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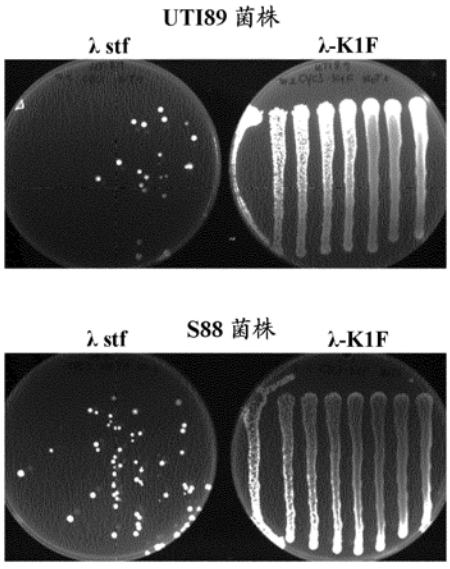
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(54)发明名称

用于细菌递送媒介物中的分支受体结合多亚基蛋白复合物

(57)摘要

本公开内容总体上涉及用于将所需有效载荷有效转移到靶细菌细胞内的细菌递送媒介物。更具体而言,本公开内容涉及基于嵌合受体结合蛋白(RBP)的存在、和/或改造的分支受体结合多亚基多肽(“分支RBP”)的存在,而具有所需宿主范围的细菌递送媒介物,所述嵌合受体结合蛋白(RBP)由衍生自λ样细菌噬菌体的RBP的N末端区域以及不同RBP的C末端区域之间的融合物组成。



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1．一种改造的分支受体结合多亚基蛋白复合物(分支RBP)，其包含两种或更多种缔合的细菌噬菌体衍生的受体结合蛋白(RBP)：

其中第一缔合的细菌噬菌体衍生的受体结合蛋白包含第一相互作用结构域(ID)；和

其中第二缔合的细菌噬菌体衍生的受体结合蛋白包含第二相互作用结构域。

2.权利要求1的改造的分支RBP，其中所述缔合是非共价缔合。

3.权利要求1的改造的分支RBP，其中所述缔合是共价缔合。

4.权利要求1至3中任一项的改造的分支RBP，其中所述两种或更多种缔合的细菌噬菌体衍生的RBP中的至少一种是具有ID结构域的嵌合RBP。

5．权利要求1至4中任一项的改造的分支RBP，其中所述两种或更多种受体结合蛋白(RBP)中的至少一种包含嵌合RBP，

其中所述嵌合RBP包含来自λ或λ样细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560，和

其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

6.权利要求1至5中任一项的改造的分支RBP，其中所述两种或更多种受体结合蛋白(RBP)中的至少一种包含嵌合RBP，

其中所述嵌合RBP包含来自λ或λ样细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，

其中来自λ或λ样细菌噬菌体的所述RBP与另一种RBP具有在三个氨基酸区域中的一个或多个中的同源性，所述氨基酸区域范围为参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460和495-560，和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560，和

其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

7．权利要求1至6中任一项的改造的分支RBP，其中所述第一ID和/或第二ID选自SEQ ID NO:131-134和280-281。

8.权利要求4至7中任一项的改造的分支RBP，其中对于所述嵌合RBP，所述不同RBP衍生自任何细菌噬菌体或细菌素。

9．权利要求4至8中任一项的改造的分支RBP，其中对于所述嵌合RBP，所述嵌合RBP的N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ细菌噬菌体stf序列(SEQ ID NO:1)的N末端RBP的位置80-150、320-460或495-560，并且其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

10．权利要求4至9中任一项的改造的分支RBP，其中对于所述嵌合RBP，所述N末端结构域和所述C末端结构域在插入位点处在所述区域内融合，所述插入位点与选自以下的插入位点具有至少80%的同一性：氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)、GAGENS(SEQ ID NO:194)、ATLKQI(SEQ

ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203),其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

11. 权利要求1至10中任一项的改造的分支RBP复合物,其中所述一种或多种受体结合蛋白(RBP)包含嵌合RBP,

其中所述嵌合RBP包含来自λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物;和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合,所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560,并且其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

12. 权利要求1至11中任一项的改造的分支RBP复合物,其中所述一种或多种受体结合蛋白(RBP)包含嵌合RBP,所述嵌合RBP包含来自λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物,

其中来自λ细菌噬菌体的所述RBP与另一种RBP具有在三个氨基酸区域中的一个或多个中的同源性,所述氨基酸区域范围为参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460和495-560,和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合,所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560,并且其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

13.权利要求11或12的改造的分支RBP,其中所述不同RBP衍生自任何细菌噬菌体或细菌素。

14. 权利要求11至13中任一项的改造的分支RBP,其中所述嵌合RBP的所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合,所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置80-150、320-460或495-560,并且其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

15. 权利要求11至14中任一项的改造的分支RBP,其中所述N末端结构域和所述C末端结构域在插入位点处在所述区域内融合,所述插入位点与选自以下的插入位点具有至少80%的同一性:氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:190)、MDETNR(SEQ ID NO:191)、SASAAA(SEQ ID NO:192)、GAGENS(SEQ ID NO:193)、ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203),其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

16.权利要求1至15中任一项的改造的分支RBP,其中所述不同RBP的C末端结构域具有针对带荚膜细菌菌株的解聚酶活性。

17. 权利要求4至16中任一项的改造的分支RBP,其中所述两种或更多种受体结合蛋白(RBP)中的至少一种包含嵌合RBP,所述嵌合RBP包含选自SEQ ID NO: 2、4、7 ,9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56、59、135

to 144、147、150、151、154、157、160、 163、215、216、219、221、223、225、227、229、232、325、237、239、241、282和283的氨基酸序列。

18.一种细菌递送媒介物,其包含改造的分支RBP。

19.权利要求18的细菌递送媒介物,其中所述细菌递送媒介物是细菌噬菌体。

20.权利要求18的细菌递送媒介物,其中所述细菌递送媒介物是包装噬菌粒。

21. 权利要求18至20中任一项的细菌递送媒介物,其中所述改造的分支RBP包含具有相互作用结构域的嵌合受体结合蛋白。

22. 权利要求21的细菌递送媒介物,其中所述嵌合RBP包含来自λ或λ样细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物,和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合,所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560,和

其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

23. 权利要求21或22的细菌递送媒介物,其中所述嵌合RBP包含来自λ或λ样细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物,

其中来自λ或λ样细菌噬菌体的所述RBP与另一种RBP具有在三个氨基酸区域中的一个或多个中的同源性,所述氨基酸区域范围为参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460和495-560,和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合,所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的1-150、320-460或495-560;和

其中其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

24.权利要求22或23的细菌递送媒介物,其中所述不同RBP衍生自任何细菌噬菌体或细菌素。

25. 权利要求22至24中任一项的细菌递送媒介物,其中所述嵌合RBP的所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合,所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置80-150、320-460或495-560,并且其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

26. 权利要求22至25中任一项的细菌递送媒介物,其中所述N末端结构域和所述C末端结构域在插入位点处在所述区域内融合,所述插入位点与选自以下的插入位点具有至少80%的同一性:氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)、GAGENS(SEQ ID NO:194)、ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203),并且其中所述嵌合RBP含有相互作用结构域,其可任选地插入所述N末端结构域和C末端结构域之间。

27. 权利要求22至26中任一项的细菌递送媒介物,其中所述不同RBP的C末端结构域具有针对带荚膜细菌菌株的解聚酶活性。

28. 权利要求22至26中任一项的细菌递送媒介物,其中所述嵌合RBP包含来自λ细菌噬

菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，和

其中所述N末端结构域在一个氨基酸区域内与所述C末端结构域融合，所述氨基酸区域是参考λ stf序列(SEQ ID NO:1)的N末端RBP的1-150、320-460或495-560；和

其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

29. 权利要求21至28中任一项的细菌递送媒介物，其中所述嵌合RBP包含来自λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，

其中来自λ细菌噬菌体的所述RBP与另一种RBP具有在三个氨基酸区域中的一个或多个中的同源性，所述氨基酸区域范围为参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460和495-560；和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域是参考λ stf序列(SEQ ID NO:1)的N末端RBP的1-150、320-460或495-560；和

其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

30.权利要求18-29中任一项的细菌递送媒介物，其进一步包含编码目的蛋白质的核酸有效载荷。

31.权利要求30的细菌递送媒介物，其中所述目的核酸选自Cas核酸酶基因、Cas9核酸酶基因、引导RNA、CRISPR基因座、毒素基因、表达酶例如核酸酶或激酶的基因、TALEN、ZFN、大范围核酸酶、重组酶、细菌受体、膜蛋白、结构蛋白、分泌蛋白、表达对一般而言的抗生素或药物的抗性的基因、表达毒性蛋白或毒性因子的基因、以及表达毒力蛋白或毒力因子的基因、或其任何组合。

32.权利要求30或31的细菌递送媒介物，其中所述目的蛋白质是靶向宿主细菌细胞基因组或宿主细菌细胞质粒的切割的核酸酶。

33.权利要求32的细菌递送媒介物，其中所述切割在抗生素抗性基因中发生。

34.权利要求30或31的细菌递送媒介物，其中所述核酸有效载荷编码治疗性蛋白质。

35.权利要求30或31的细菌递送媒介物，其中所述核酸有效载荷编码反义核酸分子。

36.权利要求18至35中任一项的细菌递送媒介物，其中所述改造的分支RBP是如权利要求1至17中任一项定义的改造的分支RBP。

37.一种编码改造的分支RBP亚基的核酸分子，其中所述核酸是多顺反子核酸分子。

38.权利要求37的核酸，其中所述多顺反子核酸分子包含一个或多个核糖体结合位点。

39. 权利要求37或38的核酸，其中所述亚基中的至少一个是嵌合RBP。

40.权利要求37至39中任一项的核酸，其中所述核酸分子编码嵌合RBP，其中所述嵌合RBP包含来自λ或λ样细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560，并且其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

41. 权利要求37至40中任一项的核酸分子，其中所述核酸编码嵌合RBP，所述嵌合RBP包含来自λ或λ样细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合

物，

其中来自λ样细菌噬菌体的所述RBP与另一种RBP具有在三个氨基酸区域中的一个或多个中的同源性，所述氨基酸区域范围为参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460和495-560，和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560，并且其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

42.权利要求40和41中任一项的核酸分子，其中所述不同RBP衍生自任何细菌噬菌体或细菌素。

43. 权利要求40至42中任一项的核酸分子，其中所述嵌合RBP的所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置80-150、320-460和495-560。

44. 权利要求40至43中任一项的核酸分子，其中所述N末端结构域和所述C末端结构域在插入位点处在所述区域内融合，所述插入位点与选自以下的插入位点具有至少80%的同一性：氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)、GAGENS(SEQ ID NO:194)、ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203)，其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

45. 权利要求37至44中任一项的核酸分子，其中所述嵌合RBP包含SEQ ID NO: 2、4、7,9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56、59、135 to 144、147、150、151、154、157、160、163、215、216、219、221、223、225、227、229、232、325、237、239、241、282或283的氨基酸序列。

46. 权利要求37至45中任一项的核酸，其包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116、119、166、167、168、171、174、175、178、181、184、187、206、207、208、209、210、211、212、243、244、247、249、251、253、255、257、260、263、265、267、269或284的核苷酸序列。

47. 权利要求40至46中任一项的核酸分子，其中所述不同RBP的C末端结构域具有针对带荚膜细菌菌株的解聚酶活性。

48.权利要求39的核酸，其中所述核酸分子编码嵌合RBP，其中所述嵌合RBP包含来自λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，和

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ stf(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560，并且其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

49.权利要求39的核酸分子，其中所述嵌合RBP包含来自λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，

其中来自λ细菌噬菌体的所述RBP与另一种RBP具有在三个氨基酸区域中的一个或多个中的同源性，所述氨基酸区域范围为参考λ stf(SEQ ID NO:1)的N末端RBP的位置1-150、

320-460和495-560，

其中所述N末端结构域在氨基酸区域之一内与所述C末端结构域融合，所述氨基酸区域选自参考λ stf(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560，并且其中所述嵌合RBP含有相互作用结构域，其可任选地插入所述N末端结构域和C末端结构域之间。

50.权利要求37至49中任一项的核酸分子，其中所述改造的分支RBP是如权利要求1至17中任一项定义的改造的分支RBP。

51.一种药物组合物或兽医组合物，其包含权利要求18至36中任一项的一种或多种细菌递送媒介物和药学上可接受的载体。

52.一种用于治疗细菌感染的方法，其包括将权利要求51的药物组合物或兽医组合物施用于需要治疗的受试者，所述受试者患有由细菌引起的疾病或病症，优选细菌感染。

53.一种用于降低细菌群体中的毒性细菌和/或抗生素抗性细菌的量的方法，其包括使细菌群体与权利要求18至36中任一项的细菌递送媒介物接触。

54.权利要求51的组合物，其中所述组合物用于目的化合物的原位细菌生产，优选地，所述目的化合物在靶向的细菌内部产生、从靶向的细菌中分泌或在靶向的细菌的表面上表达。

55.权利要求54的组合物，其中所述目的化合物是在靶向的细菌的表面上表达的抗原，用于预防性和/或治疗性疫苗接种。

56.权利要求51的组合物，其中所述组合物进一步包含至少一种另外的活性成分，例如益生元和/或益生菌和/或抗生素，和/或另一种抗菌剂或抗生物膜剂，和/或增强细菌递送媒介物对细菌的靶向和/或有效载荷递送到细菌内的任何药剂，或其任何组合。

57.权利要求51和54至56中任一项的药物组合物或兽医组合物，其用于治疗由细菌引起的疾病或病症。

58.根据权利要求57使用的药物组合物或兽医组合物，其中由细菌引起的所述疾病或病症是细菌感染、代谢紊乱或涉及人微生物组的细菌的病理状况。

用于细菌递送媒介物中的分支受体结合多亚基蛋白复合物

技术领域

[0001] 本公开内容总体上涉及用于将所需有效载荷(payload)有效转移到靶细菌细胞内的细菌递送媒介物。

背景技术

[0002] 细菌噬菌体是感染细菌并在细菌中繁殖的寄生虫。一般而言,感染过程可以分为几个阶段:(i)对应于识别且结合细菌细胞的吸附;(ii)将DNA基因组注入细菌细胞质内;(iii)产生一组病毒蛋白,其可以导致插入宿主靶基因组中(溶原性噬菌体)或产生感染性颗粒(裂解性噬菌体),以及(iv)通常通过受控裂解,从受感染细胞中释放成熟病毒粒子[1]。

[0003] 作为对于成功感染必要的第一步,识别且结合靶细胞是细菌噬菌体生命周期中的重要过程。在一些情况下,细菌噬菌体可以识别同一物种的几种菌株,具有“广宿主范围”,但非常常见的是仅能够识别存在于同一物种的一些菌株上的特异性抗原[2]。因此并不意外的是,感染过程的这一步骤是细菌噬菌体和细菌之间竞争成功感染的核心。

[0004] 作为一般机制,细菌噬菌体编码涉及识别过程的两组主要蛋白质。第一组能够附着至细胞表面上的细菌噬菌体的初级受体,这一事件触发DNA喷射到细胞质内,并且通常被视为“不可逆”的结合过程[3]。不同的细菌噬菌体属在这组蛋白质的组构方面不同,并且因此命名可以不同。例如,在一些长尾病毒(*Siphovirus*)中,它们被称为“中央尾丝”或“尾尖”,其与大肠杆菌(*Escherichia coli*)中的LamB受体不可逆地结合。在长尾噬菌体科(siphoviridae)λ中,“中央尾丝”或“尾尖”由蛋白质gpJ组成[4]。在一些其它长尾病毒如T5中,位于尾部最尖端处的蛋白质介导了这一过程。在T5的情况下,称为pb5的蛋白质识别FhuA受体[5]。这种类型的蛋白质可以在许多其它细菌噬菌体中找到。在肌尾病毒(*Myoviruse*)如T4中,与初级受体或细胞表面的不可逆结合一般而言由“短尾丝”介导,后者也位于尾管的末端处[5]。

[0005] 细菌噬菌体中的第二组蛋白质(在本文中称为“受体结合蛋白”)编码针对细菌上所谓的“次级受体”的识别和结合活性。这种次级受体允许噬菌体颗粒在细胞表面上的瞬时结合,以便扫描表面并将第一组蛋白质放置为与初级受体接触。由于这种结合是可逆的,它允许噬菌体在细胞表面上“行走”,直到找到初级受体并开始感染过程。这些蛋白质复合物有时例如在T5中被称为“L形丝”,例如在λ中被称为“侧尾丝”,如在T4 中被称为“长尾丝”,或例如在噬菌体P22中被称为尾刺[5]-[8]。对于一些噬菌体,该第二组蛋白质的存在对于感染过程发生是必要的,例如T4 [5]。在一些其它噬菌体如λ中,该第二组蛋白质对于感染过程发生并非绝对必要的,但它可能允许与靶细胞的更有效结合[7]。

[0006] 由于吸附过程对于成功感染发生是绝对必要的,因此细菌可以发展多种方式来避免被细菌噬菌体识别。例如,它们可以使细菌噬菌体结合的初级受体或次级受体突变;它们可以通过将蛋白质与之附着来掩蔽这种受体(受体掩蔽);或者它们可以以细菌荚膜的形式在其周围形成物理屏障,因此阻断对细胞表面的任何接近[9]。细菌可以产生许多不同类型

的细胞外聚合物荚膜[10]。继而，细菌噬菌体已进化出不同的策略来绕过这些防御机制。例如，尾尖蛋白的突变允许其使用不同的受体[11]。然而，细菌周围聚合物荚膜的存在需要不同的方法，因为它阻断了与细胞表面上的任何受体的所有接触。在这些情况下，细菌噬菌体已进化出特异性蛋白质，其可以酶促降解这种荚膜以获得对细胞的接近。这些解聚酶活性在以侧尾丝、长尾丝或尾刺形式的不同于初级受体识别机制的蛋白质复合物中编码[12]、[13]、[14]。

[0007] 当仅考虑吸附和注入过程时，需要重新定义细菌噬菌体的宿主范围的概念。由于与噬菌体复制周期有关的所有不相容性或防御机制都被排除在外，给定噬菌体的“吸附宿主范围”通常大于其中感染周期导致新近产生的成熟病毒粒子的“经典宿主范围”。当使用基于给定细菌噬菌体衣壳的包装噬菌粒时，宿主范围的概念甚至变得与经典定义更加不同。包装噬菌粒不含复制病毒颗粒所必要的信息，因为它们并不包装其同源病毒基因组。因此，包装噬菌粒的宿主范围趋于大于其衍生来源的亲本细菌噬菌体的宿主范围。因此，对于设计用于将外源DNA有效载荷有效递送到靶菌株内的新的细菌递送媒介物的开发，最重要的是能够改造具有所需宿主范围以及绕过细菌机制的能力的递送媒介物，所述细菌机制可以导致包装噬菌粒与细菌细胞表面的不成功结合。

发明内容

[0008] 作为一般机制，细菌噬菌体编码涉及细菌细胞识别过程的蛋白质组。本文描述的是改造具有所需靶宿主范围的合成细菌递送媒介物的新方法。

[0009] 在一些方面，提供了合成细菌递送媒介物，其特征在于嵌合受体结合蛋白(RBP)，其中所述嵌合RBP包含来自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同细菌噬菌体RBP的C末端结构域之间的融合物。例如并且取决于噬菌体科，嵌合RBP衍生来源的此类细菌噬菌体RBP包括“L形丝”、“侧尾丝(stf)”、“长尾丝”或“尾刺”。如本文公开的，已证实了λ样细菌噬菌体受体结合蛋白(RBP)的显著部分，例如stf蛋白，可以与不同RBP的一部分交换。此外，已鉴定了RBP中的特异性融合位置，其允许获得功能性嵌合RBP。

[0010] 在另外的方面，本公开内容涉及基于改造的分支受体结合多亚基蛋白复合物(“分支RBP”)的存在，而具有所需宿主范围的细菌递送媒介物。分支RBP包含衍生自细菌噬菌体的两种或更多种缔合的受体结合蛋白，其中所述RBP含有介导不同亚基缔合的“相互作用结构域”(ID)。一个亚基与另一个亚基的缔合可以是非共价的或共价的。两种或更多种缔合的RBP包括但不限于本文所述的嵌合受体结合蛋白(RBP)，其包含衍生自λ样或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物。

[0011] 嵌合受体结合蛋白(RBP)是其中嵌合RBP包含衍生自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物的嵌合受体结合蛋白，其中RBP的所述N末端结构域在氨基酸区域之一内与不同RBP的所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO: 1)的N末端RBP的位置1-150、320-460或495-560，或者与范围为参考λ stf序列的RBP的位置1-150、320-460和495-560的三个氨基酸区域中的一个或多个具有同源性的RBP的类似区域。在本发明的一个具体方面，嵌合受体结合蛋白(RBP)的不同RBP结构域衍生自任何细菌噬菌体或任何细菌素。在一个具体方面，来自λ样细菌噬菌体或λ细菌噬菌体的RBP或者不同RBP含有在三个氨基酸区域中的一个或多个中

的同源性,所述氨基酸区域范围为参考λ细菌噬菌体stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460或495-560。在某些方面,λ样细菌噬菌体、λ细菌噬菌体或不同RBP与三个氨基酸区域中的一个或多个之间的同源性,对于参考λ细菌噬菌体stf序列(SEQ ID NO:1)的45个或更多个氨基酸为约35%的同一性,对于30个或更多个氨基酸为约50%的同一性,并且对于18个或更多个氨基酸为约90%的同一性。同源性的确定可以使用比对工具来执行,所述比对工具例如Smith-Waterman算法(Smith等人,1981,J. Mol. Biol 147:195-197)或EMBOSS Matcher(Rice,Longden,Bleasby 2000 EMBOSS Trends in Genetics 16: 276-277)。

[0012] 在本发明的一个方面,嵌合RBP包含在氨基酸区域之一内与不同RBP的C末端结构域融合的RBP的N末端结构域,所述氨基酸区域选自参考λ细菌噬菌体stf序列(SEQ ID NO:1)的N末端RBP的位置80-150、320-460或495-560。在本发明的另一个实施方案中,嵌合RBP包含在插入位点处在选自位置1-150、320-460或495-560的氨基酸区域之一内融合的N末端结构域和C末端结构域,所述插入位点与选自以下的插入位点具有至少80%,优选至少85%、至少90%、至少95%、至少98%或至少99%的同一性:氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)、GAGENS(SEQ ID NO:194)、ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203)。在本发明的一个更具体的实施方案中,嵌合RBP包含在插入位点处在选自位置1-150、320-460或495-560的氨基酸区域之一内融合的N末端结构域和C末端结构域,所述插入位点与选自以下的插入位点具有至少80%,优选至少85%、至少90%、至少95%、至少98%或至少99%的同一性:氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)和GAGENS(SEQ ID NO:194)。

[0013] 在另一个方面,嵌合RBP包含与不同RBP的C末端结构域融合的RBP的N末端结构域,其中所述不同RBP是赋予改变的宿主范围的蛋白质或不同蛋白质组。在一个实施方案中,不同RBP是由近端尾丝和远端尾丝(DTF)组成的T4样或T4长尾丝,并且T4样或T4 RBP的C末端结构域是远端尾丝(DTF)。在另一个实施方案中,RBP的N末端结构域在T4样或T4 DTF内的插入位点处与T4样或T4远端尾丝融合,所述插入位点与选自以下的插入位点具有至少80%,优选至少85%、至少90%、至少95%、至少98%或至少99%的同一性:氨基酸ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203)。在一个具体实施方案中,RBP的N末端结构域在氨基酸1到90的区域内与T4样或T4远端尾丝融合,其中优选的区域是DTF的氨基酸40到50。

[0014] 在具体实施方案中,本公开内容提供了特异性嵌合RBP。SEQ ID NO 2-61、135-165、215-242、271、273、282和283公开了此类嵌合RBP的氨基酸序列,以及在一些情况下,其相应的天然伴侣蛋白质(chaperone protein) (命名为“AP”)。此类AP蛋白有助于嵌合RBP的折叠。在一个具体实施方案中,RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56、59、135至144、147、150、151、154、157、160、163、215、216、219、221、223、225、227、229、232、325、237、239、241、282或

283的氨基酸序列。在一个更具体的实施方案中，RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56或59的氨基酸序列。

[0015] 在另一个方面，本公开内容提供了编码本文公开的嵌合RBP的核苷酸序列。在一个具体实施方案中，编码此类嵌合RBP的核酸以及其相应的AP蛋白在SEQ ID NO 62-120、166-189、206-212、243-270、272、274和284中进行描绘。在一个具体实施方案中，编码此类嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116、119、166、167、168、171、174、175、178、181、184、187、206、207、208、209、210、211、212、243、244、247、249、251、253、255、257、260、263、265、267、269或284的核苷酸序列。在一个更具体的实施方案中，编码此类嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116或119的核苷酸序列。

[0016] 在本发明的一个具体的非限制性方面，已证实将嵌合RBP改造为编码酶促活性例如解聚酶活性，可以显著地增加所提供的包含本文公开的嵌合RBP的细菌递送媒介物的递送效率。在本发明的一个实施方案中，嵌合RBP的不同RBP结构域包含酶促活性，例如针对带荚膜细菌菌株的解聚酶活性。在一个具体实施方案中，解聚酶是内切唾液酸酶，例如K1F或K5内切唾液酸酶。

[0017] 在另一个方面，本公开内容提供了改造的分支RBP以及细菌递送媒介物，其基于改造的分支受体结合多亚基蛋白复合物(“分支RBP”)的存在，而具有所需宿主范围和/或特异性生物学功能。改造的分支RBP包含衍生自细菌噬菌体的两种或更多种缔合的受体结合蛋白，其基于相互作用结构域(ID)的存在而彼此缔合。每个蛋白质复合物亚基都含有ID，其充当一个亚基RBP与另一个亚基RBP缔合的“锚”。一个亚基与另一个亚基的缔合可以是非共价的或共价的。改造的分支RBP可以包含不同亚基的非共价缔合；在一些情况下，改造的分支RBP可以包含不同亚基的共价缔合；并且在进一步的情况下，改造的分支RBP可以包含不同亚基的共价缔合和非共价缔合两者。在其中缔合是非共价的情况下，蛋白质亚基作为分开的蛋白质亚基组装到改造的分支RBP内，每个蛋白质亚基具有其自身的ID。在其中相互作用是共价的非限制性实例中，改造的分支RBP可以作为单一融合蛋白存在，所述单一融合蛋白包含与两个或更多个ID结构域融合的不同目的蛋白质结构域。在具体实施方案中，分支RBP可以包含多个RBP亚基，包括例如两个、三个、四个等亚基。每个RBP亚基都可能为总体分支RBP带来不同的生物学功能。此类功能包括但不限于宿主识别和酶促活性。此类酶促活性包括解聚酶活性。

[0018] 本文公开的是能够充当相互作用结构域(ID)的氨基酸序列。出于本发明的目的，此类ID是提供一个亚基与另一个亚基的缔合，从而提供改造的分支RBP的组装的那些氨基酸序列。ID可以是天然存在的细菌噬菌体ID、衍生自非细菌噬菌体多肽的ID或重组衍生的ID。改造的分支RBP的两种或更多种缔合的受体结合蛋白可以是任何细菌噬菌体RBP，或细菌噬菌体RBP的功能结构域，例如提供所需宿主范围或生物活性的结构域，其中所述RBP或RBP的结构域与ID融合。缔合的受体结合蛋白可以包括但不限于本文所述的嵌合受体结合蛋白(RBP)，其包含衍生自λ样或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，其中所述嵌合RBP还包含ID。

[0019] 在本发明的一个实施方案中，提供了编码本文公开的嵌合RBP、以及改造的分支RBP的两个或更多个亚基RBP的核酸分子。此类核酸可以包括在载体中，所述载体例如细菌噬菌体、质粒、噬菌粒、病毒以及允许嵌合RBP编码核酸的转移和表达的其它媒介物。在其中待表达分支RBP的亚基的情况下，从含有多个核糖体结合位点(RBS)的多顺反子表达单元表达亚基可能是有利的。此类表达单元的使用可以用于调控每个RBP亚基的表达，使得实现每个亚基的等量表达。

[0020] 提供了细菌递送媒介物，其允许将编码目的蛋白质或核酸的核酸有效载荷转移到所需的靶细菌宿主细胞内。此类细菌递送媒介物的特征在于具有嵌合RBP，其包含来自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物。在本发明的一个实施方案中，细菌递送媒介物含有嵌合RBP，其包含衍生自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，其中嵌合RBP的所述N末端结构域在氨基酸区域之一内与不同RBP的所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO: 1)的N末端结构域的位置1-150、320-460或495-560。在一个方面，来自λ样细菌噬菌体、λ细菌噬菌体的RBP以及不同RBP含有在三个氨基酸区域中的一个或多个中的同源性，所述氨基酸区域范围为参考λ细菌噬菌体stf序列(SEQ ID NO:1)的RBP的位置1-150、320-460和495-560。在某些方面，同源性对于三个氨基酸区域中的一个或多个内的45个或更多个氨基酸为约35%的同一性，对于30个或更多个氨基酸为约50%的同一性，或者对于18个或更多个氨基酸为约90%的同一性，所述氨基酸区域范围为参考λ细菌噬菌体stf序列(SEQ ID NO:1)的RBP的位置1-150、320-460和495-560。在本发明的一个具体方面，嵌合受体结合蛋白(RBP)的不同RBP结构域衍生自细菌噬菌体或细菌素。在本发明的一个方面，嵌合RBP包含在氨基酸区域之一内与RBP的C末端结构域融合的RBP的N末端结构域，所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的N末端RBP的位置80-150、320-460或495-560。在本发明的另一个实施方案中，嵌合RBP包含在N末端RBP结构域的位点内融合的RBP的N末端结构域和RBP的C末端结构域，所述位点与选自氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)、GAGENS(SEQ ID NO:194)、ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203)的位点，优选与选自氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)和GAGENS(SEQ ID NO:194)的位点具有至少80%，优选至少85%、至少90%、至少95%、至少98%或至少99%的同一性。

[0021] 在具体实施方案中，本公开内容提供了包含嵌合RBP的细菌递送媒介物。SEQ ID NO 2-61、135-165、215-242、271、273、282和283公开了此类嵌合RBP的氨基酸序列，以及另外在一些情况下，其相应的天然伴侣蛋白质(命名为“AP”)。此类AP蛋白有助于嵌合PBP的折叠。在一个具体实施方案中，RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56、59、135至144、147、150、151、154、157、160、163、215、216、219、221、223、225、227、229、232、325、237、239、241、282或283的氨基酸序列。在一个更具体的实施方案中，RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56或59的氨基酸

序列。

[0022] 在一个方面，本公开内容还提供了编码本文公开的嵌合RBP的核苷酸序列。在一个具体实施方案中，编码此类嵌合RBP的核酸以及相应的AP蛋白在SEQ ID NO 62-120、166-189、206-212、243-270、272、274和284中进行描绘。在一个具体实施方案中，编码此类嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116、119、166、167、168、171、174、175、178、181、184、187、206、207、208、209、210、211、212、243、244、247、249、251、253、255、257、260、263、265、267、269或284的核苷酸序列。在一个更具体的实施方案中，编码此类嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116或119的核苷酸序列。

[0023] 在其它具体实施方案中，并且为了增加本文公开的细菌递送媒介物的递送效率，嵌合RBP的不同RBP结构域包含具有针对带荚膜细菌菌株的解聚酶活性的结构域。在一个具体实施方案中，解聚酶是内切唾液酸酶，例如K1F或K5内切唾液酸酶。

[0024] 在本发明的另一个方面，提供了细菌递送媒介物，其允许将编码目的蛋白质或核酸的核酸有效载荷转移到所需的靶细菌宿主细胞内，其中所述细菌递送媒介物的特征在于具有如本文公开的分支RBP。

[0025] 本文提供的细菌递送媒介物允许将编码目的蛋白质或核酸的核酸有效载荷转移到所需的靶细菌宿主细胞内。在本发明的某些实施方案中，目的核酸选自Cas核酸酶基因、Cas9核酸酶基因、引导RNA、CRISPR基因座、毒素基因、表达酶例如核酸酶或激酶的基因、TALEN、ZFN、大范围核酸酶、重组酶、细菌受体、膜蛋白、结构蛋白、分泌蛋白、表达对一般而言的抗生素或药物的抗性的基因、表达毒性蛋白或毒性因子的基因、以及表达毒力蛋白或毒力因子的基因、或其任何组合。在本发明的一个实施方案中，核酸有效载荷编码治疗性蛋白质。在另一个实施方案中，核酸有效载荷编码反义核酸分子。

[0026] 在一个方面，细菌递送媒介物允许转移编码核酸酶的核酸有效载荷，所述核酸酶靶向宿主细菌细胞基因组或宿主细菌细胞质粒的切割。在一些方面，切割在抗生素抗性基因中发生。在本发明的另一个实施方案中，核酸酶介导的宿主细菌细胞基因组的切割被设计为刺激同源重组事件，用于将目的核酸插入细菌细胞的基因组内。

[0027] 本发明还提供了药物组合物或兽医组合物，其包含本文公开的一种或多种细菌递送媒介物和药学上可接受的载体。还提供的是用于治疗由细菌引起的疾病或病症，优选细菌感染的方法，其包括将所提供的药物组合物或兽医组合物施用于需要治疗的受试者，所述受试者患有由细菌引起的疾病或病症，优选细菌感染。本发明还涉及如本文公开的药物组合物或兽医组合物，其用于治疗由细菌引起的疾病或病症，优选细菌感染。它进一步涉及如本文公开的药物组合物或兽医组合物用于制造药物的用途，所述药物用于治疗由细菌引起的疾病或病症，优选细菌感染。提供了用于降低细菌群体中的毒性细菌和/或抗生素抗性细菌的量的方法，其包括使细菌群体与本文公开的细菌递送媒介物接触。该方法可以是体内或体外方法。本发明还涉及如本文公开的药物组合物或兽医组合物，其用于降低特别是患有细菌感染的受试者的细菌群体中的毒性细菌和/或抗生素抗性细菌的量。它进一步涉及如本文公开的药物组合物或兽医组合物用于制造药物的用途，所述药物用于降低特别是患有细菌感染的受试者的细菌群体中的毒性细菌和/或抗生素抗性细菌的量。

附图说明

[0028] 为了更好地理解本文公开的主题并例证它可以如何在实践中执行,现在将参考附图通过非限制性示例的方式描述实施方案。具体参考附图,应强调的是所显示的细节作为示例的方式,并且用于本发明的实施方案的说明性讨论的目的。

[0029] 图1证实了用λ和OMPF-λ包装噬菌粒在野生型大肠杆菌菌株中的递送。λ包装噬菌粒在LB + 5mM $CaCl_2$中进行1:5稀释,并且在每孔中加入10 μL。然后将90 μL生长至OD_{600}约0.5的细胞加入每个含有噬菌粒的孔中,在37°C下温育30分钟,并且将10 μL点样在补充有氯霉素的LB琼脂上。左图,野生型λ包装噬菌粒;右图,OMPF-λ变体。圆圈显示了与λ野生型相比具有修饰递送的菌株。

[0030] 图2描绘了在K1+菌株上的野生型λ和λ-stf-K1F嵌合递送媒介物。λ包装噬菌粒在LB+5mM $CaCl_2$中进行10X系列稀释,并且在每孔中加入10 μL。然后将生长至OD_{600}约0.5的细胞加入每种噬菌粒稀释物中,在37°C下温育30分钟,并且将10 μL在补充有氯霉素的LB上铺平板。上图,菌株UTI89;下图,菌株S88。左图,野生型λ包装噬菌粒;右图,stf-K1F λ包装噬菌粒。

[0031] 图3描绘了在K5+菌株上的野生型λ和λ-stf-K5嵌合递送媒介物。λ包装噬菌粒在LB+5mM $CaCl_2$中进行10X系列稀释,并且在每孔中加入10 μL。然后将生长至OD_{600}约0.5的ECOR55加入每种噬菌粒稀释物中,在37°C下温育30分钟,并且将10 μL在补充有氯霉素的LB上铺平板。左图,野生型λ包装噬菌粒;右图,stf-K15 λ包装噬菌粒。

[0032] 图4描绘了在各种带荚膜菌株(O和K荚膜)上的野生型λ、λ-stf-AG22和λ-stf-SIEA11嵌合递送媒介物。λ噬菌粒在LB+5mM $CaCl_2$中进行1:5稀释,并且在每孔中加入10 μL。然后将90 μL生长至OD_{600}约0.5的细胞加入每个含有噬菌粒的孔中,在37°C下温育30分钟,并且将10 μL点样在补充有氯霉素的LB琼脂上。左图,野生型λ噬菌粒;中图,λ stf-SIEA11变体;右图,λ-stf-AG22变体。圆圈显示了与λ野生型相比具有修饰递送的菌株。

[0033] 图5A-C证实了对于各种带荚膜菌株(O和K荚膜),具有不同插入位点的野生型λ和stf嵌合体的递送。λ包装噬菌粒在LB+5mM $CaCl_2$中进行1:5稀释,并且在每孔中加入10 μL。然后将90 μL生长至OD_{600}约0.5的细胞加入每个含有噬菌粒的孔中,在37°C下温育30分钟,并且将10 μL点样在补充有氯霉素的LB琼脂上。图5A. 左图,野生型λ包装噬菌粒;剩余小图,三种不同的ADAKKS(SEQ ID NO:191)-stf变体。图5B左图,野生型λ包装噬菌粒;剩余小图,三种不同的SASAAA(SEQ ID NO: 193)-stf变体。图5C左图,野生型λ包装噬菌粒;剩余小图,三种不同的MDETNR(SEQ ID NO:192)-stf变体。对于所有小图,红色圆圈显示了与λ野生型相比具有改善递送效率的菌株。

[0034] 图6描绘了在代表性蛋白质组数据库(rp75)上,用50aa滑动窗口(步骤10)执行的phmmer搜索。报告了显著命中数(E值< 0.01)。

[0035] 图7A-B描绘了具有2个亚基的分支stf体系结构。图7A是具有2个亚基的分支stf体系结构的递送媒介物的示意图。ID:“相互作用结构域”。图7B是改造的λ stf构建体的遗传体系结构的示意图。

[0036] 图8证实了分支λ stf包装噬菌粒的递送。产生了λ包装的λ-stf-WW11.1 stf、λ-stf-K1F或图7中所示的分支构建体(WW11.1-K1F),并且针对O57和K1菌株进行滴定。

[0037] 图9A-B描绘了具有4个亚基的分支stf体系结构。图9A是具有4个亚基的分支stf体

系结构的递送媒介物的示意图。不同ID中的实际相互作用在生物组装中可能与此处描绘的图不同。图9B描绘了在诱导型启动子的控制下，编码4个亚基的分支stf的基因线路。

[0038] 图10．描绘了改造的λ stf-T4样DTF嵌合体的体系结构。半圆表示RBS位点；T符号，转录终止子；箭头，启动子。

[0039] 图11．显示了用嵌合λ stf-T4-样DTF的噬菌粒颗粒筛选。包括不同血清型的96种不同的野生型大肠杆菌菌株的集合，用基于λ的噬菌粒进行转导，并且在Cm LB琼脂上铺平板。左图，野生型λ stf；中图，嵌合λ-stf-WW13；右图，嵌合λ-stf-PP-1。

[0040] 图12证实了用嵌合λ stf-T4-样DTF的噬菌粒颗粒筛选。包括不同血清型的96种不同的野生型大肠杆菌菌株的集合，用基于λ的噬菌粒进行转导，并且在Cm LB琼脂上铺平板。左图，野生型λ stf；中图，嵌合λ-stf-WW55；右图，嵌合λ-stf-WW34。

[0041] 图13．描绘了用嵌合λ stf-T4-样DTF的噬菌粒颗粒筛选。显示的所有点指DTF的通用插入位点，其位于参考WW13氨基酸序列的位置1到90的氨基酸范围内。包括不同血清型的96种不同的野生型大肠杆菌菌株的集合，用基于λ的噬菌粒进行转导，并且在Cm LB琼脂上铺平板(名称在上面)。

[0042] 图14．描绘了定量递送效率的点评分系统。密度0，5个或更少的菌落；密度1，多于5个菌落但不足以限定清晰的圆形液滴；密度2，几个菌落，但背景清晰可见，并且一些菌落仍是分开的；密度3，许多菌落，背景仍可见，但菌落很难分辨为分开的；密度4，斑点几乎完全密集，背景仅在液滴的一些部分中隐约可见；密度5，斑点看起来完全密集，看不到背景。

[0043] 图15描绘了ECOR集合的40种人菌株中具有嵌合stf的递送颗粒的原始点滴定。在每个小图下方，嵌合stf的名称。在每个点上方，用于鉴定菌株的1-2字母代码。

[0044] 图16代表了图15的条形化递送数据。从0(无进入，灰色背景)到5(最大递送)。条长度与从1(最小条)到5(最长条)的进入评分成比例。

具体实施方式

[0045] 本文公开的是改造具有所需靶宿主范围的合成细菌递送媒介物的新方法。合成细菌递送媒介物的特征在于嵌合受体结合蛋白(RBP)，其中所述嵌合RBP包含来自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物。本文已证实了λ样RBP的显著部分，例如stf蛋白，可以与不同RBP的一部分交换。此外，已鉴定了受体结合蛋白的特异性融合位置，其允许获得功能性嵌合RBP。

[0046] 另外，本文公开的是合成细菌递送媒介物，其特征在于改造的分支受体结合多亚基蛋白复合物(“分支RBP”)的存在。改造的分支RBP包含衍生自细菌噬菌体的两种或更多种缔合的受体结合蛋白，其基于相互作用结构域(ID)的存在而彼此结合。每个多肽亚基都被改造为含有ID，所述ID充当一个亚基RBP与另一个亚基RBP缔合的“锚”。一个亚基与另一个亚基的缔合可以是非共价的或共价的。在具体实施方案中，分支RBP可以包含多个RBP亚基，包括例如两个、三个、四个等亚基。

[0047] 如本文使用的，受体结合蛋白或RBP是识别且任选地结合和/或修饰或降解位于细菌外包膜上的底物的多肽，所述底物例如但不限于细菌外膜、LPS、荚膜、蛋白质受体、通道、结构例如鞭毛、菌毛、分泌系统。底物可以是但不限于任何碳水化合物或修饰的碳水化合物、任何脂质或修饰的脂质、任何蛋白质或修饰的蛋白质、任何氨基酸序列及其任何组合。

如本文使用的，λ样细菌噬菌体指编码RBP的任何细菌噬菌体，在范围为参考SEQ ID NO: 1的λ细菌噬菌体stf序列的位置1-150、320-460和495-560的三个氨基酸区域中的一个或多个中，所述RBP具有的氨基酸序列同源性对于45个或更多个氨基酸为约35%的同一性，对于30个或更多个氨基酸为约50%的同一性，并且对于18个或更多个氨基酸为约90%的同一性，而不依赖于由所述细菌噬菌体编码的其它氨基酸序列。

[0048] 本公开内容提供了嵌合受体结合蛋白(RBP)，其中所述嵌合RBP包含来自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同细菌噬菌体RBP的C末端结构域之间的融合物。嵌合RBP衍生来源的此类细菌噬菌体RBP包括例如“L形丝”、“侧尾丝(stf)”、“长尾丝”或“尾刺”。如本文公开的，已证实了λ样细菌噬菌体受体结合蛋白(RBP)的显著部分，例如stf蛋白，可以与不同RBP的一部分交换。此外，已鉴定了RBP中的特异性融合位置，其允许获得功能性嵌合RBP。此类嵌合RBP包括具有改变的宿主范围和/或生物活性例如解聚酶活性的那些嵌合RBP。

[0049] 嵌合受体结合蛋白(RBP)是其中嵌合RBP包含衍生自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物的嵌合受体结合蛋白，其中RBP的所述N末端结构域在氨基酸区域之一内与不同RBP的所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO: 1)的N末端RBP的位置1-150、320-460或495-560，或者与范围为参考λ stf序列(SEQ ID NO: 1)的RBP的位置1-150、320-460和495-560的三个氨基酸区域中的一个或多个具有同源性的RBP的类似区域。在本发明的一个具体方面，嵌合受体结合蛋白(RBP)的不同RBP衍生自任何细菌噬菌体或任何细菌素。

[0050] 在一个具体方面，来自λ样细菌噬菌体、λ细菌噬菌体的RBP、或者不同RBP与三个氨基酸区域中的一个或多个含有同源性，所述氨基酸区域范围为参考λ细菌噬菌体stf序列(SEQ ID NO:1)的RBP的位置1-150、320-460和495-560。在某些方面，λ样细菌噬菌体、λ细菌噬菌体或不同RBP与一个或多个氨基酸区域之间的同源性，对于45个或更多个氨基酸为约35%的同一性，对于30个或更多个氨基酸为约50%的同一性，并且对于18个或更多个氨基酸为约90%的同一性。同源性的确定可以使用比对工具来执行，所述比对工具例如Smith-Waterman算法(Smith等人，1981，J. Mol. Biol 147:195-197)或EMBOSS Matcher(Rice，Longden，Bleasby 2000 EMBOSS Trends in Genetics 16: 276-277)。在本发明的一个方面，嵌合RBP包含在氨基酸区域之一内与嵌合RBP的C末端结构域融合的嵌合RBP的N末端结构域，所述氨基酸区域选自参考λ细菌噬菌体stf序列(SEQ ID NO:1)的位置80-150、320-460或495-560。在本发明的另一个实施方案中，嵌合RBP包含在插入位点处在三个氨基酸区域之一内融合的N末端结构域和C末端结构域，所述插入位点与选自以下的插入位点具有至少80%，优选至少85%、至少90%、至少95%、至少98%或至少99%的同一性：氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)、GAGENS(SEQ ID NO:194)、ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203)，优选氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)和GAGENS(SEQ ID NO:194)。在其中分支RBP包含此类嵌合RBP的一个具体实施方案中，ID可以在此类插入位点处插入，从而作用于将N末端结构域与C末端结构域融合。

[0051] 在一些情况下,ID结构域可以与细菌噬菌体RBP的N末端结构域或C末端结构域融合,以提供改造的分支RBP的非嵌合蛋白质亚基。N末端结构域或C末端结构域可以根据结构域的所需功能,例如宿主范围或生物学功能加以选择。当此类非嵌合蛋白质亚基用于产生改造的分支RBP时,ID结构域可以在本文公开的优选插入位点处融合,或可替代地,在允许维持所选结构域功能的插入位点处融合。

[0052] 在具体实施方案中,本公开内容提供了嵌合RBP。此类嵌合RBP可以充当改造的分支RBP蛋白质复合物的蛋白质亚基。SEQ ID NO 2-61、135-165、215-242、271、273、282和283公开了此类嵌合RBP的氨基酸序列,以及另外在一些情况下,其相应的天然伴侣蛋白质(命名为"AP")。此类AP蛋白有助于嵌合RBP的折叠。在一个具体实施方案中,RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56、59、135至144、147、150、151、154、157、160、163、215、216、219、221、223、225、227、229、232、325、237、239、241、282或283的氨基酸序列。在一个更具体的实施方案中,RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56或59的氨基酸序列。

[0053] 在一个方面,本公开内容还提供了编码本文公开的嵌合RBP的核苷酸序列。在一个具体实施方案中,编码此类嵌合RBP的核酸以及相应的AP蛋白在SEQ ID NO 62-120、166-189、206-212、243-270、272、274和284中进行描绘。在一个具体实施方案中,编码嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116、119、166、167、168、171、174、175、178、181、184、187、206、207、208、209、210、211、212、243、244、247、249、251、253、255、257、260、263、265、267、269或284的核苷酸序列。在一个更具体的实施方案中,编码此类嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116或119的核苷酸序列。

[0054] 在其中上述嵌合RBP用作产生分支RBP蛋白复合物的亚基的方面,所述嵌合RBP可以进一步被改造为含有ID结构域,其作用于介导各种改造的分支RBP蛋白质亚基与彼此的缔合。

[0055] 在本公开内容的一个具体的非限制性方面,已证实了将嵌合RBP改造为编码解聚酶活性,可以显著地增加所提供的包含本文公开的嵌合RBP的细菌递送媒介物的递送效率。在本公开内容的一个实施方案中,嵌合RBP的不同RBP结构域包含针对带荚膜细菌菌株的解聚酶活性。在一个具体实施方案中,解聚酶是内切唾液酸酶,例如K1F或K5内切唾液酸酶。

[0056] 关于本文公开的改造的分支RBP,本文公开的任何嵌合RBP都可以用作RBP亚基,其中所述RBP可以进一步被改造为含有ID。如实施例部分中公开的,已证实了改造分支RBP可以改变所得到的递送颗粒的宿主范围。

[0057] 提供了编码本文公开的嵌合RBP和分支RBP的核酸分子。此类核酸可以包括在载体中,所述载体例如细菌噬菌体、质粒、噬菌粒、病毒以及允许嵌合RBP编码核酸的转移和表达的其它媒介物。

[0058] 提供了细菌递送媒介物,其允许将编码目的蛋白质或核酸的核酸有效载荷转移到所需的靶细菌宿主细胞内。此类细菌递送媒介物的特征在于具有嵌合RBP,其包含来自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合

物。在本发明的一个实施方案中，细菌递送媒介物含有嵌合RBP，其包含衍生自λ样细菌噬菌体或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，其中嵌合RBP的所述N末端结构域在氨基酸区域之一内与不同RBP的所述C末端结构域融合，所述氨基酸区域选自参考λ stf序列(SEQ ID NO: 1)，N末端结构域RBP的位置1-150、320-460或495-560。在一个方面，来自λ样细菌噬菌体、λ细菌噬菌体的RBP、以及不同RBP含有在三个氨基酸区域中的一个或多个中的同源性，所述氨基酸区域范围为参考λ细菌噬菌体stf序列的N末端RBP的位置1-150、320-460和495-560。在某些方面，同源性对于三个氨基酸区域中的一个或多个内的45个或更多个氨基酸为约35%的同一性，对于30个或更多个氨基酸为约50%的同一性，或者对于18个或更多个氨基酸为约90%的同一性，所述氨基酸区域范围为参考λ细菌噬菌体stf序列(SEQ ID NO:1)的N末端RBP的位置1-150、320-460和495-560。在本发明的一个具体方面，嵌合受体结合蛋白(RBP)的不同RBP结构域衍生自细菌噬菌体或细菌素。在本发明的一个方面，嵌合RBP包含在氨基酸区域之一内与RBP的C末端结构域融合的RBP的N末端结构域，所述氨基酸区域选自参考λ stf序列(SEQ ID NO:1)的RBP的80-150、320-460或495-560。在本发明的另一个实施方案中，嵌合RBP包含在N末端RBP的位点内融合的RBP的N末端结构域和RBP的C末端结构域，所述位点与选自以下的位点具有至少80%，优选至少85%、至少90%、至少95%、至少98%或至少99%的同一性：氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)、GAGENS(SEQ ID NO:194)、ATLKQI(SEQ ID NO:195)、IIQLED(SEQ ID NO:196)、GNIIDL(SEQ ID NO:197)、IATRV(SEQ ID NO:198)、TPGEL(SEQ ID NO:199)、GAIIN(SEQ ID NO:200)、NQIID(SEQ ID NO:201)、GQIVN(SEQ ID NO:202)和VDRAV(SEQ ID NO:203)，优选氨基酸SAGDAS(SEQ ID NO:190)、ADAKKS(SEQ ID NO:191)、MDETNR(SEQ ID NO:192)、SASAAA(SEQ ID NO:193)和GAGENS(SEQ ID NO:194)。

[0059] 在具体实施方案中，本公开内容提供了包含嵌合RBP的细菌递送媒介物。SEQ ID NO 2-61、135-165、215-242、271、273、282和283公开了此类嵌合RBP的氨基酸序列，以及另外在一些情况下，其相应的天然伴侣蛋白质(命名为“AP”)。此类AP蛋白有助于嵌合RBP的折叠。在一个具体实施方案中，RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56、59、135至144、147、150、151、154、157、160、163、215、216、219、221、223、225、227、229、232、325、237、239、241、282或283的氨基酸序列。在一个更具体的实施方案中，RBP包含SEQ ID NO: 2、4、7、9、12、15、17、20、23、24、25、27、29、31、33、35、37、39、41、42、44、46、47、48、49、50、51、52、53、56或59的氨基酸序列。

[0060] 在一个方面，本公开内容还提供了编码本文公开的嵌合RBP的核苷酸序列。在一个具体实施方案中，编码此类嵌合RBP的核酸以及相应的AP蛋白在SEQ ID NO 62-120、166-189、206-212、243-270、272、274和284中进行描绘。在一个具体实施方案中，编码嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、102、104、106、107、108、109、110、111、112、113、116、119、166、167、168、171、174、175、178、181、184、187、206、207、208、209、210、211、212、243、244、247、249、251、253、255、257、260、263、265、267、269或284的核苷酸序列。在一个更具体的实施方案中，编码此类嵌合RBP的核酸包含SEQ ID NO: 62、64、67、69、72、75、77、80、83、84、85、87、89、91、93、95、97、99、101、

102、104、106、107、108、109、110、111、112、113、116或119的核苷酸序列。

[0061] 在其它具体实施方案中，并且为了增加本文公开的细菌递送媒介物的递送效率，嵌合RBP的不同RBP结构域包含具有针对带荚膜细菌菌株的解聚酶活性的结构域。在一个具体实施方案中，解聚酶是内切唾液酸酶，例如K1F或K5内切唾液酸酶。

[0062] 本公开内容提供了合成细菌递送媒介物，其特征在于改造的分支受体结合多亚基蛋白复合物(“分支RBP”)的存在。改造的分支RBP包含衍生自细菌噬菌体的两种或更多种缔合的受体结合蛋白，其基于相互作用结构域(ID)的存在而彼此缔合。一个亚基与另一个亚基的缔合可以是非共价的或共价的。每个多肽亚基都含有ID，其充当一个亚基RBP与另一个亚基RBP缔合的“锚”。在具体实施方案中，分支RBP可以包含多个RBP亚基，包括例如两个、三个、四个等亚基。

[0063] 各个RBP亚基可能为总体改造的分支RBP带来不同的生物学功能。此类功能包括但不限于宿主识别和酶促活性。此类酶促活性包括解聚酶活性。

[0064] 本文公开的是能够充当ID多肽的氨基酸序列。出于本发明的目的，此类ID是提供一种受体结合蛋白与另一种受体结合蛋白的非共价缔合或共价缔合的那些氨基酸序列。相互作用结构域是这样的多肽，其功能介导一种生物分子例如蛋白质与另一种生物分子的缔合。作为非限制性实例，生物分子可以是蛋白质、蛋白质的部分、碳水化合物、脂质和核酸。

[0065] ID可以是天然存在的细菌噬菌体ID、衍生自彼此天然缔合的非细菌噬菌体多肽的ID、或作用于介导两个蛋白质或多肽结构域的非共价缔合或共价缔合的重组衍生的ID。

[0066] 分支RBP的两种或更多种缔合的受体结合蛋白包括但不限于本文所述的嵌合受体结合蛋白(RBP)，其包含衍生自λ样或λ细菌噬菌体的RBP的N末端结构域以及不同RBP的C末端结构域之间的融合物，其中所述嵌合RBP进一步包含ID结构域。

[0067] 关于ID，此类序列与受体结合蛋白(RBP)相连，例如可以是融合物，可以是卷曲螺旋，可以是非共价相互作用或可以是RBP的天然序列。分支RBP的RBP亚基可以是识别且任选地结合和/或修饰或降解位于细菌外包膜上的底物的多肽，所述底物例如但不限于细菌外膜、LPS、荚膜、蛋白质受体、通道、结构例如鞭毛、菌毛、分泌系统。底物可以是但不限于任何碳水化合物或修饰的碳水化合物、任何脂质或修饰的脂质。

[0068] 本文提供的细菌递送媒介物允许将编码目的蛋白质或核酸的核酸有效载荷转移到所需的靶细菌宿主细胞内。如本文使用的，术语“递送媒介物”指允许将有效载荷转移到细菌内的任何手段。存在由本发明包括的几种类型的递送媒介物，包括但不限于细菌噬菌体支架、病毒支架、基于化学的递送媒介物(例如，环糊精、磷酸钙、阳离子聚合物、阳离子脂质体)、基于蛋白质或基于肽的递送媒介物、基于脂质的递送媒介物、基于纳米颗粒的递送媒介物、基于非化学的递送媒介物(例如，转化、电穿孔、声致穿孔、光学转染)、基于颗粒的递送媒介物(例如，基因枪、磁转染、刺穿感染(impalefection)、粒子轰击、细胞穿透肽)或供体细菌(缀合)。递送媒介物的任何组合也由本发明包括。递送媒介物可以指细菌噬菌体衍生的支架，并且可以得自天然、进化或改造的衣壳。在一些实施方案中，递送媒介物是有效载荷，因为细菌天然地有能力自行从环境中吸收有效载荷。

[0069] 如本文公开的递送媒介物包括包含本文公开的嵌合和/或分支RBP的包装噬菌粒以及细菌噬菌体。此类递送媒介物的改造是本领域技术人员众所周知的。此类改造技术可以采用被改造为表达本文公开的嵌合RBP或分支RBP的生产细胞系。包装噬菌粒和细菌噬菌

体颗粒的生成是本领域技术人员众所周知的常规技术。卫星噬菌体和/或辅助噬菌体可以用于促进有效载荷在本发明的递送媒介物中的包装。辅助噬菌体提供反式功能并且是本领域技术人员众所周知的。根据本发明，辅助噬菌体包含编码对于待包装的有效载荷必不可少的结构和功能蛋白的所有基因(即辅助噬菌体提供关于递送媒介物组装所有必要的基因产物)。辅助噬菌体可能含有缺陷型复制起点或包装信号，或完全缺乏后者，并且因此它无法自包装，因此仅产生携带有效载荷或质粒的细菌递送颗粒。可以这样选择辅助噬菌体，使得它们不能诱导用于递送颗粒生产的宿主的裂解。本领域技术人员应理解，一些细菌噬菌体是缺陷型的，并且需要辅助噬菌体用于有效载荷包装。因此，取决于与本发明结合选择的用于制备细菌递送颗粒的细菌噬菌体，本领域技术人员将知道是否需要辅助噬菌体。可以反式供应编码对于包装的有效载荷组装或生产必要的一种或多种蛋白质或调节过程的序列。例如，本公开内容的RBP可以在处于诱导型启动子的控制下的质粒中提供或组成型表达。在这种情况下，噬菌体野生型序列可能含有或不含反式供应的基因或序列的缺失。另外，编码新功能的嵌合或修饰的噬菌体序列，如RBP，可以直接插入辅助噬菌体的基因组中的所需位置内，从而绕过反式提供修饰序列的必要性。用于以质粒的形式反式供应序列或蛋白质的方法，以及生成直接基因组插入、修饰和突变的方法是本领域技术人员众所周知的。

[0070] 如本文使用的，术语“有效载荷”指用递送媒介物转移到细菌内的任何核酸序列或氨基酸序列、或两者的组合(例如但不限于肽核酸或肽-寡核苷酸缀合物)。术语“有效载荷”也可以指质粒、载体或货物。有效载荷可以是从天然、进化或改造的细菌噬菌体基因组获得的噬菌粒或噬粒。有效载荷也可以仅由从天然、进化或改造的细菌噬菌体基因组获得的噬菌粒或噬粒的部分组成。

[0071] 如本文使用的，术语“核酸”指共价连接在一起的至少两个核苷酸的序列，其可以是单链或双链的或者含有单链序列和双链序列两者的部分。本发明的核酸可以是天然存在的、重组的或合成的。核酸可以是环状序列或线性序列的形式或两种形式的组合。核酸可以是DNA(基因组或cDNA两者)、或RNA或两者的组合。核酸可以含有脱氧核糖核苷酸和核糖核苷酸的任何组合，以及碱基的任何组合，所述碱基包括尿嘧啶、腺嘌呤、胸腺嘧啶、胞嘧啶、鸟嘌呤、肌苷、黄嘌呤、次黄嘌呤、异胞嘧啶、5-羟甲基胞嘧啶和异鸟嘌呤。可以用于本发明中的修饰碱基的其它实例在Chemical Reviews 2016,116(20)12655-12687中详述。术语“核酸”还包括任何核酸类似物，其可以含有其它主链，包括但不限于磷酰胺、硫代磷酸酯、二硫代磷酸酯、O-甲基亚磷酰胺键和/或脱氧核糖核苷酸和核糖核苷酸核酸。核酸的上述特征的任何组合也由本发明包括。

[0072] 本领域已知的复制起点已从以下中进行鉴定：物种特异性质粒DNA(例如CoIE1、R1、pT181、pSC101、pMB1、R6K、RK2、p15a等等)、细菌病毒(例如φX174、M13、F1和P4)和细菌染色体复制起点(例如oriC)。在一个实施方案中，根据本公开内容的噬菌粒包含在靶向的细菌中有功能的细菌复制起点。

[0073] 可替代地，根据本公开内容的质粒不包含任何功能性细菌复制起点、或含有在靶向细菌中无活性的复制起点。因此，本公开内容的质粒已通过细菌病毒颗粒引入细菌内之后，它无法单独复制。

[0074] 在一个实施方案中，待包装的质粒上的复制起点在靶向的细菌中是无活性的，这

意味着该复制起点在通过细菌病毒颗粒靶向的细菌中无功能,因此阻止不需要的质粒复制。

[0075] 在一个实施方案中,质粒包含在用于生产细菌病毒颗粒的细菌中有功能的细菌复制起点。

[0076] 质粒复制取决于宿主酶和质粒控制的顺式和反式决定簇。例如,一些质粒具有的决定簇在几乎所有革兰氏阴性菌中都被识别,并且在复制启动和调控过程中在每种宿主中正确地起作用。其它质粒仅在一些细菌中拥有这种能力(Kues,U和Stahl,U 1989 Microbiol Rev 53:491-516)。

[0077] 质粒通过从复制起点处起始的三种一般机制进行复制,即θ型、链置换和滚环(通过Del Solar等人1998 Microhio and Molec Biol. Rev 62:434-464综述)。这些复制起点含有对于质粒和/或宿主编码蛋白质的相互作用所需的位点。

[0078] 在本公开内容的质粒上使用的复制起点可以具有中等拷贝数,例如来自pBR322的colEl ori(每个细胞15-20个拷贝)或R6K质粒(每个细胞15-20个拷贝),或可以是高拷贝数,例如pUC oris(每个细胞500-700个拷贝)、pGEM oris(每个细胞300-400个拷贝)、pTZ oris(每个细胞>1000个拷贝)或pBluescript oris(每个细胞300-500个拷贝)。

[0079] 在一个实施方案中,细菌复制起点选自ColE1、pMB1和变体(pBR322、pET、pUC等)、p15a、ColA、ColE2、pOSAK、pSC101、R6K、IncW(pSa etc)、IncFII、pT181、P1、F IncP、IncC、IncJ、IncN、IncP1、IncP4、IncQ、IncH11、RSF1010、CloDF13、NTP16、R1、f5、pPS10、pC194、pE194、BBR1、pBC1、pEP2、pWV01、pLF1311、pAP1、pWKS1、pLS1、pLS11、pUB6060、pJD4、pIJ101、pSN22、pAMbeta1、pIP501、pIP407、ZM6100(Sa)、pCU1、RA3、pMOL98、RK2/RP4/RP1/R68、pB10、R300B、pRO1614、pRO1600、pECB2、pCM1、pFA3、RepFIA、RepFIB、RepFIC、pYVE439-80、R387、phasyl、RA1、TF-FC2、pMV158和pUB113。

[0080] 更优选地,细菌复制起点是选自以下的大肠杆菌复制起点:ColE1、pMB1和变体(pBR322、pET、pUC等)、p15a、ColA、ColE2、pOSAK、pSC101、R6K、IncW(pSa etc)、IncFII、pT181、P1、F IncP、IncC、IncJ、IncN、IncP1、IncP4、IncQ、IncH11、RSF1010、CloDF13、NTP16、R1、f5和pPS10。

[0081] 更优选地,细菌复制起点选自pC194、pE194、BBR1、pBC1、pEP2、pWV01、pLF1311、pAP1、pWKS1、pLS1、pLS11、pUB6060、pJD4、pIJ101、pSN22、pAMbeta1、pIP501、pIP407、ZM6100(Sa)、pCU1、RA3、pMOL98、RK2/RP4/RP1/R68、pB10、R300B、pRO1614、pRO1600、pECB2、pCM1、pFA3、RepFIA、RepFIB、RepFIC、pYVE439-80、R387、phasyl、RA1、TF-FC2、pMV158和pUB113。

[0082] 甚至更优选地,细菌复制起点是ColE1。

[0083] 根据本公开内容的所递送的核酸序列可以包含噬菌体复制起点,伴随完整噬菌体基因组的互补,其可以启动所递送的核酸序列的复制,用于随后包封到不同衣壳内。

[0084] 包含在本公开内容的所递送的核酸序列中的噬菌体复制起点可以是在噬菌体中发现的任何复制起点。

[0085] 优选地,噬菌体复制起点可以是以下的野生型或非野生型序列:M13、f1、φX174、P4、λ、P2、λ样、HK022、mEP237、HK97、HK629、HK630、mEP043、mEP213、mEP234、mEP390、mEP460、mEPx1、mEPx2、phi80、mEP234、T2、T4、T5、T7、RB49、phiX174、R17、PRD1 P1样、P2样、P22、P22样、N15和N15样细菌噬菌体。

[0086] 更优选地，噬菌体复制起点选自M13、f1、φX174、P4和λ的噬菌体复制起点。

[0087] 在一个特定实施方案中，噬菌体复制起点是λ或P4复制起点。

[0088] 所递送的目的核酸包含在启动子的控制下的核酸序列。在本发明的某些实施方案中，目的核酸选自Cas核酸酶基因、Cas9核酸酶基因、引导RNA、CRISPR基因座、毒素基因、表达酶例如核酸酶或激酶的基因、TALEN、ZFN、大范围核酸酶、重组酶、细菌受体、膜蛋白、结构蛋白、分泌蛋白、表达对一般而言的抗生素或药物的抗性的基因、表达毒性蛋白或毒性因子的基因、以及表达毒力蛋白或毒力因子的基因、或其任何组合。在本发明的一个实施方案中，核酸有效载荷编码治疗性蛋白质。在另一个实施方案中，核酸有效载荷编码反义核酸分子。

[0089] 在一个实施方案中，目的序列是待递送至靶向的细菌的可编程核酸酶线路(programmable nuclease circuit)。这种可编程核酸酶线路能够介导体内序列特异性的细菌消除，所述细菌含有目的靶基因(例如对人有害的基因)。本公开内容的一些实施方案涉及化脓性链球菌(*Streptococcus pyogenes*)的II型CRISPR-Cas(成簇规律间隔短回文重复-CRISPR相关)系统的改造变体。可以使用的其它可编程核酸酶包括其它CRISPR-Cas系统，改造的TALEN(转录激活因子样效应物核酸酶)变体，改造的锌指核酸酶(ZFN)变体，天然、进化或改造的大范围核酸酶或重组酶变体，以及可编程核酸酶的任何组合或杂交体。因此，本文提供的改造的自主分布的核酸酶线路可以用于选择性地切割编码目的基因的DNA，所述目的基因例如毒素基因、毒力因子基因、抗生素抗性基因、重塑基因或调节基因(参考WO2014124226)。

[0090] 优选可编程的其它目的序列可以加入所递送的核酸序列中，以便递送至靶向的细菌。优选地，加入所递送的核酸序列中的目的序列导致靶向的细菌的细胞死亡。例如，加入质粒中的目的核酸序列可以编码穿孔素(holin)或毒素。

[0091] 可替代地，加入所递送的核酸序列中的目的序列线路并不导致细菌死亡。例如，目的序列可以编码导致发光信号或荧光信号的报告基因。可替代地，目的序列可以包含实现有用功能的蛋白质和酶，所述有用功能例如改变细菌的代谢或其环境的组成。

[0092] 在一个特定实施方案中，目的核酸序列选自Cas9、单引导RNA(sgRNA)、CRISPR基因座、表达酶例如核酸酶或激酶的基因、TALEN、ZFN、大范围核酸酶、重组酶、细菌受体、膜蛋白、结构蛋白、分泌蛋白、对一般而言的抗生素或药物的抗性、表达毒性蛋白或毒性因子的基因、以及表达毒力蛋白或毒力因子的基因。

[0093] 在一个特定实施方案中，根据本公开内容的所递送的核酸序列包含编码细菌素的目的核酸序列，所述细菌素可以是由细菌产生以杀死或抑制其它细菌生长的蛋白质毒素。细菌素按几种方式进行分类，包括生产菌株、常见抗性机制和杀死机制。来自革兰氏阴性菌(例如小菌素、大肠杆菌素样细菌素和尾链素(tailocin))、以及革兰氏阳性菌(例如I类、II类、III类或IV类细菌素)的此类细菌素已得到描述。

[0094] 在一个实施方案中，根据本公开内容的所递送的核酸序列进一步包含编码毒素的目的序列，所述毒素选自小菌素、大肠杆菌素样细菌素、尾链素、I类、II类、III类和IV类细菌素。

[0095] 在一个特定实施方案中，相应的免疫多肽(即抗毒素)可以用于保护用于所递送的核酸序列生产和衣壳化目的的细菌细胞(Cotter等人，Nature Reviews Microbiology 11:

95,2013),但在药物组合物以及被递送本公开内容的递送核酸序列的靶向的细菌中不存在。

[0096] 在本公开内容的一个方面,CRISPR系统包括在所递送的核酸序列中。CRISPR系统含有两种不同的元件,即i)内切核酸酶,在这种情况下,CRISPR相关核酸酶(Cas或"CRISPR相关蛋白"),以及ii)引导RNA。引导RNA是嵌合RNA的形式,其由CRISPR(RNAcr)细菌RNA和RNAtracr(反式激活RNA CRISPR)的组合组成(Jinek等人,2012,Science 337: 816-821)。引导RNA在单个转录物中组合了对应于"间隔序列"的RNAcr(其充当Cas蛋白的引导)的靶向特异性,以及RNAtracr的构象性质。当引导RNA和Cas蛋白在细胞中同时表达时,靶基因组序列可以被永久修饰或中断。修饰有利地由修复矩阵引导。一般而言,取决于核酸酶的作用机制,CRISPR系统包括两个主要类别。1类由多亚基效应物复合物构成,并且包括I、III和IV型。2类由单一单元效应物模块如Cas9核酸酶构成,并且包括II型(II-A、II-B、II-C、II-C变体)、V型(V-A、V-B、V-C、V-D、V-E、V-U1、V-U2、V-U3、V-U4、V-U5)和VI型(VI-A、VI-B1、VI-B2、VI-C、VI-D)。

[0097] 根据本公开内容的目的序列包含编码Cas蛋白的核酸序列。各种CRISPR酶可用作质粒上的目的序列。在一些实施方案中,CRISPR酶是II型CRISPR酶。在一些实施方案中,CRISPR酶催化DNA切割。在一些其它实施方案中,CRISPR酶催化RNA切割。在一个实施方案中,CRISPR酶可以与sgRNA偶联。在某些实施方案中,sgRNA靶向选自以下的基因:抗生素抗性基因、毒力蛋白或毒力因子基因、毒素蛋白或毒素因子基因、细菌受体基因、膜蛋白基因、结构蛋白基因、分泌蛋白基因和表达对一般而言的药物的抗性的基因。

[0098] 作为多亚基效应物的部分或作为单一单元效应物的Cas蛋白的非限制性实例包括Cas1、Cas1B、Cas2、Cas3、Cas4、Cas5、Cas6、Cas7、Cas8、Cas9(也称为Csn1和Csx12)、Cas10、Cas11(SS)、Cas12a(Cpf1)、Cas12b(C2c1)、Cas12c(C2c3)、Cas12d(CasY)、Cas12e(CasX)、C2c4、C2c8、C2c5、C2c10、C2c9、Cas13a(C2c2)、Cas13b(C2c6)、Cas13c(C2c7)、Cas13d、Csa5、Csc1、Csc2、Cse1、Cse2、Csy1、Csy2、Csy3、Csf1、Csf2、Csf3、Csf4、Csm2、Csm3、Csm4、Csm5、Csm6、Cmr1、Cmr3、Cmr4、Cmr5、Cmr6、Csn2、Csb1、Csb2、Csb3、Csx17、Csx14、Csx10、Csx16、CsaX、Csx13、Csx1、Csx15、SdCpf1、CmtCpf1、TsCpf1、CmaCpf1、PcCpf1、ErCpf1、FbCpf1、UbcCpf1、AsCpf1、LbCpf1、其同源物、其直向同源物、其变体或其修饰形式。在一些实施方案中,CRISPR酶在前间隔序列邻近基序(PAM)位点处切割靶核酸的两条链。

[0099] 在一个特定实施方案中,CRISPR酶是任何Cas9蛋白,例如任何天然存在的细菌Cas9,以及其任何变体、同源物或直向同源物。

[0100] "Cas9"意指蛋白质Cas9(也称为Csn1或Csx12)或其功能性蛋白质、肽或多肽片段,即能够与引导RNA相互作用并发挥酶促活性(核酸酶),这允许其执行靶基因组的DNA的双链切割。因此,"Cas9"可以表示修饰的蛋白质,例如截短以去除对于蛋白质的预定功能并非必需的蛋白质结构域,特别是对于与gRNA的相互作用并非必要的结构域。

[0101] 如本公开内容的上下文中使用的,编码Cas9(整个蛋白质或其片段)的序列可以从任何已知的Cas9蛋白获得(Fonfara等人,Nucleic Acids Res 42(4),2014;Koonin等人,Nat Rev Microbiol 15(3),2017)。可用于本公开内容中的Cas9蛋白的实例包括但不限于以下的Cas9蛋白:化脓性链球菌(SpCas9)、嗜热链球菌(*Streptococcus thermophilus*)(St1Cas9、St3Cas9)、变异链球菌(*Streptococcus mutans*)、金黄色葡萄球菌

(*Staphylococcus aureus*)(SaCas9)、空肠弯曲杆菌(*Campylobacter jejuni*)(CjCas9)、新泽西弗朗西斯菌(*Francisella novicida*)(FnCas9)和脑膜炎奈瑟球菌(*Neisseria meningitides*)(NmCas9)。

[0102] 如本公开内容的上下文中使用的,编码Cpf1(Cas12a)(整个蛋白质或其片段)的序列可以从任何已知的Cpf1(Cas12a)蛋白获得(Koonin等人,Nat Rev Microbiol 15(3),2017)。可用于本公开内容中的Cpf1(Cas12a)蛋白的实例包括但不限于氨基酸球菌属物种(*Acidaminococcus sp*)、毛螺菌科细菌(*Lachnospiraceae bacteriu*)和新泽西弗朗西斯菌的Cpf1(Cas12a)蛋白。

[0103] 编码Cas13a(整个蛋白质或其片段)的序列可以从任何已知的Cas13a(C2c2)蛋白获得(Abudayyeh等人,2017,Nature 550: 280-284)。可用于本公开内容中的Cas13a(C2c2)蛋白的实例包括但不限于瓦氏纤毛菌(*Leptotrichia wadei*)(LwaCas13a)的Cas13a(C2c2)蛋白。

[0104] 编码Cas13d(整个蛋白质或其片段)的序列可以从任何已知的Cas13d蛋白获得(Yan等人,2018,Mol Cell 70: 327-339)。可用于本公开内容中的Cas13d蛋白的实例包括但不限于惰性真杆菌(*Eubacterium siraeum*)和瘤胃球菌属物种(*Ruminococcus sp*)的Cas13d蛋白。

[0105] 在一个特定实施方案中,目的核酸序列是CRISPR/Cas9系统,用于选自以下的基因的基因表达降低或失活:抗生素抗性基因、毒力因子或毒力蛋白基因、毒素因子或毒素蛋白基因、表达细菌受体的基因、膜蛋白、结构蛋白、分泌蛋白和表达对一般而言的药物的抗性的基因。

[0106] 在一个实施方案中,CRISPR系统用于靶向毒力因子且使其失活。毒力因子可以是由病原体产生的任何物质,其通过增加对宿主造成的损害程度来改变宿主-病原体相互作用。毒力因子以多种方式由病原体使用,所述方式包括例如在宿主中的细胞粘附或小生境定殖,以逃避宿主的免疫应答,促进进入和离开宿主细胞,从宿主中获得营养,或抑制宿主中的其它生理过程。毒力因子可以包括酶、内毒素、粘附因子、运动因子、涉及补体逃避的因子和促进生物膜形成的因子。例如,此类靶向的毒力因子基因可以是大肠杆菌毒力因子基因,例如但不限于EHEC-HlyA、Stx1(VT1)、Stx2(VT2)、Stx2a(VT2a)、Stx2b(VT2b)、Stx2c(VT2c)、Stx2d(VT2d)、Stx2e(VT2e)和Stx2f(VT2f)、Stx2h(VT2h)、fimA、fimF、fimH、neuC、kpsE、sfa、foc、iroN、aer、iha、papC、papGI、papGII、papGIII、hlyC、cnf1、hra、sat、ireA、usp ompT、ibeA、malX、fyuA、irp2、traT、afaD、ipaH、eltB、estA、bfpA、eaeA、espA、aaiC、aatA、TEM、CTX、SHV、csgA、csgB、csgC、csgD、csgE、csgF、csgG、csgH、T1SS、T2SS、T3SS、T4SS、T5SS、T6SS(分泌系统)。例如,此类靶向的毒力因子基因可以是痢疾志贺氏菌(*Shigella dysenteriae*)毒力因子基因,例如但不限于stx1和stx2。例如,此类靶向的毒力因子基因可以是鼠疫耶尔森氏菌(*Yersinia pestis*)毒力因子基因,例如但不限于yscF(携带(pCD1)T3SS外针亚基的质粒)。例如,此类靶向的毒力因子基因可以是土拉弗朗西斯菌(*Francisella tularensis*)毒力因子基因,例如但不限于fslA。例如,此类靶向的毒力因子基因可以是炭疽杆菌(*Bacillus anthracis*)毒力因子基因,例如但不限于pag(炭疽毒素,细胞结合保护性抗原)。例如,此类靶向的毒力因子基因可以是霍乱弧菌(*Vibrio cholera*)毒力因子基因,例如但不限于ctxA和ctxB(霍乱毒素)、tcpA(毒素共调菌毛)和toxT(主毒力

调控因子)。例如,此类靶向的毒力因子基因可以是铜绿假单胞菌(*Pseudomonas aeruginosa*)毒力因子基因,例如但不限于绿脓菌素(pyoverdine)(例如σ因子pvdS、生物合成基因pvdL、pvdl、pvdJ、pvdH、pvdA、pvdF、pvdQ、pvdN、pvdM、pvdO、pvdP、转运蛋白基因pvdE、pvdR、pvdT、opmQ)、铁载体pyochelin(例如pchD、pchC、pchB、pchA、pchE、pchF和pchG,以及毒素(例如exoU、exoS和exoT)。例如,此类靶向的毒力因子基因可以是肺炎克雷伯氏菌(*Klebsiella pneumoniae*)毒力因子基因,例如但不限于fimA(粘附,I型菌毛主要亚基)和cps(荚膜多糖)。例如,此类靶向的毒力因子基因可以是鲍氏不动杆菌(*Acinetobacter baumannii*)毒力因子基因,例如但不限于ptk(荚膜聚合)和epsA(组装)。例如,此类靶向的毒力因子基因可以是伤寒肠道沙门氏菌(*Salmonella enterica Typhi*)毒力因子基因,例如但不限于MIA(侵入,SPI-1调控因子)、ssrB(SPI-2调控因子)、以及与胆汁耐受相关的那些基因,包括外排泵基因acrA、acrB和tolC。例如,此类靶向的毒力因子基因可以是具核梭杆菌(*Fusobacterium nucleatum*)毒力因子基因,例如但不限于FadA和TIGIT。例如,此类靶向的毒力因子基因可以是脆弱拟杆菌(*Bacteroides fragilis*)毒力因子基因,例如但不限于bft。

[0107] 在另一个实施方案中,CRISPR/Cas9系统用于靶向抗生素抗性基因且使其失活,所述抗生素抗性基因例如但不限于GyrB、ParE、ParY、AAC(1)、AAC(2′)、AAC(3)、AAC(6′)、ANT(2″)、ANT(3″)、ANT(4′)、ANT(6)、ANT(9)、APH(2″)、APH(3″)、APH(3′)、APH(4)、APH(6)、APH(7″)、APH(9)、ArmA、RmtA、RmtB、RmtC、Sgm、AER、BLA1、CTX-M、KPC、SHV、TEM、BlaB、CcrA、IMP、NDM、VIM、ACT、AmpC、CMY、LAT、PDC、OXA β-内酰胺酶、mecA、Omp36、OmpF、PIB、bla(blaI、blaR1)和mec(mecI、mecR1)操纵子、氯霉素乙酰转移酶(CAT)、氯霉素磷酸转移酶、乙胺丁醇抗性阿拉伯糖基转移酶(EmbB)、MupA、MupB、整合膜蛋白MprF、Cfr 23S rRNA甲基转移酶、利福平ADP-核糖基转移酶(Arr)、利福平糖基转移酶、利福平单加氧酶、利福平磷酸转移酶、DnaA、RbpA、利福平-抗性的RNA聚合酶β亚基(RpoB)、Erm 23S rRNA甲基转移酶、Lsa、MsrA、Vga、VgaB、链阳菌素Vgb裂解酶、Vat乙酰转移酶、氟喹诺酮乙酰转移酶、氟喹诺酮抗性DNA拓扑异构酶、氟喹诺酮抗性GyrA、GyrB、ParC、喹诺酮抗性蛋白(Qnr)、FomA、FomB、FosC、FosA、FosB、FosX、VanA、VanB、VanD、VanR、VanS、林可酰胺核苷酸基转移酶(Lin)、EreA、EreB、GimA、Mgt、Ole、大环内酯磷酸转移酶(MPH)、MefA、MefE、Mel、链丝菌素乙酰转移酶(sat)、Sul1、Sul2、Sul3、磺胺抗性FolP、四环素失活酶TetX、TetA、TetB、TetC、Tet30、Tet31、TetM、TetO、TetQ、Tet32、Tet36、MacAB-TolC、MsbA、MsrA,VgaB、EmrD、EmrAB-TolC、NorB、GepA、MepA、AdeABC、AcrD、MexAB-OprM、mtrCDE、EmrE、adeR、acrR、baeSR、mexR、phoPQ、mtrR、或者综合抗生素抗性数据库(Comprehensive Antibiotic Resistance Database)(CARD https://card.mcmaster.ca/)中描述的任何抗生素抗性基因。

[0108] 在另一个实施方案中,CRISPR/Cas9系统用于靶向细菌毒素基因且使其失活。细菌毒素可以分类为外毒素或内毒素。外毒素是生成并主动分泌的;内毒素仍然是细菌的部分。对细菌毒素的应答可以涉及重度炎症,并且可以导致败血症。此类毒素可以是例如肉毒杆菌神经毒素、破伤风毒素、葡萄球菌毒素、白喉毒素、炭疽毒素、α毒素、百日咳毒素、志贺毒素、热稳定肠毒素(大肠杆菌ST)、大肠杆菌素、BFT(脆弱拟杆菌毒素)或Henkel等人(Toxins from Bacteria in EXS. 2010;100: 1-29)中描述的任何毒素。

[0109] 通过本文公开的细菌递送媒介物靶向的细菌可以是存在于哺乳动物生物中的任

何细菌。在某个方面，通过由递送媒介物表达的嵌合RBP和/或分支RBP与细菌细胞的相互作用来靶向细菌。它可以是微生物群或微生物组的任何共生、共栖或致病菌。

[0110] 微生物组可以包含各种内源性细菌物种，其中任一种可以根据本公开内容进行靶向。在一些实施方案中，靶向的内源细菌细胞的属和/或种可以取决于用于制备细菌递送媒介物的细菌噬菌体的类型。例如，一些细菌噬菌体显示出对于特异性宿主细菌种的向性或优先靶向其。其它细菌噬菌体并未显示出此类向性，并且可以用于靶向内源性细菌细胞的许多不同属和/或种。

[0111] 细菌细胞的实例包括但不限于来自以下属的细菌的细胞：耶尔森氏菌属物种(*Yersinia spp.*)、埃希氏菌属物种(*Escherichia spp.*)、克雷伯氏菌属物种(*Klebsiella spp.*)、不动杆菌属物种(*Acinetobacter spp.*)、博德特氏菌属物种(*Bordetella spp.*)、奈瑟球菌属物种(*Neisseria spp.*)、气单胞菌属物种(*Aeromonas spp.*)、弗朗西斯菌属物种(*Francisella spp.*)、棒状杆菌属物种(*Corynebacterium spp.*)、柠檬酸杆菌属物种(*Citrobacter spp.*)、衣原体属物种(*Chlamydia spp.*)、嗜血杆菌属物种(*Hemophilus spp.*)、布鲁氏菌属物种(*Brucella spp.*)、分枝杆菌属物种(*Mycobacterium spp.*)、军团菌属物种(*Legionella spp.*)、红球菌属物种(*Rhodococcus spp.*)、假单胞菌属物种(*Pseudomonas spp.*)、螺杆菌属物种(*Helicobacter spp.*)、弧菌属物种(*Vibrio spp.*)、芽孢杆菌属物种(*Bacillus spp.*)、丹毒丝菌属物种(*Erysipelothrix spp.*)、沙门氏菌属物种(*Salmonella spp.*)、链霉菌属物种(*Streptomyces spp.*)、链球菌属物种(*Streptococcus spp.*)、葡萄球菌属物种(*Staphylococcus spp.*)、拟杆菌属物种(*Bacteroides spp.*)、普雷沃氏菌属物种(*Prevotella spp.*)、梭菌属物种(*Clostridium spp.*)、双歧杆菌属物种(*Bifidobacterium spp.*)、梭菌属物种、短杆菌属物种(*Brevibacterium spp.*)、乳球菌属物种(*Lactococcus spp.*)、明串珠菌属物种(*Leuconostoc spp.*)、放线杆菌属物种(*Actinobacillus spp.*)、硒单胞菌属物种(*Selnomonas spp.*)、志贺氏菌属物种(*Shigella spp.*)、发酵单胞菌属物种(*Zymonas spp.*)、支原体属物种(*Mycoplasma spp.*)、密螺旋体属物种(*Treponema spp.*)、明串珠菌属物种、棒状杆菌属物种、肠球菌属物种(*Enterococcus spp.*)、肠杆菌属物种(*Enterobacter spp.*)、热球菌属物种(*Pyrococcus spp.*)、沙雷氏菌属物种(*Serratia spp.*)、摩根氏菌属物种(*Morganella spp.*)、微单胞菌属物种(*Parvimonas spp.*)、梭杆菌属物种(*Fusobacterium spp.*)、放线菌属物种(*Actinomyces spp.*)、卟啉单胞菌属物种(*Porphyromonas spp.*)、微球菌属物种(*Micrococcus spp.*)、巴尔通体属物种(*Bartonella spp.*)、疏螺旋体属物种(*Borrelia spp.*)、布鲁氏菌属物种(*Brucelia spp.*)、弯曲杆菌属物种、*Chlamydophilia spp.*、*Cutibacterium*(以前的丙酸杆菌属(*Propionibacterium*))物种、埃立克体属物种(*Ehrlichia spp.*)、嗜血杆菌属物种、钩端螺旋体属物种(*Leptospira spp.*)、李斯特菌属物种(*Listeria spp.*)、支原体属物种、诺卡氏菌属物种(*Nocardia spp.*)、立克次体属物种(*Rickettsia spp.*)、脲原体属物种(*Ureaplasma spp.*)和乳杆菌属物种(*Lactobacillus spp*)及其混合物。

[0112] 因此，细菌递送媒介物可以靶向(例如，特异性地靶向)来自任何一个或多个前述细菌属的细菌细胞，以特异性地递送根据本公开内容的目的有效载荷。

[0113] 优选地，靶向的细菌可以选自耶尔森氏菌属物种、埃希氏菌属物种、克雷伯氏菌属

物种、不动杆菌属物种、假单胞菌属物种、螺杆菌属物种、弧菌属物种、沙门氏菌属物种、链球菌属物种、葡萄球菌属物种、拟杆菌属物种、梭菌属物种、志贺氏菌属物种、肠球菌属物种、肠杆菌属物种和李斯特菌属物种。

[0114] 在一些实施方案中，本公开内容的细菌细胞是厌氧菌细胞(例如，不需要氧用于生长的细胞)。厌氧菌细胞包括兼性厌氧细胞，例如但不限于大肠杆菌、奥奈达希瓦氏菌(*Shewanella oneidensis*)和李斯特菌属。厌氧菌细胞还包括专性厌氧细胞，例如拟杆菌属和梭菌属物种。在人中，厌氧菌最常在胃肠道中发现。在一些特定实施方案中，靶向的细菌因此是胃肠道中最常发现的细菌。用于制备细菌病毒颗粒的细菌噬菌体，然后是细菌病毒颗粒，可以根据其通过本领域技术人员已知的特异性谱来靶向(例如，特异性地靶向)厌氧菌细胞，以特异性地递送质粒。

[0115] 在一些实施方案中，靶向的细菌细胞是(但不限于)多形拟杆菌(*Bacteroides thetaiotaomicron*)、脆弱拟杆菌、吉氏拟杆菌(*Bacteroides distasonis*)、普通拟杆菌(*Bacteroides vulgatus*)、柔嫩梭菌(*Clostridium leptum*)、球形梭菌(*Clostridium coccoides*)、金黄色葡萄球菌、枯草芽孢杆菌(*Bacillus subtilis*)、丁酸梭菌(*Clostridium butyricum*)、乳糖发酵短杆菌(*Brevibacterium lactofermentum*)、无乳链球菌(*Streptococcus agalactiae*)、乳酸链球菌(*Lactococcus lactis*)、乳酸明串珠菌(*Leuconostoc lactis*)、伴放线放线杆菌(*Actinobacillus actinobycetemcomitans*)、蓝藻菌(*cyanobacteria*)、大肠杆菌、幽门螺杆菌(*Helicobacter pylori*)、反刍动物硒单胞菌(*Selnomonas ruminatium*)、宋内志贺氏菌(*Shigella sonnei*)、运动发酵单胞菌(*Zymomonas mobili*)、丝状支原体(*Mycoplasma mycoides*)、齿垢密螺旋体(*Treponema denticola*)、苏云金芽孢杆菌(*Bacillus thuringiensis*)、路邓葡萄球菌(*Staphilococcus lugdunensis*)、酒明串珠菌(*Leuconostoc oenos*)、干燥棒状杆菌(*Corynebacterium xerosis*)、植物乳杆菌(*Lactobacillus plantarum*)、鼠李糖乳杆菌(*Lactobacillus rhamnosus*)、干酪乳杆菌(*Lactobacillus casei*)、嗜酸乳杆菌(*Lactobacillus acidophilus*)、粪肠球菌(*Enterococcus faecalis*)、凝结芽孢杆菌(*Bacillus coagulans*)、蜡状芽孢杆菌(*Bacillus cereus*)、日本金龟子芽孢杆菌(*Bacillus popillae*)、集胞藻属(*Synechocystis*)菌株*PCC6803*、液化芽孢杆菌(*Bacillus liquefaciens*)、*Pyrococcus abyssi*、反刍动物硒单胞菌、希氏乳杆菌(*Lactobacillus hilgardii*)、野生链球菌(*Streptococcus ferus*)、戊糖乳杆菌(*Lactobacillus pentosus*)、脆弱拟杆菌、表皮葡萄球菌(*Staphylococcus epidermidis*)、*Streptomyces phaechromogenes*、加纳链霉菌(*Streptomyces ghanaenis*)、肺炎克雷伯氏菌(*Klebsiella pneumoniae*)、阴沟肠杆菌(*Enterobacter cloacae*)、产气肠杆菌(*Enterobacter aerogenes*)、粘质沙雷氏菌(*Serratia marcescens*)、摩氏摩根氏菌(*Morganella morganii*)、弗氏柠檬酸杆菌(*Citrobacter freundii*)、铜绿假单胞菌、微小微单胞菌(*Parvimonas micra*)、中间普雷沃氏菌(*Prevotella intermedia*)、具核梭杆菌、变黑普雷沃氏菌(*Prevotella nigrescens*)、以色列放线菌(*Actinomyces israelii*)、牙髓卟啉单胞菌(*Porphyromonas endodontalis*)、牙龈卟啉单胞菌(*Porphyromonas gingivalis*)、藤黄微球菌(*Micrococcus luteus*)、巨大芽孢杆菌(*Bacillus megaterium*)、嗜水气单胞菌(*Aeromonas hydrophila*)、豚鼠气单胞菌(*Aeromonas caviae*)、炭疽杆菌、汉氏巴尔通体

(*Bartonella henselae*)、五日热巴尔通体(*Bartonella Quintana*)、百日咳博德特氏菌(*Bordetella pertussis*)、伯氏疏螺旋体(*Borrelia burgdorferi*)、伽氏疏螺旋体(*Borrelia garinii*)、埃氏疏螺旋体(*Borrelia afzelii*)、回归热疏螺旋体(*Borrelia recurrentis*)、流产布鲁氏菌(*Brucella abortus*)、犬布鲁氏菌(*Brucella canis*)、羊布鲁氏菌(*Brucella melitensis*)、猪布鲁氏菌(*Brucella suis*)、空肠弯曲杆菌、结肠弯曲杆菌(*Campylobacter coli*)、胎儿弯曲杆菌(*Campylobacter fetus*)、肺炎衣原体(*Chlamydia pneumoniae*)、沙眼衣原体(*Chlamydia trachomatis*)、鹦鹉热衣原体(*Chlamydophila psittaci*)、肉毒梭菌(*Clostridium botulinum*)、艰难梭菌(*Clostridium difficile*)、产气荚膜梭菌(*Clostridium perfringens*)、破伤风梭菌(*Clostridium tetani*)、白喉棒状杆菌(*Corynebacterium diphtheria*)、*Cutibacterium acnes*(以前的痤疮丙酸杆菌(*Propionibacterium acnes*))、犬埃立克体(*Ehrlichia canis*)、查菲埃立克体(*Ehrlichia chaffeensis*)、屎肠球菌(*Enterococcus faecium*)、土拉弗朗西斯菌、流感嗜血杆菌(*Haemophilus influenza*)、嗜肺军团菌(*Legionella pneumophila*)、问号钩端螺旋体(*Leptospira interrogans*)、*Leptospira santarosai*、韦氏钩端螺旋体(*Leptospira weilii*)、野口钩端螺旋体(*Leptospira noguchii*)、单核细胞增多性李斯特菌(*Listeria monocytogenes*)、麻风分枝杆菌(*Mycobacterium leprae*)、结核分枝杆菌(*Mycobacterium tuberculosis*)、溃疡分枝杆菌(*Mycobacterium ulcerans*)、肺炎支原体(*Mycoplasma pneumonia*)、淋病奈瑟球菌、脑膜炎奈瑟球菌(*Neisseria meningitides*)、星形诺卡氏菌(*Nocardia asteroids*)、立氏立克次体(*Rickettsia rickettsia*)、肠炎沙门氏菌(*Salmonella enteritidis*)、伤寒沙门氏菌(*Salmonella typhi*)、副伤寒沙门氏菌(*Salmonella paratyphi*)、鼠伤寒沙门氏菌(*Salmonella typhimurium*)、福氏志贺氏菌(*Shigella flexnerii*)、痢疾志贺氏菌、腐生葡萄球菌(*Staphylococcus saprophyticus*)、肺炎链球菌(*Streptococcus pneumoniae*)、化脓性链球菌、草绿色链球菌(*Streptococcus viridans*)、苍白密螺旋体(*Treponema pallidum*)、解脲脲原体(*Ureaplasma urealyticum*)、霍乱弧菌、副溶血弧菌(*Vibrio parahaemolyticus*)、鼠疫耶尔森氏菌、小肠结肠炎耶尔森氏菌(*Yersinia enterocolitica*)、假结核病耶尔森氏菌(*Yersinia pseudotuberculosis*)、鲍氏不动杆菌、铜绿假单胞菌及其混合物,优选地,目的细菌选自大肠杆菌、屎肠球菌、金黄色葡萄球菌、肺炎克雷伯氏菌、鲍氏不动杆菌、铜绿假单胞菌、阴沟肠杆菌和产气肠杆菌及其混合物。

[0116] 在一个实施方案中,靶向的细菌是大肠杆菌。

[0117] 因此,用于制备细菌递送媒介物的细菌噬菌体,然后是细菌递送媒介物,可以靶向(例如,特异性地靶向)来自任何一个或多个前述细菌属和/或种的细菌细胞,以特异性地递送目的有效载荷。

[0118] 在一个实施方案中,靶向的细菌是致病菌。靶向的细菌可以是毒性细菌。

[0119] 靶向的细菌可以是抗菌抗性细菌,优选地选自产超广谱β-内酰胺酶(ESBL)大肠杆菌、ESBL肺炎克雷伯氏菌、万古霉素抗性肠球菌属(VRE)、甲氧西林抗性金黄色葡萄球菌(MRSA)、多药抗性(MDR)鲍氏不动杆菌、MDR肠杆菌属物种及其组合。优选地,靶向的细菌可以选自产超广谱β-内酰胺酶(ESBL)大肠杆菌菌株。

[0120] 可替代地,靶向的细菌可以是给定物种的微生物组的细菌,优选人微生物群的细

菌。

[0121] 本公开内容涉及如本文所述的含有有效载荷的细菌递送媒介物。细菌递送媒介物由细菌病毒制备。选择细菌递送媒介物，以便能够将有效载荷引入靶向的细菌内。

[0122] 具有嵌合受体结合蛋白和/或分支RBP的细菌递送媒介物可以由其衍生的细菌病毒优选是细菌噬菌体。任选地，基于Krupovic等人，2015，Arch Virol，161(1)：233-247的分类法，细菌噬菌体选自有尾噬菌体目(Caudovirales)。

[0123] 细菌噬菌体可以选自肌尾噬菌体科(Myoviridae)(例如但不限于以下属:Cp220病毒、Cp8病毒、Ea214病毒、Felixo1病毒、Moogle病毒、Susp病毒、Hp1病毒、P2病毒、Kay病毒、P100病毒、Silvia病毒、Spo1病毒、Tsarbomba病毒、Twort病毒、Cc31病毒、Jd18病毒、Js98病毒、Kp15病毒、Moon病毒、Rb49病毒、Rb69病毒、S16病毒、Schizot4病毒、Sp18病毒、T4病毒、Cr3病毒、Se1病毒、V5病毒、Abouo病毒、Agate病毒、Agrican357病毒、Ap22病毒、Arv1病毒、B4病毒、Bastille病毒、Bc431病毒、Bcep78病毒、Bcepmu病毒、Biquarta病毒、Bxz1病毒、Cd119病毒、Cp51病毒、Cvm10病毒、Eah2病毒、El病毒、Hapuna病毒、Jimmer病毒、Kpp10病毒、M12病毒、Machina病毒、Martha病毒、Msw3病毒、Mu病毒、Myohalo病毒、Nit1病毒、P1病毒、Pakpuna病毒、Pbuna病毒、Phikz病毒、Rheph4病毒、Rsl2病毒、Rsluna病毒、Secunda5病毒、Sep1病毒、Spn3病毒、Svuna病毒、Tg1病毒、Vhml病毒和Wph病毒)。

[0124] 细菌噬菌体可以选自短尾噬菌体科(Podoviridae)(例如但不限于以下属:Fri1病毒、Kp32病毒、Kp34病毒、Phikmv病毒、Prado病毒、Sp6病毒、T7病毒、Cp1病毒、P68病毒、Phi29病毒、Nona33病毒、Pocj病毒、Tl2011病毒、Bcep22病毒、Bpp1病毒、Cba41病毒、Dfl12病毒、Ea92病毒、Epsilon15病毒、F116病毒、G7c病毒、Jwalpha病毒、Kf1病毒、Kpp25病毒、Lit1病毒、Luz24病毒、Luz7病毒、N4病毒、Nonana病毒、P22病毒、Page病毒、Phieco32病毒、Prtb病毒、Sp58病毒、Una961病毒和Vp5病毒)。

[0125] 细菌噬菌体可以选自长尾噬菌体科(例如但不限于以下属:Cam病毒、Lika病毒、R4病毒、Acadian病毒、Cooper病毒、Pg1病毒、Pipefish病毒、Rosebush病毒、Brujita病毒、Che9c病毒、Hawkeye病毒、Plot病毒、Jersey病毒、K1g病毒、Sp31病毒、Lmd1病毒、Una4病毒、Bongo病毒、Rey病毒、Butters病毒、Charlie病毒、Redi病毒、Baxter病毒、Nymphadora病毒、Bignuz病毒、Fishburne病毒、Phayonce病毒、Kp36病毒、Rogue1病毒、Rtp病毒、T1病毒、Tls病毒、Ab18病毒、Amigo病毒、Anatole病毒、Andromeda病毒、Attis病毒、Barnyard病毒、Bernal13病毒、Biseptima病毒、Bron病毒、C2病毒、C5病毒、Cba181病毒、Cbast病毒、Ceci病毒、Che8病毒、Chi病毒、Cjw1病毒、Corndog病毒、Cronus病毒、D3112病毒、D3病毒、Decurro病毒、Demosthenes病毒、Doucette病毒、E125病毒、Eiau病毒、Ff47病毒、Gaia病毒、Giles病毒、Gordon病毒、Gordtnk病毒、Harrison病毒、Hk578病毒、Hk97病毒、Jenst病毒、Jwx病毒、Kellezio病毒、Korra病毒、L5病毒、lambda病毒、Laroye病毒、Liefie病毒、Marvin病毒、Mudcat病毒、N15病毒、Nonag病毒、Np1病毒、Omega病毒、P12002病毒、P12024病毒、P23病毒、P70病毒、Pa6病毒、Pamx74病毒、Patience病毒、Pbi1病毒、Pepy6病毒、Pfr1病毒、Phic31病毒、Phicbk病毒、Phieta病毒、Phifel病毒、Phijl1病毒、Pis4a病毒、Psa病毒、Psimuna病毒、Rdjl病毒、Rer2病毒、Sap6病毒、Send513病毒、Septima3病毒、Seurat病毒、Sextaec病毒、Sfi11病毒、Sfi21dt1病毒、Sitara病毒、Sk1病毒、Slash病毒、Smoothie病毒、Soups病毒、Spbeta病毒、Ssp2病毒、T5病毒、Tank病毒、Tin2病毒、Titan病毒、Tm4病毒、Tp21病毒、Tp84

病毒、Tria病毒、Trigintaduo病毒、Vegas病毒、Vendetta病毒、Wbeta病毒、Wildcat病毒、Wizard病毒、Woes病毒、Xp10病毒、Ydn12病毒和Yua病毒)。

[0126] 细菌噬菌体可以选自埃凯曼病毒科(Ackermannviridae)(例如但不限于以下属:Ag3病毒、Limestone病毒、Cba120病毒和Vi1病毒)。

[0127] 任选地,细菌噬菌体不是有尾噬菌体目的部分,而是来自具有未指定目的科,例如但不限于复层噬菌体科(Tectiviridae)(例如以下属:Alphatectivirus、Betatectivirus)、覆盖噬菌体科(Corticoviridae)(例如覆盖噬菌体属(Corticovirus))、丝状噬菌体科(Inoviridae)(例如以下属:Fibrovirus、Habenivirus、丝状噬菌体属(Inovirus)、Lineavirus、Plectrovirus、Saetivirus、Vespertiliovirus)、囊状噬菌体科(Cystoviridae)(例如囊状噬菌体属(Cystovirus))、光滑噬菌体科(Leviviridae)(例如以下属:Allolevivirus、光滑噬菌体属(Levivirus))、微小噬菌体科(Microviridae)(例如以下属:α3微小病毒、G4微小病毒、Phix174微小病毒、蛭弧菌微小噬菌体属(Bdellomicrovirus)、衣原体微小噬菌体属(Chlamydiamicrovirus)、螺旋体微小菌体属(Spiromicrovirus))和芽生噬菌体科(Plasmaviridae)(例如芽生噬菌体属(Plasmavirus))。

[0128] 任选地,细菌噬菌体靶向的古细菌不是有尾噬菌体目的部分,而是来自具有未指定目的科,例如但不限于Ampullaviridae、微小纺锤形噬菌体科(FuselloViridae)、Globuloviridae、滴状病毒科(Guttaviridae)、脂毛噬菌体科(Lipothrixviridae)、嗜盐菌多形病毒科(Pleolipoviridae)、古噬菌体科(Rudiviridae)、Salterprovirus和Bicaudaviridae。

[0129] 下述段落中呈现了细菌属及其已知宿主特异性细菌病毒的非详尽列表。作为非限制性实例,本文公开的嵌合RBP和/或分支RBP和细菌递送媒介物可以由下述噬菌体进行改造。括号中指示了同义词和拼写变体。同音异义词尽可能经常重复(例如,D、D、d)。未命名的噬菌体通过在其属旁边的"NN"指示,并且其编号在括号中给出。

[0130] 放线菌属的细菌可以被下述噬菌体感染:Av-I、Av-2、Av-3、BF307、CT1、CT2、CT3、CT4、CT6、CT7、CT8和1281。

[0131] 气单胞菌属的细菌可以被下述噬菌体感染:AA-I、Aeh2、N、PM1、TP446、3、4、11、13、29、31、32、37、43、43-10T、51、54、55R.1、56、56RR2、57、58、59.1、60、63、Aeh1、F、PM2、1、25、31、40RR2.8t、(同义词= 44R)、(同义词= 44RR2.8t)、65、PM3、PM4、PM5和PM6。

[0132] 芽孢杆菌属的细菌可以被下述噬菌体感染:A、aizl、Al-K-I、B、BCJA1、BC1、BC2、BLL1、BL1、BP142、BSL1、BSL2、BS1、BS3、BS8、BS15、BS18、BS22、BS26、BS28、BS31、BS104、BS105、BS106、BTB、B1715V1、C、CK-I、Col1、Cor1、CP-53、CS-I、CSi、D、D、D、D5、ent1、FP8、FP9、FSi、FS2、FS3、FS5、FS8、FS9、G、GH8、GT8、GV-I、GV-2、GT-4、g3、g12、g13、g14、g16、g17、g21、g23、g24、g29、H2、ken1、KK-88、Kum1、Kyu1、J7W-1、LP52、(同义词= LP-52)、L7、Mex1、MJ-I、mor2、MP-7、MP10、MP12、MP14、MP15、Neo1、N°2、N5、N6P、PBC1、PBLA、PBP1、P2、S-a、SF2、SF6、Sha1、Sil1、SP02、(同义词= ΦSPP1)、SPβ、STI、STi、SU-I1、t、TbI、Tb2、Tb5、TbIO、Tb26、Tb51、Tb53、Tb55、Tb77、Tb97、Tb99、Tb560、Tb595、Td8、Td6、Td15、TgI、Tg4、Tg6、Tg7、Tg9、TgIO、TgI1、Tg13、Tg15、Tg21、Tin1、Tin7、Tin8、Tin13、Tm3、Toc1、Tog1、toll、TP-I、TP-10vir、TP-15c、TP-16c、TP-17c、TP-19、TP35、TP51、TP-84、Tt4、Tt6、A型、B型、C型、D型、E型、

