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(73)专利权人 埃沃尔瓦公司
地址 瑞士赖纳赫
(72)发明人 韦罗尼克·杜尚
迈克尔·达尔埃格德·米克尔森
艾本·默勒-汉森
(74)专利代理机构 北京集佳知识产权代理有限公司 11227
代理人 彭鲲鹏 郑斌
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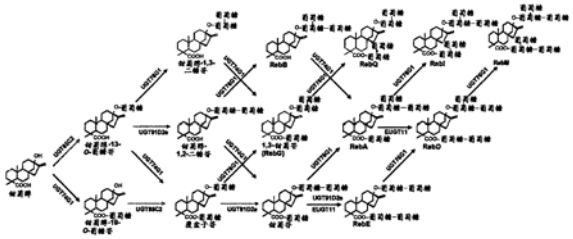
(54)发明名称

在重组宿主中生产甜菊醇糖苷

(57)摘要

本发明涉及用于生产甜菊醇糖苷和甜菊醇糖苷前体的重组微生物和方法。



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1.在细胞培养物中生产甜菊醇糖苷的重组宿主细胞,其中所述重组宿主细胞针对以下基因具有过表达:至少一种编码SEQ ID NO:26所示氨基酸序列的ATP结合盒(ABC)转运蛋白多肽和/或SEQ ID NO:38所示氨基酸序列的线粒体蛋白移位酶(MPT)转运蛋白多肽的内源转运蛋白基因,该过表达高于在相应的未修饰重组宿主细胞中观测到的表达水平;

其中当所述至少一种内源转运蛋白基因在所述重组宿主细胞中表达时,至少一部分所述甜菊醇糖苷从所述重组宿主转运到细胞培养物中;并且其中所述重组宿主细胞是真菌细胞。

2.权利要求1所述的重组宿主细胞,其还包含:

(a)编码蔗糖转运蛋白(SUC1)多肽和蔗糖合酶(SUS1)多肽的一种或更多种基因;

(b)编码能够从法呢基二磷酸(FPP)和异戊烯基二磷酸(IPP)合成牻牛儿基牻牛儿基二磷酸(GGPP)的多肽的基因;

其中所述多肽为SEQ ID NO:149中所示的氨基酸序列;

(c)编码能够从GGPP合成E型-柯巴基二磷酸的多肽的基因;

其中所述多肽为SEQ ID NO:150中所示的氨基酸序列;

(d)编码能够从E型-柯巴基二磷酸合成E型-贝壳杉烯的多肽的基因;

其中所述多肽为SEQ ID NO:152中所示的氨基酸序列;

(e)编码能够从E型-贝壳杉烯合成E型-异贝壳杉烯酸的多肽的基因;

其中所述多肽为SEQ ID NO:151中所示的氨基酸序列;

(f)编码能够从E型-异贝壳杉烯酸合成甜菊醇的多肽的基因;

其中所述多肽为SEQ ID NO:154中所示的氨基酸序列;

(g)编码能够还原细胞色素P450复合物的多肽的基因;

其中所述多肽为SEQ ID NO:153或SEQ ID NO:155中所示的氨基酸序列;

(h)编码能够对甜菊醇或甜菊醇糖苷在其C-13羟基处进行糖基化的多肽的基因;

其中所述多肽为SEQ ID NO:156中所示的氨基酸序列;

(i)编码能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽的基因;

其中所述多肽为SEQ ID NO:158中所示的氨基酸序列;

(j)编码能够对甜菊醇或甜菊醇糖苷在其C-19羧基处进行糖基化的多肽的基因;

其中所述多肽为SEQ ID NO:157中所示的氨基酸序列;和/或

(k)编码能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽的基因;

其中所述多肽为SEQ ID NO:159或SEQ ID NO:148中所示的氨基酸序列;

其中(a)至(k)项的所述基因中的至少一个是重组基因;并且

其中所述甜菊醇糖苷是莱鲍迪苷A、莱鲍迪苷B、莱鲍迪苷D和/或莱鲍迪苷M。

3.权利要求2所述的重组宿主细胞,其中(a)至(k)项的所述基因中的至少一个被密码子优化以用于在所述重组宿主细胞中表达。

4.权利要求3所述的重组宿主细胞,其中(a)至(k)项的所述基因中的至少一个被密码子优化以用于在酿酒酵母(Saccharomyces cerevisiae)中表达。

5.权利要求1所述的重组宿主细胞,其中:

(a)相对于相应的未修饰重组宿主细胞,转运到培养基中的RebD和RebM增加;

(b)相对于相应的未修饰重组宿主细胞,在上清液中RebA、RebB、RebD和/或RebM的量增加;

(c)转运到培养基中的RebD相比于所述重组宿主细胞产生的总RebD的比例增加;和/或

(d)转运到培养基中的RebM相比于所述重组宿主细胞产生的总RebM的比例增加。

6.权利要求1至5中任一项所述的重组宿主细胞,其中所述真菌细胞是酵母细胞。

7.权利要求6所述的重组宿主细胞,其中所述酵母细胞是来自酿酒酵母、粟酒裂殖酵母(Schizosaccharomyces pombe)、解脂耶氏酵母(Yarrowia lipolytica)、光滑念珠菌(Candida glabrata)、棉阿舒囊霉(Ashbya gossypii)、产朊假丝酵母(Cyberlindnera jadinii)、巴斯德毕赤酵母(Pichia pastoris)、乳酸克鲁维酵母(Kluyveromyces lactis)、多形汉逊酵母(Hansenula polymorpha)、博伊丁念珠菌(Candida boidinii)、Arxula adeninivorans、红发夫酵母(Xanthophyllomyces dendrorhous)或白色念珠菌(Candida albicans)物种的细胞。

8.权利要求1所述的重组宿主细胞,其中所述重组宿主细胞是解脂耶氏酵母细胞。

9.在细胞培养物中生产甜菊醇糖苷的方法,其包括在表达一种或更多种所述基因的条件下,在培养基中培养权利要求1-8中任一项所述的重组宿主细胞;

其中对所述至少一种内源转运蛋白基因进行表达;

其中培养包括诱导一种或更多种所述基因的表达,或者一种或更多种所述基因的组成型表达;

其中所述甜菊醇糖苷由所述重组宿主细胞生产;以及

其中所述甜菊醇糖苷是莱鲍迪苷A、莱鲍迪苷B、莱鲍迪苷D和/或莱鲍迪苷M。

10.权利要求9所述的方法,其中:

(a)莱鲍迪苷A在表达以下多肽的重组宿主细胞中生产:能够对甜菊醇或甜菊醇糖苷在其C-13羟基处进行糖基化的多肽;能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽;能够对甜菊醇或甜菊醇糖苷在其C-19羧基处进行糖基化的多肽;以及能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽;

(b)莱鲍迪苷B在表达以下多肽的重组宿主细胞中生产:能够对甜菊醇或甜菊醇糖苷在其C-13羟基处进行糖基化的多肽;能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽;以及能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽;

(c)莱鲍迪苷D在表达以下多肽的重组宿主细胞中生产:能够对甜菊醇或甜菊醇糖苷在其C-13羟基处进行糖基化的多肽;能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽;能够对甜菊醇或甜菊醇糖苷在其C-19羧基处进行糖基化的多肽;以及能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽;和/或

(d)莱鲍迪苷M在表达以下多肽的重组宿主细胞中生产:能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽;能

够对甜菊醇或甜菊醇糖苷在其C-19羧基处进行糖基化的多肽;以及能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽。

11.权利要求9所述的方法,其中所述甜菊醇糖苷以至少500mg/L细胞培养物的浓度生产。

12.使甜菊醇糖苷的生产或向细胞培养基中的转运增加的方法,其包括在表达一种或更多种所述基因的条件下,在培养基中培养权利要求1-8中任一项所述的重组宿主细胞;

其中对所述至少一种内源转运蛋白基因进行表达;

其中培养包括诱导一种或更多种所述基因的表达,或者一种或更多种所述基因的组成型表达;以及

其中所述甜菊醇糖苷是莱鲍迪苷A、莱鲍迪苷B、莱鲍迪苷D和/或莱鲍迪苷M。

13.权利要求10至12中任一项所述的方法,其还包括从所述细胞培养物中分离单独或与至少一种其他甜菊醇糖苷一起的所述莱鲍迪苷M。

14.根据权利要求10至12中任一项所述的方法,其还包括从所述细胞培养物回收包含单独或与至少一种其他甜菊醇糖苷一起的莱鲍迪苷M的甜菊醇糖苷组合物。

15.权利要求14所述的方法,其中所回收的甜菊醇糖苷组合物相对于甜叶菊植物的甜菊醇糖苷组合物是富含莱鲍迪苷M的,并且相对于从植物源甜叶菊提取物获得的甜菊醇糖苷组合物具有降低水平的甜叶菊植物源组分。

16.权利要求9所述的方法,其中使所述重组宿主细胞在发酵罐中在一定温度下生长一段时间,其中所述温度和时间促进所述甜菊醇糖苷组合物的生产。

17.权利要求9所述的方法,其中所述重组宿主细胞是解脂耶氏酵母细胞。

18.权利要求9所述的方法,其中莱鲍迪苷A在表达以下多肽的重组宿主细胞中生产:能够对甜菊醇或甜菊醇糖苷在其C-13羟基处进行糖基化的多肽;能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽;能够对甜菊醇或甜菊醇糖苷在其C-19羧基处进行糖基化的多肽;以及能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽。

19.权利要求9所述的方法,其中莱鲍迪苷D在表达以下多肽的重组宿主细胞中生产:能够对甜菊醇或甜菊醇糖苷在其C-13羟基处进行糖基化的多肽;能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽;能够对甜菊醇或甜菊醇糖苷在其C-19羧基处进行糖基化的多肽;以及能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽。

20.权利要求9所述的方法,其中莱鲍迪苷M在表达以下多肽的重组宿主细胞中生产:能够对甜菊醇的13-OH进行糖基化的多肽;能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C3'进行β-1,3糖基化的多肽;能够对甜菊醇或甜菊醇糖苷在其C-19羧基处进行糖基化的多肽;以及能够对甜菊醇糖苷的13-O-葡萄糖、19-O-葡萄糖、或13-O-葡萄糖与19-O-葡萄糖二者的C2'进行β-1,2糖基化的多肽。

在重组宿主中生产甜菊醇糖苷

技术领域

[0001] 本公开内容一般地涉及通过重组宿主(例如重组微生物)的甜菊醇糖苷(steviol glycoside)例如莱鲍迪苷(rebaudioside)A(RebA),莱鲍迪苷B(RebB),莱鲍迪苷D(RebD)和莱鲍迪苷M(RebM)的重组生产及其分离方法。特别地,本公开内容涉及对重组宿主中的转运系统的修饰,以使这些甜菊醇糖苷的生产和/或使这些甜菊醇糖苷向培养基中的转运增加。

[0002] 相关技术描述

[0003] 甜味剂作为最常用于食品、饮料或糖果业的成分是公知的。甜味剂既可以在生产过程中加入最终食品,也可以在适当稀释的情况下作为佐餐甜味剂(tabletop sweeter)或者作为烘培中糖的家用替代品单独使用。甜味剂包括天然甜味剂(例如蔗糖、高果糖玉米糖浆、糖蜜、枫糖浆和蜂蜜)和人工甜味剂(例如阿斯巴甜、糖精和三氯半乳蔗糖(sucralose))。甜菊提取物(stevia extract)是可从多年生灌木甜菊(Stevia rebaudiana)中分离和提取的天然甜味剂。甜菊在南美洲和亚洲被普遍种植用于商业生产甜菊提取物。各种程度纯化的甜菊提取物在商业中用作食品中的高甜度甜味剂,以及在共混物中或单独地作为佐餐甜味剂。

[0004] 图1中显示了几种甜菊醇糖苷的化学结构,包括二萜甜菊醇和多种甜菊醇糖苷。甜菊植物的提取物通常包含有助于甜味的莱鲍迪苷和其他甜菊醇糖苷,尽管每种甜菊醇糖苷的量通常在不同的生产批次之间不同。

[0005] 由于从甜菊植物中回收和纯化甜菊醇糖苷已被证明是劳动密集型的和低效的,因此仍然需要可以高产率生产所需甜菊醇糖苷(如RebD和RebM)的重组生产系统。

[0006] 发明概述

[0007] 与上述背景相反,本发明提供了优于现有技术的某些优点和进步。

[0008] 特别地,本发明提供了能够合成甜菊醇糖苷的重组宿主,其包含编码转运蛋白(transporter)多肽的基因和/或编码调节至少一种转运蛋白基因表达的转录因子多肽的基因;其中编码所述转运蛋白多肽的基因和/或编码所述调节至少一种转运蛋白基因表达的转录因子多肽的基因之表达被修饰,并且所述重组宿主将至少一部分所述合成的甜菊醇糖苷从所述宿主转运到培养基中。

[0009] 在本文公开的重组宿主的一些方面中,所述编码转运蛋白多肽的基因是内源基因。

[0010] 在本文公开的重组宿主的一些方面中,所述转运蛋白多肽包括ATP结合盒(ATP-binding cassette,ABC)转运蛋白、主要促进子超家族(major facilitator superfamily,MFS)转运蛋白、氨基酸/生长素通透酶(amino acid/auxin permease,AAAP)家族转运蛋白、ATP酶转运蛋白、硫酸盐通透酶(sulfate permease,SulP)家族转运蛋白、溶酶体胱氨酸转运蛋白(lysosomal cystine transporter,LCT)家族转运蛋白、Ca2+:阳离子反向转运蛋白(Ca2+:cation antiporter,CaCA)家族转运蛋白、氨基酸-多胺-有机阳离子(amino acid-polyamine-organocation,APC)超家族转运蛋白、多药/寡糖基脂质/多糖(multidrug/oligosaccharidyl-lipid/polysaccharide,MOP)转运蛋白、ZRT/IRT样蛋白(ZRT/IRT-like

protein,ZIP)金属转运蛋白家族转运蛋白、线粒体蛋白移位酶(mitochondrial protein translocase,MPT)家族转运蛋白、电压门控离子通道(voltage-gated ion channel,VIC)家族转运蛋白、单价阳离子:质子反向转运蛋白-2(cation:proton antiporter-2,CPA2)家族转运蛋白、推定的跨膜氨基酸外排转运蛋白ThrE家族、寡肽转运蛋白(oligopeptide transporter,OPT)家族转运蛋白、K^+转运蛋白(K^+ transporter,Trk)家族转运蛋白、胆汁酸:Na同向转运体(bile acid:Na symporter,BASS)家族转运蛋白、药物/代谢物转运蛋白(drug/metabolite transporter,DMT)超家族转运蛋白、线粒体运载体(mitochondrial carrier,MC)家族转运蛋白、生长素外排运载体(auxin efflux carrier,AEC)家族转运蛋白、氨通道转运蛋白(ammonia channel transporter,Amt)家族转运蛋白、金属离子(Mn^{2+}-铁)转运蛋白(metal ion(Mn^{2+}-iron)transporter,Nramp)家族转运蛋白、瞬时受体电位Ca^{2+}通道(transient receptor potential Ca^{2+} channel,TRP-CC)家族转运蛋白、耐砷-3(arsenical resistance-3,ACR3)家族转运蛋白、核碱基:阳离子同向转运体-1(nucleobase:cation symporter-1,NCS1)家族转运蛋白、无机磷酸转运蛋白(inorganic phosphate transporter,PiT)家族转运蛋白、亚砷酸-亚锑酸盐(arsenite-antimonite,ArsAB)外排家族转运蛋白、转运蛋白IISP家族、甘油摄取(glycerol uptake,GUP)家族转运蛋白、金属离子转运(metal ion transport,MIT)家族转运蛋白、铜转运(copper transport,Ctr)家族转运蛋白或阳离子扩散促进子(cation diffusion facilitator,CDF)家族转运蛋白。

[0011] 在本文公开的重组宿主的一些方面中,修饰的表达包括:

[0012] (a)过表达所述编码转运蛋白多肽的基因和/或所述编码转录因子多肽的基因;或

[0013] (b)缺失所述编码转运蛋白多肽的基因和/或所述编码转录因子多肽的基因。

[0014] 在本文公开的重组宿主的一些方面中,所述编码转运蛋白多肽的基因和/或所述编码转录因子多肽的基因具有提高的活性。

[0015] 在本文公开的重组宿主的一些方面中,所述编码转运蛋白多肽基因中的一个或更多个和/或所述编码转录因子多肽的基因中的一个或更多个过表达。

[0016] 在本文公开的重组宿主的一些方面中,所述转运蛋白多肽和/或转录多肽包含:SEQ ID NO:14中所示的YAL067C,SEQ ID NO:15中所示的YBL089W,SEQ ID NO:16中所示的YBL099W,SEQ ID NO:86中所示的YBR008C,SEQ ID NO:87中所示的YBR021W,SEQ ID NO:88中所示的YBR043C,SEQ ID NO:13中所示的YBR180W,SEQ ID NO:17中所示的YBR241C,SEQ ID NO:89中所示的YBR287W,SEQ ID NO:18中所示的YBR294W,SEQ ID NO:90中所示的YBR295W,SEQ ID NO:91中所示的YBR296C,SEQ ID NO:92中所示的YCL038C,SEQ ID NO:19中所示的YCL069W,SEQ ID NO:93中所示的YCR011C,SEQ ID NO:20中所示的YCR028C,SEQ ID NO:21中所示的YCR075C,SEQ ID NO:94中所示的YDL054C,SEQ ID NO:95中所示的YDL100C,SEQ ID NO:22中所示的YDL128W,SEQ ID NO:23中所示的YDL185W,SEQ ID NO:24中所示的YDL194W,SEQ ID NO:25中所示的YDL210W,SEQ ID NO:96中所示的YDL245C,SEQ ID NO:97中所示的YDL247W,SEQ ID NO:98中所示的YDR011W,SEQ ID NO:26中所示的YDR061W,SEQ ID NO:27中所示的YDR093W,SEQ ID NO:99中所示的YDR292C,SEQ ID NO:28中所示的YDR338C,SEQ ID NO:29中所示的YDR406W,SEQ ID NO:100中所示的YDR497C,SEQ ID NO:30中所示的YDR536W,SEQ ID NO:101中所示的YEL006W,SEQ ID NO:102中所示的

YEL027W,SEQ ID NO:31中所示的YEL031W,SEQ ID NO:103中所示的YEL065W,SEQ ID NO:104中所示的YER019C-A,SEQ ID NO:105中所示的YER053C,SEQ ID NO:106中所示的YER119C,SEQ ID NO:32中所示的YER166W,SEQ ID NO:33中所示的YFL011W,SEQ ID NO:107中所示的YFL028C,SEQ ID NO:108中所示的YFR045W,SEQ ID NO:34中所示的YGL006W,SEQ ID NO:35中所示的YGL013C,SEQ ID NO:109中所示的YGL084C,SEQ ID NO:110中所示的YGL104C,SEQ ID NO:111中所示的YGL114W,SEQ ID NO:112中所示的YGL167C,SEQ ID NO:36中所示的YGL255W,SEQ ID NO:37中所示的YGR125W,SEQ ID NO:38中所示的YGR181W,SEQ ID NO:39中所示的YGR217W,SEQ ID NO:40中所示的YGR224W,SEQ ID NO:113中所示的YGR257C,SEQ ID NO:41中所示的YGR281W,SEQ ID NO:42中所示的YHL016C,SEQ ID NO:114中所示的YHL035C,SEQ ID NO:115中所示的YHL036W,SEQ ID NO:116中所示的YHR002W,SEQ ID NO:117中所示的YHR096C,SEQ ID NO:118中所示的YIL006W,SEQ ID NO:43中所示的YIL088C,SEQ ID NO:119中所示的YIL120W,SEQ ID NO:120中所示的YIL121W,SEQ ID NO:121中所示的YIL166C,SEQ ID NO:44中所示的YJL093C,SEQ ID NO:45中所示的YJL094C,SEQ ID NO:46中所示的YJL108C,SEQ ID NO:122中所示的YJL133W,SEQ ID NO:47中所示的YJL212C,SEQ ID NO:123中所示的YJL219W,SEQ ID NO:48中所示的YJR106W,SEQ ID NO:49中所示的YJR160C,SEQ ID NO:124中所示的YKL016C,SEQ ID NO:125中所示的YKL050C,SEQ ID NO:50中所示的YKL064W,SEQ ID NO:126中所示的YKL120W,SEQ ID NO:127中所示的YKL146W,SEQ ID NO:128中所示的YKL209C,SEQ ID NO:129中所示的YKR039W,SEQ ID NO:51中所示的YKR050W,SEQ ID NO:52中所示的YKR105C,SEQ ID NO:53中所示的YKR106W,SEQ ID NO:130中所示的YLR411W,SEQ ID NO:54中所示的YLR447C,SEQ ID NO:131中所示的YML038C,SEQ ID NO:55中所示的YML116W,SEQ ID NO:56中所示的YMR034C,SEQ ID NO:57中所示的YMR056C,SEQ ID NO:132中所示的YMR166C,SEQ ID NO:58中所示的YMR253C,SEQ ID NO:133中所示的YMR279C,SEQ ID NO:134中所示的YNL003C,SEQ ID NO:59中所示的YNL065W,SEQ ID NO:60中所示的YNL070W,SEQ ID NO:61中所示的YNL083W,SEQ ID NO:62中所示的YNL095C,SEQ ID NO:63中所示的YNL121C,SEQ ID NO:64中所示的YNL142W,SEQ ID NO:135中所示的YNL268W,SEQ ID NO:136中所示的YNR055C,SEQ ID NO:65中所示的YOL020W,SEQ ID NO:66中所示的YOL075C,SEQ ID NO:67中所示的YOL077W-A,SEQ ID NO:68中所示的YOL122C,SEQ ID NO:137中所示的YOL158C,SEQ ID NO:69中所示的YOR079C,SEQ ID NO:70中所示的YOR087W,SEQ ID NO:71中所示的YOR092W,SEQ ID NO:138中所示的YOR100C,SEQ ID NO:72中所示的YOR130C,SEQ ID NO:139中所示的YOR153W,SEQ ID NO:73中所示的YOR222W,SEQ ID NO:140中所示的YOR271C,SEQ ID NO:141中所示的YOR273C,SEQ ID NO:74中所示的YOR291W,SEQ ID NO:75中所示的YOR306C,SEQ ID NO:142中所示的YOR307C,SEQ ID NO:76中所示的YOR316C,SEQ ID NO:143中所示的YOR332W,SEQ ID NO:77中所示的YOR334W,SEQ ID NO:144中所示的YOR348C,SEQ ID NO:145中所示的YPL036W,SEQ ID NO:78中所示的YPL078C,SEQ ID NO:79中所示的YPL270W,SEQ ID NO:80中所示的YPL274W,SEQ ID NO:81中所示的YPR003C,SEQ ID NO:82中所示的YPR011C,SEQ ID NO:83中所示的YPR058W,SEQ ID NO:84中所示的YPR128C,或SEQ ID NO:85中所示的YPR201W。

[0017] 在本文公开的重组宿主的一些方面中,以下序列得到过表达:SEQ ID NO:88中所示的YBR043C,SEQ ID NO:95中所示的YDL100C,SEQ ID NO:94中所示的YDL054C,SEQ ID

NO:22中所示的YDL128W,SEQ ID NO:146中所示的YDL198C,SEQ ID NO:26中所示的YDR061W,SEQ ID NO:30中所示的YDR536W,SEQ ID NO:102中所示的YEL027W,SEQ ID NO:147中所示的YFL054C,SEQ ID NO:112中所示的YGL167C,SEQ ID NO:38中所示的YGR181W,SEQ ID NO:42中所示的YHL016C,SEQ ID NO:121中所示的YIL166C,SEQ ID NO:44中所示的YJL093C,SEQ ID NO:48中所示的YJR106W,SEQ ID NO:126中所示的YKL120W,SEQ ID NO:127中所示的YKL146W,SEQ ID NO:129中所示的YKR039W,SEQ ID NO:56中所示的YMR034C,SEQ ID NO:132中所示的YMR166C,SEQ ID NO:68中所示的YOL122C,SEQ ID NO:69中所示的YOR079C,SEQ ID NO:79中所示的YPL270W,和/或SEQ ID NO:82中所示的YPR011C。

[0018] 在一些方面中,所述重组宿主还包含:

[0019] (a)编码蔗糖转运蛋白和蔗糖合酶的一种或更多种基因;

[0020] (b)编码牻牛儿基牻牛儿基二磷酸合酶(geranylgeranyl diphosphate synthase,GGPPS)多肽的基因;

[0021] (c)编码E型-柯巴基二磷酸合酶(ent-copalyl diphosphate synthase,CDPS)多肽的基因;

[0022] (d)编码贝壳杉烯合酶(kaurene synthase,KS)多肽的基因;

[0023] (e)编码贝壳杉烯氧化酶(kaurene oxidase,KO)多肽的基因;

[0024] (f)编码甜菊醇合酶(steviol synthase,KAH)多肽的基因;

[0025] (g)编码细胞色素P450还原酶(cytochrome P450 reductase,CPR)多肽的基因;

[0026] (h)编码UGT85C2多肽的基因;

[0027] (i)编码UGT76G1多肽的基因;

[0028] (k)编码UGT91D2功能同源物的基因;和/或

[0029] (l)编码EUGT11多肽的基因;

[0030] 其中所述基因的至少一个是重组基因;并且

[0031] 其中所述宿主能够生产RebA、RebB、RebD和/或RebM中的一种或更多种。

[0032] 在本文公开的重组宿主的一些方面中,所述基因中的至少一个被密码子优化以用于在宿主中表达。

[0033] 在本文公开的重组宿主的一些方面中,所述基因中的至少一个被密码子优化以用于在酿酒酵母(Saccharomyces cerevisiae)中表达。

[0034] 在本文公开的重组宿主的一些方面中,

[0035] (a)所述GGPPS多肽包含与SEQ ID NO:149中所示的氨基酸序列具有至少70%同一性的多肽;

[0036] (b)所述CDPS多肽包含与SEQ ID NO:150中所示的氨基酸序列具有至少70%同一性的多肽;

[0037] (c)所述KO多肽包含与SEQ ID NO:152中所示的氨基酸序列具有至少70%同一性的多肽;

[0038] (d)所述KS多肽包含与SEQ ID NO:151中所示的氨基酸序列具有至少40%同一性的多肽;

[0039] (e)所述KAH多肽包含与SEQ ID NO:154中所示的氨基酸序列具有至少60%同一性的多肽;

[0040] (f)所述CPR多肽包含与SEQ ID NO:153中所示的氨基酸序列具有至少70％同一性的多肽和/或与SEQ ID NO:155中所示的氨基酸序列具有至少65％同一性的多肽；

[0041] (g)所述UGT85C2多肽包含与SEQ ID NO:156中所示的氨基酸序列具有至少55％同一性的多肽；

[0042] (h)所述UGT76G1多肽包含与SEQ ID NO:158中所示的氨基酸序列具有至少50％同一性的多肽；

[0043] (i)所述UGT74G1多肽包含与SEQ ID NO:157中所示的氨基酸序列具有至少55％同一性的多肽；

[0044] (j)所述UGT91D2功能同源物包含与SEQ ID NO:159中所示的氨基酸序列具有至少90％同一性的UGT91D2e-b多肽；和

[0045] (k)所述EUGT11多肽包含与SEQ ID NO:148中所示的氨基酸序列具有至少65％同一性的多肽。

[0046] 在一些方面中，本文公开的所述重组宿主包含以下微生物：植物细胞、哺乳动物细胞、昆虫细胞、真菌细胞或细菌细胞。

[0047] 在一些方面中，所述细菌细胞包含埃希氏菌属(Escherichia)细菌细胞，乳杆菌属(Lactobacillus)细菌细胞，乳球菌属(Lactococcus)细菌细胞，棒状杆菌属(Cornebacterium)细菌细胞，醋杆菌属(Acetobacter)细菌细胞，不动杆菌属(Acinetobacter)细菌细胞或假单胞菌属(Pseudomonas)细菌细胞。

[0048] 在一些方面中，所述真菌细胞是酵母细胞。

[0049] 在一些方面中，所述酵母细胞是来自酿酒酵母、粟酒裂殖酵母(Schizosaccharomyces pombe)、解脂耶氏酵母(Yarrowia lipolytica)、光滑念珠菌(Candida glabrata)、棉阿舒囊霉(Ashbya gossypii)、产朊假丝酵母(Cyberlindnera jadinii)、巴斯德毕赤酵母(Pichia pastoris)、乳酸克鲁维酵母(Kluyveromyces lactis)、多形汉逊酵母(Hansenula polymorpha)、博伊丁念珠菌(Candida boidinii)、Arxula adeninivorans、红发夫酵母(Xanthophyllomyces dendrorhous)或白色念珠菌(Candida albicans)物种的细胞。

[0050] 在一些方面中，所述酵母细胞是酵母菌(Saccharomycete)。

[0051] 在一些方面中，所述酵母细胞是来自酿酒酵母物种的细胞。

[0052] 本发明还提供了生产甜菊醇糖苷的方法，其包括：

[0053] (a)在表达本文所公开的重组宿主所包含的基因的条件下，在培养基中培养本文所公开的重组宿主，

[0054] 其中所述甜菊醇糖苷由所述宿主合成；以及

[0055] (b)任选地分离所述甜菊醇糖苷。

[0056] 在本文公开的所述方法的一些方面中，所述甜菊醇糖苷是RebA、RebB、RebD和/或RebM，并且其中：

[0057] (a)RebA能够在表达UGT85C2、UGT76G1、UGT74G1和UGT91D2的本文所公开的重组宿主中合成；

[0058] (b)RebB能够在表达UGT85C2、UGT76G1和UGT91D2的本文所公开的重组宿主中合成；

[0059] (c)RebD能够在表达UGT85C2、UGT76G1、UGT74G1以及UGT91D2和/或EUGT11的本文所公开的重组宿主中合成;和

[0060] (d)RebM能够在表达UGT85C2、UGT76G1、UGT74G1和UGT91D2和/或EUGT11的本文所公开的重组宿主中合成。

[0061] 在本文公开的所述方法的一些方面中,编码以下序列的基因过表达:SEQ ID NO:88中所示的YBR043C,SEQ ID NO:95中所示的YDL100C,SEQ ID NO:94中所示的YDL054C,SEQ ID NO:22中所示的YDL128W,SEQ ID NO:146中所示的YDL198C,SEQ ID NO:26中所示的YDR061W,SEQ ID NO:30中所示的YDR536W,SEQ ID NO:102中所示的YEL027W,SEQ ID NO:147中所示的YFL054C,SEQ ID NO:112中所示的YGL167C,SEQ ID NO:38中所示的YGR181W,SEQ ID NO:42中所示的YHL016C,SEQ ID NO:121中所示的YIL166C,SEQ ID NO:44中所示的YJL093C,SEQ ID NO:48中所示的YJR106W,SEQ ID NO:126中所示的YKL120W,SEQ ID NO:127中所示的YKL146W,SEQ ID NO:129中所示的YKR039W,SEQ ID NO:56中所示的YMR034C,SEQ ID NO:132中所示的YMR166C,SEQ ID NO:68中所示的YOL122C,SEQ ID NO:69中所示的YOR079C,SEQ ID NO:79中所示的YPL270W,和/或SEQ ID NO:82中所示的YPR011C。

[0062] 在本文公开的所述方法的一些方面中,所述甜菊醇糖苷以约500mg/L至约10,000mg/L的浓度生产。

[0063] 本发明还提供了使甜菊醇糖苷的生产或向培养基中的转运增加的方法,其包括:

[0064] (a)在表达本文所公开的宿主所包含的基因的条件下,在培养基中培养本文所公开的重组宿主,

[0065] 其中所述甜菊醇糖苷由所述宿主合成;以及

[0066] (b)任选地分离所述甜菊醇糖苷。

[0067] 在本文公开的所述方法的一些方面中,所述甜菊醇糖苷是RebA、RebB、RebD和/或RebM。

[0068] 本发明还提供了增加重组宿主中甜菊醇或甜菊醇糖苷生产的方法,其包括修饰以下基因的表达:编码转运蛋白多肽的基因和/或编码调节至少一种转运蛋白基因表达的转录的基因,其中所述宿主能够将所生产的至少一部分甜菊醇或甜菊醇糖苷从所述宿主转运到培养基中。

[0069] 从下面结合所附权利要求的本发明的详细描述中,将更全面地理解本发明的这些和其他特征和优点。注意,权利要求的范围由其中的陈述来限定,而不是由本说明书中阐述的特征和优点的具体讨论来限定。

附图说明

[0070] 图1示出了多种甜菊醇糖苷的化学结构和合成途径。

[0071] 图2是与对照甜菊醇糖苷生产菌株相比,过表达转运蛋白基因YGR181W(SEQ ID NO:38)或YDR061W(SEQ ID NO:26)的甜菊醇糖苷生产菌株上清液中RebA、RebB、RebD或RebM的量的柱状图。参见实施例4。

[0072] 图3A和图3B是与对照甜菊醇糖苷生产菌株相比,YGR181W(SEQ ID NO:38)或YDR061W(SEQ ID NO:26)过表达菌株的上清液(图3A)或总培养物(图3B)中RebA、RebD或RebM的量(mg/L)的柱状图。参见实施例4。

[0073] 在基因组上整合转运蛋白基因的产甜菊醇糖苷的酿酒酵母(S.cerevisiae)菌株中,13-SMG的水平在图4A示出(总水平和上清液水平;μM/OD_{600}),RebA的水平在图4B示出(总水平和上清液水平;μM/OD_{600}),RebB的水平在图4C示出(总水平和上清液水平;μM/OD_{600}),RebD的水平在图4D示出(总水平和上清液水平;μM/OD_{600}),且RebM的水平图4E示出(总水平和上清液水平;μM/OD_{600})。图4A-E的基因组上整合的转运蛋白基因是YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)、YJL093C(SEQ ID NO:44)、YJR106W(SEQ ID NO:48)、YMR166C(SEQ ID NO:132)、YIL166C(SEQ ID NO:121)、YKL120W(SEQ ID NO:126)、YDL054C(SEQ ID NO:94)、YDL128W(SEQ ID NO:22)、YDR536W(SEQ ID NO:30)、YGL167C(SEQ ID NO:112)、YKL146W(SEQ ID NO:127)、YKR039W(SEQ ID NO:129)、YOL122C(SEQ ID NO:68)和YPR011C(SEQ ID NO:82)。参见实施例6。

[0074] 图5A示出了通过USER克隆系统过表达以下序列的甜菊醇糖苷生产菌株的RebA、RebB、RebD和RebM(以μM/OD_{600}计)的上清液水平:YMR166C(SEQ ID NO:132)、YEL027W(SEQ ID NO:102)、YKL120W(SEQ ID NO:126)、YIL166C(SEQ ID NO:121)、YJR106W(SEQ ID NO:48)、YJL093C(SEQ ID NO:44)和YBR043C(SEQ ID NO:88)。图5B示出了通过USER克隆系统过表达以下序列的甜菊醇糖苷生产菌株的RebA、RebB、RebD和RebM(以μM/OD_{600}计)的总水平:YMR166C(SEQ ID NO:132)、YEL027W(SEQ ID NO:102)、YKL120W(SEQ ID NO:126)、YIL166C(SEQ ID NO:121)、YJR106W(SEQ ID NO:48)、YJL093C(SEQ ID NO:44)和YBR043C(SEQ ID NO:88)。

[0075] 具体描述

[0076] 出于所有目的,本文中引用的所有出版物、专利和专利申请通过引用以其整体明确地并入本文。

[0077] 在详细描述本发明之前,将定义若干术语。除非上下文明确的另有指示,本文使用的未用量词限定的名词包括复数指示物。例如,提到“核酸”意指一个/种或更多个/种核酸。

[0078] 应注意,术语如“优选”、“一般”和“通常”在本文中并不是用于限制要求保护的发明的范围,或暗示某些特征对于要求保护的发明的结构或功能是关键的、必要的或甚至是重要的。相反,这些术语仅旨在突出可被用在或不被用在本发明的特定实施方案中的替选的或额外的特征。

[0079] 为了描述和限定本发明的目的,应注意术语“基本上”在本文中用于表示可归因于任何定量比较、值、测量或其他表述的固有的不确定程度。术语“基本上”在本文中也用于表示在不导致所讨论主题的基本功能改变的情况下,定量表达可不同于所述参考的程度。

[0080] 可使用本领域技术人员公知的方法来构建根据本发明的遗传表达构建体和重组细胞。这些方法包括体外重组DNA技术、合成技术、体内重组技术和聚合酶链式反应(PCR)技术。参见,例如描述于如下文献中的技术:Green&Sambrook,2012,MOLECULAR CLONING:A LABORATORY MANUAL,第四版,Cold Spring Harbor Laboratory,New York;Ausubel等,1989,CURRENT PROTOCOLS IN MOLECULAR BIOLOGY,Greene Publishing Associates and Wiley Interscience,New York,和PCR Protocols:A Guide to Methods and Applications(Innis等,1990,Academic Press,San Diego,CA)。

[0081] 本文中使用的术语“多核苷酸”、“核苷酸”“寡核苷酸”和“核酸”可互换使用,是指包括DNA、RNA、其衍生物或其组合的核酸。

[0082] 如本文所用，术语“微生物”、“微生物宿主”、“微生物宿主细胞”、“宿主细胞”、“重组宿主”、“重组微生物宿主”和“重组宿主细胞”可以互换使用。如本文所用，术语“重组宿主”意指这样的宿主，其基因组已经增强(augment)至少一个DNA序列。这样的DNA序列包括但不限于非天然存在的基因、通常不转录成RNA或翻译成蛋白质(“表达的”)的DNA序列和期望引入非重组宿主中的其他基因或DNA序列。应当理解，通常通过稳定引入一个或更多个重组基因来增强本文所述的重组宿主的基因组。一般而言，引入的DNA最初不是作为DNA接受者的宿主中所固有的，而是在本公开内容的范围内从给定宿主中分离DNA片段，并随后将该DNA的一个或更多个另外的拷贝引入同一宿主中，例如用来提高基因产物的产量或改变基因的表达模式。在一些情况下，引入的DNA将通过例如同源重组或定点诱变来修饰或甚至替代内源基因或DNA序列。合适的重组宿主包括微生物。

[0083] 如本文所使用的，术语“重组基因”是指引入接受者宿主的基因或DNA序列，不管相同或相似的基因或DNA序列是否可能已经存在于这样的宿主中。在本上下文中，“引入”或“增加”在本领域中已知是指人工(by the hand of man)引入或增加。因此，重组基因可以是来自另一物种的DNA序列，或者可以是源自或存在于相同物种但已通过重组方法并入宿主以形成重组宿主的DNA序列。应当理解，引入宿主的重组基因可以与正常存在于被转化宿主中的DNA序列相同，并且被引入以提供所述DNA的一个或更多个另外的拷贝，从而允许该DNA基因产物的过表达或经修饰表达。所述重组基因特别地由cDNA编码。

[0084] 如本文所用，术语“改造的生物合成途径”是指在如本文所述的重组宿主中发生并且不天然发生于宿主中的生物合成途径。

[0085] 如本文所用，术语“内源”基因是指源自特定生物体、组织或细胞并在其中产生或合成的基因。在一些实施方案中，内源基因是酵母转运蛋白。在一些实施方案中，转运蛋白对酿酒酵母，包括但不限于酿酒酵母菌株S288C是内源的。在一些实施方案中，内源酵母转运蛋白基因过表达。如本文所用，术语“过表达”用于指生物体中基因以高于野生型生物体中基因表达水平的水平表达。参见例如Prelich,2012,Genetics 190:841-54。在一些实施方案中，使内源酵母转运蛋白基因缺失。参见例如,Giaever&Nislow,2014,Genetics 197(2):451-65。如本文所用，术语“缺失”、“缺失的”，“敲除”和“敲除的”可互换使用，指已被操作变得不再在生物体中表达的内源基因，所述生物体包括但不限于酿酒酵母。在一些实施方案中，缺失/敲除的基因是转运蛋白基因或调节转运蛋白基因表达的转录因子基因。

[0086] 如本文所用，术语“异源序列”和“异源编码序列”用于描述来自除重组宿主之外的物种的序列。在一些实施方案中，重组宿主是酿酒酵母细胞，异源序列来自酿酒酵母以外的生物体。异源编码序列例如可以来自原核微生物、真核微生物、植物、动物、昆虫或不同于表达异源序列的重组宿主的真菌。在一些实施方案中，编码序列对宿主是天然的序列。

[0087] “可选择标志物”可以是补充宿主细胞营养缺陷型、提供抗生素抗性或导致颜色改变的任何数量的基因之一。然后使用本领域公知的方法(参见下文)将基因置换载体的线性化DNA片段引入细胞。可以基于选择标志物来确定线性片段整合到基因组中和基因的破坏，并且可以通过例如PCR或Southern印迹分析来验证。在将其用于选择之后，可以通过例如Cre-LoxP系统从宿主细胞的基因组中除去可选择性标志物(参见例如Gossen等,2002,Ann.Rev.Genetics 36:153-173和U.S.2006/0014264)。或者，可以以包括待破坏的基因之一部分的方式构建基因置换载体，其中所述部分缺乏任何内源基因启动子序列并且不编码

所述基因的编码序列,或编码所述基因的无活性片段。

[0088] 如本文所用的术语“变体”和“突变体”用于描述与特定蛋白质的野生型序列相比在一个或更多个氨基酸处已经被修饰的蛋白质序列。

[0089] 如本文所用的术语“无活性片段”是编码活性小于例如从基因的全长编码序列所产生之蛋白质的约10%(例如小于约9%,小于约8%,小于约7%,小于约6%,小于约5%,小于约4%,小于约3%,小于约2%,小于约1%,或0%)的蛋白质的基因片段。这样的基因部分以这样的方式插入载体中,使得没有已知的启动子序列有效地连接到基因序列,但是终止密码子和转录终止序列有效地连接至基因序列的所述部分。该载体随后可以在基因序列的所述部分中线性化并转化到细胞中。然后通过单一同源重组,将该线性化载体整合到基因的内源对应物中,使其失活。

[0090] 如本文所用的术语“甜菊醇糖苷”指莱鲍迪苷A(RebA)(CAS#58543-16-1)、莱鲍迪苷B(RebB)(CAS#58543-17-2)、莱鲍迪苷C(RebC)(CAS#63550-99-2)、莱鲍迪苷D(RebD)(CAS#63279-13-0)、莱鲍迪苷E(RebE)(CAS#63279-14-1)、莱鲍迪苷F(RebF)(CAS#438045-89-7)、莱鲍迪苷M(RebM)(CAS#1220616-44-3)、甜茶苷(Rubusoside)(CAS#63849-39-4)、杜尔可苷(Dulcoside)A(CAS#64432-06-0)、莱鲍迪苷I(RebI)(MassBank记录号:FU000332)、莱鲍迪苷Q(RebQ)、1,2-甜菊苷(Stevioside)(CAS#57817-89-7)、1,3-甜菊苷(RebG)、1,2-二糖苷(MassBank记录号:FU000299)、1,3-二糖苷、甜菊醇-13-O-葡糖苷(13-SMG)、甜菊醇-19-O-葡糖苷(19-SMG)、三-葡糖基化甜菊醇糖苷、四-糖基化甜菊醇糖苷、五-葡糖基化甜菊醇糖苷、六-葡糖基化甜菊醇糖苷、七-葡糖基化甜菊醇糖苷、二-葡糖基化异贝壳杉烯酸(di-glucosylated kaurenoic acid)、三-葡糖基化异贝壳杉烯酸、二-糖基化异贝壳杉烯醇(di-glucosylated kaurenol)、三-葡糖基化异贝壳杉烯醇,及其异构体。

[0091] 重组甜菊醇糖苷生产酿酒酵母菌株描述于WO 2011/153378,WO 2013/022989,WO 2014/122227和WO 2014/122328,其各自通过引用整体并入本文。也参见实施例2。在重组宿主中,通过全细胞生物转化并且体外生产甜菊醇糖苷的方法也描述于WO 2011/153378,WO 2013/022989,WO 2014/122227和WO 2014/122328中。

[0092] 在一些实施方案中,通过在重组宿主中参与甜菊醇糖苷生物合成途径的一种或更多种酶的表达,在体内生产甜菊醇糖苷和/或甜菊醇糖苷前体。例如,表达一种或更多种以下基因的甜菊醇生产重组宿主可以在体内产生甜菊醇糖苷和/或甜菊醇糖苷前体:编码牻牛儿基牻牛儿基二磷酸合酶(GGPPS)多肽的基因,编码内部-柯巴基二磷酸合酶(CDPS)多肽的基因,编码贝壳杉烯合酶(KS)多肽的基因,编码贝壳杉烯氧化酶多肽(KO)的基因,编码甜菊醇合酶(KAH)多肽的基因,编码细胞色素P450还原酶(CPR)多肽的基因,和编码UGT多肽的基因。参见实施例2。

[0093] 在一些实施方案中,重组宿主包含编码UGT85C2多肽的核酸,编码UGT76G1多肽的核酸,编码UGT74G1多肽的核酸,编码UGT91D2多肽的核酸,和/或编码EUGT11多肽的核酸。技术人员将理解,这些基因的表达可能是产生特定甜菊醇糖苷所必需的,但是这些基因中的一个或更多个可以是宿主内源的,条件是这些基因中的至少一个(在一些实施方案中,全部)是引入所述微生物的重组基因。在一个具体实施方案中,生产甜菊醇的重组微生物包含编码UGT85C2、UGT76G1或UGT91D2多肽的外源核酸。在另一个具体实施方案中,生产甜菊醇的重组微生物包含编码UGT85C2、UGT76G1、UGT74G1和UGT91D2多肽的外源核酸。在另一个具

体实施方案中，生产甜菊醇的重组微生物包含编码UGT85C2、UGT76G1、UGT74G1和EUGT11多肽的外源核酸。在另一个具体实施方案中，生产甜菊醇的重组微生物包含编码UGT85C2、UGT76G1、UGT74G1、UGT91D2(尤其包括91D2e、91D2m、91D2e-b及其功能同源物)和EUGT11多肽的外源核酸。参见实施例2。

[0094] 在某些实施方案中，甜菊醇糖苷是RebA、RebB、RebD和/或RebM。RebA可以在表达UGT85C2、UGT76G1、UGT74G1和UGT91D2的生产甜菊醇的重组微生物中合成。RebB可以在表达UGT85C2、UGT76G1和UGT91D2的生产甜菊醇的重组微生物中合成。RebD可以在表达UGT85C2、UGT76G1、UGT74G1以及UGT91D2和/或EUGT11的生产甜菊醇的重组微生物中合成。RebM可以在表达UGT85C2、UGT76G1、UGT74G1以及UGT91D2和/或EUGT11的生产甜菊醇的重组微生物中合成(参见图1，实施例2)。

[0095] 在一些实施方案中，通过使甜菊醇糖苷前体与参与甜菊醇糖苷途径的一种或更多种酶在体外接触而生产甜菊醇糖苷和/或甜菊醇糖苷前体。例如，使甜菊醇与UGT多肽接触可以导致体外生产甜菊醇糖苷。在一些实施方案中，通过使上游甜菊醇糖苷前体与参与甜菊醇糖苷途径的一种或更多种酶体外接触生产甜菊醇糖苷前体。例如，使E型-异贝壳杉烯酸(ent-kaurenoic acid)与KAH酶接触可以导致体外生产甜菊醇。

[0096] 在一些实施方案中，通过全细胞生物转化生产甜菊醇糖苷或甜菊醇糖苷前体。为了发生全细胞生物转化，使表达参与甜菊醇糖苷途径的一种或更多种酶的宿主细胞摄取并修饰细胞中的甜菊醇糖苷前体；在体内修饰后，甜菊醇糖苷保留在细胞中和/或分泌到培养基中。例如，表达编码UGT多肽之基因的宿主细胞可以摄取甜菊醇并在细胞中糖基化甜菊醇；在体内糖基化后，甜菊醇糖苷可以分泌到培养基中。在一些实施方案中，使细胞透化以摄取待修饰的底物或分泌经修饰的产物。

[0097] 在一些实施方案中，在体内、体外或通过全细胞生物转化生产的甜菊醇糖苷或甜菊醇糖苷前体组合物包含比特别是来自甜叶菊植物的甜叶菊提取物更少的污染物。污染物包括有助于异味的植物来源的化合物。潜在污染物包括颜料、脂质、蛋白质、酚类、糖类、脂肪醇和其他倍半萜、劳丹烷二萜(labdane diterpene)、单萜、癸酸、8,11,14-二十碳三烯酸、2-甲基十八烷、二十五烷、二十八烷、二十四烷、十八烷醇、豆固醇、β谷固醇、α-和β-香树素(amyrin)、羽扇豆醇、β香树素乙酸酯、五环三萜类、centauredin、槲皮素(quercitin)、表-α-杜松醇(epi-alpha-cadinol)、丁香烯(carophyllene)和衍生物、β-蒎烯、β-谷固醇和赤霉素。

[0098] 如本文所用，术语“可检测的量”、“可检测浓度”、“可测量的量”和“可测量的浓度”是指以AUC、μM/OD_{600}、mg/L、μM或mM测量的甜菊醇糖苷水平。可以通过本领域技术人员通常可获得的技术检测和/或分析甜菊醇糖苷产量(即总的、上清液和/或细胞内甜菊醇糖苷水平)，例如但不限于：液相色谱-质谱法(liquid chromatography-mass spectrometry，LC-MS)、薄层色谱法(thin layer chromatography，TLC)、高效液相色谱法(high-performance liquid chromatography，HPLC)、紫外-可见光谱/分光光度法(ultraviolet-visible spectroscopy/spectrophotometry，UV-Vis)、质谱法(mass spectrometry，MS)和核磁共振光谱法(nuclear magnetic resonance spectroscopy，NMR)。

[0099] 如本文所使用的，术语“或”和“和/或”用于描述多种成分的组合或彼此排除。例如，“x、y和/或z”可以单独指“x”，单独指“y”，单独指“z”，“x、y和z”，“(x和y)或z”，“x或(y和

z)”或“x或y或z”。在一些实施方案中，“和/或”用于指重组细胞包含的外源核酸，其中重组细胞包含选自一组的一种或更多种外源核酸。在一些实施方案中，“和/或”用于指甜菊醇糖苷和/或甜菊醇糖苷前体的生产。在一些实施方案中，“和/或”用于指甜菊醇糖苷的生产，其中生产一种或更多种甜菊醇糖苷。在一些实施方案中，“和/或”用于指甜菊醇糖苷的生产，其中通过以下步骤中的一个或更多个生产一种或更多种甜菊醇糖苷：培养重组微生物，在重组微生物中合成一种或更多种甜菊醇糖苷，和/或分离一种或更多种甜菊醇糖苷。

[0100] 转运蛋白和转录因子表达

[0101] 本文描述了可用于有效生产甜菊醇糖苷组合物的试剂和方法。在重组宿主中修饰参与将甜菊醇糖苷转运到培养基中的转运系统可以允许在重组宿主中更有效地生产甜菊醇糖苷。

[0102] 如本文所述，对细胞转运具有修饰的重组细胞能够生产甜菊醇。本文描述的重组宿主可以生产甜菊醇并且已经改变至少一种内源转运蛋白基因的表达。本文所述的重组宿主可以生产甜菊醇并且已经改变转录因子的表达，所述转录因子调节至少一种内源性转运蛋白基因表达。改变内源转运蛋白基因的表达可用于增加甜菊醇的生产和/或甜菊醇分泌到培养基中。

[0103] 如本文所述，对细胞转运具有修饰的重组细胞能够生产至少一种甜菊醇糖苷，其包括但不限于RebA、RebB、RebD和/或RebM。本文所述的重组宿主可以生产至少一种甜菊醇糖苷，例如RebA、RebB、RebD和/或RebM，并且已经改变至少一种内源转运蛋白基因的表达。本文所述的重组宿主可以生产至少一种甜菊醇糖苷，例如RebA、RebB、RebD和/或RebM，并且已经改变转录因子的表达，所述转录因子调节至少一种内源转运蛋白基因表达。本文所述的重组宿主可以生产至少一种甜菊醇糖苷，例如RebA、RebB、RebD和/或RebM，并且已经改变多个内源转运蛋白基因和/或调节多个内源转运蛋白基因之表达的多个转录因子基因的表达。改变内源转运蛋白基因和/或调节至少一种转运蛋白基因表达的转录因子之表达可用于增加甜菊醇糖苷的生产和/或甜菊醇糖苷分泌到培养基中。

[0104] 本文公开的重组宿主可以包括一个或更多个生物合成基因，例如：编码蔗糖转运蛋白和蔗糖合酶的一种或更多种基因；编码牻牛儿基牻牛儿基二磷酸合酶(GGPPS)多肽的基因；编码内部-柯巴基二磷酸合酶(CDPS)多肽的基因；编码贝壳杉烯合酶(KS)多肽的基因；编码贝壳杉烯氧化酶(KO)多肽的基因；编码甜菊醇合酶(KAH)多肽的基因；编码细胞色素P450还原酶(CPR)多肽的基因；编码UGT85C2多肽的基因；编码UGT76G1多肽的基因；编码UGT74G1多肽的基因；编码UGT91D2功能同源物的基因；和/或编码EUGT11多肽的基因；其中这些基因中的一个或更多个的表达导致生产甜菊醇糖苷，例如RebA、RebB、RebD和/或RebM。

[0105] 如本文所使用的术语“甜菊醇糖苷的转运”、“甜菊醇糖苷转运”、“甜菊醇糖苷的分泌”和“甜菊醇糖苷分泌”可以互换使用。

[0106] 如本文所用，术语“转运蛋白”(也称为膜转运蛋白)是指参与小分子、大分子(例如碳水化合物)和离子穿过生物膜的运动的膜蛋白。转运蛋白跨越它们定位在其中的膜并且它们跨越膜来转运物质。转运蛋白可以帮助物质从细胞内空间向培养基的运动(即转运或分泌)。已知转运蛋白用作被动运输系统，携带分子向其较低的浓度梯度移动，或作为主动运输系统，使用能量携带分子克服其浓度梯度向较高浓度梯度移动。主动运输通过这样的运载体介导，其将转运直接与源自ATP分子水解之能量的使用相偶联；或通过这样的载质介

导,其利用预先建立的电化学离子梯度来驱动营养分子和共转运离子的共转运。后一类包括分别在相同或相反方向携带离子作为被运输底物的同向转运体和反向转运蛋白。

[0107] 转运蛋白已根据转运蛋白分类数据库中的多种标准进行分类(在万维网tcdsb.org中)。参见,Saier Jr.等,Nucl.Acids Res.,42(1):D251-258(2014)。其非限制性实例包括被认为在活生物体中普遍存在的多药耐药性(Multiple Drug Resistance,MDR)质膜转运蛋白家族。MDR转运蛋白超家族可以根据将底物从膜的一侧转运到另一侧的操作模式进一步细分。转运蛋白可以响应于化学渗透离子梯度或通过主动运输来实现物质跨膜移动。ATP结合盒转运蛋白(ABC转运蛋白)是跨膜蛋白,其利用三磷酸腺苷(adenosine triphosphate,ATP)水解的能量来进行多种底物的跨膜移动。它们可以运输多种底物穿过质膜和细胞内膜,包括代谢产物、脂质和固醇以及药物。内源ABC转运蛋白基因的具体非限制性实例包括PDR5、YDR061W、PDR15、SNQ2、YOR1、YOL075C、MDL2、ADP1、CAF16、VMR1和STE6(或其功能同源物)。在一些方面中,ABC转运蛋白转运甜菊醇糖苷。

[0108] 基于促进转运的化学渗透梯度的性质将第二组MDR进一步细分。Saier,Jr.等,J.Mol.Microbiol.Biotechnol.1:257-279(1999)。在一些方面,MDR转运蛋白转运甜菊醇糖苷。

[0109] 另一个转运蛋白家族,主要促进子超家族(MFS)转运蛋白是可响应于质子梯度转运小溶质的单体多肽。MFS转运蛋白家族有时被称为单向转运蛋白-同向转运体-反向转运蛋白(uniporter-symporter-antiporter)家族。MFS转运蛋白尤其在糖摄取和药物外排系统(drug efflux system)中起作用。MFS转运蛋白通常包含保守的MFS特异性基序。内源MFS转运蛋白基因的非限制性实例包括DTR1、SEO1、YBR241C、VBA3、FEN2、SNF3、STL1、HXT10、AZR1、MPH3、VBA5、GEX2、SNQ1、AQR1、MCH1、MCH5、ATG22、HXT15、MPH2、ITR1、SIT1、VPS73、HXT5、QDR1、QDR2、QDR3、SOA1、HXT9、YMR279C、YIL166C、HOL1、ENB1、TPO4和FLR1(或其功能类似物)。在一些方面,MFS转运蛋白转运甜菊醇糖苷。

[0110] 其他转运蛋白家族包括SMR(小多药耐药性,small multidrug resistant)家族,RND(抗性-结瘤-细胞分裂,Resistance-Nodulation-Cell Division)家族和MATE(多药和毒性化合物排出,multidrug and toxic compound extrusion)家族。SMR家族成员是以四个α螺旋跨膜链为特征的整体膜蛋白,其在细菌中赋予对宽范围的抗菌剂、亲脂性季铵化合物(quaternary ammonium compound,QAC)的抗性和氨基糖苷抗性。参见Bay和Turner,2009,BMC Evol Biol.,9:140。在一些方面,SMR转运蛋白转运甜菊醇糖苷。

[0111] MATE家族成员包含12个跨膜(transmembrane,TM)结构域。已经在原核生物、酵母(如酿酒酵母和粟酒裂殖酵母)和植物中鉴定到MATE家族的成员。参见Diener等,2001,Plant Cell.13(7):1625-8。MATE家族成员是钠或质子反向转运蛋白。在一些方面中,MATE转运蛋白转运甜菊醇糖苷。

[0112] 另外的转运蛋白家族包括氨基酸/生长素通透酶(AAAP)家族(例如YKL146W/AVT3、YBL089W/AVT5、YER119C/AVT6和YIL088C/AVT7)、ATP酶家族(例如YBL099W/ATP1、YDL185W/VMA1、YLR447C/VMA6、YOL077W/ATP19、YPL078C/ATP4、YEL027W/VMA3、YKL016C/ATP7和YOR332W/VMA4)、硫酸盐通透酶(SulP)家族(例如YBR294W/SUL1、YGR125W和YPR003C)、溶酶体胱氨酸转运蛋白(LCT)家族(例如YCR075C/ERS1)、Ca2+:阳离子反向转运蛋白(CaCA)家族(例如YDL128W/VCX1和YJR106W/ECM27)、氨基酸-多胺-有机阳离子(APC)超家族(例如

YDL210W/UGA4、YOL020W/TAT2、YPL274W/SAM3、YNL268W/LYP1、YHL036W/MUP3、YKR039W/GAP1和YOR348C/PUT4)、多药/寡糖基脂质/多糖(MOP)(例如YDR338C)、ZRT/IRT样蛋白(ZIP)金属转运蛋白家族(例如YGL225W/ZRT1和YOR079C/ATX2)、线粒体蛋白移位酶(MPT)家族(例如YGR181W/TIM13、YNL070W/TOM7、YNL121C/TOM70)、电压门控离子通道(VIC)家族(例如YGR217W/CCH1和YJL093C/TOK1)、单价阳离子:质子反向转运蛋白-2(CPA2)家族(例如YJL094C/KHA1)、推定的跨膜氨基酸外排转运蛋白ThrE家族(例如YJL108C/PRM10)、寡肽转运蛋白(OPT)家族(例如YJL212C/OPT1和YGL114W)、K^+转运蛋白(Trk)家族(例如TKR050W/TRK2)、胆汁酸:Na同向转运体(BASS)家族(例如YMR034C)、药物/代谢物转运蛋白(DMT)超家族(例如YMR253C、YML038C/YMD8和YOR307C/SLY41)、线粒体运载体(MC)家族(例如YMR056C/AAC1、YNL083W/SAL1、YOR130C/ORT1、YOR222W/ODC2、YPR011C、YPR058W/YMC1、YPR128C/ANT1、YEL006W/YEA6、YER053C/PIC2、YFR045W、YGR257C/MTM1、YHR002W/LEU5、YIL006W/YIA6、YJL133W/MRS3、YKL120W/OAC1、YMR166C、YNL003C/PET8和YOR100C/CRC1)、生长素外排运载体(AEC)家族(例如YNL095C、YOR092W/ECM3和YBR287W)、氨通道转运蛋白(Amt)家族(例如YNL142W/MEP2)、金属离子(Mn^{2+}-铁)转运蛋白(Nramp)家族(例如YOL122C/SMF1)、瞬时受体电位Ca^{2+}通道(TRP-CC)家族(例如YOR087W/YVC1)、耐砷-3(ACR3)家族(例如YPR201W/ARR3)、核碱基:阳离子同向转运体-1(NCS1)家族(例如YBR021W/FUR4)、无机磷酸转运蛋白(PiT)家族(例如YBR296C/PHO89)、亚砷酸-亚锑酸盐(ArsAB)外排家族(例如YDL100C/GET3)、转运蛋白IISP家族、甘油摄取(GUP)家族(例如YGL084C/GUP1)、金属离子转运(MIT)家族(例如YKL064W/MNR2、YKL050C和YOR334W/MRS2)、铜转运(Ctr)家族(例如YLR411W/CTR3)或阳离子扩散促进子(CDF)家族(例如YOR316C/COT1)。这些转运蛋白家族中的任何一个的特定成员包括在所公开发明的范围内,其程度为,在能够生产甜菊醇糖苷的细胞中,其表达的改变增加所述甜菊醇糖苷从细胞的生产;示例性成员在上面以及表5、6和14中公开。

[0113] 如本文所用,术语“转录因子”是指调节基因表达的DNA结合蛋白。优选地,转录因子调节至少一种转运蛋白基因的表达。

[0114] 本文公开了用于鉴定影响甜菊醇糖苷和甜菊醇糖苷途径中间体之生产或转运的基因的方法。这样的方法可包括失活至少一种内源转运蛋白基因或修饰至少一种转运蛋白基因的表达。通常,制备突变体微生物文库,文库中的每个突变体具有不同的内源转运蛋白基因失活。使基因失活并确定其在微生物中之效果的方法是本领域普通技术人员已知的;在WO2014/122328中公开了另外的方法,其公开内容通过引用整体并入本文。在合成甜菊醇或甜菊醇糖苷的条件下,在培养基中培养包含一种或更多种甜菊醇糖苷途径基因的突变体微生物,并且如本文所述测量(例如,使用LC-MS)由所述微生物生产的总的、上清液和/或细胞内甜菊醇糖苷的量。

[0115] 本公开内容涉及重组宿主细胞,其中内源转运蛋白或转录因子基因的表达被修饰。在一些实施方案中,转运蛋白或转录因子基因相对酿酒酵母是内源的,所述酿酒酵母包括但不限于酿酒酵母菌株S288C。在一些实施方案中,内源转运蛋白或转录因子的表达可以通过用不同的启动子代替内源启动子来修饰,所述不同的启动子导致转运蛋白的表达增加(例如表达增加至少5%,如表达增加至少10%、15%、20%、25%、30%、35%、40%、45%或50%、100%、200%或更多)。例如,内源启动子可以用导致转运蛋白表达增加的组成型或诱导型启动子替换。同源重组可用于以导致转运蛋白表达增加的不同启动子替代内源基因的

启动子。在另一些实施方案中，可以使用同源重组将诱导型或组成型启动子和内源转运蛋白或转录因子整合到基因组的另一基因座中。在另一些实施方案中，可以使用具有启动子的外源质粒将转运蛋白或转录因子基因导入微生物中，所述启动子导致微生物中的转运蛋白或转录因子的过表达。在另一个实施方案中，外源质粒还可以包含转运蛋白或转录因子基因的多个拷贝。在另一个实施方案中，可以使用针对重组微生物的天然机制(例如热休克、应激、重金属或抗生素暴露)诱导内源转运蛋白或转录因子过表达。在另一个实施方案中，内源基因产物的活性被增强或增加(例如，通过突变)。在另一个实施方案中，内源酵母转运蛋白或转录因子基因的同源或直系同源基因过表达。

[0116] 在某些其他实施方案中，靶基因在重组微生物中的经修饰表达包括过表达转运蛋白基因和/或参与所述转运蛋白基因表达的转录因子基因。在另一些实施方案中，在所述重组微生物中过表达多个内源转运蛋白基因或转录因子基因。

[0117] 转录因子表达的修饰可用于增加转运蛋白表达。例如，酵母转录因子PDR1调节编码ABC转运蛋白PDR5、SNQ2和YOR1之基因的表达。因此，在一些实施方案中，可以用导致转录因子表达增加的不同启动子替换内源PDR1基因座的启动子，这可以增加内源转运蛋白的产量。

[0118] 在一些实施方案中，转运蛋白基因或转录因子基因为(使用各自的Uniprot排序基因座名称(Uniprot Ordered Locus Name))：YAL067C、YBL089W、YBL099W、YBR008C、YBR021W、YBR043C、YBR180W、YBR241C、YBR287W、YBR294W、YBR295W、YBR296C、YCL038C、YCL069W、YCR011C、YCR028C、YCR075C、YDL054C、YDL100C、YDL128W、YDL185W、YDL194W、YDL210W、YDL245C、YDL247W、YDR011W、YDR061W、YDR093W、YDR292C、YDR338C、YDR406W、YDR497C、YDR536W、YEL006W、YEL027W、YEL031W、YEL065W、YER019C-A、YER053C、YER119C、YER166W、YFL011W、YFL028C、YFR045W、YGL006W、YGL013C、YGL084C、YGL104C、YGL114W、YGL167C、YGL255W、YGR125W、YGR181W、YGR217W、YGR224W、YGR257C、YGR281W、YHL016C、YHL035C、YHL036W、YHR002W、YHR096C、YIL006W、YIL088C、YIL120W、YIL121W、YIL166C、YJL093C、YJL094C、YJL108C、YJL133W、YJL212C、YJL219W、YJR106W、YJR160C、YKL016C、YKI050C、YKI064W、YKL120W、YKL146W、YKL209C、YKR039W、YKR050W、YKR105C、YKR106W、YLR411W、YLR447C、YML038C、YML116W、YMR034C、YMR056C、YMR166C、YMR253C、YMR279C、YNL003C、YNL065W、YNL070W、YNL083W、YNL095C、YNL121C、YNL142W、YNL268W、YNR055C、YOL020W、YOL075C、YOL077W-A、YOL122C、YOL158C、YOR079C、YOR087W、YOR092W、YOR100C、YOR130C、YOR153W、YOR222W、YOR271C、YOR273C、YOR291W、YOR306C、YOR307C、YOR316C、YOR332W、YOR334W、YOR348C、YPL036W、YPL078C、YPL270W、YPL274W、YPR003C、YPR011C、YPR058W、YPR128C和/或YPR201W。每个排序基因座的SEQ ID NO、Uniprot登录号和基因名称可以在表5、6和14中找到。在一些实施方案中，上述转运蛋白基因和转录因子基因调节甜菊醇糖苷的分泌。

[0119] 在一些实施方案中，在甜菊醇糖苷生产菌株中缺失YDL128W(SEQ ID NO:22)、YDL194W(SEQ ID NO:24)、YDL210W(SEQ ID NO:25)、YDR536W(SEQ ID NO:30)、YFL011W(SEQ ID NO:33)、YGL006W(SEQ ID NO:34)、YGL013C(SEQ ID NO:35)、YGL255W(SEQ ID NO:36)、YGR181W(SEQ ID NO:38)、YGR217W(SEQ ID NO:39)、YHL016C(SEQ ID NO:42)、YIL088C(SEQ ID NO:43)、YJL094C(SEQ ID NO:45)、YJR106W(SEQ ID NO:48)、YKR050W(SEQ ID NO:51)、

YNL065W(SEQ ID NO:59)、YNL083W(SEQ ID NO:61)、YNL121C(SEQ ID NO:63)、YNL142W(SEQ ID NO:64)、YOR291W(SEQ ID NO:74)、YOR306C(SEQ ID NO:75)、YOR334W(SEQ ID NO:77)、YPL270W(SEQ ID NO:79)、YPR011C(SEQ ID NO:82)、YPR128C(SEQ ID NO:84)导致分泌到培养基中的RebD的可测量的减少,表明各自均在RebD分泌中起作用。参见实施例3和表7-10。

[0120] 在一些实施方案中,在甜菊醇糖苷生产菌株中缺失YBR180W(SEQ ID NO:13)、YAL067C(SEQ ID NO:14)、YBR241C(SEQ ID NO:17)、YCL069W(SEQ ID NO:19)、YCR075C(SEQ ID NO:21)、YDL128W(SEQ ID NO:22)、YDL194W(SEQ ID NO:24)、YDR093W(SEQ ID NO:27)、YDR338C(SEQ ID NO:28)、YDR406W(SEQ ID NO:29)、YER166W(SEQ ID NO:32)、YFL011W(SEQ ID NO:33)、YGL006W(SEQ ID NO:34)、YGL013C(SEQ ID NO:35)、YGL255W(SEQ ID NO:36)、YGR217W(SEQ ID NO:39)、YHL016C(SEQ ID NO:42)、YJL094C(SEQ ID NO:45)、YJL212C(SEQ ID NO:47)、YJR106W(SEQ ID NO:48)、YJR160C(SEQ ID NO:49)、YKR050W(SEQ ID NO:51)、YKR106W(SEQ ID NO:53)、YML116W(SEQ ID NO:55)、YMR034C(SEQ ID NO:56)、YMR056C(SEQ ID NO:57)、YMR253C(SEQ ID NO:58)、YNL070W(SEQ ID NO:60)、YNL083W(SEQ ID NO:61)、YNL095C(SEQ ID NO:62)、YNL121C(SEQ ID NO:63)、YOL075C(SEQ ID NO:66)、YOL122C(SEQ ID NO:68)、YOR087W(SEQ ID NO:70)、YOR222W(SEQ ID NO:73)、YOR291W(SEQ ID NO:74)、YOR306C(SEQ ID NO:75)、YPL274W(SEQ ID NO:80)、YPR003C(SEQ ID NO:81)、YPR011C(SEQ ID NO:82)或YPR201W(SEQ ID NO:85)导致RebM的可测量的减少,表明各自均在RebM分泌中起作用。参见实施例3和表7-10。

[0121] 在一些实施方案中,YGR181W(SEQ ID NO:38)或YDR061W(SEQ ID NO:26)的过表达将RebD和RebM向培养基中的转运提高约2倍(在YGR181W(SEQ ID NO:38)和YDR061W(SEQ ID NO:26)过表达菌株中约400-500mg/L的上清液RebD和RebM,相比于在对照甜菊醇糖苷生产菌株中约250mg/L的上清液RebD和RebM)。参见实施例4、图2和图3。

[0122] 在一些实施方案中,表11的转运蛋白的过表达将RebA、RebB、RebD和/或RebM的分泌增加至少20%。在一些实施方案中,表12的转运蛋白的过表达将RebA、RebB、RebD和/或RebM的产量增加至少40%。参见实施例5。

[0123] 在一些实施方案中,将转运蛋白基因整合到甜菊醇糖苷生产宿主的基因组中。在一些实施方案中,整合的转运蛋白是YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)、YJL093C(SEQ ID NO:44)、YJR106W(SEQ ID NO:48)、YMR166C(SEQ ID NO:132)、YIL166C(SEQ ID NO:121)、YKL120W(SEQ ID NO:126)、YDL054C(SEQ ID NO:94)、YDL128W(SEQ ID NO:22)、YDR536W(SEQ ID NO:30)、YGL167C(SEQ ID NO:112)、YKL146W(SEQ ID NO:127)、YKR039W(SEQ ID NO:129)、YOL122C(SEQ ID NO:68)或YPR011C(SEQ ID NO:82)。在一些实施方案中,整合YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)、YJL093C(SEQ ID NO:44)、YJR106W(SEQ ID NO:48)、YKL120W(SEQ ID NO:126)或YMR166C(SEQ ID NO:132)提高13-SMG的分泌和/或总产量。在一些实施方案中,整合YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)或YMR166C(SEQ ID NO:132)提高RebA的分泌和/或总产量。在一些实施方案中,整合YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)或YMR166C(SEQ ID NO:132)提高RebB的分泌和/或总产量。在一些实施方案中,整合SEQ ID NO:88的YBR043C、SEQ ID NO:102的YEL027W、SEQ ID NO:44的YJL093C、SEQ ID NO:48的YJR106W和SEQ ID NO:132的YMR166C提高RebD的分泌和/或总产量,以及整合SEQ ID NO:88的YBR043C、SEQ ID NO:102

的YEL027W、YIL166C(SEQ ID NO:121)、SEQ ID NO:44的YJL093C、SEQ ID NO:48的YJR106W和SEQ ID NO:132的YMR166C提高RebM的分泌和/或总产量,如通过与对照甜菊醇糖苷生产菌株相比上清液中RebD和RebM水平的增加所测量的。参见实施例6。

[0124] 在一些实施方案中,与不过表达YJL093C或YBR043C的生产甜菊醇糖苷的酿酒酵母菌株相比,过表达YJL093C(SEQ ID NO:44)或YBR043C(SEQ ID NO:88)的生产甜菊醇糖苷的酿酒酵母菌株生产更高水平的RebD+RebM。参见实施例7。

[0125] 在一些实施方案中,被敲除的转运蛋白还可具有转运较大分子量甜菊醇糖苷的特异性(例如,RebD以及敲除SEQ ID NO:38的YGR181W或SEQ ID NO:74的YOR291W),并因此可用于在需要将RebD转运到培养基中的菌株中过表达。通过通路UGT的表达来适当平衡糖基化活性速率,使得较小分子量的甜菊醇糖苷在被转移到培养基中之前被进一步糖基化。例如,与UGT74G1和UGT85C2酶相比,UGT76G1和UGT91D2e和/或EUGT11的更高表达水平可以防止更容易转运的甜菊醇单葡糖苷的积累。如果UGT活性水平比转运速率更高(因此糖基化速率更快),则将生产更大量的较大分子量的甜菊醇糖苷。

[0126] 甜菊醇和甜菊醇糖苷生物合成核酸

[0127] 编码本文所述的多肽的重组基因包含所述多肽的编码序列,该序列与适合表达所述多肽之一个或更多个调控区按照有义方向有效连接。因为许多微生物能够由多顺反子mRNA表达多种基因产物,因此如果期望的话,可以在这些微生物的单一调控区的控制下表达多个多肽。当调控区和编码序列被定位成使得调控区能够有效地调节所述序列的转录或翻译时,认为该编码序列和调控区有效连接。通常来说,对于单顺反子基因,编码序列的翻译阅读框的翻译起始位点位于调控区下游1到约50个核苷酸之间。

[0128] 在许多情况下,本文所述的多肽之编码序列是在重组宿主以外的物种中鉴定到的,即编码序列是异源核酸。因此,如果重组宿主是微生物,则编码序列可以来自其它原核或真核微生物、植物或动物。然而在一些情况下,编码序列是宿主先天具有的且被重新引入该生物体的序列。天然序列(native sequence)与天然存在的序列(naturally occurring sequence)的区别通常在于存在与外源核酸连接的非天然序列,例如例如位于重组核酸构建体中天然序列侧翼的非天然调节序列。此外,稳定转化的外源核酸通常整合到发现天然序列的位置之外的位置。“调控区”是指含有影响转录或翻译的起始和速率、以及转录或翻译产物的稳定性和/或移动性之核苷酸序列的核酸。调控区包括但不限于,启动子序列、增强子序列、反应元件、蛋白质识别位点、诱导型元件、蛋白质结合序列、5’和3’非翻译区(UTR)、转录起始位点、终止序列、多腺苷酸化序列、内含子、及其组合。调控区通常包含至少一个核心(基本)启动子。调控区还可以包含至少一个控制元件,例如增强子序列、上游元件或者上游激活区(upstream activation region,UAR)。通过将调控区与编码序列定位成使得调控区有效地调节序列的转录或翻译来使得调控区与编码序列有效连接。例如,为了有效连接编码序列和启动子序列,编码序列的翻译阅读框的翻译起始位点通常定位于启动子下游的1到约50个核苷酸之间。但调控区也可能被定位在翻译起始位点上游多达约5000个核苷酸或者转录起始位点上游约2000核苷酸的位置。

[0129] 对要包含的调控区的选择取决于几个因素,包括但不限于效率、可选择性、可诱导性、期望的表达水平,以及在某些培养阶段期间优先表达。对于本领域技术人员而言,通过相对编码序列适当选择和定位调控区来调整编码序列的表达是常规问题。应理解可能存在

多于一个调控区，例如内含子、增强子、上游激活区、转录终止子和诱导型元件。

[0130] 可以将一个或更多个基因以“模块(modules)”组合在重组核酸构建体中，可用于甜菊醇和/或甜菊醇糖苷生产的一个独立方面。以模块组合多个基因，特别是多顺反子模块，便于在多种物种中使用所述模块。例如，可以以多顺反子模块组合甜菊醇生物合成基因簇或者UGT基因簇，从而使得在插入合适的调控区后，可以将模块引入众多的物种中。作为另一个实例，可以将UGT基因簇组合，以使得每个UGT编码序列有效连接独立的调控区从而形成UGT模块。这样的模块可以用在那些必须或者期望单顺反子表达的物种中。除了对甜菊醇或甜菊醇糖苷生产有用的基因以外，重组构建体通常还含有复制起点和使构建体保持在合适的物种中的一个或更多个可选择标志物。

[0131] 应理解，由于遗传密码的简并性，许多核酸可以编码特定多肽，即对于许多氨基酸，有多于一个核苷酸三联体充当该氨基酸的密码子。因此，使用针对宿主(例如，微生物)的合适密码子偏向性表格，可以将给定多肽的编码序列中的密码子进行修饰，从而获得在所述特定宿主中的最佳表达。作为经分离的核酸，这些经修饰的序列可以作为经纯化分子存在，也可以整合到载体或病毒中用于构建重组核酸构建体的模块。

[0132] 在一些情况下，期望抑制内源多肽的一种或更多种功能，以将代谢中间体转向甜菊醇或甜菊醇糖苷生物合成。例如，可能期望下调菌株中固醇的合成，以例如通过下调角鲨烯环氧酶来进一步增加甜菊醇或甜菊醇糖苷的产量。作为另一个实例，可能需要抑制某些内源基因产物(例如，从次级代谢物中除去葡萄糖部分的糖基水解酶或如本文所讨论的磷酸酶)的降解功能。作为另一个实例，可以激活参与甜菊醇糖苷转运的膜转运蛋白的表达，使得甜菊醇糖苷的转运增加。这种调节可以是有益的，因为在微生物培养期间可以将甜菊醇糖苷的转运增加期望的时间段，从而增加收获时糖苷产物的产量。在这种情况下，可以在转化入菌株的重组构建体中包括过表达所述多肽或基因产物的核酸。或者，可使用诱变来生成期望增加或增强其功能的基因的突变体。

[0133] 重组宿主

[0134] 重组宿主可用于表达生产甜菊醇糖苷的多肽，其包括哺乳动物细胞、昆虫细胞、植物细胞和藻类细胞。许多原核生物和真核生物也适合用于构建本文所述的重组微生物，例如革兰氏阴性细菌、酵母和真菌。首先分析选择用作甜菊醇糖苷生产菌株的物种和菌株，以确定哪些生产基因对于菌株是内源的，哪些基因不存在。对于其内源对应物不存在于菌株中的基因，其有利地装配在一个或更多个重组构建体中，然后将其转化入菌株以提供丧失的功能。

[0135] 通常，使重组微生物在发酵罐中在限定的温度下生长期望的一段时间。本发明提供的经构建和经遗传改造的微生物可以使用常规发酵方法培养，尤其包括恒化器、分批、补料分批培养、半连续发酵如吸取和填充、连续灌注发酵和连续灌注细胞培养。根据该方法中使用的特定微生物，也可以存在和表达其他重组基因，例如异戊烯基生物合成基因和萜合酶和环化酶基因。可以通过从培养基中提取样品以根据公开的方法进行分析来确定底物和中间体(例如，异戊烯基二磷酸、二磷酸二甲基烯丙酯、GGPP、贝壳杉烯和异贝壳杉烯酸)的水平。

[0136] 本方法中使用的碳源包括可以被重组宿主细胞代谢以促进生长和/或甜菊醇糖苷生产的任何分子。合适的碳源的实例包括但不限于蔗糖(例如，如在糖蜜中发现的)、果糖、

木糖、乙醇、甘油、葡萄糖、纤维素、淀粉、纤维二糖或其他含葡萄糖的聚合物。例如在使用酵母作为宿主的实施方案中，碳源如蔗糖、果糖、木糖、乙醇、甘油和葡萄糖是合适的。碳源可以在整个培养期间提供给宿主生物体，或者替选地，生物体可以在另一种能量源(例如蛋白质)的存在下生长一段时间，然后仅在补料分批阶段期间提供碳源。

[0137] 在重组微生物在培养物中已经生长期望的时间后，然后可以使用本领域已知的多种技术从培养物中回收甜菊醇和/或一种或更多种甜菊醇糖苷。在一些实施方案中，可以加入透化剂以帮助原料进入宿主和产物离开。例如，可以将培养的微生物的粗裂解物离心以获得上清液。然后可将所得上清液施加到色谱柱例如C-18柱上，并用水洗涤以除去亲水性化合物，随后用溶剂如甲醇洗脱目标化合物。然后可以通过制备型HPLC进一步纯化化合物。也参见，WO 2009/140394。

[0138] 应当理解，本文所讨论的多种基因和模块可以存在于两个或更多个重组宿主中，而不是单个宿主中。当使用多种重组宿主时，它们可以在混合培养物中生长以生产甜菊醇和/或甜菊醇糖苷。

[0139] 或者，两种或更多种宿主各自可在单独的培养基中生长，并且可以将第一培养基的产物例如甜菊醇引入第二培养基中以转化为随后的中间体或最终产物例如RebA。然后回收由第二或最终宿主生产的产物。还将理解，在一些实施方案中，使用除培养基之外的营养源并利用除发酵罐之外的系统来培养重组宿主。

[0140] 示例性的原核和真核物种在下文更详细地描述。然而，应当理解，其他物种也是合适的。例如，合适的物种可以是这样的属，例如伞菌属(Agaricus)、曲霉属(Aspergillus)、芽孢杆菌属(Bacillus)、念珠菌属(Candida)、棒状杆菌属(Corynebacterium)、假囊酵母属(Eremothecium)、埃希菌属(Escherichia)、镰孢菌(Fusarium)/赤霉属(Gibberella)、克鲁维酵母属(Kluyveromyce)、硫磺菌属(Laetiporus)、香菇属(Lentinus)、红发夫酵母属(Phaffia)、平革菌属(Phanerochaete)、毕赤酵母属(Pichia)、藓属(Physcomitrella)、红酵母属(Rhodoturula)、酵母属(Saccharomyces)、裂殖酵母属(Schizosaccharomyces)、痂圆孢属(Sphaceloma)、红发夫酵母属(Xanthophyllomyces)或耶氏酵母属(Yarrowia)。来自这些属的示例性物种包括虎皮香菇(Lentinus tigrinus)、硫磺菌(Laetiporus sulphureus)、黄孢原毛平革菌(Phanerochaete chrysosporium)、巴斯德毕赤酵母(Pichia pastoris)、产朊假丝酵母(Cyberlindnera jadinii)、小立碗藓(Physcomitrella patens)、粘红酵母(Rhodoturula glutinis)、胶红酵母(Rhodoturula mucilaginosa)、红发夫酵母(Phaffia rhodozyma)、红发夫酵母(Xanthophyllomyces dendrorhous)、藤仓镰刀菌(Fusariumfujikuroi)/腾仓赤霉(Gibberella fuiikuroi)、产朊假丝酵母(Candida utilis)、光滑念珠菌(Candida glabrata)、白色念珠菌和解脂耶氏酵母。。

[0141] 在一些实施方案中，微生物可以是原核生物例如大肠杆菌(Escherichia coli)。

[0142] 在一些实施方案中，微生物可以是子囊菌(Ascomycete)，例如腾仓赤霉、乳酸克鲁维酵母、粟酒裂殖酵母、黑曲霉、解脂耶氏酵母、棉阿舒囊霉、或酿酒酵母。

[0143] 在一些实施方案中，微生物可以是藻类细胞、例如三孢布拉氏霉菌(Blakeslea trispora)、杜氏盐藻(Dunaliella salina)、雨生红球藻(Haematococcus pluvialis)、小球藻(Chlorella sp.)、裙带菜(Undaria pinnatifida)、马尾藻(Sargassum)、海带(Laminaria japonica)、almeriensis栅藻(Scenedesmus almeriensis)物种。

[0144] 在一些实施方案中，微生物可以是蓝细菌细胞，例如三孢布拉氏霉菌、杜氏盐藻、雨生红球藻、小球藻、裙带菜、马尾藻、海带、almeriensis栅藻。

[0145] 酵母属

[0146] 酵母是合成生物学中广泛使用的经典生物体，并且可以用作重组微生物平台。例如，存在可用于酿酒酵母的突变体、质粒、代谢的详细计算机模型和其他信息的文库，允许各种模块的合理设计以提高产物产量。用于制备重组微生物的方法是已知的。

[0147] 曲霉属

[0148] 曲霉属物种(例如米曲霉(A.oryzae)、黑曲霉(A.niger)和酱油曲霉(A.sojae))是食品生产中广泛使用的微生物，并且还可用作重组微生物平台。构巢曲霉(A.nidulans)、烟曲霉(A.fumigatus)、米曲霉、棒曲霉(A.clavatus)、黄曲霉(A.flavus)、黑曲霉和土曲霉(A.terreus)的基因组核苷酸序列是均是可获得的，从而允许合理设计和修饰内源途径以提高通量和提高产物产率。已经开发了用于曲霉属的代谢模型，以及转录组学研究和蛋白组学研究。黑曲霉被培养用于工业化生产多种食品成分，例如柠檬酸和葡糖酸，并且因此例如黑曲霉的物种通常适用于生产甜菊醇糖苷。

[0149] 大肠杆菌

[0150] 大肠杆菌，合成生物学中另一种广泛使用的平台生物体，也可以用作重组微生物平台。与酵母相似，大肠杆菌拥有可供使用的突变体文库、质粒、代谢的详细计算机模型以及其他信息，从而允许合理设计多种模块以提高产物的产率。可使用与上文针对酵母属所述的那些类似的方法来制备重组大肠杆菌微生物。

[0151] 伞菌属、赤霉属和平革菌属

[0152] 伞菌属、赤霉属和平革菌属是可用的，因为已知它们在培养物中生产大量类异戊二烯。因此用于大量生产甜菊醇糖苷的萜前体已由内源基因产生。因此，可将包含甜菊醇糖苷生物合成多肽的重组基因的模块引入来自这些属的物种中，而无需引入甲羟戊酸或MEP途径基因。

[0153] Arxula adeninivorans(Blastobotrys adeninivorans)

[0154] Arxula adeninivorans是具有独特生化特征的二态酵母(其在高至42℃的温度下生长为类似于面包酵母的出芽酵母，高于该阈值时，其以丝状形式生长)。其可在多种底物上生长，并且可同化硝酸盐。其已成功地应用于产生可以生产天然塑料的菌株或者应用于开发用于环境样品中之雌激素的生物传感器。

[0155] 解脂耶氏酵母

[0156] 解脂耶氏酵母是二态酵母(参见Arxula adeninivorans)并且属于半子囊菌科(family Hemiascomycetes)。解脂耶氏酵母的整个基因组是已知的。耶氏酵母属物种是需氧的并且被认为是非致病性的。耶氏酵母在使用疏水性底物(例如烷烃、脂肪酸、油)方面是高效的，并且可以在糖上生长。它具有很高的工业应用潜力，是一种产油微生物。解脂耶氏酵母可以将脂质含量累积到其干细胞重量的约40％，并且是用于脂质累积和再活化的模式生物体。参见例如Nicaud，2012，Yeast 29(10)：409-18；Beopoulos等，2009，Biohimie 91(6)：692-6；Bankar等，2009，Appl Microbiol Biotechnol.84(5)：847-65。

[0157] 红酵母属(Rhodotorula sp.)

[0158] 红酵母是单细胞的、含色素的酵母。产油的红酵母，粘红酵母(Rhodotorula

glutinis)已经显示从粗甘油生产脂质和类胡萝卜素(Saenge等,2011,Process Biochemistry 46(1):210-8)。圆红冬孢酵母(Rhodotorula toruloides)菌株已经显示为用于改善生物质和脂质生产力的高效补料分批发酵系统(Li等,2007,Enzyme and Microbial Technology 41:312-7)

[0159] 圆红冬孢酵母

[0160] 圆红冬孢酵母是产油酵母,并且可用于工程化脂质生产途径(参见例如Zhu等,2013,Nature Commun.3:1112;Ageitos等,2011,Applied Microbiology and Biotechnology 90(4):1219-27)。

[0161] 博伊丁念珠菌

[0162] 博伊丁念珠菌是甲基营养型酵母(其可在甲醇上生长)。与其他的甲基营养型物种(例如多形汉逊酵母(Hansenula polymorpha)和巴斯德毕赤酵母)类似,博伊丁念珠菌为生产异源蛋白质提供优异的平台。已报道了分泌型外来蛋白的多克级范围的产率。最近,计算方法IPRO预测了在实验上将博伊丁念珠菌木糖还原酶的辅因子特异性从NADPH转化至NADH的突变。。参见例如Mattanovich等,2012,Methods Mol Biol.824:329-58;Khoury等,2009,Protein Sci.18(10):2125-38。

[0163] 多形汉逊酵母(安格斯毕赤酵母,Pichia angusta)

[0164] 多形汉逊酵母是甲基营养型酵母(参见,博伊丁念珠菌)。其还可在多种其他底物上生长;其耐热并且可以同化硝酸盐(另参见乳酸克鲁维酵母)。多形汉逊酵母已被应用于生产乙型肝炎疫苗、胰岛素和用于治疗丙型肝炎的干扰素α-2a,还用于一系列技术酶。参见例如Xu等,2014,Virol Sin.29(6):403-9。

[0165] 乳酸克鲁维酵母

[0166] 乳酸克鲁维酵母是常规地应用于生产克非尔(kefir)的酵母。其可在数种糖上生长,最重要的是可在存在于乳和乳清中的乳糖上生长。乳酸克鲁维酵母已被成功地应用于生产凝乳酶(通常存在于牛的胃中的一种酶)等以生产奶酪。生产以40,000L的规模在发酵罐中进行。参见例如van Ooyen等,2006,FEMS Yeast Res.6(3):381-92。

[0167] 巴斯德毕赤酵母

[0168] 巴斯德毕赤酵母是甲基营养型酵母(参见博伊丁念珠菌和多形汉逊酵母)。巴斯德毕赤酵母为外来蛋白质的生产提供有效的平台。平台元件可作为试剂盒获得并且在世界范围内在学术界中被用于生产蛋白质。已将菌株改造成可生产复杂的人N-多糖(酵母多糖与在人中发现的那些类似但不相同)。参见例如Piirainen等,2014,N Biotechnol.31(6):532-7。

[0169] 小立碗藓属(Physcomitrella spp.)

