[19]中华人民共和国国家知识产权局

[51]Int. Cl[7]
C12N 9/00
C12N 9/02 C12N 9/04
C12N 9/10

[12]发明专利申请公开说明书

[21]申请号 99814291.3

[43]公开日 2002年1月2日

[11]公开号 CN 1329663A

[22]申请日 1999.10.6 [21]申请号 99814291.3

[30]优先权

[32]1998.10.9 [33]US [31]09/169789

[32]1999.7.14 [33]US [31]60/143811

[86]国际申请 PCT/NZ99/00168 1999.10.6

[87]国际公布 WO00/22099 英 2000.4.20

[85]进入国家阶段日期 2001.6.8

[71]申请人 吉尼西斯研究及发展有限公司

地址 新西兰奥克兰

共同申请人 弗莱彻·查仁茨·福雷斯特斯有限公司

[72]发明人 L·N·布洛克斯博格

I·J·哈乌卡拉

[74]专利代理机构 中国专利代理(香港)有限公司

代理人 张广育 谭明胜

权利要求书2页 说明书193页 附图页数5页

[54]发明名称 改变植物木质素含量的材料和方法

[57]摘要

提供了与木质素生物合成途径相关的新型分离多核苷酸和多肽,以 及包括所述序列的结构。还披露了用于在目标生物中改变木质素含量、木质素结构和木质素组成的方法,该方法包括将本发明的一种或多种多 核苷酸整合到目标生物的基因组中。

ISSN 1008-4274

知识产权出版社出版

权利要求书

1.一种分离的多核苷酸，包括选自下列一组的核苷酸序列：（1）序列 89-266 和 350-375 所示序列；（2）序列 89-266 和 350-375 所示序列的互补物；（3）序列 89-266 和 350-375 所示序列的反向互补物；（4）序列 89-266 和 350-375 所示序列的反向序列；（5）与上述（1）-（4）所示序列相比，所产生的预期（E）值为 0.01 或更低的核苷酸序列；（6）与上述（1）-（4）所示核苷酸序列的相同性至少为 50%的核苷酸序列；（7）在严格杂交条件下，能与上述（1）-（4）所示序列杂交的核苷酸序列；（8）作为上述（1）-（4）所示序列的 200-聚体的核苷酸序列；（9）作为上述（1）-（4）所示序列的 100-聚体的核苷酸序列；（10）作为上述（1）-（4）所示序列的 40-聚体的核苷酸序列；（11）作为上述（1）-（4）所示序列的 20-聚体的核苷酸序列；（12）作为上述（1）-（4）所示序列的简并性等同物的核苷酸序列；和（13）作为上述（1）-（4）所示序列的等位变体的核苷酸序列。

2.一种分离的寡核苷酸探针或引物，含有与权利要求 1 所述核苷酸序列的 10 个连续残基互补的至少 10 个连续的残基。

3.一种包括权利要求 2 的多种寡核苷酸探针或引物的试剂盒。

4.一种在它上面记录了多种多核苷酸的储存介质，至少有一种多核苷酸包括权利要求 1 或 2 所示的核苷酸序列。

5.一种包括权利要求 1 的多核苷酸的结构。

6.一种含有权利要求 5 所述结构的转基因细胞。

7.一种结构，沿 5’-3’方向包括：

（a）基因启动子序列；

（b）多核苷酸序列，至少包括下列一种：（1）编码由权利要求 1 的核苷酸序列所编码的多肽的至少一个功能性部分的多核苷酸；和（2）包括编码由选自权利要求 1 所示一组序列的核苷酸序列所编码的多肽的基因的非编码区的多核苷酸；和

（c）基因终止序列。

8.如权利要求 7 的结构，其中，所述多核苷酸为有义方向。

9.如权利要求 7 的结构，其中，所述多核苷酸为反义方向。

10.如权利要求 7 的结构，其中，所述基因启动子序列在植物宿主中是有功能的，以便在木质部进行转录。

11.一种含有权利要求7结构的转基因植物细胞。

12.一种含有权利要求11所述的转基因植物细胞的植物或其部分或繁殖体或后代。

13.一种改变植物木质素含量、木质素组成和木质素结构中的一种或多种的方法，包括将权利要求1的多核苷酸稳定地整合到该植物的基因组中。

14.如权利要求20的方法，其中，所述植物选自桉树和松树。

15.如权利要求20的方法，包括将权利要求7的结构稳定地整合到所述植物的基因组中。

16.一种用于生产具有改变了的木质素含量、改变了的木质素组成和改变了的木质素结构中的一种或多种的植物的方法，包括：

（a）用权利要求7的结构转化植物细胞，以便提供转基因细胞；和

（b）在有利于再生和成熟植物生长的条件下培养所述转基因细胞。

17.一种改变与植物中木质素生物合成途径相关的多肽活性的方法，包括将权利要求7的结构稳定地整合到该植物的基因组中。

18.一种分离的多肽，包括选自下列一组的氨基酸序列：

（a）序列267-349和376-401的序列；

（b）与（a）的序列至少具有50%的相同性的序列；与（a）的序列至少具有70%的相同性的序列；与（a）的序列至少具有90%的相同性的序列。

19.一种分离的多肽，由权利要求1的分离的多核苷酸序列编码。

说　　明　　书

改变植物木质素含量的材料和方法

技术领域

本发明涉及被认为是新型的多核苷酸，包括部分序列和延长的序列以及探针和引物，含有所述多核苷酸的结构，含有所述多核苷酸的生物材料（包括植物、微生物和多细胞生物），由所述多核苷酸编码的多肽，以及使用所述多核苷酸和多肽的方法。更具体地讲，本发明涉及在包括植物的生物材料中改变木质素含量和组成，涉及与木质素生物合成途径相关的多肽，并涉及编码所述酶的多核苷酸。

发明背景

木质素是一种不溶性聚合物，它主要是决定植物茎干的硬度。具体地讲，木质素在某些植物细胞的多糖成分周围起着基质作用。木质素的含量越高，植物的硬度越大。例如，树木能合成大量的木质素，木质素占木材干重的20%-30%。除了产生硬度之外，木质素还通过使得细胞壁疏水和不渗透水而有助于水分在植物内部的运输。木质素还通过阻止致病剂的穿透和繁殖，在植物抗病性方面起着作用。

树木中高浓度的木质素在造纸业中造成了很大的问题，其中，相当多的资源必须用于从造纸所需的纤维素纤维中分离木质素。常用于除去木质素的方法，要花费大量的能量和化合物，导致成本的增加和产生大量不需要的废物。仅在美国，每年就要从木材中除去大约2000万吨的木质素。

木质素主要决定饲料作物的可消化性，植物木质素含量的小的增加，就会导致可消化性的相当高的降低。例如，具有较低木质素含量的作物能够为牲畜提供更有效的饲料，相对所消耗的饲料作物量而言，奶和肉的产量较高。在正常植物生长中，干物质重量的增加伴随着可消化性的相应降低。在决定饲料作物的最佳收获时间时，农民必须在高产的具有较差可消化性的材料，和较低产量的具有较高可消化性材料之间进行选择。

对某些用途来说，木质素含量的增加是理想的，因为增加植物木质素的含量可导致木材机械强度的增强，改变其颜色并增加抗腐能力。菌根类的组成和含量通过改变木质素的含量和结构组成也有利于操作。

如下面所要详细讨论的，木质素是通过至少三种不同的单木纤维醇聚合形成的，所述木质素是在多步骤的途径中合成的，该途径中的每一个步骤是由不同的酶催化的。业已证实，控制编码某些酶，如肉桂基醇脱氢酶（CAD）和咖啡酸3-O-甲基转移酶（COMT）的基因的拷贝数，会导致木质素产量的改变；例如，参见US5,451,514和PCT公开号WO94/23044。另外，业已证实编码CAD的序列在白杨中的反义表达，会导致具有改变了的组成的木质素的产生（Grand C等，植物（柏林）163：232-237（1985））。

尽管业已分离了某些植物种的编码与木质素生物合成途径相关的某些酶的多核苷酸，但尚未鉴定多种植物中编码多种酶的基因。因此，本领域仍然需要可用于改变植物木质素含量和组成的材料，以及使用该材料的方法。

发明概述

简单地讲，本发明提供了所附序列表中序列1-266和35-375所示的分离的多核苷酸，所述序列的变体，含有所述序列的结构，含有序列1-266和350-375的序列的延长序列，及其变体，与序列1-266、350-375所示序列相应的探针和引物及其变体，以及至少含有序列1-266和350-375所示多种多核苷酸的特定数量连续残基的多核苷酸（x-聚体），以上这些在本文中统称为“本发明的多核苷酸”。本发明的多核苷酸优选可从桉树和松树中获得，并优选编码与木质素生物合成途径相关的酶。提供了含有所述序列的结构，使用所述序列和结构的方法，以及生物材料，包括具有改变了的基因组和/或木质素含量和组成的植物细胞和植物。本发明还提供了所附序列表中序列267-349和376-401所示的分离的多肽序列；所述序列的多肽变体；以及含有所述多肽序列及所述序列变体的多肽。

一方面，本发明提供了编码以下酶或以下酶的部分的分离的多核苷酸：肉桂酸4-羟化酶（C4H），香豆酸3-羟化酶（C3H），酚酶（PNL），O-甲基转移酶（OMT），肉桂基醇脱氢酶（CAD），肉桂酰-辅酶A还原酶（CCR），苯丙氨酸氨裂解酶（PAL），4-香豆酸：辅酶A连接酶（4CL），松柏醇葡糖基转移酶（CGT），松柏苷β-葡糖苷酶（CBG），漆酶（LAC），过氧化物酶（POX），阿魏酸-5-羟化酶（F5H），α淀粉酶，咖啡酸甲基转移酶，咖啡酰辅酶A甲基转移酶，香豆酸6A连接

酶，细胞色素 P450 LXX1A，联苯酚氧化酶，黄酮醇葡糖基转移酶，类黄酮羟化酶，和异黄酮还原酶。

在一种实施方案中，本发明的多核苷酸包括含有选自下列一组的核苷酸序列的多核苷酸：（a）序列 1-266 和 350-375 所示多核苷酸；（b）序列 1-266 和 350-375 所示多核苷酸的互补物；（c）序列 1-266 和 350-375 所示序列的反向互补物；（d）序列 1-266 和 350-375 所示序列的反向序列；和（e）序列 1-266 和 350-375 所示多核苷酸的变体。在本发明的另一种实施方案中，多核苷酸至少包括序列 1-266 和 350-375 的多种多核苷酸的特定数量的连续残基（x-聚体）。在另一方面，多核苷酸包括相应于序列 1-266 和 350-375 的多种多核苷酸的探针和引物。

另一方面，本发明提供了含有本发明多核苷酸的结构，所述多核苷酸是独立的或者与一种或多种本发明序列组合，或者与一种或多种已知多核苷酸组合；同时，还提供了含有所述结构的宿主细胞和转基因细胞。

在一个有关方面，本发明提供了沿 5’-3’方向包括基因启动子序列；编码由本发明的多核苷酸编码的酶的至少一个功能性部分的开放读框；和基因终止序列的结构。开放读框可以沿有义和反义方向取向。还提供了包括由上述多核苷酸编码的酶的编码基因的非编码区或与非编码区互补的多核苷酸，以及基因启动子序列和基因终止序列的 DNA 结构。所述基因启动子和终止序列优选在诸如植物细胞的宿主细胞中有功能，所述基因启动子和终止序列最优选是原始酶基因的启动子和终止序列，不过，其他本领域常用的，如花椰菜花叶病毒（CMV）启动子，有或没有增强子，如 Kozak 序列或Ω增强子，以及根癌农杆菌胭脂氨酸合成酶终止子也可被用于本发明。为了在一种或多种需要的组织中进行定向表达，可以采用组织专一性启动子。在一种优选实施方案中，所述基因启动子序列可以在木质部转录。所述结构还可以包括鉴定转化细胞的标记。

在另一方面，提供了转基因细胞，如含有本发明结构的转基因植物细胞，还提供了含有所述转基因细胞的植物以及所述植物的果实和种子。

另一方面，提供了改变诸如植物的目标生物的木质素含量和组成的方法，所述方法包括将含有本发明多核苷酸的结构稳定地整合到目标植

物的基因组中。在一种优选实施方案中，所述目标植物是木本植物，优选选自桉树和松树，最优选选自巨桉（*Eucalyptus grandis*）和辐射松（*Pinus radiata*）。在相关方面，提供了用于生产具有改变了的木质素含量的植物的方法，该方法包括用含有本发明多核苷酸的结构转化植物细胞，以便提供转基因细胞，并在有利于再生和成熟植物生长的条件下培养所述转基因细胞。

另一方面，本发明提供了用于改变诸如植物的目标生物中一种酶的活性的方法，包括将本发明的结构稳定地整合到所述目标生物的基因组中。在一种优选实施方案中，所述目标植物是木本植物，优选选自桉树和松树，最优选选自巨桉和辐射松。本发明还提供了含有序列 267-349, 376-401 所示分离的多肽的多肽，以及所述多肽的变体。

<u>附图的简要说明</u>

通过结合附图阅读下面的更详细的说明可以了解本发明的上述特征和其他特征，以及获得这些特征的方法，并能最好地理解本发明。

图 1 是木质素生物合成途径的示意图。

图 2 是来自烟草植物的基因组 DNA 样品，所述植物是在标记实验中用来自松属的单一序列识别物（左图）和来自桉属的单一序列识别物（右图）产生的。在以上两幅图中，泳道 A 和 B 含有来自用空载体转化的对照植物的 DNA 样品，泳道 C-E 含有来自用单一序列识别物转化的植物的 DNA 样品。

图 3 表示在转化的烟草植物中检测松属单一序列识别物。泳道 A 和 B 表示来自序列 402 的探针与缺乏所述松属单一序列识别物的烟草植物（空载体转化的对照植物）的基因组 DNA 的杂交。泳道 C-E 表示所述探针与含有 1-3 个拷贝的松属单一序列识别物的烟草植物的基因组 DNA 杂交。

图 4 表示在转化的烟草植物中检测桉属单一序列识别物。泳道 A 和 B 表示来自序列 403 的探针与缺乏所述桉属单一序列识别物的烟草植物（空载体转化的对照植物）的基因组 DNA 的杂交。泳道 C-E 表示所述探针与含有 1-2 个拷贝的桉属单一序列识别物的烟草植物的基因组 DNA 杂交。

图 5 表示存在于用本发明的有义和反义遗传结构转化过的烟草植物中的可提取木质素量，以野生型木质素含量的百分比形式表示。

详细说明

木质素是由至少三种不同的单木质醇聚合而成的，主要是对-香豆醇、松柏醇和芥子醇。尽管这三种类型的木质醇亚基是众所周知的，但在各种植物的木质素生物合成途径中有可能出现所述亚基的略有不同的变体。在不同的植物种之间以及在同一物种之内，木质素中所述残基的相对浓度不同。另外，在特定植物的不同组织之间，木质素的组成也会改变。以上三种单木质醇是在多步骤的过程中由苯丙氨酸产生，被认为是通过自由基机制聚合成木质素。

图 1 表示松柏醇生物合成途径的不同步骤以及负责催化每一步的酶。对-香豆醇和芥子醇是通过类似途径合成的。首先通过苯丙氨酸氨裂解酶（PAL）使苯丙氨酸脱氨，以便得到肉桂酸，然后由肉桂酸 4-羟化酶（C4H）对肉桂酸进行羟化，以便形成对-香豆酸。由香豆酸 3-羟化酶将对-香豆酸羟化成咖啡酸。然后由 O-甲基转移酶（OMT）对新加上去的羟基进行甲基化，以便得到阿魏酸，阿魏酸通过 4-香豆酸:辅酶 A 连接酶（4CL）与辅酶 A 缀合，形成阿魏酰辅酶 A。通过肉桂酰辅酶 A 还原酶（CCR）催化将阿魏酰辅酶 A 还原成松柏醛。在肉桂基醇脱氢酶（CAD）的作用下，将阿魏酰辅酶 A 进一步还原成松柏醇，然后将其转化成葡糖基化形式，以便通过松柏醇葡糖基转移酶（CGT）从细胞质中外泌到细胞壁中。在外泌之后，在松柏苷β-葡糖苷酶（CBG）的作用下获得松柏醇的脱葡糖基化形式。最后，在酚酶（PNL）、漆酶（LAC）和过氧化物酶（POX）的作用下将三种单木质醇聚合成木质素。

芥子醇的形成还涉及到另一种酶——阿魏酸-5-羟化酶（F5H）。为了更详细地了解木质素生物合成途径，可以参见 Whetton R 和 Sederoff R.植物细胞，7：1001-1013，1995。

已知植物木质素含量的定量和定性改变受诸如光线刺激，低钙含量和机械胁迫的外部因素的诱导。还可以通过病原体感染诱导新型木质素的形成，有时是在正常情况下不木质化的组织中形成。除了木质素之外，若干其他类型的植物产品也是由苯丙氨酸产生的，包括类黄酮、香豆素、芪和苯甲酸衍生物，所有这些化合物合成的第一步都相同。因此，改变与木质素生物合成途径有关的 PAL、C4H、4CL 和其他酶的作用，可以影响除木质素之外的其他产物的合成。

使用本发明的方法和材料，通过改变本发明多核苷酸的表达或通过改变由多核苷酸编码的多肽或改变所述多核苷酸可以改变植物的木质素含量。例如，可以通过将编码与木质素生物合成途径相关的酶的基因的额外的拷贝整合到目标植物基因组中，改变诸如植物的目标生物的木质素含量。类似地，通过用所述基因的反义拷贝转化所述目标植物，可以实现木质素含量的改变。另外，可以操纵编码木质素生物合成途径中不同酶的基因的拷贝数量，改变所合成的每一种单木质醇的相对含量，从而导致具有改变了的组成的木质素的形成。所述木质素组成的改变可能是有利的，例如，在用于纸张的木材加工应用中，并且还能有效改变木质材料对腐霉菌的易感性。

在第一方面，本发明提供了在序列表中序列 1-266 和 250-375 所示分离的多核苷酸序列，所述序列的变体，含有序列 1-266，350-375 所示序列的延长序列及其变体，相应于序列 1-266，350-375 所示序列的探针和引物及其变体，至少含有序列 1-266，350-375 所示多种多核苷酸的特定数量的连续残基的多核苷酸（x-聚体），以及含有序列 1-266，350-375 所示序列的部分的延长序列，以上所有序列在本文中被统称为“本发明的多核苷酸”。本发明还提供了序列表中序列 267-349 和 376-401 所示的分离的多肽，所述序列的多肽变体，以及含有所述分离的多肽序列和所述序列变体的多肽。

本文所披露的多核苷酸源于森林植物资源，即来自巨桉和辐射松。本发明的某些多核苷酸为“部分”序列，就是说它不代表编码一种完整长度多肽的完整长度的基因。所述部分序列可以通过用引物和/或探针以及众所周知的杂交和/或 PCR 技术对各种 DNA 文库进行分析和测序延长。部分序列可以一直延长到编码一种多肽的开放读框、完整长度的多核苷酸和/或基因能够表达一种多肽，或者鉴定到该基因组的其他有用部分为止。所述延长序列（包括完整长度多核苷酸和基因），在所述延长的多核苷酸包括鉴定的序列或其变体或序列 1-266，350-375 之一的鉴定的连续部分（x-聚体），或其变体时，被称为“相应于”序列 1-266，350-375 所示序列之一，或其变体，或序列 1-266，350-375 所示序列的一部分。类似地，可以用序列 1-266 和 350-375 所示 cDNA 序列通过常规方法确定并获得相应于本发明多核苷酸的 RNA 序列、反向序列、互补序列、反义序列等。

序列 1-266 和 350-375 所示的多核苷酸可以包括编码多肽的开放读框（“ORFs”）或部分开放读框。另外，编码多肽的开放读框还可以在相应于序列 1-266 和 350-375 所示序列的延长的或完整长度序列中鉴定。可以用本领域公知技术鉴定开放读框。例如，所述技术包括分析已知起始和终止密码子的位置，根据密码子频率鉴定最有可能的读框等。例如，适于 ORF 分析的工具和软件可以在互联网上获得 http://www.ncbi.nlm.nih.gov/gorf/gorf.html。可以在本发明多核苷酸上鉴定开放读框和部分开放读框。一旦鉴定到部分开放读框，就可以用本领域众所周知的技术对所述部分开放读框部位进行延长，直到鉴定到编码完整开放读框的多核苷酸。因此，可以用本发明的多核苷酸鉴定编码多肽的开放读框。

一旦在本发明的多核苷酸上鉴定到开放读框，即可分离和/或合成所述开放读框。然后，可以构建可以表达的遗传结构，该结构包括所述开放读框和合适的启动子、起始密码子、终止密码子等。可将所述遗传结构导入宿主细胞，以便表达由所述开放读框编码的多肽。合适的宿主细胞可以包括各种原核和真核细胞，包括植物细胞、哺乳动物细胞、细菌细胞、和藻类等。

可以表达由本发明多核苷酸所编码的多肽，并用于各种实验中，以便确定其生物学活性。所述多肽可用于产生抗体，分离相应的相互作用蛋白或其他化合物，并用于定量测定相互作用蛋白或其他化合物的含量。

本发明还涉及调节树木的多核苷酸和/或多肽含量和组成的方法，该方法包括将含有本发明的一种或多种多核苷酸的遗传结构稳定地整合到所述生物的基因组中。在一种实施方案中，目标生物是树木，优选为木本植物，更优选为松属和桉属的木本植物，最优选为巨桉和辐射松。在一个相关方面，提供了用于生产具有改变了的基因型和表现型的树木植物的方法，该方法包括用本发明的遗传结构转化植物细胞，以便提供转基因细胞，并在有利于再生和成熟植物生长的条件下培养所述转基因细胞。本发明还涉及并包括由于改变了本发明多核苷酸或多肽的水平或含量，因而与野生型生物相比具有改变了的基因型或表现型的树木植物，以及所述树木植物的成分（种子等），和所述树木植物的后代。

本发明的分离的多核苷酸还可用于基因组作图、物理作图、和基因

的定位克隆。另外，序列 1-266 和 350-375 所示的多核苷酸序列及其变体还可用于设计寡核苷酸探针和引物。寡核苷酸探针和引物的序列与感兴趣的多核苷酸的特定部分大体上互补。用本发明多核苷酸设计的寡核苷酸探针，可用于在其细胞中具有充分相似的 DNA 和 RNA 的任何生物中检测基因的存在，并检查基因的表达方式，使用本领域公知技术，如狭线印迹 DNA 杂交技术。用本发明多核苷酸设计的寡核苷酸探针可用于 PCR 扩增。用本发明多核苷酸设计的寡核苷酸探针和引物，还可以与各种微阵列技术结合使用，包括由 Synteni 所使用的微阵列技术（Palo Alto，加利弗尼亚）。

本发明的多核苷酸还可用于标记或鉴定一种生物或其繁殖材料。例如，所述标记可以通过将一种非破坏性、无功能的外源多核苷酸识别物稳定地整合到一种生物中。所述多核苷酸含有本发明的一种多核苷酸。

本发明的多肽和编码所述多肽的多核苷酸在植物的木质素和生物合成途径中具有活性。所述多核苷酸是通过 DNA 和多肽相似性检索而推测性鉴定的。业已证实本发明的多核苷酸和多肽与下面的已知与木质素生物合成过程相关的多肽具有相似性:

表 1

多肽身份	多肽序列	多核苷酸序列
肉桂酸 4-羟化酶 (C4H)	2, 3, 17, 48, 49, 92, 124, 125, 153-163	
香豆酸 3-羟化酶 (C3H)	4, 18, 50-52, 93, 101, 126, 127, 149-152	
酚酶(PNL)	5, 35, 36, 81, 116, 183	
O-甲基转移酶 (OMT)	6, 22-25, 53-55, 94, 104-107, 173-175	
肉桂醇脱氢酶 (CAD)	1, 7, 30, 71, 95, 112, 164	
肉桂酰-辅酶 A 还原酶 (CCR)	8, 26-29, 58-70, 96, 108-111, 128-134, 167	
苯丙氨酸氨裂解酶(PAL)	9-11, 16, 45-47, 97, 98, 100, 122, 123, 176 242-248	325-331

多肽身份	多肽序列	多核苷酸序列
4-香豆酸:辅酶 A 连接酶 (4CL)	2, 56-57, 90, 147, 158 265-266	348-349
松柏醇葡糖基转移酶(CGT)	31-33, 72, 113-115, 135, 168	
松柏苷β-葡糖苷酶(CBG)	34, 73-80, 1360141, 165, 166	
漆酶 (LAC)	37-41, 82-84, 117, 118, 142-144, 172	
过氧化物酶(POX)	13, 42-44, 85-89, 91, 119-121, 145, 146, 177-182, 249-250, 264, 350-375	332-333 347, 376-401
阿魏酸-5-羟化酶 (F5H)	19-21, 102, 103, 169-171	
α淀粉酶	184-186	267-269
咖啡酸甲基转移酶	187-192	270-275
咖啡酰辅酶 A 甲基转移酶	193-195	276-278
香豆酸辅酶 A 连接酶	196-200	279-283
细胞色素 P450 LXXIA	201-206	284-289
联酚氧化酶	207-217 251-263	290-300 334-346
黄酮醇葡糖基转移酶	218	301
类黄酮羟化酶	219-233	302-316
异黄酮还原酶	234-241	317-324

在一种实施方案中，本发明的分离的多核苷酸包括选自下列一组的序列：（a）序列 1-266 和 350-375 所示序列；（b）序列 1-266 和 350-375 所示序列的互补物；（c）序列 1-266 和 350-375 所示序列的反向互补物；（d）序列 1-266 和 350-375 所示序列的反向序列；和（e）在本文中所确定的与（a）-（d）的序列或（a）-（d）的序列的特定部位具有至少 50%、75%、90%或 98%相同性的序列。

在另一方面，提供了由本发明的多核苷酸编码的分离的多肽。在一种实施方案中，所述多肽包括序列 267-349 和 376-401 所示的氨基酸序

列，及其变体，以及由本发明的多核苷酸(包括含有序列1-266和350-375所示序列的多核苷酸）所表达的多肽。

另一方面，本发明提供了单独含有、与本发明的一种或多种其他多核苷酸组合、或与一种或多种已知多核苷酸组合的本发明多核苷酸的遗传结构，同时提供了含有所述结构的细胞和目标生物。

在一个相关方面，本发明提供了遗传结构，该结构沿5’-3’方向含有基因启动子序列、编码由本发明的多核苷酸编码的多肽的至少一个功能性部分的开放读框、以及基因终止序列。所述开放读框可以沿有义和反义方向取向。还涉及含有基因启动子序列、本发明多核苷酸、和基因终止序列的遗传结构，以及含有基因启动子序列、本发明多核苷酸的非翻译区、或互补于非翻译区的核苷酸序列、和基因终止序列的遗传结构。所述遗传结构还可以包括用于鉴定转化细胞的标记。

所述基因启动子和终止序列优选在宿主植物中具有功能，最优选是所述宿主植物所固有的。可以使用本领域常用的启动子和终止序列，如花椰菜花叶病毒（CMV）启动子，有或没有增强子，如Kozak序列或Ω增强子，以及根癌农杆菌胭脂氨酸合成酶终止子。为了在一种或多种需要的组织中进行定向表达，可以使用组织专一性启动子。

另一方面，提供了用于生产与天然生物相比具有改变了的多核苷酸或多肽含量的本发明的树木植物的方法。所述方法包括用本发明的遗传结构转化目标树木植物，以便提供转基因细胞，并在有利于再生和成熟植物生长的条件下培养所述转基因细胞。提供了含有本发明遗传结构的细胞，同时提供了含有所述转基因细胞的组织和树木植物，以及果实、种子和其他产品、衍生物、或所述树木植物的后代。本发明还包括本发明转基因植物的繁殖体。在本文中，术语“繁殖体”表示可用于进行有性或无性生殖或繁殖的植物的任何部分，包括切穗。

植物品种，特别是可以按照植物育种者权利注册的植物品种可以从本发明中排除。不能仅仅因为一种植物在其基因组中含有导入该植物或其祖先的细胞中的、稳定的转基因，就将该植物视为“植物品种”。

本文所使用的术语“多核苷酸”表示核苷酸的统称，并包括DNA和相应的RNA分子，可以是单链和双链分子，包括HnRNA和mRNA分子，DNA和RNA分子的有义和反义链，以及cDNA、基因组DNA和完全或部分合成的多核苷酸。HnRNA分子含有内含子，并且以大体

上的一对一的方式“相应于”一种DNA分子。mRNA分子“相应于”切除了其中的内含子的HnRNA和DNA分子。本发明的多核苷酸可以是完整的基因，或其任何部分。基因是编码有功能的蛋白或RNA分子的DNA序列。可操作的反义多核苷酸可以包括相应多核苷酸的一个片段，因此，“多核苷酸”的定义包括所有可操作的反义片段。反义多核苷酸和与反义多核苷酸相关的技术在本领域中是众所周知的，并且披露于，例如，Robinson-Benion等，“反义技术”，酶学方法 254(23):363-375, 1995；和Kawasaki等, Artific. Organs 20(8):836-848, 1996。

还提供了所述分离的多核苷酸的互补物、所述分离的多核苷酸的反向互补物、和所述分离的多核苷酸的反向序列、以及所述序列的变体。本文所使用的术语“互补物”、“反向互补物”、和“反向序列”的定义可以通过下面的例子得到最佳理解。对于序列5’AGGACC3’来说，其互补物、反向互补物和反向序列如下:

互补物 3’ TCCTGG 5’

反向互补物 3’ GGTCCT 5’

反向序列 5’ CCAGGA 3’.

在本文中，术语“寡核苷酸”是指多核苷酸序列的较短的片段，通常包括6-60个核苷酸，并且包括用于杂交试验的探针和用于通过聚合酶链式反应进行DNA扩增的引物。

基因组DNA和异源DNA的鉴定，可以用一种cDNA序列的全部或部分作为探针，在合适严格的条件下，通过标准DNA/DNA杂交技术筛选合适的文库完成。或者，可将使用根据已知基因组DNA、cDNA和蛋白序列设计的寡核苷酸引物的PCR技术用于扩增和鉴定基因组和cDNA序列。可以通过常规合成方法生产相应于所述鉴定序列和变体的合成DNA。本文所述的所有多核苷酸是分离的和纯化的，正如这些术语在本领域中所常用的形式。

在另一方面，本发明提供了由上述多核苷酸编码的或部分编码的分离的多肽。在本文中，术语“多肽”包括任何长度的氨基酸链，包括完整长度的蛋白，其中，所述氨基酸残基是通过共价肽键连接的。本文所说的术语“由多核苷酸编码的多肽”，包括由含有本文所提供的分离的DNA序列或变体的多核苷酸所编码的多肽。在特定实施方案中，本发明的多肽包括选自序列267-349和376-401所示序列的氨基酸序列，以

及所述序列的变体。

本发明的多肽可以通过将编码所述多肽的DNA序列插入一种表达载体，并在合适的宿主中表达所述多肽而通过重组方法产生。可以采用本领域普通技术人员所公知的多种表达载体中的任一种。表达可以在业已用含有编码一种重组多肽的DNA分子转化或转染过的任何合适的宿主细胞中完成。合适的宿主细胞包括原核细胞、酵母和高等真核细胞。所采用的宿主细胞优选为大肠杆菌、昆虫、酵母或哺乳动物细胞系，如COS或CHO。以这种方式表达的DNA序列可以编码天然存在的多肽，天然存在的多肽部分，或其变体。

在一个相关方面，提供了至少包括具有选自序列267-349和376-401所示序列的氨基酸序列的多肽的功能性部分的多肽，及其变体。在本文中，一种多肽的“功能性部分”是含有影响该多肽功能所必须的活性位点的部分，例如，该分子的能够结合一种或多种反应物的部分。所述活性位点可以由存在于一个或多个多肽链上的分离的部分组成，并且通常具有高的结合力。

可以通过以下方法鉴定一种多肽的功能性部分：首先通过化学或酶解消化所述多肽，制备该多肽的片段，或者对编码所述多肽的多核苷酸进行诱变分析，然后表达所得到的突变型多肽。然后对所述多肽片段或突变型多肽进行试验，以便确定哪一部分保留了生物学活性，例如，使用下面所提供的代表性试验方法。

所述活性位点可以由存在于一个或多个多肽链上的分离的部分组成，并且通常具有高的底物专一性。本文所使用的术语“由一种多核苷酸编码的多肽”，包括由含有本发明的部分分离的多核苷酸的多核苷酸所编码的多肽。

还可以通过合成或重组方法制备本发明多肽的部分和其他变体。可以用本领域普通技术人员所公知的技术制备具有少于大约100个氨基酸，通常含有少于大约50个氨基酸的多肽。例如，所述多肽可以用任一种商业化的固相技术合成，如Merrifield固相合成方法，其中，将氨基酸顺序添加到生长的氨基酸链上。参见Merrifield，美国化学协会杂志85: 2149-2146, 1963，用于多肽自动化合成的设备可以从诸如Perkin Elmer / Applied Biosystems, Inc. (Foster 市，加利弗尼亚)的供应商那里购买，并可以按照生产商的说明进行操作。可以用标准诱变技术制备天

然多肽的变体，如寡核苷酸定向的位点专一性诱变(Kunkel, T., 美国科学院院报 82:488-492, 1985)。还可以用标准技术从 DNA 序列中除去片段，以便能够制备截短的多肽。

一般，本文所述的多肽是以分离的大体上纯化的形式制备的。所述多肽的纯度优选为至少大约 80%；更优选为至少大约 90%；最优选为至少大约 99%。在下文所披露的某些优选实施方案中，将所述分离的多肽掺入药用组合物或疫苗中，以便用于治疗皮肤病。

在本文中，术语“变体”包括不同于特定序列的核苷酸或氨基酸序列，其中，有一个或多个核苷酸或氨基酸残基的缺失、取代或添加。变体可以是天然存在的等位变体或非天然存在的变体，变体序列（多核苷酸或多肽）与本发明的序列相比，优选具有至少 50%，更优选至少 75%，最优选至少 90%的相同性。所述百分相同性是通过按如下方法比较两个要比较的序列，测定在比较部分相同残基的数量，用本发明（查询）序列上的残基总数去除所述数量，并用 100 乘以所得结果而测定的。

可以用可公开获得的计算机程序比较多核苷酸和多肽序列，并测定在特定部位上与另一种多核苷酸相同的核苷酸的百分比。用于比较并鉴定多核苷酸序列相似性的两种代表性程序是 BLASTN 和 FASTA 程序。还可以用 BLASTX 程序分析多核苷酸，该程序能比较一种核苷酸的查询序列（两条链）的六框概念翻译产物和蛋白质序列数据库。可以用 BLASTP 程序检查多肽序列的相似性。BLASTN、BLASTX 和 BLASTP 程序可以在 NCBI 匿名 FTP 服务器上获得(ftp://ncbi.nlm.nih.gov), /blast/executables/。被设定为在有关文献中所披露的预设参数、并用该程序分配的 BLASTN 程序 2.0.4 版[1998 年 2 月 24 日]和 2.0.6 版[1998 年 9 月 16 日]，可优选用于测定本发明多核苷酸变体。被设定为在有关文献中所披露的预设参数的 BLASTP 程序、并用该程序分配的 BLASTP 程序，可优选用于测定本发明的多肽变体。包括 BLASTN，BLASTP 和 BLASTX 在内的 BLAST 程序家族的使用披露于 NCBI's 网站 URL http://www.ncbi.nlm.nih.gov/BLAST/newblast.html 并披露于 Altschul Stephen F 等的文献中，“缺口 BLAST 和 PSI-BLAST：新一代蛋白数据库检索程序”核酸研究 25: 3389-3402, 1997。

计算机程序 FASTA 可以在互联网上从 ftp 网站 ftp://ftp.virginia.edu/pub/fasta/获得。 被设定为在有关文献中披露的预

设参数并用有关程序分配的 1996 年 2 月的 2.0.4 版，可用于本发明变体的测定。FASTA 程序的使用披露于 Pearson WR 和 Lipman DJ，“用于生物学序列分析的改进工具”，美国科学院院报 85: 2444-2448, 1988; 和 Pearson WR,“用 FASTP 和 FASTA 进行快速和灵敏的序列比较”，酶学方法 183:63-98, 1990。

优选将以下运行参数用于比较和相似性的测定，使用 BLASTN，它能得出多核苷酸序列的 E 值和百分相同性： Unix 运行指令: blastall -p blastn -d embldb -e 10 –G0 -E0 -r 1 -v 30 -b 30 -i queryseq –o results; 参数为： -p 程序名 [String]; -d 数据库 [String]; -e 预期值 (E) [Real]; -G 打开一个缺口的费用 (零引起的预设行为) [整数]; -E 延长一个缺口的费用（零引起的预设行为） [整数]; -r 核苷酸比较的报酬(仅用 blastn) [整数]; -v 单线描述数量(V) [整数]; -b 要显示的比较数量 (B) [整数]; -i 查询文件[File In]; 和 -o BLAST 报告输出文件 [File Out] Optional。优选将以下运行参数用于通过 BLASTP 进行比较和相似性的测定，由此可以得到多肽序列的 E 值和百分相同性： blastall –p blastp –d swissprotdb –e 10 -G0-E 0 –v 30 –b 30 –i queryseq –o results;参数为: -p 程序名 [String]; -d 数据库 [String]; -e 预期值(E) [Real]; -G 打开一个缺口的费用 (零引起的预设行为) [整数]; -E 延长一个缺口的费用 (零引起的预设行为) [整数]; -v 单线描述的数量 (v) [整数]; -b 要显示的比较数量 (b) [整数]; -I 查询文件 [File In]; -o BLAST 报告输出文件 [File Out] Optional。通过由 BLASTN, FASTA, BLASTP 或类似序列产生的查询序列“点击”一个或多个数据库序列，可以比较并鉴定序列的相似部分。所述点击是按照相似性程度和序列重叠的长度排列的。对一个数据库序列的点击通常表示仅在查询序列的一部分序列长度上重叠。

BLASTN, FASTA, BLASTP 程序还能产生排比的“预期”值（E）。预期值（E）表示在检索特定大小的数据库时，在特定数量的连续序列上“预期”随机出现点击的次数。所述预期值被用作显著性阈值，用于确定对诸如优选的 EMBL 数据库的数据库的点击是否表示真实的相似性。例如，赋予一次多核苷酸点击的 0.1 的 E 值，被理解成意味着在 EMBL 数据库大小的数据库中，人们预期在有关序列的比较部分上看到 0.1 的匹配，具有仅通过随机方式得到的类似得分。根据该标准，所述

多核苷酸序列的比较和匹配部分有90%的可能性相同。对于在比较和匹配部分的E值为0.01或更低的序列来说，用BLASTN或FASTA在程序EMBL数据库中随机发现匹配的可能性为1%或更低。

根据一种实施方案，对于本发明的每一种多核苷酸和多肽来说，多核苷酸和多肽的“变体”优选包括与本发明的多核苷酸或多肽相比具有相同数量或较少数量核酸或氨基酸的序列，并且与本发明的多核苷酸或多肽相比能产生0.01或更低的E值。就是说，变体多核苷酸或多肽是至少有99%的可能性与本发明的多核苷酸或多肽相同的任何序列，用设定为上述参数的BLASTN、FSATA或BLASTP程序测定具有0.01或更低的E值。根据一种优选实施方案，变体多核苷酸是具有与本发明的多核苷酸相同数量或较少核酸的序列，它与本发明的多核苷酸至少有99%的可能性相同，用被设定为上述参数的BLASTN或FASTA程序测定，具有0.01或更低的E值。类似地，根据一种优选实施方案，变体多肽是与本发明的多肽相比具有相同数量或较少氨基酸的序列，它至少有99%的可能性与本发明的多肽相同，用被设定为上述参数的BLASTN或FASTA程序测定，具有0.01或更低的E值。

或者，本发明的变体多核苷酸能与序列1-266和350-375所示多核苷酸序列或这些序列的互补物、或反向序列、或反向互补物在严格条件下杂交。在本文中，“严格条件”是指在6×SSC，0.2%SDS中预洗涤，在65℃下，在6×SSC，0.2%SDS中杂交过夜；然后进行2次30分钟的洗涤，每次在65℃下，在1×SSC，0.1%SDS中进行，然后再进行2次30分钟的洗涤，分别在65℃下，在0.2×SSC，0.1%SDS中进行。

本发明还包括不同于所披露的序列的多核苷酸，由于遗传密码的简并性，该序列能编码与本发明所涉及的氨基酸相同的序列。所述多核苷酸被称为本文所披露的多核苷酸的“简并性等同物”。类似地，本发明还包括与所披露的序列不同，但它所编码的多肽与由本发明多核苷酸所编码的多肽具有相似的酶促活性的多核苷酸。因此，本发明涉及并包括由于保守性取代而不同于序列1-266和350-375所示多核苷酸序列或所述序列的互补物、反向序列、或反向互补物的序列的多核苷酸。另外，本发明还涉及并包括含有由于占总序列长度10%以下的缺失和/或插入而不同于序列1-266和350-375所示多核苷酸序列或所述序列的互补物、反向互补物、或反向序列的序列的多核苷酸。类似地，本发明涉及

并还包括含有由于占总序列长度10%以下的氨基酸取代、插入和/或缺失而不同于序列267-349和376-401所示多肽序列的序列的多肽，只要所述变体多肽在木质素生物合成途径中具有活性即可。

本发明的多核苷酸（包括变体）可以从由植物或非植物生物组建的各种文库中分离，或者用本领域公知的技术合成。本发明的多核苷酸，可以通过对按照下面的例1和例2所述方法由巨桉和辐射松制备的cDNA文库进行高处理量测序分离。或者，可以合成基于序列1-266和350-375所示序列的寡核苷酸探针，并用于通过杂交或PCR技术在来自巨桉和辐射松的cDNA和基因组DNA中鉴定阳性克隆。探针可以短于本文所提供的序列，但长度应当至少为大约10个，优选至少大约15个，最优选至少大约20个氨基酸。适用于所述寡核苷酸探针的杂交和PCR技术是本领域所熟知的。可以通过限制酶消化、DNA测序等分析阳性克隆。

本发明的多核苷酸的变体源于其他桉属和松属植物，以及源于木材行业所使用的其他商业上重要的物种。其中，举例来说，包括以下裸子植物：火炬松 （Pinus taeda），湿地松（Pinus elliotti），沙松（Pinus clausa），长叶松（ Pinus palustrus），短叶松（Pinus echinata），西黄松（Pinus ponderosa），约弗松（Pinus jeffrey），美加红松（Pinus resinosa）， 刚松（Pinus rigida）， 美国短叶松（Pinus banksiana），晚松（Pinus serotina），北美乔松（Pinus strobus），山白松（Pinus monticola），糖松（Pinus lambertiana），矮松（Pinus virginiana），小干松 Pinus contorta），加勒比松（Pinus caribaea），海岸松（P. pinaster），土耳其松（P. brutia），阿富汗松（P. eldarica），大果松（P. coulteri），欧洲黑松（P. nigra ）和欧洲赤松（P. sylvestris）；花旗松（Pseudotsuga menziesii）；铁杉包括异叶铁杉（Tsuga heterophylla）；加拿大铁杉（Tsuga canadensis）；西美山铁杉（Tsuga mertensiana）；云杉包括挪威云杉（Picea abies），红云杉（Picea rubens），白云杉（Picea glauca），黑云杉（Picea mariana），北美云杉（Picea sitchensis），恩格曼氏云杉（Picea engelmanni和蓝叶云杉（Picea pungens）；北美红杉（Sequoia sempervirens）；冷杉包括洛杉矶冷杉（Abies lasiocarpa），银杉（Abies amabilis），巨冷杉（Abies gr 和 is），壮丽冷杉（Abies procera） ，白云杉（Abies concolor），红果冷杉（Abies magnifica），和胶冷杉（Abies balsamea），

柏包括北美乔柏（Thuja plicata），下延香松（libocedrus decurrens），北美香柏（Thuja occidentalis），美国扁柏（Chamaecyparis lawsoniona），美国尖叶扁柏（Chamaecyparis thyoides）,黄扁柏（Chamaecyparis nootkatensis）,和铅笔柏（Huniperus virginiana）；落叶松包括美洲落叶松（Larix laricina）, Western 落叶松（Larix occidentalis），欧洲落叶松（Larix decidua），日本落叶松（Larix leptolepis）,和新疆落叶松（Larix siberica）；落羽杉（Taxodium distichum）和巨杉（Sequoia gigantea）；和以下被子植物，例如：白桉（Eucalyptus alba）, E. bancroftii, E. botyroides, E. bridgesiana, 美叶桉（E. calophylla），赤桉（E. camaldulensis），柠檬桉（E. citriodora），棒萼桉（E. cladocalyx）, E. coccifera, E. curtisii, 山桉（E. dalrympleana），棉芝老桉（E. deglupta）, E. delagatensis, E. diversicolor, E. dunnii, ），美丽花桉（E. ficifolia），蓝桉（E. globulus），棒头桉（E. gomphocephala）, E. gunnii, E. henryi, E. laevopinea, E. macarthurii, E. macrorhyncha, 花皮桉（E. maculata）, E. marginata, E. megacarpa, E. melliodora, E. nicholii, E. nitens, E. nova-angelica,斜叶桉（E. obliqua）, E. obtusiflora, E. oreades, E. pauciflora, E. polybractea,王桉（E. regnans），树脂桉（E. resinifera），大叶桉（E. robusta），野桉（E. rudis）,悉尼蓝桉（E. saligna），铁木桉（E. sideroxylon）, E. stuartiana, 细叶桉（E. tereticornis）,毛叶桉（E. torelliana）, E. urnigera, E. urophylla, 多枝桉（E. viminalis）, E. viridis, E. wandoo 和 E. youmanni.

本发明的多核苷酸还可以合成，例如，用自动寡核苷酸合成仪合成(例如, Beckman Oligo 1000M DNA 合成仪)，以便获得高达 50 或更多核酸的核苷酸片段。然后可以用分子生物学领域所公知的标准 DNA 操作技术，将多个这样的多核苷酸片段连接在一起。一种常用的代表性多核苷酸合成技术包括合成具有例如 80 个核酸的单链多核苷酸片段，并让该片段与合成的互补的 85 个核酸的片段杂交，以便形成 5 个核苷酸的突出端。然后以类似方式合成下一个片段，在相反的链上具有 5 个核苷酸的突出端。所述“粘性”末端能确保以上两个部分在杂交时能正确连接。这样，可以在体外完全合成本发明的完整的多核苷酸。

序列 1-266 和 350-375 所示的多核苷酸可以是“部分”或完整长度的序列。部分序列不代表编码天然多肽的基因的完整编码部分。本文所披露的部分多核苷酸序列可用于获得各种物种和生物的相应的完整长

度的基因，例如，通过用基于本发明多核苷酸的探针杂交或用基于本发明多核苷酸的引物进行 PCR 扩增筛选 DNA 表达文库获得。这样，人们可以用本领域公知的方法将本发明多核苷酸的相应 mRNA 向上游和下游延伸，并鉴定相应的基因组 DNA，包括完整基因的启动子和增强子区。

因此，本发明包括含有序列 1-266 和 350-375 所示序列的分离的多核苷酸，或编码一种功能性多肽的所述序列之一的变体，包括完整长度的基因。所述延长的多核苷酸的长度可以为大约 50-大约 4000 个核酸或碱基对，其长度优选为低于大约 4000 个核酸或碱基对，更优选低于大约 3000 个核酸或碱基对，更优选低于大约 2000 个核酸或碱基对。在某些场合下，本发明延长的多核苷酸的长度低于大约 1800 个核酸或碱基对，优选低于大约 1600 个核酸或碱基对，更优选低于大约 1400 个核酸或碱基对，更优选低于大约 1200 个核酸或碱基对，最优选低于大约 1000 个核酸或碱基对。

本发明的多核苷酸还包括至少含有序列 1-266 和 350-375 所示多核苷酸的任一种或其变体的特定数量的连续残基的多核苷酸（x-聚体）。根据优选实施方案，x 的值优选为至少 20，更优选至少 40，更优选至少 60，最优选至少 80。因此，本发明的多核苷酸包括含有序列 1-266 和 350-375 所示多核苷酸的 20-聚体、40-聚体、60-聚体、80-聚体、100-聚体、120-聚体、150-聚体、180-聚体、220-聚体、250-聚体或 300-聚体、400-聚体、500-聚体、或 600-聚体或任何 x-聚体的变体的多核苷酸。就是说，就 E 值、百分相似性和杂交而言，上述变体的定义还适用于本发明多核苷酸的任何 x-聚体。

本发明还包括与序列 1-266 和 350-375 以及这些序列的变体互补和/或相应的多核苷酸探针和引物。所述寡核苷酸探针和引物大体上互补于感兴趣的多核苷酸。如果一种寡核苷酸探针或引物或其互补物包括在序列 1-266 和 350-375 所示序列之一或所述序列之一的变体中，该寡核苷酸探针或引物则被称为“相应于”本发明的多核苷酸，包括序列 1-266 和 350-375 所示序列之一或变体。

如果一条链的核苷酸在进行合适的核苷酸插入和/或缺失之后与另一股链的核苷酸配对的比例为至少 80%，优选至少 90%-95%，更优选至少 98%-100%的话，则认为这两个单链序列大体上互补。或者，如果

第一股 DNA 链能在严格杂交条件下与第二股 DNA 链杂交，则存在明显的互补性。用于测定互补性的严格杂交条件包括至少大约 1M 的盐条件，更常见的是低于大约 500mM，优选低于大约 200mM。杂交温度可以低至 5℃，但通常高于大约 22℃，更优选高于大约 30℃，最优选高于大约 37℃。对于特定杂交来说，较长的 DNA 片段可能需要更高的杂交温度。由于杂交的严格性受诸如探针组成、有机溶剂的存在和碱基错配程度的其他因素的影响，参数的组合比任一种参数单独的绝对作用更重要。来自植物或含有植物材料的样品或产品的 DNA，可以是通过用存在于该样品中的 RNA 制备 cDNA 而产生的基因组 DNA。

除了 DNA –DNA 杂交之外，还可以进行 DNA –RNA 、RNA-RNA 杂交实验。在第一种情况下，检测来自表达基因的 mRNA，而不是检测所述样品 mRNA 的基因组 DNA 或 cDNA。在第二种情况下，可以使用 RNA 探针。另外，还可以使用能与目标序列专一性杂交的 DNA 的人工类似物。

在具体实施方案中，所述寡核苷酸探针和/或引物包括与本发明多核苷酸序列互补的至少大约 6 个连续的残基，更优选至少大约 10 个连续残基，最优选至少大约 20 个连续残基。本发明的探针和引物的长度可以为大约 8-100 个碱基对，优选为大约 10-50 个碱基对，更优选为大约 15-40 个碱基对。所述探针可以用本领域公知的方法方便地加以选择，要考虑 DNA- DNA 杂交严格性，退火和解链温度，形成环的潜力和其他因素，这些内容是本领域所公知的。适用于设计探针，特别是适用于设计 PCR 引物的工具和软件，可以从互联网上获得，例如，在 http://www.horizonpress.com/pcr/。用于设计 PCR 引物的优选技术还披露于 Dieffenbach CW 和 Dvksler GS, PCR 引物：实验室手册， CSHL 出版社：冷泉港，纽约，1995。

相应于本发明多核苷酸的多种寡核苷酸探针或引物可以试剂盒形式提供。所述试剂盒通常包括多种 DNA 或寡核苷酸探针，每一种探针对一种多核苷酸序列专一。本发明的试剂盒可以包括相应于本发明多核苷酸，包括序列 1-266 和 350-375 所示的一种或多种的探针或引物。

在一种可用于高处理量实验的实施方案中，本发明的寡核苷酸探针试剂盒包括阵列形式中的多种探针，其中，每一种探针被固定在一种固体底物表面上预定的、空间上可寻找到的位置上。例如，可用于本发明

中的阵列形式披露于US5412087，US5545531和PCT公开号WO95/00530中，以上文献的内容被收作本文参考。

对于诸如植物育种和质量控制操作的用途来说，高处理量筛选系统的重要性是显而易见的，其中，有必要鉴定大量的种子样品和植物幼苗，以便检查不希望的植物材料的样品或产品，为了检疫目的等鉴定植物或含有植物材料的样品或产品，或证实植物或含有植物材料的样品或产品的真实来源。筛选用作标记植物的识别物的本发明多核苷酸的存在或不存在，对于随后在植物育种通过分散的花粉进行基因渐渗中检测基因的流量来说是有价值的。

这样，本发明的寡核苷酸探针试剂盒可用于以快速和节省费用的方式检查本发明多核苷酸在含有不同材料的不同样品或产品中的存在/缺乏（或在混合存在的情况下其相对量）。可以用本发明检查的植物物种的例子包括树木，如松树和桉树，其他树木，农用植物，包括作物和牧草植物，以及园艺植物。

本发明的另一方面包括本发明多核苷酸的收集，本发明多核苷酸，特别是序列1-266，350-375所示的多核苷酸及其变体和x-聚体的收集，可以记录和/或保存记录和/或保存在介质上，并随后用于分析和比较目的等。合适的储存介质包括磁性介质，如磁盘，磁带，CD-ROM储存介质，和光学储存介质等。适用于记录和保存信息，以及获取信息，如记录在所述介质上的多核苷酸序列的储存介质和方法在本领域中是众所周知的。记录在储存介质上的多核苷酸信息优选是计算机可读的，并可用于分析和比较所述多核苷酸信息。

因此，本发明的另一方面包括在它上面记录了本发明的多核苷酸，特别是记录了序列1-266，350-375所示所有多核苷酸及其变体，以及序列1-266和350-375的多核苷酸的x-聚体，以及含有或相应于序列1-266和350-375的多核苷酸的延长序列、探针和引物的储存介质。根据一种实施方案，所述储存介质包括本发明的一共至少20，优选至少50，更优选至少100，最优选至少200种多核苷酸。优选序列1-266和350-375所示多核苷酸或所示多核苷酸的变体。

另一方面，本发明提供了沿5’-3’方向包括基因启动子序列；编码由本发明的多核苷酸编码的多肽的至少一个功能性部分的开放读框；和基因终止序列的遗传结构。在本文中，一种酶的“功能性部分”是含有

影响一个代谢步骤所必需的活性位点的部分，即所述分子能够结合一种或多种反应剂或能够改善或调节反应速度的部分。活性位点可以由存在于一个或多个多肽链上的分离的部分组成，并且通常具有高的底物专一性。本文所使用的术语“由核苷酸序列编码的酶”包括由包括本发明的部分分离的多核苷酸的核苷酸序列编码的酶。

所述开放读框可以沿有义或反义方向取向，对于需要增加木质素合成的用途来说，所述开放读框可以沿有义方向插入所述结构，以使用所述结构转化目标生物可导致有关基因拷贝数量的增加，并因此增加酶的量。当需要下调木质素合成时，可将所述开放读框沿反义方向插入所述结构，以便由所述多核苷酸转录所产生的 RNA 互补于内源 mRNA 序列。这反过来又会导致有关基因拷贝数量的减少，并因此减少酶的量。或者，可以通过将合适的亚序列（例如 DNA 或 RNA）插入核酶结构中而实现调节。

还提供了含有编码由上述 DNA 序列编码的酶的基因的非编码区或互补于非编码区的核苷酸序列，以及基因启动子序列和基因终止序列的遗传结构。在本文中，术语“非编码区”包括距离翻译序列或开放读框的 5’或 3’末端大约 2000 个碱基对的不被翻译的转录序列和非转录序列。可用于本发明结构中的非编码区的例子包括内含子和 5’非编码前导序列。用这样的 DNA 结构转化目标植物能通过共抑制过程导致由该植物合成的木质素量的减少，类似于披露于以下文献中的方式，例如，Napoli 等，植物细胞 2：279-290，1990；和 Carvalho Niebel 等，植物细胞 7：347-358，1995。

本发明的遗传结构还包括可操作地连接于待转录的多核苷酸上的基因启动子序列和基因终止序列，由它们控制该基因的表达。基因启动子序列通常位于待转录多核苷酸的 5’末端，并被用于启动该多核苷酸的转录。基因启动子序列通常存在于一个基因的 5’非编码区，不过，它们可以存在于内含子中（Luehrsen KR, 分子基因遗传学 ，225:81-93, 1991）,或存在于编码区，例如，存在于番茄的 PAL 上 (Bloksberg,苯丙氨酸氨裂解酶和植物病原体相互作用的生物学研究，博士论文，加利弗尼亚大学， Davis, 1991, University Microfilms International Order No.9217564)。当所述结构包括一个沿有义方向的开放读框时，所述基因启动子序列还能启动所述开放读框的翻译。对于包括沿反义方向的开

放读框或非编码区的DNA结构来说，所述基因启动子序列仅包括具有RNA聚合酶结合位点的转录起始位点。

可用于本发明DNA结构的多种基因启动子序列为本领域所熟知。所述启动子基因序列和基因终止序列可以是目标植物宿主本身所具有的，或者可以是外源性的，只要所述启动子能在所述目标宿主中起作用即可。例如，所述启动子和终止序列可源于其他植物、植物病毒、和细菌质粒。基因启动子和终止序列优选源于本发明的序列本身。

影响启动子选择的因素包括所需要的该结构的组织专一性，以及转录和翻译的时间。例如，诸如35S花椰菜花叶病毒（CaMV35S）启动子的组成型启动子，能影响所述酶在植物的所有部分中的活性。使用组织专一型启动子，会导致仅在感兴趣的组织中产生所需要的有义或反义RNA。采用使用了诱导型基因启动子序列的DNA结构，可以通过诸如光照、加热、厌氧胁迫、和改变营养条件等的外部刺激调节RNA聚合酶结合和启动的速度。可将时序调节启动子用于实现在转化细胞的发育过程的特定时间调节RNA聚合酶结合和启动的速度。优选使用来自相关酶基因的原始启动子，或来自待转化生物（如桉树或松树）中的特定组织-定向基因的启动子。可用于本发明的基因启动子的其他例子包括甘露氨酸合成酶（mas），章鱼氨酸合成酶（ocs），以及由Chua等所披露的启动子，科学244：174-181，1989。

基因终止序列位于待转录多核苷酸的3'末端，这些序列可来自与基因启动子序列相同的基因，或来自不同基因。本领域已知的很多基因终止序列可被用于本发明，如根癌农杆菌胭脂氨酸合成酶基因的3'末端，不过，优选的基因终止序列是源于原有酶基因或源于待转化的目标生物的序列。

本发明的遗传结构还可以含有一种选择标记，该标记能在植物细胞中起作用，以便检测含有本发明结构的转化细胞。所述标记是本领域所公知的，通常能赋予对一种或多种毒素的抗性。所述标记的一种例子是NPTII基因，该基因的表达会产生对卡那霉素或潮霉素的抗性，这两种抗生素在中等浓度下通常对植物细胞具有毒性（Rogers等，Weissbach A和H著，植物分子生物学方法，学术出版公司：San Diego，CA，1988）。

或者，可以通过本领域已知的其他技术，如Southern和Western印迹确定目标结构在转化细胞中的存在。

用于可操作地连接本发明遗传结构的成分的技术为本领域所熟知，并包括使用含有一种或多种所披露的限制性内切酶位点的合成接头，例如，Maniatis 等，（分子克隆：实验室手册，CSHL 出版社:冷泉港，NY, 1989）。本发明的 DNA 结构可以连接到具有至少一种复制系统的载体上，例如，大肠杆菌，以便在每一次操作之后，所得到的结构能被克隆和测序，并确保操作的正确性。

本发明的遗传结构可用于转化多种植物，包括单子叶植物（例如，牧草，玉米，谷类，燕麦，小麦和大麦），双子叶植物（例如，拟南芥属，烟草，豆类，苜蓿，橡树，桉树，槭树），和裸子植物（例如，苏格兰松；参见 Aronen，Finnish Forest Res. Papers, Vol. 595, 1996)，白云杉（Ellis 等，生物技术 11:94-92, 1993）和落叶松（黄等,体外细胞 27:201-207, 1991)）。在一种优选实施方案中，本发明的遗传结构被用于转化木本植物，在本文中被定义为其茎干生活多年，并且每一年通过木本组织的增加而增大直径的树木或灌木。优选的目标植物选自桉树和松树，最优选选自巨桉和辐射松。如上文所述，用包括编码由本发明的多核苷酸编码的酶的开放读框的遗传结构转化植物，会导致该植物木质素含量的改变，其中，所述开放读框的取向为有义方向。用含有反义方向的开放读框或一个基因的非编码（非翻译）区的遗传结构转化植物也会产生转化植物木质素含量的改变。

可以通过选择启动子序列，或通过选择将所述多核苷酸整合到目标生物基因组上的功能性拷贝或位点的数量控制 RNA 在目标细胞中的产生。可以用一种以上本发明的结构转化目标植物，以便改变木质素生物合成途径的一种以上酶的活性，在一种以上组织中影响酶的活性或在一个以上的表达时间影响酶的活性。类似地，可将一种结构组建成含有一个以上编码由本发明多核苷酸编码的酶的开放读框或一个以上编码所述酶的基因的非编码区。本发明的多核苷酸还可以编码与木质素生物合成途径相关的酶的其他已知序列组合使用。这样，有可能将木质素生物合成途径增加到非木本植物中，以便产生一种新的木本植物。

用于将 DNA 稳定整合到目标植物基因组中的技术为本领域所熟知，并包括根癌农杆菌介导的导入，电穿孔，原生质体融合，向生殖器官中注射，向未成熟胚胎中注射，以及高速轰击导入。技术的选择取决于要转化的目标植物。例如，双子叶植物和某些单子叶植物以及裸子植

物可以用农杆菌属 Ti 质粒技术转化，例如由 Bevan 所披露的（核酸研究 12：8711-8721，1984）。用于导入本发明 DNA 结构的目标包括组织，如叶片组织，分散的细胞，原生质体，种子，胚胎，分生组织；子叶，和下胚轴等。用于转化桉树和松树的一种优选方法是使用花粉（例如，参见 Aronen, Finnish Forest Res. Papers, Vol. 595, 1996）或容易再生的胚胎组织的 biolistic 方法。可用于本发明方法中的其他转化技术包括在以下文献中所披露的：Ellis 等（植物细胞报导，8：16-20，1989），Wilson 等（植物细胞报导，7：704-707，1989）和 Tautorus 等（理论应用遗传学 78：531-536，1989）。

一旦细胞被转化，就可以通过诸如上文所述的卡那霉素抗性标记的标记筛选在其基因组中整合了本发明 DNA 结构的细胞。然后可以在适于再生全植株的培养基中用本领域公知技术培养转基因细胞。对于原生质体来说，在合适的渗透压条件下再生细胞壁。对于种子或胚胎来说，使用合适的萌发或愈伤组织启动培养基。例如，使用合适的再生培养基。对很多物种来说，植物的再生方法业已完善。有关树木的再生的综述可以参见 Dunstan 等，“木本植物的体细胞胚发生”Thorpe TA 著，植物体外胚胎发生，农业上的当代植物科学和生物技术 20(12):471-540, 1995。Roberts 等披露了专门用于云杉再生的方法（“云杉体细胞胚发生”Redenbaugh K 著，合成种子：将合成种子用于作物改良，CRC 出版社：23 章, 427-449 页, 1993）。所得到的转化植物可以用本领域公知方法有性或无性方式再生，以便得到转基因植物的连续的世代。

在另一方面，本发明提供了改变一种多肽在宿主生物中的含量（浓度）或活性的方法，包括将含有本发明多核苷酸的结构稳定地整合到该植物的基因组中。 本发明的遗传 NA 结构可用于转化多种生物。所述生物包括植物，如单子叶被子植物（例如，牧草、玉米、谷类、燕麦、小麦和大麦），和双子叶被子植物（例如，拟南芥属、烟草、豆类、苜蓿、橡树、桉树、槭树），以及裸子植物（例如，苏格兰松；参见 Aronen, Finnish Forest Res. Papers, Vol. 595, 1996），白云杉（Ellis 等，生物技术 11：94-92，1993），和落叶松（Huang 等，体外细胞 27：201-207，1991）。

在优选实施方案中，本发明的遗传结构被用于转化木本植物，在本文中被定义为其茎干能生活多年，并在每一年由于木质组织的增加而增

大直径的树木或灌木。目标植物优选选自桉树和松树，最优选选自巨桉和辐射松，但也可以包括下面所列举的物种的任一种：

松树：美国短叶松树（Pinus banksiana），土耳其松（P. brutia），加勒比松（Pinus caribaea），沙松（Pinus clausa），小干松 Pinus contorta），大果松（P. coulteri），短叶松（Pinus echinata），阿富汗松（P. eldarica），湿地松（Pinus elliotti），约弗松（Pinus jeffrey），糖松（Pinus lambertiana），山白松（Pinus monticola），欧洲黑松（P. nigra ），长叶松（ Pinus palustrus），海岸松（P. pinaster），西黄松（Pinus ponderosa），美加红松（Pinus resinosa），刚松（Pinus rigida），晚松（Pinus serotina），北美乔松（Pinus strobus），欧洲赤松（P. sylvestris），火炬松 （Pinus taeda ），矮松（Pinus virginiana）。

其他裸子植物：银杉（Abies amabilis），胶冷杉（Abies balsamea），白云杉（Abies concolor），巨冷杉（Abies grandis），洛杉矶冷杉（Abies lasiocarpa），红果冷杉（Abies magnifica），壮丽冷杉（Abies procera），美国扁柏（Chamaecyparis lawsoniona），黄扁柏（Chamaecyparis nootkatensis），美国尖叶扁柏（Chamaecyparis thyoides），铅笔柏（Huniperus virginiana），欧洲落叶松（Larix decidua），美洲落叶松（Larix laricina），日本落叶松（Larix leptolepis），Western 落叶松（Larix occidentalis），新疆落叶松（Larix siberica），下延香松（libocedrus decurrens），挪威云杉（Picea abies），恩格曼氏云杉（Picea engelmanni），白云杉（Picea glauca），黑云杉（Picea mariana），蓝叶云杉（Picea pungens），红云杉（Picea rubens），北美云杉（Picea sitchensis），北美红杉（Sequoia sempervirens），花旗松（Pseudotsuga menziesii），巨杉（Sequoia gigantea），北美红杉（Sequoia sempervirens）；落羽杉（Taxodium distichum），加拿大铁杉（Tsuga canadensis），异叶铁杉（Tsuga heterophylla），西美山铁杉（Tsuga mertensiana），北美香柏（Thuja occidentalis），北美乔柏（Thuja plicata）。

桉属：白桉（Eucalyptus alba），E. bancroftii, E. botyroides, E. bridgesiana, 美叶桉（E. calophylla），赤桉（E. camaldulensis），柠檬桉（E. citriodora），棒萼桉（E. cladocalyx），E. coccifera, E. curtisii, 山桉（E. dalrympleana），棉芝老桉（E. deglupta），E. delagatensis, E. diversicolor, E. dunnii, ），美丽花桉（E. ficifolia），蓝桉（E. globulus），

棒头桉（E. gomphocephala）, E. gunnii, E. henryi, E. laevopinea, E. macarthurii, E. macrorhyncha, 花皮桉（E. maculata）, E. marginata, E. megacarpa, E. melliodora, E. nicholii, E. nitens, E. nova-angelica,斜叶桉（E. obliqua）, E. obtusiflora, E. oreades, E. pauciflora, E. polybractea,王桉（E. regnans）， 树脂桉（E. resinifera）， 大叶桉（E. robusta）， 野桉(E. rudis),悉尼蓝桉(E. saligna)，铁木桉(E. sideroxylon), E. stuartiana, 细叶桉(E. tereticornis),毛叶桉(E. torelliana), E. urnigera, E. urophylla, 多枝桉（E. viminalis）, E. viridis, E.wandoo， E. Youmanni，和上述任一物种的杂交种。

本发明的多核苷酸具有作为标记生物,特别是植物的非破坏性标记的特殊用途。不过，其他生物也可以用本发明的多核苷酸标记，其中包括有商业价值的动物、鱼、细菌和酵母。含有本发明多核苷酸的结构可以作为外源、非功能性、非破坏性标记物稳定地导入生物中。日后通过测定该标记在材料样品中的存在与否,可以证实所述生物的起源或来源。

标记的检测可以用多种常规技术完成，并且通常包括使用核酸探针。通过使用分支寡核苷酸可以提高检测探针存在的灵敏度，如 Horn T, Chang CA 和 Urdea MS, “在核酸定量分析中用作信号放大物的分支寡脱氧核糖核苷酸 (bDNA)的化学合成和鉴定”， 核酸研究 25(23):4842-4849, 1997), 从而能够检测样品中少到 50 个 DNA 分子。

提供以下的实施例是为了说明而不是为了限定。

实施例 1

分离并鉴定来自巨桉的 cDNA 克隆

按以下方法构建并筛选两个巨桉 cDNA 表达文库(一个来自同一棵树的各种组织的混合物，另一个来自同一棵树的叶片）。

使用 Chang 等的方法（植物分子生物学报导 11:113-116, 1993)，仅做过小的改进，从植物组织中提取 mRNA。具体地讲，将样品溶解在 CPC-RNAXB (100 mM Tris-Cl, pH 8,0; 25 mM EDTA; 2.0 M NaCl; 2% CTAB; 2% PVP 和 0.05% 亚精胺*3 HCl) 中，并用 24： 1 的氯仿：异戊醇提取，用乙醇沉淀 mRNA，并用 Poly(A) Quik mRNA 分离试剂盒 (Stratagene, La Jolla, CA)纯化总 RNA 制备物。通过逆转录酶合成，由

纯化的 mRNA 构建 cDNA 表达文库，然后按照生产商的方案用 ZAP 表达 cDNA 合成试剂盒 (Stratagene)插入λZAP 中。用 Gigapack II 包装提取物 (Stratagene) 包装所得到的 cDNA，使用来自 5 μl 连接混合物的 1 μl DNA 样品。用 XL1-Blue MRF' 细胞和 XLOLR 细胞 (Stratagene) 以及 ExAssist 辅助噬菌体 (Stratagene)对所述文库进行总体切除。用 NZY 培养液 (Gibco BRL, Gaithersburg, MD)稀释切除的噬菌粒，并铺平板到含有 X-gal 和异丙基-硫代-半乳糖苷 (IPTG)的 LB-卡那霉素琼脂平板上。

在被铺平板并挑选用于 DNA 微量制备的克隆中， 99% 含有适合筛选的插入片段。在含有卡那霉素的 NZY 培养液中培养阳性克隆，并通过碱性裂解和聚乙二醇 (PEG) 沉淀纯化 cDNA。用 1%的琼脂糖凝胶筛选染色体污染的测序模板。按照生产商的方案，用 Catalyst 800 仪器 (Perkin Elmer/Applied Biosystems, Foster City, CA) 制备染料引物序列。

用 Perkin Elmer/Applied Biosystems Prism 377 测序仪获得阳性克隆的 DNA 序列。首先从 5'末端对 cDNA 克隆进行测序，在某些情况下还可以从 3'末端开始测序。对某些克隆来说，用亚克隆片段获得内部序列。用限制作图的标准方法进行亚克隆，并亚克隆到 pBluescript II SK+ 载体上。

用被设定为上述优选参数的 1996 年 2 月的 FASTA 程序（2.0.4 版）(可以从互联网站ftp://ftp.virginia.edu/pub/fasta/获得)或 BLASTN 程序 2.0.4 版 [1998 年 2 月 24 日]，或 2.0.6 版 [1998 年 9 月 16 日]比较测定的 cDNA 序列和 EMBL 数据库（Realease46，1996 年 3 月）中的已知序列。用多种序列的多种排列构建可靠的共有序列。根据来自其他植物中的已知序列的相似性，确定分离的本发明的多核苷酸编码一种独特的酶。

使用上述方法分离了源于巨桉文库的编码以下多肽的 cDNA 序列：PAL (序列 16, 100, 242-246); C4H (序列 17, 153, 154, 和 161); C3H (序列 18, 101, 149 和 150); F5H (序列 19-21, 102, 103 和 169-171); OMT (序列 22-25, 104-107, 173 和 174); CCR (序列 26-29 和 108-111); CAD (序列 1, 30 和 112); CGT (序列 31-33 和 113-115); CBG (序列 34, 165 和 166); PNL (序列 35, 36 和 116); LAC (序列

37-41, 117 和 118); POX (序列 42-44, 119-121, 179, 249-250 和 350-358); 咖啡酸甲基转移酶(序列 187-192); 咖啡酰辅酶 A 甲基转移酶(序列 193-195); 香豆酸 Co-A 连接酶(序列 196-198); 细胞色素 P450 LXX1A (序列 201-206); 联酚氧化酶(序列 207-217); 黄酮醇葡糖基转移酶(序列 218); 类黄酮羟化酶(序列 219-223); 和异黄酮还原酶(序列 234-240)。

实施例 2

源于辐射松的 cDNA 克隆的分离和鉴定

a) 通过高处理量筛选分离 cDNA 克隆

从木质部构建辐射松 cDNA 表达文库，并按例 1 所述方法筛选。使用正向和反向引物在 Perkin Elmer/Applied Biosystems Prism 377 测序仪上获得阳性克隆的 DNA 序列，并按上述方法将测定的序列与 EMBL 数据库中的已知序列进行比较。 根据与其他植物总的已知序列的相似性，所分离的 DNA 序列被确定为编码以下酶 C4H (序列 2, 3, 48, 49, 92, 124, 125, 155-160, 162 和 163); C3H (序列 4, 50-52, 93, 126, 127, 151 和 152); PNL (序列 5, 81 和 183); OMT (序列 6, 53-55, 94 和 175); CAD (序列 7, 71, 95 和 164); CCR (序列 8, 58-70, 96, 128-134 和 167); PAL (序列 9-11, 45-47, 97, 98, 122, 123 和 176, 247 和 248); 4CL (序列 12, 56, 57, 90, 99, 147, 148, 265 和 266); CGT (序列 72, 135 和 168); CBG (序列 73-80 和 136-141); LAC (序列 82-84, 142-144 和 172); POX (序列 85-89, 91, 145, 146, 177, 178, 180-182, 264, 359-375); α 淀粉酶 (序列 184-186); 香豆酸 6A 连接酶 (序列 199 和 200); 类黄酮羟化酶(序列224-233); 异黄酮还原酶 (序列 241); 和联酚氧化酶(序列 251-263)。

b) 通过 PCR 分离 cDNA 克隆

根据下面的以前在其他物种中鉴定的过氧化物酶序列上的保守结构域设计两种 PCR 探针，以下称之为 LNB010 和 LNB011 (分别为序列 14 和 15): vanpox, hvupox6, taepox, hvupox1, osapox, ntopox2, ntopox1, lespox, pokpox, luspox, athpox, hrpox, spopox, 和 tvepox (Genbank 保藏号分别为 D11337, M83671, X56011, X58396, X66125, J02979, D11396, X71593, D11102, L07554, M58381, X57564, Z22920, 和 Z31011)。