Tφ3、VA-9、W、wx23、wx26、Yunl、α、γ、pl l,、φmed-2、φT、φμ-4、φ3T、φ75、φl05、(同义词= φl05)、IA、IB、1-97A、1-97B、2、2、3、3、3、5、12、14、20、30、35、36、37、38、41C、51、63、64、138D、I、II、IV、NN-芽孢杆菌属(13)、alel、ARl、AR2、AR3、AR7、AR9、Bace-11、(同义词= 11)、Bastille、BLl、BL2、BL3、BL4、BL5、BL6、BL8、BL9、BP124、BS28、BS80、Ch、CP-51、CP-54、D-5、darl、denl、DP-7、entl、FoSi、FoS2、FS4、FS6、FS7、G、gall、γ、GEl、GF-2、GSi、GT-I、GT-2、GT-3、GT-4、GT-5、GT-6、GT-7、GV-6、gl5、19、110、ISi、K、MP9、MP13、MP21、MP23、MP24、MP28、MP29、MP30、MP32、MP34、MP36、MP37、MP39、MP40、MP41、MP43、MP44、MP45、MP47、MP50、NLP-I、No.l、N17、N19、PBSl、PKl、PMBl、PMB12、PMJl、S、SPOl、SP3、SP5、SP6、SP7、SP8、SP9、SPl0、SP-15、SP50、(同义词= SP-50)、SP82、SST、subl、SW、Tg8、Tgl2、Tgl3、Tgl4、thul、thuΛ、thuS、Tin4、Tin23、TP-13、TP33、TP50、TSP-I、V型、VI型、V、Vx、β22、φe、φNR2、φ25、φ63、1、1、2、2C、3NT、4、5、6、7、8、9、10、12、12、17、18、19、21、138、III、4(巨大芽孢杆菌(B. megateriwn))、4(球形芽孢杆菌(B. sphaericus))、AR13、BPP-IO、BS32、BS107、Bl、B2、GA-I、GP-IO、GV-3、GV-5、g8、MP20、MP27、MP49、Nf、PP5、PP6、SF5、Tgl8、TP-I、Versailles、φl5、φ29、1-97、837/IV、mï-芽孢杆菌属(1)、Batl0、BSLl0、BSLI l、BS6、BSI l、BS16、BS23、BSl0l、BS102、gl8、morl、PBLl、SN45、thu2、thu3、TmI、Tm2、TP-20、TP21、TP52、F型、G型、IV型、HN-BacMus(3)、BLE、(同义词= θc)、BS2、BS4、BS5、BS7、Bl0、B12、BS20、BS21、F、MJ-4、PBA12、AP50、AP50-04、AP50-11、AP50-23、AP50-26、AP50-27和Bam35。下述芽孢杆菌特异性噬菌体是缺陷型的:DLP10716、DLP-11946、DPB5、DPB12、DPB21、DPB22、DPB23、GA-2、M、No.IM、PBLB、PBSH、PBSV、PBSW、PBSX、PBSY、PBSZ、phi、SPa、1型和μ。

[0133] 拟杆菌属的细菌可以被下述噬菌体感染:ad I2、Baf-44、Baf-48B、Baf-64、Bf-I、Bf-52、B40-8、Fl、βl、φAl、φBrOl、φBrO2、11、67.1、67.3、68.1、mt-拟杆菌属(3)、Bf42、Bf71、HN-蛭弧菌属(Bdellovibrio)(1)和BF-41。

[0134] 博德特氏菌属的细菌可以被下述噬菌体感染:134和NN-博德特氏菌属(3)。

[0135] 疏螺旋体属的细菌可以被下述噬菌体感染:NN-疏螺旋体属(1)和NN-疏螺旋体属(2)。

[0136] 布鲁氏菌属的细菌可以被下述噬菌体感染:A422、Bk、(同义词= Berkeley)、BM29、FOi、(同义词= FOl)、(同义词= FQl)、D、FP2、(同义词= FP2)、(同义词= FD2)、Fz、(同义词= Fz75/13)、(同义词= Firenze 75/13)、(同义词= Fi)、Fi、(同义词= Fl)、Fim、(同义词= FIm)、(同义词= Fim)、FiU、(同义词= FlU)、(同义词= FiU)、F2、(同义词= F2)、F3、(同义词= F3)、F4、(同义词= F4)、F5、(同义词= F5)、F6、F7、(同义词= F7)、F25、(同义词= F25)、(同义词= £25)、F25U、(同义词= F25u)、(同义词= F25U)、(同义词= F25V)、F44、(同义词-F44)、F45、(同义词= F45)、F48、(同义词= F48)、I、Im、M、MC/75、M51、(同义词= M85)、P、(同义词= D)、S708、R、Tb、(同义词= TB)、(同义词= Tbilisi)、W、(同义词= Wb)、(同义词= Weybridge)、X、3、6、7、10/1、(同义词= 10)、(同义词= F8)、(同义词= F8)、12m、24/11、(同义词= 24)、(同义词= F9)、(同义词= F9)、45/111、(同义词= 45)、75、84、212/XV、(同义词= 212)、(同义词= Fi0)、(同义词= Fl0)、371/XXIX、(同义词= 371)、(同义词= Fn)、(同义词= Fl l)和513。

[0137] 伯克霍尔德氏菌属(*Burkholderia*)的细菌可以被下述噬菌体感染:CP75、NN-伯克霍尔德氏菌属(1)和42。

[0138] 弯曲杆菌属的细菌可以被下述噬菌体感染:C型、NTCC12669、NTCC12670、NTCC12671、NTCC12672、NTCC12673、NTCC12674、NTCC12675、NTCC12676、NTCC12677、NTCC12678、NTCC12679、NTCC12680、NTCC12681、NTCC12682、NTCC12683、NTCC12684、32f、111c、191、NN-弯曲杆菌属(2)、Vfi-6、(同义词= V19)、VfV-3、V2、V3、V8、V16、(同义词= Vfi-1)、V19、V20(V45)、V45、(同义词= V-45)和NN-弯曲杆菌属(1)。

[0139] 衣原体属的细菌可以被下述噬菌体感染:Chpl。

[0140] 梭菌属的细菌可以被下述噬菌体感染:CAK1、CA5、Ca7、CEβ、(同义词= 1C)、CEγ、Cldl、c-n71、c-203 Tox-、DEβ、(同义词= ID)、(同义词= lDtOX+)、HM3、KMl、KT、Ms、NAl、(同义词= Naltox+)、PA1350e、Pfó、PL73、PL78、PL81、Pl、P50、P5771、P19402、lCtOX+、2CtOX\2D3(同义词= 2DtOX+)、3C、(同义词= 3Ctox+)、4C、(同义词= 4CtOX+)、56、III-1、NN-梭菌属(61)、NBltOX+、αl、CAl、HMT、HM2、PF15 P-23、P-46、Q-05、Q-oe、Q-16、Q-21、Q-26、Q-40、Q-46、S111、SA02、WA01、WA03、Wm、W523、80、C、CA2、CA3、CPT1、CPT4、cl、c4、c5、HM7、H11/A1、H18/Ax、FWS23、Hi58ZA1、K2ZA1、K21ZS23、ML、NA2t0X;Pf2、Pf3、Pf4、S9ZS3、S41ZA1、S44ZS23、α2、41、112ZS23、214/S23、233/Ai、234/S23、235/S23、II-1、II-2、II-3、NN-梭菌属(12)、CAl、Fl、K、S2、1、5和NN-梭菌属(8)。

[0141] 棒状杆菌属的细菌可以被下述噬菌体感染:CGK1(缺陷型)、A、A2、A3、A101、A128、A133、A137、A139、A155、A182、B、BF、B17、B18、B51、B271、B275、B276、B277、B279、B282、C、capi、CCl、CG1、CG2、CG33、CL31、Cog、(同义词= CG5)、D、E、F、H、H-I、hqi、hq2、11ZH33、Ii/31、J、K、K、(同义词= Ktox″)、L、L、(同义词= Ltox+)、M、MC-I、MC-2、MC-3、MC-4、MLMa、N、O、ovi、ov2、ov3、P、P、R、RP6、RS29、S、T、U、UB1、ub2、UH1、UH3、uh3、uh5、uh6、β、(同义词= βtox+)、βhv64、βvir、γ、(同义词= γtox-)、γ19、δ、(同义词= δ'ox+)、p、(同义词= ptox-)、Φ9、φ984、ω、IA、1/1180、2、2/1180、5/1180、5ad/9717、7/4465、8/4465、8ad/10269、10/9253、13Z9253、15/3148、21/9253、28、29、55、2747、2893、4498和5848。

[0142] 肠球菌属的细菌可以被下述噬菌体感染:DF78、Fl、F2、1、2、4、14、41、867、Dl、SB24、2BV、182、225、C2、C2F、E3、E62、DS96、H24、M35、P3、P9、SBl01、S2、2BII、5、182a、705、873、881、940、1051、1057、21096C、NN-肠球菌属(1)、PEl、Fl、F3、F4、VD13、1、200、235和341。

[0143] 丹毒丝菌属的细菌可以被下述噬菌体感染:NN-丹毒丝菌属(1)。

[0144] 埃希氏菌属的细菌可以被下述噬菌体感染:BW73、B278、D6、D108、E、El、E24、E41、FI-2、FI-4、FI-5、HI8A、Ffl8B、i、MM、Mu、(同义词= mu)、(同义词= MuI)、(同义词= Mu-I)、(同义词= MU-I)、(同义词= MuI)、(同义词= μ)、025、PhI-5、Pk、PSP3、Pl、PlD、P2、P4(缺陷型)、Sl、Wφ、φK13、φR73(缺陷型)、φl、φ2、φ7、φ92、ψ(缺陷型)、7 A、8φ、9φ、15(缺陷型)、18、28-1、186、299、HH-埃希氏菌属(2)、AB48、CM、C4、C16、DD-VI、(同义词= Dd-Vi)、(同义词= DDVI)、(同义词= DDVi)、E4、E7、E28、FIl、FI3、H、Hl、H3、H8、K3、M、N、ND-2、ND-3、ND4、ND-5、ND6、ND-7、Ox-I(同义词= OX1)、(同义词= HF)、Ox-2(同义词= Ox2)、(同义词= OX2)、Ox-3、Ox-4、Ox-5、(同义词= OX5)、Ox-6、(同义词= 66F)、(同义词= φ66t)、(同义词= φ66t-)5 0111、PhI-I、RB42、RB43、RB49、RB69、S、SaI-I、Sal-2、Sal-3、Sal-4、Sal-5、Sal-6、TC23、TC45、TuII*-6、(同义词= TuII*)、TuIP-24、TuII*46、TuIP-60、T2、(同义词= ganuTia)、(同义词= γ)、(同义词= PC)、(同义词= P.C.)、(同义词= T-2)、(同义词= T2)、(同义词= P4)、T4、(同义词= T-4)、(同义词= T4)、T6、T35、αl、1、IA、3、(同义词= Ac3)、3A、

3T+、(同义词= 3)、(同义词= M1)、5φ、(同义词= φ5)、9266Q、CFO103、HK620、J、K、KlF、m59、no. A、no. E、no. 3、no. 9、N4、sd、(同义词= Sd)、(同义词= SD)、(同义词= Sa)3(同义词= sd)、(同义词= SD)、(同义词= CD)、T3、(同义词= T-3)、(同义词= T3)、T7、(同义词= T-7)、(同义词= T7)、WPK、W31、ΔH、φC3888、φK3、φK7、φK12、φV-1、Φ04-CF、Φ05、Φ06、Φ07、φ1、φl.2、φ20、φ95、φ263、φ1092、φ1、φ11、(同义词=φW)、Ω8、1、3、7、8、26、27、28-2、29、30、31、32、38、39、42、933W、NN-埃希氏菌属(1)、Esc-7-11、AC30、CVX-5、C1、DDUP、EC1、EC2、E21、E29、F1、F26S、F27S、Hi、HK022、HK97、(同义词= ΦHK97)、HK139、HK253、HK256、K7、ND-I、no.D、PA-2、q、S2、T1、(同义词= α)、(同义词= P28)、(同义词= T-I)、(同义词= Tx)、T3C、T5、(同义词= T-5)、(同义词= T5)、UC-I、w、β4、γ2、λ(同义词= λ)、(同义词= Φλ)、ΦD326、φγ、Φ06、Φ7、Φ10、φ80、x、(同义词= xi)、(同义词= φx)、(同义词= φxi)、2、4、4A、6、8A、102、150、168、174、3000、AC6、AC7、AC28、AC43、AC50、AC57、AC81、AC95、HK243、K10、ZG/3A、5、5A、21EL、H19-J和933H。

[0145] 梭杆菌属的细菌可以被下述噬菌体感染:NN-梭杆菌属(2)、fv83-554/3、fv88-531/2、227、fv2377、fv2527和fv8501。

[0146] 嗜血杆菌属的细菌可以被下述噬菌体感染:HP1、S2和N3。

[0147] 螺杆菌属的细菌可以被下述噬菌体感染:HP1和^^-螺杆菌属(1)。

[0148] 克雷伯氏菌属的细菌可以被下述噬菌体感染:AIO-2、KI4B、K16B、K19、(同义词= K19)、K114、K115、K121、K128、K129、KI32、K133、K135、K1106B、K1171B、K1181B、K1832B、AIO-I、AO-I、AO-2、AO-3、FC3-10、K、K11、(同义词= KI1)、K12、(同义词= K12)、K13、(同义词= K13)、(同义词= K1 70/11)、K14、(同义词= K14)、K15、(同义词= K15)、K16、(同义词= K16)、K17、(同义词= K17)、K18、(同义词= K18)、K119、(同义词= K19)、K127、(同义词= K127)、K131、(同义词= K131)、K135、K1171B、II、VI、IX、CI-I、K14B、K18、K111、K112、K113、K116、K117、K118、K120、K122、K123、K124、K126、K130、K134、K1106B、KIi65B、K1328B、KLXI、K328、P5046、11、380、III、IV、VII、VIII、FC3-11、K12B、(同义词= K12B)、K125、(同义词= K125)、K142B、(同义词= K142)、(同义词= K142B)、K1181B、(同义词= KI1 81)、(同义词= K1181B)、K1765/!、(同义词= K1765/1)、K1842B、(同义词= K1832B)、K1937B、(同义词= K1937B)、L1、φ28、7、231、483、490、632和864/100。

[0149] 钩端螺旋体属的细菌可以被下述噬菌体感染:LE1、LE3、LE4和~NN -钩端螺旋体属(1)。

[0150] 李斯特菌属的细菌可以被下述噬菌体感染:A511、01761、4211、4286、(同义词= B054)、A005、A006、A020、A500、A502、A511、A1 18、A620、A640、B012、B021、B024、B025、B035、B051、B053、B054、B055、B056、B101、BI 10、B545、B604、B653、C707、D441、HS047、H10G、H8/73、H19、H21、H43、H46、H107、H108、HI 10、H163/84、H312、H340、H387、H391/73、H684/74、H924A、PSA、U153、φMLUP5、(同义词= P35)、00241、00611、02971A、02971C、5/476、5/911、5/939、5/11302、5/11605、5/11704、184、575、633、699/694、744、900、1090、1317、1444、1652、1806、1807、1921/959、1921/11367、1921/11500、1921/11566、1921/12460、1921/12582、1967、2389、2425、2671、2685、3274、3550、3551、3552、4276、4277、4292、4477、5337、5348/11363、5348/11646、5348/12430、5348/12434、10072、11355C、11711A、12029、12981、13441、90666、90816、93253、907515、910716和NN-李斯特菌属(15)。

[0151] 摩根氏菌属的细菌可以被下述噬菌体感染:47。

[0152] 分枝杆菌属的细菌可以被下述噬菌体感染:13、AG1、ALi、ATCC 11759、A2、B.C3、BG2、BK1、BK5、butyricum、B-I、B5、B7、B30、B35、Clark、C1、C2、DNAIII、DSP1、D4、D29、GS4E、(同义词= GS4E)、GS7、(同义词= GS-7)、(同义词= GS7)、IPa、lacticola、Legendre、Leo、L5、(同义词= ΦL-5)、MC-I、MC-3、MC-4、minetti、MTPHI 1、Mx4、MyF3P/59a、phlei、(同义词= phlei 1)、phlei 4、Polonus II、rabinovitschi、smegmatis、TM4、TM9、TM10、TM20、Y7、Y10、φ630、IB、IF、IH、1/1、67、106、1430、B1、(同义词= Bo1)、B24、D、D29、F-K、F-S、HP、Polonus I、Roy、R1、(同义词= R1-Myb)、(同义词= Ri)、11、31、40、50、103a、103b、128、3111-D、3215-D和NN-分枝杆菌属(1)。

[0153] 奈瑟球菌属的细菌可以被下述噬菌体感染:I组、II组和NP1。

[0154] 诺卡氏菌属的细菌可以被下述噬菌体感染:MNP8、NJ-L、NS-8、N5和TtiN -诺卡氏菌属。

[0155] 变形杆菌属的细菌可以被下述噬菌体感染:Pm5、13vir、2/44、4/545、6/1004、13/807、20/826、57、67b、78、107/69、121、9/0、22/608、30/680、PmI、Pm3、Pm4、Pm6、Pm7、Pm9、PmI0、PmI 1、Pv2、π1、φm、7/549、9B/2、10A/31、12/55、14、15、16/789、17/971、19A/653、23/532、25/909、26/219、27/953、32A/909、33/971、34/13、65、5006M、7480b、VI、13/3a、Clichy12、π2600、φx7、1/1004、5/742、9、12、14、22、24/860、2600/D52、Pm8和24/2514。

[0156] 普罗威登斯菌属(*Providencia*)的细菌可以被下述噬菌体感染:PL25、PL26、PL37、9211/9295、9213/921 Ib、9248、7/R49、7476/322、7478/325、7479、7480、9000/9402和9213/921 Ia。

[0157] 假单胞菌属的细菌可以被下述噬菌体感染:PfI、(同义词= Pf-I)、Pf2、Pf3、PP7、PRR1、7s、im-假单胞菌属(1)、AI-I、AI-2、B 17、B89、CB3、Col 2、Col 11、Col 18、Col 21、C154、C163、C167、C2121、E79、F8、ga、gb、H22、K1、M4、N2、Nu、PB-I、(同义词= PB1)、pf16、PMN17、PP1、PP8、Psal、PsP1、PsP2、PsP3、PsP4、PsP5、PS3、PS17、PTB80、PX4、PX7、PYO1、PYO2、PYO5、PYO6、PYO9、PYO10、PYO13、PYO14、PYO16、PYO18、PYO19、PYO20、PYO29、PYO32、PYO33、PYO35、PYO36、PYO37、PYO38、PYO39、PYO41、PYO42、PYO45、PYO47、PYO48、PYO64、PYO69、PYO103、P1K、SLP1、SL2、S2、UNL-I、wy、Yai、Ya4、Yan、φBE、φCTX、φC17、φKZ、(同义词=ΦKZ)、φ-LT、Φmu78、φNZ、φPLS-1、φST-1、φW-14、φ-2、1/72、2/79、3、3/DO、4/237、5/406、6C、6/6660、7、7v、7/184、8/280、9/95、10/502、11/DE、12/100、12S、16、21、24、25F、27、31、44、68、71、95、109、188、337、352、1214、HN-假单胞菌属(23)、A856、B26、CI-I、CI-2、C5、D、gh-1、Fl 16、HF、H90、K5、K6、Kl 04、K109、K166、K267、N4、N5、O6N-25P、PE69、Pf、PPN25、PPN35、PPN89、PPN91、PP2、PP3、PP4、PP6、PP7、PP8、PP56、PP87、PP1 14、PP206、PP207、PP306、PP651、Psp231a、Pssy401、Pssy9220、psi、PTB2、PTB20、PTB42、PX1、PX3、PX10、PX12、PX14、PYO70、PYO71、R、SH6、SH133、tf、Ya5、Ya7、φBS、ΦKf77、φ-MC、ΦmnF82、φPLS27、φPLS743、φS-1、1、2、2、3、4、5、6、7、7、8、9、10、11、12、12B、13、14、15、14、15、16、17、18、19、20、20、21、21、22、23、23、24、25、31、53、73、119x、145、147、170、267、284、308、525、NN-假单胞菌属(5)、af、A7、B3、B33、B39、BI-I、C22、D3、D37、D40、D62、D3112、F7、F10、g、gd、ge、gξ Hw12、Jb 19、KF1、L°、OXN-32P、O6N-52P、PCH-I、PC13-1、PC35-1、PH2、PH51、PH93、PH132、PMW、PM13、PM57、PM61、PM62、PM63、PM69、PM105、PM1 13、PM681、PM682、PO4、PP1、PP4、PP5、PP64、PP65、PP66、PP71、

PP86、PP88、PP92、PP401、PP711、PP891、Pssy41、Pssy42、Pssy403、Pssy404、Pssy420、Pssy923、PS4、PS-IO、Pz、SD1、SL1、SL3、SL5、SM、φC5、φCl l、φCl l-1、φC13、φC15、φMO、φX、φO4、φl l、φ240、2、2F、5、7m、11、13、13/441、14、20、24、40、45、49、61、73、148、160、198、218、222、236、242、246、249、258、269、295、297、309、318、342、350、351、357-1、400-1、HN-假单胞菌属(6)、G101、M6、M6a、L1、PB2、Pssy15、Pssy4210、Pssy4220、PYO12、PYO34、PYO49、PYO50、PYO51、PYO52、PYO53、PYO57、PYO59、PYO200、PX2、PX5、SL4、φO3、φO6和1214。

[0158] 立克次体属的细菌可以被下述噬菌体感染:NN-立克次体属。

[0159] 沙门氏菌属的细菌可以被下述噬菌体感染:b、Beccles、CT、d、Dundee、f、FeIs 2、GI、GUI、GVI、GVIII、k、K、i、j、L、01、(同义词= 0-1)、(同义词= 01)、(同义词= 0-I)、(同义词= 7)、02、03、P3、P9a、P10、Sab3、Sab5、SanlS、Sanl7、SI、Taunton、ViI、(同义词= ViI)、9、imSalmonella(1)、N-I、N-5、N-IO、N-17、N-22、11、12、16-19、20.2、36、449C/C178、966A/C259、a、B.A.O.R.、e、G4、GUI、L、LP7、M、MG40、N-18、PSA68、P4、P9c、P22、(同义词= P22)、(同义词= PLT22)、(同义词= PLT22)、P22al、P22-4、P22-7、P22-11、SNT-I、SNT-2、SP6、Villi、ViIV、ViV、ViVI、ViVII、Worksop、Sj5、ε34、1,37、1(40)、(同义词= φl[40])、1,422、2、2.5、3b、4、5、6,14(18)、8、14(6,7)、10、27、28B、30、31、32、33、34、36、37、39、1412、SNT-3、7-11、40.3、c、C236、C557、C625、C966N、g、GV、G5、Gl 73、h、IRA、Jersey、MB78、P22-1、P22-3、P22-12、Sabl、Sab2、Sab2、Sab4、Sanl、San2、San3、San4、San6、San7、San8、San9、Sanl3、Sanl4、Sanl6、Sanl8、Sanl9、San20、San21、San22、San23、San24、San25、San26、SasLl、SasL2、SasL3、SasL4、SasL5、SlBL、SII、ViII、φl、1、2、3a、3al、1010、Ym-沙门氏菌属(1)、N-4、SasL6和27。

[0160] 沙雷氏菌属的细菌可以被下述噬菌体感染:A2P、PS20、SMB3、SMP、SMP5、SM2、V40、V56、ic、ΦCP-3、ΦCP-6、3M、10/la、20A、34CC、34H、38T、345G、345P、501B、SMB2、SMP2、BC、BT、CW2、CW3、CW4、CW5、Lt232、L2232、L34、L.228、SLP、SMPA、V.43、σ、φCWl、ΦCP6-1、ΦCP6-2、ΦCP6-5、3T、5、8、9F、10/1、20E、32/6、34B、34CT、34P、37、41、56、56D、56P、60P、61/6、74/6、76/4、101/8900、226、227、228、229F、286、289、290F、512、764a、2847/10、2847/10a、L.359和SMBl。

[0161] 志贺氏菌属的细菌可以被下述噬菌体感染:Fsa、(同义词=a)、FSD2d、(同义词=D2d)、(同义词= W2d)、FSD2E、(同义词= W2e)、fv、F6、f7.8、H-Sh、PE5、P90、SfII、Sh、SHm、SHrv、(同义词= HIV)、SHvi、(同义词= HVI)、SHVvm、(同义词= HVIII)、SKγ66、(同义词=γ66)、(同义词= yββ)、(同义词= γ66b)、SKm、(同义词= SIIIb)5(同义词= UI)、SKw、(同义词= Siva)、(同义词= IV)、SIC™、(同义词= SIVA.)、(同义词= IVA)、SKvi、(同义词=KVI)、(同义词= Svi)、(同义词= VI)、SKvm、(同义词= Svm)、(同义词= VIII)、SKVⅡIA、(同义词= SvmA)、(同义词= VIIIA)、STvi、STK、STx1、STxn、S66、W2、(同义词= D2c)、(同义词=D20)、φl、φIVb 3-SO-R、8368-SO-R、F7、(同义词= FS7)、(同义词= K29)、F10、(同义词=FS10)、(同义词= K31)、I1、(同义词= α)、(同义词= FSa)、(同义词= K1 8)、(同义词= α)、I2、(同义词= a)、(同义词= K19)、SG33、(同义词= G35)、(同义词= SO-35/G)、SG35、(同义词= SO-55/G)、SG3201、(同义词= SO-3201/G)、SHn、(同义词= HII)、SHv、(同义词= SHV)、SHx、SHX、SKn、(同义词= K2)、(同义词= KII)、(同义词= Sn)、(同义词= SsII)、(同义词=II)、SKrv、(同义词= Sm)、(同义词= SsIV)、(同义词= IV)、SK1Va、(同义词= Swab)、(同义

词= SsIVa)、(同义词= IVa)、SKV、(同义词= K4)、(同义词= KV)、(同义词= SV)、(同义词= SsV)、(同义词= V)、SKx、(同义词= K9)、(同义词= KX)、(同义词= SX)、(同义词= SsX)、(同义词= X)、STV、(同义词= T35)、(同义词= 35-50-R)、STvm、(同义词= T8345)、(同义词= 8345-SO-S-R)、W1、(同义词= D8)、(同义词= FSD8)、W2a、(同义词= D2A)、(同义词= FS2a)、DD-2、Sf6、FSi、(同义词= F1)、SF6、(同义词= F6)、SG42、(同义词= SO-42/G)、SG3203、(同义词= SO-3203/G)、SKF12、(同义词= SsF12)、(同义词= F12)、(同义词= F12)、STn、(同义词= 1881-SO-R)、γ66、(同义词= γ66a)、(同义词= Ssγ66)、φ2、BI1、DDVII、(同义词= DD7)、FSD2b、(同义词= W2B)、FS2、(同义词= F2)、(同义词= F2)、FS4、(同义词= F4)、(同义词= F4)、FS5、(同义词= F5)、(同义词= F5)、FS9、(同义词= F9)、(同义词= F9)、FI 1、P2-SO-S、SG36、(同义词= SO-36/G)、(同义词= G36)、SG3204、(同义词= SO-3204/G)、SG3244、(同义词= SO-3244/G)、SHi、(同义词= HI)、SHvπ、(同义词= HVII)、SHK、(同义词= HIX)、SHx1、SHxπ、(同义词= HXn)、SKI、KI、(同义词= S1)、(同义词= SsI)、SKVII、(同义词= KVII)、(同义词= Svπ)、(同义词= SsVII)、SKIX、(同义词= KIX)、(同义词= S1x)、(同义词= SsIX)、SKXII、(同义词= KXII)、(同义词= Sxn)、(同义词= SsXII)、STi、STff1、STrv、STVi、STvπ、S70、S206、U2-SO-S、3210-SO-S、3859-SO-S、4020-SO-S、φ3、φ5、φ7、φ8、φ9、φ10、φ11、φ13、φ14、φ18、SHm、(同义词= Hπi)、SHxi、(同义词= HXt)和SKxI、(同义词= KXI)、(同义词= Sxi)、(同义词= SsXI)、(同义词= XI)。

[0162] 葡萄球菌属的细菌可以被下述噬菌体感染:A、EW、K、Ph5、Ph9、PhIO、Ph13、P1、P2、P3、P4、P8、P9、P10、RG、SB-i、(同义词= Sb-I)、S3K、Twort、ΦSK311、φ812、06、40、58、119、130、131、200、1623、STC1、(同义词=stc1)、STC2、(同义词=stc2)、44AHJD、68、AC1、AC2、A6″C″、A9″C″、b581、CA-I、CA-2、CA-3、CA-4、CA-5、DI 1、L39x35、L54a、M42、N1、N2、N3、N4、N5、N7、N8、N10、Ni 1、N12、N13、N14、N16、Ph6、Ph12、Ph14、UC-18、U4、U15、S1、S2、S3、S4、S5、X2、Z1、φB5-2、φD、ω、11、(同义词= φ1 1)、(同义词= P11-M15)、15、28、28A、29、31、31B、37、42D、(同义词= P42D)、44A、48、51、52、52A、(同义词= P52A)、52B、53、55、69、71、(同义词= P71)、71A、72、75、76、77、79、80、80α、82、82A、83 A、84、85、86、88、88A、89、90、92、95、96、102、107、108、111、129-26、130、130A、155、157、157A、165、187、275、275A、275B、356、456、459、471、471A、489、581、676、898、1139、1154A、1259、1314、1380、1405、1563、2148、2638A、2638B、2638C、2731、2792A、2792B、2818、2835、2848A、3619、5841、12100、AC3、A8、A10、A13、b594n、D、HK2、N9、N15、P52、P87、S1、S6、Z4、φRE、3A、3B、3C、6、7、16、21、42B、42C、42E、44、47、47A5 47C、51、54、54x1、70、73、75、78、81、82、88、93、94、101、105、110、115、129/16、174、594n、1363/14、2460和mS-葡萄球菌属(1)。

[0163] 链球菌属的细菌可以被下述噬菌体感染:EJ-I、NN-链球菌属(1)、a、C1、FLOThs、H39、Cp-I、Cp-5、Cp-7、Cp-9、Cp-IO、AT298、A5、a10/J1、a10/J2、a10/J5、a10/J9、A25、BTI 1、b6、CA1、c20-1、c20-2、DP-I、Dp-4、DT1、ET42、e10、FA101、FEThs、Fκ、FKKIOI、FKLIO、FKP74、FKH、FLOThs、FyIO1、f1、F10、F20140/76、g、GT-234、HB3、(同义词= HB-3)、HB-623、HB-746、M102、O1205、φO1205、PST、PO、P1、P2、P3、P5、P6、P8、P9、P9、P12、P13、P14、P49、P50、P51、P52、P53、P54、P55、P56、P57、P58、P59、P64、P67、P69、P71、P73、P75、P76、P77、P82、P83、P88、sc、sch、sf、SfI1 1、(同义词= SFiI 1)、(同义词= φSFi11)、(同义词= ΦSfi1 1)、(同义词= φSfi1 1)、sfi19、(同义词= SFi19)、(同义词= φSFi19)、(同义词= φSfi19)、Sfi21、(同义

词= SFi21)、(同义词= φSFi21)、(同义词= φSfi21)、ST0、STX、st2、ST2、ST4、S3、(同义词= φS3)、s265、Φ17、φ42、Φ57、φ80、φ81、φ82、φ83、φ84、φ85、φ86、φ87、φ88、φ89、φ90、φ91、φ92、φ93、φ94、φ95、φ96、φ97、φ98、φ99、φ100、φ101、φ102、φ227、Φ7201、ω1、ω2、ω3、ω4、ω5、ω6、ω8、ω10、1、6、9、10F、12/12、14、17SR、19S、24、50/33、50/34、55/14、55/15、70/35、70/36、71/ST15、71/45、71/46、74F、79/37、79/38、80/J4、80/J9、80/ST16、80/15、80/47、80/48、101、103/39、103/40、121/41、121/42、123/43、123/44、124/44、337/ST17和mStreptococcus(34)。

[0164] 密螺旋体属的细菌可以被下述噬菌体感染:NN-密螺旋体属(1)。

[0165] 弧菌属的细菌可以被下述噬菌体感染:CTXΦ、fs、(同义词= si)、fs2、Ivpf5、Vf12、Vf33、VPIΦ、VSK、v6、493、CP-T1、ET25、κ、K139、Labol、)XN-69P、OXN-86、O6N-21P、PB-I、P147、rp-1、SE3、VA-I、(同义词= VcA-I)、VcA-2、VP1、VP2、VP4、VP7、VP8、VP9、VP10、VP17、VP18、VP19、X29、(同义词= 29 d'Herelle)、t、ΦHAWI-1、ΦHAWI-2、ΦHAWI-3、ΦHAWI-4、ΦHAWI-5、ΦHAWI-6、ΦHAWI-7、XHAWI-8、ΦHAWI-9、ΦHAWI-10、ΦHC1-1、ΦHC1-2、ΦHC1-3、ΦHC1-4、ΦHC2-1、>HC2-2、ΦHC2-3、ΦHC2-4、ΦHC3-1、ΦHC3-2、ΦHC3-3、ΦHD1S-1、ΦHD1S-2、ΦHD2S-1、ΦHD2S-2、ΦHD2S-3、ΦHD2S-4、ΦHD2S-5、ΦHDO-1、ΦHDO-2、ΦHDO-3、ΦHDO-4、ΦHDO-5、ΦHDO-6、ΦKL-33、ΦKL-34、ΦKL-35、ΦKL-36、ΦKWH-2、ΦKWH-3、ΦKWH-4、ΦMARQ-1、ΦMARQ-2、ΦMARQ-3、ΦMOAT-1、ΦO139、ΦPEL1A-1、ΦPEL1A-2、ΦPEL8A-1、ΦPEL8A-2、ΦPEL8A-3、ΦPEL8C-1、ΦPEL8C-2、ΦPEL13A-1、ΦPEL13B-1、ΦPEL13B-2、ΦPEL13B-3、ΦPEL13B-4、ΦPEL13B-5、ΦPEL13B-6、ΦPEL13B-7、ΦPEL13B-8、ΦPEL13B-9、ΦPEL13B-10、φVP143、φVP253、Φ16、φ138、1- II、5、13、14、16、24、32、493、6214、7050、7227、II、(同义词= II组)、(同义词== φ2)、V、VIII、~m-弧菌属(13)、KVP20、KVP40、nt-1、O6N-22P、P68、e1、e2、e3、e4、e5、FK、G、I、K、nt-6、N1、N2、N3、N4、N5、O6N-34P、OXN-72P、OXN-85P、OXN-100P、P、Ph-I、PL163/10、Q、S、T、φ92、1-9、37、51、57、70A-8、72A-4、72A-10、110A-4、333、4996、I(同义词= I组)、III(同义词= III组)、VI、(同义词= A-Saratov)、VII、IX、X、HN-弧菌属(6)、pA1、7、7-8、70A-2、71A-6、72A-5、72A-8、108A-10、109A-6、109A-8、l 10A-1、110A-5、110A-7、hv-1、OXN-52P、P13、P38、P53、P65、P108、Pill、TP13 VP3、VP6、VP12、VP13、70A-3、70A-4、70A-10、72A-1、108A-3、109-B1、110A-2、149、(同义词= φ149)、IV、(同义词= IV组)、NN-弧菌属(22)、VP5、VPI1、VP15、VP16、α1、α2、α3a、α3b、353B和HN-弧菌属(7)。

[0166] 耶尔森氏菌属的细菌可以被下述噬菌体感染:H、H-I、H-2、H-3、H-4、Lucas 110、Lucas 303、Lucas 404、YerA3、YerA7、YerA20、YerA41、3/M64-76、5/G394-76、6/C753-76、8/C239-76、9/F18167、1701、1710、PST、1/F2852-76、D'Herelle、EV、H、Kotljarova、PTB、R、Y、YerA41、φYerO3-12、3、4/C1324-76、7/F783-76、903、1/M6176和Yer2AT。

[0167] 更优选地,细菌噬菌体选自沙门氏菌属病毒SKML39、志贺氏菌属病毒AG3、Dickeya病毒Limestone、Dickeya病毒RC2014、埃希氏菌属病毒CBA120、埃希氏菌属病毒PhaxI、沙门氏菌属病毒38、沙门氏菌属病毒Det7、沙门氏菌属病毒GG32、沙门氏菌属病毒PM10、沙门氏菌属病毒SFP10、沙门氏菌属病毒SH19、沙门氏菌属病毒SJ3、埃希氏菌属病毒ECML4、沙门氏菌属病毒Marshall、沙门氏菌属病毒Maynard、沙门氏菌属病毒SJ2、沙门氏菌属病毒STML131、沙门氏菌属病毒ViI、欧文氏菌属(Erwinia)病毒Ea2809、克雷伯氏菌属病毒0507KN21、沙雷氏菌属病毒IME250、沙雷氏菌属病毒MAM1、弯曲杆菌属病毒CP21、弯曲杆菌

属病毒CP220、弯曲杆菌属病毒CPt10、弯曲杆菌属病毒IBB35、弯曲杆菌属病毒CP81、弯曲杆菌属病毒CP30A、弯曲杆菌属病毒CPX、弯曲杆菌属病毒NCTC12673、欧文氏菌属病毒Ea214、欧文氏菌属病毒M7、埃希氏菌属病毒AYO145A、埃希氏菌属病毒EC6、埃希氏菌属病毒HY02、埃希氏菌属病毒JH2、埃希氏菌属病毒TP1、埃希氏菌属病毒VpaE1、埃希氏菌属病毒wV8、沙门氏菌属病毒Felix01、沙门氏菌属病毒HB2014、沙门氏菌属病毒Mushroom、沙门氏菌属病毒UAB87、柠檬酸杆菌属病毒Moogle、柠檬酸杆菌属病毒Mordin、埃希氏菌属病毒SUSP1、埃希氏菌属病毒SUSP2、气单胞菌属病毒phi018P、嗜血杆菌属病毒HP1、嗜血杆菌属病毒HP2、巴斯德氏菌属(Pasteurella)病毒F108、弧菌属病毒K139、弧菌属病毒Kappa、伯克霍尔德氏菌属病毒phi52237、伯克霍尔德氏菌属病毒phiE122、伯克霍尔德氏菌属病毒phiE202、埃希氏菌属病毒186、埃希氏菌属病毒P4、埃希氏菌属病毒P2、埃希氏菌属病毒Wphi、曼海姆氏菌属(Mannheimia)病毒PHL101、假单胞菌属病毒phiCTX、罗尔斯通氏菌属(Ralstonia)病毒RSA1、沙门氏菌属病毒Fels2、沙门氏菌属病毒PsP3、沙门氏菌属病毒SopEphi、耶尔森氏菌属病毒L413C、葡萄球菌属病毒G1、葡萄球菌属病毒G15、葡萄球菌属病毒JD7、葡萄球菌属病毒K、葡萄球菌属病毒MCE2014、葡萄球菌属病毒P108、葡萄球菌属病毒Rodi、葡萄球菌属病毒S253、葡萄球菌属病毒S25-4、葡萄球菌属病毒SA12、李斯特菌属病毒A511、李斯特菌属病毒P100、葡萄球菌属病毒Remus、葡萄球菌属病毒SA11、葡萄球菌属病毒Stau2、芽孢杆菌属病毒Camphawk、芽孢杆菌属病毒SPO1、芽孢杆菌属病毒BCP78、芽孢杆菌属病毒TsarBomba、葡萄球菌属病毒Twort、肠球菌属病毒phiEC24C、乳杆菌属病毒Lb338-1、乳杆菌属病毒LP65、肠杆菌属病毒PG7、埃希氏菌属病毒CC31、克雷伯氏菌属病毒JD18、克雷伯氏菌属病毒PKO111、埃希氏菌属病毒Bp7、埃希氏菌属病毒IME08、埃希氏菌属病毒JS10、埃希氏菌属病毒JS98、埃希氏菌属病毒QL01、埃希氏菌属病毒VR5、肠杆菌属病毒Eap3、克雷伯氏菌属病毒KP15、克雷伯氏菌属病毒KP27、克雷伯氏菌属病毒Matisse、克雷伯氏菌属病毒Miro、柠檬酸杆菌属病毒Merlin、柠檬酸杆菌属病毒Moon、埃希氏菌属病毒JSE、埃希氏菌属病毒phi1、埃希氏菌属病毒RB49、埃希氏菌属病毒HX01、埃希氏菌属病毒JS09、埃希氏菌属病毒RB69、志贺氏菌属病毒UTAM、沙门氏菌属病毒S16、沙门氏菌属病毒STML198、弧菌属病毒KVP40、弧菌属病毒nt1、弧菌属病毒ValKK3、埃希氏菌属病毒VR7、埃希氏菌属病毒VR20、埃希氏菌属病毒VR25、埃希氏菌属病毒VR26、志贺氏菌属病毒SP18、埃希氏菌属病毒AR1、埃希氏菌属病毒C40、埃希氏菌属病毒E112、埃希氏菌属病毒ECML134、埃希氏菌属病毒HY01、埃希氏菌属病毒Ime09、埃希氏菌属病毒RB3、埃希氏菌属病毒RB14、埃希氏菌属病毒T4、志贺氏菌属病毒Pss1、志贺氏菌属病毒Shf12、耶尔森氏菌属病毒D1、耶尔森氏菌属病毒PST、不动杆菌属病毒133、气单胞菌属病毒65、气单胞菌属病毒Aeh1、埃希氏菌属病毒RB16、埃希氏菌属病毒RB32、埃希氏菌属病毒RB43、假单胞菌属病毒42、克罗诺杆菌属(Cronobacter)病毒CR3、克罗诺杆菌属病毒CR8、克罗诺杆菌属病毒CR9、克罗诺杆菌属病毒PBES02、果胶杆菌属(Pectobacterium)病毒phiTE、克罗诺杆菌属病毒GAP31、埃希氏菌属病毒4MG、沙门氏菌属病毒SE1、沙门氏菌属病毒SSE121、埃希氏菌属病毒FFH2、埃希氏菌属病毒FV3、埃希氏菌属病毒JES2013、埃希氏菌属病毒V5、短芽孢杆菌属(Brevibacillus)病毒Abouo、短芽孢杆菌属病毒Davies、芽孢杆菌属病毒Agate、芽孢杆菌属病毒Bobb、芽孢杆菌属病毒Bp8pC、欧文氏菌属病毒Deimos、欧文氏菌属病毒Ea35-70、欧文氏菌属病毒RAY、欧文氏菌属病毒Simmy50、欧文氏菌属病毒SpecialG、不动杆菌属病毒AB1、不动杆菌属病毒AB2、不动杆菌属

病毒AbC62、不动杆菌属病毒AP22、节杆菌属(Arthrobacter)病毒ArV1、节杆菌属病毒Trina、芽孢杆菌属病毒AvesoBmore、芽孢杆菌属病毒B4、芽孢杆菌属病毒Bigbertha、芽孢杆菌属病毒Riley、芽孢杆菌属病毒Spock、芽孢杆菌属病毒Troll、芽孢杆菌属病毒Bastille、芽孢杆菌属病毒CAM003、芽孢杆菌属病毒Bc431、芽孢杆菌属病毒Bcp1、芽孢杆菌属病毒BCP82、芽孢杆菌属病毒BM15、芽孢杆菌属病毒Deepblue、芽孢杆菌属病毒JBP901、伯克霍尔德氏菌属病毒Bcep1、伯克霍尔德氏菌属病毒Bcep43、伯克霍尔德氏菌属病毒Bcep781、伯克霍尔德氏菌属病毒BcepNY3、黄单胞菌属(Xanthomonas)病毒OP2、伯克霍尔德氏菌属病毒BcepMu、伯克霍尔德氏菌属病毒phiE255、气单胞菌属病毒44RR2、分枝杆菌属病毒Alice、分枝杆菌属病毒Bxz1、分枝杆菌属病毒Dandelion、分枝杆菌属病毒HyRo、分枝杆菌属病毒I3、分枝杆菌属病毒Nappy、分枝杆菌属病毒Sebata、梭菌属病毒phiC2、梭菌属病毒phiCD27、梭菌属病毒phiCD119、芽孢杆菌属病毒CP51、芽孢杆菌属病毒JL、芽孢杆菌属病毒Shanette、埃希氏菌属病毒CVM10、埃希氏菌属病毒ep3、欧文氏菌属病毒Asesino、欧文氏菌属病毒EaH2、假单胞菌属病毒EL、盐单胞菌属(Halomonas)病毒HAP1、弧菌属病毒VP882、短芽孢杆菌属病毒Jimmer、短芽孢杆菌属病毒Osiris、假单胞菌属病毒Ab03、假单胞菌属病毒KPP10、假单胞菌属病毒PAKP3、中华根瘤菌属(Sinorhizobium)病毒M7、中华根瘤菌属病毒M12、中华根瘤菌属病毒N3、欧文氏菌属病毒Machina、节杆菌属病毒Brent、节杆菌属病毒Jawnski、节杆菌属病毒Martha、节杆菌属病毒Sonny、爱德华氏菌属(Edwardsiella)病毒MSW3、爱德华氏菌属病毒PEi21、埃希氏菌属病毒Mu、志贺氏菌属病毒SfMu、盐杆菌属(Halobacterium)病毒phiH、芽孢杆菌属病毒Grass、芽孢杆菌属病毒NIT1、芽孢杆菌属病毒SPG24、气单胞菌属病毒43、埃希氏菌属病毒P1、假单胞菌属病毒CAb1、假单胞菌属病毒CAb02、假单胞菌属病毒JG004、假单胞菌属病毒PAKP1、假单胞菌属病毒PAKP4、假单胞菌属病毒PaP1、伯克霍尔德氏菌属病毒BcepF1、假单胞菌属病毒141、假单胞菌属病毒Ab28、假单胞菌属病毒DL60、假单胞菌属病毒DL68、假单胞菌属病毒F8、假单胞菌属病毒JG024、假单胞菌属病毒KPP12、假单胞菌属病毒LBL3、假单胞菌属病毒LMA2、假单胞菌属病毒PB1、假单胞菌属病毒SN、假单胞菌属病毒PA7、假单胞菌属病毒phiKZ、根瘤菌属(Rhizobium)病毒RHEph4、罗尔斯通氏菌属病毒RSF1、罗尔斯通氏菌属病毒RSL2、罗尔斯通氏菌属病毒RSL1、气单胞菌属病毒25、气单胞菌属病毒31、气单胞菌属病毒Aes12、气单胞菌属病毒Aes508、气单胞菌属病毒AS4、窄食单胞菌属(Stenotrophomonas)病毒IME13、葡萄球菌属病毒IPLAC1C、葡萄球菌属病毒SEP1、沙门氏菌属病毒SPN3US、芽孢杆菌属病毒1、Geo芽孢杆菌属病毒GBSV1、耶尔森氏菌属病毒R1RT、耶尔森氏菌属病毒TG1、芽孢杆菌属病毒G、芽孢杆菌属病毒PBS1、微囊藻属(Microcystis)病毒Ma-LMM01、弧菌属病毒MAR、弧菌属病毒VHML、弧菌属病毒VP585、芽孢杆菌属病毒BPS13、芽孢杆菌属病毒Hakuna、芽孢杆菌属病毒Megatron、芽孢杆菌属病毒WPh、不动杆菌属病毒AB3、不动杆菌属病毒Abp1、不动杆菌属病毒Fri1、不动杆菌属病毒IME200、不动杆菌属病毒PD6A3、不动杆菌属病毒PDAB9、不动杆菌属病毒phiAB1、埃希氏菌属病毒K30、克雷伯氏菌属病毒K5、克雷伯氏菌属病毒K11、克雷伯氏菌属病毒Kp1、克雷伯氏菌属病毒KP32、克雷伯氏菌属病毒KpV289、克雷伯氏菌属病毒F19、克雷伯氏菌属病毒K244、克雷伯氏菌属病毒Kp2、克雷伯氏菌属病毒KP34、克雷伯氏菌属病毒KpV41、克雷伯氏菌属病毒KpV71、克雷伯氏菌属病毒KpV475、克雷伯氏菌属病毒SU503、克雷伯氏菌属病毒SU552A、泛菌属(Pantoea)病毒Limelight、泛菌属病毒Limezero、假单胞菌属

病毒LKA1、假单胞菌属病毒phiKMV、黄单胞菌属病毒f20、黄单胞菌属病毒f30、木杆菌属(Xylella)病毒Prado、欧文氏菌属病毒Era103、埃希氏菌属病毒K5、埃希氏菌属病毒K1-5、埃希氏菌属病毒K1E、沙门氏菌属病毒SP6、埃希氏菌属病毒T7、克吕沃尔氏菌属(Kluyvera)病毒Kvp1、假单胞菌属病毒gh1、原绿球藻属(Prochlorococcus)病毒PSSP7、聚球藻属(Synechococcus)病毒P60、聚球藻属病毒Syn5、链球菌属病毒Cp1、链球菌属病毒Cp7、葡萄球菌属病毒44AHJD、链球菌属病毒C1、芽孢杆菌属病毒B103、芽孢杆菌属病毒GA1、芽孢杆菌属病毒phi29、库特氏菌属(Kurthia)病毒6、放线菌属病毒Av1、支原体属病毒P1、埃希氏菌属病毒24B、埃希氏菌属病毒933W、埃希氏菌属病毒Min27、埃希氏菌属病毒PA28、埃希氏菌属病毒Stx2 II、志贺氏菌属病毒7502Stx、志贺氏菌属病毒POCJ13、埃希氏菌属病毒191、埃希氏菌属病毒PA2、埃希氏菌属病毒TL2011、志贺氏菌属病毒VASD、伯克霍尔德氏菌属病毒Bcep22、伯克霍尔德氏菌属病毒Bcepil02、伯克霍尔德氏菌属病毒Bcepmigl、伯克霍尔德氏菌属病毒DC1、博德特氏菌病毒BPP1、伯克霍尔德氏菌属病毒BcepC6B、噬纤维素菌属(Cellulophaga)病毒Cba41、噬纤维素菌属病毒Cba172、Dinoroseobacter病毒DFL12、欧文氏菌属病毒Ea9-2、欧文氏菌属病毒Frozen、埃希氏菌属病毒phiV10、沙门氏菌属病毒Epsilon15、沙门氏菌属病毒SPN1S、假单胞菌属病毒F116、假单胞菌属病毒H66、埃希氏菌属病毒APEC5、埃希氏菌属病毒APEC7、埃希氏菌属病毒Bp4、埃希氏菌属病毒EC1UPM、埃希氏菌属病毒ECBP1、埃希氏菌属病毒G7C、埃希氏菌属病毒IME11、志贺氏菌属病毒Sb1、无色杆菌属(Achromobacter)病毒Axp3、无色杆菌属病毒JWAlpha、爱德华氏菌属病毒KF1、假单胞菌属病毒KPP25、假单胞菌属病毒R18、假单胞菌属病毒Ab09、假单胞菌属病毒LIT1、假单胞菌属病毒PA26、假单胞菌属病毒Ab22、假单胞菌属病毒CHU、假单胞菌属病毒LUZ24、假单胞菌属病毒PAA2、假单胞菌属病毒PaP3、假单胞菌属病毒PaP4、假单胞菌属病毒TL、假单胞菌属病毒KPP21、假单胞菌属病毒LUZ7、埃希氏菌属病毒N4、沙门氏菌属病毒9NA、沙门氏菌属病毒SP069、沙门氏菌属病毒BTP1、沙门氏菌属病毒HK620、沙门氏菌属病毒P22、沙门氏菌属病毒ST64T、志贺氏菌属病毒Sf6、芽孢杆菌属病毒Page、芽孢杆菌属病毒Palmer、芽孢杆菌属病毒Pascal、芽孢杆菌属病毒Pony、芽孢杆菌属病毒Pookie、埃希氏菌属病毒172-1、埃希氏菌属病毒ECB2、埃希氏菌属病毒NJ01、埃希氏菌属病毒phiEco32、埃希氏菌属病毒Septima11、埃希氏菌属病毒SU10、布鲁氏菌属病毒Pr、布鲁氏菌属病毒Tb、埃希氏菌属病毒Pollock、沙门氏菌属病毒FSL SP-058、沙门氏菌属病毒FSL SP-076、螺杆菌属病毒1961P、螺杆菌属病毒KHP30、螺杆菌属病毒KHP40、Hamiltonella病毒APSE1、乳球菌属病毒KSY1、席藻属(Phormidium)病毒WMP3、席藻属病毒WMP4、假单胞菌属病毒119X、玫瑰杆菌属(Roseobacter)病毒SIO1、弧菌属病毒VpV262、弧菌属病毒VC8、弧菌属病毒VP2、弧菌属病毒VP5、链霉菌属病毒Amela、链霉菌属病毒phiCAM、链霉菌属病毒Aaronocolus、链霉菌属病毒Caliburn、链霉菌属病毒Danzina、链霉菌属病毒Hydra、链霉菌属病毒Izzy、链霉菌属病毒Lannister、链霉菌属病毒Lika、链霉菌属病毒Sujidade、链霉菌属病毒Zemlya、链霉菌属病毒ELB20、链霉菌属病毒R4、链霉菌属病毒phiHau3、分枝杆菌属病毒Acadian、分枝杆菌属病毒Baee、分枝杆菌属病毒Reprobate、分枝杆菌属病毒Adawi、分枝杆菌属病毒Bane1、分枝杆菌属病毒BrownCNA、分枝杆菌属病毒Chrisnmich、分枝杆菌属病毒Cooper、分枝杆菌属病毒JAMaL、分枝杆菌属病毒Nigel、分枝杆菌属病毒Stinger、分枝杆菌属病毒Vincenzo、分枝杆菌属病毒Zemanar、分枝杆菌属病毒Apizium、分枝杆菌属病毒Manad、分枝杆菌属病毒

Oline、分枝杆菌属病毒Osmaximus、分枝杆菌属病毒Pg1、分枝杆菌属病毒Soto、分枝杆菌属病毒Suffolk、分枝杆菌属病毒Athena、分枝杆菌属病毒Bernardo、分枝杆菌属病毒Gadjet、分枝杆菌属病毒Pipefish、分枝杆菌属病毒Godines、分枝杆菌属病毒Rosebush、分枝杆菌属病毒Babsiella、分枝杆菌属病毒Brujita、分枝杆菌属病毒Che9c、分枝杆菌属病毒Sbash、分枝杆菌属病毒Hawkeye、分枝杆菌属病毒Plot、沙门氏菌属病毒AG11、沙门氏菌属病毒Ent1、沙门氏菌属病毒f18SE、沙门氏菌属病毒Jersey、沙门氏菌属病毒L13、沙门氏菌属病毒LSPA1、沙门氏菌属病毒SE2、沙门氏菌属病毒SETP3、沙门氏菌属病毒SETP7、沙门氏菌属病毒SETP13、沙门氏菌属病毒SP101、沙门氏菌属病毒SS3e、沙门氏菌属病毒wksl3、埃希氏菌属病毒K1G、埃希氏菌属病毒K1H、埃希氏菌属病毒K1ind1、埃希氏菌属病毒K1ind2、沙门氏菌属病毒SP31、明串球菌属病毒Lmd1、明串球菌属病毒LN03、明串球菌属病毒LN04、明串球菌属病毒LN12、明串球菌属病毒LN6B、明串球菌属病毒P793、明串球菌属病毒1A4、明串球菌属病毒Ln8、明串球菌属病毒Ln9、明串球菌属病毒LN25、明串球菌属病毒LN34、明串球菌属病毒LNTR3、分枝杆菌属病毒Bongo、分枝杆菌属病毒Rey、分枝杆菌属病毒Butters、分枝杆菌属病毒Michelle、分枝杆菌属病毒Charlie、分枝杆菌属病毒Pipsqueaks、分枝杆菌属病毒Xeno、分枝杆菌属病毒Panchino、分枝杆菌属病毒Phrann、分枝杆菌属病毒Redi、分枝杆菌属病毒Skinnyp、戈登氏菌属(Gordonia)病毒BaxterFox、戈登氏菌属病毒Yeezy、戈登氏菌属病毒Kita、戈登氏菌属病毒Zirinka、戈登氏菌属病毒Nymphadora、分枝杆菌属病毒Bignuz、分枝杆菌属病毒Brusacoram、分枝杆菌属病毒Donovan、分枝杆菌属病毒Fishburne、分枝杆菌属病毒Jebeks、分枝杆菌属病毒Malithi、分枝杆菌属病毒Phayonce、肠杆菌属病毒F20、克雷伯氏菌属病毒1513、克雷伯氏菌属病毒KLPN1、克雷伯氏菌属病毒KP36、克雷伯氏菌属病毒PKP126、克雷伯氏菌属病毒Sushi、埃希氏菌属病毒AHP42、埃希氏菌属病毒AHS24、埃希氏菌属病毒AKS96、埃希氏菌属病毒C119、埃希氏菌属病毒E41c、埃希氏菌属病毒Eb49、埃希氏菌属病毒Jk06、埃希氏菌属病毒KP26、埃希氏菌属病毒Rogue1、埃希氏菌属病毒ACGM12、埃希氏菌属病毒Rtp、埃希氏菌属病毒ADB2、埃希氏菌属病毒JMPW1、埃希氏菌属病毒JMPW2、埃希氏菌属病毒T1、志贺氏菌属病毒PSf2、志贺氏菌属病毒Shfl1、柠檬酸杆菌属病毒Stevie、埃希氏菌属病毒TLS、沙门氏菌属病毒SP126、克罗诺杆菌属病毒Esp2949-1、假单胞菌属病毒Ab18、假单胞菌属病毒Ab19、假单胞菌属病毒PaMx11、节杆菌属病毒Amigo、丙酸杆菌属病毒Anatole、丙酸杆菌属病毒B3、芽孢杆菌属病毒Andromeda、芽孢杆菌属病毒Blastoid、芽孢杆菌属病毒Curly、芽孢杆菌属病毒Eoghan、芽孢杆菌属病毒Finn、芽孢杆菌属病毒Glittering、芽孢杆菌属病毒Riggi、芽孢杆菌属病毒Taylor、戈登氏菌属病毒Attis、分枝杆菌属病毒Barnyard、分枝杆菌属病毒Konstantine、分枝杆菌属病毒Predator、分枝杆菌属病毒Bernal13、葡萄球菌属病毒13、葡萄球菌属病毒77、葡萄球菌属病毒108PVL、分枝杆菌属病毒Bron、分枝杆菌属病毒Faith1、分枝杆菌属病毒Joedirt、分枝杆菌属病毒Rumpelstiltskin、乳球菌属病毒bIL67、乳球菌属病毒c2、乳杆菌属病毒c5、乳杆菌属病毒Ld3、乳杆菌属病毒Ld17、乳杆菌属病毒Ld25A、乳杆菌属病毒LLKu、乳杆菌属病毒phiLdb、噬纤维素菌属病毒Cba121、噬纤维素菌属病毒Cba171、噬纤维素菌属病毒Cba181、噬纤维素菌属病毒ST、芽孢杆菌属病毒250、芽孢杆菌属病毒IEBH、分枝杆菌属病毒Ardmore、分枝杆菌属病毒Avani、分枝杆菌属病毒Boomer、分枝杆菌属病毒Che8、分枝杆菌属病毒Che9d、分枝杆菌属病毒Deadp、分枝杆菌属病毒Dlane、分枝杆菌属病毒Dorothy、分

枝杆菌属病毒Dotproduct、分枝杆菌属病毒Drago、分枝杆菌属病毒Fruitloop、分枝杆菌属病毒Gumbie、分枝杆菌属病毒Ibhubesi、分枝杆菌属病毒Llij、分枝杆菌属病毒Mozy、分枝杆菌属病毒Mutaforma13、分枝杆菌属病毒Pacc40、分枝杆菌属病毒PMC、分枝杆菌属病毒Ramsey、分枝杆菌属病毒Rockyhorror、分枝杆菌属病毒SG4、分枝杆菌属病毒Shauna1、分枝杆菌属病毒Shilan、分枝杆菌属病毒Spartacus、分枝杆菌属病毒Taj、分枝杆菌属病毒Tweety、分枝杆菌属病毒Wee、分枝杆菌属病毒Yoshi、沙门氏菌属病毒Chi、沙门氏菌属病毒FSLSP030、沙门氏菌属病毒FSLSP088、沙门氏菌属病毒iEPS5、沙门氏菌属病毒SPN19、分枝杆菌属病毒244、分枝杆菌属病毒Bask21、分枝杆菌属病毒CJW1、分枝杆菌属病毒Eureka、分枝杆菌属病毒Kostya、分枝杆菌属病毒Porky、分枝杆菌属病毒Pumpkin、分枝杆菌属病毒Sirduracell、分枝杆菌属病毒Toto、分枝杆菌属病毒Corndog、分枝杆菌属病毒Firecracker、红细菌属(Rhodobacter)病毒RcCronus、假单胞菌属病毒D3112、假单胞菌属病毒DMS3、假单胞菌属病毒FHA0480、假单胞菌属病毒LPB1、假单胞菌属病毒MP22、假单胞菌属病毒MP29、假单胞菌属病毒MP38、假单胞菌属病毒PA1KOR、假单胞菌属病毒D3、假单胞菌属病毒PMG1、节杆菌属病毒Decurro、戈登氏菌属病毒Demosthenes、戈登氏菌属病毒Katyusha、戈登氏菌属病毒Kvothe、丙酸杆菌属病毒B22、丙酸杆菌属病毒Doucette、丙酸杆菌属病毒E6、丙酸杆菌属病毒G4、伯克霍尔德氏菌属病毒phi6442、伯克霍尔德氏菌属病毒phi1026b、伯克霍尔德氏菌属病毒phiE125、爱德华氏菌属病毒eiAU、分枝杆菌属病毒Ff47、分枝杆菌属病毒Muddy、分枝杆菌属病毒Gaia、分枝杆菌属病毒Giles、节杆菌属病毒Captnmurica、节杆菌属病毒Gordon、戈登氏菌属病毒GordTnk2、类芽孢杆菌属(Paenibacillus)病毒Harrison、埃希氏菌属病毒EK99P1、埃希氏菌属病毒HK578、埃希氏菌属病毒JL1、埃希氏菌属病毒SSL2009a、埃希氏菌属病毒YD2008s、志贺氏菌属病毒EP23、伴突属(Sodalis)病毒SO1、埃希氏菌属病毒HK022、埃希氏菌属病毒HK75、埃希氏菌属病毒HK97、埃希氏菌属病毒HK106、埃希氏菌属病毒HK446、埃希氏菌属病毒HK542、埃希氏菌属病毒HK544、埃希氏菌属病毒HK633、埃希氏菌属病毒mEp234、埃希氏菌属病毒mEp235、埃希氏菌属病毒mEpX1、埃希氏菌属病毒mEpX2、埃希氏菌属病毒mEp043、埃希氏菌属病毒mEp213、埃希氏菌属病毒mEp237、埃希氏菌属病毒mEp390、埃希氏菌属病毒mEp460、埃希氏菌属病毒mEp505、埃希氏菌属病毒mEp506、短芽孢杆菌属病毒Jenst、无色杆菌属病毒83-24、无色杆菌属病毒JWX、节杆菌属病毒Kellezzio、节杆菌属病毒Kitkat、节杆菌属病毒Bennie、节杆菌属病毒DrRobert、节杆菌属病毒Glenn、节杆菌属病毒HunterDalle、节杆菌属病毒Joann、节杆菌属病毒Korra、节杆菌属病毒Preamble、节杆菌属病毒Pumancara、节杆菌属病毒Wayne、分枝杆菌属病毒Alma、分枝杆菌属病毒Arturo、分枝杆菌属病毒Astro、分枝杆菌属病毒Backyardigan、分枝杆菌属病毒BBPiebs31、分枝杆菌属病毒Benedict、分枝杆菌属病毒Bethlehem、分枝杆菌属病毒Billknuckles、分枝杆菌属病毒Bruns、分枝杆菌属病毒Bxb1、分枝杆菌属病毒Bxz2、分枝杆菌属病毒Che12、分枝杆菌属病毒Cuco、分枝杆菌属病毒D29、分枝杆菌属病毒Doom、分枝杆菌属病毒Ericb、分枝杆菌属病毒Euphoria、分枝杆菌属病毒George、分枝杆菌属病毒Gladiator、分枝杆菌属病毒Goose、分枝杆菌属病毒Hammer、分枝杆菌属病毒Heldan、分枝杆菌属病毒Jasper、分枝杆菌属病毒JC27、分枝杆菌属病毒Jeffabunny、分枝杆菌属病毒JHC117、分枝杆菌属病毒KBG、分枝杆菌属病毒Kssjeb、分枝杆菌属病毒Kugel、分枝杆菌属病毒L5、分枝杆菌属病毒Lesedi、分枝杆菌属病毒LHTSCC、分枝

杆菌属病毒lockley、分枝杆菌属病毒Marcell、分枝杆菌属病毒Microwolf、分枝杆菌属病毒Mrgordo、分枝杆菌属病毒Museum、分枝杆菌属病毒Nepal、分枝杆菌属病毒Packman、分枝杆菌属病毒Peaches、分枝杆菌属病毒Perseus、分枝杆菌属病毒Pukovnik、分枝杆菌属病毒Rebeuca、分枝杆菌属病毒Redrock、分枝杆菌属病毒Ridgecb、分枝杆菌属病毒Rockstar、分枝杆菌属病毒Saintus、分枝杆菌属病毒Skipole、分枝杆菌属病毒Solon、分枝杆菌属病毒Switzer、分枝杆菌属病毒SWU1、分枝杆菌属病毒Ta17a、分枝杆菌属病毒Tiger、分枝杆菌属病毒Timshel、分枝杆菌属病毒Trixie、分枝杆菌属病毒Turbido、分枝杆菌属病毒Twister、分枝杆菌属病毒U2、分枝杆菌属病毒Violet、分枝杆菌属病毒Wonder、埃希氏菌属病毒DE3、埃希氏菌属病毒HK629、埃希氏菌属病毒HK630、埃希氏菌属病毒λ、节杆菌属病毒Laroye、分枝杆菌属病毒Halo、分枝杆菌属病毒Liefie、分枝杆菌属病毒Marvin、分枝杆菌属病毒Mosmoris、节杆菌属病毒Circum、节杆菌属病毒Mudcat、埃希氏菌属病毒N15、埃希氏菌属病毒9g、埃希氏菌属病毒JenK1、埃希氏菌属病毒JenP1、埃希氏菌属病毒JenP2、假单胞菌属病毒NP1、假单胞菌属病毒PaMx25、分枝杆菌属病毒Baka、分枝杆菌属病毒Courthouse、分枝杆菌属病毒Littlee、分枝杆菌属病毒Omega、分枝杆菌属病毒Optimus、分枝杆菌属病毒Thibault、极地杆菌属(Polaribacter)病毒P12002L、极地杆菌属病毒P12002S、Nonlabens病毒P12024L、Nonlabens病毒P12024S、栖热菌属(Thermus)病毒P23-45、栖热菌属病毒P74-26、李斯特菌属病毒LP26、李斯特菌属病毒LP37、李斯特菌属病毒LP110、李斯特菌属病毒LP114、李斯特菌属病毒P70、丙酸杆菌属病毒ATCC29399BC、丙酸杆菌属病毒ATCC29399BT、丙酸杆菌属病毒Attacne、丙酸杆菌属病毒Keiki、丙酸杆菌属病毒Kubed、丙酸杆菌属病毒Lauchelly、丙酸杆菌属病毒MrAK、丙酸杆菌属病毒Ouroboros、丙酸杆菌属病毒P91、丙酸杆菌属病毒P105、丙酸杆菌属病毒P144、丙酸杆菌属病毒P1001、丙酸杆菌属病毒P1.1、丙酸杆菌属病毒P100A、丙酸杆菌属病毒P100D、丙酸杆菌属病毒P101A、丙酸杆菌属病毒P104A、丙酸杆菌属病毒PA6、丙酸杆菌属病毒Pacnes201215、丙酸杆菌属病毒PAD20、丙酸杆菌属病毒PAS50、丙酸杆菌属病毒PHL009M11、丙酸杆菌属病毒PHL025M00、丙酸杆菌属病毒PHL037M02、丙酸杆菌属病毒PHL041M10、丙酸杆菌属病毒PHL060L00、丙酸杆菌属病毒PHL067M01、丙酸杆菌属病毒PHL070N00、丙酸杆菌属病毒PHL071N05、丙酸杆菌属病毒PHL082M03、丙酸杆菌属病毒PHL092M00、丙酸杆菌属病毒PHL095N00、丙酸杆菌属病毒PHL111M01、丙酸杆菌属病毒PHL112N00、丙酸杆菌属病毒PHL113M01、丙酸杆菌属病毒PHL114L00、丙酸杆菌属病毒PHL116M00、丙酸杆菌属病毒PHL117M00、丙酸杆菌属病毒PHL117M01、丙酸杆菌属病毒PHL132N00、丙酸杆菌属病毒PHL141N00、丙酸杆菌属病毒PHL151M00、丙酸杆菌属病毒PHL151N00、丙酸杆菌属病毒PHL152M00、丙酸杆菌属病毒PHL163M00、丙酸杆菌属病毒PHL171M01、丙酸杆菌属病毒PHL179M00、丙酸杆菌属病毒PHL194M00、丙酸杆菌属病毒PHL199M00、丙酸杆菌属病毒PHL301M00、丙酸杆菌属病毒PHL308M00、丙酸杆菌属病毒Pirate、丙酸杆菌属病毒Procrass1、丙酸杆菌属病毒SKKY、丙酸杆菌属病毒Solid、丙酸杆菌属病毒Stormborn、丙酸杆菌属病毒Wizzo、假单胞菌属病毒PaMx28、假单胞菌属病毒PaMx74、分枝杆菌属病毒Patience、分枝杆菌属病毒PBI1、红球菌属病毒Pepy6、红球菌属病毒Poco6、丙酸杆菌属病毒PFR1、链霉菌属病毒phiBT1、链霉菌属病毒phiC31、链霉菌属病毒TG1、柄杆菌属(Caulobacter)病毒Karma、柄杆菌属病毒Magneto、柄杆菌属病毒phiCbK、柄杆菌属病毒Rogue、柄杆菌属病毒Swift、葡萄球菌属病毒

11、葡萄球菌属病毒29、葡萄球菌属病毒37、葡萄球菌属病毒53、葡萄球菌属病毒55、葡萄球菌属病毒69、葡萄球菌属病毒71、葡萄球菌属病毒80、葡萄球菌属病毒85、葡萄球菌属病毒88、葡萄球菌属病毒92、葡萄球菌属病毒96、葡萄球菌属病毒187、葡萄球菌属病毒52a、葡萄球菌属病毒80alpha、葡萄球菌属病毒CNPH82、葡萄球菌属病毒EW、葡萄球菌属病毒IPLA5、葡萄球菌属病毒IPLA7、葡萄球菌属病毒IPLA88、葡萄球菌属病毒PH15、葡萄球菌属病毒phiETA、葡萄球菌属病毒phiETA2、葡萄球菌属病毒phiETA3、葡萄球菌属病毒phiMR11、葡萄球菌属病毒phiMR25、葡萄球菌属病毒phiNM1、葡萄球菌属病毒phiNM2、葡萄球菌属病毒phiNM4、葡萄球菌属病毒SAP26、葡萄球菌属病毒X2、肠球菌属病毒FL1、肠球菌属病毒FL2、肠球菌属病毒FL3、乳杆菌属病毒ATCC8014、乳杆菌属病毒phiJL1、片球菌属(Pediococcus)病毒cIP1、气单胞菌属病毒pIS4A、李斯特菌属病毒LP302、李斯特菌属病毒PSA、甲烷杆菌属(Methanobacterium)病毒psiM1、玫瑰杆菌属病毒RDJL1、玫瑰杆菌属病毒RDJL2、红球菌属病毒RER2、肠球菌属病毒BC611、肠球菌属病毒IMEEF1、肠球菌属病毒SAP6、肠球菌属病毒VD13、链球菌属病毒SPQS1、分枝杆菌属病毒Papyrus、分枝杆菌属病毒Send513、伯克霍尔德氏菌属病毒KL1、假单胞菌属病毒73、假单胞菌属病毒Ab26、假单胞菌属病毒Kakheti25、埃希氏菌属病毒Cajan、埃希氏菌属病毒Seurat、葡萄球菌属病毒SEP9、葡萄球菌属病毒Sextaec、链球菌属病毒858、链球菌属病毒2972、链球菌属病毒ALQ132、链球菌属病毒01205、链球菌属病毒Sfi11、链球菌属病毒7201、链球菌属病毒DT1、链球菌属病毒phiAbc2、链球菌属病毒Sfi19、链球菌属病毒Sfi21、类芽孢杆菌属病毒Diva、类芽孢杆菌属病毒Hb10c2、类芽孢杆菌属病毒Rani、类芽孢杆菌属病毒Shelly、类芽孢杆菌属病毒Sitara、类芽孢杆菌属病毒Willow、乳球菌属病毒712、乳球菌属病毒ASCC191、乳球菌属病毒ASCC273、乳球菌属病毒ASCC281、乳球菌属病毒ASCC465、乳球菌属病毒ASCC532、乳球菌属病毒Bibb29、乳球菌属病毒bIL170、乳球菌属病毒CB13、乳球菌属病毒CB14、乳球菌属病毒CB19、乳球菌属病毒CB20、乳球菌属病毒jj50、乳球菌属病毒P2、乳球菌属病毒P008、乳球菌属病毒sk1、乳球菌属病毒Sl4、芽孢杆菌属病毒Slash、芽孢杆菌属病毒Stahl、芽孢杆菌属病毒Staley、芽孢杆菌属病毒Stills、戈登氏菌属病毒Bachita、戈登氏菌属病毒ClubL、戈登氏菌属病毒OneUp、戈登氏菌属病毒Smoothie、戈登氏菌属病毒Soups、芽孢杆菌属病毒SPbeta、弧菌属病毒MAR10、弧菌属病毒SSP002、埃希氏菌属病毒AKFV33、埃希氏菌属病毒BF23、埃希氏菌属病毒DT57C、埃希氏菌属病毒EPS7、埃希氏菌属病毒FFH1、埃希氏菌属病毒H8、埃希氏菌属病毒slur09、埃希氏菌属病毒T5、沙门氏菌属病毒118970sal2、沙门氏菌属病毒Shivani、沙门氏菌属病毒SPC35、沙门氏菌属病毒Stitch、节杆菌属病毒Tank、束村氏菌属(Tsukamurella)病毒TIN2、束村氏菌属病毒TIN3、束村氏菌属病毒TIN4、红细菌属病毒RcSpartan、红细菌属病毒RcTitan、分枝杆菌属病毒Anaya、分枝杆菌属病毒Angelica、分枝杆菌属病毒Crimd、分枝杆菌属病毒Fionnbarth、分枝杆菌属病毒Jaws、分枝杆菌属病毒Larva、分枝杆菌属病毒Macncheese、分枝杆菌属病毒Pixie、分枝杆菌属病毒TM4、芽孢杆菌属病毒BMBtp2、芽孢杆菌属病毒TP21、Geo芽孢杆菌属病毒Tp84、葡萄球菌属病毒47、葡萄球菌属病毒3a、葡萄球菌属病毒42e、葡萄球菌属病毒IPLA35、葡萄球菌属病毒phi12、葡萄球菌属病毒phiSLT、分枝杆菌属病毒32HC、红球菌属病毒RGL3、类芽孢杆菌属病毒Vegas、戈登氏菌属病毒Vendetta、芽孢杆菌属病毒Wbeta、分枝杆菌属病毒Wildcat、戈登氏菌属病毒Twister6、戈登氏菌属病毒Wizard、戈登氏菌属病毒Hotorobo、戈登氏菌属病毒Monty、戈登

氏菌属病毒Woes、黄单胞菌属病毒CP1、黄单胞菌属病毒OP1、黄单胞菌属病毒phi17、黄单胞菌属病毒Xop411、黄单胞菌属病毒Xp10、链霉菌属病毒TP1604、链霉菌属病毒YDN12、α-变形菌纲(Alphaproteobacteria)病毒phiJ1001、假单胞菌属病毒LKO4、假单胞菌属病毒M6、假单胞菌属病毒MP1412、假单胞菌属病毒PAE1、假单胞菌属病毒Yua、假交替单胞菌属(Pseudoalteromonas)病毒PM2、假单胞菌属病毒phi6、假单胞菌属病毒phi8、假单胞菌属病毒phi12、假单胞菌属病毒phi13、假单胞菌属病毒phi2954、假单胞菌属病毒phiNN、假单胞菌属病毒phiYY、弧菌属病毒fs1、弧菌属病毒VGJ、罗尔斯通氏菌属病毒RS603、罗尔斯通氏菌属病毒RSM1、罗尔斯通氏菌属病毒RSM3、埃希氏菌属病毒M13、埃希氏菌属病毒I22、沙门氏菌属病毒IKe、无胆甾原体属(Acholeplasma)病毒L51、弧菌属病毒fs2、弧菌属病毒VFJ、埃希氏菌属病毒If1、丙酸杆菌属病毒B5、假单胞菌属病毒Pf1、假单胞菌属病毒Pf3、罗尔斯通氏菌属病毒PE226、罗尔斯通氏菌属病毒RSS1、螺原体属(Spiroplasma)病毒SVTS2、窄食单胞菌属病毒PSH1、窄食单胞菌属病毒SMA6、窄食单胞菌属病毒SMA7、窄食单胞菌属病毒SMA9、弧菌属病毒CTXphi、弧菌属病毒KSF1、弧菌属病毒VCY、弧菌属病毒Vf33、弧菌属病毒Vf03K6、黄单胞菌属病毒Cf1c、螺原体属病毒C74、螺原体属病毒R8A2B、螺原体属病毒SkV1CR23x、埃希氏菌属病毒FI、埃希氏菌属病毒Qbeta、埃希氏菌属病毒BZ13、埃希氏菌属病毒MS2、埃希氏菌属病毒alpha3、埃希氏菌属病毒ID21、埃希氏菌属病毒ID32、埃希氏菌属病毒ID62、埃希氏菌属病毒NC28、埃希氏菌属病毒NC29、埃希氏菌属病毒NC35、埃希氏菌属病毒phiK、埃希氏菌属病毒St1、埃希氏菌属病毒WA45、埃希氏菌属病毒G4、埃希氏菌属病毒ID52、埃希氏菌属病毒Talmos、埃希氏菌属病毒phiX174、蛭弧菌属病毒MAC1、蛭弧菌属病毒MH2K、衣原体属病毒Chp1、衣原体属病毒Chp2、衣原体属病毒CPAR39、衣原体属病毒CPG1、螺原体属病毒SpV4、无胆甾原体属病毒L2、假单胞菌属病毒PR4、假单胞菌属病毒PRD1、芽孢杆菌属病毒AP50、芽孢杆菌属病毒Bam35、芽孢杆菌属病毒GIL16、芽孢杆菌属病毒Wip1、埃希氏菌属病毒phi80、埃希氏菌属病毒RB42、埃希氏菌属病毒T2、埃希氏菌属病毒T3、埃希氏菌属病毒T6、埃希氏菌属病毒VT2-Sa、埃希氏菌属病毒VT1-Sakai、埃希氏菌属病毒VT2-Sakai、埃希氏菌属病毒CP-933V、埃希氏菌属病毒P27、埃希氏菌属病毒Stx2phi-I、埃希氏菌属病毒Stx1phi、埃希氏菌属病毒Stx2phi-II、埃希氏菌属病毒CP-1639、基于埃希氏菌属病毒BP-4795、埃希氏菌属病毒86、埃希氏菌属病毒Min27、埃希氏菌属病毒2851、埃希氏菌属病毒1717、埃希氏菌属病毒YYZ-2008、埃希氏菌属病毒EC026_P06、埃希氏菌属病毒ECO103_P15、埃希氏菌属病毒ECO103_P12、埃希氏菌属病毒ECO111_P16、埃希氏菌属病毒ECO111_P11、埃希氏菌属病毒VT2phi_272、埃希氏菌属病毒TL-2011c、埃希氏菌属病毒P13374、埃希氏菌属病毒Sp5。

[0168] 在一个实施方案中，细菌病毒颗粒靶向大肠杆菌，并且包括选自以下的细菌噬菌体的衣壳:BW73、B278、D6、D108、E、E1、E24、E41、FI-2、FI-4、FI-5、HI8A、Ff18B、i、MM、Mu、025、PhI-5、Pk、PSP3、P1、P1D、P2、P4、S1、WΦ、ΦK13、Φ1、Φ2、Φ7、Φ92、7 A、8Φ、9Φ、18、28-1、186、299、HH-埃希氏菌属(2)、AB48、CM、C4、C16、DD-VI、E4、E7、E28、FI1、FI3、H、H1、H3、H8、K3、M、N、ND-2、ND-3、ND4、ND-5、ND6、ND-7、Ox-I、Ox-2、Ox-3、Ox-4、Ox-5、Ox-6、PhI-I、RB42、RB43、RB49、RB69、S、SaI-I、Sal-2、Sal-3、Sal-4、Sal-5、Sal-6、TC23、TC45、TuII*-6、TuIP-24、TuII*46、TuIP-60、T2、T4、T6、T35、α1、1、IA、3、3A、3T+、5Φ、9266Q、CFO103、HK620、J、K、K1F、m59、no. A、no. E、no. 3、no. 9、N4、sd、T3、T7、WPK、W31、ΔH、ΦC3888、ΦK3、ΦK7、Φ

K12、φV-1、Φ04-CF、Φ05、Φ06、Φ07、φ1、φ1.2、φ20、φ95、φ263、φ1092、φ1、φ11、Ω8、1、3、7、8、26、27、28-2、29、30、31、32、38、39、42、933W、NN-埃希氏菌属(1)、Esc-7-11、AC30、CVX-5、C1、DDUP、EC1、EC2、E21、E29、F1、F26S、F27S、Hi、HK022、HK97、HK139、HK253、HK256、K7、ND-I、PA-2、q、S2、T1、)、T3C、T5、UC-I、w、β4、γ2、λ 、ΦD326、φγ、Φ06、Φ7、Φ10、φ80、x、2、4、4A、6、8A、102、150、168、174、3000、AC6、AC7、AC28、AC43、AC50、AC57、AC81、AC95、HK243、K10、ZG/3A、5、5A、21EL、H19-J和933H。

[0169] 如本文使用的，“益生元”指这样的成分，其允许胃肠道微生物群的组成和/或活性两者的特异性变化，所述变化可以对宿主赋予益处。益生元可以是可食用的食物或饮料或其成分。益生元可以是选择性地发酵的成分。益生元可以包括复合碳水化合物、氨基酸、肽、矿物质或细菌组合物存活的其它必需营养组分。益生元包括但不限于氨基酸、生物素、果寡糖、半乳寡糖、半纤维素(例如阿拉伯木聚糖、木聚糖、木葡聚糖和葡甘露聚糖)、菊粉、几丁质、乳果糖、甘露寡糖、富含低聚果糖的菊粉、树胶(例如瓜尔胶、阿拉伯树胶和角叉菜胶(carregenaan))、低聚果糖、低聚右旋糖(oligodextrose)、塔格糖、抗性麦芽糖糊精(例如抗性淀粉)、反式半乳寡糖、果胶(例如木糖聚半乳糖醛酸(xylogalactouronan)、柑橘果胶、苹果果胶和鼠李糖聚半乳糖醛酸-I)、膳食纤维(例如大豆纤维、甜菜纤维、豌豆纤维、玉米麸和燕麦纤维)和木寡糖。

[0170] 如本文使用的，“益生菌”指基于活微生物的饮食补充剂，当以足够数量摄入时，所述活微生物通过加强肠道生态系统对宿主生物具有有益作用。益生菌可以包含非致病性细菌或真菌群体，例如免疫调节性细菌群体，例如抗炎细菌群体，伴随或不伴随一种或多种益生元。它们含有足够高数目的存活且活性的益生菌微生物，其可以通过直接定殖对肠道菌群发挥平衡作用。必须指出，为了本说明书的目的，术语“益生菌”意指任何生物活性形式的益生菌，优选但不限于乳杆菌、双歧杆菌、链球菌、肠球菌、丙酸杆菌或酵母菌，但甚至是构成正常肠道菌群的其它微生物，或者这些微生物的细菌壁或DNA的片段。这些组合物的优点在于适合于安全施用于人和其它哺乳动物受试者，并且有效用于治疗、预防细菌感染。益生菌包括但不限于乳杆菌、双歧杆菌、链球菌、肠球菌、丙酸杆菌、酵母菌、乳杆菌、双歧杆菌或变形菌。

[0171] 抗生素可以选自青霉素类，例如青霉素G、青霉素K、青霉素N、青霉素O、青霉素V、甲氧西林、苄青霉素、萘夫西林、苯唑西林、氯唑西林、双氯西林、氨苄西林、阿莫西林、匹氨西林、海他西林、巴氨西林、美坦西林、酞氨西林、依匹西林、羧苄西林、替卡西林、替莫西林、美洛西林和哌拉西林；头孢菌素类，例如头孢乙腈、头孢羟氨苄、头孢氨苄、头孢来星、头孢洛宁、头孢噻啶、头孢噻吩、头孢匹林、头孢曲嗪、头孢氮氟、头孢西酮、头孢唑啉、头孢拉定、头孢沙定、头孢替唑、头孢克洛、头孢尼西、头孢丙烯、头孢呋辛、头孢唑南、头孢美唑、头孢替坦、头孢西丁、氯碳头孢、头孢拉宗、头孢米诺、头孢替坦、头孢西丁、头孢替安、头孢卡品、头孢达肟、头孢地尼、头孢托仑、头孢他美、头孢克肟、头孢甲肟、头孢地嗪、头孢噻肟、头孢维星、头孢咪唑、头孢泊肟、头孢特仑、ceftamere、头孢布烯、头孢噻呋、头孢噻林、头孢唑肟、头孢曲松、头孢哌酮、头孢他啶、拉氧头孢、头孢克定、头孢吡肟、头孢瑞南、头孢噻利、头孢唑兰、头孢匹罗、头孢喹肟、氟氧头孢、头孢比普、头孢洛林、头孢洛扎、头孢洛仑、头孢帕罗、头孢卡奈、头孢屈洛、头孢吡酮、头孢三唑、头孢维曲、头孢马替林、cefmepidium、头孢噁唑、头孢罗替、头孢舒米、头孢噻氧、头孢呋汀和头孢硝噻吩；多粘菌素类，例如多链丝霉素

(polysporin)、新孢霉素、多粘菌素B和多粘菌素E,利福平类,例如利福平、利福喷丁和利福昔明;非达霉素;喹诺酮类,例如西诺沙星、萘啶酸、噁喹酸、吡咯米酸、吡哌酸、罗索沙星、环丙沙星、依诺沙星、氟罗沙星、洛美沙星、那氟沙星、诺氟沙星、氧氟沙星、培氟沙星、芦氟沙星、巴洛沙星、格帕沙星、左氧氟沙星、帕珠沙星、替马沙星、托氟沙星、克林沙星、加替沙星、吉米沙星、莫西沙星、西他沙星、曲伐沙星、普卢利沙星、德拉沙星、奈诺沙星和扎波沙星;磺胺类,例如磺胺异噁唑、磺胺乙酰胺、磺胺嘧啶、磺胺二甲嘧啶、磺胺异噁唑、磺胺索嘧啶、磺胺多辛、磺胺甲噁唑、磺胺噁唑、磺胺硝苯、磺胺二甲氧嘧啶、磺胺甲氧呲嗪、磺胺对甲氧嘧啶、磺胺多辛、磺胺甲氧嗪和对苯二酚(terephtyl);大环内酯类,例如阿奇霉素、克拉霉素、红霉素、非达霉素、泰利霉素、碳霉素(carbomycin)A、交沙霉素、吉他霉素、麦迪霉素、夹竹桃霉素、索利霉素、螺旋霉素、醋竹桃霉素、泰乐菌素和罗红霉素;酮内酯类,例如泰利霉素和赛红霉素;氟酮内酯类(lluoroketolides),例如索利霉素;林可酰胺类,例如林可霉素、克林霉素和吡利霉素;四环素类,例如地美环素、多西环素、米诺环素、土霉素和四环素;氨基糖苷类,例如阿米卡星、地贝卡星、庆大霉素、卡那霉素、新霉素、奈替米星、西索米星、妥布霉素、巴龙霉素和链霉素;安莎霉素类,例如格尔德霉素、除莠霉素和利福昔明;碳头孢烯类,例如氯碳头孢;碳青霉烯类,例如厄他培南、多利培南、亚胺培南(或西司他丁)和美罗培南;糖肽类,例如替考拉宁、万古霉素、特拉万星、达巴万星和奥利万星;林可酰胺类,例如克林霉素和林可霉素;脂肽类,例如达托霉素;单内酰胺类,例如氨曲南;硝基呋喃类,例如呋喃唑酮和呋喃妥因;噁唑烷酮类,例如利奈唑胺、posizolid、雷德唑胺和特地唑胺;泰斯巴汀、氯法齐明、氨苯砜、卷曲霉素、环丝氨酸、乙胺丁醇、乙硫异烟胺、异烟肼、吡嗪酰胺、利福布汀、肿凡钠明、氯霉素、磷霉素、夫西地酸、甲硝唑、莫匹罗星、平板霉素、喹奴普丁(或达福普汀)、甲砜霉素、替加环素、替硝唑、甲氧苄啶、阿拉曲沙星、非达霉素、萘啶酸、利福平、其衍生物和组合。

[0172] 本发明提供了药物组合物或兽医组合物,其包含本文公开的一种或多种细菌递送媒介物和药学上可接受的载体。一般地,对于药物用途,细菌递送媒介物可以被配制为药物制剂或组合物,其包含至少一种细菌递送媒介物和至少一种药学上可接受的载体、稀释剂或赋形剂,以及任选地一种或多种进一步的药学活性化合物。此类制剂可以是适合于以下的形式:经口施用,肠胃外施用(例如通过静脉内、肌内或皮下注射或静脉内输注),局部施用,通过吸入、皮肤贴剂、植入物、栓剂施用等。此类施用形式可以是固体、半固体或液体,取决于施用方式和途径。例如,用于经口施用的制剂可以具有肠溶衣,所述肠溶衣允许制剂中的合成细菌递送媒介物抵抗胃环境并进入肠道。更一般地,用于经口施用的合成细菌递送媒介物制剂,可以适当地配制用于递送到胃肠道的任何所需部分内。另外,合适的栓剂可以用于递送到胃肠道内。可用于细菌递送媒介物组合物中的各种药学上可接受的载体、稀释剂和赋形剂是技术人员已知的。

[0173] 还提供的是使用本文公开的合成细菌递送媒介物,用于治疗细菌感染的方法。该方法包括将本文公开的合成细菌递送媒介物或组合物施用于需要治疗的患有细菌感染的受试者。在一些实施方案中,受试者是哺乳动物。在一些实施方案中,受试者是人。

[0174] 根据本公开内容的药物组合物或兽医组合物可以进一步包含药学上可接受的媒介物。固体药学上可接受的媒介物可以包括一种或多种物质,其也可以充当调味剂、润滑剂、增溶剂、助悬剂、染料、填料、助流剂、压缩助剂、惰性粘合剂、甜味剂、防腐剂、染料、包衣

或片剂崩解剂。合适的固体媒介物包括例如磷酸钙、硬脂酸镁、滑石、糖、乳糖、糊精、淀粉、明胶、纤维素、聚乙烯吡咯烷酮(polyvinylpyrrolidine)、低熔点蜡和离子交换树脂。

[0175] 药物组合物或兽医组合物可以制备为无菌固体组合物,其可以在施用时使用无菌水、盐水或其它适当的无菌可注射介质进行悬浮。本公开内容的药物组合物或兽医组合物可以以无菌溶液或悬浮液的形式经口施用,所述无菌溶液或悬浮液含有其它溶质或助悬剂(例如,足够的盐水或葡萄糖以使溶液等渗)、胆汁盐、阿拉伯胶、明胶、脱水山梨糖醇单油酸酯、聚山梨酸酯8o(山梨糖醇及其酸酐与环氧乙烷共聚的油酸酯)等等。根据本公开内容的颗粒也可以以液体或固体组合物的形式经口施用。适合于经口施用的组合物包括固体形式,例如丸剂、胶囊、颗粒、片剂和粉末,以及液体形式,例如溶液、糖浆剂、酏剂和悬浮液。可用于肠内施用的形式包括无菌溶液、乳状液和悬浮液。

[0176] 根据本公开内容的细菌递送媒介物可以溶解或悬浮于药学上可接受的液体媒介物中,所述液体媒介物例如水、有机溶剂、两者的混合物或者药学上可接受的油或脂肪。液体媒介物可以含有其它合适的药物添加剂,例如增溶剂、乳化剂、缓冲剂、防腐剂、甜味剂、调味剂、助悬剂、增稠剂、着色剂、粘度调节剂、稳定剂或渗透调节剂。用于经口施用和肠内施用的液体媒介物的合适实例包括水(部分含有如上文的添加剂,例如纤维素衍生物,优选羧甲基纤维素钠溶液)、醇类(包括一元醇和多元醇,例如二醇)及其衍生物、以及油(例如分馏椰子油和花生油)。对于肠胃外施用,媒介物也可以是油性酯,例如油酸乙酯和肉豆蔻酸异丙酯。无菌液体媒介物可用于无菌液体形式组合物中,用于肠内施用。用于加压组合物的液体媒介物可以是卤代烃或其它药学上可接受的推进剂。

[0177] 对于经皮施用,药物组合物或兽医组合物可以配制成软膏、乳膏或凝胶形式,并且可以使用适当的渗透剂或去污剂来促进渗透,例如二甲基亚砜、二甲基乙酰胺和二甲基甲酰胺。

[0178] 对于经粘膜施用,可以使用鼻腔喷雾剂、直肠或阴道栓剂。可以通过本领域已知的方法,将活性化合物掺入任何已知的栓剂基质内。此类基质的实例包括可可脂、聚乙二醇(碳蜡)、聚乙烯脱水山梨糖醇单硬脂酸酯,以及这些与其它相容材料的混合物,以改变熔点或溶解速率。

[0179] 本发明涉及用于治疗由细菌引起的疾病或病症的方法,其包括将治疗量的如本文公开的药物组合物或兽医组合物施用于受试者,所述受试者患有此类疾病或病症并且需要治疗。它还涉及如本文公开的药物组合物或兽医组合物,其用于治疗由细菌引起的疾病或病症。它进一步涉及如本文公开的药物组合物或兽医组合物用于制造药物的用途,所述药物用于治疗由细菌引起的疾病或病症。

[0180] 由细菌引起的疾病或病症可以选自腹部绞痛、寻常痤疮、急性会厌炎、关节炎、菌血症、血性腹泻、肉毒杆菌中毒、布鲁氏菌病、脑脓肿、软下疳、性病、衣原体、克罗恩氏病、结膜炎、胆囊炎、结肠直肠癌、息肉病、生态失调、莱姆病、腹泻、白喉、十二指肠溃疡、心内膜炎、丹毒丝菌病(erysipelothricosis)、肠热症、发热、肾小球肾炎、胃肠炎、胃溃疡、格巴二氏综合征、破伤风、淋病、牙龈炎、炎性肠病、肠易激综合征、钩端螺旋体病、麻风病、李斯特菌病、肺结核、温夫人综合征、军团菌病、脑膜炎、粘液脓性结膜炎、多药抗性细菌感染、多药抗性细菌携带、肌坏死-气性坏疽、鸟分枝杆菌复合群、新生儿坏死性小肠结肠炎、诺卡氏菌病、医院感染、耳炎、牙周炎、咽炎、肺炎、腹膜炎、紫癜热、落基山斑疹热、志贺氏菌病、梅毒、

鼻窦炎、乙状结肠炎、败血症、皮下脓肿、兔热病、气管支气管炎、扁桃体炎、伤寒、溃疡性结肠炎、尿路感染和百日咳。

[0181] 由细菌引起的疾病或病症可以是选自以下的细菌感染:皮肤感染如痤疮,肠道感染如食道炎、胃炎、肠炎、结肠炎、乙状结肠炎、直肠炎和腹膜炎,尿路感染,阴道感染,女性上生殖道感染如输卵管炎、子宫内膜炎、卵巢炎、子宫肌炎、子宫旁组织炎和盆腔腹膜感染,呼吸道感染如肺炎,羊膜内感染,牙源性感染,牙髓感染,纤维化,脑膜炎,血流感染,医院感染如导管相关感染、医院获得性肺炎、产后感染、医院获得性胃肠炎、医院获得性尿路感染及其组合。优选地,根据本公开内容的感染由呈现抗生素抗性的细菌引起。在一个特定实施方案中,感染由如上文在靶向的细菌中列出的细菌引起。

[0182] 由细菌引起的疾病或病症也可以是代谢紊乱,例如肥胖和糖尿病。因此,本公开内容还涉及如本文公开的药物组合物或兽医组合物,其用于治疗代谢紊乱,包括例如肥胖和糖尿病。它进一步涉及用于治疗代谢紊乱的方法,其包括施用治疗量的如本文公开的药物组合物或兽医组合物,以及如本文公开的药物组合物或兽医组合物用于制造用于治疗代谢紊乱的药物的用途。

[0183] 由细菌引起的疾病或病症也可能是涉及人微生物组的细菌的病理状况。因此,在一个特定实施方案中,本公开内容涉及如本文公开的药物组合物或兽医组合物,其用于治疗涉及人微生物组的细菌的病理状况,例如炎症和自身免疫性疾病、癌症、感染或脑病症。它进一步涉及用于治疗涉及人微生物组的细菌的病理状况的方法,其包括施用治疗量的如本文公开的药物组合物或兽医组合物,以及如本文公开的药物组合物或兽医组合物用于制造药物的用途,所述药物用于治疗涉及人微生物组的细菌的病理状况。事实上,微生物组的一些细菌在不触发任何感染的情况下,可以分泌诱导和/或增强炎症或自身免疫性疾病或癌症发展的分子。更具体而言,本公开内容还涉及调节微生物组的组成以改善免疫疗法的功效,所述免疫疗法基于例如CAR-T(嵌合抗原受体T)细胞、TIL(肿瘤浸润性淋巴细胞)、以及也称为抑制性T细胞的Treg(调节性T细胞)。调节微生物组的组成以改善免疫疗法的功效,还可以包括本领域众所周知的免疫检查点抑制剂的使用,所述抑制剂例如但不限于PD-1(程序性细胞死亡蛋白1)抑制剂、PD-L1(程序性死亡配体1)抑制剂和CTLA-4(细胞毒性T淋巴细胞相关蛋白4)。

[0184] 微生物组的一些细菌也可以分泌影响脑的分子。

[0185] 因此,本公开内容的一个进一步目的是用于控制受试者的微生物组的方法,其包括在所述受试者中施用有效量的如本文公开的药物组合物。

[0186] 在一个特定实施方案中,本公开内容还涉及用于需要治疗细菌感染的个体的个体化治疗的方法,其包括:i)从个体获得生物样品,并且测定来自样品的一组细菌DNA序列;ii)基于序列的确定,鉴定样品中的一种或多种致病性细菌菌株或物种;并且iii)向个体施用根据本公开内容的药物组合物,所述药物组合物能够识别样品中鉴定的每种致病性细菌菌株或物种,并递送包装的质粒。

[0187] 优选地,生物样品包含病理性和非病理性细菌物种,并且在向个体施用根据本公开内容的药物组合物或兽医组合物之后,个体上或个体中的致病菌的量降低,但非致病菌的量并未降低。

[0188] 在另一个特定实施方案中,本公开内容涉及根据本公开内容的药物组合物或兽医

组合物，其为了改善药物的有效性而使用。事实上，微生物组的一些细菌，虽然本身并非致病性的，但已知能够代谢药物并将其修饰为无效或有害的分子。

[0189] 在另一个特定实施方案中，本公开内容涉及根据本发明的组合物，其可以进一步包含至少一种另外的活性成分，例如益生元和/或益生菌和/或抗生素，和/或另一种抗菌剂或抗生物膜剂，和/或增强细菌递送媒介物对细菌的靶向和/或有效载荷递送到细菌内的任何药剂。

[0190] 在另一个特定实施方案中，本公开内容涉及任何目的化合物的原位细菌生产，所述化合物包括治疗性化合物，例如用于哺乳动物的预防性和治疗性疫苗。目的化合物可以在靶向的细菌内部产生、从靶向的细菌中分泌、或在靶向的细菌的表面上表达。在一个更特定的实施方案中，抗原在靶向的细菌的表面上表达，用于预防性和/或治疗性疫苗接种。

[0191] 本公开内容还涉及细菌递送颗粒的非治疗用途。例如，非治疗用途可以是美容用途或用于改善受试者的健康的用途，所述受试者特别是并未患有疾病，且特别是由细菌引起的疾病或病症的受试者。相应地，本公开内容还涉及包含本公开内容的细菌递送颗粒的化妆品组合物或非治疗性组合物。

[0192] 实施例1

下文实施例证实了λ受体结合蛋白(RBP)的有意义部分，例如stf蛋白，可以与不同RBP的一部分交换。更特别地，已鉴定了λRBP中的特异性融合位置，其允许获得功能性嵌合RBP。具体而言，在一个非限制性实施方案中，数据证实了，在衍生自细菌噬菌体λ的包装噬菌粒的情况下，修饰侧尾丝蛋白导致扩展的宿主范围。将嵌合stf蛋白加入λ形(lambdoid)包装噬菌粒中，被证实为修饰且增加其宿主范围的非常有力的方法，并且在一些情况下比修饰gpJ基因更有效。另外，修饰侧尾丝蛋白以编码酶促活性，例如解聚酶活性，可以显著地增加递送效率。在一些情况下，这种酶促活性的添加允许100%的递送效率，而野生型λ包装噬菌粒完全没有显示进入。这两种方法可以组合，以生成对细菌物种的许多菌株具有不同特异性和递送效率的包装噬菌粒变体。

[0193] 材料和方法

进行测试，以确定尾尖基因(gpJ)的修饰是否对λ包装噬菌粒的宿主范围具有影响。λ尾尖被修饰为包括[11]中描述的突变，以生成OMPF-λ。这种包装噬菌粒现在应该使用OmpF而不是LamB作为细胞表面中的初级受体。接下来，在跨越各种O和K血清型的大肠杆菌菌株集合中测试递送效率，如图1中所示。

[0194] 如图1中可见的，使用识别不同细胞表面受体的包装噬菌粒对递送效率和宿主范围具有最低限度的影响。在用修饰的包装噬菌粒处理后，仅3种菌株显示了菌落数目的边际改善。这一结果可能是由于在大多数细胞周围荚膜的存在，所述荚膜对包装噬菌粒形成物理屏障，因此致使这种方法不成功。鉴于这些结果，λ stf基因被修饰为包括针对细菌荚膜的酶促活性。

[0195] λ stf的序列(SEQ ID NO:1)是：

MAVKISGVLKDGTGKPVQNCTIQLKARRNSTTVVVNTVGSENPDEAGRYSMDVE
YGQYSVILQVDGFPPSHAGTITVYEDSQPGTLNDFLCAMTEDDARPEVLRRLELM
VEEVARNASVVAQSTADAKKSAGDASASAAQVAALVTDATDSARAASTSAGQAA
SSAQEASSGAEAASAKATEAEKSAAAAESSKNAAATSAGAAKTSETNAAASQQSA
ATSASTAATKASEAATSARDAVASKEAAKSSETNASSSAGRAASSATAAENSARA
AKTSETNARSSETAAERSASAAADAKTAAAGSASTASTKATEAAGSAVSASQSKS
AAEAAAIRAKNSAKRAEDIASAVALEDADTTRKGIVQLSSATNSTSETLAATPKA
VKVVMDETNRKAPLDSPALTGTPTAPTALRGTNNTQIANTAFVLAAIADVIDASP
DALNTLNELAAALGNDPDFATTMTNALAGKQPKNATLTALAGLSTAKNKLPYF
AENDAASLTELTQVGRDILAKNSVADVLEYL**GAGENSAFPAGAPIPWPSDIVPS**
GYVLMQGQAFDKSAYPKLAVAYPSGVLPDMRGWTIKGKPASGRAVLSQEQD
GIKSHTHSASASGTDLGTKTTSSFDYGTKTTGSFDYGTKSTNNTGAHAHSLS
GSTGAAGAHAHTSGLRMNSSGWSQYGTATITGSLSTVKGTSTQGIAYLSKTD
SQGSHSHSLSGTAVSAGAHAHTVGIGAHQHPVVIGAHAHSFSIGSHGHTITVN
AAGNAENTVKNIAFNYIVRLA

粗体且加下划线的序列代表引入T4噬菌体中的蛋白质部分(Montag等人J Bacteriol. 1989 Aug;171(8): 4378-4384)。进行实验,以调查是否能够用来自不同噬菌体的尾丝交换λ stf的C末端,以得到针对带荚膜的大肠杆菌具有酶促活性的嵌合侧尾丝。选择来自K1F噬菌体的尾丝,其已进行深入研究并且其结构已得到解析 [19]、[20]。K1F编码具有内切唾液酸酶活性的酶,所述酶针对通过K1包封的大肠杆菌分泌的唾液酸聚合物具有活性。事实上,K1+菌株对T7感染免疫,因为荚膜形成了阻止噬菌体附着的物理屏障,但如果在感染前将纯化的K1F酶加入细胞中,则T7能够裂解它们[21],确认了细菌荚膜的存在是避免被细菌噬菌体识别的有力机制。因此,通过在K1+菌株中测试修饰的λ-stf-K1包装噬菌粒的递送,能够验证λ-stf嵌合蛋白是否保留其酶促活性。

[0196] K1F尾丝的序列(SEQ ID NO:121)是:

MSTITQFPSGNTQYRIEFDYLARTFVVVTLVNSSNPTLNRVLEVGRDYRF
LNPTMIEMLVDQSGFDIVRIHRQTGTDLVVDFRNGSVLTASDLTTAELQA
IHIAEEGRDQTVDLAKEYADAAGSSAGNAKDSEDEARRIAESIRAAGLIG
YMTRRSFEKGYNVTTWSEVLLWEEDGDYYRWDGTLPKNVPAGSTPETS
GGIGLGAWVSVGDAALRSQISNPEGAILYPELHRARWLDEKDARGW**GA**
KGDGVTDDTAALTSALNDTPVGQKINGNGKTYKVTSLPDISRFINTR
FVYERIPGQPLYYASEEFVQGELFKITDTPYYNAWPQDKAFVYENVI
YAPYMGSDRHGVSRLHVSWVKSGDDGQTWSTPEWLTDLHPDYPTV
NYHCMSMGVCRNRLFAMIETRTLAKNALTNCALWDRPMSRSLHLT
GGITKAANQRYATIHVPDHGLFVGDFVNFSNSAVTGVSGDMTVATVI
DKDNFTVLTPNQQTSDLNNAGKNWHMGTSFHKSPWRKTDLGLIPSV
TEVHSFATIDNNGFAMGYHQGDVAPREVGLFYFPDAFNSPSNYVRRQ
IPSEYEPDASEPCIKYYDGVLYLITRGTRGDRLGSSLHRSRDIGQTWE
SLRFPHNVHHTTLPFAKVGDDLIMFGSERAENEWEAGAPDDRYKAS
YPRTFYARLNVNNWNADDIEWVNITDQIYQGGIVNSGVGVGSVVVK
DNYIYYMFGGEDHFNPWTYGDNSAKDPFKSDGHPSDLYCYKMKIGP
DNRVSRDFRYGAVPNRAVPVFFDTNGVRTVPAPMEFTGDLGLGHVT
IRASTSSNIRSEVLMEGEYGFIGKSIPTDNPAGQRIIFCGGEGTSSTTG
AQITLYGANNTDSRRIVYNGDEHLFQSADVKPYNDNVTALGGPSNRF
TTAYLGSNPIVTSNGERKTEPVVFDDAFLDAWGDVHYIMYQWLDAV
QLKGNDARIHFGVIAQQIRDVFIAHGLMDENSTNCRYAVLCYDKYPR
MTDTVFSHNEIVEHTDEEGNVTTTEEPVYTEVVIHEEGEEWGVRPD
GIFFAEAAYQRRKLERIEARLSALEQK

粗体且加下划线的序列代表已结晶，并且已显示保留其内切唾液酸酶活性的蛋白质部分。由于λ stf蛋白和K1F尾丝之间不存在同一性，因此基于从不同信息来源(包括文献和晶体结构)得出的结论来制备插入位点。

[0197] 使用Cas9介导的基因交换方案，将stf基因修饰为在其C末端处包括K1F内切唾液酸酶[22]，并且导致具有核苷酸序列SEQ ID NO:106和氨基酸序列SEQ ID NO: 46的λ-K1F嵌合stf。λ-K1F包装噬菌粒如[23]中进行生产，并且针对一些K1+菌株(具体地大肠杆菌UTI89和S88)进行滴定。结果是惊人的；在这些菌株中，如果使用λ野生型stf，则不存在递送，但将SEQ ID NO:46的λ-K1F变体加入包装噬菌粒给出100%的递送(图2)。

[0198] 遵循相同的原理来产生λ-stf的不同变体，这次具有K5荚膜降解活性(来自噬菌体K5A的K5裂解酶尾丝)。与K1F的情况一样，λ-stf和K5裂解酶之间不存在同源性，但其晶体结构已得到公开[24]。因此，使用与K1F相同的方法来生成λ-K5嵌合侧尾丝，其具有核苷酸序列SEQ ID NO:107和氨基酸序列SEQ ID NO:47，并且针对K5包封的大肠杆菌菌株(ECOR55)测试所产生的包装噬菌粒。然而，在这种情况下，产生具有λ-K5 stf融合基因的*δ-stf* λ生产菌株，所述融合基因在诱导型启动子的控制下反式表达。如图3中描绘的，使用野生型λ-stf存在一些残留递送，很可能是由于存在具有较薄K5荚膜的一些细胞。然而，λ-stf-K5嵌合体的添加允许多于10^6倍的递送改善。

[0199] 在一些其它情况下，可以发现与λ stf具有一定程度的同源性的侧尾丝，但是没有可用的晶体结构。在这些情况下，插入位点被设计为与λ stf具有同一性的最后一段氨基酸。例如，在两种内部测序的噬菌体中，预测的侧尾丝蛋白如下：

噬菌体AG22 stf：

MAIYRQGQASMDAQGYVTGYGTKWREQLTLIRPGATIFFLAQPLQAAVI
TEVISDTSIRAITTGGAVVQKTNYLILLHDSLTVDGLAQDVAETLRYYQGKESEF
AGFIEIIKDFDWDKLQKIQEDVKTNADAAAASQQAAKTSENNAKTSATNAANS
KKGADTAKAAAESARDAANTAKTGAEAAKSGAESARDAANTAKAGAESARD
QAEEYAKQAAEPYKDLLQPLPDVWIPFNDSLDMITGFSPSYKKIVIGDDEITMPG
DKIVKFKRASTATYINKSGVLTNAAIDEPRFEKDGLLIEGQRTNLLINSTNPSKW
NKSSNMILDRSGVDDFGFQYAKFTLKPEMVGQTSSINIVTVSGSRGFDVTGNEK
YVTISCRAQSGTPNLRCRLRFENYDGSAYASLGDAYVNLTDLSIEKTGGAANRI
TARAVKDEASKWIFFEATIKALDTENMIGAMVQYAPAKDGGGTGADDYIYIAT
PQVEGGVCASSFIITEATPVTRASDMVTIPIKNNLYNLPFTVLCEVHKNWYITPN
AAPRVFDTGGHQSGAAIILAFGSADGDNDGFPYCDIGKSNRRVNENAKLKKMII
GMRVKSDYNTCCVSNARISSETKTEWRYIVSTATIRIGGQTSTGERHLFGHVRNF
RIWHKALTDHQLGEIV (SEQ ID NO:204)

和相应的SEQ ID NO:213的核苷酸序列。

[0200] 它与λ stf的比对如下：

```
λ          156 STSAGQAASSAQEASSGAEAASAKATEAEKSAAAAESSKNAAATSAGAAKTSETNAAASQ
AG22        92 ETLRYYQGKESEFAGFIEIIKDFDWDKLQKIQEDVKTNADAAAASQQAAKTSENNAKTSA
               *          *          *          *** *  ****** **  *
```

第二种内部噬菌体的stf序列如下：

噬菌体SIEA11 stf：

MSTKFKTVITTAGAAKLAAATVPGGKKVTLSAMAVGDGNGKLPVPDAG
QTKLVHEVWRHALNKVSVDNKNKNYIVAELVVPPEVGGFWMRELGLYDDAG
TLIAVSNMAESYKPELAEGSGRAQTCRMVIIVSNVASVELSIDASTVMATQDYV
DDKIAEHEQSRRHPDATLTEKGFTQLSSATNSTSESLAATPKAVKAANDNANSR
LAKNQNGADIQDKSAFLDNVGVTSLTFMKNNGEMPVDADLNTFGSVKAYSGI
WSKATSTNATLEKNFPEDNAVGVLEVFTGGNFAGTQRYTTRDGNLYIRKLIGT
WNGNDGPWGAWRHVQAVTRALSTTIDLNSLGGAEHLGLWRNSSSAIASFERH
YPEQGGDAQGILEIFEGGLYGRTQRYTTRNGTMYIRGLTAKWDAENPQWEDW
NQIGYQTSSTFYEDDLDDLMSPGIYSVTGKATHTPIQGQSGFLEVIRRKDGVYVL
QRYTTTGTSAATKDRLYERVFLGGSFNAWGEWRQIYNSNSLPLELGIGGAVAK
LTSLDWQTYDFVPGSLITVRLDNMTNIPDGMDWGVIDGNLINISVGPSDDSGSG
RSMHVWRSTVSKANYRFFMVRISGNPGSRTITTRRVPIIDEAQTWGAKQTFSAG
LSGELSGNAATATKLKTARKINNVSFDGTSDINLTPKNIGAFASGKTGDTVAND
KAVGWNWSSGAYNATIGGASTLILHFNIGEGSCPAAQFRVNYKNGGIFYRSARD
GYGFEADWSEFYTTTRKPTAGDVGALPLSGGQLNGALGIGTSSALGGNSIVLGD
NDTGFKQNGDGNLDVYANSVHVMRFVSGSVQSNKTINITGRVNPSDYGNFDSR
YVRDVRLGTRVVQTMQKGVMYEKAGHVITGLGIVGEVDGDDPAVFRPIQKYIN
GTWYNVAQV (SEQ ID NO:205)

和相应的SEQ ID NO:214的核苷酸序列。

[0201] 它与λ stf的比对如下：

```
λ          367 SSATNSTSETLAATPKAVKVVMDETNRKAPLDSPALTGTPTAPTALRGTNNTQIANTAFV
SIEA11     180 SSATNSTSESLAATPKAVKAANDNANSRL---AKNQNGADIQDKSAF-LDNVGVTSLTFM
               ********* *********   *  *          *          *       *
```

在这两种具体情况下，未知这些侧尾丝能够识别哪种抗原，因此具有嵌合侧尾丝λ-AG22和λ-SIEA11的λ包装噬菌粒，分别基于SEQ ID NO:1和SEQ ID NO:213以及SEQ ID NO:1和SEQ ID NO:214进行改造，并且在含有一组非常多样化的O和K血清型的大肠杆菌集合中测试其递送效率。

[0202] 如图4中所示，嵌合stf的添加允许基于λ的包装噬菌粒在96种测试菌株中的25种(多于25%的集合)中显示增加的递送效率。在一些情况下，增加是适度的；在其它情况下，它允许在用野生型λ包装噬菌粒没有进入或具有极低进入的菌株中非常良好的递送效率。还值得注意的是，如同λ，AG22属于长尾噬菌体科，但SIEA11是P2样噬菌体。这突出显示了stf模块可以跨越细菌噬菌体属交换的重要观察结果。

[0203] 其它侧尾丝基因已如图4中所示进行分析，并且已鉴定了在λ stf基因内的几个插入位点，其给出在大肠杆菌集合中具有差异进入的嵌合变体，如先前所示。这些插入位点基于非同源尾丝变体的结果(例如在上文K1F和K5的情况下)，或基于λ stf和待测试变体之间不同程度的同源性。这种同源性可以很短，约5-10个氨基酸，或基本上相似。测试的插入位点以粗体且加下划线显示于下文：

λ stf

MAVKISGVLKDGTGKPVQNCTIQLKARRNSTTVVVNTVGSENPDEAGRYSMDVE
YGQYSVILQVDGFPPSHAGTITVYEDSQPGTLNDFLCAMTEDDARPEVLRRLELMVEEVA
RNASVVAQST**ADAKKS**AGDASASAAQVAALVTDATDSARAASTSAGQAASSAQEASSGA
EAASAKATEAEKSAAAAESSKNAAATSAGAAKTSETNAAASQQSAATSASTAATKASEA
ATSARDAVASKEAAKSSETNASSSAGRAASSATAAENSARAAKTSETNARSSETAAER**SA**
SAAADAKTAAAGSASTASTKATEAAGSAVSASQSKSAAEAAAIRAKNSAKRAEDIASAVA
LEDADTTRKGIVQLSSATNSTSETLAATPKAVKVV**MDETNR**KAPLDSPALTGTPTAPTA
LRGTNNTQIANTAFVLAAIADVIDASPDALNTLNELAAALGNDPDFATTMTNALAGKQP
KNATLTALAGLSTAKNKLPYFAENDAASLTELTQVGRDILAKNSVADVLEYL**GAGENS**AF
PAGAPIPWPSDIVPSGYVLMQGQAFDKSAYPKLAVAYPSGVLPDMRGWTIKGKPASGRA
VLSQEQDGIKSHTHSASASGTDLGTKTTSSFDYGTKTTGSFDYGTKSTNNTGAHAHSLSG
STGAAGAHAHTSGLRMNSSGWSQYGTATITGSLSTVKGTSTQGIAYLSKTDSQGSHSHSL
SGTAVSAGAHAHTVGIGAHQHPVVIGAHAHSFSIGSHGHTITVNAAGNAENTVKNIAFNY
IVRLA (SEQ ID NO:1)

λ stf蛋白由774个氨基酸组成。可以发现插入位点更靠近N末端(氨基酸131,插入点ADAKKS(SEQ ID NO:191))或更靠近C末端(氨基酸529,插入点GAGENS(SEQ ID NO:194))。使用这些插入位点改造stf嵌合体,其具有SEQ ID NO:2-45和48-61的氨基酸序列、以及SEQ ID NO:62-105和108-120的相应核苷酸序列。图5描绘了关于插入位点ADAKKS(SEQ ID NO:191)、SASAAA(SEQ ID NO:193)和MDETNR(SEQ ID NO:192)的stf嵌合体的一些所选实例的递送。本文描述的结果显示了能够构建嵌合尾丝,其将附着至一种噬菌体的衣壳的尾丝部分(通常是蛋白质的N末端)与和细菌相互作用的另一尾丝部分(通常是蛋白质的C末端)组合。不同尾丝序列之间的同源性段可以被视为优选的重组位点。为了鉴定关于噬菌体λ的stf蛋白的此类位点,用50aa窗口执行stf序列的扫描,并且对每个窗口执行phmmer搜索[25],以鉴定代表性蛋白质组75数据库中的同源序列(图6)

实施例2

许多噬菌体含有单一的stf蛋白,这是决定其宿主特异性的非常重要的因子。然而,也存在编码多于一个stf基因的几个噬菌体实例,这是有益的特性,因为据推测,它们各自识别不同的宿主。这些噬菌体已找到了不同的解决方案来实现这一特征:其中一些,如phi92,编码多达6种stf,其与基板(baseplate)/病毒颗粒的不同部分结合,并且很可能与其它stf结合[29];其它噬菌体,如CBA120 [30],编码形成四聚体结构的4种stf,其中stf之一附着至噬菌体颗粒,而其它三种通过相互作用与第一种附着;并且其它噬菌体,如DT57C,含有结合颗粒的stf、以及通过相互作用结构域附着到第一种stf的第二种stf(分支stf)[32](图7A)。就改造而言,具有能够识别不同宿主的颗粒可能在生产成本和宿主范围扩展方面具有重大影响。

[0204] 作为概念证明,改造的λ stf基于分支体系结构进行构建。被称为WW11的噬菌体含有SEQ ID NO:124和125的两种stf,其遵循相同的次序并含有与噬菌体DT57C的同源性,所述噬菌体DT57C已被暗示具有分支stf。噬菌体WW11中stf-1和stf-2的相互作用结构域已得

到鉴定,并且用作附着至λ stf的模块。最终构建体含有SEQ ID NO:1的λ stf的N末端部分,直至与SEQ ID NO:280的WW11 stf-1相互作用结构域ID1和WW11 stf-1适当融合的GAGENS插入位点SEQ ID NO:194;此后,插入合成的RBS,紧接着,将SEQ ID NO:281的stf-2相互作用结构域ID2融合到SEQ ID NO:121的K1F尾丝的C末端部分(参见节段[198]的粗体序列(图7B)。选择SEQ ID NO:194的GAGENS插入位点作为插入位点。两种嵌合蛋白均从多顺反子mRNA进行转录。这种构建导致具有氨基酸序列SEQ ID NO:282和283以及SEQ ID NO:284的核苷酸序列的最终分支stf WW11-K1F。

[0205] WW11噬菌体的原始宿主范围是O157菌株,而K1F噬菌体的原始宿主范围是K1菌株。如图8中证实的,当产生含有SEQ ID NO:282和283的分支嵌合stf的包装噬菌粒时,可见分支stf的宿主范围现在是每种单一stf的组合,即两种单一stf活性的组合(O157和K1)。尽管分支体系结构中的K1F stf似乎比仅含有一种stf的颗粒效率更低,但进一步的改造,例如,(i)选择在两种stf之间更有效的RBS,(ii)增加长度,或(iii)在相互作用结构域和融合stf之间引入弹性接头,和/或(iv)增加多顺反子中第一种stf的翻译速率(因为已知这影响多顺反子信使中第二种CDS的翻译速率)。这种方法的优点还在于:假设两种组分的正确表达,stf以1:1的比率存在于噬菌粒颗粒中,这对于监管目的可能是重要的。

[0206] 遵循与“二聚体”分支stf(λ-ID1-WW11 ID2-K1F)类似的方法,设计了其stf携带4种不同活性的λ颗粒。CBA120是具有4根丝(称为stf;参见图9)的噬菌体。它们的序列如下:

图9的Stf4(也称为TSP4)(orf213,蛋白质YP_004957867.1)(SEQ ID NO:127),图9的stf3(也称为TSP3)(orf212,蛋白质ID YP_004957866.1)(SEQ ID NO:128),图9的stf2(也称为TSP2)(orf211,蛋白质ID YP_004957865.1)(SEQ ID NO:129),以及图9的stf1(也称为TSP1)(orf210,蛋白质ID YP_004957864.1)(SEQ ID NO:130)。

[0207] 在这4种TSP的分析过程中,注意到N末端与噬菌体G7C/WW11/DT57C具有同源性,其强烈暗示这些stf结合以形成四聚体复合物。根据CBA120基因组中的TSP操纵子,待翻译的第一种stf是TSP4,然后是TSP3,然后是TSP2,然后是TSP1。根据这一信息,假设主要的stf是TSP4,因为它是第一个被表达的。它可以编码多于一种TSP与之附着的ID结构域。N末端结构域也彼此共享同源性,这帮助鉴定可能的ID结构域。发现下述相互作用结构域(ID)具有可能的分支/结合活性,对上文提到的噬菌体进行BLAST分析:图9的TSP4 ID4(SEQ ID NO:131)(ID4似乎具有在N末端处的额外结构域,其可能涉及衣壳结合,因此它被排除在最终构建体之外),图9的TSP3 ID3(SEQ ID NO:132),图9的TSP2 ID2(SEQ ID NO:133)和图9的TSP1 ID1(SEQ ID NO:134)。

[0208] 下文描述了待用于构建四聚体分支RBP的组装过程。首先,结构域被重新编码并且两个基因块被排序。重新编码是非常常见的过程,并且目的是两方面。首先,基于用于给定氨基酸的密码子取决于生物而变的事实,进行重新编码以避免密码子偏性。相应地,为了避免可能导致截短、突变或错误折叠的蛋白质的表达问题,用宿主生物(在这种情况下为大肠杆菌)的密码子使用来重新编码序列。其次,去除未知的调控层可能是有利的。对于操纵子、噬菌体以及一般而言具有高“密度信息”的任何其它序列,如噬菌体基因组,尤其如此;它们具有有限量的可以进行包装的DNA,因此几种信号和功能可以在一个区域内进行编码,并且这可能影响以所需方式使用遗传部分的能力。

[0209] 质粒pPhlF-Tetra STF BsaI克隆(pSC101 37C,KanR)已进行克隆,其含有与SEQ

ID NO:194的λ stf GAGENS的融合,具有SEQ ID NO: 131至134的TSP4相互作用结构域。其它TSP相互作用结构域之前为合成RBS,以避免包括来自噬菌体的未知调控层。这种质粒允许与每个TSP相互作用结构域融合的4种stf的TypeIIS克隆(BSaI)。对于每种stf活性的读出鉴定了4种stf和4种菌株:(i)-V10:菌株V10;(ii)- K1F:菌株K1F;(iii)-K5:菌株K5;和-stf48:菌株48。这四种stf分别作为与ID4 SEQ ID NO: 131、ID3 SEQ ID NO: 132、ID2 SEQ ID NO: 133和ID1 SEQ ID NO: 134的融合物进行克隆。ID4在GAGENS SEQ ID NO: 194插入位点处与λ stf的N末端融合(图9A-B)。用于四聚体表达的最终体系结构在图9B中进行描绘,但是此类表达方案可以进行修改,因为质粒很大(>16 kb)并且转录mRNA的长度>9kb。

[0210] 实施例3

T4样噬菌体是非常多样化的细菌噬菌体家族,其共享共同的长尾丝体系结构:通过充当"铰链连接子"的蛋白质连接的附着至噬菌体颗粒的近端尾丝和编码宿主特异性的远端尾丝(DTF)(Desplats 和Krisch,2003,Res. Microbiol. 154:259-267;Bartual等人2010,Proc. Natl. Acad. Sci. 107: 20287-20292)。认为尾丝的主要宿主范围决定簇位于远端部分中。因此,理解是否能够将给定T4样噬菌体的宿主范围(其已知是非常广泛的)转化给任何其它目的噬菌体或包装噬菌粒是非常重要的。在几种T4样噬菌体的远端尾丝(T4样长尾丝的C末端结构域)中筛选可能的功能插入位点,生成了具有λ stf基因的几种融合物,并且筛选其宿主范围。

[0211] 搜索DTF中可能的插入位点,当与异源尾丝(λ噬菌体stf)融合时,所述插入位点给出功能性嵌合体。噬菌体(WW13)的DTF用作测试平台。这种噬菌体具有经典的T4样体系结构,具有通过铰链连接子分开的近端尾丝和远端尾丝,所述铰链连接子为gp38分子伴侣/粘附素(以帮助尾丝的折叠和宿主的识别)(Trojet等人,2011,Genome Biol. Evol. 3:674-686)、以及已知对于尾丝的正确折叠所需的gp57A分子伴侣(Matsui等人,1997,J. Bacteriol. 179:1846-1851)。由于T4样噬菌体的内源基因组调控是复杂的,并且可能包括未知的调控层(Miller等人,2003,Microbio. Mol. Biol. Rev. 67:86-156),因此编码RBS的合成接头被设计为替换在DTF基因和粘附素之间的天然DNA接头;紧邻下游,添加在分子伴侣gp57A之前的另一个合成RBS,从而产生编码DTF正确折叠所需的所有功能的多顺反子mRNA(图10)。这种构建体在处于诱导型启动子的控制下的质粒中进行构建,并且在产生基于λ的噬菌粒的菌株中进行反式互补。

[0212] 图10. 描绘了改造的λ stf-T4样DTF嵌合体的体系结构。半圆表示RBS位点;T符号,转录终止子;箭头,启动子。筛选了DTF的C末端的几个部分,并且在GAGENS(SEQ ID NO:194)插入位点处与λ stf基因融合。嵌合体λ stf-WW13的几个变体是有功能的,如通过噬菌粒颗粒的产生和大肠杆菌菌株集合中氯霉素标记物的转导所评价的。获得了图11中所示的功能嵌合体,其中融合在WW13中的IIQLED(SEQ ID NO:196)插入位点处。通过在λ stf MDETNR(SEQ ID NO:192)插入位点处,以及在WW13 DTF GNIIDL(SEQ ID NO:197)、VDRAV(SEQ ID NO:203)和IIQLED(SEQ ID NO:196)插入位点处的融合,获得另外的功能性嵌合体(图13)。

[0213] 与WW13共享序列同源性的其它T4样噬菌体,如PP-1,也进行测试且验证为产生功能性嵌合体(图11)。这些功能性嵌合体显示了在PP-1DTF部分的开始处的IATRV(SEQ ID NO:198)插入位点。

[0214] 图11描绘了用包括其各自的伴侣蛋白质的嵌合λ stf-T4-样DTF,且特别是嵌合λ stf-WW13和嵌合λ stf-PP1(其具有氨基酸序列SEQ ID NO:142至149和SEQ ID NO:166至173的核苷酸序列)的噬菌粒颗粒筛选。包括不同血清型的96种不同的野生型大肠杆菌菌株的集合,用基于λ的包装噬菌粒进行转导,并且在Cm LB琼脂上铺平板。左图代表野生型λ stf;中图代表嵌合λ-stf-WW13;而右图代表嵌合λ-stf-PP-1。

[0215] 对于WW13发现的插入位点并非总是存在于给定的T4样DTF中,从而使分析复杂化。第二种噬菌体发现了与WW13不含同源性的另一个功能性插入位点(WW55,图12)。相同的TPGEL(SEQ ID NO:199)插入位点可以在T4样噬菌体的子集中找到,并且证明为得到在λ stf中具有其中至少一个WW34(图12)和MDETNR(SEQ ID NO:192)插入位点的功能性嵌合体。

[0216] 图12. 显示了用嵌合λ stf-T4-样DTF,且特别是包括其各自的伴侣蛋白质的嵌合λ stf-WW55和嵌合λ stf-WW34(其具有氨基酸序列SEQ ID NO:150至156和SEQ ID NO:174至180的核苷酸序列)的噬菌粒颗粒筛选。包括不同血清型的96种不同的野生型大肠杆菌菌株的集合,用基于λ的噬菌粒进行转导,并且在Cm LB琼脂上铺平板。左图代表野生型λ stf;中图代表嵌合λ-stf-WW55;而右图代表嵌合λ-stf-WW34。

[0217] 由于T4样DTF蛋白可能共享或不共享共同的插入位点,因此尝试鉴定存在于所有T4样DTF中的通用插入位点。当几种T4样DTF进行比对时,除了非常保守的N末端之外,沿着所有序列中存在的整个DTF基因不存在同源性。DTF的N末端被认为与铰链连接子相互作用,用于附着至主要的噬菌体颗粒。

[0218] 尽管经典观点是宿主范围决定簇位于DTF的C末端部分,但最近的研究已证明了N末端也可能涉及此过程(Chen等人,2017,Appl. Environ. Microbiol. Vl. 83 No. 23)。然后扫描DTF的N末端,以寻找存在于所有T4样噬菌体中并且能够得到功能性嵌合体的插入位点。使用噬菌体WW13 DTF和λ stf中的插入位点MDETNR(SEQ ID NO:192)。虽然完整的DTF基因的直接融合(在氨基酸2处起始)给出具有一些活性的颗粒,但图13中鉴定且显示了重现DTF融合物行为的从氨基酸1到90的区域,具有从DTF的氨基酸40到50的优选区域。重要的是,这个区域存在于所有筛选的T4样噬菌体中,并且可以非常快速地用于生成具有多样化DTF集合的嵌合体,包括WW55(图13),且特别是包括其各自的伴侣蛋白质的嵌合λ stf-WW14、嵌合λ stf-WW170和嵌合λ stf-202(其具有氨基酸序列SEQ ID NO:157至165和SEQ ID NO:181至189的核苷酸序列)。

[0219] 相应地,本公开内容可用于生成具有改变的宿主范围的噬菌体和噬菌粒颗粒,因为它提供了使用来自任何T4样噬菌体的DTF用于构建嵌合体的实用框架,突出显示了其模块化和可转换性。

[0220] 实施例4

人微生物组包括机体的不同区域,包括肠道、皮肤、阴道和口腔[29]。这些区域中的微生物群由不同的微生物群落组成,如细菌、古细菌和真菌[29]-[31]。虽然已进行了试图阐明这些群落的具体组成的众多研究,但越来越明确的是,虽然可能存在“核心微生物组”,但在每种微生物的相对含量方面存在许多变动,这取决于几种因素,例如地理位置、饮食或年龄[32]-[35]。

[0221] 具体而言,在人肠道微生物群的情况下,如果不运行诊断方法,则不可能先验地知道给定个人拥有的细菌物种是什么。在大肠杆菌的情况下,一些研究已指出一些血清型和

系统发育群在大多数人中流行;然而,取决于地理分布以及采样时间,在样品的组成方面存在显著变化:例如,二十世纪八十年代从欧洲、非洲、亚洲和南美洲分离的样品,显示了系统组(phylogroup)A和B1的流行(分别为55%和21%);但二十一世纪00年代在欧洲、北美、亚洲和澳大利亚获得的样品主要属于B2组(43%),随后为A(24%)、D(21%)和B1(12%)[36]。还认为与共生菌株相比,系统发育组B2和D通常与致病性菌株更相关[37],但存在这样的研究,其显示了属于系统发育组B2的许多人和非人特异性菌株是共生菌丛,并且属于不同的血清型[38]。

[0222] 人微生物组的内在变异性,且特别是大肠杆菌亚型的内在变异性,使得难以设计靶向治疗方法。例如,在旨在杀死靶细菌群体的噬菌体疗法的情况下,两种可能的方法是可能的:首先,使用能够识别且靶向特异性大肠杆菌血清型的窄宿主范围颗粒,或其次,使用广宿主范围的噬菌体,其能够识别许多不同的菌株,有时甚至来自不同的属[39]。如果考虑的策略并非旨在杀死靶细菌群体,而是寻求为其添加功能(即,递送在宿主中具有效应并通过靶向的微生物群表达的因子),则这一困难加剧。在这种具体情况下,包装噬菌粒的使用是非常有利的,因为它们并不杀死宿主(除非它们的有效载荷携带旨在杀死宿主的基因),有效载荷并不复制且扩增,并且不含任何内源性噬菌体基因。然而,与噬菌体的情况一样,需要诊断研究,以鉴定在治疗前存在于患者中的特异性细菌血清型/变体,以便找到或设计允许递送有效载荷的包装噬菌粒,所述有效载荷对靶细菌添加功能而不杀死它们。

[0223] 通过组合这两种方法,提议使用改造的递送媒介物,其能够识别属于不同血清型和系统发育组的大量菌株(即,具有“广宿主范围”的改造颗粒),其中重点在于大肠杆菌。与其中靶向的细菌群体需要尽可能接近100%地降低其数目的以杀死为导向的方法相反,治疗递送方法无需先验来达到大百分比的细菌;递送需要足够高,用于治疗有效载荷以正确的水平表达,其可能取决于应用而高度可变。另外,有效载荷可以由不同的血清型或系统发育组表达。这种方法增加了颗粒递送在大多数患者体内表达的有效载荷的机会。

[0224] 为了实现在由靶菌株的未知血清型/变体组成的细菌群落中的递送,递送媒介物被改造为含有嵌合侧尾丝(stf),所述stf由于其识别大量各种靶菌株的能力而被选择。存在已描述为在大肠杆菌中具有广宿主范围的许多噬菌体,并且其中许多属于T4科,但是一般而言,针对大肠杆菌和相关细菌的噬菌体具有有限的宿主范围。

[0225] 然而,根据[41],不存在关于需要通过噬菌体靶向多少菌株以被视为“广宿主范围”的共识。

[0226] 在大肠杆菌的情况下,ECOR集合是从不同来源中分离的菌株集合,其被认为代表这种细菌在自然界中的变异性[42]。一些噬菌体已显示具有针对这个集合的广宿主范围(例如,约53%的ECOR菌株可以由噬菌体AR1[43]裂解,且约60%由噬菌体SU16裂解[44])。与此相反,单一噬菌体能够感染95%的金黄色葡萄球菌菌株[40]。

[0227] 决定使用人菌株的这个集合来测试具有嵌合stf的改造递送媒介物,并且评价其宿主范围,以尝试鉴定能够识别尽可能多宿主的变体,如文献中已描述的[45]。不同之处在于本文测定测量递送效率而不是裂解。

[0228] 来自过夜培养物的菌株在深96孔板中的600 uL补充有5mM $CaCl_2$的LB中进行1:100稀释,并且在37°C下在900 rpm下生长2小时。然后将以10^6/μL的平均值产生的10 μL包装噬菌粒(其含有SEQ ID NO:277的DNA有效载荷p7.3)加入90 uL细菌培养物中,在37°C下

温育30分钟,并且将10 μL混合物在补充有24 μg/mL氯霉素的LB琼脂上铺平板,并且在37°C下温育过夜。第二天,点的密度从0到5进行评分,其中0是没有转导子,而5是具有非常高密度的斑点[图14]。斑点的密度与包装噬菌粒的递送效率直接有关,因为它对应于已接收含有氯霉素乙酰转移酶基因的有效载荷的细菌数目。

[0229] 在40种人菌株的ECOR集合中测试且筛选了几种stf嵌合体。作为对照,测试了SEQ ID NO:1的野生型λ stf的递送效率。用于递送实验的包装噬菌粒变体进行修饰,使得其尾尖gpJ现在识别除LamB外的受体(具有氨基酸序列SEQ ID NO:278和核苷酸序列SEQ ID NO:279的gpJ 1A2变体)。在图15中,显示了包括其各自的伴侣蛋白质的18个嵌合stf(其具有SEQ ID NO:215至242的氨基酸序列和SEQ ID NO:243至270的核苷酸序列)的原始点滴定,并且在图16中显示了条形化的表,其中通过点密度以及递送统计数据对递送效率进行评分。

[0230] 仅考虑密度评分为3或更高的点(被视为中至高递送效率),一些stf可以被视为广宿主范围,因为在所选ECOR菌株中的递送效率明显高于使用野生型stf时。例如,与用野生型stf的17.5%菌株相比,对于stf EB6或stf 68B,约50%的菌株显示中至高递送效率。这些stf是用于体内递送的良好候选物,因为它们能够在不同的系统发育组和血清型中递送。在图16中的表的底部,显示了密度评分高于3的条形化表示,其中广宿主范围stf的阈值设定为与野生型stf的基线相比至少2X的增加;即,stf能够在至少35%的菌株中以3或更高的评分递送。与野生型stf相比,其它stf也显示了增加的递送,因此对于能够以3或更高的评分递送的stf设定了不太严格的阈值,与用野生型stf递送的菌株数目相比,具有至少50%的增加(即,在至少26.25%的菌株中以3或更高的评分递送)。作为比较,显示了关于stf K1和stf 66D的数据:这些stf似乎在少数菌株中有效地递送(例如,关于stf K1的菌株B和AB;以及关于stf 66D的菌株E和AF),这意味着它们很可能具有窄宿主范围;这是预期的,因为在K1 stf的情况下,同源受体是K1荚膜[46]。另外,还显示了关于具有在T4样噬菌体中起源的stf的嵌合体的数据;如文献提示的,这种嵌合体显示了广宿主范围,但是它似乎不是最佳候选物。

[0231] 综上所述,这些结果提示了,可以将递送媒介物的stf改造为识别广泛数目的靶大肠杆菌菌株,从而致使其成为“广宿主范围”。这种类型的颗粒对于递送为靶细菌添加功能的有效载荷可以是非常有用的,而无需改造识别给定细菌菌株的特异性变体。

[0232] 引用的参考文献列表

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[0233] 序列

SEQ ID NO	名称	蛋白质(PRT)或DNA	起源	插入位点
1	λstf	PRT	λ细菌噬菌体	
2	STF-25	PRT	人工序列	ADAKKS
3	STF25-AP1	PRT	人工序列	
4	STF-27	PRT	人工序列	ADAKKS
5	STF27-AP1	PRT	人工序列	
6	STF27-AP2	PRT	人工序列	
7	STF-28	PRT	人工序列	ADAKKS
8	STF28-AP1	PRT	人工序列	
9	STF-15	PRT	人工序列	SASAAA
10	STF15-AP1	PRT	人工序列	
11	STF15-AP2	PRT	人工序列	
12	STF-16	PRT	人工序列	SASAAA
13	STF16-AP1	PRT	人工序列	
14	STF16-AP2	PRT	人工序列	
15	STF-17	PRT	人工序列	SASAAA
16	STF17-AP1	PRT	人工序列	
17	STF-13	PRT	人工序列	SASAAA
18	STF13-AP1	PRT	人工序列	
19	STF13-AP2	PRT	人工序列	
20	STF-12	PRT	人工序列	SASAAA
21	STF12-AP1	PRT	人工序列	
22	STF12-AP2	PRT	人工序列	
23	STF-63	PRT	人工序列	SASAAA
24	STF-62	PRT	人工序列	SASAAA
25	STF-71	PRT	人工序列	SASAAA
26	STF71-AP1	PRT	人工序列	

27	STF-20	PRT	人工序列	MDETNR
28	STF20-AP1	PRT	人工序列	
29	STF-23	PRT	人工序列	MDETNR
30	STF23-AP1	PRT	人工序列	
31	STF-24	PRT	人工序列	MDETNR
32	STF24-AP1	PRT	人工序列	
33	O111-2.0	PRT	人工序列	MDETNR
34	O111 2.0-AP1	PRT	人工序列	
35	STF-74	PRT	人工序列	MDETNR
36	STF74-AP1	PRT	人工序列	
37	STF-86	PRT	人工序列	MDETNR
38	STF86-AP1	PRT	人工序列	
39	STF-84	PRT	人工序列	MDETNR
40	STF84-AP1	PRT	人工序列	
41	STF-93	PRT	人工序列	MDETNR
42	STF-95	PRT	人工序列	MDETNR
43	STF95-AP1	PRT	人工序列	
44	STF-132	PRT	人工序列	MDETNR
45	STF132-AP1	PRT	人工序列	
46	K1F	PRT	人工序列	GAGENS
47	K5	PRT	人工序列	GAGENS
48	STF-37	PRT	人工序列	GAGENS
49	1JL	PRT	人工序列	GAGENS
50	STF-48	PRT	人工序列	GAGENS
51	STF-49	PRT	人工序列	GAGENS
52	STF-52	PRT	人工序列	GAGENS
53	1AR	PRT	人工序列	GAGENS
54	1AR-AP1	PRT	人工序列	
55	1AR-AP2	PRT	人工序列	

56	13-13.0	PRT	人工序列	GAGENS
57	13-13.0-AP1	PRT	人工序列	
58	13-13.0-AP2	PRT	人工序列	
59	13-14.3	PRT	人工序列	SAGDAS
60	13-14.3-AP1	PRT	人工序列	
61	13-14.3-AP2	PRT	人工序列	
62	STF-25	DNA	人工序列	
63	STF25-AP1	DNA	人工序列	
64	STF-27	DNA	人工序列	
65	STF27-AP1	DNA	人工序列	
66	STF27-AP2	DNA	人工序列	
67	STF-28	DNA	人工序列	
68	STF28-AP1	DNA	人工序列	
69	STF-15	DNA	人工序列	
70	STF15-AP1	DNA	人工序列	
71	STF15-AP2	DNA	人工序列	
72	STF-16	DNA	人工序列	
73	STF16-AP1	DNA	人工序列	
74	STF16-AP2	DNA	人工序列	
75	STF-17	DNA	人工序列	
76	STF17-AP1	DNA	人工序列	
77	STF-13	DNA	人工序列	
78	STF13-AP1	DNA	人工序列	
79	STF13-AP2	DNA	人工序列	
80	STF-12	DNA	人工序列	
81	STF12-AP1	DNA	人工序列	
82	STF12-AP2	DNA	人工序列	
83	STF-63	DNA	人工序列	
84	STF-62	DNA	人工序列	

85	STF-71	DNA	人工序列	
86	STF71-AP1	DNA	人工序列	
87	STF-20	DNA	人工序列	
88	STF20-AP1	DNA	人工序列	
89	STF-23	DNA	人工序列	
90	STF23-AP1	DNA	人工序列	
91	STF-24	DNA	人工序列	
92	STF24-AP1	DNA	人工序列	
93	O111-2.0	DNA	人工序列	
94	O111 2.0-AP1	DNA	人工序列	
95	STF-74	DNA	人工序列	
96	STF74-AP1	DNA	人工序列	
97	STF-86	DNA	人工序列	
98	STF86-AP1	DNA	人工序列	
99	STF-84	DNA	人工序列	
100	STF84-AP1	DNA	人工序列	
101	STF-93	DNA	人工序列	
102	STF-95	DNA	人工序列	
103	STF95-AP1	DNA	人工序列	
104	STF-132	DNA	人工序列	
105	STF132-AP1	DNA	人工序列	
106	K1F	DNA	人工序列	
107	K5	DNA	人工序列	
108	STF-37	DNA	人工序列	
109	1JL	DNA	人工序列	
110	STF-48	DNA	人工序列	
111	STF-49	DNA	人工序列	
112	STF-52	DNA	人工序列	
113	1AR	DNA	人工序列	

114	1AR-AP1	DNA	人工序列	
115	1AR-AP2	DNA	人工序列	
116	13-13.0	DNA	人工序列	
117	13-13.0-AP1	DNA	人工序列	
118	13-13.0-AP2	DNA	人工序列	
119	13-14.3	DNA	人工序列	
120	13-14.3-AP1	DNA	人工序列	
121	K1F	PRT	K1F 噬菌体	
122	13-14.3-AP2	DNA	人工序列	
123	λ stf	PRT	λ 噬菌体	
124	WW11 stf1	PRT	WW11 噬菌体	
125	WW11 stf2	PRT	WW11 噬菌体	
126	K1F	PRT	K1F 噬菌体	
127	TSP4 分支的	PRT	CBA120 噬菌体	
128	TSP3 分支的	PRT	CBA120 噬菌体	
129	TSP2 分支的	PRT	CBA120 噬菌体	
130	TSP1 分支的	PRT	CBA120 噬菌体	
131	ID4 分支的	PRT	CBA120 噬菌体	
132	ID3 分支的	PRT	CBA120 噬菌体	
133	ID2 分支的	PRT	CBA120 噬菌体	
134	ID1 分支的	PRT	CBA120 噬菌体	
135	WW13	PRT	人工序列	GNIIDL
136	PP-1	PRT	人工序列	IATRV
137	WW55	PRT	人工序列	TPGEL
138	WW34	PRT	人工序列	TPGEL
139	WW14	PRT	人工序列	NQIID
140	WW170	PRT	人工序列	GAIIN
141	WW202	PRT	人工序列	GQIVN
142	WW13 13.0	PRT	人工序列	IIQLED

143	WW13 10.0	PRT	人工序列	VDRAV
144	WW13-G8	PRT	人工序列	GNIIDL
145	WW13 gp38	PRT	ww13 噬菌体	
146	WW13 gp57A	PRT	ww13 噬菌体	
147	PP-1	PRT	人工序列	IATRV
148	PP-1 gp38	PRT	pp-1 噬菌体	
149	PP-1 gp57A	PRT	pp-1 噬菌体	
150	WW55 3.0	PRT	人工序列	TPGEL
151	WW55-G8	PRT	人工序列	GAIIN
152	WW55 gp38	PRT	ww55 噬菌体	
153	WW55 gp57A	PRT	ww55 噬菌体	
154	WW34 3.0	PRT	人工序列	TPGEL
155	WW34 gp38	PRT	ww34 噬菌体	
156	WW34 gp57A	PRT	ww34 噬菌体	
157	WW14-G8	PRT	人工序列	NQIID
158	WW14 gp38	PRT	ww14 噬菌体	
159	WW14 gp57A	PRT	ww14 噬菌体	
160	WW170-G8	PRT	人工序列	GAIIN
161	WW170 gp38	PRT	ww170 噬菌体	
162	WW170 gp57A	PRT	ww170 噬菌体	
163	WW202-G8	PRT	人工序列	GQIVN
164	WW202 gp38	PRT	ww202 噬菌体	
165	WW202 gp57A	PRT	ww202 噬菌体	
166	WW13 13.0	DNA	人工序列	
167	WW13 10.0	DNA	人工序列	
168	WW13-G8	DNA	人工序列	
169	WW13 GP38	DNA	ww13 噬菌体	
170	WW13 GP57A	DNA	ww13 噬菌体	
171	PP-1	DNA	人工序列	

172	PP-1 GP38	DNA	pp-1 噬菌体	
173	PP-1 GP57A	DNA	pp-1 噬菌体	
174	WW55 3.0	DNA	人工序列	
175	WW55-G8	DNA	人工序列	
176	WW55 GP38	DNA	ww55 噬菌体	
177	WW55 GP57A	DNA	ww55 噬菌体	
178	WW34 3.0	DNA	人工序列	
179	WW34 GP38	DNA	ww34 噬菌体	
180	WW34 GP57A	DNA	ww34 噬菌体	
181	WW14-G8	DNA	人工序列	
182	WW14 GP38	DNA	ww14 噬菌体	
183	WW14 GP57A	DNA	ww14 噬菌体	
184	WW170-G8	DNA	人工序列	
185	WW170 GP38	DNA	ww170 噬菌体	
186	WW170 GP57A	DNA	ww170 噬菌体	
187	WW202-G8	DNA	人工序列	
188	WW202 GP38	DNA	ww202 噬菌体	
189	WW202 GP57A	DNA	ww202 噬菌体	
190	插入序列	PRT	人工序列	
191	插入序列	PRT	人工序列	
192	插入序列	PRT	人工序列	
193	插入序列	PRT	人工序列	
194	插入序列	PRT	人工序列	
195	插入序列	PRT	人工序列	
196	插入序列	PRT	人工序列	
197	插入序列	PRT	人工序列	
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199	插入序列	PRT	人工序列	
200	插入序列	PRT	人工序列	

201	插入序列	PRT	人工序列	
202	插入序列	PRT	人工序列	
203	插入序列	PRT	人工序列	
204	AG22	PRT	AG22 噬菌体	
205	SIEA11	PRT	SIEA11 噬菌体	
206	WW13	DNA	人工序列	
207	PP-1	DNA	人工序列	
208	WW55	DNA	人工序列	
209	WW34	DNA	人工序列	
210	WW14	DNA	人工序列	
211	WW170	DNA	人工序列	
212	WW202	DNA	人工序列	
213	AG22	DNA	AG22 噬菌体	
214	SIEA11	DNA	SIEA11 噬菌体	
215	O111	PRT	人工序列	
216	SIED6	PRT	人工序列	
217	SIED6 AP1	PRT	人工序列	
218	SIED6 AP2	PRT	人工序列	
219	SIEA11	PRT	人工序列	
220	SIEA11 AP1	PRT	人工序列	
221	DC1	PRT	人工序列	
222	DC1 AP1	PRT	人工序列	
223	EB6	PRT	人工序列	
224	EB6 AP1	PRT	人工序列	
225	AH11L	PRT	人工序列	
226	AH11L AP1	PRT	人工序列	
227	STF-94A	PRT	人工序列	
228	STF-94A AP1	PRT	人工序列	
229	STF-69A	PRT	人工序列	

230	STF-69A AP1	PRT	人工序列	
231	STF-69A AP2	PRT	人工序列	
232	STF-68B	PRT	人工序列	
233	STF-68B AP1	PRT	人工序列	
234	STF-68B AP2	PRT	人工序列	
235	STF-118	PRT	人工序列	
236	STF-118 AP1	PRT	人工序列	
237	STF-90B	PRT	人工序列	
238	STF-90B AP1	PRT	人工序列	
239	STF-117	PRT	人工序列	
240	STF-117 AP1	PRT	人工序列	
241	STF-66D	PRT	人工序列	
242	STF-66D AP1	PRT	人工序列	
243	O111	DNA	人工序列	
244	SIED6	DNA	人工序列	
245	SIED6 AP1	DNA	人工序列	
246	SIED6 AP2	DNA	人工序列	
247	SIEA11	DNA	人工序列	
248	SIEA11 AP1	DNA	人工序列	
249	DC1	DNA	人工序列	
250	DC1 AP1	DNA	人工序列	
251	EB6	DNA	人工序列	
252	EB6 AP1	DNA	人工序列	
253	AH11L	DNA	人工序列	
254	AH11L AP1	DNA	人工序列	
255	STF-94A	DNA	人工序列	
256	STF-94A AP1	DNA	人工序列	
257	STF-69A	DNA	人工序列	
258	STF-69A AP1	DNA	人工序列	

259	STF-69A AP2	DNA	人工序列	
260	STF-68B	DNA	人工序列	
261	STF-68B AP1	DNA	人工序列	
262	STF-68B AP2	DNA	人工序列	
263	STF-118	DNA	人工序列	
264	STF-118 AP1	DNA	人工序列	
265	STF-90B	DNA	人工序列	
266	STF-90B AP1	DNA	人工序列	
267	STF-117	DNA	人工序列	
268	STF-117 AP1	DNA	人工序列	
269	STF-66D	DNA	人工序列	
270	STF-66D AP1	DNA	人工序列	
271	WW55 3.0 AP1	PRT	人工序列	
272	WW55 3.0 AP1	DNA	人工序列	
273	WW55 3.0 AP2	PRT	人工序列	
274	WW55 3.0 AP2	DNA	人工序列	
275	λ stf AP1	PRT	人工序列	
276	λ stf AP1	DNA	人工序列	
277	有效载荷 p7.3	DNA	人工序列	
278	1A2 gpJ 变体	PRT	人工序列	
279	1A2 gpJ 变体	DNA	人工序列	
280	WW11 ID1	DNA	人工序列	
281	WW11 ID2	DNA	人工序列	
282	WW11 K1F 嵌合 stfa	PRT	人工序列	
283	WW11 K1F 嵌合 stfb	PRT	人工序列	
284	WW11 K1F 嵌合 stf	DNA	人工序列	

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[0001]

序列表

<110> 艾力格生物科技有限公司

<120> 用于细菌递送媒介物中的分支受体结合多亚基蛋白复合物

<130> B3162PC

<160> 284

<170> PatentIn version 3.5

<210> 1

<211> 774

<212> PRT

<213> λ细菌噬菌体

<400> 1

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Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
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[0002]

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                260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Ala Phe Pro Ala Gly Ala Pro Ile Pro Trp Pro Ser Asp Ile Val Pro
    530                 535                 540
Ser Gly Tyr Val Leu Met Gln Gly Gln Ala Phe Asp Lys Ser Ala Tyr
545                 550                 555                 560
Pro Lys Leu Ala Val Ala Tyr Pro Ser Gly Val Leu Pro Asp Met Arg
                565                 570                 575
Gly Trp Thr Ile Lys Gly Lys Pro Ala Ser Gly Arg Ala Val Leu Ser
            580                 585                 590
Gln Glu Gln Asp Gly Ile Lys Ser His Thr His Ser Ala Ser Ala Ser
        595                 600                 605
Gly Thr Asp Leu Gly Thr Lys Thr Thr Ser Ser Phe Asp Tyr Gly Thr
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610 615 620
Lys Thr Thr Gly Ser Phe Asp Tyr Gly Thr Lys Ser Thr Asn Asn Thr
625 630 635 640
Gly Ala His Ala His Ser Leu Ser Gly Ser Thr Gly Ala Ala Gly Ala
645 650 655
His Ala His Thr Ser Gly Leu Arg Met Asn Ser Ser Gly Trp Ser Gln
660 665 670
Tyr Gly Thr Ala Thr Ile Thr Gly Ser Leu Ser Thr Val Lys Gly Thr
675 680 685
Ser Thr Gln Gly Ile Ala Tyr Leu Ser Lys Thr Asp Ser Gln Gly Ser
690 695 700
His Ser His Ser Leu Ser Gly Thr Ala Val Ser Ala Gly Ala His Ala
705 710 715 720
His Thr Val Gly Ile Gly Ala His Gln His Pro Val Val Ile Gly Ala
725 730 735
His Ala His Ser Phe Ser Ile Gly Ser His Gly His Thr Ile Thr Val
740 745 750
Asn Ala Ala Gly Asn Ala Glu Asn Thr Val Lys Asn Ile Ala Phe Asn
755 760 765
Tyr Ile Val Arg Leu Ala
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Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125

[0004]

```
Lys Ser Glu Thr Ala Ala Ala Ser Ser Arg Asn Ala Ala Lys Thr Ser
    130                 135                 140
Glu Thr Asn Ala Gly Asn Ser Ala Lys Ala Ala Ala Ser Ser Lys Thr
145                 150                 155                 160
Ala Ala Gln Asn Ala Ala Thr Ala Ala Glu Arg Ser Glu Thr Asn Ala
                165                 170                 175
Arg Ala Ser Glu Glu Ala Ser Ala Asp Ser Glu Glu Ala Ser Arg Arg
            180                 185                 190
Asn Ala Glu Ser Ala Ala Glu Asn Ala Gly Val Ala Thr Thr Lys Ala
        195                 200                 205
Arg Glu Ala Ala Ala Asp Ala Thr Lys Ala Gly Gln Lys Lys Asp Glu
    210                 215                 220
Ala Leu Ser Ala Ala Thr Arg Ala Glu Lys Ala Ala Asp Arg Ala Glu
225                 230                 235                 240
Ala Ala Ala Glu Val Thr Ala Glu Pro Cys Ala Asn Ile Val Pro Pro
                245                 250                 255
Leu Pro Asp Val Trp Ile Pro Phe Asn Asp Ser Leu Asp Met Ile Ala
            260                 265                 270
Gly Phe Ser Pro Gly Tyr Lys Lys Ile Ala Ile Gly Asp Asp Val Val
        275                 280                 285
Gln Val Ala Ser Asp Lys Gln Val Asn Phe Ser Arg Ala Ser Thr Ala
    290                 295                 300
Thr Tyr Ile Asn Lys Ser Gly Glu Leu Lys Thr Ala Glu Ile Asn Glu
305                 310                 315                 320
Pro Arg Phe Glu Cys Asp Gly Leu Leu Ile Glu Gly Gln Arg Thr Asn
                325                 330                 335
Tyr Met Leu Asn Ser Glu Ser Pro Ala Ser Trp Gly Lys Ser Ser Asn
            340                 345                 350
Met Asp Val Pro Glu Thr Gly Thr Asp Ser Phe Gly Phe Thr Tyr Gly
        355                 360                 365
Lys Phe Val Cys Asn Asp Ser Leu Val Gly Gln Thr Ser Ala Ile Asn
    370                 375                 380
Met Ala Ser Ile Ala Ala Thr Lys Ser Val Asp Val Ser Gly Asp Asn
385                 390                 395                 400
Lys Tyr Val Thr Thr Ser Cys Arg Phe Lys Thr Glu Arg Gln Val Arg
                405                 410                 415
Leu Arg Ile Arg Phe Asp Lys Tyr Asp Gly Ser Ala Thr Thr Phe Leu
            420                 425                 430
Gly Asp Ala Tyr Ile Asp Thr Gln Thr Leu Glu Ile Ser Met Thr Gly
        435                 440                 445
Gly Ala Ala Gly Arg Ile Thr Ala Arg Val Arg Lys Asp Lys Thr Thr
    450                 455                 460
Gly Trp Ile Phe Ala Glu Ala Thr Ile Gln Ala Ile Asp Gly Glu Leu
465                 470                 475                 480
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[0005]

Lys Ile Gly Ser Gln Ile Gln Tyr Ser Pro Gly Gln Gly Gly Ala Thr
485 490 495
Val Ser Gly Asp Tyr Ile Tyr Leu Ala Thr Pro Gln Val Glu Asn Gly
500 505 510
Pro Cys Val Ser Ser Phe Ile Ile Ser Gly Gly Ser Ala Thr Thr Arg
515 520 525
Ala Ser Asp Leu Val Ser Ile Pro Thr Arg Asn Asn Leu Tyr Lys Leu
530 535 540
Pro Phe Thr Phe Leu Leu Glu Ile His Lys Asn Trp Asp Ile Ala Pro
545 550 555 560
Asn Ala Ala Pro Arg Val Trp Asp Ile Ala Ala Ala Asn Thr Gly Gln
565 570 575
Ser Ala Ile Ala Ala Ile Asn Arg Gly Ser Gly Lys Leu Tyr Met Ser
580 585 590
Leu Ser Asn Pro Ser Gly Ser Tyr Val Asn Ser Ala Ala Thr Asp Val
595 600 605
Phe Ala Glu Lys Thr Thr Phe Gly Cys Ile Ala Lys Ala Asp Gly His
610 615 620
Phe His Val Val Thr Asn Gly Lys Ala Val Asn Glu Val Tyr Cys Glu
625 630 635 640
Tyr Asn Gly Val Thr Ala Asp Lys Asn Ile Arg Phe Gly Gly Gln Thr
645 650 655
Asn Thr Gly Glu Arg His Leu Phe Gly His Ile Arg Asn Phe Arg Ile
660 665 670
Trp His Lys Glu Leu Asn Asp Arg Gln Leu Lys Glu Val Val
675 680 685

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<213> 人工序列
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Met Lys Asp Leu Thr Leu Lys Phe His Asp Lys Leu Gln Phe Lys Ala
1 5 10 15
Phe Leu Ser Ser Leu Gly Trp Ala Glu Asp Glu Asp Leu Gln Asn Lys
20 25 30
Leu Leu Val Asp Glu Ile Gly Phe Thr Tyr Thr Glu Thr Gly Val Thr
35 40 45
Glu Glu Gly Glu Pro Val Cys Ile Arg Asn Asp Gly Tyr Phe Val Asn
50 55 60
Ile Arg Ile Leu Asp Asp Leu Phe Asp Val Ser Val Phe Ser Asp Tyr
65 70 75 80
Val Val Glu Leu Glu Thr Pro Leu Arg Glu Trp Ser

85 90

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1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Glu Thr Ala Ala Ala Ser Ser Lys Asn Ala Ala Lys Thr Ser
130 135 140
Glu Thr Asn Ala Ala Asn Ser Ala Gln Ala Ala Ala Ala Ser Gln Thr
145 150 155 160
Ala Ser Ala Asn Ser Ala Thr Ala Ala Lys Lys Ser Glu Thr Ser Ala
165 170 175
Lys Asn Ser Glu Thr Ala Thr Lys Ala Ser Glu Lys Asn Ala Lys Ser
180 185 190
Ser Gln Thr Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Asp Ser Glu
195 200 205
Ala Asn Ala Lys Val Ser Glu Thr Ala Ala Ala Asn Ser Ala Lys Ala
210 215 220
Ser Ala Ala Ser Gln Thr Ala Ala Lys Ala Ser Glu Asp Ala Ala Arg
225 230 235 240
Glu Tyr Ala Asn Gln Thr Ala Glu Pro Tyr Arg Tyr Val Leu Gln Pro
245 250 255
Leu Pro Asp Val Trp Ile Pro Phe Asn Asp Ser Leu Asp Met Ile Thr
260 265 270
Gly Tyr Ser Pro Gly Tyr Lys Lys Val Lys Ile Gly Asp Asn Val Val
275 280 285

[0006]

[0007]

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Gln Val Ala Ser Asp Lys Gln Val Asn Phe Ser Arg Ala Ser Thr Ala
    290                 295                 300
Thr Tyr Ile Asn Lys Ser Gly Glu Leu Lys Thr Ala Glu Ile Asn Glu
305                 310                 315                 320
Pro Arg Phe Glu Cys Asp Gly Leu Leu Ile Glu Gly Gln Arg Thr Asn
                325                 330                 335
Phe Phe Gln Asn Ser Thr Asp Pro Ser Lys Trp Asn Lys Ser Thr Ser
            340                 345                 350
Leu Asp Val Thr Glu Thr Gly Thr Asp Ser Phe Gly Phe Asn Tyr Gly
        355                 360                 365
Arg Phe Val Val Gln Asp Ser Ile Val Gly Thr Ser Lys Ala His Thr
    370                 375                 380
Ile Ile Gly Leu Tyr Ser Ser Thr Gly Gly Val Asp Thr Ser Gly Asp
385                 390                 395                 400
Glu Lys His Val Thr Ile Ser Cys Arg Val Lys Ser Glu Val Asp Asn
                405                 410                 415
Ile Ala Val Arg Ile Leu Phe Glu His Tyr Asp Gly Glu Val Arg Thr
            420                 425                 430
Ser Ile Gly Ala Ala Asn Leu Asn Leu Thr Thr Arg Ile Ile Ser Lys
        435                 440                 445
Thr Gly Gln Thr Ser Arg Val Thr Ala Arg Ser Val Lys Asp Asp Ala
    450                 455                 460
Thr Gly Trp Ile Phe Phe Glu Ala Thr Leu Lys Ala Asp Thr Thr Glu
465                 470                 475                 480
Asn Thr Val Gly Gly Phe Val Gln Tyr Ser Pro Asp Thr Gly Gln Met
                485                 490                 495
Val Thr Ser Gly Asp Tyr Leu Asp Val Thr Thr Pro Gln Ile Glu Ala
            500                 505                 510
Gly Thr Gly Ala Ser Ser Phe Ile Val Thr Gly Thr Ala Pro Ala Thr
        515                 520                 525
Arg Ala Ser Asp Met Val Thr Val Pro Ile Lys Asn Asn Leu Tyr Asn
    530                 535                 540
Leu Pro Phe Thr Val Leu Cys Glu Val His Lys Asn Trp Tyr Lys Thr
545                 550                 555                 560
Pro Asn Val Ala Pro Arg Val Phe Asp Thr Gly Gly His Gln Thr Gly
                565                 570                 575
Ala Gly Ile Val Met Gly Phe Gly Ser Ser Gly Gly Tyr Asp Gly Phe
            580                 585                 590
Pro Tyr Cys Asp Ile Gly Gly Ser Asp Arg Arg Ile Asn Glu Asn Ala
        595                 600                 605
Gly Leu Glu Lys Met Leu Ile Gly Met Arg Val Lys Ser Glu Arg Ser
    610                 615                 620
Thr Cys Val Val Ser Asn Gly Lys Leu Ser Ser Glu Thr Lys Thr Lys
625                 630                 635                 640
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Trp Glu Tyr Ile Arg Ser Thr Ala Thr Ile Arg Ile Gly Gly Gln Thr
645 650 655
Thr Ala Gly Leu Arg His Leu Phe Gly His Val Arg Asn Phe Arg Leu
660 665 670
Trp His Lys Glu Leu Thr Asp Ala Gln Leu Gly Glu Val Val Glu
675 680 685

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1 5 10 15
Phe Leu Arg Lys Leu Asn Trp Glu Glu Asp Glu Glu Leu Gln Asn Ala
20 25 30
Val Leu Val Asp Glu Ile Gly Phe Thr Phe Arg Glu Thr Asp Val Ser
35 40 45
Asp Asp Gly Glu Pro Glu Tyr Thr Arg Asn Glu Gly Tyr Phe Val Asn
50 55 60
[0008] Ile Arg Leu Leu Asp Asp Gly Phe Glu Asp Ser Val Phe Arg Glu Trp
65 70 75 80
Val Val Thr Pro Glu Arg Pro Leu Arg Glu Trp Phe
85 90

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<211> 88
<212> PRT
<213> 人工序列
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Gln Gln Glu Pro Asn Gly Trp Lys Thr Val Thr Thr Gln Phe Tyr Ile
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Gln Glu Phe Ser Glu Tyr Ile Ala Pro Leu Gln Asp Ala Val Asp Leu
35 40 45
Glu Ile Ala Thr Glu Glu Glu Arg Ser Leu Leu Glu Ala Trp Asn Lys
50 55 60
Tyr Arg Val Leu Leu Asn Arg Val Asp Thr Ser Thr Ala Pro Asp Ile
65 70 75 80
Glu Trp Pro Thr Ser Pro Ala Glu
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<212> PRT
<213> 人工序列
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<223> STF-28
<400> 7

[0009]

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            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Glu Thr Ala Ala Ala Ser Ser Arg Asn Ala Ala Lys Thr Ser
    130                 135                 140
Glu Thr Asn Ala Gly Asn Ser Ala Lys Ala Ala Ala Ser Ser Lys Thr
145                 150                 155                 160
Ala Ala Gln Asn Ala Ala Thr Ala Ala Glu Arg Ser Glu Thr Asn Ala
                165                 170                 175
Arg Ala Ser Glu Glu Ala Ser Ala Asp Ser Glu Glu Ala Ser Arg Arg
            180                 185                 190
Asn Ala Glu Ser Ala Ala Glu Asn Ala Gly Val Ala Thr Thr Lys Ala
        195                 200                 205
Arg Glu Ala Ala Ala Asp Ala Thr Lys Ala Gly Gln Lys Lys Asp Glu
    210                 215                 220
Ala Leu Ser Ala Ala Thr Arg Ala Glu Lys Ala Ala Asp Arg Ala Glu
225                 230                 235                 240
Ser Ala Ala Glu Val Thr Ala Glu Pro Cys Ala Asn Ile Val Pro Pro
                245                 250                 255
Leu Pro Asp Val Trp Ile Pro Phe Asn Asp Ser Leu Asp Met Ile Thr
            260                 265                 270
Gly Phe Ser Pro Ser Tyr Lys Lys Ile Val Ile Gly Asp Asp Glu Ile
        275                 280                 285
Thr Met Pro Gly Asp Lys Ile Val Lys Phe Lys Arg Ala Ser Thr Ala
```

[0010]

```
    290                 295                 300
Thr Tyr Ile Asn Lys Ser Gly Gln Leu Lys Leu Ala Glu Val Asp Glu
305                 310                 315                 320
Pro Arg Phe Glu Arg Asp Gly Leu Leu Ile Glu Gly Gln Arg Thr Asn
                325                 330                 335
Tyr Leu Arg Asn Ser Asn Lys Pro Asp Ser Trp Thr Val His Ser Ala
            340                 345                 350
Leu Asn Lys Thr Phe Gly Thr Asp Lys Gln Gly Phe Asn Tyr Ala Thr
        355                 360                 365
Val Thr Pro Thr Glu Ser Ile Val Gly Thr Thr Gly Gly Tyr Thr Val
    370                 375                 380
His Gly Val Val Ala Ala Asp Arg Phe Pro Leu Ala Ser Gly Glu Cys
385                 390                 395                 400
Phe Thr Phe Ser Cys Arg Val Lys Gly Ala Lys Ala Arg Cys Arg Leu
                405                 410                 415
Arg Val Ser Val Ile Ile Gly Gly Thr Asp Thr Phe Ser Ala Asp Ser
            420                 425                 430
Tyr Leu Asp Leu Asp Thr Arg Ile Ala Thr Val Ser Gly Asn Thr Ser
        435                 440                 445
Leu Ile Thr Ala Lys Ala Glu Gln Gln Gly Glu Trp Thr Tyr Tyr Glu
    450                 455                 460
Ala Thr Tyr Thr Ala Asn Thr Asp Ile Asp Thr Val Asn Cys Ala Phe
465                 470                 475                 480
Tyr Met Thr Asn Lys Ile Ser Asn Glu Pro Phe Tyr Asp Asp Ser Thr
                485                 490                 495
Leu Thr Met Thr Thr Pro Gln Ile Glu Leu Gly Asn Thr Ala Ser Ser
            500                 505                 510
Phe Ile Val Thr Thr Met Pro Thr Thr Arg Ala Ser Asp Val Val Thr
        515                 520                 525
Ile Pro Ser Ala Asn Asn Leu Ser Thr Arg Pro Phe Thr Val Leu Cys
    530                 535                 540
Glu Val Arg Arg Asn Trp Ser Thr Pro Pro Asn Val Ala Pro Arg Ile
545                 550                 555                 560
Phe Asp Val Gly Gly His Ser Ile Asp Asp Asn Tyr Leu Ser Leu Gly
                565                 570                 575
Phe Val Ser Thr Gly Lys Ile Ser Ala Asn Val Gly Met Val Gln Pro
            580                 585                 590
Gln Ile Ser Ser Asp Gly Glu Arg Phe Ile Val Gly Val Arg Ala Lys
        595                 600                 605
Ser Asp Leu Ser Val Asn Ala Ile Cys Asn Gly Asn Tyr Thr Thr Asn
    610                 615                 620
Leu Asn Gly Lys Ile Phe Gly Val Thr Ala Thr Ser Tyr Arg Phe Gly
625                 630                 635                 640
Gly Gln Thr Ala Ala Gly Thr Arg His Leu Phe Gly His Ile Arg Asn
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645 650 655
Phe Arg Val Trp Phe Lys Glu Leu Asn Asp Arg Gln Ile Lys Glu Ala
660 665 670
Val

<210> 8
<211> 92
<212> PRT
<213> 人工序列
<220>
<223> STF28-AP1
<400> 8
Met Lys Asp Leu Thr Leu Lys Phe Pro Gly Asn Arg Glu Phe Lys Ser
1 5 10 15
Phe Leu Ser Ser Leu Asp Trp Glu Glu Asp Glu Asp Leu Gln Asn Lys
20 25 30
Leu Leu Val Asp Glu Ile Gly Phe Thr Tyr Thr Glu Thr Gly Val Thr
35 40 45
Glu Glu Gly Glu Pro Val Cys Ile Arg Asn Asn Gly Tyr Phe Val Asn
50 55 60
Ile Arg Ile Leu Asp Asp Leu Phe Asp Val Ser Val Phe Ser Asp Tyr
65 70 75 80
Val Val Glu Leu Glu Thr Pro Leu Arg Glu Trp Ser
85 90

[0011]

<210> 9
<211> 798
<212> PRT
<213> 人工序列
<220>
<223> STF-15
<400> 9
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu

[0012]

```
                100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Ala Ser Ala Thr Ala Ser Ala Asn
    290                 295                 300
Ser Gln Lys Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Val Ser Glu
305                 310                 315                 320
Thr Ala Ala Ala Asn Ser Ala Lys Ala Ser Ala Ala Ser Gln Thr Ala
                325                 330                 335
Ala Lys Ala Ser Glu Asp Ala Ala Arg Glu Tyr Ala Ser Gln Ala Ala
            340                 345                 350
Glu Pro Tyr Lys Tyr Val Leu Gln Pro Leu Pro Asp Val Trp Ile Pro
        355                 360                 365
Phe Asn Asp Ser Leu Asp Met Ile Thr Gly Phe Ser Pro Ser Tyr Lys
    370                 375                 380
Lys Ile Val Ile Gly Asp Asp Glu Ile Thr Met Pro Gly Asp Lys Val
385                 390                 395                 400
Val Lys Phe Lys Arg Ala Ser Thr Ala Thr Tyr Ile Asn Lys Ser Gly
                405                 410                 415
Val Phe Ser Val Ala Lys Ile Asp Glu Pro Arg Phe Glu Lys Glu Gly
            420                 425                 430
Leu Leu Ile Glu Gly Gln Arg Thr Asn Tyr Phe Val Lys Ser Asn Thr
        435                 440                 445
Pro Ala Glu Trp Thr Ser Thr Ser Asn Ile Asp Lys Thr Asn Asn Gly
```

[0013]

450 455 460
Val Asp Glu Phe Gly Phe Ser Tyr Ala Lys Met Arg Thr Lys Asp Asn
465 470 475 480
Met Thr Gly Gln Ser Ser Ala Leu Ser Leu His Arg Cys Ser Ala Ser
485 490 495
Arg Gly Ile Asp Val Ser Gly Asp Asn Lys Tyr Cys Thr Val Ser Cys
500 505 510
Arg Val Lys Ala Pro Asp Gly Leu Arg Cys Arg Leu Arg Phe Glu Lys
515 520 525
Tyr Asp Gly Ser Val Tyr Thr Phe Leu Gly Asp Ala Tyr Leu Thr Phe
530 535 540
Gly Thr Leu Ile Ile Glu Lys Thr Gly Gly Ala Ala Asn Arg Ile Ala
545 550 555 560
Ala Thr Ala Thr Lys Asp Pro Val Thr Gly Trp Ile Phe Tyr Glu Ala
565 570 575
Thr Ile Glu Ala Val Glu Gly Glu Thr Leu Ile Gly Ala Met Ile Gln
580 585 590
Tyr Ala Pro Lys Lys Gly Gly Ile Thr Glu Ala Gly Asp Tyr Ile Tyr
595 600 605
Leu Ala Thr Pro Gln Phe Glu Asn Gly Gly Cys Ala Ser Ser Phe Val
610 615 620
Ile Thr Thr Thr Ala Pro Ala Thr Arg Ser Ser Asp Met Val Thr Ile
625 630 635 640
Pro Thr Lys Asn Asn Ile Tyr Asn Arg Pro Leu Thr Cys Leu Val Glu
645 650 655
Val Asn Arg Ile Trp Gly Asp Ile Pro Pro Asn Val Ala Pro Arg Ile
660 665 670
Phe Asp Phe Ser Gly Val Pro Pro Ile Glu Ser Ile Thr Tyr Ala Phe
675 680 685
Asn Thr Thr Glu Lys Tyr Tyr Gly Gln Leu Tyr Met Gln Thr Tyr Lys
690 695 700
Ala Ser Thr Ser Thr Tyr Val Ser Ser Val Phe Ala Gly Arg Ala Asp
705 710 715 720
Val Arg Lys Phe Ile Gly Gly Phe Asn Ile Tyr Ser Asp Gly Thr Lys
725 730 735
Arg Val Val Ser Asn Gly Glu Ala Thr Lys Thr Met Lys Thr Glu Trp
740 745 750
Thr Gly Val Lys Thr Arg Thr Phe Ile Arg Ile Gly Gly Gln Ala Thr
755 760 765
Ser Gly Thr Arg His Leu Phe Gly His Leu Arg Asn Leu Arg Leu Trp
770 775 780
His Lys Glu Leu Thr Asp Ala Gln Met Gly Glu Ser Ile Lys
785 790 795

<210> 10

<211> 93
<212> PRT
<213> 人工序列
<220>
<223> STF15-AP1
<400> 10

Met Lys Asp Leu Thr Leu Lys Phe Ala Asp Arg Ala Asp Phe Ser Ala
1 5 10 15
Phe Met Glu Ser Ile Gly Tyr Tyr Asp Asp Glu Ser Met Gln Asp Asp
20 25 30
Ile Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
35 40 45
Thr Glu Asp Gly Glu Pro Ala Cys Val Lys Glu Asp Gly Tyr Phe Val
50 55 60
Asn Val Arg Ile Ile Asn Asp Ser Gln Ile Ser Ser Leu Phe Asp Glu
65 70 75 80
His Ala Val Ala Val Glu His Gln Leu Arg Ser Trp Met
85 90

<210> 11
<211> 234
<212> PRT
<213> 人工序列
<220>
<223> STF15-AP2
<400> 11

[0014]

Met Ala Thr Ser Thr Val Ile Pro Asp Asp Ile Lys Thr Leu Lys Gly
1 5 10 15
Asp Val Ser Lys Ala Lys Glu Asp Ile Ser Ser Ile Asn Val Lys Val
20 25 30
Ser Thr Leu Gln Thr Asp Met Asp Ser Ala Lys Gln Asp Ile Ser Thr
35 40 45
Arg Tyr Thr Lys Thr Glu Val Asp Asn Lys Leu Lys Asn Lys Val Glu
50 55 60
Val Asn Asp Leu Glu Ser Gly Arg Tyr Gly Gly Asp Phe Tyr Pro Leu
65 70 75 80
Thr Gly Arg Glu Ala Phe Tyr Leu Trp Gly Leu Gly Thr Thr Thr Ala
85 90 95
Ala Ala Asn Leu Tyr Leu Asn Pro Asp Pro Ala Ile Ser Ser Val Leu
100 105 110
Arg Ser Thr Ser Ser Ile Arg Tyr Lys His Ser Val Glu Thr Ile Asp
115 120 125
Ser Glu His Ala Asp Leu Ile Phe Arg Met Arg Pro Val Trp Tyr Arg
130 135 140
Ser Gln Cys Glu Asn Asp Arg Arg Asp Trp Gly Phe Tyr Gly Leu Ile

145 150 155 160
Ala Glu Glu Val Gly Glu Ile Ala Pro Gln Phe Val His Trp Arg Pro
165 170 175
Ala Asn Glu Asp Asp Ala Pro Glu Thr Ile Ser Ser Asn Gly Leu Val
180 185 190
Ala Glu Gly Val Met Tyr Glu Arg Leu Val Val Pro Leu Ile His His
195 200 205
Ile Gln Lys Leu Thr Glu Arg Val Asp Glu Leu Glu Ser Glu Leu Lys
210 215 220
Leu Leu Ser Thr Ser Gln Ser Asp Ile Gly
225 230

<210> 12
<211> 791
<212> PRT
<213> 人工序列
<220>
<223> STF-16
<400> 12

[0015]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205

[0016]

```
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Ala Ser Ala Thr Ala Ser Ala Asn
    290                 295                 300
Ser Gln Lys Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Thr Ser Glu
305                 310                 315                 320
Thr Ala Ala Ala Asn Ser Ala Lys Ala Ser Ala Ala Ser Gln Thr Ala
                325                 330                 335
Ala Lys Ala Ser Glu Asp Ala Ala Arg Glu Tyr Ala Ser Gln Ala Ala
            340                 345                 350
Asp Pro Tyr Lys Tyr Val Leu Gln Pro Leu Pro Asp Val Trp Ile Pro
        355                 360                 365
Phe Asn Asp Ser Leu Asp Met Ile Thr Gly Phe Ser Pro Ser Tyr Lys
    370                 375                 380
Lys Ile Val Ile Gly Asp Asp Glu Ile Thr Met Pro Gly Asp Lys Ile
385                 390                 395                 400
Val Lys Phe Lys Arg Ala Ser Lys Ala Thr Tyr Ile Asn Lys Ser Gly
                405                 410                 415
Val Leu Thr Glu Ala Ala Ile Asp Glu Pro Arg Phe Glu Arg Asp Gly
            420                 425                 430
Leu Leu Ile Glu Gly Gln Arg Thr Asn Leu Leu Leu Asn Ser Thr Asn
        435                 440                 445
Pro Ser Lys Trp Asn Lys Ser Gly Asn Leu Glu Leu Thr Glu Ile Ser
    450                 455                 460
Thr Asp Ser Phe Asn Phe Thr Tyr Gly Arg Phe Thr Val Lys Asp Thr
465                 470                 475                 480
Leu Ile Gly Gln Thr Ser Ala Ile Asn Ile Val Thr Ile Ser Gly Ser
                485                 490                 495
Lys Gly Phe Asp Val Thr Gly Asp Glu Lys Tyr Val Thr Ile Ser Cys
            500                 505                 510
Arg Val Arg Ser Asp Val Glu Asn Ile Arg Cys Arg Leu Arg Phe Glu
        515                 520                 525
His His Asp Gly Tyr Thr Tyr Thr Phe Leu Gly Asp Ala Tyr Leu Asn
    530                 535                 540
Leu Ser Thr Leu Val Ile Asp Lys Thr Gly Thr Ala Ala Asp Arg Ile
545                 550                 555                 560
```

[0017]

Ile Ala Lys Ala Val Lys Asp Glu Val Thr Gly Trp Ile Phe Tyr Gln
565 570 575
Ala Thr Ile Asn Ala Leu Asp Thr Glu Ser Met Ile Gly Ala Met Val
580 585 590
Gln Tyr Ala Pro Val Lys Gly Ser Gly Thr Ala Ser Gly Asp Tyr Leu
595 600 605
Asp Ile Ala Thr Pro Gln Val Glu Gly Gly Ser Ser Ala Ser Ser Phe
610 615 620
Ile Val Thr Asp Ile Thr Ala Ser Thr Arg Ala Ser Asp Met Val Thr
625 630 635 640
Val Pro Ile Lys Asn Asn Leu Tyr Asn Leu Pro Phe Thr Val Leu Cys
645 650 655
Glu Val His Lys Asn Trp Tyr Lys Thr Pro Asn Ala Ala Pro Arg Val
660 665 670
Phe Asp Thr Gly Gly His Gln Thr Gly Ala Ala Ile Ile Leu Gly Phe
675 680 685
Gly Arg Ser Thr Asp Tyr Asp Gly Phe Pro Tyr Cys Asp Ile Gly Leu
690 695 700
Ala Asn Arg Arg Val Asn Glu Asn Ala Ser Leu Glu Lys Met Val Met
705 710 715 720
Gly Met Arg Val Lys Ser Asp Gln Ser Thr Cys Ser Val Ser Asn Gly
725 730 735
Arg Ile Ser Ser Glu Lys Lys Ala Thr Trp Ser Tyr Ile Gln Asn Ser
740 745 750
Ala Ile Ile Arg Ile Gly Gly Gln Thr Thr Ala Gly Leu Arg His Leu
755 760 765
Phe Gly His Val Arg Asn Phe Arg Ile Trp His Lys Ala Leu Thr Asp
770 775 780
Ala Gln Met Gly Glu Ser Ile
785 790

<210> 13
<211> 93
<212> PRT
<213> 人工序列
<220>
<223> STF16-AP1
<400> 13

Met Lys Asp Leu Thr Leu Lys Phe Ala Asp Arg Ala Asp Phe Ser Ala
1 5 10 15
Phe Met Asp Ser Ile Gly Tyr Tyr Asp Asp Glu Ser Met Gln Asp Asp
20 25 30
Ile Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
35 40 45
Thr Glu Asp Gly Glu Pro Val Cys Val Lys Glu Asp Gly Tyr Tyr Val

50 55 60

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

Tyr Ala Val Val Val Glu His Gln Leu Arg Gly Trp Met
85 90

<210> 14
<211> 234
<212> PRT
<213> 人工序列
<220>
<223> STF16-AP2
<400> 14

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

Asp Val Ser Lys Ala Lys Glu Asp Ile Ser Ser Ile Asn Gly Lys Val
20 25 30

Ser Thr Leu Gln Ala Asp Met Thr Ser Ala Lys Gln Asp Ile Ser Thr
35 40 45

Arg Tyr Thr Lys Thr Glu Val Asp Asn Lys Leu Lys Asn Lys Leu Glu
50 55 60

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

[0018]

Thr Gly Arg Glu Ala Phe Tyr Leu Trp Gly Leu Gly Thr Thr Thr Ala
85 90 95

Ala Ala Asn Leu Tyr Leu Asn Pro Asp Pro Ala Ile Ser Ser Val Leu
100 105 110

Arg Ser Thr Ser Ser Ile Arg Tyr Lys His Ser Val Glu Thr Ile Asp
115 120 125

Ser Glu His Ala Asp Leu Ile Phe Arg Met Arg Pro Val Trp Tyr Arg
130 135 140

Ser Gln Cys Glu Asn Asp Arg Arg Asp Trp Gly Phe Tyr Gly Leu Ile
145 150 155 160

Ala Glu Glu Val Gly Glu Ile Ala Pro Gln Phe Val His Trp Arg Pro
165 170 175

Ala Asn Glu Asp Asp Ala Pro Glu Ala Ile Ser Ser Asn Gly Leu Val
180 185 190

Ala Glu Gly Val Met Tyr Glu Arg Leu Val Val Pro Leu Ile His His
195 200 205

Ile Gln Lys Leu Thr Glu Arg Val Asp Glu Leu Glu Ser Glu Leu Lys
210 215 220

Leu Leu Ser Val Ser Arg Ser Asp Ile Gly
225 230

<210> 15
<211> 941

<212> PRT
<213> 人工序列
<220>
<223> STF-17
<400> 15

[0019]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Gly Ser Lys Thr Ala Ala Ala Leu
290 295 300
Ser Ala Ser Ala Ala Ser Thr Ser Ala Gly Gln Ala Ser Ala Ser Ala

[0020]

```
305                 310                 315                 320
Thr Ala Ala Gly Lys Ser Ala Glu Ser Ala Ala Ser Ser Ala Ser Thr
                325                 330                 335
Ala Thr Thr Lys Ala Gly Lys Ala Thr Glu Gln Ala Thr Ala Ala Ala
            340                 345                 350
Arg Ser Ala Ser Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Thr Ser
        355                 360                 365
Ala Asp Asn Ala Ala Ser Ser Lys Ala Ala Ala Ala Ser Ser Ala Ser
    370                 375                 380
Ser Ala Ala Ser Ser Ala Ser Ser Ala Ser Ala Ser Lys Asp Glu Ala
385                 390                 395                 400
Thr Arg Gln Ala Ser Ala Ala Lys Gly Ser Ala Thr Thr Ala Ser Thr
                405                 410                 415
Lys Ala Thr Glu Ala Ala Gly Ser Ala Thr Ala Ala Ala Gln Ser Lys
            420                 425                 430
Ser Thr Ala Glu Ser Ala Ala Thr Arg Ala Glu Thr Ala Ala Lys Arg
        435                 440                 445
Ala Glu Asp Ile Ala Ser Ala Val Ala Leu Glu Asp Ala Ser Thr Thr
    450                 455                 460
Lys Lys Gly Ile Val Gln Leu Ser Ser Ala Thr Asn Ser Thr Ser Glu
465                 470                 475                 480
Ser Leu Ala Ala Thr Pro Lys Ala Val Lys Ala Val Met Gly Glu Thr
                485                 490                 495
Asn Lys Lys Ala Pro Leu Asn Ser Pro Ala Leu Thr Gly Thr Pro Thr
            500                 505                 510
Thr Pro Thr Ala Arg Gln Gly Thr Asn Asn Thr Gln Ile Ala Ser Thr
        515                 520                 525
Ala Tyr Val Met Ala Ala Ile Ala Ala Leu Val Asp Ser Ser Pro Asp
    530                 535                 540
Ala Leu Asn Thr Leu Asn Glu Leu Ala Ala Ala Leu Gly Asn Asp Pro
545                 550                 555                 560
Asn Phe Ala Thr Thr Met Thr Ser Ala Leu Ala Gly Lys Gln Pro Lys
                565                 570                 575
Asp Ala Thr Leu Thr Ala Leu Ala Gly Leu Ala Thr Ala Ala Asp Arg
            580                 585                 590
Phe Pro Tyr Phe Thr Gly Asn Asp Val Ala Ser Leu Ala Thr Leu Thr
        595                 600                 605
Lys Val Gly Arg Asp Ile Leu Ala Lys Ser Thr Val Ala Ala Val Ile
    610                 615                 620
Glu Tyr Leu Gly Leu Arg Glu Leu Gly Thr Ser Gly Glu Lys Ile Pro
625                 630                 635                 640
Leu Leu Ser Thr Ala Asn Thr Trp Thr Asn Arg Gln Thr Phe Ser Gly
                645                 650                 655
Gly Leu Ser Gly Glu Leu Ser Gly Asn Ala Ser Thr Ala Ala Lys Leu
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660 665 670
Lys Thr Ala Arg Lys Ile Ser Asn Val Ala Phe Asp Gly Ser Ser Asp
675 680 685
Ile Thr Leu Lys Ala Ser His Val Gly Ala Phe Ala Leu Gly Lys Thr
690 695 700
Gly Ser Thr Val Ala Asn Asp Lys Ala Val Gly Trp Asn Trp Ser Ser
705 710 715 720
Gly Ala Tyr Asn Ala Thr Ile Ser Gly Ala Ser Thr Leu Ile Ile His
725 730 735
Phe Tyr Met Gly Glu Gly Ser Cys Pro Ala Ala Gln Phe Arg Ile Asn
740 745 750
Tyr Lys Asn Gly Gly Ile Phe Tyr Arg Ser Ala Arg Asp Gly Tyr Gly
755 760 765
Phe Glu Ala Asp Trp Ser Glu Phe Tyr Thr Thr Thr Arg Lys Pro Ser
770 775 780
Ala Gly Asp Val Gly Ala Leu Pro Leu Ser Gly Gly Gln Leu Asn Gly
785 790 795 800
Ala Leu Gly Ile Gly Thr Ser Ser Ala Leu Gly Gly Asn Ser Ile Val
805 810 815
Leu Gly Asp Asn Asp Thr Gly Phe Lys Gln Asn Gly Asp Gly Asn Leu
820 825 830
Asp Val Tyr Ala Asn Asn Val His Val Met Arg Phe Val Ser Gly Ser
835 840 845
Ile Gln Ser Asn Lys Thr Ile Asn Ile Thr Gly Arg Val Asn Pro Ser
850 855 860
Asp Tyr Gly Asn Phe Asp Ser Arg Tyr Val Lys Asp Val Arg Leu Gly
865 870 875 880
Ser Gln Gln Tyr Tyr Gly Val Asn Asn Trp Gln Thr Trp Asn Phe Gln
885 890 895
Cys Pro Ser Gly His Val Leu Ser Gly Ile Asn Val Gln Asp Thr Gly
900 905 910
Ser Asn Ser Ala Asp Asn Ile Ala Gly Val Tyr Tyr Arg Pro Val Gln
915 920 925
Lys Tyr Ile Asn Gly Thr Trp Tyr Asn Val Ala Ser Val
930 935 940

[0021]

<210> 16
<211> 177
<212> PRT
<213> 人工序列
<220>
<223> STF17-AP1
<400> 16
Met Met His Leu Lys Asn Ile Lys Ala Gly Asn Ala Lys Thr Leu Glu
1 5 10 15

Gln Tyr Glu Leu Thr Lys Lys His Gly Val Ile Trp Leu Tyr Ser Glu
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Val Lys Asn Phe Gln Pro Asp Thr
35 40 45
Ile Lys Ile Val Tyr Asp Glu Asn Asn Ile Ile Val Ala Ile Thr Lys
50 55 60
Asp Ala Ser Thr Leu Asn Pro Glu Gly Tyr Ser Val Val Glu Ile Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Asp Ser Gly Lys Trp Met Phe
85 90 95
Lys Asp Gly Ala Val Ile Lys Arg Val Tyr Thr Glu Glu Glu Leu Arg
100 105 110
Leu Gln Thr Glu Asn Gln Lys Lys Ile Leu Leu Gln Gln Ala Arg Glu
115 120 125
Lys Thr Gln Phe Trp Gln Thr Gln Leu Thr Leu Gly Ile Ile Thr Asp
130 135 140
Ser Asp Arg Gln Gln Leu Met Asn Trp Met Arg Tyr Val Gln Gln Val
145 150 155 160
Glu Thr Thr Asp Thr Ser Val Leu Pro Val Thr Phe Pro Glu Pro Pro
165 170 175
Glu

[0022]

<210> 17
<211> 791
<212> PRT
<213> 人工序列
<220>
<223> STF-13
<400> 17
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys

[0023]

```
          115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
      130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                  165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
              180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
          195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
      210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                  245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
              260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
          275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Ser Ser Ala Thr Ala Ser Ala Asn
      290                 295                 300
Ser Gln Lys Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Ala Ser Glu
305                 310                 315                 320
Thr Ala Ala Ala Asn Ser Ala Lys Ala Ser Ala Ala Ser Gln Thr Ala
                  325                 330                 335
Ala Lys Ala Ser Glu Asp Ala Ala Arg Glu Tyr Ala Ser Gln Ala Ala
              340                 345                 350
Glu Pro Tyr Lys Gln Val Leu Gln Pro Leu Pro Asp Val Trp Ile Pro
          355                 360                 365
Phe Asn Asp Ser Leu Asp Met Leu Ala Gly Phe Ser Pro Gly Tyr Lys
      370                 375                 380
Gln Ile Thr Val Gly Asp Asp Val Ile Lys Met Pro Ser Asp Lys Val
385                 390                 395                 400
Val Ser Phe Lys Arg Ala Ser Gly Ala Thr Tyr Ile Asn Lys Ser Gly
                  405                 410                 415
Val Leu Thr Val Ala Glu Val Asp Glu Pro Arg Phe Glu Arg Glu Gly
              420                 425                 430
Leu Leu Ile Glu Gly Gln Arg Thr Asn Tyr His Leu Asn Ser Leu Thr
          435                 440                 445
Pro Ser Lys Trp Gly Ala Thr Thr Ser Val Thr Ile Thr Glu Ser Gly
      450                 455                 460
Val Asp Glu Phe Gly Phe Thr Tyr Gly Arg Phe Gln Ile Lys Asp Glu
```

[0024]

465 470 475 480
Lys Ile Gly Thr Asn Thr Thr Met Asn Ile Ala Ala Val Ser Gly Gly
485 490 495
Arg Gly Val Asp Val Thr Gly Thr Glu Lys Tyr Val Thr Thr Ser Cys
500 505 510
Arg Val Lys Ser Asp Ser Ala Asn Ile Gln Cys Arg Ile Arg Phe Glu
515 520 525
Arg Tyr Asp Gly Ser Ala Tyr Phe Tyr Leu Ala Asp Ala Tyr Leu Asn
530 535 540
Ile Thr Asp Met Ser Ile Arg Lys Thr Gly Gly Gly Ala Ala Arg Ile
545 550 555 560
Thr Ala Arg Ala Glu Lys Glu Ser Asn Gly Trp Ile Tyr Phe Glu Val
565 570 575
Thr Tyr Gln Ser Glu Ala Ile Asp Asn Met Val Gly Ser Gln Ile Gln
580 585 590
Ile Ala Pro Pro Val Ser Pro Gly Thr Tyr Leu Gly Gly Glu Tyr Leu
595 600 605
Asp Val Thr Thr Pro Gln Phe Glu Gly Gly Ser Cys Ala Ser Ser Phe
610 615 620
Ile Ile Ser Asp Thr Val Ala Ser Thr Arg Ala Ser Asp Ile Val Thr
625 630 635 640
Leu Pro Cys Lys Asn Asn Met Ala Ser Lys Pro Leu Thr Cys Met Val
645 650 655
Glu Val Asn Lys Asn Trp Ser Ile Ala Pro Asn Ser Ala Pro Arg Ile
660 665 670
Tyr Asp Ile Thr Gly Phe Lys Thr Lys Asp Asp Ala Phe Val Phe Ala
675 680 685
Phe Arg Asn Thr Ala Gly Ser Val Gly Thr Pro Tyr Val Gln Phe Gly
690 695 700
Asn Pro Ile Ser Phe Pro Pro Gly Asn Tyr Pro Arg Lys Ile Ile Ala
705 710 715 720
Val Tyr Arg Ile Lys Ser Asp Gly Lys Phe Gln Ala Gly Cys Asn Gly
725 730 735
Val Leu Ser Thr Pro Ala Ser Thr Thr Trp Lys Ser Val Ser Gly Ala
740 745 750
Thr Gly Ile Arg Ile Gly Gly Gln Thr Thr Ala Gly Leu Arg His Leu
755 760 765
Phe Gly Tyr Ile Arg Asn Phe Arg Ile Trp His Lys Glu Leu Thr Asp
770 775 780
Ala Gln Met Gly Glu Ile Ile
785 790

<210> 18
<211> 93
<212> PRT

<213> 人工序列
<220>
<223> STF13-AP1
<400> 18

Met Arg Asp Leu Ile Ile Lys Phe Thr Asp Lys Ala Asp Phe Ser Ala
1 5 10 15
Phe Met Lys Ser Ala Gly Tyr Tyr Asp Asp Glu Ser Met Gln Asp Asp
20 25 30
Ile Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
35 40 45
Thr Glu Asp Gly Glu Pro Val Cys Val Lys Glu Asp Gly Tyr Phe Val
50 55 60
Asn Val Arg Ile Ile Asn Asp Ala Lys Lys Ser Ser Ile Phe Asp Lys
65 70 75 80
Tyr Ala Val Val Val Glu His Gln Leu Arg Gly Trp Met
85 90

<210> 19
<211> 234
<212> PRT
<213> 人工序列
<220>
<223> STF13-AP2

[0025]

<400> 19

Met Ala Thr Ser Thr Val Ile Pro Gly Asp Ile Thr Lys Leu Lys Gly
1 5 10 15
Asp Val Ser Lys Ala Lys Glu Asp Ile Ser Ser Ile Ser Arg Lys Val
20 25 30
Ser Thr Leu Gln Thr Glu Met Thr Ser Ala Lys Gln Asp Ile Ser Ser
35 40 45
Arg Tyr Thr Lys Thr Glu Val Asp Asn Lys Leu Lys Asn Lys Val Glu
50 55 60
Val Asn Asp Leu Glu Ser Gly Arg Tyr Gly Gly Asp Phe Tyr Pro Leu
65 70 75 80
Thr Gly Arg Glu Ala Phe Tyr Leu Trp Asn Leu Ala Thr Thr Thr Ala
85 90 95
Ala Ala Asn Leu Tyr Leu Asn Pro Asp Pro Ala Ile Ser Ser Val Leu
100 105 110
Arg Ser Thr Ser Ser Ile Arg Tyr Lys His Ser Val Glu Thr Ile Asp
115 120 125
Ser Glu His Ala Asp Leu Ile Phe Arg Met Arg Pro Val Trp Tyr Arg
130 135 140
Ser Gln Cys Glu Asn Asp Arg Arg Asp Trp Gly Phe Tyr Gly Leu Ile
145 150 155 160
Ala Glu Glu Val Gly Glu Ile Ala Pro Gln Phe Val His Trp Arg Pro

165 170 175
Ala Asn Glu Asp Asp Ala Pro Glu Ala Ile Ser Ser Asn Gly Leu Val
180 185 190
Ala Glu Gly Val Met Tyr Glu Arg Leu Val Val Pro Leu Ile His His
195 200 205
Ile Gln Lys Leu Thr Glu Arg Val Asp Glu Leu Glu Ser Glu Leu Lys
210 215 220
Leu Leu Leu Thr Ser Arg Ser Asp Ile Arg
225 230

<210> 20
<211> 781
<212> PRT
<213> 人工序列
<220>
<223> STF-12
<400> 20

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220

[0026]

[0027]

```
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Ala Ser Ala Thr Ala Ser Ala Asn
    290                 295                 300
Ser Gln Lys Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Thr Ser Glu
305                 310                 315                 320
Thr Ala Ala Ala Asn Ser Ala Gln Ala Ser Ala Ala Ser Gln Thr Ala
                325                 330                 335
Ala Lys Ala Ser Glu Asp Ala Ala Arg Glu Tyr Ala Ser Gln Ala Ala
            340                 345                 350
Glu Pro Tyr Lys Tyr Val Leu Gln Pro Leu Pro Asp Val Trp Ile Pro
        355                 360                 365
Phe Asn Asp Ser Leu Asp Met Leu Ala Gly Phe Ser Pro Gly Tyr Lys
    370                 375                 380
Gln Ile Thr Val Gly Asp Asp Val Ile Lys Met Pro Ser Asp Lys Val
385                 390                 395                 400
Val Ser Phe Lys Arg Ala Ser Gly Ala Thr Tyr Ile Asn Lys Ser Gly
                405                 410                 415
Val Leu Thr Val Ala Glu Val Asp Glu Pro Arg Phe Glu Arg Glu Gly
            420                 425                 430
Leu Leu Ile Glu Gly Gln Arg Thr Asn Tyr Phe Arg Asn Ser Asn Thr
        435                 440                 445
Pro Glu Ala Trp Asn Asn Thr Gly Ser Val Ser Val Glu Ser Phe Asp
    450                 455                 460
Ser Asp Lys Gly Phe Asn Tyr Gly Arg Ile Thr Val Ile Asn Glu Asn
465                 470                 475                 480
Pro Thr Ala Gln Gly Tyr Gln Ala Ile Ala Val Asn Thr Asn Asp Ala
                485                 490                 495
Tyr Thr Cys Pro Ala Gly Ser Tyr Thr Thr Ile Ser Cys Leu Thr Lys
            500                 505                 510
Ser Asp Asn Ser Arg Cys Arg Ala Arg Phe Gly Lys Met Ser Asp Asn
        515                 520                 525
Gly Ala Phe Val Phe His Ser Asp Ala Val Leu Asp Pro Val Thr Gly
    530                 535                 540
Asn Val Val His Gly Asn Asn Val Thr Val Thr Ala Glu Arg Val Gly
545                 550                 555                 560
Glu Trp Trp Leu Phe Thr Ala Thr Leu Phe Ala Asp Ala Glu Met Ile
                565                 570                 575
```

[0028]

Ile Ser Ser Arg Phe Glu Ile Leu Ala Met Pro Gly Ile Ser Ile Ile
580 585 590
Pro Asn Gly Ser Thr Leu Asp Ile Ala Met Pro Gln Ala Glu Ile Gly
595 600 605
Ser Tyr Arg Thr Ser Phe Ile Ile Thr Glu Gly Ala Pro Gly Thr Arg
610 615 620
Ser Ser Asp Met Val Thr Ile Pro Val Arg Asn Asn Ile His Arg Leu
625 630 635 640
Pro Phe Ser Ala Leu Val Glu Val Asn Lys Asn Trp Asp Ile Pro Pro
645 650 655
Ser Lys Ser Pro Leu Ile Phe Asn Val Lys Asp Tyr Gln Glu Asn Gly
660 665 670
Leu Phe Thr His Gly Phe Arg Gly Asn Asn Phe Ser Asp Ala Gly Ser
675 680 685
Pro Phe Ile Ser Met Gly Gly Cys Asn Lys Tyr Val Ala Thr Thr Gln
690 695 700
Arg Lys Ile Ile Ser Gly Phe Arg Cys Gly Ala Asp Gly Asp Val Gln
705 710 715 720
Ala Val Cys Asn Gly Glu Leu Ser Val Ala Ala Lys Thr Thr Trp Thr
725 730 735
Ser Ile Val Pro Arg Ala Val Leu Arg Ile Gly Gly Gln Gly Thr Asn
740 745 750
Gly Glu Tyr His Leu Phe Gly His Ile Arg Asn Leu Arg Ile Trp His
755 760 765
Lys Glu Leu Thr Asp Ala Gln Met Gly Glu Ser Ile Lys
770 775 780

<210> 21
<211> 93
<212> PRT
<213> 人工序列
<220>
<223> STF12-AP1
<400> 21

Met Lys Asp Leu Thr Leu Lys Phe Ala Asp Arg Ala Asp Phe Ser Ala
1 5 10 15
Phe Met Glu Ser Ile Gly Tyr Tyr Asp Asp Glu Ser Met Gln Asp Asp
20 25 30
Ile Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
35 40 45
Thr Glu Asp Gly Glu Pro Val Cys Val Lys Glu Asp Gly Tyr Phe Val
50 55 60
Asn Val Arg Ile Ile Asn Asp Val Lys Lys Ser Ser Ile Phe Asp Lys
65 70 75 80
Tyr Ala Val Val Val Glu His Gln Leu Arg Gly Trp Met

85 90

<210> 22
<211> 234
<212> PRT
<213> 人工序列
<220>
<223> STF12-AP2
<400> 22

Met Ala Thr Ser Thr Val Ile Pro Gly Asp Ile Thr Thr Leu Lys Gly
1 5 10 15
Asp Val Ser Lys Thr Lys Glu Asp Ile Ser Ser Ile Asn Gly Lys Val
20 25 30
Ser Thr Leu Gln Thr Asp Met Thr Ser Ala Lys Gln Asp Ile Ser Thr
35 40 45
Arg Tyr Thr Lys Thr Glu Val Asp Asn Lys Leu Lys Asn Lys Leu Glu
50 55 60
Val Asn Asp Leu Glu Ser Gly Arg Tyr Gly Gly Asp Phe Tyr Pro Leu
65 70 75 80
Thr Gly Arg Glu Ala Phe Tyr Met Trp Gly Leu Gly Thr Thr Thr Ala
85 90 95
Ala Ala Asn Leu Tyr Leu Asn Pro Asp Pro Ala Ile Ser Ser Val Leu
100 105 110
Arg Ser Thr Ser Ser Ile Arg Tyr Lys His Ser Val Glu Thr Ile Asp
115 120 125
Ser Glu His Ala Asp Leu Ile Phe Arg Met Arg Pro Val Trp Tyr Arg
130 135 140
Ser Gln Cys Glu Asn Asp Arg Arg Asp Trp Gly Phe Tyr Gly Leu Ile
145 150 155 160
Ala Glu Glu Val Gly Glu Ile Ala Pro Gln Phe Val His Trp Arg Pro
165 170 175
Ala Asn Glu Asp Asp Ala Pro Glu Ala Ile Ser Ser Asn Gly Leu Val
180 185 190
Ala Glu Gly Val Met Tyr Glu Arg Leu Val Val Pro Leu Ile His His
195 200 205
Ile Gln Lys Leu Thr Glu Arg Val Asp Glu Leu Glu Ser Glu Leu Lys
210 215 220
Leu Leu Ser Val Ser Arg Ser Asp Ile Gly
225 230

<210> 23
<211> 702
<212> PRT
<213> 人工序列
<220>
<223> STF-63

[0029]

<400> 23

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asn Ser Ala Thr Ala Ala Lys Lys
290 295 300
Ser Glu Thr Asn Ala Lys Asn Ser Glu Ser Ala Ala Lys Val Ser Glu
305 310 315 320
Thr Asn Ala Lys Ala Ser Glu Asn Lys Ala Lys Glu Tyr Leu Asp Lys
325 330 335
Val Gly Gly Leu Val Ser Pro Met Thr Gln Tyr Asp Trp Pro Val Val

[0030]

[0031]

```
                340                 345                 350
Thr Gly Asn Glu Ser Phe Tyr Ile Lys Ile Ala Lys Leu Ser Asp Pro
        355                 360                 365
Gly Ser Asn Asn Cys His Val Thr Leu Met Val Thr Asn Gly Gly Asp
    370                 375                 380
Tyr Gly Ser Pro Tyr Gly Asn Ile Asp Phe Ile Glu Ile Ser Ala Arg
385                 390                 395                 400
Gly Leu Pro Ser Ser Leu Thr Ala Asp Asn Val Ser Arg Tyr Leu Ser
                405                 410                 415
Ile Arg Arg Leu Gly Pro Thr Gly Leu Ile Asn Ser Met Gln Met Arg
            420                 425                 430
Tyr Gly Leu Val Lys Asp Asp Gly Phe Ile Glu Val Trp Ala Phe Gln
        435                 440                 445
Arg Ala Phe Ile Asn Gly Ala Lys Val Ala Val Leu Ala Gln Thr Ala
    450                 455                 460
Arg Thr Glu Leu Tyr Ile Pro Asp Gly Phe Val Lys Gln Thr Ala Ala
465                 470                 475                 480
Pro Ser Gly Tyr Val Glu Ser Pro Val Val Arg Ile Tyr Asp Gln Leu
                485                 490                 495
Asn Lys Pro Thr Lys Ala Asp Leu Gly Leu Ser Asn Ala Met Leu Thr
            500                 505                 510
Gly Ala Phe Gly Leu Gly Gly Ser Gly Ile Ser Thr Asn Gly Lys Met
        515                 520                 525
Ser Asp Val Glu Ile Leu Lys Ala Leu Arg Asp Lys Gly Gly His Phe
    530                 535                 540
Trp Arg Gly Asp Lys Pro Thr Gly Ser Thr Ala Thr Ile Tyr Ser His
545                 550                 555                 560
Gly Ser Gly Ile Phe Ser Arg Cys Gly Asp Thr Trp Ser Ala Ile Asn
                565                 570                 575
Ile Asp Tyr Ser Thr Ala Lys Ile Lys Ile Tyr Ala Gly Asn Asp Ala
            580                 585                 590
Arg Leu Asn Asn Gly Thr Phe Ser Ile Asn Glu Leu Tyr Gly Ser Ala
        595                 600                 605
Asn Lys Pro Ser Lys Ser Asp Val Gly Leu Gly Asn Val Thr Asn Asp
    610                 615                 620
Ala Gln Val Lys Lys Thr Gly Asp Thr Met Thr Gly Asp Leu Thr Ile
625                 630                 635                 640
Lys Lys Gly Thr Pro Ser Val Phe Leu Arg Ala Asp Ser Gly Val Thr
                645                 650                 655
Ala Leu Arg Phe Tyr Thr Gly Asp Asn Thr Glu Arg Gly Ile Ile Tyr
            660                 665                 670
Ala Gly Pro Asn Thr Asp Ser Leu Gly Glu Val Arg Ile Arg Ala Lys
        675                 680                 685
Thr Ala Gly Gly Thr Ser Gly Gly Asp Leu Val Val Arg His
```

690 695 700

<210> 24
<211> 1253
<212> PRT
<213> 人工序列
<220>
<223> STF-62
<400> 24

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285

[0032]