[0170] 小立碗藓苔藓(Physcomitrella mosse)在悬浮培养物中生长时具有与酵母或其他真菌培养物相似的特征。该属可用于生产可能难以在其他类型的细胞中生产的植物次级代谢物。

[0171] 甜菊醇糖苷组合物

[0172] 甜菊醇糖苷在不同的食品系统中不一定具有等同的性能。因此,期望其具有将合成引导至所选择的甜菊醇糖苷组合物的能力。本文描述的重组宿主可以生产选择性富集特定甜菊醇糖苷(例如RebD)并具有一致的味道特性的组合物。因此,本文所述的重组宿主可

以促进这样的组合物的生产，所述组合物被调整以满足给定食品所需的甜味特性，并且每批之间具有每种甜菊醇糖苷的一致比例。本文所述的宿主不产生在甜菊提取物中发现的不期望的植物副产物。因此，由本文所述的重组宿主产生的甜菊醇糖苷组合物与源自甜叶菊植物的组合物是不同的。

[0173] 生产的单一甜菊醇糖苷(例如，RebA、RebB、RebD或RebM)的量可以为约1mg/L至约2,800mg/L，例如，约1至约10mg/L，约3至约10mg/L，约5至约20mg/L，约10至约50mg/L，约10至约100mg/L，约25至约500mg/L，约100至约1,500mg/L，或约200至约1,000mg/L，至少约1,000mg/L，至少约1,200mg/L，至少约至少1,400mg/L，至少约1,600mg/L，至少约1,800mg/L，或至少约2,800mg/L。在一些方面中，单一甜菊醇糖苷的量可以超过2,800mg/L。所生产的甜菊醇糖苷(例如，RebA、RebB、RebD或RebM)的组合的量可以为约1mg/L至约6,000mg/L，例如约200至约1,500，至少约2,000mg/L，至少约3,000mg/L，至少约4,000mg/L，至少约5,000mg/L，或至少约6,000mg/L。在一些方面中，甜菊醇糖苷的组合的量可以超过6,000mg/L。一般来说，更长的培养时间将导致更大量的产品。因此，重组微生物可以培养1天至7天，1天至5天，3天至5天，约3天，约4天或约5天。

[0174] 应当理解，本文所讨论的多种基因和模块可以存在于两种或更多种重组微生物中，而不是单一微生物中。当使用多种重组微生物时，它们可以在混合培养物中生长以生产甜菊醇和/或甜菊醇糖苷。例如，第一微生物可以包含用于生产甜菊醇的一种或更多种生物合成基因和在第一组内源转运蛋白中的无效突变，而第二微生物包含甜菊醇糖苷生物合成基因和第二组内源转运蛋白中的无效突变。然后回收由第二或最终微生物生产的产物。还将理解，在一些实施方案中，使用除培养基之外的营养源并利用除发酵罐之外的系统来培养重组微生物。

[0175] 或者，两种或更多种微生物各自可在单独的培养基中生长，并且第一培养基的产物例如甜菊醇可以被引入第二培养基中以转化为随后的中间体，或转化为最终产品例如RebA。然后回收由第二或最终微生物生产的产物。微生物可以在内源转运蛋白中具有相同或不同的突变组。还将理解，在一些实施方案中，使用除培养基之外的营养源并利用除发酵罐之外的系统来培养重组微生物。

[0176] 甜菊醇糖苷在不同的食品系统中不一定具有等同的性能。因此，期望其具有将合成引导至所选择的甜菊醇糖苷组合物的能力。本文描述的重组宿主可以生产选择性富集特定甜菊醇糖苷(例如RebD)并具有一致的味道特征的组合物。因此，本文所述的重组微生物可以促进这样的组合物的生产，所述组合物被调整以满足给定食品所需的甜味特征，并且每批之间具有每种甜菊醇糖苷的一致比例。本文所述的微生物不产生在甜菊提取物中发现的不期望的植物副产物。因此，由本文所述的重组微生物生产的甜菊醇糖苷组合物与源自甜叶菊植物的组合物是不同的。

[0177] 通过本文公开的方法获得的甜菊醇糖苷和组合物可用于制备食品、膳食补充剂和甜味剂组合物。参见例如WO 2011/153378、WO 2013/022989、WO 2014/122227和WO 2014/122328，其各自通过引用整体并入本文。

[0178] 例如，基本上纯的甜菊醇或甜菊醇糖苷例如RebM或RebD可以包含在食品中，例如冰淇淋、碳酸饮料、果汁、酸奶、烘焙食品、口香糖、硬糖和软糖和调味汁(sauce)。基本上纯的甜菊醇或甜菊醇糖苷也可以包含在非食品产品例如药品、医药产品、膳食补充剂和营养

补充剂中。基本上纯的甜菊醇或甜菊醇糖苷也可以包含在用于农业工业和伴侣动物工业的动物饲料产品中。或者，可以通过分别培养重组微生物来制备甜菊醇和/或甜菊醇糖苷的混合物，每种重组微生物生产特定的甜菊醇或甜菊醇糖苷，从每种微生物中回收基本上纯的形式的甜菊醇或甜菊醇糖苷，然后合并这些化合物以获得包含所需比例的每种化合物的混合物。与目前的甜菊产品相比，本文所述的重组微生物允许获得更精确和一致的混合物。例如，本文描述的重组微生物可以表达特异性转运特定莱鲍迪苷至培养基中的转运蛋白。当转运蛋白特异性针对特定的莱鲍迪苷时，它将富集发酵液中该化合物的浓度，防止其进一步反应成不同的化合物，并通过选择性地将这种莱鲍迪苷转运到发酵液中，它将使得更容易从其他莱鲍迪苷中回收，并因此使该方法更有效。

[0179] 在另一替代方案中，可将基本上纯的甜菊醇或甜菊醇糖苷与其他甜味剂一起并入食品中，所述其他甜味剂例如糖精、右旋糖、蔗糖、果糖、赤藓糖醇、阿斯巴甜、三氯蔗糖、莫纳甜(monatin)或乙酰磺胺酸钾。甜菊醇或甜菊醇糖苷相对于其他甜味剂的重量比可以根据需要改变以在最终食品中达到令人满意的味道。参见例如，U.S.2007/0128311。在一些实施方案中，甜菊醇或甜菊醇糖苷可以与风味剂(例如柑橘)一起提供，以作为风味调节剂。

[0180] 由本文所述的重组微生物所生产的组合物可以并入食品中。例如，取决于甜菊醇糖苷和食品的类型，由重组微生物生产的甜菊醇糖苷组合物可以基于干重以约20mg甜菊醇糖苷/kg食品至约1800mg甜菊醇糖苷/kg食品的量并入食品中。例如，由重组微生物生产的甜菊醇糖苷组合物可以并入甜点、冷的糖食(例如冰淇淋)、乳制品(例如酸奶)或饮料(例如碳酸饮料)中，以使得食品基于干重具有最多500mg甜菊醇糖苷/kg食品。由重组微生物生产的甜菊醇糖苷组合物可以并入烘焙食品(例如饼干)中，以使得食品基于干重具有最多300mg甜菊醇糖苷/kg食品。由重组微生物生产的甜菊醇糖苷组合物可以并入到调味汁(例如巧克力糖浆)或蔬菜产品(例如腌菜)中，以使得食品基于干重具有最多1000mg甜菊醇糖苷/kg食品。由重组微生物生产的甜菊醇糖苷组合物可以掺入面包中以使得食品基于干重具有最多160mg甜菊醇糖苷/kg食品。由重组微生物、植物或植物细胞生产的甜菊醇糖苷组合物可以并入硬糖或软糖中，以使得食品基于干重具有最多1600mg甜菊醇糖苷/kg食品。由重组微生物、植物或植物细胞生产的甜菊醇糖苷组合物可以并入加工的水果产品(例如果汁、水果馅、果酱和果冻)中，以使得食品基于干重具有最多1000mg甜菊醇糖苷/kg食品。

[0181] 例如，这样的甜菊醇糖苷组合物可具有90-99％的RebA和不可检测量的甜叶菊植物衍生的污染物，并基于干重以25-1600mg/kg，例如100-500mg/kg、25-100mg/kg、250-1000mg/kg、50-500mg/kg或500-1000mg/kg并入食品中。

[0182] 这样的甜菊醇糖苷组合物可以是富含RebB的组合物，其具有大于3％的RebB并被并入食品中，以使得产物中RebB的量基于干重为25-1600mg/kg，例如100-500mg/kg、25-100mg/kg、250-1000mg/kg、50-500mg/kg或500-1000mg/kg。通常，富含RebB的组合物具有不可检测量的源自甜叶菊植物的污染物。

[0183] 这样的甜菊醇糖苷组合物可以是富含RebD的组合物，其具有大于3％的RebB并被并入食品中，以使得产物中RebD的量基于干重为25-1600mg/kg，例如100-500mg/kg、25-100mg/kg、250-1000mg/kg、50-500mg/kg或500-1000mg/kg。通常，富含RebD的组合物具有不可检测量的源自甜叶菊植物的污染物。

[0184] 这样的甜菊醇糖苷组合物可以是富含RebE的组合物，其具有大于3％的RebE并被

并入食品中，以使得产物中RebE的量基于干重为25-1600mg/kg，例如100-500mg/kg、25-100mg/kg、250-1000mg/kg、50-500mg/kg或500-1000mg/kg。通常，富含RebE的组合物具有不可检测量的源自甜叶菊植物的污染物。

[0185] 这样的甜菊醇糖苷组合物可以是富含RebM的组合物，其具有大于3％的RebM并被并入食品中，以使得产物中RebM的量基于干重为25-1600mg/kg，例如100-500mg/kg、25-100mg/kg、250-1000mg/kg、50-500mg/kg或500-1000mg/kg。通常，富含RebM的组合物具有不可检测量的源自甜叶菊植物的污染物。

[0186] 在一些实施方案中，将基本上纯的甜菊醇或甜菊醇糖苷并入到佐餐甜味剂或“杯对杯(“cup-for-cup”)”产品中。这样的产品通常用本领域技术人员已知的一种或更多种填充剂例如麦芽糖糊精稀释至适当的甜味水平。富含RebA、RebB、RebD、RebE或RebM的甜菊醇糖苷组合物可包装在小袋中，例如，以基于干重的10,000至30,000mg甜菊醇糖苷/kg产品用于佐餐使用。

[0187] 将在以下实施例中进一步描述本发明，这些实施例不限制权利要求中描述的本发明的范围。

实施例

[0188] 以下实施例说明本发明的具体实施方案及其多种用途。它们仅出于说明的目的而列出，并且不被认为是限制本发明。

[0189] 实施例1.LC-MS分析方法

[0190] 本文描述的LC-MS方法取向为在混合物(即培养基)存在下分离、一般检测和潜在鉴定特定质量的化学品(即甜菊醇糖苷)。在(A)**UltiMate®**3000-TSQ(Thermo Fisher Scientific)；(B)1290Infitity-6130SQ(Agilent)；或(C)Acquity-XevoTQD(Waters)系统上进行LC-MS分析。下面描述用于每个系统的具体方法。

[0191] 方法A：除非另有说明，使用配有waters ACQUITY**UPLC®**BEH shield RP18柱(2.1×50mm，1.7μm颗粒，**130 Å**孔径)的**UltiMate®**3000UPLC系统(Dionex)进行LC-MS分析，所述柱连接到具有加热电喷雾离子(HESI)源的TSQ**Quantum®**Access(ThermoFisher Scientific)三重四极杆质谱仪。使用洗脱液B(含0.1％甲酸的MeCN)和洗脱液A(含0.1％甲酸的水)的流动相，通过逐渐增加梯度来进行洗脱，所述梯度为：0.0至4.0分钟25％增加至47％B；4.0至5.0分钟47％增加至100％B；5.0至6.5分钟保持100％B再平衡。流量为0.4mL/分钟，柱温度为35℃。采用SIM(单离子监测，Single Ion Monitoring)用下述m/z迹线来检测甜菊醇糖苷。

[0192] 表1.甜菊醇糖苷的MS分析信息

[0193]

描述	精确质谱	m/z 踪迹	化合物（通常 t_R 以分钟计）
甜菊醇 +1个葡萄糖	$[M+H]^+$ 481.2796 $[M+Na]^+$ 503.2615	481.2± 0.5 503.1± 0.5	19-SMG (2.29), 13-SMG (3.5)
甜菊醇 +2个葡萄糖	$[M+Na]^+$ 665.3149	665± 0.5	覆盆子苷 (Rubusoside) (2.52) 甜菊醇-1,2-二糖苷(2.92) 甜菊醇-1,3-二糖苷(2.28)
甜菊醇 +3个葡萄糖	$[M+Na]^+$ 827.3677	827.4 ± 0.5	1,2-甜菊苷(2.01) 1,3-甜菊苷(2.39) RebB (2.88)
甜菊醇 +4个葡萄糖	$[M+Na]^+$ 989.4200	989.4 ± 0.5	RebA (2.0)
甜菊醇 +5个葡萄糖	$[M+Na]^+$ 1151.4728	1151.4 ± 0.5	RebD (1.1)
甜菊醇 +6个葡萄糖	$[M+Na]^+$ 1313.5257	1313.5 ± 0.5	RebM (1.3)

[0194] 通过与用来源于LGC Standards的可信标准品所获得的校准曲线进行比较来定量甜菊醇糖苷的水平。例如，通常使用0.5至100μM RebA的标准溶液来构建校准曲线。

[0195] 方法B：在配有waters ACQUITY UPLC® BEH shield RP18柱(2.1×50mm，1.7μm颗粒，130 Å孔径，Waters)的Agilent系统1290Infinity上进行第二分析方法，所述柱连接到具有APCI离子源的6130单四极杆质量检测器(Agilent)。使用洗脱液B(含0.1％甲酸的MeCN)和洗脱液A(含0.1％甲酸的水)的流动相，通过逐渐增加梯度来进行洗脱，所述梯度为：0.0至4.0分钟25％增加至47％B；4.0至5.0分钟47％增加至100％B；5.0至6.5分钟保持100％B再平衡。流量为0.6mL/分钟，柱温度为50℃。采用SIM(单离子监测)用下述m/z迹线来检测甜菊醇糖苷。

[0196] 表2.甜菊醇糖苷的MS分析信息

[0197]

SIM 迹线编号	时间窗	m/z 迹线	精确质量	描述	化合物（通常 t_R 以分钟计）
1	0.0-1.51分钟	1289.5	$[M-H]^-$	甜菊醇	RebM (0.91)
			1289.5281	+6个葡萄糖	
	1.51-1.90 分钟	687.3	$[M+HCOOH-H]^-$ 687.3217	甜菊醇 +2个葡萄糖	覆盆子苷
	1.90-5.0分钟	641.0	$[M-H]^-$ 641.3168	甜菊醇 +2个葡萄糖	1,2-甜菊苷 (1.44) 1,3-甜菊苷(1.74)
2	0.0-1.0分钟	1127.4	$[M-H]^-$ 1127,4752	甜菊醇 +5个葡萄糖	RebD (0.81)
	1.0-5.0分钟	525.3	$[M-HCOOH-H]^-$ 525.2689	甜菊醇 +1个葡萄糖	19SMG (2.49) 13SMG (2.65)
3	0.0-2.8分钟	965.4	$[M-H]^-$ 965.4224	甜菊醇 +4个葡萄糖	RebA (1.42)
4	0.0-3.2分钟	803.4	$[M-H]^-$ 803.3696	甜菊醇 +2个葡萄糖	1,2-甜菊苷(2.16) 1,3-甜菊苷(2.34) RebB (2.13)

[0198] 通过与用来源于LGC Standards的可信标准品所获得的校准曲线进行比较来定量甜菊醇糖苷的水平。例如，通常使用0.3至25μM RebA的标准溶液来构建校准曲线。

[0199] 方法C:所使用的第三种分析方法是使用带有Waters ACQUITY UPLC® BEH C18柱(2.1×50mm,1.7μm颗粒,130 Å孔径)的Waters ACQUITY UPLC(Waters Corporation,Milford,MA)进行LC-MS分析,所述柱偶连到具有电喷雾电离(ESI)的处于负模式的Waters ACQUITY TQD三重四极杆质谱仪。通过两个流动相A(含0.1%甲酸的水)和B(含0.1%甲酸的MeCN)的逐渐增加的梯度来实现化合物分离,所述梯度为:0.3至2.0分钟20%增加至50%B;在2.01分钟时增加至100%B,保持100%B经0.6分钟并再平衡另外0.6分钟。流量为0.6mL/分钟,柱温度为55℃。使用SIM(单离子监测)监测RebD(m/z 1127.5)、RebM(m/z 1289.5)、莱鲍迪苷A(m/z 965.4)和RebB(m/z 803.4),并通过与可信标准品比较进行定量。

[0200] 实施例2.构建甜菊醇糖苷生产酵母菌株

[0201] 如WO 2011/153378、WO 2013/022989、WO 2014/122227和WO 2014/122328中所述构建生产甜菊醇糖苷的酿酒酵母菌株,其各自通过引用整体并入本文。例如,包含以下基因的酵母菌株生产甜菊醇糖苷:编码聚球藻属(Synechococcus sp.)GGPPS多肽的重组基因(SEQ ID NO:1,SEQ ID NO:149);编码截短的玉蜀黍(Zea mays)的CDPS多肽的重组基因(SEQ ID NO:2,SEQ ID NO:150);编码拟南芥(A.thaliana)KS多肽的重组基因(SEQ ID NO:3,SEQ ID NO:151);编码重组的甜叶菊(S.rebaudiana)KO1多肽的重组基因(SEQ ID NO:4,SEQ ID NO:152);编码拟南芥ATR2多肽的重组基因(SEQ ID NO:5,SEQ ID NO:153);编码稻(O.sativa)EUGT11多肽的重组基因(SEQ ID NO:12;SEQ ID NO:148);编码SrKAHe1多肽的重组基因(SEQ ID NO:6,SEQ ID NO:154);编码甜叶菊CPR8多肽的重组基因(SEQ ID NO:7,SEQ ID NO:155);编码甜叶菊UGT85C2多肽的重组基因(SEQ ID NO:8,SEQ ID NO:156);编码甜叶菊UGT74G1多肽的重组基因(SEQ ID NO:9,SEQ ID NO:157);编码甜叶菊UGT76G1多肽的重组基因(SEQ ID NO:10,SEQ ID NO:158);和编码甜叶菊UGT91D2变体(或功能同源物),UGT91D2e-b多肽的重组基因(SEQ ID NO:11,SEQ ID NO:159)。如在从全细胞和培养混合物(总产物)中经DMSO提取总甜菊醇糖苷之后通过LC-MS(方法C)分析,在30℃,在深孔板中以400rpm振荡,在1mL SC(Synthetic Complete,合成完全)培养基中生长5天后,菌株生产了18-21μg/mL或1-1.5μg/mL/OD_{600}的RebM。参见表3。

[0202] 表3.在代表性酿酒酵母菌株中的甜菊醇糖苷生产,所述菌株包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽的基因

[0203]

RebB ($\mu g/mL/OD_{600}$)	RebA ($\mu g/mL/OD_{600}$)	RebD ($\mu g/mL/OD_{600}$)	RebM ($\mu g/mL/OD_{600}$)	以 OD_{600} 归一化
0.21	0.33	0.33	1.3	平均值
0.028	0.054	0.032	0.14	标准差
RebB (μg/mL)	RebA (μg/mL)	RebD (μg/mL)	RebM (μg/mL)	
3.1	4.9	5.0	19.0	平均值
0.42	0.81	0.48	2.1	标准差

[0204] 分析包含第一菌株的基因的额外拷贝的第二菌株的甜菊醇糖苷生产。第二菌株生产RebD和RebM作为主要甜菊醇糖苷，但是水平比第一菌株更高。

[0205] 如在从全细胞和培养混合物(总产物)中经DMSO提取总甜菊醇糖苷之后通过LC-MS(方法C)分析，在30℃，在深孔板中以400rpm振荡，在1mL SC培养基中生长5天后，第二菌株生产了60-80μg/mL或4-6μg/mL/OD_{600}的RebM。由第二菌株生产的RebA、RebB、RebD和RebM示于表4中。

[0206] 表4.在酿酒酵母菌株中的甜菊醇糖苷生产，所述菌株包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽的基因的额外拷贝。

[0207]

RebA (μg/mL/OD_{600})	RebB (μg/mL/OD_{600})	RebD (μg/mL/OD_{600})	RebM (μg/mL/OD_{600})	以 OD_{600} 归一化
2.1	0.67	1.6	4.8	平均值
0.66	0.21	0.75	2.3	标准差
RebA (μg/mL)	RebB (μg/mL)	RebD (μg/mL)	RebM (μg/mL)	
31.0	10.1	23.7	72.5	平均值
9.9	3.1	11.3	34.4	标准差

[0208] 实施例3.酵母内源转运基因和转运相关基因的敲除

[0209] 来自实施例2和类似菌株的深孔研究的观察结果表明，上清液中RebA、RebB、RebD或RebM的级分(fraction)随时间而变化，并且已确定该效应不是细胞裂解的结果。为了确定多种转运蛋白对酿酒酵母中甜菊醇糖苷分泌的影响，通过以下获得用于同源重组的缺失盒：设计在开放阅读框(ORF)上游和下游约200bp处退火的引物，然后从酿酒酵母缺失集合中扩增ORF特异性缺失盒。所选择的候选基因包括鉴定为与转运相关或包含跨膜结构域而无论亚细胞定位的ORF。在所得菌落中，通过菌落PCR确认在正确基因座处存在缺失盒。将每个缺失的最多6个克隆作为冷库储存物(freezer stock)冷冻。将用于分析的所有样品从冷库储存物中开始并在SC培养基中培养5天(30℃，400rpm振荡)，然后收获并提取用于LC-MS的样品。分析样品中缺乏细胞的培养液(上清液)以及全细胞和培养混合物(总产物)中RebA、RebB、RebD和RebM的存在。

[0210] 将总的和上清液RebA、RebB、RebD和RebM的浓度与对照甜菊醇糖苷生产菌株中的水平进行比较。通过将特定甜菊醇糖苷的值除以对照菌株的相应值，将每个样品中RebA、RebB、RebD和RebM的量相对于对照菌株归一化，从而计算相对于对照菌株的百分比，其中1等于100％。与对照甜菊醇糖苷生产菌株相比，“理想候选物”在不降低RebA、RebB、RebD和/或RebM总产量的情况下，将显示上清液中RebA、RebB、RebD和/或RebM水平的降低。

[0211] 在甜菊醇糖苷生产菌株(例如实施例2中所述的菌株)中测试酵母基因敲除对较高分子量甜菊醇糖苷转运到培养基中的作用。通过同源重组进行对每个特异性转运蛋白基因的破坏。在1mL SC培养基中在30℃和400rpm下生长5天后，收获细胞。将50μL等分试样的培养物与等体积的100％DMSO混合，涡旋，并加热至80℃持续10分钟。然后将悬浮液离心以除

去细胞碎片。通过LC-MS分析作为“总”样品的60μL混合物。然后将剩余的培养物离心以沉淀细胞。从上清液(即培养基)中取出50μL的等分试样,并与等体积的100％DMSO混合。将悬浮液加热至80℃持续10分钟并离心。通过LC-MS分析作为“上清液”样品的60μL混合物。如实施例1所述,通过LC-MS(方法C)测量较高分子量甜菊醇糖苷(包括RebA、RebB、RebD、RebM)的量。

[0212] 数据证明在甜菊醇糖苷生产菌株中单一内源酵母转运蛋白基因的破坏导致培养基上清液中多种甜菊醇糖苷水平的降低,如通过转运到上清液中的经归一化量所评估的(参见表5-10)。表5-10包含在甜菊醇糖苷生产菌株中敲除的转运相关基因的列表。更具体地,表5包含按排序基因座名称汇编的基因列表,发现所述基因影响甜菊醇糖苷生产菌株中的甜菊醇糖苷分泌,并因此鉴定为在甜菊醇糖苷分泌中具有作用。当敲除指定的基因时,观察到在单独的上清液中或在上清液/总产量的比例中,RebA、RebB、RebD和/或RebM减少超过40％。这大致相当于从对照甜菊醇糖苷生产菌株的平均值减掉大于2个标准差(值1等于对照菌株的100％,而值0.5表示降低50％)。

[0213] 表6包含按排序基因座名称汇编的基因列表,发现所述基因影响甜菊醇糖苷生产菌株中的甜菊醇糖苷分泌,并因此鉴定为在甜菊醇糖苷分泌中具有作用。当敲除时,这些基因导致在单独的上清液中或在上清液/总产量的比例中的平均值降低20-40％。这大致相当于从对照菌株的平均值减掉大约1至2个标准差(值1等于对照菌株的100％,而值0.5表示降低50％)。

[0214] 表5A.与对照甜菊醇糖苷生产菌株相比,Reb A、RebB、RebD或RebM水平降低超过40％的转运相关基因。

[0215]

SEQ ID No.	排序基因座名称	家族	描述	基因名称	Uniprot 登录号
13	YBR180W	MFS	次级转运蛋白	DTR1	P38125
14	YAL067C	MFS	次级转运蛋白	SEO1	P39709
15	YBL089W	AAAP	次级转运蛋白	AVT5	P38176
16	YBL099W	F-ATP酶	ATP-依赖性的	ATP1	P07251
17	YBR241C	MFS	次级转运蛋白		P38142
18	YBR294W	SulP	次级转运蛋白	SUL1	P38359
19	YCL069W	MFS	次级转运蛋白	VBA3	P25594
20	YCR028C	MFS	次级转运蛋白	FEN2	P25621
21	YCR075C	LCT	次级转运蛋白	ERS1	P17261
22	YDL128W	CaCA	次级转运蛋白	VCX1	Q99385
23	YDL185W	F-ATP酶	ATP-依赖性的	VMA1	P17255
24	YDL194W	MFS	次级转运蛋白	SNF3	P10870
25	YDL210W	APC	次级转运蛋白	UGA4	P32837
26	YDR061W	ABC	ATP-依赖性的		Q12298
27	YDR093W	P-ATP酶	ATP-依赖性的	DNF2	Q12675
28	YDR338C	MOP/MATE	次级转运蛋白		Q05497
29	YDR406W	ABC	ATP-依赖性的	PDR15	Q04182
30	YDR536W	MFS	次级转运蛋白	STL1	P39932
31	YEL031W	P-ATP酶	ATP-依赖性的	SPF1	P39986
32	YER166W	P-ATP酶	ATP-依赖性的	DNF1	P32660
33	YFL011W	MFS	次级转运蛋白	HXT10	P43581
34	YGL006W	P-ATP酶	ATP-依赖性的	PMC1	P38929
35	YGL013C	转录因子		PDR1	P12383
36	YGL255W	ZIP	次级转运蛋白	ZRT1	P32804
37	YGR125W	SulP	次级转运蛋白		P53273
38	YGR181W	MPT	ATP-依赖性的	TIM13	P53299
39	YGR217W	VIC	离子通道	CCH1	P50077
40	YGR224W	MFS	次级转运蛋白	AZR1	P50080
41	YGR281W	ABC	ATP-依赖性的	YOR1	P53049
42	YHL016C	SSS	次级转运蛋白	DUR3	P33413
43	YIL088C	AAAP	次级转运蛋白	AVT7	P40501
44	YJL093C	VIC	离子通道	TOK1	P40310
45	YJL094C	CPA2	次级转运蛋白	KHA1	P40309
46	YJL108C	ThrE	次级转运蛋白	PRM10	P42946
47	YJL212C	OPT	次级转运蛋白	OPT1	P40897
48	YJR106W	CaCA	次级转运蛋白	ECM27	P47144

[0216] 表5B.与对照甜菊醇糖苷生产菌株相比，Reb A、RebB、RebD或RebM水平降低超过40％的转运相关基因续表。

[0217]

No.	排序基因座名称	家族	描述	基因名称	Uniprot登录号
49	YJR160C	MFS	次级转运蛋白	MPH3	P0CE00
50	YKL064W	MIT	离子通道	MNR2	P35724
51	YKR050W	Trk	次级转运蛋白	TRK2	P28584
52	YKR105C	MFS	次级转运蛋白	VBA5	P36172
53	YKR106W	MFS	次级转运蛋白	GEX2	P36173
54	YLR447C	F-ATP酶	ATP-依赖性的	VMA6	P32366
55	YML116W	MFS	次级转运蛋白	SNQ1/ATR1	P13090
56	YMR034C	BASS	次级转运蛋白		Q05131
57	YMR056C	MC	次级转运蛋白	AAC1	P04710
58	YMR253C	DMT	次级转运蛋白		Q04835
59	YNL065W	MFS	次级转运蛋白	AQR1	P53943
60	YNL070W	MPT	ATP-依赖性的	TOM7	P53507
61	YNL083W	MC	次级转运蛋白	SAL1	D6W196
62	YNL095C	AEC	次级转运蛋白		P53932
63	YNL121C	MPT	ATP-依赖性的	TOM70	P07213
64	YNL142W	Amt	离子通道	MEP2	P41948
65	YOL020W	APC	次级转运蛋白	TAT2	P38967
66	YOL075C	ABC	ATP-依赖性的		Q08234
67	YOL077W-A	F-ATP酶	ATP-依赖性的	ATP19	P81451
68	YOL122C	Nramp	次级转运蛋白	SMF1	P38925
69	YOR079C	ZIP	次级转运蛋白	ATX2	Q12067
70	YOR087W	TRP-CC	离子通道	YVC1	Q12324
71	YOR092W	AEC	次级转运蛋白	ECM3	Q99252
72	YOR130C	MC	次级转运蛋白	ORT1	Q12375
73	YOR222W	MC	次级转运蛋白	ODC2	Q99297
74	YOR291W	P-ATP酶	ATP-依赖性的	YPK9	Q12697
75	YOR306C	MFS	次级转运蛋白	MCH5	Q08777
76	YOR316C	CDF	次级转运蛋白	COT1	P32798
77	YOR334W	MIT	离子通道	MRS2	Q01926
78	YPL078C	F-ATP酶	ATP-依赖性的	ATP4	P05626
79	YPL270W	ABC	ATP-依赖性的	MDL2	P33311
80	YPL274W	APC	次级转运蛋白	SAM3	Q08986
81	YPR003C	SulP	次级转运蛋白		P53394
82	YPR011C	MC	次级转运蛋白		Q12251
83	YPR058W	MC	次级转运蛋白	YMC1	P32331
84	YPR128C	MC	次级转运蛋白	ANT1	Q06497
85	YPR201W	ACR3	次级转运蛋白	ARR3	Q06598

[0218] 表6A.与对照甜菊醇糖苷生产菌株相比,Reb A、RebB、RebD或RebM水平降低20-40%的转运相关基因。

[0219]

SEQ ID No.	排序基因座名称	家族	描述	基因名称	Uniprot 登录号
86	YBR008C	MFS	次级转运蛋白	FLR1	P38124
87	YBR021W	NCS1	次级转运蛋白	FUR4	P05316
88	YBR043C	MFS	次级转运蛋白	QDR3	P38227
89	YBR287W	AEC	次级转运蛋白		P38355
90	YBR295W	P-ATP酶	ATP-依赖性的	PCA1	P38360
91	YBR296C	PiT	次级转运蛋白	PHO89	P38361
92	YCL038C	MFS	次级转运蛋白	ATG22	P25568
93	YCR011C	ABC	ATP-依赖性的	ADP1	P25371
94	YDL054C	MFS	次级转运蛋白	MCH1	Q07376
95	YDL100C	ArsAB	ATP-依赖性的	GET3	Q12154
96	YDL245C	MFS	次级转运蛋白	HXT15	P54854
97	YDL247W	MFS	次级转运蛋白	MPH2	P0CD99
98	YDR011W	ABC	ATP-依赖性的	SNQ2	P32568
99	YDR292C	IISP	ATP-依赖性的	SRP101	P32916
100	YDR497C	MFS	次级转运蛋白	ITR1	P30605
101	YEL006W	MC	次级转运蛋白	YEA6	P39953
102	YEL027W	F-ATP酶	ATP-依赖性的	VMA3	P25515
103	YEL065W	MFS	次级转运蛋白	SIT1	P39980
104	YER019C-A	IISP	ATP-依赖性的	SBH2	P52871
105	YER053C	MC	次级转运蛋白	PIC2	P40035
106	YER119C	AAAP	次级转运蛋白	AVT6	P40074
107	YFL028C	ABC	ATP-依赖性的	CAF16	P43569
108	YFR045W	MC	次级转运蛋白		P43617
109	YGL084C	GUP	次级转运蛋白	GUP1	P53154
110	YGL104C	MFS	次级转运蛋白	VPS73	P53142
111	YGL114W	OPT	次级转运蛋白		P53134
112	YGL167C	P-ATP酶	ATP-依赖性的	PMR1	P13586
113	YGR257C	MC	次级转运蛋白	MTM1	P53320
114	YHL035C	ABC	ATP-依赖性的	VMR1	P38735
115	YHL036W	APC	次级转运蛋白	MUP3	P38734

[0220] 表6B.与对照甜菊醇糖苷生产菌株相比,Reb A、RebB、RebD或RebM水平降低20-40%的转运相关基因续表。

[0221]

No.	排序基因座名称	家族	描述	基因名称	登录号
116	YHR002W	MC	次级转运蛋白	LEU5	P38702
117	YHR096C	MFS	次级转运蛋白	HXT5	P38695
118	YIL006W	MC	次级转运蛋白	YIA6	P40556
119	YIL120W	MFS	次级转运蛋白	QDR1	P40475
120	YIL121W	MFS	次级转运蛋白	QDR2	P40474
121	YIL166C	MFS	次级转运蛋白	SOA1	P40445
122	YJL133W	MC	次级转运蛋白	MRS3	P10566
123	YJL219W	MFS	次级转运蛋白	HXT9	P40885
124	YKL016C	F-ATP酶	ATP-依赖性的	ATP7	P30902
125	YKL050C	MIT	离子通道		P35736
126	YKL120W	MC	次级转运蛋白	OAC1	P32332
127	YKL146W	AAAP	次级转运蛋白	AVT3	P36062
128	YKL209C	ABC	ATP-依赖性的	STE6	P12866
129	YKR039W	APC	次级转运蛋白	GAP1	P19145
130	YLR411W	Ctr	离子通道	CTR3	Q06686
131	YML038C	DMT	次级转运蛋白	YMD8	Q03697
132	YMR166C	MC	次级转运蛋白		Q03829
133	YMR279C	MFS	次级转运蛋白		Q03263
134	YNL003C	MC	次级转运蛋白	PET8	P38921
135	YNL268W	APC	次级转运蛋白	LYP1	P32487
136	YNR055C	MFS	次级转运蛋白	HOL1	P53389
137	YOL158C	MFS	次级转运蛋白	ENB1	Q08299
138	YOR100C	MC	次级转运蛋白	CRC1	Q12289
139	YOR153W	ABC	ATP-依赖性的	PDR5	P33302
140	YOR271C	MTC	次级转运蛋白	FSF1	Q12029
141	YOR273C	MFS	次级转运蛋白	TPO4	Q12256
142	YOR307C	DMT	次级转运蛋白	SLY41	P22215
143	YOR332W	F-ATP酶	ATP-依赖性的	VMA4	P22203
144	YOR348C	APC	次级转运蛋白	PUT4	P15380
145	YPL036W	P-ATP酶	ATP-依赖性的	PMA2	P19657

[0222] 基于对所测量的每种甜菊醇糖苷的两个选择标准(即,两种归一化表达的方法),从数据中选择甜菊醇糖苷输出蛋白候选物。

[0223] 转运蛋白选择标准1对应于基于上清液中可用的高分子量甜菊醇糖苷(RebA、RebB、RebD或RebM)水平以及所述甜菊醇糖苷的总产量的选择。两个值均对相应的甜菊醇糖苷生产对照菌株的值进行归一化。将对照水平设定为1,并将相应的甜菊醇糖苷水平计算为对照的百分比。对于目的排序基因座名称(即基因),上清液中可用的甜菊醇糖苷应低于0.6(低于对照的60%)或0.8-0.6(对照的80-60%)。为了避免假阳性或对一般减少产量的转运蛋白的偏向,该计算具有另外的要求,即总产量必须与对照相似。在目前的计算中,当对照设置为1时,则产量设置为在对照的0.85至1.15之间。在这一点上,甜菊醇糖苷生产水平不影响结果。表7显示了满足选择标准的每个候选物的上清液/总量比例。

[0224] 转运蛋白选择标准2对应于基于上清液中高分子量甜菊醇糖苷(RebA、RebB、RebD

或RebM)相对于所述甜菊醇糖苷总产量之比例的选择。将上清液与总产量的比例(supernatant-to-total-production ratio)相对于相应的甜菊醇糖苷生产菌株对照的比例归一化。将对照水平设定为1,并将相应的甜菊醇糖苷比例计算为对照的百分比。对于目的排序基因座名称(即基因),给定甜菊醇糖苷的上清液与总产量的比例应当低于0.6(低于对照的60%)或0.8-0.6(对照的80-60%)。为了避免假阳性或对一般减少产量的转运蛋白的偏向,该计算具有另外的要求,即总产量必须与对照相似。在目前的计算中,当对照设置为1时,则产量设置为在对照的0.85至1.15之间。在这一点上,甜菊醇糖苷生产水平不影响结果。表8显示了满足选择标准的每个候选物的上清液/总量比例。

[0225] 数据证明,如通过转运到上清液中的经归一化量所评价的,在甜菊醇糖苷生产菌株中单个内源酵母转运蛋白基因的破坏导致培养基上清液中多种甜菊醇糖苷水平的降低(参见表5-10),因此被鉴定为在甜菊醇糖苷分泌中具有作用。

[0226] 例如,在甜菊醇糖苷生产菌株中缺失YDL128W(SEQ ID NO:22),YDL194W(SEQ ID NO:24),YDL210W(SEQ ID NO:25),YFL011W(SEQ ID NO:33),YGL006W(SEQ ID NO:34),YGL013C(SEQ ID NO:35),YGL255W(SEQ ID NO:36),YGR181W(SEQ ID NO:38),YGR217W(SEQ ID NO:39),YIL088C(SEQ ID NO:43),YJL094C(SEQ ID NO:45),YJR106W(SEQ ID NO:48),YNL065W(SEQ ID NO:59),YNL083W(SEQ ID NO:61),YNL121C(SEQ ID NO:63),YNL142W(SEQ ID NO:64),YOR306C(SEQ ID NO:75)或YPR011C(SEQ ID NO:82)导致分泌到培养基中的RebD的可检测的减少,表明各自均在RebD分泌中起作用。这由转运蛋白选择标准1和2证实(参见表7和8,RebD列)。

[0227] 此外,例如,在甜菊醇糖苷生产菌株中缺失YBR180W(SEQ ID NO:13),YBR241C(SEQ ID NO:17),YCL069W(SEQ ID NO:19),YCR075C(SEQ ID NO:21),YDL128W(SEQ ID NO:22),YDL194W(SEQ ID NO:24),YDR093W(SEQ ID NO:27),YDR338C(SEQ ID NO:28),YER166W(SEQ ID NO:32),YFL011W(SEQ ID NO:33),YGL006W(SEQ ID NO:34),YGL013C(SEQ ID NO:35),YGL255W(SEQ ID NO:36),YGR217W(SEQ ID NO:39),YJL094C(SEQ ID NO:45),YJR106W(SEQ ID NO:48),YJR160C(SEQ ID NO:49),YKR106W(SEQ ID NO:53),YML116W(SEQ ID NO:55),YMR056C(SEQ ID NO:57),YNL070W(SEQ ID NO:60),YNL083W(SEQ ID NO:61),YNL095C(SEQ ID NO:62),YNL121C(SEQ ID NO:63),YOR087W(SEQ ID NO:70),YOR291W(SEQ ID NO:74),YOR306C(SEQ ID NO:75),YPL274W(SEQ ID NO:80)或YPR011C(SEQ ID NO:82)导致RebM的可检测的降低,表明各自均在RebM分泌中起作用。这由转运蛋白选择标准1和2证实(参见表7和8,RebM列)。

[0228] 表7表示在甜菊醇糖苷生产菌株中缺失了每种基因(按排序基因座名称)的上清液/总产量的计算比例,其对于包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的甜菊醇糖苷生产菌株归一化。小于0.6的上清液或上清液/总量的比例表示在单独的上清液中或在上清液/总产量的比例中RebA、RebB、RebD或RebM下降超过40%,其相当于从对照甜菊醇糖苷生产菌株的平均值减掉超过2个标准差,并且表明该基因在甜菊醇糖苷转运中具有作用(表7)。0.6至0.8的上清液或上清液/总量的比例表示在单独的上清液中或在上清液/总产量的比例中RebA、RebB、RebD或RebM下降40-20%,其相当于从对照甜菊醇糖苷生产菌株的平均值减掉大约1至2个标准差,并且表明该基因在甜菊醇糖苷转运和/或生产中具有作用(表8)。与甜菊醇糖苷生

产菌株相比，每种甜菊醇糖苷的总产量在0.85和1.15之间。表8显示了满足选择标准的每个候选物的上清液/总量的比例。

[0229] 表7.与包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的对照甜菊醇糖苷生产菌株相比，RebA、RebB、RebD或RebM减少超过40％的转运相关基因。

[0230]

	转运蛋白选择标准1 总量相对于上清液				转运蛋白选择标准2 上清液/总量的 比例相对于总量			
	RebA	RebB	RebD	RebM	RebA	RebB	RebD	RebM
YBR180W				0.486				0.486
YBR241C				0.529				0.529
YCL069W				0.519				0.519
YCR075C				0.448				0.448
YDL128W			0.459	0.405			0.459	0.405
YDL194W			0.652	0.482				0.482
YDL210W			0.000				0.000	
YDR093W				0.569				0.569
YDR338C				0.451				0.451
YEL031W		0.488				0.488		
YER166W				0.495				0.495
YFL011W			0.581	0.547			0.581	0.547
YGL006W							0.410	0.424
YGL013C			0.673	0.507				0.507
YGL255W			0.669	0.632				
YGR181W			0.419				0.419	
YGR217W			0.598	0.429			0.598	0.429
YIL088C			0.135				0.135	
YJL094C			0.568	0.525			0.568	0.525
YJR106W			0.470	0.432			0.470	0.432
YJR160C				0.689				
YKL064W		0.337				0.337		
YKR106W				0.509				0.509
YML116W				0.706				
YMR056C								0.591
YNL065W							0.571	
YNL070W				0.633				
YNL083W				0.481			0.592	0.481
YNL095C				0.610				
YNL121C			0.620	0.456				0.456
YNL142W	0.561		0.369		0.561		0.369	
YOR087W				0.611				
YOR291W				0.681				
YOR306C			0.596	0.559			0.596	0.559
YOR334W		0.520				0.520		
YPL078C		0.590				0.590		
YPL270W		0.665						
YPL274W				0.561				0.561
YPR011C			0.542	0.611			0.542	

[0231] 表8.与包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的对照甜菊醇糖苷生产菌株相比，RebA、RebB、RebD或RebM减少20-40％的转运相关基因。

	转运计算1；总量相对于上清液				转运计算2；上清液/总量的比例相对于总量			
	RebA	RebB	RebD	RebM	RebA	RebB	RebD	RebM
YBL089W				0.739				0.739
YBR008C	0.784			0.640	0.784			0.640
YBR021W		0.731				0.731		
YBR043C	0.755			0.796	0.755			0.796
YBR180W			0.747				0.747	
YBR241C			0.688		0.798		0.688	
YBR287W	0.781	0.823	0.768		0.781		0.768	
YBR295W			0.885	0.876				
YBR296C		0.724	0.799	0.790		0.724	0.799	0.790
YCL038C		0.709		0.752		0.709		0.752
YCL069W			0.785				0.785	
YCR075C			0.634				0.634	
YDL054C			0.920					
YDL100C			0.867					
YDL194W							0.652	
YDL210W				0.834				
YDL245C	0.852							
YDL247W				0.682				0.682
YDR011W			0.852					
YDR093W	0.792	0.775	0.704		0.792	0.775	0.704	
YDR338C	0.711	0.695	0.680		0.711	0.695	0.680	
YDR497C				0.694				0.694
YEL006W				0.657			0.774	0.657
YEL065W			0.635				0.635	
YER119C				0.872				
YER166W	0.771	0.843	0.687		0.771		0.687	
YFL011W		0.787				0.787		
YFL028C			0.641				0.641	
YFR045W			0.779				0.779	
YGL006W			0.410	0.424				
YGL013C							0.673	
YGL084C		0.804						
YGL104C	0.628	0.731		0.683	0.628	0.731		0.683
YGL114W						0.796		
YGL167C	0.829							
YGL255W							0.669	0.632
YGR217W		0.801						
YGR257C	0.842							
YHL035C			0.900	0.792				0.792

[0232]

[0233]

	转运计算1；总量相对于上清液				转运计算2；上清液/总量的比例相对于总量			
	RebA	RebB	RebD	RebM	RebA	RebB	RebD	RebM
YHL036W				0.798				0.798
YHR096C			0.879	0.798				0.798
YIL006W	0.763			0.689	0.763		0.791	0.689
YIL120W				0.814				
YIL121W			0.903					
YIL166C			0.844					
YJL212C			0.817	0.682				0.682
YJR106W	0.719				0.719			
YJR160C		0.781	0.985			0.781		0.689
YKL050C				0.896				
YKL120W				0.706				0.706
YKL146W		0.890						
YKR039W	0.763				0.763			
YKR106W		0.785	0.738			0.785	0.738	
YLR411W	0.852		0.782				0.782	
YML038C			0.724				0.724	
YML116W			0.898					0.706
YMR056C			0.675	0.591		0.786	0.675	
YMR279C				0.885				
YNL065W	0.710	0.792	0.571		0.710	0.792		
YNL070W	0.893		0.892					0.633
YNL083W			0.592					
YNL095C			0.726				0.726	0.610
YNL121C							0.620	
YNL268W		0.920						
YNR055C			0.643				0.643	
YOL122C				0.935				
YOL158C			0.848	0.728				0.728
YOR087W								0.611
YOR100C		0.916						
YOR271C		0.889	0.758	0.608			0.758	0.608
YOR273C	0.726	0.916	0.635		0.726		0.635	
YOR291W								0.681
YOR307C								0.765
YOR348C				0.644				0.644
YPL036W	0.763		0.698		0.763		0.698	
YPL078C			0.798				0.798	
YPL270W			0.746			0.665	0.746	
YPL274W	0.817	0.807	0.721				0.721	
YPR011C	0.763				0.763			0.611

[0234] 还在包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的额外拷贝的甜菊醇糖苷生产菌株中测试了酵母基因敲除对较高分子量甜菊醇糖苷转运到培养基(即上清液)中的作用，其描述于实施例2中。数据表明，在甜菊醇糖苷生产菌株中单一内源酵母转运蛋白基因的破坏导致培养基上清液

中多种甜菊醇糖苷水平的降低，如通过归一化的转运量或通过上清液与总产量的比例所评价(参见表9和10，RebD列)。例如，在甜菊醇糖苷生产菌株中缺失YDR536W(SEQ ID NO:30)，YHL016C(SEQ ID NO:42)，YKR050W(SEQ ID NO:51)，YOR291W(SEQ ID NO:74)，YOR334W(SEQ ID NO:77)，YPL270W(SEQ ID NO:79)，YPR058W(SEQ ID NO:83)，或YPR128C(SEQ ID NO:84)导致转运到上清液中的RebD的可检测的减少，表明它们在RebD分泌中起作用。这由转运蛋白选择标准1和2证实(参见表9和10，RebD列)。

[0235] 另外，例如缺失YAL067C(SEQ ID NO:14)，YDR406W(SEQ ID NO:29)，YHL016C(SEQ ID NO:42)，YJL212C(SEQ ID NO:47)，YKR050W(SEQ ID NO:51)，YMR034C(SEQ ID NO:56)，YMR253C(SEQ ID NO:58)，YOL075C(SEQ ID NO:66)，YOL122C(SEQ ID NO:68)，YOR222W(SEQ ID NO:73)，YPR003C(SEQ ID NO:81)或YPR201W(SEQ ID NO:85)导致转运到上清液中的RebM的可检测的减少，表明它们在RebM分泌中起作用。这通过转运蛋白选择标准1和2证实(参见表9和10，RebM列)。

[0236] 表9表示在甜菊醇糖苷生产菌株中缺失的每个基因(按排序基因座名称)的上清液/总产量的计算比例，其对于包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的额外拷贝的甜菊醇糖苷生产菌株进行归一化。小于0.6的上清液或上清液/总量的比例表示在单独的上清液中或在上清液/总产量的比例中RebA、RebB、RebD或RebM降低超过40％，其相当于从对照甜菊醇糖苷生产菌株的平均值减掉大于2个标准差，并表明该基因在甜菊醇糖苷转运和/或生产中具有作用(表9)。0.6至0.8的上清液或上清液/总量的比例表示在单独的上清液中或在上清液/总产量的比例中RebA、RebB、RebD或RebM降低40-20％，其相当于从对照菌株的平均值减掉大约1至2个标准差，并表明该基因在甜菊醇糖苷转运和/或生产中具有作用，并表明该基因在甜菊醇糖苷转运和/或生产中具有作用(表10)。与对照甜菊醇糖苷生产菌株相比，每种甜菊醇糖苷的总产量在0.85和1.15之间。表10显示了满足选择标准的每种候选物的上清液/总量比例。

[0237] 表9.与包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的额外拷贝的对照甜菊醇糖苷生产菌株相比，RebA、RebB、RebD或RebM减少超过40％的转运相关基因。

[0238]

	转运蛋白选择标准1 总量相对于上清液				转运蛋白选择标准2 上清液/总量的 比例相对于总量			
	RebA	RebB	RebD	RebM	RebA	RebB	RebD	RebM
YAL067C				0.541				0.541
YBL089W	0.433	0.416			0.433	0.416		
YBL099W	0.523				0.523			
YBR294W	0.495				0.495			
YCR028C		0.419				0.419		
YDL185W	0.551				0.551			
YDL210W	0.626	0.469				0.469		
YDR061W	0.482		0.471		0.482		0.471	
YDR406W				0.288				0.288
YDR536W	0.715		0.365				0.365	
YFL011W		0.444				0.444		
YGR125W		0.400				0.400		
YGR224W		0.361				0.361		
YGR281W		0.596				0.596		
YHL016C			0.427	0.296			0.427	0.296
YJL093C		0.449				0.449		
YJL108C	0.589				0.589			
YJL212C	0.442			0.461	0.442			0.461
YKR050W	0.554		0.378	0.304	0.554		0.378	0.304
YLR447C	0.512				0.512			
YMR034C	0.331			0.316	0.331			0.316
YMR253C	0.389			0.375	0.389			0.375
YOL020W	0.371				0.371			
YOL075C	0.494			0.471	0.494			0.471
YOL077W-A	0.531				0.531			
YOL122C				0.457				0.457
YOR079C	0.552				0.552			
YOR092W	0.407				0.407			
YOR130C	0.588				0.588			
YOR222W	0.469			0.457	0.469			0.457
YOR291W			0.428				0.428	
YOR334W			0.327				0.327	

[0239]

	转运蛋白选择标准1 总量相对于上清液				转运蛋白选择标准2 上清液/总量的 比例相对于总量			
	RebA	RebB	RebD	RebM	RebA	RebB	RebD	RebM
YPL270W			0.375				0.375	
YPR003C	0.400			0.418	0.400			0.418
YPR058W			0.461				0.461	
YPR128C			0.342				0.342	
YPR201W	0.376			0.353	0.376			0.353

[0240] 表10.与包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的额外拷贝的对照甜菊醇糖苷生产菌株相

比，RebA、RebB、RebD或RebM减少20-40％的转运相关基因。

[0241]

	转运计算1；总量相对于上清液				转运计算2；上清液/总量的比例相对于总量			
	RebA	RebB	RebD	RebM	RebA	RebB	RebD	RebM
YCR011C				0.654				0.654
YDL210W			0.729		0.626		0.729	
YDR292C	0.724				0.724			
YDR536W					0.715			
YEL027W		0.799				0.799		
YER019C-A	0.789				0.789			
YER053C	0.651				0.651			
YGR256W	0.744				0.744			
YHR002W	0.795				0.795			
YJL133W	0.691				0.691			
YJL219W	0.674				0.674			
YKL016C	0.627				0.627			
YKL209C	0.721				0.721			
YKR105C					0.646			
YMR166C		0.924						
YNL003C		0.814						
YOR153W	0.801							
YOR316C					0.640			
YOR332W	0.700				0.700			

[0242] YDL210W(SEQ ID NO:25)和YPL270W(SEQ ID NO:79)的敲除导致在包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的对照甜菊醇糖苷生产菌株和包含编码GGPPS、截短的CDPS、KS、KO、ATR2、EUGT11、SrKAHe1、CPR8、UGT85C2、UGT74G1、UGT76G1和EUGT11多肽之基因的额外拷贝的甜菊醇糖苷生产菌株中RebD分泌降低。同样的，YJL212C(SEQ ID NO:47)和YOL122C(SEQ ID NO:68)的敲除导致在这两种菌株中RebM转运降低。

[0243] 实施例4.通过在RebD/M生产菌株中过表达确认酵母内源转运基因的敲除

[0244] 使用基于质粒的表达和整合盒二者进行来自实施例3的初始候选转运蛋白的亚组的过表达。首先，进行深孔微量滴定板培养实验。使用质粒在RebD/M生产菌株中过表达两个转运基因以确认敲除实验的结果。过表达YGR181W(SEQ ID NO:38)，其是TIM复合物，插入线粒体内膜蛋白的辅助蛋白；以及过表达YDR061W(SEQ ID NO:26)，其是ABC样转运蛋白。图2中所示的数据证明，用深孔板中的YGR181W(SEQ ID NO:38)和YDR061W(SEQ ID NO:26)的基于质粒的过表达表型证实了基于敲除研究的表型。

[0245] 接下来，在另外的甜菊醇糖苷生产菌株中进行发酵罐中的表型确认，所述菌株通过染色体XII上的YGR181W(SEQ ID NO:38)或YDR061W(SEQ ID NO:26)的整合来表征。在30℃下使甜菊醇糖苷生产菌株在限定培养基上在葡萄糖受限条件下在补料分批发酵中生长约5天，并使用LC-MS(方法B，实施例1)测量RebA、RebB、RebD和RebM的水平。图3中所示的图表显示了在新的整合构建体的培养基中转运的RebD和RebM大约增加2倍，并且RebA和RebB转运几乎没有变化。YGR181W(SEQ ID NO:38)或YDR061W(SEQ ID NO:26)的过表达导致RebD

和RebM向培养基中转运的提高(约2倍)(在YGR181W(SEQ ID NO:38)和YDR061W(SEQ ID NO:26)过表达菌株中约400-500mg/L的上清液RebD和RebM,相对于对照甜菊醇糖苷生产菌株中约250mg/L的上清液RebD和RebM)。参见图3A。转运的RebD相比于总RebD的比例从对照菌株中的0.158增加至在候选基因过表达时的0.21-0.25。RebM向培养基中的转运也同时改善。参见图3。

[0246] 实施例5.所选酵母内源转运基因的过表达

[0247] 使用具有表11中所示的转运蛋白基因的组成型启动子的质粒在甜菊醇糖苷生产菌株(如实施例2所述)中的过表达导致RebA、RebB、RebD和/或RebM的分泌增加超过20%。使用实施例3中描述的标准2分析结果。另外,表12中所示的转运蛋白基因的过表达导致RebA、RebB、RebD和/或RebM产量提高超过40%。表11显示了满足选择标准的每个候选物的上清液/总量比例。

[0248] 表11.与对照甜菊醇糖苷生产菌株相比,RebA、RebB、RebD或RebM分泌增加超过20%的转运相关基因。

[0249]

	上清液/总量的比例			
	RebB	RebA	RebD	RebM
YOR079C			1.21	
YMR166C		1.36	1.53	1.38
YEL027W		1.62	1.82	1.52
YDL054C		1.45	1.38	1.31
YKL120W		1.83	1.89	1.93
YDR536W		1.79	1.80	1.76
YBL099W				1.22
YML116W		1.32	1.31	1.42
YIL166C			1.27	1.22
YKR039W			1.26	1.41
YOR307C				1.23
YKL146W		1.36	1.47	1.66
YGL167C				1.33
YJL093C				1.29
YOR306C	1.67			
YDL128W	1.85		1.29	
YOR153W	1.42		1.21	
YKL050C	1.59	1.22		
YJL094C	1.71	1.24	1.24	
YCL069W	1.59			
YOL158C	1.52			
YFL011W	1.44			

[0250]

	上清液/总量的比例			
	RebB	RebA	RebD	RebM
YJR106W			1.38	1.33
YBR043C				1.20
YPR011C				1.27

[0251] 表12.与对照甜菊醇糖苷生产菌株相比,RebA、RebB、RebD或RebM产量增加超过40%的转运相关基因.

[0252]

	产量增加			
	RebB	RebA	RebD	RebM
YMR166C				1.52
YIL166C		1.41	1.50	1.55
YKR039W			1.48	1.52
YKL146W				1.42
YJL093C			1.46	1.43
YOR306C				1.59
YDL128W				1.49
YOL122C			1.41	1.59
YIL006W			1.64	2.03
YFL028C				1.55
YBR021W			1.51	1.87
YHR002W			1.51	1.73
YEL031W			1.45	1.66
YCL069W				1.53
YOL158C			1.42	1.63
YKL064W			1.40	1.44
YHR096C				1.42

[0253]

	产量增加			
	RebB	RebA	RebD	RebM
YOR332W				1.44
YDR338C			1.50	1.55
YJR106W			1.41	1.44
YBR043C			1.55	1.49
YPR011C				1.43
YFR045W			1.44	

[0254] 实施例6.转运蛋白基因的基因组整合

[0255] 通过PCR从S288C背景中扩增所选择的用于整合到生产RebD/M的酿酒酵母菌株(参见实施例2)之基因组中的转运蛋白基因DNA,并使用USER克隆系统克隆到具有用于整合位点的同源区和用于过表达的PGK1启动子的质粒中.参见例如,Nour-Eldi等,2010,Methods Mol Biol.643:185-200.使用限制酶从质粒中切出包含同源区域和转运蛋白的USER克隆构建体,并通过标准LiAc方法将线性片段DNA整合到生产菌株的接受RebD/M的基因组中.在添加生长培养基后从聚合物释放葡萄糖的平板中测试基因组上整合的转运蛋白.使用在3天内释放20g/L葡萄糖的聚合物来模拟发酵期间的进料特征.通过LC-MS(参见实施例1)测量甜菊醇糖苷水平,并在Perkin Elmer 2104 Multilabel读数器上测量OD_{600}.YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)、YJL093C(SEQ ID NO:44)、YJR106W(SEQ ID NO:48)、YKL120W(SEQ ID NO:126)和YMR166C(SEQ ID NO:132)表现出13-SG分泌提高.(图4A).YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)和YMR166C(SEQ ID NO:132)表现出RebA分泌提高(图4B).YBR043C(SEQ ID NO:88)、YEL027W(SEQ ID NO:102)和YMR166C(SEQ ID NO:132)表现出RebB分泌提高(图4C).SEQ ID NO:88的YBR043C、SEQ ID NO:102的YEL027W、SEQ ID NO:44的YJL093C、SEQ ID NO:48的YJR106W和SEQ ID NO:132的YMR166C表现出RebD产量提高,并且SEQ ID NO:88的YBR043C、SEQ ID NO:102的YEL027W、YIL166C(SEQ ID NO:121)、SEQ ID NO:44的YJL093C、SEQ ID NO:48的YJR106W和SEQ ID NO:132的YMR166C表现出RebM产量提高,如通过与对照甜菊醇糖苷生产菌株相比上清液中RebD和RebM水平的增加所测量.参见图4D和4E.具有URA标志物的对照也显示在图4中.

[0256] 图5A显示通过USER克隆系统过表达YMR166C(SEQ ID NO:132)、YEL027W(SEQ ID NO:102)、YKL120W(SEQ ID NO:126)、YJR106W(SEQ ID NO:48)、YJL093C(SEQ ID NO:44)和YBR043C(SEQ ID NO:88)的另外的甜菊醇糖苷生产菌株的RebA、RebB、RebD和RebM的上清液水平.图5的菌株包含:编码聚球藻属GGPPS多肽的重组基因(SEQ ID NO:1,SEQ ID NO:149);编码截短的玉蜀黍(Zea mays)的CDPS多肽的重组基因(SEQ ID NO:2,SEQ ID NO:150);编码拟南芥KS多肽的重组基因(SEQ ID NO:3,SEQ ID NO:151);编码重组的甜叶菊KO1多肽的重组基因(SEQ ID NO:4,SEQ ID NO:152);编码KO多肽的重组基因(SEQ ID NO:XX,SEQ ID NO:XX);编码拟南芥ATR2多肽的重组基因(SEQ ID NO:5,SEQ ID NO:153);编码

稻EUGT11多肽的重组基因(SEQ ID NO:12;SEQ ID NO:148);编码SrKAHe1多肽的重组基因(SEQ ID NO:6,SEQ ID NO:154);编码甜叶菊CPR8多肽的重组基因(SEQ ID NO:7,SEQ ID NO:155);编码甜叶菊UGT85C2多肽的重组基因(SEQ ID NO:8,SEQ ID NO:156);编码甜叶菊UGT74G1多肽的重组基因(SEQ ID NO:9,SEQ ID NO:157);编码甜叶菊UGT76G1多肽的重组基因(SEQ ID NO:10,SEQ ID NO:158);和编码甜叶菊UGT91D2变体(或功能同源物),UGT91D2e-b多肽的重组基因(SEQ ID NO:11,SEQ ID NO:159).图5B显示通过USER克隆系统过表达YMR166C(SEQ ID NO:132)、YEL027W(SEQ ID NO:102)、YKL120W(SEQ ID NO:126)、YIL166C(SEQ ID NO:132)、YJR106W(SEQ ID NO:48)、YJL093C(SEQ ID NO:44)和YBR043C(SEQ ID NO:88)的上述甜菊醇糖苷生产菌株的RebA、RebB、RebD和RebM的总水平.

[0257] 实施例7.通过过表达YJL093C或YBR043C的生产甜菊醇糖苷的酿酒酵母菌株的发酵生产RebD和RebM

[0258] 在实施例3中所述的甜菊醇糖苷生产菌株中单独过表达YJL093C(SEQ ID NO:44)和YBR043C(SEQ ID NO:88).通过发酵(补料分批,基本培养基,葡萄糖限制)培养菌株约130小时.通过LC-MS测量RebD和RebM的产量.如表13中所示,与对照甜菊醇糖苷生产菌株相比,过表达YJL093C或YBR043C的菌株生产更高水平的RebD和RebD+RebM.

[0259] 表13.过表达YJL093C和YBR043C的酿酒酵母菌株中RebD和RebM的产量.

[0260]

菌株	发酵长度(小时)	最终细胞干重	RebD滴度(g/L)	RebM滴度(g/L)	RebD + RebM	RebD/RebM比例(g/g)
对照	126.83	104.53	1.38	4.47	5.85	0.31
YJL093C	130.10	114.40	3.42	2.80	6.22	1.22
YBR043C	129.17	112.00	3.56	2.72	6.28	1.31

[0261] 表14.本文中公开的序列.

[0262] SEQ ID NO:1

[0263] 聚球藻属GGPPS(GenBank ABC98596.1)

[0264]
```
atggtcgcac aaactttcaa cctggatacc tacttatccc aaagacaaca acaagttgaa      60
gaggccctaa gtgctgctct tgtgccagct tatcctgaga gaatatacga agctatgaga     120
tactccctcc tggcaggtgg caaaagatta agacctatct tatgtttagc tgcttgcgaa     180
ttggcaggtg gttctgttga acaagccatg ccaactgcgt gtgcacttga aatgatccat     240
acaatgtcac taattcatga tgacctgcca gccatggata acgatgattt cagaagagga     300
aagccaacta atcacaaggt gttcggggaa gatatagcca tcttagcggg tgatgcgctt     360
ttagcttacg cttttgaaca tattgcttct caaacaagag gagtaccacc tcaattggtg     420
ctacaagtta ttgctagaat cggacacgcc gttgctgcaa caggcctcgt tggaggccaa     480
gtcgtagacc ttgaatctga aggtaaagct atttccttag aaacattgga gtatattcac     540
tcacataaga ctggagcctt gctggaagca tcagttgtct caggcggtat tctcgcaggg     600
gcagatgaag agcttttggc cagattgtct cattacgcta gagatatagg cttggctttt     660
caaatcgtcg atgatatcct ggatgttact gctacatctg aacagttggg gaaaaccgct     720
ggtaaagacc aggcagccgc aaaggcaact tatccaagtc tattgggttt agaagcctct     780
agacagaaag cggaagagtt gattcaatct gctaaggaag ccttaagacc ttacggttca     840
caagcagagc cactcctagc gctggcagac ttcatcacac gtcgtcagca ttaa            894
```

[0265] SEQ ID NO:2

[0266] 玉蜀黍截短的CDPS

atggcacagcaca catcagaatc cgcagctgtc gcaaagggca gcagtttgac ccctatagtg 60
agaactgacg ctgagtcaag gagaacaaga tggccaaccg atgacgatga cgccgaacct 120
ttagtggatg agatcagggc aatgcttact tccatgtctg atggtgacat ttccgtgagc 180
gcatacgata cagcctgggt cggattggtt ccaagattag acggcggtga aggtcctcaa 240
tttccagcag ctgtgagatg gataagaaat aaccagttgc ctgacggaag ttggggcgat 300
gccgcattat tctctgccta tgacaggctt atcaataccc ttgcctgcgt tgtaactttg 360
acaaggtggt ccctagaacc agagatgaga ggtagaggac tatcttttt gggtaggaac 420
atgtggaaat tagcaactga agatgaagag tcaatgccta ttggcttcga attagcattt 480
ccatctttga tagagcttgc taagagccta ggtgtccatg acttccctta tgatcaccag 540
gccctacaag gaatctactc ttcaagagag atcaaaatga agaggattcc aaaagaagtg 600
atgcataccg ttccaacatc aatattgcac agtttggagg gtatgcctgg cctagattgg 660
gctaaactac ttaaactaca gagcagcgac ggaagttttt tgttctcacc agctgccact 720
gcatatgctt taatgaatac cggagatgac aggtgtttta gctacatcga tagaacagta 780
aagaaattca acggcggcgt ccctaatgtt tatccagtgg atctatttga acatatttgg 840
gccgttgata gacttgaaag attaggaatc tccaggtact tccaaaagga gatcgaacaa 900
tgcatggatt atgtaaacag gcattggact gaggacggta tttgttgggc aaggaactct 960
gatgtcaaag aggtggacga cacagctatg gcctttagac ttcttaggtt gcacggctac 1020
agcgtcagtc ctgatgtgtt taaaaacttc gaaaaggacg gtgaattttt cgcatttgtc 1080
ggacagtcta atcaagctgt taccggtatg tacaacttaa acagagcaag ccagatatcc 1140
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[0267] aaagaagcag agggagcttt gagggacaag tggatcattt ctaaagatct acctggtgaa 1260
gttgtgtata ctttggattt tccatggtac ggcaacttac ctagagtcga ggccagagac 1320
tacctagagc aatacggagg tggtgatgac gtttggattg gcaagacatt gtataggatg 1380
ccacttgtaa acaatgatgt atatttggaa ttggcaagaa tggatttcaa ccactgccag 1440
gctttgcatc agttagagtg gcaaggacta aaaagatggt atactgaaaa taggttgatg 1500
gactttggtg tcgcccaaga agatgccctt agagcttatt ttcttgcagc cgcatctgtt 1560
tacgagcctt gtagagctgc cgagaggctt gcatgggcta gagccgcaat actagctaac 1620
gccgtgagca cccacttaag aaatagccca tcattcagag aaaggttaga gcattctctt 1680
aggtgtagac ctagtgaaga gacagatggc tcctggttta actcctcaag tggctctgat 1740
gcagttttag taaaggctgt cttaagactt actgattcat tagccaggga agcacagcca 1800
atccatggag gtgacccaga agatattata cacaagttgt taagatctgc ttgggccgag 1860

tgggttaggg aaaaggcaga cgctgccgat agcgtgtgca atggtagttc tgcagtagaa 1920
caagagggat caagaatggt ccatgataaa cagacctgtc tattattggc tagaatgatc 1980
gaaatttctg ccggtagggc agctggtgaa gcagccagtg aggacggcga tagaagaata 2040
attcaattaa caggctccat ctgcgacagt cttaagcaaa aaatgctagt ttcacaggac 2100
cctgaaaaaa atgaagagat gatgtctcac gtggatgacg aattgaagtt gaggattaga 2160
gagttcgttc aatatttgct tagactaggt gaaaaaaaga ctggatctag cgaaaccagg 2220
caaacatttt taagtatagt gaaatcatgt tactatgctg ctcattgccc acctcatgtc 2280
gttgatagac acattagtag agtgattttc gagccagtaa gtgccgcaaa gtaaccgcgg 2340

[0268] SEQ ID NO:3

[0269] 拟南芥(Arabidopsis thaliana)KS(与GenBank AEE36246.1相似)

[0270]

```
atgtctatta atttgagatc ttccggttgt agctccccaa taagcgcaac tttggaaagg      60
ggtctagact ctgaagttca aacaagagca aacaatgtat cttttgagca gaccaaagag     120
aagatcagga aaatgcttga gaaggtcgag ttgagcgtga gtgcctatga cactagttgg     180
gtagctatgg tcccatcacc atccagtcaa aacgcacctc ttttcccaca gtgcgtcaaa     240
tggctacttg ataatcaaca tgaggacggc tcttggggat tggataacca cgaccatcag     300
agcttaaaga aagatgtgtt gtcatccaca ttagcctcta tcctagctct taagaaatgg     360
ggaataggcg aaagacagat caataagggt ctacagttca ttgaattaaa ctctgcacta     420
gttaccgatg aaactataca aaaacctaca ggtttcgaca tcatttttcc aggaatgatt     480
aagtacgcca gggaccttaa tttgaccata cctcttggct cagaagtagt cgacgatatg     540
atcaggaaaa gagatctaga cttaaagtgt gatagcgaga aattcagcaa aggtagagag     600
gcttatcttg cctatgttct tgaaggaact aggaacttga aggactggga cttaattgtg     660
aaatatcaga gaaagaacgg tagtctattt gatagtccag ctacaaccgc cgcagctttc     720
actcaatttg gcaatgacgg ttgcttgagg tacttatgtt cacttttaca gaaattcgag     780
gccgcagtgc ctagtgtata tccatttgat caatacgcta gattaagcat aatcgtcact     840
ttagaatcat tgggaattga cagagatttc aagactgaga taaaaagcat attggatgag     900
acctataggt actggcttag aggtgacgaa gaaatttgcc tagatttggc cacatgtgca     960
cttgctttta ggttgctttt agcccacggc tatgacgtgt catacgatcc tctaaagcca    1020
tttgcagagg aatctggttt cagcgatacc cttgagggat atgttaaaaa caccttttcc    1080
gtattagagc ttttcaaggc tgcccaaagt taccctcatg agagtgcttt gaaaaagcag    1140
tgttgctgga caaaacaata tctagaaatg gaactaagtt catgggttaa aacaagcgtt    1200
agggacaagt acttgaaaaa ggaagtggag gatgctttgg catttccatc atatgcctct    1260
ttagaaagaa gtgaccacag aaggaaaatt cttaatggct cagcagttga aaacacaaga    1320
gtaaccaaga cctcttacag gttgcataat atatgtacat cagatatctt aaaacttgct    1380
gtcgacgatt tcaacttttg ccaatctatt catagagagg aaatggaaag attggataga    1440
tggatagtgg agaatagact acaggaatta aagttcgcca gacaaaaatt ggcttactgt    1500
tactttagtg gcgctgccac actattctct ccagaattgt ctgacgcaag gatctcatgg    1560
gctaagggag gtgttctaac cacagtagtc gatgactttt ttgatgttgg cggtagtaaa    1620
gaagagcttg agaacttaat tcacttggtg gaaaagtggg atcttaatgg agttcctgaa    1680
tactcttcag agcatgtaga aataattttc tctgtcctaa gagacactat cttagaaacc    1740
ggtgataaag cctttacata tcagggcaga aacgttactc accatattgt gaaaatatgg    1800
ttggacttac ttaagagcat gctaagggag gctgaatggt ccagtgacaa atcaacccca    1860
tctttggaag attacatgga gaatgcctat atcagcttcg cattaggtcc tattgtattg    1920
ccagctacat accttatagg acctccacta cctgaaaaga ctgtcgactc ccaccaatat    1980
aatcaattat acaaattggt tagtaccatg ggtagactat taaacgatat ccagggcttt    2040
aagagggaat cagccgaggg aaaacttaat gcagtgtctc tacatatgaa gcatgaaaga    2100
gacaacagaa gcaaagaggt tattatagaa tccatgaaag gattggctga aaggaaaaga    2160
gaggaattac acaaacttgt actagaagag aaaggtagtg tcgttccaag agaatgcaag    2220
gaagccttct taaaaatgtc aaaagtgttg aacctttttt ataggaagga tgatggcttc    2280
acatctaacg acttgatgag ccttgtgaaa tccgtcatct acgagcctgt ttcacttcaa    2340
aaggagagtc taacttga                                                  2358
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[0271] SEQ ID NO:4

[0272] 甜叶菊KO1(密码子优化的)

[0273]

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atggatgctg tgacgggttt gttaactgtc ccagcaaccg ctataactat tggtggaact      60
gctgtagcat tggcggtagc gctaatcttt tggtacctga aatcctacac atcagctaga     120
agatcccaat caaatcatct tccaagagtg cctgaagtcc caggtgttcc attgttagga     180
aatctgttac aattgaagga gaaaaagcca tacatgactt ttacgagatg ggcagcgaca     240
tatggaccta tctatagtat caaaactggg gctacaagta tggttgtggt atcatctaat     300
gagatagcca aggaggcatt ggtgaccaga ttccaatcca tatctacaag gaacttatct     360
aaagccctga aagtacttac agcagataag acaatggtcg caatgtcaga ttatgatgat     420
tatcataaaa cagttaagag acacatactg accgccgtct tgggtcctaa tgcacagaaa     480
aagcatagaa ttcacagaga tatcatgatg gataacatat ctactcaact tcatgaattc     540
gtgaaaaaca acccagaaca ggaagaggta gaccttagaa aaatctttca atctgagtta     600
ttcggcttag ctatgagaca agccttagga aaggatgttg aaagtttgta cgttgaagac     660
ctgaaaatca ctatgaatag agacgaaatc tttcaagtcc ttgttgttga tccaatgatg     720
ggagcaatcg atgttgattg gagagacttc tttccatacc taaagtgggt cccaaacaaa     780
aagttcgaaa atactattca acaaatgtac atcagaagag aagctgttat gaaatcttta     840
atcaaagagc acaaaaagag aatagcgtca ggcgaaaagc taaatagtta tatcgattac     900
cttttatctg aagctcaaac tttaaccgat cagcaactat tgatgtcctt gtgggaacca     960
atcattgaat cttcagatac aacaatggtc acaacagaat gggcaatgta cgaattagct    1020
aaaaacccta aattgcaaga taggttgtac agagacatta agtccgtctg tggatctgaa    1080
aagataaccg aagagcatct atcacagctg ccttacatta cagctatttt ccacgaaaca    1140
ctgagaagac actcaccagt tcctatcatt cctctaagac atgtacatga agataccgtt    1200
ctaggcggct accatgttcc tgctggcaca gaacttgccg ttaacatcta cggttgcaac    1260
atggacaaaa acgtttggga aaatccagag gaatggaacc cagaaagatt catgaaagag    1320
aatgagacaa ttgattttca aaagacgatg gccttcggtg gtggtaagag agtttgtgct    1380
ggttccttgc aagccctttt aactgcatct attgggattg ggagaatggt tcaagagttc    1440
gaatggaaac tgaaggatat gactcaagag gaagtgaaca cgataggcct aactacacaa    1500
atgttaagac cattgagagc tattatcaaa cctaggatct aa                       1542
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[0274] SEQ ID NO:5

[0275] 拟南芥ATR2(密码子优化的)

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atgtcttcct cttcctcttc cagtacctct atgattgatt tgatggctgc tattattaaa      60
ggtgaaccag ttatcgtctc cgacccagca aatgcctctg cttatgaatc agttgctgca     120
gaattgtctt caatgttgat cgaaaacaga caattcgcca tgatcgtaac tacatcaatc     180
gctgttttga tcggttgtat tgtcatgttg gtatggagaa gatccggtag tggtaattct     240
aaaagagtcg aacctttgaa accattagta attaagccaa gagaagaaga aatagatgac     300
ggtagaaaga aagttacaat atttttcggt acccaaactg gtacagctga aggttttgca     360
aaagccttag gtgaagaagc taaggcaaga tacgaaaaga ctagattcaa gatagtcgat     420
ttggatgact atgccgctga tgacgatgaa tacgaagaaa agttgaagaa agaagatgtt     480
gcatttttct ttttggcaac ctatggtgac ggtgaaccaa ctgacaatgc agccagattc     540
tacaaatggt ttacagaggg taatgatcgt ggtgaatggt tgaaaaactt aaagtacggt     600
gttttcggtt tgggtaacag acaatacgaa catttcaaca aagttgcaaa ggttgtcgac     660
gatattttgg tcgaacaagg tgctcaaaga ttagtccaag taggtttggg tgacgatgac     720
caatgtatag aagatgactt tactgcctgg agagaagctt tgtggcctga attagacaca     780
atcttgagag aagaaggtga caccgccgtt gctaccccat atactgctgc agtattagaa     840
tacagagttt ccatccatga tagtgaagac gcaaagttta atgatatcac tttggccaat     900
ggtaacggtt atacagtttt cgatgcacaa cacccttaca aagctaacgt tgcagtcaag     960
agagaattac atacaccaga atccgacaga agttgtatac acttggaatt tgatatcgct    1020
ggttccggtt taaccatgaa gttgggtgac catgtaggtg ttttatgcga caatttgtct    1080
gaaactgttg atgaagcatt gagattgttg gatatgtccc ctgacactta ttttagtttg    1140
cacgctgaaa aagaagatgg tacaccaatt tccagttctt taccacctcc attccctcca    1200
tgtaacttaa gaacagcctt gaccagatac gcttgcttgt tatcatcccc taaaaagtcc    1260
gccttggttg ctttagccgc tcatgctagt gatcctactg aagcagaaag attgaaacac    1320
ttagcatctc cagccggtaa agatgaatat tcaaagtggg tagttgaatc tcaaagatca    1380

ttgttagaag ttatggcaga atttccatct gccaagcctc cattaggtgt cttctttgct    1440
ggtgtagcac ctagattgca accaagattc tactcaatca gttcttcacc taagatcgct    1500
gaaactagaa ttcatgttac atgtgcatta gtctacgaaa agatgccaac cggtagaatt    1560
cacaagggtg tatgctctac ttggatgaaa aatgctgttc cttacgaaaa atcagaaaag    1620
ttgttcttag gtagaccaat cttcgtaaga caatcaaact tcaagttgcc ttctgattca    1680
aaggttccaa taatcatgat aggtcctggt acaggtttag ccccattcag aggtttcttg    1740
caagaaagat tggctttagt tgaatctggt gtcgaattag gtccttcagt tttgttcttt    1800
ggttgtagaa acagaagaat ggatttcatc tatgaagaag aattgcaaag attcgtcgaa    1860
tctggtgcat tggccgaatt atctgtagct ttttcaagag aaggtccaac taaggaatac    1920
gttcaacata agatgatgga taaggcatcc gacatatgga acatgatcag tcaaggtgct    1980
tatttgtacg tttgcggtga cgcaaagggt atggccagag atgtccatag atctttgcac    2040
acaattgctc aagaacaagg ttccatggat agtaccaaag ctgaaggttt cgtaaagaac    2100
ttacaaactt ccggtagata cttgagagat gtctggtga                           2139
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[0276]

[0277] SEQ ID NO:6

[0278] 甜叶菊KAHe1(密码子优化的)

[0279]

```
atggaagcct cttacctata catttctatt ttgcttttac tggcatcata cctgttcacc      60
actcaactta gaaggaagag cgctaatcta ccaccaaccg tgtttccatc aataccaatc     120
attggacact tatacttact caaaaagcct ctttatagaa ctttagcaaa aattgccgct     180
aagtacggac caatactgca attacaactc ggctacagac gtgttctggt gatttcctca     240
ccatcagcag cagaagagtg ctttaccaat aacgatgtaa tcttcgcaaa tagacctaag     300
acattgtttg gcaaaatagt gggtggaaca tcccttggca gtttatccta cggcgatcaa     360
tggcgtaatc taaggagagt agcttctatc gaaatcctat cagttcatag gttgaacgaa     420
tttcatgata tcagagtgga tgagaacaga ttgttaatta gaaaacttag aagttcatct     480
tctcctgtta ctcttataac agtcttttat gctctaacat tgaacgtcat tatgagaatg     540
atctctggca aaagatattt cgacagtggg gatagagaat tggaggagga aggtaagaga     600
tttcgagaaa tcttagacga aacgttgctt ctagccggtg cttctaatgt tggcgactac     660
ttaccaatat tgaactggtt gggagttaag tctcttgaaa agaaattgat cgctttgcag     720
aaaaagagag atgacttttt ccagggtttg attgaacagg ttagaaaatc tcgtggtgct     780
aaagtaggca aaggtagaaa aacgatgatc gaactcttat tatctttgca agagtcagaa     840
cctgagtact atacagatgc tatgataaga tcttttgtcc taggtctgct ggctgcaggt     900
agtgatactt cagcgggcac tatggaatgg gccatgagct tactggtcaa tcacccacat     960
gtattgaaga aagctcaagc tgaaatcgat agagttatcg gtaataacag attgattgac    1020
gagtcagaca ttggaaatat cccttacatc gggtgtatta tcaatgaaac tctaagactc    1080
tatccagcag ggccattgtt gttcccacat gaaagttctg ccgactgcgt tatttccggt    1140
tacaatatac ctagaggtac aatgttaatc gtaaaccaat gggcgattca tcacgatcct    1200
aaagtctggg atgatcctga aacctttaaa cctgaaagat ttcaaggatt agaaggaact    1260
agagatggtt tcaaacttat gccattcggt tctgggagaa gaggatgtcc aggtgaaggt    1320
ttggcaataa ggctgttagg gatgacacta ggctcagtga tccaatgttt tgattgggag    1380
agagtaggag atgagatggt tgacatgaca gaaggtttgg gtgtcacact tcctaaggcc    1440
gttccattag ttgccaaatg taagccacgt tccgaaatga ctaatctcct atccgaactt    1500
taa                                                                  1503
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[0280] SEQ ID NO:7

[0281] 甜叶菊CPR8

[0282] ATGCAATCTAACTCCGTGAAGATTTCGCCGCTTGATCTGGTAACTGCGCTGTTTAGCGGCAAGGTTTT

[0283] GGACACATCGAACGCATCGGAATCGGGAGAATCTGCTATGCTGCCGACTATAGCGATGATTATGGAGA

[0284] ATCGTGAGCTGTTGATGATACTCACAACGTCGGTTGCTGTATTGATCGGATGCGTTGTCGTTTTGGTG

[0285] TGGCGGAGATCGTCTACGAAGAAGTCGGCGTTGGAGCCACCGGTGATTGTGGTTCCGAAGAGAGTGCA

[0286] AGAGGAGGAAGTTGATGATGGTAAGAAGAAAGTTACGGTTTTCTTCGGCACCCAAACTGGAACAGCTG

[0287] AAGGCTTCGCTAAGGCACTTGTTGAGGAAGCTAAAGCTCGATATGAAAAGGCTGTCTTTAAAGTAATT

[0288] GATTTGGATGATTATGCTGCTGATGACGATGAGTATGAGGAGAAACTAAAGAAAGAATCTTTGGCCTT

[0289] TTTCTTTTTGGCTACGTATGGAGATGGTGAGCCAACAGATAATGCTGCCAGATTTTATAAATGGTTTA

[0290] CTGAGGGAGATGCGAAAGGAGAATGGCTTAATAAGCTTCAATATGGAGTATTTGGTTTGGGTAACAGA

[0291] CAATATGAACATTTTAACAAGATCGCAAAAGTGGTTGATGATGGTCTTGTAGAACAGGGTGCAAAGCG

[0292] TCTTGTTCCTGTTGGACTTGGAGATGATGATCAATGTATTGAAGATGACTTCACCGCATGGAAAGAGT

[0293] TAGTATGGCCGGAGTTGGATCAATTACTTCGTGATGAGGATGACACAACTGTTGCTACTCCATACACA

[0294] GCTGCTGTTGCAGAATATCGCGTTGTTTTTCATGAAAAACCAGACGCGCTTTCTGAAGATTATAGTTA

[0295] TACAAATGGCCATGCTGTTCATGATGCTCAACATCCATGCAGATCCAACGTGGCTGTCAAAAAGGAAC

[0296] TTCATAGTCCTGAATCTGACCGGTCTTGCACTCATCTTGAATTTGACATCTCGAACACCGGACTATCA

[0297] TATGAAACTGGGGACCATGTTGGAGTTTACTGTGAAAACTTGAGTGAAGTTGTGAATGATGCTGAAAG

[0298] ATTAGTAGGATTACCACCAGACACTTACTCCTCCATCCACACTGATAGTGAAGACGGGTCGCCACTTG

[0299] GCGGAGCCTCATTGCCGCCTCCTTTCCCGCCATGCACTTTAAGGAAAGCATTGACGTGTTATGCTGAT

[0300] GTTTTGAGTTCTCCCAAGAAGTCGGCTTTGCTTGCACTAGCTGCTCATGCCACCGATCCCAGTGAAGC

[0301] TGATAGATTGAAATTTCTTGCATCCCCCGCCGGAAAGGATGAATATTCTCAATGGATAGTTGCAAGCC

[0302] AAAGAAGTCTCCTTGAAGTCATGGAAGCATTCCCGTCAGCTAAGCCTTCACTTGGTGTTTTCTTTGCA

[0303] TCTGTTGCCCCGCGCTTACAACCAAGATACTACTCTATTTCTTCCTCACCCAAGATGGCACCGGATAG

[0304] GATTCATGTTACATGTGCATTAGTCTATGAGAAAACACCTGCAGGCCGCATCCACAAAGGAGTTTGTT

[0305] CAACTTGGATGAAGAACGCAGTGCCTATGACCGAGAGTCAAGATTGCAGTTGGGCCCCAATATACGTC

[0306] CGAACATCCAATTTCAGACTACCATCTGACCCTAAGGTCCCGGTTATCATGATTGGACCTGGCACTGG

[0307] TTTGGCTCCTTTTAGAGGTTTCCTTCAAGAGCGGTTAGCTTTAAAGGAAGCCGGAACTGACCTCGGTT

[0308] TATCCATTTTATTCTTCGGATGTAGGAATCGCAAAGTGGATTTCATATATGAAAACGAGCTTAACAAC

[0309] TTTGTGGAGACTGGTGCTCTTTCTGAGCTTATTGTTGCTTTCTCCCGTGAAGGCCCGACTAAGGAATA

[0310] TGTGCAACACAAGATGAGTGAGAAGGCTTCGGATATCTGGAACTTGCTTTCTGAAGGAGCATATTTAT

[0311] ACGTATGTGGTGATGCCAAAGGCATGGCCAAAGATGTACATCGAACCCTCCACACAATTGTGCAAGAA

[0312] CAGGGATCTCTTGACTCGTCAAAGGCAGAACTCTACGTGAAGAATCTACAAATGTCAGGAAGATACCT

[0313] CCGTGACGTTTGGTAA

[0314] SEQ ID NO:8

[0315] 甜叶菊UGT85C2(密码子优化的)

[0316]
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atggatgcaa tggcaactac tgagaaaaag cctcatgtga tcttcattcc atttcctgca      60
caatctcaca taaaggcaat gctaaagtta gcacaactat tacaccataa gggattacag     120
ataactttcg tgaataccga cttcatccat aatcaatttc tggaatctag tggccctcat     180
tgtttggacg gagccccagg gtttagattc gaaacaattc ctgacggtgt ttcacattcc     240
ccagaggcct ccatcccaat aagagagagt ttactgaggt caatagaaac caacttttg      300
gatcgtttca ttgacttggt cacaaaactt ccagacccac caacttgcat aatctctgat     360
ggctttctgt cagtgtttac tatcgacgct gccaaaaagt tgggtatccc agttatgatg     420
tactggactc ttgctgcatg cggtttcatg ggtttctatc acatccattc tcttatcgaa     480
aagggttttg ctccactgaa agatgcatca tacttaacca acggctacct ggatactgtt     540
attgactggg taccaggtat ggaaggtata agacttaaag attttccttt ggattggtct     600
acagacctta atgataaagt attgatgttt actacagaag ctccacaaag atctcataag     660
gtttcacatc atatctttca caccttttgat gaattggaac catcaatcat caaaaccttg     720
tctctaagat acaatcatat ctacactatt ggtccattac aattacttct agatcaaatt     780
cctgaagaga aaaagcaaac tggtattaca tccttacacg gctactcttt agtgaaagag     840
gaaccagaat gttttcaatg gctacaaagt aaagagccta attctgtggt ctacgtcaac     900
ttcggaagta caacagtcat gtccttggaa gatatgactg aatttggttg gggccttgct     960
aattcaaatc attactttct atggattatc aggtccaatt tggtaatagg ggaaaacgcc    1020
gtattacctc cagaattgga ggaacacatc aaaaagagag gtttcattgc ttcctggtgt    1080
tctcaggaaa aggtattgaa acatccttct gttggtggtt tccttactca ttgcggttgg    1140
ggctctacaa tcgaatcact aagtgcagga gttccaatga tttgttggcc atattcatgg    1200
gaccaactta caaattgtag gtatatctgt aaagagtggg aagttggatt agaaatggga    1260
acaaaggtta aacgtgatga agtgaaaaga ttggttcagg agttgatggg ggaaggtggc    1320

cacaagatga gaaacaaggc caaagattgg aaggaaaaag ccagaattgc tattgctcct    1380
aacgggtcat cctctctaaa cattgataag atggtcaaag agattacagt cttagccaga    1440
aactaa                                                               1446
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[0317] SEQ ID NO:9

[0318] 甜叶菊UGT74G1(GenBank AAR06920.1)

[0319]
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atggcggaac aacaaaagat caagaaatca ccacacgttc tactcatccc attcccttta      60
caaggccata taaacccttt catccagttt ggcaaacgat taatctccaa aggtgtcaaa     120
acaacacttg ttaccaccat ccacacctta aactcaaccc taaaccacag taacaccacc     180
accacctcca tcgaaatcca agcaatttcc gatggttgtg atgaaggcgg ttttatgagt     240
gcaggagaat catatttgga aacattcaaa caagttgggt ctaaatcact agctgactta     300
atcaagaagc ttcaaagtga aggaaccaca attgatgcaa tcatttatga ttctatgact     360
gaatgggttt tagatgttgc aattgagttt ggaatcgatg gtggttcgtt tttcactcaa     420
gcttgtgttg taaacagctt atattatcat gttcataagg gtttgatttc tttgccattg     480
ggtgaaactg tttcggttcc tggatttcca gtgcttcaac ggtgggagac accgttaatt     540
ttgcagaatc atgagcaaat acagagccct tggtctcaga tgttgtttgg tcagtttgct     600
aatattgatc aagcacgttg ggtcttcaca aatagttttt acaagctcga ggaagaggta     660
atagagtgga cgagaaagat atggaacttg aaggtaatcg ggccaacact tccatccatg     720
taccttgaca aacgacttga tgatgataaa gataacggat ttaatctcta caaagcaaac     780
catcatgagt gcatgaactg gttagacgat aagccaaagg aatcagttgt ttacgtagca     840
tttggtagcc tggtgaaaca tggacccgaa caagtggaag aaatcacacg ggctttaata     900
gatagtgatg tcaacttctt gtgggttatc aaacataaag aagagggaaa gctcccagaa     960
aatctttcgg aagtaataaa aaccggaaag ggtttgattg tagcatggtg caaacaattg    1020
gatgtgttag cacacgaatc agtaggatgc tttgttacac attgtgggtt caactcaact    1080
cttgaagcaa taagtcttgg agtccccgtt gttgcaatgc ctcaattttc ggatcaaact    1140
acaaatgcca agcttctaga tgaaattttg ggtgttggag ttagagttaa ggctgatgag    1200
aatgggatag tgagaagagg aaatcttgcg tcatgtatta agatgattat ggaggaggaa    1260
agaggagtaa taatccgaaa gaatgcggta aaatggaagg atttggctaa agtagccgtt    1320
catgaaggtg gtagctcaga caatgatatt gtcgaatttg taagtgagct aattaaggct    1380
taaatttttg ttgctttgta ttttatgtgt tatggttttt tgatttagat gtattcaatt    1440
aatattgaat cataactaaa ttcaagatta ttgtttgtaa tattctttgt cctaaaattt    1500
tgcgacttaa aacctttagt ttataaaaag aaattagaaa atactattgc acgga         1555
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[0320] SEQ ID NO:10

[0321] 甜叶菊UGT76G1(密码子优化的)

[0322]
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atggaaaaca agaccgaaac aacagttaga cgtaggcgta gaatcattct gtttccagta      60
ccttttcaag ggcacatcaa tccaatacta caactagcca acgttttgta ctctaaaggt     120
ttttctatta caatctttca caccaatttc aacaaaccaa aaacatccaa ttacccacat     180
ttcacattca gattcatact tgataatgat ccacaagatg aacgtatttc aaacttacct     240
acccacggtc ctttagctgg aatgagaatt ccaatcatca atgaacatgg tgccgatgag     300
cttagaagag aattagagtt acttatgttg gcatccgaag aggacgagga agtctcttgt     360
ctgattactg acgctctatg gtactttgcc caatctgtgg ctgatagttt gaatttgagg     420
agattggtac taatgacatc cagtctgttt aactttcacg ctcatgttag tttaccacaa     480
tttgacgaat tgggatactt ggaccctgat gacaagacta ggttagagga acaggcctct     540
ggttttccta tgttgaaagt caaagatatc aagtctgcct attctaattg gcaaatcttg     600
aaagagatct taggaaagat gatcaaacag acaaaggctt catctggagt gatttggaac     660
agtttcaaag agttagaaga gtctgaattg gagactgtaa tcagagaaat tccagcacct     720
tcattcctga taccattacc aaaacatttg actgcttcct cttcctcttt gttggatcat     780
gacagaacag tttttcaatg gttggaccaa caaccaccta gttctgtttt gtacgtgtca     840
tttggtagta cttctgaagt cgatgaaaag gacttccttg aaatcgcaag aggcttagtc     900
gatagtaagc agtcattcct ttgggtcgtg cgtccaggtt tcgtgaaagg ctcaacatgg     960
gtcgaaccac ttccagatgg ttttctaggc gaaagaggta gaatagtcaa atgggttcct    1020
caacaggaag ttttagctca tggcgctatt ggggcattct ggactcattc cggatggaat    1080
tcaactttag aatcagtatg cgaaggggta cctatgatct tttcagattt tggtcttgat    1140
caaccactga acgcaagata catgtctgat gttttgaaag tgggtgtata tctagaaaat    1200
ggctgggaaa ggggtgaaat agctaatgca ataagacgtg ttatggttga tgaagagggg    1260
gagtatatca gacaaaacgc aagagtgctg aagcaaaagg ccgacgtttc tctaatgaag    1320
ggaggctctt catacgaatc cttagaatct cttgtttcct acatttcatc actgtaa       1377
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[0323]

[0324] SEQ ID NO:11

[0325] 甜叶菊UGT91D2e-b(密码子优化的)

[0326]

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atggctactt ctgattccat cgttgacgat agaaagcaat tgcatgttgc tacttttcca      60
tggttggctt tcggtcatat tttgccatac ttgcaattgt ccaagttgat tgctgaaaag     120
ggtcacaagg tttcattctt gtctaccacc agaaacatcc aaagattgtc ctctcatatc     180
tccccattga tcaacgttgt tcaattgact ttgccaagag tccaagaatt gccagaagat     240
gctgaagcta ctactgatgt tcatccagaa gatatcccct acttgaaaaa ggcttccgat     300
ggtttacaac cagaagttac tagattcttg gaacaacatt ccccagattg gatcatctac     360
gattatactc attactggtt gccatccatt gctgcttcat tgggtatttc tagagcccat     420
ttctctgtta ctactccatg ggctattgct tatatgggtc catctgctga tgctatgatt     480
aacggttctg atggtagaac taccgttgaa gatttgacta ctccaccaaa gtggtttcca     540
tttccaacaa aagtctgttg gagaaaacac gatttggcta gattggttcc atacaaagct     600
ccaggtattt ctgatggtta cagaatgggt atggttttga aaggttccga ttgcttgttg     660
tctaagtgct atcatgaatt cggtactcaa tggttgcctt tgttggaaac attgcatcaa     720
gttccagttg ttccagtagg tttgttgcca ccagaaattc caggtgacga aaaagacgaa     780
acttgggttt ccatcaaaaa gtggttggat ggtaagcaaa agggttctgt tgtttatgtt     840
gctttgggtt ccgaagcttt ggtttctcaa accgaagttg ttgaattggc tttgggtttg     900
gaattgtctg gtttgccatt tgtttgggct tacagaaaac ctaaaggtcc agctaagtct     960
gattctgttg aattgccaga tggtttcgtt gaaagaacta gagatagagg tttggtttgg    1020
acttcttggg ctccacaatt gagaattttg tctcatgaat ccgtctgtgg tttcttgact    1080
cattgtggtt ctggttctat cgttgaaggt ttgatgtttg gtcacccatt gattatgttg    1140
ccaatctttg gtgaccaacc attgaacgct agattattgg aagataagca agtcggtatc    1200
gaaatcccaa gaaatgaaga agatggttgc ttgaccaaag aatctgttgc tagatctttg    1260
agatccgttg tcgttgaaaa agaaggtgaa atctacaagg ctaacgctag agaattgtcc    1320
aagatctaca acgataccaa ggtcgaaaaa gaatacgttt cccaattcgt tgactacttg    1380
gaaaagaatg ctagagctgt tgccattgat catgaatctt ga                       1422
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[0327] SEQ ID NO:12

[0328] 编码EUGT11的稻(Oryza sativa)序列(密码子优化的)

[0329]

