LC50值。SEQ ID NO:2(TIC807)展示116.79μg/mL的LC50值和437.27μg/mL的LC90。SEQ ID NO:34(TIC807_M13)展示7.59μg/mL的LC50值和239.8μg/mL的LC90值。

[0149] 将如上对于苯甲醛对叶蝉所述的进食测定用于测试eHTP's针对马铃薯小绿叶蝉的提高的杀昆虫活性和/或增大的杀昆虫特异性。针对豆荚草盲蝽和美洲牧草盲蝽具有提高的杀昆虫活性或增大的杀昆虫特异性的TIC807变体展示针对马铃薯小绿叶蝉的提高的杀昆虫活性。

[0150] 对于TIC807(SEQ ID NO:2)、TIC807_M2(SEQ ID NO:8)、TIC807_M10(SEQ ID NO:30)和TIC807_M13(SEQ ID NO:34)，在一个测试组中确定Cry51Aa1(SEQ ID NO:182)针对豆荚草盲蝽和美洲牧草盲蝽的LC50值。TIC807_M2、TIC807_M10和TIC807_M12展示与Cry51Aa1相比提高的LC50值。

[0151] 本领域技术人员应清楚，对此程序的改变可存在，并且不应影响结果。

[0152] **表 4B.** 针对草盲蝽属某些种的 eHTP's 的迭代工程化-测试-选择引起与 TIC807 相比具有针对草盲蝽属某些种的增大的草盲蝽抑制谱和/或提高的草盲蝽抑制活性的 267 种蛋白质。

		与 TIC807 母本蛋白质相比的氨基酸差异			***豆荚草盲蝽***			***美洲牧草盲蝽***		
SEQ ID NO:	**蛋白质名称**	**相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异**	**在第一曲面片中的一个或多个氨基酸差异**	**在第二曲面片中的一个或多个氨基酸差异**	**LC50 值 (μg/mL)**	**成倍增加的毒性 (LC50)**	**在约 1-3 μg/mL 蛋白质下的% 死亡率 ***	**LC50 值 (μg/mL)**	**成倍增加的毒性 (LC50)**	**在约 100 μg/mL 蛋白质下的% 死亡率 ***
2	TIC807	母本	母本	母本	73	1	0	>223	1	0
6	TIC807_M1	F147A	F147A	无	23	3	ND	100	至少 2	ND
8	TIC807_M2	F46S、Y54H、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	无	S217N，然后在残基范围 196-201 中的连续的三重缺失	6.0	12	39	>223	-	14
10	TIC807_M3	F46S、Y54H、T93A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	2.9	25	43	ND	-	ND
12	TIC807_M4	F46S、Y54H、S95A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	2.4	30	20	ND	-	ND

[0153]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异				豆类草盲蝽			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
14	TIC807_M5	F46S、Y54H、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	1.1	66	34	ND	-	ND
16	TIC807_M8	F46S、Y54H、S95A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A、F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	0.8	91	ND	223	至少 1	ND
18	TIC807_M6	F46S、Y54H、T93A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A、F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	1.5	50	ND	ND	-	ND
20	TIC807_M7	F46S、Y54H、Q149E、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	Q149E	S217N，然后在残基范围 196-201 中的连续的三重缺失	1.4	52	62	ND	-	49
28	TIC807	F46S、Y54H、	S95A、	P219R，然后	9.9	7	ND	8.3	至少 27	ND

[0154]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
	7_M9	S95A、F147A、S167R、P219R，然后在残基范围 196-201 中的连续的三重缺失	F147A	在残基范围 196-201 中的连续的三重缺失						
30	TIC807_M10	F46S、Y54H、S95A、F147A、S167R、P219R、V251A，然后在残基范围 196-201 中的连续的三重缺失	S95A、F147A、V251A	P219R，然后在残基范围 196-201 中的连续三重缺失	0.6	122	ND	4.8	至少 46	ND
32	TIC807_M11	F46S、Y54H、S95A、F147A、S167R、P219R、R273W，然后在残基范围 196-201 中的连续的三重缺失	S95A、F147A	P219R，然后在残基范围 196-201 中的连续的三重缺失	1.4	54	ND	5.9	至少 38	ND
34	TIC807_M13	F46S、Y54H、S95A、F147S、Q149E、S167R、P219R、R273W，然后在残基范围 196-201 中的连	S95A、F147A、Q149E	P219R，然后在残基范围 196-201 中的连续的三重缺失	0.3	243	ND	0.85	至少 262	ND

[0155]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		续的三重缺失								
36	TIC807_M12	F46S、Y54H、S95A、F147A、S167R、P219R、N239A、V251A，然后在残基范围 196-201 中的连续的三重缺失	S95A、F147A、V251A	P219R，然后在残基范围 196-201 中的连续的三重缺失	0.4	182	ND	1.2	至少 186	ND
37	TIC807_7_37	TIC807_HYS_缺失	无	在 HYSHYS 残基中的连续的三重缺失(位置 196-201)	22.4	3	ND	ND	-	ND
38	TIC807_7_38	F46S、Y54H、F138V、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	无	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	41	ND	-	44
39	TIC807_7_39	F46S、Y54H、S167R、S217N、H287F，然后在残基范围 196-201 中的连续的三重缺失	无	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	57	ND	-	31

[0156]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
40	TIC807_40	F46S、I52M、Y54H、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	无	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	52	ND	-	36
41	TIC807_41	N12D、F46S、Y54H、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	无	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	52	ND	-	31
42	TIC807_42	F46S、Y54H、S167R、N180D、S217N，然后在残基范围 196-201 中的连续的三重缺失	N180D	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	63	ND	-	50
43	TIC807_43	F46S、Y54H、S167R，然后在残基范围 196-201 中的连续的三重缺失	无	在 HYSHYS 残基中的连续的三重缺失(位置 196-201)	ND	-	46	ND	-	87
44	TIC807_44	F46S、Y54H、S167R、S217N、	无	S217N、P219R，然后	ND	-	30	ND	-	94

[0157]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
45	TIC807_45	P219R，然后在残基范围 196-201 中的连续的三重缺失	无	在残基范围 196-201 中的连续的三重缺失	ND	-	67	ND	-	21
46	TIC807_46	F46S、Y54H、S159T、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	无	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	52	ND	-	31
47	TIC807_47	F46S、Y54H、S167R、S217N、T247K，然后在残基范围 196-201 中的连续的三重缺失	无	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	59	ND	-	31
48	TIC807_48	F46S、Y54H、S167R、S217N、V244I、T247K，	无	S217N，然后在残基范围 196-201 中的	ND	-	58	ND	-	34

[0158]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异				豆夜蛾幼虫			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
49	TIC807_49	然后在残基范围 196-201 中的连续的三重缺失	无	连续的三重缺失	ND	-	17	ND	-	13
50	TIC807_50	F46S、Y54H、S167R、S217N、W223Y，然后在残基范围 196-201 中的连续三重缺失	无	S217N、W223Y，然后在残基范围 196-201 中的连续的三重缺失	ND	-	48	ND	-	19
51	TIC807_51	F46S、Y54H、S167R、S217N、Y246F，然后在残基范围 196-201 中的连续三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	77	ND	-	ND
52	TIC807_52	F46S、Y54H、F147A、G128A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	73	ND	-	ND
		F46S、Y54H、F147A、S167R、S217N、M300A，然后在残基范围								

[0159]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
53	TIC807_53	196-201 中的连续的三重缺失		缺失						
		F46S、Y54H、F147A、S167R、S217N、S293A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	73	ND	-	ND
54	TIC807_54	F46S、Y54H、F147A、S167R、S217N、H287A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	67	ND	-	ND
55	TIC807_55	F46S、Y54H、F147A、S167R、S217N、T274A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	65	ND	-	ND
56	TIC807_56	F46S、Y54H、F147A、S167R、S217N、R282A，然后在残基范围 196-201 中的连	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	64	ND	-	ND

[0160]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		续的三重缺失								
57	TIC807_57	F46S、Y54H、T93A、S167R、S217N、T308A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	63	ND	-	ND
58	TIC807_58	F46S、Y54H、Q70A、T93A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	61	ND	-	ND
59	TIC807_59	F46S、Y54H、E125A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	61	ND	-	ND
60	TIC807_60	F46S、Y54H、F147A、S167R、S217N、T247A，然后在残基范围 196-201 中的连	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	61	ND	-	ND

[0161]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		续的三重缺失								
61	TIC807_61	F46S、Y54H、T93A、S167R、S217N、P305A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	59	ND	-	ND
62	TIC807_62	F46S、Y54H、F147A、S167R、S217N、I306A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	57	ND	-	ND
63	TIC807_63	F46S、Y54H、T93A、S167R、S217N、R282A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	56	ND	-	ND
64	TIC807_64	F46S、Y54H、T93A、S167R、S217N、T308A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	55	ND	-	ND

[0162]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
65	TIC807_65	F46S、Y54H、T93A、S167R、S217N、M300A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	55	ND	-	ND
66	TIC807_66	F46S、Y54H、T93A、S167R、S217N、H287A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	53	ND	-	ND
67	TIC807_67	F46S、Y54H、S95A、S167R、S217N、M300A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	52	ND	-	ND
68	TIC807_68	F46S、Y54H、F147A、S167R、S217N、I275A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	52	ND	-	ND
69	TIC807	F46S、Y54H、	S95A	S217N，然后	ND	-	51	ND	-	ND

[0163]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
70	TIC807_70	S95A、S167R、S217N、T247A，然后在残基范围 196-201 中的连续的三重缺失	F147A	在残基范围 196-201 中的连续多个氨基酸缺失	ND	-	50	ND	-	ND
71	TIC807_71	F46S、Y54H、F147A、S167R、V175A、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	50	ND	-	ND
72	TIC807_72	F46S、Y54H、F147A、S159A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	48	ND	-	ND
73	TIC807_73	F46S、Y54H、S95A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A、F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	47	ND	-	ND

[0164]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异				豆夜蛾属			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		L187A、S217N，然后在残基范围 196-201 中的连续的三重缺失		196-201 中的连续的三重缺失						
74	TIC807_74	F46S、Y54H、T93A、S167R、T182A、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	47	ND	-	ND
75	TIC807_75	F46S、Y54H、F147A、S167R、S217N、T245A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	46	ND	-	ND
76	TIC807_76	F46S、Y54H、T93A、S167R、S217N、S249A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	46	ND	-	ND
77	TIC807_77	F46S、Y54H、T93A、Q149A、S167R、S217N，	T93A、Q149A	S217N，然后在残基范围 196-201 中的	ND	-	45	ND	-	ND

[0165]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		然后在残基范围 196-201 中的连续的三重缺失		连续的三重缺失						
78	TIC807_78	F46S、Y54H、T93A、S151A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A、S151A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	45	ND	-	ND
79	TIC807_79	F46S、Y54H、Q70A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	45	ND	-	ND
80	TIC807_80	F46S、Y54H、S95A、Q148A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	44	ND	-	ND
81	TIC807_81	F46S、Y54H、T93A、S167R、S217N、T274A，然后在残基范围	T93A	S217N，然后在残基范围 196-201 中的连续的三重	ND	-	44	ND	-	ND

[0166]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
82	TIC807_82	196-201 中的连续的三重缺失		缺失						
		F46S、Y54H、T93A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	43	ND	-	ND
83	TIC807_83	F46S、Y54H、T93A、S167R、M177A、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	42	ND	-	ND
84	TIC807_84	F46S、Y54H、S95A、S167R、S217N、V250A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	42	ND	-	ND
85	TIC807_85	F46S、Y54H、T93A、E155A、S167R、S217N，然后在残基范围 196-201 中的连	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	42	ND	-	ND

[0167]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
86	TIC807_86	续的三重缺失								
		F46S、Y54H、I134A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	41	ND	-	ND
87	TIC807_87	F46S、Y54H、T93A、S167R、S217N、T245A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	41	ND	-	ND
88	TIC807_88	F46S、Y54H、T93A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 S198A	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 S198A	ND	-	40	ND	-	ND
89	TIC807_89	F46S、Y54H、F147A、S167R、S217N、N295A，然后在残基范围 196-201 中的连	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	40	ND	-	ND

[0168]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		续的三重缺失								
90	TIC807_90	F46S、Y54H、A87S、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	38	ND	-	ND
91	TIC807_91	F46S、Y54H、F147A、S167R、S217N、S249A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	38	ND	-	ND
92	TIC807_92	F46S、Y54H、S95A、S167R、S217N、I275A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	37	ND	-	ND
93	TIC807_93	F46S、Y54H、T93A、A139S、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	37	ND	-	ND

[0169]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆夜蛾属			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
94	TIC807_94	F46S、Y54H、F147A、S167R、S217N、P305A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	36	ND	-	ND
95	TIC807_95	F46S、Y54H、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 S198A	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 S198A	ND	-	36	ND	-	ND
96	TIC807_96	F46S、Y54H、F147A、S217N、S252A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	36	ND	-	ND
97	TIC807_97	F46S、Y54H、T93A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A、F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	36	ND	-	ND

[0170]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆夜蛾属			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
98	TIC807_98	F46S、Y54H、F147A、S167R、S217N、V250A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	36	ND	-	ND
99	TIC807_99	F46S、Y54H、F147A、S167R、S217N、T243A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	35	ND	-	ND
100	TIC807_100	F46S、Y54H、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 Y197A	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 Y197A	ND	-	35	ND	-	ND
101	TIC807_101	F46S、Y54H、S95A、S167R、S217N、N295A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	35	ND	-	ND

[0171]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
102	TIC807_102	F46S、Y54H、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	34	ND	-	ND
103	TIC807_103	F46S、Y54H、F147A、S167R、S217N、E299A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	32	ND	-	ND
104	TIC807_104	F46S、Y54H、S95A、S167R、S217N、R282A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	32	ND	-	ND
105	TIC807_105	F46S、Y54H、T93A、S167R、S217N、I306A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	32	ND	-	ND
106	TIC807	F46S、Y54H、	S95A	S217N，然后	ND	-	30	ND	-	ND

[0172]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
107	TIC807_106	S95A、S167R、S217N、S249A，然后在残基范围 196-201 中的连续的三重缺失		在残基范围 196-201 中的连续的三重缺失						
108	TIC807_107	F46S、Y54H、A87S、T93A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	30	ND	-	ND
109	TIC807_108	F46S、Y54H、T93A、S159A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	29	ND	-	ND
110	TIC807_109	F46S、Y54H、F147A、S167R、S217N、T303A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	28	ND	-	ND
	TIC807_110	F46S、Y54H、T93A、Q148A、	T93A	S217N，然后在残基范围	ND	-	27	ND	-	ND

[0173]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
111	TIC807_111	S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失		196-201 中的连续的三重缺失						
112	TIC807_112	F46S、Y54H、S95A、S167R、V175A、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	27	ND	-	ND
113	TIC807_113	F46S、Y54H、F147A、S167R、S217N、D241A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	27	ND	-	ND
114	TIC807_114	F46S、Y54H、S95A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A、F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	26	ND	-	ND
		F46S、Y54H、F147A、S167R、M177A、S217N，	F147A	S217N，然后在残基范围 196-201 中的	ND	-	26	ND	-	ND