从松树木质部分离 RNA，并按上述方法合成第一股 cDNA 链。使用 4 μM LNB010, 4 μM LNB011, 1 x Kogen's 缓冲液, 0.1 mg/ml BSA, 200 mM dNTP, 2 mM Mg^{2+}，和 0.1 U/μl of Taq 聚合酶 (Gibco BRL)对该 DNA 进行 PCR。条件为：94°C 下 2 分钟， 55°C 下 1 分钟和 72°C 下 1 分钟，进行 2 轮； 94°C 下 1 分钟，55°C 下 1 分钟，和 72°C 下 1 分钟，进行 25 轮；和 94°C 下 1 分钟，55°C 下 1 分钟，和 72°C 下 3 分钟，进行 18 轮，在 Stratagene Robocycler 中进行。以相同方式对该基因进行再次扩增。使用 Schleicher & Schuell Elu-Quik DNA 纯化试剂盒从 TAE 琼脂糖凝胶中纯化大约 200bp 的带，并克隆到 T-尾 pBluescript 载体上 (Marchuk D 等，核酸研究 19:1154, 1991)。根据与已知序列的相似性，分离的基因（序列 13）被确定为编码松树过氧化物酶（POX）。

实施例 3

使用 O-甲基转移酶 (OMT)基因改变木质素生物合成

用辐射松 OMT 基因转化烟草植物

通过用公开的方法直接转化(参见 An G, Ebert PR, Mitra A, Ha SB, “二元载体” Gelvin SB, Schilperoort RA, 著,植物分子生物学手册, Kluwer 学术出版社: Dordrecht, 1988)将含有包括源于辐射松的 OMT 编码区（序列 53）的多核苷酸的有义和反义结构插入 LBA4301 中（由 University of California, Davis, CA 的 Dr. C. Kado 馈赠）。通过限制性消化和 DNA 测序证实所述转基因结构的存在和完整性。

用 Horsch 等的方法（科学 227:1229-1231, 1985）转化烟草 (Nicotiana tabacum cv. Samsun) 叶子切片。建立 OMT 的有义结构的 5 个独立的转化植物品系，并建立 OMT 的反义结构的 8 个独立的转化植物品系。用“Southern”印迹实验证实含有合适的木质素基因结构的转化植物。在下面的表 2 中被标明为“Southern”一栏中的“+“表示转化的植物品系被证实为独立的转化品系。

在转化植物中表达松属 OMT

从用 OMT 有义和反义结构产生的每一个独立的转化植物品系中分离总 RNA。在 Northern 印迹实验中分析 RNA 样品，以便测定所述转基因在每一个转化品系中的表达水平。在表 2 中被标明为 Northern 一栏中的数据，表示含有 OMT 的有义和反义结构的转化植物品系，相对

Northern 印迹上的背景而言，都表现出高水平的表达。在 2 号有义植物品系中未测出 OMT 的表达，因为 RNA 样品表现出降解的迹象。与来自空载体转化的对照植物的样品没有可检测的杂交。

在转化植物中改变 OMT 酶活性

分析用 OMT 有义和反义结构产生的转化植物品系，分析转化烟草植物中由松属 OMT 基因和内源烟草 OMT 基因编码的 OMT 酶的总的活性。从每一种转化植物制备粗制蛋白提取物，并用 Zhang 等 的方法（植物生理学，113:65-74, 1997）分析。在表 1 中被标明为“酶”的一栏中的数据表示含有 OMT 有义结构的转化植物品系通常具有较高的 OMT 酶活性，最高为 199%，而含有 OMT 反义结构的转化植物品系通常具有较低的 OMT 活性，最低为 35%，以上百分比是相对空载体转化的对照植物而言。3 号有义植物品系中的 OMT 酶的活性没有测定。

转化植物中松属 OMT 对木质素浓度的影响

用已经完善的硫代乙醇酸提取方法 (参见 Freudenberg 等，木质素的构建和生物合成，Springer-Verlag: 柏林，1968)测定转化植物木质素的浓度。简单地讲，在液氮中冷冻平均大小为 38 日龄的烟草全植株，并用研钵和研棒研磨成细粉。分别用甲醇提取 100 毫克来自空载体转化过的对照植物品系，含有 OMT 有义结构的 5 个独立的转化植物品系和含有 OMT 反义结构的 8 个独立的转化植物品系的冷冻粉末，然后用 10%的硫代乙醇酸提取，最后溶解在 1 M NaOH 中。测定最终提取物在 280nm 下的吸收值。表 2 中被标明为“TGA”一栏中的数据表示含有有义和反义 OMT 基因结构的转化植物品系，相对空载体转化的对照植物品系而言，均表现出木质素的显著减少。

表 2

植物品系	转基因	方向	Southern	Northern	酶	TGA
1	对照	na	+	空白	100	104
1	OMT	有义	+	2.9E+6	86	55
2	OMT	有义	+	na	162	58
3	OMT	有义	+	4.1E+6	na	63
4	OMT	有义	+	2.3E+6	142	66
5	OMT	有义	+	3.6E+5	199	75
1	OMT	反义	+	1.6E+4	189	66
2	OMT	反义	+	5.7E+3	35	70
3	OMT	反义	+	8.0E+3	105	73
4	OMT	反义	+	1.4E+4	109	74
5	OMT	反义	+	2.5E+4	87	78
6	OMT	反义	+	2.5E+4	58	84
7	OMT	反义	+	2.5E+4	97	92
8	OMT	反义	+	1.1E+4	151	94

以上数据清楚地表明，通过 OMT 的木质素合成基因的有义或反义表达可以直接操纵通过 TGA 分析测定的木质素的浓度。

实施例 4

用 4-香豆酸：辅酶 A 连接酶(4CL)基因改变木质素生物合成

a) 用辐射松 4CL 基因转化烟草植物

按照上述方法，通过直接转化将含有包括源于辐射松的 4CL 编码区（序列 56）的多核苷酸的有义和反义结构插入根癌农杆菌 LBA4301，通过限制性消化和 DNA 测序证实该转基因结构的存在和完整性。

按上述方法转化烟草(Nicotiana tabacum cv. Samsun) 叶子切片。建立 4CL 的有义结构的 5 个独立的转化植物品系，并建立 4CL 反义结构的 8 个独立的转化植物品系。用 Southern 印迹实验证实含有合成的木质素基因结构的转化植物。表 3 中被标明为 “Southern” 一栏中的 “+” 表示所列举的转化植物品系被证实为独立的转化品系。

b) 在转化植物中表达松属 4CL

从用 4CL 有义和反义结构产生的每一个独立的转化植物品系中分离总 RNA。在 Northern 印迹实验中分析 RNA 样品，以便测定所述转基因在每一个转化品系中的表达水平。在表 3 中被标明为 Northern 一栏中的数据表示含有 4CL 的有义和反义结构的转化植物品系，相对 Northern 印迹上的背景而言，都表现出高水平的表达。在 1 号反义植物品系中未测出 4CL 的表达，因为在进行该实验时是没有它的。与源于空载体转化的对照植物的 RNA 样品不存在可检测的杂交。

c) 在转化植物中改变 4CL 酶活性

分析用 4CL 有义和反义结构产生的转化植物品系，分析转化烟草植物中由松属 4CL 基因和内源烟草 4CL 基因编码的 4CL 酶的总的活性。从每一种转化植物制备粗制蛋白提取物，并用 Zhang 等 的方法（植物生理学，113:65-74, 1997）分析。在表 3 中被标明为“酶”的一栏中的数据表示含有 4CL 有义结构的转化植物品系通常具有较高的 4CL 酶活性，最高为 258%，而含有 4CL 反义结构的转化植物品系通常具有较低的 4CL 活性，最低为 59%，以上百分比是相对空载体转化的对照植物而言。

d) 转化植物中松属 4CL 对木质素浓度的影响

按例 3 所述方法测定转化植物材料样品中木质素的浓度。表 3 中被标明为“TGA”一栏中的数据表示含有有义和反义 4CL 基因结构的转化植物品系，相对空载体转化的对照植物品系而言，均表现出木质素的显著减少。以上数据清楚地表明，通过 4CL 的木质素合成基因的有义或反义表达可以直接操纵通过 TGA 分析测定的木质素的浓度。

表 3

植物品系	转基因	方向	Southern	Northern	酶	TGA
1	对照	na	+	空白	100	92
2	对照	na	+	空白	100	104
1	4CL	有义	+	2.3E+4	169	64
2	4CL	有义	+	4.5E+4	258	73
3	4CL	有义	+	3.1E+4	174	77
4	4CL	有义	+	1.7E+4	164	80
5	4CL	有义	+	1.6E+4	184	92
1	4CL	反义	+	na	59	75
2	4CL	反义	+	1.0E+4	70	75
3	4CL	反义	+	9.6E+3	81	80
4	4CL	反义	+	1.2E+4	90	83
5	4CL	反义	+	4.7E+3	101	88
6	4CL	反义	+	3.9E+3	116	89
7	4CL	反义	+	1.8E+3	125	94
8	4CL	反义	+	1.7E+4	106	97

实施例 5

用本发明的木质素生物合成基因转化烟草

通过上述直接转化将含有包括源于巨桉的 C3H (序列 18), F5H (序列 19), CCR (序列 26) 和 CGT (序列 31) 的编码区和源于辐射松的 OMT (序列 6), PAL (序列45 和 47), C4H (序列 48 和 49), PNL (序列 81) 和 LAC (序列 83) 的编码区的多核苷酸的有义和反义结构插入根癌农杆菌 LBA4301 中。通过限制性消化和 DNA 测序证实该转基因结构的存在和完整性。

用例 3 所述方法转化烟草 (Nicotiana tabacum cv. Samsun) 叶子切片。建立 12 个上述所列举的每一种有义和反义结构独立的转化植物品系。用 Southern 印迹实验证实含有合适的木质素基因结构的转化植物。分析过的所有转化植物品系都被证实为独立的转化品系。

实施例 6

操纵转化植物中木质素的含量

a) 通过 Northern 印迹实验测定转基因表达

从例 5 中所述每一个独立的转化植物品系中分离总 RNA。在 Northern 印迹实验中分析 RNA 样品，以便测定每一个转化品系中转基因的表达水平。表 4 中被标明为“Northern”的一栏表示测定的所有植物品系相对 Northern 印迹上背景的转基因表达水平。与来自空载体转化的对照植物的 RNA 样品不存在可检测的杂交。

b) 测定转化植物中木质素浓度

按例 3 所述方法测定了空载体转化的对照植物品系和多达 12 个例 5 所示每一种有义结构和每一种反义结构的独立转化品系的木质素浓度。表 4 中被标明为 “TGA”的一栏表示用 C3H, F5H, CCR, PAL, C4H, PNL 和 LAC 转化过的植物品系的硫代乙醇酸可提取的木质素，以转化植物相对对照植物的 TGA 的可提取的木质素的平均百分比表示。波动范围用括号表示。

表 4

转基因	方向	品系数量	Northern	TGA
对照	na	3	空白	100 (92-104)
C3H	有义	5	3.7E+4	74 (67-85)
F5H	有义	10	5.8E+4	70 (63-79)
F5H	反义	9	5.8E+4	73 (35-93)
CCR	有义	1	na	74
CCR	反义	2	na	74 (62-86)
PAL	有义	5	1.9E+5	77 (71-86)
PAL	反义	4	1.5E+4	62 (37-77)
C4H	反义	10	5.8E+4	86 (52-113)
PNL	反义	6	1.2E+4	88 (70-114)
LAC	有义	5	1.7E+5	na
LAC	反义	12	1.7E+5	88 (73-114)

图 5 表示可提取的木质素的量，以通过例 5 所示方法用 PAL (有义和反义), C4H (反义), C3H (有义), F5H (有义 和反义), C5H (有义 和

反义) C3H (有义; 在图 5 中被称为 COMT), OMT (有义 和 反义; 在图 5 中被称为 CCOMT), 4CL (有义 和 反义), CCR (有义 和 反义) 和 CGT (反义) 结构转化的烟草植物相对野生型木质素的百分比表示。测定转基因植物中硫代乙醇酸可提取的木质素的量，归一化为空载体对照植物。三种提取物分别来自大约 10 个独立产生的转基因植物的每一种。三种提取物的平均值用黑点表示，作为这种植物的木质素值。用特定 cDNA 结构转化的 10 个独立转基因植物的平均值用线条表示。空载体转化的对照植物的平均值用 X 表示。对照的值被外推通过有关区域，以便于比较。黑色线条表示平均值，该平均值相对对照植物而言，木质素的含量显著降低($p < 0.05$)。灰色线条表示相对对照植物没有明显变化的平均值。

含有有义和反义木质素生物合成基因结构的转化品系所表现出的平均木质素含量显著低于空载体转化的对照植物品系的含量。对木质素浓度最明显的影响出现在 OMT 有义植物中，和 PAL 有义植物中。以上数据清楚地表明，通过 TGA 分析测定的木质素浓度可以通过常规的反义方法，还可以通过用本发明的木质素生物合成基因进行有义超量表达而进行直接操纵。

实施例 7

操纵转化植物中木质素酶活性

分析含有源于辐射松的 PAL (序列 45), PNL (序列 81) 和 LAC (序列 83)和源于巨桉 的 CGT (序列 31) 的有义和反义结构的转化的烟草植物的组织提取物中特定木质素生物合成酶的活性和底物专一性。

用公开的方法对 PAL (Southerton SG 和 Deverall BJ,植物病理学 39:223-230, 1990), CGT (Vellekoop P 等, FEBS, 330:36-40, 1993), PNL (Espin CJ 等, 植物化学 44:17-22, 1997) 和 LAC (Bao W 等,科学, 260:672-674, 1993)进行酶分析。表 5 中被标明为“酶”一栏中的数据表示来自分析过的所有植物品系的重复测定值，以相对空载体转化的对照植物的酶活性的百分比表示。波动范围用括号表示。

表 5

转基因	方向	品系数量	酶	
对照	na	3	100	
PAL	有义	5	87	(60-124)
PAL	反义	3	53	(38-80)
CGT	反义	1	89	
PNL	反义	6	144	(41-279)
LAC	有义	5	78	(16-240)
LAC	反义	11	64	(14-106)

除了 PNL 反义转化植物品系之外，所有转化的植物品系所表现出的平均木质素酶活性都明显低于在空载体转化的对照植物中所观察到的活性。对木质素酶活性最明显的影响出现在 PAL 反义转化植物品系中。其中，所有的品系都表现出降低了的 PAL 活性，并且在 LAC 反义转化植物品系中所表现出的 LAC 活性仅为空载体转化的的对照植物品系的 14%。

实施例 8

木质素生物合成基因的功能鉴定

将含有包括源于辐射松的 PAL (序列 47), OMT (序列 53), 4CL (序列 56 和 57) 和 POX (序列 86)，以及源于巨桉的 OMT (序列 23 和 24), CCR (序列 26-28), CGT (序列 31 和 33) 和 POX (序列 42 和 44) 的编码区的多核苷酸的有义结构插入商业出售的蛋白表达载体 pProEX-1 (Gibco BRL)中。将所得到的结构转入大肠杆菌 XL1-Blue (Stratagene)中，然后通过添加 IPTG 对其进行诱导，以便产生重组蛋白。用 Ni 柱层析(Janknecht R 等，美国科学院院报 88:8972-8976, 1991)生产松属 OMT 和 4CL 结构以及桉属 OMT 和 POX 结构的纯化蛋白。对每一种纯化蛋白的酶分析，结论性地证实了测试基因的预期的底物专一性和酶促活性。

在表 6 中示出了表明证实辐射是 4CL 基因 (序列 56) 和 辐射松

OMT 基因 (序列 53)的酶促活性的两个代表性酶分析实验。对于 4CL 酶来说，一个单位等于以每分钟 0.1 个吸收单位的速度将底物转化成产物所需要的蛋白量。对于 OMT 酶来说，一个单位等于每分钟将 1 皮摩尔底物转化成产物所需要的蛋白量。

表 6

转基因	纯化步骤	提取物总 ml	蛋白总 mg	总活性单位	%产物活性	纯化倍数
4CL	粗制物	10 ml	51 mg	4200	100	1
	Ni 柱	4 ml	0.84 mg	3680	88	53
OMT	粗制物	10 ml	74 mg	4600	100	1
	Ni 柱	4 ml	1.2 mg	4487	98	60

表 6 中的数据表明，纯化的 4CL 和纯化的 OMT 酶在酶分析中都表现出高的活性，证实了在该申请中所披露的对 4CL 和 OMT 基因的鉴定。来自用空载体转化的大肠杆菌的粗制蛋白制剂，在 4CL 或 OMT 酶分析中未表现出活性。

实施例 9

证实植物中特殊序列识别物的存在/缺乏

用不存在于烟草中的独特的识别序列生产转基因烟草植物。所插入的独特的识别序列是从辐射松（序列 402）和巨桉（序列 403）中分离的。通过用公开的方法(参见 An G, Ebert PR, Mitra A, Ha SB, “二元载体”，Gelvin SB, Schilperoort RA,著，植物分子生物学手册，Kluwer 学术出版社，Dordrecht, 1988)通过直接转化将所述独特的识别序列插入根癌农杆菌 LBA4301(由 University of California, Davis, CA 的 Dr.C.Kado 馈赠)。通过限制性消化和 DNA 测序，证实所述独特的识别序列在农杆菌属转基因结构上的存在和完整性。

用 Horsch 等(科学 227:1229-1231, 1985)的方法转化烟草 (Nicotiana tabacum cv. Samsun）叶子切片。建立所使用的每一种独特的序列识别物的三种独立的转化植物品系。用缺乏独特的序列识别物的空基因转移载体建立两个空载体对照植物品系。

用 Southern 印迹分析确定所述序列识别物的独特性，以便检验该序列识别物在有关植物基因组中的存在。如果所述序列识别物是独特的，并因此被用作标记物，那么该序列识别物应当明确不存在于未被标记过的植物中，并且应当明确地存在于标记过的植物中。在本实施例中，所述独特的识别物预期不存在于空载体转化的对照植物中。该独特的识别物应当预期存在于用该独特序列识别物转化过的转基因植物中。

用 Murray 和 Thompson 的十六烷基三甲基溴化铵（CTAB）方法(核酸研究 8:4321-4325, 1980)制备来自空载体转化的对照植物和用独特序列识别物转化过的植物的基因组 DNA。用限制性酶消化所述 DNA 样品，对于用松属独特序列识别物（序列 402）转化过的植物来说使用 EcoRI，对于用桉属独特序列识别物（序列 403）转化过的植物来说使用限制酶 XbaI。在 1%的琼脂糖凝胶上分离所述限制性消化所产生的 DNA 片段；图 2 的左侧照片和图 2 的右侧照片分别表示来自松属和桉属实验的 DNA 样品的 DNA 片段形式。

在所述琼脂糖凝胶电泳步骤之后，用由 Southern 建立的方法 (分子生物学方法 98:503-517)将所述 DNA 样品转移到 Hybond-N+ 牌尼龙膜(Amersham Life Science, Little Chalfont, Buckinghamshire, England)上。用放射性标记过的探针检测所述尼龙膜上上述独特序列识别物，并在高严格条件下洗涤 (最终洗涤 ： 0.5 X 柠檬酸钠盐缓冲液(SSC) 加 0.1% 十二烷基硫酸钠(SDS), 15 分钟 ，65°C)。用放射性自显影检测探针与基因组 DNA 样品中的互补序列杂交。结果如图 3 和 4 所示。

图 3（相应于图 2 的左侧照片）表示用源于松属序列识别物（序列 402）的探针进行的 Southern 印迹分析中检测到的杂交形式。泳道 A-B 含有源于空载体转化的对照植物的 DNA 样品，而泳道 C-E 含有源于用序列 402 转化过的植物的 DNA。在泳道 A-B 中没有杂交，这表明序列 402 不存在于空载体转化的烟草植物中；就是说序列 402 是适用于烟草植物的非普遍性标记的独特标记。在泳道 C-E 中存在强的杂交，这表明通过转化接受了序列 402 的植物业已明确地、并非普遍性地被序列

402 所包含的独特序列所标记。

图 4（相应于图 2 的右侧照片）表示用源于桉属序列识别物（序列 403）的探针进行的 Southern 印迹分析中检测到的杂交形式。泳道 A-B 含有源于空载体转化的对照植物的 DNA 样品，而泳道 C-E 含有源于用序列 403 转化过的植物的 DNA。在泳道 A-B 中没有杂交，这表明序列 403 不存在于空载体转化的烟草植物中；就是说序列 403 是适用于烟草植物的非普遍性标记的独特标记。在泳道 C-E 中存在强的杂交，这表明通过转化接受了序列 403 的植物业已明确地、并非普遍性地被序列 403 所包含的独特序列所标记。

本实施例清楚地表明了在本说明书中所披露的序列在非普遍性标记转基因材料方面的用途。从大量的潜在标记中选择独特的序列，并证实其在要标记的生物的基因组中的缺乏。将该标记插入要标记的生物的基因组中，并使用业已完善的 DNA 检测方法明确地检测被用作标记物的所述独特序列识别物。

由于在本实施例中所使用的序列专一性检测方法，本说明书所披露的本发明的用户有很大可能性在所披露的序列中间发现一种序列识别物，该识别物可用于标记任何特定生物，并且该方法是一种用于证实被标记的生物只可能获得了特定标记的明确方法，该生物是通过将所述独特序列专门加入到要标记的生物的基因组中而标记过的。如果本发明的用户将用于特定生物中的标记的准确序列作为秘密保守，那么有关该生物的起源和历史的任何争议，都可以通过在本实施例中所证实的标记检测技术得到明确无误的解决。

在所附序列表中示出了序列 1-403 。在所附序列表中使用的核苷酸密码包括符号 “n,” 符合 WIPO 标准 ST.25 (1998)，附录 2，表 1。

本文所引用的所有文献（包括专利文献和非专利文献）被以全文形式收作本文参考。

尽管在以上说明中已经结合某些优选实施方案对本发明进行了说明，并且为了说明目的提供了许多细节，但本领域技术人员显而易见的是，本发明还有其他实施方案，并且在不超出本发明基本原则的前提下，可以对本文所披露的细节进行大的改变。

序列表

<110> Bloksberg, Leonard N.
Havukkala, Ilkka

<120> 改变植物木质素含量的材料和方法

<130> 11000.1003c4PCT

<150> US 09/169,789
<151> 1998-10-09

<150> US 60/143,811
<151> 1999-07-14

<160> 403

<170> FastSEQ for Windows Version 3.0

<210> 1
<211> 535
<212> DNA
<213>

<220>
<221>
<222> (110)...(110)

<400> 1
```
cttcgcgcta ccgcatactc caccaccgcg tgcagaagat gagctcggag ggtgggaagg      60
aggattgcct cggttgggct gcccgggacc cttctgggtt cctctccccn tacaaattca     120
cccgcaggcc gtgggaagcg aagacgtctc gattaagatc acgcactgtg gagtgtgcta     180
cgcagatgtg gcttggacta ggaatgtgca gggacactcc aagtatcctc tggtgccggg     240
gcacgagata gttggaattg tgaaacaggt tggctccagt gtccaacgct tcaaagttgg     300
cgatcatgtg gggtgggaa cttatgtcaa ttcatgcaga gagtgcgagt attgcaatga      360
caggctagaa gtccaatgtg aaaagtcggt tatgactttt gatggaattg atgcagatgg     420
tacagtgaca aagggaggat attctagtca cattgtcgtc catgaaaggt attgcgtcag     480
gattccagaa aactacccga tggatctagc agcgcattgc tctgtgctgg atcac          535
```

<210> 2
<211> 671
<212> DNA
<213>

<400> 2
```
gcgcctgcag gtcgacacta gtggatccaa agaattcggc acgaggttgc aggtcgggga      60
tgatttgaat cacagaaacc tcagcgattt tgccaagaaa tatggcaaaa tctttctgct     120
caagatgggc cagaggaatc ttgtggtagt ttcatctccc gatctcgcca aggaggtcct     180
gcacacccag ggcgtcgagt ttgggtctcg aacccggaac gtggtgttcg atatcttcac     240
gggcaagggg caggacatgg tgttcaccgt ctatggagat cactggagaa agatgcgcag     300
gatcatgact gtgcctttct ttacgaataa agttgtccag cactacagat tcgcgtggga     360
agacgagatc agccgcgtgg tcgcggatgt gaaatcccgc gccgagtctt ccacctcggg     420
cattgtcatc cgtagcgcct ccagctcatg atgtataata ttatgtatag gatgatgttc     480
```

gacaggagat tcgaatccga ggacgacccg cttttcctca agctcaaggc cctcaacgga 540
gagcgaagtc gattggccca gagctttgag tacaattatg gggatttcat tcccagtctt 600
aggcccttcc tcagaggtta tcacagaatc tgcaatgaga ttaaagagaa acggctctct 660
cttttcaagg a 671

<210> 3
<211> 940
<212> DNA
<213>

<220>
<221>
<222> (463)...(463)

<400> 3
cttcaggaca agggagagat caatgaggat aatgttttgt acatcgttga gaacatcaac 60
gttgcagcaa ttgagacaac gctgtggtcg atggaatggg gaatagcgga gctggtgaac 120
caccaggaca ttcagagcaa ggtgcgcgca gagctggacg ctgttcttgg accaggcgtg 180
cagataacgg aaccagacac gacaaggttg ccctaccttc aggcggttgt gaaggaaacc 240
cttcgtctcc gcatggcgat cccgttgctc gtcccccaca tgaatctcca cgacgccaag 300
ctcgggggct acgatattcc ggcagagagc aagatcctgg tgaacgcctg gtggttggcc 360
aacaaccccg ccaactggaa gaaccccgag gagttccgcc ccgagcggtt cttcgaggag 420
gagaagcaca ccgaagccaa tggcaacgac ttcaaattcc tgnccttcgg tgtggggagg 480
aggagctgcc cgggaatcat tctggcgctg ctctcctcgc actctccatc ggaagacttg 540
ttcagaactt ccaccttctg ccgccgcccg ggcagagcaa agtggatgtc actgagaagg 600
gcgggcaatt cagccttcac attctcaacc attctctcat cgtcgccaag cccatagctt 660
ctgcttaatc ccaacttgtc agtgactggt atataaatgc gcgcacctga acaaaaaaca 720
ctccatctat catgactgtg tgtgcgtgtc cactgtcgag tctactaaga gctcatagca 780
cttcaaaagt ttgctaggat ttcaataaca gacaccgtca attatgtcat gtttcaataa 840
aagtttgcat aaattaaatg atatttcaat atactatttt gactctccac caattgggga 900
attttactgc taaaaaaaaa aaaaaaaaaa aaaaaaaaaa 940

<210> 4
<211> 949
<212> DNA
<213>

<220>
<221>
<222> (1)...(949)
<223> n

<400> 4
nngctcnacc gacggtggac ggtccgctac tcagtaactg agtgggatcc cccgggctga 60
caggcaattc gatttagctc actcattagg caccccaggc tttacacttt atgcttccgg 120
ctcgtatgtt gtgtggaatt gtgagcggat aacaatttca cacaggaaac agctatgacc 180
atgattacgc caagcgcgca attaaccctc actaaaggga acaaaagctg gagctccacc 240
gcggtggcgg ccgctctaga actagtggat ccaaagaatt cggcacgaga cccagtgacc 300
ttcaggcctg agagatttct tgaggaagat gttgatatta agggccatga ttacaggcta 360
ctgccattgg tgcagggcgc aggatctgcc ctggtgcaca attgggtatt aatttagttc 420
agtctatgtt gggacacctg cttcatcatt tcgtatgggc acctcctgag ggaatgaagg 480
cagaagacat agatctcaca gagaatccag ggcttgttac tttcatggcc aagcctgtgc 540
aggccattgc tattcctcga ttgcctgatc atctctacaa gcgacagcca ctcaattgat 600
caattgatct gatagtaagt ttgaattttg ttttgataca aaacgaaata acgtgcagtt 660
tctccttttc catagtcaac atgcagcttt ctttctctga agcgcatgca gctttctttc 720
tctgaagccc aacttctagc aagcaataac tgtatatttt agaacaaata cctattcctc 780

aaattgagwa tttctctgta ggggnngnta attgtgcaat ttgcaagnaa tagtaaagtt 840
tantttaggg nattttaata gtcctangta anangnggna atgntagngg gcattnagaa 900
anccctaata gntgttggng gnngntaggn tttttnacca aaaaaaaaa 949

<210> 5
<211> 959
<212> DNA
<213>

<220>
<221>
<222> (697)...(697)

<400> 5
gaattcggca cgagaaagcc ctagaatttt ttcagcatgc tatcacagcc ccagcgacaa 60
ctttaactgc aataactgtg gaagcgtaca aaaagtttgt cctagtttct ctcattcaga 120
ctggtcaggt tccagcattt ccaaaataca cacctgctgt tgtccaaaga aatttgaaat 180
cttgcactca gccctacatt gatttagcaa acaactacag tagtgggaaa atttctgtat 240
tggaagcttg tgtcaacacg aacacagaga agttcaagaa tgatagtaat ttggggttag 300
tcaagcaagt tttgtcatct ctttataaac ggaatattca gagattgaca cagacatatc 360
tgaccctctc tcttcaagac atagcaagta cggtacagtt ggagactgct aagcaggctg 420
aactccatgt tctgcagatg attcaagatg gtgagatttt tgcaaccata aatcagaaag 480
atgggatggt gagcttcaat gaggatcctg aacagtacaa aacatgtcag atgactgaat 540
atatagatac tgcaattcgg agaatcatgg cactatcaaa gaagctcacc acagtagatg 600
agcagatttc gtgtgatcat tcctacctga gtaaggtggg gagagagcgt tcaagatttg 660
acatagatga ttttgatact gttccccaga agttcanaaa tatgtaacaa atgatgtaaa 720
tcatcttcaa gactcgctta tattcattac tttctatgtg aattgatagt ctgttaacaa 780
tagtactgtg gctgagtcca gaaaggatct ctcggtatta tcacttgaca tgccatcaaa 840
aaaatctcaa atttctcgat gtctagtctt gattttgatt atgaatgcga cttttagttg 900
tgacatttga gcacctcgag tgaactacaa agttgcatgt taaaaaaaaa aaaaaaaaa 959

<210> 6
<211> 1026
<212> DNA
<213>

<400> 6
gaattcggca cgagctttga ggcaacctac attcattgaa tcccaggatt tcttcttgtc 60
caaacaggtt taaggaaatg gcaggcacaa gtgttgctgc agcagaggtg aaggctcaga 120
caacccaagc agaggagccg gttaaggttg tccgccatca agaagtggga cacaaaagtc 180
ttttgcagag cgatgccctc tatcagtata tattggaaac gagcgtgtac cctcgtgagc 240
ccgagccaat gaaggagctc cgcgaagtga ctgccaagca tccctggaac ctcatgacta 300
cttctgccga tgagggtcaa tttctgggcc tcctgctgaa gctcattaac gccaagaaca 360
ccatggagat tggggtgtac actggttact cgcttctcag cacagccctt gcattgcccg 420
atgatggaaa gattctagcc atggacatca acagagagaa ctatgatatc ggattgccta 480
ttattgagaa agcaggagtt gcccacaaga ttgacttcag agagggccct gctctgccag 540
ttctggacga actgcttaag aatgaggaca tgcatggatc gttcgatttt gtgttcgtgg 600
atgcggacaa agacaactat ctaaactacc acaagcgtct gatcgatctg gtgaaggttg 660
gaggtctgat tgcatatgac aacaccctgt ggaacggatc tgtggtggct ccacccgatg 720
ctcccctgag gaaatatgtg agatattaca gagatttcgt gatggagcta aacaaggccc 780
ttgctgtcga tccccgcatt gagatcagcc aaatcccagt cggtgacggc gtcacccttt 840
gcaggcgtgt ctattgaaaa caatccttgt ttctgctcgt ctattgcaag cataaaggct 900
ctctgattat aaggagaacg ctataatata tggggttgaa gccatttgtt ttgtttagtg 960
tattgataat aaagtagtac agcatatgca aagtttgtat caaaaaaaaa aaaaaaaaaa 1020
aaaaaa 1026

<210> 7
<211> 1454
<212> DNA
<213>

<400> 7
gaattcggca cgaggccaac tgcaagcaat acagtacaag agccagacga tcgaatcctg 60
tgaagtggtt ctgaagtgat gggaagcttg gaatctgaaa aaactgttac aggatatgca 120
gctcgggact ccagtggcca cttgtcccct tacacttaca atctcagaaa gaaaggacct 180
gaggatgtaa ttgtaaaggt catttactgc ggaatctgcc actctgattt agttcaaatg 240
cgtaatgaaa tggacatgtc tcattaccca atggtccctg ggcatgaagt ggtggggatt 300
gtaacagaga ttggcagcga ggtgaagaaa ttcaaagtgg gagagcatgt aggggttggt 360
tgcattgttg ggtcctgtcg cagttgcggt aattgcaatc agagcatgga acaatactgc 420
agcaagagga tttggaccta caatgatgtg aaccatgacg gcacacctac tcagggcgga 480
tttgcaagca gtatggtggt tgatcagatg twtgtggttc gaatcccgga gaatcttcct 540
ctggaacaag cggcccctct gttatgtgca ggggttacag ttttcagccc aatgaagcat 600
ttcgccatga cagagcccgg gaagaaatgt gggattttgg gtttaggagg cgtggggcac 660
atgggtgtca agattgccaa agcctttgga ctccacgtga cggttatcag ttcgtctgat 720
aaaaagaaag aagaagccat ggaagtcctc ggcgccgatg cttatcttgt tagcaaggat 780
actgaaaaga tgatggaagc agcagagagc ctagattaca taatggacac cattccagtt 840
gctcatcctc tggaaccata tcttgccctt ctgaagacaa atggaaagct agtgatgctg 900
ggcgttgttc cagagtcgtt gcacttcgtg actcctctct taatacttgg gagaaggagc 960
atagctggaa gtttcattgg cagcatggag gaaacacagg aaactctaga tttctgtgca 1020
gagaagaagg tatcatcgat gattgaggtt gtgggcctgg actacatcaa cacggccatg 1080
gaaaggttgg agaagaacga tgtccgttac agatttgtgg tggatgttgc tagaagcaag 1140
ttggataatt agtctgcaat caatcaatca gatcaatgcc tgcatgcaag atgaatagat 1200
ctggactagt agcttaacat gaaagggaaa ttaaattttt atttaggaac tcgatactgg 1260
tttttgttac tttagtttag cttttgtgag gttgaaacaa ttcagatgtt tttttaactt 1320
gtatatgtaa agatcaattt ctcgtgacag taaataataa tccaatgtct tctgccaaat 1380
taatatatgt attcgtattt ttatatgaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1440
aaaaaaaaaa aaaa 1454

<210> 8
<211> 740
<212> DNA
<213>

<400> 8
gaattcggca cgagaccatt tccagctaat attggcatag caattggtca ttctatcttt 60
gtcaaaggag atcaaacaaa ttttgaaatt ggacctaatg gtgtggaggc tagtcagcta 120
tacccagatg tgaaatatac cactgtcgat gagtacctca gcaaatttgt gtgaagtatg 180
cgagattctc ttccacatgc ttcagagata cataacagtt tcaatcaatg tttgtcctag 240
gcatttgcca aattgtgggt tataatcctt cgtaggtgtt tggcagaaca gaacctcctg 300
tttagtatag tatgacgagc taggcactgc agatccttca cacttttctc ttccataaga 360
aacaaatact cacctgtggt ttgttttctt tctttctgga actttggtat ggcaataatg 420
tctttggaaa ccgcttagtg tggaatgcta agtactagtg tccagagttc taagggagtt 480
ccaaaatcat ggctgatgtg aactggttgt tccagagggt gtttacaacc aacagttgtt 540
cagtgaataa ttttgttaga gtgtttagat ccatctttac aaggctattg agtaaggttg 600
gtgttagtga acggaatgat gtcaaatctt gatgggctga ctgactctct tgtgatgtca 660
aatcttgatg gattgtgtct ttttcaatgg taaaaaaaaa aaaaaaaaaa aaaaaaaaaa 720
aaaaaaaaaa aaaaaaaaaa 740

<210> 9
<211> 624
<212> DNA
<213>

<400> 9
gaattcctgc agcccggggg atccactagt tctagagcgg ccgccaccgc ggtggagctc 60
gcgcgcctgc aggtcgacac tagtggatcc aaagaattcg gcacgaggcc cgacggccac 120
ttgttggacg ccatggaagc tctccggaaa gccgggattc tggaaccgtt taaactgcag 180
cccaaggaag gactggctct cgtcaacggc acagcggtgg gatccgccgt ggccgcgtcc 240
gtctgtgttg acgccaacgt gctgggcgtg ctggctgaga ttctgtctgc gctcttctgc 300
gaggtgatgc aagggaaacc ggagttcgta gatccgttaa cccaccagtt gaagcaccac 360
ccagggcaga tcgaagccgc ggccgtcatg gagttcctcc tcgacggtag cgactacgtg 420
aaagaagcag cgcggcttca cgagaaagac ccgttgagca aaccgaaaca agaccgctac 480
gctctgcgaa catcgccaca gtggttgggg cctccgatcg aagtcatccg cgctgcyact 540
cactccatcg agcgggagat caattccgtc aacgacaatc cgttaatcga tgtctccagg 600
gacatggctg tccacggcgg caac 624

<210> 10
<211> 278
<212> DNA
<213>

<400> 10
gaattcctgc agcccggggg atccactagt tctagagcgg ccgccaccgc ggtggagctc 60
cagtacctgg ccaaccccgt cacgactcac gtccagagcg ccgaacaaca caaccaggat 120
gtcaattccc tcggcttgat ctccgccaga aagactgccg aggccgttga gattttaaag 180
ctgatgttcg ctacatatct ggtggcctta tgccaggcga tcgatctccg gcacctggaa 240
gaaaacatgc gatccgttgt gaagcacgta gtcttgca 278

<210> 11
<211> 765
<212> DNA
<213>

<400> 11
gagctcctgc aagtcatcga tcatcagccc gttttctcgt acatcgacga tcccacaaat 60
ccatcatacg cgcttatgct ccaactcaga gaagtgctcg tagatgaggc tctcaaatca 120
tcttgcccag acgggaatga cgaatccgat cacaatttgc agcccgctga gagcgctgga 180
gctgctggaa tattacccaa ttgggtgttt agcaggatcc ccatatttca agaggagttg 240
aaggcccgtt tagaggaaga ggttccgaag gcgagggaac gattcgataa tggggacttc 300
ccaattgcaa acagaataaa caagtgcagg acatatccca tttacagatt cgtgagatca 360
gagttgggaa ccgatttgct aacagggccc aagtggagaa gccccggcga agatatagaa 420
aaggtatttg agggcatttg ccaagggaaa attggaaacg tgatcctcaa atgtctggac 480
gcttggggtg ggtgcgctgg accattcact ccacgtgcat atcctgcgtc tcctgcagcg 540
ttcaatgcct catattgggc atggtttgat agcaccaaat caccctctgc aacgagcggc 600
agaggtttct ggagcgccca acaacaacaa gttctttgat ttaactgact cttaagcatt 660
cctaaacagc ttgttcttcg caataacgaa tctttcatct tcgttacttt gtaaaagatg 720
gggttccaac aaaatagaag aaatattttc gatccaaaaa aaaaa 765

<210> 12
<211> 453
<212> DNA
<213>

<400> 12
tgattatgcg gatccttggg cagggatacg gcatgacaga agcaggcccg gtgctggcaa 60
tgaacctagc cttcgcaaag aatcctttcc ccgccaaatc tggctcctgc ggaacagtcg 120
tccggaacgc tcaaataaag atcctcgatt acaggaactg gcgagtctct cccgcacaat 180
caagccggcg aaatctgcat ccgcggaccc gaaataatga aaggatatat taacgacccg 240

gaatccacgg ccgctacaat cgatgaagaa ggctggctcc acacaggcga cgtcgggtac 300
attgacgatg acgaagaaat cttcatagtc gacagagtaa aggagattat caatataaag 360
gcttccaggt ggatcctgct aatcgaattc ctgcagcccg ggggtccact agttctagag 420
cggccgccac cgcggtggag ctccagcttt tgt 453

<210> 13
<211> 278
<212> DNA
<213>

<400> 13
tcttcgaatt ctctttcacg actgcttcgt taatggctgc gatggctcga tattgttaga 60
tgataactca acgttcaccg gagaaaagac tgcaggccca aatgttaatt ctgcgagagg 120
attcgacgta atagacacca tcaaaactca agttgaggca gcctgcagtg gtgtcgtgtc 180
agttgccgac attctcgcca ttgctgcacg cgattcagtc gtccaactgg ggggcccaac 240
atggacggta cttctgggag aaaagacgga tccgatca 278

<210> 14
<211> 23
<212> DNA
<213>

<400> 14
cttcgaattc wyttycayga ytg 23

<210> 15
<211> 22
<212> DNA
<213>

<400> 15
gatcggatcc rtcyykycty cc 22

<210> 16
<211> 472
<212> DNA
<213>

<400> 16
aattcggcac gagacgacct cttgtatcgg acccggatcc gctatcgtta acgtacacac 60
gttctagtgc tgaatggaga tggagagcac caccggcacc ggcaacggcc ttcacagcct 120
ctgcgccgcc gggagccacc atgccgaccc actgaactgg ggggcggcgg cagcagccct 180
cacagggagc cacctcgacg aggtgaagcg gatggtcgag gagtaccgga ggccggcggt 240
gcgcctcggc ggggagtccc tcacgatagc ccaggtggcg gcggtggcga gtcaggaggg 300
ggtaggggtc gagctctcgg aggcggcccg tcccagggtc aaggccagca gcgactgggt 360
catggagagc atgaacaagg gaactgacag ctacggggtc accaccgggt tcggcggcaa 420
cttctcaaac cggaggccga agcaaggcgg tccttttcag aaggaactta ta 472

<210> 17
<211> 622
<212> DNA
<213>

<400> 17
ccaaagctcc tagtgcctca tgagtctgct gaggattgca caattggcgg gttcgacgtg 60
ccccgaggca ccatgatcct ggttaatgcg tgggcaattc aaagagaccc aaaagtgtgg 120

01-06-08

```
gacgatccca caaattttaa accggagagg tacgagggat tggaaggtga tcatgcctac     180
cgactattgc cgtttgggat ggggaggaga agttgtcctg gtgctggcct tgccaataga     240
gtggtgagct tggtcctggc ggcgcttatt cagtgcttcg aatgggaacg agttggcgaa     300
gaattggtgg acttgtccga ggggacggga ctcacaatgc caaagagaga gccattggag     360
gccttgtgca aagcgcgtga atgcatgata gctaatgttc ttgcgcacct ttaagaaggt     420
cgttgtctaa tgaatttaca ttggtgatgt atctccaatg tttttgaata atcaaataga     480
ctgaaaatag gccagtgcag ctttaggaat gatcgtgagc atcaatagca tcctgaggag     540
gccaatgcag ctttaggcct ttctcttagg agaaaaatga tggtttatat aggtactggc     600
aacattgttc aaaaaaaaaa aa                                              622

      <210> 18
      <211> 414
      <212> DNA
      <213>

      <400> 18
cacgctcgac gaattcggta ccccgggttc gaaatcgata agcttggatc caaagcaaca      60
cattgaactc tctctctctc tctctctctc tctctctctc tccccccaccc cccttccca     120
accccaccca catacagaca agtagatacg cgcacacaga agaagaaaag atggggggttt    180
caatgcagtc aatcgcacta gcgacggttc tggccgtcct aacgacatgg gcgtggaggg     240
cggtgaactg ggtgtggctg aggccgaaga ggctcgagag gcttctgaga cagcaaggtc     300
tctccggcaa gtcctacacc ttcctggtcg gcgacctcaa ggagaacctg cggatgctca     360
aggaagccaa gtccaagccc atcgccgtct ccgatgacat caagcctcgt ctct          414

      <210> 19
      <211> 469
      <212> DNA
      <213>

      <400> 19
gaattcggca cgagtgtctc tctctctctc tctctctgta aaccaccatg ctcttcctca      60
ctcatctcct agcagttcta ggggttgtgt tgctcctgct aattctatgg agggcaagat     120
cttctccgaa caaacccaaa ggtactgcct taccccccgga gctgccgggc gcatggccga    180
tcataggcca catccacttg ctgggcggcg agaccccgct ggccaggacc ctggccgcca     240
tggcggacaa gcagggcccg atgtttcgga tccgtctcgg agtccacccg gcgaccatca     300
taagcagccg tgaggcggtc cgggagtgct tcaccaccca cgacaaggac ctcgcttctc     360
gccccaaatc caaggcggga atccacttgg gctacgggta tgccggtttt ggcttcgtag     420
aatacgggga cttttggcgc gagatgagga agatcaccat gctcgagct                 469

      <210> 20
      <211> 341
      <212> DNA
      <213>

      <400> 20
cgggctcgtg gctcggctcc ggcgcaacgc ccttcccacc gggcccgagg ggcctcccgg      60
tcatcgggaa catgctcatg atgggcgagc tcacccaccg cggcctcgcg agtctggcga     120
agaagtatgg cgggatcttc cacctccgca tgggcttcct gcacatggtt gccgtgtcgt     180
cccccgacgt ggcccgccag gtcctccagg tccacgacgg gatcttctcg aaccggcctg     240
ccaccatcgc gatcagctac ctcacgtatg accgggccga catggccttc gcgcactacg     300
gcccgttctg gcggcagatg cggaagctgt gcgtgatgaa a                         341

      <210> 21
      <211> 387
      <212> DNA
      <213>
```

<400> 21
gaattcggca cgagcgggct cgtggctcgg ctccggcgca acgcccttcc caccgggccc 60
gaggggcctc ccggtcatcg ggaacatgct catgatgggc gagctcaccc accgcggcct 120
cgcgagtctg gcgaagaagt atggcgggat cttccacctc cgcatgggct tcctgcacat 180
ggttgccgtg tcgtcccccg acgtggcccg ccaggtcctc caggtccacg acgggatctt 240
ctcgaaccgg cctgccacca tcgcgatcag ctacctcacg tatgaccggg ccgacatggc 300
cttcgcgcac tacggcccgt tctggcggca gatgcggaag ctgtgcgtga tgaaagctct 360
tcagcggaag cgggctgagt cgtggga 387

<210> 22
<211> 443
<212> DNA
<213>

<400> 22
cacgagctcg tgagccttcc cggagacaag gccatcttac ttcgcaacaa attgcgtccg 60
cactcctttc tcaagaaacc tagtcatcca agaagcagag cattgcaact gcaaacagcc 120
aaagcccaaa ctcgtacaga aggagagaga gagagagaat agaagcatga gtgcatgcac 180
gaaccaagca atcacgacgg ccagtgaaga tgaagagttc ttgttcgcca tggaaatgaa 240
tgctctgata gcactcccct tggtcttgaa ggccaccatc gaactgggga tcctcgaaat 300
actggccgag tgcgggccta tggctccact ttcgcctgct cagattgcct cccgtctctc 360
cgcaaagaac ccggaagccc ccgtaaccct tgaccggatc ctccggtttc tcgccagcta 420
ctccatcctc tcttgcactc tcg 443

<210> 23
<211> 607
<212> DNA
<213>

<400> 23
gaattcggca cgagccaacc ctggaccagg tacttttggc aggcggtcca ttgcccttca 60
aaccggtcca aaccggacca tcactgtcct tatatacgtt gcatcatgcc tgctcataga 120
acttaggtca actgcaacat ttcttgatca caacatatta caatattcct aagcagagag 180
agagagagag agagagagag agagagagag agagtttgaa tcaatggcca ccgccggaga 240
ggagagccag acccaagccg ggaggcacca ggaggttggc cacaagtctc tccttcagag 300
tgatgctctt taccaatata ttttggagac cagcgtgtac ccaagagagc ctgagcccat 360
gaaggagctc agggaaataa cagcaaaaca tccatggaac ataatgacaa catcagcaga 420
cgaagggcag ttcttgaaca tgcttctcaa gctcatcaaa gccaagaaca ccatggagat 480
tggtgtcttc actggctact ctctcctcgc caccgctctt gctcttcctg atgacggaaa 540
gattttggct atggacatta acagagagag ctatgaactt ggcctgccgg catccaaaaa 600
gccggtg 607

<210> 24
<211> 421
<212> DNA
<213>

<400> 24
gaattcggca cgagccgttt tatttcctct gatttccttt gctcgagtct cgcggaagag 60
agagaagaga ggagaggaga gaatgggttc gaccggatcc gagacccaga tgaccccgac 120
ccaagtctcg gacgaggagg cgaacctctt cgccatgcag ctggcgagcg cctccgtgct 180
ccccatggtc ctcaaggccg ccatcgagct cgacctcctc gagatcatgg ccaaggccgg 240
gccgggcgcg ttcctctccc cgggggaagt cgcggcccag ctcccgaccc agaaccccga 300
ggcacccgta atgctcgacc ggatcttccg gctgctggcc agctactccg tgctcacgtg 360
caccctccgc gacctccccg atggcaaggt cgagcggctc tacggcttag cgccggtgtg 420

c 421

<210> 25
<211> 760
<212> DNA
<213>

<400> 25
ggaagaagcc gagcaaacga attgcagacg ccattgaaaa aagacacgaa agagatcaag 60
aaggagctta agaagcatca tcaatggcag ccaacgcaga gcctcagcag acccaaccag 120
cgaagcattc ggaagtcggc cacaagagcc tcttgcagag cgatgctctc taccagtata 180
tattggagac cagcgtctac ccaagagagc cagagcccat gaaggagctc agggaaataa 240
cagccaaaca tccatggaac ctgatgacca catcggcgga tgaagggcag ttcctgaaca 300
tgctcctcaa gctcatcaac gccaagaaca ccatggagat cggcgtctac accggctact 360
ctctcctcgc aaccgccctt gctcttcccg atgacggaaa gatcttggcc atggccatca 420
atagggagaa cttcgagatc gggctgcccg tcatccagaa ggccggcctt gcccacaaga 480
tcgatttcag agaaggccct gccctgccgc tccttgatca gctcgtgcaa gatgagaaga 540
accatggaac gtacgacttc ttctcaatcc ttaatcgttc atttgaatac aaatacatgc 600
tcaatggttc aaagacaaca taagacagaa gatggaaaaa atagaaagga aggaaagtat 660
taagggtagt ttctcatttc atcaatgctt gattttgaga tctcctttct ggtgcgatca 720
gctgacccgg cggcacaggt gatgccatcc ccgacgggaa 760

<210> 26
<211> 508
<212> DNA
<213>

<400> 26
gaattcggta cccgggttcg aaatcgataa gcttggatcc aaagaattcg gcacgagatc 60
actaaccatc tgcctttctt catcttcttt cttctgcttc tcctccgttt cctcgtttcg 120
atatcgtgaa aggagtccgt cgacgacaat ggccgagaag agcaaggtcc tgatcatcgg 180
agggacgggc tacgtcggca agttcatcgt ggaagcgagt gcaaaagcag ggcatcccac 240
gttcgcgctg gttaggcaga gcacggtctc cgaccccgtc aagggccagc tcgtcgagag 300
cttcaagaac ttgggcgtca ctctgctcat cggtgatctg tacgatcatg agagcttggt 360
gaaggcaatc aagcaagccg acgtggtgat atcgacagtg ggcacatgc aaatggcgga 420
tcagaccaaa gaatcgtcga cgccattaaa ggaagctggc aacgttaagg tttgttggtt 480
ggttcatttg atctggtttg ggggggtc 508

<210> 27
<211> 495
<212> DNA
<213>

<400> 27
gaattcggca cgaggttaat ggcagtgcag cctcaacacc acccaccttc ctccatctct 60
ctcctccctt cttctttctc tgacttcaat ggcagccgac tccatgcttg cgttcagtat 120
aagaggaagg tggggcagcc taaaggggca ctgcgggtca ctgcatcaag caataagaag 180
atcctcatca tgggaggcac ccgtttcatc ggtgtgtttt tgtcgagact acttgtcaaa 240
gaaggtcatc aggtcacttt gtttaccaga ggaaaagcac ccatcactca acaattgcct 300
ggtgagtcgg acaaggactt cgctgatttt tcatccaaga tcctgcattt gaaaggagac 360
agaaaggatt ttgattttgt taaatctagt cttgctgcag aaggctttga cgttgtttat 420
gacattaacg gcgagaggcg gatgaagtcg caccaatttt ggatgcctgc caaaccttga 480
accagtcaac tactg 495

<210> 28
<211> 472

<212> DNA
<213>

<400> 28
gaattcggca cgagcataag ctctcccgta atcctcacat cacatggcga agagcaaggt 60
cctcgtcgtt ggcggcactg gctacctcgg gcggaggttc gtgagggcga gcctggacca 120
gggccacccc acgtacgtcc tccagcgtcc ggagaccggc ctcgacattg agaagctcca 180
gacgctactg cgcttcaaga ggcgtggcgc ccaactcgtc gaggcctcgt tctcagacct 240
gaggagcctc gtcgacgctg tgaggcgggt cgatgtcgtc gtctgtgcca tgtcgggggt 300
ccacttccgg agccacaaca tcctgatgca gctcaagctc gtggaggcta tcaaagaagc 360
tggaaatgtc aagcggtttt tgccgtcaga gttcggaatg gacccggccc tcatgggtca 420
tgcaattgag ccgggaaggg tcacgttcga tgagaaatgg aggtgagaaa ag 472

<210> 29
<211> 396
<212> DNA
<213>

<400> 29
gaattcggca cgaggaggca cctcctcgaa acgaagaaga agaaggacga aggacgaagg 60
agacgaaggc gagaatgagc gcggcgggcg gtgccgggaa ggtcgtgtgc gtgaccgggg 120
cgtccggtta catcgcctcg tggctcgtca agctcctcct ccagcgcggc tacaccgtca 180
aggccaccgt ccgcgatccg aatgatccaa aaaagactga acatttgctt ggacttgatg 240
gagcgaaaga tagacttcaa ctgttcaaag caaacctgct ggaagagggt tcatttgatc 300
ctattgttga gggttgtgca ggcgtttttc aaactgcctc tccctttat catgatgtca 360
aggatccgca ggcagaatta cttgatccgg ctgtaa 396

<210> 30
<211> 592
<212> DNA
<213>

<400> 30
gaattcggca cgaggttgaa cctcccgtcc tcggctctgc tcggctcgtc accctcttcg 60
cgctcccgca tactccacca ccgcgtacag aagatgagct cggagggtgg gaaggaggat 120
tgcctcggtt gggctgcccg ggacccttct gggttcctct ccccctacaa attcacccgc 180
agggccgtgg gaagcgaaga cgtctcgatt aagatcacgc actgtggagt gtgctacgca 240
gatgtggctt ggactaggaa tgtgcaggga cactccaagt atcctctggt gccagggcac 300
gagatagttg gaattgtgaa acaggttggc tccagtgtcc aacgcttcaa agttggcgat 360
catgtggggg tgggaactta tgtcaattca tgcagagagt gcgagtattg caatgacagg 420
ctagaagtcc aatgtgaaaa gtcggttatg acttttgatg gaattgatgc agatggtaca 480
gtgacaaagg gaggatattc tagtcacatt gtcgtccatg aaaggtattg cgtcaggatt 540
ccagaaaact acccgatgga tctagcagcg catttgctct gtgctggatc ac 592

<210> 31
<211> 468
<212> DNA
<213>

<400> 31
gaattcggca cgagaactca tcttgaaatg tcattggagt catcatcctc tagtgagaag 60
aaacaaatgg gttccgccgg attcgaatcg gccacaaagc cgcacgccgt ttgcattccc 120
taccctgcac aaagccacat tggcgccatg ctcaagctag caaagctcct ccatcacaag 180
ggcttccaca tctccttcgt caacaccgag ttcaaccacc ggcggctcgc cagggctcga 240
ggcccgagt tcacaaatgg aatgctgagc gactttcagt tcctgacaat ccccgatggt 300
cttcctcctt cggacttgga tgcgatccaa gacatcaaga tgctctgcga atcgtccagg 360

aactatatgg tcagccccat caacgatctt gtatcgagcc tgggctcgaa cccgagcgtc 420
cctccggtga cttgcatcaa tctcggatgg tttcatgaca ctcgtgac 468

<210> 32
<211> 405
<212> DNA
<213>

<400> 32
ctttactccg ccaagaagat ccaatcgcag ttttcgcaat tggcccatta cacaaatgcg 60
gtccatcttc atcgggaagt ctcttggcag aagaccggag ttgcatttcc tggctggaca 120
agcaagcccc taactcagtg gtctatgtga gtcttgggag catcgcctct gtgaacgagt 180
cggaattttc cgaaatagct ttaggtttag ccgatagcca gcagccattc ttgtgggtgg 240
ttcgacccgg gtcagtgagc ggctcggaac tcttagagaa tttgcccggt tgctttctgg 300
aggcattaca ggagaggggg aagattgtga aatgggcgcc tcaacatgaa gtgctggctc 360
atcgggctgt cggagcgttt tggactcaca atggatggaa ctcca 405

<210> 33
<211> 380
<212> DNA
<213>

<400> 33
ggcaaacacg cccgttttcg ttttactaag agaagatggt gagcgttgtg gctggtagag 60
tcgagagctt gtcgagcagt ggcattcagt cgatcccgca ggagtatgtg aggccgaagg 120
aggagctcac aagcattggc gacatcttcg aggaggagaa gaagcatgag ggccctcagg 180
tcccgaccat cgacctcgag gacatagcgt ctaaagaccc cgtggtgagg gagaggtgcc 240
acgaggagct caggaaggct gccaccgact ggggcgtcat gcacctcgtc aaccatggga 300
tccccaacga cctgattgag cgtgtaaaga aggctggcga ggtgttcttc aacctcccga 360
tcgaggagaa ggacaagcat 380

<210> 34
<211> 305
<212> DNA
<213>

<400> 34
ttgtacccga agatctccgg gaccgttcga cggcgacatc gccgtcggcc gggaacccgt 60
cgaggccgcc gccggaggcc ggggagaagc tggagtagcc gccgtagccg gagaaggcgc 120
cgtcgtggtc ggcggcggcg gcgtggtgga cctcatcgcc gtccatgctg aaggcgtcga 180
aggaagcgga catggctggg ggatcgatcg accgatccga tcggccggag gatttcgaga 240
tcggagatgg agagatggaa atgaaagaga gagagagaga gagatccggt ggactggtgg 300
tgttt 305

<210> 35
<211> 693
<212> DNA
<213>

<400> 35
gaattcggca cgagctaaga gaggagagga gaggagcaag atggcactag caggagctgc 60
actgtcagga accgtggtga gctccccctt tgtgaggatg cagcctgtga acagactcag 120
ggcattcccc aatgtgggtc aggccctgtt tggtgtcaac tctggccgtg gcagagtgac 180
tgccatggcc gcttacaagg tcaccctgct cacccctgaa ggcaaagtcg aactcgacgt 240
ccccgacgat gtttacatct tggactacgc cgaggagcaa ggcatcgact tgccctactc 300
ctgccgtgcc ggctcttgct cctcctgcgc gggcaaggtc gtggcgggga gcgtcgacca 360

```
gagcgacggc agcttcctgg atgatgatca gattgaggaa ggttgggtcc tcacttgtgt     420
cgcctaccct aagtctgagg tcaccattga gacccacaag gaagaggagc tcactgcttg     480
aagctctcct atatttgctt ttgcataaat cagtctcact ctacgcaact ttctccactc     540
tctcccccct tcactacatg tttgttagtt cctttagtct cttccttttt tactgtacga     600
gggatgattt gatgttattc tgagtctaat gtaatggctt ttctttttcc tatttctgta     660
tgaggaaata aaactcatgc tctaaaaaaa aaa                                  693
```

<210> 36
<211> 418
<212> DNA
<213>

<400> 36

```
aggactttat tataagcatt gtaaaaagag tcaaactaat acatcgcaag aattgggtta      60
tccaataatc tacaaaaaga aaaaagtttg atgcattgag atggtaactg cttaattcaa     120
atgccttagt ttgaaaaatt aaccaactat taaaattaat gatgatgaat atggattatg     180
tgtgaaaaac tatatagact taaaattgac tcagaagaca ttcttttctt cttattttat     240
gatatgatga attcggtcta aacaggcaaa tggtgtcaaa cgggaagtcg gcaaaactct     300
tcctcggcag tgactaccgg gcgggcgatg atgcggatcc gggggccggg tcgctggaga     360
acatcccgca cggaccggtc cacgtttggt gcggtgacaa caggcagccc aacctgga       418
```

<210> 37
<211> 777
<212> DNA
<213>

<400> 37

```
gaattcggca cgagcataca actacactgc gacgccgccg cagaacgcga gcgtgccgac      60
catgaacggc accaaggtct accggttgcc gtataacgct acggtccagc tcgttttaca     120
ggacaccggg ataatcgcgc cggagaccca ccccatccat ctgcacggat tcaacttctt     180
cggtgtgggc aaaggagtgg ggaattatga cccaaagaag gatcccaaga agttcaatct     240
ggttgaccca gtggagagga acaccattgg aatcccatct ggtggatgga tagccatcag     300
attcacagca gacaatccag gagtttggtt cctgcactgc catctggaag tgcacacaac     360
ttggggactg aagatggcat tcttggtgga caatgggaag ggcctaaag agaccctgct      420
tccacctcca agtgatcttc caaaatgttg atcatttgat catgaggacg acaagcgatt     480
actaatgaca ccaagttagt ggaatcttct ctttgaaaaa gaagaagaag agcaagaaga     540
ataagaaaga tgaggagaga agccatagaa gatttgacca agaagagaga gggcaataaa     600
ccaaagagac ccttgagatc acgacatccc gcaattgttt ctagagtaat agaaggattt     660
actccgacac tgctacaata aattaaggaa gacaaggaat ttggtttttt tcattggagg     720
agtgtaattt gtttttggc aagctcatca catgaatcac atggaaaaaa aaaaaaa         777
```

<210> 38
<211> 344
<212> DNA
<213>

<400> 38

```
atatgttcag aatttcaaat gtgggaatgt caacctcctt gaacttcaga attcagggcc      60
atacgttgaa gctagtcgag gttgaaggat ctcacaccgt ccagaacatg tatgattcaa     120
tcgatgttca cgtgggccaa tccatggctg tcttagtgac cttaaatcag cctccaaagg     180
actactacat tgtcgcatcc acccggttca ccaagacggt tctcaatgca actgcagtgc     240
tacactacac caactcgctt accccagttt ccgggccact accagctggt ccaacttacc     300
aaaaacattg gtccatgaag caagcaagaa caatcaggtg gaac                      344
```

<210> 39
<211> 341

<212> DNA
<213>

<400> 39
gccgcaactg caattctctt cgtaaaacat gacggctgtc ggcaaaacct ctttcctctt 60
gggagctctc ctcctcttct ctgtggcggt gacattggca gatgcaaaag tttactacca 120
tgattttgtc gttcaagcga ccaaggtgaa gaggctgtgc acgacccaca acaccatcac 180
ggtgaacggg caattcccgg gtccgacttt ggaagttaac gacggcgaca ccctcgttgt 240
caatgtcgtc aacaaagctc gctacaacgt caccattcac tggcacggcg tccggcaggt 300
gagatctggt tgggctgatg gggcggaatt tgtgactcaa t 341

<210> 40
<211> 358
<212> DNA
<213>

<400> 40
gaattcggca cgagatatgt tcagaatttc aaatgtggga atgtcaacct ccttgaactt 60
cagaattcag ggccatacgt tgaagctagt cgaggttgaa ggatctcaca ccgtccagaa 120
catgtatgat tcaatcgatg ttcacgtggg ccaatccatg gctgtcttag tgaccttaaa 180
tcagcctcca aaggactact acattgtcgc atccacccgg ttcaccaaga cggttctcaa 240
tgcaactgca gtgctacact acaccaactc gcttacccca gtttccgggc cactaccagc 300
tggtccaact taccaaaaac attggtccat gaagcaagca agaacaatca ggtggaac 358

<210> 41
<211> 409
<212> DNA
<213>

<400> 41
atcaagagtt tgagtctaaa ccttgtctaa tcctctctcg catagtcatt tggagacgaa 60
tgctgatcgg ccgcagctgc attctcttcg taaaacatga cggctgtcgg caaaacctct 120
ttcctcttgg gagctctcct cctcttctct gtggcggtga cattggcaga tgcaaaagtt 180
tactaccatg attttgtcgt tcaagcgacc aaggtgaaga ggctgtgcac gacccacaac 240
accatcacgg tgaacgggca attcccgggt ccgactttgg aagttaacga cggcgacacc 300
ctcgttgtca atgtcgtcaa caaagctcgc tacaacgtca ccattcactg gcacggcgtc 360
cggcaggtga gatctggttg ggctgatggg gcggaatttg tgactcaat 409

<210> 42
<211> 515
<212> DNA
<213>

<400> 42
ctctctctct ctctctctct gtgtgttcat tctcgttgag ctcgtggtcg cctcccgcca 60
tggatccgca caagtaccgt ccatccagtg ctttcaacac ttctttctgg actacgaact 120
ctggtgctcc tgtctggaac aataactctt cgttgactgt tggaagcaga ggtccaattc 180
ttcttgagga ttatcacctc gtggagaaac ttgccaactt tgatagggag aggattccag 240
agcgtgtggt gcatgccaga ggagccagtg caaagggatt ctttgaggtc actcatgaca 300
tttcccagct tacctgtgct gatttccttc gggcaccagg agttcaaaca cccgtgattg 360
tccgtttctc cactgtcatc cacgaaaggg gcagccctga aaccctgagg gaccctcgag 420
gttttgctgt gaagttctac acaagagagg gtaactttga tctggtggga aacaatttcc 480
ctgtcttctt tgtccgtaat gggataaatt ccccg 515

<210> 43
<211> 471

<212> DNA
<213>

<400> 43
gaattcggca cgaggctccc tctcgtactg ccatactcct gggacgggat tcggataggg 60
atttgcggcg atccatttct cgattcaagg ggaagaatca tggggaagtc ctacccgacc 120
gtaagccagg agtacaagaa ggctgtcgag aaatgcaaga agaagttgag aggcctcatc 180
gctgagaaga gctgcgctcc gctcatgctc cgcatcgcgt ggcactccgc cggtaccttc 240
gatgtgaaga cgaagaccgg aggcccgttc gggaccatga agcacgccgc ggagctcagc 300
cacggggcca acagcgggct cgacgttgcc gatcaggtct tgcagccgat caaggatcag 360
ttccccgtca tcacttatgc tgatttctac cagctggctg gcgtcgttgc tgtggaagtt 420
actggtggac ctgaagttgc ttttcacccg gaagagaggc aaaccacaac c 471

<210> 44
<211> 487
<212> DNA
<213>

<400> 44
gaattcggca cgagctccca cttctgtctc gccaccatta ctagcttcaa agcccagatc 60
tcagtttcgt gctctcttcg tcatctctgc ctcttgccat ggatccgtac aagtatcgcc 120
cgtccagcgc ttacgattcc agcttttgga caaccaacta cggtgctccc gtctggaaca 180
atgactcatc gctgactgtt ggaactagag gtccgattct cctggaggac taccatctga 240
ttgagaaact tgccaacttc gagagagaga ggattcctga gcgggtggtc catgcacggg 300
gagccagcgc gaaagggttc ttcgaggtca cccacgacat ctctcacttg acctgtgctg 360
atttcctccg ggctcctgga gtccagacgc ccgtaatcgt ccgtttctcc accgtcatcc 420
acgagcgcgg cagcccgaac ctcagggacc ctcgtggttt tgcagtgaag ttctacacca 480
gagaggg 487

<210> 45
<211> 684
<212> DNA
<213>

<400> 45
gaattcctgc agcccggggg atccactagt tctagagcgg ccgccaccgc ggtggagctc 60
gcgcgcctgc aggtcgacac tagtggatcc aaagaattcg gcacgaggcc cgacggccac 120
ttgttggacg ccatggaagc tctccggaaa gccgggattc tggaaccgtt taaactgcag 180
cccaaggaag gactggctct cgtcaacggc acagcggtgg gatccgccgt ggccgcgtcc 240
gtctgttttg acgccaacgt gctgggcgtg ctggctgaga ttctgtctgc gctcttctgc 300
gaggtgatgc aagggaaacc ggagttcgta gatccgttaa cccaccagtt gaagcaccac 360
ccagggcaga tcgaagccgc ggccgtcatg gagttcctcc tcgacggtag cgactacgtg 420
aaagaagcag cgcggcttca cgagaaagac ccgttgagca aaccgaaaca agaccgctac 480
gctctgcgaa catcgccaca gtggttgggg cctccgatcg aagtcatccg cgctgctact 540
cactccatcg agcgggagat caattccgtc aacgacaatc cgttaatcga tgtctccagg 600
gacatggctc tccacggcgg caacttccag ggaacaccca tcggagtttc catggacaac 660
atgcgaatct ctttggcagc cgtc 684

<210> 46
<211> 418
<212> DNA
<213>

<400> 46
gaattcggca cgaggacaag gtcataggcc ctctcttcaa atgcttggat gggtggaaag 60
gaactcctgg cccattctga aataaataat cttccaagat cgcctttata caacgactgc 120

tatgatttga gtcctcggat ctttttgttg atgcagttgt ttaccgatct ggaatttgat 180
tggtcataaa gcttgatttt gtttttcttt cttttgtttt atactgctgg atttgcatcc 240
cattggattt gccagaaata tgtaagggtg gcagatcatt tgggtgatct gaaacatgta 300
aaagtggcgg atcatttggg tagcatgcag atcagttggg tgatcgtgta ctgctttcac 360
tattacttac atatttaaag atcgggaata aaaacatgat tttaattgaa aaaaaaaa 418

<210> 47
<211> 479
<212> DNA
<213>

<400> 47
gatatcccaa cgaccgaaaa cctgtatttt cagggcgcca tggggatccg gaattcggca 60
cgagcaagga agaaaatatg gttgcagcag cagaaattac gcaggccaat gaagttcaag 120
ttaaaagcac tgggctgtgc acggacttcg gctcgtctgg cagcgatcca ctgaactggg 180
ttcgagcagc caaggccatg gaaggaagtc actttgaaga agtgaaagcg atggtggatt 240
cgtatttggg agccaaggag atttccattg aagggaaatc tctgacaatc tcagacgttg 300
ctgccgttgc tcgaagatcg caagtgaaag tgaaattgga tgctgcggct gccaaatcta 360
gggtcgagga gagttcaaac tgggttctca cccagatgac caaggggacg gatacctatg 420
gtgtcactac tggtttcgga gccacttctc acaggagaac gaaccaggga gccgagctt 479

<210> 48
<211> 1785
<212> DNA
<213>

<400> 48
tatcgataag cttgatatcg aattcctgca gcccggggga tccactagtt ctagagcggc 60
cgccaccgcg gtggagctcg cgcgcctgca ggtcgacact agtggatcca aagaattcgg 120
cacgaggttg caggtcgggg atgatttgaa tcacagaaac ctcagcgatt ttgccaagaa 180
atatggcaaa atctttctgc tcaagatggg ccagaggaat cttgtggtag tttcatctcc 240
cgatctcgcc aaggaggtcc tgcacaccca gggcgtcgag tttgggtctc gaacccggaa 300
cgtggtgttc gatatcttca cgggcaaggg gcaggacatg gtgttcaccg tctatggaga 360
tcactggaga aagatgcgca ggatcatgac tgtgcctttc tttacgaata aagttgtcca 420
gcactacaga ttcgcgtggg aagacgagat cagccgcgtg gtcgcggatg tgaaatcccg 480
cgccgagtct tccacctcgg gcattgtcat ccgtaggcgc ctccagctca tgatgtataa 540
tattatgtat aggatgatgt tcgacaggag attcgaatcc gaggacgacc cgcttttcct 600
caagctcaag gccctcaacg gagagcgaag tcgattggcc cagagctttg agtacaatta 660
tggggatttc attcccattc ttaggccctt cctcagaggt tatctcagaa tctgcaatga 720
gattaaagag aaacggctct ctcttttcaa ggactacttc gtggaagagc gcaagaagct 780
caacagtacc aagactagta ccaacaccgg gggagctcaa gtgtgcaatg gaccatattt 840
tagatgctca ggacaaggga gagatcaatg aggataatgt tttgtacatc gttgagaaca 900
tcaacgttgc agcaattgag acaacgctgt ggtcgatgga atggggaata gcggagctgg 960
tgaaccacca ggacattcag agcaaggtgc gcgcagagct ggacgctgtt cttggaccag 1020
gcgtgcagat aacggaacca gacacgacaa ggttgcccta ccttcaggcg gttgtgaagg 1080
aaacccttcg tctccgcatg gcgatcccgt tgctcgtccc ccacatgaat ctccacgacg 1140
ccaagctcgg gggctacgat attccggcag agagcaagat cctggtgaac gcctggtggt 1200
tggccaacaa ccccgccaac tggaagaacc ccgaggagtt ccgcccccgag cggttcttcg 1260
aggaggagaa gcacaccgaa gccaatggca acgacttcaa attcctgcct tcggtgtggg 1320
gaggaggagc tgcccgggaa tcattctggc gctgcctctc ctcgcactct ccatcggaag 1380
acttgttcag aacttccacc ttctgccgcc gcccgggcag agcaaagtgg atgtcactga 1440
gaagggcggg cagttcagcc ttcacattct caaccattct ctcatcgtcg ccaagcccat 1500
agcttctgct taatcccaac ttgtcagtga ctggtatata aatgcgcgca cctgaacaaa 1560
aaacactcca tctatcatga ctgtgtgtgc gtgtccactg tcgagtctac taagagctca 1620
tagcacttca aaagtttgct aggatttcaa taacagacac cgtcaattat gtcatgtttc 1680
aataaaagtt tgcataaatt aaatgatatt tcaatatact attttgactc tccaccaatt 1740

ggggaatttt actgctaaaa aaaaaaaaaa aaaaaaaaaa aaaaa 1785

<210> 49
<211> 475
<212> DNA
<213>

<400> 49
gaattcggca cgagatttcc atggacgatt ccgtttggct tcaattcgtt tcctctggct 60
gtcctcgtcc tcgttttcct tgttcttcct ccgacttttt ctctggaagc tatggcgtaa 120
taggaacctg ccgccaggac ccccggcatg gccgatcgta gggaacgtcc ttcagattgg 180
attttccagc ggcgcgttcg agacctcagt gaagaaattc catgagagat acggtccaat 240
attcactgtg tggctcggtt cccgccctct gctgatgatc accgaccgcg agcttgccca 300
cgaggcgctc gtacagaagg gctccgtctt cgctgaccgc ccgcccgccc tcgggatgca 360
gaaaatcttc agtagcaacc agcacaacat cacttcggct gaatacggcc cgctgtggcg 420
gagccttcgc aggaatctgg ttaaagaagc cctgagactt cggcgatgaa ggctt 475