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atggatagtg gctactcctc atcttatgct gctgccgctg gtatgcacgt tgtgatctgc      60
ccttggttgg cctttggtca cctgttacca tgtctggatt tagcccaaag actggcctca     120
agaggccata gagtatcatt tgtgtctact cctagaaata tctctcgttt accaccagtc     180
agacctgctc tagctcctct agttgcattc gttgctcttc cacttccaag agtagaagga     240
ttgccagacg gcgctgaatc tactaatgac gtaccacatg atagacctga catggtcgaa     300
ttgcatagaa gagcctttga tggattggca gctccatttt ctgagttcct gggcacagca     360
tgtgcagact gggttatagt cgatgtattt catcactggg ctgctgcagc cgcattggaa     420
cataaggtgc cttgtgctat gatgttgtta gggtcagcac acatgatcgc atccatagct     480
gatagaagat tggaaagagc tgaaacagaa tccccagccg cagcaggaca aggtaggcca     540
gctgccgccc caacctttga agtggctaga atgaaattga ttcgtactaa aggtagttca     600
gggatgagtc ttgctgaaag gttttctctg acattatcta gatcatcatt agttgtaggt     660
agatcctgcg tcgagttcga acctgaaaca gtacctttac tatctacttt gagaggcaaa     720
cctattactt tccttggtct aatgcctcca ttacatgaag gaaggagaga agatggtgaa     780
gatgctactg ttaggtggtt agatgcccaa cctgctaagt ctgttgttta cgttgcattg     840
ggttctgagg taccactagg ggtggaaaag gtgcatgaat tagcattagg acttgagctg     900
gccggaacaa gattcctttg ggctttgaga aaaccaaccg gtgtttctga cgccgacttg     960
ctaccagctg ggttcgaaga gagaacaaga ggccgtggtg tcgttgctac tagatgggtc    1020
ccacaaatga gtattctagc tcatgcagct gtaggggcct ttctaaccca ttgcggttgg    1080

aactcaacaa tagaaggact gatgtttggt catccactta ttatgttacc aatctttggc    1140
gatcagggac ctaacgcaag attgattgag gcaaagaacg caggtctgca ggttgcacgt    1200
aatgatggtg atggttcctt tgatagagaa ggcgttgcag ctgccatcag agcagtcgcc    1260
gttgaggaag agtcatctaa agttttccaa gctaaggcca aaaaattaca agagattgtg    1320
gctgacatgg cttgtcacga aagatacatc gatggtttca tccaacaatt gagaagttat    1380
aaagactaa                                                           1389
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[0330] SEQ ID NO:13

[0331] YBR180W

[0332] >sp|P38125|DTR1_YEAST二酪氨酸转运蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝DTR1 PE＝1 SV＝1

[0333] MGSEPFQKKNLGLQINSQESGTTRSTFHSLEDLGDDVINESWDQVNQKRANIDHDVFHEH

[0334] PDSSPSLSAQKAKTKEEEVAVKSSNSQSRDPSPDTQAHIPYTYFSKDQRLIIFGIIIFIG

[0335] FLGPMSGNIYIPALPLLQREYDVSATTINATVSVFMAVFSVGPLFWGALADFGGRKFLYM

[0336] VSLSLMLIVNILLAAVPVNIAALFVLRIFQAFASSSVISLGAGTVTDVVPPKHRGKAIAY

[0337] FMMGPNMGPIIAPIVAGLILMKGNYWRWLFGFTSIMTGIALILVTALLPETLRCIVGNGD

[0338] PKWGDKKDERENNESPFFEGNKISHRRLFPDIGIRKPVNNDAFFQENFPKPPKAGLTLYW

[0339] KMIKCPPIIITSVSTALLFSSYYAFSVTFSYYLEHDYRFTMLEIGAAYVCPGVAMLLGSQ

[0340] SGGHLSDYLRSRWIKSHPKKKFPAEFRLLLNLIGILLTICGTIGYGWAIFFHYHFVVLLV

[0341] FSALTAFGMTWCSNTSMTYLTELFPKRAAGTVAVSSFFRNVGAAISSAIILQLCNAMGIG

[0342] WCFTGLGLCSSISLIGILYLLIFQRKYTAKEF

[0343] SEQ ID NO:14

[0344] YAL067C

[0345] >sp|P39709|SEO1_YEAST可能的转运蛋白SEO1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SEO1 PE＝1 SV＝1

[0346] MYSIVKEIIVDPYKRLKWGFIPVKRQVEDLPDDLNSTEIVTISNSIQSHETAENFITTTS

[0347] EKDQLHFETSSYSEHKDNVNVTRSYEYRDEADRPWWRFFDEQEYRINEKERSHNKWYSWF

[0348] KQGTSFKEKKLLIKLDVLLAFYSCIAYWVKYLDTVNINNAYVSGMKEDLGFQGNDLVHTQ

[0349] VMYTVGNIIFQLPFLIYLNKLPLNYVLPSLDLCWSLLTVGAAYVNSVPHLKAIRFFIGAF

[0350] EAPSYLAYQYLFGSFYKHDEMVRRSAFYYLGQYIGILSAGGIQSAVYSSLNGVNGLEGWR

[0351] WNFIIDAIVSVVVGLIGFYSLPGDPYNCYSIFLTDDEIRLARKRLKENQTGKSDFETKVF

[0352] DIKLWKTIFSDWKIYILTLWNIFCWNDSNVSSGAYLLWLKSLKRYSIPKLNQLSMITPGL

[0353] GMVYLMLTGIIADKLHSRWFAIIFTQVFNIIGNSILAAWDVAEGAKWFAFMLQCFGWAMA

[0354] PVLYSWQNDICRRDAQTRAITLVTMNIMAQSSTAWISVLVWKTEEAPRYLKGFTFTACSA

[0355] FCLSIWTFVVLYFYKRDERNNAKKNGIVLYNSKHGVEKPTSKDVETLSVSDEK

[0356] SEQ ID NO:15

[0357] YBL089W

[0358] >sp|P38176|AVT5_YEAST液泡氨基酸转运蛋白5 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝AVT5 PE＝3 SV＝2

[0359] MPSNVRSGVLTLLHTACGAGVLAMPFAFKPFGLMPGLITLTFCGICSLCGLLLQTRIAKY

[0360] VPKSENASFAKLTQLINPSISVVFDFAIAVKCFGVGVSYLIIVGDLVPQIVQSIFYRNDD

[0361] NMSGSQEHHMFLDRRLYITLIIVFVISPLCFKRSLNSLRYASMIAIVSVAYLSGLIIYHF

[0362] VNRHQLERGQVYFMVPHGDSQSHSPLTTLPIFVFAYTCHHNMFSVINEQVDKSFKVIRRI

[0363] PIFAIVLAYFLYIIIGGTGYMTFGENIVGNILTLYPNSISTTIGRLAMLLLVMLAFPLQC

[0364] HPCRSSVKNIIIFIENFRKGKLYDNRASFIPLDNFNSEDPQEAPTQQNNEEPNLRSESLR

[0365] HINIITLCILLFSYLLAISITSLAKVLAIVGATGSTSISFILPGLFGYKLIGSEFTGTNE

[0366] RVPTSIKIFKYLSLSLFIWGIAVMVASLSAIVFLGTSSH

[0367] SEQ ID NO:16

[0368] YBL099W

[0369] >sp|P07251|ATPA_YEAST ATP合酶亚基α,线粒体OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ATP1 PE＝1 SV＝5

[0370] MLARTAAIRSLSRTLINSTKAARPAAAALASTRRLASTKAQPTEVSSILEERIKGVSDEA

[0371] NLNETGRVLAVGDGIARVFGLNNIQAEELVEFSSGVKGMALNLEPGQVGIVLFGSDRLVK

[0372] EGELVKRTGNIVDVPVGPGLLGRVVDALGNPIDGKGPIDAAGRSRAQVKAPGILPRRSVH

[0373] EPVQTGLKAVDALVPIGRGQRELIIGDRQTGKTAVALDTILNQKRWNNGSDESKKLYCVY

[0374] VAVGQKRSTVAQLVQTLEQHDAMKYSIIVAATASEAAPLQYLAPFTAASIGEWFRDNGKH

[0375] ALIVYDDLSKQAVAYRQLSLLLRRPPGREAYPGDVFYLHSRLLERAAKLSEKEGSGSLTA

[0376] LPVIETQGGDVSAYIPTNVISITDGQIFLEAELFYKGIRPAINVGLSVSRVGSAAQVKAL

[0377] KQVAGSLKLFLAQYREVAAFAQFGSDLDASTKQTLVRGERLTQLLKQNQYSPLATEEQVP

[0378] LIYAGVNGHLDGIELSRIGEFESSFLSYLKSNHNELLTEIREKGELSKELLASLKSATES

[0379] FVATF

[0380] SEQ ID NO:17

[0381] YBR241C

[0382] >sp|P38142|YB91_YEAST可能的代谢物转运蛋白YBR241C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YBR241C PE＝1 SV＝1

[0383] MAETERLMPNGGSRETKPLITGHLILGTIVACLGSIQYGYHIAELNAPQEFLSCSRFEAP

[0384] DENISYDDTWVGQHGLKQCIALTDSQYGAITSIFSIGGLFGSYYAGNWANRYGRKYVSMG

[0385] ASAMCMVSSLLLFFSNSYLQLLFGRFLVGMSCGTAIVITPLFINEIAPVEWRGAMGSMNQ

[0386] VSINLGILLTQTLALKYADSYNWRWLLFSGSVIAVANILAWLKVDESPRWLVSHGFVSEA

[0387] ETALFKLRPGTYQQAKQEIQDWQRSHGHNRDPESSEETHSGPTLWQYVTDPSYKKPRTVI

[0388] LAILSCQQFCGINSIIFYGVKVIGKILPDYSIQVNFAISILNVVVTLAASAIIDHVGRRP

[0389] LLLASTTVMTAMSLLISVGLTLSVSFLLVTATFVYIAAFAIGLGPIPFLIIGELSYPQDA

[0390] ATAQSFGTVCNWLATFIVGYLFPIGHGLMGGYVFAIFAAIAAMFATYVYKRVPETKGKTT

[0391] YSEVWAGY

[0392] SEQ ID NO:18

[0393] YBR294W

[0394] >sp|P38359|SUL1_YEAST硫酸盐通透酶1 OS＝酿酒酵母(菌株ATCC204508/S288c) GN＝SUL1 PE＝1 SV＝2

[0395] MSRKSSTEYVHNQEDADIEVFESEYRTYRESEAAENRDGLHNGDEENWKVNSSKQKFGVT

[0396] KNELSDVLYDSIPAYEESTVTLKEYYDHSIKNNLTAKSAGSYLVSLFPIIKWFPHYNFTW

[0397] GYADLVAGITVGCVLVPQSMSYAQIASLSPEYGLYSSFIGAFIYSLFATSKDVCIGPVAV

[0398] MSLQTAKVIAEVLKKYPEDQTEVTAPIIATTLCLLCGIVATGLGILRLGFLVELISLNAV

[0399] AGFMTGSAFNIIWGQIPALMGYNSLVNTREATYKVVINTLKHLPNTKLDAVFGLIPLVIL

[0400] YVWKWWCGTFGITLADRYYRNQPKVANRLKSFYFYAQAMRNAVVIVVFTAISWSITRNKS

[0401] SKDRPISILGTVPSGLNEVGVMKIPDGLLSNMSSEIPASIIVLVLEHIAISKSFGRINDY

[0402] KVVPDQELIAIGVTNLIGTFFHSYPATGSFSRSALKAKCNVRTPFSGVFTGGCVLLALYC

[0403] LTDAFFFIPKATLSAVIIHAVSDLLTSYKTTWTFWKTNPLDCISFIVTVFITVFSSIENG

[0404] IYFAMCWSCAMLLLKQAFPAGKFLGRVEVAEVLNPTVQEDIDAVISSNELPNELNKQVKS

[0405] TVEVLPAPEYKFSVKWVPFDHGYSRELNINTTVRPPPPGVIVYRLGDSFTYVNCSRHYDI

[0406] IFDRIKEETRRGQLITLRKKSDRPWNDPGEWKMPDSLKSLFKFKRHSATTNSDLPISNGS

[0407] SNGETYEKPLLKVVCLDFSQVAQVDSTAVQSLVDLRKAVNRYADRQVEFHFAGIISPWIK

[0408] RSLLSVKFGTTNEEYSDDSIIAGHSSFHVAKVLKDDVDYTDEDSRISTSYSNYETLCAAT

[0409] GTNLPFFHIDIPDFSKWDV

[0410] SEQ ID NO:19

[0411] YCL069W

[0412] >sp|P25594|VBA3_YEAST液泡碱性氨基酸转运蛋白3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VBA3 PE＝1 SV＝1

[0413] MNMLIVGRVVASVGGSGLQTLCFVIGCTMVGERSRPLVISILSCAFAVAAIVGPIIGGAF

[0414] TTHVTWRWCFYINLPIGGLAIIMFLLTYKAENKGILQQIKDAIGTISSFTFSKFRHQVNF

[0415] KRLMNGIIFKFDFFGFALCSAGLVLFLLGLTFGGNKYSWNSGQVIAYLVLGVLLFIFSLV

[0416] YDFFLFDKFNPEPDNISYRPLLLRRLVAKPAIIIINMVTFLLCTGYNGQMIYSVQFFQLI

[0417] FASSAWKAGLHLIPIVITNVIAAIASGVITKKLGLVKPLLIFGGVLGVIGAGLMTLMTNT

[0418] STKSTQIGVLLLPGFSLGFALQASLMSAQLQITKDRPEAAMDFIEVTAFNTFMKSLGTTL

[0419] GGVLSTTVFSASFHNKVSRAHLEPYEGKTVDDMILYRLQNYDGSHSTIGNILSDSIKNVF

[0420] WMDLGFYALGFLFCSFSSNKKLIIPKKDETPEDNLEDK

[0421] SEQ ID NO:20

[0422] YCR028C

[0423] >sp|P25621|FEN2_YEAST泛酸转运蛋白FEN2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝FEN2 PE＝1 SV＝1

[0424] MMKESKSITQHEVERESVSSKRAIKKRLLLFKIDLFVLSFVCLQYWINYVDRVGFTNAYI

[0425] SGMKEDLKMVGNDLTVSNTVFMIGYIVGMVPNNLMLLCVPPRIWLSFCTFAWGLLTLGMY

[0426] KVTSFKHICAIRFFQALFESCTFSGTHFVLGSWYKEDELPIRSAIFTGSGLVGSMFSGFM

[0427] QTSIFTHLNGRNGLAGWRWLFIIDFCITLPIAIYGFIFFPGLPDQTSAVSKFSMTRYIFN

[0428] EQELHYARRRLPARDESTRLDWSTIPRVLKRWHWWMFSLVWVLGGENLGFASNSTFALWL

[0429] QNQKYTLAQRNNYPSGIFAVGIVSTLCSAVYMSKIPRARHWHVSVFISLVMVIVAVLIRA

[0430] DPLNPKVVFSAQYLGGVAYAGQAVFFSWANIICHADLQERAIVLASMNMFSGAVNAWWSI

[0431] LFFASDMVPKFERGCYALLATAISSGIVSVVIRSLQIKENLSKKQVPYIDANDMPGEDDD

[0432] DDNQDNENDGDDESMEVELHNEEMAEISNPFR

[0433] SEQ ID NO:21

[0434] YCR075C

[0435] >sp|P17261|ERS1_YEAST胱氨酸转运蛋白 OS＝酿酒酵母(菌株ATCC204508/S288c)GN＝ERS1 PE＝1 SV＝1

[0436] MVSLDDILGIVYVTSWSISMYPPIITNWRHKSASAISMDFVMLNTAGYSYLVISIFLQLY

[0437] CWKMTGDESDLGRPKLTQFDFWYCLHGCLMNVVLLTQVVAGARIWRFPGKGHRKMNPWYL

[0438] RILLASLAIFSLLTVQFMYSNYWYDWHNSRTLAYCNNLFLLKISMSLIKYIPQVTHNSTR

[0439] KSMDCFPIQGVFLDVTGGIASLLQLIWQLSNDQGFSLDTFVTNFGKVGLSMVTLIFNFIF

[0440] IMQWFVYRSRGHDLASEYPL

[0441] SEQ ID NO:22

[0442] YDL128W

[0443] >sp|Q99385|VCX1_YEAST液泡钙离子转运蛋白 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VCX1 PE＝1 SV＝1

[0444] MDATTPLLTVANSHPARNPKHTAWRAAVYDLQYILKASPLNFLLVFVPLGLIWGHFQLSH

[0445] TLTFLFNFLAIIPLAAILANATEELADKAGNTIGGLLNATFGNAVELIVSIIALKKGQVR

[0446] IVQASMLGSLLSNLLLVLGLCFIFGGYNRVQQTFNQTAAQTMSSLLAIACASLLIPAAFR

[0447] ATLPHGKEDHFIDGKILELSRGTSIVILIVYVLFLYFQLGSHHALFEQQEEETDEVMSTI

[0448] SRNPHHSLSVKSSLVILLGTTVIISFCADFLVGTIDNVVESTGLSKTFIGLIVIPIVGNA

[0449] AEHVTSVLVAMKDKMDLALGVAIGSSLQVALFVTPFMVLVGWMIDVPMTLNFSTFETATL

[0450] FIAVFLSNYLILDGESNWLEGVMSLAMYILIAMAFFYYPDEKTLDSIGNSL

[0451] SEQ ID NO:23

[0452] YDL185W

[0453] >sp|P17255|VATA_YEAST V型质子ATP酶催化亚基A OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VMA1 PE＝1 SV＝3

[0454] MAGAIENARKEIKRISLEDHAESEYGAIYSVSGPVVIAENMIGCAMYELVKVGHDNLVGE

[0455] VIRIDGDKATIQVYEETAGLTVGDPVLRTGKPLSVELGPGLMETIYDGIQRPLKAIKEES

[0456] QSIYIPRGIDTPALDRTIKWQFTPGKFQVGDHISGGDIYGSVFENSLISSHKILLPPRSR

[0457] GTITWIAPAGEYTLDEKILEVEFDGKKSDFTLYHTWPVRVPRPVTEKLSADYPLLTGQRV

[0458] LDALFPCVQGGTTCIPGAFGCGKTVISQSLSKYSNSDAIIYVGCFAKGTNVLMADGSIEC

[0459] IENIEVGNKVMGKDGRPREVIKLPRGRETMYSVVQKSQHRAHKSDSSREVPELLKFTCNA

[0460] THELVVRTPRSVRRLSRTIKGVEYFEVITFEMGQKKAPDGRIVELVKEVSKSYPISEGPE

[0461] RANELVESYRKASNKAYFEWTIEARDLSLLGSHVRKATYQTYAPILYENDHFFDYMQKSK

[0462] FHLTIEGPKVLAYLLGLWIGDGLSDRATFSVDSRDTSLMERVTEYAEKLNLCAEYKDRKE

[0463] PQVAKTVNLYSKVVRGNGIRNNLNTENPLWDAIVGLGFLKDGVKNIPSFLSTDNIGTRET

[0464] FLAGLIDSDGYVTDEHGIKATIKTIHTSVRDGLVSLARSLGLVVSVNAEPAKVDMNGTKH

[0465] KISYAIYMSGGDVLLNVLSKCAGSKKFRPAPAAAFARECRGFYFELQELKEDDYYGITLS

[0466] DDSDHQFLLANQVVVHNCGERGNEMAEVLMEFPELYTEMSGTKEPIMKRTTLVANTSNMP

[0467] VAAREASIYTGITLAEYFRDQGKNVSMIADSSSRWAEALREISGRLGEMPADQGFPAYLG

[0468] AKLASFYERAGKAVALGSPDRTGSVSIVAAVSPAGGDFSDPVTTATLGITQVFWGLDKKL

[0469] AQRKHFPSINTSVSYSKYTNVLNKFYDSNYPEFPVLRDRMKEILSNAEELEQVVQLVGKS

[0470] ALSDSDKITLDVATLIKEDFLQQNGYSTYDAFCPIWKTFDMMRAFISYHDEAQKAVANGA

[0471] NWSKLADSTGDVKHAVSSSKFFEPSRGEKEVHGEFEKLLSTMQERFAESTD

[0472] SEQ ID NO:24

[0473] YDL194W

[0474] >sp|P10870|SNF3_YEAST高亲和力葡萄糖转运蛋白SNF3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SNF3 PE＝1 SV＝3

[0475] MDPNSNSSSETLRQEKQGFLDKALQRVKGIALRRNNSNKDHTTDDTTGSIRTPTSLQRQN

[0476] SDRQSNMTSVFTDDISTIDDNSILFSEPPQKQSMMMSICVGVFVAVGGFLFGYDTGLINS

[0477] ITSMNYVKSHVAPNHDSFTAQQMSILVSFLSLGTFFGALTAPFISDSYGRKPTIIFSTIF

[0478] IFSIGNSLQVGAGGITLLIVGRVISGIGIGAISAVVPLYQAEATHKSLRGAIISTYQWAI

[0479] TWGLLVSSAVSQGTHARNDASSYRIPIGLQYVWSSFLAIGMFFLPESPRYYVLKDKLDEA

[0480] AKSLSFLRGVPVHDSGLLEELVEIKATYDYEASFGSSNFIDCFISSKSRPKQTLRMFTGI

[0481] ALQAFQQFSGINFIFYYGVNFFNKTGVSNSYLVSFITYAVNVVFNVPGLFFVEFFGRRKV

[0482] LVVGGVIMTIANFIVAIVGCSLKTVAAAKVMIAFICLFIAAFSATWGGVVWVISAELYPL

[0483] GVRSKCTAICAAANWLVNFICALITPYIVDTGSHTSSLGAKIFFIWGSLNAMGVIVVYLT

[0484] VYETKGLTLEEIDELYIKSSTGVVSPKFNKDIRERALKFQYDPLQRLEDGKNTFVAKRNN

[0485] FDDETPRNDFRNTISGEIDHSPNQKEVHSIPERVDIPTSTEILESPNKSSGMTVPVSPSL

[0486] QDVPIPQTTEPAEIRTKYVDLGNGLGLNTYNRGPPSLSSDSSEDYTEDEIGGPSSQGDQS

[0487] NRSTMNDINDYMARLIHSTSTASNTTDKFSGNQSTLRYHTASSHSDTTEEDSNLMDLGNG

[0488] LALNAYNRGPPSILMNSSDEEANGGETSDNLNTAQDLAGMKERMAQFAQSYIDKRGGLEP

[0489] ETQSNILSTSLSVMADTNEHNNEILHSSEENATNQPVNENNDLK

[0490] SEQ ID NO:25

[0491] YDL210W

[0492] >sp|P32837|UGA4_YEAST GABA特异性通透酶 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝UGA4 PE＝1 SV＝1

[0493] MSMSSKNENKISVEQRISTDIGQAYQLQGLGSNLRSIRSKTGAGEVNYIDAAKSVNDNQL

[0494] LAEIGYKQELKRQFSTLQVFGIAFSIMGLLPSIASVMGGGLGGGPATLVWGWFVAAFFIL

[0495] LVGITMAEHASSIPTAGGLYYWTYYYAPEGYKEIISFIIGCSNSLALAAGVCSIDYGLAE

[0496] EIAAAVTLTKDGNFEVTSGKLYGIFAGAVVVMCICTCVASGAIARLQTLSIFANLFIIVL

[0497] LFIALPIGTKHRMGGFNDGDFIFGKYENLSDWNNGWQFCLAGFMPAVWTIGSFDSCVHQS

[0498] EEAKDAKKSVPIGIISSIAVCWILGWLIIICLMACINPDIDSVLDSKYGFALAQIIYDSL

[0499] GKKWAIAFMSLIAFCQFLMGASITTAVSRQVWAFSRDNGLPLSKYIKRVDSKYSVPFFAI

[0500] LAACVGSLILGLLCLIDDAATDALFSLAVAGNNLAWSTPTVFRLTSGRDLFRPGPFYLGK

[0501] IWSPIVAWTGVAFQLFIIILVMFPSQQHGITKSTMNYACVIGPGIWILAGIYYKVYKKKY

[0502] YHGPATNLSDDDYTEAVGADVIDTIMSKQEP

[0503] SEQ ID NO:26

[0504] YDR061W

[0505] >sp|Q12298|YD061_YEAST未表征的ABC转运蛋白ATP结合蛋白YDR061W OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YDR061W PE＝1 SV＝1

[0506] MSTNKFVVRITNALFKSSLASNSPPVYPKRIRHFEILPNEKWVIWGPGKGKFLDVLNNKY

[0507] ICEPPLSLRFGFLKESSNILPRIEQVAFKGVMPTAHLSARYEYFKDDYDQTCKQFIFDKA

[0508] SGSNAVSYKVETNNRQINMELYNALVENLNLSSLQDRWVMGLSNGQMRRARLARSILKEP

[0509] DLLLIDDPFLGLDPAAIATISQFLAKYDSIEVSGGCPIVIGLRYQDTIPAWCTHICCVDE

[0510] KNGILFEGPIEKLQSKMDETRSRALKELEQLKKASNSKEDISINDLICIHPMYGKKEHEI

[0511] IKMPHLIELDGLSVSYKGEAVLENLHWKVQPGSKWHIRGDNGSGKSTLLSLLTAEHPQSW

[0512] NSRVIDNGVPRRTGKTNYFDLNSKIGMSSPELHAIFLKNAGGRLNIRESVATGYHEASSN

[0513] NYLPIWKRLDKNSQEIVNMYLKYFGLDKDADSVLFEQLSVSDQKLVLFVRSLIKMPQILI

[0514] LDEAFSGMEVEPMMRCHEFLEEWPGTVLVVAHVAEETPKCAHYLRLISPGEYEIGDMEN

[0515] SEQ ID NO:27

[0516] YDR093W

[0517] >sp|Q12675|ATC4_YEAST磷脂转运ATP酶DNF2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝DNF2 PE＝1 SV＝1

[0518] MSSPSKPTSPFVDDIEHESGSASNGLSSMSPFDDSFQFEKPSSAHGNIEVAKTGGSVLKR

[0519] QSKPMKDISTPDLSKVTFDGIDDYSNDNDINDDDELNGKKTEIHEHENEVDDDLHSFQAT

[0520] PMPNTGGFEDVELDNNEGSNNDSQADHKLKRVRFGTRRNKSGRIDINRSKTLKWAKKNFH

[0521] NAIDEFSTKEDSLENSALQNRSDELRTVYYNLPLPEDMLDEDGLPLAVYPRNKIRTTKYT

[0522] PLTFFPKNILFQFHNFANIYFLILLILGAFQIFGVTNPGFASVPLIVIVIITAIKDGIED

[0523] SRRTVLDLEVNNTRTHILSGVKNENVAVDNVSLWRRFKKANTRALIKIFEYFSENLTAAG

[0524] REKKLQKKREELRRKRNSRSFGPRGSLDSIGSYRMSADFGRPSLDYENLNQTMSQANRYN

[0525] DGENLVDRTLQPNPECRFAKDYWKNVKVGDIVRVHNNDEIPADMILLSTSDVDGACYVET

[0526] KNLDGETNLKVRQSLKCSKIIKSSRDITRTKFWVESEGPHANLYSYQGNFKWQDTQNGNI

[0527] RNEPVNINNLLLRGCTLRNTKWAMGMVIFTGDDTKIMINAGVTPTKKSRISRELNFSVIL

[0528] NFVLLFILCFTAGIVNGVYYKQKPRSRDYFEFGTIGGSASTNGFVSFWVAVILYQSLVPI

[0529] SLYISVEIIKTAQAIFIYTDVLLYNAKLDYPCTPKSWNISDDLGQIEYIFSDKTGTLTQN

[0530] VMEFKKCTINGVSYGRAYTEALAGLRKRQGVDVESEGRREKEEIAKDRETMIDELRSMSD

[0531] NTQFCPEDLTFVSKEIVEDLKGSSGDHQQKCCEHFLLALALCHSVLVEPNKDDPKKLDIK

[0532] AQSPDESALVSTARQLGYSFVGSSKSGLIVEIQGVQKEFQVLNVLEFNSSRKRMSCIIKI

[0533] PGSTPKDEPKALLICKGADSVIYSRLDRTQNDATLLEKTALHLEEYATEGLRTLCLAQRE

[0534] LTWSEYERWVKTYDVAAASVTNREEELDKVTDVIERELILLGGTAIEDRLQDGVPDSIAL

[0535] LAEAGIKLWVLTGDKVETAINIGFSCNVLNNDMELLVVKASGEDVEEFGSDPIQVVNNLV

[0536] TKYLREKFGMSGSEEELKEAKREHGLPQGNFAVIIDGDALKVALNGEEMRRKFLLLCKNC

[0537] KAVLCCRVSPAQKAAVVKLVKKTLDVMTLAIGDGSNDVAMIQSADVGVGIAGEEGRQAVM

[0538] CSDYAIGQFRYVTRLVLVHGKWCYKRLAEMIPQFFYKNVIFTLSLFWYGIYNNFDGSYLF

[0539] EYTYLTFYNLAFTSVPVILLAVLDQDVSDTVSMLVPQLYRVGILRKEWNQTKFLWYMLDG

[0540] VYQSVICFFFPYLAYHKNMVVTENGLGLDHRYFVGVFVTAIAVTSCNFYVFMEQYRWDWF

[0541] CGLFICLSLAVFYGWTGIWTSSSSSNEFYKGAARVFAQPAYWAVLFVGVLFCLLPRFTID

[0542] CIRKIFYPKDIEIVREMWLRGDFDLYPQGYDPTDPSRPRINEIRPLTDFKEPISLDTHFD

[0543] GVSHSQETIVTEEIPMSILNGEQGSRKGYRVSTTLERRDQLSPVTTTNNLPRRSMASARG

[0544] NKLRTSLDRTREEMLANHQLDTRYSVERARASLDLPGINHAETLLSQRSRDR

[0545] SEQ ID NO:28

[0546] YDR338C

[0547] >sp|Q05497|YD338_YEAST未表征的转运蛋白YDR338C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YDR338C PE＝1 SV＝1

[0548] MAGILSKTLSEVHPSLRTNGMGIGNTHRRISLGFLPPNKKNPLVRKFRARTRNIDQRSFR

[0549] SLTDDFGSNVHEPNPYLGNIDEEPDLYYHDEEDGELSRTISLPSRVSETPELSPQDVDWI

[0550] LHEHERRYSSVCNSDNEEASQSNTPDRIQEYSGRELEYDEFMNRLQAQKQKLTRSAVTDA

[0551] KGTSHHRRPSFVSVTSRGSVPTIYQEIDENDSEALAELAHSHVTFKSEARVLASYSFPLI

[0552] FTFLLEQIFPMVCSLTVGHLGKNELAAVSLASMTSNITLAIFEGIATSLDTLCPQAYGSG

[0553] RFYSVGVHLQRCIAFSLVIYIPFAVMWWYSEPLLSYIIPEKELINLTSRFLRVLILGAPA

[0554] YIFFENLKRFLQAQGIFDAGIYVLTICAPLNVLVSYTLVWNKYIGVGFIGAAIAVVLNFW

[0555] LMFFLLLFYALYIDGRKCWGGFSRKAFTHWNDLGHLAFSGIIMLEAEELSYELLTLFSAY

[0556] YGVSYLAAQSAVSTMAALLYMIPFAIGISTSTRIANFIGAKRTDFAHISSQVGLSFSFIA

[0557] GFINCCILVFGRNLIANIYSKDPEVIKLIAQVLPLVGIVQNFDSLNAVAGSCLRGQGMQS

[0558] LGSIVNLMAYYLFGIPLALILSWFFDMKLYGLWIGIGSAMLLIGLVEAYYVLFPDWDKIM

[0559] TYAEILKETEDDEVDSDEYLTDSDDPDENTALLGA

[0560] SEQ ID NO:29

[0561] YDR406W

[0562] >sp|Q04182|PDR15_YEAST ATP依赖性通透酶PDR15 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PDR15 PE＝1 SV＝1

[0563] MSSDIRDVEERNSRSSSSSSSSNSAAQSIGQHPYRGFDSEAAERVHELARTLTSQSLLYT

[0564] ANSNNSSSSNHNAHNADSRSVFSTDMEGVNPVFTNPDTPGYNPKLDPNSDQFSSTAWVQN

[0565] MANICTSDPDFYKPYSLGCVWKNLSASGDSADVSYQSTFANIVPKLLTKGLRLLKPSKEE

[0566] DTFQILKPMDGCLNPGELLVVLGRPGSGCTTLLKSISSNSHGFKIAKDSIVSYNGLSSSD

[0567] IRKHYRGEVVYNAESDIHLPHLTVYQTLFTVARMKTPQNRIKGVDREAYANHVTEVAMAT

[0568] YGLSHTRDTKVGNDLVRGVSGGERKRVSIAEVAICGARFQCWDNATRGLDSATALEFIRA

[0569] LKTQADIGKTAATVAIYQCSQDAYDLFDKVCVLDDGYQLYFGPAKDAKKYFQDMGYYCPP

[0570] RQTTADFLTSITSPTERIISKEFIEKGTRVPQTPKDMAEYWLQSESYKNLIKDIDSTLEK

[0571] NTDEARNIIRDAHHAKQAKRAPPSSPYVVNYGMQVKYLLIRNFWRMKQSASVTLWQVIGN

[0572] SVMAFILGSMFYKVMKKNDTSTFYFRGAAMFFAILFNAFSCLLEIFSLYETRPITEKHRT

[0573] YSLYHPSADAFASVLSEMPPKLITAVCFNIIFYFLVDFRRNGGVFFFYFLINVIATFTLS

[0574] HLFRCVGSLTKTLQEAMVPASMLLLAISMYTGFAIPKTKILGWSIWIWYINPLAYLFESL

[0575] MINEFHDRRFPCAQYIPAGPAYQNITGTQRVCSAVGAYPGNDYVLGDDFLKESYDYEHKH

[0576] KWRGFGIGMAYVVFFFFVYLILCEYNEGAKQKGEMVVFLRSKIKQLKKEGKLQEKHRPGD

[0577] IENNAGSSPDSATTEKKILDDSSEGSDSSSDNAGLGLSKSEAIFHWRDLCYDVPIKGGQR

[0578] RILNNVDGWVKPGTLTALMGASGAGKTTLLDCLAERVTMGVITGNIFVDGRLRDESFPRS

[0579] IGYCQQQDLHLKTATVRESLRFSAYLRQPSSVSIEEKNRYVEEVIKILEMQQYSDAVVGV

[0580] AGEGLNVEQRKRLTIGVELAARPKLLVFLDEPTSGLDSQTAWDTCQLMRKLATHGQAILC

[0581] TIHQPSAILMQQFDRLLFLQKGGQTVYFGDLGEGCKTMIDYFESKGAHKCPPDANPAEWM

[0582] LEVVGAAPGSHATQDYNEVWRNSDEYKAVQEELDWMEKNLPGRSKEPTAEEHKPFAASLY

[0583] YQFKMVTIRLFQQYWRSPDYLWSKFILTIFNQVFIGFTFFKADRSLQGLQNQMLSIFMYT

[0584] VIFNPILQQYLPSFVQQRDLYEARERPSRTFSWLAFFLSQIIVEIPWNILAGTIAYCIYY

[0585] YAVGFYANASAAGQLHERGALFWLFSIAFYVYIGSMGLLMISFNEVAETAAHMGTLLFTM

[0586] ALSFCGVMATPKVMPRFWIFMYRVSPLTYMIDALLALGVANVDVKCSNYEMVKFTPPSGT

[0587] TCGDYMASYIKLAGTGYLSDPSATDICSFCAVSTTNAFLATFSSHYYRRWRNYGIFICYI

[0588] AFDYIAATFLYWLSRVPKKNGKISEKPKK

[0589] SEQ ID NO:30

[0590] YDR536W

[0591] >sp|P39932|STL1_YEAST糖转运蛋白STL1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝STL1 PE＝1 SV＝2

[0592] MKDLKLSNFKGKFISRTSHWGLTGKKLRYFITIASMTGFSLFGYDQGLMASLITGKQFNY

[0593] EFPATKENGDHDRHATVVQGATTSCYELGCFAGSLFVMFCGERIGRKPLILMGSVITIIG

[0594] AVISTCAFRGYWALGQFIIGRVVTGVGTGLNTSTIPVWQSEMSKAENRGLLVNLEGSTIA

[0595] FGTMIAYWIDFGLSYTNSSVQWRFPVSMQIVFALFLLAFMIKLPESPRWLISQSRTEEAR

[0596] YLVGTLDDADPNDEEVITEVAMLHDAVNRTKHEKHSLSSLFSRGRSQNLQRALIAASTQF

[0597] FQQFTGCNAAIYYSTVLFNKTIKLDYRLSMIIGGVFATIYALSTIGSFFLIEKLGRRKLF

[0598] LLGATGQAVSFTITFACLVKENKENARGAAVGLFLFITFFGLSLLSLPWIYPPEIASMKV

[0599] RASTNAFSTCTNWLCNFAVVMFTPIFIGQSGWGCYLFFAVMNYLYIPVIFFFYPETAGRS

[0600] LEEIDIIFAKAYEDGTQPWRVANHLPKLSLQEVEDHANALGSYDDEMEKEDFGEDRVEDT

[0601] YNQINGDNSSSSSNIKNEDTVNDKANFEG

[0602] SEQ ID NO:31

[0603] YEL031W

[0604] >sp|P39986|ATC6_YEAST锰转运ATP酶1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SPF1 PE＝1 SV＝1

[0605] MTKKSFVSSPIVRDSTLLVPKSLIAKPYVLPFFPLYATFAQLYFQQYDRYIKGPEWTFVY

[0606] LGTLVSLNILVMLMPAWNVKIKAKFNYSTTKNVNEATHILIYTTPNNGSDGIVEIQRVTE

[0607] AGSLQTFFQFQKKRFLWHENEQVFSSPKFLVDESPKIGDFQKCKGHSGDLTHLKRLYGEN

[0608] SFDIPIPTFMELFKEHAVAPLFVFQVFCVALWLLDEFWYYSLFNLFMIISMEAAAVFQRL

[0609] TALKEFRTMGIKPYTINVFRNKKWVALQTNELLPMDLVSITRTAEESAIPCDLILLDGSA

[0610] IVNEAMLSGESTPLLKESIKLRPSEDNLQLDGVDKIAVLHGGTKALQVTPPEHKSDIPPP

[0611] PDGGALAIVTKTGFETSQGSLVRVMIYSAERVSVDNKEALMFILFLLIFAVIASWYVWVE

[0612] GTKMGRIQSKLILDCILIITSVVPPELPMELTMAVNSSLAALAKFYVYCTEPFRIPFAGR

[0613] IDVCCFDKTGTLTGEDLVFEGLAGISADSENIRHLYSAAEAPESTILVIGAAHALVKLED

[0614] GDIVGDPMEKATLKAVGWAVERKNSNYREGTGKLDIIRRFQFSSALKRSASIASHNDALF

[0615] AAVKGAPETIRERLSDIPKNYDEIYKSFTRSGSRVLALASKSLPKMSQSKIDDLNRDDVE

[0616] SELTFNGFLIFHCPLKDDAIETIKMLNESSHRSIMITGDNPLTAVHVAKEVGIVFGETLI

[0617] LDRAGKSDDNQLLFRDVEETVSIPFDPSKDTFDHSKLFDRYDIAVTGYALNALEGHSQLR

[0618] DLLRHTWVYARVSPSQKEFLLNTLKDMGYQTLMCGDGTNDVGALKQAHVGIALLNGTEEG

[0619] LKKLGEQRRLEGMKMMYIKQTEFMARWNQPQPPVPEPIAHLFPPGPKNPHYLKALESKGT

[0620] VITPEIRKAVEEANSKPVEVIKPNGLSEKKPADLASLLLNSAGDAQGDEAPALKLGDASC

[0621] AAPFTSKLANVSAVTNIIRQGRCALVNTIQMYKILALNCLISAYSLSIIYMAGVKFGDGQ

[0622] ATVSGLLLSVCFLSISRGKPLEKLSKQRPQSGIFNVYIMGSILSQFAVHIATLVYITTEI

[0623] YKLEPREPQVDLEKEFAPSLLNTGIFIIQLVQQVSTFAVNYQGEPFRENIRSNKGMYYGL

[0624] LGVTGLALASATEFLPELNEAMKFVPMTDDFKIKLTLTLLLDFFGSWGVEHFFKFFFMDD

[0625] KPSDISVQQVKIASK

[0626] SEQ ID NO:32

[0627] YER166W

[0628] >sp|P32660|ATC5_YEAST磷脂转运ATP酶DNF1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝DNF1 PE＝1 SV＝2

[0629] MSGTFHGDGHAPMSPFEDTFQFEDNSSNEDTHIAPTHFDDGATSNKYSRPQVSFNDETPK

[0630] NKREDAEEFTFNDDTEYDNHSFQPTPKLNNGSGTFDDVELDNDSGEPHTNYDGMKRFRMG

[0631] TKRNKKGNPIMGRSKTLKWARKNIPNPFEDFTKDDIDPGAINRAQELRTVYYNMPLPKDM

[0632] IDEEGNPIMQYPRNKIRTTKYTPLTFLPKNILFQFHNFANVYFLVLIILGAFQIFGVTNP

[0633] GLSAVPLVVIVIITAIKDAIEDSRRTVLDLEVNNTKTHILEGVENENVSTDNISLWRRFK

[0634] KANSRLLFKFIQYCKEHLTEEGKKKRMQRKRHELRVQKTVGTSGPRSSLDSIDSYRVSAD

[0635] YGRPSLDYDNLEQGAGEANIVDRSLPPRTDCKFAKNYWKGVKVGDIVRIHNNDEIPADII

[0636] LLSTSDTDGACYVETKNLDGETNLKVRQSLKCTNTIRTSKDIARTKFWIESEGPHSNLYT

[0637] YQGNMKWRNLADGEIRNEPITINNVLLRGCTLRNTKWAMGVVMFTGGDTKIMLNSGITPT

[0638] KKSRISRELNFSVVINFVLLFILCFVSGIANGVYYDKKGRSRFSYEFGTIAGSAATNGFV

[0639] SFWVAVILYQSLVPISLYISVEIIKTAQAAFIYGDVLLYNAKLDYPCTPKSWNISDDLGQ

[0640] VEYIFSDKTGTLTQNVMEFKKCTINGVSYGRAYTEALAGLRKRQGIDVETEGRREKAEIA

[0641] KDRDTMIDELRALSGNSQFYPEEVTFVSKEFVRDLKGASGEVQQRCCEHFMLALALCHSV

[0642] LVEANPDNPKKLDLKAQSPDEAALVATARDVGFSFVGKTKKGLIIEMQGIQKEFEILNIL

[0643] EFNSSRKRMSCIVKIPGLNPGDEPRALLICKGADSIIYSRLSRQSGSNSEAILEKTALHL

[0644] EQYATEGLRTLCIAQRELSWSEYEKWNEKYDIAAASLANREDELEVVADSIERELILLGG

[0645] TAIEDRLQDGVPDCIELLAEAGIKLWVLTGDKVETAINIGFSCNLLNNEMELLVIKTTGD

[0646] DVKEFGSEPSEIVDALLSKYLKEYFNLTGSEEEIFEAKKDHEFPKGNYAIVIDGDALKLA

[0647] LYGEDIRRKFLLLCKNCRAVLCCRVSPSQKAAVVKLVKDSLDVMTLAIGDGSNDVAMIQS

[0648] ADVGIGIAGEEGRQAVMCSDYAIGQFRYLARLVLVHGRWSYKRLAEMIPEFFYKNMIFAL

[0649] ALFWYGIYNDFDGSYLYEYTYMMFYNLAFTSLPVIFLGILDQDVNDTISLVVPQLYRVGI

[0650] LRKEWNQRKFLWYMLDGLYQSIICFFFPYLVYHKNMIVTSNGLGLDHRYFVGVYVTTIAV

[0651] ISCNTYVLLHQYRWDWFSGLFIALSCLVVFAWTGIWSSAIASREFFKAAARIYGAPSFWA

[0652] VFFVAVLFCLLPRFTYDSFQKFFYPTDVEIVREMWQHGHFDHYPPGYDPTDPNRPKVTKA

[0653] GQHGEKIIEGIALSDNLGGSNYSRDSVVTEEIPMTFMHGEDGSPSGYQKQETWMTSPKET

[0654] QDLLQSPQFQQAQTFGRGPSTNVRSSLDRTREQMIATNQLDNRYSVERARTSLDLPGVTN

[0655] AASLIGTQQNN

[0656] SEQ ID NO:33

[0657] YFL011W

[0658] >sp|P43581|HXT10_YEAST己糖转运蛋白HXT10 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝HXT10 PE＝1 SV＝1

[0659] MVSSSVSILGTSAKASTSLSRKDEIKLTPETREASLDIPYKPIIAYWTVMGLCLMIAFGG

[0660] FIFGWDTGTISGFINQTDFKRRFGELQRDGSFQLSDVRTGLIVGIFNIGCALGGLTLGRL

[0661] GDIYGRKIGLMCVILVYVVGIVIQIASSDKWYQYFIGRIVSGMGVGGVAVLSPTLISEIS

[0662] PKHLRGTCVSFYQLMITLGIFLGYCTNYGTKKYSNSIQWRVPLGLCFAWAIFMVIGMVMV

[0663] PESPRYLVEKGKYEEARRSLAKSNKVTVTDPGVVFEFDTIVANMELERAVGNASWHELFS

[0664] NKGAILPRVIMGIVIQSLQQLTGCNYFFYYGTTIFNAVGMQDSFETSIVLGAVNFASTFV

[0665] ALYIVDKFGRRKCLLWGSASMAICFVIFATVGVTRLWPQGKDQPSSQSAGNVMIVFTCFF

[0666] IFSFAITWAPIAYVIVAETYPLRVKNRAMAIAVGANWMWGFLIGFFTPFITRSIGFSYGY

[0667] VFMGCLIFSYFYVFFFVCETKGLTLEEVNEMYEERIKPWKSGGWIPSSRRTPQPTSSTPL

[0668] VIVDSK

[0669] SEQ ID NO:34

[0670] YGL006W

[0671] >sp|P38929|ATC2_YEAST钙转运ATP酶2 OS＝酿酒酵母(菌株ATCC 204508/S288c) GN＝PMC1 PE＝1 SV＝1

[0672] MSRQDENSALLANNENNKPSYTGNENGVYDNFKLSKSQLSDLHNPKSIRSFVRLFGYESN

[0673] SLFKYLKTDKNAGISLPEISNYRKTNRYKNYGDNSLPERIPKSFLQLVWAAFNDKTMQLL

[0674] TVAAVVSFVLGLYELWMQPPQYDPEGNKIKQVDWIEGVAIMIAVFVVVLVSAANDYQKEL

[0675] QFAKLNKKKENRKIIVIRNDQEILISIHHVLVGDVISLQTGDVVPADCVMISGKCEADES

[0676] SITGESNTIQKFPVDNSLRDFKKFNSIDSHNHSKPLDIGDVNEDGNKIADCMLISGSRIL

[0677] SGLGRGVITSVGINSVYGQTMTSLNAEPESTPLQLHLSQLADNISVYGCVSAIILFLVLF

[0678] TRYLFYIIPEDGRFHDLDPAQKGSKFMNIFITSITVIVVAVPEGLPLAVTLALAFATTRM

[0679] TKDGNLVRVLRSCETMGSATAVCSDKTGTLTENVMTVVRGFPGNSKFDDSKSLPVSEQRK

[0680] LNSKKVFEENCSSSLRNDLLANIVLNSTAFENRDYKKNDKNTNGSKNMSKNLSFLDKCKS

[0681] RLSFFKKGNREDDEDQLFKNVNKGRQEPFIGSKTETALLSLARLSLGLQPGELQYLRDQP

[0682] MEKFNIEKVVQTIPFESSRKWAGLVVKYKEGKNKKPFYRFFIKGAAEIVSKNCSYKRNSD

[0683] DTLEEINEDNKKETDDEIKNLASDALRAISVAHKDFCECDSWPPEQLRDKDSPNIAALDL

[0684] LFNSQKGLILDGLLGIQDPLRAGVRESVQQCQRAGVTVRMVTGDNILTAKAIARNCAILS

[0685] TDISSEAYSAMEGTEFRKLTKNERIRILPNLRVLARSSPEDKRLLVETLKGMGDVVAVTG

[0686] DGTNDAPALKLADVGFSMGISGTEVAREASDIILMTDDFSAIVNAIKWGRCVSVSIKKFI

[0687] QFQLIVNITAVILTFVSSVASSDETSVLTAVQLLWINLIMDTLAALALATDKPDPNIMDR

[0688] KPRGRSTSLISVSTWKMILSQATLQLIVTFILHFYGPELFFKKHEDEITSHQQQQLNAMT

[0689] FNTFVWLQFFTMLVSRKLDEGDGISNWRGRISAANLNFFQDLGRNYYFLTIMAIIGSCQV

[0690] LIMFFGGAPFSIARQTKSMWITAVLCGMLSLIMGVLVRICPDEVAVKVFPAAFVQRFKYV

[0691] FGLEFLRKNHTGKHDDEEALLEESDSPESTAFY

[0692] SEQ ID NO:35

[0693] YGL013C

[0694] >sp|P12383|PDR1_YEAST转录因子PDR1 OS＝酿酒酵母(菌株ATCC 204508/S288c) GN＝PDR1 PE＝1 SV＝2

[0695] MRGLTPKNGVHIETGPDTESSADSSNFSTGFSGKIRKPRSKVSKACDNCRKRKIKCNGKF

[0696] PCASCEIYSCECTFSTRQGGARIKNLHKTSLEGTTVQVKEETDSSSTSFSNPQRCTDGPC

[0697] AVEQPTKFFENFKLGGRSSGDNSGSDGKNDDDVNRNGFYEDDSESQATLTSLQTTLKNLK

[0698] EMAHLGTHVTSAIESIELQISDLLKRWEPKVRTKELATTKFYPNKSIETQLMKNKYCDVV

[0699] HLTRYAAWSNNKKDQDTSSQPLIDEIFGLYSPFQFLSLQGIGKCFQNYRSKSKCEIFPRT

[0700] AKETIYIMLRFFDVCFHHINQGCVSIANPLENYLQKMNLLPSTPSSISSAGSPNTAHTKS

[0701] HVALVINHLPQPFVRNITGISNSELLSEMNNDISMFGILLKMLDMHKNSYQNFLMEITSN

[0702] PSVAKNTQSIDVLQEFIHYCQAGEALIALCYSYYNSTLYNYVDFTCDITHLEQLLYFLDL

[0703] LFWLSEIYGFEKVLNVAVHFVSRVGLSRWEFYVGLDENFAERRRNLWWKAFYFEKTLASK

[0704] LGYPSNIDDSKINCLLPKNFRDVGFLDNRDFIENVHLVRRSEAFDNMCISDLKYYGELAV

[0705] LQIVSHFSSSVLFNEKFTSIRNTSKPSVVREKLLFEVLEIFNETEMKYDAIKEQTGKLFD

[0706] IAFSKDSTELKVSREDKIMASKFVLFYEHHFCRMVNESDNIVARLCVHRRPSILIENLKI

[0707] YLHKIYKSWTDMNKILLDFDNDYSVYRSFAHYSISCIILVSQAFSVAEFIKVNDVVNMIR

[0708] VFKRFLDIKIFSENETNEHVFNSQSFKDYTRAFSFLTIVTRIMLLAYGESSSTNLDVISK

[0709] YIDENAPDLKGIIELVLDTNSCAYRFLLEPVQKSGFHLTVSQMLKNRKFQEPLMSNEDNK

[0710] QMKHNSGKNLNPDLPSLKTGTSCLLNGIESPQLPFNGRSAPSPVRNNSLPEFAQLPSFRS

[0711] LSVSDMINPDYAQPTNGQNNTQVQSNKPINAQQQIPTSVQVPFMNTNEINNNNNNNNNNK

[0712] NNINNINNNNSNNFSATSFNLGTLDEFVNNGDLEDLYSILWSDVYPDS

[0713] SEQ ID NO:36

[0714] YGL255W

[0715] >sp|P32804|ZRT1_YEAST锌调节转运蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ZRT1 PE＝1 SV＝1

[0716] MSNVTTPWWKQWDPSEVTLADKTPDDVWKTCVLQGVYFGGNEYNGNLGARISSVFVILFV

[0717] STFFTMFPLISTKVKRLRIPLYVYLFAKYFGSGVIVATAFIHLMDPAYGAIGGTTCVGQT

[0718] GNWGLYSWCPAIMLTSLTFTFLTDLFSSVWVERKYGLSHDHTHDEIKDTVVRNTAAVSSE

[0719] NDNENGTANGSHDTKNGVEYYEDSDATSMDVVQSFQAQFYAFLILEFGVIFHSVMIGLNL

[0720] GSVGDEFSSLYPVLVFHQSFEGLGIGARLSAIEFPRSKRWWPWALCVAYGLTTPICVAIG

[0721] LGVRTRYVSGSYTALVISGVLDAISAGILLYTGLVELLARDFIFNPQRTKDLRELSFNVI

[0722] CTLFGAGIMALIGKWA

[0723] SEQ ID NO:37

[0724] YGR125W

[0725] >sp|P53273|YG35_YEAST未表征的液泡膜蛋白YGR125W OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YGR125W PE＝1 SV＝1

[0726] MGRTIRRRRSNSSLSEAISVSLGINQDSSVNKMHRASVSAMSPPLCRSYMSGFFTGGNSP

[0727] MINNLSDSKLPISNKQHPKVIHGSENLHRQTAQLSNEFCSSSVEENSPTIKDYMDIIGNG

[0728] DRKDDQSMRTIEENIDEEYSDEYSRLLLSPASSNVDDDRNRGLQNSSLPELEDGYAGGYQ

[0729] SLRPSHNLRFRPRNLWHMCTSFPSKFAHYLPAAVLGLLLNILDALSYGMIIFPITEPVFS

[0730] HLGPTGISMFYISTIISQAVYSGGWSSFPSGIGSEMIEITPFYHTMALAIKEALAGNDDE

[0731] IITTTIFCYVISSMLTGVVFYALGKLRLGKIVGFFPRHILIGCIGGVGYFLIITGIEVTT

[0732] RVAKFEYSWPFFSGLFTDYDTLAKWLLPVLLTVVLIGTQRYFKNSLVLPSFYILTLVLFH

[0733] FIVAIIPTLSLDALRQAGWIFPIANSDSKWYDHYRLFNVHKVHWSLVLQQIPTMMALTFF

[0734] GILHVPINVPALAMSLQMDKYDVDRELIAHGYSNFFSGLLGSVQNYLVYTNSVLFIRAGA

[0735] DSPFAGFLLIALTICIMIIGPVIISFIPICIVGSLIFLLGYELLVEALVDTWNKLNRFEY

[0736] LTVVIIVFTMGIFDFVLGIIVGILIACFSFLVDSTKLQTINGEYNGNVARSTVYRDYVQT

[0737] KFLDGIGEQIYVLKLQNLLFFGTIISIEEKIERLLQISNKDATKRRIKYLILDFKNINAD

[0738] NIDYSAAEGFNRIKRFTETKRIKLIISSIKERDRIYNAFNNVGLLNDVELFADLNSALEW

[0739] CENEFLFQYKQLRKKAKERLEEGKQNNVVSAVIAATKNKKIDTIGNGLNRGSNGDTARNL

[0740] MSLPTNTPRNYQILSVAQNVFVNDEQAVKNFKKEYKDDEPVLPILLFALKQYRPDIISEV

[0741] QKVREKEIKFWAQLCPYFTRRRLASQSHLLHADNIFFLVETGMLKATYELPQGTLYEIFS

[0742] NGTCFGKIIAPGNAMPREQKLTIETETDSVLWVIDSSSLNKLKEDNLALYVEVALMVMCI

[0743] KDTRFKELLGYTLVSA

[0744] SEQ ID NO:38

[0745] YGR181W

[0746] >sp|P53299|TIM13_YEAST线粒体输入内膜移位酶亚基TIM13 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝TIM13 PE＝1 SV＝1

[0747] MGLSSIFGGGAPSQQKEAATTAKTTPNPIAKELKNQIAQELAVANATELVNKISENCFEK

[0748] CLTSPYATRNDACIDQCLAKYMRSWNVISKAYISRIQNASASGEI

[0749] SEQ ID NO:39

[0750] YGR217W

[0751] >sp|P50077|CCH1_YEAST钙通道蛋白CCH1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝CCH1 PE＝1 SV＝1

[0752] MQGRKRTLTEPFEPNTNPFGDNAAVMTENVEDNSETDGNRLESKPQALVPPALNIVPPES

[0753] SIHSTEEKKGDEYNGNDKDSSLISNIFRTRVGRSSHENLSRPKLSLKTASFGAAESSRRN

[0754] VSPSTKSAKSSSQYIDLNDERLRRRSFSSYSRSSSRRVSNSPSSTDRPPRSAKVLSLIAA

[0755] DDMDDFEDLQKGFKSAIDEEGLTWLPQLKSEKSRPVSDVGEDRGEGEQESIPDVHTPNVG

[0756] ASATPGSIHLTPEPAQNGSVSEGLEGSINNSRKKPSPKFFHHLSPQKEDKDQTEVIEYAE

[0757] DILDFETLQRKLESRPFVLYGHSLGVFSPTNPLRIKIARFLLHRRYSLLYNTLLTFYAIL

[0758] LAIRTYNPHNVVFLYRFSNWTDYFIFILSACFTGNDIAKIIAFGFWDDSEMFKAYGREYK

[0759] SILQRSGIMKLYIYLREKYGRKLIDFIIPFRIISPGEETKYQRSSLSTSLTKPYGAKENQ

[0760] RPFGTPRAFARSSWNRIDLVSSVSFWLGMFLSIKSYDTKTGIRIFKPLAILRILRLVNVD

[0761] TGMPSILRGLKYGIPQLVNVSSMLVYFWIFFGILGVQIFQGSFRRQCVWFNPEDPTDTYQ

[0762] YDMQFCGGYLDPVTKRKQNYIYEDGSEGSVSKGFLCPQYSKCVSNANPYNGRISFDNIVN

[0763] SMELVFVIMSANTFTDLMYYTMDSDEMAACLFFIVCIFVLTIWLLNLLIAVLVSSFEIAN

[0764] EEYKKKKFIYGSRKTGYVARIVTGYWKYFKLKANQTKFPNWSQKGLAIYSHVEFIFVILI

[0765] ICDIGMRASVKVSTSANCNNILLKTDRGISIVLFIESLARLVLYLPNMWKFLTKPSYVYD

[0766] FIISIITLVISCLAVEGVLGHMYAWLSIFHISRFYRVIISFNLTKKLWKQILSNGVMIWN

[0767] LSSFYFFFTFLVAIIMAVYFEGVIPPEEMADQPFGMYSLPNSFLSLFIIGSTENWTDILY

[0768] ALQKHSPNISSTFFCSVFFIIWFLLSNSVILNIFIALISESMEVKEEEKRPQQIKHYLKF

[0769] VYPQKIQEYTHASLVARIRKKFFGGHRNEDTRDFKQFLMRGTAIMNIAQNMGELADEFKE

[0770] PPSENLFKKGLSKLTIGVPSLKRLRMFANNPFYKNSDVVFTETNDINGRTYILELNEYED

[0771] EKLDYLKKYPLFNYSYYFFSPQHRFRRFCQRLVPPSTGKRTDGSRFFEDSTDLYNKRSYF

[0772] HHIERDVFVFIFALATILLIVCSCYVTPLYRMHHKMGTWNWSSALDCAFIGAFSIEFIVK

[0773] TVADGFIYSPNAYLRNPWNFIDFCVLISMWINLIAYLKNNGNLSRIFKGLTALRALRCLT

[0774] ISNTARQTFNLVMFDGLNKIFEAGLISLSLLFPFTVWGLSIFKGRLGTCNDGSLGRADCY

[0775] NEYSNSVFQWDIMSPRVYQQPYLHLDSFASAFSSLYQIISLEGWVDLLENMMNSSGIGTP

[0776] ATVMGSAGNALFLVLFNFLSMVFILNLFVSFIVNNQARTTGSAYFTIEEKAWLESQKLLS

[0777] QAKPKAIPNLIELSRVRQFFYQLAVEKKNFYYASFLQVVLYLHIIMLLSRSYNPGNLIGY

[0778] QGVYFMFSTSVFLIQEALHMCGEGPRLYFRQKWNSIRLSIIIIAFIMNAVAFHVPASHYW

[0779] FHNIKGFFLLVIFLFIIPQNDTLTELLETAMASLPPILSLTYTWGVLFLVYAIALNQIFG

[0780] LTRLGSNTTDNINFRTVIKSMIVLFRCSFGEGWNYIMADLTVSEPYCSSDDNSTYTDCGS

[0781] ETYAYLLLMSWNIISMYIFVNMFVSLIIGNFSYVYRSGGSRSGINRSEIKKYIEAWSKFD

[0782] TDGTGELELSYLPRIMHSFDGPLSFKIWEGRLTIKSLVENYMEVNPDDPYDVKIDLIGLN

[0783] KELNTIDKAKIIQRKLQYRRFVQSIHYTNAYNGCIRFSDLLLQIPLYTAYSARECLGIDQ

[0784] YVHHLYILGKVDKYLENQRNFDVLEMVVTRWKFHCRMKRTIEPEWDVKDPTVSSHISNIN

[0785] VNLEPAPGILEREPIATPRMDYGVNNFMWSPRMNQDSTMEPPEEPIDNNDDSANDLIDR

[0786] SEQ ID NO:40

[0787] YGR224W

[0788] >sp|P50080|AZR1_YEAST吡咯抗性蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝AZR1 PE＝1 SV＝1

[0789] MKGEPKTYSMSDLSYYGEKAQQQNEKQQKQYVVRRNSTQSTSKQNVSVVLEDNASESNEL

[0790] PKGFILYASLIALALSLFLAALDIMIVSTIIEEVAKQFGSYSEIGWLFTGYSLPNALLAL

[0791] IWGRIATPIGFKETMLFAIVIFEIGSLISALANSMSMLIGGRVIAGVGGCGIQSLSFVIG

[0792] STLVEESQRGILIAVLSCSFAIASVVGPFLGGVFTSSVTWRWCFYVNLPIGGLAFFLFLF

[0793] FYNPGLSTFQETMDNIRKFPSQFIEIVRNVAYHLLKIKGFSKLNGWRKPFMELIFMYDII

[0794] EFVFCSAGFTCILLAFTFGGNRYAWNSASIIILFIIGIVLVVLAGIYDFLVFPKFNIVKA

[0795] TPHYQPLMSWTNIKKPGIFTVNIALFLTCAGYISQFTYIVQYFQLIYNDSAWRAAVHLVA

[0796] CIISTVVTAILCGAITDKTRQIKPIIVISSIFGVVGAGILTLLNNNANNSAHIGLLILPG

[0797] VAFGGLAQSSMLASQIQLDKKSPTFRSDFVSITTFNTFCKNLGQALGGVISNTVFSAAAI

[0798] KKLTKANIQLPDGTTVDNLVIYRQTNFDGSHSKLGNIISESLTDVFYMALGFYALSLIFA

[0799] VFASNKKVTASLR

[0800] SEQ ID NO:41

[0801] YGR281W

[0802] >sp|P53049|YOR1_YEAST寡霉素抗性ATP依赖性通透酶YOR1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YOR1 PE＝1 SV＝1

[0803] MTITVGDAVSETELENKSQNVVLSPKASASSDISTDVDKDTSSSWDDKSLLPTGEYIVDR

[0804] NKPQTYLNSDDIEKVTESDIFPQKRLFSFLHSKKIPEVPQTDDERKIYPLFHTNIISNMF

[0805] FWWVLPILRVGYKRTIQPNDLFKMDPRMSIETLYDDFEKNMIYYFEKTRKKYRKRHPEAT

[0806] EEEVMENAKLPKHTVLRALLFTFKKQYFMSIVFAILANCTSGFNPMITKRLIEFVEEKAI

[0807] FHSMHVNKGIGYAIGACLMMFVNGLTFNHFFHTSQLTGVQAKSILTKAAMKKMFNASNYA

[0808] RHCFPNGKVTSFVTTDLARIEFALSFQPFLAGFPAILAICIVLLIVNLGPIALVGIGIFF

[0809] GGFFISLFAFKLILGFRIAANIFTDARVTMMREVLNNIKMIKYYTWEDAYEKNIQDIRTK

[0810] EISKVRKMQLSRNFLIAMAMSLPSIASLVTFLAMYKVNKGGRQPGNIFASLSLFQVLSLQ

[0811] MFFLPIAIGTGIDMIIGLGRLQSLLEAPEDDPNQMIEMKPSPGFDPKLALKMTHCSFEWE

[0812] DYELNDAIEEAKGEAKDEGKKNKKKRKDTWGKPSASTNKAKRLDNMLKDRDGPEDLEKTS

[0813] FRGFKDLNFDIKKGEFIMITGPIGTGKSSLLNAMAGSMRKTDGKVEVNGDLLMCGYPWIQ

[0814] NASVRDNIIFGSPFNKEKYDEVVRVCSLKADLDILPAGDMTEIGERGITLSGGQKARINL

[0815] ARSVYKKKDIYLFDDVLSAVDSRVGKHIMDECLTGMLANKTRILATHQLSLIERASRVIV

[0816] LGTDGQVDIGTVDELKARNQTLINLLQFSSQNSEKEDEEQEAVVAGELGQLKYESEVKEL

[0817] TELKKKATEMSQTANSGKIVADGHTSSKEERAVNSISLKIYREYIKAAVGKWGFIALPLY

[0818] AILVVGTTFCSLFSSVWLSYWTENKFKNRPPSFYMGLYSFFVFAAFIFMNGQFTILCAMG

[0819] IMASKWLNLRAVKRILHTPMSYIDTTPLGRILNRFTKDTDSLDNELTESLRLMTSQFANI

[0820] VGVCVMCIVYLPWFAIAIPFLLVIFVLIADHYQSSGREIKRLEAVQRSFVYNNLNEVLGG

[0821] MDTIKAYRSQERFLAKSDFLINKMNEAGYLVVVLQRWVGIFLDMVAIAFALIITLLCVTR

[0822] AFPISAASVGVLLTYVLQLPGLLNTILRAMTQTENDMNSAERLVTYATELPLEASYRKPE

[0823] MTPPESWPSMGEIIFENVDFAYRPGLPIVLKNLNLNIKSGEKIGICGRTGAGKSTIMSAL

[0824] YRLNELTAGKILIDNVDISQLGLFDLRRKLAIIPQDPVLFRGTIRKNLDPFNERTDDELW

[0825] DALVRGGAIAKDDLPEVKLQKPDENGTHGKMHKFHLDQAVEEEGSNFSLGERQLLALTRA

[0826] LVRQSKILILDEATSSVDYETDGKIQTRIVEEFGDCTILCIAHRLKTIVNYDRILVLEKG

[0827] EVAEFDTPWTLFSQEDSIFRSMCSRSGIVENDFENRS

[0828] SEQ ID NO:42

[0829] YHL016C

[0830] >sp|P33413|DUR3_YEAST尿素主动转运蛋白OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝DUR3 PE＝1 SV＝2

[0831] MGEFKPPLPQGAGYAIVLGLGAVFAGMMVLTTYLLKRYQKEIITAEEFTTAGRSVKTGLV

[0832] AAAVVSSWIWCSTLLTSSTKEYADGIFGGYAYAAGACFQIIAFAILAIKTKQMAPNAHTY

[0833] LELVRTRYGKIGHGCYLFYAIATNILVTSMLLTSGSAVFSDLTGMNTIASCFLLPVGVVV

[0834] YTLFGGIKATFLTDYMHTCVIIIIVLVFAFKVYATSDVLGSPGKVYDLVREAAKRHPVDG

[0835] NYQGEYMTMTSKSAGILLIINLIGNFGTVFLDNGYWNKAISASPAASLKAYAIGGLAWFA

[0836] VPSLISLTMGLACLAVETSPNFPTYPDPLTSFQANSGLVLPAAAIAIMGKGGAVASLLMI

[0837] FMAVTSAMSAELIAVSSVFTYDIYREYIDPRASGKKLIYTSHVACIFFGLAMSGFSVGLY

[0838] YGGISMGYIYEMMGIIISSAVLPVVLTLCSKDMNLVAAVVSPILGTGLAIMSWLVCTKSL

[0839] YKELTVDTTFMDYPMLTGNLVALLSPAIFIPILTYVFKPQNFDWEKMKDITRVDETAELV

[0840] QADPDIQLYDAEANDKEQEEETNSLVSDSEKNDVRVNNEKLIEPNLGVVISNAIFQEDDT

[0841] QLQNELDEEQRELARGLKIAYFLCVFFALAFLVVWPMPMYGSKYIFSKKFFTGWVVVMII

[0842] WLFFSAFAVCIYPLWEGRHGIYTTLRGLYWDLSGQTYKLREWQNSNPQDLHVVTSQISAR

[0843] AHRQSSHFGQVDEII

[0844] SEQ ID NO:43

[0845] YIL088C

[0846] >sp|P40501|AVT7_YEAST液泡氨基酸转运蛋白7 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝AVT7 PE＝1 SV＝1

[0847] MEATSSALSSTANLVKTIVGAGTLAIPYSFKSDGVLVGVILTLLAAVTSGLGLFVLSKCS

[0848] KTLINPRNSSFFTLCMLTYPTLAPIFDLAMIVQCFGVGLSYLVLIGDLFPGLFGGERNYW

[0849] IIASAVIIIPLCLVKKLDQLKYSSILGLFALAYISILVFSHFVFELGKGELTNILRNDIC

[0850] WWKIHDFKGLLSTFSIIIFAFTGSMNLFPMINELKDNSMENITFVINNSISLSTALFLIV

[0851] GLSGYLTFGNETLGNLMLNYDPNSIWIVIGKFCLGSMLILSFPLLFHPLRIAVNNVIIWI

[0852] EITYGGANPEEDPQVSEYTRASNLRPISMTVEDPAQPSDALDATSYNEQECLLPNGNFDN

[0853] GSIESQENNNDERGTMAVAGDNEHHAPFVKSRFYWITALLLISMYTLALSVQSFALVLSF

[0854] VGATGSTSISFTLPGLLGYKLIGLDSLAIGKMIPPKDRFYKRCSLLLVFYGLSVMFLSLY

[0855] VTVFNRSDEA

[0856] SEQ ID NO:44

[0857] YJL093C

[0858] >sp|P40310|TOK1_YEAST外向整流钾通道TOK1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝TOK1 PE＝1 SV＝1

[0859] MTRFMNSFAKQTLGYGNMATVEQESSAQAVDSHSNNTPKQAKGVLAEELKDALRFRDERV

[0860] SIINAEPSSTLFVFWFVVSCYFPVITACLGPVANTISIACVVEKWRSLKNNSVVTNPRSN

[0861] DTDVLMNQVKTVFDPPGIFAVNIISLVLGFTSNIILMLHFSKKLTYLKSQLINITGWTIA

[0862] GGMLLVDVIVCSLNDMPSIYSKTIGFWFACISSGLYLVCTIILTIHFIGYKLGKYPPTFN

[0863] LLPNERSIMAYTVLLSLWLIWGAGMFSGLLHITYGNALYFCTVSLLTVGLGDILPKSVGA

[0864] KIMVLIFSLSGVVLMGLIVFMTRSIIQKSSGPIFFFHRVEKGRSKSWKHYMDSSKNLSER

[0865] EAFDLMKCIRQTASRKQHWFSLSVTIAIFMAFWLLGALVFKFAENWSYFNCIYFCFLCLL

[0866] TIGYGDYAPRTGAGRAFFVIWALGAVPLMGAILSTVGDLLFDISTSLDIKIGESFNNKVK

[0867] SIVFNGRQRALSFMVNTGEIFEESDTADGDLEENTTSSQSSQISEFNDNNSEENDSGVTS

[0868] PPASLQESFSSLSKASSPEGILPLEYVSSAEYALQDSGTCNLRNLQELLKAVKKLHRICL

[0869] ADKDYTLSFSDWSYIHKLHLRNITDIEEYTRGPEFWISPDTPLKFPLNEPHFAFMMLFKN

[0870] IEELVGNLVEDEELYKVISKRKFLGEHRKTL

[0871] SEQ ID NO:45

[0872] YJL094C

[0873] >sp|P40309|KHA1_YEAST K(+)/H(+)反向转运蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝KHA1 PE＝1 SV＝1

[0874] MANTVGGILSGVNPFHYNSSSPLTLFLFQACLILLVCNLIHIPFSMMRQPKVISEVISGV

[0875] ILGPTIFGQIPNYTNTIFPTSSIPGLNLVANLGIILFMFFLGLEVDIAFIKKHLKKALVI

[0876] GIVTLAVPFGFGCLLAIPLFHTYANKTEGERHIKFSVFMVFIAVSISVTAFPVLCRILNE

[0877] LRLIKDRAGIVVLAAGIINDIMGWILLALSIILSSAEGSPVNTVYILLITFAWFLIYFFP

[0878] LKYLLRWVLIRTHELDRSKPSPLATMCILFIMFISAYFTDIIGVHPIFGAFIAGLVVPRD

[0879] DHYVVKLTERMEDIPNIVFIPIYFAVAGLNVDLTLLNEGRDWGYVFATIGIAIFTKIISG

[0880] TLTAKLTGLFWREATAAGVLMSCKGIVEIVVLTVGLNAGIISRKIFGMFVLMALVSTFVT

[0881] TPLTQLVYPDSYRDGVRKSLSTPAEDDGAADGLDSEGVDKTEINTQLNSLADVSKYRIGE

[0882] LTTVINTTEAISPSLKLLNYLSLGVSPKPKNNKHKNETSLSRMTTATDSTLKSNTFKIKK

[0883] MVHIWSKSVDDVDTNLSVIDEKLTPFEGVGALRAIHLRLLTERTTDLLQSSSLYNDDPHF

[0884] TANTDSLLQIFDIFSNLSKIPFSSEVIFSTMREKAANIATMKMDSTDLILLPLKGASYEY

[0885] RGSPVFIDEKYANFDHIYSHLLGLNELSSTFFKSIFQSLKANFAVQISNTYGRLNADRFK

[0886] RKRFNLLLPKPYLTQSDYLGLYLLLLICYRDGYNNDNASCSIFINSKNIDFAKDLSTAFA

[0887] EHDWLNESTIKIVDIPFETKVPEEAIEKPSFIETVLDVGLSDTALADIEETTFIIGEDLP

[0888] DESEPFSEEVRTVIFEGSNRRFDTLIVHHFSSE

[0889] SEQ ID NO:46

[0890] YJL108C

[0891] >sp|P42946|PRM10_YEAST信息素调节的膜蛋白10 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PRM10 PE＝1 SV＝1

[0892] MIVSFGDATTRTSEVQLVRCTQGLNLWKLHQVHAVYKRVVHDTLGADEGNALLDQILADT

[0893] NLYPPWMCVLLYAFCSAMVTPYAFGGDWVNLAISFFMGLCVGSLQFILSQKSYMYSNVFE

[0894] ISASIVVSFCGRAFGSIPRSHICFGAVTQGSLALILPGYIILCGALELQSRSLVAGAVRM

[0895] FYAIIYSLFLGFGITLGSALFGWMYHNATNEISCPQLISPWFRFLFVPAFTISISLLNQA

[0896] HISQLPVMVFISCTGYVVTYWAGKHFANSTEFTAALAAFVIGVLGNLYSRIWKGLAVSAM

[0897] LPAIFVQVPSGIASQNSLLSGLQSANTIVNANETITTSTSDPSSSMSFGMTMIQVCVGIS

[0898] VGLFASSLFVYPFGKKKTGLFSL

[0899] SEQ ID NO:47

[0900] YJL212C

[0901] >sp|P40897|OPT1_YEAST寡肽转运蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝OPT1 PE＝1 SV＝1

[0902] MSTIYRESDSLESEPSPTPTTIPIQINMEEEKKDAFVKNIDEDVNNLTATTDEEDRDPES

[0903] QKFDRHSIQEEGLVWKGDPTYLPNSPYPEVRSAVSIEDDPTIRLNHWRTWFLTTVFVVVF

[0904] AGVNQFFSLRYPSLEINFLVAQVVCYPIGRILALLPDWKCSKVPFFDLNPGPFTKKEHAV

[0905] VTIAVALTSSTAYAMYILNAQGSFYNMKLNVGYQFLLVWTSQMIGYGAAGLTRRWVVNPA

[0906] SSIWPQTLISVSLFDSLHSRKVEKTVANGWTMPRYRFFLIVLIGSFIWYWVPGFLFTGLS

[0907] YFNVILWGSKTRHNFIANTIFGTQSGLGALPITFDYTQVSQAMSGSVFATPFYVSANTYA

[0908] SVLIFFVIVLPCLYFTNTWYAKYMPVISGSTYDNTQNKYNVTKILNEDYSINLEKYKEYS

[0909] PVFVPFSYLLSYALNFAAVIAVFVHCILYHGKDIVAKFKDRKNGGTDIHMRIYSKNYKDC

[0910] PDWWYLLLQIVMIGLGFVAVCCFDTKFPAWAFVIAILISLVNFIPQGILEAMTNQHVGLN

[0911] IITELICGYMLPLRPMANLLFKLYGFIVMRQGLNLSRDLKLAMYMKVSPRLIFAVQIYAT

[0912] IISGMVNVGVQEWMMHNIDGLCTTDQPNGFTCANGRTVFNASIIWSLPKYLFSSGRIYNP

[0913] LMWFFLIGLLFPLAVYAVQWKFPKFKFAKHIHTPVFFTGPGNIPPSTPYNYSLFFAMSFC

[0914] LNLIRKRWRAWFNKYNFVMGAGVEAGVAISVVIIFLCVQYPGGKLSWWGNNVWKRTYDND

[0915] YKKFYTLKKGETFGYDKWW

[0916] SEQ ID NO:48

[0917] YJR106W

[0918] >sp|P47144|ECM27_YEAST蛋白ECM27 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ECM27 PE＝1 SV＝2

[0919] MDWAINVAHPRLLYKDPKLSVTFIVPSLFHIIIAFVLLGICASDFLCPNVAHISDPNSLR

[0920] SNGSLVSKTASHASHTGALMAVLLSWCNSSPDLFSNLMSWATSTRETRSTSVSLSIGEVL

[0921] GACGIILCIVEGSIFIIMSRTHIEISQIQKLSIMRDLLFSLAAMCVMSYVSLMNQVTVLN

[0922] CLLMAFLYAFYLVVKLTFKLNHSAETPDETAADTSLRENSVSPFLDDSLMASGLLPPIQP

[0923] GFDISNSITHGIKPSLLSAMDFNSFLSMLENSSLEEDDSRNEMAELNTLRSMTPGQHWSA

[0924] SATVAGEATSAGRPFSEPTNAFTEYRDSERAINSSPAVFAPYRDNPDDEESQEQVLLETT

[0925] THGHFGAQEMRRFSKRSLGWIIKIFIPHLSNFSQKSISDAIFSIITVPFFIIFKLSCPQP

[0926] PSDILSYDPTLNRYSLTTLPIILLFIQSITAPFLLCSILSVLLTYHLGYLVYLFPLILAM

[0927] ALILLLTAFITKVNLHNKFTLSLDSSNILQEKLQKRKLLERLNTSIQIIFLAIGIINIII

[0928] WISLLANSLIEMMEIYQKILGLSKAILGLTIFAWGNSVGDLISNISMCRLYKTQTHYQDR

[0929] VRLATKFFMISCASCLGGVMLNSMGGIGFSGLVSMLFIGAFNDNEWWFLRKVKLQETSQL

[0930] DNTLNYKFIVSCVFIILQIILLLLFFGGPNNIKRRLTKEMKLVGISMCGLWALATLINIL

[0931] LELFS

[0932] SEQ ID NO:49

[0933] YJR160C

[0934] >sp|P0CE00|MPH3_YEAST α葡糖苷通透酶MPH3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MPH3 PE＝1 SV＝1

[0935] MKNLSFLINRRKENTSDSNVYPGKAKSHEPSWIEMDDQTKKDGLDIVHVEFSPDTRAPSD

[0936] SNKVITEIFDATEDAKEADESERGMPLATALNTYPKAAAWSLLVSTTLIMEGYDTAILGA

[0937] FYALPIFQRKFGSQNDKTGEWEISASWQIGLTLCYMAGEIVGLQLTGPSVDLVGNRYTLI

[0938] IALFFLAAFTFILYFCNSLGMIAVGQALCGMPWGCFQCLTVSYASEICPLALRYYLTTYS

[0939] NLCWLFGQLFAAGIMKNSQKKYADSELGYKLPFALQWILPVPLALGIFFAPESPWWLVKK

[0940] GRFDEARRSLRRTLSGKGPEKEILVTLEVDKIKVTIDKEKRLTSKEGSYSDCFEDKINRR

[0941] RTRITCLCWAGQATCGSILIGYSTYFYEKAGVSTEMSFTFSIIQYCLGICATFLSWWASK

[0942] YFGRYDLYAFGLAFQTIVFFIIGGLGCSSTHGSKMGSGSLLMAVAFFYNLGIAPVVFCLV

[0943] SEMPSSRLRTKTIILARNTYNVVSIICSVLILYQLNSKKWNWGAKSGFFWGVLCFCTLIW

[0944] AVVDLPETAGKTFVEINELFKLGVSARKFKSTKVDPFVVKTPPKDVSHNDPKGDIEASIA

[0945] EE

[0946] SEQ ID NO:50

[0947] YKL064W

[0948] >sp|P35724|MNR2_YEAST锰抗性蛋白MNR2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MNR2 PE＝1 SV＝1

[0949] MSTDNSQKDEGVPLLSPYSSSPQLRKKKRNQKRRKDKFVGHLKSDSRRPTQLLHDNLQHN

[0950] HGQITDFDQIDSWGMLHESDSTSNDIIKSEDPSLKGAFIDHRPSMSQPREGPQSVSSTVQ

[0951] PQPIMKFSTPSYKKPAGLRPSDQNRSLVSDLSPSELESWLKRRKSVHKSFVDENSPTDRR

[0952] QSNANNDVVIDVDALMNHVNNNASTGVNDNSKRRKKKRGSDDSSNKNSKSTSSDSNDEED

[0953] EYNSRPSSSLSSNNSSLDDVCLVLDDEGSEVPKAWPDCTVLEEFSKEETERLRSQAIQDA

[0954] EAFHFQYDEDEEDGTSNEDGILFSKPIVTNIDVPELGNRRVNETENLKNGRLRPKRIAPW

[0955] HLIQRPMVLGSNSTKDSKSRIQSGLQDNLLVGRNIQYPPHIISNNPEHFRFTYFRVDLDS

[0956] TVHSPTISGLLQPGQKFQDLFVASIYSQDNSAGHIKTHPNSPTPGIKAETVSQLQGLTAK

[0957] NPSTLSSMSVANIEDVPPFWLDVSNPTEEEMKILSKAFGIHPLTTEDIFLGEVREKVELF

[0958] RDYYLICFRSFDIVAEKHVRRRRKEKQESATLDHESISRRKSQAYGATMSNESNANNNNS

[0959] TSNASRSKWLPSILRARRRSSANRTTNTSSSSYKRRVKSEKKKMEENEKFKRKSGDRHKP

[0960] REGELEPLNVYIIVFRTGVLTFHFAPTPHPINVRRRARLLKDYLNVTSDWIAYALIDDIT

[0961] DAFAPMIELIEDEVYEIEDAILKMHQSDDSSDSDSSDSDSDSGASDEDAFPFDVYSKKTS

[0962] YSSAKSSVSSRSMSTSEASFNANLIGWKRKGDMLRRIGECRKRVMSILRLLGSKADVIKG

[0963] FAKRYNEQWEASPQSEIAMYLGDIQDHIVTMVSSLNHYEKLLSRSHSNYLAQINIDMTKV

[0964] NNDMNDVLGKITILGTIVLPMNVITGLWGMNVIVPGQYRDSLTWFIGIVLFMCMLACSAY

[0965] MYTKRRFGF

[0966] SEQ ID NO:51

[0967] YKR050W

[0968] >sp|P28584|TRK2_YEAST低亲和力钾转运蛋白OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝TRK2 PE＝1 SV＝1

[0969] MPTAKRTSSRASLALPFQLRLVHKKSWGHRLRDFISGFLKSCRPIAKYVFPNFIVVHYIY

[0970] LITLSIIGSILLYPCKNTAFIDVLFLAAGASTQGGLATKSTNDFNLYQQIVVYVITLLST

[0971] PILIHGFLAFVRLYWFERYFDNIRDISKQNFKLRRTMTLQQRELSGSSGNAARSRSFKDN

[0972] LFRGKFVSREDPRQSASDVPMDSPDTSALSSISPLNVSSSKEESSDTQSSPPNFSSKRQP

[0973] SDVDPRDIYKSIMMLQKQQEKSNANSTDSFSSETNGPAFIVQERHERRAPHCSLKRHSVL

[0974] PSSQELNKLAQTKSFQKLLGLRRDEGDHDYFDGAPHKYMVTKKKKISRTQSCNIPTYTAS

[0975] PSPKTSGQVVENHRNLAKSAPSSFVDEEMSFSPQESLNLQFQAHPPKPKRREGDIGHPFT

[0976] RTMSTNYLSWQPTFGRNSVFIGLTKQQKEELGGVEYRALRLLCCILMVYYIGFNILAFVT

[0977] IVPWACTRHHYSEIIRRNGVSPTWWGFFTAMSAFSNLGLSLTADSMVSFDTAPYPLIFMM

[0978] FFIIIGNTGFPIMLRFIIWIMFKTSRDLSQFKESLGFLLDHPRRCFTLLFPSGPTWWLFT

[0979] TLVVLNATDWILFIILDFNSAVVRQVAKGYRALMGLFQSVCTRTAGFNVVDLSKLHPSIQ

[0980] VSYMLMMYVSVLPLAISIRRTNVYEEQSLGLYDSGQDDENITHEDDIKETDHDGESEERD

[0981] TVSTKSKPKKQSPKSFVGAHLRRQLSFDLWYLFLGLFIICICEGRKIEDVNKPDFNVFAI

[0982] LFEVVSAYGTVGLSLGYPNTNTSLSAQFTVLSKLVIIAMLIRGRNRGLPYTLDRAIMLPS

[0983] DKLEQIDRLQDMKAKGKLLAKVGEDPMTTYVKKRSHKLKKIATKFWGKH

[0984] SEQ ID NO:52

[0985] YKR105C

[0986] >sp|P36172|VBA5_YEAST液泡碱性氨基酸转运蛋白5OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VBA5 PE＝3 SV＝1

[0987] MEETKYSSQQEIEGACGSDASLNARGSNDSPMGLSLYLCLASLTLVLFITALDILIVGTI

[0988] IDVVAEQFGNYSKTGWLVTGYSLPNAILSLIWGRFASIIGFQHSLILAILIFEAGSLIAA

[0989] LASSMNMLIFGRVVAGVGGSGLQTLCFVIGCTMVGERSRPLVISILSCAFAVAAIVGPII

[0990] GGAFTTHVTWRWCFYINLPIGGLAIIMFLLTYKAENKGILQQIKDAIGTISSFTFSKFRH

[0991] QVNFKRLMNGIIFKFDFFGFALCSAGLVLFLLGLTFGGNKYSWNSGQVITYLVLGVLLFI

[0992] FSLVYDFFLFDKFNPEPDNISYRPLLLRRLVAKPAIIIVNMVTFLLCTGYNGQMIYSVQF

[0993] FQLIFASSAWKAGLHLIPIVITNVIAAIASGVITKKLGLVKPLLIFGGVLGVIGAGLMTL

[0994] MTNTSTKSTQIGVLLLPGFSLGFALQASLMSAQLQITKDRPEAAMDFIEVTAFNTFMKSL

[0995] GTTLGGVLSTTVFSASFHNKVSRAHLEPYEGKTVDDMILYRLQNYDGSHSTIGNILSDSI

[0996] KNVFWMDLGFYALGFLFCSFSSNKKLIIPKKDDTPEDNLEDK

[0997] SEQ ID NO:53

[0998] YKR106W

[0999] >sp|P36173|GEX2_YEAST谷胱甘肽交换蛋白(exchanger)2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝GEX2 PE＝1 SV＝1

[1000] MSSSVVGASSNKKSGIRQSCEIIERERHSNDDTYSMTSTFFKLKENEIMSAQFDSLKYKI

[1001] LLISTAFVCGFGISLDYTLRSTYTGYATNSYSEHSLLSTVQVINAVVSVGSQVVYSRLSD

[1002] HFGRLRLFLVATIFYIMGTIIQSQATRLTMYAAGSVFYNCGYVGTNLLLTLILSDFSSLK

[1003] WRMFYQYASYWPYIIIPWISGNIITAANPQKNWSWNIAMWAFIYPLSTLPIIFLILYMKY

[1004] KSSKTAEWRSLKEQARKERTGGLFENLVFLFWKLDIVGILLITVSLGCILVPLTLANETS

[1005] QKWHNSKIIATLVSGGCLFFIFLYWEAKFAKSPLLPFKLLSDRGIWAPLGVTFFNFFTFF

[1006] ISCDYLYPVLLVSMKESSTSAARIVNLPDFVAATASPFYSLLVAKTRKLKLSVIGGCAAW

[1007] MVCMGLFYKYRGGSGSHEGVIAASVIMGLSGLLCSNSVIVILQAMTTHSRMAVITGIQYT

[1008] FSKLGAAIGASVSGAIWTQTMPNQLYKNLGNDTLAEIAYASPYTFISDYPWGSPERDAVV

[1009] ESYRYVQRIIMTVGLACTVPFFTFTMFMRNPELIDKATHEEFTEDGLVVLPDEENIFSQI

[1010] KALFRHNRSNKKSGC

[1011] SEQ ID NO:54

[1012] YLR447C

[1013] >sp|P32366|VA0D_YEAST V型质子ATP酶亚基d OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VMA6 PE＝1 SV＝2

[1014] MEGVYFNIDNGFIEGVVRGYRNGLLSNNQYINLTQCDTLEDLKLQLSSTDYGNFLSSVSS

[1015] ESLTTSLIQEYASSKLYHEFNYIRDQSSGSTRKFMDYITYGYMIDNVALMITGTIHDRDK

[1016] GEILQRCHPLGWFDTLPTLSVATDLESLYETVLVDTPLAPYFKNCFDTAEELDDMNIEII

[1017] RNKLYKAYLEDFYNFVTEEIPEPAKECMQTLLGFEADRRSINIALNSLQSSDIDPDLKSD

[1018] LLPNIGKLYPLATFHLAQAQDFEGVRAALANVYEYRGFLETGNLEDHFYQLEMELCRDAF

[1019] TQQFAISTVWAWMKSKEQEVRNITWIAECIAQNQRERINNYISVY

[1020] SEQ ID NO:55

[1021] YML116W

[1022] >sp|P13090|ATR1_YEAST氨基三唑耐药蛋白OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ATR1 PE＝1 SV＝2

[1023] MGNQSLVVLTESKGEYENETELPVKKSSRDNNIGESLTATAFTQSEDEMVDSNQKWQNPN

[1024] YFKYAWQEYLFIFTCMISQLLNQAGTTQTLSIMNILSDSFGSEGNSKSWLMASFPLVSGS

[1025] FILISGRLGDIYGLKKMLLVGYVLVIIWSLICGITKYSGSDTFFIISRAFQGLGIAFVLP

[1026] NVLGIIGNIYVGGTFRKNIVISFVGAMAPIGATLGCLFAGLIGTEDPKQWPWAFYAYSIA

[1027] AFINFVLSIYAIPSTIPTNIHHFSMDWIGSVLGVIGLILLNFVWNQAPISGWNQAYIIVI

[1028] LIISVIFLVVFIIYEIRFAKTPLLPRAVIKDRHMIQIMLALFFGWGSFGIFTFYYFQFQL

[1029] NIRQYTALWAGGTYFMFLIWGIIAALLVGFTIKNVSPSVFLFFSMVAFNVGSIMASVTPV

[1030] HETYFRTQLGTMIILSFGMDLSFPASSIIFSDNLPMEYQGMAGSLVNTVVNYSMSLCLGM

[1031] GATVETQVNSDGKHLLKGYRGAQYLGIGLASLACMISGLYMVESFIKGRRARAAAEYDCT

[1032] VA

[1033] SEQ ID NO:56

[1034] YMR034C

[1035] >sp|Q05131|YMS4_YEAST未表征的膜蛋白YMR034C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YMR034C PE＝1 SV＝1

[1036] MKTQYSLIRKIWAHSVTEFLKSQWFFICLAILIVIARFAPNFARDGGLIKGQYSIGYGCV

[1037] AWIFLQSGLGMKSRSLMANMLNWRAHATILVLSFLITSSIVYGFCCAVKAANDPKIDDWV

[1038] LIGLILTATCPTTVASNVIMTTNAGGNSLLCVCEVFIGNLLGAFITPALVQMFTNRAPFA

[1039] YGNPATGNGIGALYGRVMKQVGLSVFVPLFVGQVIQNCFPKGTAYYLGFLKKYHIKIGSY

[1040] MLLLIMFSSFSTAFYQDAFTSVSHVCIIFLCFFNLGIYIFFTGLSYLCARPWFILKLFPH

[1041] EPIEGKSTRLYRYSYNIFRPFYYSKEDAICIMFCGPAKTAALGVSLITSQYGDKKEHLGK

[1042] LLVPLVLYQVEQVMTANFFVSLFKRWIQKDAQADGSESSCANENEEVDLEKIISIGTGEN

[1043] QSVLSNNVPYTQPR

[1044] SEQ ID NO:57

[1045] YMR056C

[1046] >sp|P04710|ADT1_YEAST ADP,ATP运载蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝AAC1 PE＝1 SV＝1

[1047] MSHTETQTQQSHFGVDFLMGGVSAAIAKTGAAPIERVKLLMQNQEEMLKQGSLDTRYKGI

[1048] LDCFKRTATHEGIVSFWRGNTANVLRYFPTQALNFAFKDKIKSLLSYDRERDGYAKWFAG

[1049] NLFSGGAAGGLSLLFVYSLDYARTRLAADARGSKSTSQRQFNGLLDVYKKTLKTDGLLGL

[1050] YRGFVPSVLGIIVYRGLYFGLYDSFKPVLLTGALEGSFVASFLLGWVITMGASTASYPLD

[1051] TVRRRMMMTSGQTIKYDGALDCLRKIVQKEGAYSLFKGCGANIFRGVAAAGVISLYDQLQ

[1052] LIMFGKKFK

[1053] SEQ ID NO:58

[1054] YMR253C

[1055] >sp|Q04835|YM87_YEAST未表征的膜蛋白YMR253C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YMR253C PE＝1 SV＝1