[0174]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异			豆荚草盲蝽			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
115	TIC807_115	然后在残基范围 196-201 中的连续的三重缺失		连续的三重缺失						
		F46S、Y54H、F147A、S167R、S217N、M300A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	26	ND	-	ND
116	TIC807_116	F46S、Y54H、S95A、S167R、S217N、P305A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	26	ND	-	ND
117	TIC807_117	F46S、Y54H、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 H196A	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 H196A	ND	-	25	ND	-	ND
118	TIC807_118	F46S、Y54H、A139S、F147A、S167R、S217N，	F147A	S217N，然后在残基范围 196-201 中的	ND	-	25	ND	-	ND

[0175]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异				豆类草盲蝽			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
119	TIC807_119	然后在残基范围 196-201 中的连续的三重缺失		连续的三重缺失						
120	TIC807_120	F46S、Y54H、T93A、S167R、S217N、N295A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	25	ND	-	ND
121	TIC807_121	F46S、Y54H、T93A、S167R、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	24	ND	-	ND
122	TIC807_122	F46S、Y54H、S117A、F147A，S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	24	ND	-	ND
		F46S、Y54H、T93A、S167R、S217N、I275A，然后在残基范围	T93A	S217N，然后在残基范围 196-201 中的连续的三重	ND	-	23	ND	-	ND

[0176]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
123	TIC807_123	196-201 中的连续的三重缺失		缺失						
		F46S、Y54H、S95A、S167R、S217N、H287A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	23	ND	-	ND
124	TIC807_124	F46S、Y54H、S95A、G105A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	21	ND	-	ND
125	TIC807_125	F46S、Y54H、S95A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	20	ND	-	ND
126	TIC807_126	F46S、Y54H、S95A、I134A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	20	ND	-	ND

[0177]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		续的三重缺失								
127	TIC807_127	F46S、Y54H、T93A、S167R、S217N、M300A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	20	ND	-	ND
128	TIC807_128	F46S、Y54H、T93A、S167R、S217N、T303A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	18	ND	-	ND
129	TIC807_129	F46S、Y54H、T93A、A150S、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	18	ND	-	ND
130	TIC807_130	F46S、Y54H、S95A、E155A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	18	ND	-	ND

[0178]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
131	TIC807_131	F46S、Y54H、T93A、S167R、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	17	ND	-	ND
132	TIC807_132	F46S、Y54H、S95A、S167R、W208A、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	W208A、S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	17	ND	-	ND
133	TIC807_133	F46S、Y54H、S95A、S167R、T182A、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A、T182A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	17	ND	-	ND
134	TIC807_134	F46S、Y54H、T93A、S167R、S217N、T243A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	17	ND	-	ND
135	TIC807	F46S、Y54H、	S95A	S217N，然后	ND	-	16	ND	-	ND

[0179]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
136	TIC807_135	S95A、S167R、S217N、I306A，然后在残基范围 196-201 中的连续的三重缺失		在残基范围 196-201 中的连续的三重缺失						
137	TIC807_136	F46S、Y54H、S95A、S117A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	16	ND	-	ND
138	TIC807_137	F46S、Y54H、T93A、S119A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	15	ND	-	ND
139	TIC807_138	F46S、Y54H、T68A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	15	ND	-	ND
	TIC807_139	F46S、Y54H、G105A、F147A、	F147A	S217N，然后在残基范围	ND	-	15	ND	-	ND

[0180]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失		196-201 中的连续的三重缺失						
140	TIC807_140	F46S、Y54H、S95A、E125A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	15	ND	-	ND
141	TIC807_141	F46S、Y54H、T93A、E155A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	14	ND	-	ND
142	TIC807_142	F46S、Y54H、T93A、S167R、S217N、P305A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	14	ND	-	ND
143	TIC807_143	F46S、Y54H、S95A、S167R、M177A、S217N，然后在残基范围 196-201 中的	S95A	S217N，然后在残基范围 196-201 中的	ND	-	13	ND	-	ND

[0181]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		然后在残基范围 196-201 中的连续的三重缺失		连续的三重缺失						
144	TIC807_144	F46S、Y54H、T93A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 H196A	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 H196A	ND	-	13	ND	-	ND
145	TIC807_145	F46S、Y54H、T93A、D153A、S167R、S217N，然后在残基范围 196-201-T93A-D153A 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	11	ND	-	ND
146	TIC807_146	F46S、Y54H、F147A、S167R、S217N、W208A，然后在残基范围 196-201 中的连续的三重缺失	F147A	W208A、S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	10	ND	-	ND
147	TIC807_147	F46S、Y54H、T93A、S167R、	T93A	S217N，然后在残基范围	ND	-	9	ND	-	ND

[0182]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
148	TIC807_148	S217N、I306A，然后在残基范围 196-201 中的连续的三重缺失	S95A	196-201 中的连续的三重缺失	ND	-	9	ND	-	ND
149	TIC807_149	F46S、Y54H、S95A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失，随后为 H196A	S95A、Q149A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	9	ND	-	ND
150	TIC807_150	F46S、Y54H、S95A、Q149A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	8	ND	-	ND
151	TIC807_151	F46S、Y54H、S95A、S167R、S217N、S293A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	8	ND	-	ND

[0183]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失		196-201 中的连续的三重缺失						
152	TIC807_152	F46S、Y54H、S119A、F147A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	7	ND	-	ND
153	TIC807_153	F46S、Y54H、S95A、S167A、S217N，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	7	ND	-	ND
154	TIC807_154	F46S、Y54H、F147A、I158A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	7	ND	-	ND
155	TIC807_155	F46S、Y54H、S95A、S167R、S217N、M300A，	S95A	S217N，然后在残基范围 196-201 中的	ND	-	7	ND	-	ND

[0184]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		然后在残基范围 196-201 中的连续的三重缺失		连续的三重缺失						
156	TIC807_156	F46S、Y54H、F147A、T182A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A、T182A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	6	ND	-	ND
157	TIC807_157	F46S、Y54H、F147A、S167R、S217N、F235A，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	5	ND	-	ND
158	TIC807_158	F46S、Y54H、F147A、S167A、S217N，然后在残基范围 196-201 中的连续的三重缺失	F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	5	ND	-	ND
159	TIC807_159	F46S、Y54H、T93A、S167R、S217N、D241A，然后在残基范围	T93A	S217N，然后在残基范围 196-201 中的连续的三重	ND	-	5	ND	-	ND

[0185]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
160	TIC807_160	196-201 中的连续的三重缺失		缺失						
		F46S、Y54H、S95A、S167R、S217N、T274A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	4	ND	-	ND
161	TIC807_161	F46S、Y54H、T93A、Q148A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	4	ND	-	ND
162	TIC807_162	F46S、Y54H、S95A、S167R、S217N、D241A，然后在残基范围 196-201 中的连续的三重缺失	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	4	ND	-	ND
163	TIC807_163	F46S、Y54H、S95A、E155A、S167R、S217N，然后在残基范围 196-201 中的连	S95A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	4	ND	-	ND

[0186]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆荚草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		续的三重缺失								
164	TIC807_164	F46S、Y54H、T93A、S167R、L187A、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	4	ND	-	ND
165	TIC807_165	F46S、Y54H、T93A、S217N、T303A，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	4	ND	-	ND
166	TIC807_166	F46S、Y54H、T93A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	3	ND	-	ND
167	TIC807_167	F46S、Y54H、T93A、D153A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	3	ND	-	ND

[0187]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆荚草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
168	TIC807_168	F46S、Y54H、T93A、I134A、S167R、S217N，然后在残基范围 196-201 中的连续的三重缺失	T93A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	3	ND	-	ND
169	TIC807_169	N137T	无	无	ND	-	44*	ND	-	ND
169	TIC807_169	E135S	无	无	ND	-	20*	ND	-	ND
169	TIC807_169	N137T、E135S	无	无	ND	-	34*	ND	-	ND
169	TIC807_169	E135T、N137D	无	无	ND	-	16*	ND	-	ND
169	TIC807_169	T133E	无	无	ND	-	60*	ND	-	ND
169	TIC807_169	E135A, N137G	无	无	ND	-	50*	ND	-	ND
170	TIC807_170	E125C	无	无	ND	-	12	ND	-	ND
170	TIC807_170	E125H	无	无	ND	-	38	ND	-	ND
170	TIC807_170	E125R	无	无	ND	-	14	ND	-	ND
170	TIC807_170	E125F	无	无	ND	-	33	ND	-	ND
170	TIC807_170	E125S	无	无	ND	-	24	ND	-	ND

[0188]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆荚草盲蝽			美洲烟草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
	7_170									
170	TIC807_170	E125Q	无	无	ND	-	21	ND	-	ND
170	TIC807_170	E125K	无	无	ND	-	20	ND	-	ND
170	TIC807_170	E125T	无	无	ND	-	33	ND	-	ND
170	TIC807_170	E125N	无	无	ND	-	19	ND	-	ND
170	TIC807_170	E125A	无	无	ND	-	41	ND	-	ND
170	TIC807_170	E125L	无	无	ND	-	13	ND	-	ND
170	TIC807_170	E125V	无	无	ND	-	14	ND	-	ND
170	TIC807_170	E125M	无	无	ND	-	13	ND	-	ND
170	TIC807_170	E125D	无	无	ND	-	15	ND	-	ND
170	TIC807_170	E125Y	无	无	ND	-	38	ND	-	ND
171	TIC807_171	T133E	无	无	ND	-	23	ND	-	ND
171	TIC807_171	T133Y	无	无	ND	-	17	ND	-	ND
171	TIC807_171	T133W	无	无	ND	-	13	ND	-	ND

[0189]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异				豆类草盲蝽			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
172	TIC807_172	I134V	无	无	ND	-	18	ND	-	ND
172	TIC807_172	I134L	无	无	ND	-	10	ND	-	ND
172	TIC807_172	I134F	无	无	ND	-	18	ND	-	ND
172	TIC807_172	I134K	无	无	ND	-	13	ND	-	ND
172	TIC807_172	I134C	无	无	ND	-	30	ND	-	ND
172	TIC807_172	I134M	无	无	ND	-	33	ND	-	ND
173	TIC807_173	E135V	无	无	ND	-	13	ND	-	ND
173	TIC807_173	E135W	无	无	ND	-	13	ND	-	ND
173	TIC807_173	E135T	无	无	ND	-	39	ND	-	ND
174	TIC807_174	N137H	无	无	ND	-	42	ND	-	ND
174	TIC807_174	N137Y	无	无	ND	-	17	ND	-	ND
174	TIC807_174	N137T	无	无	ND	-	31	ND	-	ND
174	TIC807_174	N137E	无	无	ND	-	32	ND	-	ND
174	TIC807_174	N137S	无	无	ND	-	24	ND	-	ND

[0190]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
174	TIC807_174	N137A	无	无	ND	-	24	ND	-	ND
174	TIC807_174	N137Q	无	无	ND	-	21	ND	-	ND
174	TIC807_174	N137G	无	无	ND	-	18	ND	-	ND
174	TIC807_174	N137I	无	无	ND	-	10	ND	-	ND
174	TIC807_174	N137W	无	无	ND	-	17	ND	-	ND
174	TIC807_174	N137K	无	无	ND	-	66	ND	-	ND
174	TIC807_174	N137C	无	无	ND	-	19	ND	-	ND
174	TIC807_174	N137M	无	无	ND	-	41	ND	-	ND
174	TIC807_174	N137D	无	无	ND	-	69	ND	-	ND
174	TIC807_174	N137F	无	无	ND	-	13	ND	-	ND
174	TIC807_174	N137R	无	无	ND	-	37	ND	-	ND
175	TIC807_175	F147V	F147V	无	ND	-	87	ND	-	ND
175	TIC807_175	F147T	F147T	无	ND	-	68	ND	-	ND
175	TIC807_175	F147C	F147C	无	ND	-	74	ND	-	ND

[0191]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异				豆荚草盲蝽			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
175	TIC807_175	F147L	F147L	无	ND	-	62	ND	-	ND
175	TIC807_175	F147D	F147D	无	ND	-	51	ND	-	ND
175	TIC807_175	F147A	F147A	无	ND	-	57	ND	-	ND
175	TIC807_175	F147G	F147G	无	ND	-	56	ND	-	ND
175	TIC807_175	F147E	F147E	无	ND	-	50	ND	-	ND
175	TIC807_175	F147I	F147I	无	ND	-	69	ND	-	ND
175	TIC807_175	F147Y	F147Y	无	ND	-	67	ND	-	ND
175	TIC807_175	F147M	F147M	无	ND	-	64	ND	-	ND
175	TIC807_175	F147N	F147N	无	ND	-	64	ND	-	ND
175	TIC807_175	F147Q	F147Q	无	ND	-	50	ND	-	ND
175	TIC807_175	F147H	F147H	无	ND	-	60	ND	-	ND
175	TIC807_175	F147R	F147R	无	ND	-	20	ND	-	ND
175	TIC807_175	F147W	F147W	无	ND	-	82	ND	-	ND
175	TIC807_175	F147P	F147P	无	ND	-	7	ND	-	ND

[0192]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆荚草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
176	TIC807_176	Q149D	Q149D	无	ND	-	92	ND	-	ND
176	TIC807_176	Q149E	Q149E	无	ND	-	89	ND	-	ND
176	TIC807_176	Q149C	Q149C	无	ND	-	87	ND	-	ND
176	TIC807_176	Q149A	Q149A	无	ND	-	76	ND	-	ND
176	TIC807_176	Q149F	Q149F	无	ND	-	54	ND	-	ND
177	TIC807_177	A150S	无	无	ND	-	34	ND	-	ND
177	TIC807_177	A150L	无	无	ND	-	24	ND	-	ND
177	TIC807_177	A150V	无	无	ND	-	25	ND	-	ND
177	TIC807_177	A150G	无	无	ND	-	28	ND	-	ND
177	TIC807_177	A150D	无	无	ND	-	19	ND	-	ND
177	TIC807_177	A150W	无	无	ND	-	13	ND	-	ND
177	TIC807_177	A150E	无	无	ND	-	24	ND	-	ND
177	TIC807_177	A150N	无	无	ND	-	18	ND	-	ND
177	TIC807_177	A150Y	无	无	ND	-	11	ND	-	ND

[0193]

SEQ ID NO:	与 TIC807 母本蛋白质相比的氨基酸差异				豆类草盲蝽			美洲牧草盲蝽		
	蛋白质名称	相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
177	TIC807_177	A150F	无	无	ND	-	11	ND	-	ND
177	TIC807_177	A150P	无	无	ND	-	11	ND	-	ND
177	TIC807_177	A150K	无	无	ND	-	17	ND	-	ND
177	TIC807_177	A150T	无	无	ND	-	17	ND	-	ND
177	TIC807_177	A150Q	无	无	ND	-	11	ND	-	ND
177	TIC807_177	A150R	无	无	ND	-	11	ND	-	ND
178	TIC807_178	E155C	无	无	ND	-	82	ND	-	ND
178	TIC807_178	E155I	无	无	ND	-	36	ND	-	ND
178	TIC807_178	E155K	无	无	ND	-	28	ND	-	ND
178	TIC807_178	E155D	无	无	ND	-	22	ND	-	ND
178	TIC807_178	E155H	无	无	ND	-	22	ND	-	ND
178	TIC807_178	E155Y	无	无	ND	-	16	ND	-	ND
178	TIC807_178	E155Q	无	无	ND	-	16	ND	-	ND
178	TIC807_178	E155L	无	无	ND	-	15	ND	-	ND