<210> 50
<211> 801
<212> DNA
<213>

<400> 50
gctccaccga cggtggacgg tccgctactc agtaactgag tgggatcccc cgggctgaca 60
ggcaattcga tttagctcac tcattaggca ccccaggctt tacactttat gcttccggct 120
cgtatgttgt gtggaattgt gagcggataa caatttcaca caggaaacag ctatgaccat 180
gattacgcca agcgcgcaat taaccctcac taaagggaac aaaagctgga gctccaccgc 240
ggtggcggcc gctctagaac tagtggatcc aaagaattcg gcacgagacc cagtgacctt 300
caggcctgag agatttcttg aggaagatgt tgatattaag ggccatgatt acaggctact 360
gccattcggt gcagggcgca ggatctgccc tggtgcacaa ttgggtatta atttagttca 420
gtctatgttg ggacacctgc ttcatcattt cgtatgggca cctcctgagg gaatgaaggc 480
agaagacata gatctcacag agaatccagg gcttgttact ttcatggcca agcctgtgca 540
ggccattgct attcctcgat tgcctgatca tctctacaag cgacagccac tcaattgatc 600
aattgatctg atagtaagtt tgaattttgt tttgatacaa aacgaaataa cgtgcagttt 660
ctccttttcc atagtcaaca tgcagctttc tttctctgaa gcgcatgcag ctttctttct 720
ctgaagccca acttctagca agcaataact gtatatttta gaacaaatac ctattcctca 780
aattgagtat ttctctgtag g 801

<210> 51
<211> 744
<212> DNA
<213>

<400> 51
gggccccccct tcgaggtgga cactagtgga tccaaagaat tcggcacgag gttttatctg 60
aaggacgctg tgcttgaagg ctcccagcca ttcaccaaag cccatggaat gaatgcgttc 120
gagtacccgg ccatcgatca gagattcaac aagattttca acagggctat gtctgagaat 180
tctaccatgt tgatgaacaa gattttggat acttacgagg gttttaagga ggttcaggag 240
ttggtggatg tgggaggagg tattgggtcg actctcaatc tcatagtgtc taggtatccc 300
cacatttcag gaatcaactt cgacttgtcc catgtgctgg ccgatgctcc tcactaccca 360
gctgtgaaac atgtgggtgg agacatgttt gatagtgtac caagtggcca agctattttt 420
atgaagtgga ttctgcatga ttggagcgat gatcattgca ggaagctttt gaagaattgt 480
cacaaggcgt tgccagagaa ggggaaggtg attgcggtgg acaccattct cccagtggct 540
gcagagacat ctccttatgc tcgtcaggga tttcatacag atttactgat gttggcatac 600
aacccagggg gcaaggaacg cacagagcaa gaatttcaag atttagctaa ggagacggga 660
tttgcaggtg gtgttgaacc tgtatgttgt gtcaatggaa tgtgggtaat ggaattcctg 720

cagcccgggg gatccactag ttct 744

<210> 52
<211> 426
<212> DNA
<213>

<400> 52
gtggccctgg aagtagtgtg cgcgacatgg attccttgaa tttgaacgag tttatgttgt 60
ggtttctctc ttggcttgct ctctacattg gatttcgtta tgttttgaga tcgaacttga 120
agctcaagaa gaggcgcctc ccgccgggcc catcgggatg gccagtggtg ggaagtctgc 180
cattgctggg agcgatgcct cacgttactc tctacaacat gtataagaaa tatggccccg 240
ttgtctatct caaactgggg acgtccgaca tggttgtggc ctccacgccc gctgcagcta 300
aggcgtttct gaagactttg gatataaact tctccaaccg gccgggaaat gcaggagcca 360
cgtacatcgc ctacgattct caggacatgg tgtgggcagc gtatggagga cggtggaaga 420
tggagc 426

<210> 53
<211> 562
<212> DNA
<213>

<400> 53
cagttcgaaa ttaacctcac taaagggaac aaaagctgga gttcgcgcgc ctgcaggtcg 60
acactagtgg atccaaagaa ttcggcacga gctttgaggc aacctacatt cattgaatcc 120
caggatttct tcttgtccaa acaggtttaa ggaaatggca ggcacaagtg ttgctgcagc 180
agaggtgaag gctcagacaa cccaagcaga ggagccggtt aaggttgtcc gccatcaaga 240
agtgggacac aaaagtcttt tgcagagcga tgccctctat cagtatatat tggaaacgag 300
cgtgtaccct cgtgagcccg agccaatgaa ggagctccgc gaagtgactg ccaagcatcc 360
ctggaacctc atgactactt ctgccgatga gggtcaattt ctgggcctcc tgctgaagct 420
cattaacgcc aagaacacca tggagattgg ggtgtacact ggttactcgc ttctcagcac 480
agcccttgca ttgcccgatg atggaaagat tctagccatg gacatcaaca gagagaacta 540
tgatatcgga ttgcctataa tt 562

<210> 54
<211> 1074
<212> DNA
<213>

<400> 54
tcgtgccgct cgatcctcac aggccctttt tatttccctg gtgaacgata cgatgggctc 60
gcacgctgag aatggcaacg gggtggaggt tgttgatcca acggacttaa ctgacatcga 120
gaatgggaaa ccaggttatg acaagcgtac gctgcctgcg gactggaagt ttggagtgaa 180
gcttcaaaac gttatggaag aatccattta caagtacatg ctggaaacat tcacccgcca 240
tcgagaggac gaggcgtcca aggagctctg ggaacgaaca tggaacctga cacagagagg 300
ggagatgatg acattgccag atcaggtgca gttcctgcgc ttgatggtaa agatgtcagg 360
tgctaaaaag gcattggaga tcggagtttt cactggctat tcattgctca atatcgctct 420
cgctcttcct tctgatggca aggtggtagc tgtggatcca ggagatgacc ccaaatttgg 480
ctggccctgc ttcgttaagg ctggagttgc agacaaagtg gagatcaaga aaactacagg 540
gttggactat ttggattccc ttattcaaaa gggggagaag gattgcttcg actttgcatt 600
cgtggacgca gacaaagtga actacgtgaa ctatcatcca cggctgatga agttagtgcg 660
cgtggggggc gtcataattt acgacgacac cctctggttt ggtctggtgg gaggaaagga 720
tccccacaac ctgcttaaga atgattacat gaggacttct ctggagggta tcaaggccat 780
caactccatg gtagccaacg accccaactt ggaggtcgcc acagtcttta tgggatatgg 840
tgtcactgtt tgttaccgca ctgcttagtt agctagtcct ccgtcattct gctatgtatg 900
tatatgataa tggcgtcgat ttctgatata ggtggttttt caatgtttct atcgtcatgt 960

tttctgttta gccagaatgt ttcgatcgtc atggtttctg ttaaagccag aataaaatta 1020
gccgcttgca gttcaaaaaa aaaaaaaaaa aaaaactcga gactagttct cttc 1074

<210> 55
<211> 1075
<212> DNA
<213>

<400> 55
tcggagctct cgaatcctca caggcccttt ttatttccct ggtgaacgat acgatgggct 60
cgcacgctga gaatggcaac ggggtggagg ttgttgatcc aacggactta actgacatcg 120
aagaatggga aaccaggtta tgacaagcgt cgctgcctgc ggactggaag tttggagtga 180
agcttcaaaa cgttatggaa gaatccattt acaagtacat gctggaaaca ttcacccgcc 240
atcgagagga cgaggcgtcc aaggagctct gggaacgaac atggaacctg acacagagag 300
gggagatgat gacattgcca gatcaggtgc agttcctgcg cttgatggta aagatgtcag 360
gtgctaaaaa ggcattggag atcggagttt tcactggcta ttcattgctc aatatcgctc 420
tcgctcttcc ttctgatggc aaggtggtag ctgtggatcc aggagatgac cccaaatttg 480
gctggccctg cttcgttaag gctggagttg cagacaaagt ggagatcaag aaaactacag 540
ggttggacta tttggattcc cttattcaaa aggggagaa ggattgcttc gactttgcat 600
tcgtggacgc agacaaagtg aactacgtga actatcatcc acggctgatg aagttagtgc 660
gcgtgggggg cgtcataatt tacgacgaca ccctctggtt tggtctggtg ggaggaaagg 720
atccccacaa cctgcttaag aatgattaca tgaggacttc tctggagggt atcaaggcca 780
tcaactccat ggtagccaac gaccccaact tggaggtcgc cacagtcttt atgggatatg 840
gtgtcactgt ttgttaccgc actgcttagt tagctagtcc tccgtcattc tgctatgtat 900
gtatatgata atggcgtcga tttctgatat aggtggtttt tcaatgtttc tatcgtcatg 960
ttttctgttt agccagaatg tttcgatcgt catggtttct gttaaagcca gaataaaatt 1020
agccgcttgc agttcaaaaa aaaaaaaaaa aaaaaactcg agactagttc tcttc 1075

<210> 56
<211> 1961
<212> DNA
<213>

<400> 56
gttttccgcc atttttcgcc tgtttctgcg gagaatttga tcaggttcgg attgggattg 60
aatcaattga aaggttttta ttttcagtat ttcgatcgcc atggccaacg gaatcaagaa 120
ggtcgagcat ctgtacagat cgaagcttcc cgatatcgag atctccgacc atctgcctct 180
tcattcgtat tgctttgaga gagtagcgga attcgcagac agaccctgtc tgatcgatgg 240
ggcgacagac agaacttatt gcttttcaga ggtggaactg atttctcgca aggtcgctgc 300
cggtctggcg aagctcgggt tgcagcaggg gcaggttgtc atgcttctcc ttccgaattg 360
catcgaattt gcgtttgtgt tcatgggggc ctctgtccgg ggcgccattg tgaccacggc 420
caatcctttc tacaagccgg gcgagatcgc caaacaggcc aaggccgcgg gcgcgcgcga 480
tcatagttac cctggcagct tatgtggaga aactggccga tctgcagagc cacgatgtgc 540
tcgtcatcac aatcgatgat gctcccaagg aaggttgcca acatatttcc gttctgaccg 600
aagccgacga aacccaatgc ccggccgtga caatccaccc ggacgatgtc gtggcgttgc 660
cctattcttc cggaaccacg gggctcccca agggcgtgat gttaacgcac aaaggcctgg 720
tgtccagcgt tgcccagcag gtcgatggtg aaaatcccaa tctgtatttc cattccgatg 780
acgtgatact ctgtgtcttg cctcttttcc acatctattc tctcaattcg gttctcctct 840
gcgcgctcag agccggggct gcgaccctga ttatgcagaa attcaacctc acgacctgtc 900
tggagctgat tcagaaatac aaggttaccg ttgccccaat tgtgcctcca attgtcctgg 960
acatcacaaa gagccccatc gtttcccagt acgatgtctc ggccgtccgg ataatcatgt 1020
ccggcgctgc gcctctcggg aaggaactcg aagatgccct cagagagcgt tttcccaagg 1080
ccattttcgg gcagggctac ggcatgacag aagcaggccc ggtgctggca atgaacctag 1140
ccttcgcaaa gaatcctttc cccgtcaaat ctggctcctg cggaacagtc gtccggaacg 1200
ctcaaataaa gatcctcgat acagaaactg gcgagtctct cccgcacaat caagccggcg 1260
aaatctgcat ccgcggaccc gaaataatga aaggatatat taacgacccg gaatccacgg 1320

```
ccgctacaat cgatgaagaa ggctggctcc acacaggcga cgtcgggtac attgacgatg    1380
acgaagaaat cttcatagtc gacagagtaa aggagattat caaatataag ggcttccagg    1440
tggctcctgc tgagctggaa gctttacttg ttgctcatcc gtcaatcgct gacgcagcag    1500
tcgttcctca aaagcacgag gaggcgggcg aggttccggt ggcgttcgtg gtgaagtcgt    1560
cggaaatcag cgagcaggaa atcaaggaat tcgtggcaaa gcaggtgatt ttctacaaga    1620
aaatacacag agtttacttt gtggatgcga ttcctaagtc gccgtccggc aagattctga    1680
gaaaggattt gagaagcaga ctggcagcaa aatgaaaatg aatttccata tgattctaag    1740
attcctttgc cgataattat aggattcctt tctgttcact tctatttata taataaagtg    1800
gtgcagagta agcgccctat aaggagagag agagcttatc aattgtatca tatggattgt    1860
caacgcccta cactcttgcg atcgctttca atatgcatat tactataaac gatatatgtt    1920
tttttataa atttactgca cttctcgttc aaaaaaaaaa a                         1961

      <210> 57
      <211> 1010
      <212> DNA
      <213>

      <400> 57
gacaaacttg gtcgtttgtt taggttttgc tgcaggtgaa cactaatatg gaaggccaga      60
ttgcagcatt aagcaaagaa gatgagttca tttttcacag ccctttttcct gcagtacctg    120
ttccagagaa tataagtctt ttccagtttg ttctggaagg tgctgagaaa taccgtgata    180
aggtggccct cgtggaggcc tccacaggga aggagtacaa ctatggtcag gtgatttcgc    240
tcacaaggaa tgttgcagct gggctcgtgg acaaaggcat tcaaaagggc gatgttgtat    300
ttgttctgct tccaaatatg gcagaatacc ccattattgt gctgggaata atgttggccg    360
gcgcagtgtt ttctggggca aatccttctg cacacatcaa tgaagttgaa aaacatatcc    420
aggattctgg agcaaagatt gttgtgacag ttgggtctgc ttatgagaag gtgaggcaag    480
tgaaactgcc tgttattatt gcagataacg agcatgtcat gaacacaatt ccattgcagg    540
aaatttttga gagaaactat gaggccgcag ggccttttgt acaaatttgt caggatgatc    600
tgtgtgcact cccttattcc tctggcacca caggggcctc taaaggtgtc atgctcactc    660
acagaaatct gattgcaaat ctgtgctcta gcttgtttga tgtccatgaa tctcttgtag    720
gaaatttcac cacgttgggg ctgatgccat tctttcacat atatggcatc acgggcatct    780
gttgcgccac tcttcgcaac ggaggcaagg tcgtggtcat gtccagattc gatctccgac    840
actttatcag ttctttgatt acttatgagg tcaacttcgc gcctattgtc ccgcctataa    900
tgctctccct ccggtttaaa aatcctatcg ttaacgagtt cgatctcagc cgcttgaaac    960
tccaaagctg ttcatgactg cggctgctcc actggcgccg gatctactgc               1010

      <210> 58
      <211> 741
      <212> DNA
      <213>

      <400> 58
gaattcggca cgagaccatt tccagctaat attggcatag caattggtca ttctatcttt      60
gtcaaaggag atcaaacaaa ttttgaaatt ggacctaatg gtgtggaggc tagtcagcta    120
tacccagatg tgaaatatac cactgtcgat gagtacctca gcaaatttgt gtgaagtatg    180
cgagattctc ttccacatgc ttcagagata cataacagtt tcaatcaatg tttgtcctag    240
gcatttgcca aattgtgggt tataatcctt cgtaggtgtt tggcagaaca gaacctcctg    300
tttagtatag tatgacgagc taggcactgc agatccttca cacttttctc ttccataaga    360
aacaaatact cacctgtggt ttgttttctt tctttctgga actttggtat ggcaataatg    420
tctttggaaa ccgcttagtg tggaatgcta agtactagtg tccagagttc taagggagtt    480
ccaaaatcat ggctgatgtg aactggttgt tccagagggt gtttacaacc aacagttgtt    540
cagtgaataa ttttgttaga gtgtttagat ccatctttac aaggctattg agtaaggttg    600
gtgttagtga acggaatgat gtcaaatctt gatgggctga ctgactctct tgtgatgtca    660
aatcttgatg gattgtgtct ttttcaatgg taaaaaaaaa aaaaaaaaaa aaaaaaaaaa    720
aaaaaaaaaa aaaaaaaaaa a                                              741
```

<210> 59
<211> 643
<212> DNA
<213>

<400> 59
ctcatctcgg agttgcaggc tgcagctttt ggcccaaagc atgatatcag atcaaacgac 60
gcagatgaag caaacggatc aaacagtttg cgttactgga gcagcgggtt tcattgcctc 120
atggcttgtc aagatgctcc tcatcagagg ttacactgtc agagcagcag ttcggaccaa 180
cccagctgat gataggtgga agtatgagca tctgcgagag ttggaaggag caaaagagag 240
gcttgagctt gtgaaagctg atattctcca ttaccagagc ttactcacag tcatcagagg 300
ttgccacggt gtctttcaca tggcttcagt tctcaatgat gaccctgagc aagtgataga 360
accagcagtc gaagggacga ggaatgtgat ggaggcctgc gcagaaactg ggtgaagcg 420
cgttgttttt acttcttcca tcggcgcagt ttacatgaat cctcatagag acccgctcgc 480
gattgtccat gatgactgct ggagcgattt gactactgcg tacaaaccaa gaattggtat 540
tgctatgcaa aaaccttggc agagaaatct gcatgggata ttgctaaggg aaggaattta 600
gagcttgcag tgataaatcc aggcctggcc ttaggtccct tga 643

<210> 60
<211> 441
<212> DNA
<213>

<400> 60
gaattcggca cgagaatttt tctgtggtaa gcatatctat ggctcaaacc agagagaagg 60
acgatgtcag cataacaaac tccaaaggat tggtatgcgt gacaggagcg gctggttact 120
tggcatcttg gcttatcaag cgtctcctcc agtgtggtta ccaagtgaga ggaactgtgc 180
gggatcctgg caatgagaaa aagatggctc atttatggaa gttagatggg gcgaaagaga 240
gactgcaact aatgaaagct gatttaatgg acgagggcag cttcgatgag gtcatcagag 300
gctgccatgg tgtttttcac acagcgtctc cagtcgtggg tgtcaaatca gatcccaaga 360
tatggtatgc tctggccaag actttagcag aaaaagcagc atgggatttt gcccaagaaa 420
accatctgga catggttgca g 441

<210> 61
<211> 913
<212> DNA
<213>

<400> 61
gaattcggca cgaggaaaac atcatccagg cattttggaa atttagctcg ccggttgatt 60
caggatcctg caatggcttt tggcgaagag cagactgcct tgccacaaga aacgcctttg 120
aatcctccgg tccatcgagg aacagtgtgc gttacaggag ctgctgggtt catagggtca 180
tggctcatca tgcgattgct tgagcgagga tatagtgtta gagcaactgt gcgagacact 240
ggtaatcctg taaagacaaa gcatctgttg gatctgccgg gggcaaatga gagattgact 300
ctctggaaag cagatttgga tgatgaagga agctttgatg ctgccattga tgggtgtgag 360
ggtgttttcc atgttgccac tcccatggat ttcgagtccg aggatcccga gaatgagata 420
attaagccaa caatcaacgg ggtcttgaat gttatgagat cgtgtgcaaa agccaagtcc 480
gtgaagcgag ttgttttcac gtcatctgct gggactgtga attttacaga tgatttccaa 540
acaccaggca aagtttttga cgaatcatgc tggaccaacg tggatctttg cagaaaagtt 600
aaaatgacag gatggatgta ctttgtatcg aagacattag cagagaaagc tgcttgggat 660
tttgcagagg agaacaagat cgatctcatt actgttatcc ccacattggt cgttggacca 720
ttcattatgc agaccatgcc accgagcatg atcacagcct tggcactgtt aacgcggaat 780
gaaccccact acatgatact gagacaggta cagctggttc acttggatga tctctgtatg 840
tcacatatct ttgtatatga acatcctgaa gcaaagggca gatacatctc ttccacatgt 900
gatgctaccc att 913

<210> 62
<211> 680
<212> DNA
<213>

<400> 62
```
gaattcggca cgagatcaat ttttgcatat tattaaaaag taagtgtatt cgttctctat      60
attgatcagt cacagagtca tggccagttg tggttccgag aaagtaagag ggttgaatgg     120
agatgaagca tgcgaagaga acaagagagt ggtttgtgta actggggcaa atgggtacat     180
cggctcttgg ctggtcatga gattactgga acatggctat tatgttcatg gaactgttag     240
ggacccagaa gacacaggga aggttgggca tttgctgcgg ctcccagggg caagtgagaa     300
gctaaagctg ttcaaggcag agcttaacga cgaaatggcc tttgatgatg ctgtgagcgg     360
ttgtcaaggg gttttccacg ttgccaagcc tgttaatctg gactcaaacg ctcttcaggg     420
ggaggttgtt ggtcctgcgg tgaggggaac agtaaatctg cttcgagcct gcgaacgatc     480
gggcactgtg aaacgagtga tacatacctc gtccgtttca gcagtgagat tcactgggaa     540
acctgacccc cctgatactg tgctggatga atctcattgg acttcggtcg agtattgcag     600
aaagacaaag atggtcggat ggatgtacta catcgccaac acttatgcag aagagggagc     660
ccataagttc ggatcagaga                                                 680
```

<210> 63
<211> 492
<212> DNA
<213>

<400> 63
```
gaattcggca cgaggctggt tcaagtgtca gcccaatggc ctcccctaca gagaatcccc      60
agatttcaga agagctgcta aatcatgaga tccatcaagg aagtacagta tgtgtgacag     120
gagctgctgg cttcatagga tcatggctcg tcatgcgttt gcttgagcga ggatatactg     180
ttagaggaac tgtgcgagac actggtaatc cggtgaagac gaagcatcta ttggatctgc     240
ctggggcgaa tgagaggtta actctctgga aagcagattt ggatgatgaa ggaagctttg     300
acgccgccat tgatggttgt gagggagttt tccatgttgc cactcccatg gattttgaat     360
ccgaggaccc cgagaacgag ataattaaac ccgctgtcaa tgggatgttg aatgttttga     420
gatcgtgtgg gaaaaccaag tctatgaagc gagttgtttt cacgtcgtct gctgggactc     480
tgctttttac gg                                                         492
```

<210> 64
<211> 524
<212> DNA
<213>

<400> 64
```
gaattcggca cgagcttgtt caaagtcaca tatcttattt tctttgtgat atctgcaatt      60
tccaagcttt tcgtctacct ccctgaaaag atgagcgagg tatgcgtgac aggaggcaca     120
ggcttcatag ctgcttatct cattcgtagt cttctccaga aaggttacag agttcgcact     180
acagttcgca acccagataa tgtggagaag tttagttatc tgtgggatct gcctggtgca     240
aacgaaagac tcaacatcgt gagagcagat ttgctagagg aaggcagttt tgatgcagca     300
gtagatggtg tagatggagt attccatact gcatcacctg tcttagtccc atataacgag     360
cgcttgaagg aaaccctaat agatccttgt gtgaagggca ctatcaatgt cctcaggtcc     420
tgttcaagat caccttcagt aaagcgggtg gtgcttacat cctcctgctc atcaataccg     480
atacgactat aatagcttag agcgttccct gctggactga gtca                      524
```

<210> 65
<211> 417
<212> DNA
<213>

<400> 65
tcctaattgt tcgatcctcc cttttaaagc ccttccctgg ccttcattcc aggtcacaga 60
gttgttcatg cagtgctagc aggaggagca gcgttgcaat tggggaaaat tccaaaatca 120
ataacgagag gacagaagta agtttgtgga aatagcaacc atgccggtgt ttccttctgg 180
tctggacccc tctgaggaca atggcaagct cgtttgtgtc atggatgcgt ccagttatgt 240
aggtttgtgg attgttcagg gccttcttca acgaggctat tcagtgcatg ccacggtgca 300
gagagacgct ggcgaggttg agtctctcag aaaattgcat ggggatcgat tgcagatctt 360
ctatgcagat gtcttggatt atcacagcat tactgatgcg ctcaagggct gttctgg 417

<210> 66
<211> 511
<212> DNA
<213>

<400> 66
atgacacgaa tttgtgcctc tctctgacca gagcttgaag ctctgtcttc tctgatatcg 60
cttcattcca tcatccagga gcttctgtta tatccatttc ctcaaaatgg atgcctacct 120
tgaagaaaat ggatacggcg cttccaattc tcggaaatta atgtgcctta ccgggggctg 180
gagtttcctg ggattcata tcgcaagaat gctgctcggc cggggttact cagtccgttt 240
cgcaattccg gtaacgccag aagaggcagg ctcacttatg gaatccgaag aagcattatc 300
ggggaagctg gagatatgcc aagccgatct cttggattat cgcagcgttt tcggcaacat 360
caatggttgc tccggagtct tccacgtccc tgcgccctgt gatcatctgg atggattaca 420
ggagtatccg gtatgattag tttaatagat tgacggggta tcctgtatga attagtttat 480
gaatttaagg ttttcttaga atttggatac t 511

<210> 67
<211> 609
<212> DNA
<213>

<400> 67
cattgatagt tgatggaaga ccatcagtaa agcatgaaaa agaaattgtt ccaaggtgaa 60
gaagtcagtt gctccagcag aaccttttta gcaattgttt ttgtatcctt tttgcctttg 120
aatatgtaat ccataaactt atgcaggaag tgcctcgtgc cgaattcggc acgagaatca 180
ctgaccttca catatttatt ccaattctaa tatctctact cgctgtctac ctgatttttc 240
agtggcgaac caacttgaca gggttggaca tggccaacag cagcaagatt ctgattattg 300
gaggaacagg ctacattggt cgtcatataa ccaaagccag ccttgctctt ggtcatccca 360
cattccttct tgtcagagag acctccgctt ctaatcctga gaaggctaag cttctggaat 420
ccttcaaggc ctcaggtgct attatactcc atggatcttt ggaggaccat gcaagtcttg 480
tggaggcaat caagaaagtt gatgtagtta tctcggctgt caagggacca cagctgacgg 540
ttcaaacagg atatttatcc agggtattta aagggagggt tggaacccat caagaagggt 600
tttggccaa 609

<210> 68
<211> 474
<212> DNA
<213>

<400> 68
gcaagatagg ttttattctt ctggagttgg gtgaggcttg gaaatttaag taaaaagggt 60
gcatagcaat taagcagttg cagccatggc ggtctgtgga actgaagtag ctcatactgt 120
gctctatgta gctgcagaca tggtggaaaa caacacgtct attgtgacca cctctatggc 180
tgcagcaaat tgtgagatgg agaagcctct tctaaattcc tctgccacct caagaatact 240
ggtgatggga gccacaggtt acattggccg ttttgttgcc caagaagctg ttgctgctgg 300
tcatcctacc tatgctctta tacgcccgtt tgctgcttgt gacctggcca aagcacagcg 360
cgtccaacaa ttgaaggatg ccggggtcca tatcctttat gggtctttga gtgatcacaa 420

cctcttagta aatacattga aggacatggg ccgttgttat ctctaccatt ggag 474

<210> 69
<211> 474
<212> DNA
<213>

<400> 69
gcaagatagg ttttattctt ctggagttgg gtgaggcttg gaaatttaag taaaaagggt 60
gcatagcaat taagcagttg cagccatggc ggtctgtgga actgaagtag ctcatactgt 120
gctctatgta gctgcagaca tggtggaaaa caacacgtct attgtgacca cctctatggc 180
tgcagcaaat tgtgagatgg agaagcctct tctaaattcc tctgccacct caagaatact 240
ggtgatggga gccacaggtt acattggccg ttttgttgcc caagaagctg ttgctgctgg 300
tcatcctacc tatgctctta tacgcccgtt tgctgcttgt gacctggcca aagcacagcg 360
cgtccaacaa ttgaaggatg ccggggtcca tatcctttat gggtctttga gtgatcacaa 420
cctcttagta aatacattga aggacatggg ccgttgttat ctctaccatt ggag 474

<210> 70
<211> 608
<212> DNA
<213>

<400> 70
cattgatagt tgatggaaga ccatcagtaa agcatgaaaa agaaattgtt ccaaggtgaa 60
gaagtcagtt gctccagcag aacctttta gcaattgttt ttgtatcctt tttgcctttg 120
aatatgtaat ccataaactt atgcaggaag tgcctcgtgc cgaattcggc acgagaatca 180
ctgaccttca aatatttatt ccaattctaa tatctctact cgctgtctac ctgatttttc 240
agtggcgaac caacttgaca gggttggaca tggccaacag cagcaagatt ctgattattg 300
gaggaacagg ctacattggt cgtcatataa ccaaagccag ccttgctctt ggtcatccca 360
cattccttct tgtcagagag acctccgctt ctaatcctga gaaggctaag cttctggaat 420
ccttcaaggc ctcaggtgct attatactcc atggatcttt ggaggaccat gcaagtcttg 480
tggaggcaat caagaaagtt gatgtagtta tctcggctgt caagggacca cagctgacgg 540
atcaaacagg atatttatcc agggtattta aagggaggtt ggaacccatc aagaagggtt 600
ttggccaa 608

<210> 71
<211> 1474
<212> DNA
<213>

<400> 71
gaattcggca cgagaaaacg tccatagctt ccttgccaac tgcaagcaat acagtacaag 60
agccagacga tcgaatcctg tgaagtggtt ctgaagtgat gggaagcttg gaatctgaaa 120
aaactgttac aggatatgca gctcgggact ccagtggcca cttgtcccct tacacttaca 180
atctcagaaa gaaaggacct gaggatgtaa ttgtaaaggt catttactgc ggaatctgcc 240
actctgattt agttcaaatg cgtaatgaaa tggacatgtc tcattaccca atggtccctg 300
ggcatgaagt ggtggggatt gtaacagaga ttggcagcga ggtgaagaaa ttcaaagtgg 360
gagagcatgt aggggttggt tgcattgttg ggtcctgtcg cagttgcggt aattgcaatc 420
agagcatgga acaatactgc agcaagagga tttggaccta caatgatgtg aaccatgacg 480
gcacacctac tcagggcgga tttgcaagca gtatggtggt tgatcagatg tttgtggttc 540
gaatcccgga gaatcttcct ctggaacaag cggcccctct gttatgtgca ggggttacag 600
ttttcagccc aatgaagcat ttcgccatga cagagcccgg gaagaaatgt gggattttgg 660
gtttaggagg cgtggggcac atgggtgtca agattgccaa agcctttgga ctccacgtga 720
cggttatcag ttcgtctgat aaaaagaaag aagaagccat ggaagtcctc ggcgccgatg 780
cttatcttgt tagcaaggat actgaaaaga tgatggaagc agcagagagc ctagattaca 840
taatggacac cattccagtt gctcatcctc tggaaccata tcttgccctt ctgaagacaa 900

atggaaagct agtgatgctg ggcgttgttc cagagccgtt gcacttcgtg actcctctct 960
taatacttgg gagaaggagc atagctggaa gtttcattgg cagcatggag gaaacacagg 1020
aaactctaga tttctgtgca gagaagaagg tatcatcgat gattgaggtt gtgggcctgg 1080
actacatcaa cacggccatg gaaaggttgg agaagaacga tgtccgttac agatttgtgg 1140
tggatgttgc tagaagcaag ttggataatt agtctgcaat caatcaatca gatcaatgcc 1200
tgcatgcaag atgaatagat ctggactagt agcttaacat gaaagggaaa ttaaattttt 1260
atttaggaac tcgatactgg tttttgttac tttagtttag cttttgtgag gttgaaacaa 1320
ttcagatgtt tttttaactt gtatatgtaa agatcaattt ctcgtgacag taaataataa 1380
tccaatgtct tctgccaaat taatatatgt attcgtattt ttatatgaaa aaaaaaaaaa 1440
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaa 1474

<210> 72
<211> 1038
<212> DNA
<213>

<400> 72
gaattcggca cgagagaggg ttatatatct tgattctgac ctgattgtcg tcgacgacat 60
tgccaagctc tgggccacgg atttggaatc tcgtgtcctc ggggcaccag agtactgcaa 120
ggcgaatttc acaaagtatt tcaccgataa tttctggtgg gatcccgcat tatccaagac 180
ctttgaggga aaaaaaccct gctacttcaa cacaggcgta atggtgatcg atcttgaaaa 240
atggcgggca ggggaattca caagaaagat cgaaatctgg atggacatac agaaggaacg 300
ccgtatctat gagctcggat cattaccgcc atttttactg gtatttgctg gtttggttaa 360
gcaagtcgat catcgttgga atcagcacgg tttaggcgga gataatttgc aaggcctttg 420
ccgagatctt caccctggac ctgtcagttt gttgcattgg agtggtaagg gcaaaccttg 480
gctacgcctg gaatgccaag cggacttgcc ctctggatac tttatgggct ccttatgatc 540
tttatcgatc aacgtattac ctaaatgggt gagagagcct ctctcctcgg ggtgcttttt 600
atcgaattaa acctgatttg ataaaatgcc aaatagaact ttacgcctat gcatctttca 660
gttttgaatt tcaattctgg taacgaatag aagaaaacaa tagcacagcc acaggcagga 720
caaatccatc atgagggacc aatcgtttga atttagtatt aataaggttg ttccatataa 780
cgcctgtgaa gaatgatatt gtggactgat ctatttatat ttgtactgcc atgccatcct 840
cagccagcag agaggcaagc aatgccgctg caagtcatgt agggaaggcg ttgtgaactc 900
aattttcggc gactgtacag gatgtaaatt tttggaacat taatatcatt atgataagtt 960
cctgaaccaa caactgtata ataccttata aatgtatctg caactccatt tttgcataaa 1020
aaaaaaaaaa aaaaaaaa 1038

<210> 73
<211> 372
<212> DNA
<213>

<400> 73
ctaggggtct tggggggttc ctgatgccca attgttgctg tgcttggcat gaacccaaaa 60
catgcaagag atctgtagtc agtagtcttg ttggatctat agcttttaga aaagagtcac 120
gtccttttag ggtaacatca ttccaaccat atccagttcc accaccggct acaccttcaa 180
cgggaggagg agcaagatat tcagcattgc tttgggcacc agatggatag gcattatttt 240
ccatcggaat tcagccgagc tcgcccccctc agtccaatcg tcgtgaaaat ccctcaaaat 300
tgggcaattc tggctcgaaa tcgccaaatt atgggctaca acaggattaa aattgcacag 360
aaatctgcca gt 372

<210> 74
<211> 545
<212> DNA
<213>

<400> 74

aaagaattcg gcacgagggc aatccgagcc tagccaacca acttggcagc aaggagcaca 60
gggagttggc gagagaagct gttaggaaat ctttggtatt gttgaaaaat gggaagtcag 120
ccaacaagcc tttgctccct ttggagaaga atgcttccaa ggttcttgtt gcaggaaccc 180
atcctgataa tctgggttat cagtgtggtg gatggacgat ggaatggcaa ggattaagtg 240
gaaacataac cgtaggaact acaattctgg aagctatcaa actagctgtc agcccctcta 300
ctgaagtggt ttatgagcaa aatccagatg ctaactatgt caaaggacaa gggttttcat 360
atgccattgt ggttgtgggt gaggcaccat acgcagaaac gtttggagac aatcttaatt 420
tgaccattcc cctaggcgga ggggacacga ttaagacggt ctgtggctcc ttgaaatgcc 480
ttgtaatctt gatatctgga aggccacttg ttattgaacc ttatcttcca ttggtggatc 540
gtttt 545

<210> 75
<211> 463
<212> DNA
<213>

<400> 75
gcaggtcgac actagtggat ccaaagaatt cggcacgaga aaaaacaaat gttagctagc 60
ctagtgatga gctttacgta tacctggcct tttatacatg gatctgagtt tttatgcagg 120
tgtagagcct tttgttactc tgtatcactg ggacttgcca caagctctgg aggacgaata 180
cggtggattt cgtagcaaaa aagttgtgga tgactttggc atattctcag aagaatgctt 240
tcgtgctttt ggagaccgtg tgaagtactg ggtaactgtt aacgaaccgt tgatcttctc 300
atatttttct tacgatgtgg ggcttcacgc accgggccgc tgttcgcctg gatttggaaa 360
ctgcactgcg ggaaattcag cgacagagcc ttatattgta gcccataaca tgcttcttgc 420
acatagtacc gctgttaaaa atatatagca taaataccca ggg 463

<210> 76
<211> 435
<212> DNA
<213>

<400> 76
acactagtgg atccaaagaa ttcggcacga ggctaccatc ttccctcata atattgggct 60
tggagctacc agggatcctg atctggctag aagaataggg gctgctacgg ctttggaagt 120
tcgagctact ggcattcaat acacatttgc tccatgtgtt gctgtttgca gagatcctcg 180
atggggccgc tgctatgaga gctacagtga ggatccaaaa attgtcaagg ccatgactga 240
gattatcgtt ggcctgcaag ggaatcctcc tgctaattct acaaaagggg ggccttttat 300
agctggacag tcaaatgttg cagcttgtgc taagcatttt gtgggttatg gtggaacaac 360
caaaggtatc gatgagaata atactgttat caactatcaa gggttatttc aacattccaa 420
attaccccca atttt 435

<210> 77
<211> 451
<212> DNA
<213>

<400> 77
gaattcggca cgagcctaga attctatggt gaaaattgtt gggacaaggc tgcccaagtt 60
tacaaaggaa cagtcccaaa tggttaaagg ttcaatagac tatctaggcg ttaaccaata 120
cactgcttat tacatgtatg atcctaaaca acctaaacaa aatgtaacag attaccagac 180
tggactggaa tacaggcttt gcatatgctc gcaatggagt gcctattgga ccaagggcga 240
actccaattg gctttacatt gtgccttggg gtctatacaa ggccgtcaca tacgtaaaag 300
aacactatgg aaatccaact atgattctct ctgaaaatgg aatggacgac ctggaaacgt 360
gacacttcca gcaggactgc atgataccat caggggtaac tactataaaa gctatttgca 420
aaatttgatt aatgcacgtg aatgaccggg g 451

<210> 78
<211> 374
<212> DNA
<213>

<400> 78
ctgctctgca agcagtacta tgcacagcaa ggcctgctta actgaaaaca gagcgctgag 60
cttgaggaaa cgctcaagca ttgctgaggc caccgtttat ctaaatagcg caacataggg 120
cttcagaaaa atggcaatgg cacaagcatt cagaggccgt gtcttgcaag ctgcccgttt 180
gctccgccgc aacattctgc cggaggataa aagctttgga tccgctgctt ctcctagacg 240
agctcttagc ctgctctcat caaaagcctt catctctttc tctgttgaac ggcatcggct 300
agctgctaca aattcaacaa ttgtgttgca atctcgaaac ttttctgcaa aaggtaaaaa 360
gacaggacaa tctg 374

<210> 79
<211> 457
<212> DNA
<213>

<400> 79
gaagaatgga agagattaat ggtgataacg cagtaaggag gagctgcttt cctccaggtt 60
tcatgtttgg gatagcaact tctgcttatc agtgtgaagg agctgccaac gaaggtggaa 120
aaggcccaag catctgggac tcattttcac gaacaccagg caaaattctt gatggaagca 180
acggtgatgt agcagtggat cagtatcatc gttataaggc agatgtaaaa ctgatgaaag 240
atatgggcgt ggctacctac agattctcga tttcatggcc tcgtatattt ccaaagggaa 300
aaggagagat caatgaggaa ggagtagcct attacaataa cctcatcaat gaactcctcc 360
agaatggaat ccaagcgtct gtcaactttg tttcactggg atactcccca gtctctggag 420
gatgaatatg gcggatttct gaggccaacc attgtga 457

<210> 80
<211> 346
<212> DNA
<213>

<400> 80
ggtgtgatgg caggaattcc agtcctaagg ccattttgca tctgtttgct ttcagtctac 60
atgctgcaca ttgtagctgc agtagcttca ccaaggctag gtagaagcag cttcccaagg 120
ggtttcaaat ttggtgcagg gtcatctgct tatcaggcgg aaggagctgc tcatgagggt 180
ggcaaaggcc caagcatttg ggatacattc tcccacactc caggtaaaat cgctgatggg 240
aatattggga tgttgcagta gatcaatacc accgttataa ggaagatgtg cagcttctca 300
aatacatggg aatggacgtc tatcgtttct ctatctcctg gtcacg 346

<210> 81
<211> 957
<212> DNA
<213>

<400> 81
gaattcggca cgagaaagcc ctagaatttt ttcagcatgc tatcacagcc ccagcgacaa 60
ctttaactgc aataactgtg gaagcgtaca aaaagtttgt cctagtttct ctcattcaga 120
ctggtcaggt tccagcattt ccaaaataca cacctgctgt tgtccaaaga aatttgaaat 180
cttgcactca gccctacatt gatttagcaa acaactacag tagtgggaaa atttctgtat 240
tggaagcttg tgtcaacacg aacacagaga agttcaagaa tgatagtaat ttggggttag 300
tcaagcaagt tttgtcatct ctttataaac ggaatattca gagattgaca cagacatatc 360
tgaccctctc tcttcaagac atagcaagta cggtacagtt ggagactgct aagcaggctg 420
aactccatgt tctgcagatg attcaagatg gtgagatttt tgcaaccata aatcagaaag 480

atgggatggt gagcttcaat gaggatcctg aacagtacaa aacatgtcag atgactgaat 540
atatagatac tgcaattcgg agaatcatgg cactatcaaa gaagctcacc acagtagatg 600
agcagatttc gtgtgatcat tcctacctga gtaaggtggg gagagagcgt tcaagatttg 660
acatagatga ttttgatact gttccccaga agttcacaaa tatgtaacaa atgatgtaaa 720
tcatcttcaa gactcgctta tattcattac tttctatgtg aattgatagt ctgttaacaa 780
tagtactgtg gctgagtcca gaaaggatct ctcggtatta tcacttgaca tgccatcaaa 840
aaaatctcaa atttctcgat gtctagtctt gattttgatt atgaatgcga cttttagttg 900
tgacatttga gcacctcgag tgaactacaa agttgcatgt taaaaaaaaa aaaaaaa 957

<210> 82
<211> 489
<212> DNA
<213>

<400> 82
gcaggtcgac actagtggat ccaaagaatt cggcacgaga taagactaat tttccagaca 60
atcctccatt cccattcaat tacactggta ctccacccaa taatacacag gctgtgaatg 120
ggactagagt aaaagtcctt ccctttaaca caactgttca attgattctt caagacacca 180
gcatcttcag cacagacagc caccctgtcc atctccatgg tttcaatttc tttgtggtgg 240
gccaaggtgt tggaaactac aatgaatcaa cagatgcacc aaattttaac ctcattgacc 300
ctgtcgagag aaacactgtg ggagttccca aaggaggttg ggctgctata agatttcgtg 360
cagacaatcc aggggtttgg ttcatgcact gtcatttgga ggttcacaca tcgtggggac 420
tgaaaatggc gtgggtagta aagaacggaa aagggcccat cgattttcca cccgggtggg 480
taccagtaa 489

<210> 83
<211> 471
<212> DNA
<213>

<400> 83
gaattcggca cgagaaaacc ttttcagacg aatgttctga tgctcggccc cggccagaca 60
acagacatac ttctcactgc caatcaggct acaggtagat actacatggc tgctcgagca 120
tattccaacg ggcaaggagt tcccttcgat aacaccacta ccactgccat tttagaatac 180
gagggaagct ctaagacttc aactccagtc atgcctaatc ttccattcta taacgacacc 240
aacagtgcta ctagcttcgc taatggtctt agaagcttgg gctcacacga ccacccagtc 300
ttcgttcctc agagtgtgga ggagaatctg ttctacacca tcggtttggg gttgatcaaa 360
tgtccggggc agtcttgtgg aggtccaacg gatcaagatt tgcagcaagt atgaatacat 420
atcatttgtc ccgcaaccac ttcttccaat ccttcaagct cagcattttg g 471

<210> 84
<211> 338
<212> DNA
<213>

<400> 84
gttcggcact gagagatcca tttctttcaa tgttgagaca gtgagtagta ttagtttgat 60
atctctttca ggaatatatc gtgcttgcag gatctttagt ttctgcaaca atgtcgttgc 120
aatcagtgcg tctatcttct gctctccttg ttttgctact agcatttgtt gcttacttag 180
ttgctgtaac aaacgcagat gtccacaatt ataccttcat tattagaaag agacagttac 240
caggctatgc aataagcgta taatcgccac cgtcaatggc agctaccagg cccaactatt 300
catgtacgtg atggagacgt tgttaattat caaagctt 338

<210> 85
<211> 1229
<212> DNA

<213>

<400> 85
agagaaataa ttatatttgt aaatttaagt ctacgtttat taaaaaacta caaccctaaa 60
tgcaggagaa aaaacaagca tgctgtctac tgaagcttac aaatcaaatc cctgcgatat 120
gtcttttctc gtgccgaatt cggcacgaga agatcttggt tcgagtctct cagctctctc 180
caaaggaatt ttgtgggtca tttgcaggtg aagacaccat ggtgaaggct tatcccaccg 240
taagcgagga gtacaaggct gccattgaca aatgcaagag gaagctccga gctctcattg 300
cagagaagaa ctgtgcgccg atcatggttc gaatcgcatg gcacagcgct gggacttacg 360
atgtcaagac caagaccgga gggcccttcg ggacgatgag atatggggcc gagcttgccc 420
acggtgctaa cagtggtctg gacatcgcag ttaggctcct ggagccaatc aaggaacagt 480
tccccataat cacctatgct gacctttatc agttggctgg tgtggtggct gttgaagtga 540
ccggggggacc tgacattccg ttccatcctg gaagagaaga caagcctgag cctccagaag 600
aaggccgcct tcctgatgct acaaaaggac ctgatcatct gagggatgtt tttggtcaca 660
tggggttgaa tgataaggaa attgtggcct tgtctggtgc ccacaccttg ggagatgcc 720
acaaggagag atctggtttt gaaggaccat ggacctctaa ccccccttatc tttgacaact 780
cttacttcac agagcttgtg actggagaga aggaaggcct gcttcagttg ccatctgata 840
aggcactgct tgctgatcct agttttgcag tttatgttca gaagtatgca caggacgaag 900
acgctttctt tgctgactat gcggaagctc acctgaagct ttctgaactt gggtttgctg 960
atgcgtagat tcataccttc tgcagagaca attccttgct agatagcttc gttttgtatt 1020
tcatctaatc ttttcgatta tatagtcaca tagaagttgg tgttatgcgc catagtgata 1080
cttgaaccta catgtttttg aaaagtatcg atgttcttta aaatgaacat tgaatacaac 1140
attttggaat ctggttgtgt tctatcaagc gcatatttta atcgaatgct tcgttcctgt 1200
taaaaaaaaa aataaaataa aaaaaaaaa 1229

<210> 86
<211> 1410
<212> DNA
<213>

<400> 86
gaagatgggg ctgtgggtgg tgctggcttt ggcgctcagt gcgcactatt gcagtctcag 60
gcttacaatg tggtaagttc aagcaatgct actgggagtt acagtgagaa tggattggtg 120
atgaattact atggggactc ttgccctcag gctgaagaga tcattgctga acaagtacgc 180
ctgttgtaca aaagacacaa gaacactgca ttctcatggc ttagaaatat tttccatgac 240
tgtgctgtgg agtcatgtga tgcatcgctt ctgttggact caacaaggaa cagcatatca 300
gaaaaggaca ctgacaggag cttcggcctc cgcaacttta ggtatttgga taccatcaag 360
gaagccgtgg agagggagtg ccccggggtc gtttcctgtg cagatatact cgttctctct 420
gccagagatg gcgttgtatc gttgggagga ccatacattc ccctgaagac gggaagaaga 480
gatggacgga agagcagagc agatgtggtg gagaattacc tgcccgatca caatgagagc 540
atctccactg ttctgtctcg cttcaaagcc atgggaatcg acacccgtgg ggttgttgca 600
ctgctggggg ctcacagcgt ggggaggact cactgcgtga agctggtgca caggctgtac 660
ccggaagtag atccgacact ggaccctggg cacgtggagc acatgaagca caagtgcccg 720
gacgcgatcc ccaacccgaa ggcagtgcag tatgtgcgga acgaccgggg aacgcctatg 780
aagctggaca acaactacta cgtgaacctg atgaacaaca aggggctcct aatagtggac 840
cagcaactgt atgcagattc gaggaccagg ccgtatgtga agaagatggc aaaaagccag 900
gaatacttct tcaaatactt ctcccgggcg ctcaccatcc tctctgagaa caatcctctc 960
accggcgctc gaggagaaat ccgtcggcag tgctcgctca aaaacaaatt gcacacaaaa 1020
agcaagcgtt gagcgatagc tcaatgccgc agtggtggga gtgatagcgt gatgccacag 1080
tggtgggcat ttcatatata aattgcagtt tgcgttttta ttagataatc ataatggtgt 1140
ggtgtgacta tgccctgcga atcacatcga tgaaccacaa ccgaaccgtg gaacagtagg 1200
cttattccct tatgtaagca gaacctttta ttataagcaa aaaagacaat cctgtctgtt 1260
attctagtat aattttgtca tcagttaaag ttgctcatct gataataact ggaaacggta 1320
aaatatgaca actacgtatc ttctttggtc atctgataat aaccggaaac gataaaatat 1380
gacaactaca tatattcttt aaaaaaaaaa 1410

<210> 87
<211> 687
<212> DNA
<213>

<400> 87
gtagtttcgt tttacaacaa tctcaggttt tgaatctcag aatagttgcg aaaggaagcg 60
atgacgaagt acgtgatcgt tagctccatt gtgtgtttct ttgtatttgt ttctgcgtgc 120
ataatttctg tcaatggatt agttgtccat gaagatgatc tgtcaaagcc tgtgcatggg 180
ctttcgtgga cattttataa ggacagttgc cccgacttgg aggccatagt gaaatcggta 240
cttgagccgg cgttggacga agatatcact caggccgcag gcttgctgag acttcatttc 300
catgactgtt ttgtgcaggg ttgcgatggg tccgtgttgc tgacaggaac taaaagaaac 360
cccagtgagc aacaggctca gccaaactta acactaagag cccgggcctt gcagctgatc 420
gacgaaatta aaaccgctgt agaagctagc tgcagtgggg ttgtaacttg tgcagacatt 480
ctggctttgg ctgctcgtga ctccgtccgc tcaggaggcc caaaatttcc agtaccactt 540
ggccgcagag atagcctaaa gtttgccagt caatccgtag ttctcgccaa tataccaact 600
ccaactttaa atttgacaca gctgatgaac atttttggct ccaaaggatt cagtttggcc 660
gaaatggttg ctcttcaggt ggcacac 687

<210> 88
<211> 688
<212> DNA
<213>

<400> 88
gtagtttcgt tttacaacaa tctacaggtt ttgaatctca gaatagttgc gaaaggaagc 60
gatgacgaag tacgtgatcg ttagctccat tgtatgtttc tttgtatttg tttctgcgtg 120
cataatttct gtcaatggat tagttgtcca tgaagatgat ctgtcaaagc ctgtgcatgg 180
gctttcgtgg acattttata aggacagttg ccccgacttg gaggccatag tgaaatcggt 240
acttgagccg gcgttggacg aagatatcac tcaggccgca ggttgctgag acttcatttc 300
catgactgtt ttgtgcaggg ttgcgatggg tccgtgttgc tgacaggaac taaaagaaac 360
ccccgagtga gcaacaggct cagccaaact taacactaag agcccgggcc ttgcagctga 420
tcgacgaaat taaaaccgct gtagaagcta gctgcagtgg ggttgtaact tgtgcagaca 480
ttctggcttt ggctgctcgt gactccgtcg ctcaggaggc ccaaaatttc cagtaccact 540
tggccgcaga gatagcctaa agtttgccag tcaatccgta gttctcgcca atataccaac 600
tccaacttta aatttgacac agctgatgaa catttttggc tccaaaggat tcagtttggc 660
cgaaatggtt gctcttcagg tggcacac 688

<210> 89
<211> 278
<212> DNA
<213>

<400> 89
tcttcgaatt ctctttcacg actgcttcgt taatggctgc gatggctcga tattgttaga 60
tgataactca acgttcaccg gagaaaagac tgcaggccca aatgttaatt ctgcgagagg 120
attcgacgta atagacacca tcaaaactca agttgaggca gcctgcagtg gtgtcgtgtc 180
atgtgccgac attctcgcca ttgctgcacg cgattcagtc gtccaactgg ggggcccaac 240
atggacggta cttctgggag aaaagacgga tccgatca 278

<210> 90
<211> 1960
<212> DNA
<213>

<400> 90

```
gttttccgcc atttttcgcc tgtttctgcg gagaatttga tcaggttcgg attgggattg      60
aatcaattga aaggttttta ttttcagtat ttcgatcgcc atggccaacg gaatcaagaa     120
ggtcgagcat ctgtacagat cgaagcttcc cgatatcgag atctccgacc atctgcctct     180
tcattcgtat tgctttgaga gagtagcgga attcgcagac agaccctgtc tgatcgatgg     240
ggcgacagac agaacttatt gcttttcaga ggtggaactg atttctcgca aggtcgctgc     300
cggtctggcg aagctcgggt tgcagcaggg gcaggttgtc atgcttctcc ttccgaattg     360
catcgaattt gcgtttgtgt tcatgggggc ctctgtccgg ggcgccattg tgaccacggc     420
caatcctttc tacaagccgg gcgagatcgc caaacaggcc aaggccgcgg gcgcgcgcat     480
catagttacc ctggcagctt atgtggagaa actggccgat ctgcagagcc acgatgtgct     540
cgtcatcaca atcgatgatg ctcccaagga aggttgccaa catatttccg ttctgaccga     600
agccgacgaa acccaatgcc cggccgtgac aatccacccg gacgatgtcg tggcgttgcc     660
ctattcttcc ggaaccacgg ggctccccaa gggcgtgatg ttaacgcaca aaggcctggt     720
gtccagcgtt gcccagcagg tcgatggtga aaatcccaat ctgtatttcc attccgatga     780
cgtgatactc tgtgtcttgc ctcttttcca catctattct ctcaattcgg ttctcctctg     840
cgcgctcaga gccggggctg cgaccctgat tatgcagaaa ttcaacctca cgacctgtct     900
ggagctgatt cagaaataca aggttaccgt tgccccaatt gtgcctccaa ttgtcctgga     960
catcacaaag agccccatcg tttcccagta cgatgtctcg gccgtccgga taatcatgtc    1020
cggcgctgcg cctctcggga aggaactcga agatgccctc agagagcgtt ttcccaaggc    1080
cattttcggg cagggctacg gcatgacaga agcaggcccg gtgctggcaa tgaacctagc    1140
cttcgcaaag aatcctttcc ccgtcaaatc tggctcctgc ggaacagtcg tccggaacgc    1200
tcaaataaag atcctcgata cagaaactgg cgagtctctc ccgcacaatc aagccggcga    1260
aatctgcatc cgcggacccg aaataatgaa aggatatatt aacgacccgg aatccacggc    1320
cgctacaatc gatgaagaag gctggctcca cacaggcgac gtcgggtaca ttgacgatga    1380
cgaagaaatc ttcatagtcg acagagtaaa ggagattatc aaatataagg gcttccaggt    1440
ggctcctgct gagctggaag ctttacttgt tgctcatccg tcaatcgctg acgcagcagt    1500
cgttcctcaa aagcacgagg aggcgggcga ggttccggtg gcgttcgtgg tgaagtcgtc    1560
ggaaatcagc gagcaggaaa tcaaggaatt cgtggcaaag caggtgattt tctacaagaa    1620
aatacacaga gtttactttg tggatgcgat tcctaagtcg ccgtccggca agattctgag    1680
aaaggatttg agaagcagac tggcagcaaa atgaaaatga atttccatat gattctaaga    1740
ttcctttgcc gataattata ggattccttt ctgttcactt ctatttatat aataaagtgg    1800
tgcagagtaa gcgccctata aggagagaga gagcttatca attgtatcat atggattgtc    1860
aacgccctac actcttgcga tcgctttcaa tatgcatatt actataaacg atatatgttt    1920
tttttataaa tttactgcac ttctcgttca aaaaaaaaaa                          1960
```

<210> 91
<211> 701
<212> DNA
<213>

<400> 91

```
gtagtttcgt tttacaacaa tctcaggttt tgaatctcag aatagttgcg aaaggaagcg      60
atgacgaagt acgtgatcgt tagctccatt gtatgtttct ttgtatttgt ttctgcgtgc     120
ataatttctg tcaatggatt agttgtccat gaagatgatc tgtcaaagcc tgtgcatggg     180
ctttcgtgga cattttataa ggacagttgc cccgacttgg aggccatagt gaaatcggta     240
cttgagccgg cgttggacga agatatcact caggccgcag gttgctgaga cttcatttcc     300
atgactgttt tgtgcagggt tgcgatgggt ccgtgttgct gacaggaact aaaagaaacc     360
ccgagtgagc aacaggctca gccaaactta acactaagag cccgggcctt gcagctgatc     420
gacgaaatta aaaccgctgt agaagctagc tgcagtgggg ttgtaacttg tgcagacatt     480
ctggctttgg ctgctcgtga ctccgtcgct caggaggccc aaaatttcca gtaccacttg     540
gccgcagaga tagcctaaag tttgccagtc aatccgtagt tctcgccaat ataccaactc     600
caactttaaa tttgacacag ctgatgaaca tttttggctc caaaggattc agtttggccg     660
aaatggttgc tctttcaggt ggacacacaa tcggcattgg t                         701
```

<210> 92
<211> 626
<212> DNA

<213>

<400> 92
gttgcaggtc ggggatgatt tgaatcacag aaacctcagc gattttgcca agaaatatgg 60
caaaatcttt ctgctcaaga tgggccagag gaatcttgtg gtagtttcat ctcccgatct 120
cgccaaggag gtcctgcaca cccagggcgt cgagtttggg tctcgaaccc ggaacgtggt 180
gttcgatatc ttcacgggca aggggcagga catggtgttc accgtctatg gagatcactg 240
gagaaagatg cgcaggatca tgactgtgcc tttctttacg aataaagttg tccagcacta 300
cagattcgcg tgggaagacg agatcagccg cgtggtcgcg gatgtgaaat cccgcgccga 360
gtcttccacc tcgggcattg tcatccgtag cgcctccagc tcatgatgta taatattatg 420
tataggatga tgttcgacag gagattcgaa tccgaggacg acccgctttt cctcaagctc 480
aaggccctca acggagagcg aagtcgattg gcccagagct ttgagtacaa ttatggggat 540
ttcattccca gtcttaggcc cttcctcaga ggttatcaca gaatctgcaa tgagattaaa 600
gagaaacggc tctctctttt caagga 626

<210> 93
<211> 660
<212> DNA
<213>

<220>
<221>
<222> (1)...(660)
<223> n

<400> 93
acccagtgac cttcaggcct gagagatttc ttgaggaaga tgttgatatt aagggccatg 60
attacaggct actgccattg gtgcagggcg caggatctgc cctggtgcac aattgggtat 120
taatttagtt cagtctatgt tgggacacct gcttcatcat ttcgtatggg cacctcctga 180
gggaatgaag gcagaagaca tagatctcac agagaatcca gggcttgtta ctttcatggc 240
caagcctgtg caggccattg ctattcctcg attgcctgat catctctaca agcgacagcc 300
actcaattga tcaattgatc tgatagtaag tttgaatttt gttttgatac aaaacgaaat 360
aacgtgcagt ttctcctttt ccatagtcaa catgcagctt tctttctctg aagcgcatgc 420
agctttcttt ctctgaagcc caacttctag caagcaataa ctgtatattt tagaacaaat 480
acctattcct caaattgagw atttctctgt aggggnngnt aattgtgcaa tttgcaagna 540
atagtaaagt ttantttagg gnattttaat agtcctangt aanangnggn aatgntagng 600
ggcattnaga aanccctaat agntgttggn ggnngntagg ntttttnacc aaaaaaaaaa 660

<210> 94
<211> 1012
<212> DNA
<213>

<400> 94
ctttgaggca acctacattc attgaatccc aggatttctt cttgtccaaa caggtttaag 60
gaaatggcag gcacaagtgt tgctgcagca gaggtgaagg ctcagacaac ccaagcagag 120
gagccggtta aggttgtccg ccatcaagaa gtgggacaca aaagtctttt gcagagcgat 180
gccctctatc agtatatatt ggaaacgagc gtgtaccctc gtgagcccga gccaatgaag 240
gagctccgcg aagtgactgc caagcatccc tggaacctca tgactacttc tgccgatgag 300
ggtcaatttc tgggcctcct gctgaagctc attaacgcca agaacaccat ggagattggg 360
gtgtacactg gttactcgct tctcagcaca gcccttgcat tgcccgatga tggaaagatt 420
ctagccatgg acatcaacag agagaactat gatatcggat tgcctattat tgagaaagca 480
ggagttgccc acaagattga cttcagagag ggccctgctc tgccagttct ggacgaactg 540
cttaagaatg aggacatgca tggatcgttc gattttgtgt tcgtggatgc ggacaaagac 600
aactatctaa actaccacaa gcgtctgatc gatctggtga aggttggagg tctgattgca 660
tatgacaaca ccctgtggaa cggatctgtg gtggctccac ccgatgctcc cctgaggaaa 720

tatgtgagat attacagaga tttcgtgatg gagctaaaca aggcccttgc tgtcgatccc 780
cgcattgaga tcagccaaat cccagtcggt gacggcgtca ccctttgcag gcgtgtctat 840
tgaaaacaat ccttgtttct gctcgtctat tgcaagcata aaggctctct gattataagg 900
agaacgctat aatatatggg gttgaagcca tttgttttgt ttagtgtatt gataataaag 960
tagtacagca tatgcaaagt ttgtatcaaa aaaaaaaaaa aaaaaaaaaa aa 1012

<210> 95
<211> 1460
<212> DNA
<213>

<400> 95
aaaacgtcca tagcttcctt gccaactgca agcaatacag tacaagagcc agacgatcga 60
atcctgtgaa gtggttctga agtgatggga agcttggaat ctgaaaaaac tgttacagga 120
tatgcagctc gggactccag tggccacttg tccccttaca cttacaatct cagaaagaaa 180
ggacctgagg atgtaattgt aaaggtcatt tactgcggaa tctgccactc tgatttagtt 240
caaatgcgta atgaaatgga catgtctcat tacccaatgg tccctgggca tgaagtggtg 300
gggattgtaa cagagattgg cagcgaggtg aagaaattca aagtgggaga gcatgtaggg 360
gttggttgca ttgttgggtc ctgtcgcagt tgcggtaatt gcaatcagag catggaacaa 420
tactgcagca agaggatttg gacctacaat gatgtgaacc atgacggcac acctactcag 480
ggcggatttg caagcagtat ggtggttgat cagatgtttg tggttcgaat cccggagaat 540
cttcctctgg aacaagcggc ccctctgtta tgtgcagggg ttacagtttt cagcccaatg 600
aagcatttcg ccatgacaga gcccgggaag aaatgtggga ttttgggttt aggaggcgtg 660
gggcacatgg gtgtcaagat tgccaaagcc tttggactcc acgtgacggt tatcagttcg 720
tctgataaaa agaaagaaga agccatggaa gtcctcggcg ccgatgctta tcttgttagc 780
aaggatactg aaaagatgat ggaagcagca gagagcctag attacataat ggacaccatt 840
ccagttgctc atcctctgga accatatctt gcccttctga agacaaatgg aaagctagtg 900
atgctgggcg ttgttccaga gccgttgcac ttcgtgactc ctctcttaat acttgggaga 960
aggagcatag ctggaagttt cattggcagc atggaggaaa cacaggaaac tctagatttc 1020
tgtgcagaga agaaggtatc atcgatgatt gaggttgtgg gcctggacta catcaacacg 1080
gccatggaaa ggttggagaa gaacgatgtc cgttacagat ttgtggtgga tgttgctaga 1140
agcaagttgg ataattagtc tgcaatcaat caatcagatc aatgcctgca tgcaagatga 1200
atagatctgg actagtagct taacatgaaa gggaaattaa atttttattt aggaactcga 1260
tactggtttt tgttacttta gtttagcttt tgtgaggttg aaacaattca gatgtttttt 1320
taacttgtat atgtaaagat caatttctcg tgacagtaaa taataatcca atgtcttctg 1380
ccaaattaat atatgtattc gtatttttat atgaaaaaaa aaaaaaaaaa aaaaaaaaaa 1440
aaaaaaaaaa aaaaaaaaaa 1460

<210> 96
<211> 788
<212> DNA
<213>

<400> 96
ataagactct cgagaaggtc tatgtccccg aggaggggt tctcaactta atcgcagaga 60
caccatttcc agctaatatt ggcatagcaa ttggtcattc tatctttgtc aaaggagatc 120
aaacaaattt tgaaattgga cctaatggtg tggaggctag tcagctatac ccagatgtga 180
aatataccac tgtcgatgag tacctcagca aatttgtgtg aagtatgcga gattctcttc 240
cacatgcttc agagatacat aacagtttca atcaatgttt gtcctaggca tttgccaaat 300
tgtgggttat aatccttcgt aggtgtttgg cagaacagaa cctcctgttt agtatagtat 360
gacgagctag gcactgcaga tccttcacac ttttctcttc cataagaaac aaatactcac 420
ctgtggtttg ttttctttct ttctggaact ttggtatggc aataatgtct ttggaaaccg 480
cttagtgtgg aatgctaagt actagtgtcc agagttctaa gggagttcca aaatcatggc 540
tgatgtgaac tggttgttcc agagggtgtt tacaaccaac agttgttcag tgaataattt 600
tgttagagtg tttagatcca tctttacaag gctattgagt aaggttggtg ttagtgaacg 660
gaatgatgtc aaatcttgat gggctgactg actctcttgt gatgtcaaat cttgatggat 720

tgtgtctttt tcaatggtaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 780
aaaaaaaa 788

<210> 97
<211> 577
<212> DNA
<213>

<400> 97
gcccgacggc cacttgttgg acgccatgga agctctccgg aaagccggga ttctggaacc 60
gtttaaactg cagcccaagg aaggactggc tctcgtcaac ggcacagcgg tgggatccgc 120
cgtggccgcg tccgtctgtt ttgacgccaa cgtgctgggc gtgctggctg agattctgtc 180
tgcgctcttc tgcgaggtga tgcaagggaa accggagttc gtagatccgt taacccacca 240
gttgaagcac cacccagggc agatcgaagc cgcggccgtc atggagttcc tcctcgacgg 300
tagcgactac gtgaaagaag cagcgcggct tcacgagaaa gacccgttga gcaaaccgaa 360
acaagaccgc tacgctctgc gaacatcgcc acagtggttg ggcctccgga tcgaagtcat 420
ccgcgctgct actcactcca tcgagcggga gatcaattcc gtcaacgaca atccgttaat 480
cgatgtctcc agggacatgg ctctccacgg cggcaacttc cagggaacac ccatcggagt 540
ttccatggac aacatgcgaa tctctttggc agccgtc 577

<210> 98
<211> 492
<212> DNA
<213>

<400> 98
tacctggcca accccgtcac gactcacgtc cagagcgccg aacaacacaa ccaggatgtc 60
aattccctcg gcttgatctc cgccagaaag actgccgagg ccgttgagat tttaaagctg 120
atgttcgcta catatctggt ggccttatgc caggcgatcg atctccggca cctggaagaa 180
aacatgcgat ccgttgtgaa gcacgtagtc ttgcaggccg caagaaagac actgtgcact 240
gcagaagacg gaagcctcca cgacaccgga ttttgcgaga aggagctcct gcaagtcatc 300
gatcatcagc ccgttttctc gtacatcgac gatcccacaa atccatcata cgcgcttatg 360
ctccaactca gagaagtgct cgtagatgag gctctcaaat catcttgccc agacgggaat 420
gacgaatccg atcacaattt gcagcccgct gagagcgctg gagctgctgg aatattaccc 480
aattgggtgt tt 492

<210> 99
<211> 391
<212> DNA
<213>

<400> 99
cgttttccca aaggccattt tcgggcaggg ctacggcgca tgacagaagc aggcccggtg 60
ctggcaatga acctagcctt cgcaaagaat cctttccccg ccaaatctgg ctcctgcgga 120
acagtcgtcc ggaacgctca aataaagatc ctcgattaca ggaactggcg agtctctccc 180
gcacaatcaa gccggcgaaa tctgcatccg cggacccgaa ataatgaaag gatatattaa 240
cgacccggaa tccacggccg ctacaatcga tgaagaaggc tggctccaca caggcgacgt 300
cgggtacatt gacgatgacg aagaaatctt catagtcgac agagtaaagg agattatcaa 360
tataaaggct tccaggtgga tcctgctaat c 391

<210> 100
<211> 567
<212> DNA
<213>

<400> 100

```
ctgaattttc cctaactaga aataaagaga ttatatacat acacgagcaa agcgctctcc     60
tccagttgtc ttccttcgtt cgctcatctc tcctcgtaca ttattagcat acgacctctt    120
gtatcggacc cggatccgct atcgttaacg tacacacgtt ctagtgctga atggagatgg    180
agagcaccac cggcaccggc aacggccttc acagcctctg cgccgccggg agccaccatg    240
ccgacccact gaactggggg gcggcggcag cagccctcac agggagccac ctcgacgagg    300
tgaagcggat ggtcgaggag taccggaggc cggcggtgcg cctcggcggg gagtccctca    360
cgatagccca ggtggcggcg gtggcgagtc aggagggggt aggggtcgag ctctcggagg    420
cggcccgtcc cagggtcaag gccagcagcg actgggtcat ggagagcatg aacaagggaa    480
ctgacagcta cggggtcaca ccgggttcgg cggcaacttc tcaaccggag gccgaagcaa    540
ggcggtcctt ttcagaagga acttata                                         567

      <210> 101
      <211> 612
      <212> DNA
      <213>

      <400> 101
aaagcaacac attgaactct ctctctctct ctctctctct ctctctctct cccccacccc     60
cccttcccaa ccccacccac atacagacaa gtagatacgc gcacacagaa gaagaaaaga    120
tggggggtttc aatgcagtca atcgcactag cgacggttct ggccgtccta acgacatggg    180
cgtggagggc ggtgaactgg gtgtggctga ggccgaagag gctcgagagg cttctgagac    240
agcaaggtct ctccggcaag tcctacacct tcctggtcgg cgacctcaag gagaacttgc    300
ggatgctcaa ggaagccaag tccaagccca tcgccgtctc cgatgacatc aagcctcgtc    360
tcttgccttt cttgcatcaa tccttccaaa cctatggcaa agactcgttc acatggatgg    420
gcccaacacc aagagtgaac attacgaacc cggaacaaat aaaggaggta ttctctaaga    480
tatatgacta tcccaagcca gcctccaatc ccctggtgaa gttgctcgct gatggactcg    540
cgaaccatga gggcgagaaa tgggctcggc accgaaagat tatcaatcca gcattccaca    600
tggagaagtt ga                                                         612

      <210> 102
      <211> 455
      <212> DNA
      <213>

      <400> 102
tgtctctctc tctctctctc tctgtaaacc accatgctct tcctcactca tctcctagca     60
gttctagggg ttgtgttgct cctgctaatt ctatggaggg caagatcttc tccgaacaaa    120
cccaaaggta ctgccttacc ccggagctg ccgggcgcat ggccgatcat aggccacatc     180
cacttgctgg gcggcgagac cccgctggcc aggaccctgg ccgccatggc ggacaagcag    240
ggcccgatgt ttcggatccg tctcggagtc cacccggcga ccatcataag cagccgtgag    300
gcggtccggg agtgcttcac cacccacgac aaggacctcg cttctcgccc caaatccaag    360
gcgggaatcc acttgggcta cgggtatgcc ggttttggct tcgtagaata cggggacttt    420
tggcgcgaga tgaggaagat caccatgctc gagct                                455

      <210> 103
      <211> 1866
      <212> DNA
      <213>

      <400> 103
cgggctcgtg gctcggctcc ggcgcaagcc gcccttccca ccgggcccga ggggcctccc     60
ggtcatcggg aacatgctca tgatgggcga gctcacccac cgcggcctcg cgagtctggc    120
gaagaagtat ggcgggatct tccacctccg catgggcttc ctgcacatgg ttgccgtgtc    180
gtcccccgac gtggcccgcc aggtcctcca ggtccacgac gggatcttct cgaaccggcc    240
tgccaccatc gcgatcagct acctcacgta tgaccgggcc gacatggcct tcgcgcacta    300
cggcccgttc tggcggcaga tgcggaagct gtgcgtgatg aagctcttca gccggaagcg    360
```

ggctgagtcg tgggagtcgg tccgcgatga ggtggacacg atggtgcgca ccgtcgcggg 420
cagcgagggg accgccgtga acatcggcga gctcgtgttc gagctcacgc gggacatcat 480
ctaccgcgcg gccttcgcac gagctcgacc gagggccagg acgagttcat cagcatactg 540
caggagttct cgaaattatt tggcgccttc aacatagccg attttatccc gtacctgagc 600
tggatcgatc cgcaagggct caccgccagg cttgtcaagg cgcgccagtc gctggacggg 660
ttcatcgacc acattataga tgatcacatg gacaagaaga gaaacaagac gagttccggt 720
ggaggcgatc aagatgtcga taccgacatg gtcgacgatc tgctggcctt ctacagcgac 780
gaagcgaagg tgaacgagtc cgacgatttg cagaactcga tcaggctaac gagagacaac 840
atcaaggcca tcatcatgga cgtgatgttc ggcgggacgg agactgtggc gtcggctatc 900
gagtgggcca tggcggagct catgcgaagc cccgaggacc tgaagaaggt ccagcaagaa 960
ctcgcggatg tcgtgggcct agaccggaga gtcgaggaga gcgacttcga gaagctgacc 1020
tatctcaagt gctgcctcaa agagaccctc cgcctccacc cgccgatccc gctgctcctc 1080
cacgagacgg cagaggacgc cgtgatctcc ggctaccgca tccccgcacg gtcccgggtc 1140
atgatcaatg catgggccat cgggcgtgac cccggctcgt ggaccgaacc tgacaagttc 1200
aaaccgtccc ggttcctgga gtcaggcatg cccgactaca aggggagcaa cttcgagttc 1260
atcccttcg ggtcgggccg gaggtcgtgc ccagggatgc agctcgggct ctacgcgctc 1320
gacatggccg tggcccacct cctgcactgc ttcacgtggg aactgcccga cgggatgaag 1380
ccgagcgaga tggacatggg cgacgtcttc gggctcaccg cgccgaggtc cacccggctc 1440
gtggcggtgc cgactccgag gttggtgggg gctctatatt gagcaagcaa atggagggtc 1500
gggttggggg gtgcgaggag gggaacgtat ttttcagctc ctggagggct gcaagatttg 1560
gagtgcataa acccatccat acaagggcaa aagagggtgg tgccaaaatg atttgcatgg 1620
atttttcgat ttttgttttg tattataaaa aaggtcaaat aaccgaagag gacaagaaag 1680
acaagaaaaa gaattgagac ggaacttgaa tcaatgttgt tctgttctct ctttctattt 1740
ctttgtggat attacaagac ttatctcatt tggtgggctt ttcttttctt gtgatttctt 1800
tgatcttgtc atacacaaat aaatatggaa tgaagaaacc tttccatcaa aaaaaaaaaa 1860
aaaaaa 1866