[0033]

```
Glu Arg Ser Ala Ser Ala Ala Ala Asn Ser Ala Thr Ala Ala Lys Lys
    290                 295                 300
Ser Glu Thr Asn Ala Lys Asn Ser Glu Ala Ala Ala Lys Val Ser Glu
305                 310                 315                 320
Thr Asn Ala Lys Ala Ser Glu Asn Lys Ala Lys Glu Tyr Leu Asp Lys
                325                 330                 335
Val Gly Gly Leu Val Ser Pro Met Thr Gln Tyr Asp Trp Pro Val Val
            340                 345                 350
Thr Ala Ser Glu Ser Leu Tyr Ile Lys Ile Ala Lys Leu Ser Asp Pro
        355                 360                 365
Gly Thr Ser Arg Ser His Val Thr Leu Met Val Thr Asn Ala Gly Asn
    370                 375                 380
Tyr Gly Ser Pro Tyr Gly Asn Ile Asp Phe Ile Glu Ile Ser Ala Arg
385                 390                 395                 400
Gly Leu Pro Ser Leu Leu Ser Ala Asp Asn Val Ser Arg His Leu Ser
                405                 410                 415
Ile Arg Arg Leu Gly Ser Thr Gly Leu Thr Asp Asn Asn Gln Met Arg
            420                 425                 430
Tyr Gly Leu Val Lys Gly Asp Gly Phe Ile Glu Val Trp Ala Phe Gln
        435                 440                 445
Gly Ala Phe Ile Asn Asp Ala Lys Val Ala Val Leu Ala Gln Thr Thr
    450                 455                 460
Leu Asn Thr Glu Leu Tyr Ile Pro Asp Gly Phe Val Lys Gln Thr Ala
465                 470                 475                 480
Ala Pro Ser Gly Tyr Ile Glu Gly Asn Val Val Arg Ile Tyr Asp Gln
                485                 490                 495
Val Asn Lys Pro Thr Lys Ala Asp Leu Gly Leu Ser Asn Ala Met Leu
            500                 505                 510
Thr Gly Ala Phe Gly Leu Gly Gly Ser Gly Ile Ser Thr Asn Gly Lys
        515                 520                 525
Met Ser Asp Val Glu Ile Leu Lys Ala Leu Arg Asp Lys Gly Gly His
    530                 535                 540
Phe Trp Arg Gly Asp Lys Pro Thr Gly Ser Thr Ala Thr Ile Tyr Ser
545                 550                 555                 560
His Gly Ser Gly Ile Phe Ser Arg Cys Gly Asp Thr Trp Ser Ala Ile
                565                 570                 575
Asn Ile Asp Tyr Ser Thr Ala Lys Ile Lys Ile Tyr Ala Gly Asn Asp
            580                 585                 590
Ala Arg Leu Asn Asn Gly Thr Phe Ser Val Asn Glu Leu Tyr Gly Ser
        595                 600                 605
Ala Asn Lys Pro Ser Lys Ser Asp Val Gly Leu Gly Asn Val Thr Asn
    610                 615                 620
Asp Ala Gln Val Lys Lys Ser Gly Asp Val Met Ser Gly Asp Leu Asp
625                 630                 635                 640
```

[0034]

```
Ile Leu Lys Glu Thr Pro Ser Ile Arg Leu Lys Ser Ala Lys Gly Thr
                645                 650                 655
Ala His Leu Trp Phe Met Asn Asn Asp Gly Ser Glu Arg Gly Val Val
            660                 665                 670
Trp Ser Pro Glu Asn Asn Glu Ser Leu Gly Glu Ile His Ile Arg Ala
        675                 680                 685
Lys Asn Thr Lys Gly Glu Ser Ser Gly Asp Phe Ile Val Arg His Asp
    690                 695                 700
Gly Arg Val Glu Ala Arg Asn Leu Lys Ile Thr Tyr Lys Ile Ser Ala
705                 710                 715                 720
Ala Thr Ala Glu Phe Ala Asn Thr Ser Thr Ser Ser Asp Asn Thr Thr
                725                 730                 735
Val Ser Ile Lys Gly Ser Gln His Thr Pro Leu Val Leu Thr Ser Asn
            740                 745                 750
Asn Thr Ile Lys Asn Leu Ser Ile Gly Phe Lys Val Asp Asp Val Asp
        755                 760                 765
Gln Lys Tyr Leu Gly Ile Ala Gly Asp Gly Asp Leu Tyr Phe Gly Ser
    770                 775                 780
Tyr Ser Asp His Thr Lys Asn Ser Lys Val Ile Thr Gln Ala Lys Leu
785                 790                 795                 800
Asp Ser Gly Val Thr Val Gly Gly Lys Thr Thr Phe Ser Asp Leu Ala
                805                 810                 815
Thr Phe Asn Ala Gly Met Ala Gly Ser Ile Glu Pro Glu Thr Ile Asp
            820                 825                 830
Asn Lys Thr Ile Asp Leu Asn Asp Leu Ile Ile Ala Asn Thr Val Ala
        835                 840                 845
Gly Ser Val Lys Tyr Tyr Gln Cys Lys Thr Val Ala Gly Gly Ala Tyr
    850                 855                 860
Ile Thr Asn Lys Pro Asp Gly Val Ser Gly Asn Phe Leu Leu Arg Val
865                 870                 875                 880
Glu Ser Thr Arg Lys Thr Thr Gly Ser Asp Tyr Ala Ile Met Gln Thr
                885                 890                 895
Leu Ile Gly Ser Asp Thr Lys Arg Ile Tyr Val Arg Phe Val Val Asn
            900                 905                 910
Gly Ser Trp Thr Glu Trp Ser Gln Val Val Val Ser Gly Trp Asn Gln
        915                 920                 925
Asp Val Thr Val Arg Ser Leu Thr Ser Thr Thr Pro Ser Lys Leu Gly
    930                 935                 940
Gly Gly Arg Val Asp Val Leu Gly Ser Thr Ser Asp Tyr Ser Ser Met
945                 950                 955                 960
Asn Cys Ala Val Arg Gly Val Asp Ser Thr Gly Thr Asn Ser Ala Trp
                965                 970                 975
Ser Val Gly Thr Ser Lys Asn Thr Gly Lys Met Leu Cys Leu Lys Asn
            980                 985                 990
```

[0035]

```
His Arg Ser Ser Ala Gln Val Leu  Leu Asn Gly Asp Asp  Gly Ala Val
        995                 1000                1005
Gln Leu  Leu Ser Gly Thr Val  Asn Gly Ala Thr Ala  Gln Ala Leu
    1010                1015                1020
Thr Ile  Asn Lys Asp Glu Val  Asn Ser Thr Ala Asp  Leu Val Ile
    1025                1030                1035
Arg Lys  Gln Thr Gly Thr Gly  Asn Arg Phe Ala Leu  Leu Asn Ser
    1040                1045                1050
Gly Asn  Ser Glu Leu Pro Val  Gly Ile Arg Val Trp  Gly Ser Ser
    1055                1060                1065
Thr Arg  Gln Asn Val Phe Glu  Val Gly Thr Ser Thr  Ala Tyr Leu
    1070                1075                1080
Phe Tyr  Ala Gln Lys Thr Ser  Ala Gly Gln Leu Phe  Asp Val Asn
    1085                1090                1095
Gly Ala  Ile Asn Cys Thr Thr  Leu Asn Gln Ser Ser  Asp Arg Asp
    1100                1105                1110
Leu Lys  Asp Asp Ile Leu Val  Ile Ser Asp Ala Thr  Lys Ala Ile
    1115                1120                1125
Arg Lys  Met Asn Gly Tyr Thr  Tyr Thr Leu Arg Glu  Asn Gly Met
    1130                1135                1140
Pro Tyr  Ala Gly Val Ile Ala  Gln Glu Val Met Glu  Ala Ile Pro
    1145                1150                1155
Glu Ala  Val Gly Ser Phe Thr  His Tyr Gly Glu Glu  Leu Gln Gly
    1160                1165                1170
Pro Thr  Val Asp Gly Asn Glu  Leu Arg Glu Glu Thr  Arg Tyr Leu
    1175                1180                1185
Asn Val  Asp Tyr Ala Ala Val  Thr Gly Leu Leu Val  Gln Phe Ala
    1190                1195                1200
Arg Glu  Thr Asp Asp Arg Val  Thr Ala Leu Glu Glu  Glu Asn Thr
    1205                1210                1215
Thr Leu  Arg Gln Asn Leu Ala  Thr Ala Asp Thr Arg  Ile Ser Thr
    1220                1225                1230
Leu Glu  Asn Gln Val Ser Glu  Leu Val Ala Leu Val  Arg Gln Leu
    1235                1240                1245
Thr Gly  Ser Glu His
    1250
<210>  25
<211>  790
<212>  PRT
<213>  人工序列
<220>
<223>  STF-71
<400>  25
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
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[0036]

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1               5                   10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Ser Ser Ala Thr Ala Ser Ala Asn
    290                 295                 300
Ser Gln Lys Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Ala Ser Glu
305                 310                 315                 320
Thr Ala Ala Ala Asn Ser Ala Lys Ala Ser Ala Ala Ser Gln Thr Ala
                325                 330                 335
Ala Lys Ala Ser Glu Asp Ala Ala Arg Glu Tyr Ala Ser Gln Ala Ala
            340                 345                 350
Glu Pro Tyr Lys Gln Val Leu Gln Pro Leu Pro Asp Val Trp Ile Pro
```

[0037]

355 360 365
Phe Asn Asp Ser Leu Asp Met Ile Thr Gly Phe Ser Pro Ser Tyr Lys
370 375 380
Lys Ile Val Ile Gly Asp Asp Glu Ile Thr Met Ser Gly Asp Lys Val
385 390 395 400
Val Lys Phe Lys Arg Ala Ser Lys Ala Thr Tyr Ile Asn Lys Ser Gly
405 410 415
Val Leu Thr Glu Ala Ala Ile Asp Glu Pro Arg Phe Glu Arg Asp Gly
420 425 430
Leu Leu Ile Glu Gly Gln Arg Thr Asn Tyr Met Leu Asn Ser Glu Ser
435 440 445
Pro Ala Ser Trp Gly Arg Ser Ser Asn Met Asp Val Pro Glu Thr Gly
450 455 460
Thr Asp Asn Phe Gly Phe Thr Tyr Gly Lys Phe Val Cys Asn Asp Ser
465 470 475 480
Leu Ile Gly Gln Thr Ser Ala Ile Asn Met Ala Ser Ile Ala Ala Thr
485 490 495
Lys Ser Val Asp Val Ser Gly Asp Asn Lys His Val Thr Thr Ser Cys
500 505 510
Arg Phe Lys Thr Glu Leu Gln Val Arg Leu Arg Ile Arg Phe Asp Lys
515 520 525
Tyr Asp Gly Ser Ala Thr Thr Phe Leu Gly Asp Ala Tyr Ile Asp Thr
530 535 540
Gln Thr Leu Glu Ile Asn Met Thr Gly Gly Ala Ala Ser Arg Ile Thr
545 550 555 560
Ala Arg Val Arg Lys Asp Glu Ala Thr Gly Trp Ile Phe Ala Glu Ala
565 570 575
Thr Ile Gln Ala Ile Asp Gly Glu Leu Lys Ile Gly Ser Gln Ile Gln
580 585 590
Tyr Ser Pro Lys Gln Gly Gly Ala Thr Val Ser Gly Asp Tyr Ile Tyr
595 600 605
Leu Ala Thr Pro Gln Val Glu Asn Gly Pro Cys Val Ser Ser Phe Ile
610 615 620
Ile Ser Gly Thr Thr Ala Ala Thr Arg Ala Ser Asp Ile Val Thr Val
625 630 635 640
Pro Ile Lys Asn Asn Leu Tyr Asn Leu Pro Phe Thr Val Leu Cys Glu
645 650 655
Val His Lys Asn Trp Tyr Lys Thr Pro Asn Ala Ala Pro Arg Val Phe
660 665 670
Asp Thr Gly Gly His Gln Thr Gly Ala Ala Ile Ile Leu Gly Phe Gly
675 680 685
Ser Ser Ala Asp Tyr Asp Gly Phe Pro Tyr Cys Asp Ile Gly Gly Ala
690 695 700
Asn Arg Arg Val Asn Glu Asn Ala Leu Leu Glu Lys Met Val Met Gly

705 710 715 720
Met Arg Val Lys Ser Asp Gln Ser Thr Cys Ser Val Ser Asn Gly Arg
725 730 735
Ile Ser Ser Glu Thr Lys Thr Thr Trp Ser Tyr Ile Gln Asn Thr Ala
740 745 750
Ile Ile Arg Ile Gly Gly Gln Thr Thr Ala Gly Leu Arg His Leu Phe
755 760 765
Gly His Val Arg Asn Phe Arg Ile Trp His Lys Ala Leu Thr Asp Ala
770 775 780
Gln Val Gly Glu Ser Ile
785 790

<210> 26
<211> 93
<212> PRT
<213> 人工序列
<220>
<223> STF71-AP1
<400> 26

[0038]

Met Lys Asp Leu Thr Leu Lys Leu Ala Asp Arg Ala Asp Phe Ser Ala
1 5 10 15
Phe Met Glu Ser Thr Gly Tyr Tyr Asp Asp Glu Ser Met Gln Asp Asp
20 25 30
Ile Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
35 40 45
Asn Glu Asp Gly Glu Pro Val Cys Val Lys Glu Asp Gly Tyr Phe Val
50 55 60
Asn Val Arg Ile Ile Asn Asp Val Lys Thr Pro Ser Ile Phe Asp Glu
65 70 75 80
Tyr Val Val Ala Val Glu His Gln Leu Arg Gly Trp Met
85 90

<210> 27
<211> 1098
<212> PRT
<213> 人工序列
<220>
<223> STF-20
<400> 27

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val

[0039]

```
     50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Arg Leu Ala Lys Asn Gln Asn
385                 390                 395                 400
Gly Ala Asp Ile Gln Asp Lys Ser Ala Phe Leu Asp Asn Ile Gly Val
```

405 410 415

Thr Ser Leu Thr Phe Met Lys Asn Asn Gly Glu Met Pro Val Asp Ala
420 425 430

Asp Leu Asn Thr Phe Gly Pro Val Lys Ala Tyr Val Gly Val Trp Tyr
435 440 445

Lys Ser Thr Ser Ser Asn Ala Thr Leu Glu Lys Asn Phe Pro Glu Asp
450 455 460

Gly Ala Val Gly Val Leu Glu Val Phe Asn Gly Gly Asn Phe Ser Gly
465 470 475 480

Met Gln Arg Tyr Thr Thr Arg Thr Gly Asn Val Tyr Met Arg Asn Leu
485 490 495

Ser Gly Thr Trp Asn Gly Ser Asp Gly Pro Trp Ile Tyr Trp Arg Gln
500 505 510

Ile Gln Ser Ala Thr Arg Pro Leu Ser Thr Thr Ile Asp Leu Asn Thr
515 520 525

Leu Gly Gly Ala Glu His Leu Gly Leu Trp Arg Asn Ser Ser Gly Ser
530 535 540

Ile Ala Ser Phe Asp Arg Asn Tyr Pro Glu Glu Gly Ser Tyr Gly Gln
545 550 555 560

Gly Phe Leu Glu Val Leu Glu Gly Gly Gly Tyr Ser Arg Thr Gln Arg
565 570 575

[0040] Tyr Thr Thr Arg Arg Gly Asn Val Tyr Val Arg Cys Leu Ser Ala Ile
580 585 590

Trp Asn Ala Gln Asn Pro Gln Trp Glu Pro Trp Ser Arg Val Gly His
595 600 605

Gln Ser Glu Cys Arg Tyr Tyr Glu Gly Asp Leu Asn Asp Leu Thr Ser
610 615 620

Pro Gly Ile Tyr Ser Val Thr Gly Lys Ala Ser Asn Gly Pro Met Gln
625 630 635 640

Asp Thr Ala Gly Ala Thr Leu Leu Gly Ile Leu Glu Val Ile Arg Arg
645 650 655

Phe Asp Gly Val Ser Val Trp Gln Arg Tyr Thr Thr Thr Gly Lys Ser
660 665 670

Glu Thr Thr Gln Gly Arg Thr Phe Glu Arg Val Tyr Ala Gly Ser Lys
675 680 685

Trp Thr Glu Trp Arg Glu Val Tyr Asn Ser Phe Ser Leu Pro Leu Asn
690 695 700

Leu Gly Ile Gly Gly Ala Val Ala Lys Leu Ser Ser Leu Asp Trp Gln
705 710 715 720

Thr Tyr Asp Phe Val Pro Gly Ser Leu Ile Thr Val Arg Leu Asp Asn
725 730 735

Met Thr Asn Ile Pro Asp Gly Met Asp Trp Gly Val Ile Asp Gly Asn
740 745 750

Leu Ile Asn Ile Ser Val Gly Pro Ser Asp Asp Ser Gly Ser Gly Arg

[0041]

```
          755                 760                 765
Ser Met His Val Trp Arg Ser Thr Val Ser Lys Ala Asn Tyr Arg Phe
      770                 775                 780
Phe Met Val Arg Ile Ser Gly Asn Pro Gly Ser Arg Thr Ile Thr Thr
785                 790                 795                 800
Arg Arg Val Pro Ile Ile Asp Glu Ala Gln Thr Trp Gly Ala Lys Gln
                  805                 810                 815
Thr Phe Ser Ala Gly Leu Ser Gly Glu Leu Ser Gly Asn Ala Ala Thr
              820                 825                 830
Ala Thr Lys Leu Lys Thr Ala Arg Lys Ile Asn Asn Val Ser Phe Asp
          835                 840                 845
Gly Thr Ser Asp Ile Asn Leu Thr Pro Lys Asn Ile Gly Ala Phe Ala
      850                 855                 860
Ser Gly Lys Thr Gly Asp Thr Val Ala Asn Asp Lys Ala Val Gly Trp
865                 870                 875                 880
Asn Trp Ser Ser Gly Ala Tyr Asn Ala Thr Ile Gly Gly Ala Ser Thr
                  885                 890                 895
Leu Ile Leu His Phe Asn Ile Gly Glu Gly Ser Cys Pro Ala Ala Gln
              900                 905                 910
Phe Arg Val Asn Tyr Lys Asn Gly Gly Ile Phe Tyr Arg Ser Ala Arg
          915                 920                 925
Asp Gly Tyr Gly Phe Glu Ala Asp Trp Ser Glu Phe Tyr Thr Thr Thr
      930                 935                 940
Arg Lys Pro Thr Ala Gly Asp Val Gly Ala Leu Pro Leu Ser Gly Gly
945                 950                 955                 960
Gln Leu Asn Gly Ala Leu Gly Ile Gly Thr Ser Ser Ala Leu Gly Gly
                  965                 970                 975
Asn Ser Ile Val Leu Gly Asp Asn Asp Thr Gly Phe Lys Gln Asn Gly
              980                 985                 990
Asp Gly Asn Leu Asp Val Tyr Ala  Asn Ser Val His Val  Met Arg Phe
          995                 1000                1005
Val Ser  Gly Ser Val Gln Ser  Asn Lys Thr Ile Asn  Ile Thr Gly
     1010                1015                1020
Arg Val  Asn Pro Ser Asp Tyr  Gly Asn Phe Asp Ser  Arg Tyr Val
     1025                1030                1035
Arg Asp  Val Arg Leu Gly Thr  Arg Val Val Gln Thr  Met Gln Lys
     1040                1045                1050
Gly Val  Met Tyr Glu Lys Ala  Gly His Val Ile Thr  Gly Leu Gly
     1055                1060                1065
Ile Val  Gly Glu Val Asp Gly  Asp Asp Pro Ala Val  Phe Arg Pro
     1070                1075                1080
Ile Gln  Lys Tyr Ile Asn Gly  Thr Trp Tyr Asn Val  Ala Gln Val
     1085                1090                1095
<210>  28
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<211> 175
<212> PRT
<213> 人工序列
<220>
<223> STF20-AP1
<400> 28

Met Gln His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Val Ala
1 5 10 15
Gln Tyr Gln Leu Thr Lys Asn Phe Asp Val Ile Trp Leu Trp Ser Glu
20 25 30
Glu Gly Lys Asn Trp Tyr Glu Glu Val Ser Asn Phe Gln Glu Asp Thr
35 40 45
Ile Lys Ile Val Tyr Asp Glu Asn Asn Ile Ile Val Gly Ile Thr Arg
50 55 60
Asp Ala Ser Thr Leu Asn Pro Glu Gly Phe Ser Val Val Glu Val Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Asp Ser Gly Lys Trp Met Phe
85 90 95
Lys Asp Gly Ala Val Ile Lys Arg Ile Tyr Thr Ala Asp Glu Gln Leu
100 105 110
Gln Leu Ala Glu Leu Gln Lys Ser Ala Leu Leu Ser Glu Ala Glu Thr
115 120 125

[0042]

Ile Ile Gln Pro Leu Glu Arg Ser Val Arg Leu Asn Met Ala Thr Asp
130 135 140
Asp Glu Arg Ser Arg Leu Glu Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175

<210> 29
<211> 757
<212> PRT
<213> 人工序列
<220>
<223> STF-23
<400> 29

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp

65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
[0043] Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asn Ser Pro
385 390 395 400
Ala Leu Thr Gly Thr Pro Thr Thr Pro Thr Ala Arg Gln Gly Thr Asn
405 410 415
Asn Thr Gln Ile Ala Ser Thr Ala Phe Val Met Ala Ala Ile Ala Ala

[0044]

```
                420                 425                 430
Leu Val Asp Ser Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asn Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asp Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ala Thr Ala Ala Asp Arg Phe Pro Tyr Phe Thr Gly Asn Asp Val
                485                 490                 495
Ala Ser Leu Ala Thr Leu Thr Lys Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Ser Thr Val Ala Ala Val Ile Glu Tyr Leu Gly Leu Arg Glu Leu Gly
        515                 520                 525
Thr Ser Gly Glu Lys Ile Pro Leu Leu Ser Thr Ala Asn Thr Trp Thr
    530                 535                 540
Asn Arg Gln Thr Phe Ser Gly Gly Leu Ser Gly Gly Leu Ser Gly Asn
545                 550                 555                 560
Ala Ala Thr Ala Thr Lys Leu Lys Thr Ala Arg Lys Ile Ala Gly Val
                565                 570                 575
Gly Phe Asp Gly Ser Ser Asp Ile Ser Ile Ser Ala Lys Asn Val Asn
            580                 585                 590
Ala Phe Ala Leu Arg Gln Thr Gly Asn Thr Val Asn Gly Asp Thr Ser
        595                 600                 605
Val Gly Trp Asn Trp Asp Ser Gly Ala Tyr Asn Ala Leu Ile Gly Gly
    610                 615                 620
Ala Ser Ala Leu Ile Leu His Phe Asn Ile Asn Ala Gly Ser Cys Pro
625                 630                 635                 640
Ala Val Gln Phe Arg Val Asn Tyr Lys Asn Gly Gly Ile Ser Tyr Arg
                645                 650                 655
Ser Ala Arg Asp Gly Tyr Gly Phe Glu Leu Gly Trp Ser Asp Phe Tyr
            660                 665                 670
Thr Thr Thr Arg Lys Pro Ser Ala Gly Asp Val Gly Ala Tyr Thr Arg
        675                 680                 685
Ala Glu Cys Asn Ser Arg Phe Ile Thr Gly Ile Arg Leu Gly Gly Leu
    690                 695                 700
Ser Ser Val Gln Thr Trp Asn Gly Pro Gly Trp Ser Asp Arg Ser Gly
705                 710                 715                 720
Tyr Val Val Thr Gly Ser Val Asn Gly Asn Arg Asp Glu Leu Ile Asp
                725                 730                 735
Thr Thr Gln Ala Arg Pro Ile Gln Tyr Cys Ile Asn Gly Thr Trp Tyr
            740                 745                 750
Asn Ala Gly Ser Ile
        755
<210>  30
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[0045]

<211> 177
<212> PRT
<213> 人工序列
<220>
<223> STF23-AP1
<400> 30

Met Met His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Lys Glu
1 5 10 15
Gln Tyr Gln Leu Thr Lys Gln Phe Asn Ile Lys Trp Leu Tyr Ser Asp
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Gln Lys Asn Phe Gln Pro Asp Thr
35 40 45
Leu Lys Met Val Tyr Asp His Asn Gly Val Ile Ile Cys Ile Glu Lys
50 55 60
Asp Val Ser Ala Ile Asn Pro Glu Gly Ala Ser Val Val Glu Leu Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Ile Ser Gly Lys Trp Leu Phe
85 90 95
Lys Asp Gly Val Val Ile Lys Arg Thr Tyr Thr Glu Glu Glu Gln Arg
100 105 110
Gln Gln Ala Glu Asn Glu Lys Gln Ser Leu Leu Gln Leu Val Arg Asp
115 120 125
Lys Thr Gln Leu Trp Asp Ser Gln Leu Arg Leu Gly Ile Ile Ser Asp
130 135 140
Glu Asn Lys Gln Lys Leu Thr Glu Trp Met Leu Tyr Ala Gln Lys Val
145 150 155 160
Glu Ser Thr Asp Thr Ser Ser Leu Pro Val Thr Phe Pro Glu Gln Pro
165 170 175
Glu

<210> 31
<211> 712
<212> PRT
<213> 人工序列
<220>
<223> STF-24
<400> 31

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val

[0046]

```
     50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Arg Leu Gln Lys Asp Gln Asn
385                 390                 395                 400
Gly Ala Asp Ile Pro Asp Lys Arg Leu Phe Leu Arg Asn Ile Gly Ala
```

405 410 415

Thr Asn Ser Thr Thr Met Ser Phe Ser Gly Gly Thr Gly Trp Phe Arg
420 425 430

Leu Ala Thr Val Thr Met Pro Gln Ala Ser Ser Val Val Tyr Ile Ser
435 440 445

Leu Ile Gly Gly Ala Gly Tyr Asn Val Asn Ser Pro Met Gln Ala Gly
450 455 460

Ile Ser Glu Leu Val Leu Arg Ala Gly Asn Gly Asn Pro Lys Gly Leu
465 470 475 480

Thr Gly Ala Leu Trp Arg Arg Thr Ser Val Gly Phe Thr Asn Phe Ala
485 490 495

Trp Val Asn Thr Ser Gly Asp Thr Tyr Asp Val Tyr Val Glu Ile Gly
500 505 510

Asn Tyr Ala Thr Gly Val Asn Ile Gln Trp Asp Tyr Thr Ser Asn Ala
515 520 525

Ser Val Thr Ile His Thr Ser Pro Thr Tyr Thr Ala Asn Lys Pro Thr
530 535 540

Gly Leu Thr Asp Gly Thr Val Tyr Val Ile Tyr Ser Ser Tyr Ile Lys
545 550 555 560

Pro Thr Ala Ala Asp Val Gly Ala Leu Ser Leu Ser Gly Gly Gln Leu
565 570 575

[0047] Asn Gly Ala Leu Gly Ile Gly Thr Ser Ser Ala Leu Gly Gly Asn Ser
580 585 590

Ile Val Leu Gly Asp Asn Asp Thr Gly Phe Lys Gln Asn Gly Asp Gly
595 600 605

Asn Leu Asp Val Tyr Ala Asn Ser Val His Val Met Arg Phe Val Ser
610 615 620

Gly Ser Val Gln Ser Asn Lys Thr Ile Asn Ile Thr Gly Arg Val Asn
625 630 635 640

Pro Ser Asp Tyr Gly Asn Phe Asp Ser Arg Tyr Val Arg Asp Val Arg
645 650 655

Leu Gly Thr Arg Val Val Gln Thr Met Gln Lys Gly Val Met Tyr Glu
660 665 670

Lys Ala Gly His Val Ile Thr Gly Leu Gly Ile Val Gly Glu Val Asp
675 680 685

Gly Asp Asp Pro Ala Val Phe Arg Pro Ile Gln Lys Tyr Ile Asn Gly
690 695 700

Thr Trp Tyr Asn Val Ala Gln Val
705 710

<210> 32
<211> 175
<212> PRT
<213> 人工序列
<220>

<223> STF24-AP1
<400> 32
Met Gln His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Val Ala
1 5 10 15
Gln Tyr Gln Leu Thr Lys Asn Phe Asp Val Ile Trp Leu Trp Ser Glu
20 25 30
Glu Gly Lys Asn Trp Tyr Glu Glu Val Ser Asn Phe Gln Glu Asp Thr
35 40 45
Ile Lys Ile Val Tyr Asp Glu Asn Asn Ile Ile Val Gly Ile Thr Arg
50 55 60
Asp Ala Ser Thr Leu Asn Pro Glu Gly Phe Ser Val Val Glu Val Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Asp Ser Gly Lys Trp Met Phe
85 90 95
Lys Asp Gly Ala Val Ile Lys Arg Ile Tyr Thr Ala Asp Glu Gln Leu
100 105 110
Gln Leu Ala Glu Leu Gln Lys Ser Ala Leu Leu Ser Glu Ala Glu Thr
115 120 125
Ile Ile Gln Pro Leu Glu Arg Ser Val Arg Leu Asn Met Ala Thr Asp
130 135 140
Glu Glu Arg Ser Arg Leu Glu Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
[0048]
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175
<210> 33
<211> 840
<212> PRT
<213> 人工序列
<220>
<223> 0111-2.0
<400> 33
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu

[0049]

```
                100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asn Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Thr Pro Thr Ala Pro Gln Gly Thr Asn
                405                 410                 415
Ser Thr Gln Ile Ala Ser Thr Ala Phe Val Met Ala Ala Ile Ala Ala
            420                 425                 430
Leu Val Asp Ser Ser Pro Asp Ala Leu Asn Thr Leu Ser Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asn Phe Ala Thr Thr Met Thr Asn Ala
```

450 455 460
Leu Ala Gly Lys Gln Pro Lys Asp Ala Thr Leu Thr Ala Leu Ala Gly
465 470 475 480
Leu Val Thr Ala Ala Asp Arg Phe Pro Tyr Phe Thr Gly Asn Asp Val
485 490 495
Ala Ser Leu Ala Thr Leu Thr Glu Val Gly Arg Asp Ile Leu Ala Lys
500 505 510
Ser Thr Val Ala Ala Val Ile Glu Tyr Leu Gly Leu Gln Glu Thr Val
515 520 525
Asn Gln Ala Ser Gly Ala Leu Gln Lys Asn Gln Asn Gly Ala Asp Ile
530 535 540
Pro Gly Lys Asp Thr Phe Thr Lys Asn Ile Gly Ala Cys Arg Ala Tyr
545 550 555 560
Ser Ala Trp Leu Asn Ile Gly Gly Asp Ser Gln Val Trp Thr Thr Ala
565 570 575
Gln Phe Ile Ser Trp Leu Glu Ser Gln Gly Ala Phe Asn His Pro Tyr
580 585 590
Trp Met Cys Lys Gly Ser Trp Ala Tyr Ala Asn Asn Lys Val Ile Thr
595 600 605
Asp Thr Gly Cys Gly Asn Ile Cys Leu Ala Gly Ala Val Val Glu Val
610 615 620
[0050] Ile Gly Thr Arg Gly Ala Met Thr Ile Arg Val Thr Thr Pro Ser Thr
625 630 635 640
Ser Ser Gly Gly Gly Ile Thr Asn Ala Gln Phe Thr Tyr Ile Asn His
645 650 655
Gly Asp Ala Tyr Ala Pro Gly Trp Arg Arg Asp Tyr Asn Thr Lys Asn
660 665 670
Gln Gln Pro Ala Phe Ala Leu Gly Gln Thr Gly Ser Arg Val Ala Asn
675 680 685
Asp Lys Ala Val Gly Trp Asn Trp Asn Ser Gly Val Tyr Asn Ala Asp
690 695 700
Ile Ser Gly Ala Ser Thr Leu Ile Leu His Phe Asn Met Asn Ala Gly
705 710 715 720
Ser Cys Pro Ala Val Gln Phe Arg Val Asn Tyr Arg Asn Gly Gly Ile
725 730 735
Phe Tyr Arg Ser Ala Arg Asp Gly Tyr Gly Phe Glu Ala Asn Trp Ser
740 745 750
Glu Phe Tyr Thr Thr Thr Arg Lys Pro Ser Ala Gly Asp Val Gly Ala
755 760 765
Tyr Thr Gln Ala Glu Cys Asn Ser Arg Phe Ile Thr Gly Ile Arg Leu
770 775 780
Gly Gly Leu Ser Ser Val Gln Thr Trp Asn Gly Pro Gly Trp Ser Asp
785 790 795 800
Arg Ser Gly Tyr Val Val Thr Gly Ser Val Asn Gly Asn Arg Asp Glu

805 810 815
Leu Ile Asp Thr Thr Gln Ala Arg Pro Ile Gln Tyr Cys Ile Asn Gly
820 825 830
Thr Trp Tyr Asn Ala Gly Ser Ile
835 840

<210> 34
<211> 177
<212> PRT
<213> 人工序列
<220>
<223> 0111 2.0-AP1
<400> 34

[0051]

Met Met His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Lys Glu
1 5 10 15
Gln Tyr Gln Leu Thr Lys Gln Phe Asn Ile Lys Trp Leu Tyr Ser Glu
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Gln Lys Asn Phe Gln Pro Asp Thr
35 40 45
Leu Lys Met Val Tyr Asp His Asn Gly Val Ile Ile Cys Ile Glu Lys
50 55 60
Asp Val Ser Ala Ile Asn Pro Glu Gly Ala Ser Val Val Glu Leu Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Ile Ser Gly Lys Trp Met Phe
85 90 95
Lys Asp Gly Val Val Val Lys Arg Thr Tyr Thr Glu Glu Glu Gln Arg
100 105 110
Gln Gln Ala Glu Asn Glu Lys Gln Ser Leu Leu Gln Leu Val Arg Asp
115 120 125
Lys Thr Gln Leu Trp Asp Ser Gln Leu Arg Leu Gly Ile Ile Ser Asp
130 135 140
Glu Asn Lys Gln Lys Leu Thr Glu Trp Met Leu Phe Ala Gln Lys Val
145 150 155 160
Glu Ser Thr Asp Thr Ser Ser Leu Pro Val Thr Phe Pro Glu Gln Pro
165 170 175
Glu

<210> 35
<211> 754
<212> PRT
<213> 人工序列
<220>
<223> STF-74
<400> 35

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro

[0052]

```
1               5                   10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
```

[0053]

```
          355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
      370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Tyr Thr Ala Gln Asp Ala
385                 390                 395                 400
Ser Thr Ala Gln Lys Gly Leu Val Lys Leu Ser Ser Ala Thr Asp Ser
                  405                 410                 415
Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val Lys Ala Val Asn
              420                 425                 430
Asp Asn Ala Asn Gly Arg Val Pro Ser Glu Arg Lys Val Asn Gly His
          435                 440                 445
Ser Leu Ala Gly Asp Ile Ser Val Thr Ser Gln Asp Ile Phe Asp Gly
      450                 455                 460
Gln Cys Val Glu Ile Gly Pro Gly Gln Asp Leu Asp Asn Tyr Gln Thr
465                 470                 475                 480
Pro Gly Leu Tyr Phe Gln Pro Ala Asn Ala Asn Thr Ser Ala Ala Leu
                  485                 490                 495
His Tyr Pro Glu Asn Asn Ala Gly Ser Leu Met Val Leu Arg Ser Ala
              500                 505                 510
Gly Ile Thr Gln Val Tyr Arg Val Tyr Ser Gly Ser Arg Ser Tyr Leu
          515                 520                 525
Arg Ser Lys Tyr Ser Thr Gln Pro Trp Thr Thr Trp Thr Pro Asp Asp
      530                 535                 540
Ala Phe Pro Val Gly Ala Pro Ile Pro Trp Pro Ser Asp Ile Ala Pro
545                 550                 555                 560
Pro Ala Tyr Ala Leu Met Gln Gly Gln Ser Phe Asp Lys Ser Ala Tyr
                  565                 570                 575
Pro Leu Leu Ala Val Ala Tyr Pro Ser Gly Val Ile Pro Asp Met Arg
              580                 585                 590
Gly Gln Thr Ile Lys Gly Lys Pro Asp Gly Arg Ala Val Leu Ser Tyr
          595                 600                 605
Glu Gln Asp Gly Ile Lys Ser His Ala His Thr Ala Ser Ile Ser Asp
      610                 615                 620
Thr Asp Leu Gly Thr Lys Tyr Thr Asn Ser Phe Asp Tyr Gly Ser Lys
625                 630                 635                 640
Pro Thr Thr Ser Phe Asp Tyr Gly Asn Lys Ser Ser Thr Glu Gly Gly
                  645                 650                 655
Trp His Val His Asn Phe Arg Tyr Cys Ala Thr Ser Ala Tyr Arg Asp
              660                 665                 670
Thr Pro Gly Ser Gly Leu Gly Met His Ser Ser Asn Ile Ser Trp Ser
          675                 680                 685
Ala Gly Asp Arg Ile Glu Gly Ser Gly Asn His Ala His Val Thr Trp
      690                 695                 700
Ile Gly Pro His Asp His Trp Val Gly Ile Gly Glu His Asn His Tyr
```

705 710 715 720
Val Val Met Gly Tyr His Gly His Thr Ala Thr Val His Ala Thr Gly
725 730 735
Asn Thr Glu Asn Thr Val Lys Asn Ile Ala Phe Asn Tyr Ile Val Arg
740 745 750
Leu Ala

<210> 36
<211> 192
<212> PRT
<213> 人工序列
<220>
<223> STF74-AP1
<400> 36
Met Ala Phe Glu Met Thr Gly Glu Asn Arg Thr Ile Ile Leu Tyr Asn
1 5 10 15
Leu Arg Ser Asp Thr Asn Glu Phe Ile Gly Lys Ser Asp Gly Phe Ile
20 25 30
Pro Ala Asn Thr Gly Leu Pro Ala Tyr Ser Thr Asp Ile Ala Pro Pro
35 40 45
Lys Val Thr Ala Gly Phe Val Ala Val Phe Asp Ala Gln Thr Asn Lys
50 55 60
[0054]
Trp Ser Arg Val Glu Asp Tyr Arg Gly Thr Thr Val Tyr Asp Ile Ser
65 70 75 80
Thr Gly Lys Pro Ala Val Ile Glu Lys Leu Gly Ala Leu Pro Asp Asn
85 90 95
Val Val Ser Val Ala Pro Asp Gly Glu Tyr Val Lys Trp Asp Gly Ala
100 105 110
Lys Trp Ile His Asp Ala Glu Ala Glu Lys Thr Phe Arg Gln Gly Gln
115 120 125
Ala Ala Gln Glu Lys Ser Asn Leu Leu Met Ile Ala Thr Ser Ala Ile
130 135 140
Ala Pro Leu Gln Asp Ala Val Asp Leu Asp Met Ala Thr Glu Asp Glu
145 150 155 160
Ala Thr Ala Leu Asn Glu Trp Lys Lys Tyr Arg Val Met Leu Asn Arg
165 170 175
Val Lys Pro Glu Asp Ala Pro Asp Ile Thr Trp Pro Glu Leu Pro Ala
180 185 190

<210> 37
<211> 710
<212> PRT
<213> 人工序列
<220>
<223> STF-86

<400> 37

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala

[0055]

[0056]

```
                340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Arg Val Pro Ala Ser Arg Lys
385                 390                 395                 400
Val Asn Gly His Ala Leu Asn Gly Asp Ile Asn Val Thr Ser Arg Asp
                405                 410                 415
Ile Phe Asp Gly Gln Val Ile Ala Ile Gly Ala Asn Lys Asn Leu Asp
            420                 425                 430
Asp Tyr Gln Val Pro Gly Leu Tyr Phe Gln Glu Ala Asn Asn Asn Thr
        435                 440                 445
Ser Ala Ala Met Asn Tyr Pro Glu Asn Ser Ala Gly Ser Leu Met Val
    450                 455                 460
Leu Arg Gly Ala Gly Val Thr Gln Val Tyr Arg Val Tyr Asn Ser Ser
465                 470                 475                 480
Arg Ser Tyr Ser Arg Ser Lys Tyr Ser Thr Leu Ala Trp Thr Pro Trp
                485                 490                 495
Met Pro Glu Asp Ser Tyr Pro Val Gly Ala Pro Ile Pro Trp Pro Ser
            500                 505                 510
Asp Val Thr Pro Thr Gly Tyr Ala Leu Met Gln Gly Gln Pro Phe Asp
        515                 520                 525
Lys Ala Val Tyr Pro Leu Leu Ala Ile Ala Tyr Pro Ala Gly Ile Ile
    530                 535                 540
Pro Asp Met Arg Gly Gln Thr Ile Lys Gly Lys Pro Asn Gly Arg Ala
545                 550                 555                 560
Val Leu Ser Tyr Glu Gln Asp Gly Val Ile Ser His Thr His Gly Ala
                565                 570                 575
Ser Ile Ser Asp Thr Asp Leu Gly Thr Lys Tyr Thr Ser Ser Phe Asp
            580                 585                 590
Tyr Gly Ser Lys Pro Thr Thr Ser Phe Asp Tyr Gly Asn Lys Ser Ser
        595                 600                 605
Thr Glu Gly Gly Trp His Ala His Asn Phe Arg Tyr Cys Ala Thr Ser
    610                 615                 620
Ala Tyr Arg Asp Thr Pro Gly Gln Gly Leu Gly Met His Ser Ser Asn
625                 630                 635                 640
Val Ser Trp Ala Ala Gly Asp Arg Ile Glu Gly Ser Gly Asn His Ala
                645                 650                 655
His Val Thr Trp Ile Gly Pro His Asp His Trp Val Gly Ile Gly Ala
            660                 665                 670
His Asn His Tyr Val Val Met Gly Tyr His Gly His Thr Ala Thr Val
        675                 680                 685
His Ala Ala Gly Asn Ala Glu Asn Thr Val Lys Asn Ile Ala Phe Asn
```

690 695 700

Tyr Ile Val Arg Leu Ala
705 710

<210> 38
<211> 195
<212> PRT
<213> 人工序列
<220>
<223> STF86-AP1
<400> 38

Met Thr Phe Glu Met Thr Gly Glu Asn Arg Thr Ile Thr Ile Tyr Asn
1 5 10 15
Leu Arg Ala Asp Thr Asn Glu Phe Ile Gly Lys Ser Asp Gly Phe Ile
20 25 30
Pro Ala Asn Thr Gly Leu Pro Ala Asn Ser Thr Asn Ile Ala Pro Pro
35 40 45
Pro Met Lys Ala Gly Phe Val Ala Val Phe Asn Ser Ala Ser Glu Lys
50 55 60
Trp Ser Leu Val Glu Asp His Arg Gly Lys Ile Val Tyr Asp Ile Leu
65 70 75 80
Thr Gly Lys Ser Ile Thr Ile Asp Glu Leu Gly Gln Leu Pro Asp Asp
85 90 95
[0057]
Val Val Ser Val Ala Pro Glu Gly His Phe Val Lys Trp Asn Gly Lys
100 105 110
Lys Trp Val His Asp Ala Asp Ala Glu Lys Thr Ala Gln Ile Thr Gln
115 120 125
Ala Thr Gln Gln Lys Asp Ser Leu Leu Ala Leu Ala Ala Ser Lys Ile
130 135 140
Ala Pro Leu Gln Asp Ala Val Asp Leu Asp Ile Ala Thr Glu Glu Glu
145 150 155 160
Thr Ala Leu Leu Leu Ala Trp Lys Lys Tyr Arg Val Leu Ile Asn Arg
165 170 175
Ile Lys Pro Glu Asp Ala Pro Asp Ile Asp Trp Pro Glu Val Pro Gly
180 185 190
Asp Val Ala
195

<210> 39
<211> 863
<212> PRT
<213> 人工序列
<220>
<223> STF-84
<400> 39

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro

[0058]

```
1               5                   10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
```

[0059]

```
          355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
      370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Tyr Thr Ala Gln Asp Ala
385                 390                 395                 400
Thr Thr Ala Gln Lys Gly Ile Val Gln Leu Ser Asn Ala Thr Asn Ser
                  405                 410                 415
Thr Ser Glu Met Leu Ala Ala Thr Pro Lys Ser Val Lys Ala Ala Tyr
              420                 425                 430
Asp Leu Ala Asn Gly Lys Tyr Thr Ala Gln Asp Ala Thr Thr Ala Gln
          435                 440                 445
Lys Gly Ile Val Gln Leu Ser Ser Ala Thr Asn Ser Ala Ser Glu Thr
      450                 455                 460
Leu Ala Ala Thr Pro Lys Ala Ala Asn Asp Asn Ala Asn Gly Arg Val
465                 470                 475                 480
Pro Ser Ala Arg Lys Val Asn Gly Lys Ala Leu Ser Ala Asp Ile Thr
                  485                 490                 495
Leu Thr Pro Lys Asp Ile Gly Thr Leu Asn Ser Thr Thr Met Ser Phe
              500                 505                 510
Ser Gly Gly Ala Gly Trp Phe Lys Leu Ala Thr Val Thr Met Pro Gln
          515                 520                 525
Ala Ser Ser Val Val Ser Ile Thr Leu Ile Gly Gly Ala Gly Phe Asn
      530                 535                 540
Val Gly Ser Pro Gln Gln Ala Gly Ile Ser Glu Leu Val Leu Arg Ala
545                 550                 555                 560
Gly Asn Gly Asn Pro Lys Gly Ile Thr Gly Ala Leu Trp Gln Arg Thr
                  565                 570                 575
Ser Thr Gly Phe Thr Asn Phe Ala Trp Val Asn Thr Ser Gly Asp Thr
              580                 585                 590
Tyr Asp Ile Tyr Val Ala Ile Gly Asn Tyr Ala Thr Gly Val Asn Ile
          595                 600                 605
Gln Trp Asp Tyr Thr Ser Asn Ala Ser Val Thr Ile His Thr Ser Pro
      610                 615                 620
Ala Tyr Ser Ala Asn Lys Pro Glu Gly Leu Thr Asp Gly Thr Val Tyr
625                 630                 635                 640
Ser Leu Tyr Thr Pro Ser Gly Gln Phe Tyr Pro Pro Gly Ala Pro Ile
                  645                 650                 655
Pro Trp Pro Ser Asp Thr Val Pro Ser Gly Tyr Ala Leu Met Gln Gly
              660                 665                 670
Gln Thr Phe Asp Lys Ser Ala Tyr Pro Lys Leu Ala Ala Ala Tyr Pro
          675                 680                 685
Ser Gly Val Ile Pro Asp Met Arg Gly Trp Thr Ile Lys Gly Lys Pro
      690                 695                 700
Ala Ser Gly Arg Ala Val Leu Ser Gln Glu Gln Asp Gly Ile Lys Ser
```

705 710 715 720
His Thr His Ser Ala Ser Ala Ser Ser Thr Asp Leu Gly Thr Lys Thr
725 730 735
Thr Ser Ser Phe Asp Tyr Gly Thr Lys Ser Thr Asn Asn Thr Gly Ala
740 745 750
His Thr His Ser Val Ser Gly Thr Ala Ala Ser Ala Gly Asn His Thr
755 760 765
His Ser Val Thr Gly Ala Ser Ala Val Ser Gln Trp Ser Gln Asn Gly
770 775 780
Ser Val His Lys Val Val Ser Ala Ala Ser Val Asn Thr Ser Ala Ala
785 790 795 800
Gly Ala His Thr His Ser Val Ser Gly Thr Ala Ala Ser Ala Gly Ala
805 810 815
His Ala His Thr Val Gly Ile Gly Ala His Thr His Ser Val Ala Ile
820 825 830
Gly Ser His Gly His Thr Ile Thr Val Asn Ala Ala Gly Asn Ala Glu
835 840 845
Asn Thr Val Lys Asn Ile Ala Phe Asn Tyr Ile Val Arg Leu Ala
850 855 860

[0060]

<210> 40
<211> 194
<212> PRT
<213> 人工序列
<220>
<223> STF84-AP1
<400> 40
Met Ala Phe Arg Met Ser Glu Gln Pro Arg Thr Ile Lys Ile Tyr Asn
1 5 10 15
Leu Leu Ala Gly Thr Asn Glu Phe Ile Gly Glu Gly Asp Ala Tyr Ile
20 25 30
Pro Pro His Thr Gly Leu Pro Ala Asn Ser Thr Tyr Ile Ala Pro Pro
35 40 45
Asp Ile Pro Ala Gly Phe Val Ala Val Phe Asn Ser Asp Glu Gly Ser
50 55 60
Trp His Leu Val Glu Asp His Arg Gly Lys Thr Val Tyr Asp Val Ala
65 70 75 80
Ser Gly Asp Ala Leu Phe Ile Ser Glu Leu Gly Pro Leu Pro Glu Asn
85 90 95
Val Thr Trp Leu Ser Pro Glu Gly Glu Phe Gln Lys Trp Asn Gly Thr
100 105 110
Ala Trp Val Lys Asp Ala Glu Ala Glu Lys Leu Phe Arg Ile Arg Glu
115 120 125
Ala Glu Glu Thr Lys Asn Ser Leu Met Gln Val Ala Ser Glu His Ile
130 135 140

Ala Pro Leu Gln Asp Ala Val Asp Leu Glu Ile Ala Thr Glu Glu Glu
145 150 155 160
Thr Ser Leu Leu Glu Ala Trp Lys Lys Tyr Arg Val Leu Leu Asn Arg
165 170 175
Val Asp Thr Ser Thr Ala Pro Asp Ile Glu Trp Pro Thr Asn Pro Val
180 185 190
Arg Glu

<210> 41
<211> 1283
<212> PRT
<213> 人工序列
<220>
<223> STF-93
<400> 41

[0061]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val

225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Arg Val Pro Ser Asn Arg Lys
385 390 395 400
[0062] Val Asn Gly Lys Ala Leu Thr Ala Asp Ile Thr Leu Thr Pro Lys Asp
405 410 415
Ile Gly Thr Leu Asn Ser Val Thr Met Ser Phe Ser Gly Gly Ala Gly
420 425 430
Trp Phe Lys Leu Ala Thr Val Thr Met Pro Gln Ala Ser Ser Ile Val
435 440 445
Tyr Ile Ala Leu Ile Gly Gly Ala Gly Tyr Asn Val Gly Ser Pro His
450 455 460
Gln Ala Gly Ile Ser Glu Leu Val Leu Arg Ala Gly Asn Gly Asn Pro
465 470 475 480
Lys Gly Ile Thr Gly Ala Leu Trp Lys Arg Thr Ala Val Gly Leu Thr
485 490 495
Asn Phe Ala Trp Ile Asn Thr Ser Gly Asp Thr Tyr Asp Ile Tyr Val
500 505 510
Glu Ile Gly Asn Tyr Ala Thr Ser Val Asn Ile His Trp Asp Cys Thr
515 520 525
Ala Asn Ala Thr Val Ser Ile Tyr Thr Ser Pro Thr Tyr Ser Ala Ser
530 535 540
Lys Pro Ser Ser Val Thr Asp Gly Val Val Tyr Thr Met Tyr Ser Thr
545 550 555 560
His Gln Lys Pro Thr Pro Leu Asp Ile Gly Ala Leu Pro Thr Thr Gly
565 570 575
Gly Thr Val Ser Gly Pro Leu Ser Val Thr Gly Gly Ile Thr Gly Thr

580 585 590

Leu Asn Gly Asn Ala Ser Thr Ala Thr Lys Leu Gln Thr Ala Arg Ser
595 600 605

Ile Gly Gly Val Gly Phe Asp Gly Ser Ala Asn Ile Asn Leu Pro Gly
610 615 620

Val Asn Thr Thr Gly Asn Gln Asn Thr Thr Gly Asn Ala Ala Thr Ala
625 630 635 640

Thr Lys Leu Gln Thr Ala Arg Thr Ile Gly Gly Val Ser Phe Asp Gly
645 650 655

Thr Ala Asn Ile Asn Leu Pro Gly Val Asn Thr Thr Gly Asn Gln Asn
660 665 670

Thr Thr Gly Asn Ala Ala Thr Ala Thr Lys Leu Gln Thr Ala Arg Thr
675 680 685

Ile Asn Gly Val Ser Phe Asp Gly Ser Ala Asn Ile Ser Leu Ser Pro
690 695 700

Ala Asn Ile Gly Cys Pro Ala Ser Pro Thr Gly Trp Leu Thr Thr Gly
705 710 715 720

Ser Asn Gly Gly Ala Ile Thr Thr Ala Gln Leu Val Thr Leu Leu Gln
725 730 735

Asn Asn Gly Ala Phe Asn Thr Lys Ser Trp Ile Ala Arg Cys Ala Trp
740 745 750

[0063] Ala Tyr Ala Asn Ser Ala Thr Ile Pro Asn Ser Glu Thr Gly Cys Gly
755 760 765

Val Ile Pro Leu Ala Gly Ala Val Ile Glu Val Phe Asn Asn Gly Ser
770 775 780

Ser Ser Asn Asn Tyr Thr Ile Arg Ile Thr Thr Ala Thr Thr Thr Ser
785 790 795 800

Val Ser Gly Ala Leu Thr Asn Ala Glu Phe Ile Tyr Val Phe Asn Gly
805 810 815

Thr Asp Tyr Ser Pro Gly Trp Arg Arg Val Tyr Asn Thr Lys Asn Lys
820 825 830

Pro Thr Ala Ser Asp Val Gly Ala Leu Pro Leu Thr Gly Gly Thr Leu
835 840 845

Ser Gly Gly Leu Thr Ser Ser Gly Glu Ile Ile Ser Lys Tyr Ala Asn
850 855 860

Gly Phe Arg Ile Ala Tyr Gly Ser Phe Gly Phe Phe Ile Arg Asn Asp
865 870 875 880

Gly Ser Asn Thr Tyr Phe Met Leu Thr Ala Ser Gly Asp Thr Leu Gly
885 890 895

Ser Trp Asn Gly Leu Arg Pro Ile Thr Ile Asn Asn Thr Ser Gly Ala
900 905 910

Val Ser Ile Gly Asn Gly Leu Asn Val Thr Gly Gly Val Asn Gly Ser
915 920 925

Leu Asn Gly Asn Ala Ser Thr Ala Thr Lys Leu Gln Thr Ala Arg Asn

930 935 940

Ile Asn Gly Val Lys Phe Asp Gly Ser Gly Asp Ile Asn Ile Asn Thr
945 950 955 960
Leu Val Ser Arg Gly Arg Val Thr Ala Leu Ser Gly Ser Thr Gln Gly
965 970 975
Thr Ala Gly Ile Gln Met Tyr Glu Ala Tyr Asn Asn Ser Tyr Pro Thr
980 985 990
Thr Tyr Gly Asn Val Leu His Met Lys Gly Ala Ser Ala Ala Gly Glu
995 1000 1005
Gly Glu Leu Leu Ile Gly Trp Ser Gly Thr Ser Gly Ala His Ala
1010 1015 1020
Pro Val Phe Ile Arg Ser Arg Arg Asp Thr Thr Asp Ala Ala Trp
1025 1030 1035
Ser Ala Trp Ala Gln Leu Tyr Thr Ala Lys Asp Ser Ile Pro Gly
1040 1045 1050
Val Asn Thr Thr Gly Asn Gln Asn Thr Thr Gly Asn Ala Ala Thr
1055 1060 1065
Ala Thr Lys Leu Gln Thr Ala Arg Lys Ile Ala Gly Val Ala Phe
1070 1075 1080
Asp Gly Ser Ala Asp Ile Thr Leu Thr Ala Ala Asn Leu Asn Ala
1085 1090 1095
Tyr Thr Lys Thr Glu Val Thr Asn Leu Leu Ser Ser Tyr Ala Ser
[0064] 1100 1105 1110
Arg Ser Ser Leu Thr Gly Tyr Ser Gly Asn Leu Asp Ile Ile Ala
1115 1120 1125
Glu Thr Leu Val Val Lys Ser Gly Gly Ser Gly Gly Phe Ala Ile
1130 1135 1140
Trp Asp Ile Gly Thr Thr Thr Ser Gly Ala Asn Met Tyr Ile Asp
1145 1150 1155
Pro Asn Pro Gly Ile Asn Thr Val Trp Arg Ser Thr Ser Ser Arg
1160 1165 1170
Arg Tyr Lys Lys Asp Ile Glu Thr Leu Gln Asp Arg Tyr Ala Asp
1175 1180 1185
Glu Leu Leu Ser Leu Arg Pro Val Trp Tyr Arg Ser Ile Cys Arg
1190 1195 1200
Gly Asp Arg Lys Asp Trp Gly Tyr Tyr Gly Leu Ile Ala Glu Glu
1205 1210 1215
Val Gly Glu Ile Ala Pro Gln Tyr Val His Trp Arg Glu Pro Thr
1220 1225 1230
Asn Asn Asp Ser Pro Glu Asp Ile Ser Ser Asn Gly Met Val Ala
1235 1240 1245
Glu Gly Val Met Tyr Glu Arg Leu Val Val Pro Leu Ile His His
1250 1255 1260
Ile Gln Gln Leu Thr Lys Arg Val Glu Glu Leu Glu Thr Lys Leu

1265 1270 1275

Asn Ser Pro Lys Glu
1280

<210> 42
<211> 798
<212> PRT
<213> 人工序列
<220>
<223> STF-95
<400> 42

[0065]

```
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1               5                  10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
```

[0066]

```
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Arg Val Pro Ser Ala Arg Lys
385                 390                 395                 400
Val Asn Gly Lys Ala Leu Ser Ala Asp Ile Thr Leu Thr Pro Lys Asp
                405                 410                 415
Ile Gly Thr Leu Asn Ser Thr Thr Met Ser Phe Ser Gly Gly Ala Gly
            420                 425                 430
Trp Phe Lys Leu Ala Thr Val Thr Met Pro Gln Ala Ser Ser Val Val
        435                 440                 445
Ser Ile Thr Leu Ile Gly Gly Ala Gly Phe Asn Val Gly Ser Pro Gln
    450                 455                 460
Gln Ala Gly Ile Ser Glu Leu Val Leu Arg Ala Gly Asn Gly Asn Pro
465                 470                 475                 480
Lys Gly Ile Thr Gly Ala Leu Trp Gln Arg Thr Ser Thr Gly Phe Thr
                485                 490                 495
Asn Phe Ala Trp Val Asn Thr Ser Gly Asp Thr Tyr Asp Ile Tyr Val
            500                 505                 510
Ala Ile Gly Asn Tyr Ala Thr Gly Val Asn Ile Gln Trp Asp Tyr Thr
        515                 520                 525
Ser Asn Ala Ser Val Thr Ile His Thr Ser Pro Ala Tyr Ser Ala Asn
    530                 535                 540
Lys Pro Glu Gly Leu Thr Asp Gly Thr Val Tyr Ser Leu Tyr Thr Pro
545                 550                 555                 560
Ser Glu Gln Phe Tyr Pro Pro Gly Ala Pro Ile Pro Trp Pro Ser Asp
                565                 570                 575
Thr Val Pro Ser Gly Tyr Ala Leu Met Gln Gly Gln Thr Phe Asp Lys
            580                 585                 590
Ser Ala Tyr Pro Lys Leu Ala Ala Ala Tyr Pro Ser Gly Val Ile Pro
        595                 600                 605
Asp Met Arg Gly Trp Thr Ile Lys Gly Lys Pro Ala Ser Gly Arg Ala
    610                 615                 620
```

Val Leu Ser Gln Glu Gln Asp Gly Ile Lys Ser His Thr His Ser Ala
625 630 635 640
Ser Ala Ser Ser Thr Asp Leu Gly Thr Lys Asn Thr Ser Ser Phe Asp
645 650 655
Tyr Gly Thr Lys Ser Thr Asn Asn Thr Gly Ala His Thr His Ser Leu
660 665 670
Ser Gly Ser Thr Gly Ser Ala Gly Asp His Thr His Gly Asn Gly Ile
675 680 685
Arg Trp Pro Gly Gly Gly Gly Ser Ala Leu Ala Phe Tyr Asp Gly Gly
690 695 700
Gly Phe Thr Tyr Val Gln Asp Ser Gln Tyr Gln Val Ser Pro Gly Thr
705 710 715 720
Ser Ser Arg Arg Ser Tyr Tyr Gln Arg Ile Gln Thr Gln Ser Ala Gly
725 730 735
Ala His Thr His Ser Leu Ser Gly Thr Ala Ala Ser Ser Gly Ala His
740 745 750
Ala His Thr Val Gly Ile Gly Ala His Thr His Ser Val Ala Ile Gly
755 760 765
Ser His Gly His Thr Ile Thr Val Asn Ala Ala Gly Asn Ala Glu Asn
770 775 780
Thr Val Lys Asn Ile Ala Phe Asn Tyr Ile Val Arg Leu Ala
785 790 795

[0067]

<210> 43
<211> 194
<212> PRT
<213> 人工序列
<220>
<223> STF95-AP1
<400> 43
Met Ala Phe Arg Met Ser Glu Gln Ala Arg Thr Ile Lys Ile Tyr Asn
1 5 10 15
Leu Leu Ala Gly Thr Asn Glu Phe Ile Gly Glu Gly Asp Ala Tyr Ile
20 25 30
Pro Pro His Thr Gly Leu Pro Ala Asn Ser Thr Asp Ile Ala Pro Pro
35 40 45
Asp Ile Pro Ala Gly Phe Val Ala Val Phe Asn Ser Asp Glu Ala Ser
50 55 60
Trp His Leu Val Glu Asp His Arg Gly Lys Thr Val Tyr Asp Val Ala
65 70 75 80
Ser Gly Asp Glu Leu Phe Ile Ser Glu Leu Gly Pro Leu Pro Glu Asn
85 90 95
Val Thr Trp Leu Ser Pro Glu Gly Glu Phe Gln Lys Trp Asn Gly Thr
100 105 110
Ala Trp Val Lys Asp Thr Glu Ala Glu Lys Met Phe Arg Ile Arg Glu

115 120 125

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

Ala Pro Leu Gln Asp Ala Ala Asp Leu Glu Ile Ala Thr Glu Glu Glu
145 150 155 160

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

Val Asp Thr Ser Thr Ala Pro Asp Ile Glu Trp Pro Thr Asn Pro Val
180 185 190

Arg Glu

<210> 44
<211> 625
<212> PRT
<213> 人工序列
<220>
<223> STF-132
<400> 44

[0068]

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

Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30

Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45

Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60

Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80

Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95

Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110

Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125

Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140

Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160

Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175

Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190

Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205

[0069]

```
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Ala Val Gln Arg Asp Gly Asp
385                 390                 395                 400
Thr Met Thr Gly Glu Leu Lys Ile Arg Gly Val Asn Ala Leu Arg Ile
                405                 410                 415
Phe Asn Asp Ala Phe Gly Leu Ile Phe Arg Arg Ser Glu Glu Cys Leu
            420                 425                 430
His Leu Ile Pro Thr Ser Glu Gly Gln Gly Glu Asn Gly Asp Ile Gly
        435                 440                 445
Pro Leu Arg Pro Phe Thr Ile Asn Leu Arg Thr Gly Glu Ile Ser Met
    450                 455                 460
Ser His Lys Val Ser Val Gly Gly Gly Ser Gln Val Asn Gly Ala Leu
465                 470                 475                 480
Gly Ile Gly Val Gln Asn Ala Leu Gly Gly Asn Ser Ile Ala Phe Gly
                485                 490                 495
Asp Asn Asp Thr Gly Ile Lys Gln Asn Gly Asp Gly Ile Leu Asp Val
            500                 505                 510
Tyr Ala Asn Gly Gln His Val Phe Arg Phe Gln Asn Gly Ala Leu Gln
        515                 520                 525
Ser His Arg Ala Val Asn Val Ser Gly Arg Val Thr Pro Thr Asp Tyr
    530                 535                 540
Gly Asn Phe Asp Glu Arg Tyr Gln Thr Lys Thr Gly Gly Val Gln Asn
545                 550                 555                 560
```

Phe Gln Tyr Thr Ser Glu Val Phe His Lys Pro Ala Gly Asn Glu Val
565 570 575
Ser Trp Val Phe Arg Ala Pro Ser Gly Cys Thr Leu Ser Gly Ile Asn
580 585 590
Val Gln Glu Thr Gly Ser Asn Ser Ala Asp Asn Ile Gly Gly Val Tyr
595 600 605
Tyr Lys Gln Ala Gln Ile Tyr Ile Asn Gly Ala Trp Arg Ser Val Ser
610 615 620
Gly
625

<210> 45
<211> 188
<212> PRT
<213> 人工序列
<220>
<223> STF132-AP1
<400> 45

[0070]

Met Ala Leu Ser Ile Arg Leu Ile Lys Ala Lys Ile Met Glu Leu Arg
1 5 10 15
Asn Val Thr Arg Tyr Tyr Pro Glu Asn Met Pro Tyr Gly Glu Gly Val
20 25 30
Gln Tyr Phe Arg Ser Glu Asp Gly Gln Asp Phe Tyr Glu Ser Leu Asp
35 40 45
Lys Phe Ala Lys Lys Tyr Lys Leu Cys Thr His Pro Glu Thr Gly Val
50 55 60
Ile Tyr Ser Met Ala Glu Asp Val Ser Arg Leu Tyr Pro Ala Gly Phe
65 70 75 80
Thr Ile Val Glu Val Asp Glu Leu Pro Asp Gly Phe Cys Ile Glu Ala
85 90 95
Arg Trp Tyr Tyr Lys Asp Gly Glu Val Leu Pro Val Pro Val Asp Tyr
100 105 110
Arg Leu Leu Ala Glu Ser Glu Arg Ala Arg Leu Thr Ala Ile Ala Glu
115 120 125
Arg Glu Ile Ser Asp Lys Lys Thr Asp Leu Leu Leu Gly Ile Ile Asn
130 135 140
Asn Gly Glu Lys Glu Met Leu Lys Leu Trp Arg Met Tyr Ile Arg Asn
145 150 155 160
Leu Lys Asn Ile Asp Phe Asn His Ile His Asp Lys Ser Ser Phe Asp
165 170 175
Ser Ile Lys Trp Pro Cys Asp Pro Glu Asn Ser His
180 185

<210> 46
<211> 1348
<212> PRT

<213> 人工序列
<220>
<223> K1F
<400> 46

[0071]

```
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1               5                  10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
```

[0072]

```
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Gly Ala Lys Gly Asp Gly Val Thr Asp Asp Thr Ala Ala Leu Thr Ser
    530                 535                 540
Ala Leu Asn Asp Thr Pro Val Gly Gln Lys Ile Asn Gly Asn Gly Lys
545                 550                 555                 560
Thr Tyr Lys Val Thr Ser Leu Pro Asp Ile Ser Arg Phe Ile Asn Thr
                565                 570                 575
Arg Phe Val Tyr Glu Arg Ile Pro Gly Gln Pro Leu Tyr Tyr Ala Ser
            580                 585                 590
Glu Glu Phe Val Gln Gly Glu Leu Phe Lys Ile Thr Asp Thr Pro Tyr
        595                 600                 605
Tyr Asn Ala Trp Pro Gln Asp Lys Ala Phe Val Tyr Glu Asn Val Ile
    610                 615                 620
Tyr Ala Pro Tyr Met Gly Ser Asp Arg His Gly Val Ser Arg Leu His
625                 630                 635                 640
Val Ser Trp Val Lys Ser Gly Asp Asp Gly Gln Thr Trp Ser Thr Pro
                645                 650                 655
Glu Trp Leu Thr Asp Leu His Pro Asp Tyr Pro Thr Val Asn Tyr His
            660                 665                 670
```

[0073]

```
Cys Met Ser Met Gly Val Cys Arg Asn Arg Leu Phe Ala Met Ile Glu
        675                 680                 685
Thr Arg Thr Leu Ala Lys Asn Ala Leu Thr Asn Cys Ala Leu Trp Asp
    690                 695                 700
Arg Pro Met Ser Arg Ser Leu His Leu Thr Gly Gly Ile Thr Lys Ala
705                 710                 715                 720
Ala Asn Gln Arg Tyr Ala Thr Ile His Val Pro Asp His Gly Leu Phe
                725                 730                 735
Val Gly Asp Phe Val Asn Phe Ser Asn Ser Ala Val Thr Gly Val Ser
            740                 745                 750
Gly Asp Met Thr Val Ala Thr Val Ile Asp Lys Asp Asn Phe Thr Val
        755                 760                 765
Leu Thr Pro Asn Gln Gln Thr Ser Asp Leu Asn Asn Ala Gly Lys Asn
    770                 775                 780
Trp His Met Gly Thr Ser Phe His Lys Ser Pro Trp Arg Lys Thr Asp
785                 790                 795                 800
Leu Gly Leu Ile Pro Ser Val Thr Glu Val His Ser Phe Ala Thr Ile
                805                 810                 815
Asp Asn Asn Gly Phe Ala Met Gly Tyr His Gln Gly Asp Val Ala Pro
            820                 825                 830
Arg Glu Val Gly Leu Phe Tyr Phe Pro Asp Ala Phe Asn Ser Pro Ser
        835                 840                 845
Asn Tyr Val Arg Arg Gln Ile Pro Ser Glu Tyr Glu Pro Asp Ala Ser
    850                 855                 860
Glu Pro Cys Ile Lys Tyr Tyr Asp Gly Val Leu Tyr Leu Ile Thr Arg
865                 870                 875                 880
Gly Thr Arg Gly Asp Arg Leu Gly Ser Ser Leu His Arg Ser Arg Asp
                885                 890                 895
Ile Gly Gln Thr Trp Glu Ser Leu Arg Phe Pro His Asn Val His His
            900                 905                 910
Thr Thr Leu Pro Phe Ala Lys Val Gly Asp Asp Leu Ile Met Phe Gly
        915                 920                 925
Ser Glu Arg Ala Glu Asn Glu Trp Glu Ala Gly Ala Pro Asp Asp Arg
    930                 935                 940
Tyr Lys Ala Ser Tyr Pro Arg Thr Phe Tyr Ala Arg Leu Asn Val Asn
945                 950                 955                 960
Asn Trp Asn Ala Asp Asp Ile Glu Trp Val Asn Ile Thr Asp Gln Ile
                965                 970                 975
Tyr Gln Gly Gly Ile Val Asn Ser Gly Val Gly Val Gly Ser Val Val
            980                 985                 990
Val Lys Asp Asn Tyr Ile Tyr Tyr  Met Phe Gly Gly Glu  Asp His Phe
        995                 1000                1005
Asn Pro  Trp Thr Tyr Gly Asp  Asn Ser Ala Lys Asp  Pro Phe Lys
    1010                1015                1020
```

[0074]

```
Ser Asp  Gly His Pro Ser Asp  Leu Tyr Cys Tyr Lys  Met Lys Ile
    1025                1030                1035
Gly Pro  Asp Asn Arg Val Ser  Arg Asp Phe Arg Tyr  Gly Ala Val
    1040                1045                1050
Pro Asn  Arg Ala Val Pro Val  Phe Phe Asp Thr Asn  Gly Val Arg
    1055                1060                1065
Thr Val  Pro Ala Pro Met Glu  Phe Thr Gly Asp Leu  Gly Leu Gly
    1070                1075                1080
His Val  Thr Ile Arg Ala Ser  Thr Ser Ser Asn Ile  Arg Ser Glu
    1085                1090                1095
Val Leu  Met Glu Gly Glu Tyr  Gly Phe Ile Gly Lys  Ser Ile Pro
    1100                1105                1110
Thr Asp  Asn Pro Ala Gly Gln  Arg Ile Ile Phe Cys  Gly Gly Glu
    1115                1120                1125
Gly Thr  Ser Ser Thr Thr Gly  Ala Gln Ile Thr Leu  Tyr Gly Ala
    1130                1135                1140
Asn Asn  Thr Asp Ser Arg Arg  Ile Val Tyr Asn Gly  Asp Glu His
    1145                1150                1155
Leu Phe  Gln Ser Ala Asp Val  Lys Pro Tyr Asn Asp  Asn Val Thr
    1160                1165                1170
Ala Leu  Gly Gly Pro Ser Asn  Arg Phe Thr Thr Ala  Tyr Leu Gly
    1175                1180                1185
Ser Asn  Pro Ile Val Thr Ser  Asn Gly Glu Arg Lys  Thr Glu Pro
    1190                1195                1200
Val Val  Phe Asp Asp Ala Phe  Leu Asp Ala Trp Gly  Asp Val His
    1205                1210                1215
Tyr Ile  Met Tyr Gln Trp Leu  Asp Ala Val Gln Leu  Lys Gly Asn
    1220                1225                1230
Asp Ala  Arg Ile His Phe Gly  Val Ile Ala Gln Gln  Ile Arg Asp
    1235                1240                1245
Val Phe  Ile Ala His Gly Leu  Met Asp Glu Asn Ser  Thr Asn Cys
    1250                1255                1260
Arg Tyr  Ala Val Leu Cys Tyr  Asp Lys Tyr Pro Arg  Met Thr Asp
    1265                1270                1275
Thr Val  Phe Ser His Asn Glu  Ile Val Glu His Thr  Asp Glu Glu
    1280                1285                1290
Gly Asn  Val Thr Thr Thr Glu  Glu Pro Val Tyr Thr  Glu Val Val
    1295                1300                1305
Ile His  Glu Glu Gly Glu Glu  Trp Gly Val Arg Pro  Asp Gly Ile
    1310                1315                1320
Phe Phe  Ala Glu Ala Ala Tyr  Gln Arg Arg Lys Leu  Glu Arg Ile
    1325                1330                1335
Glu Ala  Arg Leu Ser Ala Leu  Glu Gln Lys
    1340                1345
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[0075]

<210> 47
<211> 1154
<212> PRT
<213> 人工序列
<220>
<223> K5
<400> 47

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly

[0076]

290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385 390 395 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
405 410 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
420 425 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
435 440 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
450 455 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465 470 475 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
485 490 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
500 505 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
515 520 525
Pro Lys Thr Glu Gly Ile Leu His Lys Gly Gln Ser Leu Tyr Glu Tyr
530 535 540
Leu Asp Ala Arg Val Leu Thr Ser Lys Pro Phe Gly Ala Ala Gly Asp
545 550 555 560
Ala Thr Thr Asp Asp Thr Glu Val Ile Ala Ala Ser Leu Asn Ser Gln
565 570 575
Lys Ala Val Thr Ile Ser Asp Gly Val Phe Ser Ser Ser Gly Ile Asn
580 585 590
Ser Asn Tyr Cys Asn Leu Asp Gly Arg Gly Ser Gly Val Leu Ser His
595 600 605
Arg Ser Ser Thr Gly Asn Tyr Leu Val Phe Asn Asn Pro Arg Thr Gly
610 615 620
Arg Leu Ser Asn Ile Thr Val Glu Ser Asn Lys Ala Thr Asp Thr Thr
625 630 635 640
Gln Gly Gln Gln Val Ser Leu Ala Gly Gly Ser Asp Val Thr Val Ser

[0077]

645 650 655
Asp Val Asn Phe Ser Asn Val Lys Gly Thr Gly Phe Ser Leu Ile Ala
660 665 670
Tyr Pro Asn Asp Ala Pro Pro Asp Gly Leu Met Ile Lys Gly Ile Arg
675 680 685
Gly Ser Tyr Ser Gly Tyr Ala Thr Asn Lys Ala Ala Gly Cys Val Leu
690 695 700
Ala Asp Ser Ser Val Asn Ser Leu Ile Asp Asn Val Ile Ala Lys Asn
705 710 715 720
Tyr Pro Gln Phe Gly Ala Val Glu Leu Lys Gly Thr Ala Ser Tyr Asn
725 730 735
Ile Val Ser Asn Val Ile Gly Ala Asp Cys Gln His Val Thr Tyr Asn
740 745 750
Gly Thr Glu Gly Pro Ile Ala Pro Ser Asn Asn Leu Ile Lys Gly Val
755 760 765
Met Ala Asn Asn Pro Lys Tyr Ala Ala Val Val Ala Gly Lys Gly Ser
770 775 780
Thr Asn Leu Ile Ser Asp Val Leu Val Asp Tyr Ser Thr Ser Asp Ala
785 790 795 800
Arg Gln Ala His Gly Val Thr Val Glu Gly Ser Asp Asn Val Ile Asn
805 810 815
Asn Val Leu Met Ser Gly Cys Asp Gly Thr Asn Ser Leu Gly Gln Arg
820 825 830
Gln Thr Ala Thr Ile Ala Arg Phe Ile Gly Thr Ala Asn Asn Asn Tyr
835 840 845
Ala Ser Val Phe Pro Ser Tyr Ser Ala Thr Gly Val Ile Thr Phe Glu
850 855 860
Ser Gly Ser Thr Arg Asn Phe Val Glu Val Lys His Pro Gly Arg Arg
865 870 875 880
Asn Asp Leu Leu Ser Ser Ala Ser Thr Ile Asp Gly Ala Ala Thr Ile
885 890 895
Asp Gly Thr Ser Asn Ser Asn Val Val His Ala Pro Ala Leu Gly Gln
900 905 910
Tyr Ile Gly Ser Met Ser Gly Arg Phe Glu Trp Arg Ile Lys Ser Met
915 920 925
Ser Leu Pro Ser Gly Val Leu Thr Ser Ala Asp Lys Tyr Arg Met Leu
930 935 940
Gly Asp Gly Ala Val Ser Leu Ala Val Gly Gly Gly Thr Ser Ser Gln
945 950 955 960
Val Arg Leu Phe Thr Ser Asp Gly Thr Ser Arg Thr Val Ser Leu Thr
965 970 975
Asn Gly Asn Val Arg Leu Ser Thr Ser Ser Thr Gly Tyr Leu Gln Leu
980 985 990
Gly Ala Asp Ala Met Thr Pro Asp Ser Thr Gly Thr Tyr Ala Leu Gly

995 1000 1005

Ser Ala Ser Arg Ala Trp Ser Gly Gly Phe Thr Gln Ala Ala Phe
1010 1015 1020
Thr Val Thr Ser Asp Ala Arg Cys Lys Thr Glu Pro Leu Thr Ile
1025 1030 1035
Ser Asp Ala Leu Leu Asp Ala Trp Ser Glu Val Asp Phe Val Gln
1040 1045 1050
Phe Gln Tyr Leu Asp Arg Val Glu Glu Lys Gly Ala Asp Ser Ala
1055 1060 1065
Arg Trp His Phe Gly Ile Ile Ala Gln Arg Ala Lys Glu Ala Phe
1070 1075 1080
Glu Arg His Gly Ile Asp Ala His Arg Tyr Gly Phe Leu Cys Phe
1085 1090 1095
Asp Ser Trp Asp Asp Val Tyr Glu Glu Asp Ala Asn Gly Ser Arg
1100 1105 1110
Lys Leu Ile Thr Pro Ala Gly Ser Arg Tyr Gly Ile Arg Tyr Glu
1115 1120 1125
Glu Val Leu Ile Leu Glu Ala Ala Leu Met Arg Arg Thr Ile Lys
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Arg Met Gln Glu Ala Leu Ala Ala Leu Pro Lys
1145 1150

[0078]

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20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125

[0079]

```
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
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[0080]

Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
485 490 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
500 505 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
515 520 525
Glu Leu Ser Gly Glu His Gly Ser Phe Leu Ile Gly Gly Val Ile Asp
530 535 540
Cys Tyr Ser Thr Val Ser Asp Leu Ile Ser Ser Ser Pro Ser Val Gly
545 550 555 560
Arg Val Cys Arg Thr Ile Gly Tyr Tyr Ser Pro Gly Asp Gly Gly Gly
565 570 575
Ala Asp Tyr Ile Ile Ser Ile Gly Thr Pro Met Gln Asp Phe Ser Asp
580 585 590
Ser Gly Ser Ile Val Ile Asp Glu Cys Lys Phe Ala Lys Leu Ile Gln
595 600 605
Gln Ser Gln Tyr Asp Leu Lys Gln Phe Gly Val Lys Pro Ser Asp Pro
610 615 620
Ser Tyr Ala Glu Lys Asn Asp Ile Phe Ile Ser Gln Ala Ile Thr Arg
625 630 635 640
Ser Arg Val Gly Arg Cys Lys Ile Ile Ile Ser Asp Val Ile Tyr His
645 650 655
Lys Lys Pro Leu Ile Phe Asp Tyr Tyr Asn His Met Glu Gly Ser Cys
660 665 670
Ile Gly Ser Asp Pro Glu Phe Thr Pro Arg Phe Ile Lys Ile Asp Asn
675 680 685
Thr Thr Ser Gly Leu Pro Asp Met Gly Tyr Pro Gly Val Ala Asp Val
690 695 700
Val Ser Tyr Asp Val Asp Ala Gly Ile Ile Ile Lys Arg Gln Asn Ser
705 710 715 720
Gly Thr Ser Phe Ala Arg Gly Phe Ile Ile Lys Gly Phe Leu Leu Gln
725 730 735
Ser Glu Lys Lys Ser Ala Trp Ala Ile Tyr Ala Pro His Met Ala Asp
740 745 750
Phe Asp Ile Asp Ile Asp Ser Arg Gly Phe Asn Gly Gly Ile Arg Trp
755 760 765
Phe Val Asn Phe Leu Gly Arg Met Ala Gly Arg His Ile Gly Leu Gly
770 775 780
Ala Asn Ser Ser Asp Pro Thr Leu Ser Ile Gly Ala Trp Cys Ser Lys
785 790 795 800
Phe Ser Thr Ile Pro Asp Cys Gly Asn Ser Val Val Phe Arg Leu Ser
805 810 815
Phe Asn Gly Phe Asn Arg Gly Met Gln Met Glu Tyr Phe Gly Asn Gly
820 825 830

Val Leu Asp Arg Val Thr Leu Glu Asn Ile Ser Lys Pro Thr Pro Thr
835 840 845
Ser Pro Thr Thr His Gly Ile Tyr Ala Thr Asp Thr Trp Leu Thr Gly
850 855 860
Gln Val Ser Cys Glu Ser Ser Ser Thr Cys Ile Ile Arg Ala Gly Asn
865 870 875 880
Asn Ala Asn Phe Asp Ile Thr Leu Ser Ala Val Phe His Val Thr Gln
885 890 895
Asp Asp Pro Ser Glu Gly Ile Val His Val Leu Asn Gly Gly Arg Leu
900 905 910
Thr Leu Arg Ser Ser Thr Ile Leu Ala Asp Leu Ala Asp Thr Lys Ile
915 920 925
Ile Asn Glu Asn Gly Gly Tyr Leu Asp Ile Ala Ala Asn Thr Arg Thr
930 935 940
Gly Asn Ile Val Tyr Ser Asn Ser Asp Asn Tyr Arg Phe Lys Asp Arg
945 950 955 960
Thr Ile Gly Phe Gly Gln Thr Ala Ala Thr Thr Lys Thr Ser Phe Ser
965 970 975
Ser Gly Glu Glu Ile Thr Phe Ser Leu Leu Asn Gly Thr Pro Lys Ala
980 985 990
Asn Leu Ser Gly Gly Thr Ile Gln Phe Asn Ser Pro Cys Leu Ile Lys
995 1000 1005

[0081]

Ile Thr Val Gln Gly Arg Gly Ile Thr Ser Gly Ala Leu Thr Phe
1010 1015 1020
Gly Ile Asn Gly Glu Ser Ser Glu Ser Val Ser Gln Gly Gln Gln
1025 1030 1035
Val Ser Met Val Val Gly Val Val Ser Gly Asp Ile Leu Asn Leu
1040 1045 1050
Lys Ala Thr Ser Ser Leu Thr Leu Gly Ser Ala Gly Gly Val Arg
1055 1060 1065
Val Leu Leu Glu Pro Val Asn
1070 1075

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Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg

[0082]

35 40 45

Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60

Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80

Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95

Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110

Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125

Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140

Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160

Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175

Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190

Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205

Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220

Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240

Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255

Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270

Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285

Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300

Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320

Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335

Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350

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

Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380

Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro

385 390 395 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
405 410 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
420 425 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
435 440 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
450 455 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465 470 475 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
485 490 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
500 505 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
515 520 525
Gly Tyr Lys Val Gln Ser Leu Ala Ile Leu Ser Asp Thr Gln Ala Val
530 535 540
His Asp Ala Thr Asn Thr Ile Lys Thr Gln Thr Asp Lys Ile Lys Ala
545 550 555 560
Asp Thr Gln Ala Ile Lys Thr Gln Thr Asn Gln Ile Lys Thr Glu Thr
565 570 575
Gly Val Ile Arg Asp Lys Ala Asn Thr Ala Lys Thr Asp Ala Gln Ala
580 585 590
Ala Ser Ala Ala Ala Gln Gly Phe Arg Asp Gln Ala Lys Glu Trp Ala
595 600 605
Gln Ser Val Asn Ala Asp Asn Leu Leu Thr Lys Thr Gly Asn Leu Ala
610 615 620
Gly Leu Thr Asp Lys Ser Ala Ala Arg Ser Asn Leu Gly Leu Gly Ser
625 630 635 640
Val Ala Thr Glu Asn Thr Val Pro Ile Lys Lys Gly Gly Thr Ala Ala
645 650 655
Thr Thr Val Ala Ala Ala Arg Ser Asn Leu Gly Leu Gly Ser Val Ala
660 665 670
Thr Glu Asn Thr Val Pro Ile Glu Lys Gly Gly Thr Ala Ala Thr Thr
675 680 685
Ala Ala Lys Ala Arg Ser Asn Leu Gly Leu Gly Ser Val Ala Thr Glu
690 695 700
Asn Thr Val Pro Ile Glu Lys Gly Gly Thr Ala Ala Thr Thr Ala Ala
705 710 715 720
Lys Ala Arg Ser Asn Phe Gly Leu Gly Asp Asn Asn Lys Val Lys Leu
725 730 735
Gly Thr Leu Arg Leu Asn Gly Gly Glu Ser Leu Val Phe Asn Asp Val

[0083]

740 745 750
Glu Arg Asn Gly Leu Ile Ile Ser Asn Ala Ser Phe Gly Ile Asp Ser
755 760 765
Trp Val Gly Gln Thr Met His Lys Trp Tyr Thr Asp Trp Thr Arg Ala
770 775 780
Gly Leu Val Arg Ala Gly Asp Ala His Leu Ser Asp Tyr Arg Val His
785 790 795 800
Val Trp Lys Asp Gly Phe Thr Glu Ala Leu Phe Arg Phe Leu Pro Asp
805 810 815
Gly Arg Leu Ile Ser Gly Asn Ser Gly Asn Pro Ser Val Asn Glu Phe
820 825 830
Gln Lys Ala Pro Leu Ser Asp Arg Asp Leu Lys Lys Glu Ile Lys Tyr
835 840 845
Thr Asp Gly Glu Glu Ser Tyr Asn Arg Val Arg Gln Trp Leu Pro Ala
850 855 860
Met Phe Lys Tyr Lys Glu Ser Asp Val Gln Arg Tyr Gly Leu Ile Ala
865 870 875 880
Gln Asp Leu Ala Arg Ile Asp Pro Glu Tyr Val His Leu Leu Pro Gly
885 890 895
Tyr Ala Ile Tyr Glu Asp Val Lys Gly Val Asp Glu Glu Gly Asn Glu
900 905 910
Val Val Val Asp Arg Lys Glu Ile Gly Tyr Thr Asp Asp Val Leu Ser
915 920 925
Leu Asp Ser Asn Val Leu Leu Met Asp Leu Cys Ala Ala Phe Val His
930 935 940
Leu Leu His Lys Val Glu Lys Leu Glu Gly Lys
945 950 955

[0084]

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1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80

[0085]

Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385 390 395 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
405 410 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
420 425 430

[0086]

Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
435 440 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
450 455 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465 470 475 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
485 490 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
500 505 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
515 520 525
Gln Leu Glu Ser Asp Ala Asp Gly Met Gly Asp Ala Leu Val Ala Val
530 535 540
Lys Gln Pro Tyr Ile Gly Ser Ile Ala Leu Thr Gln His Asp Lys Asn
545 550 555 560
Thr Asn Phe Ile Ser Ala Lys Asp Phe Gly Ala Thr Ala Asp Gly Thr
565 570 575
Leu His Pro Leu Ser Glu Lys Phe Ser Thr Leu Ser Ala Ala Gln Ala
580 585 590
Val Tyr Pro Phe Val Thr Ser Leu Thr Gln Ser Leu Asp Tyr Ala Gly
595 600 605
Ile Gln Ala Ala Ile Asn Thr Gly Arg Asn Val Leu Leu Thr Ser Gly
610 615 620
Thr Tyr Phe Val Asn Ala Thr Ile Glu Met Asn Ser Asn Cys Thr Ile
625 630 635 640
Asn Gly Glu Thr Asn Ser Asn Ile Asn Arg Pro Glu Thr Phe Ile Ala
645 650 655
Val Ile Gly Asn Ile Ala Cys Phe His Tyr His Ala Ala Phe Asn Thr
660 665 670
Ile Asn Ile Glu Asn Val Tyr Ile Phe Tyr Asp Gly Gly Arg Pro Thr
675 680 685
Ser Pro Thr Gly Asn Asp Gly Lys Ile Gly Ile Leu Ile Asp Gly Gly
690 695 700
Thr Thr Ser Pro Gly Val Met His Ile Lys Asn Val Glu Val Asp Gly
705 710 715 720
Ala Trp Trp Ala Ile Tyr Asp Asp Ser Gly Asn Tyr Leu Thr Lys Tyr
725 730 735
Thr Gln Val Trp Ala Arg Arg Val Ala His Gly Phe Tyr Lys Ala Asn
740 745 750
Gly Thr Thr Ile Gln Trp Asp Thr Cys Tyr Val Leu Asp Ala Ala Gln
755 760 765
Ala Trp Tyr Val Val Asn Cys Leu Ser Pro Gln Leu Ile Asn Cys Ala
770 775 780

[0087]

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Gly Asp Gln Ile Thr Val Asp Gly Ser Gln Tyr Thr Phe Asp Ser Ser
785                 790                 795                 800
Gly Leu Tyr Phe Ser Gly Cys Lys Cys Leu Thr Ile Thr Gly Tyr Asp
                805                 810                 815
Gly Glu Ser Asn Ile Ile Lys Asn Thr Asn Gly Ile Thr Ala Ser Tyr
            820                 825                 830
Ile Lys Leu Asn Asp Thr Ile Ala His Ile Ser Gly Leu Ala Gly His
        835                 840                 845
Gly Asn Ser Met Gln Thr Thr Gly Ser Gly Thr Ala Ala Phe Ile Phe
    850                 855                 860
Ala Thr Gly Thr Ser Ile Val Asn Ile Lys Ser Ser Thr Asp Ser Phe
865                 870                 875                 880
Leu Asp Ser Glu Ser Ile Thr Tyr Thr Gly Ser Gly Tyr Pro Asn Thr
                885                 890                 895
Leu Leu Thr Asp Ser Thr Ala Lys Ile Ile Ala Glu Gly Cys Arg Phe
            900                 905                 910
Lys Ala Pro Thr Gly Gly Thr Pro Val Ile Ser Thr Tyr Ser Thr Gly
        915                 920                 925
Asn Gly Val Phe Thr Asp Cys Ser Leu Thr Gly Thr Gln Thr Ser Gly
    930                 935                 940
Ser Tyr Val Glu Ser Arg Ser Ser Ala Gly Asn Gln Leu Pro Ala Val
945                 950                 955                 960
Tyr Thr Ala Lys Gly Thr Gln Ala Val Ala Ala Asn Val Ala Thr Thr
                965                 970                 975
Leu Phe Glu Leu Pro Asn Ser Gln Gly Met Tyr Leu Ile Ser Val Trp
            980                 985                 990
Ala Glu Ser Ser Gly Thr Asn Phe  Ser Ser Leu Gln Leu  Ala Met Trp
        995                 1000                1005
Asp Gly  Thr Thr Leu Thr Leu  Thr Pro Leu Lys Ser  Gly Gly Leu
    1010                1015                1020
Ile Ser  Phe Thr Val Thr Gly  Arg Ile Val Thr Ile  Thr Ser Gln
    1025                1030                1035
Gly Thr  Thr Thr Phe Asn Trp  Thr Tyr Thr Lys Ala  Gly
    1040                1045                1050
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Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1               5                   10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
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[0088]

```
                20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
```

[0089]

```
370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Gly Ala Ile Gly Asp Gly Val His Asp Asp Thr Ser Ala Leu Ser Glu
    530                 535                 540
Leu Leu Ser Val Ala Thr Gly Gly Glu Lys Ile Asp Gly Arg Gly Leu
545                 550                 555                 560
Thr Phe Lys Val Ser Thr Leu Pro Asp Val Ser Arg Phe Lys Asn Ala
                565                 570                 575
Arg Phe Leu Phe Glu Arg Ile Pro Gly Gln Pro Leu Phe Tyr Ala Ser
            580                 585                 590
Glu Asp Phe Ile Gln Gly Glu Leu Phe Lys Ile Thr Asp Thr Pro Trp
        595                 600                 605
Tyr Asn Ala Trp Thr Gln Asp Lys Thr Phe Val Tyr Asp Asn Val Ile
    610                 615                 620
Tyr Ala Pro Phe Met Ala Gly Asp Arg His Gly Val Asn Asn Leu His
625                 630                 635                 640
Val Ala Trp Val Arg Ser Gly Asp Asp Gly Arg Thr Trp Thr Thr Pro
                645                 650                 655
Glu Trp Leu Thr Asp Leu His Glu Asn Tyr Pro Thr Val Asn Tyr His
            660                 665                 670
Cys Met Ser Met Gly Val Val Arg Asn Arg Leu Phe Ala Val Ile Glu
        675                 680                 685
Thr Arg Thr Val Ser Gly Asn Lys Leu Gln Val Ala Glu Leu Trp Asp
    690                 695                 700
Arg Pro Met Ser Arg Ser Leu Arg Ala Tyr Gly Gly Ile Thr Lys Ala
705                 710                 715                 720
Ala Asn Gln Gln Val Ala Tyr Ile Arg Ile Thr Asp His Gly Leu Phe
```

725 730 735
Ala Gly Asp Phe Val Asn Phe Ser Asn Ser Gly Val Thr Gly Val Thr
740 745 750
Gly Asn Met Thr Val Thr Thr Val Ile Asp Lys Asn Thr Phe Thr Val
755 760 765
Thr Thr Gln Asn Thr Gln Asp Val Asp Gln Asn Asn Glu Gly Arg Tyr
770 775 780
Trp Ser Phe Gly Thr Ser Phe His Ser Ser Pro Trp Arg Lys Thr Ser
785 790 795 800
Leu Gly Thr Ile Pro Ser Phe Val Asp Gly Ser Thr Pro Val Thr Glu
805 810 815
Ile His Ser Phe Ala Thr Ile Ser Asp Asn Ser Phe Ala Val Gly Tyr
820 825 830
His Asn Gly Asp Ile Gly Pro Arg Glu Leu Gly Ile Leu Tyr Phe Ser
835 840 845
Asp Ala Phe Gly Ser Pro Gly Ser Phe Val Arg Arg Arg Ile Pro Ala
850 855 860
Glu Tyr Glu Ala Asn Ala Ser Glu Pro Cys Val Lys Tyr Tyr Asp Gly
865 870 875 880
Ile Leu Tyr Leu Thr Thr Arg Gly Thr Leu Ser Thr Gln Pro Gly Ser
885 890 895
[0090] Ser Leu His Arg Ser Ser Asp Leu Gly Thr Ser Trp Asn Ser Leu Arg
900 905 910
Phe Pro Asn Asn Val His His Ser Asn Leu Pro Phe Ala Lys Val Gly
915 920 925
Asp Glu Leu Ile Ile Phe Gly Ser Glu Arg Ala Phe Gly Glu Trp Glu
930 935 940
Gly Gly Glu Pro Asp Asn Arg Tyr Ala Gly Asn Tyr Pro Arg Thr Phe
945 950 955 960
Met Thr Arg Val Asn Val Asn Glu Trp Ser Leu Asp Asn Val Glu Trp
965 970 975
Val Asn Val Thr Asp Gln Ile Tyr Gln Gly Gly Ile Val Asn Ser Ala
980 985 990
Val Gly Val Gly Ser Val Cys Ile Lys Asp Asn Trp Leu Tyr Tyr Ile
995 1000 1005
Phe Gly Gly Glu Asp Phe Leu Asn Pro Trp Ser Ile Gly Asp Asn
1010 1015 1020
Asn Arg Lys Tyr Pro Tyr Val His Asp Gly His Pro Ala Asp Leu
1025 1030 1035
Tyr Cys Phe Arg Val Lys Ile Lys Gln Glu Glu Phe Val Ser Arg
1040 1045 1050
Asp Phe Val Tyr Gly Ala Thr Pro Asn Arg Thr Leu Pro Thr Phe
1055 1060 1065
Met Ser Thr Ser Gly Val Arg Thr Val Pro Val Pro Val Asp Phe

1070 1075 1080
Thr Asp Asp Val Ala Val Gln Ser Leu Thr Val His Ala Gly Thr
1085 1090 1095
Ser Gly Gln Val Arg Ala Glu Val Lys Leu Glu Gly Asn Tyr Ala
1100 1105 1110
Ile Ile Ala Lys Lys Val Pro Ser Asp Asp Val Thr Ala Gln Arg
1115 1120 1125
Leu Ile Val Ser Gly Gly Glu Thr Thr Ser Ser Ala Asp Gly Ala
1130 1135 1140
Met Ile Thr Leu His Gly Ser Gly Ser Ser Thr Pro Arg Arg Ala
1145 1150 1155
Val Tyr Asn Ala Leu Glu His Leu Phe Glu Asn Gly Asp Val Lys
1160 1165 1170
Pro Tyr Leu Asp Asn Val Asn Ala Leu Gly Gly Pro Gly Asn Arg
1175 1180 1185
Phe Ser Thr Val Tyr Leu Gly Ser Asn Pro Val Val Thr Ser Asp
1190 1195 1200
Gly Thr Leu Lys Thr Glu Pro Val Ser Pro Asp Glu Ala Leu Leu
1205 1210 1215
Asp Ala Trp Gly Asp Val Arg Tyr Ile Ala Tyr Lys Trp Leu Asn
1220 1225 1230
[0091] Ala Val Ala Ile Lys Gly Glu Glu Gly Ala Arg Ile His His Gly
1235 1240 1245
Val Ile Ala Gln Gln Leu Arg Asp Val Leu Ile Ser His Gly Leu
1250 1255 1260
Met Glu Glu Glu Ser Thr Thr Cys Arg Tyr Ala Phe Leu Cys Tyr
1265 1270 1275
Asp Asp Tyr Pro Ala Val Tyr Asp Asp Val Ile Thr Gly Gln Arg
1280 1285 1290
Glu Met Pro Leu Thr Asp Asn Asp Gly Ser Ile Ile Val Asp Glu
1295 1300 1305
Asp Asp Asn Pro Val Met Val Met Glu Asp Ile Ile Glu Arg Val
1310 1315 1320
Glu Ile Thr Pro Ala Gly Ser Arg Trp Gly Val Arg Pro Asp Leu
1325 1330 1335
Leu Phe Tyr Ile Glu Ala Ala Trp Gln Arg Arg Glu Ile Glu Arg
1340 1345 1350
Ile Lys Ala Arg Leu Asp Leu Ile Glu Gly Lys His
1355 1360 1365

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<211> 1051
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<213> 人工序列
<220>

<223> STF-52

<400> 52

[0092]

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Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1               5                  10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
```

[0093]

```
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Gln Leu Ala Ser Ser Glu Asp Gly Met Gly Asp Ala Leu Val Ala Val
    530                 535                 540
Lys Gln Pro Tyr Ile Gly Ser Ile Ala Leu Thr Gln His Asp Lys Asn
545                 550                 555                 560
Thr Asn Phe Ile Ser Ala Lys Asp Phe Gly Ala Thr Ala Asp Gly Thr
                565                 570                 575
Leu His Pro Leu Ser Glu Lys Phe Ser Thr Leu Ser Ala Ala Gln Ala
            580                 585                 590
Val Tyr Pro Phe Val Thr Ser Leu Thr Gln Ser Leu Asp Tyr Ala Gly
        595                 600                 605
Ile Gln Ala Ala Ile Asn Thr Gly Arg Asn Val Leu Leu Thr Ser Gly
    610                 615                 620
Thr Tyr Phe Val Asn Ala Thr Ile Glu Met Asn Ser Asn Cys Thr Ile
625                 630                 635                 640
Asn Gly Glu Thr Asn Ser Asn Ile Asn Arg Pro Glu Thr Phe Ile Ala
                645                 650                 655
Val Ile Gly Asn Ile Ala Cys Phe His Tyr His Ala Ala Phe Asn Thr
            660                 665                 670
Ile Asn Ile Glu Asn Val Tyr Ile Phe Tyr Asp Gly Gly Arg Pro Thr
        675                 680                 685
```

[0094]

```
Ser Pro Thr Gly Asn Asp Gly Lys Ile Gly Ile Leu Ile Asp Gly Gly
    690                 695                 700
Thr Thr Ser Pro Gly Val Met His Ile Lys Asn Val Glu Val Asp Gly
705                 710                 715                 720
Ala Trp Trp Ala Ile Tyr Asp Asp Ser Gly Asn Tyr Leu Thr Lys Tyr
                725                 730                 735
Thr Gln Val Trp Ala Arg Arg Val Ala His Gly Phe Tyr Lys Ala Asn
            740                 745                 750
Gly Thr Thr Ile Gln Trp Asp Thr Cys Tyr Val Leu Asp Ala Ala Gln
        755                 760                 765
Ala Trp Tyr Val Val Asn Cys Leu Ser Pro Gln Leu Ile Asn Cys Ala
    770                 775                 780
Gly Asp Gln Ile Thr Val Asp Gly Ser Gln Tyr Thr Phe Asp Ser Ser
785                 790                 795                 800
Gly Leu Tyr Phe Ser Gly Cys Lys Cys Leu Thr Ile Thr Gly Tyr Asp
                805                 810                 815
Gly Glu Ser Asn Ile Ile Lys Asn Thr Asn Gly Ile Thr Ala Ser Tyr
            820                 825                 830
Ile Lys Leu Asn Asp Thr Ile Ala His Ile Ser Gly Leu Ala Gly His
        835                 840                 845
Gly Asn Ser Met Gln Thr Thr Gly Ser Gly Thr Ala Ala Phe Ile Phe
    850                 855                 860
Ala Thr Gly Thr Ser Ile Val Asn Ile Lys Ser Ser Thr Asp Ser Phe
865                 870                 875                 880
Leu Asp Ser Glu Ser Ile Thr Tyr Thr Gly Ser Gly Tyr Pro Asn Thr
                885                 890                 895
Leu Leu Thr Asp Ser Thr Ala Lys Ile Ile Ala Glu Gly Cys Arg Phe
            900                 905                 910
Lys Ala Pro Thr Gly Gly Thr Pro Val Ile Ser Thr Tyr Ser Thr Gly
        915                 920                 925
Asn Gly Val Phe Thr Asp Cys Ser Leu Thr Gly Thr Gln Thr Ser Gly
    930                 935                 940
Ser Tyr Val Glu Ser Arg Ser Ser Ala Gly Asn Gln Leu Pro Ala Val
945                 950                 955                 960
Tyr Thr Ala Lys Gly Thr Gln Ala Val Ala Ala Asn Val Ala Thr Thr
                965                 970                 975
Leu Phe Glu Leu Pro Asn Ser Gln Gly Met Tyr Leu Ile Ser Val Trp
            980                 985                 990
Ala Glu Ser Ser Gly Thr Asn Phe  Ser Ser Leu Gln Leu  Ala Met Trp
        995                 1000                1005
Asp Gly  Thr Thr Leu Thr Leu  Thr Pro Leu Lys Ser  Gly Gly Leu
    1010                1015                1020
Ile Ser  Phe Thr Val Thr Gly  Arg Ile Val Thr Ile  Thr Ser Gln
    1025                1030                1035
```

Gly Thr Thr Thr Phe Asn Trp Thr Tyr Thr Lys Ala Gly
1040 1045 1050

<210> 53
<211> 931
<212> PRT
<213> 人工序列
<220>
<223> 1AR
<400> 53

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala

[0095]

[0096]