[0194]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
178	TIC807_178	E155N	无	无	ND	-	14	ND	-	ND
178	TIC807_178	E155T	无	无	ND	-	13	ND	-	ND
178	TIC807_178	E155A	无	无	ND	-	11	ND	-	ND
178	TIC807_178	E155F	无	无	ND	-	7	ND	-	ND
178	TIC807_178	E155R	无	无	ND	-	6	ND	-	ND
178	TIC807_178	E155M	无	无	ND	-	6	ND	-	ND
178	TIC807_178	E155P	无	无	ND	-	5	ND	-	ND
178	TIC807_178	E155W	无	无	ND	-	5	ND	-	ND
178	TIC807_178	E155S	无	无	ND	-	4	ND	-	ND
178	TIC807_178	E155V	无	无	ND	-	4	ND	-	ND
179	TIC807_179	N157C	无	无	ND	-	86	ND	-	ND
179	TIC807_179	N157D	无	无	ND	-	64	ND	-	ND
179	TIC807_179	N157W	无	无	ND	-	52	ND	-	ND
179	TIC807_179	N157Y	无	无	ND	-	39	ND	-	ND

[0195]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆荚草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
179	TIC807_179	N157M	无	无	ND	-	22	ND	-	ND
179	TIC807_179	N157A	无	无	ND	-	22	ND	-	ND
179	TIC807_179	N157F	无	无	ND	-	20	ND	-	ND
179	TIC807_179	N157V	无	无	ND	-	18	ND	-	ND
179	TIC807_179	N157L	无	无	ND	-	18	ND	-	ND
179	TIC807_179	N157P	无	无	ND	-	18	ND	-	ND
179	TIC807_179	N157E	无	无	ND	-	17	ND	-	ND
179	TIC807_179	N157T	无	无	ND	-	8	ND	-	ND
179	TIC807_179	N157G	无	无	ND	-	7	ND	-	ND
179	TIC807_179	N157I	无	无	ND	-	7	ND	-	ND
179	TIC807_179	N157R	无	无	ND	-	6	ND	-	ND
202	TIC807_M8_d5C	F46S、Y54H、S95A、F147A、S167R、S217N，然后在 305-309 处的五个氨基酸	S95A、F147A	S217N，然后在残基范围 196-201 中的连续的三重缺失	ND	-	92*	ND	-	ND

[0196]

SEQ ID NO:	蛋白质名称	与 TIC807 母本蛋白质相比的氨基酸差异			豆类草盲蝽			美洲牧草盲蝽		
		相对于 SEQ ID NO:2 (TIC807) 的一个或多个氨基酸差异	在第一曲面片中的一个或多个氨基酸差异	在第二曲面片中的一个或多个氨基酸差异	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 1-3 μg/mL 蛋白质下的% 死亡率 *	LC50 值 (μg/mL)	成倍增加的毒性 (LC50)	在约 100 μg/mL 蛋白质下的% 死亡率 *
		缺失，然后在残基范围 196-201 中的连续的三重缺失								
204	TIC807_M14	F46S、Y54H、S95A、F147S、Q149E、S167R、P219R、S249R、V251E、Q253R、R273W，然后在残基范围 196-201 中的连续的三重缺失	S95A、F147A、Q149E、V251E、Q253R	P219R，然后再残基范围 196-201 中的连续的三重缺失	ND	-	-	ND	-	60*

ND =未确定；*在约 5 μg/mL 下测试。

[0197] 实施例5：本发明的蛋白质组成的昆虫抑制活性

[0198] 制备本发明的蛋白质并且测试针对除草盲蝽属之外的之外害虫的生物活性，所述

本发明的蛋白质例如但不限于TIC807_M1(SEQ ID NO:6)、TIC807_M2(SEQ ID NO:8)、TIC807_M3(SEQ ID NO:10)、TIC807_M4(SEQ ID NO:12)、TIC807_M5(SEQ ID NO:14)、TIC807_M6(SEQ ID NO:18)、TIC807_M7(SEQ ID NO:20)、TIC807_M8(SEQ ID NO:16)、TIC807_M9(SEQ ID NO:28)、TIC807_M11(SEQ ID NO:32)、TIC807_M13(SEQ ID NO:34)以及TIC807_M12(SEQ ID NO:36)。

[0199] 制备蛋白质TIC807_M10(SEQ ID NO:30)、TIC807_M11(SEQ ID NO:32)、TIC807_M12(SEQ ID NO:36)以及TIC807_M13(SEQ ID NO:34)并且测试其针对来自半翅目、鞘翅目、异翅目以及同翅目的害虫的生物活性。制备蛋白质TIC807_M5(SEQ ID NO:14)并且测试其针对鞘翅目害虫的生物活性。进行生物测定以评价这些蛋白质对如表5所示的昆虫的作用。对含有杀昆虫蛋白的人工食物进行进食测定。根据所测试的昆虫,如实施例3所述地制备杀昆虫蛋白并且通常使用昆虫特异人工食物应用。将毒素悬浮于缓冲液中并且以每孔500μg/mL样品的速率应用,并且在1000μg/mL TIC807_M5的情况下,并且然后允许干燥。对每种测试的昆虫种类的三个群体的8只昆虫确定平均生长缓慢评分(stunting score)和群体死亡率。对于与未处理的对照相比统计学上显著的昆虫反应如生长缓慢和死亡率,结果表示为阳性(+)。如果昆虫与UTC类似,即仅应用以上缓冲液的进食食物,则结果表示为阴性(-)。

[0200] 表5.eHTP's表明针对除草盲蝽某些种之外的害虫的额外昆虫抑制活性。

[0201]

蛋白质	μg/mL	CPB	WCR	ECB	SWCB	CEW	FAW	SGSB	NBSB	GPA
UTC	0	-	-	-	-	-	-	-	-	-
TIC807_M5	1000	+	-	ND	ND	ND	ND	ND	ND	ND
TIC807_M10	500	-	-	-	-	-	-	-	-	-
TIC807_M11	500	+	-	-	-	-	-	-	-	-
TIC807_M12	500	-	-	-	-	-	-	-	-	-
TIC807_M13	500	+	-	-	-	-	-	-	-	-

[0202] UTC=未处理的对照;ND=未确定的

[0203] CPB=科罗拉多马铃薯甲虫(科罗拉多马铃薯甲虫(Leptinotarsa decemlineata));WCR=西方玉米根虫(玉米根萤叶甲(Diabrotica virgifera));ECB=欧洲玉米螟(欧洲玉米螟(Ostrinia nubilalis));西南玉米秆草螟(西南玉米秆草螟(Diatraea grandiosella));CEW=棉铃虫(玉米穗虫(Helicoverpa zea));FAW=秋天行军虫(草地贪夜蛾(Spodoptera frugiperda));SGSB=南部绿色椿象(Nezara virudula);NBSB=新热带区布朗椿象(neotropical brown stink bug)(Euschistus heros);GPA=桃蚜(桃蚜(Myzus persicae))。

[0204] 还测试本发明的蛋白质针对来自线虫纲的害虫的生物活性。

[0205] 实施例6:表达本发明的蛋白质的植物展示昆虫抑制活性

[0206] 此实施例示出本发明的蛋白质在植物中的表达并且证明表达本发明的蛋白质的棉花植物展示昆虫抑制活性。

[0207] 根据美国专利号7,741,118所列出的方法制备用于在植物中表达本发明的蛋白质的多核苷酸区段。例如,,具有如SEQ ID NO:4(TIC807_4)、SEQ ID NO:6(TIC807_M1)、SEQ ID NO:8(TIC807_M2)、SEQ ID NO:10(TIC807_M3)、SEQ ID NO:12(TIC807_M4)、SEQ ID NO:14(TIC807_M5)、SEQ ID NO:16(TIC807_M8)、SEQ ID NO:18(TIC807_M6)、SEQ ID NO:20

(TIC807_M7)、SEQ ID NO:22(TIC807_22)、SEQ ID NO:24(TIC807_24)、SEQ ID NO:26(TIC807_26)、SEQ ID NO:28(TIC807_M9)、SEQ ID NO:30(TIC807_M10)、SEQ ID NO:32(TIC807_M11)以及SEQ ID NO:34(TIC807_M13)所列出的氨基酸序列的毒素蛋白分别由设计用于植物中使用并且编码本发明的蛋白质的多核苷酸区段表达，所述多核苷酸区段包括如SEQ ID NO:186、SEQ ID NO:187、SEQ ID NO:188、SEQ ID NO:189、SEQ ID NO:190、SEQ ID NO:191、SEQ ID NO:192、SEQ ID NO:193、SEQ ID NO:194、SEQ ID NO:195、SEQ ID NO:196、SEQ ID NO:197、SEQ ID NO:198、SEQ ID NO:199、SEQ ID NO:200以及SEQ ID NO:201所列出的多核苷酸序列。

[0208] 意图在于编码每种变体蛋白或其昆虫抑制片段的多核苷酸区段(或多核苷酸分子)可单独使用、或者彼此组合使用、或者与其它昆虫抑制蛋白或昆虫抑制剂如dsRNA介导的基因抑制分子组合使用。此类组合设计为以与本发明的蛋白质协同或可兼容的机制起作用。这些组合的意图在于获得受到保护以免受害虫、特别为昆虫害虫侵染的影响的植物和植物细胞。处于本发明的范围内的特异性变体蛋白包括与表4B所列出的和提交的申请全文所述的SEQ ID NO相对应的蛋白质。

[0209] 将来自SEQ ID NO:188(编码TIC807_M2，SEQ ID NO:8)和来自SEQ ID NO:192(编码TIC807_M8，SEQ ID NO:16)的多核苷酸区段各自重组工程化为用于棉花转化的表达构建体。

[0210] 生成转基因棉花植物(重组棉花植物)并测试其效力。选择低拷贝数和高对应变体蛋白表达的再生(R0)转基因植物，如通过各种定量和半定量方法例如PCR、ELISA和蛋白质印迹法确定的。在R0棉花叶组织中的表达水平范围通常为0.5至500ppm鲜重。将表达高水平的蛋白质的R0植物转移到土壤中并且进行自花受粉。种植三十颗来自自花受粉的R0植物的种子并且使转基因的后代纯合子生长至开花。测试此实施例的每个构建体的每4至5种事件的11至18株植物针对草盲蝽的效力(表6A、表6B和表6C)。将未转化的棉花栽培植物、来自合并的阴性分离群体的植物(后代不含有转基因)以及表达TIC807母本蛋白的植物用作阴性对照。将开花阶段棉花植物的一个分枝装在由可透气塑料“授粉”筒制成的网袋中(Vilutis and Co.Inc.,Frankfort,IL)，并且以类似方式设置多个分枝。使用拧结将每个网袋固定于茎上。将约4-6只豆荚草盲蝽若虫(孵化后<24小时)置于1.4ml锥形管(Matrix Technologies Corp.,NH)中。通过将未加盖的锥形管滑动到网袋中来用若虫侵染网袋内的分枝。在干冰上收集网袋内所有存活的昆虫之前，允许昆虫进食持续10至11天的一个时段。称量存活者以获得毛重。计算死亡率百分比和平均存活质量。在死亡率百分比的死亡率计算在包括失去的昆虫。如表6A、表6B和表6C所示，表达变体蛋白TIC807_M2和TIC807_M8的棉花植物显著影响豆荚草盲蝽若虫的生长和发育。基于这些结果，推动这些植物、种子、表达构建体进一步发育。

[0211] 表6A.使用表达变体TIC807蛋白TIC807_M2和TIC807_M8的棉花植物通过开花阶段的草盲蝽进食测定确定的平均%死亡率。

[0212]

植物事件ID	蛋白质	N	平均%死亡率	Std Dev	SEM	Lo 95%	Up 95%	死亡率t组
64	TIC807_M8	18	78.889	19.967	4.706	68.959	88.818	A
49	TIC807_M8	18	75.556	23.288	5.253	64.472	86.639	A
91	TIC807_M2	18	74.444	20.356	4.798	64.321	84.567	A
20	TIC807_M8	18	73.333	19.403	4.573	63.685	82.982	A
15	TIC807_M8	18	66.667	25.668	6.050	53.902	79.431	AB
58	TIC807_M2	18	65.556	19.166	4.517	56.025	75.086	AB
48	TIC807_M2	18	64.444	21.286	4.998	53.899	74.990	AB
19	TIC807_M2	18	53.333	25.668	6.050	40.569	66.098	BC

[0213]

植物事件ID	蛋白质	N	平均%死亡率	Std Dev	SEM	Lo 95%	Up 95%	死亡率t组
68	TIC807_M2	18	47.778	25.795	6.080	34.980	60.605	C
阴性		24	41.667	22.301	4.551	32.275	50.957	C

[0214] 表6B.使用表达变体TIC807蛋白TIC807_M2和TIC807_M8的棉花植物通过开花阶段的草盲蝽进食测定确定的平均龄期。

[0215]

植物事件ID	构建体	N	平均龄期	Std Dev	SEM	Lo 95%	Up 95%	龄期t组
64	TIC807_M8	11	3.636	0.552	0.166	3.266	4.007	C
68	TIC807_M2	16	3.949	0.803	0.201	3.521	4.377	BC
48	TIC807_M2	16	4.043	0.604	0.151	3.720	4.364	BC
58	TIC807_M2	17	4.069	0.802	0.194	3.657	4.481	BC
15	TIC807_M8	15	4.094	0.747	0.193	3.681	4.508	BC
19	TIC807_M2	17	4.100	0.698	0.169	3.741	4.459	BC
91	TIC807_M2	12	4.125	0.829	0.239	3.598	4.652	ABC
49	TIC807_M8	12	4.139	0.762	0.220	3.655	4.623	ABC
20	TIC807_M8	14	4.298	0.918	0.245	3.768	4.828	AB
阴性		24	4.599	0.774	0.158	4.273	4.926	A

[0216] 表6C.使用表达变体TIC807蛋白TIC807_M2和TIC807_M8的棉花植物通过开花阶段的草盲蝽进食测定确定的平均存活质量。

[0217]

植物事件ID	构建体	N	平均存活质量	Std Dev	SEM	Lo 95%	Up 95%	存活质量t组
64	TIC807_M8	11	2.315	1.489	0.449	1.314	3.315	C
68	TIC807_M2	16	3.548	1.325	0.331	2.843	4.254	B
58	TIC807_M2	17	3.561	1.348	0.327	2.868	4.255	B
48	TIC807_M2	16	3.896	1.436	0.359	2.831	4.362	B
91	TIC807_M2	12	3.775	1.775	0.512	2.647	4.902	AB
49	TIC807_M8	12	3.837	2.135	0.616	2.481	5.193	AB
19	TIC807_M2	17	3.908	1.467	0.356	3.154	4.662	AB
20	TIC807_M8	14	3.918	1.950	0.521	2.792	5.044	AB
15	TIC807_M8	15	3.937	1.906	0.492	2.881	4.993	AB
阴性		24	4.735	1.179	0.241	4.237	5.233	A