<210> 104
<211> 519
<212> DNA
<213>

<400> 104
cacgagctcg tgagccttcc cggagacaag gccatcttac ttcgcaacaa attgcgtccg 60
cactcctttc tcaagaaacc tagtcatcca agaagcagag cattgcaact gcaaacagcc 120
aaagcccaaa ctcgtacaga aggagagaga gagagagaat agaagcatga gtgcatgcac 180
gaaccaagca atcacgacgg ccagtgaaga tgaagagttc ttgttcgcca tggaaatgaa 240
tgctctgata gcactcccct tggtcttgaa ggccaccatc gaactgggga tcctcgaaat 300
actggccgag tgcgggccta tggctccact ttcgcctgct cagattgcct cccgtctctc 360
cgcaaagaac ccggaagccc ccgtaaccct tgaccggatc ctccggtttc tcgccagcta 420
ctccatcctc tcttgcactc tcgcccaaga cacagaaggc aaccccctga ggctttacgg 480
tttgggaccc aaaagcaaac acttcgtcag agcccatgg 519

<210> 105
<211> 594
<212> DNA
<213>

<400> 105
ccaaccctgg accaggtact tttggcaggc ggtccattgc ccttcaaacc ggtccaaacc 60
ggaccatcac tgtccttata tacgttgcat catgcctgct catagaactt aggtcaactg 120
caacatttct tgatcacaac atattacaat attcctaagc agagagagag agagagagag 180
agagagagag agagagagag tttgaatcaa tggccaccgc cggagaggag agccagaccc 240
aagccgggag gcaccaggag gttggccaca agtctctcct tcagagtgat gctctttacc 300
aatatatttt ggagaccagc gtgtacccaa gagagcctga gcccatgaag gagctcaggg 360
aaataacagc aaaacatcca tggaacataa tgacaacatc agcagacgaa gggcagttct 420

tgaacatgct tctcaagctc atcaacgcca agaacaccat ggagattggt gtcttcactg 480
gctactctct cctcgccacc gctcttgctc ttcctgatga cggaaagatt ttggctatgg 540
acattaacag agagagctat gaacttggcc tgccggtcat ccaaaaagcc ggtg 594

<210> 106
<211> 407
<212> DNA
<213>

<400> 106
ccgttttatt tcctctgatt tcctttgctc gagtctcgcg gaagagagag aagagaggag 60
aggagagaat gggttcgacc ggatccgaga cccagatgac cccgacccaa gtctcggacg 120
aggaggcgaa cctcttcgcc atgcagctgg cgagcgcctc cgtgctcccc atggtcctca 180
aggccgccat cgagctcgac ctcctcgaga tcatggccaa ggccgggccg ggcgcgttcc 240
tctccccggg ggaagtcgcg gcccagctcc cgacccagaa ccccgaggca cccgtaatgc 300
tcgaccggat cttccggctg ctggccagct actccgtgct cacgtgcacc ctccgcgacc 360
tccccgatgg caaggtcgag cggctctacg gcttagcgcc ggtgtgc 407

<210> 107
<211> 1630
<212> DNA
<213>

<400> 107
ccgttttatt tcctctgctt tcctttgctc gagtctcgcg gaagagagag aagagaggag 60
aggagagaat gggttcgacc ggatccgaga cccagatgac cccgacccaa gtctcggacg 120
aggaggcgaa cctcttcgcc atgcagctgg cgagcgcctc cgtgctcccc atggtcctca 180
aggccgccat cgagctcgac ctcctcgaga tcatggccaa ggccgggccg ggcgcgttcc 240
tctccccggg ggaagtcgcg gcccagctcc cgacccagaa ccccgaggca cccgtcatgc 300
tcgaccggat cttccggctg ctggccagct actccgtgct cacgtgcacc ctccgcgacc 360
tccccgatgg caaggtcgag cggctctacg gcttagcgcc ggtgtgcaag ttcttggtca 420
agaacgagga cggggtctcc atcgccgcac tcaacttgat gaaccaggac aaaatcctca 480
tggaaagctg gtattacctg aaagatgcgg tccttgaagg cggaatccca ttcaacaagg 540
cgtacgggat gaccgcgttc gagtatcatg gcaccgaccc gcgattcaac aagatcttta 600
accggggaat gtctgatcac tccaccatta ctatgaagaa gatactggaa acatacaagg 660
gcttcgaggg cctcgagacc gtggtcgatg tcggaggcgg cactggggcc gtgctcagca 720
tgatcgttgc caaataccca tcgatgaaag ggatcaactt cgacctgcct cacgtgattg 780
aagacgctcc acccсttcct ggtgtcaagc acgtcggagg cgacatgttc gtcagcgttc 840
caaagggaga tgccattttc atgaagtgga tatgccatga ctggagtgac gaccattgcg 900
cgaagttcct caagaactgc tacgatgcgc ttcccaacaa tggaaaggtg atcgttgcag 960
agtgcgtact ccctgtgtac ccagacacga gcctagcgac caagaatgtg atccacatcg 1020
actgcatcat gttggcccac aacccaggcg ggaaagagag gacacagaag gagttcgagg 1080
cattggccaa aggggccgga tttcagggct tccaagtcat gtgctgcgct ttcggcactc 1140
acgtcatgga gttcctgaag accgcttgat ctgctcctct gtggtgatgt tcatggttct 1200
tggatttgaa aggtcgtgaa ggagcccttt tctcacagtt ggcttcggca taccaagttc 1260
ttctcataaa aggaaacaat aagaagcgac tgtatgatgg cgcaagtgga agttacaaga 1320
tttgttgttt tatgtctata aagttttgag tcttctgcat actgatttca cagaatgtgt 1380
aacgaaacgg cgtatatgga tgtgcctgaa tgatggaaat tgtgatattc tgtcttcttt 1440
ttcagtaaat cacttcgaac aaaagttgtg ttgctcgtgg caaccaggaa aaaatctgtg 1500
ggtgactttg agttaaagcc tgtcattcac aaaccccatg gcattgcctt tggtcagggg 1560
tcagccaagc cggaagcgtc aacgtgaaaa gatcctcaag ggtccattaa aatccccaca 1620
aacccagagc 1630

<210> 108
<211> 1248
<212> DNA

<213>

<400> 108
atcactaacc atctgccttt cttcatcttc tttcttctgc ttctcctccg tttcctcgtt 60
tcgatatcgt gaaaggagtc cgtcgacgac aatggccgag aagagcaagg tcctgatcat 120
cggagggacg ggctacatcg gcaagttcat cgtggaagcg agtgcaaaag cagggcatcc 180
cacgttcgcg ctggttaggc agagcacggt ctccgacccc gtcaagggcc agctcgtcga 240
gagcttcaag aacttgggcg tcactctgct catcggtgat ctgtacgatc atgagagctt 300
ggtgaaggca atcaagcaag ccgacgtggt gatatcgaca gtggggcaca tgcaaatggc 360
ggatcagacc aagatcgtcg acgccattaa ggaagctggc aacgttaaga gattctttcc 420
ttccgaattc ggcaatgatg tggacagggt gcatgctgtg gagccagcga agtctgcttt 480
tgaattgaag gcccagatcc gccgtgccgt ggaggcggca ggcatccctt acacctacgt 540
cccatgtggc tgcttcgccg gctacttcct cccaacactg gcgcagcagg aggtcactgc 600
tcctccgaag gacaaagtca ccgtcatggg tgacggaaat gcaaaggcaa ttttcaacaa 660
ggaagatgac attgcggcct tcaccatcaa ggctgtggat gatccgagat cgctgaacaa 720
gatcctttac atcaggcctc ctaagaacgt ttactcattc aatgagcttg ttgccttgtg 780
ggagaagaaa attggcaaga ccctcgagaa gatttacctt cctgaagagc aaatcctgaa 840
gcaaatccag gagtccccaa ttcccatcaa tgtcatatta gcagtgaacc attcaatctt 900
tgttaagggc gacggtgcca attttgagat cgaggagtct tttggtgtcg aggcttctga 960
gctgtaccca gatgtgaagt acactacagt ggaagaatac ctcgaaaatt ttgtctaaat 1020
taaggccatg cgtctcctgt tcttcaagga gtgagttacc gtgactctgg tggacagtcg 1080
atatgtatta aaaggctgta cacctaaaga atatcaaagg tcacggtctt atttagaatt 1140
gtctctgatg tcatattctt cttggtcttc ttggacatgt atttgctttc ctttgccgtg 1200
gtatccatga atttcccagg ttgttgaaat taaaaaaaaa aaaaaaaa 1248

<210> 109
<211> 481
<212> DNA
<213>

<400> 109
gttaatggca gtgcagcctc aacaccaccc accttcctcc atctctctcc tcccttcttc 60
tttctctgac ttcaatggca gccgactcca tgcttgcgtt cagtataaga ggaaggtggg 120
gcagcctaaa ggggcactgc gggtcactgc atcaagcaat aagaagatcc tcatcatggg 180
aggcacccgt ttcatcggtg tgtttttgtc gagactactt gtcaaagaag gtcatcaggt 240
cactttgttt accagaggaa aagcacccat cactcaacaa ttgcctggtg agtcggacaa 300
ggacttcgct gatttttcat ccaagatcct gcatttgaaa ggagacagaa aggattttga 360
ttttgttaaa tctagtcttg ctgcagaagg ctttgacgtt gtttatgaca ttaacggcga 420
gaggcggatg aagtcgcacc aattttggat gcctgccaaa ccttgaacca gtcaactact 480
g 481

<210> 110
<211> 458
<212> DNA
<213>

<400> 110
cataagctct cccgtaatcc tcacatcaca tggcgaagag caaggtcctc gtcgttggcg 60
gcactggcta cctcgggcgg aggttcgtga gggcgagcct ggaccagggc caccccacgt 120
acgtcctcca gcgtccggag accggcctcg acattgagaa gctccagacg ctactgcgct 180
tcaagaggcg tggcgcccaa ctcgtcgagg cctcgttctc agacctgagg agcctcgtcg 240
acgctgtgag gcgggtcgat gtcgtcgtct gtgccatgtc gggggtccac ttccggagcc 300
acaacatcct gatgcagctc aagctcgtgg aggctatcaa agaagctgga aatgtcaagc 360
ggtttttgcc gtcagagttc ggaatggacc cggccctcat gggtcatgca attgagccgg 420
gaagggtcac gttcgatgag aaatggaggt gagaaaag 458

<210> 111
<211> 448
<212> DNA
<213>

<400> 111
aggaggcacc tcctcgaaac gaagaagaag aaggacgaag gacgaaggag acgaaggcga 60
gaatgagcgc ggcgggcggt gccgggaagg tcgtgtgcgt gaccggggcg tccggttaca 120
tcgcctcgtg gctcgtcaag ctcctcctcc agcgcggcta caccgtcaag gccaccgtcc 180
gcgatccgaa tgatccaaaa aagactgaac atttgcttgg acttgatgga gcgaaagata 240
gacttcaact gttcaaagca aacctgctgg aagagggttc atttgatcct attgttgagg 300
gttgtgcagg cgtttttcac actgcctctc ccttttatca tgatgtcaag gatccgcagg 360
cagaattact tgatccggct gtgaagggaa cactcaatgt cctgaagtca tgttccaaag 420
accttctctg cagcgtgtgg cttgacat 448

<210> 112
<211> 578
<212> DNA
<213>

<400> 112
gttgaacctc ccgtcctcgg ctctgctcgg ctcgtcaccc tcttcgcgct cccgcatact 60
ccaccaccgc gtacagaaga tgagctcgga gggtgggaag gaggattgcc tcggttgggc 120
tgcccgggac ccttctgggt tcctctcccc ctacaaattc acccgcaggg ccgtgggaag 180
cgaagacgtc tcgattaaga tcacgcactg tggagtgtgc tacgcagatg tggcttggac 240
taggaatgtg cagggacact ccaagtatcc tctggtgcca gggcacgaga tagttggaat 300
tgtgaaacag gttggctcca gtgtccaacg cttcaaagtt ggcgatcatg tgggggtggg 360
aacttatgtc aattcatgca gagagtgcga gtattgcaat gacaggctag aagtccaatg 420
tgaaaagtcg gttatgactt ttgatggaat tgatgcagat ggtacagtga caaagggagg 480
atattctagt cacattgtcg tccatgaaag gtattgcgtc aggattccag aaaactaccc 540
gatggatcta gcagcgcatt tgctctgtgc tggatcac 578

<210> 113
<211> 454
<212> DNA
<213>

<400> 113
aactcatctt gaaatgtcat tggagtcatc atcctctagt gagaagaaac aaatgggttc 60
cgccggattc gaatcggcca caaagccgca cgccgtttgc attccctacc ctgcacaaag 120
ccacattggc gccatgctca agctagcaaa gctcctccat cacaagggct tccacatctc 180
cttcgtcaac accgagttca accaccggcg gctcgccagg gctcgaggcc ccgagttcac 240
aaatggaatg ctgagcgact ttcagttcct gacaatcccc gatggtcttc ctccttcgga 300
cttggatgcg atccaagaca tcaagatgct ctgcgaatcg tccaggaact atatggtcag 360
ccccatcaac gatcttgtat cgagcctggg ctcgaacccg agcgtccctc cggtgacttg 420
catcaatctc ggatggtttc atgacactcg tgac 454

<210> 114
<211> 479
<212> DNA
<213>

<400> 114
catgattgag ggaatcaagg actcttcagg actcatcctg aacacatttg aagatctcga 60
gcagcccgct ctttctttac tccgccaaga agatccaatc gcagttttcg caattggccc 120
attacacaaa tgcggtccat cttcatcggg aagtctcttg gcagaagacc ggagttgcat 180

ttcctggctg gacaagcaag cccctaactc agtggtctat gtgagttttg ggagcatcgc 240
ctctgtgaac gagtcggaat tttccgaaat agctttaggt ttagccgata gccagcagcc 300
attcttgtgg gtggttcgac ccgggtcagt gagcggctcg gaactcttag agaatttgcc 360
cggttgcttt ctggaggcat tacaggagag gggaagatt gtgaaatggg cgcctcaaca 420
tgaagtgctg gctcatcggg gtgtcggagc gttttggact cacaatggat ggaactcca 479

<210> 115
<211> 420
<212> DNA
<213>

<400> 115
caacattgtg tttagagaga ggagagagaa ggcaaacacg cccgttttcg ttttactaag 60
agaagatggt gagcgttgtg gctggtagag tcgagagctt gtcgagcagt ggcattcagt 120
cgatcccgca ggagtatgtg aggccgaagg aggagctcac aagcattggc gacatcttcg 180
aggaggagaa gaagcatgag ggccctcagg tcccgaccat cgacctcgag gacatagcgt 240
ctaaagaccc cgtggtgagg gagaggtgcc acgaggagct caggaaggct gccaccgact 300
ggggcgtcat gcacctcgtc aaccatggga tccccaacga cctgattgag cgtgtcaaga 360
aggctggcga ggtgttcttc aacctcccga tcgaggagaa ggagaagcat gccaacgacc 420

<210> 116
<211> 679
<212> DNA
<213>

<400> 116
ctaagagagg agaggagagg agcaagatgg cactagcagg agctgcactg tcaggaaccg 60
tggtgagctc cccctttgtg aggatgcagc ctgtgaacag actcagggca ttccccaatg 120
tgggtcaggc cctgtttggt gtcaactctg gccgtggcag agtgactgcc atggccgctt 180
acaaggtcac cctgctcacc cctgaaggca aagtcgaact cgacgtcccc gacgatgttt 240
acatcttgga ctacgccgag gagcaaggca tcgacttgcc ctactcctgc cgtgccggct 300
cttgctcctc ctgcgcgggc aaggtcgtgg cggggagcgt cgaccagagc gacggcagct 360
tcctggatga tgatcagatt gaggaaggtt gggtcctcac ttgtgtcgcc taccctaagt 420
ctgaggtcac cattgagacc cacaaggaag aggagctcac tgcttgaagc tctcctatat 480
ttgcttttgc ataaatcagt ctcactctac gcaactttct ccactctctc ccccttcac 540
tacatgtttg ttagttcctt tagtctcttc ctttttact gtacgaggga tgatttgatg 600
ttattctgag tctaatgtaa tggcttttct ttttcctatt tctgtatgag gaaataaaac 660
tcatgctcta aaaaaaaaa 679

<210> 117
<211> 763
<212> DNA
<213>

<400> 117
catacaacta cactgcgacg ccgccgcaga acgcgagcgt gccgaccatg aacggcacca 60
aggtctaccg gttgccgtat aacgctacgg tccagctcgt tttacaggac accgggataa 120
tcgcgccgga gacccacccc atccatctgc acggattcaa cttcttcggt gtgggcaaag 180
gagtggggaa ttatgaccca aagaaggatc ccaagaagtt caatctggtt gacccagtgg 240
agaggaacac cattggaatc ccatctggtg gatggatagc catcagattc acagcagaca 300
atccaggagt ttggttcctg cactgccatc tggaagtgca cacaacttgg ggactgaaga 360
tggcattctt ggtggacaat gggaagggc ctaaagagac cctgcttcca cctccaagtg 420
atcttccaaa atgttgatca tttgatcatg aggacgacaa gcgattacta atgacaccaa 480
gttagtggaa tcttctcttt gaaaaagaag aagaagagca agaagaataa gaaagatgag 540
gagagaagcc atagaagatt tgaccaagaa gagagagggc aataaaccaa agagaccctt 600
gagatcacga catcccgcaa ttgtttctag agtaatagaa ggatttactc cgacactgct 660

acaataaatt aaggaagaca aggaatttgg tttttttcat tggaggagtg taatttgttt 720
tttggcaagc tcatcacatg aatcacatgg aaaaaaaaaa aaa 763

<210> 118
<211> 538
<212> DNA
<213>

<400> 118
atcaagagtt tgagtctaaa ccttgtctaa tcctctctcg catagtcatt tggagacgaa 60
gtgctgatcg gccgcagctg cattctcttc gtaaaacatg acggctgtcg gcaaaacctc 120
tttcctcttg ggagctctcc tcctcttctc tgtggcggtg acattggcag atgcaaaagt 180
ttactaccat gattttgtcg ttcaagcgac caaggtgaag aggctgtgca cgacccacaa 240
caccatcacg gtgaacgggc aattcccggg tccgactttg gaagttaacg acggcgacac 300
cctcgttgtc aatgtcgtca acaaagctcg ctacaacgtc accattcact ggcacggcgt 360
ccggcaggtg agatctggtt gggccgatgg gccggaattt gtgactcaat gcccgattag 420
acccggcgga agttacacgt accgtttcac catccaagga caggtaggaa cgctgtggtg 480
gcatgcacat agctcttggc taagagcgac tgtgtatggt gctctggcat tcgtccaa 538

<210> 119
<211> 515
<212> DNA
<213>

<400> 119
ctctctctct ctctctctct gtgtgttcat tctcgttgag ctcgtggtcg cctcccgcca 60
tggatccgca caagtaccgt ccatccagtg ctttcaacac ttctttctgg actacgaact 120
ctggtgctcc tgtctggaac aataactctt cgttgactgt tggaagcaga ggtccaattc 180
ttcttgagga ttatcacctc gtggagaaac ttgccaactt tgatagggag aggattccag 240
agcgtgtggt gcatgccaga ggagccagtg caaaggatt ctttgaggtc actcatgaca 300
tttcccagct tacctgtgct gatttccttc gggcaccagg agttcaaaca cccgtgattg 360
tccgtttctc cactgtcatc cacgaaaggg gcagccctga aaccctgagg gaccctcgag 420
gttttgctgt gaagttctac acaagagagg gtaactttga tctggtggga aacaatttcc 480
ctgtcttctt tgtccgtaat gggataaatt ccccg 515

<210> 120
<211> 458
<212> DNA
<213>

<400> 120
gctccctctc gtactgccat actcctgggc cgggattcgg atagggtttt gcggcgatcc 60
atttctcgat tcaaggggaa gaatcatggg gaagtcctac ccgaccgtga gcgaggagta 120
caagaaggct gtcgagaaat gcaagaagaa gttgagaggc ctcatcgctg agaagagctg 180
cgctccgctc atgctccgca tcgcgtggca ctccgccggt accttcgatg tgaagacgaa 240
gaccggaggc ccgttcggga ccatgaagca cgccgcggag ctcagccacg ggccaacag 300
cgggctcgac gttgccgatc aggtcttgca gccgatcaag gatcagttcc ccgtcatcac 360
ttatgctgat ttctaccagc tggctggcgt cgttgctgtg gaagttactg gtggacctga 420
agttgctttt cacccaggaa gagaggcaaa ccacaacc 458

<210> 121
<211> 1243
<212> DNA
<213>

<400> 121

ctcccacttc tgtctcgcca ccattactag cttcaaagcc cagatctcag tttcgtgctc 60
tcttcgtcat ctctgcctct tgccatggat ccgtacaagt atcgcccgtc cagcgcttac 120
gattccagct tttggacaac caactacggt gctcccgtct ggaacaatga ctcatcgctg 180
actgttggaa ctagaggtcc gattctcctg gaggactacc atctgattga gaaacttgcc 240
aacttcgaga gagagaggat tcctgagcgg gtggtccatg cacggggagc cagcgcgaaa 300
gggttcttcg aggtcaccca cgacatctct cacttgacct gtgctgattt cctccgggct 360
cctggagtcc agacgcccgt catcgtccgt ttctccaccg tcatccacga gcgcggcagc 420
cccgaaaccc tcagggaccc tcgtggtttt gcagtgaagt tctacaccag agagggaaac 480
tttgatctgg tggggaacaa tttcccagtc ttcttcgttc gcgatgcaat gaaattcccg 540
gacgcgatcc atgcgttcaa gccgaacccg aagtctaaca tccaggagat gtggagaatc 600
atcgatttct tctcccacca gcccgagagt ctgtccacgt tcgcgtggtt cttcgatgat 660
gtgggcattc ctcaggacta caggcacatg gagggattcg gtgtgcacgc tttcaccttc 720
atcaacaaga ccggaaagac gaattacgtt aaattccact ggaagccaac ttgcggggtg 780
aagtgcttgc tggaggagga ggcgatcctc attggaggat cgaaccacag ccatgcgacc 840
aaggatcttt atgactcgat cgctgctggc aactacccgg agtggaagct ctacatccaa 900
gtgatggatc cwgctcttga agacagcttc gacttcgatc cgctggatat gacgaaggaa 960
tggcctgagg acatcttgcc tctgcaacca gtaggccgct tggtgctgaa caaaaacgtc 1020
gataacttct tcgctgagaa tgagcagcta gcgtttaacc cagcatttgt ggtccctggc 1080
atctattact ccaatgataa gcttctccaa gctaggattt tcgcctattc tgatactcac 1140
cgatatcgcc ttggaccaaa ctaccttcaa ctccccgtta atgtcccaag tgcgtcatca 1200
caacaaccac catgatggtt tcatgaatat catgcacagg gat 1243

<210> 122
<211> 404
<212> DNA
<213>

<400> 122
gacaaggtca taggccctct cttcaaatgc ttggatgggt ggaaaggaac tcctggccca 60
ttctgaaata aataatcttc caagatcgcc tttatacaac gactgctatg atttgagtcc 120
tcggatcttt ttgttgatgc agttgtttac cgatctggaa tttgattggt cataaagctt 180
gattttgttt ttctttcttt tgttttatac tgctggattt gcatcccatt ggatttgcca 240
gaaatatgta agggtggcag atcatttggg tgatctgaaa catgtaaaag tggcggatca 300
tttgggtagc atgcagatca gttgggtgat cgtgtactgc tttcactatt acttacatat 360
ttaaagatcg ggaataaaaa catgatttta attgaaaaaa aaaa 404

<210> 123
<211> 415
<212> DNA
<213>

<400> 123
caaggaagaa aatatggttg cagcagcaga aattacgcag gccaatgaag ttcaagttaa 60
aagcactggg ctgtgcacgg acttcggctc gtctggcagc gatccactga actgggttcg 120
agcagccaag gccatggaag gaagtcactt tgaagaagtg aaagcgatgg tggattcgta 180
tttgggagcc aaggagattt ccattgaagg gaaatctctg acaatctcag acgttgctgc 240
cgttgctcga agatcgcaag tgaaagtgaa attggatgct gcggctgcca aatctagggt 300
cgaggagagt tcaaactggg ttctcaccca gatgaccaag gggacggata cctatggtgt 360
cactactggt ttcggagcca cttctcacag gagaacgaac cagggagccg agctt 415

<210> 124
<211> 1659
<212> DNA
<213>

<400> 124

```
gttgcaggtc ggggatgatt tgaatcacag aaacctcagc gattttgcca agaaatatgg      60
caaaatcttt ctgctcaaga tgggccagag gaatcttgtg gtagtttcat ctcccgatct     120
cgccaaggag gtcctgcaca cccagggcgt cgagtttggg tctcgaaccc ggaacgtggt     180
gttcgatatc ttcacgggca aggggcagga catggtgttc accgtctatg gagatcactg     240
gagaaagatg cgcaggatca tgactgtgcc tttctttacg aataaagttg tccagcacta     300
cagattcgcg tgggaagacg agatcagccg cgtggtcgcg gatgtgaaat cccgcgccga     360
gtcttccacc tcgggcattg tcatccgtag gcgcctccag ctcatgatgt ataatattat     420
gtataggatg atgttcgaca ggagattcga atccgaggac gacccgcttt tcctcaagct     480
caaggccctc aacggagagc gaagtcgatt ggcccagagc tttgagtaca attatgggga     540
tttcattccc attcttaggc ccttcctcag aggttatctc agaatctgca atgagattaa     600
agagaaacgg ctctctcttt tcaaggacta cttcgtggaa gagcgcaaga agctcaacag     660
taccaagact agtaccaaca ccggggagct caagtgtgca atggaccata ttttagatgc     720
tcaggacaag ggagagatca atgaggataa tgttttgtac atcgttgaga acatcaacgt     780
tgcagcaatt gagacaacgc tgtggtcgat ggaatgggga atagcggagc tggtgaacca     840
ccaggacatt cagagcaagg tgcgcgcaga gctggacgct gttcttggac caggcgtgca     900
gataacggaa ccagacacga caaggttgcc ctaccttcag gcggttgtga aggaaaccct     960
tcgtctccgc atggcgatcc cgttgctcgt cccccacatg aatctccacg acgccaagct    1020
cggggggctac gatattccgg cagagagcaa gatcctggtg aacgcctggt ggttggccaa    1080
caaccccgcc aactggaaga accccgagga gttccgcccc gagcggttct tcgaggagga    1140
gaagcacacc gaagccaatg gcaacgactt caaattcctg ccttgcggtg tggggaggag    1200
gagctgcccg ggaatcattc tggcgctgcc tctcctcgca ctctccatcg gaagacttgt    1260
tcagaacttc caccttctgc cgccgcccgg gcagagcaaa gtggatgtca ctgagaaggg    1320
cgggcagttc agccttcaca ttctcaacca ttctctcatc gtcgccaagc ccatagcttc    1380
tgcttaatcc caacttgtca gtgactggta tataaatgcg cgcacctgaa caaaaaacac    1440
tccatctatc atgactgtgt gtgcgtgtcc actgtcgagt ctactaagag ctcatagcac    1500
ttcaaaagtt tgctaggatt tcaataacag acaccgtcaa ttatgtcatg tttcaataaa    1560
agtttgcata aattaaatga tatttcaata tactattttg actctccacc aattggggaa    1620
ttttactgct aaaaaaaaaa aaaaaaaaaa aaaaaaaaa                            1659
```

<210> 125
<211> 461
<212> DNA
<213>

<400> 125

```
atttccatgg cgattccgtt tggcttcaat tcgtttcctc tggctgtcct cgtcctcgtt      60
ttccttgttc ttcctccgac tttttctctg gaagatatgg cgtaatagga acctgccgcc     120
aggacccccg gcatggccga tcgtagggaa cgtccttcag attggatttt ccagcggcgc     180
gttcgagacc tcagtgaaga aattccatga gagatacggt ccaatattca ctgtgtggct     240
cggttcccgc cctctgctga tgatcaccga ccgcgagctt gcccacgagg cgctcgtaca     300
gaagggctcc gtcttcgctt gaccgcccgc ccgccctcgg gatgcagaaa atcttcagta     360
gcaaccagca caacatcact tcggctgaat acggcccgct gtggcggagc ttcgcaggaa     420
tctggttaaa gaagccctga gacttcggcg atgaaggctt t                         461
```

<210> 126
<211> 569
<212> DNA
<213>

<400> 126

```
acccagtgac cttcaggcct gagagatttc ttgaggaaga tgttgatatt aagggccatg      60
attacaggct actgccattc ggtgcagggc gcaggatctg ccctggtgca caattgggta     120
ttaatttagt tcagtctatg ttgggacacc tgcttcatca tttcgtatgg gcacctcctg     180
agggaatgaa ggcagaagac atagatctca cagagaatcc agggcttgtt actttcatgg     240
ccaagcctgt gcaggccatt gctattcctc gattgcctga tcatctctac aagcgacagc     300
cactcaattg atcaattgat ctgatagtaa gtttgaattt tgttttgata caaaacgaaa     360
```

taacgtgcag tttctccttt tccatagtca acatgcagct ttctttctct gaagcgcatg 420
cagctttctt tctctgaagc ccaacttcta gcaagcaata actgtatatt ttagaacaaa 480
tacctattcc tcaaattgag tatttctctg taggcgatgt tcacttgtgc aatttgcaag 540
atatagtaaa gtttactcta aaaaaaaa 569

<210> 127
<211> 661
<212> DNA
<213>

<400> 127
gttttatctg aaggacgctg tgcttgaagg ctcccagcca ttcaccaaag cccatggaat 60
gaatgcgttc gagtacccgg ccatcgatca gagattcaac aagattttca acagggctat 120
gtctgagaat tctaccatgt tgatgaacaa gattttggat acttacgagg gttttaagga 180
ggttcaggag ttggtggatg tgggaggagg tattgggtcg actctcaatc tcatagtgtc 240
taggtatccc cacatttcag gaatcaactt cgacttgtcc catgtgctgg ccgatgctcc 300
tcactaccca gctgtgaaac atgtgggtgg agacatgttt gatagtgtac caagtggcca 360
agctattttt atgaagtgga ttctgcatga ttggagcgat gatcattgca ggaagctttt 420
gaagaattgt cacaaggcgt tgccagagaa ggggaaggtg attgcggtgg acaccattct 480
cccagtggct gcagagacat ctccttatgc tcgtcaggga tttcatacag atttactgat 540
gttggcatac aacccagggg gcaaggaacg cacagagcaa gaatttcaag atttagctaa 600
ggagacggga tttgcaggtg gtgttgaacc tgtatgttgt gtcaatggaa tgtgggtaat 660
g 661

<210> 128
<211> 427
<212> DNA
<213>

<400> 128
aatttttctg tggtaagcat atctatggct caaaccagag agaaggacga tgtcagcata 60
acaaactcca aaggattggt atgcgtgaca ggagcggctg gttacttggc atcttggctt 120
atcaagcgtc tcctccagtg tggttaccaa gtgagaggaa ctgtgcggga tcctggcaat 180
gagaaaaaga tggctcattt atggaagtta gatggggcga aagagagact gcaactaatg 240
aaagctgatt taatggacga gggcagcttc gatgaggtca tcagaggctg ccatggtgtt 300
tttcacacag cgtctccagt cgtgggtgtc aaatcagatc ccaagatatg gtatgctctg 360
gccaagactt tagcagaaaa agcagcatgg gattttgccc aagaaaacca tctggacatg 420
gttgcag 427

<210> 129
<211> 1412
<212> DNA
<213>

<400> 129
gaaaacatca tccaggcatt ttggaaattt agctcgccgg ttgattcagg atcctgcaat 60
ggcttttggc gaagagcaga ctgccttgcc acaagaaacg cctttgaatc ctccggtcca 120
tcgaggaaca gtgtgcgtta caggagctgc tgggttcata gggtcatggc tcatcatgcg 180
attgcttgag cgaggatata gtgttagagc aactgtgcga gacactggta atcctgtaaa 240
gacaaagcat ctgttggatc tgccgggggc aaatgagaga ttgactctct ggaaagcaga 300
tttggatgat gaaggaagct ttgatgctgc cattgatggg tgtgagggtg ttttccatgt 360
tgccactccc atggatttcg agtccgagga tcccgagaat gagataatta agccaacaat 420
caacggggtc ttgaatgtta tgagatcgtg tgcaaaagcc aagtccgtga agcgagttgt 480
tttcacgtca tctgctggga ctgtgaattt tacagatgat ttccaaacac caggcaaagt 540
ttttgacgaa tcatgctgga ccaacgtgga tctttgcaga aaagttaaaa tgacaggatg 600
gatgtacttt gtatcgaaga cattagcaga gaaagctgct tgggattttg cagaggagaa 660

caagatcgat ctcattactg ttatccccac attggtcgtt ggaccattca ttatgcagac 720
catgccaccg agcatgatca cagccttggc actgttaacg cggaatgaac cccactacat 780
gatactgaga caggtacagc tggttcactt ggatgatctc tgtatgtcac atatctttgt 840
atatgaacat cctgaagcaa agggcagata catctcttcc acatgtgatg ctaccattgt 900
ccaagtggcc aagatgctgg ctcagaaata cccagagtac aatgtaccaa ccacgttcaa 960
ggatgcggat gagtccctgc cggccgtgcc attttcgtca aagaagctcc ttgatttggg 1020
cttcaagttc aactacacca tggaagagat gtttgatggg gccattaagt gctgcagaga 1080
gaaaggattg ctgcctgaga aagcatcttt ctgataagta tctactgatg cagcatacac 1140
acaccgttgg catgtgtggt ttgtgtaaga catggtggca gtggagaaat aatggatcaa 1200
atttggttta tagaaaacag caggaattac tacttgcaag agtgacttat gtgacatgat 1260
atagaaataa gaagaatacc ggctgatcgc tgttgtttat taatgcgaat tttattgatg 1320
ttgacaaggt cataccaggg ctcctggaat gctacatatg tacggctgat tctagctcca 1380
gtaatataat ttttcaaatt ctaaaaaaaa aa 1412

<210> 130
<211> 666
<212> DNA
<213>

<400> 130
atcaattttt gcatattatt aaaaagtaag tgtattcgtt ctctatattg atcagtcaca 60
gagtcatggc cagttgtggt tccgagaaag taagagggtt gaatggagat gaagcatgcg 120
aagagaacaa gagagtggtt tgtgtaactg gggcaaatgg gtacatcggc tcttggctgg 180
tcatgagatt actggaacat ggctattatg ttcatggaac tgttagggac ccagaagaca 240
cagggaaggt tgggcatttg ctgcggctcc caggggcaag tgagaagcta aagctgttca 300
aggcagagct taacgacgaa atggcctttg atgatgctgt gagcggttgt caaggggttt 360
tccacgttgc caagcctgtt aatctggact caaacgctct tcaggggggag gttgttggtc 420
ctgcggtgag gggaacagta aatctgcttc gagcctgcga acgatcgggc actgtgaaac 480
gagtgataca tacctcgtcc gtttcagcag tgagattcac tgggaaacct gaccccccctg 540
atactgtgct ggatgaatct cattggactt cggtcgagta ttgcagaaag acaaagatgg 600
tcggatggat gtactacatc gccaacactt atgcagaaga gggagcccat aagttcggat 660
cagaga 666

<210> 131
<211> 478
<212> DNA
<213>

<400> 131
gctggttcaa gtgtcagccc aatggcctcc cctacagaga atccccagat ttcagaagag 60
ctgctaaatc atgagatcca tcaaggaagt acagtatgtg tgacaggagc tgctggcttc 120
ataggatcat ggctcgtcat gcgtttgctt gagcgaggat atactgttag aggaactgtg 180
cgagacactg gtaatccggt gaagacgaag catctattgg atctgcctgg ggcgaatgag 240
aggttaactc tctggaaagc agatttggat gatgaaggaa gctttgacgc cgccattgat 300
ggttgtgagg gagttttcca tgttgccact cccatggatt ttgaatccga ggaccccgag 360
aacgagataa ttaaacccgc tgtcaatggg atgttgaatg ttttgagatc gtgtgggaaa 420
accaagtcta tgaagcgagt tgttttcacg tcgtctgctg ggactctgct ttttacgg 478

<210> 132
<211> 510
<212> DNA
<213>

<400> 132
cttgttcaaa gtcacatatc ttattttctt tgtgatatct gcaatttcca agcttttcgt 60
ctacctccct gaaaagatga gcgaggtatg cgtgacagga ggcacaggct tcatagctgc 120

ttatctcatt cgtagtcttc tccagaaagg ttacagagtt cgcactacag ttcgcaaccc 180
agataatgtg gagaagttta gttatctgtg ggatctgcct ggtgcaaacg aaagactcaa 240
catcgtgaga gcagatttgc tagaggaagg cagttttgat gcagcagtag atggtgtaga 300
tggagtattc catactgcat cacctgtctt agtcccatat aacgagcgct tgaaggaaac 360
cctaatagat ccttgtgtga agggcactat caatgtcctc aggtcctgtt caagatcacc 420
ttcagtaaag cgggtggtgc ttacatcctc ctgctcatca ataccgatac gactataata 480
gcttagagcg ttccctgctg gactgagtca 510

<210> 133
<211> 890
<212> DNA
<213>

<400> 133
tcctaattgt tcgatcctcc cttttaaagc ccttccctgg ccttcattcc aggtcacaga 60
gttgttcatg cagtgctagc aggaggagca gcgttgcaat tggggaaaat tccaaaatca 120
ataacgagag gacagaagta agtttgtgga aatagcaacc atgccggtgt ttccttctgg 180
tctggacccc tctgaggaca atggcaagct cgtttgtgtc atggatgcgt ccagttatgt 240
aggtttgtgg attgttcagg gccttcttca acgaggctat tcagtgcatg ccacggtgca 300
gagagacgct ggcgaggttg agtctctcag aaaattgcat ggggatcgat tgcagatctt 360
ctatgcagat gtcttggatt atcacagcat tactgatgcg ctcaagggct gttctggtct 420
gtctatacct ttgagcaccc tcagagtgct gcaggctatg atgaagtgat ggcagaaatt 480
gaagtacaag cagcccacaa tgcactggaa gcgtgtgctc agactgagac cattgagaaa 540
gttgtgttca cttcttctgt ggctgcagca atttggagag aagatggaga ctacaaggtt 600
aatgcccttg acgagaggca ttggagtgat gcaaatcttt gcaggaaatt gaagttgtgg 660
tacgcattag ccaagacact gtcagagaag gctgcatggg cgctggcaat ggacagaggg 720
ttgaatatgg tgacaatcaa cgcatctctg attgtaggac ctggcatcac atacaaaagc 780
tcaggatcta ccattgcata tcttaaaggg gctgcacaaa tgtatgagaa gggcacttta 840
gctagtgtgg acataaggtt tctagcggat gcacatatat gcgcttatga 890

<210> 134
<211> 955
<212> DNA
<213>

<400> 134
aatcactgac cttcacatat ttattccaat tctaatatct ctactcgctg tctacctgat 60
ttttcagtgg cgaaccaact tgacagggtt ggacatggcc aacagcagca agattctgat 120
tattggagga acaggctaca ttggtcgtca tataaccaaa gccagccttg ctcttggtca 180
tcccacattc cttcttgtca gagagacctc cgcttctaat cctgagaagg ctaagcttct 240
ggaatccttc aaggcctcag gtgctattat actccatgga tctttggagg accatgcaag 300
tcttgtggag gcaatcaaga aagttgatgt agttatctcg gctgtcaagg gaccacagct 360
gacggatcaa cagaatatta tcaaggctat taaggaggtt ggaaccatca agaggttttt 420
gccatctgag ttcgggaatg acgttgatag aacccatgca gtggagcctg caaagaccat 480
gtttgctacc aaagcgaaaa ttcgcagggc cattgaggca gaaggcatcc cttacacatt 540
tgtctctagc aactgttttg ctgggttgtt cttgccaagt ttggggcagc caggccttac 600
cgccccgcca aggataaaag ttgtgatatc tggagatgga aatgccaaag ttgtttttgt 660
gaaggaggag gatataggga cattcaccat caaggcagtg gatgacccta gaactctaaa 720
caagatcctg tatttgaggc ttcctgccaa cacatattct cttaacgagc ttgtagctgt 780
gtgggagaag aagattggca agtctctgga gaagacctat ataccagagg aagaggtcct 840
gaaaaaaatt gcagagtcgc cattcccact caatgctata atgtcaaccg gccactctat 900
ttttgtgaaa ggggatcaaa caaattttga aatcggacct gatggtgtgg aggct 955

<210> 135
<211> 1024
<212> DNA

<213>

<400> 135
agagggttat atatcttgat tctgacctga ttgtcgtcga cgacattgcc aagctctggg 60
ccacggattt ggaatctcgt gtcctcgggg caccagagta ctgcaaggcg aatttcacaa 120
agtatttcac cgataatttc tggtgggatc ccgcattatc caagaccttt gagggaaaaa 180
aaccctgcta cttcaacaca ggcgtaatgg tgatcgatct tgaaaaatgg cgggcagggg 240
aattcacaag aaagatcgaa atctggatgg acatacagaa ggaacgccgt atctatgagc 300
tcggatcatt accgccattt ttactggtat ttgctggttt ggttaagcaa gtcgatcatc 360
gttggaatca gcacggttta ggcggagata atttgcaagg cctttgccga gatcttcacc 420
ctggacctgt cagtttgttg cattggagtg gtaagggcaa accttggcta cgcctggaat 480
gccaagcgga cttgccctct ggatacttta tgggctcctt atgatcttta tcgatcaacg 540
tattacctaa atgggtgaga gagcctctct cctcggggtg ctttttatcg aattaaacct 600
gatttgataa aatgccaaat agaactttac gcctatgcat ctttcagttt tgaatttcaa 660
ttctggtaac gaatagaaga aaacaatagc acagccacag gcaggacaaa tccatcatga 720
gggaccaatc gtttgaattt agtattaata aggttgttcc atataacgcc tgtgaagaat 780
gatattgtgg actgatctat ttatatttgt actgccatgc catcctcagc cagcagagag 840
gcaagcaatg ccgctgcaag tcatgtaggg aaggcgttgt gaactcaatt ttcggcgact 900
gtacaggatg taaatttttg gaacattaat atcattatga taagttcctg aaccaacaac 960
tgtataatac cttataaatg tatctgcaac tccatttttg cataaaaaaa aaaaaaaaaa 1020
aaaa 1024

<210> 136
<211> 497
<212> DNA
<213>

<400> 136
agaacataaa tccgaacaat gaacttgcaa atttcctgca ttgccatcgc cagcccaaga 60
aacttttggc cgcaaagcaa tctgtacact ttctctctca ttccttgcta caagcatgga 120
tataggttct aggggtcttg gggctcctg atgcccaatt gttgctgtgc ttggcatgac 180
ccaaacatgc aagagatctg tagtcagtag tcttgttgga tctatagctt ttagaaaaga 240
gtcacgtcct tttagggtaa catcattcca accatatcca gttccaccac cggctacacc 300
ttcaacggga ggaggagcaa gatattcagc attgctttgg gcaccagatg gataggcatt 360
attttccatc ggaattcagc cgagctcgcc ccctcagtcc aatcgtcgtg aaaatccctc 420
aaaattgggc aattctggct cgaaatcgcc aaattatggg ctacaacagg attaaaattg 480
cacagaaatc tgccagt 497

<210> 137
<211> 528
<212> DNA
<213>

<400> 137
ggcaatccga gcctagccaa ccaacttggc agcaaggagc acagggagtt ggcgagagaa 60
gctgttagga aatctttggt attgttgaaa aatgggaagt cagccaacaa gcctttgctc 120
cctttggaga agaatgcttc caaggttctt gttgcaggaa cccatcctga taatctgggt 180
tatcagtgtg gtggatggac gatggaatgg caaggattaa gtggaaacat aaccgtagga 240
actacaattc tggaagctat caaactagct gtcagcccct ctactgaagt ggtttatgag 300
caaaatccag atgctaacta tgtcaaagga caagggtttt catatgccat tgtggttgtg 360
ggtgaggcac catacgcaga aacgtttgga gacaatctta atttgaccat tcccctaggc 420
ggaggggaca cgattaagac ggtctgtggc tccttgaaat gccttgtaat cttgatatct 480
ggaaggccac ttgttattga accttatctt ccattggtgg atcgtttt 528

<210> 138
<211> 424

<212> DNA
<213>

<400> 138
aaaaaacaaa tgttagctag cctagtgatg agctttacgt atacctggcc ttttatacat 60
ggatctgagt ttttatgcag gtgtagagcc ttttgttact ctgtatcact gggacttgcc 120
acaagctctg gaggacgaat acggtggatt tcgtagcaaa aaagttgtgg atgactttgg 180
catattctca gaagaatgct ttcgtgcttt tggagaccgt gtgaagtact gggtaactgt 240
taacgaaccg ttgatcttct catatttttc ttacgatgtg gggcttcacg caccgggccg 300
ctgttcgcct ggatttggaa actgcactgc gggaaattca gcgacagagc cttatattgt 360
agcccataac atgcttcttg cacatagtac cgctgttaaa aatatatagc ataaataccc 420
aggg 424

<210> 139
<211> 404
<212> DNA
<213>

<400> 139
gctaccatct tccctcataa tattgggctt ggagctacca gggatcctga tctggctaga 60
agaatagggg ctgctacggc tttggaagtt cgagctactg gcattcaata cacatttgct 120
ccatgtgttg ctgtttgcag agatcctcga tggggccgct gctatgagag ctacagtgag 180
gatccaaaaa ttgtcaaggc catgactgag attatcgttg gcctgcaagg gaatcctcct 240
gctaattcta caaaaggggg gccttttata gctggacagt caaatgttgc agcttgtgct 300
aagcattttg tgggttatgg tggaacaacc aaaggtatcg atgagaataa tactgttatc 360
aactatcaag ggttatttca acattccaaa ttacccccaa tttt 404

<210> 140
<211> 437
<212> DNA
<213>

<400> 140
cctagaattc tatggtgaaa attgttggga caaggctgcc caagtttaca aaggaacagt 60
cccaaatggt taaaggttca atagactatc taggcgttaa ccaatacact gcttattaca 120
tgtatgatcc taaacaacct aaacaaaatg taacagatta ccagactgga ctggaataca 180
ggctttgcat atgctcgcaa tggagtgcct attggaccaa gggcgaactc caattggctt 240
tacattgtgc cttggggtct atacaaggcc gtcacatacg taaaagaaca ctatggaaat 300
ccaactatga ttctctctga aaatggaatg gacgacctgg aaacgtgaca cttccagcag 360
gactgcatga taccatcagg ggtaactact ataaaagcta tttgcaaaat ttgattaatg 420
cacgtgaatg accgggg 437

<210> 141
<211> 470
<212> DNA
<213>

<400> 141
gatacatcca agctgagaat ggaagagatt aatggtgata acgcagtaag gaggagctgc 60
tttcctccag gtttcatgtt tgggatagca acttctgctt atcagtgtga aggagctgcc 120
aacgaaggtg gaaaaggccc aagcatctgg gactcatttt cacgaacacc aggcaaaatt 180
cttgatggaa gcaacggtga tgtagcagtg gatcagtatc atcgttataa ggcagatgta 240
aaactgatga aagatatggg cgtggctacc tacagattct cgatttcatg gcctcgtata 300
tttccaaagg gaaaaggaga gatcaatgag gaaggagtag cctattacaa taacctcatc 360
aatgaactcc tccagaatgg aatccaagcg tctgtcaact ttgtttcact gggatactcc 420
ccagtctctg gaggatgaat atggcggatt tctgaggcca accattgtga 470

<210> 142
<211> 413
<212> DNA
<213>

<400> 142
ataagactaa ttttccagac aatcctccat tcccattcaa ttacactggt actccaccca 60
ataatacaca ggctgtgaat gggactagag taaaagtcct tccctttaac acaactgttc 120
aattgattct tcaagacacc agcatcttca gcacagacag ccaccctgtc catctccatg 180
gtttcaattt ctttgtggtg ggccaaggtg ttggaaacta caatgaatca acagatgcac 240
caaattttaa cctcattgac cctgtcgaga gaaacactgt gggagttccc aaaggaggtt 300
gggctgctat aagatttcgt gcagacaatc caggggtttg gttcatgcac tgtcatttgg 360
aggttcacac atcgtgggga ctgaaaatgg cgtgggtagt aaagaacgga aaa 413

<210> 143
<211> 457
<212> DNA
<213>

<400> 143
aaaacctttt cagacgaatg ttctgatgct cggccccggc cagacaacag acatacttct 60
cactgccaat caggctacag gtagatacta catggctgct cgagcatatt ccaacgggca 120
aggagttccc ttcgataaca ccactaccac tgccatttta gaatacgagg gaagctctaa 180
gacttcaact ccagtcatgc ctaatcttcc attctataac gacaccaaca gtgctactag 240
cttcgctaat ggtcttagaa gcttgggctc acacgaccac ccagtcttcg ttcctcagag 300
tgtggaggag aatctgttct acaccatcgg tttggggttg atcaaatgtc cggggcagtc 360
ttgtggaggt ccaacggatc aagatttgca gcaagtatga atacatatca tttgtcccgc 420
aaccacttct tccaatcctt caagctcagc atttgg 457

<210> 144
<211> 598
<212> DNA
<213>

<400> 144
gttcggcact gagagatcca tttctttcaa tgttgagaca gtgagtagta ttagtttgat 60
atctctttca ggaatatatc gtgcttgcag gatctttagt ttctgcaaca atgtcgttgc 120
aatcagtgcg tctatcttct gttctccttg ttttgctact agcatttgtt gcttacttag 180
ttgctgtaac aaacgcagat gtccacaatt ataccttcat tattagaaag aagacagtta 240
ccaggctatg caataagcgt ataatcgcca ccgtcaatgg acagctacca ggcccaacta 300
ttcatgtacg tgatggagac gttgttaata tcaaagctta taacaaagct gggtacaatg 360
ccactcttca ctggcatgga gtcgagcagt tgcgtacagg atgggccgat ggacctgcat 420
atgttacaca gtgccccatt ccaccaggtg gtcgttatac atacagattc accatttctg 480
aacaggaagg caccgtgtgg tggcacgctc atgtgtcatg gctccgagct acggtgcatg 540
gagctttcgt aatccttcct aagagaggca aaccatatcc ctttcctaaa ccccgtgc 598

<210> 145
<211> 1080
<212> DNA
<213>

<400> 145
aagatcttgg ttcgagtctc tcagctctct ccaaaggaat tttgtgggtc atttgcaggt 60
gaagacacca tggtgaaggc ttatcccacc gtaagcgagg agtacaaggc tgccattgac 120
aaatgcaaga ggaagctccg agctctcatt gcagagaaga actgtgcgcc gatcatggtt 180

cgaatcgcat ggcacagcgc tgggacttac gatgtcaaga ccaagaccgg agggcccttc 240
gggacgatga gatatggggc cgagcttgcc cacggtgcta acagtggtct ggacatcgca 300
gttaggctcc tggagccaat caaggaacag ttccccataa tcacctatgc tgacctttat 360
cagttggctg gtgtggtggc tgttgaagtg accgggggac ctgacattcc gttccatcct 420
ggaagagaag acaagcctga gcctccagaa gaaggccgcc ttcctgatgc tacaaaagga 480
cctgatcatc tgagggatgt ttttggtcac atggggttga atgataagga aattgtggcc 540
ttgtctggtg cccacacctt ggggagatgc cacaaggaga gatctggttt tgaaggacca 600
tggacctcta accccttat ctttgacaac tcttacttca cagagcttgt gactggagag 660
aaggaaggcc tgcttcagtt gccatctgat aaggcactgc ttgctgatcc tagttttgca 720
gtttatgttc agaagtatgc acaggacgaa gacgctttct ttgctgacta tgcggaagct 780
cacctgaagc tttctgaact tgggtttgct gatgcgtaga ttcatacctt ctgcagagac 840
aattccttgc tagatagctt cgttttgtat ttcatctaat cttttcgatt atatagtcac 900
atagaagttg gtgttatgcg ccatagtgat acttgaacct acatgttttt gaaaagtatc 960
gatgttcttt aaaatgaaca ttgaatacaa cattttggaa tctggttgtg ttctatcaag 1020
cgcatatttt aatcgaatgc ttcgttcctg ttaaaaaaaa aaataaaata aaaaaaaaaa 1080

<210> 146
<211> 701
<212> DNA
<213>

<400> 146
gtagtttcgt tttacaacaa tctcaggttt tgaatctcag aatagttgcg aaaggaagcg 60
atgacgaagt acgtgatcgt tagctccatt gtatgtttct ttgtatttgt ttctgcgtgc 120
ataatttctg tcaatggatt agttgtccat gaagatgatc tgtcaaagcc tgtgcatggg 180
ctttcgtgga cattttataa ggacagttgc cccgacttgg aggccatagt gaaatcggta 240
cttgagccgg cgttggacga agatatcact caggccgcag gttgctgaga cttcatttcc 300
atgactgttt tgtgcagggt tgcgatgggt ccgtgttgct gacaggaact aaaagaaacc 360
ccgagtgagc aacaggctca gccaaactta acactaagag cccgggcctt gcagctgatc 420
gacgaaatta aaaccgctgt agaagctagc tgcagtgggg ttgtaacttg tgcagacatt 480
ctggctttgg ctgctcgtga ctccgtcgct caggaggccc aaaatttcca gtaccacttg 540
gccgcagaga tagcctaaag tttgccagtc aatccgtagt tctcgccaat ataccaactc 600
caactttaaa tttgacacag ctgatgaaca tttttggctc caaaggattc agtttggccg 660
aaatggttgc tctttcaggt ggacacacaa tcggcattgg t 701

<210> 147
<211> 338
<212> DNA
<213>

<400> 147
ctcaattctg tgctgctctg ctcgctcagg gccgggtctg ctattctgct catgcacaag 60
tttgagatcg ggagcctgct ggatctggtg cagaggttca aggtcacggt agcgcctgtc 120
gtgcctccca ttgttctcgc ctttgccaag aacgcgctcg tggaaagcta tgatctgtcg 180
tccattaggg ttgtgctgtc cggtgccgcg cctctcggaa aggagctgga ggatgcatta 240
aggctacgac ttcccaaagc cacttttggt cagggatacg gtatgacaga ggcaggaccg 300
gtgctatcaa tgtgtctggc cttcgctaag gagccctt 338

<210> 148
<211> 357
<212> DNA
<213>

<400> 148
ctcaattctg tgctgctctg ctcgctcagg gccgggtctg ctattctgct catgcacaag 60
tttgagatcg ggagcctgct ggatctggtg cagaggttca aggtcacggt agcgcctgtc 120

gtgcctccca ttgttctcgc ctttgccaag aacgcgctcg tggaaagcta tgatctgtcg 180
tccattaggg ttgtgctgtc cggtgccgcg cctctcggaa aggagctgga ggatgcatta 240
aggctacgac ttcccaaagc cacttttggt cagggatacg gtatgacaga ggcaggaccg 300
gtgctatcaa tgtgtctggc cttcgctaag gagccctttc cgatgaagtc cgggtcg 357

<210> 149
<211> 470
<212> DNA
<213>

<220>
<221>
<222> (437)...(437)

<400> 149
gagaaattca caagcttcac agcacgagag ttaaagagcg agacacggtt tgatccagtg 60
aagggccggc ccccggagat ggcgaagacg ctcaccgcgc tggctggggg agaagaccct 120
ccagtccaaa gttcgtccgc gataaggatg agcgccccac ggtggcctac aaccagttca 180
gcaacgtgat ccccgtgata tccctggcgg ggattgacga ggccggcggc cggaagggcc 240
gagatctgca agaagatcgt ggaggcgtgc gaggactggg gcgtcttcca ggtggttgac 300
cacgggggttg atacggggct catcactgac atgacccggc tcgcgcgtaa gtncttcgct 360
ctgccctcgg aggaaaagct ccggttcgac atgactggcg gaaaaagggg gggttatcgt 420
ctccagcatc tcaaggngaa caagttcagg actggtgcaa aagtacgaac 470

<210> 150
<211> 380
<212> DNA
<213>

<400> 150
ggaggtcggt gacagagcag tacagcgaga agctcatggc cctcgcttgc aagctcttgg 60
aggtcctctc ggaggcaatg ggactggaga aggaggcact gaccaaggca tgcgtggaca 120
tggaccagaa ggtggtggtc aactactacc ccaaatgccc gcagcccgac ctcacgctcg 180
ggctgaagcg ccacactgac ccgggaacca tcactcttct gctccaggac caggtggggg 240
gcctccaggc caccagagat ggcggcaaga gctggatcac cgtccagcct gtggaagggg 300
cttttgtggt caacctaggc gatcatggtc atttcctgag caacgggagg ttcaagaacg 360
cggaccacca ggcggtggtg 380

<210> 151
<211> 349
<212> DNA
<213>

<220>
<221>
<222> (212)...(212)

<400> 151
ttggactcca tacctctcgt ggacctccaa ggtcttttac gcgattctgc tagagcccac 60
gttattcaac aaattggccg ggcctgcgct gaatatggct tcttccagat aatcaatcat 120
ggcatcccag atgcagttat caacaggatg ctggaagtag cgaaggagtt tttcagaatg 180
cctgtggagg accgaatgga atactattcc gncgatccgt ccagaaaaac acgtttgtcg 240
acgagcttca acatccataa agaacaagtc ttcaactggg ggctatctc agacatcatt 300
gttatccgtt agaagatcat gttcacactt ggccttcaaa acctgcggg 349

<210> 152

<211> 427
<212> DNA
<213>

<220>
<221>
<222> (234)...(234)

<221>
<222> (240)...(240)

<400> 152
```
atggtctggg cagcatacgg aggacgatgg aagatggaac gcaaggtgtg caacatgcac     60
atgttgggag ggaaggcgtt ggaagattgg cagccggtga gggacgccga aatgggcttc    120
atgctccgga atattctcag tcactcgcag cgcggcgaga cggtgaatgt gccggacctc    180
ctgaacatct gcgccgccaa catgatcggg cagatcattc taagcaagcg ggtnttcgan    240
acagaagggg acgaggccaa cgagttcaag gacatggtgg tggaactcat gacctgcgct    300
ggatacttca atatcggaga cttcattcca tcgctagcgt ggatggactt gcagggcatt    360
cagcggggta tgaagaagct ccacaagaaa tgggacgcac tcatacagag gattattgat    420
taacacc                                                              427
```

<210> 153
<211> 298
<212> DNA
<213>

<220>
<221>
<222> (214)...(214)

<400> 153
```
gttaccaaag ggcagcaacg tattcttaaa catgggttct atccacaggg atcccaagat     60
ttgggacaaa ccgttggagt ttagacccga gaggttcttg gaaggtccta gcaagtatga    120
tttctcaggt aacaacttcg catacatgcc attcggttct ggtcgaaggg tgtgtgcagg    180
gcttgcgctg gcagagagga tgctaccata tgtnttggcc tctcttttgc actcattcaa    240
gtgggaaata ccaccagggt ctgagctgga tttacctgga caagttcggc cttgtggt      298
```

<210> 154
<211> 251
<212> DNA
<213>

<400> 154
```
gacttcaaag ggcaggattt tgagctgata cccttcggtg caggtagaag gagctgcccg     60
gctattgcat ttggaaatgc cagtgttgag cttgctttag ctcaacttct tcacagtttc    120
gattgggagc ttcctgatgg gatccagcct agggacttgg atatgaccga agtttttggc    180
atcacaatgc acagaattgc caacctcatg gttgtagcca aaccccgctt ctcctagacg    240
atactcgtgc c                                                         251
```

<210> 155
<211> 411
<212> DNA
<213>

<220>

<221>
<222> (198)...(198)

<400> 155
```
acggggctcc ggtgacgaga tactggcagg tcgttgaagc tggttggagg ttcgaatatc     60
cgagagggat cctgtttctt gtccccttac cttggttttc ctcatccttc cgaatgcagt    120
ctaattcgaa gaccgtggaa gagcggcgcc cggggcctgg gtaagagctt gctggagata    180
tctcggcttg actatgtntt ggctcttttc gtgaatggca agggggatct aggggcgatg    240
atggggtcgg ctgtcgtttt gagggaaaat tcgcaactgt tgatggtctt gactacatct    300
ctggccgtct tgattggttg cgttttgttc tttgtttggc ggagaggggg atcggctccc    360
tcgaagcagc cggagaagcc aactcccctg gtgaaagaag aggaagagga g             411
```

<210> 156
<211> 404
<212> DNA
<213>

<400> 156
```
gctgaagtta ataaaactaa gtacattgag gttgacatgg aggcagaatt ttcaaatcta     60
gctttggaca ttattggatt gtgtgtattt aactatgatt ttggatccgt tactcgagaa    120
tcaccagtaa tcaaggcagt ctatggtaca ttgtttgaag ctgagcatag atcaaccttt    180
tacataccat actggaaatt tccgctggca agatggttag ttcctcgcca acgaaagttc    240
catgaagacc taaaggtcat taatgaatgt cttgataatc tgatagcagg ggccaaggaa    300
acaagacagg aagacgatat cgaggctctt caaggaagag attactctaa agtgaaatat    360
gcaagtttgc tcagatttct agttgatatg agggagaaga tgtt                     404
```

<210> 157
<211> 259
<212> DNA
<213>

<220>
<221>
<222> (116)...(116)

<221>
<222> (246)...(246)

<400> 157
```
ccaatcatcg gcaatttcca ccaagtgaga cttcctcttc accgtgctct caaaaatctt     60
gctgagaaat atggtcccat tttgtttctg cgctttggct ctgtacccac tgtggntgtt    120
tcttcatctg agatggccaa acactttctt aaaactcatg atttgatatt tgccagccga    180
cctccaacat cggtaggaaa atatttcttc tataacttca aagatattgc cttcagtcct    240
tatggngatc actggagga                                                 259
```

<210> 158
<211> 338
<212> DNA
<213>

<400> 158
```
aatggcagtt gggggtcaag gaaatgtggt ctcagcttgc aggcagccat ggaagctaca     60
atcgtctggt gggtgttttg gtagtaatag tttctctggc agttttttat ttgaagagta    120
gaggttcgaa gaagcgtctg cctccagggc cgaagggtgg cctctggttg gaaatttgtt    180
tcaggttgca ttctccggga agcccttcat gtatgtggtg cgagatctga gggagcagtt    240
tggctcgatt ttcacgctcc aaatggggca aaaaacgccc caaattacca cctccccgaa    300
```

atttccaaca cggggcctct taaaaaagag ggggcccc 338

<210> 159
<211> 539
<212> DNA
<213>

<220>
<221>
<222> (1)...(539)
<223> n

<400> 159
aatgtggccg aggagttcct gnaagactca tggatctggc tttcgccagc agacctccaa 60
ccatcggtaa cgaatatttt ggtataattc ctccgacgtc gcattttccc cctatggtcc 120
ttactggagg cagatgcgta aaatctgtgt gttaaagttg ctgagctcaa gacgcataga 180
ttccttccgc cacataagag aagaggaagt ctcttctatg gttcgctcta ttgctaattc 240
ggatctgcat cctgtgaaca ttagcagggc cgtgtcagcc cttgggattg atataatctg 300
caggatggcc ttcggtaaaa agtactgtga ccaagaccta attggtggca ttgggatnaa 360
gtcaatgata aaggaaacgt ttgtgtnagc agggtcnttg aacatgggag attttatacc 420
atacttggca tggattgatc ttcaaggtct caaccgtcga ttgaagaaca tacacaagat 480
ccaagacgac ttgttagggg aagatactag aggcacacgc ttcgccaacc gcagaataa 539

<210> 160
<211> 310
<212> DNA
<213>

<220>
<221>
<222> (16)...(16)

<400> 160
cgaatgggtg gtcggnaaag accgcacagt aaaggagtct gatttggtaa gtctgaaata 60
ccttcagtgt gtggtgaaag agacgctacg attataccccg ggaggacctc tagcacttcc 120
ccatgagtct gtggaggctg tgacagtaga agggtactat atacctaaga agacgatgct 180
gttggtgaat gtgtgggcta taggaaggga ccccaaagtg tgggggattg atgcttcaga 240
attcaagcca gagagattta tggaggaatt aggtgggcat ctgcatgata atgtcatgga 300
tttagcaggc 310

<210> 161
<211> 412
<212> DNA
<213>

<400> 161
cgccacctcc ctcctcctct tccccctcct cctgctcctc ctggtcgccc cgcaaaagcc 60
ctccgcctct gtccgcagtc accgccagcc atggatctcc tcctcctgga gaagaccctc 120
ctgggcctct tcgccgccgc catcgtggcc atcgcggtct ccaagctccg gggcaagcgg 180
ttccgcctcc ccccgggccc cctccccgtg cccatcttcg gcaactggct ccaggtcggc 240
gacgacctca accaccgcaa cctcaccgac ctcgccaaga ggttcggcga catcctcctc 300
ctccgcatgg ggcagcgcaa cctcgtggtc gtctcgtccc cggacctctc caaggaggtg 360
ctccacacgc agggcgtcga gttcgggtcc cgcacccgga acgtcgtctt ct 412

<210> 162
<211> 329

<212> DNA
<213>

<400> 162
acttttacaa tgagtgatca caaacaattt tttccaaaat tcataacaaa attttggata 60
cagtgcatat tcgggcaaac aatctgacgg acttcaaaac tactgacaac aaaacaaacc 120
atctggggat gaattacaat ggaaatccac acttcatttg gctgcaactg tatatataaa 180
gtgtttattg cttccagctc ctccagactt tggaagaaat tctatatttt tttttcagga 240
tctgagcttc aggctattgg tttggccaca acaacggagt ggttgagaat gtgcaggctg 300
aattgccctc ctttctctgt cacatccac 329

<210> 163
<211> 475
<212> DNA
<213>

<400> 163
atttgcgtca gtctctacct ttgcctgcaa cattcacagt cgctgatgga gggcctcccg 60
cagcaactgt cctgtgctta ctctgggctt tcttcatgat atggtttttg ggcaagagaa 120
gaactagtgc cacgctgcca ccaggaccct atgcatggcc catcatagga aacctctacc 180
aattaatact gcccgctcac cgttctctta gaggccttgc tgacaaatat ggtcccatta 240
tgtttctgcg cttaggctct gtccctaccg tcgtcgtttc ttcttctgag acggccaaag 300
agtttctcaa aactcatgac ttgatttttg ccagccgacc cccaacagcc gctgggagat 360
tgatgttttc caactctaaa gacgtggtgt tcgctccgta tggagatcac tggaggcaaa 420
tgagaaaaat atgcgtgtta gaactactga ctgccaaaag aatcgagctc gtgcc 475

<210> 164
<211> 372
<212> DNA
<213>

<220>
<221>
<222> (22)...(22)

<400> 164
tggaaataca gttcgactct gngatttcat aaaatatgat gaggaaagga gaatcaggtg 60
gatttgaggt taagggatgg gctgccatgg atgactccgg cgtcctctcg cctttcaact 120
ttactcgcag gaaaacggga tcccacgatg tactttcaag gtagcatact gtggaatctg 180
tcactccgat ctgcatcaaa ttcggaatga atggaaaaat tccctatacc caaatgggtt 240
ccaggccacg aaatcgtagg aactgttgct tgaagttcgg tcagaagtga agaattttgg 300
ctggctggag aatcggcggt gggtgtaagg gttgcatggg tttggaggtg ccagccaatt 360
ggtgaattct tg 372

<210> 165
<211> 307
<212> DNA
<213>

<400> 165
tctctctctc tctccctctt gagagtgttg aagtgttagg atgaggattc gagtgccgtc 60
gatgctgttg ttgtggtcac tgttgggcct cgtggcgagg tcgacaatgg ccgaagagac 120
ggtgatcccc gagacaacgc gtttcgacac cggtgggctg agcagatcgg ccttcccgaa 180
gggcttcgtc tgggggacgg cgacctcggc ttatcaagtc gaaggcatgg ccgacaaaga 240
gggacgcggg cctagcatct gggacgtctt cgtcaagatt ccaggaattg tggccggtaa 300
tgcaact 307

01·06·08

<210> 166
<211> 454
<212> DNA
<213>

<400> 166
gaagaaatta ggtttcttgt tgcggctttt ggtagtgggt ctggtgatag cagagacggt 60
ccatggtgct tatgagttca gcagatacga ctttcctcct ggctttgtgt ttggtgctgg 120
cacttcagct tatcaggtcg aaggagcagc aaatgaggat gggaagactc caagtataat 180
ggacacctgg gcccactctg actcagggat tacaagcgga gcaaatggag atattgcctg 240
tgatcaatat cacaaataca aggtagatgt ccaactcatg gcagaaatgg gattagacgc 300
ataccggttt tccatctcat ggtcaaggct catcccaaat gggagaggct ctgtgaatcc 360
gaagggattg cagtactaca acaacctcat caatgaactg atcagccatg ggattgaacc 420
cgcacgtgac cctgcaccat tttgatctgc caca 454

<210> 167
<211> 433
<212> DNA
<213>

<400> 167
gagaagcaat aggaaaatat ggccctggag aatggtgaaa gaagcagagt actgatcatt 60
ggaggaaccg gttattttgg cagaaggtta gtgaaggcca gccttgcctt cggacatgag 120
acttatgtcc agtatcgtgc ccaggcagcc tctgatatca acaaagtgga gacgcttatt 180
tccttcaaat ctcaaggagc acacctggtg gatgcttcca ttgacaatca cacaagcctc 240
gtaaatgccg tgaaacgagt ggaagttgta atatcggcga tgggtgccga gggtctgaga 300
gaggggcagc tgaaagtgat cgaggccatt aaagaggcag gaaccgtcaa gcgctttctt 360
ccttctgagt tcgggatggc ccagacagaa tggtgcacgc catctatccg ggcaacgagg 420
ttttctctga taa 433

<210> 168
<211> 330
<212> DNA
<213>

<400> 168
cggggagctt gacttgggac tggaaagcag cgggcatcgt ttcctgtggg ttctccgcgg 60
tcatccttcc aatccaaact tatctgcgct gctgccccg ggtttcgaac agcggaccaa 120
agatcgtggt ctcgtggtta cctcatgggc tccgcaggtt tctatccttg cacacccgtc 180
aacaggaggt tttgtgagtc actgcggttg gaactcgatg ctggagagca tttggtttgg 240
agttcccatt atcgcttggc cctccaagc tgaccaaagg ccgatcgggt tactttctgg 300
tgaatgatag tagaatagac ggtaggcttg 330

<210> 169
<211> 398
<212> DNA
<213>

<400> 169
ggaaaatttg gtatcggtag agagatcctg tgagatcgac gcgtgggtcg accttcaaaa 60
tttgacccgt gaggtgatct ctcgaacagc gtttggcagt agcttcgaag aaggcaaaag 120
gatctccgaa cttcaggggg aacaagccca gctcacgata atagcccttc aatcggtcta 180
catccctggt tggaggtttg tgccaactaa gatgaacagg aggatgaaga gcatagataa 240
ggaagtgcgg gctctgctca tggacatcat ccgcagaaga gagaaagcaa taagggaagg 300
ggaagctgct ggcgatgatc tgctggggct gttgctggag tcaaacatga aggagaatgt 360

cgggatgagc cttcacgatg tgatggacgg agttgcag 398

<210> 170
<211> 432
<212> DNA
<213>

<220>
<221>
<222> (214)...(214)