[1056] MNPSVPKVMKRENNTHLLVSKEMNDTSLQLPSTTRSLSPKESNSNEDFNVDGNETTLQRI

[1057] SKDYLKPNIGLVLLTVSYFFNSAMVVSTKVLENDPDDIANDRQIKPLQILLVRMVITYIG

[1058] TLIYMYINKSTISDVPFGKPEVRKWLVLRGCTGFFGVFGMYYSLMYLTISDAVLITFLAP

[1059] SLTIFLSWVILRERFTKVEALGSLISLLGVVLIVRPSFLFGTPELTDSSSQIVESSDPKS

[1060] RLIATLVGLWGVLGMSCVYIIIRYIGKRAHAIMSVSYFSLITAIVSFIGINTIPSMKFQI

[1061] PHSKKQWILFGNLGVSGFIFQLLLTMGIQRERAGRGSLMTYTQLLYAVFWDVALYKHWPN

[1062] IWSWIGMIIIISATLWVIRIRAANNETTAKDLTPIIDDEENSIPLTEFDLSDSK

[1063] SEQ ID NO:59

[1064] YNL065W

[1065] >sp|P53943|AQR1_YEAST可能的转运蛋白AQR1 OS＝酿酒酵母(菌株ATCC 204508/

S288c)GN＝AQR1 PE＝1 SV＝1

[1066] MSRSNSIYTEDIEMYPTHNEQHLTREYTKPDGQTKSEKLNFEGAYINSHGTLSKTTTREI

[1067] EGDLDSETSSHSSDDKVDPTQQITAETKAPYTLLSYGQKWGMVAILTMCGFWSSLGSPIY

[1068] YPALRQLEKQFNVDENMVNVTVVVYLLFQGISPTVSGGLADCFGRRPIILAGMLIYVIAS

[1069] IGLACAPSYGVIIFLRCIQSIGISPTIAISSGVVGDFTLKHERGTFVGATSGFVLLGQCF

[1070] GSLIGAVLTARWDWRAIFWFLTIGCGSCFLIAFLILPETKRTIAGNLSIKPKRFINRAPI

[1071] FLLGPVRRRFKYDNPDYETLDPTIPKLDLSSAGKILVLPEIILSLFPSGLLFAMWTLMLS

[1072] SISSGLSVAPYNYHLVIIGVCYLPGGIGGLMGSFFTGRIIDMYFKRKIKKFEQDKANGLI

[1073] PQDAEINMFKVRLVCLLPQNFLAVVAYLLFGWSIDKGWRIESILITSFVCSYCAMSTLST

[1074] STTLLVDLYPTKSSTASSCFNFVRCSLSTIFMGCFAKMKAAMTVGGTFTFLCALVFFFNF

[1075] LMFIPMKYGMKWREDRLLKQQRQSWLNTLAVKAKKGTKRDQNDNHN

[1076] SEQ ID NO:60

[1077] YNL070W

[1078] >sp|P53507|TOM7_YEAST线粒体输入受体亚基TOM7 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝TOM7 PE＝1 SV＝2

[1079] MSFLPSFILSDESKERISKILTLTHNVAHYGWIPFVLYLGWAHTSNRPNFLNLLSPLPSV

[1080] SEQ ID NO:61

[1081] YNL083W

[1082] >sp|D6W196|CMC1_YEAST截短的非功能性钙结合线粒体运载体SAL1-1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SAL1 PE＝1SV＝2

[1083] MLLKNCETDKQRDIRYACLFKELDVKGNGQVTLDNLISAFEKNDHPLKGNDEAIKMLFTA

[1084] MDVNKDSVVDLSDFKKYASNAESQIWNGFQRIDLDHDGKIGINEINRYLSDLDNQSICNN

[1085] ELNHELSNEKVNKFSRFFEWAFPKRKANIALRGQASHKKNTDNDRSKKTTDSDLYVTYDQ

[1086] WRDFLLLVPRKQGSRLHTAYSYFYLFNEDVDLSSEGDVTLINDFIRGFGFFIAGGISGVI

[1087] SRTCTAPFDRLKVFLIARTDLSSILLNSKTDLLAKNPNADINKISSPLAKAVKSLYRQGG

[1088] IKAFYVGNGLNVIKVFPESSIKFGSFEVTKKIMTKLEGCRDTKDLSKFSTYIAGGLAGMA

[1089] AQFSVYPIDTLKFRVQCAPLDTKLKGNNLLFQTAKDMFREGGGQIILQRCHSRYSGHISL

[1090] CCIRFGDFFCLKKMVYCQTGKDPEPTTRSGHSKQPGCTSNGCIQWNCRSFCCLSNQSFKN

[1091] KTTSPRNICTSLCV

[1092] SEQ ID NO:62

[1093] YNL095C

[1094] >sp|P53932|YNJ5_YEAST未表征的转运蛋白YNL095C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YNL095C PE＝1 SV＝1

[1095] MVHITLGQAIWVSVKPIIKIYLIIGVGFLMAKMGILTVEATRIISDIVLTVLLPSLSFNK

[1096] IVANIEDKDIKSVGIICLSALLIFGSGFFFAYVVRLFLPVPKQWYGGILAGGMFPNISDL

[1097] PIAYLQSMDQGLVFSEEEGNKGVANVIIFLTMFLICIFNLGGFRLIESDFEYNDDESAVR

[1098] VSETTKTQPAVSANTTNTDTSERFFSNEQQLFNNKYTARDSLTEAIGTKGENADVPPISR

[1099] RSTNSIAPLSLPDTSSNSKITKPVQVKARNTIACTQSEESQATRGSNPLDSQSSASTIHS

[1100] YNTSESYESSIDTMRARRTASQPRAYNTTTLLEENCLDEKCPKNMSMAALEPIRSIDMRA

[1101] LPSQNIHHLIREYSNVDQYGHQRRNSSLRGADMNDVHSISSNSTLQTIKTANLTRILTSD

[1102] ATVSKKDIETSGESLPQWMRKFSLTPLLVFFLKNCLRPCSMAVIIALTVAFIPWVKALFV

[1103] TTANTPHISQAPDNAPPLSFFMDFTGYVGAACVPFGLILLGATLGRLKIGNLYPGFWKAA

[1104] VTLVILRQCVMPIFGVLWCDRLVKAGWVNWQDDRMLLFVIAISWNLPTMTTLIYFTASFT

[1105] PPETTAPIQMECVSFFLMLQYPLMVVSLPFLVSYFLKVQMNL

[1106] SEQ ID NO:63

[1107] YNL121C

[1108] >sp|P07213|TOM70_YEAST线粒体输入受体亚基TOM70 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝TOM70 PE＝1 SV＝2

[1109] MKSFITRNKTAILATVAATGTAIGAYYYYNQLQQQQQQRGKKNTINKDEKKDTKDSQKETE

[1110] GAKKSTAPSNPPIYPVSSNGEPDFSNKANFTAEEKDKYALALKDKGNQFFRNKKYDDAIK

[1111] YYNWALELKEDPVFYSNLSACYVSVGDLKKVVEMSTKALELKPDYSKVLLRRASANEGLG

[1112] KFADAMFDLSVLSLNGDFNDASIEPMLERNLNKQAMSKLKEKFGDIDTATATPTELSTQP

[1113] AKERKDKQENLPSVTSMASFFGIFKPELTFANYDESNEADKELMNGLSNLYKRSPESYDK

[1114] ADESFTKAARLFEEQLDKNNEDEKLKEKLAISLEHTGIFKFLKNDPLGAHEDIKKAIELF

[1115] PRVNSYIYMALIMADRNDSTEYYNYFDKALKLDSNNSSVYYHRGQMNFILQNYDQAGKDF

[1116] DKAKELDPENIFPYIQLACLAYRENKFDDCETLFSEAKRKFPEAPEVPNFFAEILTDKND

[1117] FDKALKQYDLAIELENKLDGIYVGIAPLVGKATLLTRNPTVENFIEATNLLEKASKLDPR

[1118] SEQAKIGLAQMKLQQEDIDEAITLFEESADLARTMEEKLQAITFAEAAKVQQRIRSDPVL

[1119] AKKIQETLAKLREQGLM

[1120] SEQ ID NO:64

[1121] YNL142W

[1122] >sp|P41948|MEP2_YEAST铵转运蛋白MEP2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MEP2 PE＝1 SV＝1

[1123] MSYNFTGTPTGEGTGGNSLTTDLNTQFDLANMGWIGVASAGVWIMVPGIGLLYSGLSRKK

[1124] HALSLLWASMMASAVCIFQWFFWGYSLAFSHNTRGNGFIGTLEFFGFRNVLGAPSSVSSL

[1125] PDILFAVYQGMFAAVTGALMLGGACERARLFPMMVFLFLWMTIVYCPIACWVWNAEGWLV

[1126] KLGSLDYAGGLCVHLTSGHGGLVYALILGKRNDPVTRKGMPKYKPHSVTSVVLGTVFLWF

[1127] GWMFFNGGSAGNATIRAWYSIMSTNLAAACGGLTWMVIDYFRCGRKWTTVGLCSGIIAGL

[1128] VGITPAAGFVPIWSAVVIGVVTGAGCNLAVDLKSLLRIDDGLDCYSIHGVGGCIGSVLTG

[1129] IFAADYVNATAGSYISPIDGGWINHHYKQVGYQLAGICAALAWTVTVTSILLLTMNAIPF

[1130] LKLRLSADEEELGTDAAQIGEFTYEESTAYIPEPIRSKTSAQMPPPHENIDDKIVGNTDA

[1131] EKNSTPSDASSTKNTDHIV

[1132] SEQ ID NO:65

[1133] YOL020W

[1134] >sp|P38967|TAT2_YEAST色氨酸通透酶OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝TAT2 PE＝1 SV＝1

[1135] MTEDFISSVKRSNEELKERKSNFGFVEYKSKQLTSSSSHNSNSSHHDDDNQHGKRNIFQR

[1136] CVDSFKSPLDGSFDTSNLKRTLKPRHLIMIAIGGSIGTGLFVGSGKAIAEGGPLGVVIGW

[1137] AIAGSQIIGTIHGLGEITVRFPVVGAFANYGTRFLDPSISFVVSTIYVLQWFFVLPLEII

[1138] AAAMTVQYWNSSIDPVIWVAIFYAVIVSINLFGVRGFGEAEFAFSTIKAITVCGFIILCV

[1139] VLICGGGPDHEFIGAKYWHDPGCLANGFPGVLSVLVVASYSLGGIEMTCLASGETDPKGL

[1140] PSAIKQVFWRILFFFLISLTLVGFLVPYTNQNLLGGSSVDNSPFVIAIKLHHIKALPSIV

[1141] NAVILISVLSVGNSCIFASSRTLCSMAHQGLIPWWFGYIDRAGRPLVGIMANSLFGLLAF

[1142] LVKSGSMSEVFNWLMAIAGLATCIVWLSINLSHIRFRLAMKAQGKSLDELEFVSAVGIWG

[1143] SAYSALINCLILIAQFYCSLWPIGGWTSGKERAKIFFQNYLCALIMLFIFIVHKIYYKCQ

[1144] TGKWWGVKALKDIDLETDRKDIDIEIVKQEIAEKKMYLDSRPWYVRQFHFWC

[1145] SEQ ID NO:66

[1146] YOL075C

[1147] >sp|Q08234|Y0075_YEAST未表征的ABC转运蛋白ATP结合蛋白/通透酶YOL075C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YOL075C PE＝1 SV＝3

[1148] MSQQENGDVATELIENRLSFSRIPRISLHVRDLSIVASKTNTTLVNTFSMDLPSGSVMAV

[1149] MGGSGSGKTTLLNVLASKISGGLTHNGSIRYVLEDTGSEPNETEPKRAHLDGQDHPIQKH

[1150] VIMAYLPQQDVLSPRLTCRETLKFAADLKLNSSERTKKLMVEQLIEELGLKDCADTLVGD

[1151] NSHRGLSGGEKRRLSIGTQMISNPSIMFLDEPTTGLDAYSAFLVIKTLKKLAKEDGRTFI

[1152] MSIHQPRSDILFLLDQVCILSKGNVVYCDKMDNTIPYFESIGYHVPQLVNPADYFIDLSS

[1153] VDSRSDKEEAATQSRLNSLIDHWHDYERTHLQLQAESYISNATEIQIQNMTTRLPFWKQV

[1154] TVLTRRNFKLNFSDYVTLISTFAEPLIIGTVCGWIYYKPDKSSIGGLRTTTACLYASTIL

[1155] QCYLYLLFDTYRLCEQDIALYDRERAEGSVTPLAFIVARKISLFLSDDFAMTMIFVSITY

[1156] FMFGLEADARKFFYQFAVVFLCQLSCSGLSMLSVAVSRDFSKASLVGNMTFTVLSMGCGF

[1157] FVNAKVMPVYVRWIKYIAFTWYSFGTLMSSTFTNSYCTTDNLDECLGNQILEVYGFPRNW

[1158] ITVPAVVLLCWSVGYFVVGAIILYLHKIDITLQNEVKSKQKKIKKKSPTGMKPEIQLLDD

[1159] VYHQKDLEAEKGKNIHITIKLEDIDLRVIFSAPFSNWKEGNFHHETKEILQSVNAIFKPG

[1160] MINAIMGPSGSGKSSLLNLISGRLKSSVFAKFDTSGSIMFNDIQVSELMFKNVCSYVSQD

[1161] DDHLLAALTVKETLKYAAALRLHHLTEAERMERTDNLIRSLGLKHCENNIIGNEFVKGIS

[1162] GGEKRRVTMGVQLLNDPPILLLDEPTSGLDSFTSATILEILEKLCREQGKTIIITIHQPR

[1163] SELFKRFGNVLLLAKSGRTAFNGSPDEMIAYFTELGYNCPSFTNVADFFLDLISVNTQNE

[1164] QNEISSRARVEKILSAWKANMDNESLSPTPISEKQQYSQESFFTEYSEFVRKPANLVLAY

[1165] IVNVKRQFTTTRRSFDSLMARIAQIPGLGVIFALFFAPVKHNYTSISNRLGLAQESTALY

[1166] FVGMLGNLACYPTERDYFYEEYNDNVYGIAPFFLAYMTLELPLSALASVLYAVFTVLACG

[1167] LPRTAGNFFATVYCSFIVTCCGEALGIMTNTFFERPGFVVNCISIILSIGTQMSGLMSLG

[1168] MSRVLKGFNYLNPVGYTSMIIINFAFPGNLKLTCEDGGKNSDGTCEFANGHDVLVSYGLV

[1169] RNTQKYLGIIVCVAIIYRLIAFFILKAKLEWIKW

[1170] SEQ ID NO:67

[1171] YOL077W-A

[1172] >sp|P81451|ATP19_YEAST ATP合酶亚基K,线粒体OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ATP19 PE＝1 SV＝1

[1173] MGAAYHFMGKAIPPHQLAIGTLGLLGLLVVPNPFKSAKPKTVDIKTDNKDEEKFIENYLK

[1174] KHSEKQDA

[1175] SEQ ID NO:68

[1176] YOL122C

[1177] >sp|P38925|SMF1_YEAST锰转运蛋白SMF1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SMF1 PE＝1 SV＝2

[1178] MVNVGPSHAAVAVDASEARKRNISEEVFELRDKKDSTVVIEGEAPVRTFTSSSSNHERED

[1179] TYVSKRQVMRDIFAKYLKFIGPGLMVSVAYIDPGNYSTAVDAGASNQFSLLCIILLSNFI

[1180] AIFLQCLCIKLGSVTGLDLSRACREYLPRWLNWTLYFFAECAVIATDIAEVIGTAIALNI

[1181] LIKVPLPAGVAITVVDVFLIMFTYKPGASSIRFIRIFECFVAVLVVGVCICFAIELAYIP

[1182] KSTSVKQVFRGFVPSAQMFDHNGIYTAISILGATVMPHSLFLGSALVQPRLLDYDVKHGN

[1183] YTVSEEQDKVKKSKSTEEIMEEKYFNYRPTNAAIKYCMKYSMVELSITLFTLALFVNCAI

[1184] LVVAGSTLYNSPEADGADLFTIHELLSRNLAPAAGTIFMLALLLSGQSAGVVCTMSGQIV

[1185] SEGHINWKLQPWQRRLATRCISIIPCLVISICIGREALSKALNASQVVLSIVLPFLVAPL

[1186] IFFTCKKSIMKTEITVDHTEEDSHNHQNNNDRSAGSVIEQDGSSGMEIENGKDVKIVYMA

[1187] NNWIITVIAIIVWLFLSLLNVYAIVQLGMSHGDIS

[1188] SEQ ID NO:69

[1189] YOR079C

[1190] >sp|Q12067|ATX2_YEAST金属稳态因子ATX2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ATX2 PE＝1 SV＝1

[1191] MKFLGVILLASFLLIATFLIGLIPLYYIDKQKSSIVTNQEGADSISDFTTNADTQTINDD

[1192] VSSYRVKIAVLSQFGIGMLLGTSFMLVIPEGIKACVEHDGNVGVNLLIGFLGVYVLDRLV

[1193] TLWVSRKQTVYTHDAVKFQSWKDIINHPRQIWMNLIQNNVVFALFIHGLSDGIALGTTTN

[1194] NDSLLIVVLIAIVIHKIPAVLSLTSLMVSRQNLMKWEVICNVFLFASSTPIGYIVLSLLN

[1195] LSHSPTMDWISGNLLLMSGGSLLYASFTAFVGGDSHDHDLSVEQEVVLPHDESVYVLIGV

[1196] CIPLVISYCISEE

[1197] SEQ ID NO:70

[1198] YOR087W

[1199] >sp|Q12324|YVC1_YEAST钙通道YVC1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YVC1 PE＝1 SV＝2

[1200] MVSANGDLHLPISNEQCMPENNGSLGFEAPTPRQILRVTLNLKYLIDKVVPIVYDPNDIV

[1201] CDHSEILSPKVVKLAYEACGGNPKDKANKRKYQSVIIFSLLKVCEWYSILATMEVHNAKL

[1202] YETRNLASQQLCKLLIEREETRDLQFLFMQLLLRRYVINENDEDQEPLNALELATDMHCT

[1203] TVIGSSGFQRCLKWIWRGWIVQNGLDPTTFIKDDSLAEVSLISHFNPVRLKAPVYQNYLQ

[1204] MIFSFLFLGLYTLVVNGKDSERVQSFDLLESIFYVFNTGFILDELTKLYYIGYAHLSFWN

[1205] LFNDTTYLIITFAMGFRAMSVTPLNAKYSSEDWDKISYRVLSCAAPFVWSRLLLYLESQR

[1206] FIGIMLVILKHMMKESIVFFFLLFLIMIGFTQGFLGLDSADGKRDITGPILGNLTITVLG

[1207] LGSFDVFEEFAPPYAAILYYGYYFIVSVILLNILIALYSTAYQKVIDNADDEYMALMSQK

[1208] TLRYIRAPDEDVYVSPLNLIEVFMTPIFRILPPKRAKDLSYTVMTIVYSPFLLLISVKET

[1209] REARRIKYNRMKRLNDDANEYDTPWDLTDGYLDDDDGLFSDNRNSGMRATQLKNSRSLKL

[1210] QRTAEQEDVHFKVPKKWYKNVKKCSPSFEQYDNDDTEDDAGEDKDEVKELTKKVENLTAV

[1211] ITDLLEKLDIKDKKE

[1212] SEQ ID NO:71

[1213] YOR092W

[1214] >sp|Q99252|ECM3_YEAST蛋白ECM3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ECM3 PE＝1 SV＝1

[1215] MTHITLGQAIWASVRPIIKIYLIIGVGFGLCKMNILTVQATRSISDIVLTILLPCLSFNK

[1216] IVANIEDNDIKDVGIICLTSVILFATGLGFAFIVRSVLPVPKRWRGGILAGGMFPNISDL

[1217] PIAYLQSMDQGFIFTEAEGEKGVANVIIFLAMFLICVFNLGGFRLIENDFHYKGDDDEEN

[1218] TLTNDDSAQQPTQPIEGNSSSSSNQDILKEPNESTVPNSSQASYISEKNKKEKTELSVPK

[1219] PTHTAPPAIDDRSSNSSAVVSIDSITHSLRTNHVDAQSVSELNDPTYRTRSQPIAYTTES

[1220] RTSHVHNNRRNSITGSLRSIDMRELPAEGMSDLIREYSNVDQYGRRRKSSISSQGAPSVL

[1221] QADGTISPNLTRTSTLQRVKTSNLTRIITSDATVSKKDIETSGSSLPKWLQKFPLTKFFV

[1222] FFLKNCLRPCSMAVILALIIAFIPWVKALFVTTSNTPKIKQAPDNAPALTFIMDFTSYVG

[1223] AASVPFGLILLGATLGRLKIGKLYPGFWKSAVVLVFLRQCIMPIFGVLWCDRLVKAGWLN

[1224] WENDKMLLFVTAITWNLPTMTTLIYFTASYTPEDETEPVQMECTSFFLMLQYPLMVVSLP

[1225] FLVSYFIKVQMKL

[1226] SEQ ID NO:72

[1227] YOR130C

[1228] >sp|Q12375|ORT1_YEAST线粒体鸟氨酸转运蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ORT1 PE＝1 SV＝2

[1229] MEDSKKKGLIEGAILDIINGSIAGACGKVIEFPFDTVKVRLQTQASNVFPTTWSCIKFTY

[1230] QNEGIARGFFQGIASPLVGACLENATLFVSYNQCSKFLEKHTNVSPLGQILISGGVAGSC

[1231] ASLVLTPVELVKCKLQVANLQVASAKTKHTKVLPTIKAIITERGLAGLWQGQSGTFIRES

[1232] FGGVAWFATYEIVKKSLKDRHSLDDPKRDESKIWELLISGGSAGLAFNASIFPADTVKSV

[1233] MQTEHISLTNAVKKIFGKFGLKGFYRGLGITLFRAVPANAAVFYIFETLSAL

[1234] SEQ ID NO:73

[1235] YOR222W

[1236] >sp|Q99297|ODC2_YEAST线粒体2-氧代二羧酸盐运载体2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ODC2 PE＝1 SV＝1

[1237] MSSDSNAKPLPFIYQFISGAVAGISELTVMYPLDVVKTRFQLEVTTPTAAAVGKQVERYN

[1238] GVIDCLKKIVKKEGFSRLYRGISSPMLMEAPKRATKFACNDQYQKIFKNLFNTNETTQKI

[1239] SIAAGASAGMTEAAVIVPFELIKIRMQDVKSSYLGPMDCLKKTIKNEGIMGLYKGIESTM

[1240] WRNALWNGGYFGVIYQVRNSMPVAKTKGQKTRNDLIAGAIGGTVGTMLNTPFDVVKSRIQ

[1241] SVDAVSSAVKKYNWCLPSLLVIYREEGFRALYKGFVPKVCRLAPGGSLMLVVFTGMMNFF

[1242] RDLKYGH

[1243] SEQ ID NO:74

[1244] YOR291W

[1245] >sp|Q12697|YPK9_YEAST液泡阳离子转运ATP酶YPK9 OS＝酿酒酵母(菌株ATCC

204508/S288c)GN＝YPK9 PE＝1 SV＝1

[1246] MDIPSSNQIQHGQRSERNRRMPRASFSSTATTSTAATLTSAMVLDQNNSEPYAGATFEAV

[1247] PSSIVSFHHPHSFQSSNLPSPHSSGNLEQRGRRLTESEPLVLSSAEQSRSSSRNPSHFRF

[1248] FTQEQISNAEGASTLENTDYDMAWDATPAYEQDRIYGTGLSSRRSSIRSFSRASSLSNAK

[1249] SYGSFSKRGRSGSRAPQRLGENSDTGFVYHSATHSSSSLSRYTTRERIPIELESQTDEIL

[1250] EDESSTHSLESSDSRRSASENNRGSFSGHDDVHNQHSEYLKPDYHEKFYPQYAPNLHYQR

[1251] FYIAEEDLVIGIAAYQTSKFWYIIYNLCCFLTFGLVYLLTRWLPHLKVKLYGVKVPLAKA

[1252] EWVVIENEFGEFVIQPIDRQWYNRPLSTVLPFENYPNPSYEPNDINLSHHHANEINPNVP

[1253] ILITFEYRYIKFIYSPLDDLFKTNNNWIDPDWVDLSTVSNGLTKGVQEDRELAFGKNQIN

[1254] LRMKTTSEILFNEVLHPFYVFQVFSIILWGIDEYYYYAACIFLISVLSIFDSLNEQKKVS

[1255] RNLAEMSHFHCDVRVLRDKFWTTISSSELVPGDIYEVSDPNITILPCDSILLSSDCIVNE

[1256] SMLTGESVPVSKFPATEETMYQLCDDFQSTQISSFVSKSFLYNGTNIIRARIAPGQTAAL

[1257] AMVVRTGFSTTKGSLVRSMVFPKPTGFKFYRDSFKYIGFMSLIAIFGFCVSCVQFIKLGL

[1258] DKKTMILRALDIITIVVPPALPATLTIGTNFALSRLKEKGIFCISPTRLNISGKIDVMCF

[1259] DKTGTLTEDGLDVLGVQISEPNGVRGQKFGELLSDIRQVFPKFSLNDCSSPLDFKSRNFF

[1260] MSLLTCHSLRSVDGNLLGDPLDFKMFQFTGWSFEEDFQKRAFHSLYEGRHEDDVFPENSE

[1261] IIPAVVHPDSNNRENTFTDNDPHNFLGVVRSFEFLSELRRMSVIVKTNNDDVYWSFTKGA

[1262] PEVISEICNKSTLPADFEEVLRCYTHNGYRVIACAGKTLPKRTWLYSQKVSREEVESNLE

[1263] FLGFIIFQNKLKKETSETLKSLQDANIRTIMCTGDNILTAISVGREAGLIQCSRVYVPSI

[1264] NDTPLHGEPVIVWRDVNEPDKILDTKTLKPVKLGNNSVESLRECNYTLAVSGDVFRLLFR

[1265] DENEIPEEYLNEILLNSSIYARMSPDEKHELMIQLQKLDYTVGFCGDGANDCGALKAADV

[1266] GISLSEAEASVAAPFTSKIFNISCVLDVIREGRAALVTSFACFQYMSLYSAIQFITITIL

[1267] YSRGSNLGDFQFLYIDLLLIVPIAICMSWSKSYEKIDKKRPSANLVSPKILVPLLISVFL

[1268] VFLFQFIPWIIVQKMSWYIKPIVGGDDAVQSSDNTVLFFVSNFQYILTAIVLSVGPPYRE

[1269] PMSKNFEFIVDITVSIGASLLLMTLDTESYLGKMLQLTPISNSFTMFIIVWVILNYYAQL

[1270] YIPPSIKGWLKKKKSSKKYKLLIQEEMKLKEV

[1271] SEQ ID NO:75

[1272] YOR306C

[1273] >sp|Q08777|MCH5_YEAST核黄素转运蛋白MCH5 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MCH5 PE＝1 SV＝2

[1274] MSSDSLTPKDTIVPEEQTNQLRQPDLDEDSIHYDPEADDLESLETTASYASTSVSAKVYT

[1275] KKEVNKGTDIESQPHWGENTSSTHDSDKEEDSNEEIESFPEGGFKAWVVTFGCFLGLIAC

[1276] FGLLNSTGVIESHLQDNQLSSESVSTIGWLFSLFLFVCSASCIISGTYFDRNGFRTIMIV

[1277] GTVFHVAGLFATANSTKYWHFILSFAIVCGFGNGIVLSPLVSVPAHYFFKRRGTALAMAT

[1278] IGGSVGGVVFPIMLRSFFSMKSDTDPTYGFVWGIRTLGFLDLALLTLSIILVKERLPHVI

[1279] ENSKDGESRWRYILRVYILQCFDAKAFLDMKYLFCVLGTVFSELSINSALTYYGSYATSH

[1280] GISANDAYTLIMIINVCGIPGRWVPGYLSDKFGRFNVAIATLLTLFIVMFVGWLPFGTNL

[1281] TNMYVISALYGFCSGSVFSLLPVCCGQISKTEEFGKRYSTMYFVVGFGTLVGIPITGAII

[1282] SIKTTADYQHYIIFCGLATFVSAVCYIISRAYCVGFKWVRF

[1283] SEQ ID NO:76

[1284] YOR316C

[1285] >sp|P32798|COT1_YEAST钴摄取蛋白COT1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝COT1 PE＝1 SV＝2

[1286] MKLGSKQVKIISLLLLDTVFFGIEITTGYLSHSLALIADSFHMLNDIISLVVALWAVNVA

[1287] KNRNPDSTYTYGWKRAEILGALINAVFLIALCVSILIEALQRIIAPPVIENPKFVLYVGV

[1288] AGLISNTVGLFLFHDNDQEHGHGHGHSHGGIFADHEMHMPSSHTHTHAHVDGIENTTPMD

[1289] STDNISEIMPNAIVDSFMNENTRLLTPENASKTPSYSTSSHTIASGGNYTEHNKRKRSLN

[1290] MHGVFLHVLGDALGNIGVMLSAFFIWKTDYSWKYYTDPLVSLIITGIIFSSALPLSCKAS

[1291] KILLQATPSTLSGDQVEGDLLKIPGIIAIHDFHIWNLTESIFIASLHIQLDISPEQFTDL

[1292] AKIVRSKLHRYGIHSATLQPEFITREVTSTERAGDSQGDHLQNDPLSLRPKTYGTGISGS

[1293] TCLIDDAANCNTADCLEDH

[1294] SEQ ID NO:77

[1295] YOR334W

[1296] >sp|Q01926|MRS2_YEAST镁转运蛋白MRS2,线粒体OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MRS2 PE＝1 SV＝2

[1297] MNRRLLVRSISCFQPLSRITFGRPNTPFLRKYADTSTAANTNSTILRKQLLSLKPISASD

[1298] SLFISCTVFNSKGNIISMSEKFPKWSFLTEHSLFPRDLRKIDNSSIDIIPTIMCKPNCIV

[1299] INLLHIKALIERDKVYVFDTTNPSAAAKLSVLMYDLESKLSSTKNNSQFYEHRALESIFI

[1300] NVMSALETDFKLHSQICIQILNDLENEVNRLKLRHLLIKSKDLTLFYQKTLLIRDLLDEL

[1301] LENDDDLANMYLTVKKSPKDNFSDLEMLIETYYTQCDEYVQQSESLIQDIKSTEEIVNII

[1302] LDANRNSLMLLELKVTIYTLGFTVASVLPAFYGMNLKNFIEESEWGFTSVAVFSIVSALY

[1303] ITKKNFNSLRSVTKMTMYPNSPANSSVYPKTSASIALTNKLKRRRKWWKSTKQRLGVLLY

[1304] GSSYTNKANLSNNKINKGFSKVKKFNMENDIKNKQNRDMIWKWLIEDKKN

[1305] SEQ ID NO:78

[1306] YPL078C

[1307] >sp|P05626|ATPF_YEAST ATP合酶亚基4,线粒体OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ATP4 PE＝1 SV＝2

[1308] MSMSMGVRGLALRSVSKTLFSQGVRCPSMVIGARYMSSTPEKQTDPKAKANSIINAIPGN

[1309] NILTKTGVLGTSAAAVIYAISNELYVINDESILLLTFLGFTGLVAKYLAPAYKDFADARM

[1310] KKVSDVLNASRNKHVEAVKDRIDSVSQLQNVAETTKVLFDVSKETVELESEAFELKQKVE

[1311] LAHEAKAVLDSWVRYEASLRQLEQRQLAKSVISRVQSELGNPKFQEKVLQQSISEIEQLL

[1312] SKLK

[1313] SEQ ID NO:79

[1314] YPL270W

[1315] >sp|P33311|MDL2_YEAST ATP依赖型通透酶MDL2,线粒体OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MDL2 PE＝1 SV＝3

[1316] MLNGRLPLLRLGICRNMLSRPRLAKLPSIRFRSLVTPSSSQLIPLSRLCLRSPAVGKSLI

[1317] LQSFRCNSSKTVPETSLPSASPISKGSARSAHAKEQSKTDDYKDIIRLFMLAKRDWKLLL

[1318] TAILLLTISCSIGMSIPKVIGIVLDTLKTSSGSDFFDLKIPIFSLPLYEFLSFFTVALLI

[1319] GCAANFGRFILLRILSERVVARLRANVIKKTLHQDAEFFDNHKVGDLISRLGSDAYVVSR

[1320] SMTQKVSDGVKALICGVVGVGMMCSLSPQLSILLLFFTPPVLFSASVFGKQIRNTSKDLQ

[1321] EATGQLTRVAEEQLSGIKTVQSFVAEGNELSRYNVAIRDIFQVGKTAAFTNAKFFTTTSL

[1322] LGDLSFLTVLAYGSYLVLQSQLSIGDLTAFMLYTEYTGNAVFGLSTFYSEIMQGAGAASR

[1323] LFELTDRKPSISPTVGHKYKPDRGVIEFKDVSFSYPTRPSVQIFKNLNFKIAPGSSVCIV

[1324] GPSGRGKSTIALLLLRYYNPTTGTITIDNQDISKLNCKSLRRHIGIVQQEPVLMSGTIRD

[1325] NITYGLTYTPTKEEIRSVAKQCFCHNFITKFPNTYDTVIGPHGTLLSGGQKQRIAIARAL

[1326] IKKPTILILDEATSALDVESEGAINYTFGQLMKSKSMTIVSIAHRLSTIRRSENVIVLGH

[1327] DGSVVEMGKFKELYANPTSALSQLLNEKAAPGPSDQQLQIEKVIEKEDLNESKEHDDQKK

[1328] DDNDDNDNNHDNDSNNQSPETKDNNSDDIEKSVEHLLKDAAKEANPIKITPQP

[1329] SEQ ID NO:80

[1330] YPL274W

[1331] >sp|Q08986|SAM3_YEAST S-腺苷甲硫氨酸通透酶SAM3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SAM3 PE＝1 SV＝1

[1332] MDILKRGNESDKFTKIETESTTIPNDSDRSGSLIRRMKDSFKQSNLHVIPEDLENSEQTE

[1333] QEKIQWKLASQPYQKVLSQRHLTMIAIGGTLGTGLFIGLGYSLASGPAALLIGFLLVGTS

[1334] MFCVVQSAAELSCQFPVSGSYATHVSRFIDESVGFTVATNYALAWLISFPSELIGCALTI

[1335] SYWNQTVNPAVWVAIFYVFIMVLNLFGVRGFAETEFALSIIKVIAIFIFIIIGIVLIAGG

[1336] GPNSTGYIGAKYWHDPGAFAKPVFKNLCNTFVSAAFSFGGSELVLLTSTESKNISAISRA

[1337] AKGTFWRIAIFYITTVVIIGCLVPYNDPRLLSGSNSEDVSASPFVIALSNTGSMGAKVSN

[1338] FMNVVILVAVVSVCNSCVYASSRLIQALGASGQLPSVCSYMDRKGRPLVGIGISGAFGLL

[1339] GFLVASKKEDEVFTWLFALCSISSFFTWFCICMSQIRFRMALKAQGRSNDEIAYKSILGV

[1340] YGGILGCVLNALLIAGEIYVSAAPVGSPSSAEAFFEYCLSIPIMIVVYFAHRFYRRDWKH

[1341] FYIKRSEIDLDTGCSVENLELFKAQKEAEEQLIASKPFYYKIYRFWC

[1342] SEQ ID NO:81

[1343] YPR003C

[1344] >sp|P53394|SULX_YEAST推定的硫酸盐转运蛋白YPR003C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YPR003C PE＝1 SV＝1

[1345] MTSNNSLLGRGRMSYSSTAPPRFKRSVDQRDTFSDNFDYDKDSSNRGRTYIAASNSTTGV

[1346] PPPNNSRSGCTNNTNNTNNTSNTSNTNNNDSVDENTVFETLPYYLPCFSWLPEYTFNKLW

[1347] GDVIAGISVASFQIPLALSYTTSIAHVPPLCGLYSLAISPFVYGILGSVPQMIVGPESAI

[1348] SLVVGQAVESITLHKENVSLIDISTVITFVSGTILLFSGISRFGFLGNVLSKALLRGFIS

[1349] SVGLVMIINSLISELKLDKFLVSLPQHYHTPFEKILFLIDYAPAQYHIPTAIFSGCCLIV

[1350] LFLTRLLKRKLMKYHKSAIFFPDILLVVIVTILISMKFNLKHRYGISIIGDFSMDNFDEL

[1351] KNPLTRPRRKLIPDLFSASLIVAMLGFFESTTASKSLGTTYNLTVSSNRELVALGFMNIV

[1352] ISLFGALPAFGGYGRSKINALSGAQSVMSGVFMGVITLITMNLLLQFVHYIPNCVLSVIT

[1353] TIIGISLLEEVPGDIKFHLRCGGFSELFVFAVTFCTTIFYSIEAGICIGCVYSIINIIKH

[1354] SAKSRIQILARVAGTSNFTNLDDYMMNMKRNSLDVEGTEEIEGCMIVRIPEPLTFTNSED

[1355] LKQRLDRIERYGSSKIHPGRKSLRSKDSIKYVIFDLGGMTSIDSSAAQVLEEIITSYKRR

[1356] NVFIYLVNVSINDKVRRRLFKAGVAASVERAQANNNENNTSNTFSDAGETYSPYFDSIDA

[1357] ALYEIEKMKIKGNNVPNNDSESFMSNTLFNSSLV

[1358] SEQ ID NO:82

[1359] YPR011C

[1360] >sp|Q12251|YP011_YEAST未表征的线粒体运载体YPR011C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YPR011C PE＝1 SV＝1

[1361] MAEVLTVLEQPNSIKDFLKQDSNIAFLAGGVAGAVSRTVVSPFERVKILLQVQSSTTSYN

[1362] RGIFSSIRQVYHEEGTKGLFRGNGLNCIRIFPYSAVQFVVYEACKKKLFHVNGNNGQEQL

[1363] TNTQRLFSGALCGGCSVVATYPLDLIKTRLSIQTANLSSLNRSKAKSISKPPGIWQLLSE

[1364] TYRLEGGLRGLYRGVWPTSLGVVPYVALNFAVYEQLREFGVNSSDAQPSWKSNLYKLTIG

[1365] AISGGVAQTITYPFDLLRRRFQVLAMGGNELGFRYTSVWDALVTIGRAEGVSGYYKGLAA

[1366] NLFKVVPSTAVSWLVYEVVCDSVRNW

[1367] SEQ ID NO:83

[1368] YPR058W

[1369] >sp|P32331|YMC1_YEAST运载蛋白YMC1,线粒体OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YMC1 PE＝1 SV＝2

[1370] MSEEFPSPQLIDDLEEHPQHDNARVVKDLLAGTAGGIAQVLVGQPFDTTKVRLQTSSTPT

[1371] TAMEVVRKLLANEGPRGFYKGTLTPLIGVGACVSLQFGVNEAMKRFFHHRNADMSSTLSL

[1372] PQYYACGVTGGIVNSFLASPIEHVRIRLQTQTGSGTNAEFKGPLECIKKLRHNKALLRGL

[1373] TPTILREGHGCGTYFLVYEALIANQMNKRRGLERKDIPAWKLCIFGALSGTALWLMVYPL

[1374] DVIKSVMQTDNLQKPKFGNSISSVAKTLYANGGIGAFFKGFGPTMLRAAPANGATFATFE

[1375] LAMRLLG

[1376] SEQ ID NO:84

[1377] YPR128C

[1378] >sp|Q06497|ANT1_YEAST过氧化物酶体腺嘌呤核苷酸转运蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ANT1 PE＝1 SV＝1

[1379] MLTLESALTGAVASAMANIAVYPLDLSKTIIQSQVSPSSSEDSNEGKVLPNRRYKNVVDC

[1380] MINIFKEKGILGLYQGMTVTTVATFVQNFVYFFWYTFIRKSYMKHKLLGLQSLKNRDGPI

[1381] TPSTIEELVLGVAAASISQLFTSPMAVVATRQQTVHSAESAKFTNVIKDIYRENNGDITA

[1382] FWKGLRTGLALTINPSITYASFQRLKEVFFHDHSNDAGSLSAVQNFILGVLSKMISTLVT

[1383] QPLIVAKAMLQSAGSKFTTFQEALLYLYKNEGLKSLWKGVLPQLTKGVIVQGLLFAFRGE

[1384] LTKSLKRLIFLYSSFFLKHNGQRKLAST

[1385] SEQ ID NO:85

[1386] YPR201W

[1387] >sp|Q06598|ARR3YEAST耐砷蛋白3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ARR3 PE＝1 SV＝1

[1388] MSEDQKSENSVPSKVNMVNRTDILTTIKSLSWLDLMLPFTIILSIIIAVIISVYVPSSRH

[1389] TFDAEGHPNLMGVSIPLTVGMIVMMIPPICKVSWESIHKYFYRSYIRKQLALSLFLNWVI

[1390] GPLLMTALAWMALFDYKEYRQGIIMIGVARCIAMVLIWNQIAGGDNDLCVVLVITNSLLQ

[1391] MVLYAPLQIFYCYVISHDHLNTSNRVLFEEVAKSVGVFLGIPLGIGIIIRLGSLTIAGKS

[1392] NYEKYILRFISPWAMIGFHYTLFVIFISRGYQFIHEIGSAILCFVPLVLYFFIAWFLTFA

[1393] LMRYLSISRSDTQRECSCDQELLLKRVWGRKSCEASFSITMTQCFTMASNNFELSLAIAI

[1394] SLYGNNSKQAIAATFGPLLEVPILLILAIVARILKPYYIWNNRN

[1395] SEQ ID NO:86

[1396] YBR008C

[1397] >sp|P38124|FLR1_YEAST氟康唑耐药蛋白1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝FLR1 PE＝1 SV＝1

[1398] MVYTSTYRHTIVVDLLEYLGIVSNLETLQSAREDETRKPENTDKKECKPDYDIECGPNRS

[1399] CSESSTDSDSSGSQIEKNDPFRVDWNGPSDPENPQNWPLLKKSLVVFQIMLLTCVTYMGS

[1400] SIYTPGQEYIQEEFHVGHVVATLNLSLYVLGYGLGPIIFSPLSETARYGRLNLYMVTLFF

[1401] FMIFQVGCATVHNIGGLIVMRFISGILCSPSLATGGGTVADIISPEMVPLVLGMWSAGAV

[1402] AAPVLAPLLGAAMVDAKNWRFIFWLLMWLSAATFILLAFFFPETQHHNILYRRALKLRKE

[1403] TGDDRYYTEQDKLDREVDARTFLINTLYRPLKMIIKEPAILAFDLYIAVAYGCFYLFFEA

[1404] FPIVFVGIYHFSLVEVGLAYMGFCVGCVLAYGLFGILNMRIIVPRFRNGTFTPEAFLIVA

[1405] MCVCWCLPLSLFLFGWTARVHWILPVISEVFFVLAVFNIFQATFAYLATCYPKYVASVFA

[1406] GNGFCRASFACAFPLFGRAMYDNLATKNYPVAWGSSLVGFLTLGLAIIPFILYKYGPSLR

[1407] TRSSYTEE

[1408] SEQ ID NO:87

[1409] YBR021W

[1410] >sp|P05316|FUR4_YEAST尿嘧啶通透酶OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝FUR4 PE＝3 SV＝2

[1411] MPDNLSLHLSGSSKRLNSRQLMESSNETFAPNNVDLEKEYKSSQSNITTEVYEASSFEEK

[1412] VSSEKPQYSSFWKKIYYEYVVVDKSILGVSILDSFMYNQDLKPVEKERRVWSWYNYCYFW

[1413] LAECFNINTWQIAATGLQLGLNWWQCWITIWIGYGFVGAFVVLASRVGSAYHLSFPISSR

[1414] ASFGIFFSLWPVINRVVMAIVWYSVQAYIAATPVSLMLKSIFGKDLQDKIPDHFGSPNAT

[1415] TYEFMCFFIFWAASLPFLLVPPHKIRHLFTVKAVLVPFASFGFLIWAIRRAHGRIALGSL

[1416] TDVQPHGSAFSWAFLRSLMGCMANFSTMVINAPDFSRFSKNPNSALWSQLVCIPFLFSIT

[1417] CLIGILVTAAGYEIYGINYWSPLDVLEKFLQTTYNKGTRAGVFLISFVFAVAQLGTNISA

[1418] NSLSCGTDMSAIFPKFINIKRGSLFCAAMALCICPWNLMATSSKFTMALSAYAIFLSSIA

[1419] GVVCSDYFVVRRGYIKLTHIYSHQKGSFYMYGNRFGINWRALAAYLCGVAPCLPGFIAEV

[1420] GAPAIKVSDGAMKLYYLSYWVGYGLSFSSYTALCYFFPVPGCPVNNIIKDKGWFQRWANV

[1421] DDFEEEWKDTIERDDLVDDNISVYEHEHEKTFI

[1422] SEQ ID NO:88

[1423] YBR043C

[1424] >sp|P38227|QDR3_YEAST奎尼定耐药蛋白3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝QDR3 PE＝1 SV＝2

[1425] MQAQGSQSNVGSLRSNCSDNSLPNNHVMMHCDESSGSPHSEHNDYSYEKTNLESTASNSR

[1426] EHRDNQLSRLKSEEYVVPKNQRRGLLPQLAIIPEFKDARDYPPMMKKMIVFLIAFSSMMG

[1427] PMGTSIIFPAINSITTEFKTSVIMVNVSIGVYLLSLGVFPLWWSSLSELEGRRTTYITSF

[1428] ALLFAFNIGSALAPDINSFIALRMLCGAASASVQSVGAGTVADLYISEDRGKNLSYYYLG

[1429] PLLAPLLSPIFGSLLVNRWPWRSTQWFMVILSGCNVILLTVLLPETLRKQDSKGAIAQIL

[1430] AERRIQVDNNERGEIQEDYQRGEDETDRIENQVATLSTEKHNYVGEVRDQDSLDLESHSS

[1431] PNTYDGRAGETQLQRIYTEASRSLYEYQLDDSGIDATTAQVTRIRSTDPKLARSIRENSL

[1432] RKLQTNLEEQVKKVLSSNGGEIAPKQVSAVRKVWDTFFVYFIKPLKSLHFLEYPPVALAI

[1433] TFSAISFSTVYFVNMTVEYKYSRPPYNFKPLYIGLLYIPNSVTYFFASIYGGRWVDMLLK

[1434] RYKEKYGILAPEARISWNVVTSVISFPIALLIFGWCLDKKCHWVTPLIGTALFGYAAMMT

[1435] IGATLSYLVDSLPGKGATGVALNNLIRQILAATAVFVTTPMLNGMGTGWAFTMLAFIVLG

[1436] ASSVLIILKKHGDYWRENYDLQKLYDKID

[1437] SEQ ID NO:89

[1438] YBR287W

[1439] >sp|P38355|YB8B_YEAST未表征的转运蛋白YBR287W OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YBR287W PE＝1 SV＝1

[1440] MVETFSFAHLAYLVFESVLQVVIIALAGFWSASSGLLPKQSQKIISLLNVDLFTPCLIFS

[1441] KLAKSLSMAKIFEIAIIPIFFGLTTGISFISGKIMSRILDLDKDETNFVVANSVFGNSNS

[1442] LPVSLTLSLAYTLPNLTWDQIPNDNRDNVASRGILYLLIFQQIGQMLRWSWGYNKLMKWS

[1443] GENTQHMPPSQVQSLLERTPNIDNEELVNEEQEEQELLEEENNRMNSSFLSSSSIGDKIW

[1444] QKSCTVFERIRANLNPPLYSMIFAVVVAAIGPLQRELFMEDGFINNTFAEAVTQLGSVSI

[1445] PLILVVLGSNLYPSAEVFPKTVHHSKLLIGSIIGRMILPSCFLLPIIAIAVKYINVSILD

[1446] DPIFLVVGFLLTVSPPAIQLTQITQLNEFFEAEMADILFWGYAVLSLPVSIIVVSGAIYV

[1447] LQWANPT

[1448] SEQ ID NO:90

[1449] YBR295W

[1450] >sp|P38360|ATU1_YEAST P型阳离子转运ATP酶OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PCA1 PE＝1 SV＝2

[1451] MKPEKLFSGLGTSDGEYGVVNSENISIDAMQDNRGECHRRSIEMHANDNLGLVSQRDCTN

[1452] RPKITPQECLSETEQICHHGENRTKAGLDVDDAETGGDHTNESRVDECCAEKVNDTETGL

[1453] DVDSCCGDAQTGGDHTNESCVDGCCVRDSSVMVEEVTGSCEAVSSKEQLLTSFEVVPSKS

[1454] EGLQSIHDIRETTRCNTNSNQHTGKGRLCIESSDSTLKKRSCKVSRQKIEVSSKPECCNI

[1455] SCVERIASRSCEKRTFKGSTNVGISGSSSTDSLSEKFFSEQYSRMYNRYSSILKNLGCIC

[1456] NYLRTLGKESCCLPKVRFCSGEGASKKTKYSYRNSSGCLTKKKTHGDKERLSNDNGHADF

[1457] VCSKSCCTKMKDCAVTSTISGHSSSEISRIVSMEPIENHLNLEAGSTGTEHIVLSVSGMS

[1458] CTGCESKLKKSFGALKCVHGLKTSLILSQAEFNLDLAQGSVKDVIKHLSKTTEFKYEQIS

[1459] NHGSTIDVVVPYAAKDFINEEWPQGVTELKIVERNIIRIYFDPKVIGARDLVNEGWSVPV

[1460] SIAPFSCHPTIEVGRKHLVRVGCTTALSIILTIPILVMAWAPQLREKISTISASMVLATI

[1461] IQFVIAGPFYLNALKSLIFSRLIEMDLLIVLSTSAAYIFSIVSFGYFVVGRPLSTEQFFE

[1462] TSSLLVTLIMVGRFVSELARHRAVKSISVRSLQASSAILVDKTGKETEINIRLLQYGDIF

[1463] KVLPDSRIPTDGTVISGSSEVDEALITGESMPVPKKCQSIVVAGSVNGTGTLFVKLSKLP

[1464] GNNTISTIATMVDEAKLTKPKIQNIADKIASYFVPTIIGITVVTFCVWIAVGIRVEKQSR

[1465] SDAVIQAIIYAITVLIVSCPCVIGLAVPIVFVIASGVAAKRGVIFKSAESIEVAHNTSHV

[1466] VFDKTGTLTEGKLTVVHETVRGDRHNSQSLLLGLTEGIKHPVSMAIASYLKEKGVSAQNV

[1467] SNTKAVTGKRVEGTSYSGLKLQGGNCRWLGHNNDPDVRKALEQGYSVFCFSVNGSVTAVY

[1468] ALEDSLRADAVSTINLLRQRGISLHILSGDDDGAVRSMAARLGIESSNIRSHATPAEKSE

[1469] YIKDIVEGRNCDSSSQSKRPVVVFCGDGTNDAIGLTQATIGVHINEGSEVAKLAADVVML

[1470] KPKLNNILTMITVSQKAMFRVKLNFLWSFTYNLFAILLAAGAFVDFHIPPEYAGLGELVS

[1471] ILPVIFVAILLRYAKI

[1472] SEQ ID NO:91

[1473] YBR296C

[1474] >sp|P38361|PHO89_YEAST磷酸通透酶PHO89 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PHO89 PE＝1 SV＝1

[1475] MALHQFDYIFAIAMLFAFLDAFNIGANDVANSFASSISSRSLKYWQAMVLAGLCEFLGAV

[1476] LAGARVSGTIKNNIIDSSIFTNDPAVLMLTMTSALIGSSCWLTFATAIGMPVSTTHSIVG

[1477] GTIGAGIAAGGANGVVWGWSGVSQIIASWFIAPILAGAIAAIVFSISRFSVLEVKSLERS

[1478] IKNALLLVGVLVFATFSILTMLIVWKGSPNLHLDDLSETETAVSIVLTGAIASIVYFIFF

[1479] YPFYRRKVLDQDWTLKLIDIFRGPSFYFKSTDDIPPMPEGHQLTIDYYEGRRNLGTTVSV

[1480] EDEENKAASNSNDSVKNKEDIQEVDLVRTETEPETKLSTKQYWWSLLKQGPKKWPLLFWL

[1481] VISHGWTQDVIHAQVNDRDMLSGDLKGMYERSKFYDNRVEYIYSVLQAITAATMSFAHGA

[1482] NDVANATGPLSAVYVIWKTNTIGAKSEVPVWVLAYGGVALVIGCWTYGYNIIKNLGNKMI

[1483] LQSPSRGFSIELAVAITTVMATQLGIPTSTTQIAVGGIVAVGLCNKDLKSVNWRMVAWCY

[1484] SGWFLTLPIAGLIAGIINGIILNAPRFGVEYQMT

[1485] SEQ ID NO:92

[1486] YCL038C

[1487] >sp|P25568|ATG22_YEAST自噬相关蛋白22 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ATG22 PE＝1 SV＝1

[1488] MSYGTINDMNESVTNYRIKKAQNNIKGWYAYSFSSEPFVVSAVSTYIPLLLQQFASINGV

[1489] KVHDHSIPCLSETGSDSDKCVLGLFNNRIFVDTSSFALYVFSLSVLFQTIIVISVSGIVD

[1490] LWGSVKFKGRILVWFGIVGALSTVAISKLNDTQIYSLAGLYIVANGCFGVINVVGNSLLP

[1491] IFVKDSLKCQSQGAYEPDKVDSLTTVISGRGASLGYSSALIVQIVSMFLVASKKGSKQDV

[1492] QVAVLFVGIWWFVWQLPMIWLIDDVTIPIRVDDSTLASARSPYPGEQDALGQLNWKNYLS

[1493] YGWVSLFESFKHARLLKDVMIFLIAWFIISDSITTINSTAVLFSKAELHMSTLNLIMISV

[1494] LTVVNAMLGAFMIPQFLATKFRWTSSQTLMYIIIWASFIPFYGILGFFFNAFGLKHKFEM

[1495] FLLAIWYGLSLGGLSAVSRSVFSLIVPPGKESTFFSMFSITDKGSSILGPFLVGLLTDKT

[1496] HNIRYSFYFFFLLLMLSLPVLNCLDVKRGRREAEELSQVLPESERRLD

[1497] SEQ ID NO:93

[1498] YCR011C

[1499] >sp|P25371|ADP1_YEAST可能的ATP依赖性通透酶OS＝酿酒酵母(菌株ATCC

204508/S288c)GN＝ADP1 PE＝1 SV＝2

[1500] MGSHRRYLYYSILSFLLLSCSVVLAKQDKTPFFEGTSSKNSRLTAQDKGNDTCPPCFNCM

[1501] LPIFECKQFSECNSYTGRCECIEGFAGDDCSLPLCGGLSPDESGNKDRPIRAQNDTCHCD

[1502] NGWGGINCDVCQEDFVCDAFMPDPSIKGTCYKNGMIVDKVFSGCNVTNEKILQILNGKIP

[1503] QITFACDKPNQECNFQFWIDQLESFYCGLSDCAFEYDLEQNTSHYKCNDVQCKCVPDTVL

[1504] CGAKGSIDISDFLTETIKGPGDFSCDLETRQCKFSEPSMNDLILTVFGDPYITLKCESGE

[1505] CVHYSEIPGYKSPSKDPTVSWQGKLVLALTAVMVLALFTFATFYISKSPLFRNGLGSSKS

[1506] PIRLPDEDAVNNFLQNEDDTLATLSFENITYSVPSINSDGVEETVLNEISGIVKPGQILA

[1507] IMGGSGAGKTTLLDILAMKRKTGHVSGSIKVNGISMDRKSFSKIIGFVDQDDFLLPTLTV

[1508] FETVLNSALLRLPKALSFEAKKARVYKVLEELRIIDIKDRIIGNEFDRGISGGEKRRVSI

[1509] ACELVTSPLVLFLDEPTSGLDASNANNVIECLVRLSSDYNRTLVLSIHQPRSNIFYLFDK

[1510] LVLLSKGEMVYSGNAKKVSEFLRNEGYICPDNYNIADYLIDITFEAGPQGKRRRIRNISD

[1511] LEAGTDTNDIDNTIHQTTFTSSDGTTQREWAHLAAHRDEIRSLLRDEEDVEGTDGRRGAT

[1512] EIDLNTKLLHDKYKDSVYYAELSQEIEEVLSEGDEESNVLNGDLPTGQQSAGFLQQLSIL

[1513] NSRSFKNMYRNPKLLLGNYLLTILLSLFLGTLYYNVSNDISGFQNRMGLFFFILTYFGFV

[1514] TFTGLSSFALERIIFIKERSNNYYSPLAYYISKIMSEVVPLRVVPPILLSLIVYPMTGLN

[1515] MKDNAFFKCIGILILFNLGISLEILTIGIIFEDLNNSIILSVLVLLGSLLFSGLFINTKN

[1516] ITNVAFKYLKNFSVFYYAYESLLINEVKTLMLKERKYGLNIEVPGATILSTFGFVVQNLV

[1517] FDIKILALFNVVFLIMGYLALKWIVVEQK

[1518] SEQ ID NO:94

[1519] YDL054C

[1520] >sp|Q07376|MCH1_YEAST可能的转运蛋白MCH1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MCH1 PE＝1 SV＝1

[1521] MPLSKVEHYLSYHTRLLLPHVLSLQSSHRVAYIFSLLSAVSTGFITLISLYSQPWQKHLN

[1522] YSSWQINTIASMTNLGMYLTPPILGMIADSHGPITLSLLAIIGFIPSYSYLAYVFNHPEL

[1523] SLGGNGDSSFNLSIICFVFIGISTSALYFSALLTCTKLYPHTKLLSISLPTTCYGISSVV

[1524] GSQLLRIKWFWSSNASSSSSNSDLNLGRVFQTFALVYVVIGLLAWIATSVVSLLHFNEEQ

[1525] DNQKRLDDQTDVEQSPLLERSNHVQEKFTQTMLRIFSDPVTYILAVSILLSLGPLEMFIA

[1526] NMGSLTNLLVQLDAPTLSTKLLSTYALSSTFTRLLTGIVADFFAKKKISIKWILLTFLSL

[1527] GVCAQLFLLKMTSSASPWGLVPTGSLVGIVYGGLFTVYPTLVLLVWGERSFGTVYGSLLI

[1528] APAIGSMIFCMLYAKFYDSRCMSGGGDLRNPSCISAVYKYSSIAFVVSAVLSAVVFWKLK

[1529] SRKLRI

[1530] SEQ ID NO:95

[1531] YDL100C

[1532] >sp|Q12154|GET3_YEAST ATP酶GET3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝GET3 PE＝1 SV＝1

[1533] MDLTVEPNLHSLITSTTHKWIFVGGKGGVGKTTSSCSIAIQMALSQPNKQFLLISTDPAH

[1534] NLSDAFGEKFGKDARKVTGMNNLSCMEIDPSAALKDMNDMAVSRANNNGSDGQGDDLGSL

[1535] LQGGALADLTGSIPGIDEALSFMEVMKHIKRQEQGEGETFDTVIFDTAPTGHTLRFLQLP

[1536] NTLSKLLEKFGEITNKLGPMLNSFMGAGNVDISGKLNELKANVETIRQQFTDPDLTTFVC

[1537] VCISEFLSLYETERLIQELISYDMDVNSIIVNQLLFAENDQEHNCKRCQARWKMQKKYLD

[1538] QIDELYEDFHVVKMPLCAGEIRGLNNLTKFSQFLNKEYNPITDGKVIYELEDKE

[1539] SEQ ID NO:96

[1540] YDL245C

[1541] >sp|P54854|HXT15_YEAST己糖转运蛋白HXT15 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝HXT15 PE＝1 SV＝1

[1542] MASEQSSPEINADNLNSSAADVHVQPPGEKEWSDGFYDKEVINGNTPDAPKRGFLGYLII

[1543] YLLCYPVSFGGFLPGWDSGITAGFINMDNFKMNFGSYKHSTGEYYLSNVRMGLLVAMFSV

[1544] GCSIGGVAFARLADTLGRRLAIVIVVLVYMVGAIIQISSNHKWYQYFVGKIIYGLGAGGC

[1545] SVLCPMLLSEIAPTDLRGGLVSLYQLNMTFGIFLGYCSVYGTRKYSNTAQWRIPVGLCFL

[1546] WALIIIVGMLLVPESPRYLIECERHEEACVSIAKINKVSPEDPWVLKQADEINAGVLAQR

[1547] ELGEASWKELFSVKTKVLQRLITGILVQTFLQLTGENYFFFYGTTIFKSVGLTDGFETSI

[1548] VLGTVNFFSTIIAVMVVDKIGRRKCLLFGAASMMACMVIFASIGVKCLYPHGQDGPSSKG

[1549] AGNAMIVFTCFYIFCFATTWAPVAYIVVAESFPSKVKSKAMSISTAFNWLWQFLIGFFTP

[1550] FITGSIHFYYGYVFVGCLVAMFLYVFFFLPETIGLSLEEIQLLYEEGIKPWKSASWVPPS

[1551] RRGASSRETEAKKKSWKEVLKFPKSFN

[1552] SEQ ID NO:97

[1553] YDL247W

[1554] >sp|P0CD99|MPH2_YEASTα葡糖苷通透酶MPH2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MPH2 PE＝2 SV＝1

[1555] MKNLSFLINRRKENTSDSNVYPGKAKSHEPSWIEMDDQTKKDGLDIVHVEFSPDTRAPSD

[1556] SNKVITEIFDATEDAKEADESERGMPLATALNTYPKAAAWSLLVSTTLIMEGYDTAILGA

[1557] FYALPIFQRKFGSQNDKTGEWEISASWQIGLTLCYMAGEIVGLQLTGPSVDLVGNRYTLI

[1558] IALFFLAAFTFILYFCNSLGMIAVGQALCGMPWGCFQCLTVSYASEICPLALRYYLTTYS

[1559] NLCWLFGQLFAAGIMKNSQKKYADSELGYKLPFALQWILPVPLALGIFFAPESPWWLVKK

[1560] GRFDEARRSLRRTLSGKGPEKEILVTLEVDKIKVTIDKEKRLTSKEGSYSDCFEDKINRR

[1561] RTRITCLCWAGQATCGSILIGYSTYFYEKAGVSTEMSFTFSIIQYCLGICATFLSWWASK

[1562] YFGRYDLYAFGLAFQTIVFFIIGGLGCSSTHGSKMGSGSLLMAVAFFYNLGIAPVVFCLV

[1563] SEMPSSRLRTKTIILARNTYNVVSIICSVLILYQLNSKKWNWGAKSGFFWGVLCFCTLIW

[1564] AVVDLPETAGKTFVEINELFKLGVSARKFKSTKVDPFVVKTPLKTSLITTPREISKLPLQ

[1565] RNSNVSHHL

[1566] SEQ ID NO:98

[1567] YDR011W

[1568] >sp|P32568|SNQ2_YEAST蛋白SNQ2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SNQ2 PE＝1 SV＝2

[1569] MSNIKSTQDSSHNAVARSSSASFAASEESFTGITHDKDEQSDTPADKLTKMLTGPARDTA

[1570] SQISATVSEMAPDVVSKVESFADALSRHTTRSGAFNMDSDSDDGFDAHAIFESFVRDADE

[1571] QGIHIRKAGVTIEDVSAKGVDASALEGATFGNILCLPLTIFKGIKAKRHQKMRQIISNVN

[1572] ALAEAGEMILVLGRPGAGCSSFLKVTAGEIDQFAGGVSGEVAYDGIPQEEMMKRYKADVI

[1573] YNGELDVHFPYLTVKQTLDFAIACKTPALRVNNVSKKEYIASRRDLYATIFGLRHTYNTK

[1574] VGNDFVRGVSGGERKRVSIAEALAAKGSIYCWDNATRGLDASTALEYAKAIRIMTNLLKS

[1575] TAFVTIYQASENIYETFDKVTVLYSGKQIYFGLIHEAKPYFAKMGYLCPPRQATAEFLTA

[1576] LTDPNGFHLIKPGYENKVPRTAEEFETYWLNSPEFAQMKKDIAAYKEKVNTEKTKEVYDE

[1577] SMAQEKSKYTRKKSYYTVSYWEQVKLCTQRGFQRIYGNKSYTVINVCSAIIQSFITGSLF

[1578] YNTPSSTSGAFSRGGVLYFALLYYSLMGLANISFEHRPILQKHKGYSLYHPSAEAIGSTL

[1579] ASFPFRMIGLTCFFIILFFLSGLHRTAGSFFTIYLFLTMCSEAINGLFEMVSSVCDTLSQ

[1580] ANSISGILMMSISMYSTYMIQLPSMHPWFKWISYVLPIRYAFESMLNAEFHGRHMDCANT

[1581] LVPSGGDYDNLSDDYKVCAFVGSKPGQSYVLGDDYLKNQFQYVYKHTWRNFGILWCFLLG

[1582] YVVLKVIFTEYKRPVKGGGDALIFKKGSKRFIAHADEESPDNVNDIDAKEQFSSESSGAN

[1583] DEVFDDLEAKGVFIWKDVCFTIPYEGGKRMLLDNVSGYCIPGTMTALMGESGAGKTTLLN

[1584] TLAQRNVGIITGDMLVNGRPIDASFERRTGYVQQQDIHIAELTVRESLQFSARMRRPQHL

[1585] PDSEKMDYVEKIIRVLGMEEYAEALVGEVGCGLNVEQRKKLSIGVELVAKPDLLLFLDEP

[1586] TSGLDSQSSWAIIQLLRKLSKAGQSILCTIHQPSATLFEEFDRLLLLRKGGQTVYFGDIG

[1587] KNSATILNYFERNGARKCDSSENPAEYILEAIGAGATASVKEDWHEKWLNSVEFEQTKEK

[1588] VQDLINDLSKQETKSEVGDKPSKYATSYAYQFRYVLIRTSTSFWRSLNYIMSKMMLMLVG

[1589] GLYIGFTFFNVGKSYVGLQNAMFAAFISIILSAPAMNQIQGRAIASRELFEVRESQSNMF

[1590] HWSLVLITQYLSELPYHLFFSTIFFVSSYFPLRIFFEASRSAVYFLNYCIMFQLYYVGLG

[1591] LMILYMSPNLPSANVILGLCLSFMLSFCGVTQPVSLMPGFWTFMWKASPYTYFVQNLVGI

[1592] MLHKKPVVCKKKELNYFNPPNGSTCGEYMKPFLEKATGYIENPDATSDCAYCIYEVGDNY

[1593] LTHISSKYSYLWRNFGIFWIYIFFNIIAMVCVYYLFHVRQSSFLSPVSILNKIKNIRKKK

[1594] Q

[1595] SEQ ID NO:99

[1596] YDR292C

[1597] >sp|P32916|SRPR_YEAST信号识别颗粒受体亚基α同源物OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SRP101 PE＝1 SV＝2

[1598] MFDQLAVFTPQGQVLYQYNCLGKKFSEIQINSFISQLITSPVTRKESVANANTDGFDFNL

[1599] LTINSEHKNSPSFNALFYLNKQPELYFVVTFAEQTLELNQETQQTLALVLKLWNSLHLSE

[1600] SILKNRQGQNEKNKHNYVDILQGIEDDLKKFEQYFRIKYEESIKQDHINPDNFTKNGSVP

[1601] QSHNKNTKKKLRDTKGKKQSTGNVGSGRKWGRDGGMLDEMNHEDAAKLDFSSSNSHNSSQ

[1602] VALDSTINKDSFGDRTEGGDFLIKEIDDLLSSHKDEITSGNEAKNSGYVSTAFGFLQKHV

[1603] LGNKTINESDLKSVLEKLTQQLITKNVAPEAADYLTQQVSHDLVGSKTANWTSVENTARE

[1604] SLTKALTQILTPGVSVDLLREIQSKRSKKDEEGKCDPYVFSIVGVNGVGKSTNLSKLAFW

[1605] LLQNNFKVLIVACDTFRSGAVEQLRVHVENLAQLMDDSHVRGSKNKRGKTGNDYVELFEA

[1606] GYGGSDLVTKIAKQAIKYSRDQNFDIVLMDTAGRRHNDPTLMSPLKSFADQAKPDKIIMV

[1607] GEALVGTDSVQQAKNFNDAFGKGRNLDFFIISKCDTVGEMLGTMVNMVYATGIPILFVGV

[1608] GQTYTDLRTLSVKWAVNTLMS

[1609] SEQ ID NO:100

[1610] YDR497C

[1611] >sp|P30605|ITR1_YEAST肌醇转运蛋白1 OS＝酿酒酵母(菌株ATCC204508/S288c) GN＝ITR1 PE＝1 SV＝2

[1612] MGIHIPYLTSKTSQSNVGDAVGNADSVEFNSEHDSPSKRGKITLESHEIQRAPASDDEDR

[1613] IQIKPVNDEDDTSVMITFNQSLSPFIITLTFVASISGFMFGYDTGYISSALISIGTDLDH

[1614] KVLTYGEKEIVTAATSLGALITSIFAGTAADIFGRKRCLMGSNLMFVIGAILQVSAHTFW

[1615] QMAVGRLIMGFGVGIGSLIAPLFISEIAPKMIRGRLTVINSLWLTGGQLVAYGCGAGLNY

[1616] VNNGWRILVGLSLIPTAVQFTCLCFLPDTPRYYVMKGDLARATEVLKRSYTDTSEEIIER

[1617] KVEELVTLNQSIPGKNVPEKVWNTIKELHTVPSNLRALIIGCGLQAIQQFTGWNSLMYFS

[1618] GTIFETVGFKNSSAVSIIVSGTNFIFTLVAFFSIDKIGRRTILLIGLPGMTMALVVCSIA

[1619] FHFLGIKFDGAVAVVVSSGFSSWGIVIIVFIIVFAAFYALGIGTVPWQQSELFPQNVRGI

[1620] GTSYATATNWAGSLVIASTFLTMLQNITPAGTFAFFAGLSCLSTIFCYFCYPELSGLELE

[1621] EVQTILKDGFNIKASKALAKKRKQQVARVHELKYEPTQEIIEDI

[1622] SEQ ID NO:101

[1623] YEL006W

[1624] >sp|P39953|YEA6_YEAST线粒体烟酰胺腺嘌呤二核苷酸转运蛋白2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YEA6 PE＝1 SV＝1

[1625] MNNGDNKTTLENSKNASLANGNYAIPTKLNRLKKNADPRVAAISGALSGALSAMLVCPFD

[1626] VAKTRLQAQGLQNMTHQSQHYKGFFGTFATIFKDEGAAGLYKGLQPTVLGYIPTLMIYFS

[1627] VYDFCRKYSVDIFPHSPFLSNASSAITAGAISTVATNPIWVVKTRLMLQTGIGKYSTHYK

[1628] GTIDTFRKIIQQEGAKALYAGLVPALLGMLNVAIQFPLYENLKIRFGYSESTDVSTDVTS

[1629] SNFQKLILASMLSKMVASTVTYPHEILRTRMQLKSDLPNTVQRHLLPLIKITYRQEGFAG

[1630] FYSGFATNLVRTVPAAVVTLVSFEYSKKYLTTFFQ

[1631] SEQ ID NO:102

[1632] YEL027W

[1633] >sp|P25515|VATL1_YEAST V型质子ATP酶亚基c OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VMA3 PE＝1 SV＝1

[1634] MTELCPVYAPFFGAIGCASAIIFTSLGAAYGTAKSGVGICATCVLRPDLLFKNIVPVIMA

[1635] GIIAIYGLVVSVLVCYSLGQKQALYTGFIQLGAGLSVGLSGLAAGFAIGIVGDAGVRGSS

[1636] QQPRLFVGMILILIFAEVLGLYGLIVALLLNSRATQDVVC

[1637] SEQ ID NO:103

[1638] YEL065W

[1639] >sp|P39980|SIT1_YEAST铁载体铁转运蛋白1 OS＝酿酒酵母(菌株ATCC204508/S288c)GN＝SIT1 PE＝3 SV＝1

[1640] MDPGIANHTLPEEFEEVVVPEMLEKEVGAKVDVKPTLTTSSPAPSYIELIDPGVHNIEIY

[1641] AEMYNRPIYRVALFFSLFLIAYAYGLDGNIRYTFQAYATSSYSQHSLLSTVNCIKTVIAA

[1642] VGQIFFARLSDIFGRFSIMIVSIIFYSMGTIIESQAVNITRFAVGGCFYQLGLTGIILIL

[1643] EVIASDFSNLNWRLLALFIPALPFIINTWISGNVTSAIDANWKWGIGMWAFILPLACIPL

[1644] GICMLHMRYLARKHAKDRLKPEFEALNKLKWKSFCIDIAFWKLDIIGMLLITVFFGCVLV

[1645] PFTLAGGLKEEWKTAHIIVPEVIGWVVVLPLYMLWEIKYSRHPLTPWDLIQDRGIFFALL

[1646] IAFFINFNWYMQGDYMYTVLVVAVHESIKSATRITSLYSFVSVIVGTILGFILIKVRRTK

[1647] PFIIFGISCWIVSFGLLVHYRGDSGAHSGIIGSLCLLGFGAGSFTYVTQASIQASAKTHA

[1648] RMAVVTSLYLATYNIGSAFGSSVSGAVWTNILPKEISKRISDPTLAAQAYGSPFTFITTY

[1649] TWGTPERIALVMSYRYVQKILCIIGLVFCFPLLGCAFMLRNHKLTDSIALEGNDHLESKN

[1650] TFEIEEKEESFLKNKFFTHFTSSKDRKD

[1651] SEQ ID NO:104

[1652] YER019C-A

[1653] >sp|P52871|SC6B2_YEAST蛋白转运蛋白SBH2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SBH2 PE＝1 SV＝1

[1654] MAASVPPGGQRILQKRRQAQSIKEKQAKQTPTSTRQAGYGGSSSSILKLYTDEANGFRVD

[1655] SLVVLFLSVGFIFSVIALHLLTKFTHII

[1656] SEQ ID NO:105

[1657] YER053C

[1658] >sp|P40035|PIC2_YEAST线粒体磷酸运载蛋白2 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PIC2 PE＝1 SV＝1

[1659] MESNKQPRKIQLYTKEFYATCTLGGIIACGPTHSSITPLDLVKCRLQVNPKLYTSNLQGF

[1660] RKIIANEGWKKVYTGFGATFVGYSLQGAGKYGGYEYFKHLYSSWLSPGVTVYLMASATAE

[1661] FLADIMLCPFEAIKVKQQTTMPPFCNNVVDGWKKMYAESGGMKAFYKGIVPLWCRQIPYT

[1662] MCKFTSFEKIVQKIYSVLPKKKEEMNALQQISVSFVGGYLAGILCAAVSHPADVMVSKIN

[1663] SERKANESMSVASKRIYQKIGFTGLWNGLMVRIVMIGTLTSFQWLIYDSFKAYVGLPTTG

[1664] SEQ ID NO:106

[1665] YER119C

[1666] >sp|P40074|AVT6_YEAST液泡氨基酸转运蛋白6 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝AVT6 PE＝1 SV＝1

[1667] MVASIRSGVLTLLHTACGAGILAMPYAFKPFGLIPGVIMIVLCGACAMQSLFIQARVAKY

[1668] VPQGRASFSALTRLINPNLGIVFDLAIAIKCFGVGVSYMIVVGDLMPQIMSVWTRNAWLL

[1669] NRNVQISLIMLFFVAPLSFLKKLNSLRYASMVAISSVAYLCVLVLLHYVAPSDEILRLKG

[1670] RISYLLPPQSHDLNVLNTLPIFVFAYTCHHNMFSIINEQRSSRFEHVMKIPLIAISLALI

[1671] LYIAIGCAGYLTFGDNIIGNIIMLYPQAVSSTIGRIAIVLLVMLAFPLQCHPARASIHQI

[1672] LQHFAEENVSISATSADEPTVATESSPLIRDSSLDLNEVIEEESIYQPKETPLRGKSFIV

[1673] ITCSILVASYLVAISVSSLARVLAIVGATGSTSISFILPGLFGYKLIGTEHKTAVPLTTK

[1674] IFKYTGLLLFIWGLIIMITCLTAALKLN

[1675] SEQ ID NO:107

[1676] YFL028C

[1677] >sp|P43569|CAF16_YEAST CCR4相关因子16 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝CAF16 PE＝1 SV＝1

[1678] MVSQFAIEVRNLTYKFKESSDPSVVDINLQIPWNTRSLVVGANGAGKSTLLKLLSGKHLC

[1679] LDGKILVNGLDPFSPLSMNQVDDDESVEDSTNYQTTTYLGTEWCHMSIINRDIGVLELLK

[1680] SIGFDHFRERGERLVRILDIDVRWRMHRLSDGQKRRVQLAMGLLKPWRVLLLDEVTVDLD

[1681] VIARARLLEFLKWETETRRCSVVYATHIFDGLAKWPNQVYHMKSGKIVDNLDYQKDVEFS

[1682] EVVNAKVNGQVAFENDNNKVVISKVNSLHPLALEWLKRDNQIPDKEIGI

[1683] SEQ ID NO:108

[1684] YFR045W

[1685] >sp|P43617|YFL5_YEAST未表征的线粒体运载体YFR045W OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YFR045W PE＝1 SV＝3

[1686] MANQNSDLYKQITAGSVAAVFQTTMTYPFEYLKTGLQLQPKGTAFEIILPQIKSYFVGCS

[1687] ALNVAAFGKTILRFVTFDKLCHSLNNNIDNNDNFQRLTGYNLLIAGTLTGIVESLFIIPF

[1688] ENIKTTLIQSAMIDHKKLEKNQPVVNAKATFHKVATKSTPVARIEKLLPAVKHMYQTRGP

[1689] AAFVQGTTATIFRQIANTSIQFTAYTAFKRLLQARNDKASSVITGLATSFTLVAMTQPID

[1690] VVKTRMMSQNAKTEYKNTLNCMYRIFVQEGMATFWKGSIFRFMKVGISGGLTFTVYEQVS

[1691] LLLGFSSRS

[1692] SEQ ID NO:109

[1693] YGL084C

[1694] >sp|P53154|GUP1_YEAST甘油摄取蛋白1 OS＝酿酒酵母(菌株ATCC204508/S288c)GN＝GUP1 PE＝1 SV＝1

[1695] MSLISILSPLITSEGLDSRIKPSPKKDASTTTKPSLWKTTEFKFYYIAFLVVVPLMFYAG

[1696] LQASSPENPNYARYERLLSQGWLFGRKVDNSDSQYRFFRDNFALLSVLMLVHTSIKRIVL

[1697] YSTNITKLRFDLIFGLIFLVAAHGVNSIRILAHMLILYAIAHVLKNFRRIATISIWIYGI

[1698] STLFINDNFRAYPFGNICSFLSPLDHWYRGIIPRWDVFFNFTLLRVLSYNLDFLERWENL

[1699] QKKKSPSYESKEAKSAILLNERARLTAAHPIQDYSLMNYIAYVTYTPLFIAGPIITFNDY

[1700] VYQSKHTLPSINFKFIFYYAVRFVIALLSMEFILHFLHVVAISKTKAWENDTPFQISMIG

[1701] LFNLNIIWLKLLIPWRLFRLWALLDGIDTPENMIRCVDNNYSSLAFWRAWHRSYNKWVVR

[1702] YIYIPLGGSKNRVLTSLAVFSFVAIWHDIELKLLLWGWLIVLFLLPEIFATQIFSHYTDA

[1703] VWYRHVCAVGAVFNIWVMMIANLFGFCLGSDGTKKLLSDMFCTVSGFKFVILASVSLFIA

[1704] VQIMFEIREEEKRHGIYLKC

[1705] SEQ ID NO:110

[1706] YGL104C

[1707] >sp|P53142|VPS73_YEAST液泡蛋白分选相关蛋白73 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VPS73 PE＝1 SV＝1

[1708] MNRILSSASLLSNVSMPRQNKHKITKALCYAIIVASIGSIQFGYHLSELNAPQQVLSCSE

[1709] FDIPMEGYPYDRTWLGKRGYKQCIPLNDEQIGIVTSVFCIGGILGSYFATSLANIYGRKF

[1710] SSLINCTLNIVGSLIIFNSNSYRGLIIGRILVGISCGSLIVIIPLFIKEVAPSGWEGLLG

[1711] SMTQICIRLGVLLTQGIALPLTDSYRWRWILFGSFLIAVLNFFMWFIVDESPKWLLAHGR

[1712] VTDAKLSLCKLRGVTFDEAAQEIQDWQLQIESGDPLIEPTTTNSISGSNSLWKYLRDRTN

[1713] VKSRHVITVLLFGQQFCGINSIVLYGTKIISQLYPQHAIRINFFISMVNVLVTILVSLLI

[1714] HSLPRKPLLMTSTVLVSVTAFIMGIAMNHNKMNLLIVFSFIYMGVFTMGLNPLPFIIMRE

[1715] VSKPQDMVLAQRYGTICNWVGTFIIAYTFPIIHDVLSGYVFIIFAIIACSISAFIWKKVP

[1716] ETKRSG

[1717] SEQ ID NO:111

[1718] YGL114W

[1719] >sp|P53134|YGL4_YEAST推定的寡肽转运蛋白YGL114W OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YGL114W PE＝1 SV＝1

[1720] MPQSTPSQEVQRVPWDNKPALKQITLRATIAGIAIGSLVLTSNFQFGLQTGWVSMMSLPS

[1721] ALLACAFFKNIWPLIFPNDRPFSDVENVYVQSMAVAVGTGPLAFGFVGVIPAIEKFLTND

[1722] ESGGLREQGQSFTFRELLIWSTALAFFGIFFAVPLRKQVIVREKLPFPSGSATATLISVL

[1723] NGTEILQEVSKSELLEMRQRRLNECPEVLQPNRDPEEADYLMNSSHSELGDYTATSQDGS

[1724] SILSTGSENYRANIIILLKTFVVSSLYTMVSYFVPVIRSIPVFGKYLSNNYLWNFQPSPA

[1725] YIGQGIIMGLPTVSYMLIGCFLGWGVLAPLARYKRWVPPDADVHDWEEGVQGWILWSSLS

[1726] IMVADSVVAFIVVTVKSIVKFILIDDKAALLNNIIDDTFQSMLLEEERAINSSRRNTYVD

[1727] GRQDTVRLVSRDNEIEVDSKHLVRYTTVISGCLVSSIICIVSIIYLFGIQVIPLYAIITA

[1728] LILALFLSILGIRALGETDLNPVSGIGKISQLIFAFIIPRDRPGSVLMNVVSGGIAEASA

[1729] QQAGDLMQDLKTGHLLGASPRAQFCAQLIGACWSIILSSFMYLCYNKVYSIPSEQFRIPT

[1730] AVVWIDCARLVTGKGLPDKALECSMILGVIFAVLSLIRNTYRDYGYGWILYIPSGVAVGV

[1731] GIFNSPSFTIARFIGGWASHFWLKNHRGDLNAKTKMIVFSSGLVLGEGIFSVINMLFICL

[1732] NVPHY

[1733] SEQ ID NO:112

[1734] YGL167C

[1735] >sp|P13586|ATC1_YEAST钙转运ATP酶1 OS＝酿酒酵母(菌株ATCC204508/S288c) GN＝PMR1 PE＝1 SV＝1

[1736] MSDNPFNASLLDEDSNREREILDATAEALSKPSPSLEYCTLSVDEALEKLDTDKNGGLRS

[1737] SNEANNRRSLYGPNEITVEDDESLFKKFLSNFIEDRMILLLIGSAVVSLFMGNIDDAVSI

[1738] TLAIFIVVTVGFVQEYRSEKSLEALNKLVPAECHLMRCGQESHVLASTLVPGDLVHFRIG

[1739] DRIPADIRIIEAIDLSIDESNLTGENEPVHKTSQTIEKSSFNDQPNSIVPISERSCIAYM

[1740] GTLVKEGHGKGIVVGTGTNTSFGAVFEMMNNIEKPKTPLQLTMDKLGKDLSLVSFIVIGM

[1741] ICLVGIIQGRSWLEMFQISVSLAVAAIPEGLPIIVTVTLALGVLRMAKRKAIVRRLPSVE

[1742] TLGSVNVICSDKTGTLTSNHMTVSKLWCLDSMSNKLNVLSLDKNKKTKNSNGNLKNYLTE

[1743] DVRETLTIGNLCNNASFSQEHAIFLGNPTDVALLEQLANFEMPDIRNTVQKVQELPFNSK

[1744] RKLMATKILNPVDNKCTVYVKGAFERILEYSTSYLKSKGKKTEKLTEAQKATINECANSM

[1745] ASEGLRVFGFAKLTLSDSSTPLTEDLIKDLTFTGLIGMNDPPRPNVKFAIEQLLQGGVHI

[1746] IMITGDSENTAVNIAKQIGIPVIDPKLSVLSGDKLDEMSDDQLANVIDHVNIFARATPEH

[1747] KLNIVRALRKRGDVVAMTGDGVNDAPALKLSDIGVSMGRIGTDVAKEASDMVLTDDDFST

[1748] ILTAIEEGKGIFNNIQNFLTFQLSTSVAALSLVALSTAFKLPNPLNAMQILWINILMDGP

[1749] PAQSLGVEPVDHEVMKKPPRKRTDKILTHDVMKRLLTTAACIIVGTVYIFVKEMAEDGKV

[1750] TARDTTMTFTCFVFFDMFNALACRHNTKSIFEIGFFTNKMFNYAVGLSLLGQMCAIYIPF

[1751] FQSIFKTEKLGISDILLLLLISSSVFIVDELRKLWTRKKNEEDSTYFSNV

[1752] SEQ ID NO:113

[1753] YGR257C

[1754] >sp|P53320|MTM1_YEAST线粒体运载蛋白MTM1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MTM1 PE＝1 SV＝1

[1755] MSDRNTSNSLTLKERMLSAGAGSVLTSLILTPMDVVRIRLQQQQMIPDCSCDGAAEVPNA

[1756] VSSGSKMKTFTNVGGQNLNNAKIFWESACFQELHCKNSSLKFNGTLEAFTKIASVEGITS

[1757] LWRGISLTLLMAIPANMVYFSGYEYIRDVSPIASTYPTLNPLFCGAIARVFAATSIAPLE

[1758] LVKTKLQSIPRSSKSTKTWMMVKDLLNETRQEMKMVGPSRALFKGLEITLWRDVPFSAIY

[1759] WSSYELCKERLWLDSTRFASKDANWVHFINSFASGCISGMIAAICTHPFDVGKTRWQISM

[1760] MNNSDPKGGNRSRNMFKFLETIWRTEGLAALYTGLAARVIKIRPSCAIMISSYEISKKVF

[1761] GNKLHQ

[1762] SEQ ID NO:114

[1763] YHL035C

[1764] >sp|P38735|VMR1_YEAST ABC转运蛋白ATP结合蛋白/通透酶VMR1OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VMR1 PE＝2 SV＝1

[1765] MGTDPLIIRNNGSFWEVDDFTRLGRTQLLSYYLPLAIIASIGIFALCRSGLSRYVRSAEC

[1766] DLVNEYLFGAQEERKEDNSIERLLRNSNTQANYVNVKKQGRILKLRHFDITTIDVKQIDA

[1767] KNHGGLTFSRPSTSDHLRKSSEIVLMSLQIIGLSFLRVTKINIELTNRDVTTLLLFWLIL

[1768] LSLSILRVYKRSTNLWAICFTAHTTIWISTWIPIRSVYIGNIDDVPSQIFYIFEFVITST

[1769] LQPIKLTSPIKDNSSIIYVRDDHTSPSREHISSILSCITWSWITNFIWEAQKNTIKLKDI

[1770] WGLSMEDYSIFILKGFTRRNKHINNLTLALFESFKTYLLIGMLWVLVNSIVNLLPTILMK

[1771] RFLEIVDNPNRSSSCMNLAWLYIIGMFICRLTLAICNSQGQFVSDKICLRIRAILIGEIY

[1772] AKGLRRRLFTSPKTSSDSDSISANLGTIINLISIDSFKVSELANYLYVTVQAVIMIIVVV

[1773] GLLFNFLGVSAFAGISIILVMFPLNFLLANLLGKFQKQTLKCTDQRISKLNECLQNIRIV

[1774] KYFAWERNIINEIKSIRQKELRSLLKKSLVWSVTSFLWFVTPTLVTGVTFAICTFVQHED

[1775] LNAPLAFTTLSLFTLLKTPLDQLSNMLSFINQSKVSLKRISDFLRMDDTEKYNQLTISPD

[1776] KNKIEFKNATLTWNENDSDMNAFKLCGLNIKFQIGKLNLILGSTGSGKSALLLGLLGELN

[1777] LISGSIIVPSLEPKHDLIPDCEGLTNSFAYCSQSAWLLNDTVKNNIIFDNFYNEDRYNKV

[1778] IDACGLKRDLEILPAGDLTEIGEKGITLSGGQKQRISLARAVYSSAKHVLLDDCLSAVDS

[1779] HTAVWIYENCITGPLMKNRTCILVTHNVSLTLRNAHFAIVLENGKVKNQGTITELQSKGL

[1780] FKEKYVQLSSRDSINEKNANRLKAPRKNDSQKIEPVTENINFDANFVNDGQLIEEEEKSN

[1781] GAISPDVYKWYLKFFGGFKALTALFALYITAQILFISQSWWIRHWVNDTNVRINAPGFAM

[1782] DTLPLKGMTDSSKNKHNAFYYLTVYFLIGIIQAMLGGFKTMMTFLSGMRASRKIFNNLLD

[1783] LVLHAQIRFFDVTPVGRIMNRFSKDIEGVDQELIPYLEVTIFCLIQCASIIFLITVITPR

[1784] FLTVAVIVFVLYFFVGKWYLTASRELKRLDSITKSPIFQHFSETLVGVCTIRAFGDERRF

[1785] ILENMNKIDQNNRAFFYLSVTVKWFSFRVDMIGAFIVLASGSFILLNIANIDSGLAGISL

[1786] TYAILFTDGALWLVRLYSTFEMNMNSVERLKEYSSIEQENYLGHDEGRILLLNEPSWPKD

[1787] GEIEIENLSLRYAPNLPPVIRNVSFKVDPQSKIGIVGRTGAGKSTIITALFRLLEPITGC

[1788] IKIDGQDISKIDLVTLRRSITIIPQDPILFAGTIKSNVDPYDEYDEKKIFKALSQVNLIS

[1789] SHEFEEVLNSEERFNSTHNKFLNLHTEIAEGGLNLSQGERQLLFIARSLLREPKIILLDE

[1790] ATSSIDYDSDHLIQGIIRSEFNKSTILTIAHRLRSVIDYDRIIVMDAGEVKEYDRPSELL

[1791] KDERGIFYSMCRDSGGLELLKQIAKQSSKMMK

[1792] SEQ ID NO:115

[1793] YHL036W

[1794] >sp|P38734|MUP3_YEAST低亲和性甲硫氨酸通透酶OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MUP3 PE＝1 SV＝1

[1795] MEPLLFNSGKANPSQDVFIDVEVGDITTKYGSTNTGSFSSMDTVEAQAIKAETARFMEVP

[1796] QGRHLGVFSTVVLFVSRIMGSGIFAVPSVILLNTGGNKLIYFAIWVFSAAIAFAGLYLFL

[1797] EFGSWIPKSGGRKNFLERSFERPRLLISVVFSCYSVLTGYALTGSIVFGKYVLSAFGVTD

[1798] DSWSKYVSISFIIFAVLIHGVSVRHGVFIQNALGGLKLIMIVLMCFAGLYTLFFYKSTGQ

[1799] VAWDLPVTQVEKDSLLSVSSIATAFISSFFCFSGWDTVHTVTSEIKNPVKTLKVSGPLSL

[1800] IICFVCYTMMNVAYLKVLTYEEIVSAGPLVGSVLFTKLFGPRVGGKFIAFSIAISAASNI

[1801] LVVIYSISRVNQEIFKEGYLPFSIHMSKNWPFDAPLPSISLCGFITIAWILILPKEGESF

[1802] NYLVSMDGYGNQFFLLLVAIGLFIWRFKHKNEVPEIRASTFGVLAIITLSLYMLMAPFFA

[1803] DPSLNRVGFLPPYQIMSLLVIVACFFFWLVKFVLLPKFFHYKLLPKITYLHDGLIVTEWV

[1804] KKPCLC

[1805] SEQ ID NO:116

[1806] YHR002W

[1807] >sp|P38702|LEU5_YEAST线粒体运载蛋白LEU5 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝LEU5 PE＝3 SV＝1

[1808] MTRDSPDSNDSYKHINKNTTQKTSFDRNSFDYIVRSGLAGGISGSCAKTLIAPLDRIKIL

[1809] FQTSNPHYTKYTGSLIGLVEAAKHIWINDGVRGFFQGHSATLLRIFPYAAVKFVAYEQIR

[1810] NTLIPSKEFESHWRRLVSGSLAGLCSVFITYPLDLVRVRLAYETEHKRVKLGRIIKKIYK

[1811] EPASATLIKNDYIPNWFCHWCNFYRGYVPTVLGMIPYAGVSFFAHDLLHDVLKSPFFAPY

[1812] SVLELSEDDELERVQKKQRRPLRTWAELISGGLAGMASQTAAYPFEIIRRRLQVSALSPK

[1813] TMYDHKFQSISEIAHIIFKERGVRGFFVGLSIGYIKVTPMVACSFFVYERMKWNFGI

[1814] SEQ ID NO:117

[1815] YHR096C

[1816] >sp|P38695|HXT5_YEAST可能的葡萄糖转运蛋白HXT5 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝HXT5 PE＝1 SV＝1

[1817] MSELENAHQGPLEGSATVSTNSNSYNEKSGNSTAPGTAGYNDNLAQAKPVSSYISHEGPP

[1818] KDELEELQKEVDKQLEKKSKSDLLFVSVCCLMVAFGGFVFGWDTGTISGFVRQTDFIRRF

[1819] GSTRANGTTYLSDVRTGLMVSIFNIGCAIGGIVLSKLGDMYGRKIGLMTVVVIYSIGIII

[1820] QIASIDKWYQYFIGRIISGLGVGGITVLAPMLISEVSPKQLRGTLVSCYQLMITFGIFLG

[1821] YCTNFGTKNYSNSVQWRVPLGLCFAWSIFMIVGMTFVPESPRYLVEVGKIEEAKRSLARA

[1822] NKTTEDSPLVTLEMENYQSSIEAERLAGSASWGELVTGKPQMFRRTLMGMMIQSLQQLTG

[1823] DNYFFYYGTTIFQAVGLEDSFETAIVLGVVNFVSTFFSLYTVDRFGRRNCLLWGCVGMIC

[1824] CYVVYASVGVTRLWPNGQDQPSSKGAGNCMIVFACFYIFCFATTWAPVAYVLISESYPLR

[1825] VRGKAMSIASACNWIWGFLISFFTPFITSAINFYYGYVFMGCMVFAYFYVFFFVPETKGL

[1826] TLEEVNEMYEENVLPWKSTKWIPPSRRTTDYDLDATRNDPRPFYKRMFTKEK

[1827] SEQ ID NO:118

[1828] YIL006W

[1829] >sp|P40556|YIA6_YEAST线粒体烟酰胺腺嘌呤二核苷酸转运体1OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YIA6 PE＝1 SV＝1