[0218] Std Dev＝标准偏差

[0219] SEM＝平均标准误差

[0220] Lo 95%＝95%置信区间的下限

[0221] Up 95%＝95%置信区间的上限

[0222] T分组＝使用最小显著性差异检验,F值＝101.1756,df＝15、44,Pr<0.0001

[0223] 在另一个实施例中,在具有天然草盲蝽侵染压力的田间试验中测试来自表达TIC807_M11的五种转基因事件的棉花植物。这些植物表明与非转基因受体系(用于转化的DP393种质)相比的田间效力。每种事件的美洲牧草盲蝽在五株植物上的平均数目显著低于美洲牧草盲蝽在来自非转基因对照的植物上的平均数目。来自五种事件的植物的籽棉产量在统计学上可与非转基因对照的籽棉产量相比,例如长季节的方形保留。

[0224] 在另一个类似田间试验中,来自表达TIC807_M10的七种转基因事件的棉花植物表明与非转基因对照相比的田间效力。每种事件的美洲牧草盲蝽在五株植物上的平均数目显著低于美洲牧草盲蝽在来自非转基因对照的植物上的平均数目。来自七种事件之三的植物的籽棉产量显著高于非转基因对照的籽棉产量。

[0225] 在另一个实施例中，来自表达TIC807_M13的三十四种转基因事件的棉花植物表明与非转基因对照相比的生长室效力。将网袋置于开花阶段的全株棉花植物周围(而不是仅在此实施例先前所述的单个分枝周围)。评价每种事件的五株植物并且记录的每株植物的美洲牧草盲蝽昆虫(若虫到成虫到第2代草盲蝽)的平均数目显著低于每株非转基因植物的美洲牧草盲蝽昆虫的平均数目。

[0226] 使用表达表1以及表4A和表4B所列出的蛋白质的植物进行类似实验。

[0227] 实施例7：来自表达本发明的蛋白质的苜蓿植物的组织展示昆虫抑制活性

[0228] 此实施例示出本发明的蛋白质在苜蓿植物中的表达，并且证明来自表达本发明的蛋白质的苜蓿植物的组织展示昆虫抑制活性。

[0229] 将来自SEQ ID NO:192(编码TIC807_M8，SEQ ID NO:16)的多核苷酸区段重组工程化为三种不同配置的表达构建体，以用于苜蓿转化。出于数据报告的目的，三种重组构建体为编码的[ER]、[ES]和[ET]。

[0230] 从异型杂交并且然后自花受粉的转化株中回收转基因苜蓿植物(重组苜蓿植物)。选择低拷贝数和高TIC807表达的重组苜蓿植物，如分别通过RT-PCR和半定量蛋白质印迹法确定的。将来自十种单独事件的苜蓿植物组织合并、冻干、研磨以及重悬于储备缓冲液pH10.525mM NaCarb中。制备来自不具有表达TIC807_M8的转基因的苜蓿的植物组织以用作对照。将储备制备液系列稀释100倍、300倍和900倍，以用于并入草盲蝽食物中。使用实施例4的进食测定法，在第5天确定死亡率和生长缓慢得分并且与对照进行比较(参见表7A和表7B；使用JMP4统计软件分析数据)。对于每种测试样品和每种稀释液，使三个群体的八只若虫经历此生物测定。生长缓慢得分与目视质量分级相对应，其中0＝与阴性对照无差异、1＝约25％较少质量、2＝约50％较少质量以及3＝约75％较少质量。报道八只若虫的每个群体的生长缓慢得分的平均值。

[0231] 表7A.通过草盲蝽进食测定使用并入来自表达变体TIC807蛋白TIC807_M8的苜蓿植物的组织的食物确定的平均％死亡率。

[0232]

构建体	样品来源	稀释倍数	平均生长缓慢得分	标准偏差	SEM	下限95%	上限95%	t分组
[ER] TIC807_M8	来自每个构建体10种事件的合并的苜蓿组织	100	2.00	0.00	0.00	2.00	2.00	CD
		300	0.00	0.00	0.00	0.00	0.00	E
		900	0.00	0.00	0.00	0.00	0.00	E
[ES] TIC807_M8		100	3.00	0.00	0.00	3.00	3.00	A
		300	2.33	0.58	0.33	0.90	3.77	BC
		900	0.00	0.00	0.00	0.00	0.00	E
[ET] TIC807_M8		100	2.67	0.58	0.33	1.23	4.10	AB
		300	1.67	0.58	0.33	0.23	3.10	D
		900	0.00	0.00	0.00	0.00	0.00	E
无	对照苜蓿	100	2.00	0.00	0.00	2.00	2.00	CD
		300	0.00	0.00	0.00	0.00	0.00	E
		900	0.00	0.00	0.00	0.00	0.00	E
苜蓿没有并入食物中		0	0.00	0.00	0.00	0.00	0.00	E

[0233] 表7B.通过草盲蝽进食测定使用并入来自表达变体TIC807蛋白TIC807_M8的苜蓿植物的组织的食物确定的平均生长缓慢。

[0234]

构建体	样品来源	稀释倍数	平均死亡率百分比	标准偏差	SEM	下限95%	上限95%	Tukey分组
[ER] TIC807_M8	来自每个构建体8种事件的合并的苜蓿组织	100	4.17	7.22	4.17	-13.76	22.09	CD
		300	0.00	0.00	0.00	0.00	0.00	CD
		900	13.10	12.54	7.24	-18.06	44.25	CD
[ES] TIC807_M8		100	56.55	6.27	3.62	40.97	72.12	AB
		300	41.67	19.09	11.02	-5.77	89.10	B
		900	0.00	0.00	0.00	0.00	0.00	CD
[ET] TIC807_M8		100	64.88	19.91	11.50	15.42	114.34	A
		300	16.67	19.09	11.02	-30.77	64.10	C
		900	12.50	12.50	7.22	-18.55	43.55	CD
无	对照苜蓿	100	12.50	12.50	7.22	-18.55	43.55	CD
		300	0.00	0.00	0.00	0.00	0.00	CD
		900	8.33	14.43	8.33	-27.53	44.19	CD
苜蓿没有并入食物中		0	2.50	7.91	1.81	-1.38	6.38	D

[0235] 实施例8:共表达展示草盲蝽种类抑制活性的eHTP和第二昆虫抑制蛋白的植物

[0236] 制备包含TIC1415和TIC807_M13的不同混合物的蛋白质样品并且在生物测定中进行测定。TIC1415蛋白质和其它草盲蝽抑制蛋白描述于PCT专利申请公开号WO 2012/139004。使用生物活性测定将样品混合物供应给美洲牧草盲蝽。还将单独的TIC1415蛋白质和单独的TIC807_M13制备为阳性对照。将缓冲液用作阴性对照。来自所有三种类型的制备液的样品展示针对美洲牧草盲蝽的死亡率并且存活者生长缓慢。死亡率和生长缓慢得分与摄食缓冲液的昆虫的生物活性得分相比为重要的(参见表8A)。数据表明没有拮抗作用。对混合物进行额外生物测定测试以证明协同作用和/或加合作用。

[0237] 表8A.蛋白质混合物的生物测定数据:TIC1415与TIC807_M13组合

[0238]

样品	TIC1415 (μg/mL)	TIC807_M13 (μg/mL)	平均[f]群体死亡率	死亡率T分组	平均[f]生长缓慢[g]得分	生长缓慢的T分组
TIC1415 + TIC807_M13	4.35	1	21.79	AB*	0.60	AB*
TIC1415 + TIC807_M13	2.175	1	20.36	B*	0.60	AB*
TIC1415 + TIC807_M13	1.0875	1	12.50	BC	0.60	AB*
TIC1415 + TIC807_M13	4.35	0.5	32.50	A*	0.80	A*
TIC1415 + TIC807_M13	1.75	0.265	7.86	CD	0.40	ABC
TIC1415 + TIC807_M13	0.875	0.265	0.00	D	0.00	C
TIC1415 + TIC807_M13	0.4375	0.265	5.36	CD	0.00	C
TIC1415 + TIC807_M13	4.35	0.25	13.21	BC	0.40	ABC
TIC1415 + TIC807_M13	1.75	0.1325	0.00	D	0.00	C
TIC1415 + TIC807_M13	1.75	0.06625	0.00	D	0.00	C
TIC1415	4.35	0	12.50	BC	0.40	ABC
TIC1415	1.75	0	7.86	CD	0.00	C
TIC807_M13	0	1	0.00	D	0.20	BC
TIC807_M13	0	0.265	2.50	CD	0.00	C
缓冲液(阴性)对照	0	0	0.00	D	0.00	C

[0239] †每个群体8只若虫的5个群体的平均值(平均)。

[0240] ‡生长缓慢得分与目视质量分级相对应,其中0=与阴性对照无差异、1=约25%较少质量、2=约50%较少质量以及3=约75%较少质量。报道八只若虫的每个群体的生长缓慢得分的平均值。

[0241] *在95%置信区间内。

[0242] 包含具有转基因DNA的事件的棉花植物被设计为共表达对应蛋白质TIC1415和TIC807_M13。在用美洲牧草盲蝽侵染的笼内的全株植物测定中评价此类植物。将各自来自十种事件的五株植物关在笼中并且用每株植物2对雄性和雌性美洲牧草盲蝽侵染。测定在标准环境条件下在生长室中进行孵化,以用于棉花植物发育21天。DP393阴性对照植物以类似方式生长。在3周时段结束之后,对不同发育阶段的草盲蝽进行计数。计算在每个发育阶段每株植物的豆荚草盲蝽昆虫的平均数目(参见表8B)。

[0243] 表8B.蛋白质混合物的植物体内数据:TIC1415与TIC807_M13组合

[0244]

构建体	事件	N	平均第3期龄或<	平均第4期龄若虫	平均第5期龄若虫	平均存活的第2代成虫	平均存活的第2代若虫	SEM	图基分组
12	021	5	0.00	0.00	0.00	0.00	0.00	0.00	B
	625	5	0.20	0.20	0.20	0.00	0.60	0.24	B
	830	5	2.20	0.20	0.00	0.00	2.40	1.12	AB
	890	5	4.40	0.00	0.20	0.00	4.60	2.62	AB
	521	5	4.60	0.60	0.00	0.00	5.20	4.27	AB
	980	5	3.40	1.20	1.20	0.00	5.80	4.86	AB
13	426	5	0.00	0.00	0.00	0.00	0.00	0.00	B
	611	5	0.60	0.00	0.00	0.00	0.60	0.60	B
	999	5	0.40	0.00	0.40	0.00	0.80	0.37	B
	356	5	6.20	0.00	0.40	0.00	6.60	4.73	AB
近亲交配	DP393(阴性)	10	7.00	2.50	0.80	0.00	10.30	3.75	A

序列表

<110> 孟山都技术有限责任公司(Monsanto Technology LLC)
Baum, James A
Evdokimov, Artem G
Moshiri, Farhad
Rydel, Timothy J
Sturman, Eric J
von Rechenberg, Moritz
Vu, Halong
Wollacott, Andrew M
Zheng, Meiying

<120> 对半翅目昆虫种类有毒的蛋白质

<130> 38-21(56191)A/PCT

<150> US 61/621,436
<151> 2012-04-06

<160> 206

[0001]

<170> PatentIn 3.5 版

<210> 1
<211> 927
<212> DNA
<213> 苏云金芽孢杆菌

<220>
<221> 尚未归类的特性
<223> 代表源于编码 TIC807 蛋白质的来自苏云金芽孢杆菌(Bt)种类的天然基因的重组多核苷酸的序列。

<400> 1
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggcccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttaccttcac ccaccctcgc ttgatcccct acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtgctgg ttcctccctc taaacaagtt gtcgcgaccc ttgtgatcat gggaggcaac 540

tttaccatcc ctatggactt gatgaccacg attgatagta cagagcacta ctcccactac 600

tccggttacc ctatcctcac ctggatctcg tccccagata actcttactc cggtcccttt 660

atgtcatggt actttgcaaa ctggcctaac cttccgagtg gattcggccc actgaatagt 720

gataacacgg tcacatacac tggctctgtc gtgtcccaag tttcggccgg tgtctacgct 780

accgtccggt tcgatcagta tgacattcac aatctccgta ctatcgagaa gacttggtat 840

gctcgccatg cgacgctgca taatggcaag aagatttcta tcaacaatgt cacggaaatg 900

[0002]

gctccaacat cccctatcaa gacaaat 927

〈210〉 2
〈211〉 309
〈212〉 PRT
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈220〉
〈221〉 尚未归类的特性
〈223〉 TIC807

〈220〉
〈221〉 尚未归类的特性
〈223〉 SEQ ID NO: 1 从核苷酸 1 至 927 的开放阅读框的氨基酸序列翻译。

〈400〉 2

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0003]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
[0004] 260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

<210> 3
<211> 927
<212> DNA
<213> 人工序列

<220>
<223> 工程化

〈220〉

〈221〉 尚未归类的特性

〈223〉 编码 SEQ ID NO: 4 的具有开放阅读框 1 至 927 的核苷酸序列。

〈400〉 3

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttaccttcac ccaccctcgc ttgatcccct acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgcgggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtgctgg ttcctccctc taaacaagtt gtcgcgaccc ttgtgatcat gggaggcaac 540

[0005]

tttaccatcc ctatggactt gatgaccacg attgatagta cagagcacta ctcccactac 600

tccggttacc ctatcctcac ctggatctcg tccccagata actcttactc cggtcccttt 660

atgtcatggt actttgcaaa ctggcctaac cttccgagtg gattcggccc actgaatagt 720

gataacacgg tcacatacac tggctctgtc gtgtcccaag tttcggccgg tgtctacgct 780

accgtccggt tcgatcagta tgacattcac aatctccgta ctatcgagaa gacttggtat 840

gctcgccatg cgacgctgca taatggcaag aagatttcta tcaacaatgt cacggaaatg 900

gctccaacat cccctatcaa gacaaat 927

〈210〉 4

〈211〉 309

〈212〉 PRT

〈213〉 人工序列

〈220〉

〈223〉 工程化

〈220〉

〈221〉 尚未归类的特性

〈223〉 如 SEQ ID NO: 3 所列出的开放阅读框的氨基酸序列翻译

〈400〉 4

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

[0006] Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Ala Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

[0007]

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

<210> 5
<211> 927
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 6 的具有开放阅读框 1 至 927 的核苷酸序列。

<400> 5

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttaccttcac ccaccctcgc ttgatcccct acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

[0008]