```
          275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
      290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                  325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
              340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
          355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
      370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                  405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
              420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
          435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
      450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                  485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
              500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
          515                 520                 525
Ile Ala Thr Arg Val Ser Lys Glu Gly Asp Thr Met Thr Gly Lys Leu
      530                 535                 540
Thr Leu Ser Ala Gly Asn Asp Ala Leu Val Leu Thr Ala Gly Glu Gly
545                 550                 555                 560
Ala Ser Ser His Ile Arg Ser Asp Val Gly Gly Thr Asn Asn Trp Tyr
                  565                 570                 575
Ile Gly Lys Gly Ser Gly Asp Asn Gly Leu Gly Phe Tyr Ser Tyr Ile
              580                 585                 590
Thr Gln Gly Gly Val Tyr Ile Thr Asn Asn Gly Glu Ile Ala Leu Ser
          595                 600                 605
Pro Gln Gly Gln Gly Thr Phe Asn Phe Asn Arg Asp Arg Leu His Ile
      610                 615                 620
Asn Gly Thr Gln Trp Thr Ala His Gln Gly Gly Gly Trp Glu Asn Gln
```

625 630 635 640
Trp Asn Gln Glu Ala Pro Ile Phe Ile Asp Phe Gly Asn Val Gly Asn
645 650 655
Asp Ser Tyr Tyr Pro Ile Ile Lys Gly Lys Ser Gly Ile Thr Asn Glu
660 665 670
Gly Tyr Ile Ser Gly Val Asp Phe Gly Met Arg Arg Ile Thr Asn Thr
675 680 685
Trp Ala Gln Gly Ile Ile Arg Val Gly Asn Gln Glu Asn Gly Ser Asp
690 695 700
Pro Gln Ala Ile Tyr Glu Phe His His Asn Gly Val Leu Tyr Val Pro
705 710 715 720
Asn Met Val Lys Thr Gly Ala Arg Leu Ser Ala Gly Gly Gly Asp Pro
725 730 735
Val Trp Gln Gly Ala Cys Val Val Ile Gly Asp Asn Asp Thr Gly Leu
740 745 750
Val His Gly Gly Asp Gly Arg Ile Asn Met Val Ala Asn Gly Met His
755 760 765
Ile Ala Ser Trp Ser Ser Ala Tyr His Leu His Glu Gly Leu Trp Asp
770 775 780
Thr Thr Gly Ala Leu Trp Thr Glu Gln Gly Arg Ala Ile Ile Ser Phe
785 790 795 800

[0097]

Gly His Leu Val Gln Gln Ser Asp Ala Tyr Ser Thr Phe Val Arg Asp
805 810 815
Val Tyr Val Arg Ser Asp Ile Arg Val Lys Lys Asp Leu Val Lys Phe
820 825 830
Glu Asn Ala Ser Glu Lys Leu Ser Lys Ile Asn Gly Tyr Thr Tyr Met
835 840 845
Gln Lys Arg Gly Leu Asp Glu Glu Gly Asn Gln Lys Trp Glu Pro Asn
850 855 860
Ala Gly Leu Ile Ala Gln Glu Val Gln Ala Ile Leu Pro Glu Leu Val
865 870 875 880
Glu Gly Asp Pro Asp Gly Glu Ala Leu Leu Arg Leu Asn Tyr Asn Gly
885 890 895
Val Ile Gly Leu Asn Thr Ala Ala Ile Asn Glu His Thr Ala Glu Ile
900 905 910
Ala Glu Leu Lys Ser Glu Ile Glu Glu Leu Lys Lys Ile Val Lys Ser
915 920 925
Leu Leu Lys
930

<210> 54
<211> 259
<212> PRT
<213> 人工序列
<220>

<223> 1AR-AP1
<400> 54
Met Ala Val Thr Gly Pro Trp Val Gly Ser Ser Ala Val Val Asn Thr
1 5 10 15
Gly Gln Asn Trp Met Val Gly Ala Ala Gln Arg Leu Arg Met Gly Ala
20 25 30
Pro Phe Trp Met Ser Asn Met Ile Gly Arg Ser Val Glu Val Ile His
35 40 45
Thr Leu Gly Ala Asp His Asn Phe Asn Gly Gln Trp Phe Arg Asp Arg
50 55 60
Cys Phe Glu Ala Gly Ser Ala Pro Ile Val Phe Asn Ile Thr Gly Asp
65 70 75 80
Leu Val Ser Tyr Ser Arg Asp Val Pro Leu Phe Phe Met Tyr Gly Asp
85 90 95
Thr Pro Asn Glu Tyr Val Gln Leu Asn Ile His Gly Val Thr Met Tyr
100 105 110
Gly Arg Gly Gly Asn Gly Trp Ala Ala Gly Ala Ile Gly Ala Ser Asp
115 120 125
Gly Gly Val Cys Ile Gln Asn Asp Ile Gly Gly Arg Leu Arg Ile Asn
130 135 140
Asn Gly Gly Ala Ile Ala Gly Gly Gly Gly Gly Gly Gly Gly Tyr Ser
145 150 155 160
[0098] Gln Ala Asn Asn Trp Ala Gly Lys Tyr Val Cys Gly Gly Gly Gly Gly
165 170 175
Arg Pro Phe Gly Leu Gly Gly Asn Asn Gly Ala Arg Trp Pro Gly Gly
180 185 190
Asn Ala Ser Leu Thr Ser Pro Gly Ala Gly Gly Asn Thr Gly Thr Arg
195 200 205
Tyr Tyr Ala Gly Gly Gly Gly Glu Val Gly Gln Pro Gly Gln Tyr Ala
210 215 220
Asn Pro Gly Ala Gly Tyr Ser Thr Pro Pro Thr Ser Pro Gly Ala Ala
225 230 235 240
Val Ala Gly Ser Ala Pro Thr Trp Gln Asn Val Gly Ala Ile Tyr Gly
245 250 255
Pro Arg Val

<210> 55
<211> 80
<212> PRT
<213> 人工序列
<220>
<223> 1AR-AP2
<400> 55
Met Ser Glu Gln Thr Ile Glu Gln Lys Leu Ser Ala Glu Ile Val Thr

1 5 10 15
Leu Lys Ser Arg Ile Leu Asp Thr Gln Asp Gln Ala Ala Arg Leu Met
20 25 30
Glu Glu Ser Lys Ile Leu Gln Gly Thr Leu Ala Glu Ile Ala Arg Ala
35 40 45
Val Gly Ile Thr Gly Asp Thr Ile Lys Val Glu Glu Ile Val Glu Ala
50 55 60
Val Lys Asn Leu Thr Ala Glu Ser Thr Asp Glu Ala Lys Asp Glu Glu
65 70 75 80
<210> 56
<211> 901
<212> PRT
<213> 人工序列
<220>
<223> 13-13.0
<400> 56
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220

[0099]

[0100]

```
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Ile Ile Gln Leu Glu Asp Ser Gln Gly Ala His Phe Ser Thr Glu Arg
    530                 535                 540
Thr Leu Ala Thr Gly Ala Ile Lys Thr Arg Phe Phe Gly Glu Thr Phe
545                 550                 555                 560
Thr Asp Gly Thr Leu Tyr Leu Asn Gln Met Asn Asn Ser Ser Glu Arg
                565                 570                 575
```

[0101]

Phe Ser Ile Asn Asn Trp Gly Asn Ser Glu Val Gly Arg Pro Ala Val
580 585 590
Leu Glu Val Gly Asp Ser Lys Gly Tyr His Phe Tyr Thr Glu Arg Gly
595 600 605
Thr Asp Asn Ser Leu Asn Phe Asp Val Ala Gly Asn Phe Thr Val His
610 615 620
Gly Pro Ser Gly Ile Thr Ile Lys Thr Ser Thr Gly Ala Arg His Ile
625 630 635 640
Trp Phe Arg Asp Asp Ser Asp Ala Glu Lys Ala Val Ile Trp Ala Thr
645 650 655
Asp Glu Gly Ile Leu His Ile Arg Asn Asn Tyr Gly Gly Ser Phe Ser
660 665 670
His His Phe Gln Gly Ala Met Ile Leu Ala Gly Glu Arg Val Pro Tyr
675 680 685
Asn Ser Glu Tyr Ala Leu Ile Arg Gly Asn Ile Ser Gly Gly Ala Trp
690 695 700
Val Asp Trp Arg Gly Arg Pro Ala Gly Leu Leu Val Asp Cys Gln Asp
705 710 715 720
Ser Arg Asn Gln Ala Tyr Asn Ile Trp Lys Ala Thr His Trp Gly Asp
725 730 735
Gln His Leu Ala Ala Met Gly Val His Ala Gly Gly Gly Asn Pro Gln
740 745 750
Val Val Leu His Val Gly Gly Asn Asp Tyr Ala Phe Ala Ser Asn Gly
755 760 765
Asp Phe Thr Ala Gly Ala Ala Val Tyr Cys Asn Asp Val Tyr Ile Arg
770 775 780
Ser Asp Arg Arg Leu Lys Ile Asn Val Lys Asp Tyr Glu Glu Asn Ala
785 790 795 800
Val Asp Lys Val Asn Lys Leu Lys Val Lys Thr Tyr Asp Lys Val Lys
805 810 815
Ser Leu Ser Asp Arg Glu Val Ile Gly His Glu Ile Gly Ile Ile Ala
820 825 830
Gln Asp Leu Gln Glu Val Leu Pro Glu Ala Val Ser Thr Ser Ser Val
835 840 845
Gly Ser Gln Asp Asn Pro Glu Glu Ile Leu Thr Ile Ser Asn Ser Ala
850 855 860
Val Asn Ala Leu Leu Ile Lys Ala Ile Gln Glu Met Ser Glu Glu Ile
865 870 875 880
Lys Glu Leu Lys Thr Pro Leu Phe Thr Lys Ile Ala Arg Lys Ile Ser
885 890 895
Lys Tyr Phe Lys Phe
900

<210> 57

<211> 259

[0102]

<212> PRT
<213> 人工序列
<220>
<223> 13-13.0-AP1
<400> 57

Met Ala Val Val Gly Val Pro Gly Trp Ile Gly Ser Ser Ala Val Asn
1 5 10 15
Glu Thr Gly Gln Arg Trp Met Ser Gln Ala Ala Gly Gln Leu Arg Leu
20 25 30
Gly Val Pro Cys Trp Met Ser Gln Phe Ala Gly Arg Ser Arg Glu Ile
35 40 45
Ile His Thr Leu Gly Ala Asp His Asn Phe Asn Gly Gln Trp Phe Arg
50 55 60
Asp Arg Cys Phe Glu Ala Gly Ser Thr Pro Ile Val Phe Asn Ile Thr
65 70 75 80
Gly Asp Leu Val Ser Tyr Ser Lys Asp Val Pro Leu Phe Phe Met Tyr
85 90 95
Gly Asp Thr Pro Asn Glu Tyr Val Gln Leu Asn Ile His Gly Val Thr
100 105 110
Met Tyr Gly Arg Gly Gly Asn Gly Gly Ser Asn Ser Pro Gly Ser Ala
115 120 125
Gly Gly His Cys Ile Gln Asn Asp Ile Gly Gly Arg Leu Arg Ile Asn
130 135 140
Asn Gly Gly Ala Ile Ala Gly Gly Gly Gly Gly Gly Gly Gly Gly Arg
145 150 155 160
Tyr Gly Arg Leu Ser Phe Gly Gly Gly Gly Gly Arg Pro Phe Gly Ala
165 170 175
Gly Gly Ser Ser Ser His Met Ser Ser Gly Ala Thr Ala Gly Thr Ile
180 185 190
Ser Ala Pro Gly Ala Gly Ser Val Gly Glu Gly Ser Leu Trp Val Tyr
195 200 205
Thr Gly Gly Ser Gly Gly Asn Val Gly Ala Ala Gly Gly Arg Cys Asn
210 215 220
Ile Gln Gly Asn Gly Thr Glu Tyr Asp Gly Gly Ala Ala Gly Tyr Ala
225 230 235 240
Val Ile Gly Ser Ala Pro Thr Trp Ile Asn Val Gly Ala Ile Tyr Gly
245 250 255
Pro Arg Val

<210> 58
<211> 80
<212> PRT
<213> 人工序列
<220>

<223> 13-13.0-AP2
<400> 58
Met Ser Glu Gln Thr Ile Glu Gln Lys Leu Ser Ala Glu Ile Val Thr
1 5 10 15
Leu Lys Ser Arg Ile Leu Asp Thr Gln Asp Gln Ala Ala Arg Leu Met
20 25 30
Glu Glu Ser Lys Ile Leu Gln Gly Thr Leu Ala Glu Ile Ala Arg Ala
35 40 45
Val Gly Ile Thr Gly Asp Thr Ile Lys Val Glu Glu Ile Val Glu Ala
50 55 60
Val Lys Asn Leu Thr Ala Glu Ser Ala Asp Glu Ala Lys Asp Glu Glu
65 70 75 80
<210> 59
<211> 761
<212> PRT
<213> 人工序列
<220>
<223> 13-14.3
<400> 59
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ile Ser Asp Asp Ile Gly Trp Met His
130 135 140
Tyr Ile Gln Arg Asn Lys Asp Asn Thr Val Glu Ala Val Leu Asn Gly
145 150 155 160
Gln Gln Thr Ile Asn Glu Asn Ile Ile Ala Lys Lys Asp Ile Trp Val
165 170 175
Asp Arg Ala Val His Thr Leu Gly Glu Ile Thr Thr Asn Ala Val Asn
180 185 190
Gly Leu Arg Ile Trp Asn Asn Asp Tyr Gly Val Ile Phe Arg Arg Ser

[0103]

[0104]

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Glu Gly Ser Leu His Ile Ile Pro Thr Ala Phe Gly Glu Gly Glu Thr
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Gly Asp Ile Gly Pro Leu Arg Pro Leu Ser Ile Ala Leu Asp Thr Gly
225                 230                 235                 240
Lys Val Thr Ile Pro Asp Leu Gln Ser Ser Tyr Asn Thr Phe Ala Ala
                245                 250                 255
Asn Gly Tyr Ile Lys Phe Val Gly His Gly Ala Gly Ala Gly Gly Tyr
            260                 265                 270
Asp Ile Gln Tyr Ala Gln Ala Ala Pro Ile Phe Gln Glu Ile Asp Asp
          275                 280                 285
Asp Ala Val Ser Lys Tyr Tyr Pro Ile Val Lys Gln Lys Phe Leu Asn
      290                 295                 300
Gly Lys Ser Val Trp Ser Leu Gly Thr Glu Ile Glu Ser Gly Thr Phe
305                 310                 315                 320
Val Ile His His Leu Lys Glu Asp Gly Ser Gln Gly His Ala Ser Arg
                325                 330                 335
Phe Asn Gln Asp Gly Thr Val Asn Phe Pro Asp Asn Val Leu Val Gly
            340                 345                 350
Gly Asp Ile Asn Met Lys Gly Met Met Thr Phe Asp Ala Gly Arg Leu
          355                 360                 365
Gly Ser Arg Asp Tyr Phe Lys Phe Asn His Trp Gly Asp Ser Asn Asn
      370                 375                 380
Gly Arg Asp Asn Ile Ile Gln Leu Glu Asp Ser Gln Gly Ala His Phe
385                 390                 395                 400
Ser Thr Glu Arg Thr Leu Ala Thr Gly Ala Ile Lys Thr Arg Phe Phe
                405                 410                 415
Gly Glu Thr Phe Thr Asp Gly Thr Leu Tyr Leu Asn Gln Met Asn Asn
            420                 425                 430
Ser Ser Glu Arg Phe Ser Ile Asn Asn Trp Gly Asn Ser Glu Val Gly
          435                 440                 445
Arg Pro Ala Val Leu Glu Val Gly Asp Ser Lys Gly Tyr His Phe Tyr
      450                 455                 460
Thr Glu Arg Gly Thr Asp Asn Ser Leu Asn Phe Asp Val Ala Gly Asn
465                 470                 475                 480
Phe Thr Val His Gly Pro Ser Gly Ile Thr Ile Lys Thr Ser Thr Gly
                485                 490                 495
Ala Arg His Ile Trp Phe Arg Asp Asp Ser Asp Ala Glu Lys Ala Val
            500                 505                 510
Ile Trp Ala Thr Asp Glu Gly Ile Leu His Ile Arg Asn Asn Tyr Gly
          515                 520                 525
Gly Ser Phe Ser His His Phe Gln Gly Ala Met Ile Leu Ala Gly Glu
      530                 535                 540
Arg Val Pro Tyr Asn Ser Glu Tyr Ala Leu Ile Arg Gly Asn Ile Ser
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545 550 555 560
Gly Gly Ala Trp Val Asp Trp Arg Gly Arg Pro Ala Gly Leu Leu Val
565 570 575
Asp Cys Gln Asp Ser Arg Asn Gln Ala Tyr Asn Ile Trp Lys Ala Thr
580 585 590
His Trp Gly Asp Gln His Leu Ala Ala Met Gly Val His Ala Gly Gly
595 600 605
Gly Asn Pro Gln Val Val Leu His Val Gly Gly Asn Asp Tyr Ala Phe
610 615 620
Ala Ser Asn Gly Asp Phe Thr Ala Gly Ala Ala Val Tyr Cys Asn Asp
625 630 635 640
Val Tyr Ile Arg Ser Asp Arg Arg Leu Lys Ile Asn Val Lys Asp Tyr
645 650 655
Glu Glu Asn Ala Val Asp Lys Val Asn Lys Leu Lys Val Lys Thr Tyr
660 665 670
Asp Lys Val Lys Ser Leu Ser Asp Arg Glu Val Ile Gly His Glu Ile
675 680 685
Gly Ile Ile Ala Gln Asp Leu Gln Glu Val Leu Pro Glu Ala Val Ser
690 695 700
Thr Ser Ser Val Gly Ser Gln Asp Asn Pro Glu Glu Ile Leu Thr Ile
705 710 715 720
Ser Asn Ser Ala Val Asn Ala Leu Leu Ile Lys Ala Ile Gln Glu Met
725 730 735
Ser Glu Glu Ile Lys Glu Leu Lys Thr Pro Leu Phe Thr Lys Ile Ala
740 745 750
Arg Lys Ile Ser Lys Tyr Phe Lys Phe
755 760

[0105]

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Glu Thr Gly Gln Arg Trp Met Ser Gln Ala Ala Gly Gln Leu Arg Leu
20 25 30
Gly Val Pro Cys Trp Met Ser Gln Phe Ala Gly Arg Ser Arg Glu Ile
35 40 45
Ile His Thr Leu Gly Ala Asp His Asn Phe Asn Gly Gln Trp Phe Arg
50 55 60
Asp Arg Cys Phe Glu Ala Gly Ser Thr Pro Ile Val Phe Asn Ile Thr
65 70 75 80

Gly Asp Leu Val Ser Tyr Ser Lys Asp Val Pro Leu Phe Phe Met Tyr
85 90 95
Gly Asp Thr Pro Asn Glu Tyr Val Gln Leu Asn Ile His Gly Val Thr
100 105 110
Met Tyr Gly Arg Gly Gly Asn Gly Gly Ser Asn Ser Pro Gly Ser Ala
115 120 125
Gly Gly His Cys Ile Gln Asn Asp Ile Gly Gly Arg Leu Arg Ile Asn
130 135 140
Asn Gly Gly Ala Ile Ala Gly Gly Gly Gly Gly Gly Gly Gly Gly Arg
145 150 155 160
Tyr Gly Arg Leu Ser Phe Gly Gly Gly Gly Gly Arg Pro Phe Gly Ala
165 170 175
Gly Gly Ser Ser Ser His Met Ser Ser Gly Ala Thr Ala Gly Thr Ile
180 185 190
Ser Ala Pro Gly Ala Gly Ser Val Gly Glu Gly Ser Leu Trp Val Tyr
195 200 205
Thr Gly Gly Ser Gly Gly Asn Val Gly Ala Ala Gly Gly Arg Cys Asn
210 215 220
Ile Gln Gly Asn Gly Thr Glu Tyr Asp Gly Gly Ala Ala Gly Tyr Ala
225 230 235 240
Val Ile Gly Ser Ala Pro Thr Trp Ile Asn Val Gly Ala Ile Tyr Gly
245 250 255

[0106]

Pro Arg Val

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<213> 人工序列
<220>
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<400> 61
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Leu Lys Ser Arg Ile Leu Asp Thr Gln Asp Gln Ala Ala Arg Leu Met
20 25 30
Glu Glu Ser Lys Ile Leu Gln Gly Thr Leu Ala Glu Ile Ala Arg Ala
35 40 45
Val Gly Ile Thr Gly Asp Thr Ile Lys Val Glu Glu Ile Val Glu Ala
50 55 60
Val Lys Asn Leu Thr Ala Glu Ser Ala Asp Glu Ala Lys Asp Glu Glu
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<210> 62
<211> 2058
<212> DNA

<213> 人工序列
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<223> STF-25
<400> 62

[0107]

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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
atcctgcagg ttgacggttt tccaccatcg cacgccggga ccatcaccgt gtatgaagat 240
tcacaaccgg ggacgctgaa tgattttctc tgtgccatga cggaggatga tgcccggccg 300
gaggtgctgc gtcgtcttga actgatggtg gaagaggtgg cgcgtaacgc gtccgtggtg 360
gcacagagta cggcagacgc gaagaaatca gaaacagcag cggcatcgtc caggaacgcg 420
gcgaaaacat cagagacgaa tgcaggtaac agcgcgaaag cggcagcttc ttcaaaaaca 480
gccgcacaaa acgcagcaac agcggcagaa cgttcagaga caaatgcccg tgcgtcagaa 540
gaagcctccg cagacagtga agaggcttcc cgccgtaatg cagagtcagc cgctgaaaat 600
gccggagtcg ccaccacaaa agcgcgggag gccgcagcag acgcaacaaa ggccgggcag 660
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<212> DNA
<213> 人工序列
<220>

<223> STF25-AP1
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acctacacag aaacaggggt aacagaagag ggagaacctg tctgtatccg gaatgatggt 180
tattttgtca acattcgcat tcttgatgac ttgtttgatg tttctgtatt ctctgattat 240
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<210> 64
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<212> DNA
<213> 人工序列
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<223> STF-27
<400> 64
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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
atcctgcagg ttgacggttt tccaccatcg cacgccggga ccatcaccgt gtatgaagat 240
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gagacgaatg ccaaagacag tgaagccaac gcaaaggtga gcgaaacagc ggcggcgaac 660
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tgggaatata tccggagtac agcaaccatt cgcattggtg gacaaactac agcaggatta 1980
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cagcttgggg aggttgtgga g 2061

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<212> DNA
<213> 人工序列
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<223> STF27-AP1
<400> 65

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acgttcaggg agacagatgt ttctgatgac ggagaaccag aatacacgcg aaacgaaggg 180
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<212> DNA
<213> 人工序列
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<223> STF27-AP2
<400> 66

[0109]

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ccactgcagg atgctgtaga tctggaaatc gcaacggagg aagaaagatc gttgctggag 180
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gagtggccga cttcacctgc agag 264

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<212> DNA
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<223> STF-28
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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
atcctgcagg ttgacggttt tccaccatcg cacgccggga ccatcaccgt gtatgaagat 240
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gaggtgctgc gtcgtcttga actgatggtg gaagaggtgg cgcgtaacgc gtccgtggtg 360
gcacagagta cggcagacgc gaagaaatca gaaacagcag cggcatcgtc caggaacgcg 420
gcgaaaacat cagagacgaa tgcaggtaac agcgcgaaag cggcagcttc ttcaaaaaca 480

[0110]

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gccggagtcg ccaccacaaa agcgcgggag gccgcagcag acgcaacaaa ggccgggcag 660
aaaaaggatg aggctctgtc ggcagcgaca cgagctgaaa aggcggcaga ccgcgcagaa 720
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tatacaacaa accttaatgg taaaatattt ggagttacag caacatcgta ccggtttggt 1920
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tttaaagaat taaatgacag gcaaatcaag gaggcagta 2019

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<212> DNA
<213> 人工序列
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<223> STF28-AP1
<400> 68

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acctacacag aaacaggggt aactgaagag ggagaacctg tctgtatccg gaataacggt 180
tattttgtca acattcgcat tcttgatgac ttgtttgatg tttctgtatt ctctgattat 240
gtcgtggagc tggaaacacc gcttcgggaa tggagc 276

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<211> 2394
<212> DNA
<213> 人工序列
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<223> STF-15

<400> 69

[0111]

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gcctcaaaag aggcagcaaa atcatcagaa acgaacgcat catcaagtgc cggtcgtgca 780
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attcgaattg gaggtcaagc cacatcggga actcgtcatc tattcggcca tttgagaaat 2340
cttcgtctct ggcataaaga attaactgat gcgcaaatgg gggagagtat taaa 2394

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<211> 279
<212> DNA

<213> 人工序列
<220>
<223> STF15-AP1
<400> 70
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gtgtacaaag aaaccggaga acttactgaa gatggcgagc cggcatgtgt taaggaggac 180
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<211> 702
<212> DNA
<213> 人工序列
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<400> 71
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[0112] aaacattcag tagagacgat agattcagag cacgccgatc tcattttcag gatgcgccct 420
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gccgaggaag taggagaaat tgcccctcag tttgttcact ggcgaccagc caacgaagat 540
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tcagaattga agttgttatc aacttcccaa agcgatatcg ga 702
<210> 72
<211> 2373
<212> DNA
<213> 人工序列
<220>
<223> STF-16
<400> 72
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gtcgcggccc ttgtgactga tgcaactgac tcagcacgcg ccgccagcac gtccgccgga 480
caggctgcat cgtcagctca ggaagcgtcc tccggcgcag aagcggcatc agcaaaggcc 540

[0113]

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gcctcaaaag aggcagcaaa atcatcagaa acgaacgcat catcaagtgc cggtcgtgca 780
gcttcctcgg caacggcggc agaaaattct gccagggcgg caaaaacgtc cgagacgaat 840
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gcattgactg atgctcagat gggggagtca atc 2373

<210> 73
<211> 279
<212> DNA
<213> 人工序列
<220>
<223> STF16-AP1
<400> 73

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attggctatt atgatgacga gtcgatgcag gatgatattc ttattgacgt gataggtaac 120
gtgtacaaag aaaccggaga actgactgaa gatggcgaac cggtatgtgt taaggaagat 180
ggatattatg taaacgtgcg catcattaat gatgcaaaaa aatcgtcaat attcgatgaa 240
tacgcggttg tagttgaaca tcaacttcgt ggctggatg 279

<210> 74

<211> 702
<212> DNA
<213> 人工序列
<220>
<223> STF16-AP2
<400> 74
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<210> 75
<211> 2373
<212> DNA
<213> 人工序列
[0114] <220>
<223> STF-17
<400> 75
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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
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[0115]

<210> 76
<211> 279
<212> DNA
<213> 人工序列
<220>
<223> STF17-AP1
<400> 76

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attggctatt atgatgacga gtcgatgcag gatgatattc ttattgacgt gataggtaac 120
gtgtacaaag aaaccggaga actgactgaa gatggcgaac cggtatgtgt taaggaagat 180
ggatattatg taaacgtgcg catcattaat gatgcaaaaa aatcgtcaat attcgatgaa 240
tacgcggttg tagttgaaca tcaacttcgt ggctggatg 279

<210> 77
<211> 2374
<212> DNA
<213> 人工序列
<220>
<223> STF-13
<400> 77

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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
atcctgcagg ttgacggttt tccaccatcg cacgccggga ccatcaccgt gtatgaagat 240

[0116]

tcacaaccgg ggacgctgaa tgattttctc tgtgccatga cggaggatga tgcccggccg 300
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accagcatca acaacgtgga agagtgttag tggtgctaca ggtataagga ttggaggcca 2280
gactacagcc ggcttacgtc atttatttgg ttatatcagg aattttagaa tatggcataa 2340
agaattaacc gatgcgcaaa tgggagagat aata 2374

<210> 78
<211> 279
<212> DNA
<213> 人工序列
<220>
<223> STF13-AP1
<400> 78

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gctggctatt atgatgacga gtcgatgcag gatgatattc ttattgacgt gataggtaac 120
gtgtacaaag aaaccggaga acttactgaa gatggcgagc cggtatgtgt taaggaagac 180
ggatattttg taaacgtgcg catcattaat gatgcaaaaa aatcgtcaat attcgataaa 240
tacgcggttg ttgttgagca tcaacttcgt ggctggatg 279

<210> 79
<211> 702
<212> DNA
<213> 人工序列
<220>
<223> STF13-AP2
<400> 79

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gctaaggaag atatttcatc aattagcaga aaagtatcaa cgcttcagac tgagatgacc 120
agtgcaaagc aggatatcag ctccagatac acaaaaactg aagttgataa taagctgaaa 180
aacaaagtgg aagtgaacga tctggaaagt ggtcgttatg gcggagattt ttatccactg 240
acaggtcgtg aagcgtttta tttatggaat ttggccacga ctacagcggc ggcaaacctt 300
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gtgtggtaca ggtcgcaatg cgaaaatgac aggcgtgact ggggattcta cggattgatt 480
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ctggttgttc cactgattca ccatatccag aaactgactg aaagagttga tgaacttgag 660
tcagaattaa agttgttatt aacttcccga agcgatatta ga 702

[0117]

<210> 80
<211> 2343
<212> DNA
<213> 人工序列
<220>
<223> STF-12
<400> 80

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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
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gtcgcggccc ttgtgactga tgcaactgac tcagcacgcg ccgccagcac gtccgccgga 480
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gccggtgcgg cgaaaacgtc agaaacgaat gctgcagcgt cacaacaatc agccgccacg 660
tctgcctcca ccgcggccac gaaagcgtca gaggccgcca cttcagcacg agatgcggtg 720
gcctcaaaag aggcagcaaa atcatcagaa acgaacgcat catcaagtgc cggtcgtgca 780
gcttcctcgg caacggcggc agaaaattct gccagggcgg caaaaacgtc cgagacgaat 840

[0118]

gccaggtcat ctgaaacagc agcggaacgg agcgcctctg ccgcggcagc ttctgccact 900
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aaa 2343

<210> 81
<211> 279
<212> DNA
<213> 人工序列
<220>
<223> STF12-AP1
<400> 81

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gtgtacaaag aaaccggaga actgactgaa gatggcgaac cggtatgtgt taaggaagac 180
ggatattttg taaacgtgcg catcattaat gatgtaaaaa aatcgtcaat attcgataaa 240
tacgcggttg ttgttgagca tcaacttcgt ggctggatg 279

<210> 82
<211> 702
<212> DNA
<213> 人工序列
<220>
<223> STF12-AP2

<400> 82

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[0119]

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[0123]

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<211> 525
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<213> 人工序列
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<223> STF20-AP1
<400> 88

[0125]

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<211> 2274
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<213> 人工序列
<220>
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<400> 89

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[0126]

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<211> 531
<212> DNA
<213> 人工序列
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<223> STF23-AP1
<400> 90

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<210> 91

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<212> DNA
<213> 人工序列
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<400> 91

[0127]

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<211> 528

<212> DNA
<213> 人工序列
<220>
<223> STF24-AP1
<400> 92
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<213> 人工序列
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<223> 0111-2.0
<400> 93

[0128]

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taa 2523

[0129]

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<213> 人工序列
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<223> 0111 2.0-AP1
<400> 94

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<211> 2265
<212> DNA
<213> 人工序列
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<223> STF-74
<400> 95

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[0130]

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<211> 579
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<400> 96

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<210> 97
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<400> 97

[0131]

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[0132]

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<213> 人工序列
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<400> 99

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[0133]

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<400> 100

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[0134]

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[0135]

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[0136]

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<212> DNA
<213> 人工序列
<220>
<223> STF95-AP1
<400> 103

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<211> 1878
<212> DNA
<213> 人工序列
<220>
<223> STF-132
<400> 104

[0137]

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[0146]

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[0147]

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[0148]

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[0149]

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[0151]

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[0153]

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[0154]

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Ser Ser Asn Pro Thr Leu Asn Arg Val Leu Glu Val Gly Arg Asp Tyr
35 40 45
Arg Phe Leu Asn Pro Thr Met Ile Glu Met Leu Val Asp Gln Ser Gly
50 55 60
Phe Asp Ile Val Arg Ile His Arg Gln Thr Gly Thr Asp Leu Val Val
65 70 75 80
Asp Phe Arg Asn Gly Ser Val Leu Thr Ala Ser Asp Leu Thr Thr Ala
85 90 95
Glu Leu Gln Ala Ile His Ile Ala Glu Glu Gly Arg Asp Gln Thr Val
100 105 110
Asp Leu Ala Lys Glu Tyr Ala Asp Ala Ala Gly Ser Ser Ala Gly Asn
115 120 125
Ala Lys Asp Ser Glu Asp Glu Ala Arg Arg Ile Ala Glu Ser Ile Arg
130 135 140
Ala Ala Gly Leu Ile Gly Tyr Met Thr Arg Arg Ser Phe Glu Lys Gly
145 150 155 160
Tyr Asn Val Thr Thr Trp Ser Glu Val Leu Leu Trp Glu Glu Asp Gly
165 170 175
Asp Tyr Tyr Arg Trp Asp Gly Thr Leu Pro Lys Asn Val Pro Ala Gly
180 185 190
Ser Thr Pro Glu Thr Ser Gly Gly Ile Gly Leu Gly Ala Trp Val Ser
195 200 205
Val Gly Asp Ala Ala Leu Arg Ser Gln Ile Ser Asn Pro Glu Gly Ala
210 215 220
Ile Leu Tyr Pro Glu Leu His Arg Ala Arg Trp Leu Asp Glu Lys Asp
225 230 235 240
Ala Arg Gly Trp Gly Ala Lys Gly Asp Gly Val Thr Asp Asp Thr Ala
245 250 255

[0155]

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Gly Asn Gly Lys Thr Tyr Lys Val Thr Ser Leu Pro Asp Ile Ser Arg
        275                 280                 285
Phe Ile Asn Thr Arg Phe Val Tyr Glu Arg Ile Pro Gly Gln Pro Leu
    290                 295                 300
Tyr Tyr Ala Ser Glu Glu Phe Val Gln Gly Glu Leu Phe Lys Ile Thr
305                 310                 315                 320
Asp Thr Pro Tyr Tyr Asn Ala Trp Pro Gln Asp Lys Ala Phe Val Tyr
                325                 330                 335
Glu Asn Val Ile Tyr Ala Pro Tyr Met Gly Ser Asp Arg His Gly Val
            340                 345                 350
Ser Arg Leu His Val Ser Trp Val Lys Ser Gly Asp Asp Gly Gln Thr
        355                 360                 365
Trp Ser Thr Pro Glu Trp Leu Thr Asp Leu His Pro Asp Tyr Pro Thr
    370                 375                 380
Val Asn Tyr His Cys Met Ser Met Gly Val Cys Arg Asn Arg Leu Phe
385                 390                 395                 400
Ala Met Ile Glu Thr Arg Thr Leu Ala Lys Asn Ala Leu Thr Asn Cys
                405                 410                 415
Ala Leu Trp Asp Arg Pro Met Ser Arg Ser Leu His Leu Thr Gly Gly
            420                 425                 430
Ile Thr Lys Ala Ala Asn Gln Arg Tyr Ala Thr Ile His Val Pro Asp
        435                 440                 445
His Gly Leu Phe Val Gly Asp Phe Val Asn Phe Ser Asn Ser Ala Val
    450                 455                 460
Thr Gly Val Ser Gly Asp Met Thr Val Ala Thr Val Ile Asp Lys Asp
465                 470                 475                 480
Asn Phe Thr Val Leu Thr Pro Asn Gln Gln Thr Ser Asp Leu Asn Asn
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Ala Gly Lys Asn Trp His Met Gly Thr Ser Phe His Lys Ser Pro Trp
            500                 505                 510
Arg Lys Thr Asp Leu Gly Leu Ile Pro Ser Val Thr Glu Val His Ser
        515                 520                 525
Phe Ala Thr Ile Asp Asn Asn Gly Phe Ala Met Gly Tyr His Gln Gly
    530                 535                 540
Asp Val Ala Pro Arg Glu Val Gly Leu Phe Tyr Phe Pro Asp Ala Phe
545                 550                 555                 560
Asn Ser Pro Ser Asn Tyr Val Arg Arg Gln Ile Pro Ser Glu Tyr Glu
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[0156]

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Pro Asp Asp Arg Tyr Lys Ala Ser Tyr Pro Arg Thr Phe Tyr Ala Arg
            660                 665                 670
Leu Asn Val Asn Asn Trp Asn Ala Asp Asp Ile Glu Trp Val Asn Ile
        675                 680                 685
Thr Asp Gln Ile Tyr Gln Gly Gly Ile Val Asn Ser Gly Val Gly Val
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Gly Ser Val Val Val Lys Asp Asn Tyr Ile Tyr Tyr Met Phe Gly Gly
705                 710                 715                 720
Glu Asp His Phe Asn Pro Trp Thr Tyr Gly Asp Asn Ser Ala Lys Asp
                725                 730                 735
Pro Phe Lys Ser Asp Gly His Pro Ser Asp Leu Tyr Cys Tyr Lys Met
            740                 745                 750
Lys Ile Gly Pro Asp Asn Arg Val Ser Arg Asp Phe Arg Tyr Gly Ala
        755                 760                 765
Val Pro Asn Arg Ala Val Pro Val Phe Phe Asp Thr Asn Gly Val Arg
    770                 775                 780
Thr Val Pro Ala Pro Met Glu Phe Thr Gly Asp Leu Gly Leu Gly His
785                 790                 795                 800
Val Thr Ile Arg Ala Ser Thr Ser Ser Asn Ile Arg Ser Glu Val Leu
                805                 810                 815
Met Glu Gly Glu Tyr Gly Phe Ile Gly Lys Ser Ile Pro Thr Asp Asn
            820                 825                 830
Pro Ala Gly Gln Arg Ile Ile Phe Cys Gly Gly Glu Gly Thr Ser Ser
        835                 840                 845
Thr Thr Gly Ala Gln Ile Thr Leu Tyr Gly Ala Asn Asn Thr Asp Ser
    850                 855                 860
Arg Arg Ile Val Tyr Asn Gly Asp Glu His Leu Phe Gln Ser Ala Asp
865                 870                 875                 880
Val Lys Pro Tyr Asn Asp Asn Val Thr Ala Leu Gly Gly Pro Ser Asn
                885                 890                 895
Arg Phe Thr Thr Ala Tyr Leu Gly Ser Asn Pro Ile Val Thr Ser Asn
            900                 905                 910
Gly Glu Arg Lys Thr Glu Pro Val Val Phe Asp Asp Ala Phe Leu Asp
        915                 920                 925
Ala Trp Gly Asp Val His Tyr Ile Met Tyr Gln Trp Leu Asp Ala Val
    930                 935                 940
Gln Leu Lys Gly Asn Asp Ala Arg Ile His Phe Gly Val Ile Ala Gln
945                 950                 955                 960
```

Gln Ile Arg Asp Val Phe Ile Ala His Gly Leu Met Asp Glu Asn Ser
965 970 975
Thr Asn Cys Arg Tyr Ala Val Leu Cys Tyr Asp Lys Tyr Pro Arg Met
980 985 990
Thr Asp Thr Val Phe Ser His Asn Glu Ile Val Glu His Thr Asp Glu
995 1000 1005
Glu Gly Asn Val Thr Thr Thr Glu Glu Pro Val Tyr Thr Glu Val
1010 1015 1020
Val Ile His Glu Glu Gly Glu Glu Trp Gly Val Arg Pro Asp Gly
1025 1030 1035
Ile Phe Phe Ala Glu Ala Ala Tyr Gln Arg Arg Lys Leu Glu Arg
1040 1045 1050
Ile Glu Ala Arg Leu Ser Ala Leu Glu Gln Lys
1055 1060

<210> 122
<211> 240
<212> DNA
<213> 人工序列
<220>
<223> 13-14.3-AP1
<400> 122

[0157]
atgtctgaac aaactattga acaaaaactg tctgctgaaa tcgtaactct gaagtctcgt 60
atccttgata cgcaggacca agcggctcgt ctgatggaag aatccaaaat tctgcaagga 120
actttggctg aaattgctcg tgcagtaggt atcactggcg atactatcaa agttgaagaa 180
atcgttgaag ctgtcaagaa tcttactgct gaatctgcag atgaagcaaa agatgaagaa 240

<210> 123
<211> 1083
<212> PRT
<213> λ噬菌体
<400> 123

Met Ala Thr Leu Lys Gln Ile Gln Phe Lys Arg Ser Lys Thr Ala Gly
1 5 10 15
Ala Arg Pro Ala Ala Ser Val Leu Ala Glu Gly Glu Leu Ala Ile Asn
20 25 30
Leu Lys Asp Arg Val Leu Phe Thr Lys Asp Asp Gln Gly Asn Ile Ile
35 40 45
Asp Leu Gly Phe Ala Lys Gly Gly Ser Ile Asp Gly Asn Val Ile His
50 55 60
Ile Gly Asn Tyr Asn Gln Thr Gly Asp Tyr Thr Leu Asn Gly Thr Phe
65 70 75 80
Thr Gln Thr Gly Asn Phe Asn Leu Thr Gly Ile Ala Arg Val Thr Arg
85 90 95
Asp Ile Ile Ala Ala Gly Gln Ile Met Thr Glu Gly Gly Glu Leu Ile
100 105 110

[0158]

```
Thr Lys Ser Ser Gly Thr Ala His Val Arg Phe Phe Asp Gly Asn Ser
        115                 120                 125
Arg Glu Arg Gly Ile Ile Tyr Ala Pro Ala Asn Asp Gly Leu Thr Thr
    130                 135                 140
Gln Val Leu Asn Ile Arg Val Gln Asp Tyr Ala Ala Gly Ser Glu Ser
145                 150                 155                 160
Thr Tyr Ala Phe Ser Gly Ser Gly Leu Phe Thr Ser Pro Glu Val Ser
                165                 170                 175
Ala Trp Lys Ser Met Ser Thr Pro Gln Ile Leu Thr Asp Lys Val Ile
            180                 185                 190
Thr Asn Gly Lys Lys Thr Gly Asp Tyr Asp Ile Tyr Ser Leu Ser Asn
        195                 200                 205
Asn Thr Pro Leu Ala Glu Ser Glu Thr Ala Ile Asn His Leu Arg Val
    210                 215                 220
Met Arg Asn Ala Val Gly Ala Gly Ile Phe His Glu Val Asn Val Asn
225                 230                 235                 240
Asp Gly Ile Thr Trp Tyr Ser Gly Asp Gly Leu Asp Thr Tyr Leu Trp
                245                 250                 255
Ser Phe Asn Trp Ala Gly Gly Leu Lys Ala Gly His Ser Ile Ser Val
            260                 265                 270
Gly Leu Pro Gly Gly Ser Lys Gly Tyr Ser Glu Leu Gly Thr Ala Ser
        275                 280                 285
Ile Ala Leu Gly Asp Asn Asp Thr Gly Phe Lys Trp His Gln Asp Gly
    290                 295                 300
Tyr Phe His Thr Val Asn Asn Gly Thr Arg Thr Phe Ile Tyr Gly Pro
305                 310                 315                 320
Ala Glu Thr Gln Ser Leu Arg Lys Met Val Met Gly Tyr Ser Pro Asp
                325                 330                 335
Gly Ile Leu Met Thr Thr Pro Pro Thr Glu Asn Tyr Ala Leu Ala Thr
            340                 345                 350
Val Val Thr Tyr His Asp Asn Asn Ala Phe Gly Asp Gly Gln Thr Leu
        355                 360                 365
Leu Gly Tyr Tyr Gln Gly Gly Asn Tyr His His Tyr Phe Arg Gly Lys
    370                 375                 380
Gly Thr Thr Asn Ile Asn Thr His Gly Gly Leu Leu Val Thr Pro Gly
385                 390                 395                 400
Asn Ile Asp Val Ile Gly Gly Ser Val Asn Ile Asp Gly Arg Asn Asn
                405                 410                 415
Asn Ser Thr Leu Met Phe Lys Gly Tyr Thr Met Gly Gln Ser Ser Val
            420                 425                 430
Asp Asn Met Tyr Ile Ala Val Trp Gly Asn Thr Phe Thr Asn Pro Ser
        435                 440                 445
Glu Gly Thr Arg Lys Asn Val Met Glu Ile Ser Asp Asp Ile Gly Trp
    450                 455                 460
```

[0159]

```
Met His Tyr Ile Gln Arg Asn Lys Asp Asn Thr Val Glu Ala Val Leu
465                 470                 475                 480
Asn Gly Gln Gln Thr Ile Asn Glu Asn Ile Ile Ala Lys Lys Asp Ile
                485                 490                 495
Trp Val Asp Arg Ala Val His Thr Leu Gly Glu Ile Thr Thr Asn Ala
            500                 505                 510
Val Asn Gly Leu Arg Ile Trp Asn Asn Asp Tyr Gly Val Ile Phe Arg
        515                 520                 525
Arg Ser Glu Gly Ser Leu His Ile Ile Pro Thr Ala Phe Gly Glu Gly
    530                 535                 540
Glu Thr Gly Asp Ile Gly Pro Leu Arg Pro Leu Ser Ile Ala Leu Asp
545                 550                 555                 560
Thr Gly Lys Val Thr Ile Pro Asp Leu Gln Ser Ser Tyr Asn Thr Phe
                565                 570                 575
Ala Ala Asn Gly Tyr Ile Lys Phe Val Gly His Gly Ala Gly Ala Gly
            580                 585                 590
Gly Tyr Asp Ile Gln Tyr Ala Gln Ala Ala Pro Ile Phe Gln Glu Ile
        595                 600                 605
Asp Asp Asp Ala Val Ser Lys Tyr Tyr Pro Ile Val Lys Gln Lys Phe
    610                 615                 620
Leu Asn Gly Lys Ser Val Trp Ser Leu Gly Thr Glu Ile Glu Ser Gly
625                 630                 635                 640
Thr Phe Val Ile His His Leu Lys Glu Asp Gly Ser Gln Gly His Ala
                645                 650                 655
Ser Arg Phe Asn Gln Asp Gly Thr Val Asn Phe Pro Asp Asn Val Leu
            660                 665                 670
Val Gly Gly Asp Ile Asn Met Lys Gly Met Met Thr Phe Asp Ala Gly
        675                 680                 685
Arg Leu Gly Ser Arg Asp Tyr Phe Lys Phe Asn His Trp Gly Asp Ser
    690                 695                 700
Asn Asn Gly Arg Asp Asn Ile Ile Gln Leu Glu Asp Ser Gln Gly Ala
705                 710                 715                 720
His Phe Ser Thr Glu Arg Thr Leu Ala Thr Gly Ala Ile Lys Thr Arg
                725                 730                 735
Phe Phe Gly Glu Thr Phe Thr Asp Gly Thr Leu Tyr Leu Asn Gln Met
            740                 745                 750
Asn Asn Ser Ser Glu Arg Phe Ser Ile Asn Asn Trp Gly Asn Ser Glu
        755                 760                 765
Val Gly Arg Pro Ala Val Leu Glu Val Gly Asp Ser Lys Gly Tyr His
    770                 775                 780
Phe Tyr Thr Glu Arg Gly Thr Asp Asn Ser Leu Asn Phe Asp Val Ala
785                 790                 795                 800
Gly Asn Phe Thr Val His Gly Pro Ser Gly Ile Thr Ile Lys Thr Ser
                805                 810                 815
```

Thr Gly Ala Arg His Ile Trp Phe Arg Asp Asp Ser Asp Ala Glu Lys
820 825 830
Ala Val Ile Trp Ala Thr Asp Glu Gly Ile Leu His Ile Arg Asn Asn
835 840 845
Tyr Gly Gly Ser Phe Ser His His Phe Gln Gly Ala Met Ile Leu Ala
850 855 860
Gly Glu Arg Val Pro Tyr Asn Ser Glu Tyr Ala Leu Ile Arg Gly Asn
865 870 875 880
Ile Ser Gly Gly Ala Trp Val Asp Trp Arg Gly Arg Pro Ala Gly Leu
885 890 895
Leu Val Asp Cys Gln Asp Ser Arg Asn Gln Ala Tyr Asn Ile Trp Lys
900 905 910
Ala Thr His Trp Gly Asp Gln His Leu Ala Ala Met Gly Val His Ala
915 920 925
Gly Gly Gly Asn Pro Gln Val Val Leu His Val Gly Gly Asn Asp Tyr
930 935 940
Ala Phe Ala Ser Asn Gly Asp Phe Thr Ala Gly Ala Ala Val Tyr Cys
945 950 955 960
Asn Asp Val Tyr Ile Arg Ser Asp Arg Arg Leu Lys Ile Asn Val Lys
965 970 975
Asp Tyr Glu Glu Asn Ala Val Asp Lys Val Asn Lys Leu Lys Val Lys
980 985 990

[0160]

Thr Tyr Asp Lys Val Lys Ser Leu Ser Asp Arg Glu Val Ile Gly His
995 1000 1005
Glu Ile Gly Ile Ile Ala Gln Asp Leu Gln Glu Val Leu Pro Glu
1010 1015 1020
Ala Val Ser Thr Ser Ser Val Gly Ser Gln Asp Asn Pro Glu Glu
1025 1030 1035
Ile Leu Thr Ile Ser Asn Ser Ala Val Asn Ala Leu Leu Ile Lys
1040 1045 1050
Ala Ile Gln Glu Met Ser Glu Glu Ile Lys Glu Leu Lys Thr Pro
1055 1060 1065
Leu Phe Thr Lys Ile Ala Arg Lys Ile Ser Lys Tyr Phe Lys Phe
1070 1075 1080

<210> 124
<211> 1054
<212> PRT
<213> WW11 噬菌体
<400> 124

Met Asn Ala His Thr Pro Phe Asp Ala Asn Gln Asp Trp Thr Asn Pro
1 5 10 15
Tyr Cys Gln Asn Ser Ser Asn Asp Pro Met Val Asp Ala Leu Leu Gly
20 25 30
Asn Ala Tyr His Val Val Arg Thr Val Tyr Cys Asn Leu Gly Asn Leu

[0161]

```
          35                  40                  45
Lys Leu Ile Tyr Asp Phe Leu Asn Gln Tyr Gly Met Val Leu Gly Val
      50                  55                  60
Gln Ser Glu Ala Glu Leu Lys Ala Leu Thr Thr Lys Ala Ser Phe Ala
65                  70                  75                  80
Arg Ile Tyr Asp Lys Thr Pro Ala Gly Asp Arg Gln Val Thr Asp Tyr
                  85                  90                  95
Leu Tyr Val Glu Gly Asp Arg Thr Gly Ile Leu Pro Asp Asp Thr Thr
             100                 105                 110
Ala Thr Gly Ser Trp Val Lys Val Ala Thr Thr Gly Ser Asp Asn Gly
         115                 120                 125
Gly Asp Lys Ser Asn Asp Gly Gly Tyr Ile Pro Trp Ile Tyr Asn Ser
     130                 135                 140
Gly Ser Ala Asn Gly Gly Glu Thr Thr Ile Arg Ile Pro Asp Glu Thr
145                 150                 155                 160
Ala Gly Ala Pro Phe Met Ile Val Asn Gly Asp Trp Gln Thr Glu Gly
                165                 170                 175
Tyr Asp Phe Glu Tyr Asp Pro Val Thr Phe Glu Val Ser Phe Thr Thr
            180                 185                 190
Pro Leu Glu Pro Gly Asp Phe Val Val Val Met Arg Thr Gly Val Pro
        195                 200                 205
Ala Thr Pro Asp Asn Pro Asn Val Ser Asp Trp Val Thr Ile Asn Trp
    210                 215                 220
Leu Tyr Asn Gln Gly Ala Ala Val Gly Gly Glu Gln Val Ile Asp Ile
225                 230                 235                 240
Pro Tyr Thr Phe Gln Ser Val Pro Ala Val Tyr Lys Asn Gly Leu Arg
                245                 250                 255
Phe Tyr Lys Gly Leu Thr Asn Asn Ser Tyr Thr Val Asp Ser Asp Asn
            260                 265                 270
Asn Arg Ile Ile Leu Thr Glu Pro Leu Ala Thr Asn Asp Arg Leu Ile
        275                 280                 285
Val Gln Leu Gly Gly Glu Ala Lys Val Leu Lys Val Val Asp His Thr
    290                 295                 300
Ile Gln Glu Val Ala Arg Ser Ala Asn Val Lys Asp Ser Gln Val Ile
305                 310                 315                 320
Leu Ser Val Asp Thr Val Gln Ser Leu Asn Gly Lys Ala Val Val Tyr
                325                 330                 335
Asp Val Val Ala Gln Arg Ile Tyr Gly Leu Pro Thr Leu Pro Ser Asn
            340                 345                 350
Val Tyr Ile Asn Thr Val Ala Asn Gly Lys Leu Tyr Tyr Asn Pro Gly
        355                 360                 365
Asn Val Glu Val Thr Leu Leu Asp Val Pro Gly Ser Gly Thr Glu Val
    370                 375                 380
Lys Ser Ala Leu Ala Lys Gln Asp Gly Leu Ser Leu Ile Gly Gln Cys
```

385 390 395 400
Asn Ser Ile Ala Asp Leu Arg Asn Val Glu Pro Val Met Asp Gly Gln
405 410 415
Arg Ile Leu Val Lys Gln His Thr Ala Gly Thr Gly Lys Gly Gly Gly
420 425 430
Thr Phe Gln Ala Lys Leu Ser Gly Val Gly Leu Thr Asp Asp Asn Gly
435 440 445
Val Thr Val Lys Thr Val Gly Gly Ala Ala Trp Val Arg Val Gly Ala
450 455 460
Asp Arg Val Asn Pro Tyr Met Tyr Gly Ala Leu Gly Ser Gly Asn Asp
465 470 475 480
Asp Thr Leu Ala Val Gln Ala Cys Leu Asn Ser Gly Lys Ala Thr Asn
485 490 495
Ile Thr Asp Val His His Val Ser Asn Val Thr Met Asn Lys Ser Ser
500 505 510
Ala Ser Ile Tyr Gly Ser Gly Leu His Tyr Thr Arg Leu His Gln Leu
515 520 525
Pro Ala Ala Val Gly Ser Leu Leu Thr Ile Ala Asp Thr Cys Ser Leu
530 535 540
Thr Val Ile Asp Ser Leu Gly Leu Tyr Gly Thr Gly Tyr Lys Gln Gly
545 550 555 560
[0162] Thr Ala Phe Thr Thr Gly Thr Arg Gly Ile Asp Val Leu Thr Pro Thr
565 570 575
Gly Leu Ser Asn Asn Tyr Pro Asp His Thr Thr Ser Asp Pro Arg Arg
580 585 590
Asp Leu Val Ile Thr Lys Val His Ile Ala Gly Phe Asp Glu Tyr Gly
595 600 605
Leu Asn Val Asp Ser Gly Asn Phe Ser Val Thr Thr Glu Ser Val Leu
610 615 620
Ile Asn His Ile Lys Gln Val Gly Ala Arg Cys Ala Thr Thr Asp Trp
625 630 635 640
Thr Trp Thr Asn Ile Gln Ile Asn Thr Cys Gly Lys Gln Cys Leu Ile
645 650 655
Leu Asp Gly Cys Gly Asn Gly Arg Ile Ile Gly Gly Lys Phe Ile Trp
660 665 670
Ala Asn Trp Leu Pro Tyr Gly Ala Ser Gly Gln Phe Pro Gly Ile Thr
675 680 685
Ile Asn Asn Ser Gln Asn Met Val Ile Asn Gly Ile Glu Val Gln Asp
690 695 700
Cys Gly Gly Asn Gly Ile Glu Phe Thr Asp Ser Tyr Ser Ile Ser Met
705 710 715 720
Asn Gly Leu Asn Thr Asn Arg Asn Gly Ile Asn Ser Thr Ala Glu Phe
725 730 735
Tyr Asn Leu Val Phe Asn Arg Ser Asp Val Glu Ile Asn Gly Phe Val

[0163]

740 745 750
Gly Leu Asn Tyr Lys Val Asn Ser Gly Ser Pro Asp Asn Ser Ser Ser
755 760 765
Gly Asn Leu Lys Phe Leu Ser Ser Asp Cys Asn Val Thr Leu Asn Gly
770 775 780
Lys Leu Glu Thr Gly Tyr Met Gly Ile Glu Phe Ile Gly Asp Thr Arg
785 790 795 800
Val Ile Gln Pro Thr Ser Ser Tyr Ile Lys Leu Asn Gly Leu Val Asn
805 810 815
Tyr Ala Gly Ser Gly Ile Gln Thr Ile Asn Glu Val Pro Thr Phe Asp
820 825 830
Gly Val Ser Thr Thr Pro Val Tyr Val Pro Ile Ser Ser Val Val Gly
835 840 845
Gln Thr Asn Gly Leu Arg Leu Ser Gln Ala Asn Lys Asp Lys Val Ile
850 855 860
Tyr Thr Arg Lys Val Gly Pro Glu Gly Val Thr Met Ala Ala Val Ile
865 870 875 880
Thr Pro Thr Ile Gly Gly Ala Glu Ile Phe Asn Leu Met Ala Ile Gly
885 890 895
Thr Gly Phe Ser Ser Ala Ser Asn Ser Leu Tyr Phe Gln Leu Glu Ile
900 905 910
Ala Ala Asp Gly Ser Gln Asn Val Ser Leu Leu Leu Ser Gly Asp Gly
915 920 925
Thr Thr Gln Ile Leu Pro Gly Thr Leu Pro Ala Ala Leu Lys Leu Gln
930 935 940
Ser Gly Glu Pro Tyr His Val Ala Leu Gly Ala Lys Ala Gly Tyr Phe
945 950 955 960
Trp Trp Ser Ile Leu Asn Leu Asn Thr Gly Lys Arg Ile Arg Arg Ser
965 970 975
Phe Arg Gly Ala Tyr Leu Pro Lys Pro Phe Ala Ser Ile Phe Gly Leu
980 985 990
Val Ser Ser Pro Val Phe Phe Ser Gly Ala Gly Ile Gly Asp Ser Gly
995 1000 1005
Cys Ser Gly Val Gly Ala Lys Ile Tyr Leu Gly Ser Phe Ser Asp
1010 1015 1020
Glu Asn Asp Tyr Val Ser Ser Arg Tyr Tyr Ser Leu Val Asn Pro
1025 1030 1035
Val Asp Pro Thr Lys Met Tyr Ser Phe Arg Ile Leu Asp Ser Thr
1040 1045 1050
Ile

<210> 125
<211> 630
<212> PRT

<213> WW11 噬菌体

<400> 125

[0164]

```
Met Asn Glu Met Phe Ser Gln Gly Gly Lys Gly Ser Thr Gly Ile Leu
1               5                  10                  15
Thr Asn Lys Gln Ala Val Ala Arg His Phe Gly Val Lys Gln Ser Glu
            20                  25                  30
Val Val Tyr Phe Ser Val Gly Ala Val Leu Ser Gly Tyr Lys Val Val
        35                  40                  45
Tyr Asp Lys Glu Ser Gln Arg Ala Tyr Ser Leu Pro Ala Asp Ile Gly
    50                  55                  60
Ser Gly Val Thr Ala Val Ser Leu Ser Pro Ala Gly Val Leu Val His
65                  70                  75                  80
Ser Ala Gly Asn Val Asp Leu Gly Ala Leu Ala Val Thr Arg Glu Glu
                85                  90                  95
Tyr Val Thr Leu Pro Gly Ser Phe Asp Thr Gly Val Thr Val Asn Thr
            100                 105                 110
Lys Asn Glu Leu Val Val Phe Thr Asp Gly Lys Tyr Arg Trp Glu Gly
        115                 120                 125
Ala Leu Pro Lys Val Val Ala Ala Gly Ser Thr Pro Glu Ser Thr Gly
    130                 135                 140
Gly Val Gly Val Gly Leu Trp Lys Ser Val Gly Asn Ala Ser Leu Arg
145                 150                 155                 160
Asp Glu Leu Ser Asn Asn Asp Gly Phe Asn Leu Ile Gly Ala Ala Tyr
                165                 170                 175
Tyr Asn Asp Val Arg Gly Tyr Thr Gly Asp Gly Asp Lys Ile Ile Cys
            180                 185                 190
Ala Gly Arg Glu Asn Ile Thr Asp Gly Cys Ser Gly Val Phe Phe Leu
        195                 200                 205
Asp His Ser Asp Asn Thr Ser Ala Asp Asn Asp Gly Thr Val Leu Val
    210                 215                 220
Asp Ser Leu Gly Arg Arg Trp Lys Arg Gln Phe Asp Gly Thr Ala Gln
225                 230                 235                 240
Arg Arg Trp Phe Gly Leu Pro Asp Asn Glu Gly Leu Thr Ser Gly Trp
                245                 250                 255
Asp Ser Tyr Ala Pro Ser Gln Glu Lys Ser Leu Lys Asp Ala Val Gln
            260                 265                 270
Asp Ile Ala Val Thr Pro Asp Asp Val Cys Val Lys His Arg Ala Ile
        275                 280                 285
Lys Ala Phe Arg Lys Ser Val Gly Ile Lys Asp Ser Ala Val Ala Gly
    290                 295                 300
Ala Phe Ile Val Gly Glu Phe Pro Glu Asp Ser Asn Val Glu Pro Ser
305                 310                 315                 320
Ala Ser Val Thr Gly Phe Glu Ser Tyr Asp Asp Ile Gly Lys Tyr Pro
                325                 330                 335
```

[0165]

Gly Arg Asp Ser Val Ala Leu Phe Ala Gln Ala Glu Ser Ala Leu Pro
340 345 350
Leu Glu Phe Ser Asp Gly Val Phe Thr Ser Glu Ser Val Thr Ser Pro
355 360 365
Thr Ile Leu Ser Val Ile Gly Lys Val Gln Pro Gly Met Ile Leu Asp
370 375 380
Val Asn Phe Gly Thr Gly Gly Trp Val Gly Thr Val Ile Thr Ala Val
385 390 395 400
Asn Thr Ser Thr Gly Glu Leu Thr Ile Ser Gly Trp Arg Lys Ile Asp
405 410 415
Gly Ser Ser Ser Val Ala Ala Thr Pro Ala Asn Asn Thr Pro Ala Val
420 425 430
Ile Asn Arg His Asn Asn Leu Trp Ala Ala Asn Phe Asn Ala Leu Thr
435 440 445
Thr Pro Asn Gly Gly Ala Asn Gln Ala Ile Gly Ile Glu Thr Gly Leu
450 455 460
Ser Leu Leu Lys Thr Gly Ser Gly Ile Gly Ser Lys Ala Tyr Tyr Ala
465 470 475 480
Val Asn Leu Ser Ser Gly Thr Gly Glu Asp Pro Gln Tyr Gly Phe Met
485 490 495
Asn Gly Gly Gln Phe Gln Lys Val Phe Phe Ala Gln Leu Ala Thr Asp
500 505 510
Cys Ser Phe Glu Ser Thr Val Leu Ala Asn Thr Asn Ala Lys His Cys
515 520 525
Asn Phe His Ala Thr Asn Gly Thr Ser Leu Phe Arg Val Gly Tyr Thr
530 535 540
Gly Leu Glu Val Gln Thr Leu Ala Ile Glu Tyr Met Ser Ser Thr Gly
545 550 555 560
Thr Val Ser Glu Ala Ser Ala Leu Thr Ile Ala Thr Ala Ala Asp Ile
565 570 575
Asn Ile Asn Leu Asp Val Ala Ala Asn Phe Pro Gly Arg Leu Arg Lys
580 585 590
Ile Lys Asn Ala Ser Gly Gly Ala Ile Thr Val Asn Gly Gly Val Ala
595 600 605
Leu Thr Asp Gly Met Tyr Ala Glu Phe Ile Ser Asp Gly Ser Thr Trp
610 615 620
Ile Thr Leu Phe Thr Lys
625 630

<210> 126
<211> 980
<212> PRT
<213> K1F 噬菌体
<400> 126

Met Ala Asp Leu Ser Arg Ile Gln Phe Lys Arg Thr Ser Thr Lys Gly

[0166]

```
1               5                   10                  15
Arg Arg Pro Asp Ala Gly Thr Met Asn Pro Gly Glu Leu Ala Ile Asn
            20                  25                  30
Leu Ala Asp Gln Tyr Leu Leu Thr Lys Asn Asp Ser Gly Ala Ile Ile
        35                  40                  45
Asn Leu Ser Cys Pro Pro Val Tyr Asp Ser Asp Val Thr Met Ala Gly
    50                  55                  60
Lys Val Lys Gly Asn Asn Tyr Ile Leu Ser Lys Thr Ala Asn Tyr Phe
65                  70                  75                  80
Glu Asp Gln Thr Ala Arg Asp Leu Asn Tyr Phe Gly Ala Phe Arg Pro
                85                  90                  95
Asn Asn Ala Asp Asp Trp Ser Asn Leu Ile Leu Asn Ile Pro His Pro
            100                 105                 110
Ser Gly Lys Ala His Gly Arg Gly Phe Glu Phe Gln Tyr Gly Ser Ser
        115                 120                 125
Ser Ser Gln Val Lys Thr Tyr Gly Phe Asp Lys Asp Gly Asn Lys Arg
    130                 135                 140
Phe Ser Phe Arg Met Tyr His Glu Gly Asp Lys Pro Thr Pro Gly Glu
145                 150                 155                 160
Leu Asn Val Tyr Ser Lys Gln Glu Ile Asp Arg Met Phe Val Lys Asn
                165                 170                 175
Val Lys Met Ser Thr Pro Ser Gly Glu Ala Thr Arg Gly Tyr Phe Lys
            180                 185                 190
Ile Ala Ser Ala Met Ile Pro Gln Ser Gly Arg Met Ala Phe Leu Arg
        195                 200                 205
Ile Tyr Gly Gly Asn Gly Phe Asn Val Asn Ser Tyr Asp Gln Val Asp
    210                 215                 220
Phe Leu Glu Ile Val Ile Arg Ser Gly Asn Asn Asn Pro Lys Gly Val
225                 230                 235                 240
Ser Ile Ala Ala Tyr Arg Arg Asn Ser Leu Asn Val His Glu Val Phe
                245                 250                 255
Ala Ile Asn Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Asn Tyr Gly
            260                 265                 270
Arg Phe Thr Asp Asn Val Ile Val Glu Phe Gly Lys Thr Val Asp Val
        275                 280                 285
Ala Leu Thr Val His Asp Val Pro Glu Phe Ser Ala Thr Lys Pro Glu
    290                 295                 300
Thr Gly Thr Lys Phe Asp Ala Arg Val Ile Thr Met Phe Asn Thr Glu
305                 310                 315                 320
Asn Lys Ala Gly Thr Leu Met Phe Asp Asn Asn Asn Gln Leu Thr Tyr
                325                 330                 335
Asp Ile Val Ser Leu Ser Asn Gly Pro Asp Asp Val Arg Asn Tyr Leu
            340                 345                 350
Arg Lys Phe Arg Ser Lys Ala Gly Glu Met Ile Trp His Glu Thr Val
```

[0167]

```
          355                 360                 365
Gln Gly Ala Val Tyr Arg Leu Ala Thr Gly Thr Thr Asp Ser Thr Glu
    370                 375                 380
Val Leu Arg Val Asp Ser Asn Ser Ala Ile Pro Gly Ser Tyr Lys Gly
385                 390                 395                 400
Tyr Val Ile Thr Gly Lys Met Glu Leu His Gly Ser Gly Asn Ser Met
                405                 410                 415
Ile Leu His Arg Gln Thr Ala Gln Ala Ala Tyr Met Ser Trp Trp Asp
            420                 425                 430
Arg Arg Asp Gly Lys Asn Gln Arg Ser Gly Tyr Ile Gly His Ala Asp
        435                 440                 445
Gly Thr Ser Asp Ala Ile Val Trp Asn Asn Asp Ile Gly Gln Asn Ser
    450                 455                 460
Ala Val Leu Glu Thr Ser Gly Gln Ile Ser Phe Arg Thr Gly Ala Thr
465                 470                 475                 480
Lys Ile Val Tyr Thr Asn Gly Gln Tyr Tyr Ser Ala Asn Ser Asp Ala
                485                 490                 495
Tyr Arg Met Ile Phe Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly
            500                 505                 510
Thr Lys Val Tyr Leu Leu Ser Thr Ala Glu Asn Asp Lys Tyr Gly Gly
        515                 520                 525
Trp Asn Ala Tyr Arg Pro Phe Ile Tyr Asp Leu Thr Ser Gly Asn Val
    530                 535                 540
Gln Leu Gly Gly Asp Gly Asn Glu Asp Ala Leu Thr Leu Glu Cys Ala
545                 550                 555                 560
Ser Arg Ala Ala Arg Phe Ser Asn Asp Val Tyr Ile Lys Lys Gly Leu
                565                 570                 575
Leu Thr Phe Asp Ala Gly Arg Ala Gly Ser Arg Asp Tyr Ile Arg Phe
            580                 585                 590
Asn His Trp Gly Asp Ser Asn Asn Ala Arg Asp Asn Val Leu Cys Ile
        595                 600                 605
Glu Asp Ser Gln Gly Arg His Phe Ser Thr Glu Arg Ala Met Gly Thr
    610                 615                 620
Gly Ala Leu Lys Ala Tyr Phe Leu Gly Asp Leu Glu Val Gly Gly Lys
625                 630                 635                 640
Phe Thr Trp Gly Lys Asn Thr Ala Thr Ser Ser Phe Asn Ile Arg Ala
                645                 650                 655
Trp Gly Asn Asp Ser Arg Lys Gln Val Leu Glu Cys Ala Asp Glu Ser
            660                 665                 670
Gly Trp His Trp Tyr Thr Gln Arg Thr Gly Gly Pro Asp Thr Ser Ala
        675                 680                 685
Ile Asp Phe Ala Ile Asn Gly Thr Val Arg Pro Gln Ala Ile His Thr
    690                 695                 700
Gly Gly Asn Ile Thr Ile Asn Gly Ala Asp Ile Glu Phe Lys Arg Thr
```

705 710 715 720
Gly Asn Lys His Ile Trp Phe Arg Asp Pro Asn Gly Leu Glu Leu Gly
725 730 735
Leu Met Tyr Cys Asp Asp Ala Gly Ala Ile Arg Phe Arg Gly Gln Lys
740 745 750
Gln Ala Gln Ala Trp Lys Phe Ala Asp Lys Met Ile Gln Leu Glu Ser
755 760 765
Gly Thr Val Ser Gly Gly Gly Asn Gly Leu Ile Arg Gly Glu Val Ala
770 775 780
Gly Gly Ser Trp Ala Ser Trp Arg Asp Arg Ala Ala Gly Leu Met Val
785 790 795 800
Gly Cys Pro Gln Ser Thr Asn Ser Ala His Asn Val Trp Lys Ala Thr
805 810 815
His Trp Gly Lys Tyr His Ile Ala Ala Met Ala Val His Val Pro Asp
820 825 830
Gly Thr Ile Thr Asn Ala Leu Ala Arg Leu Asn Val His Asp Ala Asn
835 840 845
Phe Asp Phe Ser Ala Ser Gly Asp Leu Ser Ala Gly Arg Asn Gly Ser
850 855 860
Phe Asn Asp Val Tyr Ile Arg Ser Asp Ala Arg Leu Lys Ile Asn Lys
865 870 875 880
Glu Glu Tyr Lys Glu Asn Ala Thr Asp Lys Val Asn Arg Leu Thr Val
885 890 895
Tyr Thr Tyr Asp Lys Val Lys Ser Leu Thr Asp Arg Thr Val Ile Ala
900 905 910
His Glu Val Gly Ile Ile Ala Gln Asp Leu Glu Lys Glu Leu Pro Glu
915 920 925
Ala Val Thr Thr Ser Lys Ile Gly Asp Pro Asp Lys Pro Glu Glu Ile
930 935 940
Leu Thr Ile Ser Asn Ser Ala Val Asn Ala Leu Leu Ile Lys Ala Phe
945 950 955 960
Gln Glu Met Ser Glu Glu Leu Lys Ala Val Lys Ala Glu Leu Ala Glu
965 970 975
Leu Lys Lys Asn
980

[0168]

<210> 127
<211> 1036
<212> PRT
<213> CBA120 噬菌体
<400> 127
Met Ala Asn Lys Pro Thr Gln Pro Leu Phe Pro Leu Gly Leu Glu Thr
1 5 10 15
Ser Glu Ser Ser Asn Ile Lys Gly Phe Asn Asn Ser Gly Thr Ile Glu
20 25 30

[0169]

```
His Ser Pro Gly Ala Val Met Thr Phe Pro Glu Asp Thr Glu Val Thr
        35                  40                  45
Gly Leu Pro Ser Ser Val Arg Tyr Asn Pro Asp Ser Asp Glu Phe Glu
    50                  55                  60
Gly Tyr Tyr Glu Asn Gly Gly Trp Leu Ser Leu Gly Gly Gly Gly Ile
65                  70                  75                  80
Arg Trp Glu Thr Leu Pro His Ala Pro Ser Ser Asn Leu Leu Glu Gly
                85                  90                  95
Arg Gly Tyr Leu Ile Asn Asn Thr Thr Gly Thr Ser Thr Val Val Leu
            100                 105                 110
Pro Ser Pro Thr Arg Ile Gly Asp Ser Val Thr Ile Cys Asp Ala Tyr
        115                 120                 125
Gly Lys Phe Ala Thr Tyr Pro Leu Thr Val Ser Pro Ser Gly Asn Asn
    130                 135                 140
Leu Tyr Gly Ser Thr Glu Asp Met Ala Ile Thr Thr Asp Asn Val Ser
145                 150                 155                 160
Ala Thr Phe Thr Trp Ser Gly Pro Glu Gln Gly Trp Val Ile Thr Ser
                165                 170                 175
Gly Val Gly Leu Gly Gln Gly Arg Val Tyr Ser Arg Glu Ile Phe Thr
            180                 185                 190
Gln Ile Leu Ala Ser Glu Thr Ser Ala Val Thr Leu Asn Thr Pro Pro
        195                 200                 205
Thr Ile Val Asp Val Tyr Ala Asp Gly Lys Arg Leu Ala Glu Ser Lys
    210                 215                 220
Tyr Ser Leu Asp Gly Asn Val Ile Thr Phe Ser Pro Ser Leu Pro Ala
225                 230                 235                 240
Ser Thr Glu Leu Gln Val Ile Glu Tyr Thr Pro Ile Gln Leu Gly Asn
                245                 250                 255
Gly Gly Gly Ser Gly Ser Ser Thr Ile Thr Trp Val Tyr Asn Gly Gly
            260                 265                 270
Ser Ala Ile Gly Gly Glu Thr Glu Ile Thr Leu Asp Ile Val Val Asp
        275                 280                 285
Asp Val Pro Ala Ile Asp Ile Asn Gly Ser Arg Gln Tyr Lys Asn Leu
    290                 295                 300
Gly Phe Thr Phe Asp Pro Leu Thr Ser Lys Ile Thr Leu Ala Gln Glu
305                 310                 315                 320
Leu Asp Ala Glu Asp Glu Val Val Val Ile Ile Asn Gly Thr Pro Asn
                325                 330                 335
Ile Tyr Asn Gln Ile Asp Tyr Thr Leu Arg Glu Val Ala Arg Val Thr
            340                 345                 350
Asn Val Lys Asp Thr Glu Val Ile Tyr Phe Ser Val Gly Ala Val Leu
        355                 360                 365
Ser Gly Tyr Lys Val Ile Tyr Asp Lys Val Thr Gln Arg Ser Tyr Phe
    370                 375                 380
```

[0170]

```
Ile Pro Glu Leu Pro Thr Gly Thr Thr Ala Val Ser Leu Ser Ser Ser
385                 390                 395                 400
Ala Ile Leu Val His Ser Ala Gly Ser Val Asp Leu Gly Ala Leu Ala
                405                 410                 415
Val Ser Arg Glu Glu Tyr Val Thr Leu Ser Gly Thr Phe Asp Ser Gly
            420                 425                 430
Ala Val Ile Asn Thr Lys Asn Glu Leu Leu Thr His Thr Asp Gly Lys
        435                 440                 445
Tyr Arg Trp Asp Gly Thr Leu Pro Lys Thr Val Ala Ala Gly Ser Thr
    450                 455                 460
Pro Ala Thr Thr Gly Gly Val Gly Ser Gly Ala Trp Leu Ser Val Gly
465                 470                 475                 480
Asp Ala Ser Leu Lys Ser Asn Leu Asn Lys Pro Asn Gly Leu Ser Tyr
                485                 490                 495
Ile Gly Thr Val Ser Ser Val Ser Glu Leu Ser Ser Ile Ala Gly Leu
            500                 505                 510
Ile Gly Asp Ser Ile Ile Leu Asp Ser Tyr Val Asp Gly Phe Asn Leu
        515                 520                 525
Gly Gly Gly Val Met Val Ala Val Asn Ser Asp Thr Val Val Asp Asn
    530                 535                 540
Ile Val Thr Phe Gln Gly Asn Gly Val Val Trp Lys Arg Lys Leu Phe
545                 550                 555                 560
Asn Gly Val Ala Asp Val Tyr Glu Ala Gly Tyr Thr Gly Thr Gly Asp
                565                 570                 575
Leu Ala Ile Phe Ile Asn Lys Ile Asn Ala Val Gly Phe Asp Cys Ile
            580                 585                 590
Val Pro Val Ser Gly Glu Ile Thr Thr Pro Ile Ile Phe Asp Ile Ala
        595                 600                 605
Lys Gly Ala Leu Ile Gly Lys Asn Lys Cys Thr Leu Ile Glu Ser Ala
    610                 615                 620
Ser Ala Thr Gly Asp Tyr Tyr Leu Thr Ile Val Asn Thr Asp Thr Asp
625                 630                 635                 640
Tyr Thr Asn Arg Asp Val Ile Asn Ala Thr Ala Leu Met Thr Gly Val
                645                 650                 655
Ser Phe Val Gly Lys Gly Thr Arg Lys Leu Ala Ile Gly Gly Ser Thr
            660                 665                 670
Ser Gly Glu Val Ser Glu Leu Arg Ile Ser Asn Cys Gly Phe Ile Ser
        675                 680                 685
Thr Ala Gly Ile Glu Phe Leu Asp Asn Ala Tyr Arg Ile Leu Phe Asp
    690                 695                 700
Lys Cys Ala Leu Ser Arg Ser Phe Thr Asn Ser Val Ile Phe Asn Ser
705                 710                 715                 720
Pro Ala Asn Ser Gly Glu Val Ile Lys Phe Asn His Cys Trp Met Val
                725                 730                 735
```

[0171]

Asp Asn Gly Gly Pro Phe Thr Phe Lys Asn Gly Gln Phe Ile Phe Asp
740 745 750
Ser Cys Ser Leu Pro Ala Gly Lys Lys Ser Gly Tyr Phe Asp Pro Val
755 760 765
Val Ala Leu Ser Asp Asn Ala Thr Thr Val Phe Thr Asn Gly Asn Ile
770 775 780
Glu Tyr Gln Pro Gly Gln Ser Phe Val Gly Phe Thr Val Asp Gly Ser
785 790 795 800
Ser Arg Leu Ser Ile Ser Asp Ser Thr Ile Leu Leu Pro Asn Asp Tyr
805 810 815
Ser Thr Val Pro Ile Val Asn Asn Gly Asp Gly Val Val Ser Leu Asn
820 825 830
Asn Cys Ser Leu Pro Leu Tyr Gly Ser Thr Thr Ile Ala Thr Gly Phe
835 840 845
Ala Thr Arg Gln Leu Ile Gly Gly Leu Ser Lys Lys Ile Met Ser Arg
850 855 860
Gly Cys Tyr Pro Arg Ala Gly Phe Ile Thr Ser Asn Trp Asn Leu Gly
865 870 875 880
Cys Ile Val Ser Pro Tyr Ile Asn Ser Val Ser Asn Gly Ser Gly Gln
885 890 895
Phe Glu Asn Ile Ser Asn Trp Thr Leu Ser Gln Thr Gly Thr Asp Val
900 905 910
Val Thr Val Thr Thr Gly Asn Asp Val Pro Asn Asp Leu Met Phe Ser
915 920 925
Thr Ser Phe Val Leu Ser Val Pro Thr Val Gly Ala Ala Ala Asn Phe
930 935 940
Thr Gln Thr Ile Ile Asp Cys Glu Pro Gly Arg Tyr Phe Gln Leu Gly
945 950 955 960
Phe Trp Ala Lys Asn Thr Thr Thr Thr Leu Ala Ser Ile Arg Phe Leu
965 970 975
Asp Gln Gln Gly Asn Ala Val Ala Asp Ser Ile Gly Tyr Asn Ile Pro
980 985 990
Val Gly Asn Thr Phe Asn Phe Tyr Ala Leu Val Asp Cys Val Pro Pro
995 1000 1005
Gly Ala Tyr Lys Ala Glu Ile Asn Phe Asn Val Ser Ser Ile Val
1010 1015 1020
Gly Gly Ile Ala Ile His Asn Val Ile Tyr Gly Leu Ile
1025 1030 1035

<210> 128
<211> 627
<212> PRT
<213> CBA120 噬菌体
<400> 128
Met Ile Ser Gln Phe Asn Gln Pro Arg Gly Ser Thr Ser Ile Glu Val

[0172]

1 5 10 15
Asn Lys Gln Ser Ile Ala Arg Asn Phe Gly Val Lys Glu Asp Glu Val
20 25 30
Ile Tyr Phe Thr Ala Gly Ile Asp Leu Ser Gly Phe Lys Val Ile Tyr
35 40 45
Asp Glu Ser Thr Gln Arg Ala Tyr Ser Leu Pro Phe Gly Ile Val Ser
50 55 60
Gly Thr Thr Ala Ile Ser Leu Asp Glu Arg Ala Ile Leu Thr His Ser
65 70 75 80
Ala Gly Ser Val Asp Leu Gly Glu Leu Ala Val Ser Arg Glu Glu Tyr
85 90 95
Val Thr Leu Pro Gly Ser Phe Asn Phe Gly His Thr Ile Asn Val Lys
100 105 110
Asn Glu Leu Leu Val His Asp Asp Lys Lys Tyr Arg Trp Asp Gly Ser
115 120 125
Leu Pro Lys Val Val Ala Ala Gly Ser Thr Pro Asp Ser Ser Gly Gly
130 135 140
Val Gly Leu Gly Ala Trp Leu Ser Val Gly Asp Ala Ala Leu Arg Ala
145 150 155 160
Glu Leu Asn Thr Lys Val Ser Asp Gly Thr Phe Pro Ala Thr Ile Lys
165 170 175
Tyr Lys Tyr Gly Leu Pro Ser Val Ile Asp Gly Ala Ile Tyr Arg Thr
180 185 190
Val Gln Asp Lys Leu Asp Asp Phe Val Phe Leu Glu Asp Phe Gly Gly
195 200 205
Lys Asp Asp Ala Gly Ser Thr Asp Asn Ser Ile Ala Phe Arg Lys Ala
210 215 220
Phe Ala Ser Gly Ala Arg Lys Ile Arg Leu Arg Gly Ser Gly Val Tyr
225 230 235 240
Gly Met Ala Thr Arg Asp Ile Glu Leu Pro Ala Lys Tyr Glu Ile Ile
245 250 255
Gly Asn Ala Lys Asn Pro Glu Ile Lys Tyr Leu Gly Thr Asp Thr Ser
260 265 270
Phe Thr Met Phe Thr Leu Thr Gly Ser Gly Pro Ala Ser Asn Gln Trp
275 280 285
Lys Gln Gly Gly Met Phe Arg Asp Leu Ile Ile Ser Ser Asp Val Lys
290 295 300
Ile Asn Trp Met Leu Gly Arg His Val Gln Asn Leu Asp Tyr Asp Arg
305 310 315 320
Val Phe Phe Tyr Asn Ser Ala Thr Val Leu Asn Asn Tyr His Tyr Val
325 330 335
Asn Phe Thr Arg Cys Glu Arg Trp Gly Ser Ala Phe Ile Gly Arg Ala
340 345 350
Asp Leu Asn Thr Ile Gln Phe Ile Ser Glu Ser Pro Lys Phe His Leu

[0173]

355 360 365
Cys Phe Ser Ser Gly Ser Pro Ile Asp Val Trp Asp Thr Ala Asp Leu
370 375 380
Ala Ile Thr Lys Cys Thr Met Phe Ala Gly Asp Tyr Ala Val Arg Thr
385 390 395 400
Arg Val Thr Gln Lys Gln Val Thr Ala Pro Asp Leu Phe Ala Gly Tyr
405 410 415
Pro Val Leu Ile Thr Cys Ser Val Phe Asp Ala Val Arg Gly His Ala
420 425 430
Trp Asp Leu Glu Gly Ser Val Tyr Ser Thr Ile Thr Gly Asn Leu Val
435 440 445
Ser Ala Gly Arg Asp Thr Asn Ser His Gly Ala Tyr Ile Lys Gly Gly
450 455 460
Arg Ser Leu Ser Leu Thr Gly Asn Val Phe Thr Tyr Cys Gly Asn Tyr
465 470 475 480
Gly Leu Val Leu Glu Asp Val Gln Gln Ser Gly Phe Val Gly Asn Val
485 490 495
Phe Asn Gly Asn Lys Thr Gly Gly Leu Gly Thr Leu Ala Cys Lys Asp
500 505 510
Leu Ser Ile Val Gly Gly Ser Met Gly Thr Thr Tyr Val Arg Gly Gly
515 520 525
Tyr Tyr Thr Gln Pro Val Gly Tyr Ser Asp Ile Ser Ser Asn Ser Thr
530 535 540
Gly Ile Leu Leu Ser Gly Val Ala Phe Asp Glu Ala Leu Thr Thr Lys
545 550 555 560
Val Tyr Leu Asp Thr Ser Ile Thr Thr Arg Asn Lys Val Ile Asn Cys
565 570 575
Ser Gly Val Pro Asp Thr Ile Ala Arg Gly Ser Thr Ala Asn Arg Pro
580 585 590
Ala Asn Pro Gln Ala Ser Tyr Gln Tyr Tyr Asp Thr Thr Leu Gly Ile
595 600 605
Pro Ile Trp Trp Asn Ser Val Ser Gly Thr Trp Lys Asn Ala Ala Gly
610 615 620
Ala Asp Val
625

<210> 129
<211> 921
<212> PRT
<213> CBA120 噬菌体
<400> 129

Met Thr Arg Asn Val Glu Glu Leu Phe Gly Gly Val Ile Thr Ala Pro
1 5 10 15
His Gln Ile Pro Phe Thr Tyr Lys Ser Asn Val Gly Gly Glu Thr Phe
20 25 30

[0174]

```
Leu Ser Leu Pro Phe Tyr Pro Val Thr Gly Val Val Thr Ile Asn Gly
        35                  40                  45
Gly Met Gln Val Pro Leu Asp Asn Phe Glu Ile Glu Gly Asn Thr Leu
    50                  55                  60
Asn Leu Gly Arg Ala Leu Ser Lys Gly Asp Val Val Tyr Cys Leu Phe
65                  70                  75                  80
Asp Lys Ile Leu Ser Pro Glu Asp Thr Ala Lys Gly Ile Arg Ile Tyr
                85                  90                  95
Lys Phe Gln Ala Val Gly Gly Glu Thr Glu Phe Thr Pro Asp Phe Thr
            100                 105                 110
Ser Tyr Gly Val Gln Ser Leu Tyr Ile Gly Gly Glu Tyr Lys Thr Pro
        115                 120                 125
Glu Ile Glu Tyr Ser Tyr Asp Ser Thr Thr Gly Lys Val Ser Leu Gln
    130                 135                 140
Thr Ala Leu Ser Ala Gly Val Trp Val Val Ala Glu Met Ser Val Lys
145                 150                 155                 160
Gln Pro Asn Ile Ser Pro Ala Phe Asp Arg Ser Ile Gln Glu Ile Ala
                165                 170                 175
Arg Ser Ala Asn Val Lys Asp Ser Glu Val Ile Val Ser Thr Asp Thr
            180                 185                 190
Ile Ser Leu Leu Asp Gly Lys Lys Val Val Tyr Asp Ile Ala Thr Gln
        195                 200                 205
Thr Ser Tyr Gly Leu Pro Thr Ile Pro Asp Gly Ser Val Ile Ser Ser
    210                 215                 220
Val Ser Ala Gly Lys Leu Asn Tyr Asn Pro Gly Asp Val Gln Val Asp
225                 230                 235                 240
Leu Leu Pro Leu Glu Asp Ser Phe Ile Asn Val Ile Asn Thr Leu Gly
                245                 250                 255
Arg Asn Asp Gly Ala Lys Tyr Ile Gly Glu Cys His Ser Val Ala Asp
            260                 265                 270
Leu Arg Asn Thr Glu Pro Thr Met Asp Gly Gln Arg Ile Ile Leu Lys
        275                 280                 285
Gln His Thr Ala Gly Thr Leu Leu Gly Gly Gly Val Phe Arg Ala Leu
    290                 295                 300
Ile Asp Gly Thr Gly Lys Thr Asp Asn Asn Gly Thr Val Ile Lys Thr
305                 310                 315                 320
Val Gly Gly Ala Ala Trp Leu Arg Val Asn Ala Asp Arg Val Asn Pro
                325                 330                 335
Phe Met Phe Gly Ala Leu Gly Gly Ser Asn Asp Asp Thr Ile Pro Val
            340                 345                 350
Gln Ser Cys Val Asp Ser Gly Lys Ala Thr Gln Leu Thr Asp Ala His
        355                 360                 365
Tyr Val Ser Asn Ile Gln Leu Lys Tyr Asn Thr Ser Ser Ile Tyr Gly
    370                 375                 380
```

[0175]

Ser Gly Leu His Tyr Ser Arg Leu His Gln Leu Pro Ser Ala Thr Gly
385 390 395 400
Asn Cys Ile Thr Ile Lys Asp Thr Cys Ser Leu Ile Val Leu Asp Ala
405 410 415
Phe Gly Val Tyr Gly Thr Gly Ala Gln Gln Gly Thr Ser Phe Thr Ala
420 425 430
Gly Thr Thr Gly Ile Tyr Val Glu Thr Pro Ser Gly Leu Ser Ala Asp
435 440 445
Tyr Pro Phe His Thr Thr Ala Asp Pro Arg Arg Asp Leu Cys Ile Ser
450 455 460
Lys Val His Ile Ala Gly Phe Asp Glu Tyr Gly Leu Asn Ile Asp Ser
465 470 475 480
Gly Asn Phe Ser Val Thr Thr Asp Ser Leu Leu Val Asn His Ile Asn
485 490 495
Gln Val Gly Val Arg Cys Ala Thr Thr Asp Trp Thr Trp Thr Asn Ile
500 505 510
Gln Val Asn Thr Cys Gly Lys Gln Cys Leu Val Leu Asp Gly Cys Gly
515 520 525
Asn Gly Arg Ile Ile Gly Gly Lys Phe Ile Trp Ala Asn Trp Gln Pro
530 535 540
Tyr Gly Thr Val Gly Gln Phe Pro Gly Ile Thr Ile Asn Asn Ser Gln
545 550 555 560
Asn Met Val Ile Asn Gly Ile Glu Val Gln Asp Cys Gly Gly Asn Gly
565 570 575
Ile Glu Ile Ser Glu Ser Tyr Ser Ile Ser Met Asn Gly Leu Asn Thr
580 585 590
Asn Arg Asn Gly Ile Asn Ala Asn Asn Thr Phe Tyr Asn Ile Val Phe
595 600 605
Asn Lys Ser Asp Ala Val Ile Asn Gly Phe Val Gly Leu Asn Tyr Ala
610 615 620
Ala Asn Ser Gly Ser Gly Ala Asn Ser Ser Ala Gly Asn Phe Gln Phe
625 630 635 640
Leu Ser Asn Asp Cys Ser Val Thr Ile Asn Gly Val Val Glu Thr Gly
645 650 655
Tyr Met Gly Ile Asn Phe Ile Gly Asp Asn Asn Ile Ile Asn Pro Thr
660 665 670
Asn Ser Asp Leu Ser Ile Asn Gly Leu Val Asn Tyr Ser Lys Thr Gly
675 680 685
Leu Gln Thr Met Asn Glu Thr Pro Thr Phe Asp Gly Val Ser Thr Thr
690 695 700
Pro Val Tyr Val Ser Val Pro Ser Ser Val Gly Gln Val Asn Gly Leu
705 710 715 720
Arg Leu Ser Gln Ala Asn Lys Asp Lys Leu Leu Tyr Ser Arg Thr Ala
725 730 735

Gly Pro Glu Gly Ile Thr Met Ala Ala Val Ile Val Pro Thr Ile Ser
740 745 750
Gly Ala Glu Val Phe Asn Phe Met Ala Ile Gly Ser Gly Phe Ser Asp
755 760 765
Thr Ser Asn Ser Leu His Leu Gln Leu Val Ile Asp Ala Ser Gly Lys
770 775 780
Gln Thr Ile Ala Leu Leu Leu Gly Gly Asp Gly Thr Thr Gln Ile Leu
785 790 795 800
Ser Gly Asp Leu Pro Asn Asp Leu Lys Leu Gln Ser Gly Val Pro Tyr
805 810 815
His Ile Ala Ile Gly Ala Lys Pro Gly Tyr Phe Trp Trp Ser Ile Leu
820 825 830
Asn Ile Gln Thr Gly Lys Arg Ile Arg Arg Ser Phe Arg Gly Ala Tyr
835 840 845
Leu Ala Val Pro Phe Asn Ser Ile Phe Gly Leu Thr Ser Ser Leu Thr
850 855 860
Phe Phe Ser Asp Ser Asn Ala Gly Gly Asp Ala Cys Ser Gly Val Gly
865 870 875 880
Ala Lys Val Tyr Val Gly Met Phe Ser Ser Glu Asn Asp Tyr Val Ala
885 890 895
Ser Arg Tyr Tyr Asn Leu Ile Asn Pro Val Asp Pro Thr Lys Leu Ile
900 905 910
Ser Tyr Arg Ile Leu Asp Ser Ser Ile
915 920

[0176]

<210> 130
<211> 770
<212> PRT
<213> CBA120 噬菌体
<400> 130
Met Asn Glu Met Phe Ser Gln Gly Gly Lys Gly Ser Thr Gly Ile Leu
1 5 10 15
Thr Asn Lys Gln Ala Val Ala Arg His Phe Gly Val Lys Gln Ser Glu
20 25 30
Val Val Tyr Phe Ser Val Gly Val Asp Leu Gly Gly Tyr Lys Val Ile
35 40 45
Tyr Asp Lys Glu Thr Gln Arg Ala Tyr Ser Leu Pro Val Gly Ile Ala
50 55 60
Ser Gly Thr Thr Ala Val Ser Leu Ser Thr Ala Ala Val Leu Val His
65 70 75 80
Ser Ala Gly Ser Val Asp Leu Gly Ser Leu Ala Val Ser Arg Glu Glu
85 90 95
Tyr Val Thr Leu Pro Gly Ser Phe Asp Ser Gly Ser Thr Leu Asn Val
100 105 110
Lys Asn Glu Leu Leu Thr Tyr Thr Asp Gly Lys Tyr Arg Trp Asp Gly

[0177]

```
          115                 120                 125
Ile Leu Pro Lys Thr Val Ala Pro Gly Ser Thr Pro Ala Ser Thr Gly
      130                 135                 140
Gly Val Gly Leu Gly Ala Trp Ile Ser Val Gly Asp Ala Ser Leu Arg
145                 150                 155                 160
Thr Gln Leu Ala Asn Gly Asp Gly Ser Leu Ile Gly Ile His Pro Gln
                  165                 170                 175
Gly Thr Leu Asn Asn Val Leu Thr Val Arg Thr Pro Glu Gln Tyr Asn
              180                 185                 190
Ala Val Gly Asp Gly Ile Ala Asp Asp Thr Ser Lys Leu Lys Glu Met
          195                 200                 205
Leu Ser Asp Ile Asn Asn Val Pro Glu Thr Leu Pro Asp Ala Ala Ala
      210                 215                 220
Val Asn Ser Tyr Met Glu Gln Val Ala Val Lys Ile Asp Leu Thr Lys
225                 230                 235                 240
Leu Tyr Arg Phe Thr Glu Thr Leu Tyr Ile Pro Pro Gly Val Ser Ile
                  245                 250                 255
Glu Ile Pro Thr Ser Asn Phe Phe Thr Arg Glu Cys Lys Gln Gly Leu
              260                 265                 270
Phe Tyr Asp Pro Val Asp Lys Asn Thr Ala Ala Ile Ser Leu Met Val
          275                 280                 285
Tyr Arg Lys Gln Pro Asp Gly Ser Tyr Lys Leu Asn Lys Asp Val Asp
      290                 295                 300
Tyr Tyr Pro Thr Gly Leu Asp Ile Asp Asn Gly Asp Ala Ile Thr Cys
305                 310                 315                 320
Ala Arg Lys Ile Asp Ile Asn Asn Leu Asn Leu Ile Thr Ala Pro Gly
                  325                 330                 335
Val Lys Val Gly Val Lys Trp Ile Gly Gly Ala Gly Cys Thr Thr Lys
              340                 345                 350
Gly Leu Ser Ile Gly Glu Asn Thr Gly Ser Asp Ile Thr Thr Ala Arg
          355                 360                 365
Leu Pro Arg Val Gly Leu Leu Gln Ser Ala Ser Trp Gly Ser Ile His
      370                 375                 380
Glu Asn Leu Arg Ile Leu Tyr Lys Thr Gln Gly Ala Val Phe Ile Asp
385                 390                 395                 400
Ser Asn Gly Gly Ala Ala Val Asn Asn Ala Tyr Ile Ser Arg Leu Gly
                  405                 410                 415
Asn Thr Asn Gly Glu Leu Glu Gln Ala Val Tyr Lys Pro Ala Gly Phe
              420                 425                 430
Thr Glu Val Gly Asp Val Ala Val Thr Gln Phe Ala Gly Ser Glu Val
          435                 440                 445
Lys Phe Asn Ser Pro Ile Ile Glu Gln Ala Ser Phe Asp Phe Val His
      450                 455                 460
Ala Gly Arg Asp Thr Asp Ser Tyr Gly Leu Phe Met Val Asp Lys Pro
```

[0178]

```
465                 470                 475                 480
His Ile Glu Ser Ser Gly Gly Lys Lys Lys His Ser Phe Tyr Leu Ile
                485                 490                 495
Asn Thr Ser Ser Asn Val Thr Leu Ser Gly Val Gly Leu Ser Gly Gln
            500                 505                 510
Asp Pro Asp Leu Asp Ser Met Tyr Phe Leu Lys Asn Cys Pro Glu Thr
        515                 520                 525
Ala Arg Asn Val Val Arg Gly Gln Met Pro Ile Ser Gly Val Lys Leu
    530                 535                 540
Val Arg Gly Thr Gly Asn Tyr Pro Thr Leu Val Leu Asp Cys Thr Asn
545                 550                 555                 560
Met Gly Ser Gln Phe Gln Phe Gly Glu Val Gly Asp Ile Phe Tyr Ile
                565                 570                 575
Lys Asp Val Val Gly Val Lys Ala Asp Thr Leu Tyr Ile Asp Pro Val
            580                 585                 590
Asn Gly Asn Asn Tyr Asn Trp Gly Thr Asn Gly Thr Lys Pro Ile Arg
        595                 600                 605
Glu Leu Thr Asn Ile Ala Lys Ile Cys Gln Leu Phe Arg Cys Lys Ser
    610                 615                 620
Val Tyr Leu Asn Ala Gly Glu Ser Val Ile Thr Ser Asn Thr Glu Leu
625                 630                 635                 640
Pro Met Val Val Phe Glu Gly Pro Gly Ser Leu Lys Ala Asn Ser Gly
                645                 650                 655
Ser Ser Phe Leu Ile Lys Ala Gly Gly Thr Leu Ser Leu Ile Gly Leu
            660                 665                 670
Ser Gly Ile Ser Thr Asp Gly Gly His Met Phe Arg Val Ser Thr Val
        675                 680                 685
Glu Lys Val Asn Ile His Thr Asn Cys Ser Val Asn Ala Gly Ala Ala
    690                 695                 700
Tyr Val Val Leu Ser Glu Val Gln Gly Asn Ile Glu Tyr Arg Gln Leu
705                 710                 715                 720
Phe Tyr Ser Val Asn Cys Ser Lys Tyr Ile Gly Ala Thr Ala Gly Gln
                725                 730                 735
Thr Ile Ala Gly Ile Met Val Lys Thr Ala Thr Arg Pro Thr Gly Ile
            740                 745                 750
Asp Ala Ala Pro Val Asp Gly Asn Val Ser Leu Thr Tyr Lys Ile Ile
        755                 760                 765
Glu Ser
    770
<210>  131
<211>  166
<212>  PRT
<213>  CBA120 噬菌体
<400>  131
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Ala Glu Asp Glu Val Val Val Ile Ile Asn Gly Thr Pro Asn Ile Tyr
1 5 10 15
Asn Gln Ile Asp Tyr Thr Leu Arg Glu Val Ala Arg Val Thr Asn Val
20 25 30
Lys Asp Thr Glu Val Ile Tyr Phe Ser Val Gly Ala Val Leu Ser Gly
35 40 45
Tyr Lys Val Ile Tyr Asp Lys Val Thr Gln Arg Ser Tyr Phe Ile Pro
50 55 60
Glu Leu Pro Thr Gly Thr Thr Ala Val Ser Leu Ser Ser Ser Ala Ile
65 70 75 80
Leu Val His Ser Ala Gly Ser Val Asp Leu Gly Ala Leu Ala Val Ser
85 90 95
Arg Glu Glu Tyr Val Thr Leu Ser Gly Thr Phe Asp Ser Gly Ala Val
100 105 110
Ile Asn Thr Lys Asn Glu Leu Leu Thr His Thr Asp Gly Lys Tyr Arg
115 120 125
Trp Asp Gly Thr Leu Pro Lys Thr Val Ala Ala Gly Ser Thr Pro Ala
130 135 140
Thr Thr Gly Gly Val Gly Ser Gly Ala Trp Leu Ser Val Gly Asp Ala
145 150 155 160
Ser Leu Lys Ser Asn Leu
165

[0179]

<210> 132
<211> 167
<212> PRT
<213> CBA120 噬菌体
<400> 132
Met Ile Ser Gln Phe Asn Gln Pro Arg Gly Ser Thr Ser Ile Glu Val
1 5 10 15
Asn Lys Gln Ser Ile Ala Arg Asn Phe Gly Val Lys Glu Asp Glu Val
20 25 30
Ile Tyr Phe Thr Ala Gly Ile Asp Leu Ser Gly Phe Lys Val Ile Tyr
35 40 45
Asp Glu Ser Thr Gln Arg Ala Tyr Ser Leu Pro Phe Gly Ile Val Ser
50 55 60
Gly Thr Thr Ala Ile Ser Leu Asp Glu Arg Ala Ile Leu Thr His Ser
65 70 75 80
Ala Gly Ser Val Asp Leu Gly Glu Leu Ala Val Ser Arg Glu Glu Tyr
85 90 95
Val Thr Leu Pro Gly Ser Phe Asn Phe Gly His Thr Ile Asn Val Lys
100 105 110
Asn Glu Leu Leu Val His Asp Asp Lys Lys Tyr Arg Trp Asp Gly Ser
115 120 125
Leu Pro Lys Val Val Ala Ala Gly Ser Thr Pro Asp Ser Ser Gly Gly

130 135 140

Val Gly Leu Gly Ala Trp Leu Ser Val Gly Asp Ala Ala Leu Arg Ala
145 150 155 160

Glu Leu Asn Thr Lys Val Ser
165

<210> 133
<211> 241
<212> PRT
<213> CBA120 噬菌体
<400> 133

Met Gln Ile Pro Phe Thr Tyr Lys Ser Asn Val Gly Gly Glu Thr Phe
1 5 10 15

Leu Ser Leu Pro Phe Tyr Pro Val Thr Gly Val Val Thr Ile Asn Gly
20 25 30

Gly Met Gln Val Pro Leu Asp Asn Phe Glu Ile Glu Gly Asn Thr Leu
35 40 45

Asn Leu Gly Arg Ala Leu Ser Lys Gly Asp Val Val Tyr Cys Leu Phe
50 55 60

Asp Lys Ile Leu Ser Pro Glu Asp Thr Ala Lys Gly Ile Arg Ile Tyr
65 70 75 80

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

[0180]

Ser Tyr Gly Val Gln Ser Leu Tyr Ile Gly Gly Glu Tyr Lys Thr Pro
100 105 110

Glu Ile Glu Tyr Ser Tyr Asp Ser Thr Thr Gly Lys Val Ser Leu Gln
115 120 125

Thr Ala Leu Ser Ala Gly Val Trp Val Val Ala Glu Met Ser Val Lys
130 135 140

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

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

Ile Ser Leu Leu Asp Gly Lys Lys Val Val Tyr Asp Ile Ala Thr Gln
180 185 190

Thr Ser Tyr Gly Leu Pro Thr Ile Pro Asp Gly Ser Val Ile Ser Ser
195 200 205

Val Ser Ala Gly Lys Leu Asn Tyr Asn Pro Gly Asp Val Gln Val Asp
210 215 220

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

Arg

<210> 134
<211> 163

<212> PRT
<213> CBA120 噬菌体
<400> 134

Met Asn Glu Met Phe Ser Gln Gly Gly Lys Gly Ser Thr Gly Ile Leu
1 5 10 15
Thr Asn Lys Gln Ala Val Ala Arg His Phe Gly Val Lys Gln Ser Glu
20 25 30
Val Val Tyr Phe Ser Val Gly Val Asp Leu Gly Gly Tyr Lys Val Ile
35 40 45
Tyr Asp Lys Glu Thr Gln Arg Ala Tyr Ser Leu Pro Val Gly Ile Ala
50 55 60
Ser Gly Thr Thr Ala Val Ser Leu Ser Thr Ala Ala Val Leu Val His
65 70 75 80
Ser Ala Gly Ser Val Asp Leu Gly Ser Leu Ala Val Ser Arg Glu Glu
85 90 95
Tyr Val Thr Leu Pro Gly Ser Phe Asp Ser Gly Ser Thr Leu Asn Val
100 105 110
Lys Asn Glu Leu Leu Thr Tyr Thr Asp Gly Lys Tyr Arg Trp Asp Gly
115 120 125
Ile Leu Pro Lys Thr Val Ala Pro Gly Ser Thr Pro Ala Ser Thr Gly
130 135 140
Gly Val Gly Leu Gly Ala Trp Ile Ser Val Gly Asp Ala Ser Leu Arg
145 150 155 160
Thr Gln Leu

[0181]

<210> 135
<211> 1083
<212> PRT
<213> 人工序列
<220>
<223> WW13
<400> 135

Met Ala Thr Leu Lys Gln Ile Gln Phe Lys Arg Ser Lys Thr Ala Gly
1 5 10 15
Ala Arg Pro Ala Ala Ser Val Leu Ala Glu Gly Glu Leu Ala Ile Asn
20 25 30
Leu Lys Asp Arg Val Leu Phe Thr Lys Asp Asp Gln Gly Asn Ile Ile
35 40 45
Asp Leu Gly Phe Ala Lys Gly Gly Ser Ile Asp Gly Asn Val Ile His
50 55 60
Ile Gly Asn Tyr Asn Gln Thr Gly Asp Tyr Thr Leu Asn Gly Thr Phe
65 70 75 80
Thr Gln Thr Gly Asn Phe Asn Leu Thr Gly Ile Ala Arg Val Thr Arg
85 90 95

[0182]

```
Asp Ile Ile Ala Ala Gly Gln Ile Met Thr Glu Gly Gly Glu Leu Ile
            100                 105                 110
Thr Lys Ser Ser Gly Thr Ala His Val Arg Phe Phe Asp Gly Asn Ser
        115                 120                 125
Arg Glu Arg Gly Ile Ile Tyr Ala Pro Ala Asn Asp Gly Leu Thr Thr
    130                 135                 140
Gln Val Leu Asn Ile Arg Val Gln Asp Tyr Ala Ala Gly Ser Glu Ser
145                 150                 155                 160
Thr Tyr Ala Phe Ser Gly Ser Gly Leu Phe Thr Ser Pro Glu Val Ser
                165                 170                 175
Ala Trp Lys Ser Met Ser Thr Pro Gln Ile Leu Thr Asp Lys Val Ile
            180                 185                 190
Thr Asn Gly Lys Lys Thr Gly Asp Tyr Asp Ile Tyr Ser Leu Ser Asn
        195                 200                 205
Asn Thr Pro Leu Ala Glu Ser Glu Thr Ala Ile Asn His Leu Arg Val
    210                 215                 220
Met Arg Asn Ala Val Gly Ala Gly Ile Phe His Glu Val Asn Val Asn
225                 230                 235                 240
Asp Gly Ile Thr Trp Tyr Ser Gly Asp Gly Leu Asp Thr Tyr Leu Trp
                245                 250                 255
Ser Phe Asn Trp Ala Gly Gly Leu Lys Ala Gly His Ser Ile Ser Val
            260                 265                 270
Gly Leu Pro Gly Gly Ser Lys Gly Tyr Ser Glu Leu Gly Thr Ala Ser
        275                 280                 285
Ile Ala Leu Gly Asp Asn Asp Thr Gly Phe Lys Trp His Gln Asp Gly
    290                 295                 300
Tyr Phe His Thr Val Asn Asn Gly Thr Arg Thr Phe Ile Tyr Gly Pro
305                 310                 315                 320
Ala Glu Thr Gln Ser Leu Arg Lys Met Val Met Gly Tyr Ser Pro Asp
                325                 330                 335
Gly Ile Leu Met Thr Thr Pro Pro Thr Glu Asn Tyr Ala Leu Ala Thr
            340                 345                 350
Val Val Thr Tyr His Asp Asn Asn Ala Phe Gly Asp Gly Gln Thr Leu
        355                 360                 365
Leu Gly Tyr Tyr Gln Gly Gly Asn Tyr His His Tyr Phe Arg Gly Lys
    370                 375                 380
Gly Thr Thr Asn Ile Asn Thr His Gly Gly Leu Leu Val Thr Pro Gly
385                 390                 395                 400
Asn Ile Asp Val Ile Gly Gly Ser Val Asn Ile Asp Gly Arg Asn Asn
                405                 410                 415
Asn Ser Thr Leu Met Phe Lys Gly Tyr Thr Met Gly Gln Ser Ser Val
            420                 425                 430
Asp Asn Met Tyr Ile Ala Val Trp Gly Asn Thr Phe Thr Asn Pro Ser
        435                 440                 445
```

[0183]