[1830] MTQTDNPVPNCGLLPEQQYCSADHEEPLLLHEEQLIFPDHSSQLSSADIIEPIKMNSSTE

[1831] SIIGTTLRKKWVPLSSTQITALSGAFAGFLSGVAVCPLDVAKTRLQAQGLQTRFENPYYR

[1832] GIMGTLSTIVRDEGPRGLYKGLVPIVLGYFPTWMIYFSVYEFSKKFFHGIFPQFDFVAQS

[1833] CAAITAGAASTTLTNPIWVVKTRLMLQSNLGEHPTHYKGTFDAFRKLFYQEGFKALYAGL

[1834] VPSLLGLFHVAIHFPIYEDLKVRFHCYSRENNTNSINLQRLIMASSVSKMIASAVTYPHE

[1835] ILRTRMQLKSDIPDSIQRRLFPLIKATYAQEGLKGFYSGFTTNLVRTIPASAITLVSFEY

[1836] FRNRLENISTMVI

[1837] SEQ ID NO:119

[1838] YIL120W

[1839] >sp|P40475|QDR1_YEAST奎尼定耐药蛋白1OS＝酿酒酵母(菌株ATCC204508/S288c)GN＝QDR1 PE＝1 SV＝1

[1840] MTKQQTSVMRNASIAKEEREGSDNNNVDRSSSDAISDNDAERSNSHSEIDNESNFDMVPY

[1841] SRFSHKQKMLLVVQCAFTGFFSTVAGSIYYPVLTIIERKFNITEELANVTIVVYFIFQGV

[1842] APSIMGGLADTFGRRPIVLWAILAYFCACIGLACAHNYAQILALRCLQAAGISPVIAINS

[1843] GIMGDVTTKVERGGYVGLVAGFQVVGTAFGALIGAGLSSKWGWRAIFWFLAIGSGICLVF

[1844] STLLMPETKRTLVGNGSVTPRSFLNRSLILHVGSVKKTLHLDDPDPETLEPRTSVDFLAP

[1845] LKILHIREIDILLSIAGLQFSTWTTHQTALTIVLSKKYNLSVAKIGLCFLPAGISTLTSI

[1846] ISAGRYLNWSYRTRKVKYNRWIKEQELQLMEKYKGDKNKVAELIHSNSHYAFNLVEARLH

[1847] PAFVTLLLSSIGFTAFGWCISVKTPLAAVLCTSAFASLFSNCILTFSTTLIVDLFPSKAS

[1848] TATGCLNLFRCLLSAIFIAALTKMVEKMRYGGVFTFLSAITSSSSLLLFYLLKNGKQLSF

[1849] DRIRANDKSAGRSVGKNSEKVST

[1850] SEQ ID NO:120

[1851] YIL121W

[1852] >sp|P40474|QDR2_YEAST奎尼定耐药蛋白2OS＝酿酒酵母(菌株ATCC204508/S288c)GN＝QDR2 PE＝1 SV＝1

[1853] MAGATSSIIRENDFEDELAESMQSYNRETADKLALTRTESVKPEPEITAPPHSRFSRSFK

[1854] TVLIAQCAFTGFFSTIAGAIYYPVLSVIERKFDIDEELVNVTVVVYFVFQGLAPTFMGGF

[1855] ADSLGRRPVVLVAIVIYFGACIGLACAQTYAQIIVLRCLQAAGISPVIAINSGIMGDVTT

[1856] RAERGGYVGYVAGFQVLGSAFGALIGAGLSSRWGWRAIFWFLAIGSGICFLASFLILPET

[1857] KRNISGNGSVTPKSYLNRAPILVLPTVRKSLHLDNPDYETLELPTQLNLLAPFKILKAYE

[1858] ICILMLVAGLQFAMYTTHLTALSTALSKQYHLTVAKVGLCYLPSGICTLCSIVIAGRYLN

[1859] WNYRRRLKYYQNWLGKKRSKLLEEHDNDLNLVQRIIENDPKYTFNIFKARLQPAFVTLLL

[1860] SSSGFCAYGWCITVKAPLAAVLCMSGFASLFSNCILTFSTTLIVDLFPTKTSTATGCLNL

[1861] FRCILSAVFIAALSKMVEKMKFGGVFTFLGALTSSSSILLFILLRKGKELAFKRKKQELG

[1862] VN

[1863] SEQ ID NO:121

[1864] YIL166C

[1865] >sp|P40445|YIQ6_YEAST未表征的转运蛋白YIL166C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YIL166C PE＝1 SV＝1

[1866] MSVQKEEYDIVEKAQLSVSAESLTSDSESISHNPFDDFHKAERWRKVYESSGYEGLSKFD

[1867] PEFTWTKDEEKKLVRKMDLKIFLWVFIMFAFLDLIRKNIARAVSDNFIVDLKMNTNDYNL

[1868] GQTVYLVIFLASELPGNLLSKRFGPERVIPVQIVLWSVICITQAGLKNRGQFIATRCLLG

[1869] MVQGGFIPDNILYLSYYYTGAELTFRLSFFWCAIPLFQILGSLLASGIIEMRGIHNLAGW

[1870] QYLFIIEGFLSLSVGVASFYLMRRGPTQTGESAFHKGKSLFTEYEEKIMVNRILRDDPSK

[1871] GDMSNRQPVTFKEILYTLTEFDLWPLFIQGITAFISLQTVGSYLSLILKSLNYSTFLSNI

[1872] LAIPGQALLLINLPLAALLSRKLKEKSLCVGIANVWVLPFIVSLVALPTDTNPWIKYILL

[1873] TGILGLPYTHSILAGWVSEISNSVRSRTVGTALYNMSAQVGAIIASNMYRNDDKPYYTRG

[1874] NKILLGFTCFNICMAVATKFYYISRNKYKDRKWNSMTKEEQINYLDTTKDKGMKRLDYRF

[1875] IH

[1876] SEQ ID NO:122

[1877] YJL133W

[1878] >sp|P10566|MRS3_YEAST线粒体RNA剪接蛋白MRS3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝MRS3 PE＝1 SV＝4

[1879] MVENSSSNNSTRPIPAIPMDLPDYEALPTHAPLYHQLIAGAFAGIMEHSVMFPIDALKTR

[1880] IQSANAKSLSAKNMLSQISHISTSEGTLALWKGVQSVILGAGPAHAVYFGTYEFCKKNLI

[1881] DSSDTQTHHPFKTAISGACATTASDALMNPFDTIKQRIQLNTSASVWQTTKQIYQSEGLA

[1882] AFYYSYPTTLVMNIPFAAFNFVIYESSTKFLNPSNEYNPLIHCLCGSISGSTCAAITTPL

[1883] DCIKTVLQIRGSQTVSLEIMRKADTFSKAASAIYQVYGWKGFWRGWKPRIVANMPATAIS

[1884] WTAYECAKHFLMTY

[1885] SEQ ID NO:123

[1886] YJL219W

[1887] >sp|P40885|HXT9_YEAST己糖转运蛋白HXT9 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝HXT9 PE＝1 SV＝1

[1888] MSGVNNTSANDLSTTESNSNSVANAPSVKTEHNDSKNSLNLDATEPPIDLPQKPLSAYTT

[1889] VAILCLMIAFGGFIFGWDTGTISGFVNLSDFIRRFGQKNDKGTYYLSKVRMGLIVSIFNI

[1890] GCAIGGIVLSKVGDIYGRRIGLITVTAIYVVGILIQITSINKWYQYFIGRIISGLGVGGI

[1891] AVLSPMLISEVAPKQIRGTLVQLYQLMCTMGIFLGYCTNYGTKNYHNATQWRVGLGLCFA

[1892] WTTFMVSGMMFVPESPRYLIEVGKDEEAKRSLSKSNKVSVDDPALLAEYDTIKAGIELEK

[1893] LAGNASWSELLSTKTKVFQRVLMGVMIQSLQQLTGDNYFFYYGTTIFKSVGLKDSFQTSI

[1894] IIGVVNFFSSFIAVYTIERFGRRTCLLWGAASMLCCFAVFASVGVTKLWPQGSSHQDITS

[1895] QGAGNCMIVFTMFFIFSFATTWAGGCYVIVSETFPLRVKSRGMAIATAANWMWGFLISFF

[1896] TPFITGAINFYYGYVFLGCLVFAYFYVFFFVPETKGLTLEEVNTMWLEGVPAWKSASWVP

[1897] PERRTADYDADAIDHDDRPIYKRFFSS

[1898] SEQ ID NO:124

[1899] YKL016C

[1900] >sp|P30902|ATP7_YEAST ATP合酶亚基d,线粒体OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ATP7 PE＝1 SV＝2

[1901] MSLAKSAANKLDWAKVISSLRITGSTATQLSSFKKRNDEARRQLLELQSQPTEVDFSHYR

[1902] SVLKNTSVIDKIESYVKQYKPVKIDASKQLQVIESFEKHAMTNAKETESLVSKELKDLQS

[1903] TLDNIQSARPFDELTVDDLTKIKPEIDAKVEEMVKKGKWDVPGYKDRFGNLNVM

[1904] SEQ ID NO:125

[1905] YKL050C

[1906] >sp|P35736|YKF0_YEAST未表征的蛋白质YKL050C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YKL050C PE＝1 SV＝1

[1907] MSLISALQTTDVESVQTSPEQITERKAVRVSTLQESLHSSEMHRAAPETPRSISNSVHKL

[1908] KTIYSTYQQSGQPLSKEAIFRAKQKYGILNTPANYKTLGLGDSKSESVDLAARLASKRTK

[1909] VSPDDCVETAIEQKARGEAFKVTFSKIPLTPPEDVPITVNLGLKGRRDFLTRLAAQKALA

[1910] FSPSLDNSMKGTSDSSSVKKKRFSGAPIGNEFDANLVNPQHPAGFKSLDLSKVLDGAERR

[1911] AISRVNDRLYPQKVNFKNGLQSSDQSGVSKANKEVFKKGTLEKLEHSAEQFLESHAGNER

[1912] QRLSDQQYMCAKGAADAVKDLDPKTLEDPDFAAREAQKKLYIKQVASPVVLNEAQKLANR

[1913] KLQDIDSRDTYMLLFGNQAYNKLAVNIALQHYSVKQEEKKKIYLGGGLWMTPEEVNAVAK

[1914] KLISPVVNEIDERASRQRDVDKDIERRSRVLDQEYEDGNSMERAKEQNDGQLLLAMASKQ

[1915] QQEKEAKKAEEGQRYDQFVQKMNIKLQQKEKELENARENRENLRNELQERLSKNLSGEND

[1916] ELNDWNDACERDLKNSSIEHYYAVRSHFDNLGNSERGYDELLEERSKIQVEIERLVASIA

[1917] EHKTAIHGFGETADAGGAIPAVQKQKIPTRKDLLDATVNDPLVISAEMAKEEAEMATEEC

[1918] MLKELQVDEMIIIRNIMLRECEKKLEEEKETAKRSRRGTEESKNNSNFSRDVIMSTPDNN

[1919] EKVTPIGKSASPKDVVKSRFLSTYNTGKDIDSSASARSITGVSGVLDDGPKTPTSNKENE

[1920] LIDDEVKSYKVHQAVDGTGEDSIANKRDKSSRPAANSGGSITIEQFLFNKNADKQGLSKT

[1921] ESVTMKREPVVDQMDSKKGHDFTHCNDNGRRSFSGFSQGSIENDYSNEVTDDQDDQEGSE

[1922] IRVRDSNDSNTSPKESFFKEVI

[1923] SEQ ID NO:126

[1924] YKL120W

[1925] >sp|P32332|OAC1_YEAST线粒体草酰乙酸盐/酯转运蛋白OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝OAC1 PE＝1 SV＝1

[1926] MSSDNSKQDKQIEKTAAQKISKFGSFVAGGLAACIAVTVTNPIELIKIRMQLQGEMSASA

[1927] AKVYKNPIQGMAVIFKNEGIKGLQKGLNAAYIYQIGLNGSRLGFYEPIRSSLNQLFFPDQ

[1928] EPHKVQSVGVNVFSGAASGIIGAVIGSPLFLVKTRLQSYSEFIKIGEQTHYTGVWNGLVT

[1929] IFKTEGVKGLFRGIDAAILRTGAGSSVQLPIYNTAKNILVKNDLMKDGPALHLTASTISG

[1930] LGVAVVMNPWDVILTRIYNQKGDLYKGPIDCLVKTVRIEGVTALYKGFAAQVFRIAPHTI

[1931] MCLTFMEQTMKLVYSIESRVLGHN

[1932] SEQ ID NO:127

[1933] YKL146W

[1934] >sp|P36062|AVT3_YEAST液泡氨基酸转运蛋白3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝AVT3 PE＝1 SV＝1

[1935] MNGKEVSSGSGRTQSNNNKKNNNGGSTGISHASGSPLTDGNGGNSNGNSRSRSRSRKSSG

[1936] TTGGLLKKPPLLVNNEAVHASVPDASHTSCNNGTLEVSINNPEPHVVDAVARHLIRNPSN

[1937] SLQLQGGDITRDLYKWTNDHPSSPSQYQYPSQPALSTSIPSQAPSFSNRKRSMSFSAASI

[1938] ASSSHLNNNSEANGNPLAAIGLAPAPMTHEEIRAPGGFRRSFIIQKRRKHNVDAPIPNFF

[1939] TRNFIEFLTLYGHFAGEDLSEEEEEEEETEEEPEEEALETESTQLVSREHGRHPHKSSTV

[1940] KAVLLLLKSFVGTGVLFLPKAFHNGGWGFSALCLLSCALISYGCFVSLITTKDKVGVDGY

[1941] GDMGRILYGPKMKFAILSSIALSQIGFSAAYTVFTATNLQVFSENFFHLKPGSISLATYI

[1942] FAQVLIFVPLSLTRNIAKLSGTALIADLFILLGLVYVYVYSIYYIAVNGVASDTMLMFNK

[1943] ADWSLFIGTAIFTFEGIGLLIPIQESMKHPKHFRPSLSAVMCIVAVIFISCGLLCYAAFG

[1944] SDVKTVVLLNFPQDTSYTLTVQLLYALAILLSTPLQLFPAIRILENWTFPSNASGKYNPK

[1945] VKWLKNYFRCAIVVLTSILAWVGANDLDKFVSLVGSFACIPLIYIYPPLLHYKASILSGT

[1946] SRARLLLDLIVIVFGVAVMAYTSWQTIKMWSQ

[1947] SEQ ID NO:128

[1948] YKL209C

[1949] >sp|P12866|STE6_YEASTα因子转运ATP酶OS＝酿酒酵母(菌株ATCC204508/S288c) GN＝STE6 PE＝1 SV＝1

[1950] MNFLSFKTTKHYHIFRYVNIRNDYRLLMIMIIGTVATGLVPAITSILTGRVFDLLSVFVA

[1951] NGSHQGLYSQLVQRSMAVMALGAASVPVMWLSLTSWMHIGERQGFRIRSQILEAYLEEKP

[1952] MEWYDNNEKLLGDFTQINRCVEELRSSSAEASAITFQNLVAICALLGTSFYYSWSLTLII

[1953] LCSSPIITFFAVVFSRMIHVYSEKENSETSKAAQLLTWSMNAAQLVRLYCTQRLERKKFK

[1954] EIILNCNTFFIKSCFFVAANAGILRFLTLTMFVQGFWFGSAMIKKGKLNINDVITCFHSC

[1955] IMLGSTLNNTLHQIVVLQKGGVAMEKIMTLLKDGSKRNPLNKTVAHQFPLDYATSDLTFA

[1956] NVSFSYPSRPSEAVLKNVSLNFSAGQFTFIVGKSGSGKSTLSNLLLRFYDGYNGSISING

[1957] HNIQTIDQKLLIENITVVEQRCTLFNDTLRKNILLGSTDSVRNADCSTNENRHLIKDACQ

[1958] MALLDRFILDLPDGLETLIGTGGVTLSGGQQQRVAIARAFIRDTPILFLDEAVSALDIVH

[1959] RNLLMKAIRHWRKGKTTIILTHELSQIESDDYLYLMKEGEVVESGTQSELLADPTTTFST

[1960] WYHLQNDYSDAKTIVDTETEEKSIHTVESFNSQLETPKLGSCLSNLGYDETDQLSFYEAI

[1961] YQKRSNVRTRRVKVEEENIGYALKQQKNTESSTGPQLLSIIQIIKRMIKSIRYKKILILG

[1962] LLCSLIAGATNPVFSYTFSFLLEGIVPSTDGKTGSSHYLAKWSLLVLGVAAADGIFNFAK

[1963] GFLLDCCSEYWVMDLRNEVMEKLTRKNMDWFSGENNKASEISALVLNDLRDLRSLVSEFL

[1964] SAMTSFVTVSTIGLIWALVSGWKLSLVCISMFPLIIIFSAIYGGILQKCETDYKTSVAQL

[1965] ENCLYQIVTNIKTIKCLQAEFHFQLTYHDLKIKMQQIASKRAIATGFGISMTNMIVMCIQ

[1966] AIIYYYGLKLVMIHEYTSKEMFTTFTLLLFTIMSCTSLVSQIPDISRGQRAASWIYRILD

[1967] EKHNTLEVENNNARTVGIAGHTYHGKEKKPIVSIQNLTFAYPSAPTAFVYKNMNFDMFCG

[1968] QTLGIIGESGTGKSTLVLLLTKLYNCEVGKIKIDGTDVNDWNLTSLRKEISVVEQKPLLF

[1969] NGTIRDNLTYGLQDEILEIEMYDALKYVGIHDFVISSPQGLDTRIDTTLLSGGQAQRLCI

[1970] ARALLRKSKILILDECTSALDSVSSSIINEIVKKGPPALLTMVITHSEQMMRSCNSIAVL

[1971] KDGKVVERGNFDTLYNNRGELFQIVSNQSS

[1972] SEQ ID NO:129

[1973] YKR039W

[1974] >sp|P19145|GAP1_YEAST一般氨基酸通透酶GAP1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝GAP1 PE＝1 SV＝2

[1975] MSNTSSYEKNNPDNLKHNGITIDSEFLTQEPITIPSNGSAVSIDETGSGSKWQDFKDSFK

[1976] RVKPIEVDPNLSEAEKVAIITAQTPLKHHLKNRHLQMIAIGGAIGTGLLVGSGTALRTGG

[1977] PASLLIGWGSTGTMIYAMVMALGELAVIFPISGGFTTYATRFIDESFGYANNFNYMLQWL

[1978] VVLPLEIVSASITVNFWGTDPKYRDGFVALFWLAIVIINMFGVKGYGEAEFVFSFIKVIT

[1979] VVGFIILGIILNCGGGPTGGYIGGKYWHDPGAFAGDTPGAKFKGVCSVFVTAAFSFAGSE

[1980] LVGLAASESVEPRKSVPKAAKQVFWRITLFYILSLLMIGLLVPYNDKSLIGASSVDAAAS

[1981] PFVIAIKTHGIKGLPSVVNVVILIAVLSVGNSAIYACSRTMVALAEQRFLPEIFSYVDRK

[1982] GRPLVGIAVTSAFGLIAFVAASKKEGEVFNWLLALSGLSSLFTWGGICICHIRFRKALAA

[1983] QGRGLDELSFKSPTGVWGSYWGLFMVIIMFIAQFYVAVFPVGDSPSAEGFFEAYLSFPLV

[1984] MVMYIGHKIYKRNWKLFIPAEKMDIDTGRREVDLDLLKQEIAEEKAIMATKPRWYRIWNF

[1985] WC

[1986] SEQ ID NO:130

[1987] YLR411W

[1988] >sp|Q06686|CTR3_YEAST铜转运蛋白CTR3 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝CTR3 PE＝1 SV＝1

[1989] MNMGGSSSTAAKKATCKISMLWNWYTIDTCFIARSWRNDTKGKFAGSCIGCFALVVVAQW

[1990] LTRFSRQFDVELLKRQKIKHLASYSPEEYVVKCGEEDAKSDIEELQGFYNEPSWKTTLIS

[1991] LQKSFIYSFYVWGPRRLNEPEDDLLKKVLSCCTLITPVDLYPTFLDHMIRVTIFVLQWGL

[1992] SYIIMLLFMYYNGYIIISCLIGAIVGRFIFCYEPLGSLGANGSAQGTVSYDKESDDRKCC

[1993] L

[1994] SEQ ID NO:131

[1995] YML038C

[1996] >sp|Q03697|YMD8_YEAST推定的核苷酸-糖转运蛋白YMD8 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YMD8 PE＝1 SV＝1

[1997] MNRTVFLAFVFGWYFCSIALSIYNRWMFDPKDGLGIGYPVLVTTFHQATLWLLSGIYIKL

[1998] RHKPVKNVLRKNNGFNWSFFLKFLLPTAVASAGDIGLSNVSFQYVPLTIYTIIKSSSIAF

[1999] VLLFGCIFKLEKFHWKLALSVIIMFVGVALMVFKPSDSTSTKNDQALVIFGSFLVLASSC

[2000] LSGLRWVYTQLMLRNNPIQTNTAAAVEESDGALFTENEDNVDNEPVVNLANNKMLENFGE

[2001] SKPHPIHTIHQLAPIMGITLLLTSLLVEKPFPGIFSSSIFRLDTSNGGVGTETTVLSIVR

[2002] GIVLLILPGFAVFLLTICEFSILEQTPVLTVSIVGIVKELLTVIFGIIILSERLSGFYNW

[2003] LGMLIIMADVCYYNYFRYKQDLLQKYHSVSTQDNRNELKGFQDFEQLGSKKIAPYSISVD

[2004] LTNQEYELDMIAQNVSRSSQQV

[2005] SEQ ID NO:132

[2006] YMR166C

[2007] >sp|Q03829|YM39_YEAST未表征的线粒体运载体YMR166C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YMR166C PE＝1 SV＝1

[2008] MNSWNLSSSIPIIHTPHDHPPTSEGTPDQPNNNRKDDKLHKKRGDSDEDLSPIWHCVVSG

[2009] GIGGKIGDSAMHSLDTVKTRQQGAPNVKKYRNMISAYRTIWLEEGVRRGLYGGYMAAMLG

[2010] SFPSAAIFFGTYEYTKRTMIEDWQINDTITHLSAGFLGDFISSFVYVPSEVLKTRLQLQG

[2011] RFNNPFFQSGYNYSNLRNAIKTVIKEEGFRSLFFGYKATLARDLPFSALQFAFYEKFRQL

[2012] AFKIEQKDGRDGELSIPNEILTGACAGGLAGIITTPMDVVKTRVQTQQPPSQSNKSYSVT

[2013] HPHVTNGRPAALSNSISLSLRTVYQSEGVLGFFSGVGPRFVWTSVQSSIMLLLYQMTLRG

[2014] LSNAFPTD

[2015] SEQ ID NO:133

[2016] YMR279C

[2017] >sp|Q03263|YM8M_YEAST未表征的转运蛋白YMR279C OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝YMR279C PE＝1 SV＝1

[2018] MFSIFKKKTSVQGTDSEIDEKITVKAKDKVVVSTEDEEVTTIVSSTKSTQVTNDSPWQDP

[2019] TYFSSFGKELMFIATCMLAQLLNQAGQTHALCIMNVLSKSFNSEANNQAWLMASFPLAAG

[2020] SFILISGRLGDIYGLKKMLIVGYVIVIVWSIISGLSKYSNSDAFFITSRAFQGVGIAFIL

[2021] PNIMGLVGHVYKVGSFRKNIVISFIGACAPTGGMFGGLFGGLIVTEDPNQWPWVFYAFGI

[2022] ATFLSLLMAWYSIPNNVPTNIHGLSMDWTGSALAIIGLILFNFVWNQAPIVGWDKPYIIV

[2023] LLIISVIFLVAFFVYESKYAEVPLLPRAMTKNRHMIMILLAVFLGWGSFGIWTFYYVSFQ

[2024] LNLRHYSPVWTGGTYFVFVIFGSMAAFFVAFSIKRLGPALLLCFSLMAFDAGSIMFSVLP

[2025] VEQSYWKLNFAMQAILCFGMDLSFPASSIILSDGLPMQYQGMAGSLVNTVINYSASLCLG

[2026] MGGTVEHQINKSGNDLLKGYRAAVYLGVGLASLGVVISVTYMLENLWNRHRKSEDRSLEA

[2027] SEQ ID NO:134

[2028] YNL003C

[2029] >sp|P38921|PET8_YEAST推定的线粒体运载蛋白PET8 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PET8 PE＝1 SV＝1

[2030] MNTFFLSLLSGAAAGTSTDLVFFPIDTIKTRLQAKGGFFANGGYKGIYRGLGSAVVASAP

[2031] GASLFFISYDYMKVKSRPYISKLYSQGSEQLIDTTTHMLSSSIGEICACLVRVPAEVVKQ

[2032] RTQVHSTNSSWQTLQSILRNDNKEGLRKNLYRGWSTTIMREIPFTCIQFPLYEYLKKTWA

[2033] KANGQSQVEPWKGAICGSIAGGIAAATTTPLDFLKTRLMLNKTTASLGSVIIRIYREEGP

[2034] AVFFSGVGPRTMWISAGGAIFLGMYETVHSLLSKSFPTAGEMRA

[2035] SEQ ID NO:135

[2036] YNL268W

[2037] >sp|P32487|LYP1_YEAST赖氨酸特异性通透酶OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝LYP1 PE＝1 SV＝2

[2038] MGRFSNIITSNKWDEKQNNIGEQSMQELPEDQIEHEMEAIDPSNKTTPYSIDEKQYNTKK

[2039] KHGSLQGGAIADVNSITNSLTRLQVVSHETDINEDEEEAHYEDKHVKRALKQRHIGMIAL

[2040] GGTIGTGLFVGISTPLSNAGPVGSLIAYIFMGTIVYFVTQSLGEMATFIPVTSSITVFSK

[2041] RFLSPAFGVSNGYMYWFNWAITYAVEVSVIGQVIEYWTDKVPLAAWIAIFWVIITLMNFF

[2042] PVKVYGEFEFWVASVKVLAIMGYLIYALIIVCGGSHQGPIGFRYWRNPGAWGPGIISSDK

[2043] SEGRFLGWVSSLINAAFTYQGTELVGITAGEAANPRKTVPRAINKVVFRIVLFYIMSLFF

[2044] IGLLVPYNDSRLSASSAVIASSPFVISIQNAGTYALPDIFNAVVLITVVSAANSNVYVGS

[2045] RVLYSLARTGNAPKQFGYVTRQGVPYLGVVCTAALGLLAFLVVNNNANTAFNWLINISTL

[2046] AGLCAWLFISLAHIRFMQALKHRGISRDDLPFKAKLMPYGAYYAAFFVTVIIFIQGFQAF

[2047] CPFKVSEFFTSYISLILLAVVFIGCQIYYKCRFIWKLEDIDIDSDRREIEAIIWEDDEPK

[2048] NLWEKFWAAVA

[2049] SEQ ID NO:136

[2050] YNR055C

[2051] >sp|P53389|HOL1_YEAST蛋白HOL1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝HOL1 PE＝1 SV＝1

[2052] MDKYTNRDHPDYIPGTFNIYSSQNLENGIIYESKLKKTSSGVVLIPQPSYSPNDPLNWSS

[2053] WRKLAHFGLMAFITAFTAATSNDAGAAQDSLNEIYGISYDSMNTGAGVLFLGIGWSTLFL

[2054] APFANLYGRKITYIVCTTLGLFGALWFALAKRTSDTIWSQLFVGISESCAEAQVQLSLSD

[2055] IFFQHQLGSVLTVYIMCTSIGTFLGPLIAGYISAFTNFRWVGWVAVIISGGLLITIIFGC

[2056] EETYFDRGQYMTPLTSCQSGYEDGTTLQNSDNTAVSRRKRHLDAKLSTPGAMGEKGVDLS

[2057] ETAEFEVNNEEEVTIPETRELIDGSKEHLKPYPKRVAILTKATNLKGYGFKQYFKYLKIN

[2058] LRMFLFPPVWLSGMFWGIQDVFLTFYLTTQESAYYEPPWNYSDFGVAIMNVPTLIGAVIG

[2059] CICAGIVSDYFVLWMARHNRGILEAEFRLYFSIATAIIGPAGLLMFGIGTARQWPWQAIY

[2060] VGLGFVGFAWGCSGDIAMAYLMDCYPDMVLEGMVCTAIINNTISCIFTFTCSDWLAASGT

[2061] ENTYIALAVINFGITAFALPMYYYGKRIRLWTKRWYLQSVNLRDGV

[2062] SEQ ID NO:137

[2063] YOL158C

[2064] >sp|Q08299|ENB1_YEAST铁载体铁转运蛋白ENB1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝ENB1 PE＝1 SV＝1

[2065] MLETDHSRNDNLDDKSTVCYSEKTDSNVEKSTTSGLRRIDAVNKVLSDYSSFTAFGVTFS

[2066] SLKTALLVALFLQGYCTGLGGQISQSIQTYAANSFGKHSQVGSINTVKSIVASVVAVPYA

[2067] RISDRFGRIECWIFALVLYTIGEIISAATPTFSGLFAGIVIQQFGYSGFRLLATALTGDL

[2068] SGLRDRTFAMNIFLIPVIINTWVSGNIVSSVAGNVAPYKWRWGYGIFCIIVPISTLILVL

[2069] PYVYAQYISWRSGKLPPLKLKEKGQTLRQTLWKFADDINLIGVILFTAFLVLVLLPLTIA

[2070] GGATSKWREGHIIAMIVVGGCLGFIFLIWELKFAKNPFIPRVYLGDPTIYVALLMEFVWR

[2071] LGLQIELEYLVTVLMVAFGESTLSAQRIAQLYNFLQSCTNIVVGIMLHFYPHPKVFVVAG

[2072] SLLGVIGMGLLYKYRVVYDGISGLIGAEIVVGIAGGMIRFPMWTLVHASTTHNEMATVTG

[2073] LLMSVYQIGDAVGASIAGAIWTQRLAKELIQRLGSSLGMAIYKSPLNYLKKYPIGSEVRV

[2074] QMIESYSKIQRLLIIVSISFAAFNAVLCFFLRGFTVNKKQSLSAEEREKEKLKIKQQSWL

[2075] RRVIGY

[2076] SEQ ID NO:138

[2077] YOR100C

[2078] >sp|Q12289|CRC1_YEAST线粒体肉碱运载体OS＝酿酒酵母(菌株ATCC204508/

S288c)GN＝CRC1 PE＝1 SV＝1

[2079] MSSDTSLSESSLLKEESGSLTKSRPPIKSNPVRENIKSFVAGGVGGVCAVFTGHPFDLIK

[2080] VRCQNGQANSTVHAITNIIKEAKTQVKGTLFTNSVKGFYKGVIPPLLGVTPIFAVSFWGY

[2081] DVGKKLVTFNNKQGGSNELTMGQMAAAGFISAIPTTLVTAPTERVKVVLQTSSKGSFIQA

[2082] AKTIVKEGGIASLFKGSLATLARDGPGSALYFASYEISKNYLNSRQPRQDAGKDEPVNIL

[2083] NVCLAGGIAGMSMWLAVFPIDTIKTKLQASSTRQNMLSATKEIYLQRGGIKGFFPGLGPA

[2084] LLRSFPANAATFLGVEMTHSLFKKYGI

[2085] SEQ ID NO:139

[2086] YOR153W

[2087] >sp|P33302|PDR5_YEAST多种药物的多效ABC外排转运蛋白OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PDR5 PE＝1 SV＝1

[2088] MPEAKLNNNVNDVTSYSSASSSTENAADLHNYNGFDEHTEARIQKLARTLTAQSMQNSTQ

[2089] SAPNKSDAQSIFSSGVEGVNPIFSDPEAPGYDPKLDPNSENFSSAAWVKNMAHLSAADPD

[2090] FYKPYSLGCAWKNLSASGASADVAYQSTVVNIPYKILKSGLRKFQRSKETNTFQILKPMD

[2091] GCLNPGELLVVLGRPGSGCTTLLKSISSNTHGFDLGADTKISYSGYSGDDIKKHFRGEVV

[2092] YNAEADVHLPHLTVFETLVTVARLKTPQNRIKGVDRESYANHLAEVAMATYGLSHTRNTK

[2093] VGNDIVRGVSGGERKRVSIAEVSICGSKFQCWDNATRGLDSATALEFIRALKTQADISNT

[2094] SATVAIYQCSQDAYDLFNKVCVLDDGYQIYYGPADKAKKYFEDMGYVCPSRQTTADFLTS

[2095] VTSPSERTLNKDMLKKGIHIPQTPKEMNDYWVKSPNYKELMKEVDQRLLNDDEASREAIK

[2096] EAHIAKQSKRARPSSPYTVSYMMQVKYLLIRNMWRLRNNIGFTLFMILGNCSMALILGSM

[2097] FFKIMKKGDTSTFYFRGSAMFFAILFNAFSSLLEIFSLYEARPITEKHRTYSLYHPSADA

[2098] FASVLSEIPSKLIIAVCFNIIFYFLVDFRRNGGVFFFYLLINIVAVFSMSHLFRCVGSLT

[2099] KTLSEAMVPASMLLLALSMYTGFAIPKKKILRWSKWIWYINPLAYLFESLLINEFHGIKF

[2100] PCAEYVPRGPAYANISSTESVCTVVGAVPGQDYVLGDDFIRGTYQYYHKDKWRGFGIGMA

[2101] YVVFFFFVYLFLCEYNEGAKQKGEILVFPRSIVKRMKKRGVLTEKNANDPENVGERSDLS

[2102] SDRKMLQESSEEESDTYGEIGLSKSEAIFHWRNLCYEVQIKAETRRILNNVDGWVKPGTL

[2103] TALMGASGAGKTTLLDCLAERVTMGVITGDILVNGIPRDKSFPRSIGYCQQQDLHLKTAT

[2104] VRESLRFSAYLRQPAEVSIEEKNRYVEEVIKILEMEKYADAVVGVAGEGLNVEQRKRLTI

[2105] GVELTAKPKLLVFLDEPTSGLDSQTAWSICQLMKKLANHGQAILCTIHQPSAILMQEFDR

[2106] LLFMQRGGKTVYFGDLGEGCKTMIDYFESHGAHKCPADANPAEWMLEVVGAAPGSHANQD

[2107] YYEVWRNSEEYRAVQSELDWMERELPKKGSITAAEDKHEFSQSIIYQTKLVSIRLFQQYW

[2108] RSPDYLWSKFILTIFNQLFIGFTFFKAGTSLQGLQNQMLAVFMFTVIFNPILQQYLPSFV

[2109] QQRDLYEARERPSRTFSWISFIFAQIFVEVPWNILAGTIAYFIYYYPIGFYSNASAAGQL

[2110] HERGALFWLFSCAFYVYVGSMGLLVISFNQVAESAANLASLLFTMSLSFCGVMTTPSAMP

[2111] RFWIFMYRVSPLTYFIQALLAVGVANVDVKCADYELLEFTPPSGMTCGQYMEPYLQLAKT

[2112] GYLTDENATDTCSFCQISTTNDYLANVNSFYSERWRNYGIFICYIAFNYIAGVFFYWLAR

[2113] VPKKNGKLSKK

[2114] SEQ ID NO:140

[2115] YOR271C

[2116] >sp|Q12029|FSF1_YEAST可能的线粒体转运蛋白FSF1 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝FSF1 PE＝1 SV＝1

[2117] MASSVPGPIDLPESRYDLSTYWGRIRHCAEISDPTMLLTTEKDLAHAREIISAYRHGELK

[2118] ETTPEFWRAKKQLDSTVHPDTGKTVLLPFRMSSNVLSNLVVTVGMLTPGLGTAGTVFWQW

[2119] ANQSLNVAVNSANANKSHPMSTSQLLTNYAAAVTASCGVALGLNNLVPRLKNISPHSKLI

[2120] LGRLVPFAAVVSAGIVNVFLMRGNEIRKGISVFDSNGDEVGKSKKAAFMAVGETALSRVI

[2121] NATPTMVIPPLILVRLQRGVLKGKSLGVQTLANLGLISVTMFSALPFALGIFPQRQAIHL

[2122] NKLEPELHGKKDKDGKPIEKVYFNRGI

[2123] SEQ ID NO:141

[2124] YOR273C

[2125] >sp|Q12256|TPO4_YEAST多胺转运蛋白4 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝TPO4 PE＝1 SV＝1

[2126] MPSSLTKTESNSDPRTNIQQVPKALDKNVTNSGNLDSTSSSTGSITEDEKRSEPNADSNN

[2127] MTGGEPIDPRDLDWDGPDDPDNPHNWSSLKKWYTTMTSAFLCLVVTMGSSLYVSSVPELV

[2128] ERYHVSQTLALAGLTFYLLGLSTVIGAPLSEVFGRKPVYLFSLPVSMLFTMGVGLSNGHM

[2129] RIILPLRFLSGVFASPALSVGSGTILDIFDVDQVSVAMTYFVLSPFLGPVLSPIMAGFAT

[2130] EAKGWRWSEWIQLIAGGLILPFIALMPETHKGIILRKRAKKRNIALKKFSREAQKEFLKT

[2131] TVTITILRPLKMLVVEPIVFVFSVYVAFIFAILFGFFEAYAVIYRGVYHMSMGISGLPFI

[2132] GIGVGLWIGAFFYLYIDRKYLFPKPPAGTQPLTEKERTSKRTTPYRGARDAETGELLPVV

[2133] PEKFLIACKFGSVALPIGLFWQAWTARSDVHWMAPVAAGVPFGFGLILIFFSVLMYFSTC

[2134] YPPLTVASCLAANNLLRYVMSSVFPLFTIQMYTKMKIKWASTLFALVCVVMIPIPWVFEK

[2135] WGSKLRHKSQFGYAAMEKEAETEGGIDDVNAVDGELNLTRMTTLRTMETDPSTREKPGER

[2136] LSLRRTHTQPVPASFDREDGQHAQNRNEPISNSLYSAIKDNEDGYSYTEMATDASARMV

[2137] SEQ ID NO:142

[2138] YOR307C

[2139] >sp|P22215|SLY41_YEAST未表征的转运蛋白SLY41 OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝SLY41 PE＝1 SV＝2

[2140] MIQTQSTAIKRRNSVHKNLFDPSLYQIPEPPRGGFQHQKKEYSKETFSNQVFGYDITSLK

[2141] KRFTQLFPSNIQGYLPEVDLRITIICSIWYVTSSISSNLSKAILRTFNHPIALTELQFLV

[2142] SAVLCVGFASIVNLFRLPRLKHTKFSKALNSFPDGILPEYLDGNFRSSILHKFLVPSKLV

[2143] LMTTFPMGIFQFIGHITSHKAVSMIPVSLVHSVKALSPIITVGYYKFFEHRYYNSMTYYT

[2144] LLLLIFGVMTTCWSTHGSKRASDNKSGSSLIGLLFAFISMIIFVAQNIFAKNILTIRRKV

[2145] GILPSSSTDDVTSKEGQPSLDKTRFSPLQVDKITILFYCSCIGFSLTLLPFLTGELMHGG

[2146] SVINDLTLETVALVAIHGIAHFFQAMLAFQLIGLLSSINYSVANIMKRIVVISVALFWET

[2147] KLNFFQVFGVILTIAGLYGYDKWGLSKKDGRQA

[2148] SEQ ID NO:143

[2149] YOR332W

[2150] >sp|P22203|VATE_YEAST V型质子ATP酶亚基E OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝VMA4 PE＝1 SV＝4

[2151] MSSAITALTPNQVNDELNKMQAFIRKEAEEKAKEIQLKADQEYEIEKTNIVRNETNNIDG

[2152] NFKSKLKKAMLSQQITKSTIANKMRLKVLSAREQSLDGIFEETKEKLSGIANNRDEYKPI

[2153] LQSLIVEALLKLLEPKAIVKALERDVDLIESMKDDIMREYGEKAQRAPLEEIVISNDYLN

[2154] KDLVSGGVVVSNASDKIEINNTLEERLKLLSEEALPAIRLELYGPSKTRKFFD

[2155] SEQ ID NO:144

[2156] YOR348C

[2157] >sp|P15380|PUT4_YEAST脯氨酸特异性通透酶OS＝酿酒酵母(菌株ATCC 204508/S288c)GN＝PUT4 PE＝1 SV＝2

[2158] MVNILPFHKNNRHSAGVVTCADDVSGDGSGGDTKKEEDVVQVTESPSSGSRNNHRSDNEK

[2159] DDAIRMEKISKNQSASSNGTIREDLIMDVDLEKSPSVDGDSEPHKLKQGLQSRHVQLIAL

[2160] GGAIGTGLLVGTSSTLHTCGPAGLFISYIIISAVIYPIMCALGEMVCFLPGDGSDSAGST

[2161] ANLVTRYVDPSLGFATGWNYFYCYVILVAAECTAASGVVEYWTTAVPKGVWITIFLCVVV

[2162] ILNFSAVKVYGESEFWFASIKILCIVGLIILSFILFWGGGPNHDRLGFRYWQHPGAFAHH

[2163] LTGGSLGNFTDIYTGIIKGAFAFILGPELVCMTSAECADQRRNIAKASRRFVWRLIFFYV

[2164] LGTLAISVIVPYNDPTLVNALAQGKPGAGSSPFVIGIQNAGIKVLPHIINGCILTSAWSA

[2165] ANAFMFASTRSLLTMAQTGQAPKCLGRINKWGVPYVAVGVSFLCSCLAYLNVSSSTADVF

[2166] NWFSNISTISGFLGWMCGCIAYLRFRKAIFYNGLYDRLPFKTWGQPYTVWFSLIVIGIIT

[2167] ITNGYAIFIPKYWRVADFIAAYITLPIFLVLWFGHKLYTRTWRQWWLPVSEIDVTTGLVE

[2168] IEEKSREIEEMRLPPTGFKDKFLDALL

[2169] SEQ ID NO:145

[2170] YPL036W

[2171] >sp|P19657|PMA2_YEAST血浆膜ATP酶2OS＝酿酒酵母(菌株ATCC204508/S288c)GN＝PMA2 PE＝1 SV＝3

[2172] MSSTEAKQYKEKPSKEYLHASDGDDPANNSAASSSSSSSTSTSASSSAAAVPRKAAAASA

[2173] ADDSDSDEDIDQLIDELQSNYGEGDESGEEEVRTDGVHAGQRVVPEKDLSTDPAYGLTSD

[2174] EVARRRKKYGLNQMAEENESLIVKFLMFFVGPIQFVMEAAAILAAGLSDWVDVGVICALL

[2175] LLNASVGFIQEFQAGSIVDELKKTLANTATVIRDGQLIEIPANEVVPGEILQLESGTIAP

[2176] ADGRIVTEDCFLQIDQSAITGESLAAEKHYGDEVFSSSTVKTGEAFMVVTATGDNTFVGR

[2177] AAALVGQASGVEGHFTEVLNGIGIILLVLVIATLLLVWTACFYRTVGIVSILRYTLGITI

[2178] IGVPVGLPAVVTTTMAVGAAYLAKKQAIVQKLSAIESLAGVEILCSDKTGTLTKNKLSLH

[2179] EPYTVEGVSPDDLMLTACLAASRKKKGLDAIDKAFLKSLIEYPKAKDALTKYKVLEFHPF

[2180] DPVSKKVTAVVESPEGERIVCVKGAPLFVLKTVEEDHPIPEDVHENYENKVAELASRGFR

[2181] ALGVARKRGEGHWEILGVMPCMDPPRDDTAQTINEARNLGLRIKMLTGDAVGIAKETCRQ

[2182] LGLGTNIYNAERLGLGGGGDMPGSELADFVENADGFAEVFPQHKYRVVEILQNRGYLVAM

[2183] TGDGVNDAPSLKKADTGIAVEGATDAARSAADIVFLAPGLSAIIDALKTSRQIFHRMYSY

[2184] VVYRIALSLHLEIFLGLWIAILNNSLDINLIVFIAIFADVATLTIAYDNAPYAPEPVKWN

[2185] LPRLWGMSIILGIVLAIGSWITLTTMFLPNGGIIQNFGAMNGVMFLQISLTENWLIFVTR

[2186] AAGPFWSSIPSWQLAGAVFAVDIIATMFTLFGWWSENWTDIVSVVRVWIWSIGIFCVLGG

[2187] FYYIMSTSQAFDRLMNGKSLKEKKSTRSVEDFMAAMQRVSTQHEKSS

[2188] SEQ ID NO:146

[2189] YDL198C

[2190]
MPHTDKKQSG LARLLGSASA GIMEIAVFHP VDTISKRLMS NHTKITSGQE LNRVIFRDHF
SEPLGKRLFT LFPGLGYAAS YKVLQRVYKY GGQPFANEFL NKHYKKDFDN LFGEKTGKAM
RSAAAGSLIG IGEIVLLPLD VLKIKRQTNP ESFKGRGFIK ILRDEGLFNL YRGWGWTAAR
NAPGSFALFG GNAFAKEYIL GLKDYSQATW SQNFISSIVG ACSSLIVSAP LDVIKTRIQN
RNFDNPESGL RIVKNTLKNE GVTAFFKGLT PKLLTTGPKL VFSFALAQSL IPRFDNLLSK

[2191] SEQ ID NO:147

[2192] YFL054C

MSYESGRSSS SSESTRPPTL KEEPNGKIAW EESVKKSREN NENDSTLLRR KLGETRKAIE
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[2193]
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[2194] SEQ ID NO:148

[2195] 编码EUGT11的稻序列

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AAAPTFEVAR MKLIRTKGSS GMSLAERFSL TLSRSSLVVG RSCVEFEPET VPLLSTLRGK
PITFLGLMPP LHEGRREDGE DATVRWLDAQ PAKSVVYVAL GSEVPLGVEK VHELALGLEL
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[2197] SEQ ID NO:149

[2198] 聚球藻属GGPPS

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LAYAFEHIAS QTRGVPPQLV LQVIARIGHA VAATGLVGGQ VVDLESEGKA ISLETLEYIH
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[2200] SEQ ID NO:150

[2201] 玉蜀黍截短的CDPS

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[2203] SEQ ID NO:151

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[2209] SEQ ID NO:153

[2210] 拟南芥ATR2

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[2234] 已经详细地并通过参考其具体实施方案描述了本发明，明显的是，在不脱离所附权利要求中限定的本发明的范围的情况下，修改和变化是可能的。更具体地，尽管本发明的一些方面在本文中被认为是特别有利的，但是预期本发明不必限于本发明的这些特定方面。

序列表

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<150> US 62/035,902
<151> 2014-08-11

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<213> 拟南芥

<400> 5

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<213> 甜叶菊

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<213> 甜叶菊

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<213> 甜叶菊

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cttagaagag aattagagtt acttatgttg gcatccgaag aggacgagga agtctcttgt 360

ctgattactg acgctctatg gtactttgcc caatctgtgg ctgatagttt gaatttgagg 420

agattggtac taatgacatc cagtctgttt aactttcacg ctcatgttag tttaccacaa 480

tttgacgaat tgggatactt ggaccctgat gacaagacta ggttagagga acaggcctct 540

ggttttccta tgttgaaagt caaagatatc aagtctgcct attctaattg gcaaatcttg 600

aaagagatct taggaaagat gatcaaacag acaaaggctt catctggagt gatttggaac 660

agtttcaaag agttagaaga gtctgaattg gagactgtaa tcagagaaat tccagcacct 720

tcattcctga taccattacc aaaacatttg actgcttcct cttcctcttt gttggatcat 780

gacagaacag tttttcaatg gttggaccaa caaccaccta gttctgtttt gtacgtgtca 840

tttggtagta cttctgaagt cgatgaaaag gacttccttg aaatcgcaag aggcttagtc 900

gatagtaagc agtcattcct ttgggtcgtg cgtccaggtt tcgtgaaagg ctcaacatgg 960

gtcgaaccac ttccagatgg ttttctaggc gaaagaggta gaatagtcaa atgggttcct 1020

caacaggaag ttttagctca tggcgctatt ggggcattct ggactcattc cggatggaat 1080

tcaactttag aatcagtatg cgaaggggta cctatgatct tttcagattt tggtcttgat 1140

caaccactga acgcaagata catgtctgat gttttgaaag tgggtgtata tctagaaaat 1200

ggctgggaaa ggggtgaaat agctaatgca ataagacgtg ttatggttga tgaagagggg 1260

gagtatatca gacaaaacgc aagagtgctg aagcaaaagg ccgacgtttc tctaatgaag 1320

ggaggctctt catacgaatc cttagaatct cttgtttcct acatttcatc actgtaa 1377

[0010]

<210> 11
<211> 1422
<212> DNA
<213> 人工序列

<220>
<223> 密码子优化的UGT91D2e-b

<400> 11
atggctactt ctgattccat cgttgacgat agaaagcaat tgcatgttgc tacttttcca 60

tggttggctt tcggtcatat tttgccatac ttgcaattgt ccaagttgat tgctgaaaag 120

ggtcacaagg tttcattctt gtctaccacc agaaacatcc aaagattgtc ctctcatatc 180

tccccattga tcaacgttgt tcaattgact ttgccaagag tccaagaatt gccagaagat 240

gctgaagcta ctactgatgt tcatccagaa gatatccctt acttgaaaaa ggcttccgat 300

ggtttacaac cagaagttac tagattcttg gaacaacatt ccccagattg gatcatctac 360

gattatactc attactggtt gccatccatt gctgcttcat tgggtatttc tagagcccat 420

ttctctgtta ctactccatg ggctattgct tatatgggtc catctgctga tgctatgatt 480

aacggttctg atggtagaac taccgttgaa gatttgacta ctccaccaaa gtggtttcca 540

tttccaacaa aagtctgttg gagaaaacac gatttggcta gattggttcc atacaaagct 600

ccaggtattt ctgatggtta cagaatgggt atggttttga aaggttccga ttgcttgttg 660

tctaagtgct atcatgaatt cggtactcaa tggttgcctt tgttggaaac attgcatcaa 720

gttccagttg ttccagtagg tttgttgcca ccagaaattc caggtgacga aaaagacgaa 780

acttgggttt ccatcaaaaa gtggttggat ggtaagcaaa agggttctgt tgtttatgtt 840

gctttgggtt ccgaagcttt ggtttctcaa accgaagttg ttgaattggc tttgggtttg 900

gaattgtctg gtttgccatt tgtttgggct tacagaaaac ctaaaggtcc agctaagtct 960

gattctgttg aattgccaga tggtttcgtt gaaagaacta gagatagagg tttggtttgg 1020

acttcttggg ctccacaatt gagaattttg tctcatgaat ccgtctgtgg tttcttgact 1080

cattgtggtt ctggttctat cgttgaaggt ttgatgtttg gtcacccatt gattatgttg 1140

ccaatctttg gtgaccaacc attgaacgct agattattgg aagataagca agtcggtatc 1200

gaaatcccaa gaaatgaaga agatggttgc ttgaccaaag aatctgttgc tagatctttg 1260

agatccgttg tcgttgaaaa agaaggtgaa atctacaagg ctaacgctag agaattgtcc 1320

aagatctaca acgataccaa ggtcgaaaaa gaatacgttt cccaattcgt tgactacttg 1380

gaaaagaatg ctagagctgt tgccattgat catgaatctt ga 1422

<210> 12
<211> 1389
<212> DNA
<213> 人工序列

<220>
<223> 密码子优化的EUGT11

<400> 12
atggatagtg gctactcctc atcttatgct gctgccgctg gtatgcacgt tgtgatctgc 60

ccttggttgg cctttggtca cctgttacca tgtctggatt tagcccaaag actggcctca 120

[0011] agaggccata gagtatcatt tgtgtctact cctagaaata tctctcgttt accaccagtc 180

agacctgctc tagctcctct agttgcattc gttgctcttc cacttccaag agtagaagga 240

ttgccagacg gcgctgaatc tactaatgac gtaccacatg atagacctga catggtcgaa 300

ttgcatagaa gagcctttga tggattggca gctccatttt ctgagttcct gggcacagca 360

tgtgcagact gggttatagt cgatgtattt catcactggg ctgctgcagc cgcattggaa 420

cataaggtgc cttgtgctat gatgttgtta gggtcagcac acatgatcgc atccatagct 480

gatagaagat tggaaagagc tgaaacagaa tccccagccg cagcaggaca aggtaggcca 540

gctgccgccc caacctttga agtggctaga atgaaattga ttcgtactaa aggtagttca 600

gggatgagtc ttgctgaaag gttttctctg acattatcta gatcatcatt agttgtaggt 660

agatcctgcg tcgagttcga acctgaaaca gtacctttac tatctacttt gagaggcaaa 720

cctattactt tccttggtct aatgcctcca ttacatgaag gaaggagaga agatggtgaa 780

gatgctactg ttaggtggtt agatgcccaa cctgctaagt ctgttgttta cgttgcattg 840

ggttctgagg taccactagg ggtggaaaag gtgcatgaat tagcattagg acttgagctg 900

gccggaacaa gattcctttg ggctttgaga aaaccaaccg gtgtttctga cgccgacttg 960

ctaccagctg ggttcgaaga gagaacaaga ggccgtggtg tcgttgctac tagatgggtc 1020

ccacaaatga gtattctagc tcatgcagct gtaggggcct ttctaaccca ttgcggttgg 1080

aactcaacaa tagaaggact gatgtttggt catccactta ttatgttacc aatctttggc 1140

gatcagggac ctaacgcaag attgattgag gcaaagaacg caggtctgca ggttgcacgt 1200

aatgatggtg atggttcctt tgatagagaa ggcgttgcag ctgccatcag agcagtcgcc 1260

gttgaggaag agtcatctaa agttttccaa gctaaggcca aaaaattaca agagattgtg 1320

gctgacatgg cttgtcacga aagatacatc gatggtttca tccaacaatt gagaagttat 1380

aaagactaa 1389

<210> 13
<211> 572
<212> PRT
<213> 酿酒酵母 (Saccharomyces cerevisiae)

<400> 13

Met Gly Ser Glu Pro Phe Gln Lys Lys Asn Leu Gly Leu Gln Ile Asn
1 5 10 15

Ser Gln Glu Ser Gly Thr Thr Arg Ser Thr Phe His Ser Leu Glu Asp
20 25 30

Leu Gly Asp Asp Val Ile Asn Glu Ser Trp Asp Gln Val Asn Gln Lys
35 40 45

Arg Ala Asn Ile Asp His Asp Val Phe His Glu His Pro Asp Ser Ser
50 55 60

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

[0012]

Val Lys Ser Ser Asn Ser Gln Ser Arg Asp Pro Ser Pro Asp Thr Gln
85 90 95

Ala His Ile Pro Tyr Thr Tyr Phe Ser Lys Asp Gln Arg Leu Ile Ile
100 105 110

Phe Gly Ile Ile Ile Phe Ile Gly Phe Leu Gly Pro Met Ser Gly Asn
115 120 125

Ile Tyr Ile Pro Ala Leu Pro Leu Leu Gln Arg Glu Tyr Asp Val Ser
130 135 140

Ala Thr Thr Ile Asn Ala Thr Val Ser Val Phe Met Ala Val Phe Ser
145 150 155 160

Val Gly Pro Leu Phe Trp Gly Ala Leu Ala Asp Phe Gly Gly Arg Lys
165 170 175

Phe Leu Tyr Met Val Ser Leu Ser Leu Met Leu Ile Val Asn Ile Leu
180 185 190

Leu Ala Ala Val Pro Val Asn Ile Ala Ala Leu Phe Val Leu Arg Ile
195 200 205

Phe Gln Ala Phe Ala Ser Ser Ser Val Ile Ser Leu Gly Ala Gly Thr
210 215 220

```
Val Thr Asp Val Val Pro Pro Lys His Arg Gly Lys Ala Ile Ala Tyr
225                 230                 235                 240

Phe Met Met Gly Pro Asn Met Gly Pro Ile Ile Ala Pro Ile Val Ala
                245                 250                 255

Gly Leu Ile Leu Met Lys Gly Asn Tyr Trp Arg Trp Leu Phe Gly Phe
            260                 265                 270

Thr Ser Ile Met Thr Gly Ile Ala Leu Ile Leu Val Thr Ala Leu Leu
        275                 280                 285

Pro Glu Thr Leu Arg Cys Ile Val Gly Asn Gly Asp Pro Lys Trp Gly
    290                 295                 300

Asp Lys Lys Asp Glu Arg Glu Asn Asn Glu Ser Pro Phe Phe Glu Gly
305                 310                 315                 320

Asn Lys Ile Ser His Arg Arg Leu Phe Pro Asp Ile Gly Ile Arg Lys
                325                 330                 335

Pro Val Asn Asn Asp Ala Phe Phe Gln Glu Asn Phe Pro Lys Pro Pro
            340                 345                 350

Lys Ala Gly Leu Thr Leu Tyr Trp Lys Met Ile Lys Cys Pro Pro Ile
        355                 360                 365
```

[0013]

```
Ile Ile Thr Ser Val Ser Thr Ala Leu Leu Phe Ser Ser Tyr Tyr Ala
    370                 375                 380

Phe Ser Val Thr Phe Ser Tyr Tyr Leu Glu His Asp Tyr Arg Phe Thr
385                 390                 395                 400

Met Leu Glu Ile Gly Ala Ala Tyr Val Cys Pro Gly Val Ala Met Leu
                405                 410                 415

Leu Gly Ser Gln Ser Gly Gly His Leu Ser Asp Tyr Leu Arg Ser Arg
            420                 425                 430

Trp Ile Lys Ser His Pro Lys Lys Lys Phe Pro Ala Glu Phe Arg Leu
        435                 440                 445

Leu Leu Asn Leu Ile Gly Ile Leu Leu Thr Ile Cys Gly Thr Ile Gly
    450                 455                 460

Tyr Gly Trp Ala Ile Phe Phe His Tyr His Phe Val Val Leu Leu Val
465                 470                 475                 480

Phe Ser Ala Leu Thr Ala Phe Gly Met Thr Trp Cys Ser Asn Thr Ser
                485                 490                 495

Met Thr Tyr Leu Thr Glu Leu Phe Pro Lys Arg Ala Ala Gly Thr Val
            500                 505                 510
```

Ala Val Ser Ser Phe Phe Arg Asn Val Gly Ala Ala Ile Ser Ser Ala
515 520 525

Ile Ile Leu Gln Leu Cys Asn Ala Met Gly Ile Gly Trp Cys Phe Thr
530 535 540

Gly Leu Gly Leu Cys Ser Ser Ile Ser Leu Ile Gly Ile Leu Tyr Leu
545 550 555 560

Leu Ile Phe Gln Arg Lys Tyr Thr Ala Lys Glu Phe
565 570

<210> 14
<211> 593
<212> PRT
<213> 酿酒酵母

<400> 14

Met Tyr Ser Ile Val Lys Glu Ile Ile Val Asp Pro Tyr Lys Arg Leu
1 5 10 15

Lys Trp Gly Phe Ile Pro Val Lys Arg Gln Val Glu Asp Leu Pro Asp
20 25 30

Asp Leu Asn Ser Thr Glu Ile Val Thr Ile Ser Asn Ser Ile Gln Ser
35 40 45

[0014]

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

Leu His Phe Glu Thr Ser Ser Tyr Ser Glu His Lys Asp Asn Val Asn
65 70 75 80

Val Thr Arg Ser Tyr Glu Tyr Arg Asp Glu Ala Asp Arg Pro Trp Trp
85 90 95

Arg Phe Phe Asp Glu Gln Glu Tyr Arg Ile Asn Glu Lys Glu Arg Ser
100 105 110

His Asn Lys Trp Tyr Ser Trp Phe Lys Gln Gly Thr Ser Phe Lys Glu
115 120 125

Lys Lys Leu Leu Ile Lys Leu Asp Val Leu Leu Ala Phe Tyr Ser Cys
130 135 140

Ile Ala Tyr Trp Val Lys Tyr Leu Asp Thr Val Asn Ile Asn Asn Ala
145 150 155 160

Tyr Val Ser Gly Met Lys Glu Asp Leu Gly Phe Gln Gly Asn Asp Leu
165 170 175

Val His Thr Gln Val Met Tyr Thr Val Gly Asn Ile Ile Phe Gln Leu
180 185 190

Pro Phe Leu Ile Tyr Leu Asn Lys Leu Pro Leu Asn Tyr Val Leu Pro
195 200 205

Ser Leu Asp Leu Cys Trp Ser Leu Leu Thr Val Gly Ala Ala Tyr Val
210 215 220

Asn Ser Val Pro His Leu Lys Ala Ile Arg Phe Phe Ile Gly Ala Phe
225 230 235 240

Glu Ala Pro Ser Tyr Leu Ala Tyr Gln Tyr Leu Phe Gly Ser Phe Tyr
245 250 255

Lys His Asp Glu Met Val Arg Arg Ser Ala Phe Tyr Tyr Leu Gly Gln
260 265 270

Tyr Ile Gly Ile Leu Ser Ala Gly Gly Ile Gln Ser Ala Val Tyr Ser
275 280 285

Ser Leu Asn Gly Val Asn Gly Leu Glu Gly Trp Arg Trp Asn Phe Ile
290 295 300

Ile Asp Ala Ile Val Ser Val Val Val Gly Leu Ile Gly Phe Tyr Ser
305 310 315 320

Leu Pro Gly Asp Pro Tyr Asn Cys Tyr Ser Ile Phe Leu Thr Asp Asp
325 330 335

[0015]

Glu Ile Arg Leu Ala Arg Lys Arg Leu Lys Glu Asn Gln Thr Gly Lys
340 345 350

Ser Asp Phe Glu Thr Lys Val Phe Asp Ile Lys Leu Trp Lys Thr Ile
355 360 365

Phe Ser Asp Trp Lys Ile Tyr Ile Leu Thr Leu Trp Asn Ile Phe Cys
370 375 380

Trp Asn Asp Ser Asn Val Ser Ser Gly Ala Tyr Leu Leu Trp Leu Lys
385 390 395 400

Ser Leu Lys Arg Tyr Ser Ile Pro Lys Leu Asn Gln Leu Ser Met Ile
405 410 415

Thr Pro Gly Leu Gly Met Val Tyr Leu Met Leu Thr Gly Ile Ile Ala
420 425 430

Asp Lys Leu His Ser Arg Trp Phe Ala Ile Ile Phe Thr Gln Val Phe
435 440 445

Asn Ile Ile Gly Asn Ser Ile Leu Ala Ala Trp Asp Val Ala Glu Gly
450 455 460

Ala Lys Trp Phe Ala Phe Met Leu Gln Cys Phe Gly Trp Ala Met Ala

```
465                 470                 475                 480

Pro Val Leu Tyr Ser Trp Gln Asn Asp Ile Cys Arg Arg Asp Ala Gln
                485                 490                 495

Thr Arg Ala Ile Thr Leu Val Thr Met Asn Ile Met Ala Gln Ser Ser
            500                 505                 510

Thr Ala Trp Ile Ser Val Leu Val Trp Lys Thr Glu Glu Ala Pro Arg
        515                 520                 525

Tyr Leu Lys Gly Phe Thr Phe Thr Ala Cys Ser Ala Phe Cys Leu Ser
    530                 535                 540

Ile Trp Thr Phe Val Val Leu Tyr Phe Tyr Lys Arg Asp Glu Arg Asn
545                 550                 555                 560

Asn Ala Lys Lys Asn Gly Ile Val Leu Tyr Asn Ser Lys His Gly Val
                565                 570                 575

Glu Lys Pro Thr Ser Lys Asp Val Glu Thr Leu Ser Val Ser Asp Glu
            580                 585                 590

Lys
```

[0016]

```
<210>  15
<211>  459
<212>  PRT
<213>  酿酒酵母

<400>  15

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

Cys Gly Ala Gly Val Leu Ala Met Pro Phe Ala Phe Lys Pro Phe Gly
            20                  25                  30

Leu Met Pro Gly Leu Ile Thr Leu Thr Phe Cys Gly Ile Cys Ser Leu
        35                  40                  45

Cys Gly Leu Leu Leu Gln Thr Arg Ile Ala Lys Tyr Val Pro Lys Ser
    50                  55                  60

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

Ser Val Val Phe Asp Phe Ala Ile Ala Val Lys Cys Phe Gly Val Gly
                85                  90                  95

Val Ser Tyr Leu Ile Ile Val Gly Asp Leu Val Pro Gln Ile Val Gln
            100                 105                 110

Ser Ile Phe Tyr Arg Asn Asp Asp Asn Met Ser Gly Ser Gln Glu His
```

115 120 125

His Met Phe Leu Asp Arg Arg Leu Tyr Ile Thr Leu Ile Ile Val Phe
130 135 140

Val Ile Ser Pro Leu Cys Phe Lys Arg Ser Leu Asn Ser Leu Arg Tyr
145 150 155 160

Ala Ser Met Ile Ala Ile Val Ser Val Ala Tyr Leu Ser Gly Leu Ile
165 170 175

Ile Tyr His Phe Val Asn Arg His Gln Leu Glu Arg Gly Gln Val Tyr
180 185 190

Phe Met Val Pro His Gly Asp Ser Gln Ser His Ser Pro Leu Thr Thr
195 200 205

Leu Pro Ile Phe Val Phe Ala Tyr Thr Cys His His Asn Met Phe Ser
210 215 220

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

Pro Ile Phe Ala Ile Val Leu Ala Tyr Phe Leu Tyr Ile Ile Ile Gly
245 250 255

[0017]

Gly Thr Gly Tyr Met Thr Phe Gly Glu Asn Ile Val Gly Asn Ile Leu
260 265 270

Thr Leu Tyr Pro Asn Ser Ile Ser Thr Thr Ile Gly Arg Leu Ala Met
275 280 285

Leu Leu Leu Val Met Leu Ala Phe Pro Leu Gln Cys His Pro Cys Arg
290 295 300

Ser Ser Val Lys Asn Ile Ile Ile Phe Ile Glu Asn Phe Arg Lys Gly
305 310 315 320

Lys Leu Tyr Asp Asn Arg Ala Ser Phe Ile Pro Leu Asp Asn Phe Asn
325 330 335

Ser Glu Asp Pro Gln Glu Ala Pro Thr Gln Gln Asn Asn Glu Glu Pro
340 345 350

Asn Leu Arg Ser Glu Ser Leu Arg His Ile Asn Ile Ile Thr Leu Cys
355 360 365

Ile Leu Leu Phe Ser Tyr Leu Leu Ala Ile Ser Ile Thr Ser Leu Ala
370 375 380

Lys Val Leu Ala Ile Val Gly Ala Thr Gly Ser Thr Ser Ile Ser Phe
385 390 395 400

Ile Leu Pro Gly Leu Phe Gly Tyr Lys Leu Ile Gly Ser Glu Phe Thr
405 410 415

Gly Thr Asn Glu Arg Val Pro Thr Ser Ile Lys Ile Phe Lys Tyr Leu
420 425 430

Ser Leu Ser Leu Phe Ile Trp Gly Ile Ala Val Met Val Ala Ser Leu
435 440 445

Ser Ala Ile Val Phe Leu Gly Thr Ser Ser His
450 455

<210> 16
<211> 545
<212> PRT
<213> 酿酒酵母

<400> 16

Met Leu Ala Arg Thr Ala Ala Ile Arg Ser Leu Ser Arg Thr Leu Ile
1 5 10 15

Asn Ser Thr Lys Ala Ala Arg Pro Ala Ala Ala Ala Leu Ala Ser Thr
20 25 30

Arg Arg Leu Ala Ser Thr Lys Ala Gln Pro Thr Glu Val Ser Ser Ile
35 40 45

[0018]

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

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

Leu Asn Asn Ile Gln Ala Glu Glu Leu Val Glu Phe Ser Ser Gly Val
85 90 95

Lys Gly Met Ala Leu Asn Leu Glu Pro Gly Gln Val Gly Ile Val Leu
100 105 110

Phe Gly Ser Asp Arg Leu Val Lys Glu Gly Glu Leu Val Lys Arg Thr
115 120 125

Gly Asn Ile Val Asp Val Pro Val Gly Pro Gly Leu Leu Gly Arg Val
130 135 140

Val Asp Ala Leu Gly Asn Pro Ile Asp Gly Lys Gly Pro Ile Asp Ala
145 150 155 160

Ala Gly Arg Ser Arg Ala Gln Val Lys Ala Pro Gly Ile Leu Pro Arg
165 170 175

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

Leu Val Pro Ile Gly Arg Gly Gln Arg Glu Leu Ile Ile Gly Asp Arg
195 200 205

Gln Thr Gly Lys Thr Ala Val Ala Leu Asp Thr Ile Leu Asn Gln Lys
210 215 220

Arg Trp Asn Asn Gly Ser Asp Glu Ser Lys Lys Leu Tyr Cys Val Tyr
225 230 235 240

Val Ala Val Gly Gln Lys Arg Ser Thr Val Ala Gln Leu Val Gln Thr
245 250 255

Leu Glu Gln His Asp Ala Met Lys Tyr Ser Ile Ile Val Ala Ala Thr
260 265 270

Ala Ser Glu Ala Ala Pro Leu Gln Tyr Leu Ala Pro Phe Thr Ala Ala
275 280 285

Ser Ile Gly Glu Trp Phe Arg Asp Asn Gly Lys His Ala Leu Ile Val
290 295 300

Tyr Asp Asp Leu Ser Lys Gln Ala Val Ala Tyr Arg Gln Leu Ser Leu
305 310 315 320

Leu Leu Arg Arg Pro Pro Gly Arg Glu Ala Tyr Pro Gly Asp Val Phe
325 330 335

[0019]

Tyr Leu His Ser Arg Leu Leu Glu Arg Ala Ala Lys Leu Ser Glu Lys
340 345 350

Glu Gly Ser Gly Ser Leu Thr Ala Leu Pro Val Ile Glu Thr Gln Gly
355 360 365

Gly Asp Val Ser Ala Tyr Ile Pro Thr Asn Val Ile Ser Ile Thr Asp
370 375 380

Gly Gln Ile Phe Leu Glu Ala Glu Leu Phe Tyr Lys Gly Ile Arg Pro
385 390 395 400

Ala Ile Asn Val Gly Leu Ser Val Ser Arg Val Gly Ser Ala Ala Gln
405 410 415

Val Lys Ala Leu Lys Gln Val Ala Gly Ser Leu Lys Leu Phe Leu Ala
420 425 430

Gln Tyr Arg Glu Val Ala Ala Phe Ala Gln Phe Gly Ser Asp Leu Asp
435 440 445

Ala Ser Thr Lys Gln Thr Leu Val Arg Gly Glu Arg Leu Thr Gln Leu
450 455 460

Leu Lys Gln Asn Gln Tyr Ser Pro Leu Ala Thr Glu Glu Gln Val Pro
465 470 475 480

Leu Ile Tyr Ala Gly Val Asn Gly His Leu Asp Gly Ile Glu Leu Ser
485 490 495

Arg Ile Gly Glu Phe Glu Ser Ser Phe Leu Ser Tyr Leu Lys Ser Asn
500 505 510

His Asn Glu Leu Leu Thr Glu Ile Arg Glu Lys Gly Glu Leu Ser Lys
515 520 525

Glu Leu Leu Ala Ser Leu Lys Ser Ala Thr Glu Ser Phe Val Ala Thr
530 535 540

Phe
545

<210> 17
<211> 488
<212> PRT
<213> 酿酒酵母

<400> 17

Met Ala Glu Thr Glu Arg Leu Met Pro Asn Gly Gly Ser Arg Glu Thr
1 5 10 15

Lys Pro Leu Ile Thr Gly His Leu Ile Leu Gly Thr Ile Val Ala Cys
20 25 30

[0020]

Leu Gly Ser Ile Gln Tyr Gly Tyr His Ile Ala Glu Leu Asn Ala Pro
35 40 45

Gln Glu Phe Leu Ser Cys Ser Arg Phe Glu Ala Pro Asp Glu Asn Ile
50 55 60

Ser Tyr Asp Asp Thr Trp Val Gly Gln His Gly Leu Lys Gln Cys Ile
65 70 75 80

Ala Leu Thr Asp Ser Gln Tyr Gly Ala Ile Thr Ser Ile Phe Ser Ile
85 90 95

Gly Gly Leu Phe Gly Ser Tyr Tyr Ala Gly Asn Trp Ala Asn Arg Tyr
100 105 110

Gly Arg Lys Tyr Val Ser Met Gly Ala Ser Ala Met Cys Met Val Ser
115 120 125

Ser Leu Leu Leu Phe Phe Ser Asn Ser Tyr Leu Gln Leu Leu Phe Gly
130 135 140

Arg Phe Leu Val Gly Met Ser Cys Gly Thr Ala Ile Val Ile Thr Pro
145 150 155 160

Leu Phe Ile Asn Glu Ile Ala Pro Val Glu Trp Arg Gly Ala Met Gly
165 170 175

```
Ser Met Asn Gln Val Ser Ile Asn Leu Gly Ile Leu Leu Thr Gln Thr
            180                 185                 190

Leu Ala Leu Lys Tyr Ala Asp Ser Tyr Asn Trp Arg Trp Leu Leu Phe
        195                 200                 205

Ser Gly Ser Val Ile Ala Val Ala Asn Ile Leu Ala Trp Leu Lys Val
    210                 215                 220

Asp Glu Ser Pro Arg Trp Leu Val Ser His Gly Phe Val Ser Glu Ala
225                 230                 235                 240

Glu Thr Ala Leu Phe Lys Leu Arg Pro Gly Thr Tyr Gln Gln Ala Lys
                245                 250                 255

Gln Glu Ile Gln Asp Trp Gln Arg Ser His Gly His Asn Arg Asp Pro
            260                 265                 270

Glu Ser Ser Glu Glu Thr His Ser Gly Pro Thr Leu Trp Gln Tyr Val
        275                 280                 285

Thr Asp Pro Ser Tyr Lys Lys Pro Arg Thr Val Ile Leu Ala Ile Leu
    290                 295                 300

Ser Cys Gln Gln Phe Cys Gly Ile Asn Ser Ile Ile Phe Tyr Gly Val
305                 310                 315                 320
```

[0021]

```
Lys Val Ile Gly Lys Ile Leu Pro Asp Tyr Ser Ile Gln Val Asn Phe
                325                 330                 335

Ala Ile Ser Ile Leu Asn Val Val Val Thr Leu Ala Ala Ser Ala Ile
            340                 345                 350

Ile Asp His Val Gly Arg Arg Pro Leu Leu Leu Ala Ser Thr Thr Val
        355                 360                 365

Met Thr Ala Met Ser Leu Leu Ile Ser Val Gly Leu Thr Leu Ser Val
    370                 375                 380

Ser Phe Leu Leu Val Thr Ala Thr Phe Val Tyr Ile Ala Ala Phe Ala
385                 390                 395                 400

Ile Gly Leu Gly Pro Ile Pro Phe Leu Ile Ile Gly Glu Leu Ser Tyr
                405                 410                 415

Pro Gln Asp Ala Ala Thr Ala Gln Ser Phe Gly Thr Val Cys Asn Trp
            420                 425                 430

Leu Ala Thr Phe Ile Val Gly Tyr Leu Phe Pro Ile Gly His Gly Leu
        435                 440                 445

Met Gly Gly Tyr Val Phe Ala Ile Phe Ala Ala Ile Ala Ala Met Phe
    450                 455                 460
```

Ala Thr Tyr Val Tyr Lys Arg Val Pro Glu Thr Lys Gly Lys Thr Thr
465 470 475 480

Tyr Ser Glu Val Trp Ala Gly Tyr
485

<210> 18
<211> 859
<212> PRT
<213> 酿酒酵母

<400> 18

Met Ser Arg Lys Ser Ser Thr Glu Tyr Val His Asn Gln Glu Asp Ala
1 5 10 15

Asp Ile Glu Val Phe Glu Ser Glu Tyr Arg Thr Tyr Arg Glu Ser Glu
20 25 30

Ala Ala Glu Asn Arg Asp Gly Leu His Asn Gly Asp Glu Glu Asn Trp
35 40 45

Lys Val Asn Ser Ser Lys Gln Lys Phe Gly Val Thr Lys Asn Glu Leu
50 55 60

Ser Asp Val Leu Tyr Asp Ser Ile Pro Ala Tyr Glu Glu Ser Thr Val
65 70 75 80

[0022]

Thr Leu Lys Glu Tyr Tyr Asp His Ser Ile Lys Asn Asn Leu Thr Ala
85 90 95

Lys Ser Ala Gly Ser Tyr Leu Val Ser Leu Phe Pro Ile Ile Lys Trp
100 105 110

Phe Pro His Tyr Asn Phe Thr Trp Gly Tyr Ala Asp Leu Val Ala Gly
115 120 125

Ile Thr Val Gly Cys Val Leu Val Pro Gln Ser Met Ser Tyr Ala Gln
130 135 140

Ile Ala Ser Leu Ser Pro Glu Tyr Gly Leu Tyr Ser Ser Phe Ile Gly
145 150 155 160

Ala Phe Ile Tyr Ser Leu Phe Ala Thr Ser Lys Asp Val Cys Ile Gly
165 170 175

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

Leu Lys Lys Tyr Pro Glu Asp Gln Thr Glu Val Thr Ala Pro Ile Ile
195 200 205

Ala Thr Thr Leu Cys Leu Leu Cys Gly Ile Val Ala Thr Gly Leu Gly
210 215 220

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

Ala Gly Phe Met Thr Gly Ser Ala Phe Asn Ile Ile Trp Gly Gln Ile
245 250 255

Pro Ala Leu Met Gly Tyr Asn Ser Leu Val Asn Thr Arg Glu Ala Thr
260 265 270

Tyr Lys Val Val Ile Asn Thr Leu Lys His Leu Pro Asn Thr Lys Leu
275 280 285

Asp Ala Val Phe Gly Leu Ile Pro Leu Val Ile Leu Tyr Val Trp Lys
290 295 300

Trp Trp Cys Gly Thr Phe Gly Ile Thr Leu Ala Asp Arg Tyr Tyr Arg
305 310 315 320

Asn Gln Pro Lys Val Ala Asn Arg Leu Lys Ser Phe Tyr Phe Tyr Ala
325 330 335

Gln Ala Met Arg Asn Ala Val Val Ile Val Val Phe Thr Ala Ile Ser
340 345 350

Trp Ser Ile Thr Arg Asn Lys Ser Ser Lys Asp Arg Pro Ile Ser Ile
355 360 365

[0023]

Leu Gly Thr Val Pro Ser Gly Leu Asn Glu Val Gly Val Met Lys Ile
370 375 380

Pro Asp Gly Leu Leu Ser Asn Met Ser Ser Glu Ile Pro Ala Ser Ile
385 390 395 400

Ile Val Leu Val Leu Glu His Ile Ala Ile Ser Lys Ser Phe Gly Arg
405 410 415

Ile Asn Asp Tyr Lys Val Val Pro Asp Gln Glu Leu Ile Ala Ile Gly
420 425 430

Val Thr Asn Leu Ile Gly Thr Phe Phe His Ser Tyr Pro Ala Thr Gly
435 440 445

Ser Phe Ser Arg Ser Ala Leu Lys Ala Lys Cys Asn Val Arg Thr Pro
450 455 460

Phe Ser Gly Val Phe Thr Gly Gly Cys Val Leu Leu Ala Leu Tyr Cys
465 470 475 480

Leu Thr Asp Ala Phe Phe Phe Ile Pro Lys Ala Thr Leu Ser Ala Val
485 490 495

Ile Ile His Ala Val Ser Asp Leu Leu Thr Ser Tyr Lys Thr Thr Trp

500 505 510

Thr Phe Trp Lys Thr Asn Pro Leu Asp Cys Ile Ser Phe Ile Val Thr
515 520 525

Val Phe Ile Thr Val Phe Ser Ser Ile Glu Asn Gly Ile Tyr Phe Ala
530 535 540

Met Cys Trp Ser Cys Ala Met Leu Leu Leu Lys Gln Ala Phe Pro Ala
545 550 555 560

Gly Lys Phe Leu Gly Arg Val Glu Val Ala Glu Val Leu Asn Pro Thr
565 570 575

Val Gln Glu Asp Ile Asp Ala Val Ile Ser Ser Asn Glu Leu Pro Asn
580 585 590

Glu Leu Asn Lys Gln Val Lys Ser Thr Val Glu Val Leu Pro Ala Pro
595 600 605

Glu Tyr Lys Phe Ser Val Lys Trp Val Pro Phe Asp His Gly Tyr Ser
610 615 620

Arg Glu Leu Asn Ile Asn Thr Thr Val Arg Pro Pro Pro Pro Gly Val
625 630 635 640

[0024]

Ile Val Tyr Arg Leu Gly Asp Ser Phe Thr Tyr Val Asn Cys Ser Arg
645 650 655

His Tyr Asp Ile Ile Phe Asp Arg Ile Lys Glu Glu Thr Arg Arg Gly
660 665 670

Gln Leu Ile Thr Leu Arg Lys Lys Ser Asp Arg Pro Trp Asn Asp Pro
675 680 685

Gly Glu Trp Lys Met Pro Asp Ser Leu Lys Ser Leu Phe Lys Phe Lys
690 695 700

Arg His Ser Ala Thr Thr Asn Ser Asp Leu Pro Ile Ser Asn Gly Ser
705 710 715 720

Ser Asn Gly Glu Thr Tyr Glu Lys Pro Leu Leu Lys Val Val Cys Leu
725 730 735

Asp Phe Ser Gln Val Ala Gln Val Asp Ser Thr Ala Val Gln Ser Leu
740 745 750

Val Asp Leu Arg Lys Ala Val Asn Arg Tyr Ala Asp Arg Gln Val Glu
755 760 765

Phe His Phe Ala Gly Ile Ile Ser Pro Trp Ile Lys Arg Ser Leu Leu
770 775 780

Ser Val Lys Phe Gly Thr Thr Asn Glu Glu Tyr Ser Asp Asp Ser Ile
785 790 795 800

Ile Ala Gly His Ser Ser Phe His Val Ala Lys Val Leu Lys Asp Asp
805 810 815

Val Asp Tyr Thr Asp Glu Asp Ser Arg Ile Ser Thr Ser Tyr Ser Asn
820 825 830

Tyr Glu Thr Leu Cys Ala Ala Thr Gly Thr Asn Leu Pro Phe Phe His
835 840 845

Ile Asp Ile Pro Asp Phe Ser Lys Trp Asp Val
850 855

<210> 19
<211> 458
<212> PRT
<213> 酿酒酵母

<400> 19

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

Gly Leu Gln Thr Leu Cys Phe Val Ile Gly Cys Thr Met Val Gly Glu
20 25 30

[0025]

Arg Ser Arg Pro Leu Val Ile Ser Ile Leu Ser Cys Ala Phe Ala Val
35 40 45

Ala Ala Ile Val Gly Pro Ile Ile Gly Gly Ala Phe Thr Thr His Val
50 55 60

Thr Trp Arg Trp Cys Phe Tyr Ile Asn Leu Pro Ile Gly Gly Leu Ala
65 70 75 80

Ile Ile Met Phe Leu Leu Thr Tyr Lys Ala Glu Asn Lys Gly Ile Leu
85 90 95

Gln Gln Ile Lys Asp Ala Ile Gly Thr Ile Ser Ser Phe Thr Phe Ser
100 105 110

Lys Phe Arg His Gln Val Asn Phe Lys Arg Leu Met Asn Gly Ile Ile
115 120 125

Phe Lys Phe Asp Phe Phe Gly Phe Ala Leu Cys Ser Ala Gly Leu Val
130 135 140

Leu Phe Leu Leu Gly Leu Thr Phe Gly Gly Asn Lys Tyr Ser Trp Asn
145 150 155 160

Ser Gly Gln Val Ile Ala Tyr Leu Val Leu Gly Val Leu Leu Phe Ile
165 170 175

Phe Ser Leu Val Tyr Asp Phe Phe Leu Phe Asp Lys Phe Asn Pro Glu
180 185 190

Pro Asp Asn Ile Ser Tyr Arg Pro Leu Leu Leu Arg Arg Leu Val Ala
195 200 205

Lys Pro Ala Ile Ile Ile Ile Asn Met Val Thr Phe Leu Leu Cys Thr
210 215 220

Gly Tyr Asn Gly Gln Met Ile Tyr Ser Val Gln Phe Phe Gln Leu Ile
225 230 235 240

Phe Ala Ser Ser Ala Trp Lys Ala Gly Leu His Leu Ile Pro Ile Val
245 250 255

Ile Thr Asn Val Ile Ala Ala Ile Ala Ser Gly Val Ile Thr Lys Lys
260 265 270

Leu Gly Leu Val Lys Pro Leu Leu Ile Phe Gly Gly Val Leu Gly Val
275 280 285

Ile Gly Ala Gly Leu Met Thr Leu Met Thr Asn Thr Ser Thr Lys Ser
290 295 300

Thr Gln Ile Gly Val Leu Leu Leu Pro Gly Phe Ser Leu Gly Phe Ala
305 310 315 320

[0026]

Leu Gln Ala Ser Leu Met Ser Ala Gln Leu Gln Ile Thr Lys Asp Arg
325 330 335

Pro Glu Ala Ala Met Asp Phe Ile Glu Val Thr Ala Phe Asn Thr Phe
340 345 350

Met Lys Ser Leu Gly Thr Thr Leu Gly Gly Val Leu Ser Thr Thr Val
355 360 365

Phe Ser Ala Ser Phe His Asn Lys Val Ser Arg Ala His Leu Glu Pro
370 375 380

Tyr Glu Gly Lys Thr Val Asp Asp Met Ile Leu Tyr Arg Leu Gln Asn
385 390 395 400

Tyr Asp Gly Ser His Ser Thr Ile Gly Asn Ile Leu Ser Asp Ser Ile
405 410 415

Lys Asn Val Phe Trp Met Asp Leu Gly Phe Tyr Ala Leu Gly Phe Leu
420 425 430

Phe Cys Ser Phe Ser Ser Asn Lys Lys Leu Ile Ile Pro Lys Lys Asp
435 440 445

Glu Thr Pro Glu Asp Asn Leu Glu Asp Lys
450 455

<210> 20
<211> 512
<212> PRT
<213> 酿酒酵母

<400> 20

Met Met Lys Glu Ser Lys Ser Ile Thr Gln His Glu Val Glu Arg Glu
1 5 10 15

Ser Val Ser Ser Lys Arg Ala Ile Lys Lys Arg Leu Leu Leu Phe Lys
20 25 30

Ile Asp Leu Phe Val Leu Ser Phe Val Cys Leu Gln Tyr Trp Ile Asn
35 40 45

Tyr Val Asp Arg Val Gly Phe Thr Asn Ala Tyr Ile Ser Gly Met Lys
50 55 60

Glu Asp Leu Lys Met Val Gly Asn Asp Leu Thr Val Ser Asn Thr Val
65 70 75 80

Phe Met Ile Gly Tyr Ile Val Gly Met Val Pro Asn Asn Leu Met Leu
85 90 95

Leu Cys Val Pro Pro Arg Ile Trp Leu Ser Phe Cys Thr Phe Ala Trp
100 105 110

[0027]

Gly Leu Leu Thr Leu Gly Met Tyr Lys Val Thr Ser Phe Lys His Ile
115 120 125

Cys Ala Ile Arg Phe Phe Gln Ala Leu Phe Glu Ser Cys Thr Phe Ser
130 135 140

Gly Thr His Phe Val Leu Gly Ser Trp Tyr Lys Glu Asp Glu Leu Pro
145 150 155 160

Ile Arg Ser Ala Ile Phe Thr Gly Ser Gly Leu Val Gly Ser Met Phe
165 170 175

Ser Gly Phe Met Gln Thr Ser Ile Phe Thr His Leu Asn Gly Arg Asn
180 185 190

Gly Leu Ala Gly Trp Arg Trp Leu Phe Ile Ile Asp Phe Cys Ile Thr
195 200 205

Leu Pro Ile Ala Ile Tyr Gly Phe Ile Phe Phe Pro Gly Leu Pro Asp
210 215 220

Gln Thr Ser Ala Val Ser Lys Phe Ser Met Thr Arg Tyr Ile Phe Asn
225 230 235 240

Glu Gln Glu Leu His Tyr Ala Arg Arg Arg Leu Pro Ala Arg Asp Glu
245 250 255

Ser Thr Arg Leu Asp Trp Ser Thr Ile Pro Arg Val Leu Lys Arg Trp
260 265 270

His Trp Trp Met Phe Ser Leu Val Trp Val Leu Gly Gly Glu Asn Leu
275 280 285

Gly Phe Ala Ser Asn Ser Thr Phe Ala Leu Trp Leu Gln Asn Gln Lys
290 295 300

Tyr Thr Leu Ala Gln Arg Asn Asn Tyr Pro Ser Gly Ile Phe Ala Val
305 310 315 320

Gly Ile Val Ser Thr Leu Cys Ser Ala Val Tyr Met Ser Lys Ile Pro
325 330 335

Arg Ala Arg His Trp His Val Ser Val Phe Ile Ser Leu Val Met Val
340 345 350

Ile Val Ala Val Leu Ile Arg Ala Asp Pro Leu Asn Pro Lys Val Val
355 360 365

Phe Ser Ala Gln Tyr Leu Gly Gly Val Ala Tyr Ala Gly Gln Ala Val
370 375 380

Phe Phe Ser Trp Ala Asn Ile Ile Cys His Ala Asp Leu Gln Glu Arg
385 390 395 400

[0028]

Ala Ile Val Leu Ala Ser Met Asn Met Phe Ser Gly Ala Val Asn Ala
405 410 415

Trp Trp Ser Ile Leu Phe Phe Ala Ser Asp Met Val Pro Lys Phe Glu
420 425 430

Arg Gly Cys Tyr Ala Leu Leu Ala Thr Ala Ile Ser Ser Gly Ile Val
435 440 445

Ser Val Val Ile Arg Ser Leu Gln Ile Lys Glu Asn Leu Ser Lys Lys
450 455 460

Gln Val Pro Tyr Ile Asp Ala Asn Asp Met Pro Gly Glu Asp Asp Asp
465 470 475 480

Asp Asp Asn Gln Asp Asn Glu Asn Asp Gly Asp Asp Glu Ser Met Glu
485 490 495

Val Glu Leu His Asn Glu Glu Met Ala Glu Ile Ser Asn Pro Phe Arg
500 505 510

<210> 21
<211> 260
<212> PRT
<213> 酿酒酵母

<400> 21

Met Val Ser Leu Asp Asp Ile Leu Gly Ile Val Tyr Val Thr Ser Trp
1 5 10 15

Ser Ile Ser Met Tyr Pro Pro Ile Ile Thr Asn Trp Arg His Lys Ser
20 25 30

Ala Ser Ala Ile Ser Met Asp Phe Val Met Leu Asn Thr Ala Gly Tyr
35 40 45

Ser Tyr Leu Val Ile Ser Ile Phe Leu Gln Leu Tyr Cys Trp Lys Met
50 55 60

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

Phe Trp Tyr Cys Leu His Gly Cys Leu Met Asn Val Val Leu Leu Thr
85 90 95

Gln Val Val Ala Gly Ala Arg Ile Trp Arg Phe Pro Gly Lys Gly His
100 105 110

Arg Lys Met Asn Pro Trp Tyr Leu Arg Ile Leu Leu Ala Ser Leu Ala
115 120 125

Ile Phe Ser Leu Leu Thr Val Gln Phe Met Tyr Ser Asn Tyr Trp Tyr
130 135 140

[0029]

Asp Trp His Asn Ser Arg Thr Leu Ala Tyr Cys Asn Asn Leu Phe Leu
145 150 155 160

Leu Lys Ile Ser Met Ser Leu Ile Lys Tyr Ile Pro Gln Val Thr His
165 170 175

Asn Ser Thr Arg Lys Ser Met Asp Cys Phe Pro Ile Gln Gly Val Phe
180 185 190

Leu Asp Val Thr Gly Gly Ile Ala Ser Leu Leu Gln Leu Ile Trp Gln
195 200 205

Leu Ser Asn Asp Gln Gly Phe Ser Leu Asp Thr Phe Val Thr Asn Phe
210 215 220

Gly Lys Val Gly Leu Ser Met Val Thr Leu Ile Phe Asn Phe Ile Phe
225 230 235 240

Ile Met Gln Trp Phe Val Tyr Arg Ser Arg Gly His Asp Leu Ala Ser
245 250 255

Glu Tyr Pro Leu
260

<210> 22
<211> 411

<212> PRT
<213> 酿酒酵母

<400> 22

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

Arg Asn Pro Lys His Thr Ala Trp Arg Ala Ala Val Tyr Asp Leu Gln
20 25 30

Tyr Ile Leu Lys Ala Ser Pro Leu Asn Phe Leu Leu Val Phe Val Pro
35 40 45

Leu Gly Leu Ile Trp Gly His Phe Gln Leu Ser His Thr Leu Thr Phe
50 55 60

Leu Phe Asn Phe Leu Ala Ile Ile Pro Leu Ala Ala Ile Leu Ala Asn
65 70 75 80

Ala Thr Glu Glu Leu Ala Asp Lys Ala Gly Asn Thr Ile Gly Gly Leu
85 90 95

Leu Asn Ala Thr Phe Gly Asn Ala Val Glu Leu Ile Val Ser Ile Ile
100 105 110

Ala Leu Lys Lys Gly Gln Val Arg Ile Val Gln Ala Ser Met Leu Gly
115 120 125

[0030]

Ser Leu Leu Ser Asn Leu Leu Leu Val Leu Gly Leu Cys Phe Ile Phe
130 135 140

Gly Gly Tyr Asn Arg Val Gln Gln Thr Phe Asn Gln Thr Ala Ala Gln
145 150 155 160

Thr Met Ser Ser Leu Leu Ala Ile Ala Cys Ala Ser Leu Leu Ile Pro
165 170 175

Ala Ala Phe Arg Ala Thr Leu Pro His Gly Lys Glu Asp His Phe Ile
180 185 190

Asp Gly Lys Ile Leu Glu Leu Ser Arg Gly Thr Ser Ile Val Ile Leu
195 200 205

Ile Val Tyr Val Leu Phe Leu Tyr Phe Gln Leu Gly Ser His His Ala
210 215 220

Leu Phe Glu Gln Gln Glu Glu Glu Thr Asp Glu Val Met Ser Thr Ile
225 230 235 240

Ser Arg Asn Pro His His Ser Leu Ser Val Lys Ser Ser Leu Val Ile
245 250 255

Leu Leu Gly Thr Thr Val Ile Ile Ser Phe Cys Ala Asp Phe Leu Val
260 265 270

Gly Thr Ile Asp Asn Val Val Glu Ser Thr Gly Leu Ser Lys Thr Phe
275 280 285

Ile Gly Leu Ile Val Ile Pro Ile Val Gly Asn Ala Ala Glu His Val
290 295 300

Thr Ser Val Leu Val Ala Met Lys Asp Lys Met Asp Leu Ala Leu Gly
305 310 315 320

Val Ala Ile Gly Ser Ser Leu Gln Val Ala Leu Phe Val Thr Pro Phe
325 330 335

Met Val Leu Val Gly Trp Met Ile Asp Val Pro Met Thr Leu Asn Phe
340 345 350

Ser Thr Phe Glu Thr Ala Thr Leu Phe Ile Ala Val Phe Leu Ser Asn
355 360 365

Tyr Leu Ile Leu Asp Gly Glu Ser Asn Trp Leu Glu Gly Val Met Ser
370 375 380

Leu Ala Met Tyr Ile Leu Ile Ala Met Ala Phe Phe Tyr Tyr Pro Asp
385 390 395 400

Glu Lys Thr Leu Asp Ser Ile Gly Asn Ser Leu
405 410

[0031]