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtgctgg ttcctccctc taaacaagtt gtcgcgaccc ttgtgatcat gggaggcaac 540

tttaccatcc ctatggactt gatgaccacg attgatagta cagagcacta ctcccactac 600

tccggttacc ctatcctcac ctggatctcg tccccagata actcttactc cggtcccttt 660

atgtcatggt actttgcaaa ctggcctaac cttccgagtg gattcggccc actgaatagt 720

gataacacgg tcacatacac tggctctgtc gtgtcccaag tttcggccgg tgtctacgct 780

accgtccggt tcgatcagta tgacattcac aatctccgta ctatcgagaa gacttggtat 840

gctcgccatg cgacgctgca taatggcaag aagatttcta tcaacaatgt cacggaaatg 900

gctccaacat cccctatcaa gacaaat 927

<210> 6
<211> 309
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 5 所列出的开放阅读框的氨基酸序列翻译。

<400> 6

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0009]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu

100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0010]

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn

275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

<210> 7
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

[0011]

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 8 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 7
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

<210> 8
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

[0012]

<220>
<221> 尚未归类的特性
<223> TIC807M2

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 7 所列出的开放阅读框的氨基酸序列翻译。
<400> 8

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0013] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
[0014] 305

<210> 9
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 10 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 9
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

[0015]

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

<210> 10
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 9 所列出的开放阅读框的氨基酸序列翻译。

<400> 10

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

[0016]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

[0017]

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 11
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>

<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 12 的具有开放阅读框 1 至 918 的核苷酸序列。
<400> 11

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

[0018] ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaac 918

<210> 12
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

〈220〉

〈221〉 尚未归类的特性

〈223〉 如 SEQ ID NO: 11 所列出的开放阅读框的氨基酸序列翻译。

〈400〉 12

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0019] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

[0020] Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 13
<211> 918

〈212〉 DNA
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈220〉
〈221〉 尚未归类的特性
〈223〉 编码 SEQ ID NO: 14 的具有开放阅读框 1 至 918 的核苷酸序列。

〈400〉 13

[0021]

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaac 918

<210> 14
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 13 所列出的开放阅读框的氨基酸序列翻译。

<400> 14

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
[0022] 20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0023]

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 15
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 16 的具有开放阅读框 1 至 918 的核苷酸序列。

[0024] <400> 15
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

〈210〉 16
〈211〉 306
〈212〉 PRT
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈220〉
[0025] 〈221〉 尚未归类的特性
〈223〉 TIC807M8

〈220〉
〈221〉 尚未归类的特性
〈223〉 如 SEQ ID NO: 15 所列出的开放阅读框的氨基酸序列翻译。
〈400〉 16

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0026]

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

〈210〉 17

[0027] 〈211〉 918

〈212〉 DNA

〈213〉 人工序列

〈220〉

〈223〉 工程化

〈220〉

〈221〉 尚未归类的特性

〈223〉 编码 SEQ ID NO: 18 的具有开放阅读框 1 至 918 的核苷酸序列。

〈400〉 17

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

[0028]

<210> 18
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 17 所列出的开放阅读框的氨基酸序列翻译。
<400> 18

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0029]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0030] Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 19
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 20 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 19

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccaggaggca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

[0031]

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaac 918

<210> 20
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性

<223> 如 SEQ ID NO: 19 所列出的开放阅读框的氨基酸序列翻译。
<400> 20

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0032]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Glu Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile

165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0033]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 21
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 22 的具有开放阅读框 1 至 918 的核苷酸序列。
<400> 21

[0034]

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccaggcagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaac 918

<210> 22
<211> 306
<212> PRT

<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 21 所列出的开放阅读框的氨基酸序列翻译。

<400> 22

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0035]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Ala Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0036] Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 23
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 24 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 23
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

[0037]

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccaggaggca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

<210> 24
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 23 所列出的开放阅读框的氨基酸序列翻译。

<400> 24

[0038]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Glu Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0039] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 25
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

[0040]

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 26 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 25
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

[0041]

<210> 26
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 25 所列出的开放阅读框的氨基酸序列翻译。

<400> 26

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0042]

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
[0043] 305

<210> 27
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 28 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 27
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

[0044]

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

<210> 28
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 27 所列出的开放阅读框的氨基酸序列翻译。

<400> 28

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

[0045]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Arg Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

[0046]

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 29
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>

<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 30 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 29
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

[0047]
ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgccagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaac 918

<210> 30
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> TIC807M10

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 29 所列出的开放阅读框的氨基酸序列翻译。

<400> 30

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0048]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0049] Pro Asp Asn Ser Tyr Ser Gly Arg Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Ala Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 31
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 32 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 31
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

[0050]

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctctgg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

<210> 32
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 31 所列出的开放阅读框的氨基酸序列翻译。

<400> 32

[0051]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0052] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Arg Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Trp Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 33
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

[0053]

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 34 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 33
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctc ccaggaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctctgg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

[0054]

<210> 34
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> TIC807M13

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 33 所列出的开放阅读框的氨基酸序列翻译。

<400> 34

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0055]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ser Gln Glu Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Arg Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Trp Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
[0056] 290 295 300

Thr Asn
305

<210> 35
<211> 918
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 36 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 35
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttgcctc tgataacact 720

[0057]

gtgacctaca ctggctctgt cgccagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaac 918

<210> 36
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 35 所列出的开放阅读框的氨基酸序列翻译。

<400> 36

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0058]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Arg Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Ala Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Ala Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0059] Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 37
<211> 306
<212> PRT
<213> 人工序列

<220>

〈223〉 工程化

〈400〉 37

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0060] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0061]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 38
<211> 306
<212> PRT
<213> 人工序列

〈220〉

〈223〉 工程化

〈400〉 38

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0062] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Val Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

[0063] Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 39
<211> 306

<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 39

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0064]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0065]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu Phe Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 40
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 40

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0066]

Pro Arg Leu Met Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0067]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 41
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 41

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asp Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0068]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0069] Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 42
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 42

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0070]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asp Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0071] Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 43
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 43

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0072]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0073] Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 44
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 44

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0074]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0075] Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Arg Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 45
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 45

[0076]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Thr Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0077] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 46
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 46

[0078]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0079] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Lys Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 47
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

[0080]

<400> 47

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0081] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Ile Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 48
<211> 306
<212> PRT
<213> 人工序列

[0082]

<220>
<223> 工程化

<400> 48

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0083] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Ile Thr Tyr Lys Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0084]

<210> 49
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 49

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0085]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Tyr Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0086]

<210> 50
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 50

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0087]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Phe Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0088]

<210> 51
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 51

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Ala
115 120 125

[0089] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0090]

<210> 52
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 52

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0091] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Ala Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0092]

Thr Asn
305

<210> 53
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 53

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0093]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ala Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0094]

Thr Asn
305

<210> 54
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 54

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0095]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu Ala Asn Gly Lys Lys
275 280 285

[0096]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 55
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 55

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

[0097] Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Ala Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0098]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 56
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 56

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

[0099] Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

[0100] Glu Lys Thr Trp Tyr Ala Ala His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 57
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 57

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0101] Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
[0102] 260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Ala Asn
305

〈210〉 58
〈211〉 306
〈212〉 PRT
〈213〉 人工序列

〈220〉
〈223〉 工程化

<400> 58

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Ala Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0103]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0104] Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 59
<211> 306
<212> PRT
<213> 人工序列

<220>

〈223〉 工程化

〈400〉 59

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0105]

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Ala Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0106]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 60
<211> 306
<212> PRT
<213> 人工序列

〈220〉

〈223〉 工程化

〈400〉 60

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0107] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

[0108]

Val Thr Tyr Ala Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 61
<211> 306

〈212〉 PRT
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈400〉 61

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0109] Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0110]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Ala Ile Lys
290 295 300

Thr Asn
305

<210> 62
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 62

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0111]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0112]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ala Lys
290 295 300

Thr Asn
305

<210> 63
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 63

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0113]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0114] Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Ala His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 64
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 64

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0115]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0116]

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Ala Asn
305

<210> 65
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 65

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0117]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0118]

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Ala Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 66
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 66

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0119]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0120]

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu Ala Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 67
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 67

[0121]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0122] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Ala Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 68
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 68

[0123]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0124] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ala
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 69
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

[0125]

<400> 69

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0126] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Ala Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 70
<211> 306
<212> PRT
<213> 人工序列

[0127]

<220>
<223> 工程化

<400> 70

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0128] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Ala Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0129]

<210> 71
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 71

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0130]

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ala Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0131]

<210> 72
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 72

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0132]

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0133]

<210> 73
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 73

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0134] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Ala Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0135]

<210> 74
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 74

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0136] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Ala Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0137]

Thr Asn
305

<210> 75
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 75

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0138] Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Ala Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0139]

Thr Asn
305

<210> 76
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 76

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0140] Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ala Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0141]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 77
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 77

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

[0142]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Ala Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0143]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 78
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 78

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

[0144]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ala Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

[0145] Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 79
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 79

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Ala Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0146]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
[0147] 260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 80
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 80

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0148]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Ala Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0149] Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 81
<211> 306
<212> PRT
<213> 人工序列

<220>

<223> 工程化

<400> 81

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0150]

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0151]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Ala Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 82
<211> 306
<212> PRT
<213> 人工序列

〈220〉

〈223〉 工程化

〈400〉 82

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0152] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

[0153]

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 83
<211> 306

<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 83

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0154] Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Ala Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0155]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 84
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 84

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0156]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0157]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Ala Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

〈210〉 85
〈211〉 306
〈212〉 PRT
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈400〉 85

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0158]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Ala Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0159] Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 86
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 86

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0160]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ala Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0161]

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 87
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 87

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0162]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0163]

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Ala Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 88
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 88

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0164]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0165]

Ser Thr Glu His Tyr Ala Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 89
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 89

[0166]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0167] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Ala Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 90
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 90

[0168]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ser Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0169] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 91
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

[0170]

<400> 91

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0171] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ala Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 92
<211> 306
<212> PRT
<213> 人工序列

[0172]

<220>
<223> 工程化

<400> 92

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0173] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ala
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0174]

<210> 93
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 93

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ser His Asn Ser Ser Thr
130 135 140

[0175]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0176]

<210> 94
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 94

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0177]

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Ala Ile Lys
290 295 300

Thr Asn
305

[0178]

<210> 95
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 95

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0179] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ala Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0180]

<210> 96
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 96

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0181]

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ala Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0182]

Thr Asn
305

<210> 97
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 97

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0183]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0184]

Thr Asn
305

<210> 98
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 98

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0185]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Ala Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0186]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 99
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 99

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

[0187]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Ala
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0188]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 100
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 100

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Ser Thr
85 90 95

[0189] Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Ala Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

[0190] Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 101
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 101

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0191]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
[0192] 260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Ala Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

〈210〉 102
〈211〉 306
〈212〉 PRT
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈400〉 102

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0193]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0194]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 103
<211> 306
<212> PRT
<213> 人工序列

<220>

<223> 工程化

<400> 103

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0195] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0196]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Ala Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 104
<211> 306
<212> PRT
<213> 人工序列

〈220〉

〈223〉 工程化

〈400〉 104

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0197] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

[0198]

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Ala His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 105
<211> 306

<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 105

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0199] Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0200] Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ala Lys
290 295 300

Thr Asn
305

<210> 106
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 106

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0201]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0202]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ala Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 107
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 107

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0203]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ser Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0204]

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 108
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 108

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0205]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ala Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0206]

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 109
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 109

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0207]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0208] Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Ala Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 110
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 110

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0209]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Ala Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0210] Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 111
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 111

[0211]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Ala Ile
165 170 175

[0212]

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 112
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 112

[0213]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0214]

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Ala Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 113
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

[0215]

<400> 113

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0216] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 114
<211> 306
<212> PRT
<213> 人工序列

[0217]

<220>
<223> 工程化

<400> 114

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0218] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Ala Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0219]

<210> 115
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 115

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0220]

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Ala Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0221]

<210> 116
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 116

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0222]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Ala Ile Lys
290 295 300

Thr Asn
305

[0223]

<210> 117
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 117

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0224] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu Ala Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0225]

<210> 118
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 118

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0226] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ser His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0227]

Thr Asn
305

<210> 119
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 119

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0228] Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Ala Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0229]

Thr Asn
305

<210> 120
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 120

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0230]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Ala Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0231]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 121
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 121

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

[0232]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ala Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0233]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 122
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 122

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

[0234]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ala
260 265 270

[0235] Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 123
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 123

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0236] Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
[0237] 260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu Ala Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 124
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 124

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0238]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Ala Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0239] Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 125
<211> 306
<212> PRT
<213> 人工序列

<220>

<223> 工程化

<400> 125

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0240]

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0241]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 126
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 126

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0242] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ala Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

[0243] Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 127
<211> 306

<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 127

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0244]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0245]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Ala Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 128
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 128

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0246]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0247]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Ala Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 129
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 129

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0248]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ser Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0249] Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 130
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 130

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0250]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Ala Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0251] Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 131
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 131

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0252]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Ala Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0253]

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 132
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 132

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0254]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0255]

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Ala Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 133
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 133

[0256]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0257]

Met Gly Gly Asn Phe Ala Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 134
<211> 306
<212> PRT
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<220>
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<400> 134

[0258]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0259] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Ala
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 135
<211> 306
<212> PRT
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<220>
<223> 工程化

[0260]

<400> 135

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0261] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ala Lys
290 295 300

Thr Asn
305

<210> 136
<211> 306
<212> PRT
<213> 人工序列

[0262]

<220>
<223> 工程化

<400> 136

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ala Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0263] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0264]

<210> 137
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 137

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ala Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0265]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0266]

<210> 138
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 138

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Ala Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0267]

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0268]

<210> 139
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 139

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Ala Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0269] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0270]

<210> 140
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 140

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Ala Gly Gly Gly
115 120 125

[0271] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0272]

Thr Asn
305

<210> 141
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 141

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0273]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Ala Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0274]

Thr Asn
305

<210> 142
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 142

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0275]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0276]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Ala Ile Lys
290 295 300

Thr Asn
305

<210> 143
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 143

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

[0277]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Ala Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0278]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 144
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 144

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

[0279]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu Ala Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

[0280] Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 145
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 145

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0281]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Ala Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
[0282] 260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 146
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 146

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0283]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Ala Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0284] Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 147
<211> 306
<212> PRT
<213> 人工序列

<220>

<223> 工程化

<400> 147

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0285]

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0286]

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ala Lys
290 295 300

Thr Asn
305

<210> 148
<211> 306
<212> PRT
<213> 人工序列

〈220〉

〈223〉 工程化

〈400〉 148

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0287] Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu Ala Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

[0288]

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 149
<211> 306

<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 149

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0289]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Ala Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0290]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 150
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 150

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0291]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

[0292]

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ala Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 151
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 151

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0293]

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ser Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0294]

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 152
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 152

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0295]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ala Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

[0296]

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 153
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 153

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

[0297]

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ala Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0298] Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 154
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 154

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0299]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ala Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0300] Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 155
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 155

[0301]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0302] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Ala Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 156
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 156

[0303]

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0304]

Met Gly Gly Asn Phe Ala Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 157
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

[0305]

<400> 157

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0306] Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Ala Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 158
<211> 306
<212> PRT
<213> 人工序列

[0307]

<220>
<223> 工程化

<400> 158

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0308] Pro Val Leu Val Pro Pro Ala Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0309]

<210> 159
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 159

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0310]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Ala Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0311]

<210> 160
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 160

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0312]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Ala Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0313]