<400> 170
gttaccaaag ggcagcaacg tattcttaaa catgggttct atccacaggg atcccaagat 60
ttgggacaaa ccgttggagt ttagacccga gaggttcttg gaaggtccta gcaagtatga 120
tttctcaggt aacaacttcg catacatgcc attcggttct ggtcgaaggg tgtgtgcagg 180
gcttgcgctg gcagagagga tgcaaccata tgtnttggcc tctcttttgc actcattcaa 240
gtgggaaata ccaccagggt ctgagctgga tttactggac aagttcggcc ttgtggtcaa 300
gaaaatgaag ccccttgtcg ccattccaag accaagattg tccactctgg agctctacat 360
gtcgagatag atatttcatt agagtcccaa agctcttcat ttcaattcta agaaataaac 420
gtatcctgcc ag 432

<210> 171
<211> 303
<212> DNA
<213>

<220>
<221>
<222> (105)...(105)

<400> 171
ccatcgcggc cctggcccgg acctacgggc cgctcatgca cctgcggctc gggttcgtac 60
gacgtggtgg tggccgcgtc ggcctccgtg gccgccgagt tcctnaagac ccacgacgcc 120
aacttctcga gccggccgcc caactccggg gcgaacacat cgcgtacaac taccaggacc 180
tgatgttcgc gccctacggc ccgcggtggc ggatgctaag gaagataagc tccgtccacc 240
tcttctccgg caaggctctt aagcattaca gacacgttcg ccagaaaaag gtcgcaatcc 300
tca 303

<210> 172
<211> 518
<212> DNA
<213>

<400> 172
cattagatat atatatatag acacgcattt acgatatcat tgcaacaatg tcattggtag 60
gctgggttgt ttttctaatc gctttgattt cgtatttggc tgccatcaca aatgcagcaa 120
tcgtcaatta taccttcatc attgaagcga agacagttac caggctatgc aaggagaata 180
caataatcac cgtcaatggg cagctaccag gtccgaccat ctatgtccat gacggagaca 240
ctgttattgt tgaaacttat aacaaggccg agtacaatgc cactcttcac tggcatggag 300
tggagcagtt gcgtacacca tgggctgatg gacctgcata tgttactcaa tgtcccattc 360
caccaggtgg tcgttataca tacagattca acatctctgg acaagaagga accgtgtggt 420
ggcatgccca ttactcatgg ctccgagcta cggtccatgg agcttttgta atccttccta 480
aggaaggaag ctcatatccc ttttctaaac ccaatgcc 518

<210> 173
<211> 309

<212> DNA
<213>

<220>
<221>
<222> (284)...(284)

<221>
<222> (294)...(294)

<400> 173
gccgctgatc ctaggattga gatctgcatg ctccccgtgg gtgatggcat cactctctgc 60
cgtcggatca gctgagcatc taatctcaag tccttatgat cagggttcat tcttaatgta 120
gaacccacga aaaagagagg gatttatgta tatcttgttg ctgtttcttt tccatgaacc 180
tagaaacggg attcgcaatt aaatgccaaa ttatgttgct gtttctcttt agtgctctcg 240
atttcttttt atttttaat tttttgatc agtttcttcg aatnatctca agtncttcca 300
aaaaaaaaa 309

<210> 174
<211> 381
<212> DNA
<213>

<400> 174
taagacgaag aaatggaaac aacggccaag ccatcgcgaa acgcctttcc gcatatggaa 60
tgcactatat ttgatcttcc gcatgtggtg gccaatttag aagttagcga gaacgtgaga 120
tgtgttcctg ggacatgtt tgagtccata ccaccagcag atgcaataat attgaagtgg 180
atactccatg attggagcga tgaagacgct gtgaagatac tgaagcgatg caaggaggcc 240
ttaggcaagg gcaagggcaa gaaacagaag gtaattataa ttgacatggt gatggacaac 300
acgaagagcg ccaaagagac ggtcgaaacc cagctcttct atgacatgtt gattgatgaa 360
ccctcgccgt cgggaaaggg g 381

<210> 175
<211> 236
<212> DNA
<213>

<220>
<221>
<222> (37)...(37)

<400> 175
tgaattacca catgcggctg atagatctgg tgaaggncgg aggattgatt gcgtatgaca 60
atactctgtg gcaaggatcc gttgcgcttc ccccagaagt cgccatgagc gaaggcatga 120
gttatgggga agacagagag catatgttgg aactaaacag ggcccttgct gcagaccctc 180
gcatcgagat tgctcagatc ccaattgccg atggagtgac gctgtgcagg cgcctt 236

<210> 176
<211> 404
<212> DNA
<213>

<220>
<221>
<222> (1)...(404)

<223> n

<400> 176
gtcgggaatt ccacttacca gaccattaat tcacgattca tcccacctca gcctggaaat 60
ttggtctgaa tctggagccc aatactgtac aagtagcctt ggtctcttcg ggaatccgtg 120
tntggaaaga agaaattgag atccggccaa agatggttgc agggtcagac ctgggcgctg 180
tgcaggccaa tggaaatcaa aatggaaatg gatttcatca tgtgcattct gttgatctct 240
gcattcagaa tggnccagac cctctgaact gggggcaggc tgccaaggcc ctgcagggct 300
cccactttga agaagtgaag ctcatggtgg ngtcctattt cggatccgng gaagtttcca 360
ttgaaggcaa atcngtcaca atcgcggatg tgaccgcagt tgcc 404

<210> 177
<211> 415
<212> DNA
<213>

<220>
<221>
<222> (20)...(20)

<400> 177
cccaacgcta tgcgtctgan caggcaactt tcttcagtgc atttgtggcg gccatggata 60
aattgggcag tgtgggtgta aaaactggca cacaggggga ggtcaggagg agatgtgatg 120
cgttcaattg agaagagtaa agttcaaatt ctctccatta ttaaggtggg attgtatgca 180
tggttgagat taatgaacgg aacaaagaaa atttaatgtt ttgtaactag tgagattgat 240
gaattgaata aagaattttt cctgtcctct gattcaacct gttttgcact ctgtgaagca 300
ctttacagtc tggactctgg aaggaatcca tcaaatcgtg actaagaaaa gggtaatgat 360
tttaaagaga ttccgttgcg ctcattccat tgggggattc ctgaaaatat ctgcc 415

<210> 178
<211> 409
<212> DNA
<213>

<400> 178
gatgggcgcg caattctttt cagccggctg gtgtagttgc tgttgaggtt acgggaggtc 60
ccacaattga gtttgtccct ggtcgtaagg attcactggc atcaccacga gaagggcggc 120
ttcctgatgc gaagaaaggt tcacaacacc taagggatat cttttatagg atgggcctat 180
ctgacaagga tatagttgct ctttctggag cgcacaccat tgggaaaagc acatccagaa 240
aggtcaggct ttgatggagc atggaccgag cagcctctga agtttgataa ttcatatttt 300
gtagagcttc tcaaaggcga gtctgaagga ttactccaat tgcctacgga caaatgcttg 360
gtagaggatc ccagtttccg cccttatgtg gatctttatg ccaaggatg 409

<210> 179
<211> 411
<212> DNA
<213>

<220>
<221>
<222> (393)...(393)

<400> 179
agagcttctc ccagagaggc ctctctatgg aagatctcgt cgctctttcg ggaggccaca 60
cactaggatt ttcccactgc tcctccttcg caggcaggat ccgcaacttc aacaccacgc 120
acgacatcga cccatcgatg cacccatccc tggcagcgag cctaagaggc gtgtgcccga 180

gcaagaacag gccaaaaaac gcagggacca ccatggaccc ttcctcgacc accttcgaca 240
acacgtacta cgggctgatc ctccagggga agggcctgtt ctcttcggac caggccctcc 300
tggcagtgcc caagacgaag gatctggtcg agaagttcgc aggctcgcac aaggaattca 360
cggatgcatt cgtcaagtcc atgatcaaga ttnagcagca tcacaggcgg a 411

<210> 180
<211> 334
<212> DNA
<213>

<400> 180
gcatcatggg aagtacaact gggaagaaga gacagcctaa cagcaagcaa aacagcagca 60
aataacaaca ttccagcccc cacatcaaat gttgcaacac ttaactccaa gtttcagaat 120
gtaggcctca ctgaacaaga catggtcaca ctctcaggag cccatacaat aggaaaggcg 180
cgttgtgcaa cattcaactc taggctcacg ggacaaccgg atcccactct tcagaaagag 240
tttttgacat cgctccaaca aatctgcttt caagggctag ccagtaataa caacaccgta 300
acttcactgg atgtggagac tcccgtcatt tttg 334

<210> 181
<211> 343
<212> DNA
<213>

<400> 181
atttcgctga actggatctg gatcgaagaa ggtattgcat atcaaagaaa gaggcaaata 60
tgactccggc cactgttttg ctttctatat ttgtgattgt atatggtagt gctgtgaacg 120
ctctgccaac tcccgtggcg ggtctttcgt ggacgttcta caacacaagt tgcccgtcat 180
tggagtcgat agtgcggaag cgcatggaag cctatttgag tgcagacatc acacaagctg 240
caggattgct gaggctccac ttccacgact gttttgtcca gggatgcgac gggtctgtgt 300
tgctgaactc aacatcgggg gagcaaacag ttgcgcccaa ctt 343

<210> 182
<211> 443
<212> DNA
<213>

<220>
<221>
<222> (164)...(164)

<400> 182
atttcgctga actggatctg gatcgaagaa ggtattgcat atcaaagaaa gacgcaaata 60
tgactccggc cactgttttg ctttctatat ttgtgattgt atatggtagt gctgtgaacg 120
ctctgccaat tcccgtggcg ggtctttcgt ggaccgtttt acancacaag ttgcccgtca 180
ttggagtcga tagtgcggaa gcgcatggaa gcctatttga gtgcagacat cacacaagct 240
gcaggattgc tgaggctcca cttccacgac tgttttgtcc agggatgcga cgggtctgtg 300
ttgctgaact caacatcggg ggagcaaaca gttgcgccca acttatcact cagagcggag 360
gctctgaaaa tcatcaatga catcaaagag aacgtagaag cggcgtgcag cggaactgtg 420
tcgtgtgcag acattcttgc ctt 443

<210> 183
<211> 243
<212> DNA
<213>

<400> 183

acattgatga ttgtgctacg cgtatttttt tcaatctcta gcacttggga aggtctggag 60
gaggcggctc caaggttgcc tgagggccgt gaccgttctt cactataaac accatattca 120
gtccccatac taaatggtcg tctaaatggc agtggagaaa ccacactcct ggattgtcag 180
ctttgaatct tatcgcaacc caaccgctca caggagctat tactgtgttg cgtagtgggg 240
atc 243

<210> 184

<211> 473

<212> DNA
<213>

<400> 184
ggtggcccct agaagaaaca cactcagaga gtttgatcta taagaggaga gattcactcc 60
aaaatgcaca gggagattca ctccaccatc aaattttaat cattggcctt tttcctctca 120
acggccgatg gcgtaaacac gcgtaagcaa acaccaagat cctgaaacag tcgactgatc 180
gattcagaat aatttgaaag gaaactggac tactcaatca atttgttgac atttatcaag 240
aaatggatga ttcagtacag gaggtatcca aggaaggcaa tcaatgggca ggattcattg 300
agggtgagaa tgtaatccga agaggaaggg agattcttct acagcatgat aaccgggagg 360
cacataactg ggagtcacat aaacataagt ggtggccaca tttggaagaa aaaatcccgc 420
acattgccaa agcaggattt acatctatat ggctgccgcc tgcttttgat tcg 473

<210> 185
<211> 641
<212> DNA
<213>

<400> 185
ggcaccgagc tgggataccc ctgctgcgac ttgatccctt ttgaacagga attatttaat 60
tttcctaatt attttagttt gcaaggaaac ttgactactc catcaatttg tttacagttt 120
tcgaaaaatg ggctatccag ttcaggaggt atccaaggaa cacgatcaat gggcaggatt 180
tgttgaaggt gaaagtgtgc ttcaaagagg aagggagatt cttctccagg gttttaactg 240
ggagtcacat aaatacaagt ggtggccaaa tttggaagaa aagatcccgc acattgctaa 300
agcaggattt acatctgtat ggctgccacc tgcttttgat tctgctgcac cccaaggtta 360
cttgccccga aacatttatt ctctgaactc tgcatatggt tcagaatatc agctgaaaag 420
cttacttatg acaatgcgaa agaaaaatgt gagagccatg gctgacatag ttatcaatca 480
tcgcatggga agctctcagg ggtttggagg cttgtataat cgctattatg gttgcctgcc 540
ttgggatgaa cgtgctgtta cacgttgttc tggtggactt ggaaactgga gcacagggga 600
taattttcat ggagtaccaa acgttgatca cacccaagat t 641

<210> 186
<211> 655
<212> DNA
<213>

<400> 186
agaatggcca agtttcgatc tctgtcttta ttgttatggt tctcctgcat catagtcaat 60
gcagcctctc ctgcacaagc agaagctaca acgcctcctc tgaataccct cttacttcag 120
ggcttcaatt gggattcagc ccagagttct actccttggt ataatgtatt gaagggaatt 180
gtagacgatg cagcggacgc cggcattacg tacgtctggt ttccgccgcc ctcacaatcc 240
ggcgcccctc aaggttattt gccagcgaag ctctatgatt tagactcgtc ctacgggagc 300
gagcaacaac taaaggatgc cgtgaatgcg ttccaccaaa agggaattgc gattatgggc 360
gacatcgtga taaaccatcg gaacgggacg aagcaggacg ataaaggata ttggtgcgtg 420
tttgagggcg ggaaggggga cggtactctg gactggggac cctgggcggt caccgtgaag 480
gaccaaccat atccgttgtg cggctccggc caggcggaca ccggagggga cttcaagtac 540

gccccggacg tggaccacac caatcccaag atacagcaag atttgtcgga gtggatgaat 600
tggctcaagt ccatgtcgga tttgatggct ggaggttcga ctacgtcaag gctac 655

<210> 187
<211> 438
<212> DNA
<213>

<400> 187
ctggggtggg gaggctggtc gacgtgggcg ggagcgcggg ggactgcctc cggatgatca 60
tggggaagca cacgcacgtc cgggaaggga tcaacttcga cttgcccgag gtcgtggcca 120
aagcgcctcc cattcctggg gtgacccatg ttggtggcga catgttcaag tccatccctg 180
ctggtgatgc cattttcatg aggtggatac tgacgacatg gacggacgac gagtgcaagc 240
agatactgga aaactgcttc aaggcactcc ctgcgggagg gaagctgatt gcctgcgagc 300
cggtgctacc gcagcactca gatgatagcc acaggactcg agcacttctt gagggcgaca 360
tcttcgtgat gaccatctac agggccaagg gcaagcatag gactgagcag gaattccagc 420
agctcgggct ctctaccg 438

<210> 188
<211> 597
<212> DNA
<213>

<400> 188
acccaacaat ggccgacaac caagaacgcg aagggcgcga tcaagaagag gaagtcggga 60
agctggcggt ccagctggcc agcgcggtgg tgctcccgat gaccctcaag tcggccctcg 120
agctcggcat catcgacgcc ctcgtctccg ccggtgggtt cctctcggct gccgagatag 180
cgagccgggt tggcgccaag aacccggggg ccccagtcct ggtggaccgg atgatgcgcc 240
tcctggcgag ccacggcgtg atcgagtggc ggttgaggag ggcgacggc aacggagatg 300
gaggggagag agagtacggt ccaggaccca tgtgcaggtt ctttgccaag gaccaagaag 360
gtggagatgt tggtcctctg tttctgctaa ttcacgacaa ggtcttcatg gagagttggt 420
accacttgaa cgatgtcatc atggaaggag gggttccgtt cgagagggca tacgggatga 480
cggcgttcga gtatcctgcc gttgacgata ggttcaatca agttttcaac cgggccatgg 540
cgagtcatac ttccctcatc atgaagaaaa tactcgatgt ctacagaggg tttgaag 597

<210> 189
<211> 470
<212> DNA
<213>

<400> 189
cccgaccccg ctttacatga acaagatcct cgagtcgtac cgtgggtttg agggcgcaaa 60
gacgattgcc gacctaggtg gcggcgtcgg ccagaacctt cggctcatat tggacaagtt 120
cccaaatctc aggggcatac tctatgatct gcctcatgtg atcaaagatg cacctgccca 180
tcctcgtatg gagcgtgtcg gaggagacct gttaaagtct gttccgaaag cagatatact 240
cttcatgaag tggcttttcc atggtctacg agacgatttc tgcaaaatgc tactccagaa 300
ctgttacgag gcgctgccac caaatggcaa ggtggtcatc gtggacccga tccttcccga 360
ataccccgag acagacatag tgtcgaggaa ctcgttcacc tccgacatga tcatgctata 420
cacgagccct ggagaagacc ggacgaggaa agagctggag gtgctcgcac 470

<210> 190
<211> 499
<212> DNA
<213>

<400> 190

```
gtccagtttt cagccgtgct atgaagaagc caacagttta gaccgttgga ttcagcctcc      60
gtcggatctg cttcataata tgtccgataa agaactattt tggagagcga cccttgttcc     120
taaaatcaag aagtatccat tcagaagagt tccaaaaatt gctttcatgt tcttgaccaa     180
gggtccattg ccgctggctc ctctttggga gaggttcttc aagggccatg aggggcttta     240
ttcgatctat attcattccc atccatcatt ccatgcccac tttcatcctt ggtcggtatt     300
taacaggaga caaatcccaa gtcaggtgtc tgagtggggc aggatgagca tgtgtgatgc     360
agagaaaaga ctcctagcca acgcattgct agacatatcc aatgagcggt tcattcttct     420
ttctgaatca tgcattccgc tgtataactt cagcctcatc tatcactaca ttatgaagtc     480
cggatatagc ttcatgggt                                                  499

      <210> 191
      <211> 1036
      <212> DNA
      <213>

      <400> 191
ggcaagtggt ggctggaatt cacacccatt gcgctctctc tctctctcta gatcctatct      60
cgaaagccaa aagaaaagac agtcggaaga aaaaatataa aaaaaaacat gagttcgaag     120
gaagccccag tcattacaac ttcccatgaa gatgaagaaa ttttgaatgc ctttgaggtc     180
ccctcaatgg cttttgttcc catggtcttg aaaggcgtcc atgagctggg gattcttgaa     240
ttgctggcca agggtgacca gctctctccg ttggacatcg tggcccgcct ctctatcgac     300
aacccggccg caccggacac gatcgaccgg atgctgcggc tccttgcgag ttactccatc     360
ttatcgtgca ctctcgtgga ggataaagaa ggccgccccc agaggctcta cggcctcggg     420
cctcggagca agttcttttt ggaccagaat ggagcttcta ctttaccaac tcatatgcta     480
ctccaagaaa agactctcct ggaatgctgg aactgcctta aagatgcagt taaggaagga     540
ggggcagatc ctttcacccg caggcacggc atgaacgtgt tcgactacat gggccaggac     600
ccgagattca acgacctgta caacaagtcg atgaggaccg ggtcggcgat ttacatgccc     660
aagatcgctc agcattatcg tgggttttca aaggcgaaga cggtcgtcaa tgtgggcggt     720
ggcatcggcg agaccctgaa aaccatactc tccaagaatc cccacatccg cgccatcaac     780
tacgacttgc ctcatgtgat cgcaactgct cctcccattc ctggtattac gcatgttgga     840
ggagacattc taaagtccgt ccctaaagcg gatgtccatt tcctgaagtc ggttctccat     900
cgcggggatg atgagttctg cgtgaaggtg ctcaagaatt gctgggaggc attgccgccg     960
acggggaaag tggtgatcgt ggaggaagtg accccggagt atcctgggac cgacgatgtc    1020
tcacagacca cgctct                                                    1036

      <210> 192
      <211> 682
      <212> DNA
      <213>

      <400> 192
agacgttgga ggaggtatag gctctgcctt gtccatcatt gtgaaggaac atccacacat      60
tcgtggcatt aatctcgatc tgcctcatgt cattgccact gcgcctctca taactggggt     120
ggagcacatg gagggaaata tgttcgagca catacttctt gccgatgcag tcatgatgaa     180
gtggatcctc catgactggg cggacgagga gtgtgtgaaa ttgctgagaa gaagctacga     240
cgcaacgcca gcgaagggaa aggtgttaat tgtggaagca gttgttgagg gagacaaaga     300
aggtgaaagc atgtcgaggc gattgggatt gttatatgat atatcgatga tggcttacac     360
aactggtggg aaggagagaa cagaggaaga attcaaaggg ttgttccagc gcgcagggtt     420
caagagccac accatcatca agttgccttt ccttcagtcg ctcatagtgc tgtccaaagc     480
ctaataagct attgcgcttc cgattatcgt tacaataacg ttggttttgc tggggttgtt     540
atcatgcagt atatgaccta tgttttatgt tatctggcag tataagattt ctgaagacat     600
ggttgaaatt attgtgagat tttaaagata tttatccatc ataaaaataa tggaatatga     660
taatattttt acaaaaaaaa aa                                              682

      <210> 193
      <211> 399
```

<212> DNA
<213>

<400> 193
agcgtctaat ggttcctatt tagaagttca gaaagtctct gtctttccta ccttgcgggg 60
tagtctcttc ggacgtactc aaacatggag caaggctggg acaagggcga gatcctggca 120
agcaaagctc tctcgaagta catattggag accaatgcat atccgagaga gcacgagcag 180
ctgaaagaac tcagggaggc cacggtccag aagtaccaaa tccggagtat aatgaacgtg 240
ccggttgatg aggggcagct gatctccatg atgttgaagc tcatgaatgc gaagaagaca 300
atcgagatcg gagtcttcac cggctactct cttctgacca ccgcacttgc acttccggcc 360
gacggcaaga taatagcgat agaccaggat aaggaggcc 399

<210> 194
<211> 399
<212> DNA
<213>

<400> 194
cggacgtact cagacatgga gcgaggcggg gacaagggcg agatcctggc aagcaaagct 60
ctctcgaagt acatattgga gacgaatgca tatccgagag agcacgagca gctaaaagaa 120
ctcagggagg ccacggtcca aaagtaccaa atgcggagta taatgagcgt gccggctgat 180
gaggggcagc taatctccat gatgttgaag ctcatgaatg cgaagaaaac aatcgagatc 240
ggagtcttca cgggctattc tcttctcacc accgcacttg cacttccggc cgacggcaag 300
ataatagcaa tagacccgga taaggaggcc tatgaaattg gcctgccata tatcaaaaaa 360
gccggagtcg atcataagat caacttcatc cagtcggat 399

<210> 195
<211> 296
<212> DNA
<213>

<400> 195
ttgcagtaca tattggagac gaatgcatat ccgagagagc acgagcagct gaaagaactc 60
agggaggcca cagtccagaa gtaccaaatc cggagtataa tgaacgtgcc ggctgacgag 120
gggcagctaa tctccatgat gttgaagctc atgaatgcga agaagacgat cgagatcgga 180
gtcttcaccg gctgttctct tctcaccacc gcacttgcac ttccggccga tggcaagata 240
atagcgatag acccggataa ggaggcctat gaaattggcc taccatatat ccgaaa 296

<210> 196
<211> 474
<212> DNA
<213>

<400> 196
gcgccaccac caaacgctca ccttctcatc atcagccctc tgtctctgtc tctgtctctc 60
gattctccgc cccgccacga caatggaggc gaagccgtcg gagcagcccc gcgagttcat 120
cttccggtcg aagctccccg acatctacat tcccgacaac ctctccctcc acgcctactg 180
cttcgagaac atctccgagt tcgccgaccg cccctgcgtc atcaacgggg ccaccggccg 240
gacctacacc tatgccgagg tcgagctgat ctcccgccgg gtctcagccg gcctcaacgg 300
gctcggcgtc ggacagggcg acgtgatcat gctgctcctc cagaactgcc ctgagttcgt 360
gttcgcgttc ctcggcgcgt cctaccgggg cgccatcagc acgaccgcga acccgttcta 420
caccccgggc gagatcgcca agcaggcctc agctgcccgg gccaagatcg tgat 474

<210> 197
<211> 543
<212> DNA

<213>

<400> 197
gttcgccgac aaggtgaggc cgttcgcgga ggagaacggg gtgaaggtcg tgtgcatcga 60
taccgcgccg gagggctgcc tgcacttctc ggaattgatg caggcggacg agaacgccgc 120
ccccgcggcg gacgtcaagc cggacgacgt cttggcgctc ccctattcgt cgggcacgac 180
ggggcttccc aagggagtga tgcttacgca caggggtcaa gtgaccagcg tggcgcagca 240
ggtcgacgga gacaacccca acttgtactt ccacaaggag gacgtgatcc tgtgcacgct 300
cccgttgttc cacatatact ccctcaactc ggtgatgttc tgcgcgctcc gtgtcggcgc 360
cgccatcctg atcatgcaga agttcgagat cgtggcgctg atggagctcg tgcagcggta 420
ccgggtgacg atcctgccca ttgtcccgcc gatcgtgctg gagatcgcaa agagcgccga 480
ggtggaccgg tacgacctgt cgtcgatccg gaccatcatg tcgggtgcgg cccgatgggg 540
aag 543

<210> 198
<211> 564
<212> DNA
<213>

<400> 198
ctggacaact agttgcagga gttgaagctc aagttatcag cgtggataca ctaaaatctc 60
ttccccctaa tcagttaggg gaaatatggg ttcgtggacc taacatgatg aaaggatatt 120
ataacaatcc acaagcaact aaattgacaa ttgataacaa gggttgggtg cacactggag 180
accttggata ttttgatgag gaagggcaac tatatgttgt tgatcgaatc aaagagctca 240
tcaagtacaa aggttttcag attgctccag ctgagcttga aggactcctt ctttcacatc 300
ctgaaatttt agatgctgtt gtcattccat ttcctgatgc tgaagctggt gaagttccta 360
ttgcatatgt cgttcgctca cctaccagct ctctaactga agaggaagtc cagaaattca 420
ttgccaatca ggttgcacca ttcaaaagac taaggagggt gacattcgtc aacagcgtcc 480
caaagtctgc ttccggcaaa attttgagac gtgagctgat tgcaaaagta cgagcaaaga 540
tataactgtg catgctcgat gcgt 564

<210> 199
<211> 455
<212> DNA
<213>

<400> 199
ggctactttg atgaggaagg aggattattt attgtggatc gtattaaaga actaatcaaa 60
tacaaaggtt tccaggttgc ccctgctgag ttggagggca tattgttgac acatccccaa 120
attgcagatg ctggagttat tccccttcct gatctaaaag ctggagaggt tccaatagca 180
tatgttgtac gtacccctgg aagctctttg acggaaaagg atgccatgga ttatgttgcc 240
aagcaggtcg caccatttaa aaggttgcat agagtcaatt ttgtagactc tatacccaag 300
tctgcctcag ggaagattct tcgacgagag cttattgcta aggccaaatc aaaattgtaa 360
gcaaagaaat atatcatttt ttctggtatc atgatacaaa gttgcacaaa cttatttgta 420
agtgtcaccc cagatgaaca aggaatttgt tccgc 455

<210> 200
<211> 569
<212> DNA
<213>

<400> 200
gtcgtctgta aattactctg tgagtgttta gtgttttctt ctcttattga tttcagggga 60
caagtaggtg gggtggggg agcttaagtc aaatctagtg ctttctctgt aagattttcc 120
cttttttttc ttgctaagag tagccatgat tgaggtacag tcagctcccc ccatggcacg 180
gtccactgag aacgagaata accagcatga tgccgaagaa ggggcggtat tgaatgaggg 240

cggcatggat tttctgtatc ggtcaaagct tccagacata gatattccat accatcttcc 300
attgcactcg tattgcttcg agaaactgga cgagctcaga gagaagccat gtctgataca 360
ggggtcgaac gggaagattt acagctatgg cgaagtggaa ttgatatctc gcaaggtggc 420
ctcgggtttg gccaaattgg gattcaaaaa gggggacgtg gtcatgctgc tgctgcccaa 480
ttgccccgaa tttgtctttg ttttcctagg ggcgtccatg gctggtgcca ttgccaccac 540
ggcgaaccct ttttacactc cctccgata 569

<210> 201
<211> 993
<212> DNA
<213>

<400> 201
tgaccatcct ccggcaatgg ctcttcacat cctcttcaca tggcttgctc tttcccttcc 60
tctcctcctc ctcctcctcc tctcagtgaa aaacttcaat aacaaaaaga agaacctccc 120
tccagggcct ccatcacttc ccatcatagg caacttccac cagctcggcc ccctgcctca 180
tcagtctctg tggaaactct ccagacgata tggccccgtc atgctcatcc gcctcggtgg 240
cacccctacc atcgtaatct cctcccctga tgctgccagg gaggtcctca agacccacga 300
ccttgatagt tgcagtcgcc cgcagatggt cggcccggga cgcctctcct atgactccct 360
cgacatggcc ttcgtggagt acggcgatta ctggagggag ttaaggacgc tgtgtgtgct 420
cgagctgttt agcatgaagc gagtccagtc cttccgatac atcagggaag aggaggtggg 480
atctatgatc gaatcgatcg caaaatcagc agagagcgga actccggtta atatgagcga 540
gaagttcatg gctctgacgg ctaacttcac ttgcagggtc gcatttggga agccatttca 600
ggggacggag ttggaagacg aagggttcat ggatatggtt cacgagggaa tggcgatgtt 660
gggaagcttc tcggcatctg attatttccc tcgactcggc tggattgtgg acaggttcac 720
ggggctccat tcgaggttgg agaagagctt tcgcaatttg gacgatctct atcagaaggt 780
gatcgaagag catcggaatg cgaataagag caacgaggga aaggaggaca ttgtcgatgt 840
gctgctgaag atggagaaag atcagactga gctcgcgggg gtccggctca aggaagataa 900
catcaaggcc atcttgatga atatatttct cggaggagtg gacaccggtg cagtgtcatg 960
gactggacaa tggctgagct cgctaggaac ccg 993

<210> 202
<211> 349
<212> DNA
<213>

<400> 202
ggacggagtt ggaagacgaa gggttcatgg atatggttca cgagggaatg gcgatgttgg 60
gaagcttctc ggcatctgat tatttccctc gactcggctg gattgtggac aggttcacgg 120
ggctccattc gaggttggag aagagctttc gcaatttgga cgatctctat cagaaggtga 180
tcgaagagca tcggaatgcg aataagagca acgagggaaa ggaggacatt gtcgatgtgc 240
tgctgaagat ggagaaagat cagactgagc tcgcgggtgt ccggctcaag gaagataaca 300
tcaaggccat cttgatggta tatcatacaa tctctacgta ttacttaat 349

<210> 203
<211> 432
<212> DNA
<213>

<400> 203
cttggtcgta gcagctttgc tgattgttct cttgaggagc aagtctagga aaagaaagag 60
caacctccca ccgagccctc ctaagttgcc gatcatcggc aatcttcacc agcttggcaa 120
atcgccacac atatctctcc atcgccttgc gagaaactac gggccaatca tgtccttgca 180
gctcggcgaa gtcccaacca tagtcgtttc ctcagccgca atggccaagg aggtgatgaa 240
aacccatgac ctagtgctcg caaaccgccc tcagatcttc tctgccaagc acttgtttta 300
tgactgcaca gacatggcct tctctcccta tggcgcttat tggaggcaca taaggaaaat 360

ctgcatactt gaagtgctta gcgcaaaacg ggttcagtca tttagtcatg tcagggagga 420
agaagttgct cg 432

<210> 204
<211> 407
<212> DNA
<213>

<400> 204
ctcaccttca aatgcctccg cttcctcttc tcctctgccg ccgctactaa ccttcacctt 60
ccgccatcac cgccgaagct ccctatcatc gggaacctcc accagctcag tgatcaccct 120
caccgctcgc tccaagccct gtcgagacgc tatggcccct tgatgatgct ccacttcgga 180
agcgtgcccg tcctcgtcgt atcttccgcc gactgtgcac gggacatctt gaagacccac 240
gacctcattt tctccgaccg acccaggtca accctgtcgg agaggctttt gtaccaccgc 300
aaggacgtgg ctctggcgcc gtttggcgag tactggaggg aaatgaggag catctgtgtc 360
ctccagctgc tgagcaacaa gagggtccac tcgtttcgga cggtcca 407

<210> 205
<211> 384
<212> DNA
<213>

<400> 205
gggaaattac cccacaggtc gctggatcga ctctccaaaa catatggccc cctcatgtat 60
atgagactcg gatccatgcc atgcgtggtc ggctcatccg ctgagatggc ccgagagttt 120
ctcaagaccc acgatctcac attctcgtcc cgaccccgtg tggcggccgg gaaatacact 180
gtttacaact actccgacat cacctggtct ccctacggag agcactggcg tctcgccaga 240
aaaatctgcc tcatggagct cttcagtgcc aaacgcctcg aatctttcga gtacatcaga 300
gtagaagagg tcgcccggat gctgagttcc gtcttcgaaa ccagccggca gggccttcct 360
gtagaaatca gggaagagac gact 384

<210> 206
<211> 543
<212> DNA
<213>

<400> 206
ataaataaga atggtgaacg agttagggtc ggaaaagccc tttctggtat gcctagagtt 60
ttatatgaaa ctcgctattg ctctagttgc gttggtggtg gcatggagct tcttcgtcaa 120
gggaagaaat aggaagctgc ccccgggacc gttctctttg cccatcatcg gaaatctcca 180
tttgctggga cagcttccac accgagcact gaccgctctt tctctcaaat tcgggcctct 240
tatgtcgctt cgcctcggct ctgctcttac attagtagtc tcttcacctg atatggccaa 300
ggagtttctg aagacacatg atctgctttt tgctagcaga cctccatccg cggctactaa 360
ttatttttgg tataattgca ctgacatcgg ttttgctccg tatggcgctt actggaggca 420
agtgcgtaag gtgtgcgttt tacagttgct gagctccaga cgcttggatt atttccgctt 480
tataagagaa gaggaggtct ctgctatgat tcattctatt gctcattccg atcatcctgt 540
aaa 543

<210> 207
<211> 1320
<212> DNA
<213>

<400> 207
tcatcacttg catttggcca gcacatcata gctacctctt atagctgtaa tcttcaccaa 60
attggagaga tgagcttcca gaaccagctc ttcatcttct gcacgttgct actagggttt 120

ctgaagttgg cagaaggcaa aacgaggcac tacaccttcc atatcgattc ccataacatg 180
acgaggctgt gccacacgag gagtgtgctg agtgtaaaca agcagtatcc agggccgccg 240
cttgtggcga gggaaggcga caacatcctc gtcaaggtgg tgaatcatgt tgccgccaac 300
gtcacgattc actggcatgg ggttcggcaa ctgaggacgg gatgggcgga tggaccggct 360
tacgtaaccc agtgtcccat acagaccaac cagagctaca cctacaactt caccctcacc 420
ggccagagag gaacgctgct gtggcacgcg cacgtctcgt ggctaagatc gagcatccac 480
ggccccatca tcatcctccc caagcggaac gagtcctacc cgttcgagaa accctccaag 540
gaagtcccca taatatttgg agagtggttt aatgtagacc ccgaagcggt catcgcccaa 600
gctcttcaga gtggaggagg tcccaatgtc tccgatgcct ataccatcaa tggccttcca 660
ggacccttgt acaattgctc ctctaaagac accttcaagt tgaaggtgaa acctgggaag 720
acatacctcc tccggctgat caacgctgca ctcaacgacg agctcttctt cagcatagcc 780
aaccacgcag tcaccgtcgt cgaggttgat gccgtgtaca ctaagccctt ttctgcgggc 840
tgcctccacc taaccccggg ccaaaccatg aatgtcctcc tcaagacaaa aaccgacttt 900
cccaactcca ccttcctcat ggcagcgtgg ccctatttca ccggcatggg cactttcgac 960
aattccaccg tcgccggaat ccttgagtac gaacatccaa agagctcaaa ttacccgccg 1020
ctcaagaagc tcccccaata taaaccaact ctccctccca tgaacagcac cggttttgtc 1080
gccaaattta cagggcaatt gcgtagtttg gccagcgcta agtttcctgc caacgtgcca 1140
caaaaggttg acagaaaatt cttcttcacc gtcggccttg ggaccagtcc gtgccccaaa 1200
aacaccacgt gtcaaggacc aaatggcacg aaattcgccg catcagtcaa caacatatcg 1260
tttgtgctgc cgtccgtcgc tctcctgcag gctcacttct tcggccagtc caacggagtg 1320

<210> 208
<211> 980
<212> DNA
<213>

<400> 208
ctccggccgt ggttgagggc agagtccgta actacacatt caatgtggta atgaagaata 60
ccacgagact gtgttcgagc aagcccatcg tgaccgtgaa cgggatgttc ccgggaccca 120
ctctctatgc tagggaagat gacaccgtgc tcgtgagggt ctctaaccgt gtcaaataca 180
atgtcaccat ccattggcat ggtatccggc agttgaggac ggggtgggcc gacgggccag 240
catacattac ccaatgcccg atccagccgg gccaaagcta tgtgtacaat ttcaccatca 300
cgggccaacg ggcaccctc ctgtggcatg cacacatact ctggctcagg gcaaccctgc 360
acggagccat tgtcatcttg cccaagcgtg gtgttccata ccctttccct aaaccccaca 420
aggaagttgt tgtcgtattg ggcgaatggt ggaaatctga tacagaaggt gtgatcagtc 480
aagccatcaa gtccggatta gcaccgaatg tctccgatgc tcacacgatc aatggccatc 540
cagggccaag ttccaattgc ccttcccagg gtggatttac gttgcctgtt gagagtggca 600
agaagtacat gctgcgaatc atcaacgctg cgctcaatga ggagctcttc ttcaagattg 660
ccgggcacca gctgaccatc gtggaggtcg acgccaccta cgtcaagcct ttcaagaccg 720
acacgatcgt gattgcacct ggccaaacca ccaatgccct catctccacc gaccagagct 780
ctggcaagta catggtcgcc gcctcccctt ttatggactc cccgatcgcc gtcgacaaca 840
tgaccgcgac cgccacatta cactactctg gcacgcttgc tgcgacctcc acgaccctca 900
ccaagactcc cccacaaaac gcgaccgctg tggccaacaa tttcgttaac tcgctccgga 960
gcctcaactc gaagaggtac 980

<210> 209
<211> 305
<212> DNA
<213>

<400> 209
gaggctgtgt tcgagcaagc ccatcgtgac cgtgaatggg atgttcccgg gacccactct 60
ctacgctagg gaagacgaca ccgtgctcgt gagggtctcc aaccgtgtca aatacaatgt 120
caccatccat tggcatggta ttcggcagct gaggtcgggg tgggccgacg ggccggcata 180
catcacccaa tgcccaattc agccaggcca aagctatgtg tacaatttca ccatcacggg 240
ccaacggggc accctccttt ggcatgcgca catactctgg ctcagggcaa ccctgcacgg 300

agcca 305

<210> 210
<211> 411
<212> DNA
<213>

<400> 210
ttaccgtcga tcacagcctc cttttcacag ttggactagg aatcaaccct tgcccttcct 60
gcaaagctgg caacggaagc agagtcgtgg caagcatgaa caacgtgaca ttcgtgatgc 120
cgacgacagc cattctccaa gcacatttct tcaacaaaag cggcgtcttc acgagcgatt 180
tccccggtaa cccgccaacc attttcaact acacggggtc accgccatca aatttgcgga 240
ccacaagcgg gacaaaggtg taccggttgc gttataactc gacggtccag ctggtgtttc 300
aagacaccgg gattatcgcc ccagagaacc acccaattca tcttcacggg ttcaatttct 360
tcgccattgg gaagggatta ggaaattata atccgaaagt ggatcagaag a 411

<210> 211
<211> 311
<212> DNA
<213>

<400> 211
cacaaggaag ttgttgtcgt attgggcgaa tggtggaagt ctgatacaga agctgtgatc 60
aatcaagcca tcaagtccgg attggcaccg aatgtctcgg atgctcacac gatcaatggc 120
catccagggc caagttccaa ttgcccttcc cagggtggat ttacattgcc tgttgagagt 180
ggcaagaagt acatgctccg aatcatcaat gctgcgctca atgaggagct cttcttcaag 240
attgctgggc accagctgac catcgtggag gtcgacgcca cctacgtcaa gcctttcaag 300
accaacacgg g 311

<210> 212
<211> 334
<212> DNA
<213>

<400> 212
agcgtggcgt tccatatcct ttccctaaac cccacaagga agttgttgtc gtattgggcg 60
aatggtggaa gtctgataca gaagctgtga tcaatcaagc catcaagtcc ggattggcac 120
cgaatgtctc ggatgctcac acgatcaatg gccatccagg gccaagttcc aattgccctt 180
cccagggtgg atttacattg cctgttgaga gtggcaagaa gtacatgctc cgaatcatca 240
atgctgcgct caatgaggag ctcttcttca agattgctgg gcaccagctg accatcgtgg 300
aggtcgacgc cacctacgtc aagcctttca agac 334

<210> 213
<211> 1374
<212> DNA
<213>

<400> 213
accgaacgtg tccgacgctt ataccatcaa cggtcaacct ggagatctct acaactgctc 60
aagcaaagac accgtcatag ttccgatcga ttccggggag acccacctcc tccgagtcat 120
caacgctgcg ctcaatcagg aactcttctt caccgtagcg aaccataggt tcactgtggt 180
cggtgccgac gcctcctacc tgaaaccctt caccacctcg gtgatcatgc ttgggccagg 240
ccaaacgacg gatgtattga tctctggaga ccagcccccg gctcggtact acatggcggc 300
cgaaccctac cagagtgctc agggagcgcc ttttgacaac accacgacca cggccatact 360
ggagtacaag tccgccccgt gccccgccaa gggcatatcg agcaagccag tcatgccaac 420
cctaccggct ttcaacgaca cggctaccgt cacagccttc attcagagct tcaggagccc 480

aaataaggtt gacgtcccga ccgacatcga cgaaaacctc tttatcacgg tcggcctagg 540
actcttcaac tgcccaaaga atttcggtag cagtaggtgc caggggccga atgggacccg 600
tttcacggcc agcatgaaca acgtgtcctt cgtgctgccg tctaatgtct cgatcctgca 660
agcctacaag cagggcgtgc ctggagtttt taccaccgat ttccctgcta acccccctgt 720
ccagttcgat tacacgggga acgtgagccg ctcgctgtgg cagcccgttc cggggaccaa 780
ggtgtacaag ttgaagtacg ggtctagagt acagattgtc ttgcaaggaa ccaacataca 840
aacggccgag aaccacccga tccacattca cgggtacgat ttctacatcc tcgccacagg 900
cttcgggaac ttcaaccccc agaaagatac agcgaagttc aaccttgtcg acccgccaat 960
gaggaacaca gttggcgtct ctgtgaacgg gtgggctgtc attagatttg tcgccgacaa 1020
tccaggtgct tggttgatgc actgtcactt ggatgttcac atcacctggg gattggccgt 1080
ggttttcctt gtcgagaatg gagttggcga attgcaatct ctacagcctc ctcctgcaga 1140
tttgcctcca tgttaaaaga tctgcggctg acagatagtc ctccacgaga aattcataac 1200
gcccacaaca cgggcctatt ctaattttct tcttcttctt tcacctttcc gttttcgttt 1260
cgcggagttt cagttcagtg attgtttccc ctgaattcag ggagccacca gttgtttgct 1320
tgtctcatac tttttttat agataaaatt gtcttgcata aaaaaaaaaa aaaa 1374

<210> 214
<211> 418
<212> DNA
<213>

<400> 214
atcctgtctc agtctccatc atcacttgcg ccaagtaaca tctgatttcg aggaagacga 60
ggagcgcaaa atgggctccg ctactgctgc tggtgcctcg gtttcgtcgc gaatgattct 120
gatgagagcc gccttcttca cactgtgcgc tctcgtgttc ttgccggctc ttgctcaggc 180
gaagcacgga ggtgtcacca ggcattacaa gtttgatatc aagatgcaga atgtgacgag 240
gttgtgccag acgaagagca ttgtcacggt caatggccag ctcccggggc ctcgaatcat 300
cgctagagaa ggcgaccggc tcctaatcaa agtcgttaac aatgtccagt acaatgtcac 360
aatccactgg catggagtcc gacaactcag aagcgggtgg gctgacggac cggcatac 418

<210> 215
<211> 466
<212> DNA
<213>

<400> 215
ccggatcgag tgattagtac aagttcaatt ttgtatcagg gagagagagg gacgatggga 60
acatttctag ggttcgcagt cactgcgacc ctgctcttct gcgtggctca aggcgaagtc 120
ctcttttatg attttgtggt aaatgagaca cctattgaga tgctatgtga gacaaatcgg 180
agcgtactaa ctgtgaacgg tctatttcct gggccggaga tccatgctca caagggtgac 240
actatttacg ttaatgtcac caacttagga ccttatggag tcactattca ctggcatgga 300
gtgagacaaa tacggtatcc ttggtctgat ggcccagaat atgtcacgca atgccccatc 360
cctacaaact cgagctttct tcaaaaaatc aaactcaccg aggaagaggg cacggtgtgg 420
tggcacgccc acagcgactg gtcacgtgcc acaatacatg gcctat 466

<210> 216
<211> 757
<212> DNA
<213>

<400> 216
tcgggttctt tgtacaactt aatcggttgt atgtggatac agtgcagaaa ctgcccacga 60
attcagaatc aaatattatg agatgctcca cagttccccg gtttaagtac cttcccatca 120
gtgtacctgc attgtcttca aggaggacat ctaaagcaac tactgtaaga ctttggaccg 180
gcacgagcac aagtctcctt ctttgttctg gatcaagtga ttgttacaag ttcatttttc 240
tcttgttgag agagagagag agatgggaac atttctaggg tttgtggtca ccatgaccct 300

gctcttttgc atggctcaag gcgaagtcat ctactatgat ttcgtggtga aggagacacc 360
tattcagatg ttatgtggga cgaatcagac cgtattgact gtgaatggtc tgtttcctgg 420
gccagagatt catgctcaca aaggcgacac catctacgtt aatgtcacca acacaggacc 480
ttatggagtc actattcatt ggcatggagt gagacaaata agatatccct ggtccgacgg 540
cccggagtac atcacacaat gcccaatccc tacaaactca agtttccttc aaaaaatcat 600
actcactgaa gaagagggca cactatggtg gcacgctcat agtgactgga cacgtgccac 660
tatacacggc cctataatca ttttgcctgt caacggcacc aactaccctt acaagtttga 720
cgaacaacac acaatcgtga tatctgaatg gtatgca 757

<210> 217
<211> 251
<212> DNA
<213>

<400> 217
acacaagtct ccttctttgt tctggatcaa gtgattgtta caagttcatt tttctcttgt 60
tgagagagag agatgggaac atttctaggg tttgtggtca ccatgaccct gctcttttgc 120
atggctcaag gcgaagtcct ctactatgat ttcgtggtga aggagacacc tattcagatg 180
ttatgtggga cgaatcagac cgtattgact gtgaatggtc tgtttcctgg gccagagatt 240
catgctcaca a 251

<210> 218
<211> 762
<212> DNA
<213>

<400> 218
gcctggcagt aatgtctaat gaacaactcc tggaatttgc ttggggattg gcttccagta 60
accaatcctt cttgtgggtt gtgaggtcag atatcgtgca tggtgaatct gccatattac 120
ccaaagagtt cattgaggaa accaaggata gaggtatgct ggtgggttgg gcgcctcaga 180
taaaggtact gtcgcaccca tctgtgggag gatttctaac tcacagcggt tggaactcta 240
cattggaaag cattagtgcg ggtgtgccaa tgatgtgctg gcccttcttt gccgagcaag 300
aaacaaatgc taaatttgtg tgtgaagagt ggggaatagg aatgcaggtg aagaaaatgg 360
tgaagagaga agagttggcg atactggtga ggaattcgat caaaggtgaa gaaggagatg 420
aaatgaggaa aagaattgga aaactgaagg aaactgccaa gcgagcagtt agtgaaggag 480
gctcttctaa gaacaactta gacaagttac tccatcatat attcctcaag ggaatgcatc 540
aaatgatagt ccagaatgtt gaagcaaaca attagttaga agagaacgtg taggacgaac 600
gaaaacatcc cagtacccca agcgttcata tttctgcatt tcgcattaaa tttactttgt 660
attgttccgc acatatgtat tttcaggttg tcaggtttcc ccagagttga acctcatttt 720
caattagatt gtttcacgtc tttacggcgc agggggttgt ga 762

<210> 219
<211> 1144
<212> DNA
<213>

<400> 219
aaatagctca aaggttagtg tcgcgaccta aattggtgtc aacagctagc caatggagtc 60
ctgctctatt tcgctatttt ggctgggcct cctcctcccg gcacttctag ttttccttct 120
caaccgtcgg aagcgcacca agcttccccc tcagccccca gcatggcccg tgatcggcaa 180
cattttcgac ctcgggacca tgccgcacca gaacctccac aacctccgag ccaagcatgg 240
gcctgtcttg tggttgaagc tcggttccgt gaacaccatg gtgatccaat cagctcgagc 300
ggccatggag ttattcaagg gccatgactt cgtgttcgca gaccgcaagt gttcccaagc 360
gtttactgct ctcggctatg accaaggctc gctcgctctt ggtcgtcatg gtgactactg 420
gcgcgctctc cggcgtctct gctccgcgga gctcctcgtg aacaagcgcg tcaacgatac 480
ggcccacctc aggcaaaagt gtgtcgacag catgatcatg tatatagaag aagaaatggc 540

agtcaaacaa gcaacaaaag ggcaaggaat cgacttatct cacttcctct ttctcctggc 600
atttaatgtg gtgggcaaca tggtgctctc acgggatcta ttggacccaa aatcgaagga 660
tgggcccgag ttctacgacg ccatgaaccg gttcatggag tgggctggca agcccaacgt 720
agccgacttc atgccatggt tgaaatggtt ggatccgcag gggatcaagg caggcatggc 780
gaaggacatg ggtcgagcca tgaggattgc cgaaggcttt gtgaaagaga ggttggagga 840
gcgaaagcta aggggagaga tgagaacaac gaatgatttc ttggacgcag tattggatta 900
tgagggcgat ggaaaagaag gccctcacaa tatctcttcc cagaacataa atataatcat 960
tctggaaatg tttttcgccg gatcggagag tacaagtagc accatcgagt gggcgatggc 1020
ggagctactc cgccaacccg agtcaatgaa aaaggccaaa gatgagattg accaggttgt 1080
ggggttgaac agaaagctcg aggaaaatga cacggaaaag atgccatttt tgcaagccgt 1140
ggtg 1144

<210> 220
<211> 563
<212> DNA
<213>

<400> 220
agctcaaagc ttagccaatg gagtcctgct ctatttcgct attttggctg ggcctcctcc 60
tcccggcact tctagttttc cttctcaacc gtcggaagcg caccaagctt ccccctcagc 120
ccccagcatg gcccgtgatc ggcaacattt tcgacctcgg gaccatgccg caccagaacc 180
tccacaacct ccgagccaag catgggcctg tcttgtggtt gaagctcggt tccgtgaaca 240
ccatggtgat ccaatcagct caagcggcca tggagttatt caagggccat gacttcgtgt 300
tcgcggaccg caagtgttcc caagcgttta ctgctcttgg ctatgaccaa ggctcgctcg 360
ctcttggtcg tcatggtgac tactggcgcg ctctccggcg tctctgctcc gcggagctcc 420
tcgtgaacaa gcgcgtcaac gagacggccc acctcaggca aaagtgtgtc gacagcatga 480
tcatgtacat agaggaagaa atggcagtca aacaagcaac aaaagggcaa ggaatcgact 540
tatctcactt cctctttctc ctg 563

<210> 221
<211> 447
<212> DNA
<213>

<400> 221
taatgaaggc ccaagatgag attgattcta tgattggcca tgatagtttg ttagaagaat 60
cggatgtttc aaaactacct taccttcagt gcattatctt ggagaccctt cgactaaaca 120
cgacggcacc acttctcctc ccacacgcgt catcggctga ttgcactata ggaggatact 180
tcgtcccacg cgacactatt gtgatggtga atgcatgggc cattcacaaa gaccctcagt 240
tgtgggagga tccattgagc ttcaagcctg aaaggttcga gggcaatggc agcgaaaagc 300
aacaaaagct actattgcct tttggactgg gacggagggc atgccctggt gccccttgg 360
ctcatcgggt catggggtgg acgttgggct tgttgattca gtgttttgat tggaaaagag 420
taagcgaaga agagattgac atgacgg 447

<210> 222
<211> 494
<212> DNA
<213>

<400> 222
ttaccttggc gatttcctgc ccatactaaa gttggtcgat tacaatggag tcaagaagag 60
ggtggttgag ctgaaagaga aattcgatgc gttcattcag ggcttgatca acgagcaccg 120
gaggaagaag ggcgacccag agctcgcaga cagcatgatc agtcatcttc tgcatctaca 180
agaatctcag ccggaagact actcggactc catgatcaaa gggcttgtcc ttgttttgtt 240
agttgcggga acagacacgt catcgcttac attagaatgg ataatgacaa acttactaaa 300
caatcctgaa aagttagaga aggcccgaaa tgagattgat tctgttattg gccacgatcg 360

tctggtagaa gaatcggatg tttcgaatct accttacctt cagtgcatca tcttagagac 420
ccttcgacta aacaccacgg tgccacttct cgtcccgcac gcatcatcag ctgattgcac 480
cattggtgga tact 494

<210> 223
<211> 492
<212> DNA
<213>

<400> 223
gttgtcagat gcgatcccgg ctcttggctg gttggactca ggtggctata gacgatcgat 60
ggacgagaca gcgaaagagt tggatgtttt ggctcagggg tggctagagg agcatagaag 120
gaagagattg tcctgcccca aagacgacag agagcaagat ttcatggatt ggatgatcaa 180
cgccctcgaa ggtcggaatt ttccagattt tgacgcggat acagttatta aggcgacttg 240
tttgaacatg ataatagcgg ggactgatac ttcgacggtg gcgatcacct gggcgctatc 300
gctgctaatg aacaaccgtc gtgcattgaa gaaggcgcaa caagagctgg acacccatgt 360
tggcaggagt aggcccgtgg aagagtccga tgtgaaaaac ttgacctacc tccaagccat 420
cgtcaaggaa gcactgcgtt tatatcctcc agtaccggtg aacggcctta gaagctccat 480
ggaagagtgc ac 492

<210> 224
<211> 391
<212> DNA
<213>

<400> 224
gcaggcttcc tccgggacct ccagggtggc cgattgtggg aaacctgttc cagttgggta 60
acaaacccca cgaagctctc ttccacctcg ctcagaagta cggccctctc atgtgtgtct 120
ctctcggaat gaaaactaca gtggtagtct cctctccggc catggcaaag caagttctca 180
agacccatga ccatgttttt gcgggccgaa cggtcataca gtcagttcag tgcctttctt 240
acgacaagtc ctcagtaatt tgggcccaat atggatccca ctggcgtttg ctcagacgca 300
tatccaatac aaagctcttc agcgtcaaga ggttagaagc cctggaacat ttgagaagag 360
atgaagtatt ccgaacaatc aagcagattc t 391

<210> 225
<211> 536
<212> DNA
<213>

<400> 225
ctcgtttatt tacaagctgc ggtgaaagaa actcttcgac tccatccatc cgggccttta 60
ttggtgcgcc atttatttgg taccgcgtcc tgcaatgtat tggggtatga aatcccgcag 120
aatactctcg ttctcgtgaa tgtttgggcg attgggagga accctaagtc atgggaggac 180
gccgaagttt tcaagccaga gagattcatg gaaaaagttg ggtctgaagt agatgcaaat 240
ggagatcaaa actttgggtg ccttctcttc ggagcagggc ggagaagatg cccaggacag 300
caattgggaa cgcttcttgt agagtttggg ttggcacagc tgttgcactg cttcaactgg 360
aggcttccct tggatgacat aaatggcgaa aatcaagaag tggatatgaa tgaaatgttt 420
aatggagtca cgctgcgcaa agctcgtgag ctctcggcta ttccgacacc acgccttgaa 480
tgcattgctc acctgaaata ggtcatcagg tttcgagtga aacctgtgga gataga 536

<210> 226
<211> 463
<212> DNA
<213>

<400> 226

gaaaggtacc gtcccgcttg aaaaatatct acagctttta gattggacgc aattataaac 60
attttattcc agtttgtatg tgttatctct gatcgtgttg gagatgtgtg gctgagccta 120
atcatgcatg gagcaacttg tccaggaaaa gaaaaggcag actgcccccg gggcctttct 180
cgttgcccat tatcggcaat cttcacatgc taggaaagat tcctcaccga tcactggcag 240
agctgtctat gaaatacggg cctctcctgt ctctccgcct cggctctact cccgccttag 300
tcgtctcttc tccagaaata gccagtgaat ttctcaaaac ccatgatcag ctttttgcca 360
gcagaattcc ctctgctgct attaaggtat tgacctacaa tttgtccggc ctcatatttt 420
ccccgtatgg cccttgctgg aggcaagtgc gtaaactttg cgt 463

<210> 227
<211> 463
<212> DNA
<213>

<400> 227
ggctgagcct aatcatggtt attacatatc ttgaaccttt gtagtagatg ttgtttgtgg 60
atatagctaa tatcaaattg tttgagatag atgtttgctg gtagatatag ctagattagt 120
acagtgaacc atctaaaaaa ctggcgatgg agtttgtaga gttttgtata acactcgtca 180
ctgctcttct ttttgttgta ttggtagcag catggagcaa cttgttcagg aaaagaaaag 240
gcagactgcc cccggggcct ttctcgttgc ccattatcgg caatcttcac atgctaggaa 300
agattcctca ccgatcactg gcagagctgt ctatgaaata cgggcctctc ctgtctctcc 360
gcctcggctc tactcccgcc ttagtcgtct cttctccaga aatagccagt gaatttctca 420
aaacccatga tcagcttttt gccagcagaa ttccctctgc tgc 463

<210> 228
<211> 463
<212> DNA
<213>

<400> 228
gaattgcttt ctgcgtgtcc agttcatgaa tgcccatact tttattttaa tctcgctact 60
gttattcttc tgggcgtggt gacgggatgg ggtttcttat tccggggaag aaaacagaag 120
cttcctccgg ggccttttca gtggccgatt gttggaaacc ttcacatgat gggagagctt 180
ccacaccaag caattacagc tctctctatg aaatatgggc ctctcatgtc tctccgcctc 240
ggctcctatc tcactttggt cgtttcttct ccagatgtgg ccgaggagtt cctgaagact 300
catgatctgg ctttcgccag cagacctcca accatcggta cgaagtactt ttggtataat 360
tcctccgacg tcgcattttc cccctatggt ccttactgga ggcagatgcg taaaatctgt 420
gtgttacagt tgctgagctc aagacgcata gattccttcc gcc 463

<210> 229
<211> 463
<212> DNA
<213>

<400> 229
actgtgacca agacctaatt ggtggcattg ggatcaagtc aatgataaag gaaacgtttg 60
tgttagcagg gtctttgaac atgggagatt ttataccata cttggcatgg attgatcttc 120
aaggtctcaa ccgtcgattg aagaacatac acaagatcca agacgacttg ttagggaaga 180
tactagagga acacgcttcg ccaccgcaga ataaccccaa ctacatgcca gatctcgtgg 240
atgttttgct cgcggcctct gcggatgaag atctggagtt cgaaattact cgagacaata 300
taaaatctgt catctatgta tatattgtcc atgcaattat tagatttcaa tgacttaaat 360
aaaacatgac acggtgatta tatcttgaca tttgttttgg atttgttttg ttggtaggat 420
atcttgtccg ctggttcgga ctcgtcgtct gcaagcatag agt 463

<210> 230
<211> 543

<212> DNA
<213>

<400> 230
ggcaccagac gagctggaac gtgtcgttgg attgggtcgt atggtaaggg aatctgatct 60
gcctcgtctc gtttatttac aagctgtggt gaaagaaact ctgaggctat acccacaggg 120
gccgatttta ttccgccact tgtcttcgga gccctgcaat gtcctgggct atgaaatctc 180
tcaaaacact caagttctgg ttaatatttg ggcgattgga aggaactctg agtcatggga 240
agatgccgga agcttcaaac ctgagagatt catggaaaga gttgggtctg aggtagatac 300
aaatggagat caaaattctg cgtggcttcc cttcggagca gggaggagaa gatgcccagg 360
acagcaattg ggaacgcttg ttgcagaaat tgggctggca cagctcttgc actgtttcaa 420
atggaggctt cccgaagctg atatggatgg cccaaatcaa gaacttgaca tgatggaaag 480
gtttaatgga atcacatcgc cgagggctaa ggaactgttt gcgattccga cacccgcct 540
tga 543

<210> 231
<211> 381
<212> DNA
<213>

<400> 231
ggaatcctct ttgatatgtt gctcggtggg tcagacacag cgcctacaat aatagagtgg 60
gcaatatcgg aggcgctgat aaaccctcca gtgatgaaga aacttcagga cgagctggaa 120
cgcgtcgttg gattggatcg catggcatgc gaatctgatc tgcctcagct cgtttattta 180
caagctatgg taaaagaaac gcttcgactt cacccagcgg ggcctctttt gaaccgtcgc 240
ttatccgctg agtcctgcaa tgtgttgggg tacgaattcc ctaaaaacac tcgtgttctc 300
gttaatgctt gggcgattgg gaggaaccca aagttatggg aggacgctga aactttcaag 360
ccagaaagat tcacgggaag a 381

<210> 232
<211> 384
<212> DNA
<213>

<400> 232
ccacttcggc aacagttgaa tgggcaatgg ctgagcttat cagaaaacca acgctactga 60
aaaaggccca ggcagagctg gatgaggttg ttggtcgaga gaagagaatg gaggaatcag 120
acatagcaaa attgccctat ctacaagcag tagtgaagga ggtactcaga ttgcacccag 180
cagctccact gataattcct cgaagagcag acaactctgc cgagattggt ggatatgttg 240
tcccagagaa cacgcaggtg tttgtgaata tctggggcat cggaagagat cccaacgttt 300
ggaaggaacc tctgaaattc aaaccggaaa ggtttttaga ctgtaatact gactacagag 360
gccaggattt tgaactgata ccat 384

<210> 233
<211> 405
<212> DNA
<213>

<400> 233
gagaagatga agtttccgct atgattcgct ctattgttaa ttcagatgcc cacaaggact 60
ctcgtcctgt caacatcaag caacttgcgt catcccttgt gacagctata gtcttgagga 120
tgaccttcgg taaaaagtat tcggaccggg attcaggagc attcagttca atgatcaaag 180
aaagtttact gttactcggc tcctttaata ttggagaata cataccttac ttgaactgga 240
tggatttgca aggtctcaac cgccggctga agaagctacg tacaacacaa gaccagttgc 300
tagagaaagt aatagaggaa catgctgccc agaatcggag caacatgacg catgatcttg 360
tggatgcctt acttgcagcc tctgcggata aagatagaga gctcc 405

<210> 234
<211> 348
<212> DNA
<213>

<400> 234
catatacgat caagagagtt tgctgaatgc aattaagcag gttgatgtgg taatctctgc 60
tgtggggcaa gcacaaacgg aggaccaaga ccggattgtt gctgccatca aagcagccgg 120
gaatatcaag agattcttgc cttcagagtt tggaaatgat gtggatcgtg tccatgctgt 180
ggagccagta aaaactggat ttgctctcaa ggccaagatc cgccgccttg ttgaggccga 240
gggaatccct tatacctatg tgtcttctaa ctcttttgca ggttactacc ttcaaacatt 300
gtcacagccc ggggctacag ctccccctag agataacgtt gttatctt 348

<210> 235
<211> 640
<212> DNA
<213>

<400> 235
ctgtgtgtta agctagtagt cagtcaagca ttgaaggcat gaacacctta aagacatgaa 60
cagatgaaga tttggagtct caattatact gtgtgttaag ctagtagtca gtcaagcatt 120
gaaggcatga acaccttaaa gacatgaaca gatgaagatt tggagtctca atggtattat 180
tgcctacctt atctccagtc acagcagagt cgcttctaga aaccgatcga gttcgccgga 240
aaacaccgcg cctccgccgt gaaaaccact cagagatggc tgcgaagagc aaggtcctgg 300
tgatcggagg cactggatac atcggaaagt tcatcgtgga agccagtgct aagtccggtc 360
gccctacctt cgctctcgcg agggagtcca ctctctccaa ccccgccaag gccaagatcg 420
tcgaaggttt caagagcctc ggcgtcactt tagttcacgg agacatatac gatcaagaga 480
gtctattgaa tgcgatcaag caggtcgatg tggtaatctc tgctgtgggg cgagcacaaa 540
tagaggacca agacaggatt gttgctgcca tcaaagcagc cgggaatatc aagagatttg 600
tgccttcaga gtttggaaac aacgtggatc gtgtccatgc 640

<210> 236
<211> 464
<212> DNA
<213>

<400> 236
gtctcgagtt ttttcttatt taattaattt tctttttaga gattcttgcc ttcagagttt 60
ggaaatgatg tggatcgtgt ccatgctgtg gagccagtaa aaactggatt tgctctcaag 120
gccaagatcc gccgcctcgt tgaggccgag ggaatccctt atacctatgt gtcttctaac 180
tcttttgcag gttactacct tcaaacattg tcacagcccg gggctacagc tccccctaga 240
gataacgttg ttatcttagg ggatggaaat gccaaagtgg tgtttaacaa ggaggatgac 300
atcggcacct ataccatcaa agctgtggat gatccaagga ccttgaacaa aattctgtac 360
atcaggcctc ctgccaacac ctactcaatg aatgagctcg tgtctttgtg ggagagaaag 420
atcggcaagg ctctggagag ggtgtatgtt ccagaggagc aaat 464

<210> 237
<211> 315
<212> DNA
<213>

<400> 237
cttctagaaa ccgatcgagt tcgccggaaa acaccgcgcc tccgccgtga aaaccacttc 60
agagatggcc gcgaagagca aggtcctggt gatcggaggc actggttaca tcggaaagtt 120
catcgtggaa gccagtgcta agtccggtcg ccctaccttc gttctcgcga gggagtccac 180

tctctccaac cccgccaagg ccaagatcgt ccaaggtttc aagagcctcg gcgtcacttt 240
agttcacgga gacatatacg atcaagagag tctgttgaat gcgatcaagc aggtcgatgt 300
ggtaatctct gctga 315

<210> 238
<211> 376
<212> DNA
<213>

<400> 238
caaagtcacg tcagagaccg atcaagttcg ccggaaaaca ccacgcgcgc tatgaaaaga 60
ccctccaaga tggcagagat gagcagagtc ttggtgattg gaggcgccgg atacatcgga 120
aagttcattg tgaaagcgtg tgctaagtcc ggtcacccta cctttgttct cgagacggag 180
tccactctct ccaaccccgc caacgccgaa atcatcaaag gtttcaagag cttaggcgtg 240
aacctagtcc atggagacat atacgatcaa aaaagtctgt tgagtgcgat taagcaagtt 300
gatgtggtaa tatctactgt ggggcaagca cagctagaag accaagacag gattgttgca 360
gccatcaaag cagccg 376

<210> 239
<211> 297
<212> DNA
<213>

<400> 239
atcaagttcg ccggaaaaca ccacgcccgc tgtgaaaaga ccctccaaga tggcagagat 60
gagcagagtc ttggtgatcg gaggcgccgg atacatcgga aagttcatcg tgaaagcgtg 120
tgctaagtcc ggtcacccta cctttgttct cgagacggag tccactctct ccaaccccgc 180
caacgccgaa atcatcaaag gtttcaagag cttaggcgtg aacctagtcc atggagacat 240
atacgatcaa aagagtctgt tgagtgcgat taagcaagtt gatgtggtaa tctctac 297

<210> 240
<211> 951
<212> DNA
<213>

<400> 240
tctcgcacag ttgacgacgt tttcttgtat ttgtagcgtt cggcacgatc ggggaaaaac 60
gatggcatgc gctactgatg ttgcacgtca gtttctgcca tgcgtccaac ccgtgccgtc 120
cagcatggga ggagagaccg cccggtcgat caacctcacc tgcaatggcc tctccccgcc 180
tcaaccgcag tacaacgccg agaacaacca tgatcaggac accacagttg ccacaagggt 240
tctcattatt ggcgccaccg ggttcatcgg tcggtttgtt gcagaggcca gtgtgaaatc 300
cgggcgccca acttatgccc ttgtgcggcc gacaacatta agttcgaagc ccaaggtcat 360
tcagtctctg gtggattcgg gtattcaagt tgtttatgga tgtctacatg atcacaattc 420
tttggtgaaa gccatcaggc aggttgacgt tgttatttct actgttggtg gagccctaat 480
tcttgatcag ctcaagattg tggatgccat caaggaagtt ggcactgtca agagatttct 540
tccttcagag tttggacacg atgtagaccg agcagatccc gtagagcctg ctcttagttt 600
ttacatagaa aagagaaaag tccggcgtgc agtggaggaa gcaaagattc cttacacata 660
catctgctgc aactccatag ctggctggcc atactattat cacacacatc caactgagct 720
ccccccacca aaggaacagt ttgagatcta tggggatgga agcgttaaag ccttttttcgt 780
tactggggac gatattggcg cgtataccat gaaagctgtg gatgaccctc gtactctgaa 840
caagtctatt catttcagac caccaaagaa ttttctcaac ttaaacgaac tcgcagacat 900
atgggagaat aagattaaca gaactctgcc aagagtatct gtctcagcag a 951

<210> 241
<211> 371
<212> DNA

<213>

<400> 241
tttagctgac atttattaa ttcaaagtgg caagatgaca ggtctcaagg actctgctaa 60
tagggttttg ataataggag gcacgggata cattgggaaa tacatggcaa aagccagcgt 120
ttcacagggc tatccaacct acgttcttgt ccgtcctgct acagcagctg cccctgattc 180
cttcaaagca aagctacttc agcaattcaa agatattggc attcatattc ttgaaggatc 240
attagatgat cacaacagcc ttgtggatgc aatcaagcaa gtagacatag taatatccgc 300
agttgccatt cctcagcatt tggatcagtt taatatcata aacgccatta aggatgttgg 360
aatggaaata t 371

<210> 242
<211> 687
<212> DNA
<213>

<400> 242
taatggcgag ctccacccgt ctcactactg tgagagggac ctgctcaaag tggtcgaccg 60
cgagcatgtg ttcacctacg ctgatgacgc ctgcagcgcc acctacccgc tgatgcagaa 120
gctgaggcaa gtcctggtcg accaggcact ggtgaatggc gagagcgagc tgaacccgag 180
cacttcgatc ttccaaaaga tcgtggcctt cgaggaggag ctcaaggccc agttgccgaa 240
ggacgtcgag ggcgttcgag tccagtacga gacaggcaac ctcgccatcc ccaaccagat 300
caaggaatgc aggtcctatc cattgtacaa gctggtgagg gaggagctgg ggactgccct 360
gctcacgggc gagggcgtga tatcccctgg cgaggacttc gacaaggtct tcactgcgat 420
ctgtgctgga aaactgattg atccgctgct ggagtgccta agcggttgga acggtgctcc 480
tcttcccatc tcttaggaat tgtcctatat tctttctcct tctttttccc tttccgttac 540
ttgccaagta aatctcatgt atccaatctt ttctatcaag agacaattgt atttcttgtt 600
ttctgtttgg tcctttttgt ctcctcccaa gtgaagaaat tggagaatat aagtaattga 660
gtaaattttt acatggaaaa aaaaaaa 687

<210> 243
<211> 344
<212> DNA
<213>

<400> 243
tcctggtcga ccaggcactg gtgaatggcg agagcgagct gaacccgagc acttcgatct 60
tccaaaagat cgtggccttc gaggaggagc tcaaggccca gttgccgaag gacgtcgagg 120
gcgttcgagt ccagtacgag acaggaaacc tcgccatccc caaccagatc aaggaatgca 180
ggtcctatcc attgtacaag ctggtgaggg aggagctggg gactgccctg ctcacgggcg 240
agggcgtgat atcccctggc gaggacttcg acaaggtctt cactgcgatc tgtgctggaa 300
aactgattga tccgctgctg gagtgcctaa gcggttggaa cggt 344

<210> 244
<211> 681
<212> DNA
<213>

<400> 244
cccaagcctg gattacggct tcaagggagc tgagatcgcc atggcctcat actgctcgga 60
gctgcagttc cttgccaacc ctgtgaccaa ccatgtccag agcgcggagc aacacaacca 120
ggacgtgaac tccttgggcc tgatctcgtc gaggaagact gccgaggcca tcgatgtgct 180
gaagctcatg tcctccacct tcctggtcgc cctgtgccag gccatcgacc tgaggcacct 240
ggaagagaac ctcaagagcg tggtcaagaa cacggtgaac caagtggcca agaaggtcct 300
ctacgtcggg tccaacggcg agctccaccc gtcgcggttc agcgagaaag acctgatcaa 360
ggtggtcgac cgggagtacg tcttcgccta catcgatgac ccctgcagcg ccacgtaccc 420

cctgatgcag aaactgaggc aggtcctcgt ggacgatgcg ctggacgacg tcgaccggga 480
gaagaacccc agcacctcca tcttccagaa gattggggct ttcgaggagg agctcaaggc 540
actcctcccg aaggaggtcg agaacgcgag agctcagttc gagagcggga actcggcgat 600
cgctaacaag atcagggggt gcaggtcgta cccattgtac aggttcgtga gggaagagct 660
cgggaccggt ttgctcacgg g 681