<210> 23
<211> 1071
<212> PRT
<213> 酿酒酵母

<400> 23

Met Ala Gly Ala Ile Glu Asn Ala Arg Lys Glu Ile Lys Arg Ile Ser
1 5 10 15

Leu Glu Asp His Ala Glu Ser Glu Tyr Gly Ala Ile Tyr Ser Val Ser
20 25 30

Gly Pro Val Val Ile Ala Glu Asn Met Ile Gly Cys Ala Met Tyr Glu
35 40 45

Leu Val Lys Val Gly His Asp Asn Leu Val Gly Glu Val Ile Arg Ile
50 55 60

Asp Gly Asp Lys Ala Thr Ile Gln Val Tyr Glu Glu Thr Ala Gly Leu
65 70 75 80

Thr Val Gly Asp Pro Val Leu Arg Thr Gly Lys Pro Leu Ser Val Glu
85 90 95

Leu Gly Pro Gly Leu Met Glu Thr Ile Tyr Asp Gly Ile Gln Arg Pro
100 105 110

Leu Lys Ala Ile Lys Glu Glu Ser Gln Ser Ile Tyr Ile Pro Arg Gly
115 120 125

Ile Asp Thr Pro Ala Leu Asp Arg Thr Ile Lys Trp Gln Phe Thr Pro
130 135 140

Gly Lys Phe Gln Val Gly Asp His Ile Ser Gly Gly Asp Ile Tyr Gly
145 150 155 160

Ser Val Phe Glu Asn Ser Leu Ile Ser Ser His Lys Ile Leu Leu Pro
165 170 175

Pro Arg Ser Arg Gly Thr Ile Thr Trp Ile Ala Pro Ala Gly Glu Tyr
180 185 190

Thr Leu Asp Glu Lys Ile Leu Glu Val Glu Phe Asp Gly Lys Lys Ser
195 200 205

Asp Phe Thr Leu Tyr His Thr Trp Pro Val Arg Val Pro Arg Pro Val
210 215 220

Thr Glu Lys Leu Ser Ala Asp Tyr Pro Leu Leu Thr Gly Gln Arg Val
225 230 235 240

Leu Asp Ala Leu Phe Pro Cys Val Gln Gly Gly Thr Thr Cys Ile Pro
245 250 255

[0032]

Gly Ala Phe Gly Cys Gly Lys Thr Val Ile Ser Gln Ser Leu Ser Lys
260 265 270

Tyr Ser Asn Ser Asp Ala Ile Ile Tyr Val Gly Cys Phe Ala Lys Gly
275 280 285

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

Glu Val Gly Asn Lys Val Met Gly Lys Asp Gly Arg Pro Arg Glu Val
305 310 315 320

Ile Lys Leu Pro Arg Gly Arg Glu Thr Met Tyr Ser Val Val Gln Lys
325 330 335

Ser Gln His Arg Ala His Lys Ser Asp Ser Ser Arg Glu Val Pro Glu
340 345 350

Leu Leu Lys Phe Thr Cys Asn Ala Thr His Glu Leu Val Val Arg Thr
355 360 365

Pro Arg Ser Val Arg Arg Leu Ser Arg Thr Ile Lys Gly Val Glu Tyr
370 375 380

Phe Glu Val Ile Thr Phe Glu Met Gly Gln Lys Lys Ala Pro Asp Gly

385 390 395 400

Arg Ile Val Glu Leu Val Lys Glu Val Ser Lys Ser Tyr Pro Ile Ser
405 410 415

Glu Gly Pro Glu Arg Ala Asn Glu Leu Val Glu Ser Tyr Arg Lys Ala
420 425 430

Ser Asn Lys Ala Tyr Phe Glu Trp Thr Ile Glu Ala Arg Asp Leu Ser
435 440 445

Leu Leu Gly Ser His Val Arg Lys Ala Thr Tyr Gln Thr Tyr Ala Pro
450 455 460

Ile Leu Tyr Glu Asn Asp His Phe Phe Asp Tyr Met Gln Lys Ser Lys
465 470 475 480

Phe His Leu Thr Ile Glu Gly Pro Lys Val Leu Ala Tyr Leu Leu Gly
485 490 495

Leu Trp Ile Gly Asp Gly Leu Ser Asp Arg Ala Thr Phe Ser Val Asp
500 505 510

Ser Arg Asp Thr Ser Leu Met Glu Arg Val Thr Glu Tyr Ala Glu Lys
515 520 525

[0033]

Leu Asn Leu Cys Ala Glu Tyr Lys Asp Arg Lys Glu Pro Gln Val Ala
530 535 540

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

Asn Asn Leu Asn Thr Glu Asn Pro Leu Trp Asp Ala Ile Val Gly Leu
565 570 575

Gly Phe Leu Lys Asp Gly Val Lys Asn Ile Pro Ser Phe Leu Ser Thr
580 585 590

Asp Asn Ile Gly Thr Arg Glu Thr Phe Leu Ala Gly Leu Ile Asp Ser
595 600 605

Asp Gly Tyr Val Thr Asp Glu His Gly Ile Lys Ala Thr Ile Lys Thr
610 615 620

Ile His Thr Ser Val Arg Asp Gly Leu Val Ser Leu Ala Arg Ser Leu
625 630 635 640

Gly Leu Val Val Ser Val Asn Ala Glu Pro Ala Lys Val Asp Met Asn
645 650 655

Gly Thr Lys His Lys Ile Ser Tyr Ala Ile Tyr Met Ser Gly Gly Asp
660 665 670

Val Leu Leu Asn Val Leu Ser Lys Cys Ala Gly Ser Lys Lys Phe Arg
675 680 685

Pro Ala Pro Ala Ala Ala Phe Ala Arg Glu Cys Arg Gly Phe Tyr Phe
690 695 700

Glu Leu Gln Glu Leu Lys Glu Asp Asp Tyr Tyr Gly Ile Thr Leu Ser
705 710 715 720

Asp Asp Ser Asp His Gln Phe Leu Leu Ala Asn Gln Val Val Val His
725 730 735

Asn Cys Gly Glu Arg Gly Asn Glu Met Ala Glu Val Leu Met Glu Phe
740 745 750

Pro Glu Leu Tyr Thr Glu Met Ser Gly Thr Lys Glu Pro Ile Met Lys
755 760 765

Arg Thr Thr Leu Val Ala Asn Thr Ser Asn Met Pro Val Ala Ala Arg
770 775 780

Glu Ala Ser Ile Tyr Thr Gly Ile Thr Leu Ala Glu Tyr Phe Arg Asp
785 790 795 800

Gln Gly Lys Asn Val Ser Met Ile Ala Asp Ser Ser Ser Arg Trp Ala
805 810 815

[0034]

Glu Ala Leu Arg Glu Ile Ser Gly Arg Leu Gly Glu Met Pro Ala Asp
820 825 830

Gln Gly Phe Pro Ala Tyr Leu Gly Ala Lys Leu Ala Ser Phe Tyr Glu
835 840 845

Arg Ala Gly Lys Ala Val Ala Leu Gly Ser Pro Asp Arg Thr Gly Ser
850 855 860

Val Ser Ile Val Ala Ala Val Ser Pro Ala Gly Gly Asp Phe Ser Asp
865 870 875 880

Pro Val Thr Thr Ala Thr Leu Gly Ile Thr Gln Val Phe Trp Gly Leu
885 890 895

Asp Lys Lys Leu Ala Gln Arg Lys His Phe Pro Ser Ile Asn Thr Ser
900 905 910

Val Ser Tyr Ser Lys Tyr Thr Asn Val Leu Asn Lys Phe Tyr Asp Ser
915 920 925

Asn Tyr Pro Glu Phe Pro Val Leu Arg Asp Arg Met Lys Glu Ile Leu
930 935 940

Ser Asn Ala Glu Glu Leu Glu Gln Val Val Gln Leu Val Gly Lys Ser
945 950 955 960

Ala Leu Ser Asp Ser Asp Lys Ile Thr Leu Asp Val Ala Thr Leu Ile
965 970 975

Lys Glu Asp Phe Leu Gln Gln Asn Gly Tyr Ser Thr Tyr Asp Ala Phe
980 985 990

Cys Pro Ile Trp Lys Thr Phe Asp Met Met Arg Ala Phe Ile Ser Tyr
995 1000 1005

His Asp Glu Ala Gln Lys Ala Val Ala Asn Gly Ala Asn Trp Ser
1010 1015 1020

Lys Leu Ala Asp Ser Thr Gly Asp Val Lys His Ala Val Ser Ser
1025 1030 1035

Ser Lys Phe Phe Glu Pro Ser Arg Gly Glu Lys Glu Val His Gly
1040 1045 1050

Glu Phe Glu Lys Leu Leu Ser Thr Met Gln Glu Arg Phe Ala Glu
1055 1060 1065

Ser Thr Asp
1070

[0035]

<210> 24
<211> 884
<212> PRT
<213> 酿酒酵母

<400> 24

Met Asp Pro Asn Ser Asn Ser Ser Ser Glu Thr Leu Arg Gln Glu Lys
1 5 10 15

Gln Gly Phe Leu Asp Lys Ala Leu Gln Arg Val Lys Gly Ile Ala Leu
20 25 30

Arg Arg Asn Asn Ser Asn Lys Asp His Thr Thr Asp Asp Thr Thr Gly
35 40 45

Ser Ile Arg Thr Pro Thr Ser Leu Gln Arg Gln Asn Ser Asp Arg Gln
50 55 60

Ser Asn Met Thr Ser Val Phe Thr Asp Asp Ile Ser Thr Ile Asp Asp
65 70 75 80

Asn Ser Ile Leu Phe Ser Glu Pro Pro Gln Lys Gln Ser Met Met Met
85 90 95

Ser Ile Cys Val Gly Val Phe Val Ala Val Gly Gly Phe Leu Phe Gly
100 105 110

Tyr Asp Thr Gly Leu Ile Asn Ser Ile Thr Ser Met Asn Tyr Val Lys
115 120 125

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Ser His Val Ala Pro Asn His Asp Ser Phe Thr Ala Gln Gln Met Ser
    130                 135                 140

Ile Leu Val Ser Phe Leu Ser Leu Gly Thr Phe Phe Gly Ala Leu Thr
145                 150                 155                 160

Ala Pro Phe Ile Ser Asp Ser Tyr Gly Arg Lys Pro Thr Ile Ile Phe
                165                 170                 175

Ser Thr Ile Phe Ile Phe Ser Ile Gly Asn Ser Leu Gln Val Gly Ala
            180                 185                 190

Gly Gly Ile Thr Leu Leu Ile Val Gly Arg Val Ile Ser Gly Ile Gly
        195                 200                 205

Ile Gly Ala Ile Ser Ala Val Val Pro Leu Tyr Gln Ala Glu Ala Thr
    210                 215                 220

His Lys Ser Leu Arg Gly Ala Ile Ile Ser Thr Tyr Gln Trp Ala Ile
225                 230                 235                 240

Thr Trp Gly Leu Leu Val Ser Ser Ala Val Ser Gln Gly Thr His Ala
                245                 250                 255

Arg Asn Asp Ala Ser Ser Tyr Arg Ile Pro Ile Gly Leu Gln Tyr Val
            260                 265                 270
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[0036]

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Trp Ser Ser Phe Leu Ala Ile Gly Met Phe Phe Leu Pro Glu Ser Pro
        275                 280                 285

Arg Tyr Tyr Val Leu Lys Asp Lys Leu Asp Glu Ala Ala Lys Ser Leu
    290                 295                 300

Ser Phe Leu Arg Gly Val Pro Val His Asp Ser Gly Leu Leu Glu Glu
305                 310                 315                 320

Leu Val Glu Ile Lys Ala Thr Tyr Asp Tyr Glu Ala Ser Phe Gly Ser
                325                 330                 335

Ser Asn Phe Ile Asp Cys Phe Ile Ser Ser Lys Ser Arg Pro Lys Gln
            340                 345                 350

Thr Leu Arg Met Phe Thr Gly Ile Ala Leu Gln Ala Phe Gln Gln Phe
        355                 360                 365

Ser Gly Ile Asn Phe Ile Phe Tyr Tyr Gly Val Asn Phe Phe Asn Lys
    370                 375                 380

Thr Gly Val Ser Asn Ser Tyr Leu Val Ser Phe Ile Thr Tyr Ala Val
385                 390                 395                 400

Asn Val Val Phe Asn Val Pro Gly Leu Phe Phe Val Glu Phe Phe Gly
                405                 410                 415
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Arg Arg Lys Val Leu Val Val Gly Gly Val Ile Met Thr Ile Ala Asn
            420                 425                 430

Phe Ile Val Ala Ile Val Gly Cys Ser Leu Lys Thr Val Ala Ala Ala
        435                 440                 445

Lys Val Met Ile Ala Phe Ile Cys Leu Phe Ile Ala Ala Phe Ser Ala
    450                 455                 460

Thr Trp Gly Gly Val Val Trp Val Ile Ser Ala Glu Leu Tyr Pro Leu
465                 470                 475                 480

Gly Val Arg Ser Lys Cys Thr Ala Ile Cys Ala Ala Ala Asn Trp Leu
                485                 490                 495

Val Asn Phe Ile Cys Ala Leu Ile Thr Pro Tyr Ile Val Asp Thr Gly
            500                 505                 510

Ser His Thr Ser Ser Leu Gly Ala Lys Ile Phe Phe Ile Trp Gly Ser
        515                 520                 525

Leu Asn Ala Met Gly Val Ile Val Val Tyr Leu Thr Val Tyr Glu Thr
    530                 535                 540

Lys Gly Leu Thr Leu Glu Glu Ile Asp Glu Leu Tyr Ile Lys Ser Ser
545                 550                 555                 560
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[0037]

```
Thr Gly Val Val Ser Pro Lys Phe Asn Lys Asp Ile Arg Glu Arg Ala
                565                 570                 575

Leu Lys Phe Gln Tyr Asp Pro Leu Gln Arg Leu Glu Asp Gly Lys Asn
            580                 585                 590

Thr Phe Val Ala Lys Arg Asn Asn Phe Asp Asp Glu Thr Pro Arg Asn
        595                 600                 605

Asp Phe Arg Asn Thr Ile Ser Gly Glu Ile Asp His Ser Pro Asn Gln
    610                 615                 620

Lys Glu Val His Ser Ile Pro Glu Arg Val Asp Ile Pro Thr Ser Thr
625                 630                 635                 640

Glu Ile Leu Glu Ser Pro Asn Lys Ser Ser Gly Met Thr Val Pro Val
                645                 650                 655

Ser Pro Ser Leu Gln Asp Val Pro Ile Pro Gln Thr Thr Glu Pro Ala
            660                 665                 670

Glu Ile Arg Thr Lys Tyr Val Asp Leu Gly Asn Gly Leu Gly Leu Asn
        675                 680                 685

Thr Tyr Asn Arg Gly Pro Pro Ser Leu Ser Ser Asp Ser Ser Glu Asp
```

690 695 700

Tyr Thr Glu Asp Glu Ile Gly Gly Pro Ser Ser Gln Gly Asp Gln Ser
705 710 715 720

Asn Arg Ser Thr Met Asn Asp Ile Asn Asp Tyr Met Ala Arg Leu Ile
725 730 735

His Ser Thr Ser Thr Ala Ser Asn Thr Thr Asp Lys Phe Ser Gly Asn
740 745 750

Gln Ser Thr Leu Arg Tyr His Thr Ala Ser Ser His Ser Asp Thr Thr
755 760 765

Glu Glu Asp Ser Asn Leu Met Asp Leu Gly Asn Gly Leu Ala Leu Asn
770 775 780

Ala Tyr Asn Arg Gly Pro Pro Ser Ile Leu Met Asn Ser Ser Asp Glu
785 790 795 800

Glu Ala Asn Gly Gly Glu Thr Ser Asp Asn Leu Asn Thr Ala Gln Asp
805 810 815

Leu Ala Gly Met Lys Glu Arg Met Ala Gln Phe Ala Gln Ser Tyr Ile
820 825 830

[0038] Asp Lys Arg Gly Gly Leu Glu Pro Glu Thr Gln Ser Asn Ile Leu Ser
835 840 845

Thr Ser Leu Ser Val Met Ala Asp Thr Asn Glu His Asn Asn Glu Ile
850 855 860

Leu His Ser Ser Glu Glu Asn Ala Thr Asn Gln Pro Val Asn Glu Asn
865 870 875 880

Asn Asp Leu Lys

<210> 25
<211> 571
<212> PRT
<213> 酿酒酵母

<400> 25

Met Ser Met Ser Ser Lys Asn Glu Asn Lys Ile Ser Val Glu Gln Arg
1 5 10 15

Ile Ser Thr Asp Ile Gly Gln Ala Tyr Gln Leu Gln Gly Leu Gly Ser
20 25 30

Asn Leu Arg Ser Ile Arg Ser Lys Thr Gly Ala Gly Glu Val Asn Tyr
35 40 45

Ile Asp Ala Ala Lys Ser Val Asn Asp Asn Gln Leu Leu Ala Glu Ile

50 55 60

Gly Tyr Lys Gln Glu Leu Lys Arg Gln Phe Ser Thr Leu Gln Val Phe
65 70 75 80

Gly Ile Ala Phe Ser Ile Met Gly Leu Leu Pro Ser Ile Ala Ser Val
85 90 95

Met Gly Gly Gly Leu Gly Gly Gly Pro Ala Thr Leu Val Trp Gly Trp
100 105 110

Phe Val Ala Ala Phe Phe Ile Leu Leu Val Gly Ile Thr Met Ala Glu
115 120 125

His Ala Ser Ser Ile Pro Thr Ala Gly Gly Leu Tyr Tyr Trp Thr Tyr
130 135 140

Tyr Tyr Ala Pro Glu Gly Tyr Lys Glu Ile Ile Ser Phe Ile Ile Gly
145 150 155 160

Cys Ser Asn Ser Leu Ala Leu Ala Ala Gly Val Cys Ser Ile Asp Tyr
165 170 175

Gly Leu Ala Glu Glu Ile Ala Ala Ala Val Thr Leu Thr Lys Asp Gly
180 185 190

[0039]

Asn Phe Glu Val Thr Ser Gly Lys Leu Tyr Gly Ile Phe Ala Gly Ala
195 200 205

Val Val Val Met Cys Ile Cys Thr Cys Val Ala Ser Gly Ala Ile Ala
210 215 220

Arg Leu Gln Thr Leu Ser Ile Phe Ala Asn Leu Phe Ile Ile Val Leu
225 230 235 240

Leu Phe Ile Ala Leu Pro Ile Gly Thr Lys His Arg Met Gly Gly Phe
245 250 255

Asn Asp Gly Asp Phe Ile Phe Gly Lys Tyr Glu Asn Leu Ser Asp Trp
260 265 270

Asn Asn Gly Trp Gln Phe Cys Leu Ala Gly Phe Met Pro Ala Val Trp
275 280 285

Thr Ile Gly Ser Phe Asp Ser Cys Val His Gln Ser Glu Glu Ala Lys
290 295 300

Asp Ala Lys Lys Ser Val Pro Ile Gly Ile Ile Ser Ser Ile Ala Val
305 310 315 320

Cys Trp Ile Leu Gly Trp Leu Ile Ile Ile Cys Leu Met Ala Cys Ile
325 330 335

Asn Pro Asp Ile Asp Ser Val Leu Asp Ser Lys Tyr Gly Phe Ala Leu
340 345 350

Ala Gln Ile Ile Tyr Asp Ser Leu Gly Lys Lys Trp Ala Ile Ala Phe
355 360 365

Met Ser Leu Ile Ala Phe Cys Gln Phe Leu Met Gly Ala Ser Ile Thr
370 375 380

Thr Ala Val Ser Arg Gln Val Trp Ala Phe Ser Arg Asp Asn Gly Leu
385 390 395 400

Pro Leu Ser Lys Tyr Ile Lys Arg Val Asp Ser Lys Tyr Ser Val Pro
405 410 415

Phe Phe Ala Ile Leu Ala Ala Cys Val Gly Ser Leu Ile Leu Gly Leu
420 425 430

Leu Cys Leu Ile Asp Asp Ala Ala Thr Asp Ala Leu Phe Ser Leu Ala
435 440 445

Val Ala Gly Asn Asn Leu Ala Trp Ser Thr Pro Thr Val Phe Arg Leu
450 455 460

Thr Ser Gly Arg Asp Leu Phe Arg Pro Gly Pro Phe Tyr Leu Gly Lys
465 470 475 480

[0040]

Ile Trp Ser Pro Ile Val Ala Trp Thr Gly Val Ala Phe Gln Leu Phe
485 490 495

Ile Ile Ile Leu Val Met Phe Pro Ser Gln Gln His Gly Ile Thr Lys
500 505 510

Ser Thr Met Asn Tyr Ala Cys Val Ile Gly Pro Gly Ile Trp Ile Leu
515 520 525

Ala Gly Ile Tyr Tyr Lys Val Tyr Lys Lys Lys Tyr Tyr His Gly Pro
530 535 540

Ala Thr Asn Leu Ser Asp Asp Asp Tyr Thr Glu Ala Val Gly Ala Asp
545 550 555 560

Val Ile Asp Thr Ile Met Ser Lys Gln Glu Pro
565 570

<210> 26
<211> 539
<212> PRT
<213> 酿酒酵母

<400> 26

Met Ser Thr Asn Lys Phe Val Val Arg Ile Thr Asn Ala Leu Phe Lys
1 5 10 15

```
Ser Ser Leu Ala Ser Asn Ser Pro Pro Val Tyr Pro Lys Arg Ile Arg
            20                  25                  30

His Phe Glu Ile Leu Pro Asn Glu Lys Trp Val Ile Trp Gly Pro Gly
        35                  40                  45

Lys Gly Lys Phe Leu Asp Val Leu Asn Asn Lys Tyr Ile Cys Glu Pro
    50                  55                  60

Pro Leu Ser Leu Arg Phe Gly Phe Leu Lys Glu Ser Ser Asn Ile Leu
65                  70                  75                  80

Pro Arg Ile Glu Gln Val Ala Phe Lys Gly Val Met Pro Thr Ala His
                85                  90                  95

Leu Ser Ala Arg Tyr Glu Tyr Phe Lys Asp Asp Tyr Asp Gln Thr Cys
            100                 105                 110

Lys Gln Phe Ile Phe Asp Lys Ala Ser Gly Ser Asn Ala Val Ser Tyr
        115                 120                 125

Lys Val Glu Thr Asn Asn Arg Gln Ile Asn Met Glu Leu Tyr Asn Ala
    130                 135                 140

Leu Val Glu Asn Leu Asn Leu Ser Ser Leu Gln Asp Arg Trp Val Met
145                 150                 155                 160
```

[0041]

```
Gly Leu Ser Asn Gly Gln Met Arg Arg Ala Arg Leu Ala Arg Ser Ile
                165                 170                 175

Leu Lys Glu Pro Asp Leu Leu Leu Ile Asp Asp Pro Phe Leu Gly Leu
            180                 185                 190

Asp Pro Ala Ala Ile Ala Thr Ile Ser Gln Phe Leu Ala Lys Tyr Asp
        195                 200                 205

Ser Ile Glu Val Ser Gly Gly Cys Pro Ile Val Ile Gly Leu Arg Tyr
    210                 215                 220

Gln Asp Thr Ile Pro Ala Trp Cys Thr His Ile Cys Cys Val Asp Glu
225                 230                 235                 240

Lys Asn Gly Ile Leu Phe Glu Gly Pro Ile Glu Lys Leu Gln Ser Lys
                245                 250                 255

Met Asp Glu Thr Arg Ser Arg Ala Leu Lys Glu Leu Glu Gln Leu Lys
            260                 265                 270

Lys Ala Ser Asn Ser Lys Glu Asp Ile Ser Ile Asn Asp Leu Ile Cys
        275                 280                 285

Ile His Pro Met Tyr Gly Lys Lys Glu His Glu Ile Ile Lys Met Pro
    290                 295                 300
```

His Leu Ile Glu Leu Asp Gly Leu Ser Val Ser Tyr Lys Gly Glu Ala
305 310 315 320

Val Leu Glu Asn Leu His Trp Lys Val Gln Pro Gly Ser Lys Trp His
325 330 335

Ile Arg Gly Asp Asn Gly Ser Gly Lys Ser Thr Leu Leu Ser Leu Leu
340 345 350

Thr Ala Glu His Pro Gln Ser Trp Asn Ser Arg Val Ile Asp Asn Gly
355 360 365

Val Pro Arg Arg Thr Gly Lys Thr Asn Tyr Phe Asp Leu Asn Ser Lys
370 375 380

Ile Gly Met Ser Ser Pro Glu Leu His Ala Ile Phe Leu Lys Asn Ala
385 390 395 400

Gly Gly Arg Leu Asn Ile Arg Glu Ser Val Ala Thr Gly Tyr His Glu
405 410 415

Ala Ser Ser Asn Asn Tyr Leu Pro Ile Trp Lys Arg Leu Asp Lys Asn
420 425 430

Ser Gln Glu Ile Val Asn Met Tyr Leu Lys Tyr Phe Gly Leu Asp Lys
435 440 445

[0042]

Asp Ala Asp Ser Val Leu Phe Glu Gln Leu Ser Val Ser Asp Gln Lys
450 455 460

Leu Val Leu Phe Val Arg Ser Leu Ile Lys Met Pro Gln Ile Leu Ile
465 470 475 480

Leu Asp Glu Ala Phe Ser Gly Met Glu Val Glu Pro Met Met Arg Cys
485 490 495

His Glu Phe Leu Glu Glu Trp Pro Gly Thr Val Leu Val Val Ala His
500 505 510

Val Ala Glu Glu Thr Pro Lys Cys Ala His Tyr Leu Arg Leu Ile Ser
515 520 525

Pro Gly Glu Tyr Glu Ile Gly Asp Met Glu Asn
530 535

<210> 27
<211> 1612
<212> PRT
<213> 酿酒酵母

<400> 27

Met Ser Ser Pro Ser Lys Pro Thr Ser Pro Phe Val Asp Asp Ile Glu
1 5 10 15

```
His Glu Ser Gly Ser Ala Ser Asn Gly Leu Ser Ser Met Ser Pro Phe
            20                  25                  30

Asp Asp Ser Phe Gln Phe Glu Lys Pro Ser Ser Ala His Gly Asn Ile
        35                  40                  45

Glu Val Ala Lys Thr Gly Gly Ser Val Leu Lys Arg Gln Ser Lys Pro
    50                  55                  60

Met Lys Asp Ile Ser Thr Pro Asp Leu Ser Lys Val Thr Phe Asp Gly
65                  70                  75                  80

Ile Asp Asp Tyr Ser Asn Asp Asn Asp Ile Asn Asp Asp Asp Glu Leu
                85                  90                  95

Asn Gly Lys Lys Thr Glu Ile His Glu His Glu Asn Glu Val Asp Asp
            100                 105                 110

Asp Leu His Ser Phe Gln Ala Thr Pro Met Pro Asn Thr Gly Gly Phe
        115                 120                 125

Glu Asp Val Glu Leu Asp Asn Asn Glu Gly Ser Asn Asn Asp Ser Gln
    130                 135                 140

Ala Asp His Lys Leu Lys Arg Val Arg Phe Gly Thr Arg Arg Asn Lys
145                 150                 155                 160
```

[0043]

```
Ser Gly Arg Ile Asp Ile Asn Arg Ser Lys Thr Leu Lys Trp Ala Lys
                165                 170                 175

Lys Asn Phe His Asn Ala Ile Asp Glu Phe Ser Thr Lys Glu Asp Ser
            180                 185                 190

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

Tyr Tyr Asn Leu Pro Leu Pro Glu Asp Met Leu Asp Glu Asp Gly Leu
    210                 215                 220

Pro Leu Ala Val Tyr Pro Arg Asn Lys Ile Arg Thr Thr Lys Tyr Thr
225                 230                 235                 240

Pro Leu Thr Phe Phe Pro Lys Asn Ile Leu Phe Gln Phe His Asn Phe
                245                 250                 255

Ala Asn Ile Tyr Phe Leu Ile Leu Leu Ile Leu Gly Ala Phe Gln Ile
            260                 265                 270

Phe Gly Val Thr Asn Pro Gly Phe Ala Ser Val Pro Leu Ile Val Ile
        275                 280                 285

Val Ile Ile Thr Ala Ile Lys Asp Gly Ile Glu Asp Ser Arg Arg Thr
    290                 295                 300
```

Val Leu Asp Leu Glu Val Asn Asn Thr Arg Thr His Ile Leu Ser Gly
305 310 315 320

Val Lys Asn Glu Asn Val Ala Val Asp Asn Val Ser Leu Trp Arg Arg
325 330 335

Phe Lys Lys Ala Asn Thr Arg Ala Leu Ile Lys Ile Phe Glu Tyr Phe
340 345 350

Ser Glu Asn Leu Thr Ala Ala Gly Arg Glu Lys Lys Leu Gln Lys Lys
355 360 365

Arg Glu Glu Leu Arg Arg Lys Arg Asn Ser Arg Ser Phe Gly Pro Arg
370 375 380

Gly Ser Leu Asp Ser Ile Gly Ser Tyr Arg Met Ser Ala Asp Phe Gly
385 390 395 400

Arg Pro Ser Leu Asp Tyr Glu Asn Leu Asn Gln Thr Met Ser Gln Ala
405 410 415

Asn Arg Tyr Asn Asp Gly Glu Asn Leu Val Asp Arg Thr Leu Gln Pro
420 425 430

Asn Pro Glu Cys Arg Phe Ala Lys Asp Tyr Trp Lys Asn Val Lys Val
435 440 445

[0044]

Gly Asp Ile Val Arg Val His Asn Asn Asp Glu Ile Pro Ala Asp Met
450 455 460

Ile Leu Leu Ser Thr Ser Asp Val Asp Gly Ala Cys Tyr Val Glu Thr
465 470 475 480

Lys Asn Leu Asp Gly Glu Thr Asn Leu Lys Val Arg Gln Ser Leu Lys
485 490 495

Cys Ser Lys Ile Ile Lys Ser Ser Arg Asp Ile Thr Arg Thr Lys Phe
500 505 510

Trp Val Glu Ser Glu Gly Pro His Ala Asn Leu Tyr Ser Tyr Gln Gly
515 520 525

Asn Phe Lys Trp Gln Asp Thr Gln Asn Gly Asn Ile Arg Asn Glu Pro
530 535 540

Val Asn Ile Asn Asn Leu Leu Leu Arg Gly Cys Thr Leu Arg Asn Thr
545 550 555 560

Lys Trp Ala Met Gly Met Val Ile Phe Thr Gly Asp Asp Thr Lys Ile
565 570 575

Met Ile Asn Ala Gly Val Thr Pro Thr Lys Lys Ser Arg Ile Ser Arg

580 585 590

Glu Leu Asn Phe Ser Val Ile Leu Asn Phe Val Leu Leu Phe Ile Leu
595 600 605

Cys Phe Thr Ala Gly Ile Val Asn Gly Val Tyr Tyr Lys Gln Lys Pro
610 615 620

Arg Ser Arg Asp Tyr Phe Glu Phe Gly Thr Ile Gly Gly Ser Ala Ser
625 630 635 640

Thr Asn Gly Phe Val Ser Phe Trp Val Ala Val Ile Leu Tyr Gln Ser
645 650 655

Leu Val Pro Ile Ser Leu Tyr Ile Ser Val Glu Ile Ile Lys Thr Ala
660 665 670

Gln Ala Ile Phe Ile Tyr Thr Asp Val Leu Leu Tyr Asn Ala Lys Leu
675 680 685

Asp Tyr Pro Cys Thr Pro Lys Ser Trp Asn Ile Ser Asp Asp Leu Gly
690 695 700

Gln Ile Glu Tyr Ile Phe Ser Asp Lys Thr Gly Thr Leu Thr Gln Asn
705 710 715 720

[0045]

Val Met Glu Phe Lys Lys Cys Thr Ile Asn Gly Val Ser Tyr Gly Arg
725 730 735

Ala Tyr Thr Glu Ala Leu Ala Gly Leu Arg Lys Arg Gln Gly Val Asp
740 745 750

Val Glu Ser Glu Gly Arg Arg Glu Lys Glu Glu Ile Ala Lys Asp Arg
755 760 765

Glu Thr Met Ile Asp Glu Leu Arg Ser Met Ser Asp Asn Thr Gln Phe
770 775 780

Cys Pro Glu Asp Leu Thr Phe Val Ser Lys Glu Ile Val Glu Asp Leu
785 790 795 800

Lys Gly Ser Ser Gly Asp His Gln Gln Lys Cys Cys Glu His Phe Leu
805 810 815

Leu Ala Leu Ala Leu Cys His Ser Val Leu Val Glu Pro Asn Lys Asp
820 825 830

Asp Pro Lys Lys Leu Asp Ile Lys Ala Gln Ser Pro Asp Glu Ser Ala
835 840 845

Leu Val Ser Thr Ala Arg Gln Leu Gly Tyr Ser Phe Val Gly Ser Ser
850 855 860

```
Lys Ser Gly Leu Ile Val Glu Ile Gln Gly Val Gln Lys Glu Phe Gln
865                 870                 875                 880

Val Leu Asn Val Leu Glu Phe Asn Ser Ser Arg Lys Arg Met Ser Cys
                885                 890                 895

Ile Ile Lys Ile Pro Gly Ser Thr Pro Lys Asp Glu Pro Lys Ala Leu
            900                 905                 910

Leu Ile Cys Lys Gly Ala Asp Ser Val Ile Tyr Ser Arg Leu Asp Arg
        915                 920                 925

Thr Gln Asn Asp Ala Thr Leu Leu Glu Lys Thr Ala Leu His Leu Glu
    930                 935                 940

Glu Tyr Ala Thr Glu Gly Leu Arg Thr Leu Cys Leu Ala Gln Arg Glu
945                 950                 955                 960

Leu Thr Trp Ser Glu Tyr Glu Arg Trp Val Lys Thr Tyr Asp Val Ala
                965                 970                 975

Ala Ala Ser Val Thr Asn Arg Glu Glu Glu Leu Asp Lys Val Thr Asp
            980                 985                 990

Val Ile Glu Arg Glu Leu Ile Leu  Leu Gly Gly Thr Ala  Ile Glu Asp
        995                 1000                1005
```

[0046]

```
Arg Leu  Gln Asp Gly Val Pro  Asp Ser Ile Ala Leu  Leu Ala Glu
    1010                1015                1020

Ala Gly  Ile Lys Leu Trp Val  Leu Thr Gly Asp Lys  Val Glu Thr
    1025                1030                1035

Ala Ile  Asn Ile Gly Phe Ser  Cys Asn Val Leu Asn  Asn Asp Met
    1040                1045                1050

Glu Leu  Leu Val Val Lys Ala  Ser Gly Glu Asp Val  Glu Glu Phe
    1055                1060                1065

Gly Ser  Asp Pro Ile Gln Val  Val Asn Asn Leu Val  Thr Lys Tyr
    1070                1075                1080

Leu Arg  Glu Lys Phe Gly Met  Ser Gly Ser Glu Glu  Glu Leu Lys
    1085                1090                1095

Glu Ala  Lys Arg Glu His Gly  Leu Pro Gln Gly Asn  Phe Ala Val
    1100                1105                1110

Ile Ile  Asp Gly Asp Ala Leu  Lys Val Ala Leu Asn  Gly Glu Glu
    1115                1120                1125

Met Arg  Arg Lys Phe Leu Leu  Leu Cys Lys Asn Cys  Lys Ala Val
    1130                1135                1140
```

Leu Cys Cys Arg Val Ser Pro Ala Gln Lys Ala Ala Val Val Lys
1145 1150 1155

Leu Val Lys Lys Thr Leu Asp Val Met Thr Leu Ala Ile Gly Asp
1160 1165 1170

Gly Ser Asn Asp Val Ala Met Ile Gln Ser Ala Asp Val Gly Val
1175 1180 1185

Gly Ile Ala Gly Glu Glu Gly Arg Gln Ala Val Met Cys Ser Asp
1190 1195 1200

Tyr Ala Ile Gly Gln Phe Arg Tyr Val Thr Arg Leu Val Leu Val
1205 1210 1215

His Gly Lys Trp Cys Tyr Lys Arg Leu Ala Glu Met Ile Pro Gln
1220 1225 1230

Phe Phe Tyr Lys Asn Val Ile Phe Thr Leu Ser Leu Phe Trp Tyr
1235 1240 1245

Gly Ile Tyr Asn Asn Phe Asp Gly Ser Tyr Leu Phe Glu Tyr Thr
1250 1255 1260

Tyr Leu Thr Phe Tyr Asn Leu Ala Phe Thr Ser Val Pro Val Ile
1265 1270 1275

[0047]

Leu Leu Ala Val Leu Asp Gln Asp Val Ser Asp Thr Val Ser Met
1280 1285 1290

Leu Val Pro Gln Leu Tyr Arg Val Gly Ile Leu Arg Lys Glu Trp
1295 1300 1305

Asn Gln Thr Lys Phe Leu Trp Tyr Met Leu Asp Gly Val Tyr Gln
1310 1315 1320

Ser Val Ile Cys Phe Phe Phe Pro Tyr Leu Ala Tyr His Lys Asn
1325 1330 1335

Met Val Val Thr Glu Asn Gly Leu Gly Leu Asp His Arg Tyr Phe
1340 1345 1350

Val Gly Val Phe Val Thr Ala Ile Ala Val Thr Ser Cys Asn Phe
1355 1360 1365

Tyr Val Phe Met Glu Gln Tyr Arg Trp Asp Trp Phe Cys Gly Leu
1370 1375 1380

Phe Ile Cys Leu Ser Leu Ala Val Phe Tyr Gly Trp Thr Gly Ile
1385 1390 1395

Trp Thr Ser Ser Ser Ser Ser Asn Glu Phe Tyr Lys Gly Ala Ala
1400 1405 1410

Arg Val Phe Ala Gln Pro Ala Tyr Trp Ala Val Leu Phe Val Gly
1415 1420 1425

Val Leu Phe Cys Leu Leu Pro Arg Phe Thr Ile Asp Cys Ile Arg
1430 1435 1440

Lys Ile Phe Tyr Pro Lys Asp Ile Glu Ile Val Arg Glu Met Trp
1445 1450 1455

Leu Arg Gly Asp Phe Asp Leu Tyr Pro Gln Gly Tyr Asp Pro Thr
1460 1465 1470

Asp Pro Ser Arg Pro Arg Ile Asn Glu Ile Arg Pro Leu Thr Asp
1475 1480 1485

Phe Lys Glu Pro Ile Ser Leu Asp Thr His Phe Asp Gly Val Ser
1490 1495 1500

His Ser Gln Glu Thr Ile Val Thr Glu Glu Ile Pro Met Ser Ile
1505 1510 1515

Leu Asn Gly Glu Gln Gly Ser Arg Lys Gly Tyr Arg Val Ser Thr
1520 1525 1530

Thr Leu Glu Arg Arg Asp Gln Leu Ser Pro Val Thr Thr Thr Asn
1535 1540 1545

[0048]

Asn Leu Pro Arg Arg Ser Met Ala Ser Ala Arg Gly Asn Lys Leu
1550 1555 1560

Arg Thr Ser Leu Asp Arg Thr Arg Glu Glu Met Leu Ala Asn His
1565 1570 1575

Gln Leu Asp Thr Arg Tyr Ser Val Glu Arg Ala Arg Ala Ser Leu
1580 1585 1590

Asp Leu Pro Gly Ile Asn His Ala Glu Thr Leu Leu Ser Gln Arg
1595 1600 1605

Ser Arg Asp Arg
1610

<210> 28
<211> 695
<212> PRT
<213> 酿酒酵母

<400> 28

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

Arg Thr Asn Gly Met Gly Ile Gly Asn Thr His Arg Arg Ile Ser Leu
20 25 30

Gly Phe Leu Pro Pro Asn Lys Lys Asn Pro Leu Val Arg Lys Phe Arg
35 40 45

Ala Arg Thr Arg Asn Ile Asp Gln Arg Ser Phe Arg Ser Leu Thr Asp
50 55 60

Asp Phe Gly Ser Asn Val His Glu Pro Asn Pro Tyr Leu Gly Asn Ile
65 70 75 80

Asp Glu Glu Pro Asp Leu Tyr Tyr His Asp Glu Glu Asp Gly Glu Leu
85 90 95

Ser Arg Thr Ile Ser Leu Pro Ser Arg Val Ser Glu Thr Pro Glu Leu
100 105 110

Ser Pro Gln Asp Val Asp Trp Ile Leu His Glu His Glu Arg Arg Tyr
115 120 125

Ser Ser Val Cys Asn Ser Asp Asn Glu Glu Ala Ser Gln Ser Asn Thr
130 135 140

Pro Asp Arg Ile Gln Glu Tyr Ser Gly Arg Glu Leu Glu Tyr Asp Glu
145 150 155 160

Phe Met Asn Arg Leu Gln Ala Gln Lys Gln Lys Leu Thr Arg Ser Ala
165 170 175

[0049]

Val Thr Asp Ala Lys Gly Thr Ser His His Arg Arg Pro Ser Phe Val
180 185 190

Ser Val Thr Ser Arg Gly Ser Val Pro Thr Ile Tyr Gln Glu Ile Asp
195 200 205

Glu Asn Asp Ser Glu Ala Leu Ala Glu Leu Ala His Ser His Val Thr
210 215 220

Phe Lys Ser Glu Ala Arg Val Leu Ala Ser Tyr Ser Phe Pro Leu Ile
225 230 235 240

Phe Thr Phe Leu Leu Glu Gln Ile Phe Pro Met Val Cys Ser Leu Thr
245 250 255

Val Gly His Leu Gly Lys Asn Glu Leu Ala Ala Val Ser Leu Ala Ser
260 265 270

Met Thr Ser Asn Ile Thr Leu Ala Ile Phe Glu Gly Ile Ala Thr Ser
275 280 285

Leu Asp Thr Leu Cys Pro Gln Ala Tyr Gly Ser Gly Arg Phe Tyr Ser
290 295 300

Val Gly Val His Leu Gln Arg Cys Ile Ala Phe Ser Leu Val Ile Tyr

305 310 315 320

Ile Pro Phe Ala Val Met Trp Trp Tyr Ser Glu Pro Leu Leu Ser Tyr
325 330 335

Ile Ile Pro Glu Lys Glu Leu Ile Asn Leu Thr Ser Arg Phe Leu Arg
340 345 350

Val Leu Ile Leu Gly Ala Pro Ala Tyr Ile Phe Phe Glu Asn Leu Lys
355 360 365

Arg Phe Leu Gln Ala Gln Gly Ile Phe Asp Ala Gly Ile Tyr Val Leu
370 375 380

Thr Ile Cys Ala Pro Leu Asn Val Leu Val Ser Tyr Thr Leu Val Trp
385 390 395 400

Asn Lys Tyr Ile Gly Val Gly Phe Ile Gly Ala Ala Ile Ala Val Val
405 410 415

Leu Asn Phe Trp Leu Met Phe Phe Leu Leu Leu Phe Tyr Ala Leu Tyr
420 425 430

Ile Asp Gly Arg Lys Cys Trp Gly Gly Phe Ser Arg Lys Ala Phe Thr
435 440 445

[0050]

His Trp Asn Asp Leu Gly His Leu Ala Phe Ser Gly Ile Ile Met Leu
450 455 460

Glu Ala Glu Glu Leu Ser Tyr Glu Leu Leu Thr Leu Phe Ser Ala Tyr
465 470 475 480

Tyr Gly Val Ser Tyr Leu Ala Ala Gln Ser Ala Val Ser Thr Met Ala
485 490 495

Ala Leu Leu Tyr Met Ile Pro Phe Ala Ile Gly Ile Ser Thr Ser Thr
500 505 510

Arg Ile Ala Asn Phe Ile Gly Ala Lys Arg Thr Asp Phe Ala His Ile
515 520 525

Ser Ser Gln Val Gly Leu Ser Phe Ser Phe Ile Ala Gly Phe Ile Asn
530 535 540

Cys Cys Ile Leu Val Phe Gly Arg Asn Leu Ile Ala Asn Ile Tyr Ser
545 550 555 560

Lys Asp Pro Glu Val Ile Lys Leu Ile Ala Gln Val Leu Pro Leu Val
565 570 575

Gly Ile Val Gln Asn Phe Asp Ser Leu Asn Ala Val Ala Gly Ser Cys
580 585 590

Leu Arg Gly Gln Gly Met Gln Ser Leu Gly Ser Ile Val Asn Leu Met
595 600 605

Ala Tyr Tyr Leu Phe Gly Ile Pro Leu Ala Leu Ile Leu Ser Trp Phe
610 615 620

Phe Asp Met Lys Leu Tyr Gly Leu Trp Ile Gly Ile Gly Ser Ala Met
625 630 635 640

Leu Leu Ile Gly Leu Val Glu Ala Tyr Tyr Val Leu Phe Pro Asp Trp
645 650 655

Asp Lys Ile Met Thr Tyr Ala Glu Ile Leu Lys Glu Thr Glu Asp Asp
660 665 670

Glu Val Asp Ser Asp Glu Tyr Leu Thr Asp Ser Asp Asp Pro Asp Glu
675 680 685

Asn Thr Ala Leu Leu Gly Ala
690 695

<210> 29
<211> 1529
<212> PRT
<213> 酿酒酵母

<400> 29

[0051]

Met Ser Ser Asp Ile Arg Asp Val Glu Glu Arg Asn Ser Arg Ser Ser
1 5 10 15

Ser Ser Ser Ser Ser Ser Asn Ser Ala Ala Gln Ser Ile Gly Gln His
20 25 30

Pro Tyr Arg Gly Phe Asp Ser Glu Ala Ala Glu Arg Val His Glu Leu
35 40 45

Ala Arg Thr Leu Thr Ser Gln Ser Leu Leu Tyr Thr Ala Asn Ser Asn
50 55 60

Asn Ser Ser Ser Ser Asn His Asn Ala His Asn Ala Asp Ser Arg Ser
65 70 75 80

Val Phe Ser Thr Asp Met Glu Gly Val Asn Pro Val Phe Thr Asn Pro
85 90 95

Asp Thr Pro Gly Tyr Asn Pro Lys Leu Asp Pro Asn Ser Asp Gln Phe
100 105 110

Ser Ser Thr Ala Trp Val Gln Asn Met Ala Asn Ile Cys Thr Ser Asp
115 120 125

Pro Asp Phe Tyr Lys Pro Tyr Ser Leu Gly Cys Val Trp Lys Asn Leu
130 135 140

```
Ser Ala Ser Gly Asp Ser Ala Asp Val Ser Tyr Gln Ser Thr Phe Ala
145                 150                 155                 160

Asn Ile Val Pro Lys Leu Leu Thr Lys Gly Leu Arg Leu Leu Lys Pro
                165                 170                 175

Ser Lys Glu Glu Asp Thr Phe Gln Ile Leu Lys Pro Met Asp Gly Cys
            180                 185                 190

Leu Asn Pro Gly Glu Leu Leu Val Val Leu Gly Arg Pro Gly Ser Gly
        195                 200                 205

Cys Thr Thr Leu Leu Lys Ser Ile Ser Ser Asn Ser His Gly Phe Lys
    210                 215                 220

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

Ile Arg Lys His Tyr Arg Gly Glu Val Val Tyr Asn Ala Glu Ser Asp
                245                 250                 255

Ile His Leu Pro His Leu Thr Val Tyr Gln Thr Leu Phe Thr Val Ala
            260                 265                 270

Arg Met Lys Thr Pro Gln Asn Arg Ile Lys Gly Val Asp Arg Glu Ala
        275                 280                 285
```

[0052]

```
Tyr Ala Asn His Val Thr Glu Val Ala Met Ala Thr Tyr Gly Leu Ser
    290                 295                 300

His Thr Arg Asp Thr Lys Val Gly Asn Asp Leu Val Arg Gly Val Ser
305                 310                 315                 320

Gly Gly Glu Arg Lys Arg Val Ser Ile Ala Glu Val Ala Ile Cys Gly
                325                 330                 335

Ala Arg Phe Gln Cys Trp Asp Asn Ala Thr Arg Gly Leu Asp Ser Ala
            340                 345                 350

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

Lys Thr Ala Ala Thr Val Ala Ile Tyr Gln Cys Ser Gln Asp Ala Tyr
    370                 375                 380

Asp Leu Phe Asp Lys Val Cys Val Leu Asp Asp Gly Tyr Gln Leu Tyr
385                 390                 395                 400

Phe Gly Pro Ala Lys Asp Ala Lys Lys Tyr Phe Gln Asp Met Gly Tyr
                405                 410                 415

Tyr Cys Pro Pro Arg Gln Thr Thr Ala Asp Phe Leu Thr Ser Ile Thr
            420                 425                 430
```

Ser Pro Thr Glu Arg Ile Ile Ser Lys Glu Phe Ile Glu Lys Gly Thr
435 440 445

Arg Val Pro Gln Thr Pro Lys Asp Met Ala Glu Tyr Trp Leu Gln Ser
450 455 460

Glu Ser Tyr Lys Asn Leu Ile Lys Asp Ile Asp Ser Thr Leu Glu Lys
465 470 475 480

Asn Thr Asp Glu Ala Arg Asn Ile Ile Arg Asp Ala His His Ala Lys
485 490 495

Gln Ala Lys Arg Ala Pro Pro Ser Ser Pro Tyr Val Val Asn Tyr Gly
500 505 510

Met Gln Val Lys Tyr Leu Leu Ile Arg Asn Phe Trp Arg Met Lys Gln
515 520 525

Ser Ala Ser Val Thr Leu Trp Gln Val Ile Gly Asn Ser Val Met Ala
530 535 540

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

Ser Thr Phe Tyr Phe Arg Gly Ala Ala Met Phe Phe Ala Ile Leu Phe
565 570 575

[0053]

Asn Ala Phe Ser Cys Leu Leu Glu Ile Phe Ser Leu Tyr Glu Thr Arg
580 585 590

Pro Ile Thr Glu Lys His Arg Thr Tyr Ser Leu Tyr His Pro Ser Ala
595 600 605

Asp Ala Phe Ala Ser Val Leu Ser Glu Met Pro Pro Lys Leu Ile Thr
610 615 620

Ala Val Cys Phe Asn Ile Ile Phe Tyr Phe Leu Val Asp Phe Arg Arg
625 630 635 640

Asn Gly Gly Val Phe Phe Phe Tyr Phe Leu Ile Asn Val Ile Ala Thr
645 650 655

Phe Thr Leu Ser His Leu Phe Arg Cys Val Gly Ser Leu Thr Lys Thr
660 665 670

Leu Gln Glu Ala Met Val Pro Ala Ser Met Leu Leu Leu Ala Ile Ser
675 680 685

Met Tyr Thr Gly Phe Ala Ile Pro Lys Thr Lys Ile Leu Gly Trp Ser
690 695 700

Ile Trp Ile Trp Tyr Ile Asn Pro Leu Ala Tyr Leu Phe Glu Ser Leu
705 710 715 720

Met Ile Asn Glu Phe His Asp Arg Arg Phe Pro Cys Ala Gln Tyr Ile
725 730 735

Pro Ala Gly Pro Ala Tyr Gln Asn Ile Thr Gly Thr Gln Arg Val Cys
740 745 750

Ser Ala Val Gly Ala Tyr Pro Gly Asn Asp Tyr Val Leu Gly Asp Asp
755 760 765

Phe Leu Lys Glu Ser Tyr Asp Tyr Glu His Lys His Lys Trp Arg Gly
770 775 780

Phe Gly Ile Gly Met Ala Tyr Val Val Phe Phe Phe Val Tyr Leu
785 790 795 800

Ile Leu Cys Glu Tyr Asn Glu Gly Ala Lys Gln Lys Gly Glu Met Val
805 810 815

Val Phe Leu Arg Ser Lys Ile Lys Gln Leu Lys Lys Glu Gly Lys Leu
820 825 830

Gln Glu Lys His Arg Pro Gly Asp Ile Glu Asn Asn Ala Gly Ser Ser
835 840 845

Pro Asp Ser Ala Thr Thr Glu Lys Lys Ile Leu Asp Asp Ser Ser Glu
850 855 860

[0054]

Gly Ser Asp Ser Ser Ser Asp Asn Ala Gly Leu Gly Leu Ser Lys Ser
865 870 875 880

Glu Ala Ile Phe His Trp Arg Asp Leu Cys Tyr Asp Val Pro Ile Lys
885 890 895

Gly Gly Gln Arg Arg Ile Leu Asn Asn Val Asp Gly Trp Val Lys Pro
900 905 910

Gly Thr Leu Thr Ala Leu Met Gly Ala Ser Gly Ala Gly Lys Thr Thr
915 920 925

Leu Leu Asp Cys Leu Ala Glu Arg Val Thr Met Gly Val Ile Thr Gly
930 935 940

Asn Ile Phe Val Asp Gly Arg Leu Arg Asp Glu Ser Phe Pro Arg Ser
945 950 955 960

Ile Gly Tyr Cys Gln Gln Gln Asp Leu His Leu Lys Thr Ala Thr Val
965 970 975

Arg Glu Ser Leu Arg Phe Ser Ala Tyr Leu Arg Gln Pro Ser Ser Val
980 985 990

Ser Ile Glu Glu Lys Asn Arg Tyr Val Glu Glu Val Ile Lys Ile Leu

995 1000 1005

Glu Met Gln Gln Tyr Ser Asp Ala Val Val Gly Val Ala Gly Glu
1010 1015 1020

Gly Leu Asn Val Glu Gln Arg Lys Arg Leu Thr Ile Gly Val Glu
1025 1030 1035

Leu Ala Ala Arg Pro Lys Leu Leu Val Phe Leu Asp Glu Pro Thr
1040 1045 1050

Ser Gly Leu Asp Ser Gln Thr Ala Trp Asp Thr Cys Gln Leu Met
1055 1060 1065

Arg Lys Leu Ala Thr His Gly Gln Ala Ile Leu Cys Thr Ile His
1070 1075 1080

Gln Pro Ser Ala Ile Leu Met Gln Gln Phe Asp Arg Leu Leu Phe
1085 1090 1095

Leu Gln Lys Gly Gly Gln Thr Val Tyr Phe Gly Asp Leu Gly Glu
1100 1105 1110

Gly Cys Lys Thr Met Ile Asp Tyr Phe Glu Ser Lys Gly Ala His
1115 1120 1125

[0055]

Lys Cys Pro Pro Asp Ala Asn Pro Ala Glu Trp Met Leu Glu Val
1130 1135 1140

Val Gly Ala Ala Pro Gly Ser His Ala Thr Gln Asp Tyr Asn Glu
1145 1150 1155

Val Trp Arg Asn Ser Asp Glu Tyr Lys Ala Val Gln Glu Glu Leu
1160 1165 1170

Asp Trp Met Glu Lys Asn Leu Pro Gly Arg Ser Lys Glu Pro Thr
1175 1180 1185

Ala Glu Glu His Lys Pro Phe Ala Ala Ser Leu Tyr Tyr Gln Phe
1190 1195 1200

Lys Met Val Thr Ile Arg Leu Phe Gln Gln Tyr Trp Arg Ser Pro
1205 1210 1215

Asp Tyr Leu Trp Ser Lys Phe Ile Leu Thr Ile Phe Asn Gln Val
1220 1225 1230

Phe Ile Gly Phe Thr Phe Phe Lys Ala Asp Arg Ser Leu Gln Gly
1235 1240 1245

Leu Gln Asn Gln Met Leu Ser Ile Phe Met Tyr Thr Val Ile Phe
1250 1255 1260

Asn Pro Ile Leu Gln Gln Tyr Leu Pro Ser Phe Val Gln Gln Arg
1265 1270 1275

Asp Leu Tyr Glu Ala Arg Glu Arg Pro Ser Arg Thr Phe Ser Trp
1280 1285 1290

Leu Ala Phe Phe Leu Ser Gln Ile Ile Val Glu Ile Pro Trp Asn
1295 1300 1305

Ile Leu Ala Gly Thr Ile Ala Tyr Cys Ile Tyr Tyr Tyr Ala Val
1310 1315 1320

Gly Phe Tyr Ala Asn Ala Ser Ala Ala Gly Gln Leu His Glu Arg
1325 1330 1335

Gly Ala Leu Phe Trp Leu Phe Ser Ile Ala Phe Tyr Val Tyr Ile
1340 1345 1350

Gly Ser Met Gly Leu Leu Met Ile Ser Phe Asn Glu Val Ala Glu
1355 1360 1365

Thr Ala Ala His Met Gly Thr Leu Leu Phe Thr Met Ala Leu Ser
1370 1375 1380

Phe Cys Gly Val Met Ala Thr Pro Lys Val Met Pro Arg Phe Trp
1385 1390 1395

[0056]

Ile Phe Met Tyr Arg Val Ser Pro Leu Thr Tyr Met Ile Asp Ala
1400 1405 1410

Leu Leu Ala Leu Gly Val Ala Asn Val Asp Val Lys Cys Ser Asn
1415 1420 1425

Tyr Glu Met Val Lys Phe Thr Pro Pro Ser Gly Thr Thr Cys Gly
1430 1435 1440

Asp Tyr Met Ala Ser Tyr Ile Lys Leu Ala Gly Thr Gly Tyr Leu
1445 1450 1455

Ser Asp Pro Ser Ala Thr Asp Ile Cys Ser Phe Cys Ala Val Ser
1460 1465 1470

Thr Thr Asn Ala Phe Leu Ala Thr Phe Ser Ser His Tyr Tyr Arg
1475 1480 1485

Arg Trp Arg Asn Tyr Gly Ile Phe Ile Cys Tyr Ile Ala Phe Asp
1490 1495 1500

Tyr Ile Ala Ala Thr Phe Leu Tyr Trp Leu Ser Arg Val Pro Lys
1505 1510 1515

Lys Asn Gly Lys Ile Ser Glu Lys Pro Lys Lys
1520 1525

<210> 30
<211> 569
<212> PRT
<213> 酿酒酵母

<400> 30

Met Lys Asp Leu Lys Leu Ser Asn Phe Lys Gly Lys Phe Ile Ser Arg
1 5 10 15

Thr Ser His Trp Gly Leu Thr Gly Lys Lys Leu Arg Tyr Phe Ile Thr
20 25 30

Ile Ala Ser Met Thr Gly Phe Ser Leu Phe Gly Tyr Asp Gln Gly Leu
35 40 45

Met Ala Ser Leu Ile Thr Gly Lys Gln Phe Asn Tyr Glu Phe Pro Ala
50 55 60

Thr Lys Glu Asn Gly Asp His Asp Arg His Ala Thr Val Val Gln Gly
65 70 75 80

Ala Thr Thr Ser Cys Tyr Glu Leu Gly Cys Phe Ala Gly Ser Leu Phe
85 90 95

Val Met Phe Cys Gly Glu Arg Ile Gly Arg Lys Pro Leu Ile Leu Met
100 105 110

[0057]

Gly Ser Val Ile Thr Ile Ile Gly Ala Val Ile Ser Thr Cys Ala Phe
115 120 125

Arg Gly Tyr Trp Ala Leu Gly Gln Phe Ile Ile Gly Arg Val Val Thr
130 135 140

Gly Val Gly Thr Gly Leu Asn Thr Ser Thr Ile Pro Val Trp Gln Ser
145 150 155 160

Glu Met Ser Lys Ala Glu Asn Arg Gly Leu Leu Val Asn Leu Glu Gly
165 170 175

Ser Thr Ile Ala Phe Gly Thr Met Ile Ala Tyr Trp Ile Asp Phe Gly
180 185 190

Leu Ser Tyr Thr Asn Ser Ser Val Gln Trp Arg Phe Pro Val Ser Met
195 200 205

Gln Ile Val Phe Ala Leu Phe Leu Leu Ala Phe Met Ile Lys Leu Pro
210 215 220

Glu Ser Pro Arg Trp Leu Ile Ser Gln Ser Arg Thr Glu Glu Ala Arg
225 230 235 240

Tyr Leu Val Gly Thr Leu Asp Asp Ala Asp Pro Asn Asp Glu Glu Val
245 250 255

```
Ile Thr Glu Val Ala Met Leu His Asp Ala Val Asn Arg Thr Lys His
            260                 265                 270

Glu Lys His Ser Leu Ser Ser Leu Phe Ser Arg Gly Arg Ser Gln Asn
        275                 280                 285

Leu Gln Arg Ala Leu Ile Ala Ala Ser Thr Gln Phe Phe Gln Gln Phe
    290                 295                 300

Thr Gly Cys Asn Ala Ala Ile Tyr Tyr Ser Thr Val Leu Phe Asn Lys
305                 310                 315                 320

Thr Ile Lys Leu Asp Tyr Arg Leu Ser Met Ile Ile Gly Gly Val Phe
                325                 330                 335

Ala Thr Ile Tyr Ala Leu Ser Thr Ile Gly Ser Phe Phe Leu Ile Glu
            340                 345                 350

Lys Leu Gly Arg Arg Lys Leu Phe Leu Leu Gly Ala Thr Gly Gln Ala
        355                 360                 365

Val Ser Phe Thr Ile Thr Phe Ala Cys Leu Val Lys Glu Asn Lys Glu
    370                 375                 380

Asn Ala Arg Gly Ala Ala Val Gly Leu Phe Leu Phe Ile Thr Phe Phe
385                 390                 395                 400
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[0058]

```
Gly Leu Ser Leu Leu Ser Leu Pro Trp Ile Tyr Pro Pro Glu Ile Ala
                405                 410                 415

Ser Met Lys Val Arg Ala Ser Thr Asn Ala Phe Ser Thr Cys Thr Asn
            420                 425                 430

Trp Leu Cys Asn Phe Ala Val Val Met Phe Thr Pro Ile Phe Ile Gly
        435                 440                 445

Gln Ser Gly Trp Gly Cys Tyr Leu Phe Phe Ala Val Met Asn Tyr Leu
    450                 455                 460

Tyr Ile Pro Val Ile Phe Phe Phe Tyr Pro Glu Thr Ala Gly Arg Ser
465                 470                 475                 480

Leu Glu Glu Ile Asp Ile Ile Phe Ala Lys Ala Tyr Glu Asp Gly Thr
                485                 490                 495

Gln Pro Trp Arg Val Ala Asn His Leu Pro Lys Leu Ser Leu Gln Glu
            500                 505                 510

Val Glu Asp His Ala Asn Ala Leu Gly Ser Tyr Asp Asp Glu Met Glu
        515                 520                 525

Lys Glu Asp Phe Gly Glu Asp Arg Val Glu Asp Thr Tyr Asn Gln Ile
    530                 535                 540
```

Asn Gly Asp Asn Ser Ser Ser Ser Ser Asn Ile Lys Asn Glu Asp Thr
545 550 555 560

Val Asn Asp Lys Ala Asn Phe Glu Gly
565

<210> 31
<211> 1215
<212> PRT
<213> 酿酒酵母

<400> 31

Met Thr Lys Lys Ser Phe Val Ser Ser Pro Ile Val Arg Asp Ser Thr
1 5 10 15

Leu Leu Val Pro Lys Ser Leu Ile Ala Lys Pro Tyr Val Leu Pro Phe
20 25 30

Phe Pro Leu Tyr Ala Thr Phe Ala Gln Leu Tyr Phe Gln Gln Tyr Asp
35 40 45

Arg Tyr Ile Lys Gly Pro Glu Trp Thr Phe Val Tyr Leu Gly Thr Leu
50 55 60

Val Ser Leu Asn Ile Leu Val Met Leu Met Pro Ala Trp Asn Val Lys
65 70 75 80

[0059]

Ile Lys Ala Lys Phe Asn Tyr Ser Thr Thr Lys Asn Val Asn Glu Ala
85 90 95

Thr His Ile Leu Ile Tyr Thr Thr Pro Asn Asn Gly Ser Asp Gly Ile
100 105 110

Val Glu Ile Gln Arg Val Thr Glu Ala Gly Ser Leu Gln Thr Phe Phe
115 120 125

Gln Phe Gln Lys Lys Arg Phe Leu Trp His Glu Asn Glu Gln Val Phe
130 135 140

Ser Ser Pro Lys Phe Leu Val Asp Glu Ser Pro Lys Ile Gly Asp Phe
145 150 155 160

Gln Lys Cys Lys Gly His Ser Gly Asp Leu Thr His Leu Lys Arg Leu
165 170 175

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

Phe Lys Glu His Ala Val Ala Pro Leu Phe Val Phe Gln Val Phe Cys
195 200 205

Val Ala Leu Trp Leu Leu Asp Glu Phe Trp Tyr Tyr Ser Leu Phe Asn
210 215 220

Leu Phe Met Ile Ile Ser Met Glu Ala Ala Ala Val Phe Gln Arg Leu
225 230 235 240

Thr Ala Leu Lys Glu Phe Arg Thr Met Gly Ile Lys Pro Tyr Thr Ile
245 250 255

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

Leu Pro Met Asp Leu Val Ser Ile Thr Arg Thr Ala Glu Glu Ser Ala
275 280 285

Ile Pro Cys Asp Leu Ile Leu Leu Asp Gly Ser Ala Ile Val Asn Glu
290 295 300

Ala Met Leu Ser Gly Glu Ser Thr Pro Leu Leu Lys Glu Ser Ile Lys
305 310 315 320

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

Ala Val Leu His Gly Gly Thr Lys Ala Leu Gln Val Thr Pro Pro Glu
340 345 350

His Lys Ser Asp Ile Pro Pro Pro Pro Asp Gly Gly Ala Leu Ala Ile
355 360 365

[0060]

Val Thr Lys Thr Gly Phe Glu Thr Ser Gln Gly Ser Leu Val Arg Val
370 375 380

Met Ile Tyr Ser Ala Glu Arg Val Ser Val Asp Asn Lys Glu Ala Leu
385 390 395 400

Met Phe Ile Leu Phe Leu Leu Ile Phe Ala Val Ile Ala Ser Trp Tyr
405 410 415

Val Trp Val Glu Gly Thr Lys Met Gly Arg Ile Gln Ser Lys Leu Ile
420 425 430

Leu Asp Cys Ile Leu Ile Ile Thr Ser Val Val Pro Pro Glu Leu Pro
435 440 445

Met Glu Leu Thr Met Ala Val Asn Ser Ser Leu Ala Ala Leu Ala Lys
450 455 460

Phe Tyr Val Tyr Cys Thr Glu Pro Phe Arg Ile Pro Phe Ala Gly Arg
465 470 475 480

Ile Asp Val Cys Cys Phe Asp Lys Thr Gly Thr Leu Thr Gly Glu Asp
485 490 495

Leu Val Phe Glu Gly Leu Ala Gly Ile Ser Ala Asp Ser Glu Asn Ile

500 505 510

Arg His Leu Tyr Ser Ala Ala Glu Ala Pro Glu Ser Thr Ile Leu Val
515 520 525

Ile Gly Ala Ala His Ala Leu Val Lys Leu Glu Asp Gly Asp Ile Val
530 535 540

Gly Asp Pro Met Glu Lys Ala Thr Leu Lys Ala Val Gly Trp Ala Val
545 550 555 560

Glu Arg Lys Asn Ser Asn Tyr Arg Glu Gly Thr Gly Lys Leu Asp Ile
565 570 575

Ile Arg Arg Phe Gln Phe Ser Ser Ala Leu Lys Arg Ser Ala Ser Ile
580 585 590

Ala Ser His Asn Asp Ala Leu Phe Ala Ala Val Lys Gly Ala Pro Glu
595 600 605

Thr Ile Arg Glu Arg Leu Ser Asp Ile Pro Lys Asn Tyr Asp Glu Ile
610 615 620

Tyr Lys Ser Phe Thr Arg Ser Gly Ser Arg Val Leu Ala Leu Ala Ser
625 630 635 640

[0061]

Lys Ser Leu Pro Lys Met Ser Gln Ser Lys Ile Asp Asp Leu Asn Arg
645 650 655

Asp Asp Val Glu Ser Glu Leu Thr Phe Asn Gly Phe Leu Ile Phe His
660 665 670

Cys Pro Leu Lys Asp Asp Ala Ile Glu Thr Ile Lys Met Leu Asn Glu
675 680 685

Ser Ser His Arg Ser Ile Met Ile Thr Gly Asp Asn Pro Leu Thr Ala
690 695 700

Val His Val Ala Lys Glu Val Gly Ile Val Phe Gly Glu Thr Leu Ile
705 710 715 720

Leu Asp Arg Ala Gly Lys Ser Asp Asp Asn Gln Leu Leu Phe Arg Asp
725 730 735

Val Glu Glu Thr Val Ser Ile Pro Phe Asp Pro Ser Lys Asp Thr Phe
740 745 750

Asp His Ser Lys Leu Phe Asp Arg Tyr Asp Ile Ala Val Thr Gly Tyr
755 760 765

Ala Leu Asn Ala Leu Glu Gly His Ser Gln Leu Arg Asp Leu Leu Arg
770 775 780

His Thr Trp Val Tyr Ala Arg Val Ser Pro Ser Gln Lys Glu Phe Leu
785 790 795 800

Leu Asn Thr Leu Lys Asp Met Gly Tyr Gln Thr Leu Met Cys Gly Asp
805 810 815

Gly Thr Asn Asp Val Gly Ala Leu Lys Gln Ala His Val Gly Ile Ala
820 825 830

Leu Leu Asn Gly Thr Glu Glu Gly Leu Lys Lys Leu Gly Glu Gln Arg
835 840 845

Arg Leu Glu Gly Met Lys Met Met Tyr Ile Lys Gln Thr Glu Phe Met
850 855 860

Ala Arg Trp Asn Gln Pro Gln Pro Pro Val Pro Glu Pro Ile Ala His
865 870 875 880

Leu Phe Pro Pro Gly Pro Lys Asn Pro His Tyr Leu Lys Ala Leu Glu
885 890 895

Ser Lys Gly Thr Val Ile Thr Pro Glu Ile Arg Lys Ala Val Glu Glu
900 905 910

Ala Asn Ser Lys Pro Val Glu Val Ile Lys Pro Asn Gly Leu Ser Glu
915 920 925

[0062]

Lys Lys Pro Ala Asp Leu Ala Ser Leu Leu Leu Asn Ser Ala Gly Asp
930 935 940

Ala Gln Gly Asp Glu Ala Pro Ala Leu Lys Leu Gly Asp Ala Ser Cys
945 950 955 960

Ala Ala Pro Phe Thr Ser Lys Leu Ala Asn Val Ser Ala Val Thr Asn
965 970 975

Ile Ile Arg Gln Gly Arg Cys Ala Leu Val Asn Thr Ile Gln Met Tyr
980 985 990

Lys Ile Leu Ala Leu Asn Cys Leu Ile Ser Ala Tyr Ser Leu Ser Ile
995 1000 1005

Ile Tyr Met Ala Gly Val Lys Phe Gly Asp Gly Gln Ala Thr Val
1010 1015 1020

Ser Gly Leu Leu Leu Ser Val Cys Phe Leu Ser Ile Ser Arg Gly
1025 1030 1035

Lys Pro Leu Glu Lys Leu Ser Lys Gln Arg Pro Gln Ser Gly Ile
1040 1045 1050

Phe Asn Val Tyr Ile Met Gly Ser Ile Leu Ser Gln Phe Ala Val
1055 1060 1065

His Ile Ala Thr Leu Val Tyr Ile Thr Thr Glu Ile Tyr Lys Leu
1070 1075 1080

Glu Pro Arg Glu Pro Gln Val Asp Leu Glu Lys Glu Phe Ala Pro
1085 1090 1095

Ser Leu Leu Asn Thr Gly Ile Phe Ile Ile Gln Leu Val Gln Gln
1100 1105 1110

Val Ser Thr Phe Ala Val Asn Tyr Gln Gly Glu Pro Phe Arg Glu
1115 1120 1125

Asn Ile Arg Ser Asn Lys Gly Met Tyr Tyr Gly Leu Leu Gly Val
1130 1135 1140

Thr Gly Leu Ala Leu Ala Ser Ala Thr Glu Phe Leu Pro Glu Leu
1145 1150 1155

Asn Glu Ala Met Lys Phe Val Pro Met Thr Asp Asp Phe Lys Ile
1160 1165 1170

Lys Leu Thr Leu Thr Leu Leu Leu Asp Phe Phe Gly Ser Trp Gly
1175 1180 1185

Val Glu His Phe Phe Lys Phe Phe Phe Met Asp Asp Lys Pro Ser
1190 1195 1200

[0063]

Asp Ile Ser Val Gln Gln Val Lys Ile Ala Ser Lys
1205 1210 1215

<210> 32
<211> 1571
<212> PRT
<213> 酿酒酵母

<400> 32

Met Ser Gly Thr Phe His Gly Asp Gly His Ala Pro Met Ser Pro Phe
1 5 10 15

Glu Asp Thr Phe Gln Phe Glu Asp Asn Ser Ser Asn Glu Asp Thr His
20 25 30

Ile Ala Pro Thr His Phe Asp Asp Gly Ala Thr Ser Asn Lys Tyr Ser
35 40 45

Arg Pro Gln Val Ser Phe Asn Asp Glu Thr Pro Lys Asn Lys Arg Glu
50 55 60

Asp Ala Glu Glu Phe Thr Phe Asn Asp Asp Thr Glu Tyr Asp Asn His
65 70 75 80

Ser Phe Gln Pro Thr Pro Lys Leu Asn Asn Gly Ser Gly Thr Phe Asp
85 90 95

```
Asp Val Glu Leu Asp Asn Asp Ser Gly Glu Pro His Thr Asn Tyr Asp
            100                 105                 110

Gly Met Lys Arg Phe Arg Met Gly Thr Lys Arg Asn Lys Lys Gly Asn
        115                 120                 125

Pro Ile Met Gly Arg Ser Lys Thr Leu Lys Trp Ala Arg Lys Asn Ile
    130                 135                 140

Pro Asn Pro Phe Glu Asp Phe Thr Lys Asp Asp Ile Asp Pro Gly Ala
145                 150                 155                 160

Ile Asn Arg Ala Gln Glu Leu Arg Thr Val Tyr Tyr Asn Met Pro Leu
                165                 170                 175

Pro Lys Asp Met Ile Asp Glu Glu Gly Asn Pro Ile Met Gln Tyr Pro
            180                 185                 190

Arg Asn Lys Ile Arg Thr Thr Lys Tyr Thr Pro Leu Thr Phe Leu Pro
        195                 200                 205

Lys Asn Ile Leu Phe Gln Phe His Asn Phe Ala Asn Val Tyr Phe Leu
    210                 215                 220

Val Leu Ile Ile Leu Gly Ala Phe Gln Ile Phe Gly Val Thr Asn Pro
225                 230                 235                 240
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[0064]

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Gly Leu Ser Ala Val Pro Leu Val Val Ile Val Ile Ile Thr Ala Ile
                245                 250                 255

Lys Asp Ala Ile Glu Asp Ser Arg Arg Thr Val Leu Asp Leu Glu Val
            260                 265                 270

Asn Asn Thr Lys Thr His Ile Leu Glu Gly Val Glu Asn Glu Asn Val
        275                 280                 285

Ser Thr Asp Asn Ile Ser Leu Trp Arg Arg Phe Lys Lys Ala Asn Ser
    290                 295                 300

Arg Leu Leu Phe Lys Phe Ile Gln Tyr Cys Lys Glu His Leu Thr Glu
305                 310                 315                 320

Glu Gly Lys Lys Lys Arg Met Gln Arg Lys Arg His Glu Leu Arg Val
                325                 330                 335

Gln Lys Thr Val Gly Thr Ser Gly Pro Arg Ser Ser Leu Asp Ser Ile
            340                 345                 350

Asp Ser Tyr Arg Val Ser Ala Asp Tyr Gly Arg Pro Ser Leu Asp Tyr
        355                 360                 365

Asp Asn Leu Glu Gln Gly Ala Gly Glu Ala Asn Ile Val Asp Arg Ser
    370                 375                 380
```

Leu Pro Pro Arg Thr Asp Cys Lys Phe Ala Lys Asn Tyr Trp Lys Gly
385 390 395 400

Val Lys Val Gly Asp Ile Val Arg Ile His Asn Asn Asp Glu Ile Pro
405 410 415

Ala Asp Ile Ile Leu Leu Ser Thr Ser Asp Thr Asp Gly Ala Cys Tyr
420 425 430

Val Glu Thr Lys Asn Leu Asp Gly Glu Thr Asn Leu Lys Val Arg Gln
435 440 445

Ser Leu Lys Cys Thr Asn Thr Ile Arg Thr Ser Lys Asp Ile Ala Arg
450 455 460

Thr Lys Phe Trp Ile Glu Ser Glu Gly Pro His Ser Asn Leu Tyr Thr
465 470 475 480

Tyr Gln Gly Asn Met Lys Trp Arg Asn Leu Ala Asp Gly Glu Ile Arg
485 490 495

Asn Glu Pro Ile Thr Ile Asn Asn Val Leu Leu Arg Gly Cys Thr Leu
500 505 510

Arg Asn Thr Lys Trp Ala Met Gly Val Val Met Phe Thr Gly Gly Asp
515 520 525

[0065]

Thr Lys Ile Met Leu Asn Ser Gly Ile Thr Pro Thr Lys Lys Ser Arg
530 535 540

Ile Ser Arg Glu Leu Asn Phe Ser Val Val Ile Asn Phe Val Leu Leu
545 550 555 560

Phe Ile Leu Cys Phe Val Ser Gly Ile Ala Asn Gly Val Tyr Tyr Asp
565 570 575

Lys Lys Gly Arg Ser Arg Phe Ser Tyr Glu Phe Gly Thr Ile Ala Gly
580 585 590

Ser Ala Ala Thr Asn Gly Phe Val Ser Phe Trp Val Ala Val Ile Leu
595 600 605

Tyr Gln Ser Leu Val Pro Ile Ser Leu Tyr Ile Ser Val Glu Ile Ile
610 615 620

Lys Thr Ala Gln Ala Ala Phe Ile Tyr Gly Asp Val Leu Leu Tyr Asn
625 630 635 640

Ala Lys Leu Asp Tyr Pro Cys Thr Pro Lys Ser Trp Asn Ile Ser Asp
645 650 655

Asp Leu Gly Gln Val Glu Tyr Ile Phe Ser Asp Lys Thr Gly Thr Leu

660 665 670

Thr Gln Asn Val Met Glu Phe Lys Lys Cys Thr Ile Asn Gly Val Ser
675 680 685

Tyr Gly Arg Ala Tyr Thr Glu Ala Leu Ala Gly Leu Arg Lys Arg Gln
690 695 700

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

Lys Asp Arg Asp Thr Met Ile Asp Glu Leu Arg Ala Leu Ser Gly Asn
725 730 735

Ser Gln Phe Tyr Pro Glu Glu Val Thr Phe Val Ser Lys Glu Phe Val
740 745 750

Arg Asp Leu Lys Gly Ala Ser Gly Glu Val Gln Gln Arg Cys Cys Glu
755 760 765

His Phe Met Leu Ala Leu Ala Leu Cys His Ser Val Leu Val Glu Ala
770 775 780

Asn Pro Asp Asn Pro Lys Lys Leu Asp Leu Lys Ala Gln Ser Pro Asp
785 790 795 800

[0066]

Glu Ala Ala Leu Val Ala Thr Ala Arg Asp Val Gly Phe Ser Phe Val
805 810 815

Gly Lys Thr Lys Lys Gly Leu Ile Ile Glu Met Gln Gly Ile Gln Lys
820 825 830

Glu Phe Glu Ile Leu Asn Ile Leu Glu Phe Asn Ser Ser Arg Lys Arg
835 840 845

Met Ser Cys Ile Val Lys Ile Pro Gly Leu Asn Pro Gly Asp Glu Pro
850 855 860

Arg Ala Leu Leu Ile Cys Lys Gly Ala Asp Ser Ile Ile Tyr Ser Arg
865 870 875 880

Leu Ser Arg Gln Ser Gly Ser Asn Ser Glu Ala Ile Leu Glu Lys Thr
885 890 895

Ala Leu His Leu Glu Gln Tyr Ala Thr Glu Gly Leu Arg Thr Leu Cys
900 905 910

Ile Ala Gln Arg Glu Leu Ser Trp Ser Glu Tyr Glu Lys Trp Asn Glu
915 920 925

Lys Tyr Asp Ile Ala Ala Ala Ser Leu Ala Asn Arg Glu Asp Glu Leu
930 935 940

Glu Val Val Ala Asp Ser Ile Glu Arg Glu Leu Ile Leu Leu Gly Gly
945 950 955 960

Thr Ala Ile Glu Asp Arg Leu Gln Asp Gly Val Pro Asp Cys Ile Glu
965 970 975

Leu Leu Ala Glu Ala Gly Ile Lys Leu Trp Val Leu Thr Gly Asp Lys
980 985 990

Val Glu Thr Ala Ile Asn Ile Gly Phe Ser Cys Asn Leu Leu Asn Asn
995 1000 1005

Glu Met Glu Leu Leu Val Ile Lys Thr Thr Gly Asp Asp Val Lys
1010 1015 1020

Glu Phe Gly Ser Glu Pro Ser Glu Ile Val Asp Ala Leu Leu Ser
1025 1030 1035

Lys Tyr Leu Lys Glu Tyr Phe Asn Leu Thr Gly Ser Glu Glu Glu
1040 1045 1050

Ile Phe Glu Ala Lys Lys Asp His Glu Phe Pro Lys Gly Asn Tyr
1055 1060 1065

Ala Ile Val Ile Asp Gly Asp Ala Leu Lys Leu Ala Leu Tyr Gly
1070 1075 1080

[0067]

Glu Asp Ile Arg Arg Lys Phe Leu Leu Leu Cys Lys Asn Cys Arg
1085 1090 1095

Ala Val Leu Cys Cys Arg Val Ser Pro Ser Gln Lys Ala Ala Val
1100 1105 1110

Val Lys Leu Val Lys Asp Ser Leu Asp Val Met Thr Leu Ala Ile
1115 1120 1125

Gly Asp Gly Ser Asn Asp Val Ala Met Ile Gln Ser Ala Asp Val
1130 1135 1140

Gly Ile Gly Ile Ala Gly Glu Glu Gly Arg Gln Ala Val Met Cys
1145 1150 1155

Ser Asp Tyr Ala Ile Gly Gln Phe Arg Tyr Leu Ala Arg Leu Val
1160 1165 1170

Leu Val His Gly Arg Trp Ser Tyr Lys Arg Leu Ala Glu Met Ile
1175 1180 1185

Pro Glu Phe Phe Tyr Lys Asn Met Ile Phe Ala Leu Ala Leu Phe
1190 1195 1200

Trp Tyr Gly Ile Tyr Asn Asp Phe Asp Gly Ser Tyr Leu Tyr Glu
1205 1210 1215

Tyr Thr Tyr Met Met Phe Tyr Asn Leu Ala Phe Thr Ser Leu Pro
1220 1225 1230

Val Ile Phe Leu Gly Ile Leu Asp Gln Asp Val Asn Asp Thr Ile
1235 1240 1245

Ser Leu Val Val Pro Gln Leu Tyr Arg Val Gly Ile Leu Arg Lys
1250 1255 1260

Glu Trp Asn Gln Arg Lys Phe Leu Trp Tyr Met Leu Asp Gly Leu
1265 1270 1275

Tyr Gln Ser Ile Ile Cys Phe Phe Phe Pro Tyr Leu Val Tyr His
1280 1285 1290

Lys Asn Met Ile Val Thr Ser Asn Gly Leu Gly Leu Asp His Arg
1295 1300 1305

Tyr Phe Val Gly Val Tyr Val Thr Thr Ile Ala Val Ile Ser Cys
1310 1315 1320

Asn Thr Tyr Val Leu Leu His Gln Tyr Arg Trp Asp Trp Phe Ser
1325 1330 1335

Gly Leu Phe Ile Ala Leu Ser Cys Leu Val Val Phe Ala Trp Thr
1340 1345 1350

[0068]

Gly Ile Trp Ser Ser Ala Ile Ala Ser Arg Glu Phe Phe Lys Ala
1355 1360 1365

Ala Ala Arg Ile Tyr Gly Ala Pro Ser Phe Trp Ala Val Phe Phe
1370 1375 1380

Val Ala Val Leu Phe Cys Leu Leu Pro Arg Phe Thr Tyr Asp Ser
1385 1390 1395

Phe Gln Lys Phe Phe Tyr Pro Thr Asp Val Glu Ile Val Arg Glu
1400 1405 1410

Met Trp Gln His Gly His Phe Asp His Tyr Pro Pro Gly Tyr Asp
1415 1420 1425

Pro Thr Asp Pro Asn Arg Pro Lys Val Thr Lys Ala Gly Gln His
1430 1435 1440

Gly Glu Lys Ile Ile Glu Gly Ile Ala Leu Ser Asp Asn Leu Gly
1445 1450 1455

Gly Ser Asn Tyr Ser Arg Asp Ser Val Val Thr Glu Glu Ile Pro
1460 1465 1470

Met Thr Phe Met His Gly Glu Asp Gly Ser Pro Ser Gly Tyr Gln
1475 1480 1485

Lys Gln Glu Thr Trp Met Thr Ser Pro Lys Glu Thr Gln Asp Leu
1490 1495 1500

Leu Gln Ser Pro Gln Phe Gln Gln Ala Gln Thr Phe Gly Arg Gly
1505 1510 1515

Pro Ser Thr Asn Val Arg Ser Ser Leu Asp Arg Thr Arg Glu Gln
1520 1525 1530

Met Ile Ala Thr Asn Gln Leu Asp Asn Arg Tyr Ser Val Glu Arg
1535 1540 1545

Ala Arg Thr Ser Leu Asp Leu Pro Gly Val Thr Asn Ala Ala Ser
1550 1555 1560

Leu Ile Gly Thr Gln Gln Asn Asn
1565 1570

<210> 33
<211> 546
<212> PRT
<213> 酿酒酵母

<400> 33

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

[0069]

Thr Ser Leu Ser Arg Lys Asp Glu Ile Lys Leu Thr Pro Glu Thr Arg
20 25 30

Glu Ala Ser Leu Asp Ile Pro Tyr Lys Pro Ile Ile Ala Tyr Trp Thr
35 40 45

Val Met Gly Leu Cys Leu Met Ile Ala Phe Gly Gly Phe Ile Phe Gly
50 55 60

Trp Asp Thr Gly Thr Ile Ser Gly Phe Ile Asn Gln Thr Asp Phe Lys
65 70 75 80

Arg Arg Phe Gly Glu Leu Gln Arg Asp Gly Ser Phe Gln Leu Ser Asp
85 90 95

Val Arg Thr Gly Leu Ile Val Gly Ile Phe Asn Ile Gly Cys Ala Leu
100 105 110

Gly Gly Leu Thr Leu Gly Arg Leu Gly Asp Ile Tyr Gly Arg Lys Ile
115 120 125

Gly Leu Met Cys Val Ile Leu Val Tyr Val Val Gly Ile Val Ile Gln
130 135 140

Ile Ala Ser Ser Asp Lys Trp Tyr Gln Tyr Phe Ile Gly Arg Ile Val
145 150 155 160

Ser Gly Met Gly Val Gly Gly Val Ala Val Leu Ser Pro Thr Leu Ile
165 170 175

Ser Glu Ile Ser Pro Lys His Leu Arg Gly Thr Cys Val Ser Phe Tyr
180 185 190

Gln Leu Met Ile Thr Leu Gly Ile Phe Leu Gly Tyr Cys Thr Asn Tyr
195 200 205

Gly Thr Lys Lys Tyr Ser Asn Ser Ile Gln Trp Arg Val Pro Leu Gly
210 215 220

Leu Cys Phe Ala Trp Ala Ile Phe Met Val Ile Gly Met Val Met Val
225 230 235 240

Pro Glu Ser Pro Arg Tyr Leu Val Glu Lys Gly Lys Tyr Glu Glu Ala
245 250 255

Arg Arg Ser Leu Ala Lys Ser Asn Lys Val Thr Val Thr Asp Pro Gly
260 265 270

Val Val Phe Glu Phe Asp Thr Ile Val Ala Asn Met Glu Leu Glu Arg
275 280 285

Ala Val Gly Asn Ala Ser Trp His Glu Leu Phe Ser Asn Lys Gly Ala
290 295 300

[0070]

Ile Leu Pro Arg Val Ile Met Gly Ile Val Ile Gln Ser Leu Gln Gln
305 310 315 320

Leu Thr Gly Cys Asn Tyr Phe Phe Tyr Tyr Gly Thr Thr Ile Phe Asn
325 330 335

Ala Val Gly Met Gln Asp Ser Phe Glu Thr Ser Ile Val Leu Gly Ala
340 345 350

Val Asn Phe Ala Ser Thr Phe Val Ala Leu Tyr Ile Val Asp Lys Phe
355 360 365

Gly Arg Arg Lys Cys Leu Leu Trp Gly Ser Ala Ser Met Ala Ile Cys
370 375 380

Phe Val Ile Phe Ala Thr Val Gly Val Thr Arg Leu Trp Pro Gln Gly
385 390 395 400

Lys Asp Gln Pro Ser Ser Gln Ser Ala Gly Asn Val Met Ile Val Phe
405 410 415

Thr Cys Phe Phe Ile Phe Ser Phe Ala Ile Thr Trp Ala Pro Ile Ala
420 425 430

Tyr Val Ile Val Ala Glu Thr Tyr Pro Leu Arg Val Lys Asn Arg Ala

435 440 445

Met Ala Ile Ala Val Gly Ala Asn Trp Met Trp Gly Phe Leu Ile Gly
450 455 460

Phe Phe Thr Pro Phe Ile Thr Arg Ser Ile Gly Phe Ser Tyr Gly Tyr
465 470 475 480

Val Phe Met Gly Cys Leu Ile Phe Ser Tyr Phe Tyr Val Phe Phe Phe
485 490 495

Val Cys Glu Thr Lys Gly Leu Thr Leu Glu Glu Val Asn Glu Met Tyr
500 505 510

Glu Glu Arg Ile Lys Pro Trp Lys Ser Gly Gly Trp Ile Pro Ser Ser
515 520 525

Arg Arg Thr Pro Gln Pro Thr Ser Ser Thr Pro Leu Val Ile Val Asp
530 535 540

Ser Lys
545

<210> 34
<211> 1173
<212> PRT
<213> 酿酒酵母

[0071]

<400> 34

Met Ser Arg Gln Asp Glu Asn Ser Ala Leu Leu Ala Asn Asn Glu Asn
1 5 10 15

Asn Lys Pro Ser Tyr Thr Gly Asn Glu Asn Gly Val Tyr Asp Asn Phe
20 25 30

Lys Leu Ser Lys Ser Gln Leu Ser Asp Leu His Asn Pro Lys Ser Ile
35 40 45

Arg Ser Phe Val Arg Leu Phe Gly Tyr Glu Ser Asn Ser Leu Phe Lys
50 55 60

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

Asn Tyr Arg Lys Thr Asn Arg Tyr Lys Asn Tyr Gly Asp Asn Ser Leu
85 90 95

Pro Glu Arg Ile Pro Lys Ser Phe Leu Gln Leu Val Trp Ala Ala Phe
100 105 110

Asn Asp Lys Thr Met Gln Leu Leu Thr Val Ala Ala Val Val Ser Phe
115 120 125

Val Leu Gly Leu Tyr Glu Leu Trp Met Gln Pro Pro Gln Tyr Asp Pro

130 135 140

Glu Gly Asn Lys Ile Lys Gln Val Asp Trp Ile Glu Gly Val Ala Ile
145 150 155 160

Met Ile Ala Val Phe Val Val Val Leu Val Ser Ala Ala Asn Asp Tyr
165 170 175

Gln Lys Glu Leu Gln Phe Ala Lys Leu Asn Lys Lys Lys Glu Asn Arg
180 185 190

Lys Ile Ile Val Ile Arg Asn Asp Gln Glu Ile Leu Ile Ser Ile His
195 200 205

His Val Leu Val Gly Asp Val Ile Ser Leu Gln Thr Gly Asp Val Val
210 215 220

Pro Ala Asp Cys Val Met Ile Ser Gly Lys Cys Glu Ala Asp Glu Ser
225 230 235 240

Ser Ile Thr Gly Glu Ser Asn Thr Ile Gln Lys Phe Pro Val Asp Asn
245 250 255

Ser Leu Arg Asp Phe Lys Lys Phe Asn Ser Ile Asp Ser His Asn His
260 265 270

[0072]

Ser Lys Pro Leu Asp Ile Gly Asp Val Asn Glu Asp Gly Asn Lys Ile
275 280 285

Ala Asp Cys Met Leu Ile Ser Gly Ser Arg Ile Leu Ser Gly Leu Gly
290 295 300

Arg Gly Val Ile Thr Ser Val Gly Ile Asn Ser Val Tyr Gly Gln Thr
305 310 315 320

Met Thr Ser Leu Asn Ala Glu Pro Glu Ser Thr Pro Leu Gln Leu His
325 330 335

Leu Ser Gln Leu Ala Asp Asn Ile Ser Val Tyr Gly Cys Val Ser Ala
340 345 350

Ile Ile Leu Phe Leu Val Leu Phe Thr Arg Tyr Leu Phe Tyr Ile Ile
355 360 365

Pro Glu Asp Gly Arg Phe His Asp Leu Asp Pro Ala Gln Lys Gly Ser
370 375 380

Lys Phe Met Asn Ile Phe Ile Thr Ser Ile Thr Val Ile Val Val Ala
385 390 395 400

Val Pro Glu Gly Leu Pro Leu Ala Val Thr Leu Ala Leu Ala Phe Ala
405 410 415

Thr Thr Arg Met Thr Lys Asp Gly Asn Leu Val Arg Val Leu Arg Ser
420 425 430

Cys Glu Thr Met Gly Ser Ala Thr Ala Val Cys Ser Asp Lys Thr Gly
435 440 445

Thr Leu Thr Glu Asn Val Met Thr Val Val Arg Gly Phe Pro Gly Asn
450 455 460

Ser Lys Phe Asp Asp Ser Lys Ser Leu Pro Val Ser Glu Gln Arg Lys
465 470 475 480

Leu Asn Ser Lys Lys Val Phe Glu Glu Asn Cys Ser Ser Ser Leu Arg
485 490 495

Asn Asp Leu Leu Ala Asn Ile Val Leu Asn Ser Thr Ala Phe Glu Asn
500 505 510

Arg Asp Tyr Lys Lys Asn Asp Lys Asn Thr Asn Gly Ser Lys Asn Met
515 520 525

Ser Lys Asn Leu Ser Phe Leu Asp Lys Cys Lys Ser Arg Leu Ser Phe
530 535 540

Phe Lys Lys Gly Asn Arg Glu Asp Asp Glu Asp Gln Leu Phe Lys Asn
545 550 555 560

[0073]

Val Asn Lys Gly Arg Gln Glu Pro Phe Ile Gly Ser Lys Thr Glu Thr
565 570 575

Ala Leu Leu Ser Leu Ala Arg Leu Ser Leu Gly Leu Gln Pro Gly Glu
580 585 590

Leu Gln Tyr Leu Arg Asp Gln Pro Met Glu Lys Phe Asn Ile Glu Lys
595 600 605

Val Val Gln Thr Ile Pro Phe Glu Ser Ser Arg Lys Trp Ala Gly Leu
610 615 620

Val Val Lys Tyr Lys Glu Gly Lys Asn Lys Lys Pro Phe Tyr Arg Phe
625 630 635 640

Phe Ile Lys Gly Ala Ala Glu Ile Val Ser Lys Asn Cys Ser Tyr Lys
645 650 655

Arg Asn Ser Asp Asp Thr Leu Glu Glu Ile Asn Glu Asp Asn Lys Lys
660 665 670

Glu Thr Asp Asp Glu Ile Lys Asn Leu Ala Ser Asp Ala Leu Arg Ala
675 680 685

Ile Ser Val Ala His Lys Asp Phe Cys Glu Cys Asp Ser Trp Pro Pro
690 695 700

Glu Gln Leu Arg Asp Lys Asp Ser Pro Asn Ile Ala Ala Leu Asp Leu
705 710 715 720

Leu Phe Asn Ser Gln Lys Gly Leu Ile Leu Asp Gly Leu Leu Gly Ile
725 730 735

Gln Asp Pro Leu Arg Ala Gly Val Arg Glu Ser Val Gln Gln Cys Gln
740 745 750

Arg Ala Gly Val Thr Val Arg Met Val Thr Gly Asp Asn Ile Leu Thr
755 760 765

Ala Lys Ala Ile Ala Arg Asn Cys Ala Ile Leu Ser Thr Asp Ile Ser
770 775 780

Ser Glu Ala Tyr Ser Ala Met Glu Gly Thr Glu Phe Arg Lys Leu Thr
785 790 795 800

Lys Asn Glu Arg Ile Arg Ile Leu Pro Asn Leu Arg Val Leu Ala Arg
805 810 815

Ser Ser Pro Glu Asp Lys Arg Leu Leu Val Glu Thr Leu Lys Gly Met
820 825 830

Gly Asp Val Val Ala Val Thr Gly Asp Gly Thr Asn Asp Ala Pro Ala
835 840 845

[0074]

Leu Lys Leu Ala Asp Val Gly Phe Ser Met Gly Ile Ser Gly Thr Glu
850 855 860

Val Ala Arg Glu Ala Ser Asp Ile Ile Leu Met Thr Asp Asp Phe Ser
865 870 875 880

Ala Ile Val Asn Ala Ile Lys Trp Gly Arg Cys Val Ser Val Ser Ile
885 890 895

Lys Lys Phe Ile Gln Phe Gln Leu Ile Val Asn Ile Thr Ala Val Ile
900 905 910

Leu Thr Phe Val Ser Ser Val Ala Ser Ser Asp Glu Thr Ser Val Leu
915 920 925

Thr Ala Val Gln Leu Leu Trp Ile Asn Leu Ile Met Asp Thr Leu Ala
930 935 940

Ala Leu Ala Leu Ala Thr Asp Lys Pro Asp Pro Asn Ile Met Asp Arg
945 950 955 960

Lys Pro Arg Gly Arg Ser Thr Ser Leu Ile Ser Val Ser Thr Trp Lys
965 970 975

Met Ile Leu Ser Gln Ala Thr Leu Gln Leu Ile Val Thr Phe Ile Leu
980 985 990

His Phe Tyr Gly Pro Glu Leu Phe Phe Lys Lys His Glu Asp Glu Ile
995 1000 1005

Thr Ser His Gln Gln Gln Gln Leu Asn Ala Met Thr Phe Asn Thr
1010 1015 1020

Phe Val Trp Leu Gln Phe Phe Thr Met Leu Val Ser Arg Lys Leu
1025 1030 1035

Asp Glu Gly Asp Gly Ile Ser Asn Trp Arg Gly Arg Ile Ser Ala
1040 1045 1050

Ala Asn Leu Asn Phe Phe Gln Asp Leu Gly Arg Asn Tyr Tyr Phe
1055 1060 1065

Leu Thr Ile Met Ala Ile Ile Gly Ser Cys Gln Val Leu Ile Met
1070 1075 1080

Phe Phe Gly Gly Ala Pro Phe Ser Ile Ala Arg Gln Thr Lys Ser
1085 1090 1095

Met Trp Ile Thr Ala Val Leu Cys Gly Met Leu Ser Leu Ile Met
1100 1105 1110

Gly Val Leu Val Arg Ile Cys Pro Asp Glu Val Ala Val Lys Val
1115 1120 1125

[0075]

Phe Pro Ala Ala Phe Val Gln Arg Phe Lys Tyr Val Phe Gly Leu
1130 1135 1140

Glu Phe Leu Arg Lys Asn His Thr Gly Lys His Asp Asp Glu Glu
1145 1150 1155

Ala Leu Leu Glu Glu Ser Asp Ser Pro Glu Ser Thr Ala Phe Tyr
1160 1165 1170

<210> 35
<211> 1068
<212> PRT
<213> 酿酒酵母

<400> 35

Met Arg Gly Leu Thr Pro Lys Asn Gly Val His Ile Glu Thr Gly Pro
1 5 10 15

Asp Thr Glu Ser Ser Ala Asp Ser Ser Asn Phe Ser Thr Gly Phe Ser
20 25 30

Gly Lys Ile Arg Lys Pro Arg Ser Lys Val Ser Lys Ala Cys Asp Asn
35 40 45

Cys Arg Lys Arg Lys Ile Lys Cys Asn Gly Lys Phe Pro Cys Ala Ser
50 55 60

Cys Glu Ile Tyr Ser Cys Glu Cys Thr Phe Ser Thr Arg Gln Gly Gly
65 70 75 80

Ala Arg Ile Lys Asn Leu His Lys Thr Ser Leu Glu Gly Thr Thr Val
85 90 95

Gln Val Lys Glu Glu Thr Asp Ser Ser Ser Thr Ser Phe Ser Asn Pro
100 105 110

Gln Arg Cys Thr Asp Gly Pro Cys Ala Val Glu Gln Pro Thr Lys Phe
115 120 125

Phe Glu Asn Phe Lys Leu Gly Gly Arg Ser Ser Gly Asp Asn Ser Gly
130 135 140

Ser Asp Gly Lys Asn Asp Asp Asp Val Asn Arg Asn Gly Phe Tyr Glu
145 150 155 160

Asp Asp Ser Glu Ser Gln Ala Thr Leu Thr Ser Leu Gln Thr Thr Leu
165 170 175

Lys Asn Leu Lys Glu Met Ala His Leu Gly Thr His Val Thr Ser Ala
180 185 190

Ile Glu Ser Ile Glu Leu Gln Ile Ser Asp Leu Leu Lys Arg Trp Glu
195 200 205

[0076]

Pro Lys Val Arg Thr Lys Glu Leu Ala Thr Thr Lys Phe Tyr Pro Asn
210 215 220

Lys Ser Ile Glu Thr Gln Leu Met Lys Asn Lys Tyr Cys Asp Val Val
225 230 235 240

His Leu Thr Arg Tyr Ala Ala Trp Ser Asn Asn Lys Lys Asp Gln Asp
245 250 255

Thr Ser Ser Gln Pro Leu Ile Asp Glu Ile Phe Gly Leu Tyr Ser Pro
260 265 270

Phe Gln Phe Leu Ser Leu Gln Gly Ile Gly Lys Cys Phe Gln Asn Tyr
275 280 285

Arg Ser Lys Ser Lys Cys Glu Ile Phe Pro Arg Thr Ala Lys Glu Thr
290 295 300

Ile Tyr Ile Met Leu Arg Phe Phe Asp Val Cys Phe His His Ile Asn
305 310 315 320

Gln Gly Cys Val Ser Ile Ala Asn Pro Leu Glu Asn Tyr Leu Gln Lys
325 330 335

Met Asn Leu Leu Pro Ser Thr Pro Ser Ser Ile Ser Ser Ala Gly Ser

340 345 350

Pro Asn Thr Ala His Thr Lys Ser His Val Ala Leu Val Ile Asn His
355 360 365

Leu Pro Gln Pro Phe Val Arg Asn Ile Thr Gly Ile Ser Asn Ser Glu
370 375 380

Leu Leu Ser Glu Met Asn Asn Asp Ile Ser Met Phe Gly Ile Leu Leu
385 390 395 400

Lys Met Leu Asp Met His Lys Asn Ser Tyr Gln Asn Phe Leu Met Glu
405 410 415

Ile Thr Ser Asn Pro Ser Val Ala Lys Asn Thr Gln Ser Ile Asp Val
420 425 430

Leu Gln Glu Phe Ile His Tyr Cys Gln Ala Gly Glu Ala Leu Ile Ala
435 440 445

Leu Cys Tyr Ser Tyr Tyr Asn Ser Thr Leu Tyr Asn Tyr Val Asp Phe
450 455 460

Thr Cys Asp Ile Thr His Leu Glu Gln Leu Leu Tyr Phe Leu Asp Leu
465 470 475 480

[0077]

Leu Phe Trp Leu Ser Glu Ile Tyr Gly Phe Glu Lys Val Leu Asn Val
485 490 495

Ala Val His Phe Val Ser Arg Val Gly Leu Ser Arg Trp Glu Phe Tyr
500 505 510

Val Gly Leu Asp Glu Asn Phe Ala Glu Arg Arg Arg Asn Leu Trp Trp
515 520 525

Lys Ala Phe Tyr Phe Glu Lys Thr Leu Ala Ser Lys Leu Gly Tyr Pro
530 535 540

Ser Asn Ile Asp Asp Ser Lys Ile Asn Cys Leu Leu Pro Lys Asn Phe
545 550 555 560

Arg Asp Val Gly Phe Leu Asp Asn Arg Asp Phe Ile Glu Asn Val His
565 570 575

Leu Val Arg Arg Ser Glu Ala Phe Asp Asn Met Cys Ile Ser Asp Leu
580 585 590

Lys Tyr Tyr Gly Glu Leu Ala Val Leu Gln Ile Val Ser His Phe Ser
595 600 605

Ser Ser Val Leu Phe Asn Glu Lys Phe Thr Ser Ile Arg Asn Thr Ser
610 615 620

Lys Pro Ser Val Val Arg Glu Lys Leu Leu Phe Glu Val Leu Glu Ile
625 630 635 640

Phe Asn Glu Thr Glu Met Lys Tyr Asp Ala Ile Lys Glu Gln Thr Gly
645 650 655

Lys Leu Phe Asp Ile Ala Phe Ser Lys Asp Ser Thr Glu Leu Lys Val
660 665 670

Ser Arg Glu Asp Lys Ile Met Ala Ser Lys Phe Val Leu Phe Tyr Glu
675 680 685

His His Phe Cys Arg Met Val Asn Glu Ser Asp Asn Ile Val Ala Arg
690 695 700

Leu Cys Val His Arg Arg Pro Ser Ile Leu Ile Glu Asn Leu Lys Ile
705 710 715 720

Tyr Leu His Lys Ile Tyr Lys Ser Trp Thr Asp Met Asn Lys Ile Leu
725 730 735

Leu Asp Phe Asp Asn Asp Tyr Ser Val Tyr Arg Ser Phe Ala His Tyr
740 745 750

Ser Ile Ser Cys Ile Ile Leu Val Ser Gln Ala Phe Ser Val Ala Glu
755 760 765

[0078]

Phe Ile Lys Val Asn Asp Val Val Asn Met Ile Arg Val Phe Lys Arg
770 775 780

Phe Leu Asp Ile Lys Ile Phe Ser Glu Asn Glu Thr Asn Glu His Val
785 790 795 800

Phe Asn Ser Gln Ser Phe Lys Asp Tyr Thr Arg Ala Phe Ser Phe Leu
805 810 815

Thr Ile Val Thr Arg Ile Met Leu Leu Ala Tyr Gly Glu Ser Ser Ser
820 825 830

Thr Asn Leu Asp Val Ile Ser Lys Tyr Ile Asp Glu Asn Ala Pro Asp
835 840 845

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

Arg Phe Leu Leu Glu Pro Val Gln Lys Ser Gly Phe His Leu Thr Val
865 870 875 880

Ser Gln Met Leu Lys Asn Arg Lys Phe Gln Glu Pro Leu Met Ser Asn
885 890 895

Glu Asp Asn Lys Gln Met Lys His Asn Ser Gly Lys Asn Leu Asn Pro
900 905 910

Asp Leu Pro Ser Leu Lys Thr Gly Thr Ser Cys Leu Leu Asn Gly Ile
915 920 925

Glu Ser Pro Gln Leu Pro Phe Asn Gly Arg Ser Ala Pro Ser Pro Val
930 935 940

Arg Asn Asn Ser Leu Pro Glu Phe Ala Gln Leu Pro Ser Phe Arg Ser
945 950 955 960

Leu Ser Val Ser Asp Met Ile Asn Pro Asp Tyr Ala Gln Pro Thr Asn
965 970 975

Gly Gln Asn Asn Thr Gln Val Gln Ser Asn Lys Pro Ile Asn Ala Gln
980 985 990

Gln Gln Ile Pro Thr Ser Val Gln Val Pro Phe Met Asn Thr Asn Glu
995 1000 1005

Ile Asn Asn Asn Asn Asn Asn Asn Asn Asn Asn Lys Asn Asn Ile
1010 1015 1020

Asn Asn Ile Asn Asn Asn Asn Ser Asn Asn Phe Ser Ala Thr Ser
1025 1030 1035

Phe Asn Leu Gly Thr Leu Asp Glu Phe Val Asn Asn Gly Asp Leu
1040 1045 1050

[0079]

Glu Asp Leu Tyr Ser Ile Leu Trp Ser Asp Val Tyr Pro Asp Ser
1055 1060 1065

<210> 36
<211> 376
<212> PRT
<213> 酿酒酵母

<400> 36

Met Ser Asn Val Thr Thr Pro Trp Trp Lys Gln Trp Asp Pro Ser Glu
1 5 10 15

Val Thr Leu Ala Asp Lys Thr Pro Asp Asp Val Trp Lys Thr Cys Val
20 25 30

Leu Gln Gly Val Tyr Phe Gly Gly Asn Glu Tyr Asn Gly Asn Leu Gly
35 40 45

Ala Arg Ile Ser Ser Val Phe Val Ile Leu Phe Val Ser Thr Phe Phe
50 55 60

Thr Met Phe Pro Leu Ile Ser Thr Lys Val Lys Arg Leu Arg Ile Pro
65 70 75 80

Leu Tyr Val Tyr Leu Phe Ala Lys Tyr Phe Gly Ser Gly Val Ile Val
85 90 95