<210> 161
<211> 306
<212> PRT
<213> 人工序列

<220>
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<400> 161

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0314] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Ala Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0315]

<210> 162
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 162

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0316] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Ala Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0317]

Thr Asn
305

<210> 163
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 163

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0318]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Ala Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

[0319]

Thr Asn
305

<210> 164
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 164

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0320] Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Ala Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0321]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 165
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 165

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

[0322]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0323]

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Ala Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 166
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 166

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

[0324]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Ala Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

[0325] Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 167
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 167

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0326]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Ala Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
[0327] 260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 168
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<400> 168

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0328]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ala Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

[0329] Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
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[0330]

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Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
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Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
            20                  25                  30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
        35                  40                  45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
    50                  55                  60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65                  70                  75                  80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Ala Thr Ser Thr
                85                  90                  95
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Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Xaa Ile Xaa Ala Xaa Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

[0331] Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
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Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Xaa Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0333]

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

[0334]

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<223> 不是 T

<400> 171

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0335] Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Xaa Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
[0336] 290 295 300

Pro Ile Lys Thr Asn
305

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<400> 172

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

[0337]

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Xaa Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
[0338] 260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

<210> 173
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<400> 173

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
[0339] 50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Xaa Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

[0340]

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

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<223> 不是 N

<400> 174

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

[0341]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Xaa Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0342]

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

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<223> 不是 F

[0343]

<400> 175

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Xaa Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

[0344]

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
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<210> 176
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Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

[0346] Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Xaa Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

[0347] Pro Ile Lys Thr Asn
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Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Ser Thr
85 90 95

[0348]

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Xaa Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

[0349]

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
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<223> 不是 E

<400> 178

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

[0350]

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Xaa Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

[0351]

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

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Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
[0352] 35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Xaa Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

[0353]

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

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<223> 不是 TIC807 (SEQ ID NO: 2)

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<223> Xaa 可为任何天然发生的氨基酸

[0354]

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<223> Xaa 可为任何天然发生的氨基酸

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<223> Xaa 可为任何天然发生的氨基酸

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<223> Xaa 可为任何天然发生的氨基酸

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<223> Xaa 可为任何天然发生的氨基酸

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<222> (70)..(70)
<223> Xaa 可为任何天然发生的氨基酸

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<222> (87)..(87)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (93)..(93)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (95)..(95)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (105)..(105)
<223> Xaa 可为任何天然发生的氨基酸

[0355]

<220>
<221> 尚未归类的特性
<222> (117)..(117)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (119)..(119)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (125)..(125)
<223> Xaa 可为任何天然发生的氨基酸

<220>
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<222> (128)..(128)
<223> Xaa 可为任何天然发生的氨基酸

<220>

〈221〉 尚未归类的特性
〈222〉 (133)..(135)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (137)..(139)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (145)..(145)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (147)..(151)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
[0356] 〈222〉 (153)..(153)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (155)..(155)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (157)..(159)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (167)..(167)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (175)..(175)
〈223〉 Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (177)..(177)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (180)..(180)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (182)..(182)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (187)..(187)
<223> Xaa 可为任何天然发生的氨基酸

[0357]

<220>
<221> 尚未归类的特性
<222> (196)..(201)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (208)..(208)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (217)..(217)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (219)..(219)
<223> Xaa 可为任何天然发生的氨基酸

<220>
<221> 尚未归类的特性
<222> (223)..(223)
<223> Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (235)..(235)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (239)..(239)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (241)..(241)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (243)..(247)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
[0358] 〈221〉 尚未归类的特性
〈222〉 (249)..(252)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (273)..(275)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (282)..(282)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (287)..(287)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (293)..(293)

〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (295)..(295)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (299)..(300)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (303)..(303)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈220〉
〈221〉 尚未归类的特性
〈222〉 (305)..(306)
〈223〉 Xaa 可为任何天然发生的氨基酸

[0359]

〈220〉
〈221〉 尚未归类的特性
〈222〉 (308)..(308)
〈223〉 Xaa 可为任何天然发生的氨基酸

〈400〉 180

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Xaa Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Xaa Thr His
35 40 45

Pro Arg Leu Xaa Pro Xaa Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Xaa Thr Xaa Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Xaa Lys Lys Thr Thr Thr Xaa Thr Xaa Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Xaa Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Xaa Val Xaa Ile Pro Phe Ile Gly Xaa Gly Gly Xaa
115 120 125

Lys Asn Ser Thr Xaa Xaa Xaa Ala Xaa Xaa Xaa His Asn Ser Ser Thr
130 135 140

[0360]

Xaa Thr Xaa Xaa Xaa Xaa Xaa Thr Xaa Ile Xaa Trp Xaa Xaa Xaa Gln
145 150 155 160

Pro Val Leu Val Pro Pro Xaa Lys Gln Val Val Ala Thr Leu Xaa Ile
165 170 175

Xaa Gly Gly Xaa Phe Xaa Ile Pro Met Asp Xaa Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Tyr Pro Ile Leu Thr Xaa
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Xaa Gly Xaa Phe Met Ser Xaa Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Xaa Gly Pro Leu Xaa Ser
225 230 235 240

[0361]

Xaa Asn Xaa Xaa Xaa Xaa Xaa Gly Xaa Xaa Xaa Xaa Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Xaa Xaa Xaa Glu Lys Thr Trp Tyr Ala Xaa His Ala Thr Leu Xaa Asn
275 280 285

Gly Lys Lys Ile Xaa Ile Xaa Asn Val Thr Xaa Xaa Ala Pro Xaa Ser
290 295 300

Xaa Xaa Lys Xaa Asn
305

<210> 181
<211> 927
<212> DNA
<213> 苏云金芽孢杆菌

<220>
<221> 尚未归类的特性
<223> 为代表源于编码 Cry51Aa1 蛋白质的来自苏云金芽孢杆菌(Bt)种类的天然基因的重组多核苷酸的序列。

<300>
<308> DQ836184
<309> 2007-08-01
<313> (1)..(927)

<400> 181
atgatttttt tggcaatttt agatttaaaa tctttagtac tcaatgcaat aaattattgg 60

ggtcctaaaa ataataatgg catacagggt ggtgattttg gttaccctat atcagaaaaa 120

caaatagata cgtctattat aacttctact catcctcgtt taattccaca tgatttaaca 180

attcctcaaa atttagaaac tatttttact acaactcaag tattaacaaa taatacagat 240

ttacaacaaa gtcaaactgt ttcttttgct aaaaaaacaa cgacaacaac ttcaacttca 300

actacaaatg gttggacaga aggtgggaaa atttcagata cattagaaga aaaagtaagt 360

gtatctattc cttttattgg agagggagga ggaaaaaaca gtacaactat agaagctaat 420

tttgcacata actctagtac tactactttt caacaggctt caactgatat agagtggaat 480

atttcacaac cagtattggt tcccccacgt aaacaagttg tagcaacatt agttattatg 540

ggaggtaatt ttactattcc tatggatttg atgactacta tagattctac agaacattat 600

agtggttatc caatattaac atggatatcg agccccgata atagttataa tggtccattt 660

atgagttggt attttgcaaa ttggcccaat ttaccatcgg ggtttggtcc tttaaattca 720

gataatacgg tcacttatac aggttctgtt gtaagtcaag tatcagctgg tgtatatgcc 780

actgtacgat ttgatcaata tgatatacac aatttaagga caattgaaaa aacttggtat 840

[0362]

gcacgacatg caactcttca taatggaaag aaaatatcta taaataatgt tactgaaatg 900

gcaccaacaa gtccaataaa aacaaat 927

<210> 182
<211> 309
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 为 SEQ ID NO: 181 的核苷酸(NT)位置 1 至 927 的氨基酸序列翻译。

<300>
<308> ABI14444
<309> 2007-08-01
<313> (1)..(309)

〈400〉 182

Met Ile Phe Leu Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala
1 5 10 15

Ile Asn Tyr Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp
20 25 30

Phe Gly Tyr Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr
35 40 45

Ser Thr His Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn
50 55 60

Leu Glu Thr Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp
65 70 75 80

[0363]

Leu Gln Gln Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr
85 90 95

Thr Ser Thr Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser
100 105 110

Asp Thr Leu Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu
115 120 125

Gly Gly Gly Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn
130 135 140

Ser Ser Thr Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn
145 150 155 160

Ile Ser Gln Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr

165 170 175

Leu Val Ile Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr
180 185 190

Thr Ile Asp Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

[0364]

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

<210> 183
<211> 918
<212> DNA
<213> 苏云金芽孢杆菌

〈220〉

〈221〉 尚未归类的特性

〈223〉 为代表源于编码 TIC853 蛋白质的来自苏云金芽孢杆菌(Bt)种类的天然基因的重组多核苷酸的序列。

〈400〉 183

ttggcaattt tagatttaaa atctttagta ctcgatgcaa taaactattg gggtcctaaa 60

aataataatg gtatacaggg ttataatttt aattacccta tatcagaaag acaaatagat 120

acgtcgatta taacttctac tcattctcgt ttaatgccac atgatttaac aattcctcaa 180

aatttagaaa ctatttttac tacaactcaa gtattaacaa ataatacaga tgtacaacaa 240

agtcaaactg tttctttttc taaaaaaaca acgacaacaa cttcaacttc aactacagat 300

ggttggacag aaggtgggag aatttcagat acattagaag aaaacgtaag tgtatctatt 360

ccttttattg gagcgggagg agcaaaaaac agtacaacta tagaagctaa tgttgcacat 420

aactctagta ctactacttc tcaacaggct tcaactgaga tagagtggaa tatttcacaa 480

[0365]

ccagtattgg ttcccccacg taaacaagtt gtagcaacat tagttattat gggaggtgat 540

tttactgttc ctatggattt gataactact atagattcta cacaacattt tactggttat 600

ccaatattaa catggataga gaaccccgag cataatgtta gaggtcgatt tctgagttgg 660

ttttttgcaa attggcccaa tttaccatcg gagtttggtt ctttaaattc agataatacg 720

atcacttata aaggttctgt tgtaagtcga atatcagctg gtgtatatgc tactgtacga 780

tttgatcaat atgctataaa taatttaaga acaattgaaa aaacttggta tgcacgacat 840

ggaactcttc ataatggaaa gaaaatatct ataaataatg ttactgaaat ggcaccaaca 900

agtccaatag aaagaaat 918

〈210〉 184

〈211〉 306

〈212〉 PRT

〈213〉 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 为 SEQ ID NO: 183 的核苷酸(NT)位置 1 至 918 的氨基酸序列翻译

<400> 184

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asp Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Tyr Asn Phe Asn Tyr
20 25 30

Pro Ile Ser Glu Arg Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

[0366]

Ser Arg Leu Met Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Val Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ser Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asp Gly Trp Thr Glu Gly Gly Arg Ile Ser Asp Thr Leu
100 105 110

Glu Glu Asn Val Ser Val Ser Ile Pro Phe Ile Gly Ala Gly Gly Ala
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Val Ala His Asn Ser Ser Thr

130 135 140

Thr Thr Ser Gln Gln Ala Ser Thr Glu Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asp Phe Thr Val Pro Met Asp Leu Ile Thr Thr Ile Asp
180 185 190

Ser Thr Gln His Phe Thr Gly Tyr Pro Ile Leu Thr Trp Ile Glu Asn
195 200 205

Pro Glu His Asn Val Arg Gly Arg Phe Leu Ser Trp Phe Phe Ala Asn
210 215 220

[0367]

Trp Pro Asn Leu Pro Ser Glu Phe Gly Ser Leu Asn Ser Asp Asn Thr
225 230 235 240

Ile Thr Tyr Lys Gly Ser Val Val Ser Arg Ile Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Ala Ile Asn Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Gly Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Glu
290 295 300

Arg Asn

305

<210> 185
<211> 309
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 为由甲硫氨酸取代的 TIC807 (SEQ ID NO: 2)位置 11 亮氨酸

<400> 185

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Met Asn Ala Ile Asn Tyr
1 5 10 15

[0368]

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Phe Thr His
35 40 45

Pro Arg Leu Ile Pro Tyr Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ser Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Phe Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Ser Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

[0369]

Ser Thr Glu His Tyr Ser His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp
195 200 205

Ile Ser Ser Pro Asp Asn Ser Tyr Ser Gly Pro Phe Met Ser Trp Tyr
210 215 220

Phe Ala Asn Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser
225 230 235 240

Asp Asn Thr Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala
245 250 255

Gly Val Tyr Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu
260 265 270

Arg Thr Ile Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn
275 280 285

Gly Lys Lys Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser
290 295 300

Pro Ile Lys Thr Asn
305

<210> 186
<211> 930
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 4 的具有开放阅读框 1 至 927 的核苷酸序列。

[0370]

<400> 186
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttaccttcac ccaccctcgc ttgatcccct acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgcgggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtgctgg ttcctccctc taaacaagtt gtcgcgaccc ttgtgatcat gggaggcaac 540

tttaccatcc ctatggactt gatgaccacg attgatagta cagagcacta ctcccactac 600

tccggttacc ctatcctcac ctggatctcg tccccagata actcttactc cggtcccttt 660

atgtcatggt actttgcaaa ctggcctaac cttccgagtg gattcggccc actgaatagt 720

gataacacgg tcacatacac tggctctgtc gtgtcccaag tttcggccgg tgtctacgct 780

accgtccggt tcgatcagta tgacattcac aatctccgta ctatcgagaa gacttggtat 840

gctcgccatg cgacgctgca taatggcaag aagatttcta tcaacaatgt cacggaaatg 900

gctccaacat cccctatcaa gacaaattga 930

<210> 187
<211> 930
<212> DNA
<213> 人工序列

<220>
<223> 工程化

[0371]

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 6 的具有开放阅读框 1 至 927 的核苷酸序列。

<400> 187
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttaccttcac ccaccctcgc ttgatcccct acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtgctgg ttcctccctc taaacaagtt gtcgcgaccc ttgtgatcat gggaggcaac 540

tttaccatcc ctatggactt gatgaccacg attgatagta cagagcacta ctcccactac 600

tccggttacc ctatcctcac ctggatctcg tccccagata actcttactc cggtcccttt 660

atgtcatggt actttgcaaa ctggcctaac cttccgagtg gattcggccc actgaatagt 720

gataacacgg tcacatacac tggctctgtc gtgtcccaag tttcggccgg tgtctacgct 780

accgtccggt tcgatcagta tgacattcac aatctccgta ctatcgagaa gacttggtat 840

gctcgccatg cgacgctgca taatggcaag aagatttcta tcaacaatgt cacggaaatg 900

gctccaacat cccctatcaa gacaaattga 930

<210> 188
<211> 921
<212> DNA
<213> 人工序列

[0372]
<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 8 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 188
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccccctacc 900

agcccgatca agactaactg a 921

[0373]

<210> 189
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 10 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 189
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

[0374]

<210> 190
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 12 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 190
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

[0375] agcccgatca agactaactg a 921

<210> 191
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 14 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 191
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

[0376]

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaactg a 921

<210> 192
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 16 的具有开放阅读框 1 至 918 的核苷酸序列。
<400> 192
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

[0377]