```
Glu Gly Thr Arg Lys Asn Val Met Glu Ile Ser Asp Asp Ile Gly Trp
    450                 455                 460
Met His Tyr Ile Gln Arg Asn Lys Asp Asn Thr Val Glu Ala Val Leu
465                 470                 475                 480
Asn Gly Gln Gln Thr Ile Asn Glu Asn Ile Ile Ala Lys Lys Asp Ile
                485                 490                 495
Trp Val Asp Arg Ala Val His Thr Leu Gly Glu Ile Thr Thr Asn Ala
            500                 505                 510
Val Asn Gly Leu Arg Ile Trp Asn Asn Asp Tyr Gly Val Ile Phe Arg
        515                 520                 525
Arg Ser Glu Gly Ser Leu His Ile Ile Pro Thr Ala Phe Gly Glu Gly
    530                 535                 540
Glu Thr Gly Asp Ile Gly Pro Leu Arg Pro Leu Ser Ile Ala Leu Asp
545                 550                 555                 560
Thr Gly Lys Val Thr Ile Pro Asp Leu Gln Ser Ser Tyr Asn Thr Phe
                565                 570                 575
Ala Ala Asn Gly Tyr Ile Lys Phe Val Gly His Gly Ala Gly Ala Gly
            580                 585                 590
Gly Tyr Asp Ile Gln Tyr Ala Gln Ala Ala Pro Ile Phe Gln Glu Ile
        595                 600                 605
Asp Asp Asp Ala Val Ser Lys Tyr Tyr Pro Ile Val Lys Gln Lys Phe
    610                 615                 620
Leu Asn Gly Lys Ser Val Trp Ser Leu Gly Thr Glu Ile Glu Ser Gly
625                 630                 635                 640
Thr Phe Val Ile His His Leu Lys Glu Asp Gly Ser Gln Gly His Ala
                645                 650                 655
Ser Arg Phe Asn Gln Asp Gly Thr Val Asn Phe Pro Asp Asn Val Leu
            660                 665                 670
Val Gly Gly Asp Ile Asn Met Lys Gly Met Met Thr Phe Asp Ala Gly
        675                 680                 685
Arg Leu Gly Ser Arg Asp Tyr Phe Lys Phe Asn His Trp Gly Asp Ser
    690                 695                 700
Asn Asn Gly Arg Asp Asn Ile Ile Gln Leu Glu Asp Ser Gln Gly Ala
705                 710                 715                 720
His Phe Ser Thr Glu Arg Thr Leu Ala Thr Gly Ala Ile Lys Thr Arg
                725                 730                 735
Phe Phe Gly Glu Thr Phe Thr Asp Gly Thr Leu Tyr Leu Asn Gln Met
            740                 745                 750
Asn Asn Ser Ser Glu Arg Phe Ser Ile Asn Asn Trp Gly Asn Ser Glu
        755                 760                 765
Val Gly Arg Pro Ala Val Leu Glu Val Gly Asp Ser Lys Gly Tyr His
    770                 775                 780
Phe Tyr Thr Glu Arg Gly Thr Asp Asn Ser Leu Asn Phe Asp Val Ala
785                 790                 795                 800
```

[0184]

```
Gly Asn Phe Thr Val His Gly Pro Ser Gly Ile Thr Ile Lys Thr Ser
                805                 810                 815
Thr Gly Ala Arg His Ile Trp Phe Arg Asp Asp Ser Asp Ala Glu Lys
            820                 825                 830
Ala Val Ile Trp Ala Thr Asp Glu Gly Ile Leu His Ile Arg Asn Asn
        835                 840                 845
Tyr Gly Gly Ser Phe Ser His His Phe Gln Gly Ala Met Ile Leu Ala
    850                 855                 860
Gly Glu Arg Val Pro Tyr Asn Ser Glu Tyr Ala Leu Ile Arg Gly Asn
865                 870                 875                 880
Ile Ser Gly Gly Ala Trp Val Asp Trp Arg Gly Arg Pro Ala Gly Leu
                885                 890                 895
Leu Val Asp Cys Gln Asp Ser Arg Asn Gln Ala Tyr Asn Ile Trp Lys
            900                 905                 910
Ala Thr His Trp Gly Asp Gln His Leu Ala Ala Met Gly Val His Ala
        915                 920                 925
Gly Gly Gly Asn Pro Gln Val Val Leu His Val Gly Gly Asn Asp Tyr
    930                 935                 940
Ala Phe Ala Ser Asn Gly Asp Phe Thr Ala Gly Ala Ala Val Tyr Cys
945                 950                 955                 960
Asn Asp Val Tyr Ile Arg Ser Asp Arg Arg Leu Lys Ile Asn Val Lys
                965                 970                 975
Asp Tyr Glu Glu Asn Ala Val Asp Lys Val Asn Lys Leu Lys Val Lys
            980                 985                 990
Thr Tyr Asp Lys Val Lys Ser Leu  Ser Asp Arg Glu Val  Ile Gly His
        995                 1000                1005
Glu Ile  Gly Ile Ile Ala Gln  Asp Leu Gln Glu Val  Leu Pro Glu
    1010                1015                1020
Ala Val  Ser Thr Ser Ser Val  Gly Ser Gln Asp Asn  Pro Glu Glu
    1025                1030                1035
Ile Leu  Thr Ile Ser Asn Ser  Ala Val Asn Ala Leu  Leu Ile Lys
    1040                1045                1050
Ala Ile  Gln Glu Met Ser Glu  Glu Ile Lys Glu Leu  Lys Thr Pro
    1055                1060                1065
Leu Phe  Thr Lys Ile Ala Arg  Lys Ile Ser Lys Tyr  Phe Lys Phe
    1070                1075                1080
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Met Ala Thr Leu Lys Gln Ile Gln Phe Lys Arg Ser Lys Thr Ala Gly
```

[0185]

```
1               5                   10                  15
Gln Arg Pro Ala Ala Ser Val Leu Ala Glu Gly Glu Leu Ala Ile Asn
            20                  25                  30
Leu Lys Asp Arg Val Leu Phe Thr Lys Asp Asp Gln Gly Asn Ile Ile
        35                  40                  45
Asp Leu Gly Phe Ala Lys Gly Gly Ser Ile Asp Gly Asn Val Ile His
    50                  55                  60
Lys Gly Asn Tyr Asn Gln Thr Gly Asp Tyr Thr Leu Asn Gly Thr Phe
65                  70                  75                  80
Thr Gln Thr Gly Asn Phe Asn Leu Thr Gly Ile Ala Arg Val Thr Arg
                85                  90                  95
Asp Ile Ile Ala Ala Gly Gln Ile Met Thr Glu Gly Gly Glu Leu Ile
            100                 105                 110
Thr Lys Ser Ser Gly Thr Ala His Val Arg Phe His Asp Ser Ala Asp
        115                 120                 125
Arg Glu Arg Gly Ile Ile Phe Ser Pro Ala Asn Asp Gly Leu Thr Thr
    130                 135                 140
Gln Val Val Asn Ile Arg Val Gln Asp Tyr Lys Ala Ser Ser Glu Ser
145                 150                 155                 160
Thr Phe Ala Phe Asn Gly Asn Gly Leu Phe Ser Ser Pro Glu Val Phe
                165                 170                 175
Gly Trp Lys Ser Val Ser Thr Pro Val Ile Tyr Thr Asn Lys Val Ile
            180                 185                 190
Thr Asn Lys Lys Val Lys Asp Asp Tyr Asp Ile Tyr Ser Met Ala Asp
        195                 200                 205
Asn Val Pro Leu Ser Glu Ile Thr Thr Ala Ile Asn His Leu Arg Val
    210                 215                 220
Met Arg Asn Ala Val Gly Ser Gly Ile Phe His Glu Val Lys Asp Asn
225                 230                 235                 240
Asp Gly Ile Thr Trp Tyr Ser Gly Asp Gly Leu Asp Ala Tyr Leu Trp
                245                 250                 255
Ser Phe Thr Trp Ser Gly Gly Ile Lys Ser Ser His Ser Ile Ser Ile
            260                 265                 270
Gly Leu Thr Pro Gly Pro Lys Asp Tyr Ser Ile Leu Gly Pro Ser Ser
        275                 280                 285
Ile Ala Leu Gly Asp Asn Asp Thr Gly Phe Lys Trp His Gln Asp Gly
    290                 295                 300
Tyr Tyr Phe Ser Val Asn Asn Gly Thr Lys Thr Phe Leu Phe Ser Pro
305                 310                 315                 320
Ser Glu Thr Thr Ser Leu Arg Lys Phe Val Ala Gly Tyr Ser Thr Asn
                325                 330                 335
Gly Thr Asp Leu Thr Thr Pro Pro Thr Glu Asn Tyr Ala Leu Ala Thr
            340                 345                 350
Val Val Thr Tyr His Asp Asn Asn Ala Phe Gly Asp Gly Gln Thr Leu
```

[0186]

```
          355                 360                 365
Leu Gly Tyr Tyr Gln Gly Gly Asn Tyr His His Tyr Phe Arg Gly Lys
      370                 375                 380
Gly Thr Thr Asn Ile Asn Thr His Gly Gly Leu Leu Val Thr Pro Gly
385                 390                 395                 400
Asn Ile Asp Val Ile Gly Gly Ser Val Asn Ile Asp Gly Arg Asn Asn
                  405                 410                 415
Ala Ser Thr Ala Met Phe Lys Gly Asn Thr Thr Gly Ser Ser Ser Val
              420                 425                 430
Asp Asn Met Thr Ile Ser Val Trp Gly Asn Thr Phe Thr Asn Pro Ser
          435                 440                 445
Glu Gly Asn Arg Lys Asn Val Met Glu Ile Ser Asp Ala Thr Ser Trp
      450                 455                 460
Met Ser Tyr Ile Gln Arg Leu Thr Thr Gly Glu Val Glu Met Asn Val
465                 470                 475                 480
Asn Gly Ser Phe Glu Ser Ser Gly Val Thr Ala Gly Asn Arg Gly Val
                  485                 490                 495
His Thr Thr Gly Glu Ile Ser Ser Gly Ala Val Asn Ala Leu Arg Ile
              500                 505                 510
Trp Asn Ala Asp Tyr Gly Val Ile Phe Arg Arg Ser Glu Gly Ser Leu
          515                 520                 525
His Ile Ile Pro Thr Ala Tyr Gly Glu Gly Lys Asn Gly Asp Ile Gly
      530                 535                 540
Pro Leu Arg Pro Phe Ser Ile Ala Leu Asp Thr Gly Lys Val Val Ile
545                 550                 555                 560
Pro Asp Leu Glu Ser Ser Tyr Asn Thr Phe Ala Ala Asn Gly Tyr Ile
                  565                 570                 575
Lys Phe Ala Gly His Gly Ala Gly Ala Gly Gly Tyr Asp Ile Gln Tyr
              580                 585                 590
Ser Gln Ala Ala Pro Ile Phe Gln Glu Ile Asp Asp Ala Ala Val Ser
          595                 600                 605
Lys Tyr Tyr Pro Ile Val Lys Gln Lys Phe Leu Asn Gly Lys Ala Val
      610                 615                 620
Trp Ser Leu Gly Thr Glu Ile Asn Ser Gly Thr Phe Val Leu His His
625                 630                 635                 640
Leu Lys Glu Asp Gly Ser Gln Gly His Thr Ser Arg Phe Asn Ala Asp
                  645                 650                 655
Gly Thr Val Asn Phe Pro Asp Asn Val Gln Val Gly Gly Gly Glu Ala
              660                 665                 670
Thr Ile Ala Arg Asn Gly Asn Ile Phe Ser Asp Ile Trp Lys Thr Phe
          675                 680                 685
Thr Ser Ala Gly Glu Thr Thr Asn Ile Arg Asp Ala Ile Ala Thr Arg
      690                 695                 700
Val Ser Lys Glu Gly Asp Thr Met Thr Gly Lys Leu Thr Leu Ser Ala
```

705 710 715 720
Gly Asn Asp Ala Leu Val Leu Thr Ala Gly Glu Gly Ala Ser Ser His
725 730 735
Ile Arg Ser Asp Val Gly Gly Thr Asn Asn Trp Tyr Ile Gly Lys Gly
740 745 750
Ser Gly Asp Asn Gly Leu Gly Phe Tyr Ser Tyr Ile Thr Gln Gly Gly
755 760 765
Val Tyr Ile Thr Asn Asn Gly Glu Ile Ala Leu Ser Pro Gln Gly Gln
770 775 780
Gly Thr Phe Asn Phe Asn Arg Asp Arg Leu His Ile Asn Gly Thr Gln
785 790 795 800
Trp Thr Ala His Gln Gly Gly Gly Trp Glu Asn Gln Trp Asn Gln Glu
805 810 815
Ala Pro Ile Phe Ile Asp Phe Gly Asn Val Gly Asn Asp Ser Tyr Tyr
820 825 830
Pro Ile Ile Lys Gly Lys Ser Gly Ile Thr Asn Glu Gly Tyr Ile Ser
835 840 845
Gly Val Asp Phe Gly Met Arg Arg Ile Thr Asn Thr Trp Ala Gln Gly
850 855 860
Ile Ile Arg Val Gly Asn Gln Glu Asn Gly Ser Asp Pro Gln Ala Ile
865 870 875 880
Tyr Glu Phe His His Asn Gly Val Leu Tyr Val Pro Asn Met Val Lys
885 890 895
Thr Gly Ala Arg Leu Ser Ala Gly Gly Gly Asp Pro Val Trp Gln Gly
900 905 910
Ala Cys Val Val Ile Gly Asp Asn Asp Thr Gly Leu Val His Gly Gly
915 920 925
Asp Gly Arg Ile Asn Met Val Ala Asn Gly Met His Ile Ala Ser Trp
930 935 940
Ser Ser Ala Tyr His Leu His Glu Gly Leu Trp Asp Thr Thr Gly Ala
945 950 955 960
Leu Trp Thr Glu Gln Gly Arg Ala Ile Ile Ser Phe Gly His Leu Val
965 970 975
Gln Gln Ser Asp Ala Tyr Ser Thr Phe Val Arg Asp Val Tyr Val Arg
980 985 990
Ser Asp Ile Arg Val Lys Lys Asp Leu Val Lys Phe Glu Asn Ala Ser
995 1000 1005
Glu Lys Leu Ser Lys Ile Asn Gly Tyr Thr Tyr Met Gln Lys Arg
1010 1015 1020
Gly Leu Asp Glu Glu Gly Asn Gln Lys Trp Glu Pro Asn Ala Gly
1025 1030 1035
Leu Ile Ala Gln Glu Val Gln Ala Ile Leu Pro Glu Leu Val Glu
1040 1045 1050
Gly Asp Pro Asp Gly Glu Ala Leu Leu Arg Leu Asn Tyr Asn Gly

[0187]

1055 1060 1065
Val Ile Gly Leu Asn Thr Ala Ala Ile Asn Glu His Thr Ala Glu
1070 1075 1080
Ile Ala Glu Leu Lys Ser Glu Ile Glu Glu Leu Lys Lys Ile Val
1085 1090 1095
Lys Ser Leu Leu Lys
1100

<210> 137
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<223> WW55
<400> 137

[0188]

Met Ala Asp Leu Ser Arg Ile Gln Phe Lys Arg Thr Ser Thr Lys Gly
1 5 10 15
Arg Arg Pro Asp Ala Ser Thr Met Asn Pro Gly Glu Leu Ala Ile Asn
20 25 30
Leu Ala Asp Gln Tyr Leu Leu Thr Lys Asn Asp Ser Gly Ala Ile Ile
35 40 45
Asn Leu Ser Cys Pro Pro Val Tyr Asp Arg Asp Val Thr Met Ala Gly
50 55 60
Lys Val Lys Gly Asn Asn Tyr Ile Leu Ser Lys Thr Ala Asn Tyr Leu
65 70 75 80
Glu Asp Gln Thr Ala Arg Asp Leu Asn Tyr Phe Gly Ala Phe Arg Thr
85 90 95
Asn Gly Leu Asp Gly Leu Leu Glu Leu Thr Leu Asn Val Pro His Ser
100 105 110
Ser Gly Val Gln His Gly Arg Gly Phe Thr Phe Gln Tyr Gly His Thr
115 120 125
Gly Ser Arg Val Glu Thr Tyr Gly Tyr Asn Lys Glu Gly Gln Lys Ala
130 135 140
Phe Ser Tyr Lys Met Tyr His Glu Gly Asp Lys Pro Thr Pro Gly Glu
145 150 155 160
Leu Asn Val Tyr Ser Lys Gln Glu Ile Asp Arg Met Phe Val Lys Asn
165 170 175
Val Lys Met Val Val Pro Ser Gly Gly Ala Thr Arg Gly Tyr Phe Lys
180 185 190
Ile Ala Ser Ala Met Ile Pro Gln Ser Gly Arg Met Ala Phe Leu Arg
195 200 205
Ile Tyr Gly Gly Asn Gly Tyr Asn Val Asn Ser Tyr Asp Gln Val Asp
210 215 220
Phe Leu Glu Ile Val Ile Arg Ser Gly Asn Asn Asn Pro Lys Gly Val
225 230 235 240

[0189]

```
Ser Ile Ala Ala Tyr Arg Arg Asn Ser Leu Asn Val His Glu Val Phe
                245                 250                 255
Ala Ile Asn Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Asn Tyr Gly
            260                 265                 270
Arg Phe Thr Asp Asn Val Ile Val Glu Phe Gly Lys Thr Val Asp Val
        275                 280                 285
Ala Leu Thr Val His Asp Val Pro Glu Phe Ser Ala Thr Lys Pro Glu
    290                 295                 300
Thr Gly Thr Lys Phe Asp Ala Arg Val Ile Thr Met Phe Asn Thr Glu
305                 310                 315                 320
Asn Lys Ala Gly Thr Leu Met Phe Asp Asn Asn Asn Gln Leu Thr Tyr
                325                 330                 335
Asp Ile Val Ser Leu Ser Asn Gly Pro Asp Asp Val Arg Asn Tyr Leu
            340                 345                 350
Arg Lys Phe Arg Ser Lys Ala Gly Glu Met Ile Trp His Glu Thr Val
        355                 360                 365
Gln Gly Ala Val Tyr Arg Leu Ala Thr Gly Thr Thr Asp Ser Thr Glu
    370                 375                 380
Val Leu Arg Val Asp Ser Asn Ser Ala Leu Pro Gly Ser Tyr Lys Gly
385                 390                 395                 400
Tyr Val Ile Thr Gly Lys Met Glu Leu His Gly Ser Gly Ser Ala Met
                405                 410                 415
Asn Leu His Arg Gln Thr Gly Gln Ala Ala Tyr Met Ala Trp Trp Asp
            420                 425                 430
Arg Arg Asp Gly Lys Asn Gln Arg Ser Gly Tyr Ile Gly His Ala Asp
        435                 440                 445
Gly Thr Thr Asp Gly Phe Val Trp Arg Asn Asp Val Gly Ala Asn Ser
    450                 455                 460
Phe Asp Leu Glu Ser Ser Gly Gln Val Asn Leu Thr Thr Gly Lys Thr
465                 470                 475                 480
Lys Ile Val Tyr Thr Asn Gly Gln Tyr Tyr Ser Ala Asn Ser Asp Ala
                485                 490                 495
Phe Arg Met Ile Tyr Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly
            500                 505                 510
Gly Lys Val Tyr Leu Leu Ser Thr Ala Glu Asn Asp Arg Phe Gly Gly
        515                 520                 525
Trp Asn Gly Asn Arg Pro Phe Ile Tyr Asp Leu Ser Thr Gly Lys Val
    530                 535                 540
Thr Leu Gly Gly Asp Gly Asn Glu Gly Ala Leu Val Leu Glu Arg Asp
545                 550                 555                 560
Ser Arg Ala Ala Arg Phe Ser Asn Ser Val Phe Leu Glu Lys Gly Leu
                565                 570                 575
Leu Thr Phe Ser Ala Gly Gly Asn Gln Ser Met Asp Ser Phe Thr Ile
            580                 585                 590
```

[0190]

```
Asn His Trp Gly Asn Ser Asn Ala Gly Arg Tyr Asn Val Leu Gln Phe
        595                 600                 605
Glu Asp Thr Lys Gly Thr His Phe Thr Thr Glu Arg Asn Ala Asp Gly
    610                 615                 620
Gly Leu Leu Ala His Phe Arg Gly Asp Leu Thr Thr Glu Gly Lys Leu
625                 630                 635                 640
Thr Trp Gly Lys Gly Thr Ala Thr Ser Ser Phe Asn Ile Arg Ala Trp
                645                 650                 655
Gly Asn Ser Asp Ser Arg Lys Gln Val Phe Glu Cys Val Asp Glu Ser
            660                 665                 670
Gly Trp His Trp Tyr Thr Gln Arg Pro Gly Gly Pro Gly Thr Ser Ala
        675                 680                 685
Ile Glu Phe Ala Ile Asn Gly Thr Val Lys Pro Gln Ala Ile His Thr
    690                 695                 700
Gly Gly Asn Ile Leu Leu Asn Gly Ala Asp Ile Glu Phe Arg Arg Thr
705                 710                 715                 720
Gly Asn Lys His Leu Trp Phe Arg Asp Pro Asn Gly Leu Glu Leu Gly
                725                 730                 735
Leu Ile Tyr Cys Asp Asp Asn Gly Val Ile Arg Phe Arg Gly Gln Lys
            740                 745                 750
Gln Gly Gln Asp Trp Val Phe Ala Asn Lys Met Ile Gln Leu Gly Thr
        755                 760                 765
Ala Ser Thr Val Gly Gly Ser Gly Asn Gly Leu Ile Arg Gly Gln Val
    770                 775                 780
Gln Gly Gly Ala Trp Ala Gln Trp Arg Asp Arg Ala Ala Gly Ile Leu
785                 790                 795                 800
Val Asp Cys Gln Gln Ser Thr Asp Ser Ala His Asn Ile Trp Lys Ala
                805                 810                 815
Thr His Trp Gly Lys Tyr His Ile Ala Ala Met Gly Val His Val Pro
            820                 825                 830
Ser Gly Thr Ile Gly Asn Ala Met Ala Arg Leu Asn Val Asn Asp Ala
        835                 840                 845
Asn Phe Asp Phe Ser Ala Ser Gly Asp Met Ser Ala Gly Arg Asn Gly
    850                 855                 860
Ser Phe Asn Asp Val Tyr Ile Arg Ser Asp Ala Arg Leu Lys Ile Asn
865                 870                 875                 880
Lys Glu Glu Tyr Lys Glu Asn Ala Thr Asp Lys Val Asn Arg Leu Thr
                885                 890                 895
Val Tyr Thr Tyr Asp Lys Val Lys Ser Leu Thr Asp Arg Thr Val Ile
            900                 905                 910
Ala His Glu Val Gly Ile Ile Ala Gln Asp Leu Glu Lys Glu Leu Pro
        915                 920                 925
Glu Ala Val Thr Thr Ser Lys Ile Gly Asp Pro Asp Lys Pro Glu Glu
    930                 935                 940
```

Ile Leu Thr Ile Ser Asn Ser Ala Val Asn Ala Leu Leu Ile Lys Ala
945 950 955 960
Phe Gln Glu Met Ser Glu Glu Leu Lys Ala Val Lys Ala Glu Leu Ala
965 970 975
Glu Leu Lys Lys
980

<210> 138
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<220>
<223> WW34
<400> 138

[0191]

Met Ala Asp Leu Ser Arg Ile Gln Phe Lys Arg Thr Ser Thr Lys Gly
1 5 10 15
Arg Arg Pro Asp Ala Gly Thr Met Asn Pro Gly Glu Leu Ala Ile Asn
20 25 30
Leu Ala Asp Gln Tyr Leu Leu Thr Lys Asn Asp Ser Gly Ala Ile Ile
35 40 45
Asn Leu Ser Cys Pro Pro Val Tyr Asp Ser Asp Val Thr Met Ala Gly
50 55 60
Lys Val Lys Gly Asn Asn Tyr Ile Leu Ser Lys Thr Ala Asn Tyr Phe
65 70 75 80
Glu Asp Gln Thr Ala Arg Asp Leu Asn Tyr Phe Gly Ala Phe Arg Pro
85 90 95
Asn Asn Ala Asp Asp Trp Ser Asn Leu Ile Leu Asn Ile Pro His Pro
100 105 110
Ser Gly Lys Ala His Gly Arg Gly Phe Glu Phe Gln Tyr Gly Ser Ser
115 120 125
Ser Ser Gln Val Lys Thr Tyr Gly Phe Asp Lys Asp Gly Asn Lys Arg
130 135 140
Phe Ser Phe Arg Met Tyr His Glu Gly Asp Lys Pro Thr Pro Gly Glu
145 150 155 160
Leu Asn Val Tyr Ser Lys Gln Glu Ile Asp Arg Met Phe Val Lys Asn
165 170 175
Val Lys Met Ser Thr Pro Ser Gly Glu Ala Thr Arg Gly Tyr Phe Lys
180 185 190
Ile Ala Ser Ala Met Ile Pro Gln Ser Gly Arg Met Ala Phe Leu Arg
195 200 205
Ile Tyr Gly Gly Asn Gly Phe Asn Val Asn Ser Tyr Asp Gln Val Asp
210 215 220
Phe Leu Glu Ile Val Ile Arg Ser Gly Asn Asn Asn Pro Lys Gly Val
225 230 235 240
Ser Ile Ala Ala Tyr Arg Arg Asn Ser Leu Asn Val His Glu Val Phe

[0192]

245 250 255
Ala Ile Asn Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Asn Tyr Gly
260 265 270
Arg Phe Thr Asp Asn Val Ile Val Glu Phe Gly Lys Thr Val Asp Val
275 280 285
Ala Leu Thr Val His Asp Val Pro Glu Phe Ser Ala Thr Lys Pro Glu
290 295 300
Thr Gly Thr Lys Phe Asp Ala Arg Val Ile Thr Met Phe Asn Thr Glu
305 310 315 320
Asn Lys Ala Gly Thr Leu Met Phe Asp Asn Asn Asn Gln Leu Thr Tyr
325 330 335
Asp Ile Val Ser Leu Ser Asn Gly Pro Asp Asp Val Arg Asn Tyr Leu
340 345 350
Arg Lys Phe Arg Ser Lys Ala Gly Glu Met Ile Trp His Glu Thr Val
355 360 365
Gln Gly Ala Val Tyr Arg Leu Ala Thr Gly Thr Thr Asp Ser Thr Glu
370 375 380
Val Leu Arg Val Asp Ser Asn Ser Ala Ile Pro Gly Ser Tyr Lys Gly
385 390 395 400
Tyr Val Ile Thr Gly Lys Met Glu Leu His Gly Ser Gly Asn Ser Met
405 410 415
Ile Leu His Arg Gln Thr Ala Gln Ala Ala Tyr Met Ser Trp Trp Asp
420 425 430
Arg Arg Asp Gly Lys Asn Gln Arg Ser Gly Tyr Ile Gly His Ala Asp
435 440 445
Gly Thr Ser Asp Ala Ile Val Trp Asn Asn Asp Ile Gly Gln Asn Ser
450 455 460
Ala Val Leu Glu Thr Ser Gly Gln Ile Ser Phe Arg Thr Gly Ala Thr
465 470 475 480
Lys Ile Val Tyr Thr Asn Gly Gln Tyr Tyr Ser Ala Asn Ser Asp Ala
485 490 495
Tyr Arg Met Ile Phe Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly
500 505 510
Thr Lys Val Tyr Leu Leu Ser Thr Ala Glu Asn Asp Lys Tyr Gly Gly
515 520 525
Trp Asn Ala Tyr Arg Pro Phe Ile Tyr Asp Leu Thr Ser Gly Asn Val
530 535 540
Gln Leu Gly Gly Asp Gly Asn Glu Asp Ala Leu Thr Leu Glu Cys Ala
545 550 555 560
Ser Arg Ala Ala Arg Phe Ser Asn Asp Val Tyr Ile Lys Lys Gly Leu
565 570 575
Leu Thr Phe Asp Ala Gly Arg Ala Gly Ser Arg Asp Tyr Ile Arg Phe
580 585 590
Asn His Trp Gly Asp Ser Asn Asn Ala Arg Asp Asn Val Leu Cys Ile

595 600 605

Glu Asp Ser Gln Gly Arg His Phe Ser Thr Glu Arg Ala Met Gly Thr
610 615 620

Gly Ala Leu Lys Ala Tyr Phe Leu Gly Asp Leu Glu Val Gly Gly Lys
625 630 635 640

Phe Thr Trp Gly Lys Asn Thr Ala Thr Ser Ser Phe Asn Ile Arg Ala
645 650 655

Trp Gly Asn Asp Ser Arg Lys Gln Val Leu Glu Cys Ala Asp Glu Ser
660 665 670

Gly Trp His Trp Tyr Thr Gln Arg Thr Gly Gly Pro Asp Thr Ser Ala
675 680 685

Ile Asp Phe Ala Ile Asn Gly Thr Val Arg Pro Gln Ala Ile His Thr
690 695 700

Gly Gly Asn Ile Thr Ile Asn Gly Ala Asp Ile Glu Phe Lys Arg Thr
705 710 715 720

Gly Asn Lys His Ile Trp Phe Arg Asp Pro Asn Gly Leu Glu Leu Gly
725 730 735

Leu Met Tyr Cys Asp Asp Ala Gly Ala Ile Arg Phe Arg Gly Gln Lys
740 745 750

Gln Ala Gln Ala Trp Lys Phe Ala Asp Lys Met Ile Gln Leu Glu Ser
755 760 765

[0193] Gly Thr Val Ser Gly Gly Gly Asn Gly Leu Ile Arg Gly Glu Val Ala
770 775 780

Gly Gly Ser Trp Ala Ser Trp Arg Asp Arg Ala Ala Gly Leu Met Val
785 790 795 800

Gly Cys Pro Gln Ser Thr Asn Ser Ala His Asn Val Trp Lys Ala Thr
805 810 815

His Trp Gly Lys Tyr His Ile Ala Ala Met Ala Val His Val Pro Asp
820 825 830

Gly Thr Ile Thr Asn Ala Leu Ala Arg Leu Asn Val His Asp Ala Asn
835 840 845

Phe Asp Phe Ser Ala Ser Gly Asp Leu Ser Ala Gly Arg Asn Gly Ser
850 855 860

Phe Asn Asp Val Tyr Ile Arg Ser Asp Ala Arg Leu Lys Ile Asn Lys
865 870 875 880

Glu Glu Tyr Lys Glu Asn Ala Thr Asp Lys Val Asn Arg Leu Thr Val
885 890 895

Tyr Thr Tyr Asp Lys Val Lys Ser Leu Thr Asp Arg Thr Val Ile Ala
900 905 910

His Glu Val Gly Ile Ile Ala Gln Asp Leu Glu Lys Glu Leu Pro Glu
915 920 925

Ala Val Thr Thr Ser Lys Ile Gly Asp Pro Asp Lys Pro Glu Glu Ile
930 935 940

Leu Thr Ile Ser Asn Ser Ala Val Asn Ala Leu Leu Ile Lys Ala Phe

945 950 955 960
Gln Glu Met Ser Glu Glu Leu Lys Ala Val Lys Ala Glu Leu Ala Glu
965 970 975
Leu Lys Lys Asn
980

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<220>
<223> WW14
<400> 139

[0194]

Met Ala Thr Leu Lys Ala Ile Gln Phe Lys Arg Ser Lys Thr Pro Gly
1 5 10 15
Ala Lys Pro Thr Val Asp Gln Leu Val Glu Gly Glu Leu Ala Ile Asn
20 25 30
Leu Arg Asp Arg Thr Ile Phe Thr Lys Ser Asp Gln Asn Gln Ile Ile
35 40 45
Asp Leu Gly Phe Ala Lys Gly Gly Gln Val Asp Gly Asp Val Thr Ile
50 55 60
Asn Gly Thr Leu Asn Leu Asn Gly Pro Glu Ile Val Ala Ser Gly Gly
65 70 75 80
Tyr Ile Glu Phe Asn Tyr Arg Thr Thr Gly Ser Gly Ser Trp Ala Gly
85 90 95
Gln His Ala Ala Lys Ala Pro Ile Phe Val Asp Leu Ser Ala Ala Leu
100 105 110
Ser Thr Ser Glu Tyr Asn Pro Leu Phe Lys Gln Arg Tyr Lys Asp Gly
115 120 125
Thr Phe Ser Ala Gly Thr Leu Val Thr Glu Gly Ser Phe Lys Phe His
130 135 140
Tyr Ile Asn Glu Ala Gly Asp Ser Lys Tyr Trp Thr Phe Asn Arg Asn
145 150 155 160
Gly Asn Phe Gln Val Asp Thr Gly Ser Leu Phe Val Ser Gly Gly Asn
165 170 175
Ile Ser Ala Ser Gly Asn Ile Asn Ser Ala Ser Gly Phe Val Ser Ala
180 185 190
Pro Gln Ile Asn Thr Lys Asn Ile Ile Leu Asp Thr Lys Ala Phe Gly
195 200 205
Gln Tyr Asp Ser Gln Ser Leu Val Asn Tyr Val Tyr Pro Gly Thr Gly
210 215 220
Glu Thr Asn Gly Val Asn Tyr Leu Arg Lys Val Arg Ala Lys Ser Gly
225 230 235 240
Gly Thr Met Trp His Glu Leu Cys Thr Ala Gln Leu Gly Gln Ala Asp
245 250 255

[0195]

Glu Met Ser Trp Trp Thr Gly Asn Thr Pro Gln Ser Lys Gln Tyr Gly
260 265 270
Val Arg Asn Asp Gly Arg Leu Ile Gly Arg Asn Ser Leu Ala Leu Gly
275 280 285
Thr Met Thr Thr Asp Phe Pro Ser Ser Asp Tyr Gly Asn Thr Gly Ala
290 295 300
Met Gly Asp Lys Tyr Leu Val Leu Gly Asp Thr Ala Thr Gly Leu Lys
305 310 315 320
Tyr Ile Lys Gln Gly Asn Phe Asp Leu Val Gly Gly Gly Tyr Ser Val
325 330 335
Ala Ser Ile Thr Thr Asp Gly Phe Arg Gly Thr Ser Lys Thr Leu Phe
340 345 350
Gly Arg Ser Asn Asp Gln Gly Leu Thr Trp Leu Leu Pro Gly Gln Asn
355 360 365
Ser Ala Met Val Ser Ile Arg Thr Glu Ile Asp Gly Asn Asn Ser Gly
370 375 380
Asp Gly Gln Thr His Leu Gly Tyr Asn Ser Asn Gly Lys Leu Tyr His
385 390 395 400
Tyr Phe Arg Gly Thr Gly Arg Val Ala Ile Ser Met Ala Glu Gly Met
405 410 415
Ile Ile Glu Pro Gly Ile Leu Asn Ile Lys Thr Gly Val Asn Glu Leu
420 425 430
Asn Leu Arg Ala Asp Gly Thr Val Ser Thr Thr Gln Arg Leu Met Val
435 440 445
Asn Asn Gly Leu Val Leu Asn Ala Asn Asn Asn Thr Ser Ala Leu Ala
450 455 460
Leu Thr Ala Pro Thr Gly Val Asp Gly Thr Lys Thr Ile Asn Trp Asp
465 470 475 480
Ala Gly Thr Arg Asn Gly Gln Asn Lys Asn Thr Val Thr Met Lys Ala
485 490 495
Trp Gly Asn Ser Phe Asn Ala Gly Gly Gly Asn Arg Glu Thr Val Phe
500 505 510
Glu Val Ser Asp Ser Gln Gly Tyr Tyr Phe Tyr Gly Gln Arg Thr Asn
515 520 525
Pro Ala Ser Gly Glu Thr Val Gly Pro Ile Asn Phe Lys Phe Asn Gly
530 535 540
Ser Val Glu Thr Gly His Phe Ser Ser Leu Gly Asn Ile Ser Ala Ser
545 550 555 560
Gly Thr Gly Ser Phe Gly Gly Asn Val Thr Met Thr Asn Gly Leu Phe
565 570 575
Val Gln Gly Gly Ala Ser Ile Asn Gly Gln Val Lys Met Gly Gly Thr
580 585 590
Ala Asp Ala Leu Arg Ile Trp Asn Ala Glu Tyr Gly Met Ile Phe Arg
595 600 605

[0196]

```
Arg Ser Glu Thr Gly Ser Ser Ala Ser Phe His Leu Ile Pro Thr Leu
    610                 615                 620
Gln Asn Ala Gly Glu Asn Gly Gly Ile Ser Asp Leu Arg Pro Leu Ser
625                 630                 635                 640
Ile Asn Leu Ala Ser Gly Thr Val Ile Met Gly Asn Lys Ser Thr Gly
                645                 650                 655
Gly Pro Leu Phe Thr Val Asp Asn Val Ser Lys Phe Val Gln Thr Asp
            660                 665                 670
Cys Arg Leu Arg Val Asn Met Asp Ser Asp Gly Ile Val Leu Asn Ala
        675                 680                 685
Ser Ser Gln Ala Ala Ser Asn Phe Ile Gln Gly Arg Lys Ala Asp Val
    690                 695                 700
Thr Lys Trp Tyr Leu Gly Ile Gly Asp Gly Gly Asn Val Val Arg Met
705                 710                 715                 720
His Asn Tyr Thr Tyr Ser His Gly Ile Ala Leu Asn Ser Asp Thr Val
                725                 730                 735
Asp Ile Thr Lys Pro Leu Lys Ile Gly Ser Asp Ile Arg Ile Gly Thr
            740                 745                 750
Asp Gly Asn Ile Ile Gly Ser Ala Thr Leu Asp Asn Phe Lys Asn Leu
        755                 760                 765
Asn Thr Thr Leu Asp His Lys Val Asn Met Gly Gly Trp Ser Gly Gly
    770                 775                 780
Ala Thr Thr Gly Trp Tyr Lys Phe Ala Thr Val Glu Ile Pro Gln Ala
785                 790                 795                 800
Thr Gly Thr Ala Ser Phe Lys Ile Phe Gly Gly Ser Gly Phe Asn Phe
                805                 810                 815
Lys Ser Tyr Gly Gln Ala Ser Ile Ala Glu Ile Ile Leu Arg Thr Gly
            820                 825                 830
Asn Asn Asn Pro Lys Gly Leu Asn Ala Thr Leu Trp Asn Arg Thr Ser
        835                 840                 845
Glu Ala Ile Ser Gln Ile Ala Ser Val Asn Thr Ser Glu Asp Ile Tyr
    850                 855                 860
Asp Ile Tyr Val Tyr Leu Gly Gly Tyr Ser Asn Ser Leu Val Val Glu
865                 870                 875                 880
Tyr Thr Cys Ser Ser Asn Ser Lys Val Thr Val Val Gly Met Asp Gly
                885                 890                 895
Gly Val Gln Pro Leu Val Glu Thr Leu Pro Glu Gly His Val Val Gly
            900                 905                 910
Lys Ser Val Arg Met Leu Asn Asn Leu Asp Gly Met Phe Ala Ala Gly
        915                 920                 925
Glu Ser Asp Ile Val Thr Arg Gly Glu Tyr Val Thr Asn Asn Gln Lys
    930                 935                 940
Gly Met Arg Ile Lys Ser Lys Gly Asn Asp Leu Asp Ser Asn Ala Ala
945                 950                 955                 960
```

[0197]

```
Leu Leu Arg Asn Asp Gly Gly Ser Phe Tyr Ile Leu Ala Thr Asp Lys
                965                 970                 975
Asn Thr Thr Glu Lys Pro Asp Ala Ala Asn Gly Asp Trp Asn Gly Leu
            980                 985                 990
Arg Pro Phe Ser Ile Asn Met Ala  Asp Gly Arg Val Gly  Met Asn His
        995                 1000                1005
Gly Leu  Asn Ile Thr Gly Gly  Gly Leu Asn Val Thr  Gly Gly Asn
    1010                1015                1020
Thr Asn  Leu Gly Asn Ile Thr  Ser Arg Val Val Ser  Ser Ala Arg
    1025                1030                1035
Ala Gly  Ser Gly Trp Gly Asp  Asn Ser Asp Ala Met  Lys Ser Lys
    1040                1045                1050
Ile Thr  Phe Met Ala Asp His  Gly Asp Leu Ser Asn  Ser Gly Ser
    1055                1060                1065
Tyr Tyr  Pro Ile Val Gly Ala  Tyr Ser Asn Tyr Gly  Ser Ala Gly
    1070                1075                1080
Tyr Arg  Gln Thr Phe Glu Phe  Gly Trp Val Gly Ser  Gly Ser Thr
    1085                1090                1095
Ala Asn  Trp Arg Glu Gly Ile  Ile Arg Ile Arg Gly  Asp Asn Ala
    1100                1105                1110
Asn Gly  Gln Gln Ala Arg Trp  Arg Phe Thr Met Asp  Gly Ile Leu
    1115                1120                1125
Gly Cys  Pro Gly Lys Val Glu  Met Pro Glu Thr Ser  Ala Phe Gly
    1130                1135                1140
Ile Asn  Thr Thr Asn Gly Phe  Gly Gly Asn Ser Ile  Val Ile Gly
    1145                1150                1155
Asp Ser  Asp Thr Gly Phe Arg  Gln Val Gly Asp Gly  Leu Leu Glu
    1160                1165                1170
Val Trp  Thr Asn Ala Ser Arg  Arg Met Arg Phe Gln  Gly Gly Asp
    1175                1180                1185
Thr Tyr  Ser Asp Met Asn Ile  Asn Ala Pro Asn Val  Tyr Ile Arg
    1190                1195                1200
Ser Asp  Ile Arg Leu Lys Ser  Asn Phe Lys Pro Ile  Glu Asn Ala
    1205                1210                1215
Leu Asp  Lys Val Glu Gln Leu  Asp Gly Leu Ile Tyr  Asp Lys Ala
    1220                1225                1230
Asp Tyr  Ile Gly Gly Glu Val  Val His Thr Glu Ala  Gly Val Ile
    1235                1240                1245
Ala Gln  Ser Leu Glu Lys Val  Leu Pro Glu Ala Val  Arg Glu Val
    1250                1255                1260
Asp Asp  Ile Lys Gly Asn Lys  Val Leu Thr Val Ser  Thr Gln Ala
    1265                1270                1275
Gln Val  Ala Leu Leu Ile Glu  Ala Val Lys Thr Leu  Ser Ala Lys
    1280                1285                1290
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Val Lys Glu Leu Glu Ala Lys Leu Asn
1295 1300

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<213> 人工序列
<220>
<223> WW170
<400> 140

Met Ala Asp Leu Ser Arg Ile Gln Phe Lys Arg Thr Ser Thr Lys Gly
1 5 10 15
Arg Arg Pro Asp Ala Ser Thr Met Asn Pro Gly Glu Leu Ala Ile Asn
20 25 30
Leu Ala Asp Gln Tyr Leu Leu Thr Lys Asn Asp Ser Gly Ala Ile Ile
35 40 45
Asn Leu Ser Cys Pro Pro Val Tyr Asp Arg Asp Val Thr Met Ala Gly
50 55 60
Lys Val Lys Gly Asn Asn Tyr Ile Leu Ser Lys Thr Ala Asn Tyr Leu
65 70 75 80
Glu Asp Gln Thr Ala Arg Asp Leu Asn Tyr Phe Gly Ala Phe Arg Thr
85 90 95
Asn Gly Gln Asp Gly Leu Leu Asp Leu Thr Leu Asn Val Pro His Ser
100 105 110
Ala Gly Val Asn His Gly Arg Gly Phe Thr Phe Arg Tyr Ala Thr Gly
115 120 125
Gly Ser Arg Val Glu Thr Tyr Gly Tyr Asn Ala Gln Gly Gln Lys Ala
130 135 140
Phe Ser Tyr Lys Met Tyr His Glu Gly Asp Lys Pro Thr Pro Ser Glu
145 150 155 160
Leu Asn Val Tyr Ser Lys Gln Glu Val Asp Arg Met Phe Val Lys Thr
165 170 175
Val Lys Leu Ala Thr Val Pro Val Asp Ile Val Asp Gly Tyr Phe Lys
180 185 190
Leu Ala Thr Ala Met Ile Pro Gln Asn Gly Arg Ser Val Phe Phe Arg
195 200 205
Ile His Gly Gly Asn Gly Tyr Asn Val Thr Ala Tyr Asp Gln Val Asp
210 215 220
Ile Val Glu Ile Val Ile Arg Ser Gly Asn Asn Arg Pro Lys Gly Val
225 230 235 240
Asn Val Ile Ala Tyr Arg Arg Asn Thr Asn Lys Ala Phe Asp Val Leu
245 250 255
Ala Val Asn Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Lys Tyr Gln
260 265 270
Arg Tyr Thr Asp Asn Val Ile Val Glu Phe Gly Lys Ser Val Asp Val

[0198]

[0199]

```
          275                 280                 285
Asp Leu Val Val His Asp Val Pro Asp Phe Val Val Asp Arg Pro Val
      290                 295                 300
Gly Asp Asn Val Ile Gly Gly Arg Ala Val Thr Leu Phe Asn Thr Glu
305                 310                 315                 320
Asn Lys Arg Gly Val Leu Ser Phe Asp Asp Asn Thr Gln Asn Ser Tyr
                  325                 330                 335
Asp Ile Val His Leu Ser Asn Asp Arg Gly Thr Gly Arg Lys Tyr Ile
              340                 345                 350
Arg Lys Phe Arg Ser Asn Tyr Asn Glu Met Ile Trp His Glu Thr Val
          355                 360                 365
Gln Gly Ser Thr Tyr Arg Leu Ala Thr Gly Ser Thr Asp Ala Gln Glu
      370                 375                 380
Ile Leu Ser Val Glu Ser Ser Ser Ser Ile Ala Gly Thr His Lys Gly
385                 390                 395                 400
Asn Ile Leu Ser Gly Arg Met Met Leu Gly Gly Gly Ser Asn Val Ile
                  405                 410                 415
Thr Leu Arg Arg Pro Ala Gly Gln Ser Asn His Ile Ala Phe Gln Asp
              420                 425                 430
Asn Arg Thr Gly Ser Ile Thr Arg Gln Gly Trp Ile Gly Tyr Gly Asn
          435                 440                 445
Ala Asp Thr Asn Val Phe Glu Trp Tyr Ser Asp Val Gly Gly Thr Ser
      450                 455                 460
Ile Arg His His Ile Asp Gly Gln Ile Glu Leu Ala Thr Gly Asn Thr
465                 470                 475                 480
Lys Arg Val Tyr Thr Asn Ala Gln Phe Ile Ser Met Asn Ser Asp Ala
                  485                 490                 495
Tyr Arg Met Ile Phe Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly
              500                 505                 510
Thr Lys Val Tyr Leu Leu Ser Thr Ala Glu Asp Asp Lys Phe Gly Gly
          515                 520                 525
Trp Asn Gly Asn Arg Pro Phe Ile Tyr Asp Leu Thr Asn Gly Lys Val
      530                 535                 540
Thr Leu Gly Gly Asp Gly Asn Glu Gly Ala Leu Val Leu Glu Arg Asp
545                 550                 555                 560
Ser Arg Ala Ala Arg Phe Ala Gly Asp Val Tyr Val Glu Lys Gly Phe
                  565                 570                 575
Leu His Phe Ser Ser Gly Arg Gln Gly Ala Ser Gly Phe Met Lys Ile
              580                 585                 590
Asn His Leu Gly Asp Ile Ala Ser Gly Arg His Asn Ile Leu Gln Ile
          595                 600                 605
Glu Asp Pro Thr Gly Ile His Phe Ser Thr Glu Arg Asn Asp Glu Thr
      610                 615                 620
Gly Asn Ile Thr Ala Arg Phe Lys Gly Phe Val Arg Val Glu Ala Gly
```

625 630 635 640
Glu Ile Ala Phe Asp Ala Asn Arg Gly Ser Gln Ser Gln Phe Thr Leu
645 650 655
His Thr Trp Gly Asn Glu Gln Arg Lys Gln Val Phe Glu Cys Lys Asp
660 665 670
Ala Thr Gly Tyr His Trp Tyr Thr Glu Arg Thr Gln Gly Gly Thr Gly
675 680 685
Asn Val Leu Phe Ser Met Ala Gly Ser Leu Asn Val Thr Ser Asn Ile
690 695 700
Thr Thr Thr Gly Ala Asp Ile Thr Phe Lys Arg Ala Gly Asn Lys His
705 710 715 720
Ile Trp Phe Arg Asp Pro Asp Gly Leu Glu Leu Gly Leu Met Tyr Cys
725 730 735
Asp Asp Ala Gly Ala Ile Arg Phe Arg Gly Gln Lys Gln Ala Gln Ala
740 745 750
Trp Lys Phe Ala Asp Lys Met Ile Gln Leu Glu Ser Gly Thr Val Ser
755 760 765
Gly Gly Gly Asn Gly Leu Ile Arg Gly Glu Val Ala Gly Gly Ser Trp
770 775 780
Ser Ser Trp Arg Asp Arg Ala Ala Gly Leu Met Val Gly Cys Pro Gln
785 790 795 800
[0200] Ser Thr Asn Ser Ala His Asn Val Trp Lys Ala Thr His Trp Gly Lys
805 810 815
Tyr His Ile Ala Ala Met Gly Ile His Val Pro Asp Gly Thr Ile Gly
820 825 830
Asn Ala Leu Ala Arg Leu His Val His Asp Thr Asn Phe Asp Phe Ser
835 840 845
Ala Ser Gly Asp Met Thr Ala Gly Arg Asn Gly Ser Phe Asn Asp Val
850 855 860
Tyr Ile Arg Ser Asp Ala Arg Leu Lys Ile Asn Lys Glu Glu Tyr Lys
865 870 875 880
Glu Asn Ala Thr Asp Lys Ile Asn Arg Leu Thr Val Tyr Thr Tyr Asp
885 890 895
Lys Val Lys Ser Leu Thr Asp Arg Thr Val Ile Ala His Glu Val Gly
900 905 910
Ile Ile Ala Gln Asp Leu Glu Lys Glu Leu Pro Glu Ala Val Thr Thr
915 920 925
Ser Lys Val Gly Asp Pro Asp Lys Pro Glu Glu Ile Leu Thr Ile Ser
930 935 940
Asn Ser Ala Val Asn Ala Leu Leu Ile Lys Ala Phe Gln Glu Met Ser
945 950 955 960
Glu Glu Leu Lys Ala Val Lys Ala Glu Leu Ala Glu Leu Lys Lys Asn
965 970 975

<210> 141

[0201]

<211> 966
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<213> 人工序列
<220>
<223> WW202
<400> 141

Met Ala Asp Leu Asn Arg Ile Gln Phe Lys Arg Thr Ser Thr Ala Gly
1 5 10 15
Arg Lys Pro Asp Ala Gly Thr Met Asn Pro Gly Glu Leu Ala Ile Asn
20 25 30
Leu Ala Asp Gln Tyr Leu Leu Thr Lys Asn Asp Asp Gly Gln Ile Val
35 40 45
Asn Leu Ser Cys Pro Pro Val Tyr Asp Lys Gly Phe Asp Val Arg Gly
50 55 60
Arg Val Val Val Asp Asp Leu Val Trp Ser Asn Thr Ala Asn Tyr Phe
65 70 75 80
Asp Asp Pro Thr Ala Arg Asn Leu Asp Lys Phe Gly Ala Phe Arg Thr
85 90 95
Asn Asp Met Asp Gly His Leu Ala Phe Ala Leu His Ile Pro His Pro
100 105 110
Ser Gly Ile Asn His Ala Arg Gly Phe Asp Phe Thr Tyr Gly Ser Asn
115 120 125
Val Val Pro Thr Val Lys Thr Tyr Gly Tyr Asn Ala Asp Gly Val Leu
130 135 140
Ala Tyr Ser Tyr Arg Met Tyr His Glu Gly Asp Lys Pro Ser Pro Ser
145 150 155 160
Glu Leu Asn Val Tyr Ser Lys Gln Glu Val Asp Arg Met Phe Gln Lys
165 170 175
Thr Ile Asn Phe Gly Val Glu Thr Gly Trp Phe Lys Ile Ala Thr Ala
180 185 190
Phe Ile Pro Gln Asn Asp Gly Arg Ser Leu Lys Ile Arg Leu Val Gly
195 200 205
Gly Asn Gly Trp Asn Val Gly Gln Thr Gly Gln Cys Asn Ile Ile Glu
210 215 220
Leu Val Ile Arg Thr Ser Asn Gly Ser Pro Lys Gly Ile Asn Phe Val
225 230 235 240
Ala Tyr His His Val Ser Gly Tyr Glu Asn Gln Phe Cys Ala Ile Asn
245 250 255
Thr Gly Asp Asp Thr Tyr Asp Ile Tyr Ala Tyr Tyr Tyr Glu Phe Thr
260 265 270
Asn Met Val Met Ala Glu Tyr Gln Ala Ser Ser Asp Val Asn Leu Thr
275 280 285
Val Phe Asp Arg Pro Glu Tyr Val Gly Glu Lys Pro Val Ala Glu His
290 295 300

[0202]

```
Ile Phe Asp Ala Tyr Thr Ile His Ser Phe Asn Ser Phe Ser Asn Arg
305                 310                 315                 320
Gly Thr Leu Asn Phe Ala Gly Asn His Gln Gly Gln Tyr Asp Ile Glu
                325                 330                 335
His Met Asn Glu Gln Pro Thr Asn Ala Lys Lys Met Leu Arg Arg Phe
            340                 345                 350
Arg Ser Ser Ala Ser Ala Thr Ile Trp His Glu Thr Val Asp Asp Gln
        355                 360                 365
Asn Tyr Arg Leu Ala Thr Gly Gly Thr Asp Ser Val Gln Gln Leu Leu
    370                 375                 380
Leu Ser Ser Gly Thr Gly Leu His Ile Arg Arg Leu Thr Ile Asp Gly
385                 390                 395                 400
Gly Leu Gly Ser Gly Ser Asn Ala Gly Ile Asp Ile Arg Arg Gly Pro
                405                 410                 415
Asn Glu Ser Ser His Phe Asn Phe Met Asp Tyr Arg Thr Gly Gln Asp
            420                 425                 430
Val Arg Asn Gly Trp Phe Gly Phe Gly Asp Leu Thr Thr Lys Asp Phe
        435                 440                 445
Ile Trp Trp Asn Asp Asn Gly Gln Asn Ser Ile Asn Leu Ile Glu Asn
    450                 455                 460
Gly Glu Leu His Ile Thr Gly Gly Arg Gly Gln Lys Ile Val Met Asn
465                 470                 475                 480
Ser Glu Val Ala Leu Ser Glu Asn Ala Arg Leu Ala Val Lys Gly Gly
                485                 490                 495
Asn Tyr Gly Leu Ile Leu Arg Asn Asp Gly Thr Gly Phe His Ile Leu
            500                 505                 510
Thr Thr Asp Leu Lys Asp Ser Phe Gly Ser Trp Asn Asn Arg Arg Pro
        515                 520                 525
Phe Ser Tyr Asn Phe Ala Asp Gly Gly Leu Tyr Leu Gly Gly Thr Glu
    530                 535                 540
Thr Ala Arg Cys Leu His Leu Gly Ile Asp Gly Ser Thr Arg Leu Glu
545                 550                 555                 560
Asp Asn Leu Phe Phe Lys Ala Gly Ser Arg Gln Ser Met Asp Tyr Met
                565                 570                 575
Glu Leu Val His Trp Gly Ala Ser Asn Thr Gly Arg Asn Asn Val Leu
            580                 585                 590
Ser Leu Arg Asp Ser Lys Gly Phe Leu Ala Glu Phe Glu Arg Val Gly
        595                 600                 605
Gly Thr Asp Gly Val Lys Thr Arg Phe Phe Gly Glu Thr Phe Thr Asp
    610                 615                 620
Gly Thr Leu Tyr Leu Asn Gln Met Asn Asn Ser Ser Glu Arg Phe Ser
625                 630                 635                 640
Ile Asn Asn Trp Gly Asn Ser Glu Val Gly Arg Ala Ala Val Met Glu
                645                 650                 655
```

[0203]

Val Gly Asp Ser Lys Gly Tyr His Phe Tyr Ala Glu Arg Arg Thr Asp
660 665 670
Asp Thr Val Leu Phe Asp Val Ser Gly Ala Leu Thr Val His Gly Pro
675 680 685
Asn Gly Ile Thr Val Lys Asn Ser Thr Gly Ala Arg His Ile Trp Phe
690 695 700
Arg Asp Asp Ser Asp Thr Glu Lys Ala Val Ile Trp Ala Thr Asp Asp
705 710 715 720
Gly Met Leu His Ile Arg Asn Asn His Glu Gly Ser Phe Ala His His
725 730 735
Phe Gln Gly Ala Met Ile Lys Leu Glu Gly Arg Val Pro Tyr Gly Ala
740 745 750
Ala Lys Gly Leu Ile Arg Gly Glu Val Asp Gly Gly Ala Tyr Val Ala
755 760 765
Trp Arg Asp Arg Pro Ala Gly Leu Leu Val Asp Cys Gln Lys Ser Ile
770 775 780
Asp Ser Ala His Ala Val Trp Lys Ala Val Asp Trp Gly Arg Gln Tyr
785 790 795 800
Ile Ala Ala Met Asp Val His Cys Pro Gly Asp Gly Asn Asn Thr Ala
805 810 815
Ala Ala Val Leu His Val Gln Ala Ala Asp Tyr Gln Phe His Ala Ser
820 825 830
Gly Glu Phe His Ala Ser Gly Asn Gly Asn Phe Asn Asp Val Tyr Ile
835 840 845
Arg Ser Asp Arg Arg Leu Lys Asp Asn Ile Glu Asp Tyr Thr Gly Asn
850 855 860
Ala Leu Ser Leu Ile Gly Lys Leu Lys Val Lys Thr Tyr Asp Lys Val
865 870 875 880
Lys Ser Leu Lys Asp Arg Glu Ile Ile Gly His Glu Ile Gly Ile Ile
885 890 895
Ala Gln Asp Leu Gln Glu Ile Leu Pro Glu Ala Val Lys Ser Ser Lys
900 905 910
Val Gly Asn Leu Asp Asn Pro Asp Asp Val Leu Thr Ile Ser Asn Ser
915 920 925
Ala Val Asn Ala Leu Leu Ile Lys Ala Ile Gln Glu Met Ser Glu Glu
930 935 940
Ile Lys Glu Leu Lys Thr Pro Phe Phe Thr Lys Ile Ala Arg Lys Ile
945 950 955 960
Ser Lys Tyr Phe Lys Phe
965

<210> 142
<211> 901
<212> PRT
<213> 人工序列

<220>
<223> WW13 13.0
<400> 142

[0204]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg

[0205]

```
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Ile Ile Gln Leu Glu Asp Ser Gln Gly Ala His Phe Ser Thr Glu Arg
    530                 535                 540
Thr Leu Ala Thr Gly Ala Ile Lys Thr Arg Phe Phe Gly Glu Thr Phe
545                 550                 555                 560
Thr Asp Gly Thr Leu Tyr Leu Asn Gln Met Asn Asn Ser Ser Glu Arg
                565                 570                 575
Phe Ser Ile Asn Asn Trp Gly Asn Ser Glu Val Gly Arg Pro Ala Val
            580                 585                 590
Leu Glu Val Gly Asp Ser Lys Gly Tyr His Phe Tyr Thr Glu Arg Gly
        595                 600                 605
Thr Asp Asn Ser Leu Asn Phe Asp Val Ala Gly Asn Phe Thr Val His
    610                 615                 620
Gly Pro Ser Gly Ile Thr Ile Lys Thr Ser Thr Gly Ala Arg His Ile
625                 630                 635                 640
Trp Phe Arg Asp Asp Ser Asp Ala Glu Lys Ala Val Ile Trp Ala Thr
                645                 650                 655
Asp Glu Gly Ile Leu His Ile Arg Asn Asn Tyr Gly Gly Ser Phe Ser
            660                 665                 670
His His Phe Gln Gly Ala Met Ile Leu Ala Gly Glu Arg Val Pro Tyr
```

675 680 685
Asn Ser Glu Tyr Ala Leu Ile Arg Gly Asn Ile Ser Gly Gly Ala Trp
690 695 700
Val Asp Trp Arg Gly Arg Pro Ala Gly Leu Leu Val Asp Cys Gln Asp
705 710 715 720
Ser Arg Asn Gln Ala Tyr Asn Ile Trp Lys Ala Thr His Trp Gly Asp
725 730 735
Gln His Leu Ala Ala Met Gly Val His Ala Gly Gly Gly Asn Pro Gln
740 745 750
Val Val Leu His Val Gly Gly Asn Asp Tyr Ala Phe Ala Ser Asn Gly
755 760 765
Asp Phe Thr Ala Gly Ala Ala Val Tyr Cys Asn Asp Val Tyr Ile Arg
770 775 780
Ser Asp Arg Arg Leu Lys Ile Asn Val Lys Asp Tyr Glu Glu Asn Ala
785 790 795 800
Val Asp Lys Val Asn Lys Leu Lys Val Lys Thr Tyr Asp Lys Val Lys
805 810 815
Ser Leu Ser Asp Arg Glu Val Ile Gly His Glu Ile Gly Ile Ile Ala
820 825 830
Gln Asp Leu Gln Glu Val Leu Pro Glu Ala Val Ser Thr Ser Ser Val
835 840 845
Gly Ser Gln Asp Asn Pro Glu Glu Ile Leu Thr Ile Ser Asn Ser Ala
850 855 860
Val Asn Ala Leu Leu Ile Lys Ala Ile Gln Glu Met Ser Glu Glu Ile
865 870 875 880
Lys Glu Leu Lys Thr Pro Leu Phe Thr Lys Ile Ala Arg Lys Ile Ser
885 890 895
Lys Tyr Phe Lys Phe
900

[0206]

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<220>
<223> WW13 10.0
<400> 143
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1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60

[0207]

Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Val Asp Arg Ala Val His Thr
385 390 395 400
Leu Gly Glu Ile Thr Thr Asn Ala Val Asn Gly Leu Arg Ile Trp Asn
405 410 415

[0208]

```
Asn Asp Tyr Gly Val Ile Phe Arg Arg Ser Glu Gly Ser Leu His Ile
            420                 425                 430
Ile Pro Thr Ala Phe Gly Glu Gly Glu Thr Gly Asp Ile Gly Pro Leu
        435                 440                 445
Arg Pro Leu Ser Ile Ala Leu Asp Thr Gly Lys Val Thr Ile Pro Asp
    450                 455                 460
Leu Gln Ser Ser Tyr Asn Thr Phe Ala Ala Asn Gly Tyr Ile Lys Phe
465                 470                 475                 480
Val Gly His Gly Ala Gly Ala Gly Gly Tyr Asp Ile Gln Tyr Ala Gln
                485                 490                 495
Ala Ala Pro Ile Phe Gln Glu Ile Asp Asp Asp Ala Val Ser Lys Tyr
            500                 505                 510
Tyr Pro Ile Val Lys Gln Lys Phe Leu Asn Gly Lys Ser Val Trp Ser
        515                 520                 525
Leu Gly Thr Glu Ile Glu Ser Gly Thr Phe Val Ile His His Leu Lys
    530                 535                 540
Glu Asp Gly Ser Gln Gly His Ala Ser Arg Phe Asn Gln Asp Gly Thr
545                 550                 555                 560
Val Asn Phe Pro Asp Asn Val Leu Val Gly Gly Asp Ile Asn Met Lys
                565                 570                 575
Gly Met Met Thr Phe Asp Ala Gly Arg Leu Gly Ser Arg Asp Tyr Phe
            580                 585                 590
Lys Phe Asn His Trp Gly Asp Ser Asn Asn Gly Arg Asp Asn Ile Ile
        595                 600                 605
Gln Leu Glu Asp Ser Gln Gly Ala His Phe Ser Thr Glu Arg Thr Leu
    610                 615                 620
Ala Thr Gly Ala Ile Lys Thr Arg Phe Phe Gly Glu Thr Phe Thr Asp
625                 630                 635                 640
Gly Thr Leu Tyr Leu Asn Gln Met Asn Asn Ser Ser Glu Arg Phe Ser
                645                 650                 655
Ile Asn Asn Trp Gly Asn Ser Glu Val Gly Arg Pro Ala Val Leu Glu
            660                 665                 670
Val Gly Asp Ser Lys Gly Tyr His Phe Tyr Thr Glu Arg Gly Thr Asp
        675                 680                 685
Asn Ser Leu Asn Phe Asp Val Ala Gly Asn Phe Thr Val His Gly Pro
    690                 695                 700
Ser Gly Ile Thr Ile Lys Thr Ser Thr Gly Ala Arg His Ile Trp Phe
705                 710                 715                 720
Arg Asp Asp Ser Asp Ala Glu Lys Ala Val Ile Trp Ala Thr Asp Glu
                725                 730                 735
Gly Ile Leu His Ile Arg Asn Asn Tyr Gly Gly Ser Phe Ser His His
            740                 745                 750
Phe Gln Gly Ala Met Ile Leu Ala Gly Glu Arg Val Pro Tyr Asn Ser
        755                 760                 765
```

[0209]

Glu Tyr Ala Leu Ile Arg Gly Asn Ile Ser Gly Gly Ala Trp Val Asp
770 775 780
Trp Arg Gly Arg Pro Ala Gly Leu Leu Val Asp Cys Gln Asp Ser Arg
785 790 795 800
Asn Gln Ala Tyr Asn Ile Trp Lys Ala Thr His Trp Gly Asp Gln His
805 810 815
Leu Ala Ala Met Gly Val His Ala Gly Gly Gly Asn Pro Gln Val Val
820 825 830
Leu His Val Gly Gly Asn Asp Tyr Ala Phe Ala Ser Asn Gly Asp Phe
835 840 845
Thr Ala Gly Ala Ala Val Tyr Cys Asn Asp Val Tyr Ile Arg Ser Asp
850 855 860
Arg Arg Leu Lys Ile Asn Val Lys Asp Tyr Glu Glu Asn Ala Val Asp
865 870 875 880
Lys Val Asn Lys Leu Lys Val Lys Thr Tyr Asp Lys Val Lys Ser Leu
885 890 895
Ser Asp Arg Glu Val Ile Gly His Glu Ile Gly Ile Ile Ala Gln Asp
900 905 910
Leu Gln Glu Val Leu Pro Glu Ala Val Ser Thr Ser Ser Val Gly Ser
915 920 925
Gln Asp Asn Pro Glu Glu Ile Leu Thr Ile Ser Asn Ser Ala Val Asn
930 935 940
Ala Leu Leu Ile Lys Ala Ile Gln Glu Met Ser Glu Glu Ile Lys Glu
945 950 955 960
Leu Lys Thr Pro Leu Phe Thr Lys Ile Ala Arg Lys Ile Ser Lys Tyr
965 970 975
Phe Lys Phe

<210> 144
<211> 1432
<212> PRT
<213> 人工序列
<220>
<223> WW13-G8
<400> 144
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp

65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
[0210] Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Gly Asn Ile Ile Asp Leu Gly
385 390 395 400
Phe Ala Lys Gly Gly Ser Ile Asp Gly Asn Val Ile His Ile Gly Asn
405 410 415
Tyr Asn Gln Thr Gly Asp Tyr Thr Leu Asn Gly Thr Phe Thr Gln Thr

[0211]

```
                420                 425                 430
Gly Asn Phe Asn Leu Thr Gly Ile Ala Arg Val Thr Arg Asp Ile Ile
        435                 440                 445
Ala Ala Gly Gln Ile Met Thr Glu Gly Gly Glu Leu Ile Thr Lys Ser
    450                 455                 460
Ser Gly Thr Ala His Val Arg Phe Phe Asp Gly Asn Ser Arg Glu Arg
465                 470                 475                 480
Gly Ile Ile Tyr Ala Pro Ala Asn Asp Gly Leu Thr Thr Gln Val Leu
                485                 490                 495
Asn Ile Arg Val Gln Asp Tyr Ala Ala Gly Ser Glu Ser Thr Tyr Ala
            500                 505                 510
Phe Ser Gly Ser Gly Leu Phe Thr Ser Pro Glu Val Ser Ala Trp Lys
        515                 520                 525
Ser Met Ser Thr Pro Gln Ile Leu Thr Asp Lys Val Ile Thr Asn Gly
    530                 535                 540
Lys Lys Thr Gly Asp Tyr Asp Ile Tyr Ser Leu Ser Asn Asn Thr Pro
545                 550                 555                 560
Leu Ala Glu Ser Glu Thr Ala Ile Asn His Leu Arg Val Met Arg Asn
                565                 570                 575
Ala Val Gly Ala Gly Ile Phe His Glu Val Asn Val Asn Asp Gly Ile
            580                 585                 590
Thr Trp Tyr Ser Gly Asp Gly Leu Asp Thr Tyr Leu Trp Ser Phe Asn
        595                 600                 605
Trp Ala Gly Gly Leu Lys Ala Gly His Ser Ile Ser Val Gly Leu Pro
    610                 615                 620
Gly Gly Ser Lys Gly Tyr Ser Glu Leu Gly Thr Ala Ser Ile Ala Leu
625                 630                 635                 640
Gly Asp Asn Asp Thr Gly Phe Lys Trp His Gln Asp Gly Tyr Phe His
                645                 650                 655
Thr Val Asn Asn Gly Thr Arg Thr Phe Ile Tyr Gly Pro Ala Glu Thr
            660                 665                 670
Gln Ser Leu Arg Lys Met Val Met Gly Tyr Ser Pro Asp Gly Ile Leu
        675                 680                 685
Met Thr Thr Pro Pro Thr Glu Asn Tyr Ala Leu Ala Thr Val Val Thr
    690                 695                 700
Tyr His Asp Asn Asn Ala Phe Gly Asp Gly Gln Thr Leu Leu Gly Tyr
705                 710                 715                 720
Tyr Gln Gly Gly Asn Tyr His His Tyr Phe Arg Gly Lys Gly Thr Thr
                725                 730                 735
Asn Ile Asn Thr His Gly Gly Leu Leu Val Thr Pro Gly Asn Ile Asp
            740                 745                 750
Val Ile Gly Gly Ser Val Asn Ile Asp Gly Arg Asn Asn Asn Ser Thr
        755                 760                 765
Leu Met Phe Lys Gly Tyr Thr Met Gly Gln Ser Ser Val Asp Asn Met
```

[0212]

770 775 780
Tyr Ile Ala Val Trp Gly Asn Thr Phe Thr Asn Pro Ser Glu Gly Thr
785 790 795 800
Arg Lys Asn Val Met Glu Ile Ser Asp Asp Ile Gly Trp Met His Tyr
805 810 815
Ile Gln Arg Asn Lys Asp Asn Thr Val Glu Ala Val Leu Asn Gly Gln
820 825 830
Gln Thr Ile Asn Glu Asn Ile Ile Ala Lys Lys Asp Ile Trp Val Asp
835 840 845
Arg Ala Val His Thr Leu Gly Glu Ile Thr Thr Asn Ala Val Asn Gly
850 855 860
Leu Arg Ile Trp Asn Asn Asp Tyr Gly Val Ile Phe Arg Arg Ser Glu
865 870 875 880
Gly Ser Leu His Ile Ile Pro Thr Ala Phe Gly Glu Gly Glu Thr Gly
885 890 895
Asp Ile Gly Pro Leu Arg Pro Leu Ser Ile Ala Leu Asp Thr Gly Lys
900 905 910
Val Thr Ile Pro Asp Leu Gln Ser Ser Tyr Asn Thr Phe Ala Ala Asn
915 920 925
Gly Tyr Ile Lys Phe Val Gly His Gly Ala Gly Ala Gly Gly Tyr Asp
930 935 940
Ile Gln Tyr Ala Gln Ala Ala Pro Ile Phe Gln Glu Ile Asp Asp Asp
945 950 955 960
Ala Val Ser Lys Tyr Tyr Pro Ile Val Lys Gln Lys Phe Leu Asn Gly
965 970 975
Lys Ser Val Trp Ser Leu Gly Thr Glu Ile Glu Ser Gly Thr Phe Val
980 985 990
Ile His His Leu Lys Glu Asp Gly Ser Gln Gly His Ala Ser Arg Phe
995 1000 1005
Asn Gln Asp Gly Thr Val Asn Phe Pro Asp Asn Val Leu Val Gly
1010 1015 1020
Gly Asp Ile Asn Met Lys Gly Met Met Thr Phe Asp Ala Gly Arg
1025 1030 1035
Leu Gly Ser Arg Asp Tyr Phe Lys Phe Asn His Trp Gly Asp Ser
1040 1045 1050
Asn Asn Gly Arg Asp Asn Ile Ile Gln Leu Glu Asp Ser Gln Gly
1055 1060 1065
Ala His Phe Ser Thr Glu Arg Thr Leu Ala Thr Gly Ala Ile Lys
1070 1075 1080
Thr Arg Phe Phe Gly Glu Thr Phe Thr Asp Gly Thr Leu Tyr Leu
1085 1090 1095
Asn Gln Met Asn Asn Ser Ser Glu Arg Phe Ser Ile Asn Asn Trp
1100 1105 1110
Gly Asn Ser Glu Val Gly Arg Pro Ala Val Leu Glu Val Gly Asp

[0213]

1115 1120 1125

Ser Lys Gly Tyr His Phe Tyr Thr Glu Arg Gly Thr Asp Asn Ser

1130 1135 1140

Leu Asn Phe Asp Val Ala Gly Asn Phe Thr Val His Gly Pro Ser

1145 1150 1155

Gly Ile Thr Ile Lys Thr Ser Thr Gly Ala Arg His Ile Trp Phe

1160 1165 1170

Arg Asp Asp Ser Asp Ala Glu Lys Ala Val Ile Trp Ala Thr Asp

1175 1180 1185

Glu Gly Ile Leu His Ile Arg Asn Asn Tyr Gly Gly Ser Phe Ser

1190 1195 1200

His His Phe Gln Gly Ala Met Ile Leu Ala Gly Glu Arg Val Pro

1205 1210 1215

Tyr Asn Ser Glu Tyr Ala Leu Ile Arg Gly Asn Ile Ser Gly Gly

1220 1225 1230

Ala Trp Val Asp Trp Arg Gly Arg Pro Ala Gly Leu Leu Val Asp

1235 1240 1245

Cys Gln Asp Ser Arg Asn Gln Ala Tyr Asn Ile Trp Lys Ala Thr

1250 1255 1260

His Trp Gly Asp Gln His Leu Ala Ala Met Gly Val His Ala Gly

1265 1270 1275

Gly Gly Asn Pro Gln Val Val Leu His Val Gly Gly Asn Asp Tyr

1280 1285 1290

Ala Phe Ala Ser Asn Gly Asp Phe Thr Ala Gly Ala Ala Val Tyr

1295 1300 1305

Cys Asn Asp Val Tyr Ile Arg Ser Asp Arg Arg Leu Lys Ile Asn

1310 1315 1320

Val Lys Asp Tyr Glu Glu Asn Ala Val Asp Lys Val Asn Lys Leu

1325 1330 1335

Lys Val Lys Thr Tyr Asp Lys Val Lys Ser Leu Ser Asp Arg Glu

1340 1345 1350

Val Ile Gly His Glu Ile Gly Ile Ile Ala Gln Asp Leu Gln Glu

1355 1360 1365

Val Leu Pro Glu Ala Val Ser Thr Ser Ser Val Gly Ser Gln Asp

1370 1375 1380

Asn Pro Glu Glu Ile Leu Thr Ile Ser Asn Ser Ala Val Asn Ala

1385 1390 1395

Leu Leu Ile Lys Ala Ile Gln Glu Met Ser Glu Glu Ile Lys Glu

1400 1405 1410

Leu Lys Thr Pro Leu Phe Thr Lys Ile Ala Arg Lys Ile Ser Lys

1415 1420 1425

Tyr Phe Lys Phe

1430

<210> 145

<211> 259
<212> PRT
<213> ww13 噬菌体
<400> 145

Met Ala Val Val Gly Val Pro Gly Trp Ile Gly Ser Ser Ala Val Asn
1 5 10 15
Glu Thr Gly Gln Arg Trp Met Ser Gln Ala Ala Gly Gln Leu Arg Leu
20 25 30
Gly Val Pro Cys Trp Met Ser Gln Phe Ala Gly Arg Ser Arg Glu Ile
35 40 45
Ile His Thr Leu Gly Ala Asp His Asn Phe Asn Gly Gln Trp Phe Arg
50 55 60
Asp Arg Cys Phe Glu Ala Gly Ser Thr Pro Ile Val Phe Asn Ile Thr
65 70 75 80
Gly Asp Leu Val Ser Tyr Ser Lys Asp Val Pro Leu Phe Phe Met Tyr
85 90 95
Gly Asp Thr Pro Asn Glu Tyr Val Gln Leu Asn Ile His Gly Val Thr
100 105 110
Met Tyr Gly Arg Gly Gly Asn Gly Gly Ser Asn Ser Pro Gly Ser Ala
115 120 125
Gly Gly His Cys Ile Gln Asn Asp Ile Gly Gly Arg Leu Arg Ile Asn
130 135 140

[0214]

Asn Gly Gly Ala Ile Ala Gly Gly Gly Gly Gly Gly Gly Gly Gly Arg
145 150 155 160
Tyr Gly Arg Leu Ser Phe Gly Gly Gly Gly Gly Arg Pro Phe Gly Ala
165 170 175
Gly Gly Ser Ser Ser His Met Ser Ser Gly Ala Thr Ala Gly Thr Ile
180 185 190
Ser Ala Pro Gly Ala Gly Ser Val Gly Glu Gly Ser Leu Trp Val Tyr
195 200 205
Thr Gly Gly Ser Gly Gly Asn Val Gly Ala Ala Gly Gly Arg Cys Asn
210 215 220
Ile Gln Gly Asn Gly Thr Glu Tyr Asp Gly Gly Ala Ala Gly Tyr Ala
225 230 235 240
Val Ile Gly Ser Ala Pro Thr Trp Ile Asn Val Gly Ala Ile Tyr Gly
245 250 255
Pro Arg Val

<210> 146
<211> 80
<212> PRT
<213> ww13 噬菌体
<400> 146

Met Ser Glu Gln Thr Ile Glu Gln Lys Leu Ser Ala Glu Ile Val Thr

1 5 10 15
Leu Lys Ser Arg Ile Leu Asp Thr Gln Asp Gln Ala Ala Arg Leu Met
20 25 30
Glu Glu Ser Lys Ile Leu Gln Gly Thr Leu Ala Glu Ile Ala Arg Ala
35 40 45
Val Gly Ile Thr Gly Asp Thr Ile Lys Val Glu Glu Ile Val Glu Ala
50 55 60
Val Lys Asn Leu Thr Ala Glu Ser Ala Asp Glu Ala Lys Asp Glu Glu
65 70 75 80

<210> 147
<211> 931
<212> PRT
<213> 人工序列
<220>
<223> PP-1
<400> 147

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45

[0215]

Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220

[0216]

Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385 390 395 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
405 410 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
420 425 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
435 440 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
450 455 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465 470 475 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
485 490 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
500 505 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
515 520 525
Ile Ala Thr Arg Val Ser Lys Glu Gly Asp Thr Met Thr Gly Lys Leu
530 535 540
Thr Leu Ser Ala Gly Asn Asp Ala Leu Val Leu Thr Ala Gly Glu Gly
545 550 555 560
Ala Ser Ser His Ile Arg Ser Asp Val Gly Gly Thr Asn Asn Trp Tyr
565 570 575

[0217]

Ile Gly Lys Gly Ser Gly Asp Asn Gly Leu Gly Phe Tyr Ser Tyr Ile
580 585 590
Thr Gln Gly Gly Val Tyr Ile Thr Asn Asn Gly Glu Ile Ala Leu Ser
595 600 605
Pro Gln Gly Gln Gly Thr Phe Asn Phe Asn Arg Asp Arg Leu His Ile
610 615 620
Asn Gly Thr Gln Trp Thr Ala His Gln Gly Gly Gly Trp Glu Asn Gln
625 630 635 640
Trp Asn Gln Glu Ala Pro Ile Phe Ile Asp Phe Gly Asn Val Gly Asn
645 650 655
Asp Ser Tyr Tyr Pro Ile Ile Lys Gly Lys Ser Gly Ile Thr Asn Glu
660 665 670
Gly Tyr Ile Ser Gly Val Asp Phe Gly Met Arg Arg Ile Thr Asn Thr
675 680 685
Trp Ala Gln Gly Ile Ile Arg Val Gly Asn Gln Glu Asn Gly Ser Asp
690 695 700
Pro Gln Ala Ile Tyr Glu Phe His His Asn Gly Val Leu Tyr Val Pro
705 710 715 720
Asn Met Val Lys Thr Gly Ala Arg Leu Ser Ala Gly Gly Gly Asp Pro
725 730 735
Val Trp Gln Gly Ala Cys Val Val Ile Gly Asp Asn Asp Thr Gly Leu
740 745 750
Val His Gly Gly Asp Gly Arg Ile Asn Met Val Ala Asn Gly Met His
755 760 765
Ile Ala Ser Trp Ser Ser Ala Tyr His Leu His Glu Gly Leu Trp Asp
770 775 780
Thr Thr Gly Ala Leu Trp Thr Glu Gln Gly Arg Ala Ile Ile Ser Phe
785 790 795 800
Gly His Leu Val Gln Gln Ser Asp Ala Tyr Ser Thr Phe Val Arg Asp
805 810 815
Val Tyr Val Arg Ser Asp Ile Arg Val Lys Lys Asp Leu Val Lys Phe
820 825 830
Glu Asn Ala Ser Glu Lys Leu Ser Lys Ile Asn Gly Tyr Thr Tyr Met
835 840 845
Gln Lys Arg Gly Leu Asp Glu Glu Gly Asn Gln Lys Trp Glu Pro Asn
850 855 860
Ala Gly Leu Ile Ala Gln Glu Val Gln Ala Ile Leu Pro Glu Leu Val
865 870 875 880
Glu Gly Asp Pro Asp Gly Glu Ala Leu Leu Arg Leu Asn Tyr Asn Gly
885 890 895
Val Ile Gly Leu Asn Thr Ala Ala Ile Asn Glu His Thr Ala Glu Ile
900 905 910
Ala Glu Leu Lys Ser Glu Ile Glu Glu Leu Lys Lys Ile Val Lys Ser
915 920 925

Leu Leu Lys
930

<210> 148
<211> 259
<212> PRT
<213> pp-1 噬菌体
<400> 148

Met Ala Val Thr Gly Pro Trp Val Gly Ser Ser Ala Val Val Asn Thr
1 5 10 15
Gly Gln Asn Trp Met Val Gly Ala Ala Gln Arg Leu Arg Met Gly Ala
20 25 30
Pro Phe Trp Met Ser Asn Met Ile Gly Arg Ser Val Glu Val Ile His
35 40 45
Thr Leu Gly Ala Asp His Asn Phe Asn Gly Gln Trp Phe Arg Asp Arg
50 55 60
Cys Phe Glu Ala Gly Ser Ala Pro Ile Val Phe Asn Ile Thr Gly Asp
65 70 75 80
Leu Val Ser Tyr Ser Arg Asp Val Pro Leu Phe Phe Met Tyr Gly Asp
85 90 95
Thr Pro Asn Glu Tyr Val Gln Leu Asn Ile His Gly Val Thr Met Tyr
100 105 110
Gly Arg Gly Gly Asn Gly Trp Ala Ala Gly Ala Ile Gly Ala Ser Asp
115 120 125
Gly Gly Val Cys Ile Gln Asn Asp Ile Gly Gly Arg Leu Arg Ile Asn
130 135 140
Asn Gly Gly Ala Ile Ala Gly Gly Gly Gly Gly Gly Gly Gly Tyr Ser
145 150 155 160
Gln Ala Asn Asn Trp Ala Gly Lys Tyr Val Cys Gly Gly Gly Gly Gly
165 170 175
Arg Pro Phe Gly Leu Gly Gly Asn Asn Gly Ala Arg Trp Pro Gly Gly
180 185 190
Asn Ala Ser Leu Thr Ser Pro Gly Ala Gly Gly Asn Thr Gly Thr Arg
195 200 205
Tyr Tyr Ala Gly Gly Gly Gly Glu Val Gly Gln Pro Gly Gln Tyr Ala
210 215 220
Asn Pro Gly Ala Gly Tyr Ser Thr Pro Pro Thr Ser Pro Gly Ala Ala
225 230 235 240
Val Ala Gly Ser Ala Pro Thr Trp Gln Asn Val Gly Ala Ile Tyr Gly
245 250 255
Pro Arg Val

[0218]

<210> 149
<211> 80
<212> PRT

<213> pp-1 噬菌体
<400> 149
Met Ser Glu Gln Thr Ile Glu Gln Lys Leu Ser Ala Glu Ile Val Thr
1 5 10 15
Leu Lys Ser Arg Ile Leu Asp Thr Gln Asp Gln Ala Ala Arg Leu Met
20 25 30
Glu Glu Ser Lys Ile Leu Gln Gly Thr Leu Ala Glu Ile Ala Arg Ala
35 40 45
Val Gly Ile Thr Gly Asp Thr Ile Lys Val Glu Glu Ile Val Glu Ala
50 55 60
Val Lys Asn Leu Thr Ala Glu Ser Thr Asp Glu Ala Lys Asp Glu Glu
65 70 75 80
<210> 150
<211> 1217
<212> PRT
<213> 人工序列
<220>
<223> WW55 3.0
<400> 150
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu

[0219]

[0220]

```
          195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
      210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
          275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
      290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
          355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
      370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Thr Pro Gly Glu Leu Asn Val
385                 390                 395                 400
Tyr Ser Lys Gln Glu Ile Asp Arg Met Phe Val Lys Asn Val Lys Met
                405                 410                 415
Val Val Pro Ser Gly Gly Ala Thr Arg Gly Tyr Phe Lys Ile Ala Ser
            420                 425                 430
Ala Met Ile Pro Gln Ser Gly Arg Met Ala Phe Leu Arg Ile Tyr Gly
          435                 440                 445
Gly Asn Gly Tyr Asn Val Asn Ser Tyr Asp Gln Val Asp Phe Leu Glu
      450                 455                 460
Ile Val Ile Arg Ser Gly Asn Asn Asn Pro Lys Gly Val Ser Ile Ala
465                 470                 475                 480
Ala Tyr Arg Arg Asn Ser Leu Asn Val His Glu Val Phe Ala Ile Asn
                485                 490                 495
Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Asn Tyr Gly Arg Phe Thr
            500                 505                 510
Asp Asn Val Ile Val Glu Phe Gly Lys Thr Val Asp Val Ala Leu Thr
          515                 520                 525
Val His Asp Val Pro Glu Phe Ser Ala Thr Lys Pro Glu Thr Gly Thr
      530                 535                 540
Lys Phe Asp Ala Arg Val Ile Thr Met Phe Asn Thr Glu Asn Lys Ala
```

545 550 555 560
Gly Thr Leu Met Phe Asp Asn Asn Asn Gln Leu Thr Tyr Asp Ile Val
565 570 575
Ser Leu Ser Asn Gly Pro Asp Asp Val Arg Asn Tyr Leu Arg Lys Phe
580 585 590
Arg Ser Lys Ala Gly Glu Met Ile Trp His Glu Thr Val Gln Gly Ala
595 600 605
Val Tyr Arg Leu Ala Thr Gly Thr Thr Asp Ser Thr Glu Val Leu Arg
610 615 620
Val Asp Ser Asn Ser Ala Leu Pro Gly Ser Tyr Lys Gly Tyr Val Ile
625 630 635 640
Thr Gly Lys Met Glu Leu His Gly Ser Gly Ser Ala Met Asn Leu His
645 650 655
Arg Gln Thr Gly Gln Ala Ala Tyr Met Ala Trp Trp Asp Arg Arg Asp
660 665 670
Gly Lys Asn Gln Arg Ser Gly Tyr Ile Gly His Ala Asp Gly Thr Thr
675 680 685
Asp Gly Phe Val Trp Arg Asn Asp Val Gly Ala Asn Ser Phe Asp Leu
690 695 700
Glu Ser Ser Gly Gln Val Asn Leu Thr Thr Gly Lys Thr Lys Ile Val
705 710 715 720
[0221] Tyr Thr Asn Gly Gln Tyr Tyr Ser Ala Asn Ser Asp Ala Phe Arg Met
725 730 735
Ile Tyr Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly Gly Lys Val
740 745 750
Tyr Leu Leu Ser Thr Ala Glu Asn Asp Arg Phe Gly Gly Trp Asn Gly
755 760 765
Asn Arg Pro Phe Ile Tyr Asp Leu Ser Thr Gly Lys Val Thr Leu Gly
770 775 780
Gly Asp Gly Asn Glu Gly Ala Leu Val Leu Glu Arg Asp Ser Arg Ala
785 790 795 800
Ala Arg Phe Ser Asn Ser Val Phe Leu Glu Lys Gly Leu Leu Thr Phe
805 810 815
Ser Ala Gly Gly Asn Gln Ser Met Asp Ser Phe Thr Ile Asn His Trp
820 825 830
Gly Asn Ser Asn Ala Gly Arg Tyr Asn Val Leu Gln Phe Glu Asp Thr
835 840 845
Lys Gly Thr His Phe Thr Thr Glu Arg Asn Ala Asp Gly Gly Leu Leu
850 855 860
Ala His Phe Arg Gly Asp Leu Thr Thr Glu Gly Lys Leu Thr Trp Gly
865 870 875 880
Lys Gly Thr Ala Thr Ser Ser Phe Asn Ile Arg Ala Trp Gly Asn Ser
885 890 895
Asp Ser Arg Lys Gln Val Phe Glu Cys Val Asp Glu Ser Gly Trp His

900 905 910
Trp Tyr Thr Gln Arg Pro Gly Gly Pro Gly Thr Ser Ala Ile Glu Phe
915 920 925
Ala Ile Asn Gly Thr Val Lys Pro Gln Ala Ile His Thr Gly Gly Asn
930 935 940
Ile Leu Leu Asn Gly Ala Asp Ile Glu Phe Arg Arg Thr Gly Asn Lys
945 950 955 960
His Leu Trp Phe Arg Asp Pro Asn Gly Leu Glu Leu Gly Leu Ile Tyr
965 970 975
Cys Asp Asp Asn Gly Val Ile Arg Phe Arg Gly Gln Lys Gln Gly Gln
980 985 990
Asp Trp Val Phe Ala Asn Lys Met Ile Gln Leu Gly Thr Ala Ser Thr
995 1000 1005
Val Gly Gly Ser Gly Asn Gly Leu Ile Arg Gly Gln Val Gln Gly
1010 1015 1020
Gly Ala Trp Ala Gln Trp Arg Asp Arg Ala Ala Gly Ile Leu Val
1025 1030 1035
Asp Cys Gln Gln Ser Thr Asp Ser Ala His Asn Ile Trp Lys Ala
1040 1045 1050
Thr His Trp Gly Lys Tyr His Ile Ala Ala Met Gly Val His Val
1055 1060 1065
[0222] Pro Ser Gly Thr Ile Gly Asn Ala Met Ala Arg Leu Asn Val Asn
1070 1075 1080
Asp Ala Asn Phe Asp Phe Ser Ala Ser Gly Asp Met Ser Ala Gly
1085 1090 1095
Arg Asn Gly Ser Phe Asn Asp Val Tyr Ile Arg Ser Asp Ala Arg
1100 1105 1110
Leu Lys Ile Asn Lys Glu Glu Tyr Lys Glu Asn Ala Thr Asp Lys
1115 1120 1125
Val Asn Arg Leu Thr Val Tyr Thr Tyr Asp Lys Val Lys Ser Leu
1130 1135 1140
Thr Asp Arg Thr Val Ile Ala His Glu Val Gly Ile Ile Ala Gln
1145 1150 1155
Asp Leu Glu Lys Glu Leu Pro Glu Ala Val Thr Thr Ser Lys Ile
1160 1165 1170
Gly Asp Pro Asp Lys Pro Glu Glu Ile Leu Thr Ile Ser Asn Ser
1175 1180 1185
Ala Val Asn Ala Leu Leu Ile Lys Ala Phe Gln Glu Met Ser Glu
1190 1195 1200
Glu Leu Lys Ala Val Lys Ala Glu Leu Ala Glu Leu Lys Lys
1205 1210 1215
<210> 151
<211> 1330
<212> PRT

<213> 人工序列
<220>
<223> WW55-G8
<400> 151

[0223]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320

[0224]

Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Gly Ala Ile Ile Asn Leu Ser
385 390 395 400
Cys Pro Pro Val Tyr Asp Arg Asp Val Thr Met Ala Gly Lys Val Lys
405 410 415
Gly Asn Asn Tyr Ile Leu Ser Lys Thr Ala Asn Tyr Leu Glu Asp Gln
420 425 430
Thr Ala Arg Asp Leu Asn Tyr Phe Gly Ala Phe Arg Thr Asn Gly Leu
435 440 445
Asp Gly Leu Leu Glu Leu Thr Leu Asn Val Pro His Ser Ser Gly Val
450 455 460
Gln His Gly Arg Gly Phe Thr Phe Gln Tyr Gly His Thr Gly Ser Arg
465 470 475 480
Val Glu Thr Tyr Gly Tyr Asn Lys Glu Gly Gln Lys Ala Phe Ser Tyr
485 490 495
Lys Met Tyr His Glu Gly Asp Lys Pro Thr Pro Gly Glu Leu Asn Val
500 505 510
Tyr Ser Lys Gln Glu Ile Asp Arg Met Phe Val Lys Asn Val Lys Met
515 520 525
Val Val Pro Ser Gly Gly Ala Thr Arg Gly Tyr Phe Lys Ile Ala Ser
530 535 540
Ala Met Ile Pro Gln Ser Gly Arg Met Ala Phe Leu Arg Ile Tyr Gly
545 550 555 560
Gly Asn Gly Tyr Asn Val Asn Ser Tyr Asp Gln Val Asp Phe Leu Glu
565 570 575
Ile Val Ile Arg Ser Gly Asn Asn Asn Pro Lys Gly Val Ser Ile Ala
580 585 590
Ala Tyr Arg Arg Asn Ser Leu Asn Val His Glu Val Phe Ala Ile Asn
595 600 605
Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Asn Tyr Gly Arg Phe Thr
610 615 620
Asp Asn Val Ile Val Glu Phe Gly Lys Thr Val Asp Val Ala Leu Thr
625 630 635 640
Val His Asp Val Pro Glu Phe Ser Ala Thr Lys Pro Glu Thr Gly Thr
645 650 655
Lys Phe Asp Ala Arg Val Ile Thr Met Phe Asn Thr Glu Asn Lys Ala
660 665 670

[0225]

Gly Thr Leu Met Phe Asp Asn Asn Asn Gln Leu Thr Tyr Asp Ile Val
675 680 685
Ser Leu Ser Asn Gly Pro Asp Asp Val Arg Asn Tyr Leu Arg Lys Phe
690 695 700
Arg Ser Lys Ala Gly Glu Met Ile Trp His Glu Thr Val Gln Gly Ala
705 710 715 720
Val Tyr Arg Leu Ala Thr Gly Thr Thr Asp Ser Thr Glu Val Leu Arg
725 730 735
Val Asp Ser Asn Ser Ala Leu Pro Gly Ser Tyr Lys Gly Tyr Val Ile
740 745 750
Thr Gly Lys Met Glu Leu His Gly Ser Gly Ser Ala Met Asn Leu His
755 760 765
Arg Gln Thr Gly Gln Ala Ala Tyr Met Ala Trp Trp Asp Arg Arg Asp
770 775 780
Gly Lys Asn Gln Arg Ser Gly Tyr Ile Gly His Ala Asp Gly Thr Thr
785 790 795 800
Asp Gly Phe Val Trp Arg Asn Asp Val Gly Ala Asn Ser Phe Asp Leu
805 810 815
Glu Ser Ser Gly Gln Val Asn Leu Thr Thr Gly Lys Thr Lys Ile Val
820 825 830
Tyr Thr Asn Gly Gln Tyr Tyr Ser Ala Asn Ser Asp Ala Phe Arg Met
835 840 845
Ile Tyr Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly Gly Lys Val
850 855 860
Tyr Leu Leu Ser Thr Ala Glu Asn Asp Arg Phe Gly Gly Trp Asn Gly
865 870 875 880
Asn Arg Pro Phe Ile Tyr Asp Leu Ser Thr Gly Lys Val Thr Leu Gly
885 890 895
Gly Asp Gly Asn Glu Gly Ala Leu Val Leu Glu Arg Asp Ser Arg Ala
900 905 910
Ala Arg Phe Ser Asn Ser Val Phe Leu Glu Lys Gly Leu Leu Thr Phe
915 920 925
Ser Ala Gly Gly Asn Gln Ser Met Asp Ser Phe Thr Ile Asn His Trp
930 935 940
Gly Asn Ser Asn Ala Gly Arg Tyr Asn Val Leu Gln Phe Glu Asp Thr
945 950 955 960
Lys Gly Thr His Phe Thr Thr Glu Arg Asn Ala Asp Gly Gly Leu Leu
965 970 975
Ala His Phe Arg Gly Asp Leu Thr Thr Glu Gly Lys Leu Thr Trp Gly
980 985 990
Lys Gly Thr Ala Thr Ser Ser Phe Asn Ile Arg Ala Trp Gly Asn Ser
995 1000 1005
Asp Ser Arg Lys Gln Val Phe Glu Cys Val Asp Glu Ser Gly Trp
1010 1015 1020

[0226]

His Trp Tyr Thr Gln Arg Pro Gly Gly Pro Gly Thr Ser Ala Ile
1025 1030 1035
Glu Phe Ala Ile Asn Gly Thr Val Lys Pro Gln Ala Ile His Thr
1040 1045 1050
Gly Gly Asn Ile Leu Leu Asn Gly Ala Asp Ile Glu Phe Arg Arg
1055 1060 1065
Thr Gly Asn Lys His Leu Trp Phe Arg Asp Pro Asn Gly Leu Glu
1070 1075 1080
Leu Gly Leu Ile Tyr Cys Asp Asp Asn Gly Val Ile Arg Phe Arg
1085 1090 1095
Gly Gln Lys Gln Gly Gln Asp Trp Val Phe Ala Asn Lys Met Ile
1100 1105 1110
Gln Leu Gly Thr Ala Ser Thr Val Gly Gly Ser Gly Asn Gly Leu
1115 1120 1125
Ile Arg Gly Gln Val Gln Gly Gly Ala Trp Ala Gln Trp Arg Asp
1130 1135 1140
Arg Ala Ala Gly Ile Leu Val Asp Cys Gln Gln Ser Thr Asp Ser
1145 1150 1155
Ala His Asn Ile Trp Lys Ala Thr His Trp Gly Lys Tyr His Ile
1160 1165 1170
Ala Ala Met Gly Val His Val Pro Ser Gly Thr Ile Gly Asn Ala
1175 1180 1185
Met Ala Arg Leu Asn Val Asn Asp Ala Asn Phe Asp Phe Ser Ala
1190 1195 1200
Ser Gly Asp Met Ser Ala Gly Arg Asn Gly Ser Phe Asn Asp Val
1205 1210 1215
Tyr Ile Arg Ser Asp Ala Arg Leu Lys Ile Asn Lys Glu Glu Tyr
1220 1225 1230
Lys Glu Asn Ala Thr Asp Lys Val Asn Arg Leu Thr Val Tyr Thr
1235 1240 1245
Tyr Asp Lys Val Lys Ser Leu Thr Asp Arg Thr Val Ile Ala His
1250 1255 1260
Glu Val Gly Ile Ile Ala Gln Asp Leu Glu Lys Glu Leu Pro Glu
1265 1270 1275
Ala Val Thr Thr Ser Lys Ile Gly Asp Pro Asp Lys Pro Glu Glu
1280 1285 1290
Ile Leu Thr Ile Ser Asn Ser Ala Val Asn Ala Leu Leu Ile Lys
1295 1300 1305
Ala Phe Gln Glu Met Ser Glu Glu Leu Lys Ala Val Lys Ala Glu
1310 1315 1320
Leu Ala Glu Leu Lys Lys Asn
1325 1330

<210> 152
<211> 261

<212> PRT
<213> ww55 噬菌体
<400> 152

Met Ala Ile Ser Ser Gly Trp Val Gly Ser Ser Ala Val Ser Glu Thr
1 5 10 15
Gly Gln Arg Trp Met Ser Ala Ala Met Gln Ala Val Arg Leu Gly Arg
20 25 30
Pro Ala Tyr Met Ser Ala Met Val Gly Arg Ser Lys Glu Ile His Tyr
35 40 45
Ser Ile Gly Ala Ser Asn Ser Tyr Asn Lys Asp Thr Leu Ile Asn Trp
50 55 60
Met Lys Ala Gln Gly Ser Thr Pro Val Val Ile Thr Ile Thr Gly Asn
65 70 75 80
Ile Val Ser Gln Ser Thr Gly Val Pro Cys Leu Asp Phe Pro Ser Ser
85 90 95
Leu Thr Asn Glu Tyr Val Thr Leu Ile Ile Asn Ser Gly Val His Val
100 105 110
Leu Gly Arg Gly Gly Asn Gly Gly Ser Asn Ser Ala Gly Gly Ala Gly
115 120 125
Gly Asn Ala Ile Asn Asn Gly Ile Gly Thr Arg Leu Arg Ile Asn Asn
130 135 140
Asn Gly Ile Ile Gly Gly Gly Gly Gly Gly Gly Ala Gly Ala Arg Tyr
145 150 155 160
Asn Pro Phe Pro Gln Met Asp Met Lys Phe Gly Gly Gly Gly Gly Arg
165 170 175
Pro Phe Gly Ala Ala Gly Ala Ala Gly Gly Gly Ala Ala Ala Ala Ser
180 185 190
Ala Gly Thr Ile Ser Ala Pro Gly Lys Gly Thr Val Ser Gly Val His
195 200 205
Tyr Gly Gly Asp Gly Gly Asp Leu Gly Ala Ala Gly Lys Ser Ser Tyr
210 215 220
Ile Lys Gly Gly Thr Gly Gly Thr Val His Ser Gly Gly Ala Ala Gly
225 230 235 240
Lys Ala Val Thr Gly Asn Ala Pro Arg Trp Asp Lys Val Gly Thr Ile
245 250 255
Tyr Gly Ala Arg Val
260

[0227]

<210> 153
<211> 86
<212> PRT
<213> ww55 噬菌体
<400> 153

Met Ser Asn Gln His Glu Gln Met Ile Asn Val Leu Lys Val Arg Leu
1 5 10 15

Phe Asp Thr Gln Glu Lys Ala Ala Phe Leu Glu Gly Gln Leu Lys Asp
20 25 30
Arg Glu Arg Val Leu Met Glu Leu Val Arg Ile Leu Gly Ile Gln Pro
35 40 45
Asp Glu Asn Gly Thr Val Ser Leu Asp Ala Ile Val Glu Glu Val Lys
50 55 60
Ala Leu Leu Pro Lys Asp Glu Ala Ala Glu Asp Ala Glu Glu Glu Val
65 70 75 80
Glu Leu Ile Thr Glu Ala
85

<210> 154
<211> 1217
<212> PRT
<213> 人工序列
<220>
<223> WW34 3.0
<400> 154

[0228]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr

[0229]

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    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Thr Pro Gly Glu Leu Asn Val
385                 390                 395                 400
Tyr Ser Lys Gln Glu Ile Asp Arg Met Phe Val Lys Asn Val Lys Met
                405                 410                 415
Ser Thr Pro Ser Gly Glu Ala Thr Arg Gly Tyr Phe Lys Ile Ala Ser
            420                 425                 430
Ala Met Ile Pro Gln Ser Gly Arg Met Ala Phe Leu Arg Ile Tyr Gly
        435                 440                 445
Gly Asn Gly Phe Asn Val Asn Ser Tyr Asp Gln Val Asp Phe Leu Glu
    450                 455                 460
Ile Val Ile Arg Ser Gly Asn Asn Asn Pro Lys Gly Val Ser Ile Ala
465                 470                 475                 480
Ala Tyr Arg Arg Asn Ser Leu Asn Val His Glu Val Phe Ala Ile Asn
                485                 490                 495
Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Asn Tyr Gly Arg Phe Thr
            500                 505                 510
Asp Asn Val Ile Val Glu Phe Gly Lys Thr Val Asp Val Ala Leu Thr
        515                 520                 525
Val His Asp Val Pro Glu Phe Ser Ala Thr Lys Pro Glu Thr Gly Thr
    530                 535                 540
Lys Phe Asp Ala Arg Val Ile Thr Met Phe Asn Thr Glu Asn Lys Ala
545                 550                 555                 560
Gly Thr Leu Met Phe Asp Asn Asn Asn Gln Leu Thr Tyr Asp Ile Val
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[0230]