<210> 245
<211> 1455
<212> DNA
<213>

<400> 245
tttgcaatcc tctgaatttt ccctaactag aaataaagag attatataca tacacgagca 60
aagcgctctc ctccagttgt cttccttcgt tcgctcatct ctcctcgtac attattagca 120
tacgacctct tgtatcggac ccggatccgc tatcgttaac gtacacacgt tctagtgctg 180
aatggagatg gagagcacca ccggcaccgg caacggcctt cacagcctct gcgccgccgg 240
gagccaccat gccgacccac tgaactgggg ggcggcggca gcagccctca cagggagcca 300
cctcgacgag gtgaagcgga tggtcgagga gtaccggagg ccggcggtgc gcctcggcgg 360
ggagtccctc acgatagccc aggtggcggc ggtggcgagt caggaggggg taggggtcga 420
gctctcggag gcggcccgtc ccagggtcaa ggccagcagc gactgggtca tggagagcat 480
gaacaaggga actgacagct acggggtcac caccgggttc ggcgccactt ctcaccggag 540
gacgaagcaa ggcggtgctt tgcagaagga acttataagg ttcttgaatg ccgggatctt 600
cggcaacggc acggagtcgt gccacaccct gcctcaatcc tccacccgag ccgccatgct 660
cgtccgggtc aacaccctcc tccagggcta ctccggcatc cgttttgaga tcctcgaggc 720
catcaccaag ttcctcaacc acaacatcac cccgtgcctg cccctcaggg gcaccatcac 780
tgcctcaggc gacttggtcc ccctctccta cattgccggg ctcctgacgg gccggcccaa 840
ctccaaggcc gtcgggcctg atgggaagtc cctggacgct gtcgaggcct tccggctcgc 900
cgggattgac acgggcttct tcgagctgca gccaaaggaa gggttggcgc tcgtgaacgg 960
cacggcagtc gggtctggcc tggcttccat cgtcctcttc gaggccaaca tactcgcggt 1020
cctgtccgag gtcctgtcag cgatcttcgc agaggtgatg caggggaagc cggagttcac 1080
agaccacttg acgcataaat tgaagcacca tcccgggcag attgagtctg cggctataat 1140
ggagcacatt ttggatggaa gcgcttacgt gaaggctgct aaaaagttgc acgagatgga 1200
tccgctccag aagccaaagc aggacaggta cgctctcagg acttctcccc agtggctagg 1260
gccccagatt gaggtgatcc gagcggcaac caagatgatt gagagggaaa tcaattcggt 1320
caatgacaac ccgctgatcg atgtcgcgag gaacaaggcc ctgcacggtg ggaacttcca 1380
ggggaccccg attggtgtct ccatggacaa cactcgcctg gcggttgcgt ccatagggaa 1440
gctcatgttc gcgca 1455

<210> 246
<211> 294
<212> DNA
<213>

<400> 246
caacagtggc atcacgccgt gcttgccgct ccgcggctcg atctccgcct ctggtgactt 60
ggtacccttt tcctacatcg cgggtctttt gacgggacgt cccaattcca aagcggtcgg 120
acccgctggg gagaccctca cggccaaaca agcctttgag ctcgctggga tcagtggtgg 180
attcttcgag ttgcagccga aggaaggact tgcccttgtg aatgggacgg gagttgggtc 240
tgccttagct gccatagtgc tttttgaagc taatatgctc actgtcctct caga 294

<210> 247
<211> 1520
<212> DNA
<213>

<400> 247

```
gtgatctggt tcccctgtct tatattgctg ggctcttgac cgggaggcct aattccagag     60
tcagatccag agatggaatt gaaatgagcg gagccgaagc gctcaagaaa gtgggcctgg    120
aaaagccctt tgaattgcag cctaaagaag gtctggccat tgtcaatggc acttcagtgg    180
gagcagcact ggcttccatt gtgtgtttcg atgccaatgt tcttgctctg ctctctgaag    240
taatctctgc catgttctgc gaggttatga atgggaagcc tgagtttaca gatccattaa    300
ctcacaagct gaagcaccat cctggccaaa tggaagctgc agcgatcatg gagtatgtct    360
tggacgggag tcttatatga aacacgctgc taagctccat gagatgaatc ctctgcagaa    420
gccaaagcag gatcgctatg cgcttcgcac ttcgcctcag tggctcggcc ctcaggtgga    480
gattatcaga tctgcaactc acatgattga gcgggaaatc aattctgtga atgacaatcc    540
agtaattgat gttgccagag acaaagctct acatggaggg aatttccagg gcacacctat    600
tggtgtttcc atggataatc ttcgtctgtc aatttcagca attgggaaat tgatgttcgc    660
tcaattctca gagcttgtga atgattacta caatggaggc ttgccttcga atctgagtgg    720
tgggcctaat cccagcctgg attatggact gaaaggggcc gagatcgcta tggcttctta    780
cacttctgag cttctttacc tggcaaatcc tgtcaccagc catgtacaga gcgccgaaca    840
gcataaccag gatgtcaatt ctctgggtct cgtttcagct agaaaatctg ccgaggccat    900
cgatattctg aagctgatgc tctccacata cctgacagct ctgtgccagg ctgtggattt    960
aaggcatctg gaggaaaaca tgctggccac tgtgaagcag attgtttctc aggtagccaa   1020
gaaaaccctg agcacagggc tcaacgggga gcttttgcca ggccgtttct gcgaaaagga   1080
tttgctccag gtagtggata acgaacatgt tttctcttac attgacgatc cgtgcaatgc   1140
cagctaccca ttgactcaga aactgagaaa catcctggtg gaacatgcct tcaagaacgc   1200
agaaggtgag aaggatccca acacttccat tttcaataag attcctgtgt ttgaagccga   1260
gctgaaggca cagcttgaac cgcaagttag tctggccaga gaaagttatg acaaagggac   1320
cagccctctg cccaacagga tccaggaatg caggtcttat cctctctatg aatttgtgag   1380
aaaccagctc ggtacccttc aggcatggtt attccatata aatattgtaa tgagatgttt   1440
aattatttac tgctctcttt tttttccgga gcttgcgacc gccttcgatt ccgtgcacta   1500
cgcgaggacg aagcctctgt                                                1520
```

<210> 248
<211> 449
<212> DNA
<213>

<400> 248

```
ctctcattct gaggttcatc tggctgaagt ttgaactgtg ctcgaattct gaggttcatc     60
gtgcagaagt ttgattcgtg aattatttgt ttgtttaatt atagtgcaca tggcgcctca    120
ggaattcaca ggcgaagtga aattctgtgc gggaaatggc ggtacggcgt ctttgaacga    180
tccgctgaat tgggcagccg cagcggagtc catgaaggga tctcacttcg aggaagttaa    240
acgaatgtgg gaggagtttc gttctccagt tgtgaggctc cagggatccg gtctcacgat    300
tgcccaggtg gcagccgtgg ccaggagaac gggatccgtg agagtcgaac ttgagaccgg    360
cgcgaaggcg cgggtagatg agagcagtaa ttgggtgatg gacagtatgg cgaacgggac    420
ggatagctat ggcgttacga cggggttcg                                      449
```

<210> 249
<211> 512
<212> DNA
<213>

<400> 249

```
gaacttggtg aagttaggaa gtatactagg catggccatc ggtgttgcac tcttcagctc     60
gcttcttgta ctttcatttg tctctccaat ctcttcacta agttccaatt actacgacaa    120
gacctgtccc aatgctgagt tgatcgtcgc aaatgctgtc aagaatgcgg caatgaagga    180
caaaaccgtt ccggctgctc ttctgcggat gcattttcac gactgtttca ttaggggttg    240
cgatgcgtcg gtgcttttaa actccaaagg aagcaacaaa gcggagaagg atggacctcc    300
taatgtctct ctgcactcat tttttgtaat cgacaatgcc aaaaaggagt tggaagcttc    360
ttgccccggc gtggtttcat gtgcggacat cttggcacta gctgctagag attccgtcgt    420
actgtccgga ggtccgactt gggatgtgcc caagggaagg aaggatggaa gaacatcaaa    480
```

agccagcgag acgactcaac tcccagcacc ac 512

<210> 250
<211> 354
<212> DNA
<213>

<400> 250
ctggtaatca ccatagttgt cttctttggg cacataggag actcagaagg aggggacttg 60
aggaagaatt tctacaagag cgcatgtcct cttgctgagg aaatagtgaa gaatgtcacg 120
tggaagcatg ccgccagtaa ctcagctttg cccgccaagt tcctgaggat gcatttccac 180
gattgcttcg ttaggggttg cgatggctca gttttgctag actcgacggc gaacaacaag 240
gcggagaagg tggcggttcc gaaccagtcg ctaaccgggt tcgacgtaat agacgagatc 300
aaggagaagc tggaggaaac atgccctggg gtcgtctctt gtgccgacat cctg 354

<210> 251
<211> 195
<212> DNA
<213>

<400> 251
aacgctgacc ctatcgcggt tatagacgaa gcactcagca ctggtggtgc gcccaatttg 60
tcggatgcat ataccctaaa tggacagcca ggagacctgt ataactgctc tagggcagga 120
acattccggt ttctggtcaa acaaggagaa acttaccttc tacggatggt caatgctgca 180
ctcaatagtg cccac 195

<210> 252
<211> 377
<212> DNA
<213>

<400> 252
ccaaacccca tggagaaact ccgctcataa taggagaatg gtggaacgct gaccctattg 60
cggttataga tgaagcactc cgcactggtg gtgcgcccaa tttgtcggat gcatataccc 120
taaatggaca gccaggagac ctgtataact gctctagggc aggaacattt cggtttcctg 180
taaaacaagg agaaacttac cttctccgga tggtcaatgc tgcactcaat agtgcccact 240
ttttcaagat cgcaggccac aaatttacag tagtagctgt ggatgcttcc tacaccaagc 300
catacaaaca gatgtaatcg ccattgctcc cggtcagact actgatgttc tcgtcacggc 360
cgaccaacct gtgggca 377

<210> 253
<211> 387
<212> DNA
<213>

<400> 253
gatgcccaca ccattaatgg aaagccaggg ccactcttca aatgccctac caaagatact 60
tttgtggttc cagtggaaca tgggaagact taccttcttc gaatcatcaa cgcagctctc 120
aatgacgagc tctttttgga tgttgcaaac catcatctga aagtggtgga gattgacgca 180
gtatacacaa agccactaat aacgaactca atagtaattg ctccaggcca gaccacaaat 240
gccttgatcc acaccaacaa aaggagtggc aggtatttca tggctgctcg ctcattcatg 300
gacgcgcccg tctccgtcga caataaaacc gccacagcca ttttgcagta cgtcaattca 360
atacaaattc tgttataatg cccagca 387

<210> 254
<211> 534

<212> DNA
<213>

<400> 254
aacatgatgg cgcccatggc cggagcagag tacggaataa agctgattat tcagttgctt 60
gttgtactac ttgctgttca acttgttgca gggaaaacga ccagacatta ctcattccat 120
gtgaggttga agaacgttac tcgtctctgc cacacaaagc cattgattac agtcaatggg 180
aaatctcctg gacctaaagt agtcgtccgt gagggagata gagtcatcat caaagttcat 240
aatcatgtta gcaataatgt ctcaattcac tggcatggag ttcgacaatt gaggtctggt 300
tgggcagatg gccctgctta cataacccaa tgcccaattc aaacgggaca gacttatgtt 360
tataacttca ctgtcacagg acagaggga actctctggt ggcacgctca catctcttgg 420
ctaagagcga gcgtatatgg cgctttcatc atctatccta aacgccatgt tccttatcca 480
tttccaaagc catacaaaga agtccctctg attctcgggg aatggtggaa tgca 534

<210> 255
<211> 1076
<212> DNA
<213>

<400> 255
gcccaattcc accaggtggt cgttacacat atagattcaa catctctggt caagaaggaa 60
cggtttggtg gcatgcccat tactcatggc tccgagctac tgtgcatgga gcttttgtaa 120
tccttcctaa gaaaggaagc tcatatccct tttctaaacc gcatgctgaa attcctatta 180
taataggtga atggtggaac gctaacccca tcgccgttat agacgaagcg gttcgcacag 240
gtggtgcgcc taatttatcc gatgccttca ccataaatgg acagccagga gatctgttta 300
actgctctac ctcgggaaca tttcgcctcc ctgtagaaag cggagaaacg taccttctgc 360
ggattgtgaa tgctgcactc aatagcgggc actttttcaa gatagcaggc cacgaattta 420
cagtggtagc tgtggatgct tgttacacca agccatacaa aacagatgta ctcgtcatat 480
ctgccggcca gacgacagat gttcttatca cggccaacca gtctgtgggc agatactata 540
tggccgcccg agcgtatcaa aatcaggcgg caggcgattt cactaacacc acaacaactg 600
ccattctaga gtacattgga agtgaaaatt ctactcgccc aattttgcct agccttccag 660
cctacaacga cactgccact gtcactagat ttagcagagc actgcgaagt ctggcatccc 720
aggagcaccc tgtgaatgtt ccgcacacaa tagatgaaag cctcatctca actgttggac 780
tggggctact tccgtgtggc gctgggaata cctgtgaagg tcccaacgga acgaggctga 840
gtgcaagtat caacaacata tcgtatgtag agcccacgat ctcgttgctt caagcatatt 900
attacactgc caatggtatc tttacggggg attttccatc aaaacctgaa gttagattca 960
actacacggg ggacgatata ccccgaaaat tttgggctcc ggaccccgca acaaaagtga 1020
aggtgctcga atacaactcc acagtgcagc tcgtttttca gtcaacaaac atcttc 1076

<210> 256
<211> 483
<212> DNA
<213>

<400> 256
atttcgcagg gaaactgtaa tacagcatat ttcaagaagc tttctttcga aaatggtgat 60
ctcaaaatat gcagcagcga tgtcgtgctt gctcatcgca gtagttgcat tagaggttgg 120
ggcagaaacg agacattaca aatttgacat aaaattcaag aacgttactc gtttatgcca 180
cacaaagccg atagttacag cgaatggcaa gttcccaggc ccaacaatat atgcacgaga 240
aggagacaca gtcactgtga aagtaaccaa tcacgtgaca tacaacgtgt ccatacactg 300
gcacgggata aggcagttgc ggactgggtg ggctgatggg cctgcttata ttacgcagtg 360
ccccattcaa acaggccaaa cttatgtata taactttaca atcacagggc agcgaggcac 420
acttttctgg cacgctcaca ttctctggtt acgtgcaaca ttgaatgggc ccatcgtcat 480
tct 483

<210> 257

<211> 470
<212> DNA
<213>

<400> 257
ggttgttgtt taagtacaag gatgaacatg tcgagatcaa aggcgttgct ctgcccttcc 60
ccagctcatg tgaagtacgt gctaattgtc atcctgttga ttattatgat tcagtgcccg 120
gatatagtag caggaaagca tgcgcagaca accaggcatt acaagttcaa cgtgaggcta 180
agcaatgtga cacgtctttg ccgcacgaaa cctttgatta cagtgaatgg aaagtatcca 240
ggacctacag ttgttgctcg cgagggagat cgggtaatta taaaacttgt aaaccacgtg 300
aaggacaacg tcactattca ctggcatggc gttcgacagc tgagatcggg atgggcggat 360
ggtcctggtt atatcactca atgtccactt caaaccggaa tgagttacgt ttataatttc 420
accatcgtag ggcagagagg aactctatgg tggcacgcac acatttcttg 470

<210> 258
<211> 472
<212> DNA
<213>

<400> 258
agttatccag caggctcttc aaacaggagg tggtccaaat gtatctgatg cctatactat 60
aaatggactt cctggaccac tttacaactg ttccaatgag acatttgttt tgaaagtgca 120
tcctggacaa acatatcttc ttcgtatcat caatgctgca ctcaatgatg aactcttcct 180
tgccattgca aatcacagtt taacagttgt ggaggtggat gcagtgtatg tcaagccttt 240
ccagacagat actcttctta taaccccagg gcagactacc aatgttttac ttactgctaa 300
tgctactagt ggtaaaaata aacaatttgt catagctgct agtccttttg ttaccggttc 360
agggacattt gataattcca ctgttgcagg aattgtgagt tataattctc ataagtttaa 420
aaattcttcc accattattc tgccaaaact cccatccttc aatgatacaa at 472

<210> 259
<211> 405
<212> DNA
<213>

<400> 259
caggacaaac cacgaatgtt ttgctcgagg ctaacaaaag atctggaagt tatttcgtgg 60
ctgctcggcc attcatggat gcacctgtga cagtgaacaa caagaccgca actgccattt 120
tgcactacat cggcaggaat tctgaatcag atattcccgc cgttaatcct ctcatgccac 180
gacttcctct cctcaacgac actgcgtttg caacgagttt cacctccaag ctcagaagct 240
tgaattctgt tcagtttccc gcaaaagtcc cgcagacaat agatcgcaat ctcttcttcg 300
cagtggggct tgcgacggag tcttgtcaga cctgtaacgg tggcctccgt gcttccgcat 360
caatcaacaa cataagcttc gtcatgccca gcatttctct tctgg 405

<210> 260
<211> 1352
<212> DNA
<213>

<400> 260
acaccactta tccctttacc tttaccaggc cgcatcgcca gattcccatt cttctaggag 60
aatggtggaa taggaatccc atggacgttg tgaatcaagc aacccaaaca ggagctgccc 120
ccaacgtttc agatgcattt actataaatg gacaaccagg cgacctatac aaatgttcta 180
cttcagatac ctttagcgtg tcgatgaaag gtggggaaac taatcttcta cgtgttatca 240
acgctgcact caatactgac ctattcttct ccattgctag ccacacaatg acagttgtcg 300
ctgtggatgc cttgtataca aaacctttc agacgaatgt tctgatgctc ggccccggcc 360
agacaacaga catacttctc actgccaatc aggctacagg tagatactac atggctgctc 420

gagcatattc cagcgggcaa ggagttccct tcgataacac cactaccact gccattttag 480
aatacgaggg aagctctaag acttcaactc cagtcatgcc taatcttcca ttctataacg 540
acaccaacag tgctactagc ttcgctaatg gtcttagaag cttgggctca cacgaccacc 600
cagtcttcgt tcctcagagt gtggaggaga atctgttcta caccatcggt ttggggttga 660
tcaaatgtcc ggggcagtct tgtggaggtc ccaacggatc aagatttgca gcaagtatga 720
ataacatatc atttgtcccg ccaaccactt cttccatcct tcaagctcag cattttggca 780
tgaaaggagt attctccgcg gacttccccg ataacccttc cgtgggattt gattataccg 840
cacagaacat cagcagagac ctctggtccc ctgtgaaagc cacaagagtg aaagttctta 900
aatataactc gacggtgcaa gtaattcttc aaggaaccaa tatatttgcg ggtgaaagcc 960
atcctatcca tctccatggt tatgacttct acatcgtggg agcaggcttt ggcaattata 1020
acgcacaaac cgatcctcac aagttcaacc tggtggatcc tcctatgcgc aacactgtga 1080
acgttccagt caatggctgg gctgcaataa gattcgtggc tgacaatcct ggagcttggg 1140
tgatgcactg ccacttggac gtgcacataa catggggatt ggccatggtg tttgtggtta 1200
acaatggacc tgacgctctt ttgagtctcc agtcacctcc cagagatctt ccgctatgct 1260
gaggaaaact gtgatgcata gcgatcctct attggtccca cttcattctt tttccttctc 1320
gtcactttgc tccttccatc gtttatgtct at 1352

<210> 261
<211> 337
<212> DNA
<213>

<400> 261
ttcttaacta taacgcgaca gttcaagtaa ttctccaggg aacaaatata tttgctggtg 60
aaagccatcc tatccatctc catggttatg acttttacat cgtgggagca gggtttggta 120
attataatgc acaaacagat cctcagaagt tcaacctggt ggatcctcct atgcgcaaca 180
ctgtgaacgt tccagtcaat ggctgggctg ccataagatt cgttgctgac aatcctggag 240
cttgggtgat gcactgccac ttagacgtgc acataacatg gggttggcg atggtttttg 300
tggttaacaa tggacctgat cctcttttga gtctcca 337

<210> 262
<211> 279
<212> DNA
<213>

<400> 262
acaagagtga aagttcttaa ttataacaca acggtgcaag taattcttca aggaacaaat 60
atatttgcgg gtgaaagcca tcctattcat ctccatggtt atgacttcta catagtggga 120
gcaggatttg gcaattataa tccacaaacc gatcctcaaa agttcaacct ggcggatcct 180
cctatgcgca acactgtaaa cgttccagtt aatggctggg ctgcaataag attcgtggcc 240
gacaatcctg gcgcttgggt gatgcactgc cacttggac 279

<210> 263
<211> 279
<212> DNA
<213>

<400> 263
aaaacctttt cagacgaatg ttctgatgct cggccccggc cagacaacag acatagcggc 60
cgcgtcgacc aacttgcaga tacctttagc gtgtcgatga aaggtgggga aactaatctt 120
ctacgtgtta tcaacgctgc actcaatact gacctattct tctccattgc tagccacaca 180
atgacagttg tcgctgtgga tgccttgtat acaaaacctt ttcagacgaa tgttctgatg 240
ctcggccccg gccagacaac agacatagcg gccgcgaat 279

<210> 264
<211> 474

<212> DNA
<213>

<400> 264
```
ccctgactct acaatcaata cgtcgttcct gcaacagtta caagggcagt gtcctcgggc      60
tggtggagac gagttgcctt cgtctcttga ctacgtaacg ccagcccgtt ttgataacac     120
ttactttgcc aacttgaagc agcagaaggg tgttctgcac tctgatcgca cgctatacga     180
tcccgcagcc tcagggtctg taactagcag tacagttgat catttctctt ctgatcagac     240
tgctttcttc gaaagcttca aaggagccat gatcaaaatg gggaacctca gcccttcggc     300
cggaacgcaa ggagaaatcc ggcgggactg cagaaaagta aattagagag ctcctagcct     360
tcatccagag gcatcaacca tgaggataag ttggataaat tatcttgtct taatatcagg     420
ttggatttag tggtataata tcgggttgga tttagtggta aaaaaaaaaa aaaa           474
```

<210> 265
<211> 1790
<212> DNA
<213>

<400> 265
```
ggcacgaggc aaacttggtc gtttgtttag gttttgctgc aggtgaacac taatatggaa      60
ggccagattg cagcattaag caaagaagat gagttcattt ttcacagccc ttttcctgca     120
gtacctgttc cagagaatat aagtcttttc cagtttgttc tggaaggtgc tgagaaatac     180
cgtgataagg tggccctcgt ggaggcctcc acagggaagg agtacaacta tggtcaggtg     240
atttcgctca caaggaatgt tgcagctggg ctcgtggaca aaggcattca aaagggcgat     300
gttgtatttg ttctgcttcc aaatatggca gaatacccca ttattgtgct gggaataatg     360
ttggccggcg cagtgttttc tggggcaaat ccttctgcac acatcaatga agttgaaaaa     420
catatccagg attctggagc aaagattgtt gtgacagttg ggtctgctta tgagaaggtg     480
aggcaagtga aactgcctgt tattattgca gataacgagc atgtcatgaa cacaattcca     540
ttgcaggaaa tttttgagag aaactatgag gccgcagggc cttttgtaca aatttgtcag     600
gatgatctgt gtgcactccc ttattcctct ggcaccacag ggcctctaa aggtgtcatg       660
ctcactcaca gaaatctgat tgcaaatctg tgctctagct tgtttgatgt ccatgaatct     720
cttgtaggaa atttcaccac gttggggctg atgccattct ttcacatata tggcatcacg     780
ggcatctgtt gcgccactct tcgcaacgga ggcaaggtcg tggtcatgtc cagattcgat     840
ctccgacact ttatcagttc tttgattact tatgaggtca acttcgcgcc tattgtcccg     900
cctataatgc tctccctcgt taaaaatcct atcgttaacg agttcgatct cagccgcttg     960
aaactcaaag ctgtcatgac tgcggctgct ccactggcgc cggatctact gcgagcgttc    1020
gaggaaaaat tccctggggt tgaggttcaa gaggcctatg gtcttacgga acacagttgc    1080
atcacattga ctcattgcgc tcccggaaac atacgtggga gagccaagaa gagttcggtt    1140
ggttttatta ttcccaatct ggaggtgaag tttattgatc ccgaaactgg aaagtcattg    1200
cccaggaatt ccatcgggga ggtgtgcgtc agaagccaat gtgtcatgcg agggtattac    1260
aagaaaccga cagaaaccga gaaaacagtg gacagcgacg gctggctgca tactggggat    1320
gtcggtttca tagatgatga cgacgacgta ttcatcgtcg acagaattaa agagctgatc    1380
aaatacaaag gttttcaggt tgctcctgca gaactggaag ccattctact ttctcatcca    1440
tcagtggaag acgcagcagt ggttccttta cctgatgagg aagcagggga gattccagcg    1500
gcgtgcgtgg tgatggcagc cagtgctacg gagacggagg acgacatttc gaagtttgtg    1560
gcgtcgcagg tggctacata caagagggtg agactggtga agtttgtgtc caccattcct    1620
aaatcttctt ccggaaagat cctgcgcaga cttctgagag ataatctccg tgaaacgctc    1680
aaaaaccagc accaaccatt gtccacttag gctttgcagc gttatatata aataaataat    1740
caaacatcta gggatgggat tatagcccca taacatacat tttgaaattc               1790
```

<210> 266
<211> 2043
<212> DNA
<213>

<400> 266

```
gcgccaccac caaacgctca ccttctcatc atcagccctc tgtctctgtc tctgtctctc      60
gattctccgc cccgccacga caatggaggc gaagccgtcg gagcagcccc gcgagttcat     120
cttccggtcg aagctccccg acatctacat tcccgacaac ctctccctcc acgcctactg     180
cttcgagaac atctccgagt tcgccgaccg cccctgcgtc atcaacgggg ccaccggccg     240
gacctacacc tatgccgagg tcgagctgat ctcccgccgg gtctcagccg gcctcaacgg     300
gctcggcgtc ggacagggcg acgtgatcat gctgctcctc cagaactgcc ctgagttcgt     360
gttcgcgttc ctcggcgcgt cctaccgggg cgccatcagc acgaccgcga acccgttcta     420
caccccgggc gagatcgcca agcaggcctc agctgcccgg gccaagatcg tgatcacgca     480
ggccgcgttc gccgacaagg tgaggccgtt cgcggaggag aacggggtga aggtcgtgtg     540
catcgatacc gcgccggagg gctgcctgca cttctcggaa ttgatgcagg cggacgagaa     600
cgccgccccc gcggcggacg tcaagccgga cgacgtcttg gcgctcccct attcgtcggg     660
cacgacgggg cttcccaagg gagtgatgct tacgcacagg ggtcaagtga ccagcgtggc     720
gcagcaggtc gacggagaca accccaactt gtacttccac aaggaggacg tgatcctgtg     780
cacgctcccg ttgttccaca tatactccct caactcggtg atgttctgcg cgctccgtgt     840
cggcgccgcc atcctgatca tgcagaagtt cgagatcgtg gcgctgatgg agctcgtgca     900
gcggtaccgg gtgacgatcc tgcccattgt cccgccgatc gtgctggaga tcgccaagag     960
cgccgaggtg gaccggtacg acctgtcgtc gatccggacc atcatgtcgg gtgcggcccc    1020
gatggggaag gagctcgagg acaccgtgcg agccaagctg cccaatgcca agctcggaca    1080
gggctatggg atgacggagg cgggcccggt gctggcaatg tgcccggcat ttgcaaagga    1140
gccgttcgag atcaagtcag gcgcatgcgg gaccgtcgtg aggaacgcgg agatgaagat    1200
cgtcgacccg gagacagggg cctcgctccc gcggaaccag gccggcgaga tctgcatccg    1260
gggtcaccag atcatgaaag gttatctgaa cgacgccgag gcgaccgcaa ataccataga    1320
caaagaaggg tggctgcaca ccggcgacat cggctacata gacgatgacg acgagctctt    1380
cattgtcgat cggttgaagg aactcatcaa gtacaagggc ttccaggttg ctccggccga    1440
gctagaggca atgctgattg cacacccaag tatctcggat gccgctgttg tgccgatgaa    1500
ggatgaggtt gccggtgagg ttcctgttgc attcgtggtg aaatccaatg gttccgtaat    1560
caccgaggac gaaatcaagc aatacatctc gaagcaggtc gtgttttaca agaggatcaa    1620
gcgggttttc ttcacggacg caattccgaa agccccctcc ggaaaaatct tgaggaagga    1680
cctaagagca aagttggcct ctggtgttta caattaattt ctcataccct tttctttttc    1740
aaccctgccc ctgtacttgc ttaaagaccc atgtagttga aatgaatgta acctcttcgg    1800
aggggccaaa tatggaaggg ggaaagaaag acatatggcg atgatttgat ttcacatgct    1860
attgtaatgt atttattgtt tcaattccga attagacaaa gtgcttaaag ctctcttttc    1920
ggattttttt tttcattaat gtataataat tgcggacatt acaatatact gtacaacgtg    1980
atttgagctt gatgaattac aagattggaa gaacttcgaa gacaaaaaaa aaaaaaaaaa    2040
aaa                                                                  2043
```

<210> 267
<211> 92
<212> PRT
<213>

<400> 267

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

<210> 268
<211> 182

<212> PRT
<213>

<400> 268
Leu Leu His Gln Phe Val Tyr Ser Phe Arg Lys Met Gly Tyr Pro Val
1   5   10   15
Gln Glu Val Ser Lys Glu His Asp Gln Trp Ala Gly Phe Val Glu Gly
            20   25   30
Glu Ser Val Leu Gln Arg Gly Arg Glu Ile Leu Leu Gln Gly Phe Asn
        35   40   45
Trp Glu Ser His Lys Tyr Lys Trp Trp Pro Asn Leu Glu Glu Lys Ile
    50   55   60
Pro His Ile Ala Lys Ala Gly Phe Thr Ser Val Trp Leu Pro Pro Ala
65   70   75   80
Phe Asp Ser Ala Ala Pro Gln Gly Tyr Leu Pro Arg Asn Ile Tyr Ser
                85   90   95
Leu Asn Ser Ala Tyr Gly Ser Glu Tyr Gln Leu Lys Ser Leu Leu Met
            100   105   110
Thr Met Arg Lys Lys Asn Val Arg Ala Met Ala Asp Ile Val Ile Asn
        115   120   125
His Arg Met Gly Ser Ser Gln Gly Phe Gly Gly Leu Tyr Asn Arg Tyr
    130   135   140
Tyr Gly Cys Leu Pro Trp Asp Glu Arg Ala Val Thr Arg Cys Ser Gly
145   150   155   160
Gly Leu Gly Asn Trp Ser Thr Gly Asp Asn Phe His Gly Val Pro Asn
                165   170   175
Val Asp His Thr Gln Asp
            180

<210> 269
<211> 218
<212> PRT
<213>

<400> 269
Arg Met Ala Lys Phe Arg Ser Leu Ser Leu Leu Leu Trp Phe Ser Cys
1   5   10   15
Ile Ile Val Asn Ala Ala Ser Pro Ala Gln Ala Glu Ala Thr Thr Pro
            20   25   30
Pro Leu Asn Thr Leu Leu Leu Gln Gly Phe Asn Trp Asp Ser Ala Gln
        35   40   45
Ser Ser Thr Pro Trp Tyr Asn Val Leu Lys Gly Ile Val Asp Asp Ala
    50   55   60
Ala Asp Ala Gly Ile Thr Tyr Val Trp Phe Pro Pro Pro Ser Gln Ser
65   70   75   80
Gly Ala Pro Gln Gly Tyr Leu Pro Ala Lys Leu Tyr Asp Leu Asp Ser
                85   90   95
Ser Tyr Gly Ser Glu Gln Gln Leu Lys Asp Ala Val Asn Ala Phe His
            100   105   110
Gln Lys Gly Ile Ala Ile Met Gly Asp Ile Val Ile Asn His Arg Asn
        115   120   125
Gly Thr Lys Gln Asp Asp Lys Gly Tyr Trp Cys Val Phe Glu Gly Gly
    130   135   140
Lys Gly Asp Gly Thr Leu Asp Trp Gly Pro Trp Ala Val Thr Val Lys
145   150   155   160
Asp Gln Pro Tyr Pro Leu Cys Gly Ser Gly Gln Ala Asp Thr Gly Gly

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

      <210> 270
      <211> 145
      <212> PRT
      <213>

      <400> 270
Gly Val Gly Arg Leu Val Asp Val Gly Gly Ser Ala Gly Asp Cys Leu
 1               5                  10                  15
Arg Met Ile Met Gly Lys His Thr His Val Arg Glu Gly Ile Asn Phe
            20                  25                  30
Asp Leu Pro Glu Val Val Ala Lys Ala Pro Pro Ile Pro Gly Val Thr
        35                  40                  45
His Val Gly Gly Asp Met Phe Lys Ser Ile Pro Ala Gly Asp Ala Ile
    50                  55                  60
Phe Met Arg Trp Ile Leu Thr Thr Trp Thr Asp Asp Glu Cys Lys Gln
65                  70                  75                  80
Ile Leu Glu Asn Cys Phe Lys Ala Leu Pro Ala Gly Gly Lys Leu Ile
                85                  90                  95
Ala Cys Glu Pro Val Leu Pro Gln His Ser Asp Asp Ser His Arg Thr
            100                 105                 110
Arg Ala Leu Leu Glu Gly Asp Ile Phe Val Met Thr Ile Tyr Arg Ala
        115                 120                 125
Lys Gly Lys His Arg Thr Glu Gln Glu Phe Gln Gln Leu Gly Leu Ser
    130                 135                 140
Thr
145

      <210> 271
      <211> 198
      <212> PRT
      <213>

      <400> 271
Pro Thr Met Ala Asp Asn Gln Glu Arg Glu Gly Arg Asp Gln Glu Glu
 1               5                  10                  15
Glu Val Gly Lys Leu Ala Val Gln Leu Ala Ser Ala Val Val Leu Pro
            20                  25                  30
Met Thr Leu Lys Ser Ala Leu Glu Leu Gly Ile Ile Asp Ala Leu Val
        35                  40                  45
Ser Ala Gly Gly Phe Leu Ser Ala Ala Glu Ile Ala Ser Arg Val Gly
    50                  55                  60
Ala Lys Asn Pro Gly Ala Pro Val Leu Val Asp Arg Met Met Arg Leu
65                  70                  75                  80
Leu Ala Ser His Gly Val Ile Glu Trp Arg Leu Arg Arg Gly Asp Gly
                85                  90                  95
Asn Gly Asp Gly Gly Glu Arg Glu Tyr Gly Pro Gly Pro Met Cys Arg
            100                 105                 110
Phe Phe Ala Lys Asp Gln Glu Gly Gly Asp Val Gly Pro Leu Phe Leu
```

```
        115                 120                 125
Leu Ile His Asp Lys Val Phe Met Glu Ser Trp Tyr His Leu Asn Asp
    130                 135                 140
Val Ile Met Glu Gly Gly Val Pro Phe Glu Arg Ala Tyr Gly Met Thr
145                 150                 155                 160
Ala Phe Glu Tyr Pro Ala Val Asp Asp Arg Phe Asn Gln Val Phe Asn
                165                 170                 175
Arg Ala Met Ala Ser His Thr Ser Leu Ile Met Lys Lys Ile Leu Asp
            180                 185                 190
Val Tyr Arg Gly Phe Glu
        195

      <210> 272
      <211> 156
      <212> PRT
      <213>

      <400> 272
Pro Thr Pro Leu Tyr Met Asn Lys Ile Leu Glu Ser Tyr Arg Gly Phe
 1               5                  10                  15
Glu Gly Ala Lys Thr Ile Ala Asp Leu Gly Gly Gly Val Gly Gln Asn
            20                  25                  30
Leu Arg Leu Ile Leu Asp Lys Phe Pro Asn Leu Arg Gly Ile Leu Tyr
        35                  40                  45
Asp Leu Pro His Val Ile Lys Asp Ala Pro Ala His Pro Arg Met Glu
    50                  55                  60
Arg Val Gly Gly Asp Leu Leu Lys Ser Val Pro Lys Ala Asp Ile Leu
65                  70                  75                  80
Phe Met Lys Trp Leu Phe His Gly Leu Arg Asp Asp Phe Cys Lys Met
                85                  90                  95
Leu Leu Gln Asn Cys Tyr Glu Ala Leu Pro Pro Asn Gly Lys Val Val
            100                 105                 110
Ile Val Asp Pro Ile Leu Pro Glu Tyr Pro Glu Thr Asp Ile Val Ser
        115                 120                 125
Arg Asn Ser Phe Thr Ser Asp Met Ile Met Leu Tyr Thr Ser Pro Gly
    130                 135                 140
Glu Asp Arg Thr Arg Lys Glu Leu Glu Val Leu Ala
145                 150                 155

      <210> 273
      <211> 166
      <212> PRT
      <213>

      <400> 273
Ser Ser Phe Gln Pro Cys Tyr Glu Glu Ala Asn Ser Leu Asp Arg Trp
 1               5                  10                  15
Ile Gln Pro Pro Ser Asp Leu Leu His Asn Met Ser Asp Lys Glu Leu
            20                  25                  30
Phe Trp Arg Ala Thr Leu Val Pro Lys Ile Lys Lys Tyr Pro Phe Arg
        35                  40                  45
Arg Val Pro Lys Ile Ala Phe Met Phe Leu Thr Lys Gly Pro Leu Pro
    50                  55                  60
Leu Ala Pro Leu Trp Glu Arg Phe Phe Lys Gly His Glu Gly Leu Tyr
65                  70                  75                  80
Ser Ile Tyr Ile His Ser His Pro Ser Phe His Ala His Phe His Pro
```

```
                85                  90                  95
Trp Ser Val Phe Asn Arg Arg Gln Ile Pro Ser Gln Val Ser Glu Trp
            100                 105                 110
Gly Arg Met Ser Met Cys Asp Ala Glu Lys Arg Leu Leu Ala Asn Ala
        115                 120                 125
Leu Leu Asp Ile Ser Asn Glu Arg Phe Ile Leu Leu Ser Glu Ser Cys
    130                 135                 140
Ile Pro Leu Tyr Asn Phe Ser Leu Ile Tyr His Tyr Ile Met Lys Ser
145                 150                 155                 160
Gly Tyr Ser Phe Met Gly
                165

    &lt;210&gt; 274
    &lt;211&gt; 328
    &lt;212&gt; PRT
    &lt;213&gt;

    &lt;400&gt; 274
Ile Leu Ser Arg Lys Pro Lys Glu Lys Thr Val Gly Arg Lys Asn Ile
 1               5                  10                  15
Lys Lys Asn Met Ser Ser Lys Glu Ala Pro Val Ile Thr Thr Ser His
            20                  25                  30
Glu Asp Glu Glu Ile Leu Asn Ala Phe Glu Val Pro Ser Met Ala Phe
        35                  40                  45
Val Pro Met Val Leu Lys Gly Val His Glu Leu Gly Ile Leu Glu Leu
    50                  55                  60
Leu Ala Lys Gly Asp Gln Leu Ser Pro Leu Asp Ile Val Ala Arg Leu
65                  70                  75                  80
Ser Ile Asp Asn Pro Ala Ala Pro Asp Thr Ile Asp Arg Met Leu Arg
                85                  90                  95
Leu Leu Ala Ser Tyr Ser Ile Leu Ser Cys Thr Leu Val Glu Asp Lys
            100                 105                 110
Glu Gly Arg Pro Gln Arg Leu Tyr Gly Leu Gly Pro Arg Ser Lys Phe
        115                 120                 125
Phe Leu Asp Gln Asn Gly Ala Ser Thr Leu Pro Thr His Met Leu Leu
    130                 135                 140
Gln Glu Lys Thr Leu Leu Glu Cys Trp Asn Cys Leu Lys Asp Ala Val
145                 150                 155                 160
Lys Glu Gly Gly Ala Asp Pro Phe Thr Arg Arg His Gly Met Asn Val
                165                 170                 175
Phe Asp Tyr Met Gly Gln Asp Pro Arg Phe Asn Asp Leu Tyr Asn Lys
            180                 185                 190
Ser Met Arg Thr Gly Ser Ala Ile Tyr Met Pro Lys Ile Ala Gln His
        195                 200                 205
Tyr Arg Gly Phe Ser Lys Ala Lys Thr Val Val Asn Val Gly Gly Gly
    210                 215                 220
Ile Gly Glu Thr Leu Lys Thr Ile Leu Ser Lys Asn Pro His Ile Arg
225                 230                 235                 240
Ala Ile Asn Tyr Asp Leu Pro His Val Ile Ala Thr Ala Pro Pro Ile
                245                 250                 255
Pro Gly Ile Thr His Val Gly Gly Asp Ile Leu Lys Ser Val Pro Lys
            260                 265                 270
Ala Asp Val His Phe Leu Lys Ser Val Leu His Arg Gly Asp Asp Glu
        275                 280                 285
Phe Cys Val Lys Val Leu Lys Asn Cys Trp Glu Ala Leu Pro Pro Thr
    290                 295                 300
Gly Lys Val Val Ile Val Glu Glu Val Thr Pro Glu Tyr Pro Gly Thr
```

305 310 315 320
Asp Asp Val Ser Gln Thr Thr Leu
325

<210> 275
<211> 160
<212> PRT
<213>

<400> 275
Asp Val Gly Gly Gly Ile Gly Ser Ala Leu Ser Ile Ile Val Lys Glu
1 5 10 15
His Pro His Ile Arg Gly Ile Asn Leu Asp Leu Pro His Val Ile Ala
20 25 30
Thr Ala Pro Leu Ile Thr Gly Val Glu His Met Glu Gly Asn Met Phe
35 40 45
Glu His Ile Pro Ser Ala Asp Ala Val Met Met Lys Trp Ile Leu His
50 55 60
Asp Trp Ala Asp Glu Glu Cys Val Lys Leu Leu Arg Arg Ser Tyr Asp
65 70 75 80
Ala Thr Pro Ala Lys Gly Lys Val Leu Ile Val Glu Ala Val Val Glu
85 90 95
Gly Asp Lys Glu Gly Glu Ser Met Ser Arg Arg Leu Gly Leu Leu Tyr
100 105 110
Asp Ile Ser Met Met Ala Tyr Thr Thr Gly Gly Lys Glu Arg Thr Glu
115 120 125
Glu Glu Phe Lys Gly Leu Phe Gln Arg Ala Gly Phe Lys Ser His Thr
130 135 140
Ile Ile Lys Leu Pro Phe Leu Gln Ser Leu Ile Val Leu Ser Lys Ala
145 150 155 160

<210> 276
<211> 112
<212> PRT
<213>

<400> 276
Ser Leu Arg Thr Tyr Ser Asn Met Glu Gln Gly Trp Asp Lys Gly Glu
1 5 10 15
Ile Leu Ala Ser Lys Ala Leu Ser Lys Tyr Ile Leu Glu Thr Asn Ala
20 25 30
Tyr Pro Arg Glu His Glu Gln Leu Lys Glu Leu Arg Glu Ala Thr Val
35 40 45
Gln Lys Tyr Gln Ile Arg Ser Ile Met Asn Val Pro Val Asp Glu Gly
50 55 60
Gln Leu Ile Ser Met Met Leu Lys Leu Met Asn Ala Lys Lys Thr Ile
65 70 75 80
Glu Ile Gly Val Phe Thr Gly Tyr Ser Leu Leu Thr Thr Ala Leu Ala
85 90 95
Leu Pro Ala Asp Gly Lys Ile Ile Ala Ile Asp Gln Asp Lys Glu Ala
100 105 110

<210> 277
<211> 133
<212> PRT
<213>

<400> 277
Arg Thr Tyr Ser Asp Met Glu Arg Gly Gly Asp Lys Gly Glu Ile Leu
1 5 10 15
Ala Ser Lys Ala Leu Ser Lys Tyr Ile Leu Glu Thr Asn Ala Tyr Pro
20 25 30
Arg Glu His Glu Gln Leu Lys Glu Leu Arg Glu Ala Thr Val Gln Lys
35 40 45
Tyr Gln Met Arg Ser Ile Met Ser Val Pro Ala Asp Glu Gly Gln Leu
50 55 60
Ile Ser Met Met Leu Lys Leu Met Asn Ala Lys Lys Thr Ile Glu Ile
65 70 75 80
Gly Val Phe Thr Gly Tyr Ser Leu Leu Thr Thr Ala Leu Ala Leu Pro
85 90 95
Ala Asp Gly Lys Ile Ile Ala Ile Asp Pro Asp Lys Glu Ala Tyr Glu
100 105 110
Ile Gly Leu Pro Tyr Ile Lys Lys Ala Gly Val Asp His Lys Ile Asn
115 120 125
Phe Ile Gln Ser Asp
130

<210> 278
<211> 98
<212> PRT
<213>

<400> 278
Leu Gln Tyr Ile Leu Glu Thr Asn Ala Tyr Pro Arg Glu His Glu Gln
1 5 10 15
Leu Lys Glu Leu Arg Glu Ala Thr Val Gln Lys Tyr Gln Ile Arg Ser
20 25 30
Ile Met Asn Val Pro Ala Asp Glu Gly Gln Leu Ile Ser Met Met Leu
35 40 45
Lys Leu Met Asn Ala Lys Lys Thr Ile Glu Ile Gly Val Phe Thr Gly
50 55 60
Cys Ser Leu Leu Thr Thr Ala Leu Ala Leu Pro Ala Asp Gly Lys Ile
65 70 75 80
Ile Ala Ile Asp Pro Asp Lys Glu Ala Tyr Glu Ile Gly Leu Pro Tyr
85 90 95
Ile Arg

<210> 279
<211> 157
<212> PRT
<213>

<400> 279
Arg His His Gln Thr Leu Thr Phe Ser Ser Ser Ala Leu Cys Leu Cys
1 5 10 15
Leu Cys Leu Ser Ile Leu Arg Pro Ala Thr Thr Met Glu Ala Lys Pro
20 25 30
Ser Glu Gln Pro Arg Glu Phe Ile Phe Arg Ser Lys Leu Pro Asp Ile
35 40 45
Tyr Ile Pro Asp Asn Leu Ser Leu His Ala Tyr Cys Phe Glu Asn Ile
50 55 60

Ser Glu Phe Ala Asp Arg Pro Cys Val Ile Asn Gly Ala Thr Gly Arg
65   70   75   80
Thr Tyr Thr Tyr Ala Glu Val Glu Leu Ile Ser Arg Arg Val Ser Ala
                85   90   95
Gly Leu Asn Gly Leu Gly Val Gly Gln Gly Asp Val Ile Met Leu Leu
            100   105   110
Leu Gln Asn Cys Pro Glu Phe Val Phe Ala Phe Leu Gly Ala Ser Tyr
        115   120   125
Arg Gly Ala Ile Ser Thr Thr Ala Asn Pro Phe Tyr Thr Pro Gly Glu
    130   135   140
Ile Ala Lys Gln Ala Ser Ala Ala Arg Ala Lys Ile Val
145   150   155

<210> 280
<211> 180
<212> PRT
<213>

<400> 280
Phe Ala Asp Lys Val Arg Pro Phe Ala Glu Glu Asn Gly Val Lys Val
1   5   10   15
Val Cys Ile Asp Thr Ala Pro Glu Gly Cys Leu His Phe Ser Glu Leu
            20   25   30
Met Gln Ala Asp Glu Asn Ala Ala Pro Ala Ala Asp Val Lys Pro Asp
        35   40   45
Asp Val Leu Ala Leu Pro Tyr Ser Ser Gly Thr Thr Gly Leu Pro Lys
    50   55   60
Gly Val Met Leu Thr His Arg Gly Gln Val Thr Ser Val Ala Gln Gln
65   70   75   80
Val Asp Gly Asp Asn Pro Asn Leu Tyr Phe His Lys Glu Asp Val Ile
                85   90   95
Leu Cys Thr Leu Pro Leu Phe His Ile Tyr Ser Leu Asn Ser Val Met
            100   105   110
Phe Cys Ala Leu Arg Val Gly Ala Ala Ile Leu Ile Met Gln Lys Phe
        115   120   125
Glu Ile Val Ala Leu Met Glu Leu Val Gln Arg Tyr Arg Val Thr Ile
    130   135   140
Leu Pro Ile Val Pro Pro Ile Val Leu Glu Ile Ala Lys Ser Ala Glu
145   150   155   160
Val Asp Arg Tyr Asp Leu Ser Ser Ile Arg Thr Ile Met Ser Gly Ala
                165   170   175
Ala Arg Trp Gly
            180

<210> 281
<211> 180
<212> PRT
<213>

<400> 281
Gly Gln Leu Val Ala Gly Val Glu Ala Gln Val Ile Ser Val Asp Thr
1   5   10   15
Leu Lys Ser Leu Pro Pro Asn Gln Leu Gly Glu Ile Trp Val Arg Gly
            20   25   30
Pro Asn Met Met Lys Gly Tyr Tyr Asn Asn Pro Gln Ala Thr Lys Leu
        35   40   45

Thr Ile Asp Asn Lys Gly Trp Val His Thr Gly Asp Leu Gly Tyr Phe
50 55 60
Asp Glu Glu Gly Gln Leu Tyr Val Val Asp Arg Ile Lys Glu Leu Ile
65 70 75 80
Lys Tyr Lys Gly Phe Gln Ile Ala Pro Ala Glu Leu Glu Gly Leu Leu
85 90 95
Leu Ser His Pro Glu Ile Leu Asp Ala Val Val Ile Pro Phe Pro Asp
100 105 110
Ala Glu Ala Gly Glu Val Pro Ile Ala Tyr Val Val Arg Ser Pro Thr
115 120 125
Ser Ser Leu Thr Glu Glu Glu Val Gln Lys Phe Ile Ala Asn Gln Val
130 135 140
Ala Pro Phe Lys Arg Leu Arg Arg Val Thr Phe Val Asn Ser Val Pro
145 150 155 160
Lys Ser Ala Ser Gly Lys Ile Leu Arg Arg Glu Leu Ile Ala Lys Val
165 170 175
Arg Ala Lys Ile
180

<210> 282
<211> 119
<212> PRT
<213>

<400> 282
Gly Tyr Phe Asp Glu Glu Gly Gly Leu Phe Ile Val Asp Arg Ile Lys
1 5 10 15
Glu Leu Ile Lys Tyr Lys Gly Phe Gln Val Ala Pro Ala Glu Leu Glu
20 25 30
Gly Ile Leu Leu Thr His Pro Gln Ile Ala Asp Ala Gly Val Ile Pro
35 40 45
Leu Pro Asp Leu Lys Ala Gly Glu Val Pro Ile Ala Tyr Val Val Arg
50 55 60
Thr Pro Gly Ser Ser Leu Thr Glu Lys Asp Ala Met Asp Tyr Val Ala
65 70 75 80
Lys Gln Val Ala Pro Phe Lys Arg Leu His Arg Val Asn Phe Val Asp
85 90 95
Ser Ile Pro Lys Ser Ala Ser Gly Lys Ile Leu Arg Arg Glu Leu Ile
100 105 110
Ala Lys Ala Lys Ser Lys Leu
115

<210> 283
<211> 152
<212> PRT
<213>

<400> 283
Asp Phe Pro Phe Phe Phe Leu Leu Arg Val Ala Met Ile Glu Val Gln
1 5 10 15
Ser Ala Pro Pro Met Ala Arg Ser Thr Glu Asn Glu Asn Asn Gln His
20 25 30
Asp Ala Glu Glu Gly Ala Val Leu Asn Glu Gly Gly Met Asp Phe Leu
35 40 45
Tyr Arg Ser Lys Leu Pro Asp Ile Asp Ile Pro Tyr His Leu Pro Leu
50 55 60

```
His Ser Tyr Cys Phe Glu Lys Leu Asp Glu Leu Arg Glu Lys Pro Cys
65                  70                  75                  80
Leu Ile Gln Gly Ser Asn Gly Lys Ile Tyr Ser Tyr Gly Glu Val Glu
                85                  90                  95
Leu Ile Ser Arg Lys Val Ala Ser Gly Leu Ala Lys Leu Gly Phe Lys
            100                 105                 110
Lys Gly Asp Val Val Met Leu Leu Leu Pro Asn Cys Pro Glu Phe Val
        115                 120                 125
Phe Val Phe Leu Gly Ala Ser Met Ala Gly Ala Ile Ala Thr Thr Ala
    130                 135                 140
Asn Pro Phe Tyr Thr Pro Ser Asp
145                 150
```

<210> 284
<211> 330
<212> PRT
<213>

<400> 284

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

Leu Met Asn Ile Phe Leu Gly Gly Val Asp Thr Gly Ala Val Ser Trp
305 310 315 320
Thr Gly Gln Trp Leu Ser Ser Leu Gly Thr
325 330

<210> 285
<211> 115
<212> PRT
<213>

<400> 285
Thr Glu Leu Glu Asp Glu Gly Phe Met Asp Met Val His Glu Gly Met
1 5 10 15
Ala Met Leu Gly Ser Phe Ser Ala Ser Asp Tyr Phe Pro Arg Leu Gly
20 25 30
Trp Ile Val Asp Arg Phe Thr Gly Leu His Ser Arg Leu Glu Lys Ser
35 40 45
Phe Arg Asn Leu Asp Asp Leu Tyr Gln Lys Val Ile Glu Glu His Arg
50 55 60
Asn Ala Asn Lys Ser Asn Glu Gly Lys Glu Asp Ile Val Asp Val Leu
65 70 75 80
Leu Lys Met Glu Lys Asp Gln Thr Glu Leu Ala Gly Val Arg Leu Lys
85 90 95
Glu Asp Asn Ile Lys Ala Ile Leu Met Val Tyr His Thr Ile Ser Thr
100 105 110
Tyr Tyr Leu
115

<210> 286
<211> 143
<212> PRT
<213>

<400> 286
Leu Val Val Ala Ala Leu Leu Ile Val Leu Leu Arg Ser Lys Ser Arg
1 5 10 15
Lys Arg Lys Ser Asn Leu Pro Pro Ser Pro Pro Lys Leu Pro Ile Ile
20 25 30
Gly Asn Leu His Gln Leu Gly Lys Ser Pro His Ile Ser Leu His Arg
35 40 45
Leu Ala Arg Asn Tyr Gly Pro Ile Met Ser Leu Gln Leu Gly Glu Val
50 55 60
Pro Thr Ile Val Val Ser Ser Ala Ala Met Ala Lys Glu Val Met Lys
65 70 75 80
Thr His Asp Leu Val Leu Ala Asn Arg Pro Gln Ile Phe Ser Ala Lys
85 90 95
His Leu Phe Tyr Asp Cys Thr Asp Met Ala Phe Ser Pro Tyr Gly Ala
100 105 110
Tyr Trp Arg His Ile Arg Lys Ile Cys Ile Leu Glu Val Leu Ser Ala
115 120 125
Lys Arg Val Gln Ser Phe Ser His Val Arg Glu Glu Glu Val Ala
130 135 140

<210> 287
<211> 135
<212> PRT

<213>

<400> 287
Leu Thr Phe Lys Cys Leu Arg Phe Leu Phe Ser Ser Ala Ala Ala Thr
1 5 10 15
Asn Leu His Leu Pro Pro Ser Pro Pro Lys Leu Pro Ile Ile Gly Asn
20 25 30
Leu His Gln Leu Ser Asp His Pro His Arg Ser Leu Gln Ala Leu Ser
35 40 45
Arg Arg Tyr Gly Pro Leu Met Met Leu His Phe Gly Ser Val Pro Val
50 55 60
Leu Val Val Ser Ser Ala Asp Cys Ala Arg Asp Ile Leu Lys Thr His
65 70 75 80
Asp Leu Ile Phe Ser Asp Arg Pro Arg Ser Thr Leu Ser Glu Arg Leu
85 90 95
Leu Tyr His Arg Lys Asp Val Ala Leu Ala Pro Phe Gly Glu Tyr Trp
100 105 110
Arg Glu Met Arg Ser Ile Cys Val Leu Gln Leu Leu Ser Asn Lys Arg
115 120 125
Val His Ser Phe Arg Thr Val
130 135

<210> 288
<211> 128
<212> PRT
<213>

<400> 288
Gly Lys Leu Pro His Arg Ser Leu Asp Arg Leu Ser Lys Thr Tyr Gly
1 5 10 15
Pro Leu Met Tyr Met Arg Leu Gly Ser Met Pro Cys Val Val Gly Ser
20 25 30
Ser Ala Glu Met Ala Arg Glu Phe Leu Lys Thr His Asp Leu Thr Phe
35 40 45
Ser Ser Arg Pro Arg Val Ala Ala Gly Lys Tyr Thr Val Tyr Asn Tyr
50 55 60
Ser Asp Ile Thr Trp Ser Pro Tyr Gly Glu His Trp Arg Leu Ala Arg
65 70 75 80
Lys Ile Cys Leu Met Glu Leu Phe Ser Ala Lys Arg Leu Glu Ser Phe
85 90 95
Glu Tyr Ile Arg Val Glu Glu Val Ala Arg Met Leu Ser Ser Val Phe
100 105 110
Glu Thr Ser Arg Gln Gly Leu Pro Val Glu Ile Arg Glu Glu Thr Thr
115 120 125

<210> 289
<211> 179
<212> PRT
<213>

<400> 289
Ile Arg Met Val Asn Glu Leu Gly Ser Glu Lys Pro Phe Leu Val Cys
1 5 10 15
Leu Glu Phe Tyr Met Lys Leu Ala Ile Ala Leu Val Ala Leu Val Val
20 25 30
Ala Trp Ser Phe Phe Val Lys Gly Arg Asn Arg Lys Leu Pro Pro Gly

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


<210> 290
<211> 440
<212> PRT
<213>

<400> 290
Ser Ser Leu Ala Phe Gly Gln His Ile Ile Ala Thr Ser Tyr Ser Cys
 1               5                  10                  15
Asn Leu His Gln Ile Gly Glu Met Ser Phe Gln Asn Gln Leu Phe Ile
            20                  25                  30
Phe Cys Thr Leu Leu Leu Gly Phe Leu Lys Leu Ala Glu Gly Lys Thr
        35                  40                  45
Arg His Tyr Thr Phe His Ile Asp Ser His Asn Met Thr Arg Leu Cys
    50                  55                  60
His Thr Arg Ser Val Leu Ser Val Asn Lys Gln Tyr Pro Gly Pro Pro
65                  70                  75                  80
Leu Val Ala Arg Glu Gly Asp Asn Ile Leu Val Lys Val Val Asn His
                85                  90                  95
Val Ala Ala Asn Val Thr Ile His Trp His Gly Val Arg Gln Leu Arg
            100                 105                 110
Thr Gly Trp Ala Asp Gly Pro Ala Tyr Val Thr Gln Cys Pro Ile Gln
        115                 120                 125
Thr Asn Gln Ser Tyr Thr Tyr Asn Phe Thr Leu Thr Gly Gln Arg Gly
    130                 135                 140
Thr Leu Leu Trp His Ala His Val Ser Trp Leu Arg Ser Ser Ile His
145                 150                 155                 160
Gly Pro Ile Ile Ile Leu Pro Lys Arg Asn Glu Ser Tyr Pro Phe Glu
                165                 170                 175
Lys Pro Ser Lys Glu Val Pro Ile Ile Phe Gly Glu Trp Phe Asn Val
            180                 185                 190
Asp Pro Glu Ala Val Ile Ala Gln Ala Leu Gln Ser Gly Gly Gly Pro
        195                 200                 205
Asn Val Ser Asp Ala Tyr Thr Ile Asn Gly Leu Pro Gly Pro Leu Tyr
    210                 215                 220
Asn Cys Ser Ser Lys Asp Thr Phe Lys Leu Lys Val Lys Pro Gly Lys
225                 230                 235                 240
Thr Tyr Leu Leu Arg Leu Ile Asn Ala Ala Leu Asn Asp Glu Leu Phe
```

01.06.08

245 250 255
Phe Ser Ile Ala Asn His Ala Val Thr Val Val Glu Val Asp Ala Val
260 265 270
Tyr Thr Lys Pro Phe Ser Ala Gly Cys Leu His Leu Thr Pro Gly Gln
275 280 285
Thr Met Asn Val Leu Leu Lys Thr Lys Thr Asp Phe Pro Asn Ser Thr
290 295 300
Phe Leu Met Ala Ala Trp Pro Tyr Phe Thr Gly Met Gly Thr Phe Asp
305 310 315 320
Asn Ser Thr Val Ala Gly Ile Leu Glu Tyr Glu His Pro Lys Ser Ser
325 330 335
Asn Tyr Pro Pro Leu Lys Lys Leu Pro Gln Tyr Lys Pro Thr Leu Pro
340 345 350
Pro Met Asn Ser Thr Gly Phe Val Ala Lys Phe Thr Gly Gln Leu Arg
355 360 365
Ser Leu Ala Ser Ala Lys Phe Pro Ala Asn Val Pro Gln Lys Val Asp
370 375 380
Arg Lys Phe Phe Phe Thr Val Gly Leu Gly Thr Ser Pro Cys Pro Lys
385 390 395 400
Asn Thr Thr Cys Gln Gly Pro Asn Gly Thr Lys Phe Ala Ala Ser Val
405 410 415
Asn Asn Ile Ser Phe Val Leu Pro Ser Val Ala Leu Leu Gln Ala His
420 425 430
Phe Phe Gly Gln Ser Asn Gly Val
435 440

<210> 291
<211> 326
<212> PRT
<213>

<400> 291
Pro Ala Val Val Glu Gly Arg Val Arg Asn Tyr Thr Phe Asn Val Val
1 5 10 15
Met Lys Asn Thr Thr Arg Leu Cys Ser Ser Lys Pro Ile Val Thr Val
20 25 30
Asn Gly Met Phe Pro Gly Pro Thr Leu Tyr Ala Arg Glu Asp Asp Thr
35 40 45
Val Leu Val Arg Val Ser Asn Arg Val Lys Tyr Asn Val Thr Ile His
50 55 60
Trp His Gly Ile Arg Gln Leu Arg Thr Gly Trp Ala Asp Gly Pro Ala
65 70 75 80
Tyr Ile Thr Gln Cys Pro Ile Gln Pro Gly Gln Ser Tyr Val Tyr Asn
85 90 95
Phe Thr Ile Thr Gly Gln Arg Gly Thr Leu Leu Trp His Ala His Ile
100 105 110
Leu Trp Leu Arg Ala Thr Leu His Gly Ala Ile Val Ile Leu Pro Lys
115 120 125
Arg Gly Val Pro Tyr Pro Phe Pro Lys Pro His Lys Glu Val Val Val
130 135 140
Val Leu Gly Glu Trp Trp Lys Ser Asp Thr Glu Gly Val Ile Ser Gln
145 150 155 160
Ala Ile Lys Ser Gly Leu Ala Pro Asn Val Ser Asp Ala His Thr Ile
165 170 175
Asn Gly His Pro Gly Pro Ser Ser Asn Cys Pro Ser Gln Gly Gly Phe
180 185 190
Thr Leu Pro Val Glu Ser Gly Lys Lys Tyr Met Leu Arg Ile Ile Asn

195 200 205
Ala Ala Leu Asn Glu Glu Leu Phe Phe Lys Ile Ala Gly His Gln Leu
210 215 220
Thr Ile Val Glu Val Asp Ala Thr Tyr Val Lys Pro Phe Lys Thr Asp
225 230 235 240
Thr Ile Val Ile Ala Pro Gly Gln Thr Thr Asn Ala Leu Ile Ser Thr
245 250 255
Asp Gln Ser Ser Gly Lys Tyr Met Val Ala Ala Ser Pro Phe Met Asp
260 265 270
Ser Pro Ile Ala Val Asp Asn Met Thr Ala Thr Ala Thr Leu His Tyr
275 280 285
Ser Gly Thr Leu Ala Ala Thr Ser Thr Thr Leu Thr Lys Thr Pro Pro
290 295 300
Gln Asn Ala Thr Ala Val Ala Asn Asn Phe Val Asn Ser Leu Arg Ser
305 310 315 320
Leu Asn Ser Lys Arg Tyr
325

<210> 292
<211> 101
<212> PRT
<213>

<400> 292
Arg Leu Cys Ser Ser Lys Pro Ile Val Thr Val Asn Gly Met Phe Pro
1 5 10 15
Gly Pro Thr Leu Tyr Ala Arg Glu Asp Asp Thr Val Leu Val Arg Val
20 25 30
Ser Asn Arg Val Lys Tyr Asn Val Thr Ile His Trp His Gly Ile Arg
35 40 45
Gln Leu Arg Ser Gly Trp Ala Asp Gly Pro Ala Tyr Ile Thr Gln Cys
50 55 60
Pro Ile Gln Pro Gly Gln Ser Tyr Val Tyr Asn Phe Thr Ile Thr Gly
65 70 75 80
Gln Arg Gly Thr Leu Leu Trp His Ala His Ile Leu Trp Leu Arg Ala
85 90 95
Thr Leu His Gly Ala
100

<210> 293
<211> 136
<212> PRT
<213>

<400> 293
Thr Val Asp His Ser Leu Leu Phe Thr Val Gly Leu Gly Ile Asn Pro
1 5 10 15
Cys Pro Ser Cys Lys Ala Gly Asn Gly Ser Arg Val Val Ala Ser Met
20 25 30
Asn Asn Val Thr Phe Val Met Pro Thr Thr Ala Ile Leu Gln Ala His
35 40 45
Phe Phe Asn Lys Ser Gly Val Phe Thr Ser Asp Phe Pro Gly Asn Pro
50 55 60
Pro Thr Ile Phe Asn Tyr Thr Gly Ser Pro Pro Ser Asn Leu Arg Thr
65 70 75 80
Thr Ser Gly Thr Lys Val Tyr Arg Leu Arg Tyr Asn Ser Thr Val Gln

```
                85                  90                  95
Leu Val Phe Gln Asp Thr Gly Ile Ile Ala Pro Glu Asn His Pro Ile
            100                 105                 110
His Leu His Gly Phe Asn Phe Phe Ala Ile Gly Lys Gly Leu Gly Asn
        115                 120                 125
Tyr Asn Pro Lys Val Asp Gln Lys
    130                 135

      <210> 294
      <211> 104
      <212> PRT
      <213>

      <400> 294
His Lys Glu Val Val Val Val Leu Gly Glu Trp Trp Lys Ser Asp Thr
 1               5                  10                  15
Glu Ala Val Ile Asn Gln Ala Ile Lys Ser Gly Leu Ala Pro Asn Val
            20                  25                  30
Ser Asp Ala His Thr Ile Asn Gly His Pro Gly Pro Ser Ser Asn Cys
        35                  40                  45
Pro Ser Gln Gly Gly Phe Thr Leu Pro Val Glu Ser Gly Lys Lys Tyr
    50                  55                  60
Met Leu Arg Ile Ile Asn Ala Ala Leu Asn Glu Glu Leu Phe Phe Lys
65                  70                  75                  80
Ile Ala Gly His Gln Leu Thr Ile Val Glu Val Asp Ala Thr Tyr Val
                85                  90                  95
Lys Pro Phe Lys Thr Asn Thr Gly
            100

      <210> 295
      <211> 110
      <212> PRT
      <213>

      <400> 295
Arg Gly Val Pro Tyr Pro Phe Pro Lys Pro His Lys Glu Val Val Val
 1               5                  10                  15
Val Leu Gly Glu Trp Trp Lys Ser Asp Thr Glu Ala Val Ile Asn Gln
            20                  25                  30
Ala Ile Lys Ser Gly Leu Ala Pro Asn Val Ser Asp Ala His Thr Ile
        35                  40                  45
Asn Gly His Pro Gly Pro Ser Ser Asn Cys Pro Ser Gln Gly Gly Phe
    50                  55                  60
Thr Leu Pro Val Glu Ser Gly Lys Lys Tyr Met Leu Arg Ile Ile Asn
65                  70                  75                  80
Ala Ala Leu Asn Glu Glu Leu Phe Phe Lys Ile Ala Gly His Gln Leu
                85                  90                  95
Thr Ile Val Glu Val Asp Ala Thr Tyr Val Lys Pro Phe Lys
            100                 105                 110

      <210> 296
      <211> 384
      <212> PRT
      <213>

      <400> 296
```

Pro Asn Val Ser Asp Ala Tyr Thr Ile Asn Gly Gln Pro Gly Asp Leu
1 5 10 15
Tyr Asn Cys Ser Ser Lys Asp Thr Val Ile Val Pro Ile Asp Ser Gly
20 25 30
Glu Thr His Leu Leu Arg Val Ile Asn Ala Ala Leu Asn Gln Glu Leu
35 40 45
Phe Phe Thr Val Ala Asn His Arg Phe Thr Val Val Gly Ala Asp Ala
50 55 60
Ser Tyr Leu Lys Pro Phe Thr Thr Ser Val Ile Met Leu Gly Pro Gly
65 70 75 80
Gln Thr Thr Asp Val Leu Ile Ser Gly Asp Gln Pro Pro Ala Arg Tyr
85 90 95
Tyr Met Ala Ala Glu Pro Tyr Gln Ser Ala Gln Gly Ala Pro Phe Asp
100 105 110
Asn Thr Thr Thr Thr Ala Ile Leu Glu Tyr Lys Ser Ala Pro Cys Pro
115 120 125
Ala Lys Gly Ile Ser Ser Lys Pro Val Met Pro Thr Leu Pro Ala Phe
130 135 140
Asn Asp Thr Ala Thr Val Thr Ala Phe Ile Gln Ser Phe Arg Ser Pro
145 150 155 160
Asn Lys Val Asp Val Pro Thr Asp Ile Asp Glu Asn Leu Phe Ile Thr
165 170 175
Val Gly Leu Gly Leu Phe Asn Cys Pro Lys Asn Phe Gly Ser Ser Arg
180 185 190
Cys Gln Gly Pro Asn Gly Thr Arg Phe Thr Ala Ser Met Asn Asn Val
195 200 205
Ser Phe Val Leu Pro Ser Asn Val Ser Ile Leu Gln Ala Tyr Lys Gln
210 215 220
Gly Val Pro Gly Val Phe Thr Thr Asp Phe Pro Ala Asn Pro Pro Val
225 230 235 240
Gln Phe Asp Tyr Thr Gly Asn Val Ser Arg Ser Leu Trp Gln Pro Val
245 250 255
Pro Gly Thr Lys Val Tyr Lys Leu Lys Tyr Gly Ser Arg Val Gln Ile
260 265 270
Val Leu Gln Gly Thr Asn Ile Gln Thr Ala Glu Asn His Pro Ile His
275 280 285
Ile His Gly Tyr Asp Phe Tyr Ile Leu Ala Thr Gly Phe Gly Asn Phe
290 295 300
Asn Pro Gln Lys Asp Thr Ala Lys Phe Asn Leu Val Asp Pro Pro Met
305 310 315 320
Arg Asn Thr Val Gly Val Ser Val Asn Gly Trp Ala Val Ile Arg Phe
325 330 335
Val Ala Asp Asn Pro Gly Ala Trp Leu Met His Cys His Leu Asp Val
340 345 350
His Ile Thr Trp Gly Leu Ala Val Val Phe Leu Val Glu Asn Gly Val
355 360 365
Gly Glu Leu Gln Ser Leu Gln Pro Pro Pro Ala Asp Leu Pro Pro Cys
370 375 380

<210> 297
<211> 139
<212> PRT
<213>

<400> 297
Ser Cys Leu Ser Leu His His His Leu Arg Gln Val Thr Ser Asp Phe
1 5 10 15

01.06.06

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

<210> 298
<211> 155
<212> PRT
<213>

<400> 298
Pro Asp Arg Val Ile Ser Thr Ser Ser Ile Leu Tyr Gln Gly Glu Arg
1 5 10 15
Gly Thr Met Gly Thr Phe Leu Gly Phe Ala Val Thr Ala Thr Leu Leu
20 25 30
Phe Cys Val Ala Gln Gly Glu Val Leu Phe Tyr Asp Phe Val Val Asn
35 40 45
Glu Thr Pro Ile Glu Met Leu Cys Glu Thr Asn Arg Ser Val Leu Thr
50 55 60
Val Asn Gly Leu Phe Pro Gly Pro Glu Ile His Ala His Lys Gly Asp
65 70 75 80
Thr Ile Tyr Val Asn Val Thr Asn Leu Gly Pro Tyr Gly Val Thr Ile
85 90 95
His Trp His Gly Val Arg Gln Ile Arg Tyr Pro Trp Ser Asp Gly Pro
100 105 110
Glu Tyr Val Thr Gln Cys Pro Ile Pro Thr Asn Ser Ser Phe Leu Gln
115 120 125
Lys Ile Lys Leu Thr Glu Glu Glu Gly Thr Val Trp Trp His Ala His
130 135 140
Ser Asp Trp Ser Arg Ala Thr Ile His Gly Leu
145 150 155

<210> 299
<211> 179
<212> PRT
<213>

<400> 299
Leu Leu Gln Val His Phe Ser Leu Val Glu Arg Glu Arg Glu Met Gly
1 5 10 15
Thr Phe Leu Gly Phe Val Val Thr Met Thr Leu Leu Phe Cys Met Ala
20 25 30
Gln Gly Glu Val Ile Tyr Tyr Asp Phe Val Val Lys Glu Thr Pro Ile
35 40 45

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

<210> 300
<211> 62
<212> PRT
<213>

<400> 300
Glu Arg Glu Met Gly Thr Phe Leu Gly Phe Val Val Thr Met Thr Leu
 1   5   10   15
Leu Phe Cys Met Ala Gln Gly Glu Val Leu Tyr Tyr Asp Phe Val Val
            20   25   30
Lys Glu Thr Pro Ile Gln Met Leu Cys Gly Thr Asn Gln Thr Val Leu
        35   40   45
Thr Val Asn Gly Leu Phe Pro Gly Pro Glu Ile His Ala His
    50   55   60