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaactg a 921

〈210〉 193
〈211〉 921
〈212〉 DNA
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈220〉
〈221〉 尚未归类的特性
〈223〉 编码 SEQ ID NO: 18 的具有开放阅读框 1 至 918 的核苷酸序列。

〈400〉 193

[0378]

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

<210> 194
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性

〈223〉 编码 SEQ ID NO: 20 的具有开放阅读框 1 至 918 的核苷酸序列。

〈400〉 194

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccaggaggca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

[0379] ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccccctacc 900

agcccgatca agactaacta g 921

〈210〉 195
〈211〉 921
〈212〉 DNA
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈220〉

〈221〉 尚未归类的特性

〈223〉 编码 SEQ ID NO: 22 的具有开放阅读框 1 至 918 的核苷酸序列。

〈400〉 195

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccaggcagca agcactgaca ttgagtggaa cattagccaa 480

[0380]

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

〈210〉 196

〈211〉 921

〈212〉 DNA

〈213〉 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 24 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 196
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccgcga cctcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

[0381] ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctt ccaggaggca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca acggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

<210> 197
<211> 921

〈212〉 DNA
〈213〉 人工序列

〈220〉
〈223〉 工程化

〈220〉
〈221〉 尚未归类的特性
〈223〉 编码 SEQ ID NO: 26 的具有开放阅读框 1 至 918 的核苷酸序列。

〈400〉 197

atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

[0382]

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtccatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

<210> 198
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 28 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 198
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

[0383]

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccctacc 900

agcccgatca agactaactg a 921

<210> 199
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 30 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 199
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

[0384]

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgccagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctcagg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

<210> 200
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 32 的具有开放阅读框 1 至 918 的核苷酸序列。

<400> 200
[0385] atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactaccgc ccagcaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctctgg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

<210> 201
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 34 的具有开放阅读框 1 至 918 的核苷酸序列。

[0386]

<400> 201
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctc ccaggaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggctctgt cgtcagtcag gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctctgg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggcccctacc 900

agcccgatca agactaactg a 921

<210> 202
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

[0387]

<220>
<221> 尚未归类的特性
<223> SEQ ID NO: 15 的核苷酸 1 至 903 的 AA 序列翻译。

<400> 202

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

[0388]

Thr Thr Ala Gln Gln Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Asn Gly Pro Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Ser Val Val Ser Gln Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Arg Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

[0389]

<210> 203
<211> 921
<212> DNA
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 编码 SEQ ID NO: 204 的具有开放阅读框 1 至 918 的核苷酸序列。
<400> 203
atggctatcc tagaccttaa gtccctcgtg ctgaacgcca ttaactactg gggccctaag 60

aacaacaacg gcatccaggg cggtgacttc ggctacccca tctctgagaa gcagatcgac 120

actagcatca ttacctccac ccaccctcgc ttgatccccc acgatcttac tatcccgcag 180

aaccttgaga ccatcttcac cacaacgcag gtgctcacca ataacactga cctccagcaa 240

tcccagaccg tgagctttgc gaagaagacc actaccacga ccgcaactag cacgaccaac 300

ggttggacag aaggaggcaa gatcagcgac acgctggagg agaaagtttc ggttagcatt 360

ccgttcatcg gtgagggtgg cgggaagaac tcgactacca tagaggccaa cttcgcacac 420

aactctagca ccactacctc ccaggaagca agcactgaca ttgagtggaa cattagccaa 480

ccggtccttg tgcctccccg caaacaggtt gttgccactc tcgttatcat gggtggcaac 540

ttcactattc ctatggatct tatgactacc attgactcta ctgagcacta ctctggctac 600

cccattctca cttggatctc ttctcctgac aatagctaca gcggtcgatt catgtcatgg 660

tacttcgcta actggccgaa tctcccttct ggctttggtc ctcttaactc tgataacact 720

gtgacctaca ctggccgggt cgaaagtcgg gtctctgccg gtgtgtacgc aactgttcgc 780

ttcgatcagt atgacatcca taatctctgg actattgaga agacctggta cgctcgtcat 840

gcgacgcttc acaacggcaa gaagatcagc atcaataacg tgacagaaat ggccccctacc 900

agcccgatca agactaactg a 921

[0390]

<210> 204
<211> 306
<212> PRT
<213> 人工序列

<220>
<223> 工程化

<220>
<221> 尚未归类的特性
<223> 如 SEQ ID NO: 203 所列出的开放阅读框的氨基酸序列翻译。

<400> 204

Met Ala Ile Leu Asp Leu Lys Ser Leu Val Leu Asn Ala Ile Asn Tyr
1 5 10 15

Trp Gly Pro Lys Asn Asn Asn Gly Ile Gln Gly Gly Asp Phe Gly Tyr
20 25 30

Pro Ile Ser Glu Lys Gln Ile Asp Thr Ser Ile Ile Thr Ser Thr His
35 40 45

Pro Arg Leu Ile Pro His Asp Leu Thr Ile Pro Gln Asn Leu Glu Thr
50 55 60

Ile Phe Thr Thr Thr Gln Val Leu Thr Asn Asn Thr Asp Leu Gln Gln
65 70 75 80

Ser Gln Thr Val Ser Phe Ala Lys Lys Thr Thr Thr Thr Thr Ala Thr
85 90 95

Ser Thr Thr Asn Gly Trp Thr Glu Gly Gly Lys Ile Ser Asp Thr Leu
100 105 110

[0391]

Glu Glu Lys Val Ser Val Ser Ile Pro Phe Ile Gly Glu Gly Gly Gly
115 120 125

Lys Asn Ser Thr Thr Ile Glu Ala Asn Phe Ala His Asn Ser Ser Thr
130 135 140

Thr Thr Ser Gln Glu Ala Ser Thr Asp Ile Glu Trp Asn Ile Ser Gln
145 150 155 160

Pro Val Leu Val Pro Pro Arg Lys Gln Val Val Ala Thr Leu Val Ile
165 170 175

Met Gly Gly Asn Phe Thr Ile Pro Met Asp Leu Met Thr Thr Ile Asp
180 185 190

Ser Thr Glu His Tyr Ser Gly Tyr Pro Ile Leu Thr Trp Ile Ser Ser
195 200 205

Pro Asp Asn Ser Tyr Ser Gly Arg Phe Met Ser Trp Tyr Phe Ala Asn
210 215 220

Trp Pro Asn Leu Pro Ser Gly Phe Gly Pro Leu Asn Ser Asp Asn Thr
225 230 235 240

Val Thr Tyr Thr Gly Arg Val Glu Ser Arg Val Ser Ala Gly Val Tyr
245 250 255

Ala Thr Val Arg Phe Asp Gln Tyr Asp Ile His Asn Leu Trp Thr Ile
260 265 270

Glu Lys Thr Trp Tyr Ala Arg His Ala Thr Leu His Asn Gly Lys Lys
275 280 285

[0392] Ile Ser Ile Asn Asn Val Thr Glu Met Ala Pro Thr Ser Pro Ile Lys
290 295 300

Thr Asn
305

<210> 205
<211> 2577
<212> DNA
<213> 苏云金芽孢杆菌

<220>
<221> 尚未归类的特性
<223> AXMI-171 US2010/0298207 A1 SEQ ID NO:204

<400> 205
atgaaaaata aaaagaaata tatgaagcca ctcgcagtag gcttgctcgc aactaacatt 60

attggatttg gtactcagac agtagcgttt gctgcgacag ataaagcggg ttccaaagaa 120

cagatgcagc aacaaatgaa aacacagaat aagagcttta atccgacagt attagccagt 180

atgccatcgg atacatcgga gcttcaaaaa atgttggaag acgcgattaa aaataaggat 240

acccagatta ctccggaatt aataaaaaaa cttcaggaca aaggatttga ttaccttagt 300

attgtaaagg gtttaactgg cggattactg aagcaaattc cgtatgcagg ttcaatcctc 360

tccccttttgg tagttggcct ttttccaggt aagggttatg taacgaaggc gaatgtctgg 420

ggagagatac aggatcgcgt ttcaaattta atagatcaaa aattagaaga gtcacaagta 480

aataacttaa ttgggaaact aacgggtatt caggataatt taggaatata ccaaactcgg 540

gttggtttag ttaatgggat aaaaccacca attgctaatt ttatacaaaa ggatgcaaat 600

tctgataaaa ataaggagaa tttaagaagc acaatagact ccttggacaa ggatttaggc 660

cgagtgatac ctgagtttgc tgttaaaggt tacgaggcag cttctcttcc atattatgta 720

caagttgcca atgtgcatct tttcttattg aaagatgcac ttacacatgc agatgagtgg 780

[0393]

gggcttactg atgatgaaaa gagaggatat ttgtcaagac ttcaacaaaa aattcaagag 840

tatagcagcg tcgtatatga ttcctttaat aaaggagtcg aagccgctaa aagtaagggt 900

ggaagtaccg ccgacagttg gaacagaacc aatgcctatg taagaacaat gacattgtat 960

ggtttagatt ttgtggcttt atggccggct tttgatacta aacattataa tcagccagta 1020

aaattgcagc aaacacgtga attatattct aacatgatag gaagaccaat aaactggcaa 1080

gactatgata caactcttca acaaattcat aatagtgggt atgcgggtta tccaggcgag 1140

ctgaaacaag ttggtgtttc acagtgggat cgtattgatg gaatcaggga aatatttgat 1200

tggactggag acggctcacg agattatacg ctacaatggg gccacgcaaa caaaaatggg 1260

tattcggacc gtagccagac cgtcaataac ccagcaatag gaatttcagc atatgaatcc 1320

aataatgcta atttctataa tatgtctact atcacatata aacaaaataa cgaagtatct 1380

tggttctatg gtccatttac tactcaaagc gatagtaaag atggaagtag aatagatagc 1440

aaagctccag cgggccataa attatctcgc gtcaaagtac aagaaaaaag atcagatcta 1500

aatacaatat catcttttgt ggctgcatat gttcctgaag aagttcatcc acagaatata 1560

cttgaggcta aagctattac aggggtacca gctgaaaaat atctcgcaca tgcaggattt 1620

gaagataaga ttgaatacat gaatggttcg aatgcgatgg tatcttctaa aaatggtgac 1680

acgatagatt acaatgttca aagtccagga aaacaaaaat ataaaatacg cctccgtgtt 1740

gcgacaaata gtgacacatc tgtgggaatc tctataaatg gggattctca gcaagtgaat 1800

ataaaaaata cagaagccgc aacaaagtta gaagacggta ttacagttaa aggtgtaaat 1860

gggaagtaca tgttaattga cggaccaact gttgaactta gcgaaggtgt gaatacaatt 1920

cagcttaaaa atagtggtgg agctaagatt gcattagatc gaatagaatt tgagcctata 1980

ggcggtgagc tacgcaagtg gaaacaggaa ggtgataagt ggtactttta cgatgaaaat 2040

gataaaaagt taacaggttg gcaaaagatt aatgaaagaa aatactacct tggacattct 2100

[0394]

ggtgatggtt ctggtatgac cactgaaggg gagatggcaa caggctggaa aacgattgat 2160

ggagtacaat attactttgg acattctggt gatggttctg gtatggtcac tgaaggggag 2220

atggcaacag gctggaaaac gataaatgga gtaaaatatt attttggaca gactggtgat 2280

ggctctggta tgcaacacga aggggaaaag gcaacaggct ggaaaacgat tgatggagta 2340

aaatattact tcaataaaac tggtgatggc tctggtatgc aacacgaagg ggaaaaggca 2400

ataggctgga aaacgattga tggagtaaaa tattacttca ataaaactgg tgatggctct 2460

ggtatgcaac acgaaggaga aatggcatta ggagatatga cgattgatgg agtaaaacat 2520

cactttaata aaactggtga tggaacgggt cgcgaccatg aaggagagct cgtatgg 2577

〈210〉 206
〈211〉 859
〈212〉 PRT
〈213〉 苏云金芽孢杆菌

<220>
<221> 尚未归类的特性
<223> AXMI-171 US2010/0298207 A1 SEQ ID NO:205

<400> 206

Met Lys Asn Lys Lys Lys Tyr Met Lys Pro Leu Ala Val Gly Leu Leu
1 5 10 15

Ala Thr Asn Ile Ile Gly Phe Gly Thr Gln Thr Val Ala Phe Ala Ala
20 25 30

Thr Asp Lys Ala Gly Ser Lys Glu Gln Met Gln Gln Gln Met Lys Thr
35 40 45

Gln Asn Lys Ser Phe Asn Pro Thr Val Leu Ala Ser Met Pro Ser Asp
50 55 60

[0395]

Thr Ser Glu Leu Gln Lys Met Leu Glu Asp Ala Ile Lys Asn Lys Asp
65 70 75 80

Thr Gln Ile Thr Pro Glu Leu Ile Lys Lys Leu Gln Asp Lys Gly Phe
85 90 95

Asp Tyr Leu Ser Ile Val Lys Gly Leu Thr Gly Gly Leu Leu Lys Gln
100 105 110

Ile Pro Tyr Ala Gly Ser Ile Leu Ser Pro Leu Val Val Gly Leu Phe
115 120 125

Pro Gly Lys Gly Tyr Val Thr Lys Ala Asn Val Trp Gly Glu Ile Gln
130 135 140

Asp Arg Val Ser Asn Leu Ile Asp Gln Lys Leu Glu Glu Ser Gln Val

145 150 155 160

Asn Asn Leu Ile Gly Lys Leu Thr Gly Ile Gln Asp Asn Leu Gly Ile
165 170 175

Tyr Gln Thr Arg Val Gly Leu Val Asn Gly Ile Lys Pro Pro Ile Ala
180 185 190

Asn Phe Ile Gln Lys Asp Ala Asn Ser Asp Lys Asn Lys Glu Asn Leu
195 200 205

Arg Ser Thr Ile Asp Ser Leu Asp Lys Asp Leu Gly Arg Val Ile Pro
210 215 220

Glu Phe Ala Val Lys Gly Tyr Glu Ala Ala Ser Leu Pro Tyr Tyr Val
225 230 235 240

[0396]

Gln Val Ala Asn Val His Leu Phe Leu Leu Lys Asp Ala Leu Thr His
245 250 255

Ala Asp Glu Trp Gly Leu Thr Asp Asp Glu Lys Arg Gly Tyr Leu Ser
260 265 270

Arg Leu Gln Gln Lys Ile Gln Glu Tyr Ser Ser Val Val Tyr Asp Ser
275 280 285

Phe Asn Lys Gly Val Glu Ala Ala Lys Ser Lys Gly Gly Ser Thr Ala
290 295 300

Asp Ser Trp Asn Arg Thr Asn Ala Tyr Val Arg Thr Met Thr Leu Tyr
305 310 315 320

Gly Leu Asp Phe Val Ala Leu Trp Pro Ala Phe Asp Thr Lys His Tyr

325 330 335

Asn Gln Pro Val Lys Leu Gln Gln Thr Arg Glu Leu Tyr Ser Asn Met
340 345 350

Ile Gly Arg Pro Ile Asn Trp Gln Asp Tyr Asp Thr Thr Leu Gln Gln
355 360 365

Ile His Asn Ser Gly Tyr Ala Gly Tyr Pro Gly Glu Leu Lys Gln Val
370 375 380

Gly Val Ser Gln Trp Asp Arg Ile Asp Gly Ile Arg Glu Ile Phe Asp
385 390 395 400

Trp Thr Gly Asp Gly Ser Arg Asp Tyr Thr Leu Gln Trp Gly His Ala
405 410 415

[0397]