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                565                 570                 575
Ser Leu Ser Asn Gly Pro Asp Asp Val Arg Asn Tyr Leu Arg Lys Phe
            580                 585                 590
Arg Ser Lys Ala Gly Glu Met Ile Trp His Glu Thr Val Gln Gly Ala
        595                 600                 605
Val Tyr Arg Leu Ala Thr Gly Thr Thr Asp Ser Thr Glu Val Leu Arg
    610                 615                 620
Val Asp Ser Asn Ser Ala Ile Pro Gly Ser Tyr Lys Gly Tyr Val Ile
625                 630                 635                 640
Thr Gly Lys Met Glu Leu His Gly Ser Gly Asn Ser Met Ile Leu His
                645                 650                 655
Arg Gln Thr Ala Gln Ala Ala Tyr Met Ser Trp Trp Asp Arg Arg Asp
            660                 665                 670
Gly Lys Asn Gln Arg Ser Gly Tyr Ile Gly His Ala Asp Gly Thr Ser
        675                 680                 685
Asp Ala Ile Val Trp Asn Asn Asp Ile Gly Gln Asn Ser Ala Val Leu
    690                 695                 700
Glu Thr Ser Gly Gln Ile Ser Phe Arg Thr Gly Ala Thr Lys Ile Val
705                 710                 715                 720
Tyr Thr Asn Gly Gln Tyr Tyr Ser Ala Asn Ser Asp Ala Tyr Arg Met
                725                 730                 735
Ile Phe Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly Thr Lys Val
            740                 745                 750
Tyr Leu Leu Ser Thr Ala Glu Asn Asp Lys Tyr Gly Gly Trp Asn Ala
        755                 760                 765
Tyr Arg Pro Phe Ile Tyr Asp Leu Thr Ser Gly Asn Val Gln Leu Gly
    770                 775                 780
Gly Asp Gly Asn Glu Asp Ala Leu Thr Leu Glu Cys Ala Ser Arg Ala
785                 790                 795                 800
Ala Arg Phe Ser Asn Asp Val Tyr Ile Lys Lys Gly Leu Leu Thr Phe
                805                 810                 815
Asp Ala Gly Arg Ala Gly Ser Arg Asp Tyr Ile Arg Phe Asn His Trp
            820                 825                 830
Gly Asp Ser Asn Asn Ala Arg Asp Asn Val Leu Cys Ile Glu Asp Ser
        835                 840                 845
Gln Gly Arg His Phe Ser Thr Glu Arg Ala Met Gly Thr Gly Ala Leu
    850                 855                 860
Lys Ala Tyr Phe Leu Gly Asp Leu Glu Val Gly Gly Lys Phe Thr Trp
865                 870                 875                 880
Gly Lys Asn Thr Ala Thr Ser Ser Phe Asn Ile Arg Ala Trp Gly Asn
                885                 890                 895
Asp Ser Arg Lys Gln Val Leu Glu Cys Ala Asp Glu Ser Gly Trp His
            900                 905                 910
Trp Tyr Thr Gln Arg Thr Gly Gly Pro Asp Thr Ser Ala Ile Asp Phe
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915 920 925
Ala Ile Asn Gly Thr Val Arg Pro Gln Ala Ile His Thr Gly Gly Asn
930 935 940
Ile Thr Ile Asn Gly Ala Asp Ile Glu Phe Lys Arg Thr Gly Asn Lys
945 950 955 960
His Ile Trp Phe Arg Asp Pro Asn Gly Leu Glu Leu Gly Leu Met Tyr
965 970 975
Cys Asp Asp Ala Gly Ala Ile Arg Phe Arg Gly Gln Lys Gln Ala Gln
980 985 990
Ala Trp Lys Phe Ala Asp Lys Met Ile Gln Leu Glu Ser Gly Thr Val
995 1000 1005
Ser Gly Gly Gly Asn Gly Leu Ile Arg Gly Glu Val Ala Gly Gly
1010 1015 1020
Ser Trp Ala Ser Trp Arg Asp Arg Ala Ala Gly Leu Met Val Gly
1025 1030 1035
Cys Pro Gln Ser Thr Asn Ser Ala His Asn Val Trp Lys Ala Thr
1040 1045 1050
His Trp Gly Lys Tyr His Ile Ala Ala Met Ala Val His Val Pro
1055 1060 1065
Asp Gly Thr Ile Thr Asn Ala Leu Ala Arg Leu Asn Val His Asp
1070 1075 1080
[0231] Ala Asn Phe Asp Phe Ser Ala Ser Gly Asp Leu Ser Ala Gly Arg
1085 1090 1095
Asn Gly Ser Phe Asn Asp Val Tyr Ile Arg Ser Asp Ala Arg Leu
1100 1105 1110
Lys Ile Asn Lys Glu Glu Tyr Lys Glu Asn Ala Thr Asp Lys Val
1115 1120 1125
Asn Arg Leu Thr Val Tyr Thr Tyr Asp Lys Val Lys Ser Leu Thr
1130 1135 1140
Asp Arg Thr Val Ile Ala His Glu Val Gly Ile Ile Ala Gln Asp
1145 1150 1155
Leu Glu Lys Glu Leu Pro Glu Ala Val Thr Thr Ser Lys Ile Gly
1160 1165 1170
Asp Pro Asp Lys Pro Glu Glu Ile Leu Thr Ile Ser Asn Ser Ala
1175 1180 1185
Val Asn Ala Leu Leu Ile Lys Ala Phe Gln Glu Met Ser Glu Glu
1190 1195 1200
Leu Lys Ala Val Lys Ala Glu Leu Ala Glu Leu Lys Lys Asn
1205 1210 1215

<210> 155
<211> 259
<212> PRT
<213> ww34 噬菌体
<400> 155

Met Ala Ile Ser Ser Gly Trp Val Gly Ser Ser Ala Val Ser Glu Thr
1 5 10 15
Gly Gln Arg Trp Met Ser Ala Ala Met Gln Ala Val Arg Leu Gly Arg
20 25 30
Pro Ala Tyr Met Ser Ala Met Val Gly Arg Ser Lys Glu Ile His Tyr
35 40 45
Ser Ile Gly Ala Ser Asn Ser Tyr Asn Lys Asp Thr Leu Ile Asn Trp
50 55 60
Met Lys Ala Gln Gly Ser Thr Pro Val Val Ile Thr Ile Thr Gly Asn
65 70 75 80
Ile Val Ser Gln Ser Thr Gly Val Pro Cys Leu Asp Phe Pro Ser Ser
85 90 95
Leu Thr Asn Glu Tyr Val Thr Leu Ile Ile Asn Pro Gly Val His Val
100 105 110
Trp Gly Arg Gly Gly Asn Gly Gly Asn Asn Ser Ala Gly Gly Ala Gly
115 120 125
Gly Asn Ala Ile Asn Asn Gly Ile Gly Thr Arg Leu Arg Ile Thr Asn
130 135 140
Asn Gly Ala Ile Cys Gly Gly Gly Gly Gly Gly Gly Gly Gly Tyr Tyr
145 150 155 160
Ser Pro Phe Ser Gln Met Arg Leu Thr Phe Gly Gly Gly Gly Gly Arg
165 170 175
[0232] Pro Phe Gly Ala Ala Gly Gly Ser Ala Asn Met Glu Gln Gly Ala Thr
180 185 190
Ala Gly Thr Ile Ser Ala Pro Gly Lys Gly Ser Val Asn Gly Val Tyr
195 200 205
Asn Gly Gly Asn Gly Gly Asp Ala Gly Gly Ala Gly Gly Lys Cys Asn
210 215 220
Ile Arg Gly Gln Gly Ser Glu Tyr Asn Gly Gly Ala Ala Gly Lys Ala
225 230 235 240
Val Thr Gly Asn Ala Pro Arg Trp Asp Lys Val Gly Thr Ile Tyr Gly
245 250 255
Ala Arg Val

<210> 156
<211> 86
<212> PRT
<213> ww34 噬菌体
<400> 156
Met Ser Asn Gln His Glu Gln Met Ile Asn Val Leu Lys Val Arg Leu
1 5 10 15
Phe Asp Thr Gln Glu Lys Ala Ala Phe Leu Glu Gly Gln Leu Lys Asp
20 25 30
Arg Glu Arg Val Leu Met Glu Leu Val Arg Ile Leu Gly Ile Gln Pro

35 40 45

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

Ala Leu Leu Pro Lys Asp Glu Ala Ala Glu Asp Ala Glu Glu Glu Val
65 70 75 80

Glu Leu Ile Thr Glu Ala
85

<210> 157

<211> 1651

<212> PRT

<213> 人工序列

<220>

<223> WW14-G8

<400> 157

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

Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30

Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45

Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60

[0233]

Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80

Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95

Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110

Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125

Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140

Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160

Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175

Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190

Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205

Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220

Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240

[0234]

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Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Asn Gln Ile Ile Asp Leu Gly
385                 390                 395                 400
Phe Ala Lys Gly Gly Gln Val Asp Gly Asp Val Thr Ile Asn Gly Thr
                405                 410                 415
Leu Asn Leu Asn Gly Pro Glu Ile Val Ala Ser Gly Gly Tyr Ile Glu
            420                 425                 430
Phe Asn Tyr Arg Thr Thr Gly Ser Gly Ser Trp Ala Gly Gln His Ala
        435                 440                 445
Ala Lys Ala Pro Ile Phe Val Asp Leu Ser Ala Ala Leu Ser Thr Ser
    450                 455                 460
Glu Tyr Asn Pro Leu Phe Lys Gln Arg Tyr Lys Asp Gly Thr Phe Ser
465                 470                 475                 480
Ala Gly Thr Leu Val Thr Glu Gly Ser Phe Lys Phe His Tyr Ile Asn
                485                 490                 495
Glu Ala Gly Asp Ser Lys Tyr Trp Thr Phe Asn Arg Asn Gly Asn Phe
            500                 505                 510
Gln Val Asp Thr Gly Ser Leu Phe Val Ser Gly Gly Asn Ile Ser Ala
        515                 520                 525
Ser Gly Asn Ile Asn Ser Ala Ser Gly Phe Val Ser Ala Pro Gln Ile
    530                 535                 540
Asn Thr Lys Asn Ile Ile Leu Asp Thr Lys Ala Phe Gly Gln Tyr Asp
545                 550                 555                 560
Ser Gln Ser Leu Val Asn Tyr Val Tyr Pro Gly Thr Gly Glu Thr Asn
                565                 570                 575
Gly Val Asn Tyr Leu Arg Lys Val Arg Ala Lys Ser Gly Gly Thr Met
            580                 585                 590
```

[0235]

Trp His Glu Leu Cys Thr Ala Gln Leu Gly Gln Ala Asp Glu Met Ser
595 600 605
Trp Trp Thr Gly Asn Thr Pro Gln Ser Lys Gln Tyr Gly Val Arg Asn
610 615 620
Asp Gly Arg Leu Ile Gly Arg Asn Ser Leu Ala Leu Gly Thr Met Thr
625 630 635 640
Thr Asp Phe Pro Ser Ser Asp Tyr Gly Asn Thr Gly Ala Met Gly Asp
645 650 655
Lys Tyr Leu Val Leu Gly Asp Thr Ala Thr Gly Leu Lys Tyr Ile Lys
660 665 670
Gln Gly Asn Phe Asp Leu Val Gly Gly Gly Tyr Ser Val Ala Ser Ile
675 680 685
Thr Thr Asp Gly Phe Arg Gly Thr Ser Lys Thr Leu Phe Gly Arg Ser
690 695 700
Asn Asp Gln Gly Leu Thr Trp Leu Leu Pro Gly Gln Asn Ser Ala Met
705 710 715 720
Val Ser Ile Arg Thr Glu Ile Asp Gly Asn Asn Ser Gly Asp Gly Gln
725 730 735
Thr His Leu Gly Tyr Asn Ser Asn Gly Lys Leu Tyr His Tyr Phe Arg
740 745 750
Gly Thr Gly Arg Val Ala Ile Ser Met Ala Glu Gly Met Ile Ile Glu
755 760 765
Pro Gly Ile Leu Asn Ile Lys Thr Gly Val Asn Glu Leu Asn Leu Arg
770 775 780
Ala Asp Gly Thr Val Ser Thr Thr Gln Arg Leu Met Val Asn Asn Gly
785 790 795 800
Leu Val Leu Asn Ala Asn Asn Asn Thr Ser Ala Leu Ala Leu Thr Ala
805 810 815
Pro Thr Gly Val Asp Gly Thr Lys Thr Ile Asn Trp Asp Ala Gly Thr
820 825 830
Arg Asn Gly Gln Asn Lys Asn Thr Val Thr Met Lys Ala Trp Gly Asn
835 840 845
Ser Phe Asn Ala Gly Gly Gly Asn Arg Glu Thr Val Phe Glu Val Ser
850 855 860
Asp Ser Gln Gly Tyr Tyr Phe Tyr Gly Gln Arg Thr Asn Pro Ala Ser
865 870 875 880
Gly Glu Thr Val Gly Pro Ile Asn Phe Lys Phe Asn Gly Ser Val Glu
885 890 895
Thr Gly His Phe Ser Ser Leu Gly Asn Ile Ser Ala Ser Gly Thr Gly
900 905 910
Ser Phe Gly Gly Asn Val Thr Met Thr Asn Gly Leu Phe Val Gln Gly
915 920 925
Gly Ala Ser Ile Asn Gly Gln Val Lys Met Gly Gly Thr Ala Asp Ala
930 935 940

[0236]

```
Leu Arg Ile Trp Asn Ala Glu Tyr Gly Met Ile Phe Arg Arg Ser Glu
945                 950                 955                 960
Thr Gly Ser Ser Ala Ser Phe His Leu Ile Pro Thr Leu Gln Asn Ala
                965                 970                 975
Gly Glu Asn Gly Gly Ile Ser Asp Leu Arg Pro Leu Ser Ile Asn Leu
            980                 985                 990
Ala Ser Gly Thr Val Ile Met Gly  Asn Lys Ser Thr Gly  Gly Pro Leu
        995                 1000                1005
Phe Thr  Val Asp Asn Val Ser  Lys Phe Val Gln Thr  Asp Cys Arg
    1010                1015                1020
Leu Arg  Val Asn Met Asp Ser  Asp Gly Ile Val Leu  Asn Ala Ser
    1025                1030                1035
Ser Gln  Ala Ala Ser Asn Phe  Ile Gln Gly Arg Lys  Ala Asp Val
    1040                1045                1050
Thr Lys  Trp Tyr Leu Gly Ile  Gly Asp Gly Gly Asn  Val Val Arg
    1055                1060                1065
Met His  Asn Tyr Thr Tyr Ser  His Gly Ile Ala Leu  Asn Ser Asp
    1070                1075                1080
Thr Val  Asp Ile Thr Lys Pro  Leu Lys Ile Gly Ser  Asp Ile Arg
    1085                1090                1095
Ile Gly  Thr Asp Gly Asn Ile  Ile Gly Ser Ala Thr  Leu Asp Asn
    1100                1105                1110
Phe Lys  Asn Leu Asn Thr Thr  Leu Asp His Lys Val  Asn Met Gly
    1115                1120                1125
Gly Trp  Ser Gly Gly Ala Thr  Thr Gly Trp Tyr Lys  Phe Ala Thr
    1130                1135                1140
Val Glu  Ile Pro Gln Ala Thr  Gly Thr Ala Ser Phe  Lys Ile Phe
    1145                1150                1155
Gly Gly  Ser Gly Phe Asn Phe  Lys Ser Tyr Gly Gln  Ala Ser Ile
    1160                1165                1170
Ala Glu  Ile Ile Leu Arg Thr  Gly Asn Asn Asn Pro  Lys Gly Leu
    1175                1180                1185
Asn Ala  Thr Leu Trp Asn Arg  Thr Ser Glu Ala Ile  Ser Gln Ile
    1190                1195                1200
Ala Ser  Val Asn Thr Ser Glu  Asp Ile Tyr Asp Ile  Tyr Val Tyr
    1205                1210                1215
Leu Gly  Gly Tyr Ser Asn Ser  Leu Val Val Glu Tyr  Thr Cys Ser
    1220                1225                1230
Ser Asn  Ser Lys Val Thr Val  Val Gly Met Asp Gly  Gly Val Gln
    1235                1240                1245
Pro Leu  Val Glu Thr Leu Pro  Glu Gly His Val Val  Gly Lys Ser
    1250                1255                1260
Val Arg  Met Leu Asn Asn Leu  Asp Gly Met Phe Ala  Ala Gly Glu
    1265                1270                1275
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[0237]

Ser Asp Ile Val Thr Arg Gly Glu Tyr Val Thr Asn Asn Gln Lys
1280 1285 1290
Gly Met Arg Ile Lys Ser Lys Gly Asn Asp Leu Asp Ser Asn Ala
1295 1300 1305
Ala Leu Leu Arg Asn Asp Gly Gly Ser Phe Tyr Ile Leu Ala Thr
1310 1315 1320
Asp Lys Asn Thr Thr Glu Lys Pro Asp Ala Ala Asn Gly Asp Trp
1325 1330 1335
Asn Gly Leu Arg Pro Phe Ser Ile Asn Met Ala Asp Gly Arg Val
1340 1345 1350
Gly Met Asn His Gly Leu Asn Ile Thr Gly Gly Gly Leu Asn Val
1355 1360 1365
Thr Gly Gly Asn Thr Asn Leu Gly Asn Ile Thr Ser Arg Val Val
1370 1375 1380
Ser Ser Ala Arg Ala Gly Ser Gly Trp Gly Asp Asn Ser Asp Ala
1385 1390 1395
Met Lys Ser Lys Ile Thr Phe Met Ala Asp His Gly Asp Leu Ser
1400 1405 1410
Asn Ser Gly Ser Tyr Tyr Pro Ile Val Gly Ala Tyr Ser Asn Tyr
1415 1420 1425
Gly Ser Ala Gly Tyr Arg Gln Thr Phe Glu Phe Gly Trp Val Gly
1430 1435 1440
Ser Gly Ser Thr Ala Asn Trp Arg Glu Gly Ile Ile Arg Ile Arg
1445 1450 1455
Gly Asp Asn Ala Asn Gly Gln Gln Ala Arg Trp Arg Phe Thr Met
1460 1465 1470
Asp Gly Ile Leu Gly Cys Pro Gly Lys Val Glu Met Pro Glu Thr
1475 1480 1485
Ser Ala Phe Gly Ile Asn Thr Thr Asn Gly Phe Gly Gly Asn Ser
1490 1495 1500
Ile Val Ile Gly Asp Ser Asp Thr Gly Phe Arg Gln Val Gly Asp
1505 1510 1515
Gly Leu Leu Glu Val Trp Thr Asn Ala Ser Arg Arg Met Arg Phe
1520 1525 1530
Gln Gly Gly Asp Thr Tyr Ser Asp Met Asn Ile Asn Ala Pro Asn
1535 1540 1545
Val Tyr Ile Arg Ser Asp Ile Arg Leu Lys Ser Asn Phe Lys Pro
1550 1555 1560
Ile Glu Asn Ala Leu Asp Lys Val Glu Gln Leu Asp Gly Leu Ile
1565 1570 1575
Tyr Asp Lys Ala Asp Tyr Ile Gly Gly Glu Val Val His Thr Glu
1580 1585 1590
Ala Gly Val Ile Ala Gln Ser Leu Glu Lys Val Leu Pro Glu Ala
1595 1600 1605

Val Arg Glu Val Asp Asp Ile Lys Gly Asn Lys Val Leu Thr Val
1610 1615 1620
Ser Thr Gln Ala Gln Val Ala Leu Leu Ile Glu Ala Val Lys Thr
1625 1630 1635
Leu Ser Ala Lys Val Lys Glu Leu Glu Ala Lys Leu Asn
1640 1645 1650

<210> 158
<211> 262
<212> PRT
<213> ww14 噬菌体
<400> 158

[0238]

Met Ala Ile Val Gly Val Pro Gly Trp Ile Gly Gln Ser Ala Val Asp
1 5 10 15
Glu Thr Gly Gln Arg Trp Met Asp Ala Ala Met Arg Asp Val Arg Val
20 25 30
Ala Val Pro Gly Trp Met Gly Ser Met Ala Gly Gln Ser Lys Glu Ile
35 40 45
Tyr Leu Ser Ile Gly Ala Asn Asn Ser Tyr Asp Arg Asn Ser Leu Ile
50 55 60
Asn Trp Met Arg Ala Gln Gly Gly Ala Pro Val Val Ile Thr Ile Thr
65 70 75 80
Gly Asn Leu Val Ser Asn Ser Thr Gly Asn Ala Cys Leu Glu Phe Pro
85 90 95
Ser Asn Leu Pro Asn Ala Tyr Ile Gln Leu Ile Ile Asn Ser Gly Val
100 105 110
Thr Val Tyr Gly Arg Gly Gly Asn Gly Ser Thr Asn Gly Ser Ala Gly
115 120 125
Gly Asn Gly Gly Thr Ala Ile His Asn Ala Ala Gly Thr Lys Leu Arg
130 135 140
Ile Arg Asn Asn Gly Ala Ile Ala Gly Gly Gly Gly Gly Gly Gly Ala
145 150 155 160
Val Ser Leu Gln Asn Ser Tyr Pro Thr Asn Gly Thr Cys Gly Gly Gly
165 170 175
Gly Gly Arg Pro Phe Gly Val Gly Gly Lys Ile Gly Ser Asp Ala Ile
180 185 190
Leu Ser Gly Ser Asn Ala Ser Leu Thr Ala Ala Gly Thr Gly Gly Ala
195 200 205
Thr Val Gln Tyr Gly Gly Gly Asn Gly Gly Asn Val Gly Ala Gly Gly
210 215 220
Gly Arg Gly Trp Gly Lys Asn Val Tyr Thr Ser Ala Gly Gly Ser Ala
225 230 235 240
Gly Ala Ala Val Thr Gly Asn Ala Pro Asn Trp Gln Asn Val Gly Thr
245 250 255
Ile Tyr Gly Ser Arg Val

260

<210> 159
<211> 76
<212> PRT
<213> ww14 噬菌体
<400> 159

Met Ser Glu Gln Thr Ile Glu Gln Lys Leu Gln Ala Glu Ile Val Ala
1 5 10 15
Leu Lys Ser Arg Ile Leu Asp Thr Gln Asp Val Ala Ala Gln Ala Gln
20 25 30
Gln Glu Ser Arg Ile Leu Gln Asp Ala Leu Ser Lys Ile Ala Ala Arg
35 40 45
Leu Gly Ile Thr Gly Asp Gln Ile Gln Ile Glu Asp Leu Ile Ala Ala
50 55 60
Val Pro Asp Leu Thr Ala Glu Ser Ala Asp Glu Glu
65 70 75

<210> 160
<211> 1325
<212> PRT
<213> 人工序列
<220>
<223> WW170-G8

[0239]

<400> 160

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala

[0240]

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                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Gly Ala Ile Ile Asn Leu Ser
385                 390                 395                 400
Cys Pro Pro Val Tyr Asp Arg Asp Val Thr Met Ala Gly Lys Val Lys
                405                 410                 415
Gly Asn Asn Tyr Ile Leu Ser Lys Thr Ala Asn Tyr Leu Glu Asp Gln
            420                 425                 430
Thr Ala Arg Asp Leu Asn Tyr Phe Gly Ala Phe Arg Thr Asn Gly Gln
        435                 440                 445
Asp Gly Leu Leu Asp Leu Thr Leu Asn Val Pro His Ser Ala Gly Val
    450                 455                 460
Asn His Gly Arg Gly Phe Thr Phe Arg Tyr Ala Thr Gly Gly Ser Arg
465                 470                 475                 480
Val Glu Thr Tyr Gly Tyr Asn Ala Gln Gly Gln Lys Ala Phe Ser Tyr
                485                 490                 495
Lys Met Tyr His Glu Gly Asp Lys Pro Thr Pro Ser Glu Leu Asn Val
            500                 505                 510
Tyr Ser Lys Gln Glu Val Asp Arg Met Phe Val Lys Thr Val Lys Leu
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[0241]

515 520 525

Ala Thr Val Pro Val Asp Ile Val Asp Gly Tyr Phe Lys Leu Ala Thr
530 535 540
Ala Met Ile Pro Gln Asn Gly Arg Ser Val Phe Phe Arg Ile His Gly
545 550 555 560
Gly Asn Gly Tyr Asn Val Thr Ala Tyr Asp Gln Val Asp Ile Val Glu
565 570 575
Ile Val Ile Arg Ser Gly Asn Asn Arg Pro Lys Gly Val Asn Val Ile
580 585 590
Ala Tyr Arg Arg Asn Thr Asn Lys Ala Phe Asp Val Leu Ala Val Asn
595 600 605
Thr Ser Gly Asp Asn Tyr Asp Ile Tyr Val Lys Tyr Gln Arg Tyr Thr
610 615 620
Asp Asn Val Ile Val Glu Phe Gly Lys Ser Val Asp Val Asp Leu Val
625 630 635 640
Val His Asp Val Pro Asp Phe Val Val Asp Arg Pro Val Gly Asp Asn
645 650 655
Val Ile Gly Gly Arg Ala Val Thr Leu Phe Asn Thr Glu Asn Lys Arg
660 665 670
Gly Val Leu Ser Phe Asp Asp Asn Thr Gln Asn Ser Tyr Asp Ile Val
675 680 685
His Leu Ser Asn Asp Arg Gly Thr Gly Arg Lys Tyr Ile Arg Lys Phe
690 695 700
Arg Ser Asn Tyr Asn Glu Met Ile Trp His Glu Thr Val Gln Gly Ser
705 710 715 720
Thr Tyr Arg Leu Ala Thr Gly Ser Thr Asp Ala Gln Glu Ile Leu Ser
725 730 735
Val Glu Ser Ser Ser Ser Ile Ala Gly Thr His Lys Gly Asn Ile Leu
740 745 750
Ser Gly Arg Met Met Leu Gly Gly Gly Ser Asn Val Ile Thr Leu Arg
755 760 765
Arg Pro Ala Gly Gln Ser Asn His Ile Ala Phe Gln Asp Asn Arg Thr
770 775 780
Gly Ser Ile Thr Arg Gln Gly Trp Ile Gly Tyr Gly Asn Ala Asp Thr
785 790 795 800
Asn Val Phe Glu Trp Tyr Ser Asp Val Gly Gly Thr Ser Ile Arg His
805 810 815
His Ile Asp Gly Gln Ile Glu Leu Ala Thr Gly Asn Thr Lys Arg Val
820 825 830
Tyr Thr Asn Ala Gln Phe Ile Ser Met Asn Ser Asp Ala Tyr Arg Met
835 840 845
Ile Phe Gly Asn Tyr Gly Ala Phe Trp Arg Asn Asp Gly Thr Lys Val
850 855 860
Tyr Leu Leu Ser Thr Ala Glu Asp Asp Lys Phe Gly Gly Trp Asn Gly

865 870 875 880
Asn Arg Pro Phe Ile Tyr Asp Leu Thr Asn Gly Lys Val Thr Leu Gly
885 890 895
Gly Asp Gly Asn Glu Gly Ala Leu Val Leu Glu Arg Asp Ser Arg Ala
900 905 910
Ala Arg Phe Ala Gly Asp Val Tyr Val Glu Lys Gly Phe Leu His Phe
915 920 925
Ser Ser Gly Arg Gln Gly Ala Ser Gly Phe Met Lys Ile Asn His Leu
930 935 940
Gly Asp Ile Ala Ser Gly Arg His Asn Ile Leu Gln Ile Glu Asp Pro
945 950 955 960
Thr Gly Ile His Phe Ser Thr Glu Arg Asn Asp Glu Thr Gly Asn Ile
965 970 975
Thr Ala Arg Phe Lys Gly Phe Val Arg Val Glu Ala Gly Glu Ile Ala
980 985 990
Phe Asp Ala Asn Arg Gly Ser Gln Ser Gln Phe Thr Leu His Thr Trp
995 1000 1005
Gly Asn Glu Gln Arg Lys Gln Val Phe Glu Cys Lys Asp Ala Thr
1010 1015 1020
Gly Tyr His Trp Tyr Thr Glu Arg Thr Gln Gly Gly Thr Gly Asn
1025 1030 1035
[0242] Val Leu Phe Ser Met Ala Gly Ser Leu Asn Val Thr Ser Asn Ile
1040 1045 1050
Thr Thr Thr Gly Ala Asp Ile Thr Phe Lys Arg Ala Gly Asn Lys
1055 1060 1065
His Ile Trp Phe Arg Asp Pro Asp Gly Leu Glu Leu Gly Leu Met
1070 1075 1080
Tyr Cys Asp Asp Ala Gly Ala Ile Arg Phe Arg Gly Gln Lys Gln
1085 1090 1095
Ala Gln Ala Trp Lys Phe Ala Asp Lys Met Ile Gln Leu Glu Ser
1100 1105 1110
Gly Thr Val Ser Gly Gly Gly Asn Gly Leu Ile Arg Gly Glu Val
1115 1120 1125
Ala Gly Gly Ser Trp Ser Ser Trp Arg Asp Arg Ala Ala Gly Leu
1130 1135 1140
Met Val Gly Cys Pro Gln Ser Thr Asn Ser Ala His Asn Val Trp
1145 1150 1155
Lys Ala Thr His Trp Gly Lys Tyr His Ile Ala Ala Met Gly Ile
1160 1165 1170
His Val Pro Asp Gly Thr Ile Gly Asn Ala Leu Ala Arg Leu His
1175 1180 1185
Val His Asp Thr Asn Phe Asp Phe Ser Ala Ser Gly Asp Met Thr
1190 1195 1200
Ala Gly Arg Asn Gly Ser Phe Asn Asp Val Tyr Ile Arg Ser Asp

1205 1210 1215
Ala Arg Leu Lys Ile Asn Lys Glu Glu Tyr Lys Glu Asn Ala Thr
1220 1225 1230
Asp Lys Ile Asn Arg Leu Thr Val Tyr Thr Tyr Asp Lys Val Lys
1235 1240 1245
Ser Leu Thr Asp Arg Thr Val Ile Ala His Glu Val Gly Ile Ile
1250 1255 1260
Ala Gln Asp Leu Glu Lys Glu Leu Pro Glu Ala Val Thr Thr Ser
1265 1270 1275
Lys Val Gly Asp Pro Asp Lys Pro Glu Glu Ile Leu Thr Ile Ser
1280 1285 1290
Asn Ser Ala Val Asn Ala Leu Leu Ile Lys Ala Phe Gln Glu Met
1295 1300 1305
Ser Glu Glu Leu Lys Ala Val Lys Ala Glu Leu Ala Glu Leu Lys
1310 1315 1320
Lys Asn
1325

<210> 161
<211> 259
<212> PRT
<213> ww170 噬菌体

[0243]
<400> 161
Met Ala Ile Ser Ser Gly Trp Val Gly Ser Ser Ala Val Ser Glu Thr
1 5 10 15
Gly Gln Arg Trp Met Ser Ala Ala Met Gln Ala Val Arg Leu Gly Arg
20 25 30
Pro Ala Tyr Met Ser Ala Met Val Gly Arg Ser Lys Glu Ile His Tyr
35 40 45
Ser Ile Gly Ala Ser Asn Ser Tyr Asn Lys Asp Thr Leu Ile Asn Trp
50 55 60
Met Lys Ala Gln Gly Ser Thr Pro Val Val Ile Thr Ile Thr Gly Asn
65 70 75 80
Ile Val Ser Gln Ser Thr Gly Val Pro Cys Leu Asp Phe Pro Ser Ser
85 90 95
Leu Thr Asn Glu Tyr Val Thr Leu Ile Ile Asn Pro Gly Val His Val
100 105 110
Trp Gly Arg Gly Gly Asn Gly Gly Asn Asn Ser Ala Gly Gly Ala Gly
115 120 125
Gly Asn Ala Ile Asn Asn Gly Ile Gly Thr Arg Leu Arg Ile Thr Asn
130 135 140
Asn Gly Ala Ile Cys Gly Gly Gly Gly Gly Gly Gly Gly Gly Tyr Tyr
145 150 155 160
Ser Pro Phe Ser Gln Met Arg Leu Thr Phe Gly Gly Gly Gly Gly Arg
165 170 175

Pro Phe Gly Ala Ala Gly Gly Ser Ala Asn Met Glu Gln Gly Ala Thr
180 185 190
Ala Gly Thr Ile Ser Ala Pro Gly Lys Gly Ser Val Asn Gly Val Tyr
195 200 205
Asn Gly Gly Asn Gly Gly Asp Ala Gly Gly Ala Gly Gly Lys Cys Asn
210 215 220
Ile Arg Gly Gln Gly Ser Glu Tyr Asn Gly Gly Ala Ala Gly Lys Ala
225 230 235 240
Val Thr Gly Asn Ala Pro Arg Trp Asp Lys Val Gly Thr Ile Tyr Gly
245 250 255
Ala Arg Val

<210> 162
<211> 86
<212> PRT
<213> ww170 噬菌体
<400> 162
Met Ser Asn Gln His Glu Gln Met Ile Asn Val Leu Lys Val Arg Leu
1 5 10 15
Phe Asp Thr Gln Glu Lys Ala Ala Phe Leu Glu Gly Gln Leu Lys Asp
20 25 30
Arg Glu Arg Val Leu Met Glu Leu Val Arg Ile Leu Gly Ile Gln Pro
35 40 45
Asp Glu Asn Gly Thr Val Ser Leu Asp Ala Ile Val Glu Glu Val Lys
50 55 60
Ala Leu Leu Pro Lys Asp Glu Ala Ala Glu Asp Ala Lys Glu Glu Val
65 70 75 80
Glu Leu Ile Thr Glu Ala
85

[0244]

<210> 163
<211> 1315
<212> PRT
<213> 人工序列
<220>
<223> WW202-G8
<400> 163
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60

[0245]

Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Val Val Met Asp Glu Thr Asn Arg Gly Gln Ile Val Asn Leu Ser
385 390 395 400
Cys Pro Pro Val Tyr Asp Lys Gly Phe Asp Val Arg Gly Arg Val Val
405 410 415

[0246]

Val Asp Asp Leu Val Trp Ser Asn Thr Ala Asn Tyr Phe Asp Asp Pro
420 425 430
Thr Ala Arg Asn Leu Asp Lys Phe Gly Ala Phe Arg Thr Asn Asp Met
435 440 445
Asp Gly His Leu Ala Phe Ala Leu His Ile Pro His Pro Ser Gly Ile
450 455 460
Asn His Ala Arg Gly Phe Asp Phe Thr Tyr Gly Ser Asn Val Val Pro
465 470 475 480
Thr Val Lys Thr Tyr Gly Tyr Asn Ala Asp Gly Val Leu Ala Tyr Ser
485 490 495
Tyr Arg Met Tyr His Glu Gly Asp Lys Pro Ser Pro Ser Glu Leu Asn
500 505 510
Val Tyr Ser Lys Gln Glu Val Asp Arg Met Phe Gln Lys Thr Ile Asn
515 520 525
Phe Gly Val Glu Thr Gly Trp Phe Lys Ile Ala Thr Ala Phe Ile Pro
530 535 540
Gln Asn Asp Gly Arg Ser Leu Lys Ile Arg Leu Val Gly Gly Asn Gly
545 550 555 560
Trp Asn Val Gly Gln Thr Gly Gln Cys Asn Ile Ile Glu Leu Val Ile
565 570 575
Arg Thr Ser Asn Gly Ser Pro Lys Gly Ile Asn Phe Val Ala Tyr His
580 585 590
His Val Ser Gly Tyr Glu Asn Gln Phe Cys Ala Ile Asn Thr Gly Asp
595 600 605
Asp Thr Tyr Asp Ile Tyr Ala Tyr Tyr Tyr Glu Phe Thr Asn Met Val
610 615 620
Met Ala Glu Tyr Gln Ala Ser Ser Asp Val Asn Leu Thr Val Phe Asp
625 630 635 640
Arg Pro Glu Tyr Val Gly Glu Lys Pro Val Ala Glu His Ile Phe Asp
645 650 655
Ala Tyr Thr Ile His Ser Phe Asn Ser Phe Ser Asn Arg Gly Thr Leu
660 665 670
Asn Phe Ala Gly Asn His Gln Gly Gln Tyr Asp Ile Glu His Met Asn
675 680 685
Glu Gln Pro Thr Asn Ala Lys Lys Met Leu Arg Arg Phe Arg Ser Ser
690 695 700
Ala Ser Ala Thr Ile Trp His Glu Thr Val Asp Asp Gln Asn Tyr Arg
705 710 715 720
Leu Ala Thr Gly Gly Thr Asp Ser Val Gln Gln Leu Leu Leu Ser Ser
725 730 735
Gly Thr Gly Leu His Ile Arg Arg Leu Thr Ile Asp Gly Gly Leu Gly
740 745 750
Ser Gly Ser Asn Ala Gly Ile Asp Ile Arg Arg Gly Pro Asn Glu Ser
755 760 765

[0247]

```
Ser His Phe Asn Phe Met Asp Tyr Arg Thr Gly Gln Asp Val Arg Asn
    770                 775                 780
Gly Trp Phe Gly Phe Gly Asp Leu Thr Thr Lys Asp Phe Ile Trp Trp
785                 790                 795                 800
Asn Asp Asn Gly Gln Asn Ser Ile Asn Leu Ile Glu Asn Gly Glu Leu
                805                 810                 815
His Ile Thr Gly Gly Arg Gly Gln Lys Ile Val Met Asn Ser Glu Val
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Ala Leu Ser Glu Asn Ala Arg Leu Ala Val Lys Gly Gly Asn Tyr Gly
        835                 840                 845
Leu Ile Leu Arg Asn Asp Gly Thr Gly Phe His Ile Leu Thr Thr Asp
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Leu Lys Asp Ser Phe Gly Ser Trp Asn Asn Arg Arg Pro Phe Ser Tyr
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Asn Phe Ala Asp Gly Gly Leu Tyr Leu Gly Gly Thr Glu Thr Ala Arg
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Cys Leu His Leu Gly Ile Asp Gly Ser Thr Arg Leu Glu Asp Asn Leu
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Phe Phe Lys Ala Gly Ser Arg Gln Ser Met Asp Tyr Met Glu Leu Val
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His Trp Gly Ala Ser Asn Thr Gly Arg Asn Asn Val Leu Ser Leu Arg
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Asp Ser Lys Gly Phe Leu Ala Glu Phe Glu Arg Val Gly Gly Thr Asp
945                 950                 955                 960
Gly Val Lys Thr Arg Phe Phe Gly Glu Thr Phe Thr Asp Gly Thr Leu
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Tyr Leu Asn Gln Met Asn Asn Ser Ser Glu Arg Phe Ser Ile Asn Asn
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Trp Gly Asn Ser Glu Val Gly Arg  Ala Ala Val Met Glu  Val Gly Asp
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Ser Lys  Gly Tyr His Phe Tyr  Ala Glu Arg Arg Thr  Asp Asp Thr
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Val Leu  Phe Asp Val Ser Gly  Ala Leu Thr Val His  Gly Pro Asn
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Gly Ile  Thr Val Lys Asn Ser  Thr Gly Ala Arg His  Ile Trp Phe
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Arg Asp  Asp Ser Asp Thr Glu  Lys Ala Val Ile Trp  Ala Thr Asp
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Asp Gly  Met Leu His Ile Arg  Asn Asn His Glu Gly  Ser Phe Ala
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His His  Phe Gln Gly Ala Met  Ile Lys Leu Glu Gly  Arg Val Pro
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[0248]

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Gly Lys Leu Lys Val Lys Thr Tyr Asp Lys Val Lys Ser Leu Lys
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Asp Arg Cys Phe Glu Ala Gly Ser Thr Pro Ile Val Phe Asn Ile Thr
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Gly Asp Leu Val Ser Tyr Ser Lys Asp Val Pro Leu Phe Phe Met Tyr

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100 105 110
Met Tyr Gly Arg Gly Gly Asn Gly Gly Ser Asn Ser Pro Gly Ser Ala
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[0249]

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[0251]

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[0252]

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[0253]

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[0261]

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[0262]

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<212> DNA
<213> 人工序列
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[0263]

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[0266]

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gaacttaaaa agaattaa 3978

<210> 185
<211> 780
<212> DNA
<213> ww170 噬菌体
<400> 185

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ggacgctcta aagagattca ttatagcatt ggtgctagta actcttacaa taaagacact 180
cttattaact ggatgaaagc acaaggatct actccggtag taattactat cactggtaat 240
attgtttccc aatctactgg cgttccttgt cttgacttcc ctagctcgtt aacaaacgaa 300
tatgtaacat tgatcattaa ccccggtgtt catgtttggg ggcgtggtgg taatggtggc 360
aataactccg ctggtggtgc tggtggtaat gcaattaaca acggtatagg cacacgctta 420
cgcatcacaa ataacggcgc tatttgcggt ggcggtggcg gtggcggcgg tgggtattat 480
tctccttttt cacaaatgag attaaccttt ggcggtggtg gtgggcgtcc gtttggtgct 540
gccggtgggt ctgctaatat ggaacagggt gctactgctg gtactatttc cgcgccaggt 600
aaagggtctg tcaacggtgt atataatggc ggtaacggtg gtgatgctgg tggtgctggt 660
ggtaaatgta atatccgtgg acagggatcg gaatataacg gtggtgcggc tggtaaggct 720
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[0267]

<210> 186
<211> 261
<212> DNA
<213> ww170 噬菌体
<400> 186

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gtacgcattc tgggtattca gccagacgaa aacggcactg tttcccttga tgctatcgtc 180
gaagaagtga aagcacttct ccctaaagac gaagcagcgg aagacgctaa agaggaagta 240
gaactgatca cggaggcttg a 261

<210> 187
<211> 3948
<212> DNA
<213> 人工序列
<220>
<223> WW202-G8
<400> 187

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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
atcctgcagg ttgacggttt tccaccatcg cacgccggga ccatcaccgt gtatgaagat 240

[0268]

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tcacaaccgg ggacgctgaa tgattttctc tgtgccatga cggaggatga tgcccggccg      300
gaggtgctgc gtcgtcttga actgatggtg gaagaggtgg cgcgtaacgc gtccgtggtg      360
gcacagagta cggcagacgc gaagaaatca gccggcgatg ccagtgcatc agctgctcag      420
gtcgcggccc ttgtgactga tgcaactgac tcagcacgcg ccgccagcac gtccgccgga      480
caggctgcat cgtcagctca ggaagcgtcc tccggcgcag aagcggcatc agcaaaggcc      540
actgaagcgg aaaaaagtgc cgcagccgca gagtcctcaa aaaacgcggc ggccaccagt      600
gccggtgcgg cgaaaacgtc agaaacgaat gctgcagcgt cacaacaatc agccgccacg      660
tctgcctcca ccgcggccac gaaagcgtca gaggccgcca cttcagcacg agatgcggtg      720
gcctcaaaag aggcagcaaa atcatcagaa acgaacgcat catcaagtgc cggtcgtgca      780
gcttcctcgg caacggcggc agaaaattct gccagggcgg caaaaacgtc cgagacgaat      840
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gcggcggcgg ggagtgcgtc aacggcatcc acgaaggcga cagaggctgc gggaagtgcg      960
gtatcagcat cgcagagcaa aagtgcggca gaagcggcgg caatacgtgc aaaaaattcg     1020
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cctagcggta taaatcatgc tcgtgggttt gattttactt atggttctaa cgttgttcct     1440
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tggaacgtag gccaaacggg acaatgtaat attattgaac ttgttataag gactagcaac     1740
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actaatatgg taatggctga atatcaagcg tccagcgatg ttaatttaac tgtatttgat     1920
cgacctgaat atgtaggcga aaaacctgta gccgaacata tattcgatgc atatacaata     1980
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<210> 188
<211> 783
<212> DNA
<213> ww202 噬菌体

[0269]

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ttctccggtc gttcaagaga aattattcat acacttggag cagaccataa cttcaatggt 180
cagtggttcc gtgatagatg ctttgaagca ggtagtacac ctatagtgtt taatatcacc 240
ggagatttag tatcatattc taaagatgtt cctttattct ttatgtacgg agatacacct 300
aatgaatatg ttcagttgaa tatacatggc gtaacgatgt atggtcgtgg cgggaatggc 360
ggtagcaata gtcctggatc agctgggggt cattgtattc aaaatgatat tggtgggaga 420
ctaagaatta ataatggtgg agctattgca ggtggcggtg gcggtggcgg tggcgggtat 480
tattctcctt tttcacaaat gagattaacc tttggcggtg gcggtgggcg tccgtttggt 540
gcacccggcg gatctattga tatgcaatca ggcgcaactg ctggtactct ttatgctcct 600
ggatcggggt ccgtgaacgg tatctataat ggcggaagcg gtggtgaggt aggcgccgca 660
ggaggtagat gtaatattcg tggtcaagga tatgaataca atggcggcga tgctggttat 720
gctgttatag gttcttctcc aacgtggcaa aatcgcggag ctatttacgg acctgctgtt 780
taa 783

<210> 189
<211> 261
<212> DNA
<213> ww202 噬菌体
<400> 189
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gaaaaagccg cattcttaga aggccaactg aaagatcgtg agcgtgtatt gatggaactg 120

gtgcgtgttc tgggtattca gccagatgaa aatggcactg tttcccttga tgctatcgtc 180
gaagaagtaa aagcacttct ccctaaagac gaagcagcgg aagacgctaa agaggaagta 240
gaactgatca cggaggcttg a 261
<210> 190
<211> 6
<212> PRT
<213> 人工序列
<220>
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<400> 190
Ser Ala Gly Asp Ala Ser
1 5
<210> 191
<211> 6
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<223> 插入序列
<400> 191
Ala Asp Ala Lys Lys Ser
1 5

[0270]

<210> 192
<211> 6
<212> PRT
<213> 人工序列
<220>
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<400> 192
Met Asp Glu Thr Asn Arg
1 5
<210> 193
<211> 6
<212> PRT
<213> 人工序列
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<223> 插入序列
<400> 193
Ser Ala Ser Ala Ala Ala
1 5
<210> 194
<211> 6
<212> PRT
<213> 人工序列
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<223> 插入序列
<400> 194
Gly Ala Gly Glu Asn Ser
1 5
<210> 195
<211> 6
<212> PRT
<213> 人工序列
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<223> 插入序列
<400> 195
Ala Thr Leu Lys Gln Ile
1 5
<210> 196
<211> 6
<212> PRT
<213> 人工序列
<220>
<223> 插入序列
<400> 196
Ile Ile Gln Leu Glu Asp
1 5

[0271]

<210> 197
<211> 6
<212> PRT
<213> 人工序列
<220>
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<400> 197
Gly Asn Ile Ile Asp Leu
1 5
<210> 198
<211> 5
<212> PRT
<213> 人工序列
<220>
<223> 插入序列
<400> 198
Ile Ala Thr Arg Val
1 5
<210> 199
<211> 5
<212> PRT
<213> 人工序列

[0272]

<220>
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Thr Pro Gly Glu Leu
1 5
<210> 200
<211> 5
<212> PRT
<213> 人工序列
<220>
<223> 插入序列
<400> 200
Gly Ala Ile Ile Asn
1 5
<210> 201
<211> 5
<212> PRT
<213> 人工序列
<220>
<223> 插入序列
<400> 201
Asn Gln Ile Ile Asp
1 5
<210> 202
<211> 5
<212> PRT
<213> 人工序列
<220>
<223> 插入序列
<400> 202
Gly Gln Ile Val Asn
1 5
<210> 203
<211> 5
<212> PRT
<213> 人工序列
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<223> 插入序列
<400> 203
Val Asp Arg Ala Val
1 5
<210> 204
<211> 659
<212> PRT

<213> AG22 噬菌体

<400> 204

[0273]

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Met Ala Ile Tyr Arg Gln Gly Gln Ala Ser Met Asp Ala Gln Gly Tyr
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Val Thr Gly Tyr Gly Thr Lys Trp Arg Glu Gln Leu Thr Leu Ile Arg
            20                  25                  30
Pro Gly Ala Thr Ile Phe Phe Leu Ala Gln Pro Leu Gln Ala Ala Val
        35                  40                  45
Ile Thr Glu Val Ile Ser Asp Thr Ser Ile Arg Ala Ile Thr Thr Gly
    50                  55                  60
Gly Ala Val Val Gln Lys Thr Asn Tyr Leu Ile Leu Leu His Asp Ser
65                  70                  75                  80
Leu Thr Val Asp Gly Leu Ala Gln Asp Val Ala Glu Thr Leu Arg Tyr
                85                  90                  95
Tyr Gln Gly Lys Glu Ser Glu Phe Ala Gly Phe Ile Glu Ile Ile Lys
            100                 105                 110
Asp Phe Asp Trp Asp Lys Leu Gln Lys Ile Gln Glu Asp Val Lys Thr
        115                 120                 125
Asn Ala Asp Ala Ala Ala Ala Ser Gln Gln Ala Ala Lys Thr Ser Glu
    130                 135                 140
Asn Asn Ala Lys Thr Ser Ala Thr Asn Ala Ala Asn Ser Lys Lys Gly
145                 150                 155                 160
Ala Asp Thr Ala Lys Ala Ala Ala Glu Ser Ala Arg Asp Ala Ala Asn
                165                 170                 175
Thr Ala Lys Thr Gly Ala Glu Ala Ala Lys Ser Gly Ala Glu Ser Ala
            180                 185                 190
Arg Asp Ala Ala Asn Thr Ala Lys Ala Gly Ala Glu Ser Ala Arg Asp
        195                 200                 205
Gln Ala Glu Glu Tyr Ala Lys Gln Ala Ala Glu Pro Tyr Lys Asp Leu
    210                 215                 220
Leu Gln Pro Leu Pro Asp Val Trp Ile Pro Phe Asn Asp Ser Leu Asp
225                 230                 235                 240
Met Ile Thr Gly Phe Ser Pro Ser Tyr Lys Lys Ile Val Ile Gly Asp
                245                 250                 255
Asp Glu Ile Thr Met Pro Gly Asp Lys Ile Val Lys Phe Lys Arg Ala
            260                 265                 270
Ser Thr Ala Thr Tyr Ile Asn Lys Ser Gly Val Leu Thr Asn Ala Ala
        275                 280                 285
Ile Asp Glu Pro Arg Phe Glu Lys Asp Gly Leu Leu Ile Glu Gly Gln
    290                 295                 300
Arg Thr Asn Leu Leu Ile Asn Ser Thr Asn Pro Ser Lys Trp Asn Lys
305                 310                 315                 320
Ser Ser Asn Met Ile Leu Asp Arg Ser Gly Val Asp Asp Phe Gly Phe
                325                 330                 335
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[0274]

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Gln Tyr Ala Lys Phe Thr Leu Lys Pro Glu Met Val Gly Gln Thr Ser
            340                 345                 350
Ser Ile Asn Ile Val Thr Val Ser Gly Ser Arg Gly Phe Asp Val Thr
        355                 360                 365
Gly Asn Glu Lys Tyr Val Thr Ile Ser Cys Arg Ala Gln Ser Gly Thr
    370                 375                 380
Pro Asn Leu Arg Cys Arg Leu Arg Phe Glu Asn Tyr Asp Gly Ser Ala
385                 390                 395                 400
Tyr Ala Ser Leu Gly Asp Ala Tyr Val Asn Leu Thr Asp Leu Ser Ile
                405                 410                 415
Glu Lys Thr Gly Gly Ala Ala Asn Arg Ile Thr Ala Arg Ala Val Lys
            420                 425                 430
Asp Glu Ala Ser Lys Trp Ile Phe Phe Glu Ala Thr Ile Lys Ala Leu
        435                 440                 445
Asp Thr Glu Asn Met Ile Gly Ala Met Val Gln Tyr Ala Pro Ala Lys
    450                 455                 460
Asp Gly Gly Gly Thr Gly Ala Asp Asp Tyr Ile Tyr Ile Ala Thr Pro
465                 470                 475                 480
Gln Val Glu Gly Gly Val Cys Ala Ser Ser Phe Ile Ile Thr Glu Ala
                485                 490                 495
Thr Pro Val Thr Arg Ala Ser Asp Met Val Thr Ile Pro Ile Lys Asn
            500                 505                 510
Asn Leu Tyr Asn Leu Pro Phe Thr Val Leu Cys Glu Val His Lys Asn
        515                 520                 525
Trp Tyr Ile Thr Pro Asn Ala Ala Pro Arg Val Phe Asp Thr Gly Gly
    530                 535                 540
His Gln Ser Gly Ala Ala Ile Ile Leu Ala Phe Gly Ser Ala Asp Gly
545                 550                 555                 560
Asp Asn Asp Gly Phe Pro Tyr Cys Asp Ile Gly Lys Ser Asn Arg Arg
                565                 570                 575
Val Asn Glu Asn Ala Lys Leu Lys Lys Met Ile Ile Gly Met Arg Val
            580                 585                 590
Lys Ser Asp Tyr Asn Thr Cys Cys Val Ser Asn Ala Arg Ile Ser Ser
        595                 600                 605
Glu Thr Lys Thr Glu Trp Arg Tyr Ile Val Ser Thr Ala Thr Ile Arg
    610                 615                 620
Ile Gly Gly Gln Thr Ser Thr Gly Glu Arg His Leu Phe Gly His Val
625                 630                 635                 640
Arg Asn Phe Arg Ile Trp His Lys Ala Leu Thr Asp His Gln Leu Gly
                645                 650                 655
Glu Ile Val
```

<210> 205
<211> 909

<212> PRT
<213> SIEA11 噬菌体
<400> 205

[0275]

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Leu Ala Ala Ala Thr Val Pro Gly Gly Lys Lys Val Thr Leu Ser Ala
20 25 30
Met Ala Val Gly Asp Gly Asn Gly Lys Leu Pro Val Pro Asp Ala Gly
35 40 45
Gln Thr Lys Leu Val His Glu Val Trp Arg His Ala Leu Asn Lys Val
50 55 60
Ser Val Asp Asn Lys Asn Lys Asn Tyr Ile Val Ala Glu Leu Val Val
65 70 75 80
Pro Pro Glu Val Gly Gly Phe Trp Met Arg Glu Leu Gly Leu Tyr Asp
85 90 95
Asp Ala Gly Thr Leu Ile Ala Val Ser Asn Met Ala Glu Ser Tyr Lys
100 105 110
Pro Glu Leu Ala Glu Gly Ser Gly Arg Ala Gln Thr Cys Arg Met Val
115 120 125
Ile Ile Val Ser Asn Val Ala Ser Val Glu Leu Ser Ile Asp Ala Ser
130 135 140
Thr Val Met Ala Thr Gln Asp Tyr Val Asp Asp Lys Ile Ala Glu His
145 150 155 160
Glu Gln Ser Arg Arg His Pro Asp Ala Thr Leu Thr Glu Lys Gly Phe
165 170 175
Thr Gln Leu Ser Ser Ala Thr Asn Ser Thr Ser Glu Ser Leu Ala Ala
180 185 190
Thr Pro Lys Ala Val Lys Ala Ala Asn Asp Asn Ala Asn Ser Arg Leu
195 200 205
Ala Lys Asn Gln Asn Gly Ala Asp Ile Gln Asp Lys Ser Ala Phe Leu
210 215 220
Asp Asn Val Gly Val Thr Ser Leu Thr Phe Met Lys Asn Asn Gly Glu
225 230 235 240
Met Pro Val Asp Ala Asp Leu Asn Thr Phe Gly Ser Val Lys Ala Tyr
245 250 255
Ser Gly Ile Trp Ser Lys Ala Thr Ser Thr Asn Ala Thr Leu Glu Lys
260 265 270
Asn Phe Pro Glu Asp Asn Ala Val Gly Val Leu Glu Val Phe Thr Gly
275 280 285
Gly Asn Phe Ala Gly Thr Gln Arg Tyr Thr Thr Arg Asp Gly Asn Leu
290 295 300
Tyr Ile Arg Lys Leu Ile Gly Thr Trp Asn Gly Asn Asp Gly Pro Trp
305 310 315 320
Gly Ala Trp Arg His Val Gln Ala Val Thr Arg Ala Leu Ser Thr Thr

[0276]

325 330 335
Ile Asp Leu Asn Ser Leu Gly Gly Ala Glu His Leu Gly Leu Trp Arg
340 345 350
Asn Ser Ser Ser Ala Ile Ala Ser Phe Glu Arg His Tyr Pro Glu Gln
355 360 365
Gly Gly Asp Ala Gln Gly Ile Leu Glu Ile Phe Glu Gly Gly Leu Tyr
370 375 380
Gly Arg Thr Gln Arg Tyr Thr Thr Arg Asn Gly Thr Met Tyr Ile Arg
385 390 395 400
Gly Leu Thr Ala Lys Trp Asp Ala Glu Asn Pro Gln Trp Glu Asp Trp
405 410 415
Asn Gln Ile Gly Tyr Gln Thr Ser Ser Thr Phe Tyr Glu Asp Asp Leu
420 425 430
Asp Asp Leu Met Ser Pro Gly Ile Tyr Ser Val Thr Gly Lys Ala Thr
435 440 445
His Thr Pro Ile Gln Gly Gln Ser Gly Phe Leu Glu Val Ile Arg Arg
450 455 460
Lys Asp Gly Val Tyr Val Leu Gln Arg Tyr Thr Thr Thr Gly Thr Ser
465 470 475 480
Ala Ala Thr Lys Asp Arg Leu Tyr Glu Arg Val Phe Leu Gly Gly Ser
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Leu Gly Gly Asn Ser Ile Val Leu Gly Asp Asn Asp Thr Gly Phe Lys
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Gln Asn Gly Asp Gly Asn Leu Asp Val Tyr Ala Asn Ser Val His Val
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[0285]

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tatcagacca gtagtacctt ctatgaggat gacctggatg atttgatgtc tccaggtatt 1320
tacagtgtga caggcaaagc gacccacacc ccaatccagg ggcagtctgg ttttctggaa 1380
gtcatcaggc gcaaggatgg tgtctatgtt ttgcaacgtt acacgaccac aggaaccagc 1440
gcagctacaa aagaccgttt atatgagcga gtgtttcttg gtggctcatt taacgcgtgg 1500
ggggagtggc gacagattta taactcaaac tctttgccgt tagagttggg tatcggtggc 1560
gcagtggcaa aactcaccag cctggactgg cagacatacg attttgtgcc gggcagtctg 1620
ataaccgttc ggctggataa catgaccaat attcccgacg gtatggactg gggcgtcatt 1680
gatggcaacc tgataaacat ctcagtcggt ccgagtgatg attctggttc gggacgctca 1740
atgcatgtat ggcgcagcac tgtaagtaaa gccaactacc gctttttat ggtgcgtatt 1800
tcaggaaatc cgggaagccg cacgatcacg acaagacgtg tgccaattat cgacgaagcc 1860
cagacatggg gcgcgaaaca gacattcagt gctggccttt ctggtgaact gtccggcaat 1920
gcggcgacag caacaaagct gaaaacagcc cgtaaaatta ataacgtttc gtttgatgga 1980

acatcagata ttaacctgac gccgaaaaat attggtgcat ttgcttcagg aaaaacagga 2040
gacaccgttg cgaatgataa agccgttgga tggaactgga gtagcggagc ctataacgca 2100
actattggtg gggcatcaac gttaattctt cattttaata tcggggaagg aagttgtccc 2160
gccgcccagt ttcgcgttaa ttataagaac ggtggtattt tttatcgttc tgctcgtgac 2220
ggttacggat tcgaggctga ctggtctgag ttttatacca caacgcgaaa acctacagcg 2280
ggagatgtcg gtgcactgcc gttatctggt ggtcaattga atggtgctct gggtatagga 2340
acatccagtg ctcttggcgg taattcgatt gttttgggtg ataatgacac gggctttaaa 2400
caaaatggtg atggtaatct ggatgtttat gctaatagcg tccatgttat gcgctttgtc 2460
tccggaagcg ttcaaagtaa taaaaccata aatattacgg ggcgtgttaa tccctcggat 2520
tacggtaact ttgattcccg ctatgtgaga gatgtcagac ttggcacacg tgttgtccag 2580
accatgcaga aaggggtgat gtatgagaaa gcagggcacg taattaccgg gcttggtatt 2640
gtcggtgaag tcgatggtga tgaccccgca gtattcagac caatacaaaa atacatcaat 2700
ggcacatggt ataacgtcgc acaggtg 2727

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<220>
<223> 0111
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[0289]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
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Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190

[0290]

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Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
                485                 490                 495
Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Ala Ser Gly Ala Leu Gln Lys Asn Gln Asn Gly Ala Asp Ile Pro Gly
    530                 535                 540
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[0291]

Lys Asp Thr Phe Thr Lys Asn Ile Gly Ala Cys Arg Ala Tyr Ser Ala
545 550 555 560
Trp Leu Asn Ile Gly Gly Asp Ser Gln Val Trp Thr Thr Ala Gln Phe
565 570 575
Ile Ser Trp Leu Glu Ser Gln Gly Ala Phe Asn His Pro Tyr Trp Met
580 585 590
Cys Lys Gly Ser Trp Ala Tyr Ala Asn Asn Lys Val Ile Thr Asp Thr
595 600 605
Gly Cys Gly Asn Ile Cys Leu Ala Gly Ala Val Val Glu Val Ile Gly
610 615 620
Thr Arg Gly Ala Met Thr Ile Arg Val Thr Thr Pro Ser Thr Ser Ser
625 630 635 640
Gly Gly Gly Ile Thr Asn Ala Gln Phe Thr Tyr Ile Asn His Gly Asp
645 650 655
Ala Tyr Ala Pro Gly Trp Arg Arg Asp Tyr Asn Thr Lys Asn Gln Gln
660 665 670
Pro Ala Phe Ala Leu Gly Gln Thr Gly Ser Arg Val Ala Asn Asp Lys
675 680 685
Ala Val Gly Trp Asn Trp Asn Ser Gly Val Tyr Asn Ala Asp Ile Ser
690 695 700
Gly Ala Ser Thr Leu Ile Leu His Phe Asn Met Asn Ala Gly Ser Cys
705 710 715 720
Pro Ala Val Gln Phe Arg Val Asn Tyr Arg Asn Gly Gly Ile Phe Tyr
725 730 735
Arg Ser Ala Arg Asp Gly Tyr Gly Phe Glu Ala Asn Trp Ser Glu Phe
740 745 750
Tyr Thr Thr Thr Arg Lys Pro Ser Ala Gly Asp Val Gly Ala Tyr Thr
755 760 765
Gln Ala Glu Cys Asn Ser Arg Phe Ile Thr Gly Ile Arg Leu Gly Gly
770 775 780
Leu Ser Ser Val Gln Thr Trp Asn Gly Pro Gly Trp Ser Asp Arg Ser
785 790 795 800
Gly Tyr Val Val Thr Gly Ser Val Asn Gly Asn Arg Asp Glu Leu Ile
805 810 815
Asp Thr Thr Gln Ala Arg Pro Ile Gln Tyr Cys Ile Asn Gly Thr Trp
820 825 830
Tyr Asn Ala Gly Ser Ile
835

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<211> 791
<212> PRT
<213> 人工
<220>
<223> SIED6

<400> 216

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Asp Pro Ala Ser

[0292]

340 345 350

Val Pro Pro Leu Pro Asp Ile Trp Leu Pro Leu Asn Asp Ser Leu Glu
355 360 365

Ala Ile Thr Gly Tyr Ala Pro Gly Tyr Lys Thr Ile Thr Ile Gly Ser
370 375 380

Asp Glu Ile Thr Val Pro Val Asn Gly Ile Cys Gln Phe Ser Arg Ala
385 390 395 400

Ser Ser Ala Thr Tyr Ile Asp Lys Ser Gly His Ile Thr Val Ala Gly
405 410 415

Asn Asn Val Pro Arg Phe Glu Lys Tyr Gly Leu Leu Ile Glu Asn Gln
420 425 430

Arg Thr Asn Met Phe Val Asn Ser Phe Asn Pro Asp Ala Trp Asn Lys
435 440 445

Ser Gly Gly Ile Ser Val Thr Ser Ser Thr Asp Glu Phe Glu Phe Lys
450 455 460

Tyr Gly Arg Phe Thr Val Gly Ser Asp Ile Ala Gly Thr Thr Thr Gly
465 470 475 480

Arg Asn Ile Cys Thr Val Ala Gly Asn Arg Gly Ile Asp Val Thr Gly
485 490 495

Asp Asp Gln Tyr Ser Lys Gly Pro Tyr Val Thr Ala Ser Phe Arg Val
500 505 510

[0293] Arg Ser Asp Leu Asn Val Arg Ala Arg Ile Arg Phe Glu Arg Tyr Asn
515 520 525

Ser Glu Gly Tyr Thr Phe Leu Cys Asp Ala Tyr Leu Ser Leu Gln Thr
530 535 540

His Glu Leu Gln Ile Thr Gly Asp Asn Ala Gln Leu Leu Thr Ala Asn
545 550 555 560

Phe Glu Ile Asp Pro Gly Ser Gly Trp Ile Tyr Phe Gln Ala Thr Leu
565 570 575

Lys Cys Leu Pro Glu Trp Gly Met Val Gly Thr Gln Leu Gln Ile Ala
580 585 590

Ala Asp Arg Ala Val Gly Ser Phe Ala Thr Gly Asp Trp Ile Glu Val
595 600 605

Thr Thr Pro Gln Phe Glu Tyr Gly Ala Cys Ala Thr Ser Phe Ile Ile
610 615 620

Thr Thr Thr Glu Pro Ala Thr Arg Ala Ser Asp Leu Cys Lys Phe Pro
625 630 635 640

Leu Met Lys Asn Met Tyr Thr Met Pro Phe Thr Phe Met Val Glu Val
645 650 655

His Lys Asn Trp Phe Ile Ala His Asn Ala Ala Pro Arg Val Ile Asp
660 665 670

Thr Glu Asn His Gln Ser Gly Ala Pro Phe Ile Met Gly Phe Gly Ser
675 680 685

Ser Gly Thr Ile Ser Gln Asp Gly Tyr Pro Tyr Cys Asp Ile Gly Gly

690 695 700

Ala Asn Arg Arg Val Tyr Glu Ser Cys Gly Val Arg Asp Leu Val Met
705 710 715 720
Gly Phe Arg Val Lys Ala Asp Gly Met Thr Cys Ser Phe Ala Asn Lys
725 730 735
His Ile Ser Thr Glu Thr Lys Thr Val Trp Lys Tyr Ile Arg Glu Ala
740 745 750
Ala Val Ile Arg Ile Gly Gly Gln Thr Thr Thr Gly Leu Arg His Leu
755 760 765
Asn Gly His Ile Lys Asn Leu Arg Phe Trp Asn Arg Ala Leu Ser Asp
770 775 780
Thr Gln Leu Lys Glu Tyr Val
785 790

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<211> 89
<212> PRT
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<220>
<223> SIED6 AP1
<400> 217

[0294]

Met Arg Asp Ile Thr Leu Arg Phe Asp Asn Arg Glu Gln Phe Asn Ala
1 5 10 15
Ile Val Tyr Asp Ser Gly Leu Phe Ser Leu Glu Glu Glu Asn Gly Ile
20 25 30
Leu Val Asp Val Ile Gly Arg Val Ile Asp Tyr Glu Glu Pro Glu Asn
35 40 45
Glu Arg Cys Thr Gly Ile Asp Arg Gly Gly Phe Phe Val Asn Met Arg
50 55 60
Ile Val Asp Ser Ser Lys Asn Ile Ser Ser Leu Met Pro Phe Ile Thr
65 70 75 80
Thr Asp Gln His Val Arg Thr Trp Ala
85

<210> 218
<211> 294
<212> PRT
<213> 人工
<220>
<223> SIED6 AP2
<400> 218

Met Val Thr Lys Thr Val Ile Pro Asp Asp Ile Lys Thr Leu Lys Ser
1 5 10 15
Asp Val Ser Lys Leu Lys Asn Asp Gln Gly Ser Tyr Ala Thr Lys Ser
20 25 30
Tyr Val Asp Ser Lys Asp Glu Thr Val Gly Asp Trp Ser Ala Ser Trp

[0295]

35 40 45
Tyr Gln Gln Val Leu Pro Thr Ser Gly Ala Ile Phe Gly Arg Lys Leu
50 55 60
Arg Ser Thr His Arg Thr Ala Gly Val Glu Asp Ala Tyr Cys Glu Leu
65 70 75 80
Tyr Leu Lys Lys Trp Ile Asp Ser Pro Gly Asn Ala Met Ala Arg Leu
85 90 95
Asn Leu Asn Asp Asn Gly Glu Asn Ile Cys Trp Asp Phe Thr Asn Leu
100 105 110
Tyr Gly Gly Thr Met Ile Phe Pro Gly Thr Ser Gly Tyr Leu Lys Met
115 120 125
Gly Asn Cys Leu Met Ser Tyr Gly Val Arg Gly Ser Asn Ala Leu Ile
130 135 140
Lys Phe Asp Asn Thr Asp Ser Leu Gln Ile Lys Tyr Ala Asn His Gly
145 150 155 160
Ser Thr Met Thr Leu Asn Thr Gln Gly Thr Ala Tyr Ser Gly Val Ser
165 170 175
Thr Leu Leu Trp Gly Asn Ser Ser Arg Pro Val Val Tyr Glu Ile Arg
180 185 190
Asp Asp Gly Gly Leu Phe Leu Phe Tyr Ala Gln Arg Asn Pro Asp Lys
195 200 205
Thr Tyr Gln Leu Glu Ile Asn Gly Pro Cys Lys Ala Thr Ser Phe Asp
210 215 220
Gln Val Ser Asp Arg Asp Leu Lys Glu Asn Ile Arg Val Ile Asp Asn
225 230 235 240
Ala Thr Glu Arg Ile Arg Leu Met Asn Gly Tyr Thr Tyr Arg Leu Lys
245 250 255
Ser Asn Gly Met Pro Tyr Ala Gly Val Ile Ala Gln Glu Ala Leu Asn
260 265 270
Ala Ile Pro Glu Ser Val Gly Ser Thr Ile Lys Tyr Lys Ser Gly Asp
275 280 285
Asn Gly Ser Asp Gly Glu
290

<210> 219
<211> 1096
<212> PRT
<213> 人工
<220>
<223> SIEA11
<400> 219
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30

[0296]

```
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
```

[0297]

Lys Ala Ala Asn Asp Asn Ala Asn Ser Arg Leu Ala Lys Asn Gln Asn
385 390 395 400
Gly Ala Asp Ile Gln Asp Lys Ser Ala Phe Leu Asp Asn Val Gly Val
405 410 415
Thr Ser Leu Thr Phe Met Lys Asn Asn Gly Glu Met Pro Val Asp Ala
420 425 430
Asp Leu Asn Thr Phe Gly Ser Val Lys Ala Tyr Ser Gly Ile Trp Ser
435 440 445
Lys Ala Thr Ser Thr Asn Ala Thr Leu Glu Lys Asn Phe Pro Glu Asp
450 455 460
Asn Ala Val Gly Val Leu Glu Val Phe Thr Gly Gly Asn Phe Ala Gly
465 470 475 480
Thr Gln Arg Tyr Thr Thr Arg Asp Gly Asn Leu Tyr Ile Arg Lys Leu
485 490 495
Ile Gly Thr Trp Asn Gly Asn Asp Gly Pro Trp Gly Ala Trp Arg His
500 505 510
Val Gln Ala Val Thr Arg Ala Leu Ser Thr Thr Ile Asp Leu Asn Ser
515 520 525
Leu Gly Gly Ala Glu His Leu Gly Leu Trp Arg Asn Ser Ser Ser Ala
530 535 540
Ile Ala Ser Phe Glu Arg His Tyr Pro Glu Gln Gly Gly Asp Ala Gln
545 550 555 560
Gly Ile Leu Glu Ile Phe Glu Gly Gly Leu Tyr Gly Arg Thr Gln Arg
565 570 575
Tyr Thr Thr Arg Asn Gly Thr Met Tyr Ile Arg Gly Leu Thr Ala Lys
580 585 590
Trp Asp Ala Glu Asn Pro Gln Trp Glu Asp Trp Asn Gln Ile Gly Tyr
595 600 605
Gln Thr Ser Ser Thr Phe Tyr Glu Asp Asp Leu Asp Asp Leu Met Ser
610 615 620
Pro Gly Ile Tyr Ser Val Thr Gly Lys Ala Thr His Thr Pro Ile Gln
625 630 635 640
Gly Gln Ser Gly Phe Leu Glu Val Ile Arg Arg Lys Asp Gly Val Tyr
645 650 655
Val Leu Gln Arg Tyr Thr Thr Thr Gly Thr Ser Ala Ala Thr Lys Asp
660 665 670
Arg Leu Tyr Glu Arg Val Phe Leu Gly Gly Ser Phe Asn Ala Trp Gly
675 680 685
Glu Trp Arg Gln Ile Tyr Asn Ser Asn Ser Leu Pro Leu Glu Leu Gly
690 695 700
Ile Gly Gly Ala Val Ala Lys Leu Thr Ser Leu Asp Trp Gln Thr Tyr
705 710 715 720
Asp Phe Val Pro Gly Ser Leu Ile Thr Val Arg Leu Asp Asn Met Thr
725 730 735

[0298]

```
Asn Ile Pro Asp Gly Met Asp Trp Gly Val Ile Asp Gly Asn Leu Ile
            740                 745                 750
Asn Ile Ser Val Gly Pro Ser Asp Asp Ser Gly Ser Gly Arg Ser Met
        755                 760                 765
His Val Trp Arg Ser Thr Val Ser Lys Ala Asn Tyr Arg Phe Phe Met
    770                 775                 780
Val Arg Ile Ser Gly Asn Pro Gly Ser Arg Thr Ile Thr Thr Arg Arg
785                 790                 795                 800
Val Pro Ile Ile Asp Glu Ala Gln Thr Trp Gly Ala Lys Gln Thr Phe
                805                 810                 815
Ser Ala Gly Leu Ser Gly Glu Leu Ser Gly Asn Ala Ala Thr Ala Thr
            820                 825                 830
Lys Leu Lys Thr Ala Arg Lys Ile Asn Asn Val Ser Phe Asp Gly Thr
        835                 840                 845
Ser Asp Ile Asn Leu Thr Pro Lys Asn Ile Gly Ala Phe Ala Ser Gly
    850                 855                 860
Lys Thr Gly Asp Thr Val Ala Asn Asp Lys Ala Val Gly Trp Asn Trp
865                 870                 875                 880
Ser Ser Gly Ala Tyr Asn Ala Thr Ile Gly Gly Ala Ser Thr Leu Ile
                885                 890                 895
Leu His Phe Asn Ile Gly Glu Gly Ser Cys Pro Ala Ala Gln Phe Arg
            900                 905                 910
Val Asn Tyr Lys Asn Gly Gly Ile Phe Tyr Arg Ser Ala Arg Asp Gly
        915                 920                 925
Tyr Gly Phe Glu Ala Asp Trp Ser Glu Phe Tyr Thr Thr Thr Arg Lys
    930                 935                 940
Pro Thr Ala Gly Asp Val Gly Ala Leu Pro Leu Ser Gly Gly Gln Leu
945                 950                 955                 960
Asn Gly Ala Leu Gly Ile Gly Thr Ser Ser Ala Leu Gly Gly Asn Ser
                965                 970                 975
Ile Val Leu Gly Asp Asn Asp Thr Gly Phe Lys Gln Asn Gly Asp Gly
            980                 985                 990
Asn Leu Asp Val Tyr Ala Asn Ser  Val His Val Met Arg  Phe Val Ser
        995                 1000                1005
Gly Ser  Val Gln Ser Asn Lys  Thr Ile Asn Ile Thr  Gly Arg Val
    1010                1015                1020
Asn Pro  Ser Asp Tyr Gly Asn  Phe Asp Ser Arg Tyr  Val Arg Asp
    1025                1030                1035
Val Arg  Leu Gly Thr Arg Val  Val Gln Thr Met Gln  Lys Gly Val
    1040                1045                1050
Met Tyr  Glu Lys Ala Gly His  Val Ile Thr Gly Leu  Gly Ile Val
    1055                1060                1065
Gly Glu  Val Asp Gly Asp Asp  Pro Ala Val Phe Arg  Pro Ile Gln
    1070                1075                1080
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Lys Tyr Ile Asn Gly Thr Trp Tyr Asn Val Ala Gln Val
1085 1090 1095

<210> 220
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<220>
<223> SIEA11 AP1
<400> 220

Met Gln His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Val Ala
1 5 10 15
Gln Tyr Gln Leu Thr Lys Asn Phe Asp Val Ile Trp Leu Trp Ser Glu
20 25 30
Glu Gly Lys Asn Trp Tyr Glu Glu Val Ser Asn Phe Gln Glu Asp Thr
35 40 45
Ile Lys Ile Val Tyr Asp Glu Asn Asn Ile Ile Val Gly Ile Thr Arg
50 55 60
Asp Ala Ser Thr Leu Asn Pro Glu Gly Phe Ser Val Val Glu Val Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Asp Ser Gly Lys Trp Met Phe
85 90 95
Lys Asp Gly Ala Val Ile Lys Arg Ile Tyr Thr Ala Asp Glu Gln Leu
100 105 110
Gln Leu Ala Glu Leu Gln Lys Ser Ala Leu Leu Ser Glu Ala Glu Thr
115 120 125
Ile Ile Gln Pro Leu Glu Arg Ser Val Arg Leu Asn Met Ala Thr Asp
130 135 140
Glu Glu Arg Ser Arg Leu Glu Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175

[0299]

<210> 221
<211> 835
<212> PRT
<213> 人工
<220>
<223> DC1
<400> 221

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45

[0300]

Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
325 330 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Ala Ala Tyr Asp Leu Ala Asn Gly Lys Tyr Thr Ala Gln Asp Ala
385 390 395 400

[0301]

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Thr Thr Ala Arg Lys Gly Leu Val Gln Leu Ser Ser Val Thr Asn Ser
                405                 410                 415
Asp Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val Lys Ser Ala Tyr
            420                 425                 430
Asp Asn Ala Glu Lys Arg Leu Gln Lys Asp Gln Asn Gly Ala Asp Ile
        435                 440                 445
Pro Gly Lys Asp Thr Phe Thr Lys Asn Ile Gly Ala Cys Arg Ala Tyr
    450                 455                 460
Ser Gly Ala Leu Ser Thr Glu Ala Gly Asn Trp Thr Thr Ala Gln Phe
465                 470                 475                 480
Ile Asp Trp Leu Glu Ser Gln Gly Ala Phe Asn His Pro Tyr Trp Met
                485                 490                 495
Cys Lys Cys Ser Trp Ser Tyr Gly Asn Asn Lys Ile Ile Thr Asp Thr
            500                 505                 510
Asp Cys Gly Thr Ile His Leu Ala Gly Cys Val Ile Glu Val Met Gly
        515                 520                 525
Val Lys Ala Ala Met Thr Ile Arg Val Thr Thr Pro Ser Thr Ser Ser
    530                 535                 540
Ser Gly Gly Thr Thr Ser Ala Gln Phe Thr Tyr Ile Asn His Gly Ala
545                 550                 555                 560
Asp Tyr Ala Pro Gly Trp Arg Arg Asp Tyr Asn Thr Lys Asn Lys Gln
                565                 570                 575
Pro Ala Phe Ala Leu Gly Lys Thr Gly Asn Thr Val Ala Asn Asn Lys
            580                 585                 590
Ala Val Gly Trp Asn Trp Asp Ser Gly Ala Tyr Cys Ala Gln Asp Gly
        595                 600                 605
Gly Ala Ser Lys Met Val Leu His Phe Tyr Thr Gly Glu Gly Ser Cys
    610                 615                 620
Pro Ala Met Gln Phe Leu Val Asp Tyr Lys Asn Arg Gly Ile Phe Tyr
625                 630                 635                 640
Arg Ser Ala Arg Asp Gly Tyr Gly Phe Glu Ala Asp Trp Ser Glu Phe
                645                 650                 655
Tyr Thr Thr Ser Arg Lys Pro Thr Pro Ala Asp Ile Leu Ala Leu Ala
            660                 665                 670
Leu Ser Gly Gly Ser Met Ser Gly Ser Ile Lys Phe Ile Asn Asp Ala
        675                 680                 685
Phe Leu Ile Trp Glu Arg Asn Thr Asp Trp Ala Lys Ile Gly Phe Lys
    690                 695                 700
Asn Asp Ser Asp Ala Asp Ser Asp Ser Tyr Met Trp Phe Glu Thr Gly
705                 710                 715                 720
Asp Asn Gly Asn Glu Tyr Phe Lys Trp Arg Ile Arg Ser Gly Ser Thr
                725                 730                 735
Thr Lys Asp Leu Met Thr Leu Lys Ser Asp Ala Leu Arg Val Thr Gly
            740                 745                 750
```

Gln Val Ile Pro Ser Asn Phe Ser Asn Phe Asp Ser Arg Tyr Val Arg
755 760 765
Asp Ile Arg Leu Gly Gly Ala Ala Thr Tyr Lys Pro Ala Asn Asn Gly
770 775 780
Met Thr Trp Thr His Gln Ala Pro Ser Gly Cys Val Tyr Thr Gly Ile
785 790 795 800
Ile Val Gln Asp Thr Gly Ser Asn Ser Ala Asp Asn Ile Gly Gly Val
805 810 815
Tyr Tyr Arg Pro Val Gln Lys Tyr Ile Asn Gly Thr Trp Tyr Asn Val
820 825 830
Ala Gln Val
835

<210> 222
<211> 175
<212> PRT
<213> 人工
<220>
<223> DC1 AP1
<400> 222

[0302]

Met Gln His Leu Ile Asn Ile Thr Ala Gly Asn Pro Lys Thr Val Glu
1 5 10 15
Gln Tyr Gln Leu Thr Lys Asp Phe Asp Val Val Trp Phe Phe Ser Glu
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Gln Lys Tyr Phe Ala Asp Asp Thr
35 40 45
Ile Lys Ile Ala Tyr Asp Lys Asp Asn Ile Ile Arg Tyr Val Glu Lys
50 55 60
Asp Val Thr Ala Ile Arg Pro Asp Gly Leu Ser Val Val Glu Val Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Ile Ser Gly Gly Trp Met Phe
85 90 95
Lys Asp Gly Lys Val Ile Lys Arg Ile Tyr Thr Ala Glu Glu Leu Gln
100 105 110
Gln Gln Ala Glu Asn Arg Lys Ala Arg Leu Leu Ala Asp Ala Glu Ser
115 120 125
Val Ile Leu Pro Leu Glu Arg Ala Val Arg Leu Asn Met Ala Thr Asp
130 135 140
Glu Glu Arg Ser Arg Leu Asp Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175

<210> 223
<211> 745
<212> PRT

<213> 人工
<220>
<223> EB6
<400> 223

[0303]

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
275 280 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
290 295 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305 310 315 320

[0304]

```
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Ile Ala Met Asp Asn Ala Asn Ala Arg Leu Ala Lys Asp Arg Asn
385                 390                 395                 400
Gly Ala Asp Ile Pro Asn Lys Pro Leu Phe Ile Gln Asn Leu Gly Leu
                405                 410                 415
Gln Glu Thr Val Asn Lys Ala Gly Asn Ala Val Gln Lys Thr Gly Asp
            420                 425                 430
Thr Leu Ser Gly Gly Leu Thr Phe Glu Asn Asp Ser Ile Leu Ala Trp
        435                 440                 445
Ile Arg Asn Thr Asp Trp Ala Lys Ile Gly Phe Lys Asn Asp Ala Asp
    450                 455                 460
Ser Asp Thr Asp Ser Tyr Met Trp Phe Glu Thr Gly Asp Asn Gly Asn
465                 470                 475                 480
Glu Tyr Phe Lys Trp Arg Ser Arg Gln Ser Thr Thr Thr Lys Asp Leu
                485                 490                 495
Met Asn Leu Lys Trp Asp Ala Leu Tyr Val Leu Val Asn Ala Ile Val
            500                 505                 510
Asn Gly Glu Val Ile Ser Lys Ser Ala Asn Gly Leu Arg Ile Ala Tyr
        515                 520                 525
Gly Asn Tyr Gly Phe Phe Ile Arg Asn Asp Gly Ser Asn Thr Tyr Phe
    530                 535                 540
Met Leu Thr Asn Ser Gly Asp Asn Met Gly Thr Tyr Asn Gly Leu Arg
545                 550                 555                 560
Pro Leu Trp Ile Asn Asn Ala Thr Gly Ala Val Ser Met Gly Arg Gly
                565                 570                 575
Leu Asn Val Ser Gly Glu Thr Leu Ser Asp Arg Phe Ala Ile Asn Ser
            580                 585                 590
Ser Asn Gly Met Trp Ile Gln Met Arg Asp Asn Asn Ala Ile Phe Gly
        595                 600                 605
Lys Asn Ile Val Asn Thr Asp Ser Ala Gln Ala Leu Leu Arg Gln Asn
    610                 615                 620
His Ala Asp Arg Lys Phe Met Ile Gly Gly Leu Gly Asn Lys Gln Phe
625                 630                 635                 640
Gly Ile Tyr Met Ile Asn Asn Ser Arg Thr Ala Asn Gly Thr Asp Gly
                645                 650                 655
Gln Ala Tyr Met Asp Asn Asn Gly Asn Trp Leu Cys Gly Ala Gln Val
            660                 665                 670
```

Ile Pro Gly Asn Tyr Gly Asn Phe Asp Ser Arg Tyr Val Arg Asp Val
675 680 685
Arg Leu Gly Thr Arg Val Val Gln Leu Met Ala Arg Gly Gly Arg Tyr
690 695 700
Glu Lys Ala Gly His Ala Ile Thr Gly Leu Arg Ile Ile Gly Glu Val
705 710 715 720
Asp Gly Asp Asp Glu Ala Ile Phe Arg Pro Ile Gln Lys Tyr Ile Asn
725 730 735
Gly Thr Trp Tyr Asn Val Ala Gln Val
740 745

<210> 224
<211> 175
<212> PRT
<213> 人工
<220>
<223> EB6 AP1
<400> 224

[0305]

Met Gln His Leu Lys Asn Ile Lys Ser Gly Asn Pro Lys Thr Lys Glu
1 5 10 15
Gln Tyr Gln Leu Thr Lys Asn Phe Asp Val Ile Trp Leu Trp Ser Glu
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Val Asn Asn Phe Gln Asp Asp Thr
35 40 45
Ile Lys Ile Val Tyr Asp Glu Asn Asn Ile Ile Val Ala Ile Thr Lys
50 55 60
Asp Ala Ser Thr Leu Asn Pro Glu Gly Phe Ser Val Val Glu Ile Pro
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Asp Ser Gly Lys Trp Met Phe
85 90 95
Lys Asp Gly Ala Val Val Lys Arg Ile Tyr Thr Ala Asp Glu Gln Gln
100 105 110
Gln Gln Ala Glu Ser Gln Lys Ala Ala Leu Leu Ser Glu Ala Glu Asn
115 120 125
Val Ile Gln Pro Leu Glu Arg Ala Val Arg Leu Asn Met Ala Thr Asp
130 135 140
Glu Glu Arg Ala Arg Leu Glu Ser Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
Ser Arg Val Asp Thr Ala Lys Pro Glu Trp Pro Gln Lys Pro Glu
165 170 175

<210> 225
<211> 1106
<212> PRT
<213> 人工
<220>

<223> AH11L

<400> 225

[0306]

```
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1               5                  10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
```

[0307]

Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
340 345 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
355 360 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
370 375 380
Lys Ala Ala Asn Asp Asn Ala Asn Ser Arg Leu Ala Lys Asn Gln Asn
385 390 395 400
Gly Ala Asp Ile Gln Asp Lys Ser Val Phe Leu Asp Asn Val Gly Val
405 410 415
Thr Ser Leu Thr Phe Met Lys Asn Asn Gly Glu Met Pro Leu Asp Ala
420 425 430
Asp Leu Asn Thr Phe Gly Pro Val Lys Ala Tyr Leu Gly Ile Trp Ser
435 440 445
Lys Ala Thr Ser Thr Asn Ala Thr Leu Glu Lys Asn Phe Pro Glu Asp
450 455 460
Asn Ala Val Gly Val Leu Glu Val Phe Ala Ala Gly Asn Phe Ala Gly
465 470 475 480
Thr Gln Arg Phe Thr Thr Arg Asp Gly Asn Val Tyr Met Arg Lys Leu
485 490 495
Ala Asn Lys Trp Asn Gly Thr Asp Gly Pro Trp Gly Val Trp Arg His
500 505 510
Thr Gln Ser Ala Thr Arg Pro Leu Ser Thr Thr Ile Asp Leu Asn Thr
515 520 525
Leu Gly Ala Ala Glu His Leu Gly Leu Trp Arg Asn Ser Ser Ser Ala
530 535 540
Ile Ala Ser Tyr Glu Arg Asn Tyr Pro Glu Glu Gly Gly Phe Ala Gln
545 550 555 560
Gly Thr Leu Glu Ile Leu Glu Gly Gly Asn Tyr Gly Arg Thr Gln Arg
565 570 575
Tyr Thr Thr Arg Arg Gly Asn Met Tyr Val Arg Cys Leu Ala Ala Ser
580 585 590
Trp Asp Ala Ser Asn Pro Gln Trp Glu Pro Trp Leu Arg Val Gly His
595 600 605
Gln Ser Glu Ser Arg Tyr Tyr Glu Gly Asp Leu Asn Asp Val Thr Ser
610 615 620
Pro Gly Ile Tyr Ser Val Thr Gly Lys Ala Thr Asn Gly Pro Val Leu
625 630 635 640
Asp Gly Asn Gly Val Thr Val Leu Gly Ile Leu Glu Val Leu Arg Arg
645 650 655
Phe Asp Gly Val Asn Val Trp Gln Arg Tyr Thr Thr Ala Gly Thr Gly
660 665 670
Thr Thr Leu Lys Gly Arg Thr Phe Glu Arg Val Phe Thr Gly Ser Ser
675 680 685

[0308]

```
Trp Ser Glu Trp Arg Glu Val Tyr Thr Ser Tyr Ser Leu Pro Leu Asn
    690                 695                 700
Leu Gly Ile Gly Gly Ala Val Ala Lys Leu Thr Ser Leu Asp Trp Gln
705                 710                 715                 720
Thr Tyr Asp Phe Val Pro Gly Ser Leu Ile Thr Val Arg Leu Asp Asn
                725                 730                 735
Met Thr Asn Ile Pro Asp Gly Met Asp Trp Gly Val Ile Asp Gly Asn
            740                 745                 750
Leu Ile Asn Ile Ala Val Gly Pro Ser Asp Asp Ser Gly Thr Gly Arg
        755                 760                 765
Ser Met His Val Trp Arg Ser Thr Val Ser Lys Ala Asn Tyr Arg Phe
    770                 775                 780
Phe Met Val Arg Ile Ser Gly Asn Pro Gly Ser Arg Thr Ile Thr Ala
785                 790                 795                 800
Arg Arg Val Pro Ile Ile Asp Glu Ala Gln Thr Trp Gly Ala Lys Gln
                805                 810                 815
Thr Phe Ser Ala Gly Leu Ser Gly Glu Leu Ser Gly Asn Ala Ala Thr
            820                 825                 830
Ala Thr Lys Leu Lys Thr Ala Arg Lys Ile Asn Asn Val Ser Phe Asp
        835                 840                 845
Gly Thr Ser Asp Ile Asn Leu Thr Pro Lys Asn Ile Gly Ala Phe Ala
    850                 855                 860
Ser Gly Lys Thr Gly Asp Thr Val Ala Asn Asp Lys Ala Val Gly Trp
865                 870                 875                 880
Asn Trp Ser Ser Gly Ala Tyr Asn Ala Thr Thr Gly Gly Ala Ser Thr
                885                 890                 895
Leu Ile Leu His Phe Asn Ile Gly Glu Gly Ser Cys Pro Ala Ala Gln
            900                 905                 910
Phe Arg Val Asn Tyr Lys Asn Gly Gly Ile Phe Tyr Arg Ser Ala Arg
        915                 920                 925
Asp Gly Tyr Gly Phe Glu Ala Asp Trp Ser Glu Phe Tyr Thr Thr Thr
    930                 935                 940
Arg Lys Pro Thr Ala Gly Asp Val Gly Ala Leu Pro Leu Ser Gly Gly
945                 950                 955                 960
Gln Leu Asn Gly Ala Leu Gly Ile Gly Thr Ser Ser Ala Leu Gly Gly
                965                 970                 975
Asn Ser Ile Val Leu Gly Asp Asn Asp Thr Gly Phe Lys Gln Asn Gly
            980                 985                 990
Asp Gly Asn Leu Asp Val Tyr Ala  Asn Ser Val His Ile  Met Arg Phe
        995                 1000                1005
Val Ser  Gly Ser Ile Gln Ser  Asn Lys Thr Ile Asn  Ile Thr Gly
    1010                1015                1020
Arg Val  Asn Pro Ser Asp Tyr  Gly Asn Phe Asp Ser  Arg Tyr Val
    1025                1030                1035
```

Arg Asp Ile Arg Leu Gly Gly Ala Ala Thr Tyr Lys Pro Ala Asn
1040 1045 1050
Asn Gly Met Thr Trp Thr His Gln Ala Pro Ser Gly Cys Val Tyr
1055 1060 1065
Ser Gly Ile Ile Val Gln Asp Thr Gly Ser Asn Ser Ala Asp Asn
1070 1075 1080
Ile Gly Gly Val Tyr Tyr Arg Pro Val Gln Lys Tyr Ile Asn Gly
1085 1090 1095
Thr Trp Tyr Asn Val Ala Gln Val
1100 1105

<210> 226
<211> 175
<212> PRT
<213> 人工
<220>
<223> AH11L AP1
<400> 226

[0309]

Met Gln His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Val Glu
1 5 10 15
Gln Tyr Gln Leu Thr Lys Gly Phe Asp Val Val Trp Phe Phe Ser Glu
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Gln Lys Tyr Phe Ala Asp Asp Thr
35 40 45
Ile Lys Ile Ala Tyr Asp Lys Asp Asn Ile Ile Arg Tyr Val Glu Lys
50 55 60
Asp Val Thr Ala Ile Arg Pro Asp Gly Leu Ser Val Val Glu Val Ala
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Ile Ser Gly Gly Trp Met Phe
85 90 95
Lys Asp Gly Lys Val Ile Lys Arg Ile Tyr Thr Ala Glu Glu Leu Leu
100 105 110
Gln Gln Ala Glu Asn Arg Lys Ala Arg Leu Leu Ala Asp Ala Glu Ser
115 120 125
Val Ile Leu Pro Leu Glu Arg Ala Val Arg Leu Asn Met Ala Thr Asp
130 135 140
Glu Glu Arg Ser Arg Leu Asp Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175

<210> 227
<211> 915
<212> PRT
<213> 人工
<220>

<223> STF-94A

<400> 227

[0310]

```
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1               5                  10                  15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
            20                  25                  30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
```

[0311]

```
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Tyr Thr Ala Gln Asp Ala
385                 390                 395                 400
Thr Thr Ala Arg Lys Gly Leu Val Gln Leu Ser Ser Ala Ile Asn Ser
                405                 410                 415
Asp Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val Lys Thr Ala Tyr
            420                 425                 430
Asp Leu Ala Asn Arg Lys Tyr Thr Ala Gln Asp Ala Thr Thr Ala Arg
        435                 440                 445
Lys Gly Leu Val Gln Leu Ser Ser Ala Thr Asn Ser Asp Ser Glu Thr
    450                 455                 460
Leu Ala Ala Thr Ser Lys Ala Val Lys Ser Ala Tyr Asp Asn Ala Glu
465                 470                 475                 480
Lys Arg Leu Gln Lys Asp Gln Asn Gly Ala Asp Ile Pro Gly Lys Asp
                485                 490                 495
Thr Phe Thr Lys Asn Ile Gly Ala Cys Arg Ala Tyr Ser Gly Ala Leu
            500                 505                 510
Ser Thr Glu Ala Gly Asn Trp Thr Thr Ala Gln Phe Ile Glu Trp Leu
        515                 520                 525
Asp Ser Arg Gly Ala Phe Asn His Pro Tyr Trp Met Cys Lys Gly Ser
    530                 535                 540
Trp Ser Tyr Ala Asn Asn Lys Ile Ile Thr Asp Thr Gly Cys Gly Asp
545                 550                 555                 560
Ile His Leu Ala Gly Cys Val Val Glu Val Met Gly Thr Lys Ser Ala
                565                 570                 575
Ile Thr Ile Arg Val Thr Thr Pro Thr Thr Ser Ser Gly Gly Gly Thr
            580                 585                 590
Thr Ser Ala Gln Phe Thr Tyr Ile Asn His Gly Asp Gly Tyr Ser Pro
        595                 600                 605
Gly Trp Arg Arg Asp Trp Asn Arg Gln Gly Asp Ala Met Thr Gly Thr
    610                 615                 620
Ile Asn Gln Asp Gly Gly Ser Gln Asn Ala Tyr Met Ser Thr Ala Leu
625                 630                 635                 640
Cys Ser Gly Thr Arg Gly Gly Lys Lys Tyr Leu Arg Lys Phe Arg Gly
                645                 650                 655
Gly Glu Gly Asp Thr Ile Trp His Glu Thr Val Gln Gly Gly Val Val
            660                 665                 670
Arg Trp Ala Thr Gly Asn Thr Asp Ala Gln Glu Glu Leu Ser Leu Ser
        675                 680                 685
```

[0312]

Ser Ala Tyr Gly Leu Arg Ser Arg Gly Glu Ile Thr Ser Leu Ser Ala
690 695 700
Asn Gly Leu Arg Ile Ala Tyr Gly Asn Tyr Gly Phe Phe Ile Arg Asn
705 710 715 720
Asp Gly Ser Ser Thr Tyr Phe Met Leu Thr Lys Ser Gly Asp Arg Leu
725 730 735
Gly Thr Tyr Asn Asn Leu Arg Pro Leu Ile Ile Asn Asp Ala Thr Gly
740 745 750
Ala Val Ser Met Gly His Gly Leu Asn Val Thr Gly Asp Ile Val Ser
755 760 765
Ser Thr Lys Val Arg Ala Gly Ser Gly Lys Lys Phe Thr Val Ser Ser
770 775 780
Ser Asn Thr Ser Thr Lys Glu Ala Ala Phe Asn Leu Trp Gly Asn Ser
785 790 795 800
Ser Arg Pro Val Val Ala Glu Leu Gly Asp Asp Ala Gly Trp His Phe
805 810 815
Tyr Ser Gln Arg Asn Thr Asp Asn Ser Ile Thr Phe Ala Val Asn Gly
820 825 830
Gln Val Ser Pro Ser Asn Tyr Gly Asn Phe Asp Ser Arg Tyr Val Arg
835 840 845
Asp Ile Arg Leu Gly Gly Ala Ala Thr Tyr Lys Pro Ala Asn Asn Gly
850 855 860
Met Thr Trp Thr His Gln Ala Pro Ser Gly Cys Val Tyr Ser Gly Ile
865 870 875 880
Ile Val Gln Asp Thr Gly Ser Asn Ser Ala Asp Asn Ile Gly Gly Ile
885 890 895
Tyr Tyr Arg Pro Val Gln Lys Tyr Ile Asn Gly Thr Trp Tyr Asn Val
900 905 910
Ala Gln Val
915

<210> 228
<211> 175
<212> PRT
<213> 人工
<220>
<223> STF-94A AP1
<400> 228

Met Gln His Leu Ile Asn Ile Met Ala Gly Asn Pro Lys Thr Val Glu
1 5 10 15
Gln Tyr Gln Leu Thr Lys Gly Phe Asp Val Val Trp Phe Phe Thr Glu
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Gln Lys Tyr Phe Ala Asp Asp Thr
35 40 45
Ile Lys Ile Ala Tyr Asp Lys Asp Asn Ile Ile Arg Tyr Val Glu Lys

50 55 60

Asp Val Thr Ala Ile Arg Pro Asp Gly Leu Ser Val Val Glu Val Ala
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Ile Ser Gly Gly Trp Met Phe
85 90 95
Lys Asp Gly Lys Val Ile Lys Arg Ile Tyr Thr Ala Glu Glu Leu Gln
100 105 110
Gln Gln Ala Glu Ile Arg Lys Ala Arg Leu Leu Ala Asp Ala Glu Ser
115 120 125
Val Ile Leu Pro Leu Glu Arg Ala Val Arg Leu Asn Met Ala Thr Glu
130 135 140
Glu Glu Arg Thr Arg Leu Glu Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175

<210> 229
<211> 502
<212> PRT
<213> 人工
<220>
<223> STF-69A

[0313]

<400> 229
Ala Ser Ala Thr Ala Ser Ala Asn Ser Gln Lys Ala Ala Lys Thr Ser
1 5 10 15
Glu Thr Asn Ala Lys Ala Ser Glu Thr Ala Ala Ala Asn Ser Ala Lys
20 25 30
Ala Ser Ala Ala Ser Gln Thr Ala Ala Lys Ala Ser Glu Asp Ala Ala
35 40 45
Arg Glu Tyr Ala Ser Gln Ala Ala Glu Pro Tyr Lys Tyr Val Leu Gln
50 55 60
Pro Leu Pro Glu Val Trp Ile Pro Phe Asn Asp Ser Leu Asp Met Ile
65 70 75 80
Thr Gly Phe Ala Pro Gly Tyr Lys Ser Ile Thr Val Gly Asp Asp Val
85 90 95
Ile Ala Leu Pro Ser Glu Lys Val Val Ser Phe Thr Arg Ala Ser Thr
100 105 110
Ala Thr Tyr Ile Asp Lys Ser Gly Cys Phe Ala Glu Ser Ala Ile Asn
115 120 125
Glu Pro Arg Phe Glu Lys Asp Gly Leu Leu Ile Glu Gly Gln Arg Thr
130 135 140
Asn Thr Phe Ser Tyr Thr Asn Thr Pro Val Ser Trp Asn Tyr Asp Thr
145 150 155 160
Ala Asn Leu Thr Ile Thr Thr Gly Val Asp Glu Tyr Gly Phe Ser Tyr
165 170 175

[0314]

Gly Leu Phe Gly Val Lys Glu Thr Ser Thr Thr Glu Arg Ala Thr Leu
180 185 190
Ile Ser Thr Gly Tyr Thr Arg Val Ile Ser Val Ser Ala Asn Glu Ser
195 200 205
Val Thr Leu Ser Cys Arg Val Lys Lys Val Ser Gly Asp Gly Ile Ile
210 215 220
Thr Leu Arg Pro Arg Ile Ser Tyr Val Asn Asp Asp Gly Ser Ser Asn
225 230 235 240
Thr Leu Thr Ala Gly Ala Tyr Ile Asp Cys Glu Thr Gly Asp Met Leu
245 250 255
Ser Tyr Ser Gly Gly Glu Ala Ala Thr Tyr Asn Ile Phe Arg Glu Ser
260 265 270
Asn Gly Trp Ile Arg Val Glu Phe Thr Tyr Lys Ser Pro Glu Ala Lys
275 280 285
Asn Met Tyr Gly Arg Phe Glu Phe Gly Ala His Gln Arg Ser Ile Lys
290 295 300
Ser Gly Asp Lys Leu Met Leu Thr Thr Pro Gln Phe Glu Lys Gly Leu
305 310 315 320
Asn Ala Ser Ser Phe Ile Ile Thr Thr Glu Val Gly Ala Thr Arg Ala
325 330 335
Ser Asp Gln Val Ile Ile Pro Ile Pro Phe Asn Trp Ala Thr Pro Pro
340 345 350
Val Ser Val Leu Met Glu Val Asn Val Asn Trp Asp Ser Glu Met Pro
355 360 365
Asn Leu Glu Gly Ser Ala Arg Leu Leu Asn Ile Ser Ile Thr Gly Ala
370 375 380
Thr Thr Glu Val Ser Asp Glu Ser Tyr Met Tyr Phe Gly Phe Thr Thr
385 390 395 400
Arg Gly Lys Arg Leu Ile Ile Thr Asn Gly Lys Gly Thr Lys Thr Glu
405 410 415
Tyr Lys Ala Tyr Gly Asn Arg Glu Lys Arg Lys Phe Val Thr Gly Phe
420 425 430
Lys Phe Thr Glu Asp Lys Gln Leu Gln Val Val Val Asp Gly Ile Leu
435 440 445
Gly Gly Ser Ser Pro Ser Leu His Thr Leu Gln Arg Tyr Thr Ala Gly
450 455 460
Asn Ile Asn Ile Gly Gly Gln Ser Ser Ser Gly Asn Arg His Leu Phe
465 470 475 480
Gly His Val Lys Asn Leu Arg Ile Trp His Lys Glu Leu Thr Glu Ala
485 490 495
Gln Met Gly Glu Ser Ile
500

<210> 230
<211> 93

<212> PRT
<213> 人工
<220>
<223> STF-69A AP1
<400> 230

Met Lys Asp Leu Thr Leu Lys Phe Glu Asp Arg Ala Asp Phe Ser Ala
1 5 10 15
Phe Met Glu Ser Ile Gly Tyr Tyr Asp Asp Glu Ser Met Gln Asp Asp
20 25 30
Ile Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
35 40 45
Thr Glu Asp Gly Glu Pro Val Cys Val Lys Glu Asp Gly Tyr Phe Val
50 55 60
Asn Val Arg Ile Ile Asn Asp Ser Gln Ile Ser Ser Leu Phe Asp Glu
65 70 75 80
Tyr Val Val Ala Val Glu His Gln Leu Arg Gly Trp Met
85 90

<210> 231
<211> 346
<212> PRT
<213> 人工
<220>
<223> STF-69A AP2
<400> 231

[0315]

Met Ala Thr Ser Thr Val Ile Pro Asp Asp Ile Lys Thr Leu Lys Ser
1 5 10 15
Asp Val Ser Lys Leu Lys Asn Asp Gln Gly Ser Tyr Ala Thr Lys Leu
20 25 30
Tyr Val Asp Ser Lys Asp Glu Ile Val Gly Asp Trp Ser Ala Ser Trp
35 40 45
Tyr Gln Gln Val Leu Pro Thr Ser Gly Ala Ile Phe Gly Arg Lys Leu
50 55 60
Arg Ser Thr His Arg Thr Ala Gly Val Glu Asp Ala Tyr Cys Glu Leu
65 70 75 80
Tyr Leu Lys Lys Trp Ile Asp Ser Pro Gly Asn Ala Met Ala Arg Leu
85 90 95
Asn Leu Asn Asp Asn Gly Thr Asn Ile Cys Trp Asp Phe Thr Asn Leu
100 105 110
Tyr Gly Gly Thr Met Ile Phe Pro Gly Asp Ser Gly Tyr Leu Lys Met
115 120 125
Gly Asn Cys Leu Met Ser Tyr Ser Lys Arg Gly Ser Asn Ala Leu Ile
130 135 140
Lys Phe Asp Tyr Thr Asp Thr Leu Gln Ile Lys Tyr Ala Asn His Gly
145 150 155 160