<210> 301
<211> 190
<212> PRT
<213>

<400> 301
Leu Ala Val Met Ser Asn Glu Gln Leu Leu Glu Phe Ala Trp Gly Leu
 1   5   10   15
Ala Ser Ser Asn Gln Ser Phe Leu Trp Val Val Arg Ser Asp Ile Val
            20   25   30
His Gly Glu Ser Ala Ile Leu Pro Lys Glu Phe Ile Glu Glu Thr Lys
        35   40   45
Asp Arg Gly Met Leu Val Gly Trp Ala Pro Gln Ile Lys Val Leu Ser
    50   55   60
His Pro Ser Val Gly Gly Phe Leu Thr His Ser Gly Trp Asn Ser Thr
65   70   75   80
Leu Glu Ser Ile Ser Ala Gly Val Pro Met Met Cys Trp Pro Phe Phe
                85   90   95
Ala Glu Gln Glu Thr Asn Ala Lys Phe Val Cys Glu Glu Trp Gly Ile
            100   105   110
Gly Met Gln Val Lys Lys Met Val Lys Arg Glu Glu Leu Ala Ile Leu
        115   120   125

Val Arg Asn Ser Ile Lys Gly Glu Glu Gly Asp Glu Met Arg Lys Arg
    130   135   140
Ile Gly Lys Leu Lys Glu Thr Ala Lys Arg Ala Val Ser Glu Gly Gly
145   150   155   160
Ser Ser Lys Asn Asn Leu Asp Lys Leu Leu His His Ile Phe Leu Lys
                165   170   175
Gly Met His Gln Met Ile Val Gln Asn Val Glu Ala Asn Asn
            180   185   190

<210> 302
<211> 365
<212> PRT
<213>

<400> 302
Pro Met Glu Ser Cys Ser Ile Ser Leu Phe Trp Leu Gly Leu Leu Leu
 1   5   10   15
Pro Ala Leu Leu Val Phe Leu Leu Asn Arg Arg Lys Arg Thr Lys Leu
            20   25   30
Pro Pro Gln Pro Pro Ala Trp Pro Val Ile Gly Asn Ile Phe Asp Leu
        35   40   45
Gly Thr Met Pro His Gln Asn Leu His Asn Leu Arg Ala Lys His Gly
    50   55   60
Pro Val Leu Trp Leu Lys Leu Gly Ser Val Asn Thr Met Val Ile Gln
65   70   75   80
Ser Ala Arg Ala Ala Met Glu Leu Phe Lys Gly His Asp Phe Val Phe
                85   90   95
Ala Asp Arg Lys Cys Ser Gln Ala Phe Thr Ala Leu Gly Tyr Asp Gln
            100   105   110
Gly Ser Leu Ala Leu Gly Arg His Gly Asp Tyr Trp Arg Ala Leu Arg
        115   120   125
Arg Leu Cys Ser Ala Glu Leu Leu Val Asn Lys Arg Val Asn Asp Thr
    130   135   140
Ala His Leu Arg Gln Lys Cys Val Asp Ser Met Ile Met Tyr Ile Glu
145   150   155   160
Glu Glu Met Ala Val Lys Gln Ala Thr Lys Gly Gln Gly Ile Asp Leu
                165   170   175
Ser His Phe Leu Phe Leu Leu Ala Phe Asn Val Val Gly Asn Met Val
            180   185   190
Leu Ser Arg Asp Leu Leu Asp Pro Lys Ser Lys Asp Gly Pro Glu Phe
        195   200   205
Tyr Asp Ala Met Asn Arg Phe Met Glu Trp Ala Gly Lys Pro Asn Val
    210   215   220
Ala Asp Phe Met Pro Trp Leu Lys Trp Leu Asp Pro Gln Gly Ile Lys
225   230   235   240
Ala Gly Met Ala Lys Asp Met Gly Arg Ala Met Arg Ile Ala Glu Gly
                245   250   255
Phe Val Lys Glu Arg Leu Glu Glu Arg Lys Leu Arg Gly Glu Met Arg
            260   265   270
Thr Thr Asn Asp Phe Leu Asp Ala Val Leu Asp Tyr Glu Gly Asp Gly
        275   280   285
Lys Glu Gly Pro His Asn Ile Ser Ser Gln Asn Ile Asn Ile Ile Ile
    290   295   300
Leu Glu Met Phe Phe Ala Gly Ser Glu Ser Thr Ser Ser Thr Ile Glu
305   310   315   320
Trp Ala Met Ala Glu Leu Leu Arg Gln Pro Glu Ser Met Lys Lys Ala
                325   330   335

Lys Asp Glu Ile Asp Gln Val Val Gly Leu Asn Arg Lys Leu Glu Glu
340 345 350
Asn Asp Thr Glu Lys Met Pro Phe Leu Gln Ala Val Val
355 360 365

<210> 303
<211> 183
<212> PRT
<213>

<400> 303
Pro Met Glu Ser Cys Ser Ile Ser Leu Phe Trp Leu Gly Leu Leu Leu
1 5 10 15
Pro Ala Leu Leu Val Phe Leu Leu Asn Arg Arg Lys Arg Thr Lys Leu
20 25 30
Pro Pro Gln Pro Pro Ala Trp Pro Val Ile Gly Asn Ile Phe Asp Leu
35 40 45
Gly Thr Met Pro His Gln Asn Leu His Asn Leu Arg Ala Lys His Gly
50 55 60
Pro Val Leu Trp Leu Lys Leu Gly Ser Val Asn Thr Met Val Ile Gln
65 70 75 80
Ser Ala Gln Ala Ala Met Glu Leu Phe Lys Gly His Asp Phe Val Phe
85 90 95
Ala Asp Arg Lys Cys Ser Gln Ala Phe Thr Ala Leu Gly Tyr Asp Gln
100 105 110
Gly Ser Leu Ala Leu Gly Arg His Gly Asp Tyr Trp Arg Ala Leu Arg
115 120 125
Arg Leu Cys Ser Ala Glu Leu Leu Val Asn Lys Arg Val Asn Glu Thr
130 135 140
Ala His Leu Arg Gln Lys Cys Val Asp Ser Met Ile Met Tyr Ile Glu
145 150 155 160
Glu Glu Met Ala Val Lys Gln Ala Thr Lys Gly Gln Gly Ile Asp Leu
165 170 175
Ser His Phe Leu Phe Leu Leu
180

<210> 304
<211> 148
<212> PRT
<213>

<400> 304
Met Lys Ala Gln Asp Glu Ile Asp Ser Met Ile Gly His Asp Ser Leu
1 5 10 15
Leu Glu Glu Ser Asp Val Ser Lys Leu Pro Tyr Leu Gln Cys Ile Ile
20 25 30
Leu Glu Thr Leu Arg Leu Asn Thr Thr Ala Pro Leu Leu Leu Pro His
35 40 45
Ala Ser Ser Ala Asp Cys Thr Ile Gly Gly Tyr Phe Val Pro Arg Asp
50 55 60
Thr Ile Val Met Val Asn Ala Trp Ala Ile His Lys Asp Pro Gln Leu
65 70 75 80
Trp Glu Asp Pro Leu Ser Phe Lys Pro Glu Arg Phe Glu Gly Asn Gly
85 90 95
Ser Glu Lys Gln Gln Lys Leu Leu Leu Pro Phe Gly Leu Gly Arg Arg
100 105 110

Ala Cys Pro Gly Ala Pro Leu Ala His Arg Val Met Gly Trp Thr Leu
        115   120   125
Gly Leu Leu Ile Gln Cys Phe Asp Trp Lys Arg Val Ser Glu Glu Glu
    130   135   140
Ile Asp Met Thr
145

<210> 305
<211> 164
<212> PRT
<213>

<400> 305
Tyr Leu Gly Asp Phe Leu Pro Ile Leu Lys Leu Val Asp Tyr Asn Gly
 1   5   10   15
Val Lys Lys Arg Val Val Glu Leu Lys Glu Lys Phe Asp Ala Phe Ile
            20   25   30
Gln Gly Leu Ile Asn Glu His Arg Arg Lys Lys Gly Asp Pro Glu Leu
        35   40   45
Ala Asp Ser Met Ile Ser His Leu Leu His Leu Gln Glu Ser Gln Pro
    50   55   60
Glu Asp Tyr Ser Asp Ser Met Ile Lys Gly Leu Val Leu Val Leu Leu
65   70   75   80
Val Ala Gly Thr Asp Thr Ser Ser Leu Thr Leu Glu Trp Ile Met Thr
                85   90   95
Asn Leu Leu Asn Asn Pro Glu Lys Leu Glu Lys Ala Arg Asn Glu Ile
            100   105   110
Asp Ser Val Ile Gly His Asp Arg Leu Val Glu Glu Ser Asp Val Ser
        115   120   125
Asn Leu Pro Tyr Leu Gln Cys Ile Ile Leu Glu Thr Leu Arg Leu Asn
    130   135   140
Thr Thr Val Pro Leu Leu Val Pro His Ala Ser Ser Ala Asp Cys Thr
145   150   155   160
Ile Gly Gly Tyr

<210> 306
<211> 163
<212> PRT
<213>

<400> 306
Leu Ser Asp Ala Ile Pro Ala Leu Gly Trp Leu Asp Ser Gly Gly Tyr
 1   5   10   15
Arg Arg Ser Met Asp Glu Thr Ala Lys Glu Leu Asp Val Leu Ala Gln
            20   25   30
Gly Trp Leu Glu Glu His Arg Arg Lys Arg Leu Ser Cys Pro Lys Asp
        35   40   45
Asp Arg Glu Gln Asp Phe Met Asp Trp Met Ile Asn Ala Leu Glu Gly
    50   55   60
Arg Asn Phe Pro Asp Phe Asp Ala Asp Thr Val Ile Lys Ala Thr Cys
65   70   75   80
Leu Asn Met Ile Ile Ala Gly Thr Asp Thr Ser Thr Val Ala Ile Thr
                85   90   95
Trp Ala Leu Ser Leu Leu Met Asn Asn Arg Arg Ala Leu Lys Lys Ala
            100   105   110

Gln Gln Glu Leu Asp Thr His Val Gly Arg Ser Arg Pro Val Glu Glu
115 120 125
Ser Asp Val Lys Asn Leu Thr Tyr Leu Gln Ala Ile Val Lys Glu Ala
130 135 140
Leu Arg Leu Tyr Pro Pro Val Pro Val Asn Gly Leu Arg Ser Ser Met
145 150 155 160
Glu Glu Cys

<210> 307
<211> 129
<212> PRT
<213>

<400> 307
Arg Leu Pro Pro Gly Pro Pro Gly Trp Pro Ile Val Gly Asn Leu Phe
1 5 10 15
Gln Leu Gly Asn Lys Pro His Glu Ala Leu Phe His Leu Ala Gln Lys
20 25 30
Tyr Gly Pro Leu Met Cys Val Ser Leu Gly Met Lys Thr Thr Val Val
35 40 45
Val Ser Ser Pro Ala Met Ala Lys Gln Val Leu Lys Thr His Asp His
50 55 60
Val Phe Ala Gly Arg Thr Val Ile Gln Ser Val Gln Cys Leu Ser Tyr
65 70 75 80
Asp Lys Ser Ser Val Ile Trp Ala Gln Tyr Gly Ser His Trp Arg Leu
85 90 95
Leu Arg Arg Ile Ser Asn Thr Lys Leu Phe Ser Val Lys Arg Leu Glu
100 105 110
Ala Leu Glu His Leu Arg Arg Asp Glu Val Phe Arg Thr Ile Lys Gln
115 120 125
Ile

<210> 308
<211> 166
<212> PRT
<213>

<400> 308
Leu Val Tyr Leu Gln Ala Ala Val Lys Glu Thr Leu Arg Leu His Pro
1 5 10 15
Ser Gly Pro Leu Leu Val Arg His Leu Phe Gly Thr Ala Ser Cys Asn
20 25 30
Val Leu Gly Tyr Glu Ile Pro Gln Asn Thr Leu Val Leu Val Asn Val
35 40 45
Trp Ala Ile Gly Arg Asn Pro Lys Ser Trp Glu Asp Ala Glu Val Phe
50 55 60
Lys Pro Glu Arg Phe Met Glu Lys Val Gly Ser Glu Val Asp Ala Asn
65 70 75 80
Gly Asp Gln Asn Phe Gly Cys Leu Leu Phe Gly Ala Gly Arg Arg Arg
85 90 95
Cys Pro Gly Gln Gln Leu Gly Thr Leu Leu Val Glu Phe Gly Leu Ala
100 105 110
Gln Leu Leu His Cys Phe Asn Trp Arg Leu Pro Leu Asp Asp Ile Asn
115 120 125

Gly Glu Asn Gln Glu Val Asp Met Asn Glu Met Phe Asn Gly Val Thr
130 135 140
Leu Arg Lys Ala Arg Glu Leu Ser Ala Ile Pro Thr Pro Arg Leu Glu
145 150 155 160
Cys Ile Ala His Leu Lys
165

<210> 309
<211> 123
<212> PRT
<213>

<400> 309
Ser Cys Trp Arg Cys Val Ala Glu Pro Asn His Ala Trp Ser Asn Leu
1 5 10 15
Ser Arg Lys Arg Lys Gly Arg Leu Pro Pro Gly Pro Phe Ser Leu Pro
20 25 30
Ile Ile Gly Asn Leu His Met Leu Gly Lys Ile Pro His Arg Ser Leu
35 40 45
Ala Glu Leu Ser Met Lys Tyr Gly Pro Leu Leu Ser Leu Arg Leu Gly
50 55 60
Ser Thr Pro Ala Leu Val Val Ser Ser Pro Glu Ile Ala Ser Glu Phe
65 70 75 80
Leu Lys Thr His Asp Gln Leu Phe Ala Ser Arg Ile Pro Ser Ala Ala
85 90 95
Ile Lys Val Leu Thr Tyr Asn Leu Ser Gly Leu Ile Phe Ser Pro Tyr
100 105 110
Gly Pro Cys Trp Arg Gln Val Arg Lys Leu Cys
115 120

<210> 310
<211> 114
<212> PRT
<213>

<400> 310
Tyr Ser Glu Pro Ser Lys Lys Leu Ala Met Glu Phe Val Glu Phe Cys
1 5 10 15
Ile Thr Leu Val Thr Ala Leu Leu Phe Val Val Leu Val Ala Ala Trp
20 25 30
Ser Asn Leu Phe Arg Lys Arg Lys Gly Arg Leu Pro Pro Gly Pro Phe
35 40 45
Ser Leu Pro Ile Ile Gly Asn Leu His Met Leu Gly Lys Ile Pro His
50 55 60
Arg Ser Leu Ala Glu Leu Ser Met Lys Tyr Gly Pro Leu Leu Ser Leu
65 70 75 80
Arg Leu Gly Ser Thr Pro Ala Leu Val Val Ser Ser Pro Glu Ile Ala
85 90 95
Ser Glu Phe Leu Lys Thr His Asp Gln Leu Phe Ala Ser Arg Ile Pro
100 105 110
Ser Ala

<210> 311
<211> 154
<212> PRT

<213>

<400> 311
Glu Leu Leu Ser Ala Cys Pro Val His Glu Cys Pro Tyr Phe Tyr Phe
1 5 10 15
Asn Leu Ala Thr Val Ile Leu Leu Gly Val Val Thr Gly Trp Gly Phe
20 25 30
Leu Phe Arg Gly Arg Lys Gln Lys Leu Pro Pro Gly Pro Phe Gln Trp
35 40 45
Pro Ile Val Gly Asn Leu His Met Met Gly Glu Leu Pro His Gln Ala
50 55 60
Ile Thr Ala Leu Ser Met Lys Tyr Gly Pro Leu Met Ser Leu Arg Leu
65 70 75 80
Gly Ser Tyr Leu Thr Leu Val Val Ser Ser Pro Asp Val Ala Glu Glu
85 90 95
Phe Leu Lys Thr His Asp Leu Ala Phe Ala Ser Arg Pro Pro Thr Ile
100 105 110
Gly Thr Lys Tyr Phe Trp Tyr Asn Ser Ser Asp Val Ala Phe Ser Pro
115 120 125
Tyr Gly Pro Tyr Trp Arg Gln Met Arg Lys Ile Cys Val Leu Gln Leu
130 135 140
Leu Ser Ser Arg Arg Ile Asp Ser Phe Arg
145 150

<210> 312
<211> 116
<212> PRT
<213>

<400> 312
Cys Asp Gln Asp Leu Ile Gly Gly Ile Gly Ile Lys Ser Met Ile Lys
1 5 10 15
Glu Thr Phe Val Leu Ala Gly Ser Leu Asn Met Gly Asp Phe Ile Pro
20 25 30
Tyr Leu Ala Trp Ile Asp Leu Gln Gly Leu Asn Arg Arg Leu Lys Asn
35 40 45
Ile His Lys Ile Gln Asp Asp Leu Leu Gly Lys Ile Leu Glu Glu His
50 55 60
Ala Ser Pro Pro Gln Asn Asn Pro Asn Tyr Met Pro Asp Leu Val Asp
65 70 75 80
Val Leu Leu Ala Ala Ser Ala Asp Glu Asp Leu Glu Phe Glu Ile Thr
85 90 95
Arg Asp Asn Ile Lys Ser Val Ile Tyr Val Tyr Ile Val His Ala Ile
100 105 110
Ile Arg Phe Gln
115

<210> 313
<211> 180
<212> PRT
<213>

<400> 313
Ala Pro Asp Glu Leu Glu Arg Val Val Gly Leu Gly Arg Met Val Arg
1 5 10 15
Glu Ser Asp Leu Pro Arg Leu Val Tyr Leu Gln Ala Val Val Lys Glu

01.06.08

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

<210> 314
<211> 127
<212> PRT
<213>

<400> 314
Gly Ile Leu Phe Asp Met Leu Leu Gly Gly Ser Asp Thr Ala Pro Thr
1 5 10 15
Ile Ile Glu Trp Ala Ile Ser Glu Ala Leu Ile Asn Pro Pro Val Met
20 25 30
Lys Lys Leu Gln Asp Glu Leu Glu Arg Val Val Gly Leu Asp Arg Met
35 40 45
Ala Cys Glu Ser Asp Leu Pro Gln Leu Val Tyr Leu Gln Ala Met Val
50 55 60
Lys Glu Thr Leu Arg Leu His Pro Ala Gly Pro Leu Leu Asn Arg Arg
65 70 75 80
Leu Ser Ala Glu Ser Cys Asn Val Leu Gly Tyr Glu Phe Pro Lys Asn
85 90 95
Thr Arg Val Leu Val Asn Ala Trp Ala Ile Gly Arg Asn Pro Lys Leu
100 105 110
Trp Glu Asp Ala Glu Thr Phe Lys Pro Glu Arg Phe Thr Gly Arg
115 120 125

<210> 315
<211> 127
<212> PRT
<213>

<400> 315
Thr Ser Ala Thr Val Glu Trp Ala Met Ala Glu Leu Ile Arg Lys Pro
1 5 10 15
Thr Leu Leu Lys Lys Ala Gln Ala Glu Leu Asp Glu Val Val Gly Arg
20 25 30
Glu Lys Arg Met Glu Glu Ser Asp Ile Ala Lys Leu Pro Tyr Leu Gln

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

<210> 316
<211> 134
<212> PRT
<213>

<400> 316
Glu Asp Glu Val Ser Ala Met Ile Arg Ser Ile Val Asn Ser Asp Ala
1 5 10 15
His Lys Asp Ser Arg Pro Val Asn Ile Lys Gln Leu Ala Ser Ser Leu
20 25 30
Val Thr Ala Ile Val Leu Arg Met Thr Phe Gly Lys Lys Tyr Ser Asp
35 40 45
Arg Asp Ser Gly Ala Phe Ser Ser Met Ile Lys Glu Ser Leu Leu Leu
50 55 60
Leu Gly Ser Phe Asn Ile Gly Glu Tyr Ile Pro Tyr Leu Asn Trp Met
65 70 75 80
Asp Leu Gln Gly Leu Asn Arg Arg Leu Lys Lys Leu Arg Thr Thr Gln
85 90 95
Asp Gln Leu Leu Glu Lys Val Ile Glu Glu His Ala Ala Gln Asn Arg
100 105 110
Ser Asn Met Thr His Asp Leu Val Asp Ala Leu Leu Ala Ala Ser Ala
115 120 125
Asp Lys Asp Arg Glu Leu
130

<210> 317
<211> 115
<212> PRT
<213>

<400> 317
Ile Tyr Asp Gln Glu Ser Leu Leu Asn Ala Ile Lys Gln Val Asp Val
1 5 10 15
Val Ile Ser Ala Val Gly Gln Ala Gln Thr Glu Asp Gln Asp Arg Ile
20 25 30
Val Ala Ala Ile Lys Ala Ala Gly Asn Ile Lys Arg Phe Leu Pro Ser
35 40 45
Glu Phe Gly Asn Asp Val Asp Arg Val His Ala Val Glu Pro Val Lys
50 55 60
Thr Gly Phe Ala Leu Lys Ala Lys Ile Arg Arg Leu Val Glu Ala Glu
65 70 75 80
Gly Ile Pro Tyr Thr Tyr Val Ser Ser Asn Ser Phe Ala Gly Tyr Tyr
85 90 95
Leu Gln Thr Leu Ser Gln Pro Gly Ala Thr Ala Pro Pro Arg Asp Asn

```
            100                 105                 110
Val Val Ile
        115

      <210> 318
      <211> 161
      <212> PRT
      <213>

      <400> 318
Arg Phe Gly Val Ser Met Val Leu Leu Pro Thr Leu Ser Pro Val Thr
 1               5                  10                  15
Ala Glu Ser Leu Leu Glu Thr Asp Arg Val Arg Arg Lys Thr Pro Arg
            20                  25                  30
Leu Arg Arg Glu Asn His Ser Glu Met Ala Ala Lys Ser Lys Val Leu
        35                  40                  45
Val Ile Gly Gly Thr Gly Tyr Ile Gly Lys Phe Ile Val Glu Ala Ser
    50                  55                  60
Ala Lys Ser Gly Arg Pro Thr Phe Ala Leu Ala Arg Glu Ser Thr Leu
65                  70                  75                  80
Ser Asn Pro Ala Lys Ala Lys Ile Val Glu Gly Phe Lys Ser Leu Gly
                85                  90                  95
Val Thr Leu Val His Gly Asp Ile Tyr Asp Gln Glu Ser Leu Leu Asn
            100                 105                 110
Ala Ile Lys Gln Val Asp Val Val Ile Ser Ala Val Gly Arg Ala Gln
        115                 120                 125
Ile Glu Asp Gln Asp Arg Ile Val Ala Ala Ile Lys Ala Ala Gly Asn
    130                 135                 140
Ile Lys Arg Phe Val Pro Ser Glu Phe Gly Asn Asn Val Asp Arg Val
145                 150                 155                 160
His


      <210> 319
      <211> 141
      <212> PRT
      <213>

      <400> 319
Arg Phe Leu Pro Ser Glu Phe Gly Asn Asp Val Asp Arg Val His Ala
 1               5                  10                  15
Val Glu Pro Val Lys Thr Gly Phe Ala Leu Lys Ala Lys Ile Arg Arg
            20                  25                  30
Leu Val Glu Ala Glu Gly Ile Pro Tyr Thr Tyr Val Ser Ser Asn Ser
        35                  40                  45
Phe Ala Gly Tyr Tyr Leu Gln Thr Leu Ser Gln Pro Gly Ala Thr Ala
    50                  55                  60
Pro Pro Arg Asp Asn Val Val Ile Leu Gly Asp Gly Asn Ala Lys Val
65                  70                  75                  80
Val Phe Asn Lys Glu Asp Asp Ile Gly Thr Tyr Thr Ile Lys Ala Val
                85                  90                  95
Asp Asp Pro Arg Thr Leu Asn Lys Ile Leu Tyr Ile Arg Pro Pro Ala
            100                 105                 110
Asn Thr Tyr Ser Met Asn Glu Leu Val Ser Leu Trp Glu Arg Lys Ile
        115                 120                 125
Gly Lys Ala Leu Glu Arg Val Tyr Val Pro Glu Glu Gln
```

130 135 140

<210> 320
<211> 102
<212> PRT
<213>

<400> 320
Lys Pro Ile Glu Phe Ala Gly Lys His Arg Ala Ser Ala Val Lys Thr
1 5 10 15
Thr Ser Glu Met Ala Ala Lys Ser Lys Val Leu Val Ile Gly Gly Thr
20 25 30
Gly Tyr Ile Gly Lys Phe Ile Val Glu Ala Ser Ala Lys Ser Gly Arg
35 40 45
Pro Thr Phe Val Leu Ala Arg Glu Ser Thr Leu Ser Asn Pro Ala Lys
50 55 60
Ala Lys Ile Val Gln Gly Phe Lys Ser Leu Gly Val Thr Leu Val His
65 70 75 80
Gly Asp Ile Tyr Asp Gln Glu Ser Leu Leu Asn Ala Ile Lys Gln Val
85 90 95
Asp Val Val Ile Ser Ala
100

<210> 321
<211> 125
<212> PRT
<213>

<400> 321
Gln Ser His Val Arg Asp Arg Ser Ser Ser Pro Glu Asn Thr Thr Arg
1 5 10 15
Ala Met Lys Arg Pro Ser Lys Met Ala Glu Met Ser Arg Val Leu Val
20 25 30
Ile Gly Gly Ala Gly Tyr Ile Gly Lys Phe Ile Val Lys Ala Cys Ala
35 40 45
Lys Ser Gly His Pro Thr Phe Val Leu Glu Thr Glu Ser Thr Leu Ser
50 55 60
Asn Pro Ala Asn Ala Glu Ile Ile Lys Gly Phe Lys Ser Leu Gly Val
65 70 75 80
Asn Leu Val His Gly Asp Ile Tyr Asp Gln Lys Ser Leu Leu Ser Ala
85 90 95
Ile Lys Gln Val Asp Val Val Ile Ser Thr Val Gly Gln Ala Gln Leu
100 105 110
Glu Asp Gln Asp Arg Ile Val Ala Ala Ile Lys Ala Ala
115 120 125

<210> 322
<211> 98
<212> PRT
<213>

<400> 322
Ser Ser Ser Pro Glu Asn Thr Thr Pro Ala Val Lys Arg Pro Ser Lys
1 5 10 15
Met Ala Glu Met Ser Arg Val Leu Val Ile Gly Gly Ala Gly Tyr Ile
20 25 30

Gly Lys Phe Ile Val Lys Ala Cys Ala Lys Ser Gly His Pro Thr Phe
35 40 45
Val Leu Glu Thr Glu Ser Thr Leu Ser Asn Pro Ala Asn Ala Glu Ile
50 55 60
Ile Lys Gly Phe Lys Ser Leu Gly Val Asn Leu Val His Gly Asp Ile
65 70 75 80
Tyr Asp Gln Lys Ser Leu Leu Ser Ala Ile Lys Gln Val Asp Val Val
85 90 95
Ile Ser

<210> 323
<211> 319
<212> PRT
<213>

<400> 323
Lys Asp Pro Leu Ala Gln Leu Thr Thr Phe Ser Cys Ile Cys Ser Val
1 5 10 15
Arg His Asp Arg Gly Lys Thr Met Ala Cys Ala Thr Asp Val Ala Arg
20 25 30
Gln Phe Leu Pro Cys Val Gln Pro Val Pro Ser Ser Met Gly Gly Glu
35 40 45
Thr Ala Arg Ser Ile Asn Leu Thr Cys Asn Gly Leu Ser Pro Pro Gln
50 55 60
Pro Gln Tyr Asn Ala Glu Asn Asn His Asp Gln Asp Thr Thr Val Ala
65 70 75 80
Thr Arg Val Leu Ile Ile Gly Ala Thr Gly Phe Ile Gly Arg Phe Val
85 90 95
Ala Glu Ala Ser Val Lys Ser Gly Arg Pro Thr Tyr Ala Leu Val Arg
100 105 110
Pro Thr Thr Leu Ser Ser Lys Pro Lys Val Ile Gln Ser Leu Val Asp
115 120 125
Ser Gly Ile Gln Val Val Tyr Gly Cys Leu His Asp His Asn Ser Leu
130 135 140
Val Lys Ala Ile Arg Gln Val Asp Val Val Ile Ser Thr Val Gly Gly
145 150 155 160
Ala Leu Ile Leu Asp Gln Leu Lys Ile Val Asp Ala Ile Lys Glu Val
165 170 175
Gly Thr Val Lys Arg Phe Leu Pro Ser Glu Phe Gly His Asp Val Asp
180 185 190
Arg Ala Asp Pro Val Glu Pro Ala Leu Ser Phe Tyr Ile Glu Lys Arg
195 200 205
Lys Val Arg Arg Ala Val Glu Glu Ala Lys Ile Pro Tyr Thr Tyr Ile
210 215 220
Cys Cys Asn Ser Ile Ala Gly Trp Pro Tyr Tyr Tyr His Thr His Pro
225 230 235 240
Thr Glu Leu Pro Pro Pro Lys Glu Gln Phe Glu Ile Tyr Gly Asp Gly
245 250 255
Ser Val Lys Ala Phe Phe Val Thr Gly Asp Asp Ile Gly Ala Tyr Thr
260 265 270
Met Lys Ala Val Asp Asp Pro Arg Thr Leu Asn Lys Ser Ile His Phe
275 280 285
Arg Pro Pro Lys Asn Phe Leu Asn Leu Asn Glu Leu Ala Asp Ile Trp
290 295 300
Glu Asn Lys Ile Asn Arg Thr Leu Pro Arg Val Ser Val Ser Ala
305 310 315

<210> 324
<211> 126
<212> PRT
<213>

<400> 324
Leu Asn Ser Leu Ala Asp Ile Leu Leu Ile Gln Ser Gly Lys Met Thr
1   5   10   15
Gly Leu Lys Asp Ser Ala Asn Arg Val Leu Ile Ile Gly Gly Thr Gly
            20   25   30
Tyr Ile Gly Lys Tyr Met Ala Lys Ala Ser Val Ser Gln Gly Tyr Pro
        35   40   45
Thr Tyr Val Leu Val Arg Pro Ala Thr Ala Ala Ala Pro Asp Ser Phe
    50   55   60
Lys Ala Lys Leu Leu Gln Gln Phe Lys Asp Ile Gly Ile His Ile Leu
65   70   75   80
Glu Gly Ser Leu Asp Asp His Asn Ser Leu Val Asp Ala Ile Lys Gln
                85   90   95
Val Asp Ile Val Ile Ser Ala Val Ala Ile Pro Gln His Leu Asp Gln
            100   105   110
Phe Asn Ile Ile Asn Ala Ile Lys Asp Val Gly Met Glu Ile
        115   120   125

<210> 325
<211> 164
<212> PRT
<213>

<400> 325
Asn Gly Glu Leu His Pro Ser His Tyr Cys Glu Arg Asp Leu Leu Lys
1   5   10   15
Val Val Asp Arg Glu His Val Phe Thr Tyr Ala Asp Asp Ala Cys Ser
            20   25   30
Ala Thr Tyr Pro Leu Met Gln Lys Leu Arg Gln Val Leu Val Asp Gln
        35   40   45
Ala Leu Val Asn Gly Glu Ser Glu Leu Asn Pro Ser Thr Ser Ile Phe
    50   55   60
Gln Lys Ile Val Ala Phe Glu Glu Glu Leu Lys Ala Gln Leu Pro Lys
65   70   75   80
Asp Val Glu Gly Val Arg Val Gln Tyr Glu Thr Gly Asn Leu Ala Ile
                85   90   95
Pro Asn Gln Ile Lys Glu Cys Arg Ser Tyr Pro Leu Tyr Lys Leu Val
            100   105   110
Arg Glu Glu Leu Gly Thr Ala Leu Leu Thr Gly Glu Gly Val Ile Ser
        115   120   125
Pro Gly Glu Asp Phe Asp Lys Val Phe Thr Ala Ile Cys Ala Gly Lys
    130   135   140
Leu Ile Asp Pro Leu Leu Glu Cys Leu Ser Gly Trp Asn Gly Ala Pro
145   150   155   160
Leu Pro Ile Ser

<210> 326
<211> 114
<212> PRT

01.06.08

<213>

<400> 326
Leu Val Asp Gln Ala Leu Val Asn Gly Glu Ser Glu Leu Asn Pro Ser
1   5   10   15
Thr Ser Ile Phe Gln Lys Ile Val Ala Phe Glu Glu Glu Leu Lys Ala
            20   25   30
Gln Leu Pro Lys Asp Val Glu Gly Val Arg Val Gln Tyr Glu Thr Gly
        35   40   45
Asn Leu Ala Ile Pro Asn Gln Ile Lys Glu Cys Arg Ser Tyr Pro Leu
    50   55   60
Tyr Lys Leu Val Arg Glu Glu Leu Gly Thr Ala Leu Leu Thr Gly Glu
65   70   75   80
Gly Val Ile Ser Pro Gly Glu Asp Phe Asp Lys Val Phe Thr Ala Ile
                85   90   95
Cys Ala Gly Lys Leu Ile Asp Pro Leu Leu Glu Cys Leu Ser Gly Trp
            100   105   110
Asn Gly

<210> 327
<211> 226
<212> PRT
<213>

<400> 327
Pro Ser Leu Asp Tyr Gly Phe Lys Gly Ala Glu Ile Ala Met Ala Ser
1   5   10   15
Tyr Cys Ser Glu Leu Gln Phe Leu Ala Asn Pro Val Thr Asn His Val
            20   25   30
Gln Ser Ala Glu Gln His Asn Gln Asp Val Asn Ser Leu Gly Leu Ile
        35   40   45
Ser Ser Arg Lys Thr Ala Glu Ala Ile Asp Val Leu Lys Leu Met Ser
    50   55   60
Ser Thr Phe Leu Val Ala Leu Cys Gln Ala Ile Asp Leu Arg His Leu
65   70   75   80
Glu Glu Asn Leu Lys Ser Val Val Lys Asn Thr Val Asn Gln Val Ala
                85   90   95
Lys Lys Val Leu Tyr Val Gly Ser Asn Gly Glu Leu His Pro Ser Arg
            100   105   110
Phe Ser Glu Lys Asp Leu Ile Lys Val Val Asp Arg Glu Tyr Val Phe
        115   120   125
Ala Tyr Ile Asp Asp Pro Cys Ser Ala Thr Tyr Pro Leu Met Gln Lys
    130   135   140
Leu Arg Gln Val Leu Val Asp Asp Ala Leu Asp Asp Val Asp Arg Glu
145   150   155   160
Lys Asn Pro Ser Thr Ser Ile Phe Gln Lys Ile Gly Ala Phe Glu Glu
                165   170   175
Glu Leu Lys Ala Leu Leu Pro Lys Glu Val Glu Asn Ala Arg Ala Gln
            180   185   190
Phe Glu Ser Gly Asn Ser Ala Ile Ala Asn Lys Ile Arg Gly Cys Arg
        195   200   205
Ser Tyr Pro Leu Tyr Arg Phe Val Arg Glu Glu Leu Gly Thr Gly Leu
    210   215   220
Leu Thr
225

01.06.08

<210> 328
<211> 424
<212> PRT
<213>

<400> 328

```
Met Glu Met Glu Ser Thr Thr Gly Thr Gly Asn Gly Leu His Ser Leu
1               5                   10                  15
Cys Ala Ala Gly Ser His His Ala Asp Pro Leu Asn Trp Gly Ala Ala
            20                  25                  30
Ala Ala Ala Leu Thr Gly Ser His Leu Asp Glu Val Lys Arg Met Val
        35                  40                  45
Glu Glu Tyr Arg Arg Pro Ala Val Arg Leu Gly Gly Glu Ser Leu Thr
    50                  55                  60
Ile Ala Gln Val Ala Ala Val Ala Ser Gln Glu Gly Val Gly Val Glu
65                  70                  75                  80
Leu Ser Glu Ala Ala Arg Pro Arg Val Lys Ala Ser Ser Asp Trp Val
                85                  90                  95
Met Glu Ser Met Asn Lys Gly Thr Asp Ser Tyr Gly Val Thr Thr Gly
            100                 105                 110
Phe Gly Ala Thr Ser His Arg Arg Thr Lys Gln Gly Gly Ala Leu Gln
        115                 120                 125
Lys Glu Leu Ile Arg Phe Leu Asn Ala Gly Ile Phe Gly Asn Gly Thr
    130                 135                 140
Glu Ser Cys His Thr Leu Pro Gln Ser Ser Thr Arg Ala Ala Met Leu
145                 150                 155                 160
Val Arg Val Asn Thr Leu Leu Gln Gly Tyr Ser Gly Ile Arg Phe Glu
                165                 170                 175
Ile Leu Glu Ala Ile Thr Lys Phe Leu Asn His Asn Ile Thr Pro Cys
            180                 185                 190
Leu Pro Leu Arg Gly Thr Ile Thr Ala Ser Gly Asp Leu Val Pro Leu
        195                 200                 205
Ser Tyr Ile Ala Gly Leu Leu Thr Gly Arg Pro Asn Ser Lys Ala Val
    210                 215                 220
Gly Pro Asp Gly Lys Ser Leu Asp Ala Val Glu Ala Phe Arg Leu Ala
225                 230                 235                 240
Gly Ile Asp Thr Gly Phe Phe Glu Leu Gln Pro Lys Glu Gly Leu Ala
                245                 250                 255
Leu Val Asn Gly Thr Ala Val Gly Ser Gly Leu Ala Ser Ile Val Leu
            260                 265                 270
Phe Glu Ala Asn Ile Leu Ala Val Leu Ser Glu Val Leu Ser Ala Ile
        275                 280                 285
Phe Ala Glu Val Met Gln Gly Lys Pro Glu Phe Thr Asp His Leu Thr
    290                 295                 300
His Lys Leu Lys His His Pro Gly Gln Ile Glu Ser Ala Ala Ile Met
305                 310                 315                 320
Glu His Ile Leu Asp Gly Ser Ala Tyr Val Lys Ala Ala Lys Lys Leu
                325                 330                 335
His Glu Met Asp Pro Leu Gln Lys Pro Lys Gln Asp Arg Tyr Ala Leu
            340                 345                 350
Arg Thr Ser Pro Gln Trp Leu Gly Pro Gln Ile Glu Val Ile Arg Ala
        355                 360                 365
Ala Thr Lys Met Ile Glu Arg Glu Ile Asn Ser Val Asn Asp Asn Pro
    370                 375                 380
Leu Ile Asp Val Ala Arg Asn Lys Ala Leu His Gly Gly Asn Phe Gln
385                 390                 395                 400
```

Gly Thr Pro Ile Gly Val Ser Met Asp Asn Thr Arg Leu Ala Val Ala
405 410 415
Ser Ile Gly Lys Leu Met Phe Ala
420

<210> 329
<211> 97
<212> PRT
<213>

<400> 329
Asn Ser Gly Ile Thr Pro Cys Leu Pro Leu Arg Gly Ser Ile Ser Ala
1 5 10 15
Ser Gly Asp Leu Val Pro Phe Ser Tyr Ile Ala Gly Leu Leu Thr Gly
20 25 30
Arg Pro Asn Ser Lys Ala Val Gly Pro Ala Gly Glu Thr Leu Thr Ala
35 40 45
Lys Gln Ala Phe Glu Leu Ala Gly Ile Ser Gly Gly Phe Phe Glu Leu
50 55 60
Gln Pro Lys Glu Gly Leu Ala Leu Val Asn Gly Thr Gly Val Gly Ser
65 70 75 80
Ala Leu Ala Ala Ile Val Leu Phe Glu Ala Asn Met Leu Thr Val Leu
85 90 95
Ser

<210> 330
<211> 412
<212> PRT
<213>

<400> 330
Val Tyr Arg Ser Ile Asn Ser Gln Ala Glu Ala Pro Ser Trp Pro Asn
1 5 10 15
Gly Ser Cys Ser Asp His Gly Val Cys Leu Gly Arg Glu Ser Tyr Met
20 25 30
Lys His Ala Ala Lys Leu His Glu Met Asn Pro Leu Gln Lys Pro Lys
35 40 45
Gln Asp Arg Tyr Ala Leu Arg Thr Ser Pro Gln Trp Leu Gly Pro Gln
50 55 60
Val Glu Ile Ile Arg Ser Ala Thr His Met Ile Glu Arg Glu Ile Asn
65 70 75 80
Ser Val Asn Asp Asn Pro Val Ile Asp Val Ala Arg Asp Lys Ala Leu
85 90 95
His Gly Gly Asn Phe Gln Gly Thr Pro Ile Gly Val Ser Met Asp Asn
100 105 110
Leu Arg Leu Ser Ile Ser Ala Ile Gly Lys Leu Met Phe Ala Gln Phe
115 120 125
Ser Glu Leu Val Asn Asp Tyr Tyr Asn Gly Gly Leu Pro Ser Asn Leu
130 135 140
Ser Gly Gly Pro Asn Pro Ser Leu Asp Tyr Gly Leu Lys Gly Ala Glu
145 150 155 160
Ile Ala Met Ala Ser Tyr Thr Ser Glu Leu Leu Tyr Leu Ala Asn Pro
165 170 175
Val Thr Ser His Val Gln Ser Ala Glu Gln His Asn Gln Asp Val Asn
180 185 190

Ser Leu Gly Leu Val Ser Ala Arg Lys Ser Ala Glu Ala Ile Asp Ile
        195   200   205
Leu Lys Leu Met Leu Ser Thr Tyr Leu Thr Ala Leu Cys Gln Ala Val
    210   215   220
Asp Leu Arg His Leu Glu Glu Asn Met Leu Ala Thr Val Lys Gln Ile
225   230   235   240
Val Ser Gln Val Ala Lys Lys Thr Leu Ser Thr Gly Leu Asn Gly Glu
                245   250   255
Leu Leu Pro Gly Arg Phe Cys Glu Lys Asp Leu Leu Gln Val Val Asp
            260   265   270
Asn Glu His Val Phe Ser Tyr Ile Asp Asp Pro Cys Asn Ala Ser Tyr
        275   280   285
Pro Leu Thr Gln Lys Leu Arg Asn Ile Leu Val Glu His Ala Phe Lys
    290   295   300
Asn Ala Glu Gly Glu Lys Asp Pro Asn Thr Ser Ile Phe Asn Lys Ile
305   310   315   320
Pro Val Phe Glu Ala Glu Leu Lys Ala Gln Leu Glu Pro Gln Val Ser
                325   330   335
Leu Ala Arg Glu Ser Tyr Asp Lys Gly Thr Ser Pro Leu Pro Asn Arg
            340   345   350
Ile Gln Glu Cys Arg Ser Tyr Pro Leu Tyr Glu Phe Val Arg Asn Gln
        355   360   365
Leu Gly Thr Leu Gln Ala Trp Leu Phe His Ile Asn Ile Val Met Arg
    370   375   380
Cys Leu Ile Ile Tyr Cys Ser Leu Phe Phe Pro Glu Leu Ala Thr Ala
385   390   395   400
Phe Asp Ser Val His Tyr Ala Arg Thr Lys Pro Leu
                405   410

<210> 331
<211> 132
<212> PRT
<213>

<400> 331
Gly Ser Ser Cys Arg Ser Leu Ile Arg Glu Leu Phe Val Cys Leu Ile
1   5   10   15
Ile Val His Met Ala Pro Gln Glu Phe Thr Gly Glu Val Lys Phe Cys
            20   25   30
Ala Gly Asn Gly Gly Thr Ala Ser Leu Asn Asp Pro Leu Asn Trp Ala
        35   40   45
Ala Ala Ala Glu Ser Met Lys Gly Ser His Phe Glu Glu Val Lys Arg
    50   55   60
Met Trp Glu Glu Phe Arg Ser Pro Val Val Arg Leu Gln Gly Ser Gly
65   70   75   80
Leu Thr Ile Ala Gln Val Ala Ala Val Ala Arg Arg Thr Gly Ser Val
                85   90   95
Arg Val Glu Leu Glu Thr Gly Ala Lys Ala Arg Val Asp Glu Ser Ser
            100   105   110
Asn Trp Val Met Asp Ser Met Ala Asn Gly Thr Asp Ser Tyr Gly Val
        115   120   125
Thr Thr Gly Phe
    130

<210> 332
<211> 170
<212> PRT

01.06.06

<213>

<400> 332
Asn Leu Val Lys Leu Gly Ser Ile Leu Gly Met Ala Ile Gly Val Ala
1   5   10   15
Leu Phe Ser Ser Leu Leu Val Leu Ser Phe Val Ser Pro Ile Ser Ser
            20   25   30
Leu Ser Ser Asn Tyr Tyr Asp Lys Thr Cys Pro Asn Ala Glu Leu Ile
        35   40   45
Val Ala Asn Ala Val Lys Asn Ala Ala Met Lys Asp Lys Thr Val Pro
    50   55   60
Ala Ala Leu Leu Arg Met His Phe His Asp Cys Phe Ile Arg Gly Cys
65   70   75   80
Asp Ala Ser Val Leu Leu Asn Ser Lys Gly Ser Asn Lys Ala Glu Lys
                85   90   95
Asp Gly Pro Pro Asn Val Ser Leu His Ser Phe Phe Val Ile Asp Asn
            100   105   110
Ala Lys Lys Glu Leu Glu Ala Ser Cys Pro Gly Val Val Ser Cys Ala
        115   120   125
Asp Ile Leu Ala Leu Ala Ala Arg Asp Ser Val Val Leu Ser Gly Gly
    130   135   140
Pro Thr Trp Asp Val Pro Lys Gly Arg Lys Asp Gly Arg Thr Ser Lys
145   150   155   160
Ala Ser Glu Thr Thr Gln Leu Pro Ala Pro
                165   170

<210> 333
<211> 118
<212> PRT
<213>

<400> 333
Leu Val Ile Thr Ile Val Val Phe Phe Gly His Ile Gly Asp Ser Glu
1   5   10   15
Gly Gly Asp Leu Arg Lys Asn Phe Tyr Lys Ser Ala Cys Pro Leu Ala
            20   25   30
Glu Glu Ile Val Lys Asn Val Thr Trp Lys His Ala Ala Ser Asn Ser
        35   40   45
Ala Leu Pro Ala Lys Phe Leu Arg Met His Phe His Asp Cys Phe Val
    50   55   60
Arg Gly Cys Asp Gly Ser Val Leu Leu Asp Ser Thr Ala Asn Asn Lys
65   70   75   80
Ala Glu Lys Val Ala Val Pro Asn Gln Ser Leu Thr Gly Phe Asp Val
                85   90   95
Ile Asp Glu Ile Lys Glu Lys Leu Glu Glu Thr Cys Pro Gly Val Val
            100   105   110
Ser Cys Ala Asp Ile Leu
        115

<210> 334
<211> 65
<212> PRT
<213>

<400> 334
Asn Ala Asp Pro Ile Ala Val Ile Asp Glu Ala Leu Ser Thr Gly Gly

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

<210> 335
<211> 104
<212> PRT
<213>

<400> 335
Lys Pro His Gly Glu Thr Pro Leu Ile Ile Gly Glu Trp Trp Asn Ala
1 5 10 15
Asp Pro Ile Ala Val Ile Asp Glu Ala Leu Arg Thr Gly Gly Ala Pro
20 25 30
Asn Leu Ser Asp Ala Tyr Thr Leu Asn Gly Gln Pro Gly Asp Leu Tyr
35 40 45
Asn Cys Ser Arg Ala Gly Thr Phe Arg Phe Pro Val Lys Gln Gly Glu
50 55 60
Thr Tyr Leu Leu Arg Met Val Asn Ala Ala Leu Asn Ser Ala His Phe
65 70 75 80
Phe Lys Ile Ala Gly His Lys Phe Thr Val Val Ala Val Asp Ala Ser
85 90 95
Tyr Thr Lys Pro Tyr Lys Gln Met
100

<210> 336
<211> 125
<212> PRT
<213>

<400> 336
Asp Ala His Thr Ile Asn Gly Lys Pro Gly Pro Leu Phe Lys Cys Pro
1 5 10 15
Thr Lys Asp Thr Phe Val Val Pro Val Glu His Gly Lys Thr Tyr Leu
20 25 30
Leu Arg Ile Ile Asn Ala Ala Leu Asn Asp Glu Leu Phe Phe Asp Val
35 40 45
Ala Asn His His Leu Lys Val Val Glu Ile Asp Ala Val Tyr Thr Lys
50 55 60
Pro Leu Ile Thr Asn Ser Ile Val Ile Ala Pro Gly Gln Thr Thr Asn
65 70 75 80
Ala Leu Ile His Thr Asn Lys Arg Ser Gly Arg Tyr Phe Met Ala Ala
85 90 95
Arg Ser Phe Met Asp Ala Pro Val Ser Val Asp Asn Lys Thr Ala Thr
100 105 110
Ala Ile Leu Gln Tyr Val Asn Ser Ile Gln Ile Leu Leu
115 120 125

<210> 337
<211> 178

<212> PRT
<213>

<400> 337
Asn Met Met Ala Pro Met Ala Gly Ala Glu Tyr Gly Ile Lys Leu Ile
1 5 10 15
Ile Gln Leu Leu Val Val Leu Leu Ala Val Gln Leu Val Ala Gly Lys
20 25 30
Thr Thr Arg His Tyr Ser Phe His Val Arg Leu Lys Asn Val Thr Arg
35 40 45
Leu Cys His Thr Lys Pro Leu Ile Thr Val Asn Gly Lys Ser Pro Gly
50 55 60
Pro Lys Val Val Val Arg Glu Gly Asp Arg Val Ile Ile Lys Val His
65 70 75 80
Asn His Val Ser Asn Asn Val Ser Ile His Trp His Gly Val Arg Gln
85 90 95
Leu Arg Ser Gly Trp Ala Asp Gly Pro Ala Tyr Ile Thr Gln Cys Pro
100 105 110
Ile Gln Thr Gly Gln Thr Tyr Val Tyr Asn Phe Thr Val Thr Gly Gln
115 120 125
Arg Gly Thr Leu Trp Trp His Ala His Ile Ser Trp Leu Arg Ala Ser
130 135 140
Val Tyr Gly Ala Phe Ile Ile Tyr Pro Lys Arg His Val Pro Tyr Pro
145 150 155 160
Phe Pro Lys Pro Tyr Lys Glu Val Pro Leu Ile Leu Gly Glu Trp Trp
165 170 175
Asn Ala

<210> 338
<211> 358
<212> PRT
<213>

<400> 338
Pro Ile Pro Pro Gly Gly Arg Tyr Thr Tyr Arg Phe Asn Ile Ser Gly
1 5 10 15
Gln Glu Gly Thr Val Trp Trp His Ala His Tyr Ser Trp Leu Arg Ala
20 25 30
Thr Val His Gly Ala Phe Val Ile Leu Pro Lys Lys Gly Ser Ser Tyr
35 40 45
Pro Phe Ser Lys Pro His Ala Glu Ile Pro Ile Ile Ile Gly Glu Trp
50 55 60
Trp Asn Ala Asn Pro Ile Ala Val Ile Asp Glu Ala Val Arg Thr Gly
65 70 75 80
Gly Ala Pro Asn Leu Ser Asp Ala Phe Thr Ile Asn Gly Gln Pro Gly
85 90 95
Asp Leu Phe Asn Cys Ser Thr Ser Gly Thr Phe Arg Leu Pro Val Glu
100 105 110
Ser Gly Glu Thr Tyr Leu Leu Arg Ile Val Asn Ala Ala Leu Asn Ser
115 120 125
Gly His Phe Phe Lys Ile Ala Gly His Glu Phe Thr Val Val Ala Val
130 135 140
Asp Ala Cys Tyr Thr Lys Pro Tyr Lys Thr Asp Val Leu Val Ile Ser
145 150 155 160
Ala Gly Gln Thr Thr Asp Val Leu Ile Thr Ala Asn Gln Ser Val Gly

165 170 175
Arg Tyr Tyr Met Ala Ala Arg Ala Tyr Gln Asn Gln Ala Ala Gly Asp
180 185 190
Phe Thr Asn Thr Thr Thr Thr Ala Ile Leu Glu Tyr Ile Gly Ser Glu
195 200 205
Asn Ser Thr Arg Pro Ile Leu Pro Ser Leu Pro Ala Tyr Asn Asp Thr
210 215 220
Ala Thr Val Thr Arg Phe Ser Arg Ala Leu Arg Ser Leu Ala Ser Gln
225 230 235 240
Glu His Pro Val Asn Val Pro His Thr Ile Asp Glu Ser Leu Ile Ser
245 250 255
Thr Val Gly Leu Gly Leu Leu Pro Cys Gly Ala Gly Asn Thr Cys Glu
260 265 270
Gly Pro Asn Gly Thr Arg Leu Ser Ala Ser Ile Asn Asn Ile Ser Tyr
275 280 285
Val Glu Pro Thr Ile Ser Leu Leu Gln Ala Tyr Tyr Tyr Thr Ala Asn
290 295 300
Gly Ile Phe Thr Gly Asp Phe Pro Ser Lys Pro Glu Val Arg Phe Asn
305 310 315 320
Tyr Thr Gly Asp Asp Ile Pro Arg Lys Phe Trp Ala Pro Asp Pro Ala
325 330 335
Thr Lys Val Lys Val Leu Glu Tyr Asn Ser Thr Val Gln Leu Val Phe
340 345 350
Gln Ser Thr Asn Ile Phe
355

<210> 339
<211> 160
<212> PRT
<213>

<400> 339
Phe Arg Arg Glu Thr Val Ile Gln His Ile Ser Arg Ser Phe Leu Ser
1 5 10 15
Lys Met Val Ile Ser Lys Tyr Ala Ala Ala Met Ser Cys Leu Leu Ile
20 25 30
Ala Val Val Ala Leu Glu Val Gly Ala Glu Thr Arg His Tyr Lys Phe
35 40 45
Asp Ile Lys Phe Lys Asn Val Thr Arg Leu Cys His Thr Lys Pro Ile
50 55 60
Val Thr Ala Asn Gly Lys Phe Pro Gly Pro Thr Ile Tyr Ala Arg Glu
65 70 75 80
Gly Asp Thr Val Thr Val Lys Val Thr Asn His Val Thr Tyr Asn Val
85 90 95
Ser Ile His Trp His Gly Ile Arg Gln Leu Arg Thr Gly Trp Ala Asp
100 105 110
Gly Pro Ala Tyr Ile Thr Gln Cys Pro Ile Gln Thr Gly Gln Thr Tyr
115 120 125
Val Tyr Asn Phe Thr Ile Thr Gly Gln Arg Gly Thr Leu Phe Trp His
130 135 140
Ala His Ile Leu Trp Leu Arg Ala Thr Leu Asn Gly Pro Ile Val Ile
145 150 155 160

<210> 340
<211> 156
<212> PRT

<213>

<400> 340
Gly Cys Cys Leu Ser Thr Arg Met Asn Met Ser Arg Ser Lys Ala Leu
1 5 10 15
Leu Cys Pro Ser Pro Ala His Val Lys Tyr Val Leu Ile Val Ile Leu
20 25 30
Leu Ile Ile Met Ile Gln Cys Pro Asp Ile Val Ala Gly Lys His Ala
35 40 45
Gln Thr Thr Arg His Tyr Lys Phe Asn Val Arg Leu Ser Asn Val Thr
50 55 60
Arg Leu Cys Arg Thr Lys Pro Leu Ile Thr Val Asn Gly Lys Tyr Pro
65 70 75 80
Gly Pro Thr Val Val Ala Arg Glu Gly Asp Arg Val Ile Ile Lys Leu
85 90 95
Val Asn His Val Lys Asp Asn Val Thr Ile His Trp His Gly Val Arg
100 105 110
Gln Leu Arg Ser Gly Trp Ala Asp Gly Pro Gly Tyr Ile Thr Gln Cys
115 120 125
Pro Leu Gln Thr Gly Met Ser Tyr Val Tyr Asn Phe Thr Ile Val Gly
130 135 140
Gln Arg Gly Thr Leu Trp Trp His Ala His Ile Ser
145 150 155

<210> 341
<211> 157
<212> PRT
<213>

<400> 341
Val Ile Gln Gln Ala Leu Gln Thr Gly Gly Gly Pro Asn Val Ser Asp
1 5 10 15
Ala Tyr Thr Ile Asn Gly Leu Pro Gly Pro Leu Tyr Asn Cys Ser Asn
20 25 30
Glu Thr Phe Val Leu Lys Val His Pro Gly Gln Thr Tyr Leu Leu Arg
35 40 45
Ile Ile Asn Ala Ala Leu Asn Asp Glu Leu Phe Leu Ala Ile Ala Asn
50 55 60
His Ser Leu Thr Val Val Glu Val Asp Ala Val Tyr Val Lys Pro Phe
65 70 75 80
Gln Thr Asp Thr Leu Leu Ile Thr Pro Gly Gln Thr Thr Asn Val Leu
85 90 95
Leu Thr Ala Asn Ala Thr Ser Gly Lys Asn Lys Gln Phe Val Ile Ala
100 105 110
Ala Ser Pro Phe Val Thr Gly Ser Gly Thr Phe Asp Asn Ser Thr Val
115 120 125
Ala Gly Ile Val Ser Tyr Asn Ser His Lys Phe Lys Asn Ser Ser Thr
130 135 140
Ile Ile Leu Pro Lys Leu Pro Ser Phe Asn Asp Thr Asn
145 150 155

<210> 342
<211> 134
<212> PRT
<213>

<400> 342
Gly Gln Thr Thr Asn Val Leu Leu Glu Ala Asn Lys Arg Ser Gly Ser
1   5   10   15
Tyr Phe Val Ala Ala Arg Pro Phe Met Asp Ala Pro Val Thr Val Asn
            20   25   30
Asn Lys Thr Ala Thr Ala Ile Leu His Tyr Ile Gly Arg Asn Ser Glu
        35   40   45
Ser Asp Ile Pro Ala Val Asn Pro Leu Met Pro Arg Leu Pro Leu Leu
    50   55   60
Asn Asp Thr Ala Phe Ala Thr Ser Phe Thr Ser Lys Leu Arg Ser Leu
65   70   75   80
Asn Ser Val Gln Phe Pro Ala Lys Val Pro Gln Thr Ile Asp Arg Asn
                85   90   95
Leu Phe Phe Ala Val Gly Leu Ala Thr Glu Ser Cys Gln Thr Cys Asn
            100   105   110
Gly Gly Leu Arg Ala Ser Ala Ser Ile Asn Asn Ile Ser Phe Val Met
        115   120   125
Pro Ser Ile Ser Leu Leu
    130

<210> 343
<211> 419
<212> PRT
<213>

<400> 343
Thr Thr Tyr Pro Phe Thr Phe Thr Arg Pro His Arg Gln Ile Pro Ile
1   5   10   15
Leu Leu Gly Glu Trp Trp Asn Arg Asn Pro Met Asp Val Val Asn Gln
            20   25   30
Ala Thr Gln Thr Gly Ala Ala Pro Asn Val Ser Asp Ala Phe Thr Ile
        35   40   45
Asn Gly Gln Pro Gly Asp Leu Tyr Lys Cys Ser Thr Ser Asp Thr Phe
    50   55   60
Ser Val Ser Met Lys Gly Gly Glu Thr Asn Leu Leu Arg Val Ile Asn
65   70   75   80
Ala Ala Leu Asn Thr Asp Leu Phe Phe Ser Ile Ala Ser His Thr Met
                85   90   95
Thr Val Val Ala Val Asp Ala Leu Tyr Thr Lys Pro Phe Gln Thr Asn
            100   105   110
Val Leu Met Leu Gly Pro Gly Gln Thr Thr Asp Ile Leu Leu Thr Ala
        115   120   125
Asn Gln Ala Thr Gly Arg Tyr Tyr Met Ala Ala Arg Ala Tyr Ser Ser
    130   135   140
Gly Gln Gly Val Pro Phe Asp Asn Thr Thr Thr Thr Ala Ile Leu Glu
145   150   155   160
Tyr Glu Gly Ser Ser Lys Thr Ser Thr Pro Val Met Pro Asn Leu Pro
                165   170   175
Phe Tyr Asn Asp Thr Asn Ser Ala Thr Ser Phe Ala Asn Gly Leu Arg
            180   185   190
Ser Leu Gly Ser His Asp His Pro Val Phe Val Pro Gln Ser Val Glu
        195   200   205
Glu Asn Leu Phe Tyr Thr Ile Gly Leu Gly Leu Ile Lys Cys Pro Gly
    210   215   220
Gln Ser Cys Gly Gly Pro Asn Gly Ser Arg Phe Ala Ala Ser Met Asn
225   230   235   240
Asn Ile Ser Phe Val Pro Pro Thr Thr Ser Ser Ile Leu Gln Ala Gln

                    245   250   255
His Phe Gly Met Lys Gly Val Phe Ser Ala Asp Phe Pro Asp Asn Pro
            260   265   270
Ser Val Gly Phe Asp Tyr Thr Ala Gln Asn Ile Ser Arg Asp Leu Trp
        275   280   285
Ser Pro Val Lys Ala Thr Arg Val Lys Val Leu Lys Tyr Asn Ser Thr
    290   295   300
Val Gln Val Ile Leu Gln Gly Thr Asn Ile Phe Ala Gly Glu Ser His
305   310   315   320
Pro Ile His Leu His Gly Tyr Asp Phe Tyr Ile Val Gly Ala Gly Phe
                    325   330   335
Gly Asn Tyr Asn Ala Gln Thr Asp Pro His Lys Phe Asn Leu Val Asp
            340   345   350
Pro Pro Met Arg Asn Thr Val Asn Val Pro Val Asn Gly Trp Ala Ala
        355   360   365
Ile Arg Phe Val Ala Asp Asn Pro Gly Ala Trp Val Met His Cys His
    370   375   380
Leu Asp Val His Ile Thr Trp Gly Leu Ala Met Val Phe Val Val Asn
385   390   395   400
Asn Gly Pro Asp Ala Leu Leu Ser Leu Gln Ser Pro Pro Arg Asp Leu
                    405   410   415
Pro Leu Cys

<210> 344
<211> 111
<212> PRT
<213>

<400> 344
Leu Asn Tyr Asn Ala Thr Val Gln Val Ile Leu Gln Gly Thr Asn Ile
1   5   10   15
Phe Ala Gly Glu Ser His Pro Ile His Leu His Gly Tyr Asp Phe Tyr
            20   25   30
Ile Val Gly Ala Gly Phe Gly Asn Tyr Asn Ala Gln Thr Asp Pro Gln
        35   40   45
Lys Phe Asn Leu Val Asp Pro Pro Met Arg Asn Thr Val Asn Val Pro
    50   55   60
Val Asn Gly Trp Ala Ala Ile Arg Phe Val Ala Asp Asn Pro Gly Ala
65   70   75   80
Trp Val Met His Cys His Leu Asp Val His Ile Thr Trp Gly Leu Ala
                85   90   95
Met Val Phe Val Val Asn Asn Gly Pro Asp Pro Leu Leu Ser Leu
            100   105   110

<210> 345
<211> 93
<212> PRT
<213>

<400> 345
Thr Arg Val Lys Val Leu Asn Tyr Asn Thr Thr Val Gln Val Ile Leu
1   5   10   15
Gln Gly Thr Asn Ile Phe Ala Gly Glu Ser His Pro Ile His Leu His
            20   25   30
Gly Tyr Asp Phe Tyr Ile Val Gly Ala Gly Phe Gly Asn Tyr Asn Pro

01·06·08

```
        35                  40                  45
Gln Thr Asp Pro Gln Lys Phe Asn Leu Ala Asp Pro Pro Met Arg Asn
    50                  55                  60
Thr Val Asn Val Pro Val Asn Gly Trp Ala Ala Ile Arg Phe Val Ala
65                  70                  75                  80
Asp Asn Pro Gly Ala Trp Val Met His Cys His Leu Asp
                85                  90
```

<210> 346
<211> 93
<212> PRT
<213>

<400> 346

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

<210> 347
<211> 114
<212> PRT
<213>

<400> 347

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

<210> 348
<211> 551
<212> PRT
<213>

<400> 348

01.06.08

Met Glu Gly Gln Ile Ala Ala Leu Ser Lys Glu Asp Glu Phe Ile Phe
1 5 10 15
His Ser Pro Phe Pro Ala Val Pro Val Pro Glu Asn Ile Ser Leu Phe
20 25 30
Gln Phe Val Leu Glu Gly Ala Glu Lys Tyr Arg Asp Lys Val Ala Leu
35 40 45
Val Glu Ala Ser Thr Gly Lys Glu Tyr Asn Tyr Gly Gln Val Ile Ser
50 55 60
Leu Thr Arg Asn Val Ala Ala Gly Leu Val Asp Lys Gly Ile Gln Lys
65 70 75 80
Gly Asp Val Val Phe Val Leu Leu Pro Asn Met Ala Glu Tyr Pro Ile
85 90 95
Ile Val Leu Gly Ile Met Leu Ala Gly Ala Val Phe Ser Gly Ala Asn
100 105 110
Pro Ser Ala His Ile Asn Glu Val Glu Lys His Ile Gln Asp Ser Gly
115 120 125
Ala Lys Ile Val Val Thr Val Gly Ser Ala Tyr Glu Lys Val Arg Gln
130 135 140
Val Lys Leu Pro Val Ile Ile Ala Asp Asn Glu His Val Met Asn Thr
145 150 155 160
Ile Pro Leu Gln Glu Ile Phe Glu Arg Asn Tyr Glu Ala Ala Gly Pro
165 170 175
Phe Val Gln Ile Cys Gln Asp Asp Leu Cys Ala Leu Pro Tyr Ser Ser
180 185 190
Gly Thr Thr Gly Ala Ser Lys Gly Val Met Leu Thr His Arg Asn Leu
195 200 205
Ile Ala Asn Leu Cys Ser Ser Leu Phe Asp Val His Glu Ser Leu Val
210 215 220
Gly Asn Phe Thr Thr Leu Gly Leu Met Pro Phe Phe His Ile Tyr Gly
225 230 235 240
Ile Thr Gly Ile Cys Cys Ala Thr Leu Arg Asn Gly Gly Lys Val Val
245 250 255
Val Met Ser Arg Phe Asp Leu Arg His Phe Ile Ser Ser Leu Ile Thr
260 265 270
Tyr Glu Val Asn Phe Ala Pro Ile Val Pro Pro Ile Met Leu Ser Leu
275 280 285
Val Lys Asn Pro Ile Val Asn Glu Phe Asp Leu Ser Arg Leu Lys Leu
290 295 300
Lys Ala Val Met Thr Ala Ala Ala Pro Leu Ala Pro Asp Leu Leu Arg
305 310 315 320
Ala Phe Glu Glu Lys Phe Pro Gly Val Glu Val Gln Glu Ala Tyr Gly
325 330 335
Leu Thr Glu His Ser Cys Ile Thr Leu Thr His Cys Ala Pro Gly Asn
340 345 350
Ile Arg Gly Arg Ala Lys Lys Ser Ser Val Gly Phe Ile Ile Pro Asn
355 360 365
Leu Glu Val Lys Phe Ile Asp Pro Glu Thr Gly Lys Ser Leu Pro Arg
370 375 380
Asn Ser Ile Gly Glu Val Cys Val Arg Ser Gln Cys Val Met Arg Gly
385 390 395 400
Tyr Tyr Lys Lys Pro Thr Glu Thr Glu Lys Thr Val Asp Ser Asp Gly
405 410 415
Trp Leu His Thr Gly Asp Val Gly Phe Ile Asp Asp Asp Asp Asp Val
420 425 430
Phe Ile Val Asp Arg Ile Lys Glu Leu Ile Lys Tyr Lys Gly Phe Gln
435 440 445
Val Ala Pro Ala Glu Leu Glu Ala Ile Leu Leu Ser His Pro Ser Val

```
    450                 455                 460
Glu Asp Ala Ala Val Val Pro Leu Pro Asp Glu Glu Ala Gly Glu Ile
465                 470                 475                 480
Pro Ala Ala Cys Val Val Met Ala Ala Ser Ala Thr Glu Thr Glu Asp
                485                 490                 495
Asp Ile Ser Lys Phe Val Ala Ser Gln Val Ala Thr Tyr Lys Arg Val
            500                 505                 510
Arg Leu Val Lys Phe Val Ser Thr Ile Pro Lys Ser Ser Ser Gly Lys
        515                 520                 525
Ile Leu Arg Arg Leu Leu Arg Asp Asn Leu Arg Glu Thr Leu Lys Asn
    530                 535                 540
Gln His Gln Pro Leu Ser Thr
545                 550

      <210> 349
      <211> 544
      <212> PRT
      <213>

      <400> 349
Met Glu Ala Lys Pro Ser Glu Gln Pro Arg Glu Phe Ile Phe Arg Ser
 1               5                  10                  15
Lys Leu Pro Asp Ile Tyr Ile Pro Asp Asn Leu Ser Leu His Ala Tyr
            20                  25                  30
Cys Phe Glu Asn Ile Ser Glu Phe Ala Asp Arg Pro Cys Val Ile Asn
        35                  40                  45
Gly Ala Thr Gly Arg Thr Tyr Thr Tyr Ala Glu Val Glu Leu Ile Ser
    50                  55                  60
Arg Arg Val Ser Ala Gly Leu Asn Gly Leu Gly Val Gly Gln Gly Asp
65                  70                  75                  80
Val Ile Met Leu Leu Leu Gln Asn Cys Pro Glu Phe Val Phe Ala Phe
                85                  90                  95
Leu Gly Ala Ser Tyr Arg Gly Ala Ile Ser Thr Thr Ala Asn Pro Phe
            100                 105                 110
Tyr Thr Pro Gly Glu Ile Ala Lys Gln Ala Ser Ala Ala Arg Ala Lys
        115                 120                 125
Ile Val Ile Thr Gln Ala Ala Phe Ala Asp Lys Val Arg Pro Phe Ala
    130                 135                 140
Glu Glu Asn Gly Val Lys Val Val Cys Ile Asp Thr Ala Pro Glu Gly
145                 150                 155                 160
Cys Leu His Phe Ser Glu Leu Met Gln Ala Asp Glu Asn Ala Ala Pro
                165                 170                 175
Ala Ala Asp Val Lys Pro Asp Asp Val Leu Ala Leu Pro Tyr Ser Ser
            180                 185                 190
Gly Thr Thr Gly Leu Pro Lys Gly Val Met Leu Thr His Arg Gly Gln
        195                 200                 205
Val Thr Ser Val Ala Gln Gln Val Asp Gly Asp Asn Pro Asn Leu Tyr
    210                 215                 220
Phe His Lys Glu Asp Val Ile Leu Cys Thr Leu Pro Leu Phe His Ile
225                 230                 235                 240
Tyr Ser Leu Asn Ser Val Met Phe Cys Ala Leu Arg Val Gly Ala Ala
                245                 250                 255
Ile Leu Ile Met Gln Lys Phe Glu Ile Val Ala Leu Met Glu Leu Val
            260                 265                 270
Gln Arg Tyr Arg Val Thr Ile Leu Pro Ile Val Pro Pro Ile Val Leu
        275                 280                 285
Glu Ile Ala Lys Ser Ala Glu Val Asp Arg Tyr Asp Leu Ser Ser Ile
```

```
    290                 295                 300
Arg Thr Ile Met Ser Gly Ala Ala Pro Met Gly Lys Glu Leu Glu Asp
305                 310                 315                 320
Thr Val Arg Ala Lys Leu Pro Asn Ala Lys Leu Gly Gln Gly Tyr Gly
                325                 330                 335
Met Thr Glu Ala Gly Pro Val Leu Ala Met Cys Pro Ala Phe Ala Lys
            340                 345                 350
Glu Pro Phe Glu Ile Lys Ser Gly Ala Cys Gly Thr Val Val Arg Asn
        355                 360                 365
Ala Glu Met Lys Ile Val Asp Pro Glu Thr Gly Ala Ser Leu Pro Arg
    370                 375                 380
Asn Gln Ala Gly Glu Ile Cys Ile Arg Gly His Gln Ile Met Lys Gly
385                 390                 395                 400
Tyr Leu Asn Asp Ala Glu Ala Thr Ala Asn Thr Ile Asp Lys Glu Gly
                405                 410                 415
Trp Leu His Thr Gly Asp Ile Gly Tyr Ile Asp Asp Asp Asp Glu Leu
            420                 425                 430
Phe Ile Val Asp Arg Leu Lys Glu Leu Ile Lys Tyr Lys Gly Phe Gln
        435                 440                 445
Val Ala Pro Ala Glu Leu Glu Ala Met Leu Ile Ala His Pro Ser Ile
    450                 455                 460
Ser Asp Ala Ala Val Val Pro Met Lys Asp Glu Val Ala Gly Glu Val
465                 470                 475                 480
Pro Val Ala Phe Val Val Lys Ser Asn Gly Ser Val Ile Thr Glu Asp
                485                 490                 495
Glu Ile Lys Gln Tyr Ile Ser Lys Gln Val Val Phe Tyr Lys Arg Ile
            500                 505                 510
Lys Arg Val Phe Phe Thr Asp Ala Ile Pro Lys Ala Pro Ser Gly Lys
        515                 520                 525
Ile Leu Arg Lys Asp Leu Arg Ala Lys Leu Ala Ser Gly Val Tyr Asn
    530                 535                 540
```

<210> 350

<211> 717

<212> DNA

<213>

<400> 350

```
cctgttttgg caacaactcc agcagctctc tgctcttttt actataaaaa aacccatctt      60

cacttcttct gtacttgcac acgaacatta agcgcttgat cagaacttgt atcagctccc     120
caccaccacc aaacagaaga gaaacagaag aaaaggaaaa gttcgaacaa cttcgaacga     180
tgcgagccct tgctgttgtg ctcggttctg ctatcttgct ggcgtatgtc gcgagcagtg     240
cgggtgcgct gagcttggat tactatgacc agacgtgccc gaagctcgag ttttcggtga     300
gggggctgt gaagaaagcg atgaagaacg acaacaccgt tcctgctgct ttacttcgca     360
tgcacttcca cgactgcttc atcagaggat gtgacggttc cgtgctcttg aactcgacgg     420
caaagaacac agccgaaaaa gacgggccgc cgaacatctc actccacgca ttctatgtga     480
tcgaccttgc gaaggaagcg gtggaagctc agtgccctgg ggtcgtctct tgcgccgaca     540
tcttggcctt ggccgctcgg gatgctgtcg ctctgtctgg aggaccgcat tgggatgtgc     600
cgaaaggaag aaaagatggg aggattcgaa agcgaatgac acaaggcaat taccagctcc     660
gaccttcaac atctctcaac tacagcaagc ttctctcaag aggcctttcc atggaga       717
```