Asn Lys Asn Gly Tyr Ser Asp Arg Ser Gln Thr Val Asn Asn Pro Ala
420 425 430

Ile Gly Ile Ser Ala Tyr Glu Ser Asn Asn Ala Asn Phe Tyr Asn Met
435 440 445

Ser Thr Ile Thr Tyr Lys Gln Asn Asn Glu Val Ser Trp Phe Tyr Gly
450 455 460

Pro Phe Thr Thr Gln Ser Asp Ser Lys Asp Gly Ser Arg Ile Asp Ser
465 470 475 480

Lys Ala Pro Ala Gly His Lys Leu Ser Arg Val Lys Val Gln Glu Lys
485 490 495

Arg Ser Asp Leu Asn Thr Ile Ser Ser Phe Val Ala Ala Tyr Val Pro

500 505 510

Glu Glu Val His Pro Gln Asn Ile Leu Glu Ala Lys Ala Ile Thr Gly
515 520 525

Val Pro Ala Glu Lys Tyr Leu Ala His Ala Gly Phe Glu Asp Lys Ile
530 535 540

Glu Tyr Met Asn Gly Ser Asn Ala Met Val Ser Ser Lys Asn Gly Asp
545 550 555 560

Thr Ile Asp Tyr Asn Val Gln Ser Pro Gly Lys Gln Lys Tyr Lys Ile
565 570 575

Arg Leu Arg Val Ala Thr Asn Ser Asp Thr Ser Val Gly Ile Ser Ile
580 585 590

[0398]

Asn Gly Asp Ser Gln Gln Val Asn Ile Lys Asn Thr Glu Ala Ala Thr
595 600 605

Lys Leu Glu Asp Gly Ile Thr Val Lys Gly Val Asn Gly Lys Tyr Met
610 615 620

Leu Ile Asp Gly Pro Thr Val Glu Leu Ser Glu Gly Val Asn Thr Ile
625 630 635 640

Gln Leu Lys Asn Ser Gly Gly Ala Lys Ile Ala Leu Asp Arg Ile Glu
645 650 655

Phe Glu Pro Ile Gly Gly Glu Leu Arg Lys Trp Lys Gln Glu Gly Asp
660 665 670

Lys Trp Tyr Phe Tyr Asp Glu Asn Asp Lys Lys Leu Thr Gly Trp Gln

675 680 685

Lys Ile Asn Glu Arg Lys Tyr Tyr Leu Gly His Ser Gly Asp Gly Ser
690 695 700

Gly Met Thr Thr Glu Gly Glu Met Ala Thr Gly Trp Lys Thr Ile Asp
705 710 715 720

Gly Val Gln Tyr Tyr Phe Gly His Ser Gly Asp Gly Ser Gly Met Val
725 730 735

Thr Glu Gly Glu Met Ala Thr Gly Trp Lys Thr Ile Asn Gly Val Lys
740 745 750

Tyr Tyr Phe Gly Gln Thr Gly Asp Gly Ser Gly Met Gln His Glu Gly
755 760 765

[0399]

Glu Lys Ala Thr Gly Trp Lys Thr Ile Asp Gly Val Lys Tyr Tyr Phe
770 775 780

Asn Lys Thr Gly Asp Gly Ser Gly Met Gln His Glu Gly Glu Lys Ala
785 790 795 800

Ile Gly Trp Lys Thr Ile Asp Gly Val Lys Tyr Tyr Phe Asn Lys Thr
805 810 815

Gly Asp Gly Ser Gly Met Gln His Glu Gly Glu Met Ala Leu Gly Asp
820 825 830

Met Thr Ile Asp Gly Val Lys His His Phe Asn Lys Thr Gly Asp Gly
835 840 845

Thr Gly Arg Asp His Glu Gly Glu Leu Val Trp

[0400] 850 855

图 1A

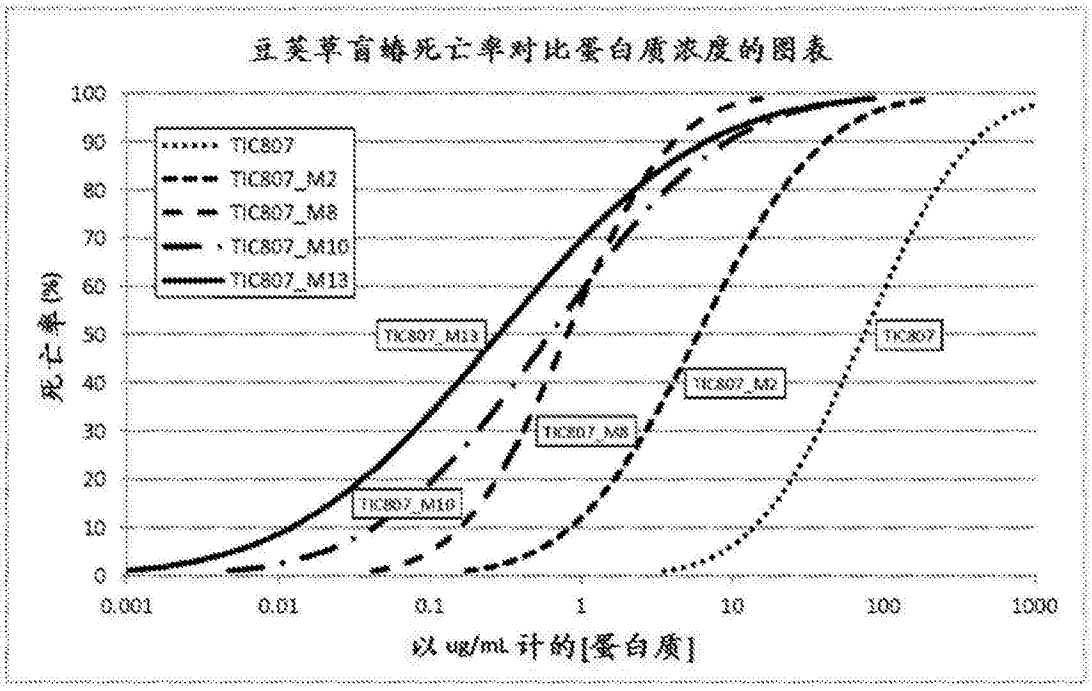

豆芙草盲蝽死亡率对比蛋白质浓度的图表
TIC807
TIC807_M2
TIC807_M8
TIC807_M10
TIC807_M13
死亡率(%)
以 ug/mL 计的[蛋白质]
0.001
0.01
0.1
1
10
100
1000

图 1B

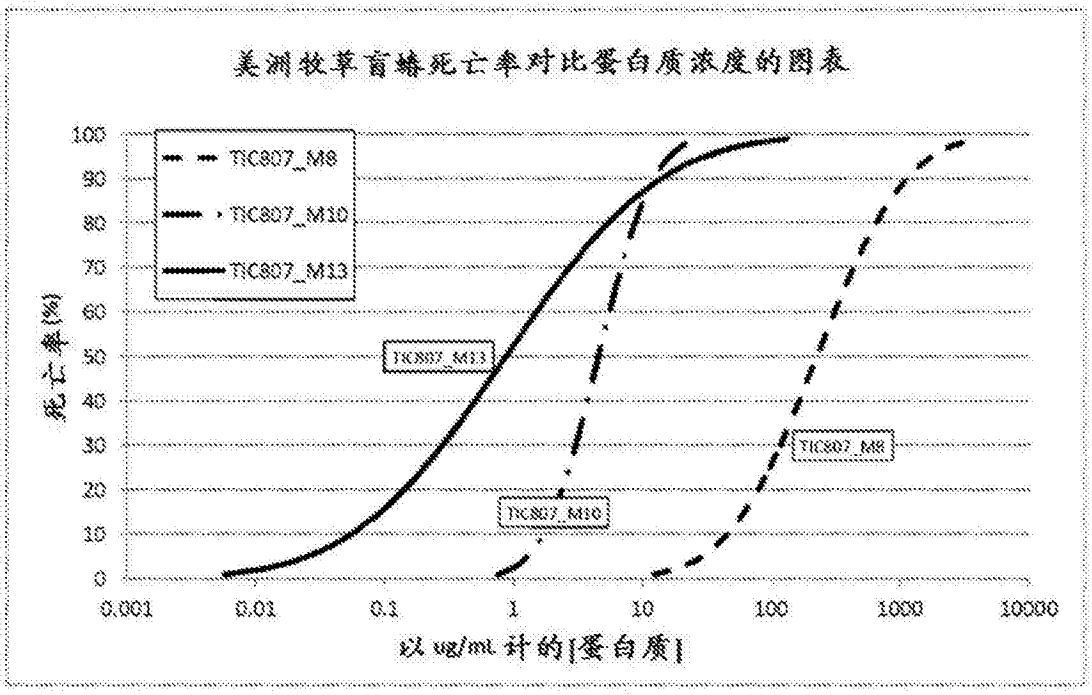

美洲牧草盲蝽死亡率对比蛋白质浓度的图表
TIC807_M8
TIC807_M10
TIC807_M13
死亡率(%)
以 ug/mL 计的[蛋白质]
0.001
0.01
0.1
1
10
100
1000
10000

图1

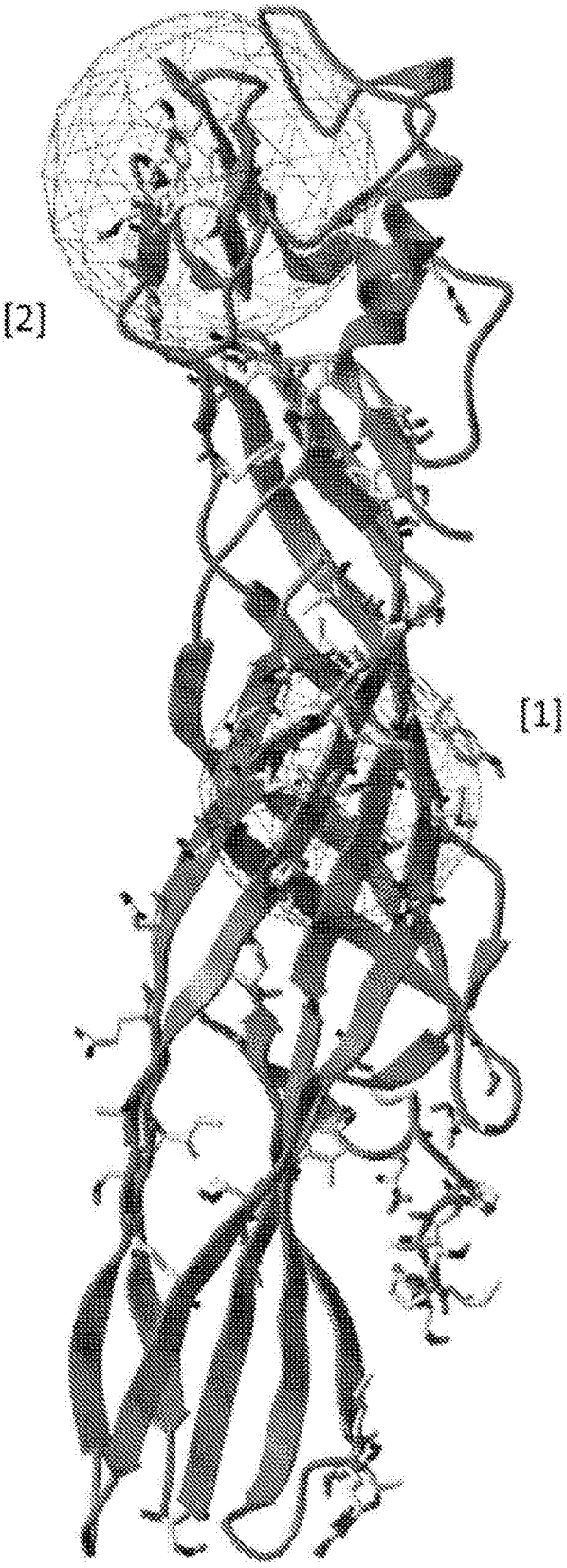


图2

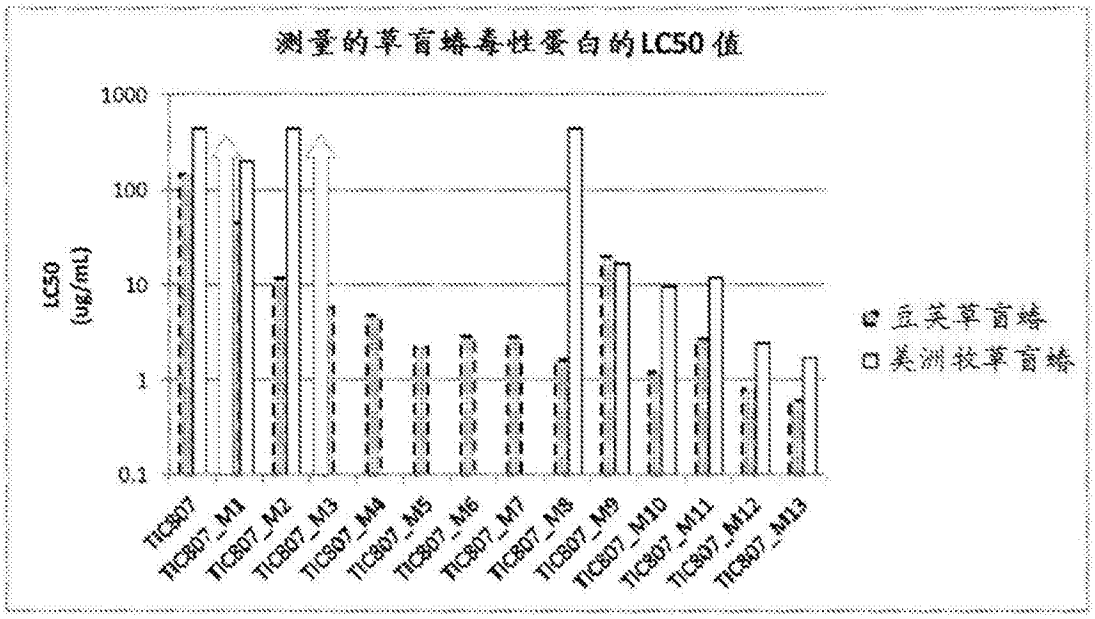

测量的草盲蝽毒性蛋白的LC50值
LC50 (ug/ml)
1000
100
10
1
0.1
TIC807
TIC807_M1
TIC807_M2
TIC807_M3
TIC807_M4
TIC807_M5
TIC807_M6
TIC807_M7
TIC807_M8
TIC807_M9
TIC807_M10
TIC807_M11
TIC807_M12
TIC807_M13
豆荚草盲蝽
美洲牧草盲蝽

图3