Ser Thr Met Thr Leu Asn Thr Gln Gly Thr Ala Tyr Ala Gly Val Thr
165 170 175
Ala Gln Leu Trp Gly Asn Ser Ser Arg Pro Val Val Tyr Glu Val Gly
180 185 190
Val Asp Gly Gly Ala Tyr Met Phe Tyr Ala Gln Lys Asn Thr Asp Asn
195 200 205
Thr Tyr Met Leu Ser Val Asn Gly Ala Cys His Ala Thr Ala Phe Asn
210 215 220
Gln His Ser Asp Arg Asp Leu Lys Asp Asn Ile Gln Val Ile Asp Asn
225 230 235 240
Ala Thr Asp Arg Ile Arg Lys Met Asn Gly Tyr Thr Tyr Thr Leu Lys
245 250 255
Glu Asn Gly Met Pro Tyr Ala Gly Val Ile Ala Gln Glu Ala Leu Glu
260 265 270
Ala Ile Pro Glu Val Val Gly Ser Ala Met Lys Tyr Gln Asp Gly Ala
275 280 285
Ser Gly Ser Glu Gly Glu Glu Gly Glu Arg Tyr Tyr Thr Val Asp Tyr
290 295 300
Ser Gly Val Thr Gly Leu Leu Val Gln Val Ala Arg Glu Ser Asp Asp
305 310 315 320
Arg Ile Thr Ala Leu Glu Glu Glu Asn Ala Glu Leu Arg Gln Arg Leu
325 330 335
Ser Ala Ile Glu Ala Ala Leu Ala Ser Lys
340 345

[0316]

<210> 232
<211> 797
<212> PRT
<213> 人工
<220>
<223> STF-68B
<400> 232
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu

[0317]

```
                100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Ala Ser Ala Thr Ala Ser Ala Asn
    290                 295                 300
Ser Gln Lys Ala Ala Lys Thr Ser Glu Thr Asn Ala Lys Thr Ser Glu
305                 310                 315                 320
Thr Ala Ala Ala Asn Ser Ala Lys Ala Ser Ala Ala Ser Gln Thr Ala
                325                 330                 335
Ala Lys Ala Ser Glu Asp Ala Ala Arg Glu Tyr Ala Ser Gln Ala Ala
            340                 345                 350
Glu Pro Tyr Lys Gln Val Leu Gln Pro Leu Pro Asp Val Trp Ile Pro
        355                 360                 365
Phe Asn Asp Ser Leu Glu Met Ile Thr Gly Phe Ala Pro Gly Tyr Lys
    370                 375                 380
Lys Val Thr Ile Gly Asp Asp Val Ile Thr Phe Pro Ser Glu Lys Val
385                 390                 395                 400
Val Ser Phe Thr Arg Ser Thr Ser Ala Thr Tyr Ile Asn Lys Ser Gly
                405                 410                 415
Ser Phe Ala Phe Ala Glu Ile Asn Glu Pro Arg Phe Glu Lys Glu Gly
            420                 425                 430
Leu Leu Ile Glu Gly Gln Arg Thr Asn Thr Phe Thr Asn Ser Asn Asn
        435                 440                 445
Pro Ser Leu Trp Asn Tyr Asp Asp Lys Asn Ile Glu Ile Thr Thr Ser
```

450 455 460

Val Asp Glu Tyr Gly Phe Lys Tyr Gly Leu Phe Asp Val Lys Glu Thr
465 470 475 480

Ser Thr Thr Glu Arg Ala Thr Ile Ile Ser Thr Gly Tyr Ser Arg Val
485 490 495

Ile Asp Val Ala Ala Asn Glu Ser Val Thr Leu Ser Cys Arg Val Lys
500 505 510

Lys Ile Asn Gly Glu Gly Ile Ile Thr Leu Arg Pro Arg Ile Ser Phe
515 520 525

Val Asn Asp Asp Gly Thr Ser Asn Thr Leu Val Ala Gly Ser Tyr Ile
530 535 540

Asp Cys Glu Thr Gly Asp Val Leu Gly Phe Ser Gly Gly Asp Ala Val
545 550 555 560

Asn His Val Ile Tyr Arg Glu Ala Asn Gly Trp Leu Arg Val Glu Phe
565 570 575

Thr Tyr Lys Ser Pro Glu Ala Lys Ser Met Tyr Gly Arg Phe Glu Met
580 585 590

Gly Ala Asp Lys Arg Ala Ile Lys Lys Gly Asp Gln Ile Met Phe Thr
595 600 605

Thr Pro Gln Phe Glu Lys Gly Ser Cys Ala Ser Ser Phe Ile Val Thr
610 615 620

[0318] Ser Asp Val Ala Val Thr Arg Ala Ser Asp Val Val Ile Met Pro Ile
625 630 635 640

Arg Leu Asn Trp Ser Thr Pro Pro Leu Ser Val Leu Met Glu Val Asn
645 650 655

Ile Asn Trp Asp Lys Met Pro Asn Ser Glu Gly Ser Ala Arg Leu Leu
660 665 670

Asn Val Ser Ile Thr Gly Ala Thr Thr Asp Val Ala Asp Glu Ser Tyr
675 680 685

Met Tyr Phe Gly Phe Thr Ser Gly Gly Ala Arg Ser Ile Ile Thr Asn
690 695 700

Gly Lys Gly Thr Lys Thr Glu Tyr Lys Ala Tyr Cys Asn Arg Thr Thr
705 710 715 720

Arg Arg Phe Ile Ala Gly Phe Lys Phe Thr Glu Gln Lys Glu Leu Arg
725 730 735

Ala Val Ile Asn Gly Asn Phe Gly Ala Val Asp Val Ser Gln His Thr
740 745 750

Arg Gln Arg Tyr Thr Glu Gly Pro Ile Asn Ile Gly Gly Gln Ser Ile
755 760 765

Ser Gly Asn Arg His Leu Phe Gly His Val Arg Asn Leu Arg Ile Trp
770 775 780

His Lys Glu Leu Thr Asp Ala Gln Met Gly Glu Arg Ile
785 790 795

<210> 233

<211> 93
<212> PRT
<213> 人工
<220>
<223> STF-68B AP1
<400> 233

Met Arg Asp Leu Thr Leu Lys Phe Ile Asn Lys Ala Asp Phe Ser Ala
1 5 10 15
Phe Met Asp Ser Ile Gly Tyr Glu Asp Asp Glu Val Met Gln Asn Asn
20 25 30
Val Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
35 40 45
Thr Glu Asp Gly Glu Pro Val Cys Val Lys Glu Asp Gly Tyr Phe Val
50 55 60
Asn Val Arg Ile Ile Asn Asp Ala Lys Lys Ser Ser Ile Phe Asp Lys
65 70 75 80
Tyr Ala Val Val Val Glu His Gln Leu Arg Gly Trp Met
85 90

<210> 234
<211> 346
<212> PRT
<213> 人工
<220>
<223> STF-68B AP2
<400> 234

[0319]

Met Ala Thr Ser Thr Val Ile Pro Asp Asp Ile Lys Thr Leu Lys Ser
1 5 10 15
Asp Val Ser Lys Leu Lys Asn Asp Gln Gly Ser Tyr Ala Thr Lys Ser
20 25 30
Tyr Val Asp Ser Lys Asp Glu Thr Val Gly Asp Trp Ser Ala Ser Trp
35 40 45
Tyr Gln Gln Val Leu Pro Thr Ser Gly Ala Ile Phe Gly Arg Lys Leu
50 55 60
Arg Ser Thr His Arg Thr Ala Gly Val Glu Asp Ala Tyr Cys Glu Leu
65 70 75 80
Tyr Leu Lys Lys Trp Ile Asp Ser Pro Gly Asn Ala Met Ala Arg Leu
85 90 95
Asn Leu Asn Asp Asn Gly Thr Asn Ile Cys Trp Asp Phe Thr Asn Leu
100 105 110
Tyr Gly Gly Thr Met Ile Phe Pro Gly Asp Ser Gly Tyr Leu Lys Met
115 120 125
Gly Asn Cys Leu Met Ser Tyr Ser Lys Arg Gly Ser Asn Ala Leu Ile
130 135 140
Lys Phe Asp Tyr Thr Asp Thr Leu Gln Ile Lys Tyr Ala Asn His Gly

145 150 155 160
Ser Thr Met Thr Leu Asn Thr Gln Gly Thr Ala His Ala Gly Val Thr
165 170 175
Thr Arg Leu Trp Gly Asn Ser Ser Arg Pro Val Val Tyr Glu Val Gly
180 185 190
Val Asp Glu Ala Leu Tyr Met Phe Tyr Ala Gln Lys Thr Thr Ser Asn
195 200 205
Thr Tyr Glu Leu Thr Val Asn Gly Ala Cys Asn Ala Ser Ala Phe Asn
210 215 220
Gln Gly Ser Asp Arg Asp Leu Lys Asp Asn Ile Gln Val Ile Asp Asn
225 230 235 240
Ala Thr Asp Arg Ile Arg Lys Met Asn Gly Tyr Thr Tyr Thr Leu Lys
245 250 255
Glu Asn Gly Met Pro Tyr Ala Gly Val Ile Ala Gln Glu Thr Leu Glu
260 265 270
Ala Ile Pro Glu Ala Val Gly Ala Met Met Lys Tyr Pro Asp Gly Gly
275 280 285
Ser Gly Leu Asp Gly Glu Glu Gly Glu Arg Tyr Tyr Thr Val Asp Tyr
290 295 300
Ser Gly Val Thr Gly Leu Leu Val Gln Val Ala Arg Glu Ser Asp Asp
305 310 315 320
Arg Ile Thr Ala Leu Glu Glu Glu Asn Ala Glu Leu Arg Gln Arg Leu
325 330 335
Ser Ala Ile Glu Ala Ala Leu Ala Ser Lys
340 345

[0320]

<210> 235
<211> 824
<212> PRT
<213> 人工
<220>
<223> STF-118
<400> 235
Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95

[0321]

```
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asn Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Thr Pro Thr Ala Arg Gln Gly Thr Asn
                405                 410                 415
Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Met Ala Ala Ile Ala Ala
            420                 425                 430
Leu Val Asp Ser Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
        435                 440                 445
```

[0322]

Ala Ala Leu Gly Asn Asp Pro Asn Phe Ala Thr Thr Met Thr Asn Ala
450 455 460
Leu Ala Gly Lys Gln Pro Lys Asp Ala Thr Leu Ala Ala Leu Ala Gly
465 470 475 480
Leu Ala Thr Ala Ala Asp Arg Phe Pro Tyr Phe Thr Gly Asn Asp Val
485 490 495
Ala Ser Leu Ala Thr Leu Thr Lys Val Gly Arg Asp Ile Leu Ala Lys
500 505 510
Ser Thr Val Ser Ala Val Ile Glu Tyr Leu Gly Leu Gln Glu Thr Val
515 520 525
Asn Arg Ala Gly Asn Ala Val Gln Lys Asn Gly Asp Thr Leu Ser Gly
530 535 540
Gly Leu Thr Phe Glu Asn Asp Ser Ile Leu Ala Trp Ile Arg Asn Thr
545 550 555 560
Asp Trp Ala Lys Ile Gly Phe Lys Asn Asp Ala Asp Gly Asp Thr Asp
565 570 575
Ser Tyr Met Trp Phe Glu Thr Gly Asp Asn Gly Asn Glu Tyr Phe Lys
580 585 590
Trp Arg Ser Arg Gln Ser Thr Thr Thr Lys Asp Leu Met Asn Leu Lys
595 600 605
Trp Asp Ala Leu Tyr Val Leu Val Lys Ala Leu Phe Ser Ser Glu Val
610 615 620
Lys Ile Ser Thr Val Asn Ala Leu Arg Ile Phe Asn Ser Ser Phe Gly
625 630 635 640
Ala Ile Phe Arg Arg Ser Glu Glu Asn Leu Tyr Ile Ile Pro Thr Arg
645 650 655
Glu Asn Glu Gly Glu Asn Gly Asp Ile Gly Pro Leu Arg Pro Phe Gly
660 665 670
Ile Asn Leu Arg Thr Gly Val Val Ser Val Gly Asn Gly Ala Arg Ile
675 680 685
Asp Gly Gly Leu Ala Leu Gly Thr Asn Asn Ala Leu Gly Gly Asn Ser
690 695 700
Ile Val Leu Gly Asp Asn Asp Thr Gly Phe Lys Gln Asn Gly Asp Gly
705 710 715 720
Asn Leu Asp Val Tyr Ala Asn Asn Val His Val Met Arg Phe Val Ser
725 730 735
Gly Ser Ile Gln Ser Asn Lys Thr Ile Asn Ile Thr Gly Arg Val Asn
740 745 750
Pro Ser Asp Tyr Gly Asn Phe Asp Ser Arg Tyr Val Arg Asp Ile Arg
755 760 765
Leu Gly Thr Arg Val Val Gln Thr Met Gln Lys Gly Val Met Tyr Glu
770 775 780
Lys Ala Gly His Val Ile Thr Gly Leu Gly Ile Val Gly Glu Val Asp
785 790 795 800

Gly Asp Asp Pro Ala Val Phe Arg Pro Ile Gln Lys Tyr Ile Asn Gly
805 810 815
Thr Trp Tyr Asn Val Ala Gln Val
820

<210> 236
<211> 175
<212> PRT
<213> 人工
<220>
<223> STF-118 AP1
<400> 236

Met Gln His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Val Ala
1 5 10 15
Gln Tyr Gln Leu Thr Lys Asn Phe Asp Val Ile Trp Leu Trp Ser Glu
20 25 30
Glu Gly Lys Asn Trp Tyr Glu Glu Val Ser Asn Phe Gln Glu Asp Thr
35 40 45
Ile Lys Ile Val Tyr Asp Glu Asn Asn Ile Ile Val Gly Ile Thr Arg
50 55 60
Asp Ala Ser Thr Leu Asn Pro Glu Gly Phe Ser Val Val Glu Val Pro
65 70 75 80
Asp Ile Thr Ser Asn Arg Arg Ala Asp Asp Ser Gly Lys Trp Met Phe
85 90 95
Lys Asp Gly Ala Val Ile Lys Arg Ile Tyr Thr Ala Asp Glu Gln Glu
100 105 110
Gln Gln Ala Glu Ser Gln Lys Ala Ala Leu Leu Ser Glu Ala Glu Ser
115 120 125
Val Ile Leu Pro Leu Glu Arg Ala Val Arg Leu Asn Met Ala Thr Asp
130 135 140
Glu Glu Arg Ser Arg Leu Glu Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175

[0323]

<210> 237
<211> 879
<212> PRT
<213> 人工
<220>
<223> STF-90B
<400> 237

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30

[0324]

```
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
        35                  40                  45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
    50                  55                  60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65                  70                  75                  80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
                85                  90                  95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
            100                 105                 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
        115                 120                 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
    130                 135                 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145                 150                 155                 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
```

[0325]

```
Lys Val Val Met Asp Glu Thr Asn Arg Lys Tyr Thr Ala Gln Asp Ala
385                 390                 395                 400
Thr Thr Ala Arg Lys Gly Leu Val Gln Leu Ser Ser Val Thr Asn Ser
                405                 410                 415
Asp Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val Lys Thr Ala Tyr
            420                 425                 430
Asp Leu Ala Asn Gly Lys Tyr Thr Ala Gln Asp Ala Thr Thr Ala Arg
        435                 440                 445
Lys Gly Leu Val Gln Leu Ser Ser Ala Thr Asn Ser Asp Ser Glu Thr
    450                 455                 460
Leu Ala Ala Thr Pro Lys Ala Val Lys Ser Ala Tyr Asp Asn Ala Glu
465                 470                 475                 480
Lys Arg Leu Gln Lys Asp Gln Asn Gly Ala Asp Ile Pro Gly Lys Asp
                485                 490                 495
Thr Phe Thr Lys Asn Ile Gly Ala Cys Arg Ala Tyr Ser Gly Ala Leu
            500                 505                 510
Ser Thr Asp Ala Gly Asn Trp Thr Thr Ala Gln Phe Ile Asp Trp Leu
        515                 520                 525
Glu Ser Gln Gly Ala Phe Asn His Pro Tyr Trp Met Cys Lys Cys Ser
    530                 535                 540
Trp Ser Tyr Gly Asn Asn Lys Ile Ile Thr Asp Thr Asp Cys Gly Thr
545                 550                 555                 560
Ile His Leu Ala Gly Cys Val Ile Glu Val Met Gly Val Lys Ala Ala
                565                 570                 575
Met Thr Ile Arg Val Thr Thr Pro Ser Thr Ser Ser Gly Gly Gly Thr
            580                 585                 590
Thr Ser Ala Gln Phe Thr Tyr Ile Asn His Gly Ala Asp Tyr Ala Pro
        595                 600                 605
Gly Trp Arg Arg Asp Tyr Asn Thr Lys Asn Lys Gln Pro Ala Phe Ala
    610                 615                 620
Leu Gly Lys Thr Gly Asn Thr Val Ala Asn Asn Lys Ala Val Gly Trp
625                 630                 635                 640
Asn Trp Asp Ser Gly Ala Tyr Cys Ala Gln Asp Gly Gly Ala Ser Lys
                645                 650                 655
Met Val Leu His Phe Tyr Thr Gly Glu Gly Ser Cys Pro Ala Met Gln
            660                 665                 670
Phe Leu Val Asp Tyr Lys Asn Arg Gly Ile Phe Tyr Arg Ser Ala Arg
        675                 680                 685
Asp Gly Tyr Gly Phe Glu Ala Asp Trp Ser Glu Phe Tyr Thr Thr Ser
    690                 695                 700
Arg Lys Pro Thr Pro Ala Asp Ile Leu Ala Leu Ala Leu Ser Gly Gly
705                 710                 715                 720
Ser Met Ser Gly Ser Ile Lys Phe Ile Asn Asp Ala Phe Leu Ile Trp
                725                 730                 735
```

Glu Arg Asn Thr Asp Trp Ala Lys Ile Gly Phe Lys Asn Asp Ser Asp
740 745 750
Ala Asp Ser Asp Ser Tyr Met Trp Phe Glu Thr Gly Asp Asn Gly Asn
755 760 765
Glu Tyr Phe Lys Trp Arg Ile Arg Ser Gly Ser Thr Thr Lys Asp Leu
770 775 780
Met Thr Leu Lys Ser Asp Ala Leu Arg Val Thr Gly Gln Val Ile Pro
785 790 795 800
Ser Asn Phe Ser Asn Phe Asp Ser Arg Tyr Val Arg Asp Ile Arg Leu
805 810 815
Gly Gly Ala Ala Thr Tyr Lys Pro Ala Asn Asn Gly Met Thr Trp Thr
820 825 830
His Gln Ala Pro Ser Gly Cys Val Tyr Thr Gly Ile Ile Val Gln Asp
835 840 845
Thr Gly Ser Asn Ser Ala Asp Asn Ile Gly Gly Val Tyr Tyr Arg Pro
850 855 860
Val Gln Lys Tyr Ile Asn Gly Thr Trp Tyr Asn Val Ala Gln Val
865 870 875

[0326]

<210> 238
<211> 175
<212> PRT
<213> 人工
<220>
<223> STF-90B AP1
<400> 238

Met Gln His Leu Lys Asn Ile Thr Ala Gly Asn Pro Lys Thr Val Glu
1 5 10 15
Gln Tyr Gln Leu Thr Lys Asp Phe Asp Val Val Trp Phe Phe Ser Glu
20 25 30
Asp Gly Lys Asn Trp Tyr Glu Glu Gln Lys Tyr Phe Ala Asp Asp Thr
35 40 45
Ile Lys Ile Ala Tyr Asp Lys Asp Asn Ile Ile Arg Tyr Val Glu Lys
50 55 60
Asp Val Thr Ala Ile Arg Pro Asp Gly Leu Ser Val Val Glu Val Ala
65 70 75 80
Asp Ile Thr Ala Asn Arg Arg Ala Asp Ile Ser Gly Asn Trp Met Phe
85 90 95
Lys Asp Gly Thr Val Ile Lys Arg Ile Tyr Thr Ala Glu Glu Leu Gln
100 105 110
Gln Gln Ala Glu Asn Arg Lys Ala Arg Leu Leu Ala Asp Ala Glu Ser
115 120 125
Val Ile Leu Pro Leu Glu Arg Ala Val Arg Leu Asn Met Ala Thr Glu
130 135 140
Glu Glu Arg Ser Arg Leu Glu Arg Trp Glu Arg Tyr Ser Val Leu Val

145 150 155 160
Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
165 170 175

<210> 239
<211> 871
<212> PRT
<213> 人工
<220>
<223> STF-117
<400> 239

Met Ala Val Lys Ile Ser Gly Val Leu Lys Asp Gly Thr Gly Lys Pro
1 5 10 15
Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30
Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
[0327]
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
210 215 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225 230 235 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
245 250 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
260 265 270

[0328]

```
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Tyr Thr Ala Gln Asp Ala
385                 390                 395                 400
Thr Thr Ala Arg Lys Gly Leu Val Gln Leu Ser Ser Ala Thr Asn Ser
                405                 410                 415
Asp Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val Lys Ser Ala Tyr
            420                 425                 430
Asp Asn Ala Glu Lys Arg Leu Gln Lys Asp Gln Asn Gly Ala Asp Ile
        435                 440                 445
Pro Gly Lys Asp Thr Phe Thr Lys Asn Ile Gly Ala Cys Arg Ala Tyr
    450                 455                 460
Ser Gly Ala Leu Ser Thr Glu Ala Gly Asn Trp Thr Thr Ala Gln Phe
465                 470                 475                 480
Ile Glu Trp Leu Asp Ser Arg Gly Ala Phe Asn His Pro Tyr Trp Met
                485                 490                 495
Cys Lys Gly Ser Trp Ser Tyr Ala Asn Asn Lys Ile Ile Thr Asp Thr
            500                 505                 510
Gly Cys Gly Asp Ile His Leu Ala Gly Cys Val Val Glu Val Met Gly
        515                 520                 525
Thr Lys Ser Ala Ile Thr Ile Arg Val Thr Thr Pro Thr Thr Ser Ser
    530                 535                 540
Gly Gly Gly Thr Thr Ser Ala Gln Phe Thr Tyr Ile Asn His Gly Asp
545                 550                 555                 560
Gly Tyr Ser Pro Gly Trp Arg Arg Asp Trp Asn Arg Gln Gly Asp Ala
                565                 570                 575
Met Thr Gly Thr Ile Asn Gln Asp Gly Gly Ser Gln Asn Ala Tyr Met
            580                 585                 590
Ser Thr Ala Leu Cys Ser Gly Thr Arg Gly Gly Lys Lys Tyr Leu Arg
        595                 600                 605
Lys Phe Arg Gly Gly Glu Gly Asp Thr Ile Trp His Glu Thr Val Gln
    610                 615                 620
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Gly Gly Val Val Arg Trp Ala Thr Gly Asn Thr Asp Ala Gln Glu Glu
625 630 635 640
Leu Ser Leu Ser Ser Ala Tyr Gly Leu Arg Ser Arg Gly Glu Ile Thr
645 650 655
Ser Ser Ser Ala Asn Gly Leu Arg Ile Ala Tyr Gly Asn Tyr Gly Phe
660 665 670
Phe Ile Arg Asn Asp Gly Ser Ser Thr Tyr Phe Met Leu Thr Lys Ser
675 680 685
Gly Asp Arg Leu Gly Thr Tyr Asn Asn Leu Arg Pro Leu Ile Ile Asn
690 695 700
Asp Ala Thr Gly Ala Val Ser Met Gly His Gly Leu Ser Val Thr Gly
705 710 715 720
Asp Ile Ala Ser Ser Thr Lys Val Arg Ala Gly Ser Gly Lys Lys Phe
725 730 735
Thr Val Ser Ser Ser Asn Thr Ser Thr Lys Glu Ala Ala Phe Asn Leu
740 745 750
Trp Gly Asn Ser Ser Arg Pro Val Val Ala Glu Leu Gly Asp Asp Ala
755 760 765
Gly Trp His Phe Tyr Ser Gln Arg Asn Thr Asp Asn Ser Ile Thr Phe
770 775 780
Ala Val Asn Gly Gln Val Ser Pro Ser Asn Tyr Ser Asn Phe Asp Ser
785 790 795 800

[0329]

Arg Tyr Val Arg Asp Ile Arg Leu Gly Gly Ala Ala Thr Tyr Lys Pro
805 810 815
Ala Asn Asn Gly Met Thr Trp Thr His Gln Ala Pro Ser Gly Cys Val
820 825 830
Tyr Ser Gly Ile Ile Val Gln Asp Thr Gly Ser Asn Ser Ala Asp Asn
835 840 845
Ile Gly Gly Val Tyr Tyr Arg Pro Val Gln Lys Tyr Ile Asn Gly Thr
850 855 860
Trp Tyr Asn Val Ala Gln Val
865 870

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<213> 人工
<220>
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Gln Tyr Gln Leu Thr Lys Asp Phe Asp Val Val Trp Phe Phe Thr Glu
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Asp Gly Lys Asn Trp Tyr Glu Glu Gln Lys Tyr Phe Ala Asp Asp Thr

35 40 45

Ile Lys Ile Ala Tyr Asp Lys Asp Asn Ile Ile Arg Tyr Val Glu Lys
50 55 60

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

Asp Ile Thr Ala Asn Arg Arg Ala Asp Ile Ser Gly Asn Trp Met Phe
85 90 95

Lys Asp Gly Lys Val Ile Lys Arg Ile Tyr Thr Ala Glu Glu Leu Gln
100 105 110

Gln Gln Ala Glu Asn Arg Lys Ala Arg Leu Leu Ala Asp Ala Glu Ser
115 120 125

Val Ile Leu Pro Leu Glu Arg Ala Val Arg Leu Asn Met Ala Thr Asp
130 135 140

Glu Glu Arg Ser Arg Leu Glu Ala Trp Glu Arg Tyr Ser Val Leu Val
145 150 155 160

Ser Arg Val Asp Pro Ala Asn Pro Glu Trp Pro Glu Met Pro Gln
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<210> 241
<211> 798
<212> PRT
<213> 人工
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<223> STF-66D

[0330]

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Val Gln Asn Cys Thr Ile Gln Leu Lys Ala Arg Arg Asn Ser Thr Thr
20 25 30

Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45

Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60

Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80

Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95

Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110

Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125

Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140

Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160

[0331]

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Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
                165                 170                 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
            180                 185                 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
        195                 200                 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr
    210                 215                 220
Ala Ala Thr Lys Ala Ser Glu Ala Ala Thr Ser Ala Arg Asp Ala Val
225                 230                 235                 240
Ala Ser Lys Glu Ala Ala Lys Ser Ser Glu Thr Asn Ala Ser Ser Ser
                245                 250                 255
Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Ala Ala Ser Ala Thr Ala Ala Ala Asn
    290                 295                 300
Ser Gln Lys Ala Ala Lys Thr Ser Glu Thr Asn Ser Lys Ala Ser Glu
305                 310                 315                 320
Thr Ala Ala Ala Asn Ser Ala Lys Ala Ser Ala Ala Ser Gln Thr Ala
                325                 330                 335
Ala Lys Ala Ser Glu Asp Ala Ala Arg Glu Tyr Ala Ser Gln Ala Ala
            340                 345                 350
Glu Pro Tyr Lys Gln Val Leu Gln Pro Leu Pro Asp Val Trp Ile Pro
        355                 360                 365
Phe Asn Asp Ser Leu Asp Met Ile Thr Gly Phe Ser Pro Ser Tyr Lys
    370                 375                 380
Lys Ile Val Ile Gly Asp Asp Glu Ile Thr Met Pro Gly Asp Lys Val
385                 390                 395                 400
Val Lys Phe Lys Arg Ala Ser Lys Ala Thr Tyr Ile Asn Lys Ser Gly
                405                 410                 415
Val Leu Thr Glu Ala Ala Ile Asp Glu Pro Arg Phe Glu Arg Asp Gly
            420                 425                 430
Leu Leu Ile Glu Gly Gln Arg Thr Asn Tyr Met Leu Asn Ser Glu Asn
        435                 440                 445
Pro Ala Ser Trp Gly Arg Ser Ser Asn Met Asp Val Pro Glu Thr Gly
    450                 455                 460
Thr Asp Ser Phe Gly Phe Thr Tyr Gly Lys Phe Val Cys Asn Asp Ser
465                 470                 475                 480
Leu Ile Gly Gln Thr Ser Ala Ile Asn Met Ala Ser Ile Ala Ala Thr
                485                 490                 495
Lys Ser Val Asp Val Ser Gly Asp Asn Lys Tyr Val Thr Thr Ser Cys
            500                 505                 510
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[0332]

Arg Phe Lys Thr Glu Leu Gln Val Arg Leu Arg Ile Arg Phe Asp Lys
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Tyr Asp Gly Ser Ala Thr Thr Phe Leu Gly Asp Ala Tyr Ile Asp Thr
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545 550 555 560
Ala Arg Val Arg Lys Asp Glu Thr Thr Gly Trp Ile Phe Ala Glu Ala
565 570 575
Thr Ile Gln Ala Ile Asp Gly Glu Leu Lys Ile Gly Ser Gln Ile Gln
580 585 590
Tyr Ser Pro Lys Gln Gly Gly Ala Thr Val Ser Gly Asp Tyr Ile Tyr
595 600 605
Leu Ala Thr Pro Gln Val Glu Asn Gly Ala Cys Val Ser Ser Phe Ile
610 615 620
Ile Ser Gly Thr Thr Ala Ala Thr Arg Ala Ser Asp Met Val Thr Ile
625 630 635 640
Pro Thr Glu Asn Asn Ile Tyr Asn Arg Pro Leu Thr Cys Leu Val Glu
645 650 655
Val Asn Arg Asn Trp Gly Asp Ile Pro Pro Asn Val Ala Pro Arg Ile
660 665 670
Phe Asp Phe Ser Gly Val Pro Pro Ile Glu Ser Ile Thr Tyr Ala Phe
675 680 685
Asn Thr Thr Glu Lys Tyr Tyr Gly Gln Leu Tyr Met Gln Thr Tyr Lys
690 695 700
Ala Ser Thr Ser Ser Tyr Val Ser Ser Leu Phe Thr Gly Arg Thr Asp
705 710 715 720
Val Arg Lys Leu Ile Gly Gly Phe Asn Ile Tyr Ser Asp Gly Thr Lys
725 730 735
Arg Val Val Ser Asn Gly Glu Ala Thr Lys Thr Met Lys Thr Glu Trp
740 745 750
Thr Gly Val Lys Thr Arg Thr Phe Ile Arg Ile Gly Gly Gln Ala Thr
755 760 765
Ser Gly Thr Arg His Leu Phe Gly His Leu Arg Asn Leu Arg Leu Trp
770 775 780
His Lys Glu Leu Thr Asp Ala Gln Met Gly Glu Ser Ile Lys
785 790 795

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<211> 93
<212> PRT
<213> 人工
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<223> STF-66D AP1
<400> 242

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            20                  25                  30
Ile Leu Ile Asp Val Ile Gly Asn Val Tyr Lys Glu Thr Gly Glu Leu
        35                  40                  45
Thr Glu Asp Gly Glu Pro Val Cys Val Lys Glu Asp Gly Tyr Phe Val
    50                  55                  60
Asn Val Arg Ile Ile Asn Asp Ser Gln Ile Ser Ser Leu Phe Asp Glu
65                  70                  75                  80
Tyr Val Val Ala Val Glu His Gln Leu Arg Gly Trp Met
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<223> 0111
<400> 243

[0333]

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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc     180
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caggctgcat cgtcagctca ggaagcgtcc tccggcgcag aagcggcatc agcaaaggcc     540
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gcaaaacgtg cagaagatat agcttcagct gtcgcgcttg aggatgcgga cacaacgaga    1080
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gagaatccgg atgaagccgg gcgttacagc atggatgtgg agtacggtca gtacagtgtc 180
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atcgattacg aggagccaga aaacgaaaga tgtacaggca ttgatcgcgg cggttttttc 180
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acagatcagc atgtaaggac atgggcttaa 270

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<212> DNA
<213> 人工
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[0336]

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[0337]

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<220>
<223> SIEA11 AP1
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[0338]

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<212> DNA
<213> 人工
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<223> DC1 AP1
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<223> EB6
<400> 251

[0339]

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[0340]

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[0341]

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<223> AH11L AP1

[0342]

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[0343]

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[0344]

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[0351]

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<223> STF66 AP1
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<211> 261
<212> PRT
<213> 人工
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<223> WW55 3.0 AP1
<400> 271

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35 40 45
Ser Ile Gly Ala Ser Asn Ser Tyr Asn Lys Asp Thr Leu Ile Asn Trp
50 55 60
Met Lys Ala Gln Gly Ser Thr Pro Val Val Ile Thr Ile Thr Gly Asn
65 70 75 80
Ile Val Ser Gln Ser Thr Gly Val Pro Cys Leu Asp Phe Pro Ser Ser
85 90 95

Leu Thr Asn Glu Tyr Val Thr Leu Ile Ile Asn Ser Gly Val His Val
100 105 110
Leu Gly Arg Gly Gly Asn Gly Gly Ser Asn Ser Ala Gly Gly Ala Gly
115 120 125
Gly Asn Ala Ile Asn Asn Gly Ile Gly Thr Arg Leu Arg Ile Asn Asn
130 135 140
Asn Gly Ile Ile Gly Gly Gly Gly Gly Gly Gly Ala Gly Ala Arg Tyr
145 150 155 160
Asn Pro Phe Pro Gln Met Asp Met Lys Phe Gly Gly Gly Gly Gly Arg
165 170 175
Pro Phe Gly Ala Ala Gly Ala Ala Gly Gly Gly Ala Ala Ala Ala Ser
180 185 190
Ala Gly Thr Ile Ser Ala Pro Gly Lys Gly Thr Val Ser Gly Val His
195 200 205
Tyr Gly Gly Asp Gly Gly Asp Leu Gly Ala Ala Gly Lys Ser Ser Tyr
210 215 220
Ile Lys Gly Gly Thr Gly Gly Thr Val His Ser Gly Gly Ala Ala Gly
225 230 235 240
Lys Ala Val Thr Gly Asn Ala Pro Arg Trp Asp Lys Val Gly Thr Ile
245 250 255
Tyr Gly Ala Arg Val
260

[0354]

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gtgtaa 786

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<211> 86
<212> PRT
<213> 人工
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<223> WW55 3.0 AP2
<400> 273

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Arg Glu Arg Val Leu Met Glu Leu Val Arg Ile Leu Gly Ile Gln Pro
35 40 45
Asp Glu Asn Gly Thr Val Ser Leu Asp Ala Ile Val Glu Glu Val Lys
50 55 60
Ala Leu Leu Pro Lys Asp Glu Ala Ala Glu Asp Ala Glu Glu Glu Val
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Glu Leu Ile Thr Glu Ala
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[0355]

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<212> PRT
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20 25 30
Pro Pro His Thr Gly Leu Pro Ala Asn Ser Thr Asp Ile Ala Pro Pro
35 40 45
Asp Ile Pro Ala Gly Phe Val Ala Val Phe Asn Ser Asp Glu Ala Ser

50 55 60

Trp His Leu Val Glu Asp His Arg Gly Lys Thr Val Tyr Asp Val Ala
65 70 75 80
Ser Gly Asp Ala Leu Phe Ile Ser Glu Leu Gly Pro Leu Pro Glu Asn
85 90 95
Phe Thr Trp Leu Ser Pro Gly Gly Glu Tyr Gln Lys Trp Asn Gly Thr
100 105 110
Ala Trp Val Lys Asp Thr Glu Ala Glu Lys Leu Phe Arg Ile Arg Glu
115 120 125
Ala Glu Glu Thr Lys Lys Ser Leu Met Gln Val Ala Ser Glu His Ile
130 135 140
Ala Pro Leu Gln Asp Ala Ala Asp Leu Glu Ile Ala Thr Lys Glu Glu
145 150 155 160
Thr Ser Leu Leu Glu Ala Trp Lys Lys Tyr Arg Val Leu Leu Asn Arg
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[0356]

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[0358]

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[0360]

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Ser Thr Pro Val Leu Asp Thr Glu Gly Asn Thr Asn Ile Ser Gly Val
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Thr Val Val Phe Arg Ala Gly Glu Gln Glu Gln Thr Pro Pro Glu Gly
65                  70                  75                  80
Phe Glu Ser Ser Gly Ser Glu Thr Val Leu Gly Thr Glu Val Lys Tyr
                85                  90                  95
Asp Thr Pro Ile Thr Arg Thr Ile Thr Ser Ala Asn Ile Asp Arg Leu
            100                 105                 110
Arg Phe Thr Phe Gly Val Gln Ala Leu Val Glu Thr Thr Ser Lys Gly
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Asp Arg Asn Pro Ser Glu Val Arg Leu Leu Val Gln Ile Gln Arg Asn
    130                 135                 140
Gly Gly Trp Val Thr Glu Lys Asp Ile Thr Ile Lys Gly Lys Thr Thr
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Ser Gln Tyr Leu Ala Ser Val Val Met Gly Asn Leu Pro Pro Arg Pro
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Phe Asn Ile Arg Met Arg Arg Met Thr Pro Asp Ser Thr Thr Asp Gln
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Leu Gln Asn Lys Thr Leu Trp Ser Ser Tyr Thr Glu Ile Ile Asp Val
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Lys Gln Cys Tyr Pro Asn Thr Ala Leu Val Gly Val Gln Val Asp Ser
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Glu Gln Phe Gly Ser Gln Gln Val Ser Arg Asn Tyr His Leu Arg Gly
225                 230                 235                 240
Arg Ile Leu Gln Val Pro Ser Asn Tyr Asn Pro Gln Thr Arg Gln Tyr
                245                 250                 255
Ser Gly Ile Trp Asp Gly Thr Phe Lys Pro Ala Tyr Ser Asn Asn Met
            260                 265                 270
Ala Trp Cys Leu Trp Asp Met Leu Thr His Pro Arg Tyr Gly Met Gly
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Lys Arg Leu Gly Ala Ala Asp Val Asp Lys Trp Ala Leu Tyr Val Ile
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Gly Gln Tyr Cys Asp Gln Ser Val Pro Asp Gly Phe Gly Gly Thr Glu
305                 310                 315                 320
Pro Arg Ile Thr Cys Asn Ala Tyr Leu Thr Thr Gln Arg Lys Ala Trp
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Asp Val Leu Ser Asp Phe Cys Ser Ala Met Arg Cys Met Pro Val Trp
            340                 345                 350
Asn Gly Gln Thr Leu Thr Phe Val Gln Asp Arg Pro Ser Asp Lys Thr
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Trp Thr Tyr Asn Arg Ser Asn Val Val Met Pro Asp Asp Gly Ala Pro
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[0361]

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Met Asp Ala Phe Gly Cys Thr Ser Arg Gly Gln Ala His Arg Ala Gly
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Leu Trp Leu Ile Lys Thr Glu Leu Leu Glu Thr Gln Thr Val Asp Phe
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Ser Val Gly Ala Glu Gly Leu Arg His Val Pro Gly Asp Val Ile Glu
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Ile Cys Asp Asp Asp Tyr Ala Gly Ile Ser Thr Gly Gly Arg Val Leu
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Leu Pro Ser Ser Gly Thr Ala Leu Ile Ser Leu Val Asp Gly Ser Gly
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Pro Glu Lys Glu Ala Ile Val Asp Asn Gly Ala His Phe Asp Gly Glu
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Gln Ser Gly Thr Val Asn Gly Val Thr Pro Pro Ala Val Gln His Leu
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Arg Leu Thr Val Arg Ala Val Asn Ala Trp Gly Gln Gln Gly Asp Pro
690 695 700
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Glu Leu Thr Pro Gly Tyr Phe Gln Ile Thr Ala Thr Pro His Leu Ala
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[0362]

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Ala Leu Tyr Trp Ile Ala Ala Ser Ile Asn Ile Lys Pro Gly His Asp
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Tyr Tyr Phe Tyr Ile Arg Ser Val Asn Thr Val Gly Lys Ser Ala Phe
785                 790                 795                 800
Val Glu Ala Val Gly Arg Ala Ser Asp Asp Ala Glu Gly Tyr Leu Asp
                805                 810                 815
Phe Phe Lys Gly Lys Ile Thr Glu Ser His Leu Gly Lys Glu Leu Leu
            820                 825                 830
Glu Lys Val Glu Leu Thr Glu Asp Asn Ala Ser Arg Leu Glu Glu Phe
        835                 840                 845
Ser Lys Glu Trp Lys Asp Ala Ser Asp Lys Trp Asn Ala Met Trp Ala
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Val Lys Ile Glu Gln Thr Lys Asp Gly Lys His Tyr Val Ala Gly Ile
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Gly Leu Ser Met Glu Asp Thr Glu Glu Gly Lys Leu Ser Gln Phe Leu
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Val Ala Ala Asn Arg Ile Ala Phe Ile Asp Pro Ala Asn Gly Asn Glu
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Thr Pro Met Phe Val Ala Gln Gly Asn Gln Ile Phe Met Asn Asp Val
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Phe Leu Lys Arg Leu Thr Ala Pro Thr Ile Thr Ser Gly Gly Asn Pro
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Pro Ala Phe Ser Leu Thr Pro Asp Gly Lys Leu Thr Ala Lys Asn Ala
945                 950                 955                 960
Asp Ile Ser Gly Asn Val Asn Ala Asn Ser Gly Thr Leu Asn Asn Val
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Thr Ile Asn Glu Asn Cys Arg Val Leu Gly Lys Leu Ser Ala Asn Gln
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Ile Glu Gly Asp Leu Val Lys Thr  Val Gly Lys Ala Phe  Pro Arg Asp
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Ser Arg  Ala Pro Glu Arg Trp  Pro Ser Gly Thr Ile  Thr Val Arg
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Val Tyr  Asp Asp Gln Pro Phe  Asp Arg Gln Ile Val  Ile Pro Ala
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Val Ala  Phe Ser Gly Ala Lys  His Glu Lys Glu His  Thr Asp Ile
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Tyr Ser  Ser Cys Arg Leu Ile  Val Arg Lys Asn Gly  Ala Glu Ile
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Tyr Asn  Arg Thr Ala Leu Asp  Asn Thr Leu Ile Tyr  Ser Gly Val
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Ile Asp Met Pro Ala Gly His Gly His Met Thr Leu Glu Phe Ser
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Val Val Met Arg Thr Gly Val Pro Ala Thr Pro Asp Asn Pro Asn Val

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50 55 60
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65 70 75 80
Ser Ala Gly Asn Val Asp Leu Gly Ala Leu Ala Val Thr Arg Glu Glu
85 90 95
Tyr Val Thr Leu Pro Gly Ser Phe Asp Thr Gly Val Thr Val Asn Thr
100 105 110

Lys Asn Glu Leu Val Val Phe Thr Asp Gly Lys Tyr Arg Trp Glu Gly
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[0366]

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Val Val Val Asn Thr Val Gly Ser Glu Asn Pro Asp Glu Ala Gly Arg
35 40 45
Tyr Ser Met Asp Val Glu Tyr Gly Gln Tyr Ser Val Ile Leu Gln Val
50 55 60
Asp Gly Phe Pro Pro Ser His Ala Gly Thr Ile Thr Val Tyr Glu Asp
65 70 75 80
Ser Gln Pro Gly Thr Leu Asn Asp Phe Leu Cys Ala Met Thr Glu Asp
85 90 95
Asp Ala Arg Pro Glu Val Leu Arg Arg Leu Glu Leu Met Val Glu Glu
100 105 110
Val Ala Arg Asn Ala Ser Val Val Ala Gln Ser Thr Ala Asp Ala Lys
115 120 125
Lys Ser Ala Gly Asp Ala Ser Ala Ser Ala Ala Gln Val Ala Ala Leu
130 135 140
Val Thr Asp Ala Thr Asp Ser Ala Arg Ala Ala Ser Thr Ser Ala Gly
145 150 155 160
Gln Ala Ala Ser Ser Ala Gln Glu Ala Ser Ser Gly Ala Glu Ala Ala
165 170 175
Ser Ala Lys Ala Thr Glu Ala Glu Lys Ser Ala Ala Ala Ala Glu Ser
180 185 190
Ser Lys Asn Ala Ala Ala Thr Ser Ala Gly Ala Ala Lys Thr Ser Glu
195 200 205
Thr Asn Ala Ala Ala Ser Gln Gln Ser Ala Ala Thr Ser Ala Ser Thr

[0367]

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Ala Gly Arg Ala Ala Ser Ser Ala Thr Ala Ala Glu Asn Ser Ala Arg
            260                 265                 270
Ala Ala Lys Thr Ser Glu Thr Asn Ala Arg Ser Ser Glu Thr Ala Ala
        275                 280                 285
Glu Arg Ser Ala Ser Ala Ala Ala Asp Ala Lys Thr Ala Ala Ala Gly
    290                 295                 300
Ser Ala Ser Thr Ala Ser Thr Lys Ala Thr Glu Ala Ala Gly Ser Ala
305                 310                 315                 320
Val Ser Ala Ser Gln Ser Lys Ser Ala Ala Glu Ala Ala Ala Ile Arg
                325                 330                 335
Ala Lys Asn Ser Ala Lys Arg Ala Glu Asp Ile Ala Ser Ala Val Ala
            340                 345                 350
Leu Glu Asp Ala Asp Thr Thr Arg Lys Gly Ile Val Gln Leu Ser Ser
        355                 360                 365
Ala Thr Asn Ser Thr Ser Glu Thr Leu Ala Ala Thr Pro Lys Ala Val
    370                 375                 380
Lys Val Val Met Asp Glu Thr Asn Arg Lys Ala Pro Leu Asp Ser Pro
385                 390                 395                 400
Ala Leu Thr Gly Thr Pro Thr Ala Pro Thr Ala Leu Arg Gly Thr Asn
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Asn Thr Gln Ile Ala Asn Thr Ala Phe Val Leu Ala Ala Ile Ala Asp
            420                 425                 430
Val Ile Asp Ala Ser Pro Asp Ala Leu Asn Thr Leu Asn Glu Leu Ala
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Ala Ala Leu Gly Asn Asp Pro Asp Phe Ala Thr Thr Met Thr Asn Ala
    450                 455                 460
Leu Ala Gly Lys Gln Pro Lys Asn Ala Thr Leu Thr Ala Leu Ala Gly
465                 470                 475                 480
Leu Ser Thr Ala Lys Asn Lys Leu Pro Tyr Phe Ala Glu Asn Asp Ala
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Ala Ser Leu Thr Glu Leu Thr Gln Val Gly Arg Asp Ile Leu Ala Lys
            500                 505                 510
Asn Ser Val Ala Asp Val Leu Glu Tyr Leu Gly Ala Gly Glu Asn Ser
        515                 520                 525
Tyr Ile Pro Trp Ile Tyr Asn Ser Gly Ser Ala Asn Gly Gly Glu Thr
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Thr Ile Arg Ile Pro Asp Glu Thr Ala Gly Ala Pro Phe Met Ile Val
545                 550                 555                 560
Asn Gly Asp Trp Gln Thr Glu Gly Tyr Asp Phe Glu Tyr Asp Pro Val
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Val Val Met Arg Thr Gly Val Pro Ala Thr Pro Asp Asn Pro Asn Val
595 600 605
Ser Asp Trp Val Thr Ile Asn Trp Leu Tyr Asn Gln Gly Ala Ala Val
610 615 620
Gly Gly Glu Gln Val Ile Asp Ile Pro Tyr Thr Phe Gln Ser Val Pro
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Ala Val Tyr Lys Asn Gly Leu Arg Phe Tyr Lys Gly Leu Thr Asn Asn
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Ser Tyr Thr Val Asp Ser Asp Asn Asn Arg Ile Ile Leu Thr Glu Pro
660 665 670
Leu Ala Thr Asn Asp Arg Leu Ile Val Gln Leu Gly Gly Glu Ala Lys
675 680 685
Val Leu Lys Val Val Asp His Thr Ile Gln Glu Val Ala Arg Ser Ala
690 695 700
Asn Val Lys Asp Ser Gln Val Ile Leu Ser Val Asp Thr Val Gln Ser
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Leu Asn Gly Lys Ala Val Val Tyr Asp Val Val Ala Gln Arg Ile Tyr
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Gly Leu Pro Thr Leu Pro Ser Asn Val Tyr Ile Asn Thr Val Ala Asn
740 745 750
Gly Lys Leu Tyr Tyr Asn Pro Gly Asn Val Glu Val Thr Leu Leu Asp
755 760 765
Val Pro Gly Ser Gly Thr Glu Val Lys Ser Ala Leu Ala Lys Gln Asp
770 775 780
Gly Leu Ser Leu Ile Gly Gln Cys Asn Ser Ile Ala Asp Leu Arg Asn
785 790 795 800
Val Glu Pro Val Met Asp Gly Gln Arg Ile Leu Val Lys Gln His Thr
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820 825 830
Val Gly Leu Thr Asp Asp Asn Gly Val Thr Val Lys Thr Val Gly Gly
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Ala Ala Trp Val Arg Val Gly Ala Asp Arg Val Asn Pro Tyr Met Tyr
850 855 860
Gly Ala Leu Gly Ser Gly Asn Asp Asp Thr Leu Ala Val Gln Ala Cys
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Leu Asn Ser Gly Lys Ala Thr Asn Ile Thr Asp Val His His Val Ser
885 890 895
Asn Val Thr Met Asn Lys Ser Ser Ala Ser Ile Tyr Gly Ser Gly Leu
900 905 910
His Tyr Thr Arg Leu His Gln Leu Pro Ala Ala Val Gly Ser Leu Leu

[0368]

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930 935 940
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945 950 955 960
Gly Ile Asp Val Leu Thr Pro Thr Gly Leu Ser Asn Asn Tyr Pro Asp
965 970 975
His Thr Thr Ser Asp Pro Arg Arg Asp Leu Val Ile Thr Lys Val His
980 985 990
Ile Ala Gly Phe Asp Glu Tyr Gly Leu Asn Val Asp Ser Gly Asn Phe
995 1000 1005
Ser Val Thr Thr Glu Ser Val Leu Ile Asn His Ile Lys Gln Val
1010 1015 1020
Gly Ala Arg Cys Ala Thr Thr Asp Trp Thr Trp Thr Asn Ile Gln
1025 1030 1035
Ile Asn Thr Cys Gly Lys Gln Cys Leu Ile Leu Asp Gly Cys Gly
1040 1045 1050
Asn Gly Arg Ile Ile Gly Gly Lys Phe Ile Trp Ala Asn Trp Leu
1055 1060 1065
Pro Tyr Gly Ala Ser Gly Gln Phe Pro Gly Ile Thr Ile Asn Asn
1070 1075 1080
[0369] Ser Gln Asn Met Val Ile Asn Gly Ile Glu Val Gln Asp Cys Gly
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Gly Asn Gly Ile Glu Phe Thr Asp Ser Tyr Ser Ile Ser Met Asn
1100 1105 1110
Gly Leu Asn Thr Asn Arg Asn Gly Ile Asn Ser Thr Ala Glu Phe
1115 1120 1125
Tyr Asn Leu Val Phe Asn Arg Ser Asp Val Glu Ile Asn Gly Phe
1130 1135 1140
Val Gly Leu Asn Tyr Lys Val Asn Ser Gly Ser Pro Asp Asn Ser
1145 1150 1155
Ser Ser Gly Asn Leu Lys Phe Leu Ser Ser Asp Cys Asn Val Thr
1160 1165 1170
Leu Asn Gly Lys Leu Glu Thr Gly Tyr Met Gly Ile Glu Phe Ile
1175 1180 1185
Gly Asp Thr Arg Val Ile Gln Pro Thr Ser Ser Tyr Ile Lys Leu
1190 1195 1200
Asn Gly Leu Val Asn Tyr Ala Gly Ser Gly Ile Gln Thr Ile Asn
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Glu Val Pro Thr Phe Asp Gly Val Ser Thr Thr Pro Val Tyr Val
1220 1225 1230
Pro Ile Ser Ser Val Val Gly Gln Thr Asn Gly Leu Arg Leu Ser
1235 1240 1245
Gln Ala Asn Lys Asp Lys Val Ile Tyr Thr Arg Lys Val Gly Pro

1250 1255 1260
Glu Gly Val Thr Met Ala Ala Val Ile Thr Pro Thr Ile Gly Gly
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Ala Glu Ile Phe Asn Leu Met Ala Ile Gly Thr Gly Phe Ser Ser
1280 1285 1290
Ala Ser Asn Ser Leu Tyr Phe Gln Leu Glu Ile Ala Ala Asp Gly
1295 1300 1305
Ser Gln Asn Val Ser Leu Leu Leu Ser Gly Asp Gly Thr Thr Gln
1310 1315 1320
Ile Leu Pro Gly Thr Leu Pro Ala Ala Leu Lys Leu Gln Ser Gly
1325 1330 1335
Glu Pro Tyr His Val Ala Leu Gly Ala Lys Ala Gly Tyr Phe Trp
1340 1345 1350
Trp Ser Ile Leu Asn Leu Asn Thr Gly Lys Arg Ile Arg Arg Ser
1355 1360 1365
Phe Arg Gly Ala Tyr Leu Pro Lys Pro Phe Ala Ser Ile Phe Gly
1370 1375 1380
Leu Val Ser Ser Pro Val Phe Phe Ser Gly Ala Gly Ile Gly Asp
1385 1390 1395
Ser Gly Cys Ser Gly Val Gly Ala Lys Ile Tyr Leu Gly Ser Phe
1400 1405 1410
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Tyr Asp Lys Glu Ser Gln Arg Ala Tyr Ser Leu Pro Ala Asp Ile Gly
50 55 60
Ser Gly Val Thr Ala Val Ser Leu Ser Pro Ala Gly Val Leu Val His
65 70 75 80

[0371]

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Tyr Val Thr Leu Pro Gly Ser Phe Asp Thr Gly Val Thr Val Asn Thr
100 105 110
Lys Asn Glu Leu Val Val Phe Thr Asp Gly Lys Tyr Arg Trp Glu Gly
115 120 125
Ala Leu Pro Lys Val Val Ala Ala Gly Ser Thr Pro Glu Ser Thr Gly
130 135 140
Gly Val Gly Val Gly Leu Trp Lys Ser Val Gly Asn Ala Ser Leu Arg
145 150 155 160
Asp Glu Leu Ser Asn Asn Asp Gly Phe Asn Leu Ile Gly Ala Ala Tyr
165 170 175
Tyr Asn Asp Val Arg Gly Ala Lys Gly Asp Gly Val Thr Asp Asp Thr
180 185 190
Ala Ala Leu Thr Ser Ala Leu Asn Asp Thr Pro Val Gly Gln Lys Ile
195 200 205
Asn Gly Asn Gly Lys Thr Tyr Lys Val Thr Ser Leu Pro Asp Ile Ser
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Arg Phe Ile Asn Thr Arg Phe Val Tyr Glu Arg Ile Pro Gly Gln Pro
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Leu Tyr Tyr Ala Ser Glu Glu Phe Val Gln Gly Glu Leu Phe Lys Ile
245 250 255
Thr Asp Thr Pro Tyr Tyr Asn Ala Trp Pro Gln Asp Lys Ala Phe Val
260 265 270
Tyr Glu Asn Val Ile Tyr Ala Pro Tyr Met Gly Ser Asp Arg His Gly
275 280 285
Val Ser Arg Leu His Val Ser Trp Val Lys Ser Gly Asp Asp Gly Gln
290 295 300
Thr Trp Ser Thr Pro Glu Trp Leu Thr Asp Leu His Pro Asp Tyr Pro
305 310 315 320
Thr Val Asn Tyr His Cys Met Ser Met Gly Val Cys Arg Asn Arg Leu
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355 360 365
Gly Ile Thr Lys Ala Ala Asn Gln Arg Tyr Ala Thr Ile His Val Pro
370 375 380
Asp His Gly Leu Phe Val Gly Asp Phe Val Asn Phe Ser Asn Ser Ala
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Val Thr Gly Val Ser Gly Asp Met Thr Val Ala Thr Val Ile Asp Lys
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Asp Asn Phe Thr Val Leu Thr Pro Asn Gln Gln Thr Ser Asp Leu Asn
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[0372]

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    450                 455                 460
Ser Phe Ala Thr Ile Asp Asn Asn Gly Phe Ala Met Gly Tyr His Gln
465                 470                 475                 480
Gly Asp Val Ala Pro Arg Glu Val Gly Leu Phe Tyr Phe Pro Asp Ala
                485                 490                 495
Phe Asn Ser Pro Ser Asn Tyr Val Arg Arg Gln Ile Pro Ser Glu Tyr
            500                 505                 510
Glu Pro Asp Ala Ser Glu Pro Cys Ile Lys Tyr Tyr Asp Gly Val Leu
        515                 520                 525
Tyr Leu Ile Thr Arg Gly Thr Arg Gly Asp Arg Leu Gly Ser Ser Leu
    530                 535                 540
His Arg Ser Arg Asp Ile Gly Gln Thr Trp Glu Ser Leu Arg Phe Pro
545                 550                 555                 560
His Asn Val His His Thr Thr Leu Pro Phe Ala Lys Val Gly Asp Asp
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Leu Ile Met Phe Gly Ser Glu Arg Ala Glu Asn Glu Trp Glu Ala Gly
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Ala Pro Asp Asp Arg Tyr Lys Ala Ser Tyr Pro Arg Thr Phe Tyr Ala
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Arg Leu Asn Val Asn Asn Trp Asn Ala Asp Asp Ile Glu Trp Val Asn
    610                 615                 620
Ile Thr Asp Gln Ile Tyr Gln Gly Gly Ile Val Asn Ser Gly Val Gly
625                 630                 635                 640
Val Gly Ser Val Val Val Lys Asp Asn Tyr Ile Tyr Tyr Met Phe Gly
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Gly Glu Asp His Phe Asn Pro Trp Thr Tyr Gly Asp Asn Ser Ala Lys
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Asp Pro Phe Lys Ser Asp Gly His Pro Ser Asp Leu Tyr Cys Tyr Lys
        675                 680                 685
Met Lys Ile Gly Pro Asp Asn Arg Val Ser Arg Asp Phe Arg Tyr Gly
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Ala Val Pro Asn Arg Ala Val Pro Val Phe Phe Asp Thr Asn Gly Val
705                 710                 715                 720
Arg Thr Val Pro Ala Pro Met Glu Phe Thr Gly Asp Leu Gly Leu Gly
                725                 730                 735
His Val Thr Ile Arg Ala Ser Thr Ser Ser Asn Ile Arg Ser Glu Val
            740                 745                 750
Leu Met Glu Gly Glu Tyr Gly Phe Ile Gly Lys Ser Ile Pro Thr Asp
        755                 760                 765
Asn Pro Ala Gly Gln Arg Ile Ile Phe Cys Gly Gly Glu Gly Thr Ser
    770                 775                 780
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Ser Thr Thr Gly Ala Gln Ile Thr Leu Tyr Gly Ala Asn Asn Thr Asp
785 790 795 800
Ser Arg Arg Ile Val Tyr Asn Gly Asp Glu His Leu Phe Gln Ser Ala
805 810 815
Asp Val Lys Pro Tyr Asn Asp Asn Val Thr Ala Leu Gly Gly Pro Ser
820 825 830
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835 840 845
Asn Gly Glu Arg Lys Thr Glu Pro Val Val Phe Asp Asp Ala Phe Leu
850 855 860
Asp Ala Trp Gly Asp Val His Tyr Ile Met Tyr Gln Trp Leu Asp Ala
865 870 875 880
Val Gln Leu Lys Gly Asn Asp Ala Arg Ile His Phe Gly Val Ile Ala
885 890 895
Gln Gln Ile Arg Asp Val Phe Ile Ala His Gly Leu Met Asp Glu Asn
900 905 910
Ser Thr Asn Cys Arg Tyr Ala Val Leu Cys Tyr Asp Lys Tyr Pro Arg
915 920 925
Met Thr Asp Thr Val Phe Ser His Asn Glu Ile Val Glu His Thr Asp
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Glu Glu Gly Asn Val Thr Thr Thr Glu Glu Pro Val Tyr Thr Glu Val
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[0374]

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[0375]

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gcactccttc gcgaccattg ataacaacgg tttcgctatg ggttatcacc aaggtgatgt 5820

[0376]

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gcgcaccttc tacgcgcgtc tgaacgtgaa caactggaac gcagacgata tcgaatgggt	6240
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cgttgtagtt aaagataact acatctatta tatgttcggc ggcgaagacc acttcaaccc	6360
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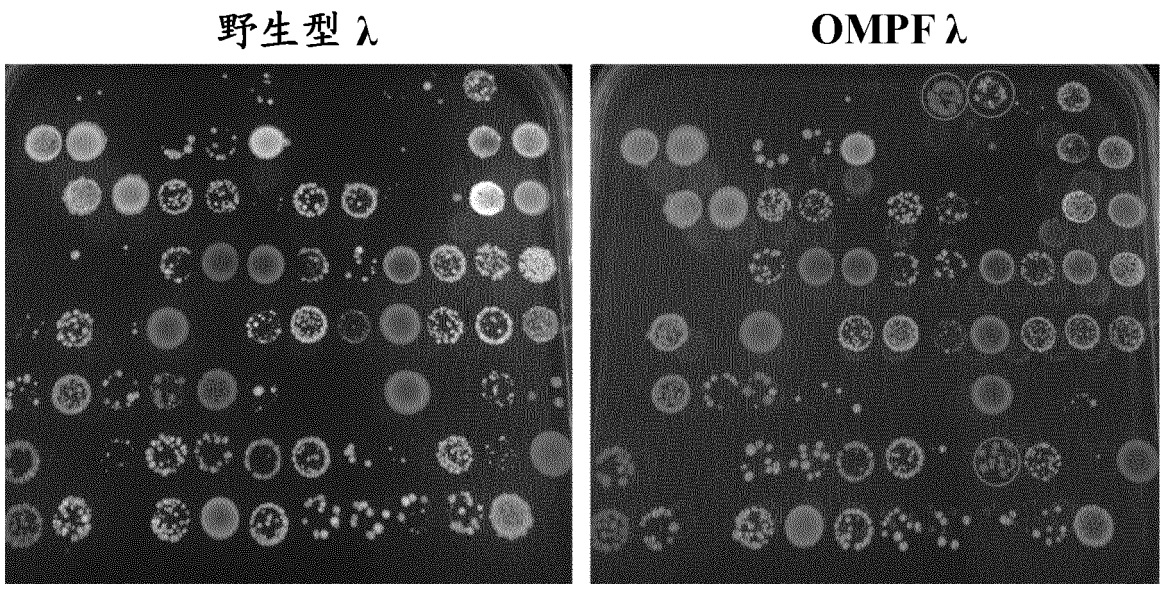


图 1

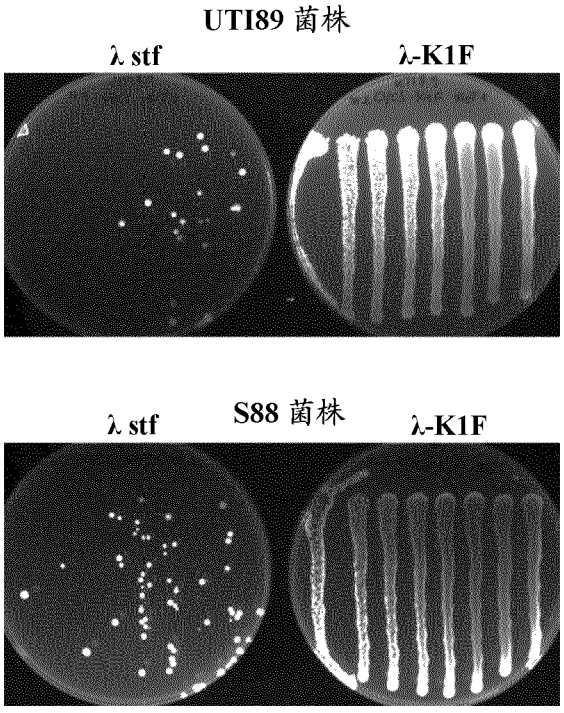


图 2

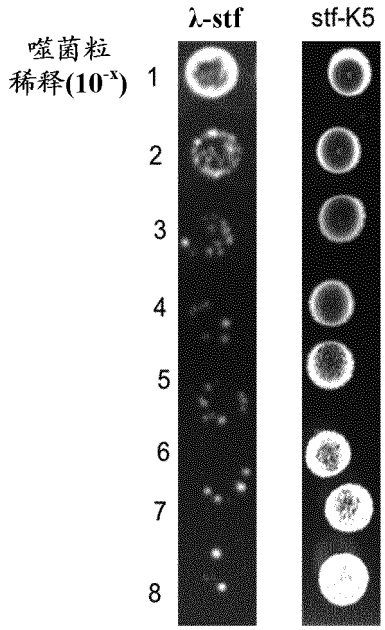


图 3

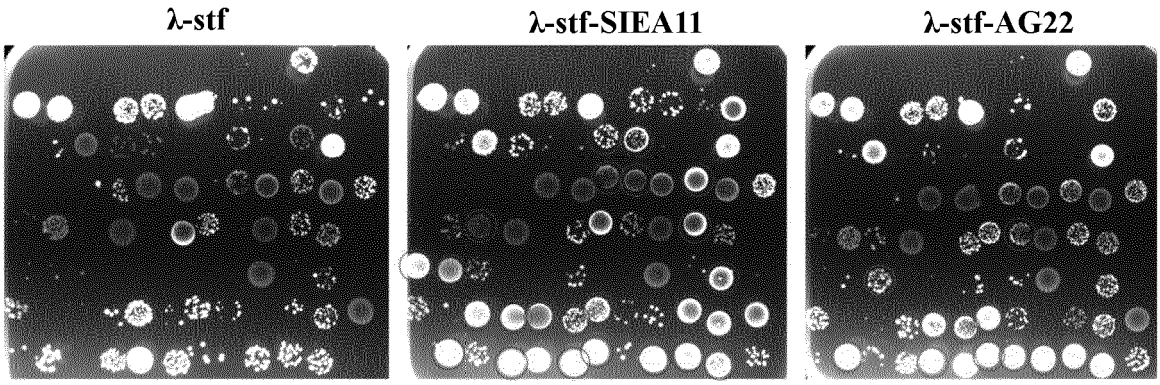


图 4

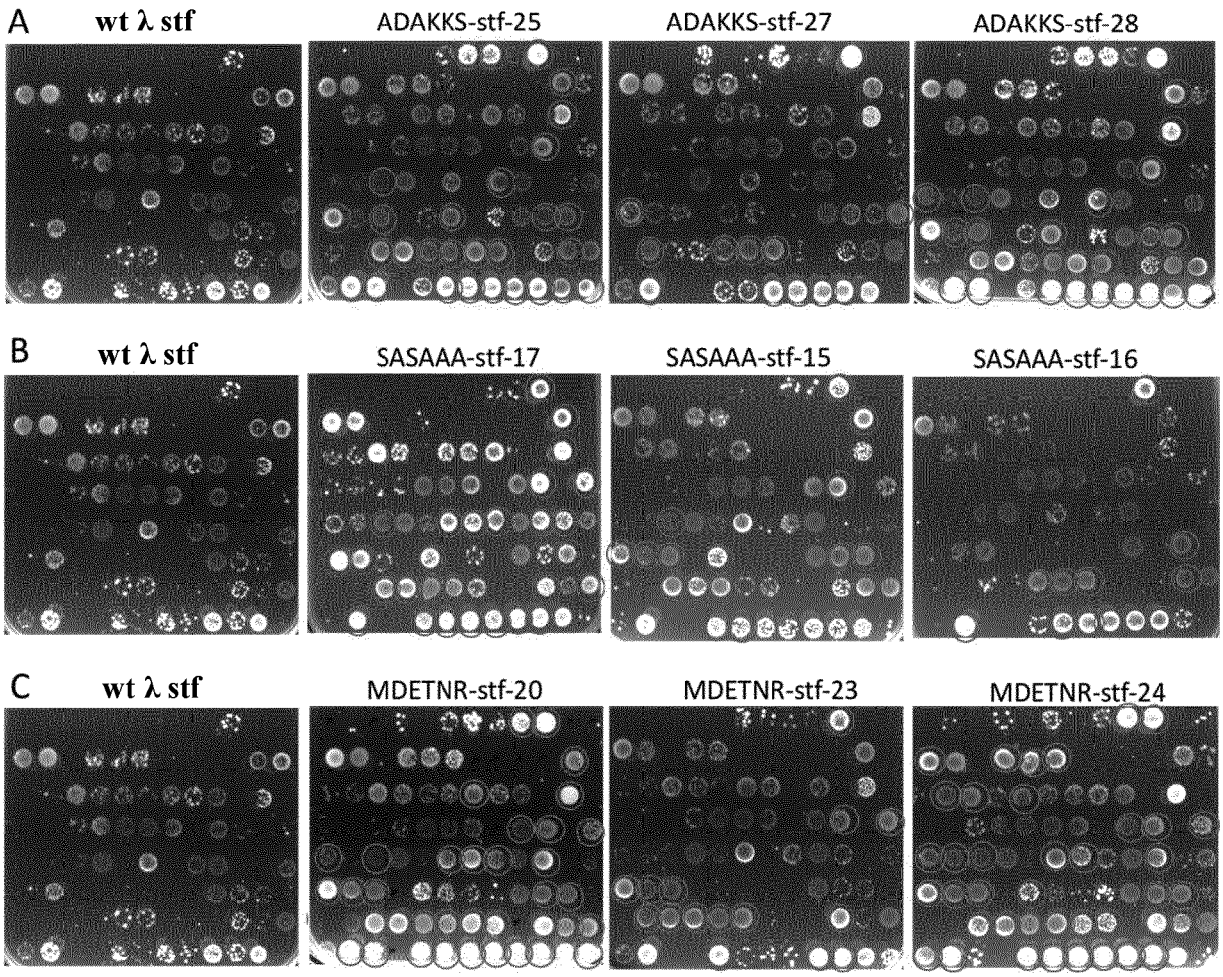

A
wt λ stf
ADAKKS-stf-25
ADAKKS-stf-27
ADAKKS-stf-28
B
wt λ stf
SASAAA-stf-17
SASAAA-stf-15
SASAAA-stf-16
C
wt λ stf
MDETNR-stf-20
MDETNR-stf-23
MDETNR-stf-24

图 5

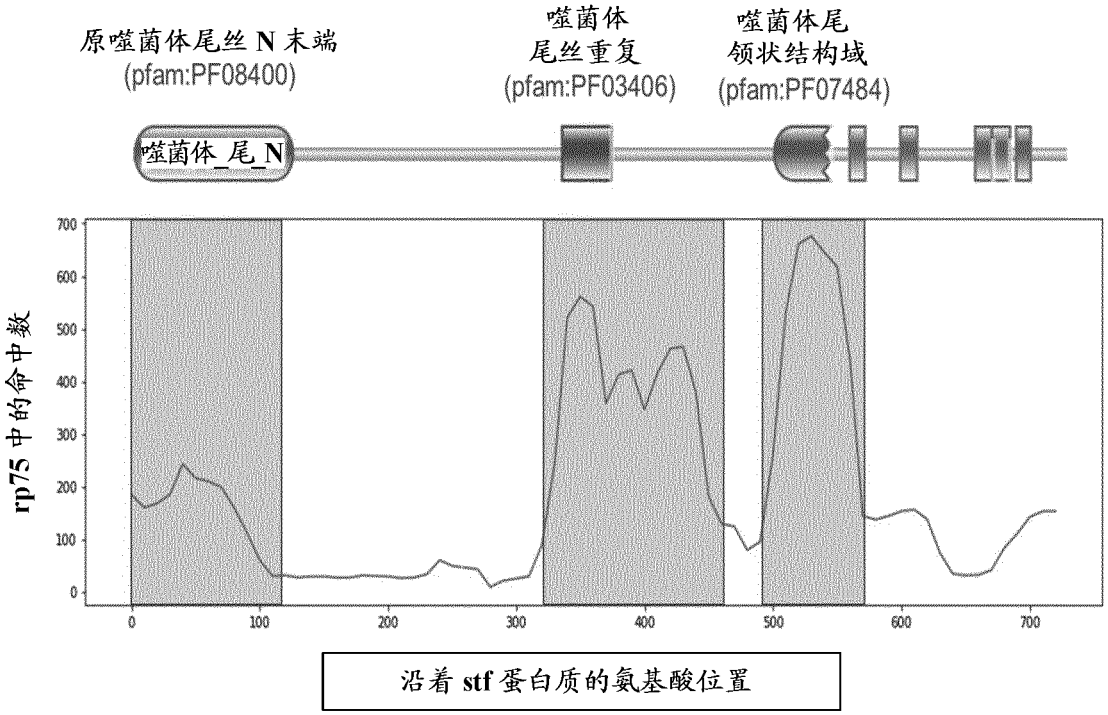

原噬菌体尾丝 N 末端
(pfam:PF08400)
噬菌体
尾丝重复
(pfam:PF03406)
噬菌体尾
领状结构域
(pfam:PF07484)
噬菌体_尾_N
rp75 中的命中数
沿着 stf 蛋白质的氨基酸位置

图 6

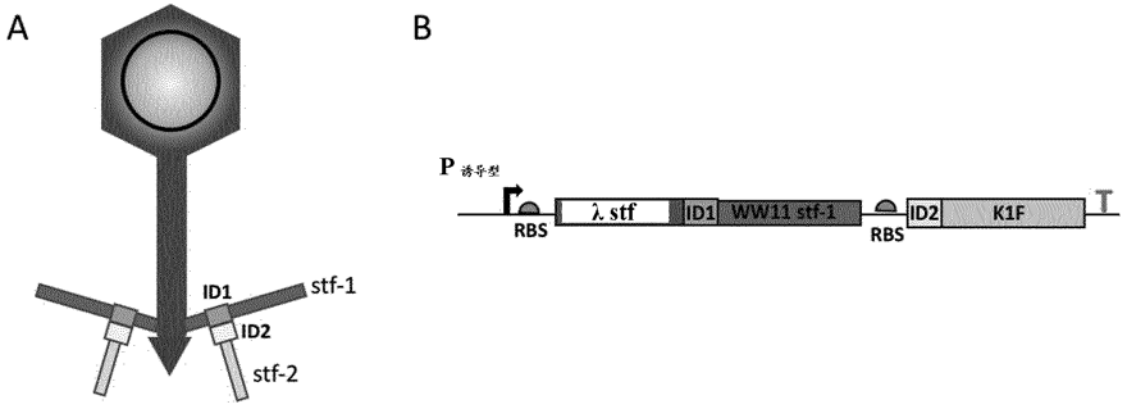

A
ID1
stf-1
ID2
stf-2
B
P 诱导型
RBS
λ stf
ID1
WW11 stf-1
RBS
ID2
K1F
T

图 7A-B

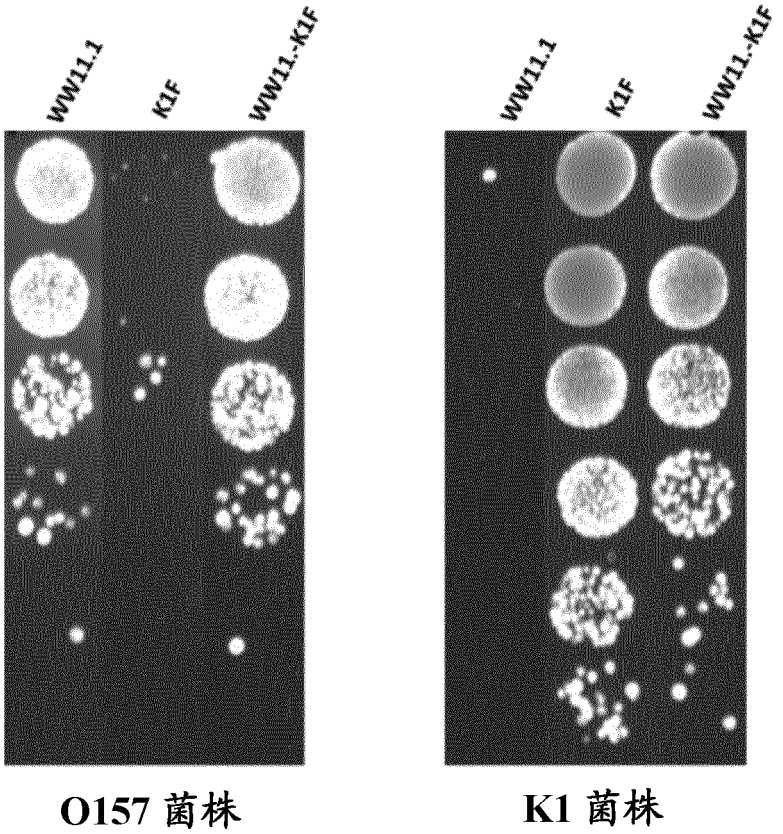


图 8

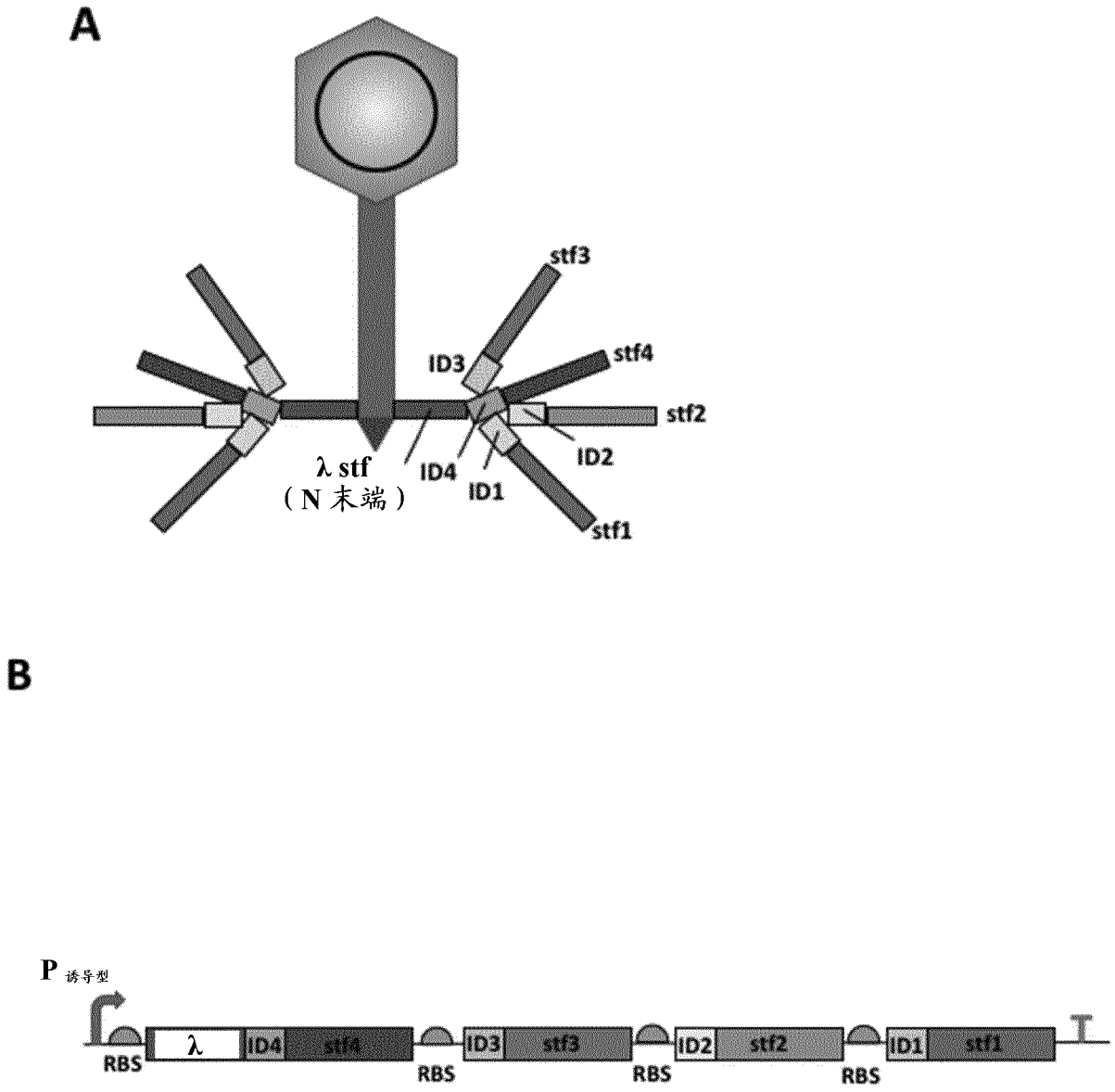

A
stf3
ID3
stf4
stf2
ID2
λ stf
（N 末端）
ID4
ID1
stf1
B
P 诱导型
RBS
λ
ID4
stf4
RBS
ID3
stf3
RBS
ID2
stf2
RBS
ID1
stf1

图 9

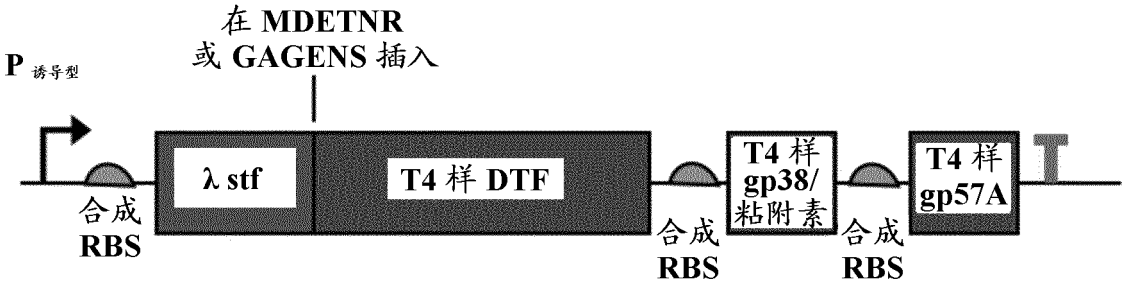

在 MDETNR
或 GAGENS 插入
P 诱导型
λ stf
T4 样 DTF
T4 样
gp38/
粘附素
T4 样
gp57A
合成
RBS
合成
RBS
合成
RBS

图 10

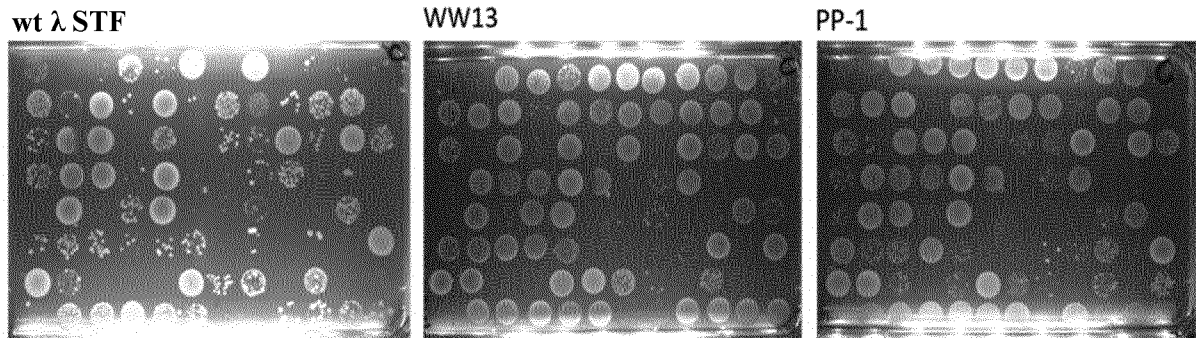

wt λ STF
WW13
PP-1

图 11

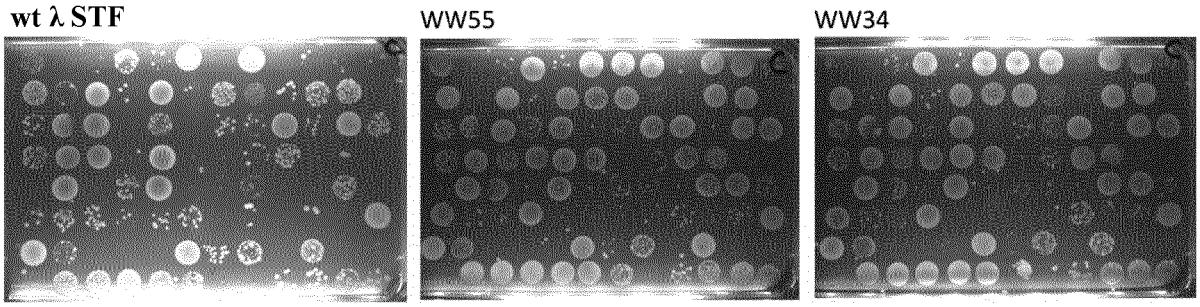

wt λ STF
WW55
WW34

图 12

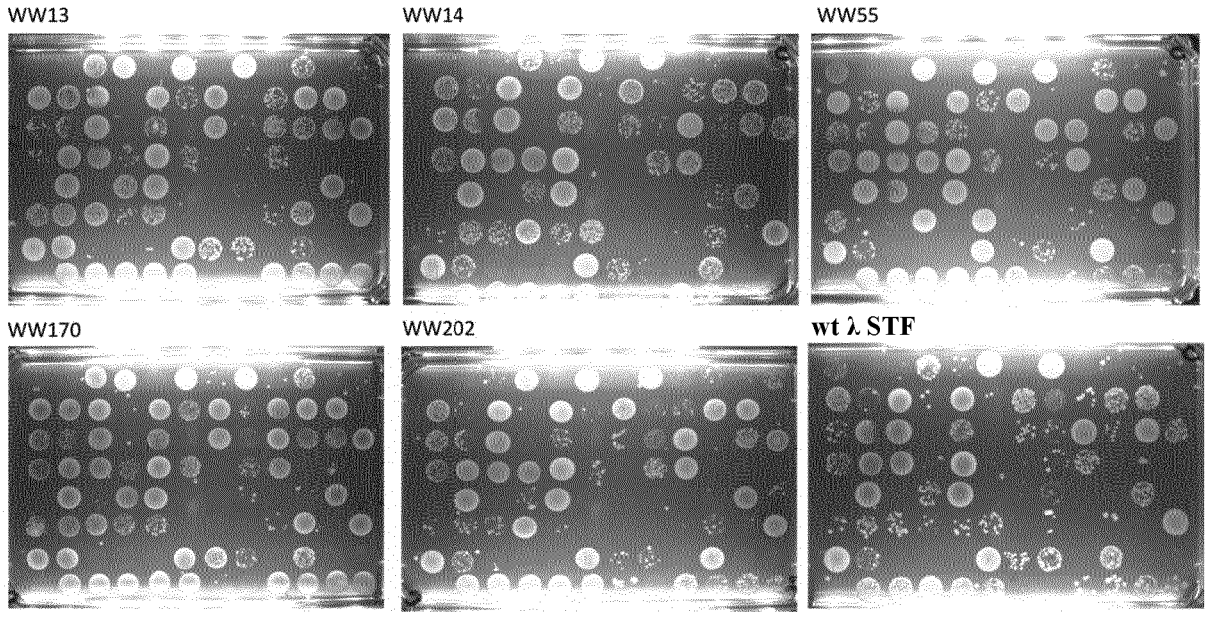

WW13
WW14
WW55
WW170
WW202
wt λ STF

图 13

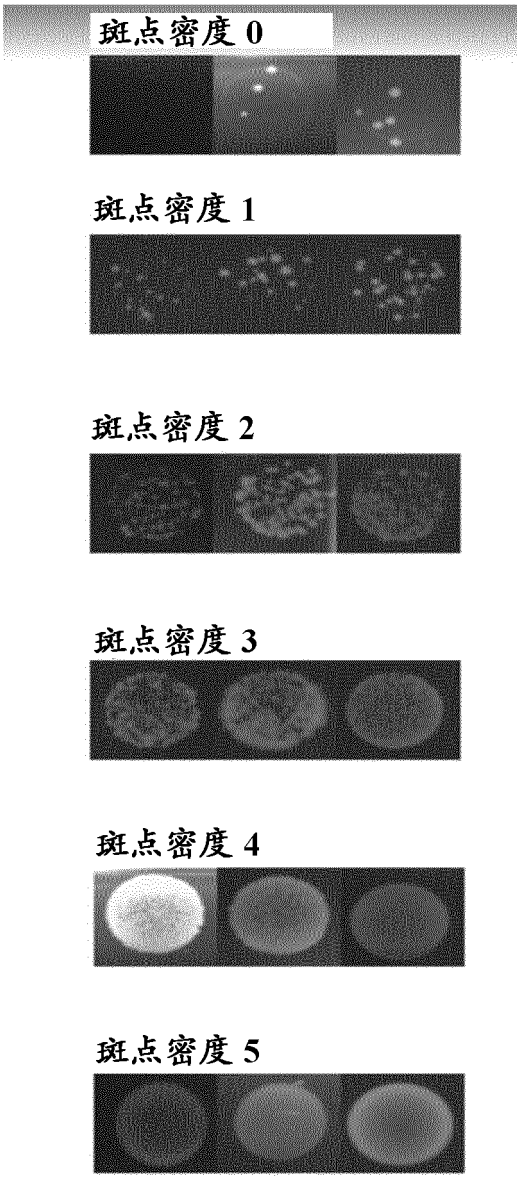


图 14

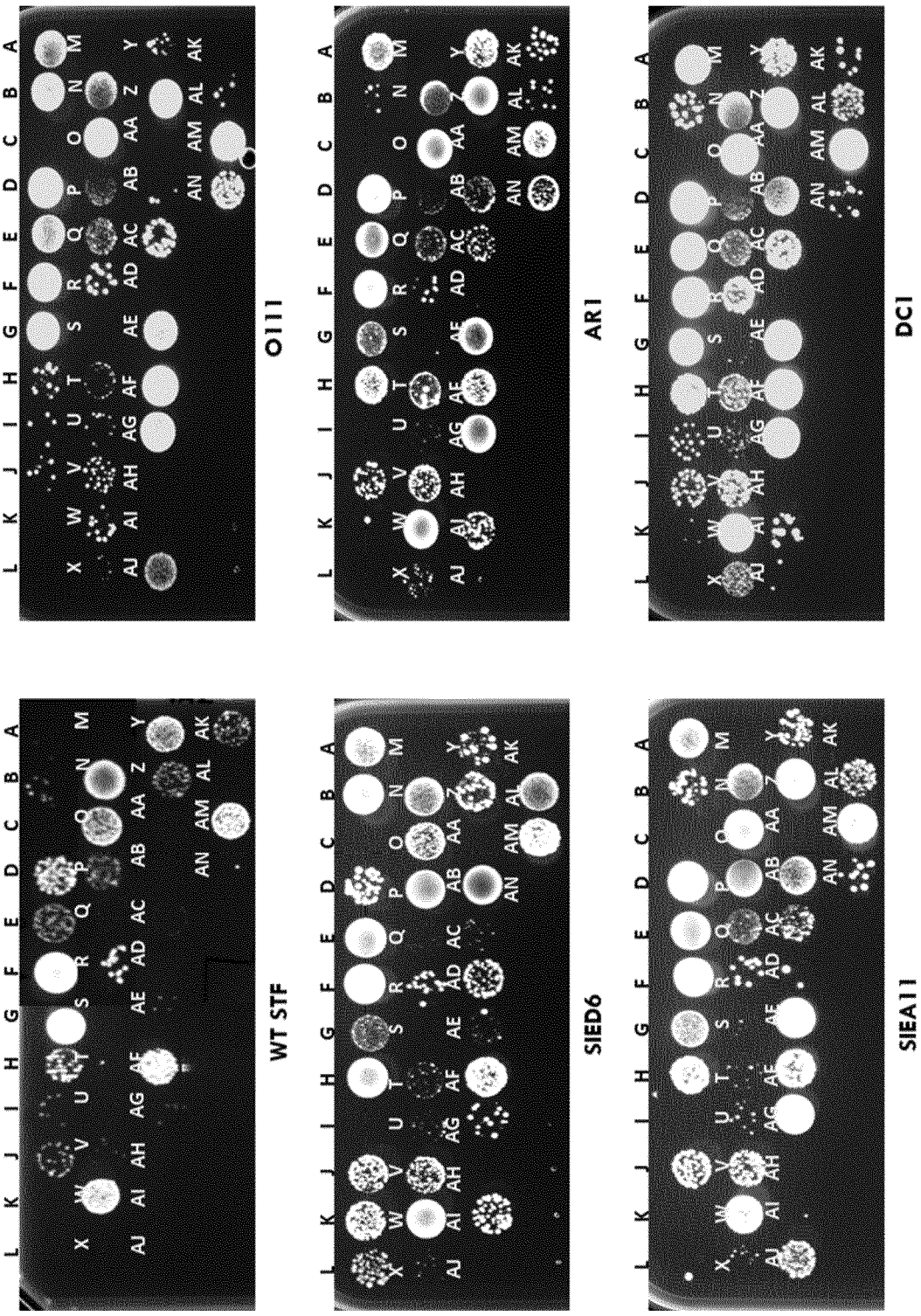


图 15

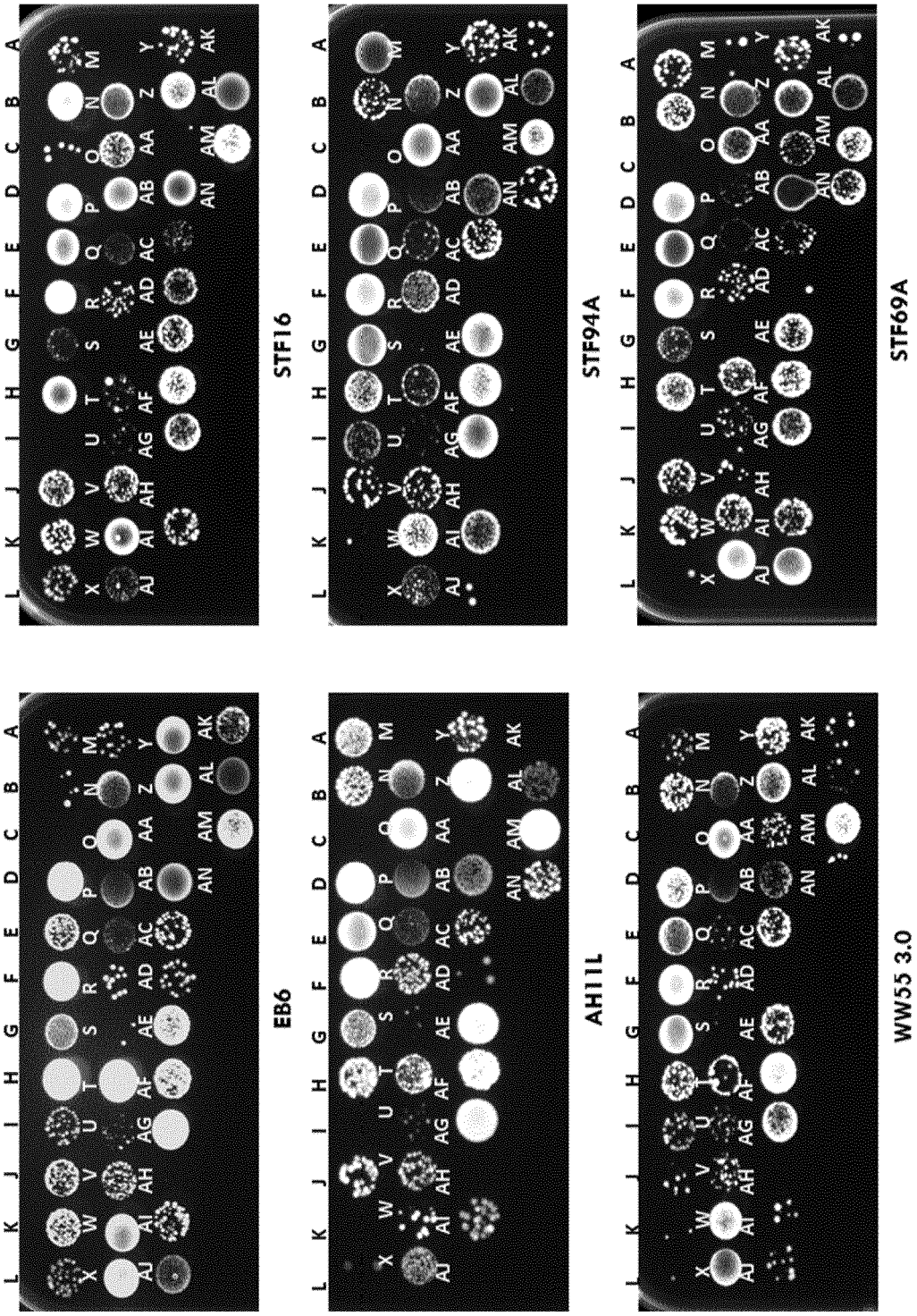


图 15(续)

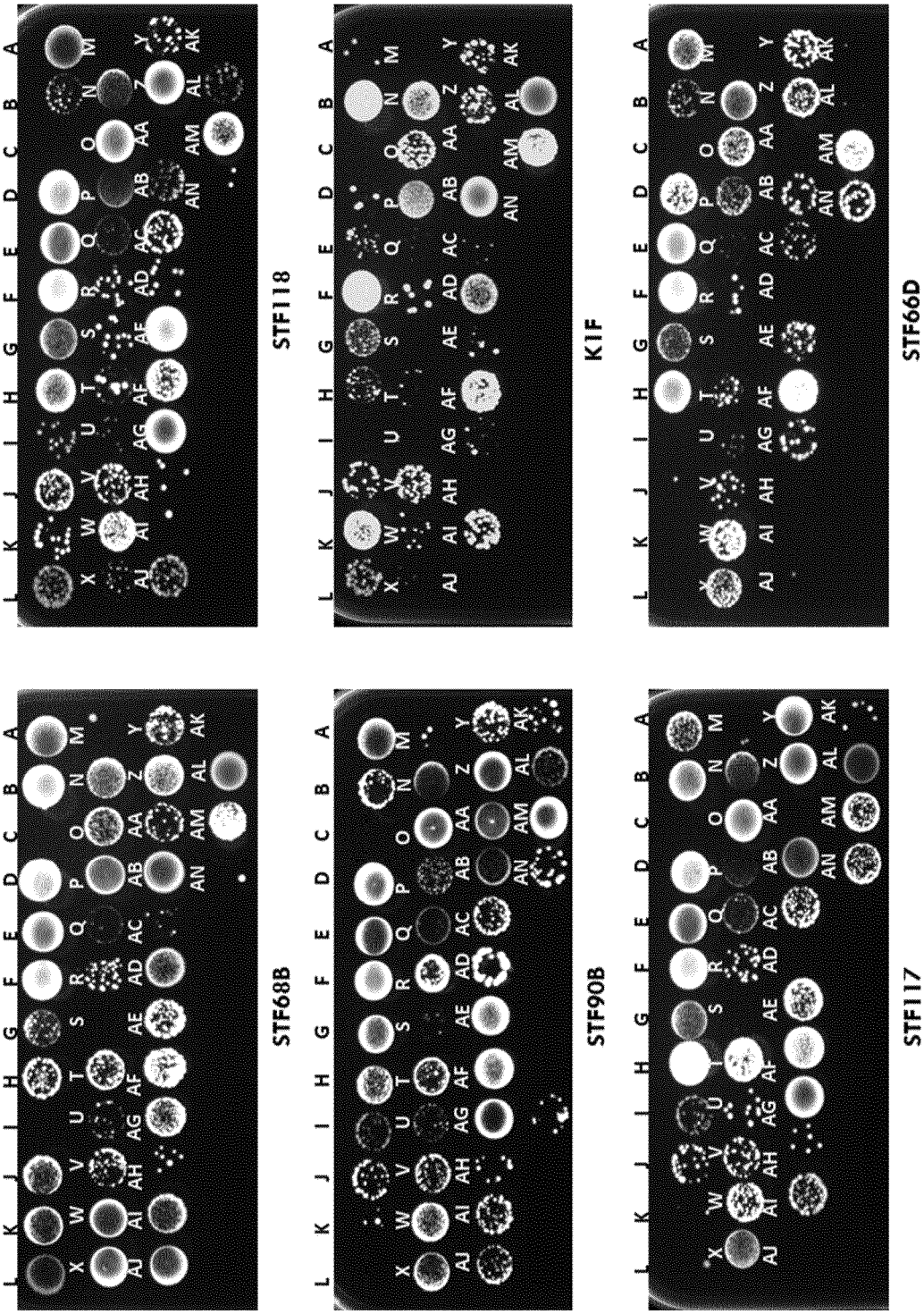


图 15(续)

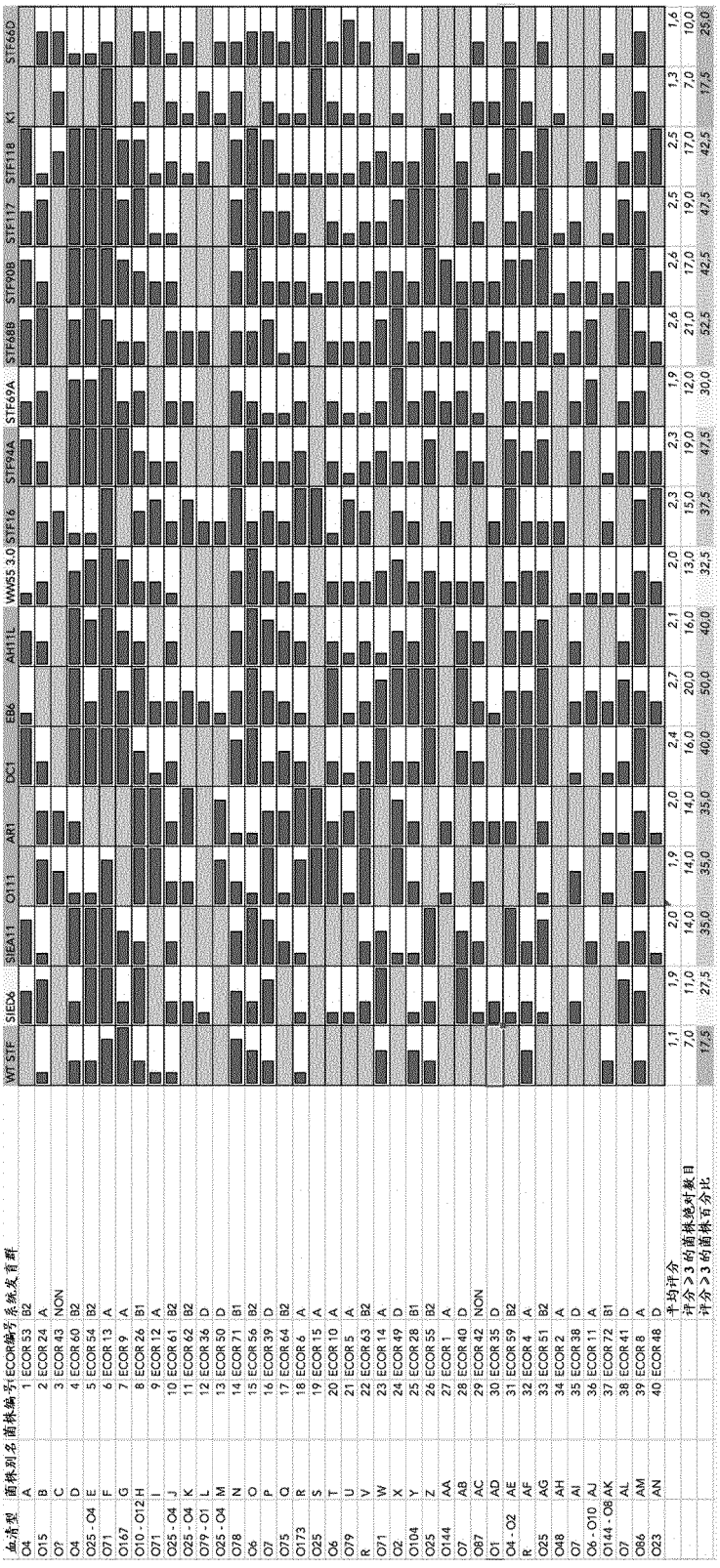

血清型 菌株别名 菌株编号 ECOR编号 系统发育群
O4 A 1 ECOR 53 B2
O15 B 2 ECOR 24 A
O7 C 3 ECOR 43 NON
O4 D 4 ECOR 60 B2
O25 - O4 E 5 ECOR 54 B2
O71 F 6 ECOR 13 A
O167 G 7 ECOR 9 A
O10 - O12 H 8 ECOR 26 B1
O71 I 9 ECOR 12 A
O25 - O4 J 10 ECOR 61 B2
O25 - O4 K 11 ECOR 62 B2
O79 - O1 L 12 ECOR 36 D
O25 - O4 M 13 ECOR 50 D
O78 N 14 ECOR 71 B1
O6 O 15 ECOR 56 B2
O7 P 16 ECOR 39 D
O75 Q 17 ECOR 64 B2
O173 R 18 ECOR 6 A
O25 S 19 ECOR 15 A
O6 T 20 ECOR 10 A
O79 U 21 ECOR 5 A
R V 22 ECOR 63 B2
O71 W 23 ECOR 14 A
O2 X 24 ECOR 49 D
O104 Y 25 ECOR 28 B1
O25 Z 26 ECOR 55 B2
O144 AA 27 ECOR 1 A
O7 AB 28 ECOR 40 D
O87 AC 29 ECOR 42 NON
O1 AD 30 ECOR 35 D
O4 - O2 AE 31 ECOR 59 B2
R AF 32 ECOR 4 A
O25 AG 33 ECOR 51 B2
O48 AH 34 ECOR 2 A
O7 AI 35 ECOR 38 D
O6 - O10 AJ 36 ECOR 11 A
O144 - O8 AK 37 ECOR 72 B1
O7 AL 38 ECOR 41 D
O86 AM 39 ECOR 8 A
O23 AN 40 ECOR 48 D
WT STF SIEA6 SIEA11 O111 AR1 DC1 EB6 AH11L WW55 3.0 STF16 STF94A STF69A STF68B STF90B STF117 STF118 K1 STF66D
1,1 1,9 2,0 1,9 2,0 2,4 2,7 2,1 2,0 2,3 2,3 1,9 2,6 2,6 2,5 2,5 1,3 1,6
7,0 11,0 14,0 14,0 14,0 16,0 20,0 16,0 13,0 15,0 19,0 12,0 21,0 17,0 19,0 17,0 7,0 10,0
17,5 27,5 35,0 35,0 35,0 40,0 50,0 40,0 32,5 37,5 47,5 30,0 52,5 42,5 47,5 42,5 17,5 25,0
半均评分
评分≥3的菌株绝对数目
评分≥3的菌株百分比

图 16