<210> 351
<211> 369
<212> DNA
<213>

<400> 351
ggcgtctctc ctctgtctag tcatgtttct gaaatacctc tccgccgcac tcatctctct 60
tgcaacgatt cgctctgctt acggtgcctc cactccgaag cgaagagcaa catgcgcggg 120
cgggcagacc gtgaaaaacg aggcctgttg cgcctggttc cccgtcctgg aagacattct 180
gcccaacatg ttcgacaacg aatgtggcga cgacgcccat ggcgctctgc gtctgagctt 240
ccacgacgcg atcggtttct ctccttctca aggtggagga ggcgcggacg gatccatttt 300
gtcttcagtg acaccgaact gcagttcccc gcgaacgctg gcctcgacga cccgatcgac 360
actgagctt 369

<210> 352
<211> 1391
<212> DNA
<213>

<400> 352
gaaaaactgt ggtggtgaag ctgcctcgca aagatgtgac gttatctaat cagcgtctcc 60
ctgcccggaa aaagccggaa aaggaactgt tattttcaag cttttatttc accacaatca 120
cggagttata tattatacca agatttccgc gttaacctta cgccggagaa acttcatctg 180
agtgtgtgct cttgctggtt ttcaacagga acatatcgat aatttatgtc atggctacac 240
acgatatggt cggctttcc gtcgtcgttg tcctccttgc cacttcggtt atcaccactg 300
cccgttgtaa gctctcaccg agtcattatc aatcaacatg tccgaaagca ttgtcgattg 360
ttcgagctgg agtagcaaaa gcaatcaaga atgagacccg gacgggcgcg tccttgcttc 420
ggctgcactt ccatgactgc ttcgtcaatg ggtgcgatgc gtcgatattg ttggatgaca 480
cgcctagctt cgtgggcgag aaaacagcag ctccgaacaa caattccgtg agagggttcg 540
aagtgatcga ccgcatcaag gctagtctgg agaaggagtg ccctggagtg gtttcctgtg 600
cagatatcgt tgccctggct gctcgcgact cagtcgttca tttgggaggt ccttcatgga 660
ccgtaagctt agggagaaag gattccatta ctgctagcag gagccttgct aacacctcca 720
tacctccacc tacttctaat ctcagtgctc tcataaccag cttcgctgct cagggtcttt 780
cagtcaagaa catggtggct ctttctggtt cacataccat tggcctagcg agatgcactt 840
ccttccgaag acggatctac aacgactcga acatagatac atccttcgcc cataaattgc 900
agaagatatg tcccaggatt ggaaatgata gtgtccttca aaggctagac atccaaacgc 960
cgaccttctt tgacaacctt tactaccaca atttactgca gaagaagggc cttcttcact 1020
ctgatcaaga gctcttcaat ggcagttctg tggattcact ggtcaagaag tatgcatgcg 1080
acacaggaaa atttttccga gattttgcca aggcaatgat caaaatgagc gaaattaagc 1140
cccccaaagg aagcaatggt caaataagga aaaattgcag gaaagtgaac taagtatgaa 1200
gctcatatat gcaatttgaa actgccacat atgaacacgg tagtgaaatc agggctcgat 1260
aatgtcccct gacaatttgt cgtcatgtat ctgtcttctt gactaatttg tggttgctgc 1320
ttgaaaaata aaggagctcg tctcagtttc tgtaaaaaaa aaaaaaaaaa aaaaaaaaaa 1380
aaaaaaaaaa a 1391

<210> 353
<211> 337
<212> DNA
<213>

<400> 353
cagaatgcct agtcgtcatc cgatttgggt aattgtcgcc atagcttttg taaccgcact 60
cgggtgggga agtgcctccg cacaactctc tacaaacttc tactccaaaa gttgtcccaa 120
tgttttgagc acggtgaaat ctgttgtccg gtccgcggtg tcgaaagagc gccgcatggg 180
tgcttctctc ctgcgcctct tctttcatga ttgcttcgtc aatgggtgcg atggctcgat 240

actcctggac gacacatcct cgttccaagg ggagaagacg gccggcccaa ataataagtc 300
tttgagagga tacaacgtca ttgaccggat caagtcc 337

<210> 354
<211> 368
<212> DNA
<213>

<400> 354
ctcacttccg agcgcgccat gcagttcacc ttttccgccg ctttcctcgc tctcgtcaca 60
gtcgcggccg ctatgcccac caagcgtgcg gcgtgcagca acggacgaac ggccactcat 120
gcctcgtgct gtgtgtggtt cgacgtcctc gacgatattc aagagaatct gttcgacggt 180
ggagagtgcg gagaggaaac acacgagtct ctgcggctca ctttccacga tgccatcggc 240
ttctccccga gcctgtttct cgagggaaaa ttcggtggtc tcggcgctga tggttccatc 300
atggctcact ctgacatcga gaccgtgttc cccgccaaca atggaattga tgatatcgtc 360
gacgcgca 368

<210> 355
<211> 955
<212> DNA
<213>

<400> 355
aagaaactca gacccagacc cagaccacat catggcctcc cgtttcagct ctttcgtttt 60
ggtttctttt cttgtgatag ctgcatcaca tgttcatgtt acgagctctg ctcacttggt 120
gaaggggctc tcgtggtcct tctacgagaa gagctgtccc aaggtggagt ccgtcatcaa 180
gaaacatctc aagaaggtgt tcgaggagga tattggccaa gctgctgggc tgcttcgtct 240
gcacttccat gactgctttg ttaagggatg tgatgcttcg gtgttgctgg atggatcagc 300
cagtggacca agtgagcagg acgctccacc gaaccggagc ttgagaccat cagcattcaa 360
gatcatcgat gacctccgtg agctcgtgga caagaagtgt ggtcgagtag tctcttgtgc 420
tgatatcgca gccattgccg ctcgtgactc cgttgtcctg tcaggcggac ctgagtatga 480
tgtgccgttg ggaaggcggg atggactcac gtttgcgact caaaatgtga ccttagagaa 540
tttacctgca ccaactgaga acgccagtgc aattctctcc gccctagcca agaaaaactt 600
agacgctacc gacgtggtgg ccctctctgg aggccacacc atcgggcttg ggcactgcac 660
ctcctttgag aatcggctct acccgaccca agaccccacg atggagaaga cctttgccca 720
tgatctcaag ggcgtgtgcc ccaccacaaa ctccaccaac actacggtct tggacatccg 780
atcacccaac cgattcgaca acaagtactt tgtcgatttg gtgaaccgcc aaggcctgtt 840
cacctcagac caagatctgt atgaggatcc cacaaccagg gacattgtca ctagctttgc 900
cgaggaccag gaattgttct ttgagaagtt tgtcctagcc atgacgaaga tgggg 955

<210> 356
<211> 308
<212> DNA
<213>

<400> 356
ctgtgtctag tcatgttcct gaagtatctc tccggcgccc tcgtctccct tgcaacgatc 60
cgcggtgttt gcggtgcttc cgctccgatg cgaagagcaa catgtgcggg tgggcagact 120
gtcaaaaatg cggcatgttg tgcatggttc ccagtactcg acgacatcag ggaaaacttt 180
ttcgacaacg aatgcggcga tgacgcccat gctgccctgc gtctgagttt ccacgatgca 240
atcggtttct ctcgttcgaa aggtggagga ggcgcggacg gatccatcat tgccttcaat 300
aagactga 308

<210> 357
<211> 373
<212> DNA

<213>

<400> 357
tcaggtcctt gtcaacatgg cattcaaact cgtggttaat cttgttagtc ttgctctcgc 60
cgtcagtgct gcaaacttca agcgagttgc ttgcccaggt actacggcca cagctcgcaa 120
tccggcgtgc tgcgcattct tctcactgag agatgacttg cttacaaatc tcttcggggg 180
tgtgtgcggc gaagaggcgc acgagtctct ccgattgtct ttccatgatg ccattgcgtt 240
ttcgcccgca ttaattaggc aaggcaaacc gggaggtgga ggtgctgatg gctctatgat 300
tactttccca aacgtcgagc ccaattttaa tgccaacaac ggcattattg attctgtcga 360
ctttttgaca cca 373

<210> 358
<211> 417
<212> DNA
<213>

<400> 358
ctcttgtcct gggaccgtgt cttgcgccga cattctcgcc ctcggtgctc aagcttctgt 60
cgttctgtca ggaggtccat cttggagggt gctctcgggg aggagggaca gcttgacggc 120
gaaccaagca ggagcgaaca catcgatacc tagccctttt gattccttgg ctaacctcac 180
ttccaaattc gccgctgttg gcttggacac caatgacctt gtcactcttt ccggagctca 240
cacctttgga cgtgcacagt gcaggacatt cagccctagg ctctacaact tcaacgcgag 300
tggcagccca gatccaacca taagtccttc atacttgacc actctccaac aactttgccc 360
acagaatgga agcggctccg tcctcgccaa cctcgacccg acgaccgtga acacatt 417

<210> 359
<211> 659
<212> DNA
<213>

<400> 359
cacaatggaa atagtttagg tcagtaatgg aacggatgaa acatattccc ggccttacac 60
tgcagtttca gtctgtgctg atcactggag cggcattgtt tctatggatc cagacatcgg 120
atgctcagga ctgtaatggt ctgagtcatc actattatca gaagtcctgt ccaaatgccc 180
aggctatcat taaatctgta gtttcagatg ctgtcaaaaa ggaagcgaga atggctgctt 240
ccttgcttcg tctgcatttt catgactgtt ttgttcaggg ctgtgatgct tcaattctgc 300
ttgatgacac tgctagtttc acaggggaga agacagcatt acctaacaga aattctgtaa 360
gaggctttga ggtagtggat aagatcaaaa gcaaattgga ggaagcatgt cctggagtgg 420
tctcatgtgc tgacattctt gctgtggcag cccgtgattc agtaggcttt agtgtgggtc 480
cgtattggga ggttctactg ggcaggaggg actcaaagac tgcaagcaag agcggtgcaa 540
acaacgacat tcctgcaccc aactcaaccc atcagactct ggaaaccaaa ttcaacctca 600
aaggtctcaa tgtgcttgac ctagttgctc tatcaaggtc ccataacaat agggttagc 659

<210> 360
<211> 669
<212> DNA
<213>

<400> 360
gcggcacgag cggcaaaact aaagctattc gcagcctccc tctatggcga cattagggat 60
ccctctcggc tcactcagcc tgctcctcct cttcttctgc tgcgcacaac gcagtgtggg 120
actgaaggaa aattactacg caacgtcgtg tccgagagca gagcacatag tgaaggagca 180
ggtctacaat ctctaccagg agcacggcaa cactgccgtt tcatggatca gacttatctt 240
ccatgactgc atagttcagt cgtgcgatgc ctccattcta ttagacagta gtggagacgt 300
gcagacagag aaacaatcgg accgaaactt cggaatgcga aacttcaagt atgtggacac 360
cattaaggag gccatcgagg tggaatgtcc tggagtggtg tcgtgtgctg acattattgt 420

tctcgccgca aaggaggcag ctgcaatgct aggaggtcca cgcatcgcgg tgaaaacagg 480
gagacgagac agcagaaaaa gcagtgcagc agtggtggac aaatacgttc cgctgcataa 540
tggcagcatc tcatctcttc tctctgcctt tgcctctgtg ggcatcgatg cggaaggagc 600
tgtggccctt ttaggtttga tacttatcca ttctgtatta cattatacat aaataaaaaa 660
aaaaaaaaa 669

<210> 361
<211> 916
<212> DNA
<213>

<400> 361
agcaaattgg ttgcttttgg agcgcttgtt ccaacagcaa aaatggctgt tttgatgaag 60
agctttccgt gcattgctgt cattgtgttc attatctgtt cgattactga tactgtgaat 120
gggaaactga gctccacgtt ttatgataag tcttgtccca aggccctgtc tatagtgcaa 180
gccggggtga agcaagcagt ggctaaggaa aaacgtatgg gggcatcgct tctccgcctt 240
catttccacg actgcttcgt taatggctgc gatgggtctg tactgttgga caattccacg 300
accttcacta gcgagaaata tgctcttccc aataacaatt ccgcgagggg tttcgaggtg 360
atcgatagca taaagagcca actcgagaat gcttgcaccg gcgtcgtttc ttgtgcagac 420
attctcacga ttgctgctcg tgattctgtt gttcagttgg gtggaccttc gtggaaggtg 480
atgttgggga ggcgagactc aacaacagcg agcattagcg gtgcaaacaa taacattccg 540
cctcccactt ccaatctgac gaaactcatt tcactatttc aggcacaggg cctctccaca 600
aaggaaatgg ttgcactctc tggtggtcat accatcgggc aggcgcaatg caagaatttc 660
agagcccata tttacaacga caccaacata gatactacgt acgccacttc attgcgttca 720
aagtgtccta gtaccacagg ctccggagac agcaacctgt cgccactgga ttatacgact 780
cccactgtgt ttgacaaaaa ctattactac aatctgaaaa gcaaaagagg acttctccac 840
tccgaccagg aactcttcaa cggaggctcc actgattcgc atgtgactaa gtacgcctcc 900
aaccagaata ccttct 916

<210> 362
<211> 586
<212> DNA
<213>

<400> 362
gcaaacagca accttccctc gccagcttcc agtctcagca cactcatgac agcatttcaa 60
aaacagggtc tctctaccaa ggacctcgtc gcactctcag gtgctcatac aattggtcaa 120
gcacggtgca ccacattcag aactcgcatc tacaacgata ccaacattaa cgctgccttc 180
gctacatctg cgaaggcgaa ctgccccagc actggtggcg acaacaccct ctctcccttg 240
gatgttctca cccctaccac atttgacaac aagtattaca ctaatctgaa aagccaaaag 300
ggacttttcc actccgatca ggagctattt aatggaggtt ccacagactc tagagttagt 360
atctacagca ccagtcaagc catttctttt actgactttg cagccgccat ggtgaatatg 420
ggtaatatta gtcccctcac tggcaccaac ggcgagatcc gcacaaactg caggaaagtc 480
aattaaaatt tgtaaagatt gtattatcta tagcttttct ctgaagttat aagcgaagct 540
ttacaagaaa gcaataaatt actgtttaat taaaaaaaaa aaaaaa 586

<210> 363
<211> 1224
<212> DNA
<213>

<400> 363
ctaccactca atttcgctct tatcttctgt gtttcatcgt tttcttccaa atatgatgat 60
gaggactcta gtgtgcattg ggttaatggc tgtgtttgta gccttcatac atataaacgc 120
tgtgaatggg cagctgagct caacgtttta tgccaaatcg tgtccgaggt tgccatcgat 180
agtgaaatca gtggtgaagc aagcggtagc taaggagaaa agaatgggag cgtccttggt 240

ccgccttcac tttcacgatt gcttcgtcaa cgggtgcgat ggttcaatct tattggatga 300
caacgctacg tttaccggag aaaagactgc aggcccaaac gccaattctg cgagaggctt 360
cgaggtaatt gacagcatta aaactcaagt ggaggcagcc tgcagtggag tcgtgtcgtg 420
tgcagacatt ctcaccattg ctgctcgtga ctctattgtt gaacttcaag gcccaacatg 480
gacggtaatg cttggaaggc gagactccac gactgcgagt ttaagcgctg caaacaacaa 540
cattccatct cccgcttcca gtctgagcac actcatctca tcttttcaag ctcacggtct 600
ttctaccaaa gaccttgttg cactctcagg tgctcataca attggtcaat cacgatgcgc 660
ctttttcaga actcggatct acaacgaaac gaacattaac gctgctttcg ctacatctgt 720
aaaggcaaac tgccccagcg ctggtggcga cagcaacctc tctcccttag atgcggtcac 780
ctcaatcaca tttgacaaca agtattactc taatcttaaa atacagaaag gacttctcca 840
ctccgaccag cagctcttta atggaggttc tacagattct caggttactg cgtacagcag 900
caatcagaac agcttcttta tagactttac agctgccatg gtgaagatgg gaaatattag 960
ccctctcact ggcactaacg ggcaaatccg caaaaactgc aggaagtcca attagtctct 1020
ctgaagattg tattctccgt actctttcag cttatttttt ctttgtaaca ttgattttcg 1080
atcggctagt gagccttcaa atcgaagctc taaaagaaag caataaacta catttctgag 1140
attatgttca gagttgtatg cagttcagac cataattcca attttgcttc ccaaaaaaaa 1200
aagacttgta aaaaaaaaaa aaaa 1224

<210> 364
<211> 519
<212> DNA
<213>

<400> 364
aaactgccca agtcaggagg cgacaataac ctgtcaccgt tggatctact gactccaaca 60
acgttcgaca ataaatacta cacaaatctg aagagccaaa agggtcttct ccactcagac 120
cagcagctgt ttaatggcgg ctctgcagat tcccaggtta ctacctacag caccactcag 180
agcaccttct ttaccgactt cgcagcttcc atgttgaata tgggtaatat cagtcccctc 240
actggcacca gcggacaaat ccgcaaaaac tgcagaaaac ctaattgatg cctctcttag 300
gccatatgta ctttactgtt ctcatgggat tatattttga ttgtagaatt atatagatag 360
ttgggagacc tacggctgcg ttagacacta gcaagcctcc aattggatct gtgcgtccct 420
agtttgttga ctatttggtt gatttcgatg taccaagtac aaagtttctc aacagattaa 480
tccaatgaat taggttttat aaaaaaaaaa aaaaaaaaa 519

<210> 365
<211> 646
<212> DNA
<213>

<400> 365
aaaccattca aacccaccga agatttcatt gcgtcgcagc atcatgactt cctttacagc 60
aatggcgtca gtcgtgtgca tcgctctgct cttttttttcg accgttgctt ttgctcaact 120
caactcaacg tattatgata cgtcgtgtcc caaactcctg gcaacggtga aggctgcagt 180
gaagacggcg gtggccaatg agaaacgcat gggggcatca ttgctccgtc ttcactttca 240
tgattgtttc gtcaatggtt gcgatgggtc agtgttgttg gacgactctt cgagtctaac 300
tggggaaaag actgctcttc ccaacaacaa ttcgttgagg ggtttcgacg tcatagacac 360
catcaaatca caagtggaag cagtttgcag cggaatcgta tcgtgcgctg acattttggc 420
tattacggct agagattctg tcgtcgaatt gggaggacca acatggacag tgctgcttgg 480
aaggagagac tcagcaactg ccagcctaag cgccgcaaac accaacattc ccgctcccac 540
ttccaatctc agtggtctca tctcatcttt tcaagcacag ggcctttcaa ccaaggatat 600
gattgtccta tcaggtgcac ataccattgg ccaagctcga tgcaca 646

<210> 366
<211> 364
<212> DNA
<213>

<400> 366
ccttaatctc ctcttttaca gcccatggtc tttccacaaa ggatctcggt gcactctcgg 60
gagctcatac gattggccaa gcgcggtgca ccacattcag agctcgcgtc tacaacgaat 120
ccaacattga cacttccttc gccacttcgg tgaaggcaaa ctggccaagc gctggtggcg 180
acaacacccct ctcgccctta gatctggcca cgcctaccac atttgacaac aagtattaca 240
ctgatttgag aagccaaaag ggacttctgc actccgatca gcaaatgttt agcggagggt 300
ctacaaattc tcaagtcacc acctatagct ccaatcaaaa acaccttctt tacagacttt 360
acag 364

<210> 367
<211> 364
<212> DNA
<213>

<400> 367
ggaaaaggat caactttcac ttaaaggagg acatcaccca agcggctggt ttgctgcgcg 60
tccatttcca tgactgcttc gttcagggtt gcgacggatc ggttctgttg gacggttctg 120
ccagcggtcc tagcgaacaa gacgctccac cgaacttaac gctgagagca aaagcctttg 180
aaataattaa cgacatcaag aaacatgtgg aaaaggcttg cagcggcgtt gtctcttgcg 240
cggacttgac tgctctcgca gctcgcgagt cggtcagagc agttggagga ccagagtatc 300
gagtgcctct ggggcgcagg gacagcctga aattcgccac acgaaaagtg acccttgcca 360
acct 364

<210> 368
<211> 801
<212> DNA
<213>

<400> 368
gtcatggctt cgtttacagc aatgcgatct ctggccttta tcgccttgtt gatgtgttcg 60
accgttgcgt acgcgcagct tagcgcaacg ttttataata catcatgtcc caaactactc 120
tcaacggtgc aggccgctgt gaagcaagcg gtggccaacg agaagcgcat gggggcatcg 180
ctcctccgcc ttcactttca cgactgcttc gttaatggtt gcgatgggtc tgtgctgctg 240
gacgactctt cgactctaac tggagagaag accgccgttc ccaacaacaa ttcggcaagg 300
ggtttcgatg tgatagacac catcaagtct caagtggaag cagtttgcag tggagttgtg 360
tcgtgcgcag atattttggc tattgctgct agagattctg ttgtccagtt gggaggccca 420
acatggacag tgcagctggg gaggagagac tccaggactg ccagcctaag tggtgcaaac 480
aacaacattc cggctcctac ttctaatctc agtgctctca tctcattatt tcaagctcag 540
ggtctttcca cgaaggacat ggttgtccta tcaggtgcgc acaccatagg ccaagcgcgg 600
tgcacaagct tcagggcccg catctacaac gaatccaaca ttaatgcagc atacgcaact 660
tccctgaaga caaactgtcc gactacagga agcgacaaca acctgtcacc attggatcgt 720
gttactccca ctacgtttga catcaactac tactcaaatc tgagaagcca aaagggactt 780
ctccactccg accagcagct g 801

<210> 369
<211> 1171
<212> DNA
<213>

<400> 369
gccaaataaa gttatctttt ggctttattc cacaagaaaa aaatggctta cctaaggaag 60
agtttcgcct gtatagctgt aatggtgttt atcgtgtgtt ctattacaga tactgtgaat 120
gggcagctga gctccacgtt ttacgacaaa tcttgcccga cggcactgtc ggtagtgaag 180
gccgcagtga agcaagcggt cgctaacgag aaacggatgg gtgcgtcttt gctccgcctg 240
cactttcacg actgcttcgt taatggttgc gatgggtccg ttctgttgga cgattcttcg 300

```
accattactg gcgagaagac agctaatccc aatgccaatt ctgcgagggg attcgacgta     360
atagatacca taaagagcaa tgtcgagaaa gcttgcagtg gagtcgtttc ctgtgcagac     420
attctcgcca ttgctgctcg tgattctgtt gttgaactgg gcggtccttc atggacagta     480
atgttgggaa ggcgagactc gacaacagct agcaaaagcg gtgcaaacag taatattccg     540
cctccgactt ccagtctgag caacctcatc tcactattcc aagcgcaggg actctccgca     600
aaggaaatgg ttgcactttc tggcggtcat accatcgggc aggcgcaatg caagaatttc     660
agagcccata tttacaacga gaccaacata gacagtgcgt acgccacttc attgcgttca     720
aagtgtccga gtaccacagg ctccggagac agcaacttgt cgccattgga ttatatgact     780
cccactgtgt ttgacaaaaa ctattacagc gacctgaaaa gccaaaaagg acttctccac     840
tccgaccagg aactcttcaa cggaggctcc actgattcac aggtgactac gtacgcctcc     900
aaccagaaca ccttcttctc cgattttgct gcggccatgg ttaagatggg aaatatcaaa     960
cctcttaccg gcaccagcgg acagatccca aagaactgca ggaagccaaa ctaattatga    1020
tcactgtcga attatcatca ctccgttgca ctgcctttta attgtaaaag taacgtttcg    1080
actgatttca gtctatggat accatatgct gatggagctt gtcatgaata aataagttca    1140
taactttacc atcattaaaa aaaaaaaaaa a                                   1171
```

<210> 370
<211> 1073
<212> DNA
<213>

<400> 370

```
atcagattaa gagtgcactt gagaaggagt gcccaaaaac tgtatcgtgt gcagatattc      60
tcgctattgc atctcgtgat tcagtggtcc tgagtggagg gctgggctgg gaagttttac     120
tggggaggag agattcgaag agtgcaagtt tgagtgggtc caacaacaat atcccggcgc     180
ccaactcaac tctgcagacg cttactacca agttcaaact acaaggtcta gatgaggtag     240
acttggtatc cctttcaggg agtcacacca tcggcctatc tcgatgcaca agtttcaggc     300
agaggcttta caaccagagt ggaaatgggc tgccagactt cactctaaac aggggttact     360
atgctcggct gaaatccgga tgtccaaaat ctggaggaga taataacttg ttcccattgg     420
atttcgtgac tcctaccaaa ttcgataact actacttcaa gagcttgctg agcggtcaag     480
ggctgttgaa cacagacgaa gaattgttcg caaagggctc agggaagacg aaggagctag     540
ttaaacttta tgcagcaaat gaggagctct ttctcaaaca gtttgcatta tctatggtga     600
agatgggaaa catcaagcct cttacaggca ccgtgggaga aatcagggtc aactgtcgta     660
aggttaacag ttgatcgttt taatttaatc attttccatc tcttgcattg cattttgtta     720
catctccctt cttagctgcc atcaaattgc attactagat catccttccc atggctttca     780
gttgtaacag gttgaataaa attgccactt ctgaattatt aaacttctga ttgggctgga     840
cgatagaggg aaacttcaac gtcccaatca aattgtcatg taagaaatat ctcgggcagt     900
aaactcagag tggtaaatca agattgttga ataaaatgtt agctcttcgt taatggctgt     960
ggagaaggtc aacactcctc gtgtgtttag ctatgtgtct gtttattaac gcttgcgagt    1020
tttgatgtaa tggaaatcgt gtcttcaaca agaataaaaa aaaaaaaaaa aaa           1073
```

<210> 371
<211> 1522
<212> DNA
<213>

<400> 371

```
gaaaggcctg tcgatttcct ccatttgaat cgacaggatc gaagaatcta ttttacatca      60
aagcaaagcc aaagctgtgg ccgacatggg caagtttatc acggctctgg cttctgttat     120
tctctgcgtg tttgtgatct atggcggcgc tgtcaatgct ctgcccagtc ccgtggctgg     180
tctttcttgg acgttctaca gctcgagttg cccgtccttg gagtccatag tgtgggagcg     240
catggaagcc tatttgagtg cagacatcac acaggctgca ggattgttga ggctccactt     300
ccacgactgc tttgtccagg gatgcgatgg gtcggtgttg ttgaacgcaa cgtcaggtga     360
gcaaacggct cccccaaact tatcactcag agcgcaggct ttaaagatta ttaacgacat     420
caaagagaac gtcgaagccg cctgcagcgg aattgtgtcg tgtgccgaca ttgttacttt     480
agcagctcgt gactccgttg taatggctgg aggaccgttc taccccttac cactcggccg     540
```

```
cagggacagc cttaccttcg ccaatcgatc gaccgttctc gccaatttgc catccccaac     600
ctccaatgta acggggctca tcagtgtttt gggtcccaaa ggcttgaatt tcacagatct     660
ggtggccctc tcaggaggac atacaattgg cagaagcaac tgctcctcct tcgacaacag     720
actatataac agcaccaccg gtacacaaat gcgggatccc acgatggacc agagtttcgc     780
taagaatctt tatctcacct gccctaccag taccaccgtt aacaccacca aattggatat     840
tcgcactcca aatgtgttcg acaacaaata ctacgtcgat ctcctcaacc gacagaccct     900
cttcacttct gaccagactc tttacaccga cactcgaacc cgcgacattg tgatcaattt     960
tgcggtgaat cagagcctct tctttgaaca gtttgtgctg agcatgctca aaatggggca    1020
gctggatgtg ctcacaggaa gcgagggaga gatccgtaag aactgctggg ctgcgaatcc    1080
ttcaacattt tcgattatgg atccagaggc gtctcaagaa tcaacatctt actctatgtg    1140
agattagggt tatgagcgaa tctcaaatat aagcaagcag cgttaattcc cagcaaagtc    1200
taataaatat atatataacc ggcatcttgt aaaccctttg caatgctggt tctacaaatt    1260
actttttccc ttttgacctt ctgaaagagc agaaatcaag cctgaataca gtgcattctc    1320
gttgaaaata aatagcgttt cttgttgata atcagatttc caaccgattc cggcaatttc    1380
caataagaaa ctttactgaa tttaaactca aatgctggcc aattttgttt agggcgtttt    1440
tgaaatcgtt ggactgttat ctttggaaac ctacattaga cttatattta tctaaaatat    1500
tgcacccaaa aaaaaaaaaa aa                                             1522
```

<210> 372
<211> 311
<212> DNA
<213>

<400> 372

```
ctcaatttcg ctcttatctt ctgtgtttca tcgttttctt cccaatatga tgatgaggac      60
tctagtgtgc attgggttaa tggctgtgtt tgtagccttc atacatataa acgcttgaat     120
gggcagctga gctcaacgtt ttatgccaaa tcgtgtccga ggttgccatc gatagtgaaa     180
tcagtggtga agcaagcggt cgctaaggag aaaagaatgg gagcgtcctt ggtccgcctt     240
cactttcacg attgcttcgt caatgggtgc gatggttcaa tcttattgga tgacaacgcg     300
acgtttaccg g                                                          311
```

<210> 373
<211> 474
<212> DNA
<213>

<400> 373

```
catcgatgct atcaagacag ccctcgagag ttcttgcaac gccactgttt cttgcgcaga      60
tattctcgct attgcagcgc gggattcagt ataccttagc ggtgggcctt actggcaagt     120
gcagatgggg agaagagatg gcaccactgc cagcaaaagt gcagcaaatg ccgacatccc     180
ttctcctatt gagtcgcttg gttcactcat atcccaattc caaggtgttg ggctttctgt     240
tcatgatctt gtagtgcttt caggggctca caccataggc cgtgcccact gtggcacctt     300
cagctcacgc ctattcaatt tcagcggctc aaacagtgcg gacccaacta ttcaccaatc     360
tctactgcaa gacctgcata gtttatgccc agatggaaac agtgatccaa ataccctggc     420
gccactggac cctgtgacca aagacaagct ccataatgtg tatttcagaa atct           474
```

<210> 374
<211> 353
<212> DNA
<213>

<400> 374

```
ctttctgtta cggatgtcgt tgctttgtca gggggacata caattgggcg agctcggtgc      60
acagtgttca gcggtagact ctacaatttc agcggaacgg gcagtccgga tccgacactg     120
aattcctcct atctatccac cttgcaaagc acgtgcccgc agaatggaag cgcgaatacg     180
ttaacgtcac tggatccagg gactccaaat acgttcgaca acaactactt tgcaaatctg     240
```

```
cagattgaga tgggtctgct tcagtcgatc aagaacttct ttccacatcg ggagcaagca     300
ccatctctac tgtcaatgat tatgccagta gtcaatccga tttcttcttc aac            353

      <210> 375
      <211> 461
      <212> DNA
      <213>

      <400> 375
caaagcagag ttgcgtttga agcgcaagaa atggccgctt taatgaaaag ctccgcatgc      60
attgctgtaa ttgtgtttat tgtgtgttcg attaataaca ctgtgcatgg gcagctgagc     120
tcaacatttt atgacaaatc ttgcccgacg gtgctgtcgg tagtgaaagc cggggtgaag     180
caagcggtcg ccaaggagca aaggatgggg gcgtcgcttc tccgacttca cttccacgac     240
tgcttcgtta atggttgcga tgggtccgtt ctgttggatg actcttcgaa aattactggc     300
gagaaaacgg ctattcccaa tgccaattcg gcgagggggt tcgatgtgat cgataccata     360
aagagtcagg tcgagaaatc ttgcagcgca gtcgtttcct gttctgacat tctagccatt     420
gctgctcgtg attctgttgt tgaactgggc ggcccttcat g                         461

      <210> 376
      <211> 179
      <212> PRT
      <213>

      <400> 376
Met Arg Ala Leu Ala Val Val Leu Gly Ser Ala Ile Leu Leu Ala Tyr
 1               5                  10                  15
Val Ala Ser Ser Ala Gly Ala Leu Ser Leu Asp Tyr Tyr Asp Gln Thr
            20                  25                  30
Cys Pro Lys Leu Glu Phe Ser Val Arg Gly Ala Val Lys Lys Ala Met
        35                  40                  45
Lys Asn Asp Asn Thr Val Pro Ala Ala Leu Leu Arg Met His Phe His
    50                  55                  60
Asp Cys Phe Ile Arg Gly Cys Asp Gly Ser Val Leu Leu Asn Ser Thr
65                  70                  75                  80
Ala Lys Asn Thr Ala Glu Lys Asp Gly Pro Pro Asn Ile Ser Leu His
                85                  90                  95
Ala Phe Tyr Val Ile Asp Leu Ala Lys Glu Ala Val Glu Ala Gln Cys
            100                 105                 110
Pro Gly Val Val Ser Cys Ala Asp Ile Leu Ala Leu Ala Ala Arg Asp
        115                 120                 125
Ala Val Ala Leu Ser Gly Gly Pro His Trp Asp Val Pro Lys Gly Arg
    130                 135                 140
Lys Asp Gly Arg Ile Arg Lys Arg Met Thr Gln Gly Asn Tyr Gln Leu
145                 150                 155                 160
Arg Pro Ser Thr Ser Leu Asn Tyr Ser Lys Leu Leu Ser Arg Gly Leu
                165                 170                 175
Ser Met Glu


      <210> 377
      <211> 115
      <212> PRT
      <213>

      <400> 377
Met Phe Leu Lys Tyr Leu Ser Ala Ala Leu Ile Ser Leu Ala Thr Ile
```

01.06.08

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

<210> 378
<211> 315
<212> PRT
<213>

<400> 378
Met Val Gly Phe Ser Val Val Val Val Leu Leu Ala Thr Ser Val Ile
1 5 10 15
Thr Thr Ala Arg Cys Lys Leu Ser Pro Ser His Tyr Gln Ser Thr Cys
20 25 30
Pro Lys Ala Leu Ser Ile Val Arg Ala Gly Val Ala Lys Ala Ile Lys
35 40 45
Asn Glu Thr Arg Thr Gly Ala Ser Leu Leu Arg Leu His Phe His Asp
50 55 60
Cys Phe Val Asn Gly Cys Asp Ala Ser Ile Leu Leu Asp Asp Thr Pro
65 70 75 80
Ser Phe Val Gly Glu Lys Thr Ala Ala Pro Asn Asn Asn Ser Val Arg
85 90 95
Gly Phe Glu Val Ile Asp Arg Ile Lys Ala Ser Leu Glu Lys Glu Cys
100 105 110
Pro Gly Val Val Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg Asp
115 120 125
Ser Val Val His Leu Gly Gly Pro Ser Trp Thr Val Ser Leu Gly Arg
130 135 140
Lys Asp Ser Ile Thr Ala Ser Arg Ser Leu Ala Asn Thr Ser Ile Pro
145 150 155 160
Pro Pro Thr Ser Asn Leu Ser Ala Leu Ile Thr Ser Phe Ala Ala Gln
165 170 175
Gly Leu Ser Val Lys Asn Met Val Ala Leu Ser Gly Ser His Thr Ile
180 185 190
Gly Leu Ala Arg Cys Thr Ser Phe Arg Arg Arg Ile Tyr Asn Asp Ser
195 200 205
Asn Ile Asp Thr Ser Phe Ala His Lys Leu Gln Lys Ile Cys Pro Arg
210 215 220
Ile Gly Asn Asp Ser Val Leu Gln Arg Leu Asp Ile Gln Thr Pro Thr
225 230 235 240
Phe Phe Asp Asn Leu Tyr Tyr His Asn Leu Leu Gln Lys Lys Gly Leu
245 250 255
Leu His Ser Asp Gln Glu Leu Phe Asn Gly Ser Ser Val Asp Ser Leu
260 265 270
Val Lys Lys Tyr Ala Cys Asp Thr Gly Lys Phe Phe Arg Asp Phe Ala

```
      275                 280                 285
Lys Ala Met Ile Lys Met Ser Glu Ile Lys Pro Pro Lys Gly Ser Asn
    290                 295                 300
Gly Gln Ile Arg Lys Asn Cys Arg Lys Val Asn
305                 310                 315
```

<210> 379
<211> 111
<212> PRT
<213>

<400> 379

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

<210> 380
<211> 116
<212> PRT
<213>

<400> 380

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

<210> 381
<211> 308
<212> PRT
<213>

<400> 381

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

<210> 382
<211> 98
<212> PRT
<213>

<400> 382
Met Phe Leu Lys Tyr Leu Ser Gly Ala Leu Val Ser Leu Ala Thr Ile
1   5   10   15
Arg Gly Val Cys Gly Ala Ser Ala Pro Met Arg Arg Ala Thr Cys Ala
            20   25   30
Gly Gly Gln Thr Val Lys Asn Ala Ala Cys Cys Ala Trp Phe Pro Val
        35   40   45
Leu Asp Asp Ile Arg Glu Asn Phe Phe Asp Asn Glu Cys Gly Asp Asp
    50   55   60
Ala His Ala Ala Leu Arg Leu Ser Phe His Asp Ala Ile Gly Phe Ser
65   70   75   80

Arg Ser Lys Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asn
85 90 95
Lys Thr

<210> 383
<211> 119
<212> PRT
<213>

<400> 383
Met Ala Phe Lys Leu Val Val Asn Leu Val Ser Leu Ala Leu Ala Val
1 5 10 15
Ser Ala Ala Asn Phe Lys Arg Val Ala Cys Pro Gly Thr Thr Ala Thr
20 25 30
Ala Arg Asn Pro Ala Cys Cys Ala Phe Phe Ser Leu Arg Asp Asp Leu
35 40 45
Leu Thr Asn Leu Phe Gly Gly Val Cys Gly Glu Glu Ala His Glu Ser
50 55 60
Leu Arg Leu Ser Phe His Asp Ala Ile Ala Phe Ser Pro Ala Leu Ile
65 70 75 80
Arg Gln Gly Lys Pro Gly Gly Gly Gly Ala Asp Gly Ser Met Ile Thr
85 90 95
Phe Pro Asn Val Glu Pro Asn Phe Asn Ala Asn Asn Gly Ile Ile Asp
100 105 110
Ser Val Asp Phe Leu Thr Pro
115

<210> 384
<211> 138
<212> PRT
<213>

<400> 384
Ser Cys Pro Gly Thr Val Ser Cys Ala Asp Ile Leu Ala Leu Gly Ala
1 5 10 15
Gln Ala Ser Val Val Leu Ser Gly Gly Pro Ser Trp Arg Val Leu Ser
20 25 30
Gly Arg Arg Asp Ser Leu Thr Ala Asn Gln Ala Gly Ala Asn Thr Ser
35 40 45
Ile Pro Ser Pro Phe Asp Ser Leu Ala Asn Leu Thr Ser Lys Phe Ala
50 55 60
Ala Val Gly Leu Asp Thr Asn Asp Leu Val Thr Leu Ser Gly Ala His
65 70 75 80
Thr Phe Gly Arg Ala Gln Cys Arg Thr Phe Ser Pro Arg Leu Tyr Asn
85 90 95
Phe Asn Ala Ser Gly Ser Pro Asp Pro Thr Ile Ser Pro Ser Tyr Leu
100 105 110
Thr Thr Leu Gln Gln Leu Cys Pro Gln Asn Gly Ser Gly Ser Val Leu
115 120 125
Ala Asn Leu Asp Pro Thr Thr Val Asn Thr
130 135

<210> 385
<211> 208
<212> PRT

<213>

<400> 385

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

<210> 386
<211> 202
<212> PRT
<213>

<400> 386

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

Tyr Val Pro Leu His Asn Gly Ser Ile Ser Ser Leu Leu Ser Ala Phe
165 170 175
Ala Ser Val Gly Ile Asp Ala Glu Gly Ala Val Ala Leu Leu Gly Leu
180 185 190
Ile Leu Ile His Ser Val Leu His Tyr Thr
195 200

<210> 387
<211> 287
<212> PRT
<213>

<400> 387
Met Lys Ser Phe Pro Cys Ile Ala Val Ile Val Phe Ile Ile Cys Ser
1 5 10 15
Ile Thr Asp Thr Val Asn Gly Lys Leu Ser Ser Thr Phe Tyr Asp Lys
20 25 30
Ser Cys Pro Lys Ala Leu Ser Ile Val Gln Ala Gly Val Lys Gln Ala
35 40 45
Val Ala Lys Glu Lys Arg Met Gly Ala Ser Leu Leu Arg Leu His Phe
50 55 60
His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser Val Leu Leu Asp Asn
65 70 75 80
Ser Thr Thr Phe Thr Ser Glu Lys Tyr Ala Leu Pro Asn Asn Asn Ser
85 90 95
Ala Arg Gly Phe Glu Val Ile Asp Ser Ile Lys Ser Gln Leu Glu Asn
100 105 110
Ala Cys Thr Gly Val Val Ser Cys Ala Asp Ile Leu Thr Ile Ala Ala
115 120 125
Arg Asp Ser Val Val Gln Leu Gly Gly Pro Ser Trp Lys Val Met Leu
130 135 140
Gly Arg Arg Asp Ser Thr Thr Ala Ser Ile Ser Gly Ala Asn Asn Asn
145 150 155 160
Ile Pro Pro Pro Thr Ser Asn Leu Thr Lys Leu Ile Ser Leu Phe Gln
165 170 175
Ala Gln Gly Leu Ser Thr Lys Glu Met Val Ala Leu Ser Gly Gly His
180 185 190
Thr Ile Gly Gln Ala Gln Cys Lys Asn Phe Arg Ala His Ile Tyr Asn
195 200 205
Asp Thr Asn Ile Asp Thr Thr Tyr Ala Thr Ser Leu Arg Ser Lys Cys
210 215 220
Pro Ser Thr Thr Gly Ser Gly Asp Ser Asn Leu Ser Pro Leu Asp Tyr
225 230 235 240
Thr Thr Pro Thr Val Phe Asp Lys Asn Tyr Tyr Tyr Asn Leu Lys Ser
245 250 255
Lys Arg Gly Leu Leu His Ser Asp Gln Glu Leu Phe Asn Gly Gly Ser
260 265 270
Thr Asp Ser His Val Thr Lys Tyr Ala Ser Asn Gln Asn Thr Phe
275 280 285

<210> 388
<211> 161
<212> PRT
<213>

<400> 388

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

<210> 389
<211> 318
<212> PRT
<213>

<400> 389
Met Arg Thr Leu Val Cys Ile Gly Leu Met Ala Val Phe Val Ala Phe
1   5   10   15
Ile His Ile Asn Ala Val Asn Gly Gln Leu Ser Ser Thr Phe Tyr Ala
            20   25   30
Lys Ser Cys Pro Arg Leu Pro Ser Ile Val Lys Ser Val Val Lys Gln
        35   40   45
Ala Val Ala Lys Glu Lys Arg Met Gly Ala Ser Leu Val Arg Leu His
    50   55   60
Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser Ile Leu Leu Asp
65   70   75   80
Asp Asn Ala Thr Phe Thr Gly Glu Lys Thr Ala Gly Pro Asn Ala Asn
                85   90   95
Ser Ala Arg Gly Phe Glu Val Ile Asp Ser Ile Lys Thr Gln Val Glu
            100   105   110
Ala Ala Cys Ser Gly Val Val Ser Cys Ala Asp Ile Leu Thr Ile Ala
        115   120   125
Ala Arg Asp Ser Ile Val Glu Leu Gln Gly Pro Thr Trp Thr Val Met
    130   135   140
Leu Gly Arg Arg Asp Ser Thr Thr Ala Ser Leu Ser Ala Ala Asn Asn
145   150   155   160
Asn Ile Pro Ser Pro Ala Ser Ser Leu Ser Thr Leu Ile Ser Ser Phe
                165   170   175
Gln Ala His Gly Leu Ser Thr Lys Asp Leu Val Ala Leu Ser Gly Ala
            180   185   190
His Thr Ile Gly Gln Ser Arg Cys Ala Phe Phe Arg Thr Arg Ile Tyr
        195   200   205
Asn Glu Thr Asn Ile Asn Ala Ala Phe Ala Thr Ser Val Lys Ala Asn
    210   215   220

Cys Pro Ser Ala Gly Gly Asp Ser Asn Leu Ser Pro Leu Asp Ala Val
225 230 235 240
Thr Ser Ile Thr Phe Asp Asn Lys Tyr Tyr Ser Asn Leu Lys Ile Gln
245 250 255
Lys Gly Leu Leu His Ser Asp Gln Gln Leu Phe Asn Gly Gly Ser Thr
260 265 270
Asp Ser Gln Val Thr Ala Tyr Ser Ser Asn Gln Asn Ser Phe Phe Ile
275 280 285
Asp Phe Thr Ala Ala Met Val Lys Met Gly Asn Ile Ser Pro Leu Thr
290 295 300
Gly Thr Asn Gly Gln Ile Arg Lys Asn Cys Arg Lys Ser Asn
305 310 315

<210> 390
<211> 95
<212> PRT
<213>

<400> 390
Lys Leu Pro Lys Ser Gly Gly Asp Asn Asn Leu Ser Pro Leu Asp Leu
1 5 10 15
Leu Thr Pro Thr Thr Phe Asp Asn Lys Tyr Tyr Thr Asn Leu Lys Ser
20 25 30
Gln Lys Gly Leu Leu His Ser Asp Gln Gln Leu Phe Asn Gly Gly Ser
35 40 45
Ala Asp Ser Gln Val Thr Thr Tyr Ser Thr Thr Gln Ser Thr Phe Phe
50 55 60
Thr Asp Phe Ala Ala Ser Met Leu Asn Met Gly Asn Ile Ser Pro Leu
65 70 75 80
Thr Gly Thr Ser Gly Gln Ile Arg Lys Asn Cys Arg Lys Pro Asn
85 90 95

<210> 391
<211> 201
<212> PRT
<213>

<400> 391
Met Thr Ser Phe Thr Ala Met Ala Ser Val Val Cys Ile Ala Leu Leu
1 5 10 15
Phe Phe Ser Thr Val Ala Phe Ala Gln Leu Asn Ser Thr Tyr Tyr Asp
20 25 30
Thr Ser Cys Pro Lys Leu Leu Ala Thr Val Lys Ala Ala Val Lys Thr
35 40 45
Ala Val Ala Asn Glu Lys Arg Met Gly Ala Ser Leu Leu Arg Leu His
50 55 60
Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser Val Leu Leu Asp
65 70 75 80
Asp Ser Ser Ser Leu Thr Gly Glu Lys Thr Ala Leu Pro Asn Asn Asn
85 90 95
Ser Leu Arg Gly Phe Asp Val Ile Asp Thr Ile Lys Ser Gln Val Glu
100 105 110
Ala Val Cys Ser Gly Ile Val Ser Cys Ala Asp Ile Leu Ala Ile Thr
115 120 125
Ala Arg Asp Ser Val Val Glu Leu Gly Gly Pro Thr Trp Thr Val Leu
130 135 140

Leu Gly Arg Arg Asp Ser Ala Thr Ala Ser Leu Ser Ala Ala Asn Thr
145 150 155 160
Asn Ile Pro Ala Pro Thr Ser Asn Leu Ser Gly Leu Ile Ser Ser Phe
165 170 175
Gln Ala Gln Gly Leu Ser Thr Lys Asp Met Ile Val Leu Ser Gly Ala
180 185 190
His Thr Ile Gly Gln Ala Arg Cys Thr
195 200

<210> 392
<211> 120
<212> PRT
<213>

<400> 392
Leu Ile Ser Ser Phe Thr Ala His Gly Leu Ser Thr Lys Asp Leu Gly
1 5 10 15
Ala Leu Ser Gly Ala His Thr Ile Gly Gln Ala Arg Cys Thr Thr Phe
20 25 30
Arg Ala Arg Val Tyr Asn Glu Ser Asn Ile Asp Thr Ser Phe Ala Thr
35 40 45
Ser Val Lys Ala Asn Trp Pro Ser Ala Gly Gly Asp Asn Thr Leu Ser
50 55 60
Pro Leu Asp Leu Ala Thr Pro Thr Thr Phe Asp Asn Lys Tyr Tyr Thr
65 70 75 80
Asp Leu Arg Ser Gln Lys Gly Leu Leu His Ser Asp Gln Gln Met Phe
85 90 95
Ser Gly Gly Ser Thr Asn Ser Gln Val Thr Thr Tyr Ser Ser Asn Gln
100 105 110
Lys His Leu Leu Tyr Arg Leu Tyr
115 120

<210> 393
<211> 120
<212> PRT
<213>

<400> 393
Lys Arg Ile Asn Phe His Leu Lys Glu Asp Ile Thr Gln Ala Ala Gly
1 5 10 15
Leu Leu Arg Val His Phe His Asp Cys Phe Val Gln Gly Cys Asp Gly
20 25 30
Ser Val Leu Leu Asp Gly Ser Ala Ser Gly Pro Ser Glu Gln Asp Ala
35 40 45
Pro Pro Asn Leu Thr Leu Arg Ala Lys Ala Phe Glu Ile Ile Asn Asp
50 55 60
Ile Lys Lys His Val Glu Lys Ala Cys Ser Gly Val Val Ser Cys Ala
65 70 75 80
Asp Leu Thr Ala Leu Ala Ala Arg Glu Ser Val Arg Ala Val Gly Gly
85 90 95
Pro Glu Tyr Arg Val Pro Leu Gly Arg Arg Asp Ser Leu Lys Phe Ala
100 105 110
Thr Arg Lys Val Thr Leu Ala Asn
115 120

<210> 394

<211> 266
<212> PRT
<213>

<400> 394
```
Met Ala Ser Phe Thr Ala Met Arg Ser Leu Ala Phe Ile Ala Leu Leu
 1               5                  10                  15
Met Cys Ser Thr Val Ala Tyr Ala Gln Leu Ser Ala Thr Phe Tyr Asn
            20                  25                  30
Thr Ser Cys Pro Lys Leu Leu Ser Thr Val Gln Ala Ala Val Lys Gln
        35                  40                  45
Ala Val Ala Asn Glu Lys Arg Met Gly Ala Ser Leu Leu Arg Leu His
    50                  55                  60
Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser Val Leu Leu Asp
65                  70                  75                  80
Asp Ser Ser Thr Leu Thr Gly Glu Lys Thr Ala Val Pro Asn Asn Asn
                85                  90                  95
Ser Ala Arg Gly Phe Asp Val Ile Asp Thr Ile Lys Ser Gln Val Glu
            100                 105                 110
Ala Val Cys Ser Gly Val Val Ser Cys Ala Asp Ile Leu Ala Ile Ala
        115                 120                 125
Ala Arg Asp Ser Val Val Gln Leu Gly Gly Pro Thr Trp Thr Val Gln
    130                 135                 140
Leu Gly Arg Arg Asp Ser Arg Thr Ala Ser Leu Ser Gly Ala Asn Asn
145                 150                 155                 160
Asn Ile Pro Ala Pro Thr Ser Asn Leu Ser Ala Leu Ile Ser Leu Phe
                165                 170                 175
Gln Ala Gln Gly Leu Ser Thr Lys Asp Met Val Val Leu Ser Gly Ala
            180                 185                 190
His Thr Ile Gly Gln Ala Arg Cys Thr Ser Phe Arg Ala Arg Ile Tyr
        195                 200                 205
Asn Glu Ser Asn Ile Asn Ala Ala Tyr Ala Thr Ser Leu Lys Thr Asn
    210                 215                 220
Cys Pro Thr Thr Gly Ser Asp Asn Asn Leu Ser Pro Leu Asp Arg Val
225                 230                 235                 240
Thr Pro Thr Thr Phe Asp Ile Asn Tyr Tyr Ser Asn Leu Arg Ser Gln
                245                 250                 255
Lys Gly Leu Leu His Ser Asp Gln Gln Leu
            260                 265
```

<210> 395
<211> 323
<212> PRT
<213>

<400> 395
```
Met Ala Tyr Leu Arg Lys Ser Phe Ala Cys Ile Ala Val Met Val Phe
 1               5                  10                  15
Ile Val Cys Ser Ile Thr Asp Thr Val Asn Gly Gln Leu Ser Ser Thr
            20                  25                  30
Phe Tyr Asp Lys Ser Cys Pro Thr Ala Leu Ser Val Val Lys Ala Ala
        35                  40                  45
Val Lys Gln Ala Val Ala Asn Glu Lys Arg Met Gly Ala Ser Leu Leu
    50                  55                  60
Arg Leu His Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser Val
65                  70                  75                  80
```

Leu Leu Asp Asp Ser Ser Thr Ile Thr Gly Glu Lys Thr Ala Asn Pro
85 90 95
Asn Ala Asn Ser Ala Arg Gly Phe Asp Val Ile Asp Thr Ile Lys Ser
100 105 110
Asn Val Glu Lys Ala Cys Ser Gly Val Val Ser Cys Ala Asp Ile Leu
115 120 125
Ala Ile Ala Ala Arg Asp Ser Val Val Glu Leu Gly Gly Pro Ser Trp
130 135 140
Thr Val Met Leu Gly Arg Arg Asp Ser Thr Thr Ala Ser Lys Ser Gly
145 150 155 160
Ala Asn Ser Asn Ile Pro Pro Pro Thr Ser Ser Leu Ser Asn Leu Ile
165 170 175
Ser Leu Phe Gln Ala Gln Gly Leu Ser Ala Lys Glu Met Val Ala Leu
180 185 190
Ser Gly Gly His Thr Ile Gly Gln Ala Gln Cys Lys Asn Phe Arg Ala
195 200 205
His Ile Tyr Asn Glu Thr Asn Ile Asp Ser Ala Tyr Ala Thr Ser Leu
210 215 220
Arg Ser Lys Cys Pro Ser Thr Thr Gly Ser Gly Asp Ser Asn Leu Ser
225 230 235 240
Pro Leu Asp Tyr Met Thr Pro Thr Val Phe Asp Lys Asn Tyr Tyr Ser
245 250 255
Asp Leu Lys Ser Gln Lys Gly Leu Leu His Ser Asp Gln Glu Leu Phe
260 265 270
Asn Gly Gly Ser Thr Asp Ser Gln Val Thr Thr Tyr Ala Ser Asn Gln
275 280 285
Asn Thr Phe Phe Ser Asp Phe Ala Ala Ala Met Val Lys Met Gly Asn
290 295 300
Ile Lys Pro Leu Thr Gly Thr Ser Gly Gln Ile Pro Lys Asn Cys Arg
305 310 315 320
Lys Pro Asn

<210> 396
<211> 223
<212> PRT
<213>

<400> 396
Gln Ile Lys Ser Ala Leu Glu Lys Glu Cys Pro Lys Thr Val Ser Cys
1 5 10 15
Ala Asp Ile Leu Ala Ile Ala Ser Arg Asp Ser Val Val Leu Ser Gly
20 25 30
Gly Leu Gly Trp Glu Val Leu Leu Gly Arg Arg Asp Ser Lys Ser Ala
35 40 45
Ser Leu Ser Gly Ser Asn Asn Asn Ile Pro Ala Pro Asn Ser Thr Leu
50 55 60
Gln Thr Leu Thr Thr Lys Phe Lys Leu Gln Gly Leu Asp Glu Val Asp
65 70 75 80
Leu Val Ser Leu Ser Gly Ser His Thr Ile Gly Leu Ser Arg Cys Thr
85 90 95
Ser Phe Arg Gln Arg Leu Tyr Asn Gln Ser Gly Asn Gly Leu Pro Asp
100 105 110
Phe Thr Leu Asn Arg Gly Tyr Tyr Ala Arg Leu Lys Ser Gly Cys Pro
115 120 125
Lys Ser Gly Gly Asp Asn Asn Leu Phe Pro Leu Asp Phe Val Thr Pro
130 135 140

01.06.08

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

<210> 397
<211> 351
<212> PRT
<213>

<400> 397
Met Gly Lys Phe Ile Thr Ala Leu Ala Ser Val Ile Leu Cys Val Phe
1 5 10 15
Val Ile Tyr Gly Gly Ala Val Asn Ala Leu Pro Ser Pro Val Ala Gly
20 25 30
Leu Ser Trp Thr Phe Tyr Ser Ser Ser Cys Pro Ser Leu Glu Ser Ile
35 40 45
Val Trp Glu Arg Met Glu Ala Tyr Leu Ser Ala Asp Ile Thr Gln Ala
50 55 60
Ala Gly Leu Leu Arg Leu His Phe His Asp Cys Phe Val Gln Gly Cys
65 70 75 80
Asp Gly Ser Val Leu Leu Asn Ala Thr Ser Gly Glu Gln Thr Ala Pro
85 90 95
Pro Asn Leu Ser Leu Arg Ala Gln Ala Leu Lys Ile Ile Asn Asp Ile
100 105 110
Lys Glu Asn Val Glu Ala Ala Cys Ser Gly Ile Val Ser Cys Ala Asp
115 120 125
Ile Val Thr Leu Ala Ala Arg Asp Ser Val Val Met Ala Gly Gly Pro
130 135 140
Phe Tyr Pro Leu Pro Leu Gly Arg Arg Asp Ser Leu Thr Phe Ala Asn
145 150 155 160
Arg Ser Thr Val Leu Ala Asn Leu Pro Ser Pro Thr Ser Asn Val Thr
165 170 175
Gly Leu Ile Ser Val Leu Gly Pro Lys Gly Leu Asn Phe Thr Asp Leu
180 185 190
Val Ala Leu Ser Gly Gly His Thr Ile Gly Arg Ser Asn Cys Ser Ser
195 200 205
Phe Asp Asn Arg Leu Tyr Asn Ser Thr Thr Gly Thr Gln Met Arg Asp
210 215 220
Pro Thr Met Asp Gln Ser Phe Ala Lys Asn Leu Tyr Leu Thr Cys Pro
225 230 235 240
Thr Ser Thr Thr Val Asn Thr Thr Lys Leu Asp Ile Arg Thr Pro Asn
245 250 255
Val Phe Asp Asn Lys Tyr Tyr Val Asp Leu Leu Asn Arg Gln Thr Leu
260 265 270
Phe Thr Ser Asp Gln Thr Leu Tyr Thr Asp Thr Arg Thr Arg Asp Ile
275 280 285
Val Ile Asn Phe Ala Val Asn Gln Ser Leu Phe Phe Glu Gln Phe Val
290 295 300
Leu Ser Met Leu Lys Met Gly Gln Leu Asp Val Leu Thr Gly Ser Glu
305 310 315 320

01.06.08

```
Gly Glu Ile Arg Lys Asn Cys Trp Ala Ala Asn Pro Ser Thr Phe Ser
                325                 330                 335
Ile Met Asp Pro Glu Ala Ser Gln Glu Ser Thr Ser Tyr Ser Met
            340                 345                 350

<210> 398
<211> 103
<212> PRT
<213>

<400> 398
Leu Asn Phe Ala Leu Ile Phe Cys Val Ser Ser Phe Ser Ser Gln Tyr
 1               5                  10                  15
Asp Asp Glu Asp Ser Ser Val His Trp Val Asn Gly Cys Val Cys Ser
            20                  25                  30
Leu His Thr Tyr Lys Arg Leu Asn Gly Gln Leu Ser Ser Thr Phe Tyr
        35                  40                  45
Ala Lys Ser Cys Pro Arg Leu Pro Ser Ile Val Lys Ser Val Val Lys
    50                  55                  60
Gln Ala Val Ala Lys Glu Lys Arg Met Gly Ala Ser Leu Val Arg Leu
65                  70                  75                  80
His Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser Ile Leu Leu
                85                  90                  95
Asp Asp Asn Ala Thr Phe Thr
            100

<210> 399
<211> 157
<212> PRT
<213>

<400> 399
Ile Asp Ala Ile Lys Thr Ala Leu Glu Ser Ser Cys Asn Ala Thr Val
 1               5                  10                  15
Ser Cys Ala Asp Ile Leu Ala Ile Ala Ala Arg Asp Ser Val Tyr Leu
            20                  25                  30
Ser Gly Gly Pro Tyr Trp Gln Val Gln Met Gly Arg Arg Asp Gly Thr
        35                  40                  45
Thr Ala Ser Lys Ser Ala Ala Asn Ala Asp Ile Pro Ser Pro Ile Glu
    50                  55                  60
Ser Leu Gly Ser Leu Ile Ser Gln Phe Gln Gly Val Gly Leu Ser Val
65                  70                  75                  80
His Asp Leu Val Val Leu Ser Gly Ala His Thr Ile Gly Arg Ala His
                85                  90                  95
Cys Gly Thr Phe Ser Ser Arg Leu Phe Asn Phe Ser Gly Ser Asn Ser
            100                 105                 110
Ala Asp Pro Thr Ile His Gln Ser Leu Leu Gln Asp Leu His Ser Leu
        115                 120                 125
Cys Pro Asp Gly Asn Ser Asp Pro Asn Thr Leu Ala Pro Leu Asp Pro
    130                 135                 140
Val Thr Lys Asp Lys Leu His Asn Val Tyr Phe Arg Asn
145                 150                 155

<210> 400
<211> 117
<212> PRT
```

<213>

<400> 400
Leu Ser Val Thr Asp Val Val Ala Leu Ser Gly Gly His Thr Ile Gly
1 5 10 15
Arg Ala Arg Cys Thr Val Phe Ser Gly Arg Leu Tyr Asn Phe Ser Gly
20 25 30
Thr Gly Ser Pro Asp Pro Thr Leu Asn Ser Ser Tyr Leu Ser Thr Leu
35 40 45
Gln Ser Thr Cys Pro Gln Asn Gly Ser Ala Asn Thr Leu Thr Ser Leu
50 55 60
Asp Pro Gly Thr Pro Asn Thr Phe Asp Asn Asn Tyr Phe Ala Asn Leu
65 70 75 80
Gln Ile Glu Met Gly Leu Leu Gln Ser Ile Lys Asn Phe Phe Pro His
85 90 95
Arg Glu Gln Ala Pro Ser Leu Leu Ser Met Ile Met Pro Val Val Asn
100 105 110
Pro Ile Ser Ser Ser
115

<210> 401
<211> 143
<212> PRT
<213>

<400> 401
Met Ala Ala Leu Met Lys Ser Ser Ala Cys Ile Ala Val Ile Val Phe
1 5 10 15
Ile Val Cys Ser Ile Asn Asn Thr Val His Gly Gln Leu Ser Ser Thr
20 25 30
Phe Tyr Asp Lys Ser Cys Pro Thr Val Leu Ser Val Val Lys Ala Gly
35 40 45
Val Lys Gln Ala Val Ala Lys Glu Gln Arg Met Gly Ala Ser Leu Leu
50 55 60
Arg Leu His Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser Val
65 70 75 80
Leu Leu Asp Asp Ser Ser Lys Ile Thr Gly Glu Lys Thr Ala Ile Pro
85 90 95
Asn Ala Asn Ser Ala Arg Gly Phe Asp Val Ile Asp Thr Ile Lys Ser
100 105 110
Gln Val Glu Lys Ser Cys Ser Ala Val Val Ser Cys Ser Asp Ile Leu
115 120 125
Ala Ile Ala Ala Arg Asp Ser Val Val Glu Leu Gly Gly Pro Ser
130 135 140

<210> 402
<211> 1474
<212> DNA
<213>

<400> 402
gaattcggca cgagaaaacg tccatagctt ccttgccaac tgcaagcaat acagtacaag 60
agccagacga tcgaatcctg tgaagtggtt ctgaagtgat gggaagcttg gaatctgaaa 120
aaactgttac aggatatgca gctcgggact ccagtggcca cttgtcccct tacacttaca 180
atctcagaaa gaaaggacct gaggatgtaa ttgtaaaggt catttactgc ggaatctgcc 240

01.06.03

actctgattt agttcaaatg cgtaatgaaa tggacatgtc tcattaccca atggtccctg 300
ggcatgaagt ggtggggatt gtaacagaga ttggcagcga ggtgaagaaa ttcaaagtgg 360
gagagcatgt aggggttggt tgcattgttg ggtcctgtcg cagttgcggt aattgcaatc 420
agagcatgga acaatactgc agcaagagga tttggaccta caatgatgtg aaccatgacg 480
gcacacctac tcagggcgga tttgcaagca gtatggtggt tgatcagatg tttgtggttc 540
gaatcccgga gaatcttcct ctggaacaag cggcccctct gttatgtgca ggggttacag 600
ttttcagccc aatgaagcat ttcgccatga cagagcccgg gaagaaatgt gggattttgg 660
gtttaggagg cgtggggcac atgggtgtca agattgccaa agcctttgga ctccacgtga 720
cggttatcag ttcgtctgat aaaaagaaag aagaagccat ggaagtcctc ggcgccgatg 780
cttatcttgt tagcaaggat actgaaaaga tgatggaagc agcagagagc ctagattaca 840
taatggacac cattccagtt gctcatcctc tggaaccata tcttgccctt ctgaagacaa 900
atggaaagct agtgatgctg ggcgttgttc cagagccgtt gcacttcgtg actcctctct 960
taatacttgg gagaaggagc atagctggaa gtttcattgg cagcatggag gaaacacagg 1020
aaactctaga tttctgtgca gagaagaagg tatcatcgat gattgaggtt gtgggcctgg 1080
actacatcaa cacggccatg gaaaggttgg agaagaacga tgtccgttac agatttgtgg 1140
tggatgttgc tagaagcaag ttggataatt agtctgcaat caatcaatca gatcaatgcc 1200
tgcatgcaag atgaatagat ctggactagt agcttaacat gaaagggaaa ttaaattttt 1260
atttaggaac tcgatactgg tttttgttac tttagtttag cttttgtgag gttgaaacaa 1320
ttcagatgtt tttttaactt gtatatgtaa agatcaattt ctcgtgacag taaataataa 1380
tccaatgtct tctgccaaat taatatatgt attcgtattt ttatatgaaa aaaaaaaaaa 1440
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaa 1474

<210> 403
<211> 414
<212> DNA
<213>

<400> 403
cacgctcgac gaattcggta ccccgggttc gaaatcgata agcttggatc caaagcaaca 60
cattgaactc tctctctctc tctctctctc tctctctctc tcccccaccc ccccttccca 120
accccaccca catacagaca agtagatacg cgcacacaga agaagaaaag atgggggttt 180
caatgcagtc aatcgcacta gcgacggttc tggccgtcct aacgacatgg gcgtggaggg 240
cggtgaactg ggtgtggctg aggccgaaga ggctcgagag gcttctgaga cagcaaggtc 300
tctccggcaa gtcctacacc ttcctggtcg gcgacctcaa ggagaacctg cggatgctca 360
aggaagccaa gtccaagccc atcgccgtct ccgatgacat caagcctcgt ctct 414

说 明 书 附 图

L-苯丙氨酸	
↓	苯丙氨酸氨裂解酶 (PAL)
肉桂酸	
↓	肉桂酸4-羟化酶 (C4H)
香豆酸	
↓	香豆酸3-羟化酶 (C3H)
咖啡酸	
↓	O-甲基转移酶 (OMT)
阿魏酸	
↓	4-香豆酸:CoA裂解酶 (4CL)
阿魏酰-CoA	
↓	肉桂酰-CoA还原酶 (CCR)
松柏醛	
↓	肉桂基醇脱氢酶 (CAD)
松柏醇	
↓	松柏醇葡糖基转移酶 (CGT)
糖基化形式	
↓	松柏苷β-葡糖苷酶 (CBG)
脱糖基化形式	
↓	酚酶 (PNL)
↓	漆酶 (LAC)
↓	过氧化物酶 (POX)
木质素	

图 1

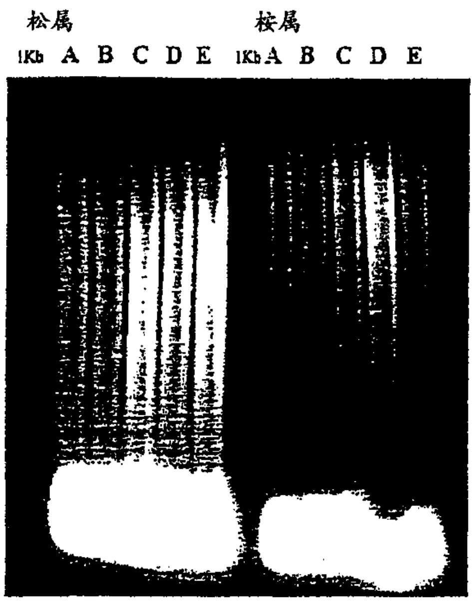

图2

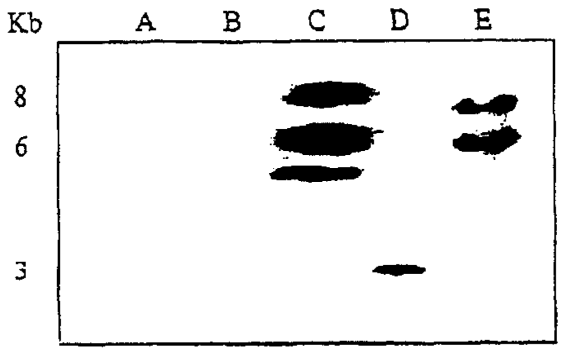

图 3

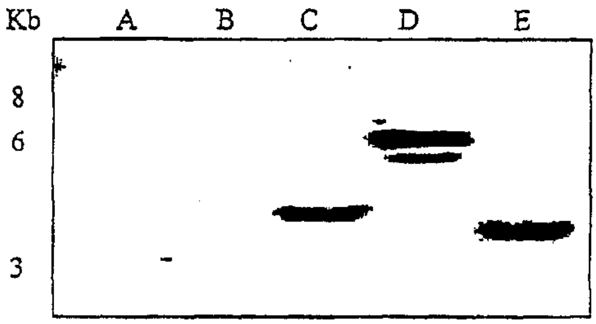

图 4

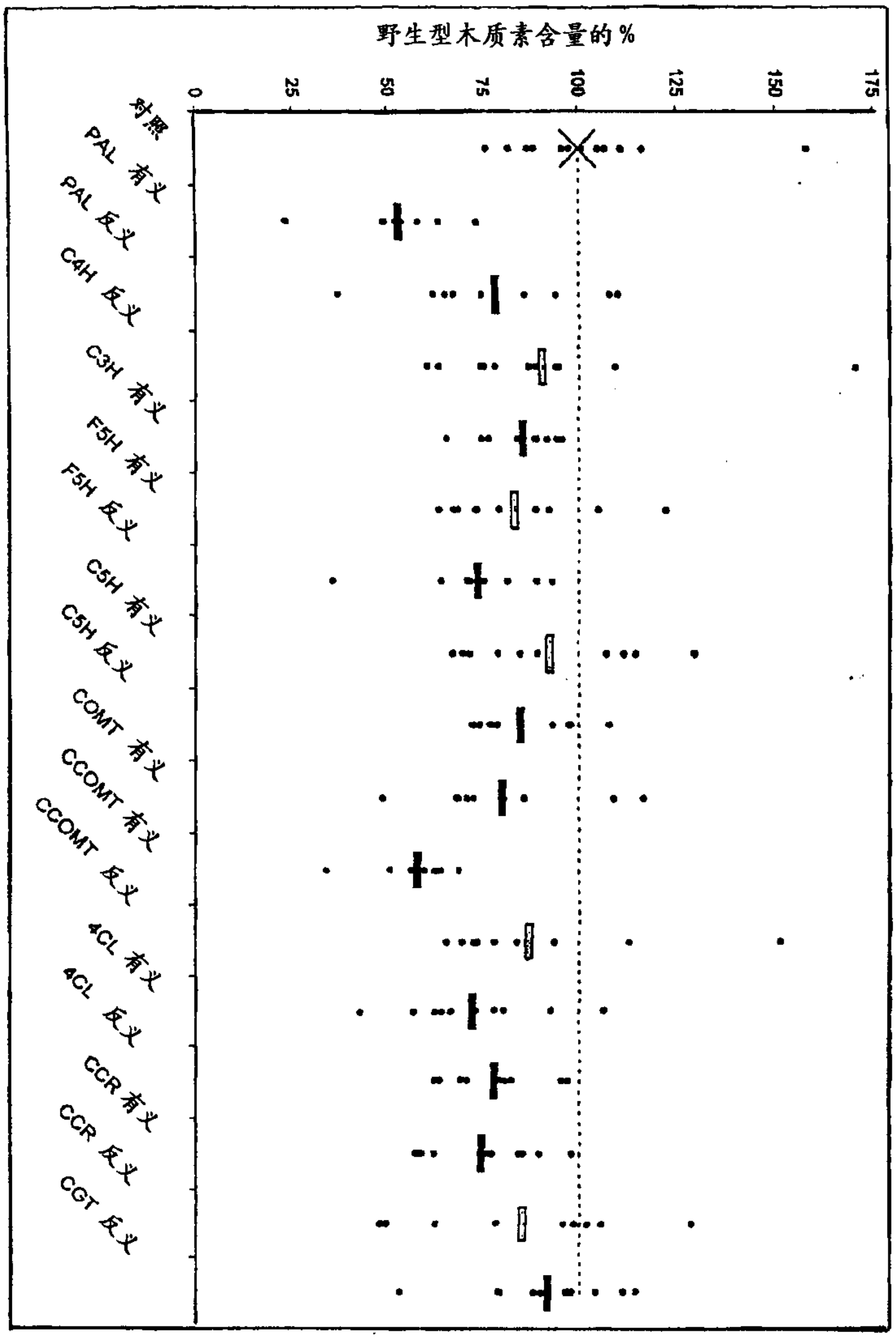
野生型木质素含量的 %
0
25
50
75
100
125
150
175
对照
PAL 有义
PAL 反义
C4H 反义
C3H 有义
F5H 有义
F5H 反义
C5H 有义
C5H 反义
COMT 有义
CCOMT 有义
CCOMT 反义
4CL 有义
4CL 反义
CCR 有义
CCR 反义
CGT 反义

图 5