```
Ala Thr Ala Phe Ile His Leu Met Asp Pro Ala Tyr Gly Ala Ile Gly
            100                 105                 110

Gly Thr Thr Cys Val Gly Gln Thr Gly Asn Trp Gly Leu Tyr Ser Trp
        115                 120                 125

Cys Pro Ala Ile Met Leu Thr Ser Leu Thr Phe Thr Phe Leu Thr Asp
    130                 135                 140

Leu Phe Ser Ser Val Trp Val Glu Arg Lys Tyr Gly Leu Ser His Asp
145                 150                 155                 160

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

Val Ser Ser Glu Asn Asp Asn Glu Asn Gly Thr Ala Asn Gly Ser His
            180                 185                 190

Asp Thr Lys Asn Gly Val Glu Tyr Tyr Glu Asp Ser Asp Ala Thr Ser
        195                 200                 205

Met Asp Val Val Gln Ser Phe Gln Ala Gln Phe Tyr Ala Phe Leu Ile
    210                 215                 220

Leu Glu Phe Gly Val Ile Phe His Ser Val Met Ile Gly Leu Asn Leu
225                 230                 235                 240
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[0080]

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Gly Ser Val Gly Asp Glu Phe Ser Ser Leu Tyr Pro Val Leu Val Phe
                245                 250                 255

His Gln Ser Phe Glu Gly Leu Gly Ile Gly Ala Arg Leu Ser Ala Ile
            260                 265                 270

Glu Phe Pro Arg Ser Lys Arg Trp Trp Pro Trp Ala Leu Cys Val Ala
        275                 280                 285

Tyr Gly Leu Thr Thr Pro Ile Cys Val Ala Ile Gly Leu Gly Val Arg
    290                 295                 300

Thr Arg Tyr Val Ser Gly Ser Tyr Thr Ala Leu Val Ile Ser Gly Val
305                 310                 315                 320

Leu Asp Ala Ile Ser Ala Gly Ile Leu Leu Tyr Thr Gly Leu Val Glu
                325                 330                 335

Leu Leu Ala Arg Asp Phe Ile Phe Asn Pro Gln Arg Thr Lys Asp Leu
            340                 345                 350

Arg Glu Leu Ser Phe Asn Val Ile Cys Thr Leu Phe Gly Ala Gly Ile
        355                 360                 365

Met Ala Leu Ile Gly Lys Trp Ala
    370                 375
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<210> 37
<211> 1036
<212> PRT
<213> 酿酒酵母

<400> 37

Met Gly Arg Thr Ile Arg Arg Arg Arg Ser Asn Ser Ser Leu Ser Glu
1 5 10 15

Ala Ile Ser Val Ser Leu Gly Ile Asn Gln Asp Ser Ser Val Asn Lys
20 25 30

Met His Arg Ala Ser Val Ser Ala Met Ser Pro Pro Leu Cys Arg Ser
35 40 45

Tyr Met Ser Gly Phe Phe Thr Gly Gly Asn Ser Pro Met Ile Asn Asn
50 55 60

Leu Ser Asp Ser Lys Leu Pro Ile Ser Asn Lys Gln His Pro Lys Val
65 70 75 80

Ile His Gly Ser Glu Asn Leu His Arg Gln Thr Ala Gln Leu Ser Asn
85 90 95

Glu Phe Cys Ser Ser Ser Val Glu Glu Asn Ser Pro Thr Ile Lys Asp
100 105 110

[0081]

Tyr Met Asp Ile Ile Gly Asn Gly Asp Arg Lys Asp Asp Gln Ser Met
115 120 125

Arg Thr Ile Glu Glu Asn Ile Asp Glu Glu Tyr Ser Asp Glu Tyr Ser
130 135 140

Arg Leu Leu Leu Ser Pro Ala Ser Ser Asn Val Asp Asp Asp Arg Asn
145 150 155 160

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

Gly Gly Tyr Gln Ser Leu Arg Pro Ser His Asn Leu Arg Phe Arg Pro
180 185 190

Arg Asn Leu Trp His Met Cys Thr Ser Phe Pro Ser Lys Phe Ala His
195 200 205

Tyr Leu Pro Ala Ala Val Leu Gly Leu Leu Leu Asn Ile Leu Asp Ala
210 215 220

Leu Ser Tyr Gly Met Ile Ile Phe Pro Ile Thr Glu Pro Val Phe Ser
225 230 235 240

His Leu Gly Pro Thr Gly Ile Ser Met Phe Tyr Ile Ser Thr Ile Ile
245 250 255

Ser Gln Ala Val Tyr Ser Gly Gly Trp Ser Ser Phe Pro Ser Gly Ile
260 265 270

Gly Ser Glu Met Ile Glu Ile Thr Pro Phe Tyr His Thr Met Ala Leu
275 280 285

Ala Ile Lys Glu Ala Leu Ala Gly Asn Asp Asp Glu Ile Ile Thr Thr
290 295 300

Thr Ile Phe Cys Tyr Val Ile Ser Ser Met Leu Thr Gly Val Val Phe
305 310 315 320

Tyr Ala Leu Gly Lys Leu Arg Leu Gly Lys Ile Val Gly Phe Phe Pro
325 330 335

Arg His Ile Leu Ile Gly Cys Ile Gly Gly Val Gly Tyr Phe Leu Ile
340 345 350

Ile Thr Gly Ile Glu Val Thr Thr Arg Val Ala Lys Phe Glu Tyr Ser
355 360 365

Trp Pro Phe Phe Ser Gly Leu Phe Thr Asp Tyr Asp Thr Leu Ala Lys
370 375 380

Trp Leu Leu Pro Val Leu Leu Thr Val Val Leu Ile Gly Thr Gln Arg
385 390 395 400

[0082]

Tyr Phe Lys Asn Ser Leu Val Leu Pro Ser Phe Tyr Ile Leu Thr Leu
405 410 415

Val Leu Phe His Phe Ile Val Ala Ile Ile Pro Thr Leu Ser Leu Asp
420 425 430

Ala Leu Arg Gln Ala Gly Trp Ile Phe Pro Ile Ala Asn Ser Asp Ser
435 440 445

Lys Trp Tyr Asp His Tyr Arg Leu Phe Asn Val His Lys Val His Trp
450 455 460

Ser Leu Val Leu Gln Gln Ile Pro Thr Met Met Ala Leu Thr Phe Phe
465 470 475 480

Gly Ile Leu His Val Pro Ile Asn Val Pro Ala Leu Ala Met Ser Leu
485 490 495

Gln Met Asp Lys Tyr Asp Val Asp Arg Glu Leu Ile Ala His Gly Tyr
500 505 510

Ser Asn Phe Phe Ser Gly Leu Leu Gly Ser Val Gln Asn Tyr Leu Val
515 520 525

Tyr Thr Asn Ser Val Leu Phe Ile Arg Ala Gly Ala Asp Ser Pro Phe

530 535 540

Ala Gly Phe Leu Leu Ile Ala Leu Thr Ile Cys Ile Met Ile Ile Gly
545 550 555 560

Pro Val Ile Ile Ser Phe Ile Pro Ile Cys Ile Val Gly Ser Leu Ile
565 570 575

Phe Leu Leu Gly Tyr Glu Leu Leu Val Glu Ala Leu Val Asp Thr Trp
580 585 590

Asn Lys Leu Asn Arg Phe Glu Tyr Leu Thr Val Val Ile Ile Val Phe
595 600 605

Thr Met Gly Ile Phe Asp Phe Val Leu Gly Ile Ile Val Gly Ile Leu
610 615 620

Ile Ala Cys Phe Ser Phe Leu Val Asp Ser Thr Lys Leu Gln Thr Ile
625 630 635 640

Asn Gly Glu Tyr Asn Gly Asn Val Ala Arg Ser Thr Val Tyr Arg Asp
645 650 655

Tyr Val Gln Thr Lys Phe Leu Asp Gly Ile Gly Glu Gln Ile Tyr Val
660 665 670

[0083]

Leu Lys Leu Gln Asn Leu Leu Phe Phe Gly Thr Ile Ile Ser Ile Glu
675 680 685

Glu Lys Ile Glu Arg Leu Leu Gln Ile Ser Asn Lys Asp Ala Thr Lys
690 695 700

Arg Arg Ile Lys Tyr Leu Ile Leu Asp Phe Lys Asn Ile Asn Ala Asp
705 710 715 720

Asn Ile Asp Tyr Ser Ala Ala Glu Gly Phe Asn Arg Ile Lys Arg Phe
725 730 735

Thr Glu Thr Lys Arg Ile Lys Leu Ile Ile Ser Ser Ile Lys Glu Arg
740 745 750

Asp Arg Ile Tyr Asn Ala Phe Asn Asn Val Gly Leu Leu Asn Asp Val
755 760 765

Glu Leu Phe Ala Asp Leu Asn Ser Ala Leu Glu Trp Cys Glu Asn Glu
770 775 780

Phe Leu Phe Gln Tyr Lys Gln Leu Arg Lys Lys Ala Lys Glu Arg Leu
785 790 795 800

Glu Glu Gly Lys Gln Asn Asn Val Val Ser Ala Val Ile Ala Ala Thr
805 810 815

Lys Asn Lys Lys Ile Asp Thr Ile Gly Asn Gly Leu Asn Arg Gly Ser
820 825 830

Asn Gly Asp Thr Ala Arg Asn Leu Met Ser Leu Pro Thr Asn Thr Pro
835 840 845

Arg Asn Tyr Gln Ile Leu Ser Val Ala Gln Asn Val Phe Val Asn Asp
850 855 860

Glu Gln Ala Val Lys Asn Phe Lys Lys Glu Tyr Lys Asp Asp Glu Pro
865 870 875 880

Val Leu Pro Ile Leu Leu Phe Ala Leu Lys Gln Tyr Arg Pro Asp Ile
885 890 895

Ile Ser Glu Val Gln Lys Val Arg Glu Lys Glu Ile Lys Phe Trp Ala
900 905 910

Gln Leu Cys Pro Tyr Phe Thr Arg Arg Arg Leu Ala Ser Gln Ser His
915 920 925

Leu Leu His Ala Asp Asn Ile Phe Phe Leu Val Glu Thr Gly Met Leu
930 935 940

Lys Ala Thr Tyr Glu Leu Pro Gln Gly Thr Leu Tyr Glu Ile Phe Ser
945 950 955 960

[0084]

Asn Gly Thr Cys Phe Gly Lys Ile Ile Ala Pro Gly Asn Ala Met Pro
965 970 975

Arg Glu Gln Lys Leu Thr Ile Glu Thr Glu Thr Asp Ser Val Leu Trp
980 985 990

Val Ile Asp Ser Ser Ser Leu Asn Lys Leu Lys Glu Asp Asn Leu Ala
995 1000 1005

Leu Tyr Val Glu Val Ala Leu Met Val Met Cys Ile Lys Asp Thr
1010 1015 1020

Arg Phe Lys Glu Leu Leu Gly Tyr Thr Leu Val Ser Ala
1025 1030 1035

<210> 38
<211> 105
<212> PRT
<213> 酿酒酵母

<400> 38

Met Gly Leu Ser Ser Ile Phe Gly Gly Gly Ala Pro Ser Gln Gln Lys
1 5 10 15

Glu Ala Ala Thr Thr Ala Lys Thr Thr Pro Asn Pro Ile Ala Lys Glu
20 25 30

Leu Lys Asn Gln Ile Ala Gln Glu Leu Ala Val Ala Asn Ala Thr Glu
35 40 45

Leu Val Asn Lys Ile Ser Glu Asn Cys Phe Glu Lys Cys Leu Thr Ser
50 55 60

Pro Tyr Ala Thr Arg Asn Asp Ala Cys Ile Asp Gln Cys Leu Ala Lys
65 70 75 80

Tyr Met Arg Ser Trp Asn Val Ile Ser Lys Ala Tyr Ile Ser Arg Ile
85 90 95

Gln Asn Ala Ser Ala Ser Gly Glu Ile
100 105

<210> 39
<211> 2039
<212> PRT
<213> 酿酒酵母

<400> 39

Met Gln Gly Arg Lys Arg Thr Leu Thr Glu Pro Phe Glu Pro Asn Thr
1 5 10 15

Asn Pro Phe Gly Asp Asn Ala Ala Val Met Thr Glu Asn Val Glu Asp
20 25 30

[0085]

Asn Ser Glu Thr Asp Gly Asn Arg Leu Glu Ser Lys Pro Gln Ala Leu
35 40 45

Val Pro Pro Ala Leu Asn Ile Val Pro Pro Glu Ser Ser Ile His Ser
50 55 60

Thr Glu Glu Lys Lys Gly Asp Glu Tyr Asn Gly Asn Asp Lys Asp Ser
65 70 75 80

Ser Leu Ile Ser Asn Ile Phe Arg Thr Arg Val Gly Arg Ser Ser His
85 90 95

Glu Asn Leu Ser Arg Pro Lys Leu Ser Leu Lys Thr Ala Ser Phe Gly
100 105 110

Ala Ala Glu Ser Ser Arg Arg Asn Val Ser Pro Ser Thr Lys Ser Ala
115 120 125

Lys Ser Ser Ser Gln Tyr Ile Asp Leu Asn Asp Glu Arg Leu Arg Arg
130 135 140

Arg Ser Phe Ser Ser Tyr Ser Arg Ser Ser Ser Arg Arg Val Ser Asn
145 150 155 160

Ser Pro Ser Ser Thr Asp Arg Pro Pro Arg Ser Ala Lys Val Leu Ser
165 170 175

```
Leu Ile Ala Ala Asp Asp Met Asp Asp Phe Glu Asp Leu Gln Lys Gly
            180                 185                 190

Phe Lys Ser Ala Ile Asp Glu Glu Gly Leu Thr Trp Leu Pro Gln Leu
        195                 200                 205

Lys Ser Glu Lys Ser Arg Pro Val Ser Asp Val Gly Glu Asp Arg Gly
    210                 215                 220

Glu Gly Glu Gln Glu Ser Ile Pro Asp Val His Thr Pro Asn Val Gly
225                 230                 235                 240

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

Asn Gly Ser Val Ser Glu Gly Leu Glu Gly Ser Ile Asn Asn Ser Arg
            260                 265                 270

Lys Lys Pro Ser Pro Lys Phe Phe His His Leu Ser Pro Gln Lys Glu
        275                 280                 285

Asp Lys Asp Gln Thr Glu Val Ile Glu Tyr Ala Glu Asp Ile Leu Asp
    290                 295                 300

Phe Glu Thr Leu Gln Arg Lys Leu Glu Ser Arg Pro Phe Val Leu Tyr
305                 310                 315                 320
```

[0086]

```
Gly His Ser Leu Gly Val Phe Ser Pro Thr Asn Pro Leu Arg Ile Lys
                325                 330                 335

Ile Ala Arg Phe Leu Leu His Arg Arg Tyr Ser Leu Leu Tyr Asn Thr
            340                 345                 350

Leu Leu Thr Phe Tyr Ala Ile Leu Leu Ala Ile Arg Thr Tyr Asn Pro
        355                 360                 365

His Asn Val Val Phe Leu Tyr Arg Phe Ser Asn Trp Thr Asp Tyr Phe
    370                 375                 380

Ile Phe Ile Leu Ser Ala Cys Phe Thr Gly Asn Asp Ile Ala Lys Ile
385                 390                 395                 400

Ile Ala Phe Gly Phe Trp Asp Asp Ser Glu Met Phe Lys Ala Tyr Gly
                405                 410                 415

Arg Glu Tyr Lys Ser Ile Leu Gln Arg Ser Gly Ile Met Lys Leu Tyr
            420                 425                 430

Ile Tyr Leu Arg Glu Lys Tyr Gly Arg Lys Leu Ile Asp Phe Ile Ile
        435                 440                 445

Pro Phe Arg Ile Ile Ser Pro Gly Glu Glu Thr Lys Tyr Gln Arg Ser
    450                 455                 460
```

```
Ser Leu Ser Thr Ser Leu Thr Lys Pro Tyr Gly Ala Lys Glu Asn Gln
465                 470                 475                 480

Arg Pro Phe Gly Thr Pro Arg Ala Phe Ala Arg Ser Ser Trp Asn Arg
                485                 490                 495

Ile Asp Leu Val Ser Ser Val Ser Phe Trp Leu Gly Met Phe Leu Ser
            500                 505                 510

Ile Lys Ser Tyr Asp Thr Lys Thr Gly Ile Arg Ile Phe Lys Pro Leu
        515                 520                 525

Ala Ile Leu Arg Ile Leu Arg Leu Val Asn Val Asp Thr Gly Met Pro
    530                 535                 540

Ser Ile Leu Arg Gly Leu Lys Tyr Gly Ile Pro Gln Leu Val Asn Val
545                 550                 555                 560

Ser Ser Met Leu Val Tyr Phe Trp Ile Phe Phe Gly Ile Leu Gly Val
                565                 570                 575

Gln Ile Phe Gln Gly Ser Phe Arg Arg Gln Cys Val Trp Phe Asn Pro
            580                 585                 590

Glu Asp Pro Thr Asp Thr Tyr Gln Tyr Asp Met Gln Phe Cys Gly Gly
        595                 600                 605
```

[0087]

```
Tyr Leu Asp Pro Val Thr Lys Arg Lys Gln Asn Tyr Ile Tyr Glu Asp
    610                 615                 620

Gly Ser Glu Gly Ser Val Ser Lys Gly Phe Leu Cys Pro Gln Tyr Ser
625                 630                 635                 640

Lys Cys Val Ser Asn Ala Asn Pro Tyr Asn Gly Arg Ile Ser Phe Asp
                645                 650                 655

Asn Ile Val Asn Ser Met Glu Leu Val Phe Val Ile Met Ser Ala Asn
            660                 665                 670

Thr Phe Thr Asp Leu Met Tyr Tyr Thr Met Asp Ser Asp Glu Met Ala
        675                 680                 685

Ala Cys Leu Phe Phe Ile Val Cys Ile Phe Val Leu Thr Ile Trp Leu
    690                 695                 700

Leu Asn Leu Leu Ile Ala Val Leu Val Ser Ser Phe Glu Ile Ala Asn
705                 710                 715                 720

Glu Glu Tyr Lys Lys Lys Lys Phe Ile Tyr Gly Ser Arg Lys Thr Gly
                725                 730                 735

Tyr Val Ala Arg Ile Val Thr Gly Tyr Trp Lys Tyr Phe Lys Leu Lys
            740                 745                 750
```

```
Ala Asn Gln Thr Lys Phe Pro Asn Trp Ser Gln Lys Gly Leu Ala Ile
        755                 760                 765

Tyr Ser His Val Glu Phe Ile Phe Val Ile Leu Ile Ile Cys Asp Ile
    770                 775                 780

Gly Met Arg Ala Ser Val Lys Val Ser Thr Ser Ala Asn Cys Asn Asn
785                 790                 795                 800

Ile Leu Leu Lys Thr Asp Arg Gly Ile Ser Ile Val Leu Phe Ile Glu
                805                 810                 815

Ser Leu Ala Arg Leu Val Leu Tyr Leu Pro Asn Met Trp Lys Phe Leu
            820                 825                 830

Thr Lys Pro Ser Tyr Val Tyr Asp Phe Ile Ile Ser Ile Ile Thr Leu
        835                 840                 845

Val Ile Ser Cys Leu Ala Val Glu Gly Val Leu Gly His Met Tyr Ala
    850                 855                 860

Trp Leu Ser Ile Phe His Ile Ser Arg Phe Tyr Arg Val Ile Ile Ser
865                 870                 875                 880

Phe Asn Leu Thr Lys Lys Leu Trp Lys Gln Ile Leu Ser Asn Gly Val
                885                 890                 895
```

[0088]

```
Met Ile Trp Asn Leu Ser Ser Phe Tyr Phe Phe Phe Thr Phe Leu Val
            900                 905                 910

Ala Ile Ile Met Ala Val Tyr Phe Glu Gly Val Ile Pro Pro Glu Glu
        915                 920                 925

Met Ala Asp Gln Pro Phe Gly Met Tyr Ser Leu Pro Asn Ser Phe Leu
    930                 935                 940

Ser Leu Phe Ile Ile Gly Ser Thr Glu Asn Trp Thr Asp Ile Leu Tyr
945                 950                 955                 960

Ala Leu Gln Lys His Ser Pro Asn Ile Ser Ser Thr Phe Phe Cys Ser
                965                 970                 975

Val Phe Phe Ile Ile Trp Phe Leu Leu Ser Asn Ser Val Ile Leu Asn
            980                 985                 990

Ile Phe Ile Ala Leu Ile Ser Glu  Ser Met Glu Val Lys  Glu Glu Glu
        995                 1000                1005

Lys Arg  Pro Gln Gln Ile Lys  His Tyr Leu Lys Phe  Val Tyr Pro
    1010                1015                1020

Gln Lys  Ile Gln Glu Tyr Thr  His Ala Ser Leu Val  Ala Arg Ile
```

1025 1030 1035

Arg Lys Lys Phe Phe Gly Gly His Arg Asn Glu Asp Thr Arg Asp
1040 1045 1050

Phe Lys Gln Phe Leu Met Arg Gly Thr Ala Ile Met Asn Ile Ala
1055 1060 1065

Gln Asn Met Gly Glu Leu Ala Asp Glu Phe Lys Glu Pro Pro Ser
1070 1075 1080

Glu Asn Leu Phe Lys Lys Gly Leu Ser Lys Leu Thr Ile Gly Val
1085 1090 1095

Pro Ser Leu Lys Arg Leu Arg Met Phe Ala Asn Asn Pro Phe Tyr
1100 1105 1110

Lys Asn Ser Asp Val Val Phe Thr Glu Thr Asn Asp Ile Asn Gly
1115 1120 1125

Arg Thr Tyr Ile Leu Glu Leu Asn Glu Tyr Glu Asp Glu Lys Leu
1130 1135 1140

Asp Tyr Leu Lys Lys Tyr Pro Leu Phe Asn Tyr Ser Tyr Tyr Phe
1145 1150 1155

[0089]

Phe Ser Pro Gln His Arg Phe Arg Arg Phe Cys Gln Arg Leu Val
1160 1165 1170

Pro Pro Ser Thr Gly Lys Arg Thr Asp Gly Ser Arg Phe Phe Glu
1175 1180 1185

Asp Ser Thr Asp Leu Tyr Asn Lys Arg Ser Tyr Phe His His Ile
1190 1195 1200

Glu Arg Asp Val Phe Val Phe Ile Phe Ala Leu Ala Thr Ile Leu
1205 1210 1215

Leu Ile Val Cys Ser Cys Tyr Val Thr Pro Leu Tyr Arg Met His
1220 1225 1230

His Lys Met Gly Thr Trp Asn Trp Ser Ser Ala Leu Asp Cys Ala
1235 1240 1245

Phe Ile Gly Ala Phe Ser Ile Glu Phe Ile Val Lys Thr Val Ala
1250 1255 1260

Asp Gly Phe Ile Tyr Ser Pro Asn Ala Tyr Leu Arg Asn Pro Trp
1265 1270 1275

Asn Phe Ile Asp Phe Cys Val Leu Ile Ser Met Trp Ile Asn Leu
1280 1285 1290

Ile Ala Tyr Leu Lys Asn Asn Gly Asn Leu Ser Arg Ile Phe Lys
1295 1300 1305

Gly Leu Thr Ala Leu Arg Ala Leu Arg Cys Leu Thr Ile Ser Asn
1310 1315 1320

Thr Ala Arg Gln Thr Phe Asn Leu Val Met Phe Asp Gly Leu Asn
1325 1330 1335

Lys Ile Phe Glu Ala Gly Leu Ile Ser Leu Ser Leu Leu Phe Pro
1340 1345 1350

Phe Thr Val Trp Gly Leu Ser Ile Phe Lys Gly Arg Leu Gly Thr
1355 1360 1365

Cys Asn Asp Gly Ser Leu Gly Arg Ala Asp Cys Tyr Asn Glu Tyr
1370 1375 1380

Ser Asn Ser Val Phe Gln Trp Asp Ile Met Ser Pro Arg Val Tyr
1385 1390 1395

Gln Gln Pro Tyr Leu His Leu Asp Ser Phe Ala Ser Ala Phe Ser
1400 1405 1410

Ser Leu Tyr Gln Ile Ile Ser Leu Glu Gly Trp Val Asp Leu Leu
1415 1420 1425

[0090]

Glu Asn Met Met Asn Ser Ser Gly Ile Gly Thr Pro Ala Thr Val
1430 1435 1440

Met Gly Ser Ala Gly Asn Ala Leu Phe Leu Val Leu Phe Asn Phe
1445 1450 1455

Leu Ser Met Val Phe Ile Leu Asn Leu Phe Val Ser Phe Ile Val
1460 1465 1470

Asn Asn Gln Ala Arg Thr Thr Gly Ser Ala Tyr Phe Thr Ile Glu
1475 1480 1485

Glu Lys Ala Trp Leu Glu Ser Gln Lys Leu Leu Ser Gln Ala Lys
1490 1495 1500

Pro Lys Ala Ile Pro Asn Leu Ile Glu Leu Ser Arg Val Arg Gln
1505 1510 1515

Phe Phe Tyr Gln Leu Ala Val Glu Lys Lys Asn Phe Tyr Tyr Ala
1520 1525 1530

Ser Phe Leu Gln Val Val Leu Tyr Leu His Ile Ile Met Leu Leu
1535 1540 1545

Ser Arg Ser Tyr Asn Pro Gly Asn Leu Ile Gly Tyr Gln Gly Val
1550 1555 1560

Tyr Phe Met Phe Ser Thr Ser Val Phe Leu Ile Gln Glu Ala Leu
1565 1570 1575

His Met Cys Gly Glu Gly Pro Arg Leu Tyr Phe Arg Gln Lys Trp
1580 1585 1590

Asn Ser Ile Arg Leu Ser Ile Ile Ile Ile Ala Phe Ile Met Asn
1595 1600 1605

Ala Val Ala Phe His Val Pro Ala Ser His Tyr Trp Phe His Asn
1610 1615 1620

Ile Lys Gly Phe Phe Leu Leu Val Ile Phe Leu Phe Ile Ile Pro
1625 1630 1635

Gln Asn Asp Thr Leu Thr Glu Leu Leu Glu Thr Ala Met Ala Ser
1640 1645 1650

Leu Pro Pro Ile Leu Ser Leu Thr Tyr Thr Trp Gly Val Leu Phe
1655 1660 1665

Leu Val Tyr Ala Ile Ala Leu Asn Gln Ile Phe Gly Leu Thr Arg
1670 1675 1680

Leu Gly Ser Asn Thr Thr Asp Asn Ile Asn Phe Arg Thr Val Ile
1685 1690 1695

[0091]

Lys Ser Met Ile Val Leu Phe Arg Cys Ser Phe Gly Glu Gly Trp
1700 1705 1710

Asn Tyr Ile Met Ala Asp Leu Thr Val Ser Glu Pro Tyr Cys Ser
1715 1720 1725

Ser Asp Asp Asn Ser Thr Tyr Thr Asp Cys Gly Ser Glu Thr Tyr
1730 1735 1740

Ala Tyr Leu Leu Leu Met Ser Trp Asn Ile Ile Ser Met Tyr Ile
1745 1750 1755

Phe Val Asn Met Phe Val Ser Leu Ile Ile Gly Asn Phe Ser Tyr
1760 1765 1770

Val Tyr Arg Ser Gly Gly Ser Arg Ser Gly Ile Asn Arg Ser Glu
1775 1780 1785

Ile Lys Lys Tyr Ile Glu Ala Trp Ser Lys Phe Asp Thr Asp Gly
1790 1795 1800

Thr Gly Glu Leu Glu Leu Ser Tyr Leu Pro Arg Ile Met His Ser
1805 1810 1815

Phe Asp Gly Pro Leu Ser Phe Lys Ile Trp Glu Gly Arg Leu Thr
1820 1825 1830

Ile Lys Ser Leu Val Glu Asn Tyr Met Glu Val Asn Pro Asp Asp
1835 1840 1845

Pro Tyr Asp Val Lys Ile Asp Leu Ile Gly Leu Asn Lys Glu Leu
1850 1855 1860

Asn Thr Ile Asp Lys Ala Lys Ile Ile Gln Arg Lys Leu Gln Tyr
1865 1870 1875

Arg Arg Phe Val Gln Ser Ile His Tyr Thr Asn Ala Tyr Asn Gly
1880 1885 1890

Cys Ile Arg Phe Ser Asp Leu Leu Leu Gln Ile Pro Leu Tyr Thr
1895 1900 1905

Ala Tyr Ser Ala Arg Glu Cys Leu Gly Ile Asp Gln Tyr Val His
1910 1915 1920

His Leu Tyr Ile Leu Gly Lys Val Asp Lys Tyr Leu Glu Asn Gln
1925 1930 1935

Arg Asn Phe Asp Val Leu Glu Met Val Val Thr Arg Trp Lys Phe
1940 1945 1950

His Cys Arg Met Lys Arg Thr Ile Glu Pro Glu Trp Asp Val Lys
1955 1960 1965

[0092]

Asp Pro Thr Val Ser Ser His Ile Ser Asn Ile Asn Val Asn Leu
1970 1975 1980

Glu Pro Ala Pro Gly Ile Leu Glu Arg Glu Pro Ile Ala Thr Pro
1985 1990 1995

Arg Met Asp Tyr Gly Val Asn Asn Phe Met Trp Ser Pro Arg Met
2000 2005 2010

Asn Gln Asp Ser Thr Met Glu Pro Pro Glu Glu Pro Ile Asp Asn
2015 2020 2025

Asn Asp Asp Ser Ala Asn Asp Leu Ile Asp Arg
2030 2035

<210> 40
<211> 613
<212> PRT
<213> 酿酒酵母

<400> 40

Met Lys Gly Glu Pro Lys Thr Tyr Ser Met Ser Asp Leu Ser Tyr Tyr
1 5 10 15

Gly Glu Lys Ala Gln Gln Gln Asn Glu Lys Gln Gln Lys Gln Tyr Val
20 25 30

Val Arg Arg Asn Ser Thr Gln Ser Thr Ser Lys Gln Asn Val Ser Val
35 40 45

Val Leu Glu Asp Asn Ala Ser Glu Ser Asn Glu Leu Pro Lys Gly Phe
50 55 60

Ile Leu Tyr Ala Ser Leu Ile Ala Leu Ala Leu Ser Leu Phe Leu Ala
65 70 75 80

Ala Leu Asp Ile Met Ile Val Ser Thr Ile Ile Glu Glu Val Ala Lys
85 90 95

Gln Phe Gly Ser Tyr Ser Glu Ile Gly Trp Leu Phe Thr Gly Tyr Ser
100 105 110

Leu Pro Asn Ala Leu Leu Ala Leu Ile Trp Gly Arg Ile Ala Thr Pro
115 120 125

Ile Gly Phe Lys Glu Thr Met Leu Phe Ala Ile Val Ile Phe Glu Ile
130 135 140

Gly Ser Leu Ile Ser Ala Leu Ala Asn Ser Met Ser Met Leu Ile Gly
145 150 155 160

Gly Arg Val Ile Ala Gly Val Gly Gly Cys Gly Ile Gln Ser Leu Ser
165 170 175

[0093]

Phe Val Ile Gly Ser Thr Leu Val Glu Glu Ser Gln Arg Gly Ile Leu
180 185 190

Ile Ala Val Leu Ser Cys Ser Phe Ala Ile Ala Ser Val Val Gly Pro
195 200 205

Phe Leu Gly Gly Val Phe Thr Ser Ser Val Thr Trp Arg Trp Cys Phe
210 215 220

Tyr Val Asn Leu Pro Ile Gly Gly Leu Ala Phe Phe Leu Phe Leu Phe
225 230 235 240

Phe Tyr Asn Pro Gly Leu Ser Thr Phe Gln Glu Thr Met Asp Asn Ile
245 250 255

Arg Lys Phe Pro Ser Gln Phe Ile Glu Ile Val Arg Asn Val Ala Tyr
260 265 270

His Leu Leu Lys Ile Lys Gly Phe Ser Lys Leu Asn Gly Trp Arg Lys
275 280 285

Pro Phe Met Glu Leu Ile Phe Met Tyr Asp Ile Ile Glu Phe Val Phe
290 295 300

Cys Ser Ala Gly Phe Thr Cys Ile Leu Leu Ala Phe Thr Phe Gly Gly

305 310 315 320

Asn Arg Tyr Ala Trp Asn Ser Ala Ser Ile Ile Ile Leu Phe Ile Ile
325 330 335

Gly Ile Val Leu Val Val Leu Ala Gly Ile Tyr Asp Phe Leu Val Phe
340 345 350

Pro Lys Phe Asn Ile Val Lys Ala Thr Pro His Tyr Gln Pro Leu Met
355 360 365

Ser Trp Thr Asn Ile Lys Lys Pro Gly Ile Phe Thr Val Asn Ile Ala
370 375 380

Leu Phe Leu Thr Cys Ala Gly Tyr Ile Ser Gln Phe Thr Tyr Ile Val
385 390 395 400

Gln Tyr Phe Gln Leu Ile Tyr Asn Asp Ser Ala Trp Arg Ala Ala Val
405 410 415

His Leu Val Ala Cys Ile Ile Ser Thr Val Val Thr Ala Ile Leu Cys
420 425 430

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

[0094]

Ser Ser Ile Phe Gly Val Val Gly Ala Gly Ile Leu Thr Leu Leu Asn
450 455 460

Asn Asn Ala Asn Asn Ser Ala His Ile Gly Leu Leu Ile Leu Pro Gly
465 470 475 480

Val Ala Phe Gly Gly Leu Ala Gln Ser Ser Met Leu Ala Ser Gln Ile
485 490 495

Gln Leu Asp Lys Lys Ser Pro Thr Phe Arg Ser Asp Phe Val Ser Ile
500 505 510

Thr Thr Phe Asn Thr Phe Cys Lys Asn Leu Gly Gln Ala Leu Gly Gly
515 520 525

Val Ile Ser Asn Thr Val Phe Ser Ala Ala Ala Ile Lys Lys Leu Thr
530 535 540

Lys Ala Asn Ile Gln Leu Pro Asp Gly Thr Thr Val Asp Asn Leu Val
545 550 555 560

Ile Tyr Arg Gln Thr Asn Phe Asp Gly Ser His Ser Lys Leu Gly Asn
565 570 575

Ile Ile Ser Glu Ser Leu Thr Asp Val Phe Tyr Met Ala Leu Gly Phe
580 585 590

Tyr Ala Leu Ser Leu Ile Phe Ala Val Phe Ala Ser Asn Lys Lys Val
595 600 605

Thr Ala Ser Leu Arg
610

<210> 41
<211> 1477
<212> PRT
<213> 酿酒酵母

<400> 41

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

Lys Ser Gln Asn Val Val Leu Ser Pro Lys Ala Ser Ala Ser Ser Asp
20 25 30

Ile Ser Thr Asp Val Asp Lys Asp Thr Ser Ser Ser Trp Asp Asp Lys
35 40 45

Ser Leu Leu Pro Thr Gly Glu Tyr Ile Val Asp Arg Asn Lys Pro Gln
50 55 60

Thr Tyr Leu Asn Ser Asp Asp Ile Glu Lys Val Thr Glu Ser Asp Ile
65 70 75 80

[0095]

Phe Pro Gln Lys Arg Leu Phe Ser Phe Leu His Ser Lys Lys Ile Pro
85 90 95

Glu Val Pro Gln Thr Asp Asp Glu Arg Lys Ile Tyr Pro Leu Phe His
100 105 110

Thr Asn Ile Ile Ser Asn Met Phe Phe Trp Trp Val Leu Pro Ile Leu
115 120 125

Arg Val Gly Tyr Lys Arg Thr Ile Gln Pro Asn Asp Leu Phe Lys Met
130 135 140

Asp Pro Arg Met Ser Ile Glu Thr Leu Tyr Asp Asp Phe Glu Lys Asn
145 150 155 160

Met Ile Tyr Tyr Phe Glu Lys Thr Arg Lys Lys Tyr Arg Lys Arg His
165 170 175

Pro Glu Ala Thr Glu Glu Glu Val Met Glu Asn Ala Lys Leu Pro Lys
180 185 190

His Thr Val Leu Arg Ala Leu Leu Phe Thr Phe Lys Lys Gln Tyr Phe
195 200 205

Met Ser Ile Val Phe Ala Ile Leu Ala Asn Cys Thr Ser Gly Phe Asn
210 215 220

Pro Met Ile Thr Lys Arg Leu Ile Glu Phe Val Glu Glu Lys Ala Ile
225 230 235 240

Phe His Ser Met His Val Asn Lys Gly Ile Gly Tyr Ala Ile Gly Ala
245 250 255

Cys Leu Met Met Phe Val Asn Gly Leu Thr Phe Asn His Phe Phe His
260 265 270

Thr Ser Gln Leu Thr Gly Val Gln Ala Lys Ser Ile Leu Thr Lys Ala
275 280 285

Ala Met Lys Lys Met Phe Asn Ala Ser Asn Tyr Ala Arg His Cys Phe
290 295 300

Pro Asn Gly Lys Val Thr Ser Phe Val Thr Thr Asp Leu Ala Arg Ile
305 310 315 320

Glu Phe Ala Leu Ser Phe Gln Pro Phe Leu Ala Gly Phe Pro Ala Ile
325 330 335

Leu Ala Ile Cys Ile Val Leu Leu Ile Val Asn Leu Gly Pro Ile Ala
340 345 350

Leu Val Gly Ile Gly Ile Phe Phe Gly Gly Phe Phe Ile Ser Leu Phe
355 360 365

[0096]

Ala Phe Lys Leu Ile Leu Gly Phe Arg Ile Ala Ala Asn Ile Phe Thr
370 375 380

Asp Ala Arg Val Thr Met Met Arg Glu Val Leu Asn Asn Ile Lys Met
385 390 395 400

Ile Lys Tyr Tyr Thr Trp Glu Asp Ala Tyr Glu Lys Asn Ile Gln Asp
405 410 415

Ile Arg Thr Lys Glu Ile Ser Lys Val Arg Lys Met Gln Leu Ser Arg
420 425 430

Asn Phe Leu Ile Ala Met Ala Met Ser Leu Pro Ser Ile Ala Ser Leu
435 440 445

Val Thr Phe Leu Ala Met Tyr Lys Val Asn Lys Gly Gly Arg Gln Pro
450 455 460

Gly Asn Ile Phe Ala Ser Leu Ser Leu Phe Gln Val Leu Ser Leu Gln
465 470 475 480

Met Phe Phe Leu Pro Ile Ala Ile Gly Thr Gly Ile Asp Met Ile Ile
485 490 495

Gly Leu Gly Arg Leu Gln Ser Leu Leu Glu Ala Pro Glu Asp Asp Pro
500 505 510

```
Asn Gln Met Ile Glu Met Lys Pro Ser Pro Gly Phe Asp Pro Lys Leu
        515                 520                 525

Ala Leu Lys Met Thr His Cys Ser Phe Glu Trp Glu Asp Tyr Glu Leu
    530                 535                 540

Asn Asp Ala Ile Glu Glu Ala Lys Gly Glu Ala Lys Asp Glu Gly Lys
545                 550                 555                 560

Lys Asn Lys Lys Lys Arg Lys Asp Thr Trp Gly Lys Pro Ser Ala Ser
                565                 570                 575

Thr Asn Lys Ala Lys Arg Leu Asp Asn Met Leu Lys Asp Arg Asp Gly
            580                 585                 590

Pro Glu Asp Leu Glu Lys Thr Ser Phe Arg Gly Phe Lys Asp Leu Asn
        595                 600                 605

Phe Asp Ile Lys Lys Gly Glu Phe Ile Met Ile Thr Gly Pro Ile Gly
    610                 615                 620

Thr Gly Lys Ser Ser Leu Leu Asn Ala Met Ala Gly Ser Met Arg Lys
625                 630                 635                 640

Thr Asp Gly Lys Val Glu Val Asn Gly Asp Leu Leu Met Cys Gly Tyr
                645                 650                 655
```

[0097]

```
Pro Trp Ile Gln Asn Ala Ser Val Arg Asp Asn Ile Ile Phe Gly Ser
            660                 665                 670

Pro Phe Asn Lys Glu Lys Tyr Asp Glu Val Val Arg Val Cys Ser Leu
        675                 680                 685

Lys Ala Asp Leu Asp Ile Leu Pro Ala Gly Asp Met Thr Glu Ile Gly
    690                 695                 700

Glu Arg Gly Ile Thr Leu Ser Gly Gly Gln Lys Ala Arg Ile Asn Leu
705                 710                 715                 720

Ala Arg Ser Val Tyr Lys Lys Lys Asp Ile Tyr Leu Phe Asp Asp Val
                725                 730                 735

Leu Ser Ala Val Asp Ser Arg Val Gly Lys His Ile Met Asp Glu Cys
            740                 745                 750

Leu Thr Gly Met Leu Ala Asn Lys Thr Arg Ile Leu Ala Thr His Gln
        755                 760                 765

Leu Ser Leu Ile Glu Arg Ala Ser Arg Val Ile Val Leu Gly Thr Asp
    770                 775                 780

Gly Gln Val Asp Ile Gly Thr Val Asp Glu Leu Lys Ala Arg Asn Gln
785                 790                 795                 800
```

Thr Leu Ile Asn Leu Leu Gln Phe Ser Ser Gln Asn Ser Glu Lys Glu
805 810 815

Asp Glu Glu Gln Glu Ala Val Val Ala Gly Glu Leu Gly Gln Leu Lys
820 825 830

Tyr Glu Ser Glu Val Lys Glu Leu Thr Glu Leu Lys Lys Lys Ala Thr
835 840 845

Glu Met Ser Gln Thr Ala Asn Ser Gly Lys Ile Val Ala Asp Gly His
850 855 860

Thr Ser Ser Lys Glu Glu Arg Ala Val Asn Ser Ile Ser Leu Lys Ile
865 870 875 880

Tyr Arg Glu Tyr Ile Lys Ala Ala Val Gly Lys Trp Gly Phe Ile Ala
885 890 895

Leu Pro Leu Tyr Ala Ile Leu Val Val Gly Thr Thr Phe Cys Ser Leu
900 905 910

Phe Ser Ser Val Trp Leu Ser Tyr Trp Thr Glu Asn Lys Phe Lys Asn
915 920 925

Arg Pro Pro Ser Phe Tyr Met Gly Leu Tyr Ser Phe Phe Val Phe Ala
930 935 940

[0098]

Ala Phe Ile Phe Met Asn Gly Gln Phe Thr Ile Leu Cys Ala Met Gly
945 950 955 960

Ile Met Ala Ser Lys Trp Leu Asn Leu Arg Ala Val Lys Arg Ile Leu
965 970 975

His Thr Pro Met Ser Tyr Ile Asp Thr Thr Pro Leu Gly Arg Ile Leu
980 985 990

Asn Arg Phe Thr Lys Asp Thr Asp Ser Leu Asp Asn Glu Leu Thr Glu
995 1000 1005

Ser Leu Arg Leu Met Thr Ser Gln Phe Ala Asn Ile Val Gly Val
1010 1015 1020

Cys Val Met Cys Ile Val Tyr Leu Pro Trp Phe Ala Ile Ala Ile
1025 1030 1035

Pro Phe Leu Leu Val Ile Phe Val Leu Ile Ala Asp His Tyr Gln
1040 1045 1050

Ser Ser Gly Arg Glu Ile Lys Arg Leu Glu Ala Val Gln Arg Ser
1055 1060 1065

Phe Val Tyr Asn Asn Leu Asn Glu Val Leu Gly Gly Met Asp Thr

1070 1075 1080

Ile Lys Ala Tyr Arg Ser Gln Glu Arg Phe Leu Ala Lys Ser Asp
1085 1090 1095

Phe Leu Ile Asn Lys Met Asn Glu Ala Gly Tyr Leu Val Val Val
1100 1105 1110

Leu Gln Arg Trp Val Gly Ile Phe Leu Asp Met Val Ala Ile Ala
1115 1120 1125

Phe Ala Leu Ile Ile Thr Leu Leu Cys Val Thr Arg Ala Phe Pro
1130 1135 1140

Ile Ser Ala Ala Ser Val Gly Val Leu Leu Thr Tyr Val Leu Gln
1145 1150 1155

Leu Pro Gly Leu Leu Asn Thr Ile Leu Arg Ala Met Thr Gln Thr
1160 1165 1170

Glu Asn Asp Met Asn Ser Ala Glu Arg Leu Val Thr Tyr Ala Thr
1175 1180 1185

Glu Leu Pro Leu Glu Ala Ser Tyr Arg Lys Pro Glu Met Thr Pro
1190 1195 1200

[0099]

Pro Glu Ser Trp Pro Ser Met Gly Glu Ile Ile Phe Glu Asn Val
1205 1210 1215

Asp Phe Ala Tyr Arg Pro Gly Leu Pro Ile Val Leu Lys Asn Leu
1220 1225 1230

Asn Leu Asn Ile Lys Ser Gly Glu Lys Ile Gly Ile Cys Gly Arg
1235 1240 1245

Thr Gly Ala Gly Lys Ser Thr Ile Met Ser Ala Leu Tyr Arg Leu
1250 1255 1260

Asn Glu Leu Thr Ala Gly Lys Ile Leu Ile Asp Asn Val Asp Ile
1265 1270 1275

Ser Gln Leu Gly Leu Phe Asp Leu Arg Arg Lys Leu Ala Ile Ile
1280 1285 1290

Pro Gln Asp Pro Val Leu Phe Arg Gly Thr Ile Arg Lys Asn Leu
1295 1300 1305

Asp Pro Phe Asn Glu Arg Thr Asp Asp Glu Leu Trp Asp Ala Leu
1310 1315 1320

Val Arg Gly Gly Ala Ile Ala Lys Asp Asp Leu Pro Glu Val Lys
1325 1330 1335

Leu Gln Lys Pro Asp Glu Asn Gly Thr His Gly Lys Met His Lys
1340 1345 1350

Phe His Leu Asp Gln Ala Val Glu Glu Glu Gly Ser Asn Phe Ser
1355 1360 1365

Leu Gly Glu Arg Gln Leu Leu Ala Leu Thr Arg Ala Leu Val Arg
1370 1375 1380

Gln Ser Lys Ile Leu Ile Leu Asp Glu Ala Thr Ser Ser Val Asp
1385 1390 1395

Tyr Glu Thr Asp Gly Lys Ile Gln Thr Arg Ile Val Glu Glu Phe
1400 1405 1410

Gly Asp Cys Thr Ile Leu Cys Ile Ala His Arg Leu Lys Thr Ile
1415 1420 1425

Val Asn Tyr Asp Arg Ile Leu Val Leu Glu Lys Gly Glu Val Ala
1430 1435 1440

Glu Phe Asp Thr Pro Trp Thr Leu Phe Ser Gln Glu Asp Ser Ile
1445 1450 1455

Phe Arg Ser Met Cys Ser Arg Ser Gly Ile Val Glu Asn Asp Phe
1460 1465 1470

[0100]

Glu Asn Arg Ser
1475

<210> 42
<211> 735
<212> PRT
<213> 酿酒酵母

<400> 42

Met Gly Glu Phe Lys Pro Pro Leu Pro Gln Gly Ala Gly Tyr Ala Ile
1 5 10 15

Val Leu Gly Leu Gly Ala Val Phe Ala Gly Met Met Val Leu Thr Thr
20 25 30

Tyr Leu Leu Lys Arg Tyr Gln Lys Glu Ile Ile Thr Ala Glu Glu Phe
35 40 45

Thr Thr Ala Gly Arg Ser Val Lys Thr Gly Leu Val Ala Ala Ala Val
50 55 60

Val Ser Ser Trp Ile Trp Cys Ser Thr Leu Leu Thr Ser Ser Thr Lys
65 70 75 80

Glu Tyr Ala Asp Gly Ile Phe Gly Gly Tyr Ala Tyr Ala Ala Gly Ala
85 90 95

```
Cys Phe Gln Ile Ile Ala Phe Ala Ile Leu Ala Ile Lys Thr Lys Gln
            100                 105                 110

Met Ala Pro Asn Ala His Thr Tyr Leu Glu Leu Val Arg Thr Arg Tyr
        115                 120                 125

Gly Lys Ile Gly His Gly Cys Tyr Leu Phe Tyr Ala Ile Ala Thr Asn
    130                 135                 140

Ile Leu Val Thr Ser Met Leu Leu Thr Ser Gly Ser Ala Val Phe Ser
145                 150                 155                 160

Asp Leu Thr Gly Met Asn Thr Ile Ala Ser Cys Phe Leu Leu Pro Val
                165                 170                 175

Gly Val Val Val Tyr Thr Leu Phe Gly Gly Ile Lys Ala Thr Phe Leu
            180                 185                 190

Thr Asp Tyr Met His Thr Cys Val Ile Ile Ile Ile Val Leu Val Phe
        195                 200                 205

Ala Phe Lys Val Tyr Ala Thr Ser Asp Val Leu Gly Ser Pro Gly Lys
    210                 215                 220

Val Tyr Asp Leu Val Arg Glu Ala Ala Lys Arg His Pro Val Asp Gly
225                 230                 235                 240
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[0101]

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Asn Tyr Gln Gly Glu Tyr Met Thr Met Thr Ser Lys Ser Ala Gly Ile
                245                 250                 255

Leu Leu Ile Ile Asn Leu Ile Gly Asn Phe Gly Thr Val Phe Leu Asp
            260                 265                 270

Asn Gly Tyr Trp Asn Lys Ala Ile Ser Ala Ser Pro Ala Ala Ser Leu
        275                 280                 285

Lys Ala Tyr Ala Ile Gly Gly Leu Ala Trp Phe Ala Val Pro Ser Leu
    290                 295                 300

Ile Ser Leu Thr Met Gly Leu Ala Cys Leu Ala Val Glu Thr Ser Pro
305                 310                 315                 320

Asn Phe Pro Thr Tyr Pro Asp Pro Leu Thr Ser Phe Gln Ala Asn Ser
                325                 330                 335

Gly Leu Val Leu Pro Ala Ala Ala Ile Ala Ile Met Gly Lys Gly Gly
            340                 345                 350

Ala Val Ala Ser Leu Leu Met Ile Phe Met Ala Val Thr Ser Ala Met
        355                 360                 365

Ser Ala Glu Leu Ile Ala Val Ser Ser Val Phe Thr Tyr Asp Ile Tyr
    370                 375                 380
```

Arg Glu Tyr Ile Asp Pro Arg Ala Ser Gly Lys Lys Leu Ile Tyr Thr
385 390 395 400

Ser His Val Ala Cys Ile Phe Phe Gly Leu Ala Met Ser Gly Phe Ser
405 410 415

Val Gly Leu Tyr Tyr Gly Gly Ile Ser Met Gly Tyr Ile Tyr Glu Met
420 425 430

Met Gly Ile Ile Ile Ser Ser Ala Val Leu Pro Val Val Leu Thr Leu
435 440 445

Cys Ser Lys Asp Met Asn Leu Val Ala Ala Val Val Ser Pro Ile Leu
450 455 460

Gly Thr Gly Leu Ala Ile Met Ser Trp Leu Val Cys Thr Lys Ser Leu
465 470 475 480

Tyr Lys Glu Leu Thr Val Asp Thr Thr Phe Met Asp Tyr Pro Met Leu
485 490 495

Thr Gly Asn Leu Val Ala Leu Leu Ser Pro Ala Ile Phe Ile Pro Ile
500 505 510

Leu Thr Tyr Val Phe Lys Pro Gln Asn Phe Asp Trp Glu Lys Met Lys
515 520 525

[0102]

Asp Ile Thr Arg Val Asp Glu Thr Ala Glu Leu Val Gln Ala Asp Pro
530 535 540

Asp Ile Gln Leu Tyr Asp Ala Glu Ala Asn Asp Lys Glu Gln Glu Glu
545 550 555 560

Glu Thr Asn Ser Leu Val Ser Asp Ser Glu Lys Asn Asp Val Arg Val
565 570 575

Asn Asn Glu Lys Leu Ile Glu Pro Asn Leu Gly Val Val Ile Ser Asn
580 585 590

Ala Ile Phe Gln Glu Asp Asp Thr Gln Leu Gln Asn Glu Leu Asp Glu
595 600 605

Glu Gln Arg Glu Leu Ala Arg Gly Leu Lys Ile Ala Tyr Phe Leu Cys
610 615 620

Val Phe Phe Ala Leu Ala Phe Leu Val Val Trp Pro Met Pro Met Tyr
625 630 635 640

Gly Ser Lys Tyr Ile Phe Ser Lys Lys Phe Phe Thr Gly Trp Val Val
645 650 655

Val Met Ile Ile Trp Leu Phe Phe Ser Ala Phe Ala Val Cys Ile Tyr
660 665 670

Pro Leu Trp Glu Gly Arg His Gly Ile Tyr Thr Thr Leu Arg Gly Leu
675 680 685

Tyr Trp Asp Leu Ser Gly Gln Thr Tyr Lys Leu Arg Glu Trp Gln Asn
690 695 700

Ser Asn Pro Gln Asp Leu His Val Val Thr Ser Gln Ile Ser Ala Arg
705 710 715 720

Ala His Arg Gln Ser Ser His Phe Gly Gln Val Asp Glu Ile Ile
725 730 735

<210> 43
<211> 490
<212> PRT
<213> 酿酒酵母

<400> 43

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

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

Asp Gly Val Leu Val Gly Val Ile Leu Thr Leu Leu Ala Ala Val Thr
35 40 45

[0103]

Ser Gly Leu Gly Leu Phe Val Leu Ser Lys Cys Ser Lys Thr Leu Ile
50 55 60

Asn Pro Arg Asn Ser Ser Phe Phe Thr Leu Cys Met Leu Thr Tyr Pro
65 70 75 80

Thr Leu Ala Pro Ile Phe Asp Leu Ala Met Ile Val Gln Cys Phe Gly
85 90 95

Val Gly Leu Ser Tyr Leu Val Leu Ile Gly Asp Leu Phe Pro Gly Leu
100 105 110

Phe Gly Gly Glu Arg Asn Tyr Trp Ile Ile Ala Ser Ala Val Ile Ile
115 120 125

Ile Pro Leu Cys Leu Val Lys Lys Leu Asp Glu Leu Lys Tyr Ser Ser
130 135 140

Ile Leu Gly Leu Phe Ala Leu Ala Tyr Ile Ser Ile Leu Val Phe Ser
145 150 155 160

His Phe Val Phe Glu Leu Gly Lys Gly Glu Leu Thr Asn Ile Leu Arg
165 170 175

Asn Asp Ile Cys Trp Trp Lys Ile His Asp Phe Lys Gly Leu Leu Ser
180 185 190

Thr Phe Ser Ile Ile Ile Phe Ala Phe Thr Gly Ser Met Asn Leu Phe
195 200 205

Pro Met Ile Asn Glu Leu Lys Asp Asn Ser Met Glu Asn Ile Thr Phe
210 215 220

Val Ile Asn Asn Ser Ile Ser Leu Ser Thr Ala Leu Phe Leu Ile Val
225 230 235 240

Gly Leu Ser Gly Tyr Leu Thr Phe Gly Asn Glu Thr Leu Gly Asn Leu
245 250 255

Met Leu Asn Tyr Asp Pro Asn Ser Ile Trp Ile Val Ile Gly Lys Phe
260 265 270

Cys Leu Gly Ser Met Leu Ile Leu Ser Phe Pro Leu Leu Phe His Pro
275 280 285

Leu Arg Ile Ala Val Asn Asn Val Ile Ile Trp Ile Glu Ile Thr Tyr
290 295 300

Gly Gly Ala Asn Pro Glu Glu Asp Pro Gln Val Ser Glu Tyr Thr Arg
305 310 315 320

Ala Ser Asn Leu Arg Pro Ile Ser Met Thr Val Glu Asp Pro Ala Gln
325 330 335

[0104]

Pro Ser Asp Ala Leu Asp Ala Thr Ser Tyr Asn Glu Gln Glu Cys Leu
340 345 350

Leu Pro Asn Gly Asn Phe Asp Asn Gly Ser Ile Glu Ser Gln Glu Asn
355 360 365

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

His Ala Pro Phe Val Lys Ser Arg Phe Tyr Trp Ile Thr Ala Leu Leu
385 390 395 400

Leu Ile Ser Met Tyr Thr Leu Ala Leu Ser Val Gln Ser Phe Ala Leu
405 410 415

Val Leu Ser Phe Val Gly Ala Thr Gly Ser Thr Ser Ile Ser Phe Thr
420 425 430

Leu Pro Gly Leu Leu Gly Tyr Lys Leu Ile Gly Leu Asp Ser Leu Ala
435 440 445

Ile Gly Lys Met Ile Pro Pro Lys Asp Arg Phe Tyr Lys Arg Cys Ser
450 455 460

Leu Leu Leu Val Phe Tyr Gly Leu Ser Val Met Phe Leu Ser Leu Tyr

465 470 475 480

Val Thr Val Phe Asn Arg Ser Asp Glu Ala
485 490

<210> 44
<211> 691
<212> PRT
<213> 酿酒酵母

<400> 44

Met Thr Arg Phe Met Asn Ser Phe Ala Lys Gln Thr Leu Gly Tyr Gly
1 5 10 15

Asn Met Ala Thr Val Glu Gln Glu Ser Ser Ala Gln Ala Val Asp Ser
20 25 30

His Ser Asn Asn Thr Pro Lys Gln Ala Lys Gly Val Leu Ala Glu Glu
35 40 45

Leu Lys Asp Ala Leu Arg Phe Arg Asp Glu Arg Val Ser Ile Ile Asn
50 55 60

Ala Glu Pro Ser Ser Thr Leu Phe Val Phe Trp Phe Val Val Ser Cys
65 70 75 80

[0105] Tyr Phe Pro Val Ile Thr Ala Cys Leu Gly Pro Val Ala Asn Thr Ile
85 90 95

Ser Ile Ala Cys Val Val Glu Lys Trp Arg Ser Leu Lys Asn Asn Ser
100 105 110

Val Val Thr Asn Pro Arg Ser Asn Asp Thr Asp Val Leu Met Asn Gln
115 120 125

Val Lys Thr Val Phe Asp Pro Pro Gly Ile Phe Ala Val Asn Ile Ile
130 135 140

Ser Leu Val Leu Gly Phe Thr Ser Asn Ile Ile Leu Met Leu His Phe
145 150 155 160

Ser Lys Lys Leu Thr Tyr Leu Lys Ser Gln Leu Ile Asn Ile Thr Gly
165 170 175

Trp Thr Ile Ala Gly Gly Met Leu Leu Val Asp Val Ile Val Cys Ser
180 185 190

Leu Asn Asp Met Pro Ser Ile Tyr Ser Lys Thr Ile Gly Phe Trp Phe
195 200 205

Ala Cys Ile Ser Ser Gly Leu Tyr Leu Val Cys Thr Ile Ile Leu Thr
210 215 220

Ile His Phe Ile Gly Tyr Lys Leu Gly Lys Tyr Pro Pro Thr Phe Asn

225 230 235 240

Leu Leu Pro Asn Glu Arg Ser Ile Met Ala Tyr Thr Val Leu Leu Ser
245 250 255

Leu Trp Leu Ile Trp Gly Ala Gly Met Phe Ser Gly Leu Leu His Ile
260 265 270

Thr Tyr Gly Asn Ala Leu Tyr Phe Cys Thr Val Ser Leu Leu Thr Val
275 280 285

Gly Leu Gly Asp Ile Leu Pro Lys Ser Val Gly Ala Lys Ile Met Val
290 295 300

Leu Ile Phe Ser Leu Ser Gly Val Val Leu Met Gly Leu Ile Val Phe
305 310 315 320

Met Thr Arg Ser Ile Ile Gln Lys Ser Ser Gly Pro Ile Phe Phe Phe
325 330 335

His Arg Val Glu Lys Gly Arg Ser Lys Ser Trp Lys His Tyr Met Asp
340 345 350

Ser Ser Lys Asn Leu Ser Glu Arg Glu Ala Phe Asp Leu Met Lys Cys
355 360 365

[0106]

Ile Arg Gln Thr Ala Ser Arg Lys Gln His Trp Phe Ser Leu Ser Val
370 375 380

Thr Ile Ala Ile Phe Met Ala Phe Trp Leu Leu Gly Ala Leu Val Phe
385 390 395 400

Lys Phe Ala Glu Asn Trp Ser Tyr Phe Asn Cys Ile Tyr Phe Cys Phe
405 410 415

Leu Cys Leu Leu Thr Ile Gly Tyr Gly Asp Tyr Ala Pro Arg Thr Gly
420 425 430

Ala Gly Arg Ala Phe Phe Val Ile Trp Ala Leu Gly Ala Val Pro Leu
435 440 445

Met Gly Ala Ile Leu Ser Thr Val Gly Asp Leu Leu Phe Asp Ile Ser
450 455 460

Thr Ser Leu Asp Ile Lys Ile Gly Glu Ser Phe Asn Asn Lys Val Lys
465 470 475 480

Ser Ile Val Phe Asn Gly Arg Gln Arg Ala Leu Ser Phe Met Val Asn
485 490 495

Thr Gly Glu Ile Phe Glu Glu Ser Asp Thr Ala Asp Gly Asp Leu Glu
500 505 510

Glu Asn Thr Thr Ser Ser Gln Ser Ser Gln Ile Ser Glu Phe Asn Asp
515 520 525

Asn Asn Ser Glu Glu Asn Asp Ser Gly Val Thr Ser Pro Pro Ala Ser
530 535 540

Leu Gln Glu Ser Phe Ser Ser Leu Ser Lys Ala Ser Ser Pro Glu Gly
545 550 555 560

Ile Leu Pro Leu Glu Tyr Val Ser Ser Ala Glu Tyr Ala Leu Gln Asp
565 570 575

Ser Gly Thr Cys Asn Leu Arg Asn Leu Gln Glu Leu Leu Lys Ala Val
580 585 590

Lys Lys Leu His Arg Ile Cys Leu Ala Asp Lys Asp Tyr Thr Leu Ser
595 600 605

Phe Ser Asp Trp Ser Tyr Ile His Lys Leu His Leu Arg Asn Ile Thr
610 615 620

Asp Ile Glu Glu Tyr Thr Arg Gly Pro Glu Phe Trp Ile Ser Pro Asp
625 630 635 640

Thr Pro Leu Lys Phe Pro Leu Asn Glu Pro His Phe Ala Phe Met Met
645 650 655

[0107]

Leu Phe Lys Asn Ile Glu Glu Leu Val Gly Asn Leu Val Glu Asp Glu
660 665 670

Glu Leu Tyr Lys Val Ile Ser Lys Arg Lys Phe Leu Gly Glu His Arg
675 680 685

Lys Thr Leu
690

<210> 45
<211> 873
<212> PRT
<213> 酿酒酵母

<400> 45

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

Tyr Asn Ser Ser Ser Pro Leu Thr Leu Phe Leu Phe Gln Ala Cys Leu
20 25 30

Ile Leu Leu Val Cys Asn Leu Ile His Ile Pro Phe Ser Met Met Arg
35 40 45

Gln Pro Lys Val Ile Ser Glu Val Ile Ser Gly Val Ile Leu Gly Pro
50 55 60

Thr Ile Phe Gly Gln Ile Pro Asn Tyr Thr Asn Thr Ile Phe Pro Thr
65 70 75 80

Ser Ser Ile Pro Gly Leu Asn Leu Val Ala Asn Leu Gly Ile Ile Leu
85 90 95

Phe Met Phe Phe Leu Gly Leu Glu Val Asp Ile Ala Phe Ile Lys Lys
100 105 110

His Leu Lys Lys Ala Leu Val Ile Gly Ile Val Thr Leu Ala Val Pro
115 120 125

Phe Gly Phe Gly Cys Leu Leu Ala Ile Pro Leu Phe His Thr Tyr Ala
130 135 140

Asn Lys Thr Glu Gly Glu Arg His Ile Lys Phe Ser Val Phe Met Val
145 150 155 160

Phe Ile Ala Val Ser Ile Ser Val Thr Ala Phe Pro Val Leu Cys Arg
165 170 175

Ile Leu Asn Glu Leu Arg Leu Ile Lys Asp Arg Ala Gly Ile Val Val
180 185 190

Leu Ala Ala Gly Ile Ile Asn Asp Ile Met Gly Trp Ile Leu Leu Ala
195 200 205

[0108]

Leu Ser Ile Ile Leu Ser Ser Ala Glu Gly Ser Pro Val Asn Thr Val
210 215 220

Tyr Ile Leu Leu Ile Thr Phe Ala Trp Phe Leu Ile Tyr Phe Phe Pro
225 230 235 240

Leu Lys Tyr Leu Leu Arg Trp Val Leu Ile Arg Thr His Glu Leu Asp
245 250 255

Arg Ser Lys Pro Ser Pro Leu Ala Thr Met Cys Ile Leu Phe Ile Met
260 265 270

Phe Ile Ser Ala Tyr Phe Thr Asp Ile Ile Gly Val His Pro Ile Phe
275 280 285

Gly Ala Phe Ile Ala Gly Leu Val Val Pro Arg Asp Asp His Tyr Val
290 295 300

Val Lys Leu Thr Glu Arg Met Glu Asp Ile Pro Asn Ile Val Phe Ile
305 310 315 320

Pro Ile Tyr Phe Ala Val Ala Gly Leu Asn Val Asp Leu Thr Leu Leu
325 330 335

Asn Glu Gly Arg Asp Trp Gly Tyr Val Phe Ala Thr Ile Gly Ile Ala
340 345 350

Ile Phe Thr Lys Ile Ile Ser Gly Thr Leu Thr Ala Lys Leu Thr Gly
355 360 365

Leu Phe Trp Arg Glu Ala Thr Ala Ala Gly Val Leu Met Ser Cys Lys
370 375 380

Gly Ile Val Glu Ile Val Val Leu Thr Val Gly Leu Asn Ala Gly Ile
385 390 395 400

Ile Ser Arg Lys Ile Phe Gly Met Phe Val Leu Met Ala Leu Val Ser
405 410 415

Thr Phe Val Thr Thr Pro Leu Thr Gln Leu Val Tyr Pro Asp Ser Tyr
420 425 430

Arg Asp Gly Val Arg Lys Ser Leu Ser Thr Pro Ala Glu Asp Asp Gly
435 440 445

Ala Ala Asp Gly Leu Asp Ser Glu Gly Val Asp Lys Thr Glu Ile Asn
450 455 460

Thr Gln Leu Asn Ser Leu Ala Asp Val Ser Lys Tyr Arg Ile Gly Glu
465 470 475 480

Leu Thr Thr Val Ile Asn Thr Thr Glu Ala Ile Ser Pro Ser Leu Lys
485 490 495

[0109]

Leu Leu Asn Tyr Leu Ser Leu Gly Val Ser Pro Lys Pro Lys Asn Asn
500 505 510

Lys His Lys Asn Glu Thr Ser Leu Ser Arg Met Thr Thr Ala Thr Asp
515 520 525

Ser Thr Leu Lys Ser Asn Thr Phe Lys Ile Lys Lys Met Val His Ile
530 535 540

Trp Ser Lys Ser Val Asp Asp Val Asp Thr Asn Leu Ser Val Ile Asp
545 550 555 560

Glu Lys Leu Thr Pro Phe Glu Gly Val Gly Ala Leu Arg Ala Ile His
565 570 575

Leu Arg Leu Leu Thr Glu Arg Thr Thr Asp Leu Leu Gln Ser Ser Ser
580 585 590

Leu Tyr Asn Asp Asp Pro His Phe Thr Ala Asn Thr Asp Ser Leu Leu
595 600 605

Gln Ile Phe Asp Ile Phe Ser Asn Leu Ser Lys Ile Pro Phe Ser Ser
610 615 620

Glu Val Ile Phe Ser Thr Met Arg Glu Lys Ala Ala Asn Ile Ala Thr
625 630 635 640

Met Lys Met Asp Ser Thr Asp Leu Ile Leu Leu Pro Leu Lys Gly Ala
645 650 655

Ser Tyr Glu Tyr Arg Gly Ser Pro Val Phe Ile Asp Glu Lys Tyr Ala
660 665 670

Asn Phe Asp His Ile Tyr Ser His Leu Leu Gly Leu Asn Glu Leu Ser
675 680 685

Ser Thr Phe Phe Lys Ser Ile Phe Gln Ser Leu Lys Ala Asn Phe Ala
690 695 700

Val Gln Ile Ser Asn Thr Tyr Gly Arg Leu Asn Ala Asp Arg Phe Lys
705 710 715 720

Arg Lys Arg Phe Asn Leu Leu Leu Pro Lys Pro Tyr Leu Thr Gln Ser
725 730 735

Asp Tyr Leu Gly Leu Tyr Leu Leu Leu Leu Ile Cys Tyr Arg Asp Gly
740 745 750

Tyr Asn Asn Asp Asn Ala Ser Cys Ser Ile Phe Ile Asn Ser Lys Asn
755 760 765

Ile Asp Phe Ala Lys Asp Leu Ser Thr Ala Phe Ala Glu His Asp Trp
770 775 780

[0110]

Leu Asn Glu Ser Thr Ile Lys Ile Val Asp Ile Pro Phe Glu Thr Lys
785 790 795 800

Val Pro Glu Glu Ala Ile Glu Lys Pro Ser Phe Ile Glu Thr Val Leu
805 810 815

Asp Val Gly Leu Ser Asp Thr Ala Leu Ala Asp Ile Glu Glu Thr Thr
820 825 830

Phe Ile Ile Gly Glu Asp Leu Pro Asp Glu Ser Glu Pro Phe Ser Glu
835 840 845

Glu Val Arg Thr Val Ile Phe Glu Gly Ser Asn Arg Arg Phe Asp Thr
850 855 860

Leu Ile Val His His Phe Ser Ser Glu
865 870

<210> 46
<211> 383
<212> PRT
<213> 酿酒酵母

<400> 46

Met Ile Val Ser Phe Gly Asp Ala Thr Thr Arg Thr Ser Glu Val Gln
1 5 10 15

```
Leu Val Arg Cys Thr Gln Gly Leu Asn Leu Trp Lys Leu His Gln Val
            20                  25                  30

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

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

Pro Trp Met Cys Val Leu Leu Tyr Ala Phe Cys Ser Ala Met Val Thr
65                  70                  75                  80

Pro Tyr Ala Phe Gly Gly Asp Trp Val Asn Leu Ala Ile Ser Phe Phe
                85                  90                  95

Met Gly Leu Cys Val Gly Ser Leu Gln Phe Ile Leu Ser Gln Lys Ser
            100                 105                 110

Tyr Met Tyr Ser Asn Val Phe Glu Ile Ser Ala Ser Ile Val Val Ser
        115                 120                 125

Phe Cys Gly Arg Ala Phe Gly Ser Ile Pro Arg Ser His Ile Cys Phe
    130                 135                 140

Gly Ala Val Thr Gln Gly Ser Leu Ala Leu Ile Leu Pro Gly Tyr Ile
145                 150                 155                 160
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[0111]

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Ile Leu Cys Gly Ala Leu Glu Leu Gln Ser Arg Ser Leu Val Ala Gly
                165                 170                 175

Ala Val Arg Met Phe Tyr Ala Ile Ile Tyr Ser Leu Phe Leu Gly Phe
            180                 185                 190

Gly Ile Thr Leu Gly Ser Ala Leu Phe Gly Trp Met Tyr His Asn Ala
        195                 200                 205

Thr Asn Glu Ile Ser Cys Pro Gln Leu Ile Ser Pro Trp Phe Arg Phe
    210                 215                 220

Leu Phe Val Pro Ala Phe Thr Ile Ser Ile Ser Leu Leu Asn Gln Ala
225                 230                 235                 240

His Ile Ser Gln Leu Pro Val Met Val Phe Ile Ser Cys Thr Gly Tyr
                245                 250                 255

Val Val Thr Tyr Trp Ala Gly Lys His Phe Ala Asn Ser Thr Glu Phe
            260                 265                 270

Thr Ala Ala Leu Ala Ala Phe Val Ile Gly Val Leu Gly Asn Leu Tyr
        275                 280                 285

Ser Arg Ile Trp Lys Gly Leu Ala Val Ser Ala Met Leu Pro Ala Ile
```

290 295 300

Phe Val Gln Val Pro Ser Gly Ile Ala Ser Gln Asn Ser Leu Leu Ser
305 310 315 320

Gly Leu Gln Ser Ala Asn Thr Ile Val Asn Ala Asn Glu Thr Ile Thr
325 330 335

Thr Ser Thr Ser Asp Pro Ser Ser Ser Met Ser Phe Gly Met Thr Met
340 345 350

Ile Gln Val Cys Val Gly Ile Ser Val Gly Leu Phe Ala Ser Ser Leu
355 360 365

Phe Val Tyr Pro Phe Gly Lys Lys Lys Thr Gly Leu Phe Ser Leu
370 375 380

<210> 47
<211> 799
<212> PRT
<213> 酿酒酵母

<400> 47

Met Ser Thr Ile Tyr Arg Glu Ser Asp Ser Leu Glu Ser Glu Pro Ser
1 5 10 15

Pro Thr Pro Thr Thr Ile Pro Ile Gln Ile Asn Met Glu Glu Glu Lys
[0112] 20 25 30

Lys Asp Ala Phe Val Lys Asn Ile Asp Glu Asp Val Asn Asn Leu Thr
35 40 45

Ala Thr Thr Asp Glu Glu Asp Arg Asp Pro Glu Ser Gln Lys Phe Asp
50 55 60

Arg His Ser Ile Gln Glu Glu Gly Leu Val Trp Lys Gly Asp Pro Thr
65 70 75 80

Tyr Leu Pro Asn Ser Pro Tyr Pro Glu Val Arg Ser Ala Val Ser Ile
85 90 95

Glu Asp Asp Pro Thr Ile Arg Leu Asn His Trp Arg Thr Trp Phe Leu
100 105 110

Thr Thr Val Phe Val Val Val Phe Ala Gly Val Asn Gln Phe Phe Ser
115 120 125

Leu Arg Tyr Pro Ser Leu Glu Ile Asn Phe Leu Val Ala Gln Val Val
130 135 140

Cys Tyr Pro Ile Gly Arg Ile Leu Ala Leu Leu Pro Asp Trp Lys Cys
145 150 155 160

Ser Lys Val Pro Phe Phe Asp Leu Asn Pro Gly Pro Phe Thr Lys Lys

165 170 175

Glu His Ala Val Val Thr Ile Ala Val Ala Leu Thr Ser Ser Thr Ala
180 185 190

Tyr Ala Met Tyr Ile Leu Asn Ala Gln Gly Ser Phe Tyr Asn Met Lys
195 200 205

Leu Asn Val Gly Tyr Gln Phe Leu Leu Val Trp Thr Ser Gln Met Ile
210 215 220

Gly Tyr Gly Ala Ala Gly Leu Thr Arg Arg Trp Val Val Asn Pro Ala
225 230 235 240

Ser Ser Ile Trp Pro Gln Thr Leu Ile Ser Val Ser Leu Phe Asp Ser
245 250 255

Leu His Ser Arg Lys Val Glu Lys Thr Val Ala Asn Gly Trp Thr Met
260 265 270

Pro Arg Tyr Arg Phe Phe Leu Ile Val Leu Ile Gly Ser Phe Ile Trp
275 280 285

Tyr Trp Val Pro Gly Phe Leu Phe Thr Gly Leu Ser Tyr Phe Asn Val
290 295 300

[0113]

Ile Leu Trp Gly Ser Lys Thr Arg His Asn Phe Ile Ala Asn Thr Ile
305 310 315 320

Phe Gly Thr Gln Ser Gly Leu Gly Ala Leu Pro Ile Thr Phe Asp Tyr
325 330 335

Thr Gln Val Ser Gln Ala Met Ser Gly Ser Val Phe Ala Thr Pro Phe
340 345 350

Tyr Val Ser Ala Asn Thr Tyr Ala Ser Val Leu Ile Phe Phe Val Ile
355 360 365

Val Leu Pro Cys Leu Tyr Phe Thr Asn Thr Trp Tyr Ala Lys Tyr Met
370 375 380

Pro Val Ile Ser Gly Ser Thr Tyr Asp Asn Thr Gln Asn Lys Tyr Asn
385 390 395 400

Val Thr Lys Ile Leu Asn Glu Asp Tyr Ser Ile Asn Leu Glu Lys Tyr
405 410 415

Lys Glu Tyr Ser Pro Val Phe Val Pro Phe Ser Tyr Leu Leu Ser Tyr
420 425 430

Ala Leu Asn Phe Ala Ala Val Ile Ala Val Phe Val His Cys Ile Leu
435 440 445

Tyr His Gly Lys Asp Ile Val Ala Lys Phe Lys Asp Arg Lys Asn Gly
450 455 460

Gly Thr Asp Ile His Met Arg Ile Tyr Ser Lys Asn Tyr Lys Asp Cys
465 470 475 480

Pro Asp Trp Trp Tyr Leu Leu Leu Gln Ile Val Met Ile Gly Leu Gly
485 490 495

Phe Val Ala Val Cys Cys Phe Asp Thr Lys Phe Pro Ala Trp Ala Phe
500 505 510

Val Ile Ala Ile Leu Ile Ser Leu Val Asn Phe Ile Pro Gln Gly Ile
515 520 525

Leu Glu Ala Met Thr Asn Gln His Val Gly Leu Asn Ile Ile Thr Glu
530 535 540

Leu Ile Cys Gly Tyr Met Leu Pro Leu Arg Pro Met Ala Asn Leu Leu
545 550 555 560

Phe Lys Leu Tyr Gly Phe Ile Val Met Arg Gln Gly Leu Asn Leu Ser
565 570 575

Arg Asp Leu Lys Leu Ala Met Tyr Met Lys Val Ser Pro Arg Leu Ile
580 585 590

[0114]

Phe Ala Val Gln Ile Tyr Ala Thr Ile Ile Ser Gly Met Val Asn Val
595 600 605

Gly Val Gln Glu Trp Met Met His Asn Ile Asp Gly Leu Cys Thr Thr
610 615 620

Asp Gln Pro Asn Gly Phe Thr Cys Ala Asn Gly Arg Thr Val Phe Asn
625 630 635 640

Ala Ser Ile Ile Trp Ser Leu Pro Lys Tyr Leu Phe Ser Ser Gly Arg
645 650 655

Ile Tyr Asn Pro Leu Met Trp Phe Phe Leu Ile Gly Leu Leu Phe Pro
660 665 670

Leu Ala Val Tyr Ala Val Gln Trp Lys Phe Pro Lys Phe Lys Phe Ala
675 680 685

Lys His Ile His Thr Pro Val Phe Phe Thr Gly Pro Gly Asn Ile Pro
690 695 700

Pro Ser Thr Pro Tyr Asn Tyr Ser Leu Phe Phe Ala Met Ser Phe Cys
705 710 715 720

Leu Asn Leu Ile Arg Lys Arg Trp Arg Ala Trp Phe Asn Lys Tyr Asn
725 730 735

Phe Val Met Gly Ala Gly Val Glu Ala Gly Val Ala Ile Ser Val Val
740 745 750

Ile Ile Phe Leu Cys Val Gln Tyr Pro Gly Gly Lys Leu Ser Trp Trp
755 760 765

Gly Asn Asn Val Trp Lys Arg Thr Tyr Asp Asn Asp Tyr Lys Lys Phe
770 775 780

Tyr Thr Leu Lys Lys Gly Glu Thr Phe Gly Tyr Asp Lys Trp Trp
785 790 795

<210> 48
<211> 725
<212> PRT
<213> 酿酒酵母

<400> 48

Met Asp Trp Ala Ile Asn Val Ala His Pro Arg Leu Leu Tyr Lys Asp
1 5 10 15

Pro Lys Leu Ser Val Thr Phe Ile Val Pro Ser Leu Phe His Ile Ile
20 25 30

Ile Ala Phe Val Leu Leu Gly Ile Cys Ala Ser Asp Phe Leu Cys Pro
35 40 45

[0115]

Asn Val Ala His Ile Ser Asp Pro Asn Ser Leu Arg Ser Asn Gly Ser
50 55 60

Leu Val Ser Lys Thr Ala Ser His Ala Ser His Thr Gly Ala Leu Met
65 70 75 80

Ala Val Leu Leu Ser Trp Cys Asn Ser Ser Pro Asp Leu Phe Ser Asn
85 90 95

Leu Met Ser Trp Ala Thr Ser Thr Arg Glu Thr Arg Ser Thr Ser Val
100 105 110

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

Ile Val Glu Gly Ser Ile Phe Ile Ile Met Ser Arg Thr His Ile Glu
130 135 140

Ile Ser Gln Ile Gln Lys Leu Ser Ile Met Arg Asp Leu Leu Phe Ser
145 150 155 160

Leu Ala Ala Met Cys Val Met Ser Tyr Val Ser Leu Met Asn Gln Val
165 170 175

Thr Val Leu Asn Cys Leu Leu Met Ala Phe Leu Tyr Ala Phe Tyr Leu
180 185 190

Val Val Lys Leu Thr Phe Lys Leu Asn His Ser Ala Glu Thr Pro Asp
195 200 205

Glu Thr Ala Ala Asp Thr Ser Leu Arg Glu Asn Ser Val Ser Pro Phe
210 215 220

Leu Asp Asp Ser Leu Met Ala Ser Gly Leu Leu Pro Pro Ile Gln Pro
225 230 235 240

Gly Phe Asp Ile Ser Asn Ser Ile Thr His Gly Ile Lys Pro Ser Leu
245 250 255

Leu Ser Ala Met Asp Phe Asn Ser Phe Leu Ser Met Leu Glu Asn Ser
260 265 270

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

Leu Arg Ser Met Thr Pro Gly Gln His Trp Ser Ala Ser Ala Thr Val
290 295 300

Ala Gly Glu Ala Thr Ser Ala Gly Arg Pro Phe Ser Glu Pro Thr Asn
305 310 315 320

Ala Phe Thr Glu Tyr Arg Asp Ser Glu Arg Ala Ile Asn Ser Ser Pro
325 330 335

[0116]

Ala Val Phe Ala Pro Tyr Arg Asp Asn Pro Asp Asp Glu Glu Ser Gln
340 345 350

Glu Gln Val Leu Leu Glu Thr Thr Thr His Gly His Phe Gly Ala Gln
355 360 365

Glu Met Arg Arg Phe Ser Lys Arg Ser Leu Gly Trp Ile Ile Lys Ile
370 375 380

Phe Ile Pro His Leu Ser Asn Phe Ser Gln Lys Ser Ile Ser Asp Ala
385 390 395 400

Ile Phe Ser Ile Ile Thr Val Pro Phe Phe Ile Ile Phe Lys Leu Ser
405 410 415

Cys Pro Gln Pro Pro Ser Asp Ile Leu Ser Tyr Asp Pro Thr Leu Asn
420 425 430

Arg Tyr Ser Leu Thr Thr Leu Pro Ile Ile Leu Leu Phe Ile Gln Ser
435 440 445

Ile Thr Ala Pro Phe Leu Leu Cys Ser Ile Leu Ser Val Leu Leu Thr
450 455 460

Tyr His Leu Gly Tyr Leu Val Tyr Leu Phe Pro Leu Ile Leu Ala Met
465 470 475 480

Ala Leu Ile Leu Leu Leu Thr Ala Phe Ile Thr Lys Val Asn Leu His
485 490 495

Asn Lys Phe Thr Leu Ser Leu Asp Ser Ser Asn Ile Leu Gln Glu Lys
500 505 510

Leu Gln Lys Arg Lys Leu Leu Glu Arg Leu Asn Thr Ser Ile Gln Ile
515 520 525

Ile Phe Leu Ala Ile Gly Ile Ile Asn Ile Ile Ile Trp Ile Ser Leu
530 535 540

Leu Ala Asn Ser Leu Ile Glu Met Met Glu Ile Tyr Gln Lys Ile Leu
545 550 555 560

Gly Leu Ser Lys Ala Ile Leu Gly Leu Thr Ile Phe Ala Trp Gly Asn
565 570 575

Ser Val Gly Asp Leu Ile Ser Asn Ile Ser Met Cys Arg Leu Tyr Lys
580 585 590

Thr Gln Thr His Tyr Gln Asp Arg Val Arg Leu Ala Thr Lys Phe Phe
595 600 605

[0117] Met Ile Ser Cys Ala Ser Cys Leu Gly Gly Val Met Leu Asn Ser Met
610 615 620

Gly Gly Ile Gly Phe Ser Gly Leu Val Ser Met Leu Phe Ile Gly Ala
625 630 635 640

Phe Asn Asp Asn Glu Trp Trp Phe Leu Arg Lys Val Lys Leu Gln Glu
645 650 655

Thr Ser Gln Leu Asp Asn Thr Leu Asn Tyr Lys Phe Ile Val Ser Cys
660 665 670

Val Phe Ile Ile Leu Gln Ile Ile Leu Leu Leu Leu Phe Phe Gly Gly
675 680 685

Pro Asn Asn Ile Lys Arg Arg Leu Thr Lys Glu Met Lys Leu Val Gly
690 695 700

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

Leu Glu Leu Phe Ser
725

<210> 49
<211> 602
<212> PRT
<213> 酿酒酵母

<400> 49

Met Lys Asn Leu Ser Phe Leu Ile Asn Arg Arg Lys Glu Asn Thr Ser
1 5 10 15

Asp Ser Asn Val Tyr Pro Gly Lys Ala Lys Ser His Glu Pro Ser Trp
20 25 30

Ile Glu Met Asp Asp Gln Thr Lys Lys Asp Gly Leu Asp Ile Val His
35 40 45

Val Glu Phe Ser Pro Asp Thr Arg Ala Pro Ser Asp Ser Asn Lys Val
50 55 60

Ile Thr Glu Ile Phe Asp Ala Thr Glu Asp Ala Lys Glu Ala Asp Glu
65 70 75 80

Ser Glu Arg Gly Met Pro Leu Ala Thr Ala Leu Asn Thr Tyr Pro Lys
85 90 95

Ala Ala Ala Trp Ser Leu Leu Val Ser Thr Thr Leu Ile Met Glu Gly
100 105 110

Tyr Asp Thr Ala Ile Leu Gly Ala Phe Tyr Ala Leu Pro Ile Phe Gln
115 120 125

[0118] Arg Lys Phe Gly Ser Gln Asn Asp Lys Thr Gly Glu Trp Glu Ile Ser
130 135 140

Ala Ser Trp Gln Ile Gly Leu Thr Leu Cys Tyr Met Ala Gly Glu Ile
145 150 155 160

Val Gly Leu Gln Leu Thr Gly Pro Ser Val Asp Leu Val Gly Asn Arg
165 170 175

Tyr Thr Leu Ile Ile Ala Leu Phe Phe Leu Ala Ala Phe Thr Phe Ile
180 185 190

Leu Tyr Phe Cys Asn Ser Leu Gly Met Ile Ala Val Gly Gln Ala Leu
195 200 205

Cys Gly Met Pro Trp Gly Cys Phe Gln Cys Leu Thr Val Ser Tyr Ala
210 215 220

Ser Glu Ile Cys Pro Leu Ala Leu Arg Tyr Tyr Leu Thr Thr Tyr Ser
225 230 235 240

Asn Leu Cys Trp Leu Phe Gly Gln Leu Phe Ala Ala Gly Ile Met Lys
245 250 255

Asn Ser Gln Lys Lys Tyr Ala Asp Ser Glu Leu Gly Tyr Lys Leu Pro
260 265 270

Phe Ala Leu Gln Trp Ile Leu Pro Val Pro Leu Ala Leu Gly Ile Phe

275 280 285

Phe Ala Pro Glu Ser Pro Trp Trp Leu Val Lys Lys Gly Arg Phe Asp
290 295 300

Glu Ala Arg Arg Ser Leu Arg Arg Thr Leu Ser Gly Lys Gly Pro Glu
305 310 315 320

Lys Glu Ile Leu Val Thr Leu Glu Val Asp Lys Ile Lys Val Thr Ile
325 330 335

Asp Lys Glu Lys Arg Leu Thr Ser Lys Glu Gly Ser Tyr Ser Asp Cys
340 345 350

Phe Glu Asp Lys Ile Asn Arg Arg Arg Thr Arg Ile Thr Cys Leu Cys
355 360 365

Trp Ala Gly Gln Ala Thr Cys Gly Ser Ile Leu Ile Gly Tyr Ser Thr
370 375 380

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

Ser Ile Ile Gln Tyr Cys Leu Gly Ile Cys Ala Thr Phe Leu Ser Trp
405 410 415

[0119]

Trp Ala Ser Lys Tyr Phe Gly Arg Tyr Asp Leu Tyr Ala Phe Gly Leu
420 425 430

Ala Phe Gln Thr Ile Val Phe Phe Ile Ile Gly Gly Leu Gly Cys Ser
435 440 445

Ser Thr His Gly Ser Lys Met Gly Ser Gly Ser Leu Leu Met Ala Val
450 455 460

Ala Phe Phe Tyr Asn Leu Gly Ile Ala Pro Val Val Phe Cys Leu Val
465 470 475 480

Ser Glu Met Pro Ser Ser Arg Leu Arg Thr Lys Thr Ile Ile Leu Ala
485 490 495

Arg Asn Thr Tyr Asn Val Val Ser Ile Ile Cys Ser Val Leu Ile Leu
500 505 510

Tyr Gln Leu Asn Ser Lys Lys Trp Asn Trp Gly Ala Lys Ser Gly Phe
515 520 525

Phe Trp Gly Val Leu Cys Phe Cys Thr Leu Ile Trp Ala Val Val Asp
530 535 540

Leu Pro Glu Thr Ala Gly Lys Thr Phe Val Glu Ile Asn Glu Leu Phe
545 550 555 560

Lys Leu Gly Val Ser Ala Arg Lys Phe Lys Ser Thr Lys Val Asp Pro
565 570 575

Phe Val Val Lys Thr Pro Pro Lys Asp Val Ser His Asn Asp Pro Lys
580 585 590

Gly Asp Ile Glu Ala Ser Ile Ala Glu Glu
595 600

<210> 50
<211> 969
<212> PRT
<213> 酿酒酵母

<400> 50

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

Pro Tyr Ser Ser Ser Pro Gln Leu Arg Lys Lys Lys Arg Asn Gln Lys
20 25 30

Arg Arg Lys Asp Lys Phe Val Gly His Leu Lys Ser Asp Ser Arg Arg
35 40 45

Pro Thr Gln Leu Leu His Asp Asn Leu Gln His Asn His Gly Gln Ile
50 55 60

[0120]

Thr Asp Phe Asp Gln Ile Asp Ser Trp Gly Met Leu His Glu Ser Asp
65 70 75 80

Ser Thr Ser Asn Asp Ile Ile Lys Ser Glu Asp Pro Ser Leu Lys Gly
85 90 95

Ala Phe Ile Asp His Arg Pro Ser Met Ser Gln Pro Arg Glu Gly Pro
100 105 110

Gln Ser Val Ser Ser Thr Val Gln Pro Gln Pro Ile Met Lys Phe Ser
115 120 125

Thr Pro Ser Tyr Lys Lys Pro Ala Gly Leu Arg Pro Ser Asp Gln Asn
130 135 140

Arg Ser Leu Val Ser Asp Leu Ser Pro Ser Glu Leu Glu Ser Trp Leu
145 150 155 160

Lys Arg Arg Lys Ser Val His Lys Ser Phe Val Asp Glu Asn Ser Pro
165 170 175

Thr Asp Arg Arg Gln Ser Asn Ala Asn Asn Asp Val Val Ile Asp Val
180 185 190

Asp Ala Leu Met Asn His Val Asn Asn Asn Ala Ser Thr Gly Val Asn
195 200 205

```
Asp Asn Ser Lys Arg Arg Lys Lys Lys Arg Gly Ser Asp Asp Ser Ser
    210                 215                 220

Asn Lys Asn Ser Lys Ser Thr Ser Ser Asp Ser Asn Asp Glu Glu Asp
225                 230                 235                 240

Glu Tyr Asn Ser Arg Pro Ser Ser Ser Leu Ser Ser Asn Asn Ser Ser
                245                 250                 255

Leu Asp Asp Val Cys Leu Val Leu Asp Asp Glu Gly Ser Glu Val Pro
            260                 265                 270

Lys Ala Trp Pro Asp Cys Thr Val Leu Glu Glu Phe Ser Lys Glu Glu
        275                 280                 285

Thr Glu Arg Leu Arg Ser Gln Ala Ile Gln Asp Ala Glu Ala Phe His
    290                 295                 300

Phe Gln Tyr Asp Glu Asp Glu Glu Asp Gly Thr Ser Asn Glu Asp Gly
305                 310                 315                 320

Ile Leu Phe Ser Lys Pro Ile Val Thr Asn Ile Asp Val Pro Glu Leu
                325                 330                 335

Gly Asn Arg Arg Val Asn Glu Thr Glu Asn Leu Lys Asn Gly Arg Leu
            340                 345                 350
```

[0121]

```
Arg Pro Lys Arg Ile Ala Pro Trp His Leu Ile Gln Arg Pro Met Val
        355                 360                 365

Leu Gly Ser Asn Ser Thr Lys Asp Ser Lys Ser Arg Ile Gln Ser Gly
    370                 375                 380

Leu Gln Asp Asn Leu Leu Val Gly Arg Asn Ile Gln Tyr Pro Pro His
385                 390                 395                 400

Ile Ile Ser Asn Asn Pro Glu His Phe Arg Phe Thr Tyr Phe Arg Val
                405                 410                 415

Asp Leu Asp Ser Thr Val His Ser Pro Thr Ile Ser Gly Leu Leu Gln
            420                 425                 430

Pro Gly Gln Lys Phe Gln Asp Leu Phe Val Ala Ser Ile Tyr Ser Gln
        435                 440                 445

Asp Asn Ser Ala Gly His Ile Lys Thr His Pro Asn Ser Pro Thr Pro
    450                 455                 460

Gly Ile Lys Ala Glu Thr Val Ser Gln Leu Gln Gly Leu Thr Ala Lys
465                 470                 475                 480

Asn Pro Ser Thr Leu Ser Ser Met Ser Val Ala Asn Ile Glu Asp Val
                485                 490                 495
```

Pro Pro Phe Trp Leu Asp Val Ser Asn Pro Thr Glu Glu Glu Met Lys
500 505 510

Ile Leu Ser Lys Ala Phe Gly Ile His Pro Leu Thr Thr Glu Asp Ile
515 520 525

Phe Leu Gly Glu Val Arg Glu Lys Val Glu Leu Phe Arg Asp Tyr Tyr
530 535 540

Leu Ile Cys Phe Arg Ser Phe Asp Ile Val Ala Glu Lys His Val Arg
545 550 555 560

Arg Arg Arg Lys Glu Lys Gln Glu Ser Ala Thr Leu Asp His Glu Ser
565 570 575

Ile Ser Arg Arg Lys Ser Gln Ala Tyr Gly Ala Thr Met Ser Asn Glu
580 585 590

Ser Asn Ala Asn Asn Asn Asn Ser Thr Ser Asn Ala Ser Arg Ser Lys
595 600 605

Trp Leu Pro Ser Ile Leu Arg Ala Arg Arg Arg Ser Ser Ala Asn Arg
610 615 620

Thr Thr Asn Thr Ser Ser Ser Ser Tyr Lys Arg Arg Val Lys Ser Glu
625 630 635 640

[0122]

Lys Lys Lys Met Glu Glu Asn Glu Lys Phe Lys Arg Lys Ser Gly Asp
645 650 655

Arg His Lys Pro Arg Glu Gly Glu Leu Glu Pro Leu Asn Val Tyr Ile
660 665 670

Ile Val Phe Arg Thr Gly Val Leu Thr Phe His Phe Ala Pro Thr Pro
675 680 685

His Pro Ile Asn Val Arg Arg Arg Ala Arg Leu Leu Lys Asp Tyr Leu
690 695 700

Asn Val Thr Ser Asp Trp Ile Ala Tyr Ala Leu Ile Asp Asp Ile Thr
705 710 715 720

Asp Ala Phe Ala Pro Met Ile Glu Leu Ile Glu Asp Glu Val Tyr Glu
725 730 735

Ile Glu Asp Ala Ile Leu Lys Met His Gln Ser Asp Asp Ser Ser Asp
740 745 750

Ser Asp Ser Ser Asp Ser Asp Ser Asp Ser Gly Ala Ser Asp Glu Asp
755 760 765

Ala Phe Pro Phe Asp Val Tyr Ser Lys Lys Thr Ser Tyr Ser Ser Ala
770 775 780

Lys Ser Ser Val Ser Ser Arg Ser Met Ser Thr Ser Glu Ala Ser Phe
785 790 795 800

Asn Ala Asn Leu Ile Gly Trp Lys Arg Lys Gly Asp Met Leu Arg Arg
805 810 815

Ile Gly Glu Cys Arg Lys Arg Val Met Ser Ile Leu Arg Leu Leu Gly
820 825 830

Ser Lys Ala Asp Val Ile Lys Gly Phe Ala Lys Arg Tyr Asn Glu Gln
835 840 845

Trp Glu Ala Ser Pro Gln Ser Glu Ile Ala Met Tyr Leu Gly Asp Ile
850 855 860

Gln Asp His Ile Val Thr Met Val Ser Ser Leu Asn His Tyr Glu Lys
865 870 875 880

Leu Leu Ser Arg Ser His Ser Asn Tyr Leu Ala Gln Ile Asn Ile Asp
885 890 895

Met Thr Lys Val Asn Asn Asp Met Asn Asp Val Leu Gly Lys Ile Thr
900 905 910

Ile Leu Gly Thr Ile Val Leu Pro Met Asn Val Ile Thr Gly Leu Trp
915 920 925

[0123]

Gly Met Asn Val Ile Val Pro Gly Gln Tyr Arg Asp Ser Leu Thr Trp
930 935 940

Phe Ile Gly Ile Val Leu Phe Met Cys Met Leu Ala Cys Ser Ala Tyr
945 950 955 960

Met Tyr Thr Lys Arg Arg Phe Gly Phe
965

<210> 51
<211> 889
<212> PRT
<213> 酿酒酵母

<400> 51

Met Pro Thr Ala Lys Arg Thr Ser Ser Arg Ala Ser Leu Ala Leu Pro
1 5 10 15

Phe Gln Leu Arg Leu Val His Lys Lys Ser Trp Gly His Arg Leu Arg
20 25 30

Asp Phe Ile Ser Gly Phe Leu Lys Ser Cys Arg Pro Ile Ala Lys Tyr
35 40 45

Val Phe Pro Asn Phe Ile Val Val His Tyr Ile Tyr Leu Ile Thr Leu
50 55 60

Ser Ile Ile Gly Ser Ile Leu Leu Tyr Pro Cys Lys Asn Thr Ala Phe
65 70 75 80

Ile Asp Val Leu Phe Leu Ala Ala Gly Ala Ser Thr Gln Gly Gly Leu
85 90 95

Ala Thr Lys Ser Thr Asn Asp Phe Asn Leu Tyr Gln Gln Ile Val Val
100 105 110

Tyr Val Ile Thr Leu Leu Ser Thr Pro Ile Leu Ile His Gly Phe Leu
115 120 125

Ala Phe Val Arg Leu Tyr Trp Phe Glu Arg Tyr Phe Asp Asn Ile Arg
130 135 140

Asp Ile Ser Lys Gln Asn Phe Lys Leu Arg Arg Thr Met Thr Leu Gln
145 150 155 160

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

Phe Lys Asp Asn Leu Phe Arg Gly Lys Phe Val Ser Arg Glu Asp Pro
180 185 190

Arg Gln Ser Ala Ser Asp Val Pro Met Asp Ser Pro Asp Thr Ser Ala
195 200 205

[0124]

Leu Ser Ser Ile Ser Pro Leu Asn Val Ser Ser Ser Lys Glu Glu Ser
210 215 220

Ser Asp Thr Gln Ser Ser Pro Pro Asn Phe Ser Ser Lys Arg Gln Pro
225 230 235 240

Ser Asp Val Asp Pro Arg Asp Ile Tyr Lys Ser Ile Met Met Leu Gln
245 250 255

Lys Gln Gln Glu Lys Ser Asn Ala Asn Ser Thr Asp Ser Phe Ser Ser
260 265 270

Glu Thr Asn Gly Pro Ala Phe Ile Val Gln Glu Arg His Glu Arg Arg
275 280 285

Ala Pro His Cys Ser Leu Lys Arg His Ser Val Leu Pro Ser Ser Gln
290 295 300

Glu Leu Asn Lys Leu Ala Gln Thr Lys Ser Phe Gln Lys Leu Leu Gly
305 310 315 320

Leu Arg Arg Asp Glu Gly Asp His Asp Tyr Phe Asp Gly Ala Pro His
325 330 335

Lys Tyr Met Val Thr Lys Lys Lys Lys Ile Ser Arg Thr Gln Ser Cys

340 345 350

Asn Ile Pro Thr Tyr Thr Ala Ser Pro Ser Pro Lys Thr Ser Gly Gln
355 360 365

Val Val Glu Asn His Arg Asn Leu Ala Lys Ser Ala Pro Ser Ser Phe
370 375 380

Val Asp Glu Glu Met Ser Phe Ser Pro Gln Glu Ser Leu Asn Leu Gln
385 390 395 400

Phe Gln Ala His Pro Pro Lys Pro Lys Arg Arg Glu Gly Asp Ile Gly
405 410 415

His Pro Phe Thr Arg Thr Met Ser Thr Asn Tyr Leu Ser Trp Gln Pro
420 425 430

Thr Phe Gly Arg Asn Ser Val Phe Ile Gly Leu Thr Lys Gln Gln Lys
435 440 445

Glu Glu Leu Gly Gly Val Glu Tyr Arg Ala Leu Arg Leu Leu Cys Cys
450 455 460

Ile Leu Met Val Tyr Tyr Ile Gly Phe Asn Ile Leu Ala Phe Val Thr
465 470 475 480

[0125]

Ile Val Pro Trp Ala Cys Thr Arg His His Tyr Ser Glu Ile Ile Arg
485 490 495

Arg Asn Gly Val Ser Pro Thr Trp Trp Gly Phe Phe Thr Ala Met Ser
500 505 510

Ala Phe Ser Asn Leu Gly Leu Ser Leu Thr Ala Asp Ser Met Val Ser
515 520 525

Phe Asp Thr Ala Pro Tyr Pro Leu Ile Phe Met Met Phe Phe Ile Ile
530 535 540

Ile Gly Asn Thr Gly Phe Pro Ile Met Leu Arg Phe Ile Ile Trp Ile
545 550 555 560

Met Phe Lys Thr Ser Arg Asp Leu Ser Gln Phe Lys Glu Ser Leu Gly
565 570 575

Phe Leu Leu Asp His Pro Arg Arg Cys Phe Thr Leu Leu Phe Pro Ser
580 585 590

Gly Pro Thr Trp Trp Leu Phe Thr Thr Leu Val Val Leu Asn Ala Thr
595 600 605

Asp Trp Ile Leu Phe Ile Ile Leu Asp Phe Asn Ser Ala Val Val Arg
610 615 620

Gln Val Ala Lys Gly Tyr Arg Ala Leu Met Gly Leu Phe Gln Ser Val
625 630 635 640

Cys Thr Arg Thr Ala Gly Phe Asn Val Val Asp Leu Ser Lys Leu His
645 650 655

Pro Ser Ile Gln Val Ser Tyr Met Leu Met Met Tyr Val Ser Val Leu
660 665 670

Pro Leu Ala Ile Ser Ile Arg Arg Thr Asn Val Tyr Glu Glu Gln Ser
675 680 685

Leu Gly Leu Tyr Asp Ser Gly Gln Asp Asp Glu Asn Ile Thr His Glu
690 695 700

Asp Asp Ile Lys Glu Thr Asp His Asp Gly Glu Ser Glu Glu Arg Asp
705 710 715 720

Thr Val Ser Thr Lys Ser Lys Pro Lys Lys Gln Ser Pro Lys Ser Phe
725 730 735

Val Gly Ala His Leu Arg Arg Gln Leu Ser Phe Asp Leu Trp Tyr Leu
740 745 750

Phe Leu Gly Leu Phe Ile Ile Cys Ile Cys Glu Gly Arg Lys Ile Glu
755 760 765

[0126]

Asp Val Asn Lys Pro Asp Phe Asn Val Phe Ala Ile Leu Phe Glu Val
770 775 780

Val Ser Ala Tyr Gly Thr Val Gly Leu Ser Leu Gly Tyr Pro Asn Thr
785 790 795 800

Asn Thr Ser Leu Ser Ala Gln Phe Thr Val Leu Ser Lys Leu Val Ile
805 810 815

Ile Ala Met Leu Ile Arg Gly Arg Asn Arg Gly Leu Pro Tyr Thr Leu
820 825 830

Asp Arg Ala Ile Met Leu Pro Ser Asp Lys Leu Glu Gln Ile Asp Arg
835 840 845

Leu Gln Asp Met Lys Ala Lys Gly Lys Leu Leu Ala Lys Val Gly Glu
850 855 860

Asp Pro Met Thr Thr Tyr Val Lys Lys Arg Ser His Lys Leu Lys Lys
865 870 875 880

Ile Ala Thr Lys Phe Trp Gly Lys His
885

<210> 52
<211> 582
<212> PRT

<213> 酿酒酵母

<400> 52

```
Met Glu Glu Thr Lys Tyr Ser Ser Gln Gln Glu Ile Glu Gly Ala Cys
1               5                  10                  15

Gly Ser Asp Ala Ser Leu Asn Ala Arg Gly Ser Asn Asp Ser Pro Met
            20                  25                  30

Gly Leu Ser Leu Tyr Leu Cys Leu Ala Ser Leu Thr Leu Val Leu Phe
        35                  40                  45

Ile Thr Ala Leu Asp Ile Leu Ile Val Gly Thr Ile Ile Asp Val Val
    50                  55                  60

Ala Glu Gln Phe Gly Asn Tyr Ser Lys Thr Gly Trp Leu Val Thr Gly
65                  70                  75                  80

Tyr Ser Leu Pro Asn Ala Ile Leu Ser Leu Ile Trp Gly Arg Phe Ala
                85                  90                  95

Ser Ile Ile Gly Phe Gln His Ser Leu Ile Leu Ala Ile Leu Ile Phe
            100                 105                 110

Glu Ala Gly Ser Leu Ile Ala Ala Leu Ala Ser Ser Met Asn Met Leu
        115                 120                 125
```

[0127]

```
Ile Phe Gly Arg Val Val Ala Gly Val Gly Gly Ser Gly Leu Gln Thr
    130                 135                 140

Leu Cys Phe Val Ile Gly Cys Thr Met Val Gly Glu Arg Ser Arg Pro
145                 150                 155                 160

Leu Val Ile Ser Ile Leu Ser Cys Ala Phe Ala Val Ala Ala Ile Val
                165                 170                 175

Gly Pro Ile Ile Gly Gly Ala Phe Thr Thr His Val Thr Trp Arg Trp
            180                 185                 190

Cys Phe Tyr Ile Asn Leu Pro Ile Gly Gly Leu Ala Ile Ile Met Phe
        195                 200                 205

Leu Leu Thr Tyr Lys Ala Glu Asn Lys Gly Ile Leu Gln Gln Ile Lys
    210                 215                 220

Asp Ala Ile Gly Thr Ile Ser Ser Phe Thr Phe Ser Lys Phe Arg His
225                 230                 235                 240

Gln Val Asn Phe Lys Arg Leu Met Asn Gly Ile Ile Phe Lys Phe Asp
                245                 250                 255

Phe Phe Gly Phe Ala Leu Cys Ser Ala Gly Leu Val Leu Phe Leu Leu
            260                 265                 270
```

```
Gly Leu Thr Phe Gly Gly Asn Lys Tyr Ser Trp Asn Ser Gly Gln Val
        275                 280                 285

Ile Thr Tyr Leu Val Leu Gly Val Leu Leu Phe Ile Phe Ser Leu Val
    290                 295                 300

Tyr Asp Phe Phe Leu Phe Asp Lys Phe Asn Pro Glu Pro Asp Asn Ile
305                 310                 315                 320

Ser Tyr Arg Pro Leu Leu Leu Arg Arg Leu Val Ala Lys Pro Ala Ile
                325                 330                 335

Ile Ile Val Asn Met Val Thr Phe Leu Leu Cys Thr Gly Tyr Asn Gly
            340                 345                 350

Gln Met Ile Tyr Ser Val Gln Phe Phe Gln Leu Ile Phe Ala Ser Ser
        355                 360                 365

Ala Trp Lys Ala Gly Leu His Leu Ile Pro Ile Val Ile Thr Asn Val
    370                 375                 380

Ile Ala Ala Ile Ala Ser Gly Val Ile Thr Lys Lys Leu Gly Leu Val
385                 390                 395                 400

Lys Pro Leu Leu Ile Phe Gly Gly Val Leu Gly Val Ile Gly Ala Gly
                405                 410                 415
```

[0128]

```
Leu Met Thr Leu Met Thr Asn Thr Ser Thr Lys Ser Thr Gln Ile Gly
            420                 425                 430

Val Leu Leu Leu Pro Gly Phe Ser Leu Gly Phe Ala Leu Gln Ala Ser
        435                 440                 445

Leu Met Ser Ala Gln Leu Gln Ile Thr Lys Asp Arg Pro Glu Ala Ala
    450                 455                 460

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

Gly Thr Thr Leu Gly Gly Val Leu Ser Thr Thr Val Phe Ser Ala Ser
                485                 490                 495

Phe His Asn Lys Val Ser Arg Ala His Leu Glu Pro Tyr Glu Gly Lys
            500                 505                 510

Thr Val Asp Asp Met Ile Leu Tyr Arg Leu Gln Asn Tyr Asp Gly Ser
        515                 520                 525

His Ser Thr Ile Gly Asn Ile Leu Ser Asp Ser Ile Lys Asn Val Phe
    530                 535                 540

Trp Met Asp Leu Gly Phe Tyr Ala Leu Gly Phe Leu Phe Cys Ser Phe
545                 550                 555                 560
```

Ser Ser Asn Lys Lys Leu Ile Ile Pro Lys Lys Asp Asp Thr Pro Glu
565 570 575

Asp Asn Leu Glu Asp Lys
580

<210> 53
<211> 615
<212> PRT
<213> 酿酒酵母

<400> 53

Met Ser Ser Ser Val Val Gly Ala Ser Ser Asn Lys Lys Ser Gly Ile
1 5 10 15

Arg Gln Ser Cys Glu Ile Ile Glu Arg Glu Arg His Ser Asn Asp Asp
20 25 30

Thr Tyr Ser Met Thr Ser Thr Phe Phe Lys Leu Lys Glu Asn Glu Ile
35 40 45

Met Ser Ala Gln Phe Asp Ser Leu Lys Tyr Lys Ile Leu Leu Ile Ser
50 55 60

Thr Ala Phe Val Cys Gly Phe Gly Ile Ser Leu Asp Tyr Thr Leu Arg
65 70 75 80

[0129]

Ser Thr Tyr Thr Gly Tyr Ala Thr Asn Ser Tyr Ser Glu His Ser Leu
85 90 95

Leu Ser Thr Val Gln Val Ile Asn Ala Val Val Ser Val Gly Ser Gln
100 105 110

Val Val Tyr Ser Arg Leu Ser Asp His Phe Gly Arg Leu Arg Leu Phe
115 120 125

Leu Val Ala Thr Ile Phe Tyr Ile Met Gly Thr Ile Ile Gln Ser Gln
130 135 140

Ala Thr Arg Leu Thr Met Tyr Ala Ala Gly Ser Val Phe Tyr Asn Cys
145 150 155 160

Gly Tyr Val Gly Thr Asn Leu Leu Leu Thr Leu Ile Leu Ser Asp Phe
165 170 175

Ser Ser Leu Lys Trp Arg Met Phe Tyr Gln Tyr Ala Ser Tyr Trp Pro
180 185 190

Tyr Ile Ile Ile Pro Trp Ile Ser Gly Asn Ile Ile Thr Ala Ala Asn
195 200 205

Pro Gln Lys Asn Trp Ser Trp Asn Ile Ala Met Trp Ala Phe Ile Tyr
210 215 220

Pro Leu Ser Thr Leu Pro Ile Ile Phe Leu Ile Leu Tyr Met Lys Tyr
225 230 235 240

Lys Ser Ser Lys Thr Ala Glu Trp Arg Ser Leu Lys Glu Gln Ala Arg
245 250 255

Lys Glu Arg Thr Gly Gly Leu Phe Glu Asn Leu Val Phe Leu Phe Trp
260 265 270

Lys Leu Asp Ile Val Gly Ile Leu Leu Ile Thr Val Ser Leu Gly Cys
275 280 285

Ile Leu Val Pro Leu Thr Leu Ala Asn Glu Thr Ser Gln Lys Trp His
290 295 300

Asn Ser Lys Ile Ile Ala Thr Leu Val Ser Gly Gly Cys Leu Phe Phe
305 310 315 320

Ile Phe Leu Tyr Trp Glu Ala Lys Phe Ala Lys Ser Pro Leu Leu Pro
325 330 335

Phe Lys Leu Leu Ser Asp Arg Gly Ile Trp Ala Pro Leu Gly Val Thr
340 345 350

Phe Phe Asn Phe Phe Thr Phe Phe Ile Ser Cys Asp Tyr Leu Tyr Pro
355 360 365

[0130]

Val Leu Leu Val Ser Met Lys Glu Ser Ser Thr Ser Ala Ala Arg Ile
370 375 380

Val Asn Leu Pro Asp Phe Val Ala Ala Thr Ala Ser Pro Phe Tyr Ser
385 390 395 400

Leu Leu Val Ala Lys Thr Arg Lys Leu Lys Leu Ser Val Ile Gly Gly
405 410 415

Cys Ala Ala Trp Met Val Cys Met Gly Leu Phe Tyr Lys Tyr Arg Gly
420 425 430

Gly Ser Gly Ser His Glu Gly Val Ile Ala Ala Ser Val Ile Met Gly
435 440 445

Leu Ser Gly Leu Leu Cys Ser Asn Ser Val Ile Val Ile Leu Gln Ala
450 455 460

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

Phe Ser Lys Leu Gly Ala Ala Ile Gly Ala Ser Val Ser Gly Ala Ile
485 490 495

Trp Thr Gln Thr Met Pro Asn Gln Leu Tyr Lys Asn Leu Gly Asn Asp

500 505 510

Thr Leu Ala Glu Ile Ala Tyr Ala Ser Pro Tyr Thr Phe Ile Ser Asp
515 520 525

Tyr Pro Trp Gly Ser Pro Glu Arg Asp Ala Val Val Glu Ser Tyr Arg
530 535 540

Tyr Val Gln Arg Ile Ile Met Thr Val Gly Leu Ala Cys Thr Val Pro
545 550 555 560

Phe Phe Thr Phe Thr Met Phe Met Arg Asn Pro Glu Leu Ile Asp Lys
565 570 575

Ala Thr His Glu Glu Phe Thr Glu Asp Gly Leu Val Val Leu Pro Asp
580 585 590

Glu Glu Asn Ile Phe Ser Gln Ile Lys Ala Leu Phe Arg His Asn Arg
595 600 605

Ser Asn Lys Lys Ser Gly Cys
610 615

<210> 54
<211> 345
<212> PRT
<213> 酿酒酵母

[0131]

<400> 54

Met Glu Gly Val Tyr Phe Asn Ile Asp Asn Gly Phe Ile Glu Gly Val
1 5 10 15

Val Arg Gly Tyr Arg Asn Gly Leu Leu Ser Asn Asn Gln Tyr Ile Asn
20 25 30

Leu Thr Gln Cys Asp Thr Leu Glu Asp Leu Lys Leu Gln Leu Ser Ser
35 40 45

Thr Asp Tyr Gly Asn Phe Leu Ser Ser Val Ser Ser Glu Ser Leu Thr
50 55 60

Thr Ser Leu Ile Gln Glu Tyr Ala Ser Ser Lys Leu Tyr His Glu Phe
65 70 75 80

Asn Tyr Ile Arg Asp Gln Ser Ser Gly Ser Thr Arg Lys Phe Met Asp
85 90 95

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

Gly Thr Ile His Asp Arg Asp Lys Gly Glu Ile Leu Gln Arg Cys His
115 120 125

Pro Leu Gly Trp Phe Asp Thr Leu Pro Thr Leu Ser Val Ala Thr Asp

130 135 140

Leu Glu Ser Leu Tyr Glu Thr Val Leu Val Asp Thr Pro Leu Ala Pro
145 150 155 160

Tyr Phe Lys Asn Cys Phe Asp Thr Ala Glu Glu Leu Asp Asp Met Asn
165 170 175

Ile Glu Ile Ile Arg Asn Lys Leu Tyr Lys Ala Tyr Leu Glu Asp Phe
180 185 190

Tyr Asn Phe Val Thr Glu Glu Ile Pro Glu Pro Ala Lys Glu Cys Met
195 200 205

Gln Thr Leu Leu Gly Phe Glu Ala Asp Arg Arg Ser Ile Asn Ile Ala
210 215 220

Leu Asn Ser Leu Gln Ser Ser Asp Ile Asp Pro Asp Leu Lys Ser Asp
225 230 235 240

Leu Leu Pro Asn Ile Gly Lys Leu Tyr Pro Leu Ala Thr Phe His Leu
245 250 255

Ala Gln Ala Gln Asp Phe Glu Gly Val Arg Ala Ala Leu Ala Asn Val
260 265 270

[0132] Tyr Glu Tyr Arg Gly Phe Leu Glu Thr Gly Asn Leu Glu Asp His Phe
275 280 285

Tyr Gln Leu Glu Met Glu Leu Cys Arg Asp Ala Phe Thr Gln Gln Phe
290 295 300

Ala Ile Ser Thr Val Trp Ala Trp Met Lys Ser Lys Glu Gln Glu Val
305 310 315 320

Arg Asn Ile Thr Trp Ile Ala Glu Cys Ile Ala Gln Asn Gln Arg Glu
325 330 335

Arg Ile Asn Asn Tyr Ile Ser Val Tyr
340 345

<210> 55
<211> 542
<212> PRT
<213> 酿酒酵母

<400> 55

Met Gly Asn Gln Ser Leu Val Val Leu Thr Glu Ser Lys Gly Glu Tyr
1 5 10 15

Glu Asn Glu Thr Glu Leu Pro Val Lys Lys Ser Ser Arg Asp Asn Asn
20 25 30

Ile Gly Glu Ser Leu Thr Ala Thr Ala Phe Thr Gln Ser Glu Asp Glu

35 40 45

Met Val Asp Ser Asn Gln Lys Trp Gln Asn Pro Asn Tyr Phe Lys Tyr
50 55 60

Ala Trp Gln Glu Tyr Leu Phe Ile Phe Thr Cys Met Ile Ser Gln Leu
65 70 75 80

Leu Asn Gln Ala Gly Thr Thr Gln Thr Leu Ser Ile Met Asn Ile Leu
85 90 95

Ser Asp Ser Phe Gly Ser Glu Gly Asn Ser Lys Ser Trp Leu Met Ala
100 105 110

Ser Phe Pro Leu Val Ser Gly Ser Phe Ile Leu Ile Ser Gly Arg Leu
115 120 125

Gly Asp Ile Tyr Gly Leu Lys Lys Met Leu Leu Val Gly Tyr Val Leu
130 135 140

Val Ile Ile Trp Ser Leu Ile Cys Gly Ile Thr Lys Tyr Ser Gly Ser
145 150 155 160

Asp Thr Phe Phe Ile Ile Ser Arg Ala Phe Gln Gly Leu Gly Ile Ala
165 170 175

[0133]

Phe Val Leu Pro Asn Val Leu Gly Ile Ile Gly Asn Ile Tyr Val Gly
180 185 190

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

Pro Ile Gly Ala Thr Leu Gly Cys Leu Phe Ala Gly Leu Ile Gly Thr
210 215 220

Glu Asp Pro Lys Gln Trp Pro Trp Ala Phe Tyr Ala Tyr Ser Ile Ala
225 230 235 240

Ala Phe Ile Asn Phe Val Leu Ser Ile Tyr Ala Ile Pro Ser Thr Ile
245 250 255

Pro Thr Asn Ile His His Phe Ser Met Asp Trp Ile Gly Ser Val Leu
260 265 270

Gly Val Ile Gly Leu Ile Leu Leu Asn Phe Val Trp Asn Gln Ala Pro
275 280 285

Ile Ser Gly Trp Asn Gln Ala Tyr Ile Ile Val Ile Leu Ile Ile Ser
290 295 300

Val Ile Phe Leu Val Val Phe Ile Ile Tyr Glu Ile Arg Phe Ala Lys
305 310 315 320

Thr Pro Leu Leu Pro Arg Ala Val Ile Lys Asp Arg His Met Ile Gln
325 330 335

Ile Met Leu Ala Leu Phe Phe Gly Trp Gly Ser Phe Gly Ile Phe Thr
340 345 350

Phe Tyr Tyr Phe Gln Phe Gln Leu Asn Ile Arg Gln Tyr Thr Ala Leu
355 360 365

Trp Ala Gly Gly Thr Tyr Phe Met Phe Leu Ile Trp Gly Ile Ile Ala
370 375 380

Ala Leu Leu Val Gly Phe Thr Ile Lys Asn Val Ser Pro Ser Val Phe
385 390 395 400

Leu Phe Phe Ser Met Val Ala Phe Asn Val Gly Ser Ile Met Ala Ser
405 410 415

Val Thr Pro Val His Glu Thr Tyr Phe Arg Thr Gln Leu Gly Thr Met
420 425 430

Ile Ile Leu Ser Phe Gly Met Asp Leu Ser Phe Pro Ala Ser Ser Ile
435 440 445

Ile Phe Ser Asp Asn Leu Pro Met Glu Tyr Gln Gly Met Ala Gly Ser
450 455 460

[0134]

Leu Val Asn Thr Val Val Asn Tyr Ser Met Ser Leu Cys Leu Gly Met
465 470 475 480

Gly Ala Thr Val Glu Thr Gln Val Asn Ser Asp Gly Lys His Leu Leu
485 490 495

Lys Gly Tyr Arg Gly Ala Gln Tyr Leu Gly Ile Gly Leu Ala Ser Leu
500 505 510

Ala Cys Met Ile Ser Gly Leu Tyr Met Val Glu Ser Phe Ile Lys Gly
515 520 525

Arg Arg Ala Arg Ala Ala Ala Glu Tyr Asp Cys Thr Val Ala
530 535 540

<210> 56
<211> 434
<212> PRT
<213> 酿酒酵母

<400> 56

Met Lys Thr Gln Tyr Ser Leu Ile Arg Lys Ile Trp Ala His Ser Val
1 5 10 15

Thr Glu Phe Leu Lys Ser Gln Trp Phe Phe Ile Cys Leu Ala Ile Leu
20 25 30

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

Ile Lys Gly Gln Tyr Ser Ile Gly Tyr Gly Cys Val Ala Trp Ile Phe
50 55 60

Leu Gln Ser Gly Leu Gly Met Lys Ser Arg Ser Leu Met Ala Asn Met
65 70 75 80

Leu Asn Trp Arg Ala His Ala Thr Ile Leu Val Leu Ser Phe Leu Ile
85 90 95

Thr Ser Ser Ile Val Tyr Gly Phe Cys Cys Ala Val Lys Ala Ala Asn
100 105 110

Asp Pro Lys Ile Asp Asp Trp Val Leu Ile Gly Leu Ile Leu Thr Ala
115 120 125

Thr Cys Pro Thr Thr Val Ala Ser Asn Val Ile Met Thr Thr Asn Ala
130 135 140

Gly Gly Asn Ser Leu Leu Cys Val Cys Glu Val Phe Ile Gly Asn Leu
145 150 155 160

Leu Gly Ala Phe Ile Thr Pro Ala Leu Val Gln Met Phe Thr Asn Arg
165 170 175

[0135]

Ala Pro Phe Ala Tyr Gly Asn Pro Ala Thr Gly Asn Gly Ile Gly Ala
180 185 190

Leu Tyr Gly Arg Val Met Lys Gln Val Gly Leu Ser Val Phe Val Pro
195 200 205

Leu Phe Val Gly Gln Val Ile Gln Asn Cys Phe Pro Lys Gly Thr Ala
210 215 220

Tyr Tyr Leu Gly Phe Leu Lys Lys Tyr His Ile Lys Ile Gly Ser Tyr
225 230 235 240

Met Leu Leu Leu Ile Met Phe Ser Ser Phe Ser Thr Ala Phe Tyr Gln
245 250 255

Asp Ala Phe Thr Ser Val Ser His Val Cys Ile Ile Phe Leu Cys Phe
260 265 270

Phe Asn Leu Gly Ile Tyr Ile Phe Phe Thr Gly Leu Ser Tyr Leu Cys
275 280 285

Ala Arg Pro Trp Phe Ile Leu Lys Leu Phe Pro His Glu Pro Ile Glu
290 295 300

Gly Lys Ser Thr Arg Leu Tyr Arg Tyr Ser Tyr Asn Ile Phe Arg Pro
305 310 315 320

Phe Tyr Tyr Ser Lys Glu Asp Ala Ile Cys Ile Met Phe Cys Gly Pro
325 330 335

Ala Lys Thr Ala Ala Leu Gly Val Ser Leu Ile Thr Ser Gln Tyr Gly
340 345 350

Asp Lys Lys Glu His Leu Gly Lys Leu Leu Val Pro Leu Val Leu Tyr
355 360 365

Gln Val Glu Gln Val Met Thr Ala Asn Phe Phe Val Ser Leu Phe Lys
370 375 380

Arg Trp Ile Gln Lys Asp Ala Gln Ala Asp Gly Ser Glu Ser Ser Cys
385 390 395 400

Ala Asn Glu Asn Glu Glu Val Asp Leu Glu Lys Ile Ile Ser Ile Gly
405 410 415

Thr Gly Glu Asn Gln Ser Val Leu Ser Asn Asn Val Pro Tyr Thr Gln
420 425 430

Pro Arg

[0136]

<210> 57
<211> 309
<212> PRT
<213> 酿酒酵母

<400> 57

Met Ser His Thr Glu Thr Gln Thr Gln Gln Ser His Phe Gly Val Asp
1 5 10 15

Phe Leu Met Gly Gly Val Ser Ala Ala Ile Ala Lys Thr Gly Ala Ala
20 25 30

Pro Ile Glu Arg Val Lys Leu Leu Met Gln Asn Gln Glu Glu Met Leu
35 40 45

Lys Gln Gly Ser Leu Asp Thr Arg Tyr Lys Gly Ile Leu Asp Cys Phe
50 55 60

Lys Arg Thr Ala Thr His Glu Gly Ile Val Ser Phe Trp Arg Gly Asn
65 70 75 80

Thr Ala Asn Val Leu Arg Tyr Phe Pro Thr Gln Ala Leu Asn Phe Ala
85 90 95

Phe Lys Asp Lys Ile Lys Ser Leu Leu Ser Tyr Asp Arg Glu Arg Asp
100 105 110

Gly Tyr Ala Lys Trp Phe Ala Gly Asn Leu Phe Ser Gly Gly Ala Ala
115 120 125

Gly Gly Leu Ser Leu Leu Phe Val Tyr Ser Leu Asp Tyr Ala Arg Thr
130 135 140

Arg Leu Ala Ala Asp Ala Arg Gly Ser Lys Ser Thr Ser Gln Arg Gln
145 150 155 160

Phe Asn Gly Leu Leu Asp Val Tyr Lys Lys Thr Leu Lys Thr Asp Gly
165 170 175

Leu Leu Gly Leu Tyr Arg Gly Phe Val Pro Ser Val Leu Gly Ile Ile
180 185 190

Val Tyr Arg Gly Leu Tyr Phe Gly Leu Tyr Asp Ser Phe Lys Pro Val
195 200 205

Leu Leu Thr Gly Ala Leu Glu Gly Ser Phe Val Ala Ser Phe Leu Leu
210 215 220

Gly Trp Val Ile Thr Met Gly Ala Ser Thr Ala Ser Tyr Pro Leu Asp
225 230 235 240

Thr Val Arg Arg Arg Met Met Met Thr Ser Gly Gln Thr Ile Lys Tyr
245 250 255

Asp Gly Ala Leu Asp Cys Leu Arg Lys Ile Val Gln Lys Glu Gly Ala
260 265 270

[0137]

Tyr Ser Leu Phe Lys Gly Cys Gly Ala Asn Ile Phe Arg Gly Val Ala
275 280 285

Ala Ala Gly Val Ile Ser Leu Tyr Asp Gln Leu Gln Leu Ile Met Phe
290 295 300

Gly Lys Lys Phe Lys
305

<210> 58
<211> 414
<212> PRT
<213> 酿酒酵母

<400> 58

Met Asn Pro Ser Val Pro Lys Val Met Lys Arg Glu Asn Asn Thr His
1 5 10 15

Leu Leu Val Ser Lys Glu Met Asn Asp Thr Ser Leu Gln Leu Pro Ser
20 25 30

Thr Thr Arg Ser Leu Ser Pro Lys Glu Ser Asn Ser Asn Glu Asp Phe
35 40 45

Asn Val Asp Gly Asn Glu Thr Thr Leu Gln Arg Ile Ser Lys Asp Tyr
50 55 60

```
Leu Lys Pro Asn Ile Gly Leu Val Leu Leu Thr Val Ser Tyr Phe Phe
65                  70                  75                  80

Asn Ser Ala Met Val Val Ser Thr Lys Val Leu Glu Asn Asp Pro Asp
                85                  90                  95

Asp Ile Ala Asn Asp Arg Gln Ile Lys Pro Leu Gln Ile Leu Leu Val
            100                 105                 110

Arg Met Val Ile Thr Tyr Ile Gly Thr Leu Ile Tyr Met Tyr Ile Asn
        115                 120                 125

Lys Ser Thr Ile Ser Asp Val Pro Phe Gly Lys Pro Glu Val Arg Lys
    130                 135                 140

Trp Leu Val Leu Arg Gly Cys Thr Gly Phe Phe Gly Val Phe Gly Met
145                 150                 155                 160

Tyr Tyr Ser Leu Met Tyr Leu Thr Ile Ser Asp Ala Val Leu Ile Thr
                165                 170                 175

Phe Leu Ala Pro Ser Leu Thr Ile Phe Leu Ser Trp Val Ile Leu Arg
            180                 185                 190

Glu Arg Phe Thr Lys Val Glu Ala Leu Gly Ser Leu Ile Ser Leu Leu
        195                 200                 205
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[0138]

```
Gly Val Val Leu Ile Val Arg Pro Ser Phe Leu Phe Gly Thr Pro Glu
    210                 215                 220

Leu Thr Asp Ser Ser Ser Gln Ile Val Glu Ser Ser Asp Pro Lys Ser
225                 230                 235                 240

Arg Leu Ile Ala Thr Leu Val Gly Leu Trp Gly Val Leu Gly Met Ser
                245                 250                 255

Cys Val Tyr Ile Ile Ile Arg Tyr Ile Gly Lys Arg Ala His Ala Ile
            260                 265                 270

Met Ser Val Ser Tyr Phe Ser Leu Ile Thr Ala Ile Val Ser Phe Ile
        275                 280                 285

Gly Ile Asn Thr Ile Pro Ser Met Lys Phe Gln Ile Pro His Ser Lys
    290                 295                 300

Lys Gln Trp Ile Leu Phe Gly Asn Leu Gly Val Ser Gly Phe Ile Phe
305                 310                 315                 320

Gln Leu Leu Leu Thr Met Gly Ile Gln Arg Glu Arg Ala Gly Arg Gly
                325                 330                 335

Ser Leu Met Thr Tyr Thr Gln Leu Leu Tyr Ala Val Phe Trp Asp Val
            340                 345                 350
```

Ala Leu Tyr Lys His Trp Pro Asn Ile Trp Ser Trp Ile Gly Met Ile
355 360 365

Ile Ile Ile Ser Ala Thr Leu Trp Val Ile Arg Ile Arg Ala Ala Asn
370 375 380

Asn Glu Thr Thr Ala Lys Asp Leu Thr Pro Ile Ile Asp Asp Glu Glu
385 390 395 400

Asn Ser Ile Pro Leu Thr Glu Phe Asp Leu Ser Asp Ser Lys
405 410

<210> 59
<211> 586
<212> PRT
<213> 酿酒酵母

<400> 59

Met Ser Arg Ser Asn Ser Ile Tyr Thr Glu Asp Ile Glu Met Tyr Pro
1 5 10 15

Thr His Asn Glu Gln His Leu Thr Arg Glu Tyr Thr Lys Pro Asp Gly
20 25 30

Gln Thr Lys Ser Glu Lys Leu Asn Phe Glu Gly Ala Tyr Ile Asn Ser
35 40 45

[0139]

His Gly Thr Leu Ser Lys Thr Thr Thr Arg Glu Ile Glu Gly Asp Leu
50 55 60

Asp Ser Glu Thr Ser Ser His Ser Ser Asp Asp Lys Val Asp Pro Thr
65 70 75 80

Gln Gln Ile Thr Ala Glu Thr Lys Ala Pro Tyr Thr Leu Leu Ser Tyr
85 90 95

Gly Gln Lys Trp Gly Met Val Ala Ile Leu Thr Met Cys Gly Phe Trp
100 105 110

Ser Ser Leu Gly Ser Pro Ile Tyr Tyr Pro Ala Leu Arg Gln Leu Glu
115 120 125

Lys Gln Phe Asn Val Asp Glu Asn Met Val Asn Val Thr Val Val Val
130 135 140

Tyr Leu Leu Phe Gln Gly Ile Ser Pro Thr Val Ser Gly Gly Leu Ala
145 150 155 160

Asp Cys Phe Gly Arg Arg Pro Ile Ile Leu Ala Gly Met Leu Ile Tyr
165 170 175

Val Ile Ala Ser Ile Gly Leu Ala Cys Ala Pro Ser Tyr Gly Val Ile
180 185 190

Ile Phe Leu Arg Cys Ile Gln Ser Ile Gly Ile Ser Pro Thr Ile Ala
195 200 205

Ile Ser Ser Gly Val Val Gly Asp Phe Thr Leu Lys His Glu Arg Gly
210 215 220

Thr Phe Val Gly Ala Thr Ser Gly Phe Val Leu Leu Gly Gln Cys Phe
225 230 235 240

Gly Ser Leu Ile Gly Ala Val Leu Thr Ala Arg Trp Asp Trp Arg Ala
245 250 255

Ile Phe Trp Phe Leu Thr Ile Gly Cys Gly Ser Cys Phe Leu Ile Ala
260 265 270

Phe Leu Ile Leu Pro Glu Thr Lys Arg Thr Ile Ala Gly Asn Leu Ser
275 280 285

Ile Lys Pro Lys Arg Phe Ile Asn Arg Ala Pro Ile Phe Leu Leu Gly
290 295 300

Pro Val Arg Arg Arg Phe Lys Tyr Asp Asn Pro Asp Tyr Glu Thr Leu
305 310 315 320

Asp Pro Thr Ile Pro Lys Leu Asp Leu Ser Ser Ala Gly Lys Ile Leu
325 330 335

[0140]

Val Leu Pro Glu Ile Ile Leu Ser Leu Phe Pro Ser Gly Leu Leu Phe
340 345 350

Ala Met Trp Thr Leu Met Leu Ser Ser Ile Ser Ser Gly Leu Ser Val
355 360 365

Ala Pro Tyr Asn Tyr His Leu Val Ile Ile Gly Val Cys Tyr Leu Pro
370 375 380

Gly Gly Ile Gly Gly Leu Met Gly Ser Phe Phe Thr Gly Arg Ile Ile
385 390 395 400

Asp Met Tyr Phe Lys Arg Lys Ile Lys Lys Phe Glu Gln Asp Lys Ala
405 410 415

Asn Gly Leu Ile Pro Gln Asp Ala Glu Ile Asn Met Phe Lys Val Arg
420 425 430

Leu Val Cys Leu Leu Pro Gln Asn Phe Leu Ala Val Val Ala Tyr Leu
435 440 445

Leu Phe Gly Trp Ser Ile Asp Lys Gly Trp Arg Ile Glu Ser Ile Leu
450 455 460

Ile Thr Ser Phe Val Cys Ser Tyr Cys Ala Met Ser Thr Leu Ser Thr

```
465                 470                 475                 480

Ser Thr Thr Leu Leu Val Asp Leu Tyr Pro Thr Lys Ser Ser Thr Ala
                485                 490                 495

Ser Ser Cys Phe Asn Phe Val Arg Cys Ser Leu Ser Thr Ile Phe Met
            500                 505                 510

Gly Cys Phe Ala Lys Met Lys Ala Ala Met Thr Val Gly Gly Thr Phe
        515                 520                 525

Thr Phe Leu Cys Ala Leu Val Phe Phe Phe Asn Phe Leu Met Phe Ile
    530                 535                 540

Pro Met Lys Tyr Gly Met Lys Trp Arg Glu Asp Arg Leu Leu Lys Gln
545                 550                 555                 560

Gln Arg Gln Ser Trp Leu Asn Thr Leu Ala Val Lys Ala Lys Lys Gly
                565                 570                 575

Thr Lys Arg Asp Gln Asn Asp Asn His Asn
            580                 585
```

[0141]

```
<210>  60
<211>  60
<212>  PRT
<213>  酿酒酵母

<400>  60

Met Ser Phe Leu Pro Ser Phe Ile Leu Ser Asp Glu Ser Lys Glu Arg
1               5                   10                  15

Ile Ser Lys Ile Leu Thr Leu Thr His Asn Val Ala His Tyr Gly Trp
            20                  25                  30

Ile Pro Phe Val Leu Tyr Leu Gly Trp Ala His Thr Ser Asn Arg Pro
        35                  40                  45

Asn Phe Leu Asn Leu Leu Ser Pro Leu Pro Ser Val
    50                  55                  60

<210>  61
<211>  494
<212>  PRT
<213>  酿酒酵母

<400>  61

Met Leu Leu Lys Asn Cys Glu Thr Asp Lys Gln Arg Asp Ile Arg Tyr
1               5                   10                  15

Ala Cys Leu Phe Lys Glu Leu Asp Val Lys Gly Asn Gly Gln Val Thr
            20                  25                  30

Leu Asp Asn Leu Ile Ser Ala Phe Glu Lys Asn Asp His Pro Leu Lys
        35                  40                  45
```

```
Gly Asn Asp Glu Ala Ile Lys Met Leu Phe Thr Ala Met Asp Val Asn
     50                  55                  60

Lys Asp Ser Val Val Asp Leu Ser Asp Phe Lys Lys Tyr Ala Ser Asn
65                  70                  75                  80

Ala Glu Ser Gln Ile Trp Asn Gly Phe Gln Arg Ile Asp Leu Asp His
                85                  90                  95

Asp Gly Lys Ile Gly Ile Asn Glu Ile Asn Arg Tyr Leu Ser Asp Leu
            100                 105                 110

Asp Asn Gln Ser Ile Cys Asn Asn Glu Leu Asn His Glu Leu Ser Asn
        115                 120                 125

Glu Lys Val Asn Lys Phe Ser Arg Phe Phe Glu Trp Ala Phe Pro Lys
    130                 135                 140

Arg Lys Ala Asn Ile Ala Leu Arg Gly Gln Ala Ser His Lys Lys Asn
145                 150                 155                 160

Thr Asp Asn Asp Arg Ser Lys Lys Thr Thr Asp Ser Asp Leu Tyr Val
                165                 170                 175

Thr Tyr Asp Gln Trp Arg Asp Phe Leu Leu Leu Val Pro Arg Lys Gln
            180                 185                 190
```

[0142]

```
Gly Ser Arg Leu His Thr Ala Tyr Ser Tyr Phe Tyr Leu Phe Asn Glu
        195                 200                 205

Asp Val Asp Leu Ser Ser Glu Gly Asp Val Thr Leu Ile Asn Asp Phe
    210                 215                 220

Ile Arg Gly Phe Gly Phe Phe Ile Ala Gly Gly Ile Ser Gly Val Ile
225                 230                 235                 240

Ser Arg Thr Cys Thr Ala Pro Phe Asp Arg Leu Lys Val Phe Leu Ile
                245                 250                 255

Ala Arg Thr Asp Leu Ser Ser Ile Leu Leu Asn Ser Lys Thr Asp Leu
            260                 265                 270

Leu Ala Lys Asn Pro Asn Ala Asp Ile Asn Lys Ile Ser Ser Pro Leu
        275                 280                 285

Ala Lys Ala Val Lys Ser Leu Tyr Arg Gln Gly Gly Ile Lys Ala Phe
    290                 295                 300

Tyr Val Gly Asn Gly Leu Asn Val Ile Lys Val Phe Pro Glu Ser Ser
305                 310                 315                 320

Ile Lys Phe Gly Ser Phe Glu Val Thr Lys Lys Ile Met Thr Lys Leu
```

325 330 335

Glu Gly Cys Arg Asp Thr Lys Asp Leu Ser Lys Phe Ser Thr Tyr Ile
340 345 350

Ala Gly Gly Leu Ala Gly Met Ala Ala Gln Phe Ser Val Tyr Pro Ile
355 360 365

Asp Thr Leu Lys Phe Arg Val Gln Cys Ala Pro Leu Asp Thr Lys Leu
370 375 380

Lys Gly Asn Asn Leu Leu Phe Gln Thr Ala Lys Asp Met Phe Arg Glu
385 390 395 400

Gly Gly Gly Gln Ile Ile Leu Gln Arg Cys His Ser Arg Tyr Ser Gly
405 410 415

His Ile Ser Leu Cys Cys Ile Arg Phe Gly Asp Phe Phe Cys Leu Lys
420 425 430

Lys Met Val Tyr Cys Gln Thr Gly Lys Asp Pro Glu Pro Thr Thr Arg
435 440 445

Ser Gly His Ser Lys Gln Pro Gly Cys Thr Ser Asn Gly Cys Ile Gln
450 455 460

[0143] Trp Asn Cys Arg Ser Phe Cys Cys Leu Ser Asn Gln Ser Phe Lys Asn
465 470 475 480

Lys Thr Thr Ser Pro Arg Asn Ile Cys Thr Ser Leu Cys Val
485 490

<210> 62
<211> 642
<212> PRT
<213> 酿酒酵母

<400> 62

Met Val His Ile Thr Leu Gly Gln Ala Ile Trp Val Ser Val Lys Pro
1 5 10 15

Ile Ile Lys Ile Tyr Leu Ile Ile Gly Val Gly Phe Leu Met Ala Lys
20 25 30

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

Leu Thr Val Leu Leu Pro Ser Leu Ser Phe Asn Lys Ile Val Ala Asn
50 55 60

Ile Glu Asp Lys Asp Ile Lys Ser Val Gly Ile Ile Cys Leu Ser Ala
65 70 75 80

Leu Leu Ile Phe Gly Ser Gly Phe Phe Phe Ala Tyr Val Val Arg Leu

85 90 95

Phe Leu Pro Val Pro Lys Gln Trp Tyr Gly Gly Ile Leu Ala Gly Gly
100 105 110

Met Phe Pro Asn Ile Ser Asp Leu Pro Ile Ala Tyr Leu Gln Ser Met
115 120 125

Asp Gln Gly Leu Val Phe Ser Glu Glu Glu Gly Asn Lys Gly Val Ala
130 135 140

Asn Val Ile Ile Phe Leu Thr Met Phe Leu Ile Cys Ile Phe Asn Leu
145 150 155 160

Gly Gly Phe Arg Leu Ile Glu Ser Asp Phe Glu Tyr Asn Asp Asp Glu
165 170 175

Ser Ala Val Arg Val Ser Glu Thr Thr Lys Thr Gln Pro Ala Val Ser
180 185 190

Ala Asn Thr Thr Asn Thr Asp Thr Ser Glu Arg Phe Phe Ser Asn Glu
195 200 205

Gln Gln Leu Phe Asn Asn Lys Tyr Thr Ala Arg Asp Ser Leu Thr Glu
210 215 220

[0144]

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

Arg Ser Thr Asn Ser Ile Ala Pro Leu Ser Leu Pro Asp Thr Ser Ser
245 250 255

Asn Ser Lys Ile Thr Lys Pro Val Gln Val Lys Ala Arg Asn Thr Ile
260 265 270

Ala Cys Thr Gln Ser Glu Glu Ser Gln Ala Thr Arg Gly Ser Asn Pro
275 280 285

Leu Asp Ser Gln Ser Ser Ala Ser Thr Ile His Ser Tyr Asn Thr Ser
290 295 300

Glu Ser Tyr Glu Ser Ser Ile Asp Thr Met Arg Ala Arg Arg Thr Ala
305 310 315 320

Ser Gln Pro Arg Ala Tyr Asn Thr Thr Thr Leu Leu Glu Glu Asn Cys
325 330 335

Leu Asp Glu Lys Cys Pro Lys Asn Met Ser Met Ala Ala Leu Glu Pro
340 345 350

Ile Arg Ser Ile Asp Met Arg Ala Leu Pro Ser Gln Asn Ile His His
355 360 365

Leu Ile Arg Glu Tyr Ser Asn Val Asp Gln Tyr Gly His Gln Arg Arg
370 375 380

Asn Ser Ser Leu Arg Gly Ala Asp Met Asn Asp Val His Ser Ile Ser
385 390 395 400

Ser Asn Ser Thr Leu Gln Thr Ile Lys Thr Ala Asn Leu Thr Arg Ile
405 410 415

Leu Thr Ser Asp Ala Thr Val Ser Lys Lys Asp Ile Glu Thr Ser Gly
420 425 430

Glu Ser Leu Pro Gln Trp Met Arg Lys Phe Ser Leu Thr Pro Leu Leu
435 440 445

Val Phe Phe Leu Lys Asn Cys Leu Arg Pro Cys Ser Met Ala Val Ile
450 455 460

Ile Ala Leu Thr Val Ala Phe Ile Pro Trp Val Lys Ala Leu Phe Val
465 470 475 480

Thr Thr Ala Asn Thr Pro His Ile Ser Gln Ala Pro Asp Asn Ala Pro
485 490 495

Pro Leu Ser Phe Phe Met Asp Phe Thr Gly Tyr Val Gly Ala Ala Cys
500 505 510

[0145]

Val Pro Phe Gly Leu Ile Leu Leu Gly Ala Thr Leu Gly Arg Leu Lys
515 520 525

Ile Gly Asn Leu Tyr Pro Gly Phe Trp Lys Ala Ala Val Thr Leu Val
530 535 540

Ile Leu Arg Gln Cys Val Met Pro Ile Phe Gly Val Leu Trp Cys Asp
545 550 555 560

Arg Leu Val Lys Ala Gly Trp Val Asn Trp Gln Asp Asp Arg Met Leu
565 570 575

Leu Phe Val Ile Ala Ile Ser Trp Asn Leu Pro Thr Met Thr Thr Leu
580 585 590

Ile Tyr Phe Thr Ala Ser Phe Thr Pro Pro Glu Thr Thr Ala Pro Ile
595 600 605

Gln Met Glu Cys Val Ser Phe Phe Leu Met Leu Gln Tyr Pro Leu Met
610 615 620

Val Val Ser Leu Pro Phe Leu Val Ser Tyr Phe Leu Lys Val Gln Met
625 630 635 640

Asn Leu

<210> 63
<211> 617
<212> PRT
<213> 酿酒酵母

<400> 63

Met Lys Ser Phe Ile Thr Arg Asn Lys Thr Ala Ile Leu Ala Thr Val
1 5 10 15

Ala Ala Thr Gly Thr Ala Ile Gly Ala Tyr Tyr Tyr Tyr Asn Gln Leu
20 25 30

Gln Gln Gln Gln Gln Arg Gly Lys Lys Asn Thr Ile Asn Lys Asp Glu
35 40 45

Lys Lys Asp Thr Lys Asp Ser Gln Lys Glu Thr Glu Gly Ala Lys Lys
50 55 60

Ser Thr Ala Pro Ser Asn Pro Pro Ile Tyr Pro Val Ser Ser Asn Gly
65 70 75 80

Glu Pro Asp Phe Ser Asn Lys Ala Asn Phe Thr Ala Glu Glu Lys Asp
85 90 95

Lys Tyr Ala Leu Ala Leu Lys Asp Lys Gly Asn Gln Phe Phe Arg Asn
100 105 110

[0146]

Lys Lys Tyr Asp Asp Ala Ile Lys Tyr Tyr Asn Trp Ala Leu Glu Leu
115 120 125

Lys Glu Asp Pro Val Phe Tyr Ser Asn Leu Ser Ala Cys Tyr Val Ser
130 135 140

Val Gly Asp Leu Lys Lys Val Val Glu Met Ser Thr Lys Ala Leu Glu
145 150 155 160

Leu Lys Pro Asp Tyr Ser Lys Val Leu Leu Arg Arg Ala Ser Ala Asn
165 170 175

Glu Gly Leu Gly Lys Phe Ala Asp Ala Met Phe Asp Leu Ser Val Leu
180 185 190

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

Arg Asn Leu Asn Lys Gln Ala Met Ser Lys Leu Lys Glu Lys Phe Gly
210 215 220

Asp Ile Asp Thr Ala Thr Ala Thr Pro Thr Glu Leu Ser Thr Gln Pro
225 230 235 240

Ala Lys Glu Arg Lys Asp Lys Gln Glu Asn Leu Pro Ser Val Thr Ser
245 250 255

Met Ala Ser Phe Phe Gly Ile Phe Lys Pro Glu Leu Thr Phe Ala Asn
260 265 270

Tyr Asp Glu Ser Asn Glu Ala Asp Lys Glu Leu Met Asn Gly Leu Ser
275 280 285

Asn Leu Tyr Lys Arg Ser Pro Glu Ser Tyr Asp Lys Ala Asp Glu Ser
290 295 300

Phe Thr Lys Ala Ala Arg Leu Phe Glu Glu Gln Leu Asp Lys Asn Asn
305 310 315 320

Glu Asp Glu Lys Leu Lys Glu Lys Leu Ala Ile Ser Leu Glu His Thr
325 330 335

Gly Ile Phe Lys Phe Leu Lys Asn Asp Pro Leu Gly Ala His Glu Asp
340 345 350

Ile Lys Lys Ala Ile Glu Leu Phe Pro Arg Val Asn Ser Tyr Ile Tyr
355 360 365

Met Ala Leu Ile Met Ala Asp Arg Asn Asp Ser Thr Glu Tyr Tyr Asn
370 375 380

Tyr Phe Asp Lys Ala Leu Lys Leu Asp Ser Asn Asn Ser Ser Val Tyr
385 390 395 400

[0147]

Tyr His Arg Gly Gln Met Asn Phe Ile Leu Gln Asn Tyr Asp Gln Ala
405 410 415

Gly Lys Asp Phe Asp Lys Ala Lys Glu Leu Asp Pro Glu Asn Ile Phe
420 425 430

Pro Tyr Ile Gln Leu Ala Cys Leu Ala Tyr Arg Glu Asn Lys Phe Asp
435 440 445

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

Pro Glu Val Pro Asn Phe Phe Ala Glu Ile Leu Thr Asp Lys Asn Asp
465 470 475 480

Phe Asp Lys Ala Leu Lys Gln Tyr Asp Leu Ala Ile Glu Leu Glu Asn
485 490 495

Lys Leu Asp Gly Ile Tyr Val Gly Ile Ala Pro Leu Val Gly Lys Ala
500 505 510

Thr Leu Leu Thr Arg Asn Pro Thr Val Glu Asn Phe Ile Glu Ala Thr
515 520 525

Asn Leu Leu Glu Lys Ala Ser Lys Leu Asp Pro Arg Ser Glu Gln Ala
530 535 540

Lys Ile Gly Leu Ala Gln Met Lys Leu Gln Gln Glu Asp Ile Asp Glu
545 550 555 560

Ala Ile Thr Leu Phe Glu Glu Ser Ala Asp Leu Ala Arg Thr Met Glu
565 570 575

Glu Lys Leu Gln Ala Ile Thr Phe Ala Glu Ala Ala Lys Val Gln Gln
580 585 590

Arg Ile Arg Ser Asp Pro Val Leu Ala Lys Lys Ile Gln Glu Thr Leu
595 600 605

Ala Lys Leu Arg Glu Gln Gly Leu Met
610 615

<210> 64
<211> 499
<212> PRT
<213> 酿酒酵母

<400> 64

Met Ser Tyr Asn Phe Thr Gly Thr Pro Thr Gly Glu Gly Thr Gly Gly
1 5 10 15

Asn Ser Leu Thr Thr Asp Leu Asn Thr Gln Phe Asp Leu Ala Asn Met
20 25 30

[0148]

Gly Trp Ile Gly Val Ala Ser Ala Gly Val Trp Ile Met Val Pro Gly
35 40 45

Ile Gly Leu Leu Tyr Ser Gly Leu Ser Arg Lys Lys His Ala Leu Ser
50 55 60

Leu Leu Trp Ala Ser Met Met Ala Ser Ala Val Cys Ile Phe Gln Trp
65 70 75 80

Phe Phe Trp Gly Tyr Ser Leu Ala Phe Ser His Asn Thr Arg Gly Asn
85 90 95

Gly Phe Ile Gly Thr Leu Glu Phe Phe Gly Phe Arg Asn Val Leu Gly
100 105 110

Ala Pro Ser Ser Val Ser Ser Leu Pro Asp Ile Leu Phe Ala Val Tyr
115 120 125

Gln Gly Met Phe Ala Ala Val Thr Gly Ala Leu Met Leu Gly Gly Ala
130 135 140

Cys Glu Arg Ala Arg Leu Phe Pro Met Met Val Phe Leu Phe Leu Trp
145 150 155 160

Met Thr Ile Val Tyr Cys Pro Ile Ala Cys Trp Val Trp Asn Ala Glu
165 170 175

Gly Trp Leu Val Lys Leu Gly Ser Leu Asp Tyr Ala Gly Gly Leu Cys
180 185 190

Val His Leu Thr Ser Gly His Gly Gly Leu Val Tyr Ala Leu Ile Leu
195 200 205

Gly Lys Arg Asn Asp Pro Val Thr Arg Lys Gly Met Pro Lys Tyr Lys
210 215 220

Pro His Ser Val Thr Ser Val Val Leu Gly Thr Val Phe Leu Trp Phe
225 230 235 240

Gly Trp Met Phe Phe Asn Gly Gly Ser Ala Gly Asn Ala Thr Ile Arg
245 250 255

Ala Trp Tyr Ser Ile Met Ser Thr Asn Leu Ala Ala Ala Cys Gly Gly
260 265 270

Leu Thr Trp Met Val Ile Asp Tyr Phe Arg Cys Gly Arg Lys Trp Thr
275 280 285

Thr Val Gly Leu Cys Ser Gly Ile Ile Ala Gly Leu Val Gly Ile Thr
290 295 300

Pro Ala Ala Gly Phe Val Pro Ile Trp Ser Ala Val Val Ile Gly Val
305 310 315 320

[0149]

Val Thr Gly Ala Gly Cys Asn Leu Ala Val Asp Leu Lys Ser Leu Leu
325 330 335

Arg Ile Asp Asp Gly Leu Asp Cys Tyr Ser Ile His Gly Val Gly Gly
340 345 350

Cys Ile Gly Ser Val Leu Thr Gly Ile Phe Ala Ala Asp Tyr Val Asn
355 360 365

Ala Thr Ala Gly Ser Tyr Ile Ser Pro Ile Asp Gly Gly Trp Ile Asn
370 375 380

His His Tyr Lys Gln Val Gly Tyr Gln Leu Ala Gly Ile Cys Ala Ala
385 390 395 400

Leu Ala Trp Thr Val Thr Val Thr Ser Ile Leu Leu Leu Thr Met Asn
405 410 415

Ala Ile Pro Phe Leu Lys Leu Arg Leu Ser Ala Asp Glu Glu Glu Leu
420 425 430

Gly Thr Asp Ala Ala Gln Ile Gly Glu Phe Thr Tyr Glu Glu Ser Thr
435 440 445

Ala Tyr Ile Pro Glu Pro Ile Arg Ser Lys Thr Ser Ala Gln Met Pro

450 455 460

Pro Pro His Glu Asn Ile Asp Asp Lys Ile Val Gly Asn Thr Asp Ala
465 470 475 480

Glu Lys Asn Ser Thr Pro Ser Asp Ala Ser Ser Thr Lys Asn Thr Asp
485 490 495

His Ile Val

<210> 65
<211> 592
<212> PRT
<213> 酿酒酵母

<400> 65

Met Thr Glu Asp Phe Ile Ser Ser Val Lys Arg Ser Asn Glu Glu Leu
1 5 10 15

Lys Glu Arg Lys Ser Asn Phe Gly Phe Val Glu Tyr Lys Ser Lys Gln
20 25 30

Leu Thr Ser Ser Ser Ser His Asn Ser Asn Ser Ser His His Asp Asp
35 40 45

[0150]

Asp Asn Gln His Gly Lys Arg Asn Ile Phe Gln Arg Cys Val Asp Ser
50 55 60

Phe Lys Ser Pro Leu Asp Gly Ser Phe Asp Thr Ser Asn Leu Lys Arg
65 70 75 80

Thr Leu Lys Pro Arg His Leu Ile Met Ile Ala Ile Gly Gly Ser Ile
85 90 95

Gly Thr Gly Leu Phe Val Gly Ser Gly Lys Ala Ile Ala Glu Gly Gly
100 105 110

Pro Leu Gly Val Val Ile Gly Trp Ala Ile Ala Gly Ser Gln Ile Ile
115 120 125

Gly Thr Ile His Gly Leu Gly Glu Ile Thr Val Arg Phe Pro Val Val
130 135 140

Gly Ala Phe Ala Asn Tyr Gly Thr Arg Phe Leu Asp Pro Ser Ile Ser
145 150 155 160

Phe Val Val Ser Thr Ile Tyr Val Leu Gln Trp Phe Phe Val Leu Pro
165 170 175

Leu Glu Ile Ile Ala Ala Ala Met Thr Val Gln Tyr Trp Asn Ser Ser
180 185 190

Ile Asp Pro Val Ile Trp Val Ala Ile Phe Tyr Ala Val Ile Val Ser

195 200 205

Ile Asn Leu Phe Gly Val Arg Gly Phe Gly Glu Ala Glu Phe Ala Phe
210 215 220

Ser Thr Ile Lys Ala Ile Thr Val Cys Gly Phe Ile Ile Leu Cys Val
225 230 235 240

Val Leu Ile Cys Gly Gly Gly Pro Asp His Glu Phe Ile Gly Ala Lys
245 250 255

Tyr Trp His Asp Pro Gly Cys Leu Ala Asn Gly Phe Pro Gly Val Leu
260 265 270

Ser Val Leu Val Val Ala Ser Tyr Ser Leu Gly Gly Ile Glu Met Thr
275 280 285

Cys Leu Ala Ser Gly Glu Thr Asp Pro Lys Gly Leu Pro Ser Ala Ile
290 295 300

Lys Gln Val Phe Trp Arg Ile Leu Phe Phe Phe Leu Ile Ser Leu Thr
305 310 315 320

Leu Val Gly Phe Leu Val Pro Tyr Thr Asn Gln Asn Leu Leu Gly Gly
325 330 335

[0151]

Ser Ser Val Asp Asn Ser Pro Phe Val Ile Ala Ile Lys Leu His His
340 345 350

Ile Lys Ala Leu Pro Ser Ile Val Asn Ala Val Ile Leu Ile Ser Val
355 360 365

Leu Ser Val Gly Asn Ser Cys Ile Phe Ala Ser Ser Arg Thr Leu Cys
370 375 380

Ser Met Ala His Gln Gly Leu Ile Pro Trp Trp Phe Gly Tyr Ile Asp
385 390 395 400

Arg Ala Gly Arg Pro Leu Val Gly Ile Met Ala Asn Ser Leu Phe Gly
405 410 415

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

Trp Leu Met Ala Ile Ala Gly Leu Ala Thr Cys Ile Val Trp Leu Ser
435 440 445

Ile Asn Leu Ser His Ile Arg Phe Arg Leu Ala Met Lys Ala Gln Gly
450 455 460

Lys Ser Leu Asp Glu Leu Glu Phe Val Ser Ala Val Gly Ile Trp Gly
465 470 475 480

Ser Ala Tyr Ser Ala Leu Ile Asn Cys Leu Ile Leu Ile Ala Gln Phe
485 490 495

Tyr Cys Ser Leu Trp Pro Ile Gly Gly Trp Thr Ser Gly Lys Glu Arg
500 505 510

Ala Lys Ile Phe Phe Gln Asn Tyr Leu Cys Ala Leu Ile Met Leu Phe
515 520 525

Ile Phe Ile Val His Lys Ile Tyr Tyr Lys Cys Gln Thr Gly Lys Trp
530 535 540

Trp Gly Val Lys Ala Leu Lys Asp Ile Asp Leu Glu Thr Asp Arg Lys
545 550 555 560

Asp Ile Asp Ile Glu Ile Val Lys Gln Glu Ile Ala Glu Lys Lys Met
565 570 575

Tyr Leu Asp Ser Arg Pro Trp Tyr Val Arg Gln Phe His Phe Trp Cys
580 585 590

<210> 66
<211> 1294
<212> PRT
<213> 酿酒酵母

<400> 66

[0152]

Met Ser Gln Gln Glu Asn Gly Asp Val Ala Thr Glu Leu Ile Glu Asn
1 5 10 15

Arg Leu Ser Phe Ser Arg Ile Pro Arg Ile Ser Leu His Val Arg Asp
20 25 30

Leu Ser Ile Val Ala Ser Lys Thr Asn Thr Thr Leu Val Asn Thr Phe
35 40 45

Ser Met Asp Leu Pro Ser Gly Ser Val Met Ala Val Met Gly Gly Ser
50 55 60

Gly Ser Gly Lys Thr Thr Leu Leu Asn Val Leu Ala Ser Lys Ile Ser
65 70 75 80

Gly Gly Leu Thr His Asn Gly Ser Ile Arg Tyr Val Leu Glu Asp Thr
85 90 95

Gly Ser Glu Pro Asn Glu Thr Glu Pro Lys Arg Ala His Leu Asp Gly
100 105 110

Gln Asp His Pro Ile Gln Lys His Val Ile Met Ala Tyr Leu Pro Gln
115 120 125

Gln Asp Val Leu Ser Pro Arg Leu Thr Cys Arg Glu Thr Leu Lys Phe
130 135 140

```
Ala Ala Asp Leu Lys Leu Asn Ser Ser Glu Arg Thr Lys Lys Leu Met
145                 150                 155                 160

Val Glu Gln Leu Ile Glu Glu Leu Gly Leu Lys Asp Cys Ala Asp Thr
                165                 170                 175

Leu Val Gly Asp Asn Ser His Arg Gly Leu Ser Gly Gly Glu Lys Arg
            180                 185                 190

Arg Leu Ser Ile Gly Thr Gln Met Ile Ser Asn Pro Ser Ile Met Phe
        195                 200                 205

Leu Asp Glu Pro Thr Thr Gly Leu Asp Ala Tyr Ser Ala Phe Leu Val
    210                 215                 220

Ile Lys Thr Leu Lys Lys Leu Ala Lys Glu Asp Gly Arg Thr Phe Ile
225                 230                 235                 240

Met Ser Ile His Gln Pro Arg Ser Asp Ile Leu Phe Leu Leu Asp Gln
                245                 250                 255

Val Cys Ile Leu Ser Lys Gly Asn Val Val Tyr Cys Asp Lys Met Asp
            260                 265                 270

Asn Thr Ile Pro Tyr Phe Glu Ser Ile Gly Tyr His Val Pro Gln Leu
        275                 280                 285
```

[0153]

```
Val Asn Pro Ala Asp Tyr Phe Ile Asp Leu Ser Ser Val Asp Ser Arg
    290                 295                 300

Ser Asp Lys Glu Glu Ala Ala Thr Gln Ser Arg Leu Asn Ser Leu Ile
305                 310                 315                 320

Asp His Trp His Asp Tyr Glu Arg Thr His Leu Gln Leu Gln Ala Glu
                325                 330                 335

Ser Tyr Ile Ser Asn Ala Thr Glu Ile Gln Ile Gln Asn Met Thr Thr
            340                 345                 350

Arg Leu Pro Phe Trp Lys Gln Val Thr Val Leu Thr Arg Arg Asn Phe
        355                 360                 365

Lys Leu Asn Phe Ser Asp Tyr Val Thr Leu Ile Ser Thr Phe Ala Glu
    370                 375                 380

Pro Leu Ile Ile Gly Thr Val Cys Gly Trp Ile Tyr Tyr Lys Pro Asp
385                 390                 395                 400

Lys Ser Ser Ile Gly Gly Leu Arg Thr Thr Thr Ala Cys Leu Tyr Ala
                405                 410                 415

Ser Thr Ile Leu Gln Cys Tyr Leu Tyr Leu Leu Phe Asp Thr Tyr Arg
            420                 425                 430
```

```
Leu Cys Glu Gln Asp Ile Ala Leu Tyr Asp Arg Glu Arg Ala Glu Gly
        435                 440                 445

Ser Val Thr Pro Leu Ala Phe Ile Val Ala Arg Lys Ile Ser Leu Phe
    450                 455                 460

Leu Ser Asp Asp Phe Ala Met Thr Met Ile Phe Val Ser Ile Thr Tyr
465                 470                 475                 480

Phe Met Phe Gly Leu Glu Ala Asp Ala Arg Lys Phe Phe Tyr Gln Phe
                485                 490                 495

Ala Val Val Phe Leu Cys Gln Leu Ser Cys Ser Gly Leu Ser Met Leu
            500                 505                 510

Ser Val Ala Val Ser Arg Asp Phe Ser Lys Ala Ser Leu Val Gly Asn
        515                 520                 525

Met Thr Phe Thr Val Leu Ser Met Gly Cys Gly Phe Phe Val Asn Ala
    530                 535                 540

Lys Val Met Pro Val Tyr Val Arg Trp Ile Lys Tyr Ile Ala Phe Thr
545                 550                 555                 560

Trp Tyr Ser Phe Gly Thr Leu Met Ser Ser Thr Phe Thr Asn Ser Tyr
                565                 570                 575
```

[0154]

```
Cys Thr Thr Asp Asn Leu Asp Glu Cys Leu Gly Asn Gln Ile Leu Glu
            580                 585                 590

Val Tyr Gly Phe Pro Arg Asn Trp Ile Thr Val Pro Ala Val Val Leu
        595                 600                 605

Leu Cys Trp Ser Val Gly Tyr Phe Val Val Gly Ala Ile Ile Leu Tyr
    610                 615                 620

Leu His Lys Ile Asp Ile Thr Leu Gln Asn Glu Val Lys Ser Lys Gln
625                 630                 635                 640

Lys Lys Ile Lys Lys Lys Ser Pro Thr Gly Met Lys Pro Glu Ile Gln
                645                 650                 655

Leu Leu Asp Asp Val Tyr His Gln Lys Asp Leu Glu Ala Glu Lys Gly
            660                 665                 670

Lys Asn Ile His Ile Thr Ile Lys Leu Glu Asp Ile Asp Leu Arg Val
        675                 680                 685

Ile Phe Ser Ala Pro Phe Ser Asn Trp Lys Glu Gly Asn Phe His His
    690                 695                 700

Glu Thr Lys Glu Ile Leu Gln Ser Val Asn Ala Ile Phe Lys Pro Gly
705                 710                 715                 720
```

Met Ile Asn Ala Ile Met Gly Pro Ser Gly Ser Gly Lys Ser Ser Leu
725 730 735

Leu Asn Leu Ile Ser Gly Arg Leu Lys Ser Ser Val Phe Ala Lys Phe
740 745 750

Asp Thr Ser Gly Ser Ile Met Phe Asn Asp Ile Gln Val Ser Glu Leu
755 760 765

Met Phe Lys Asn Val Cys Ser Tyr Val Ser Gln Asp Asp Asp His Leu
770 775 780

Leu Ala Ala Leu Thr Val Lys Glu Thr Leu Lys Tyr Ala Ala Ala Leu
785 790 795 800

Arg Leu His His Leu Thr Glu Ala Glu Arg Met Glu Arg Thr Asp Asn
805 810 815

Leu Ile Arg Ser Leu Gly Leu Lys His Cys Glu Asn Asn Ile Ile Gly
820 825 830

Asn Glu Phe Val Lys Gly Ile Ser Gly Gly Glu Lys Arg Arg Val Thr
835 840 845

Met Gly Val Gln Leu Leu Asn Asp Pro Pro Ile Leu Leu Leu Asp Glu
850 855 860

[0155]

Pro Thr Ser Gly Leu Asp Ser Phe Thr Ser Ala Thr Ile Leu Glu Ile
865 870 875 880

Leu Glu Lys Leu Cys Arg Glu Gln Gly Lys Thr Ile Ile Ile Thr Ile
885 890 895

His Gln Pro Arg Ser Glu Leu Phe Lys Arg Phe Gly Asn Val Leu Leu
900 905 910

Leu Ala Lys Ser Gly Arg Thr Ala Phe Asn Gly Ser Pro Asp Glu Met
915 920 925

Ile Ala Tyr Phe Thr Glu Leu Gly Tyr Asn Cys Pro Ser Phe Thr Asn
930 935 940

Val Ala Asp Phe Phe Leu Asp Leu Ile Ser Val Asn Thr Gln Asn Glu
945 950 955 960

Gln Asn Glu Ile Ser Ser Arg Ala Arg Val Glu Lys Ile Leu Ser Ala
965 970 975

Trp Lys Ala Asn Met Asp Asn Glu Ser Leu Ser Pro Thr Pro Ile Ser
980 985 990

Glu Lys Gln Gln Tyr Ser Gln Glu Ser Phe Phe Thr Glu Tyr Ser Glu

995 1000 1005

Phe Val Arg Lys Pro Ala Asn Leu Val Leu Ala Tyr Ile Val Asn
1010 1015 1020

Val Lys Arg Gln Phe Thr Thr Thr Arg Arg Ser Phe Asp Ser Leu
1025 1030 1035

Met Ala Arg Ile Ala Gln Ile Pro Gly Leu Gly Val Ile Phe Ala
1040 1045 1050

Leu Phe Phe Ala Pro Val Lys His Asn Tyr Thr Ser Ile Ser Asn
1055 1060 1065

Arg Leu Gly Leu Ala Gln Glu Ser Thr Ala Leu Tyr Phe Val Gly
1070 1075 1080

Met Leu Gly Asn Leu Ala Cys Tyr Pro Thr Glu Arg Asp Tyr Phe
1085 1090 1095

Tyr Glu Glu Tyr Asn Asp Asn Val Tyr Gly Ile Ala Pro Phe Phe
1100 1105 1110

Leu Ala Tyr Met Thr Leu Glu Leu Pro Leu Ser Ala Leu Ala Ser
1115 1120 1125

[0156]

Val Leu Tyr Ala Val Phe Thr Val Leu Ala Cys Gly Leu Pro Arg
1130 1135 1140

Thr Ala Gly Asn Phe Phe Ala Thr Val Tyr Cys Ser Phe Ile Val
1145 1150 1155

Thr Cys Cys Gly Glu Ala Leu Gly Ile Met Thr Asn Thr Phe Phe
1160 1165 1170

Glu Arg Pro Gly Phe Val Val Asn Cys Ile Ser Ile Ile Leu Ser
1175 1180 1185

Ile Gly Thr Gln Met Ser Gly Leu Met Ser Leu Gly Met Ser Arg
1190 1195 1200

Val Leu Lys Gly Phe Asn Tyr Leu Asn Pro Val Gly Tyr Thr Ser
1205 1210 1215

Met Ile Ile Ile Asn Phe Ala Phe Pro Gly Asn Leu Lys Leu Thr
1220 1225 1230

Cys Glu Asp Gly Gly Lys Asn Ser Asp Gly Thr Cys Glu Phe Ala
1235 1240 1245

Asn Gly His Asp Val Leu Val Ser Tyr Gly Leu Val Arg Asn Thr
1250 1255 1260

Gln Lys Tyr Leu Gly Ile Ile Val Cys Val Ala Ile Ile Tyr Arg
1265 1270 1275

Leu Ile Ala Phe Phe Ile Leu Lys Ala Lys Leu Glu Trp Ile Lys
1280 1285 1290

Trp

<210> 67
<211> 68
<212> PRT
<213> 酿酒酵母

<400> 67

Met Gly Ala Ala Tyr His Phe Met Gly Lys Ala Ile Pro Pro His Gln
1 5 10 15

Leu Ala Ile Gly Thr Leu Gly Leu Leu Gly Leu Leu Val Val Pro Asn
20 25 30

Pro Phe Lys Ser Ala Lys Pro Lys Thr Val Asp Ile Lys Thr Asp Asn
35 40 45

Lys Asp Glu Glu Lys Phe Ile Glu Asn Tyr Leu Lys Lys His Ser Glu
50 55 60

[0157] Lys Gln Asp Ala
65

<210> 68
<211> 575
<212> PRT
<213> 酿酒酵母

<400> 68

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

Glu Ala Arg Lys Arg Asn Ile Ser Glu Glu Val Phe Glu Leu Arg Asp
20 25 30

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

Phe Thr Ser Ser Ser Ser Asn His Glu Arg Glu Asp Thr Tyr Val Ser
50 55 60

Lys Arg Gln Val Met Arg Asp Ile Phe Ala Lys Tyr Leu Lys Phe Ile
65 70 75 80

Gly Pro Gly Leu Met Val Ser Val Ala Tyr Ile Asp Pro Gly Asn Tyr
85 90 95

Ser Thr Ala Val Asp Ala Gly Ala Ser Asn Gln Phe Ser Leu Leu Cys

100 105 110

Ile Ile Leu Leu Ser Asn Phe Ile Ala Ile Phe Leu Gln Cys Leu Cys
115 120 125

Ile Lys Leu Gly Ser Val Thr Gly Leu Asp Leu Ser Arg Ala Cys Arg
130 135 140

Glu Tyr Leu Pro Arg Trp Leu Asn Trp Thr Leu Tyr Phe Phe Ala Glu
145 150 155 160

Cys Ala Val Ile Ala Thr Asp Ile Ala Glu Val Ile Gly Thr Ala Ile
165 170 175

Ala Leu Asn Ile Leu Ile Lys Val Pro Leu Pro Ala Gly Val Ala Ile
180 185 190

Thr Val Val Asp Val Phe Leu Ile Met Phe Thr Tyr Lys Pro Gly Ala
195 200 205

Ser Ser Ile Arg Phe Ile Arg Ile Phe Glu Cys Phe Val Ala Val Leu
210 215 220

Val Val Gly Val Cys Ile Cys Phe Ala Ile Glu Leu Ala Tyr Ile Pro
225 230 235 240

[0158]

Lys Ser Thr Ser Val Lys Gln Val Phe Arg Gly Phe Val Pro Ser Ala
245 250 255

Gln Met Phe Asp His Asn Gly Ile Tyr Thr Ala Ile Ser Ile Leu Gly
260 265 270

Ala Thr Val Met Pro His Ser Leu Phe Leu Gly Ser Ala Leu Val Gln
275 280 285

Pro Arg Leu Leu Asp Tyr Asp Val Lys His Gly Asn Tyr Thr Val Ser
290 295 300

Glu Glu Gln Asp Lys Val Lys Lys Ser Lys Ser Thr Glu Glu Ile Met
305 310 315 320

Glu Glu Lys Tyr Phe Asn Tyr Arg Pro Thr Asn Ala Ala Ile Lys Tyr
325 330 335

Cys Met Lys Tyr Ser Met Val Glu Leu Ser Ile Thr Leu Phe Thr Leu
340 345 350

Ala Leu Phe Val Asn Cys Ala Ile Leu Val Val Ala Gly Ser Thr Leu
355 360 365

Tyr Asn Ser Pro Glu Ala Asp Gly Ala Asp Leu Phe Thr Ile His Glu
370 375 380

Leu Leu Ser Arg Asn Leu Ala Pro Ala Ala Gly Thr Ile Phe Met Leu
385 390 395 400

Ala Leu Leu Leu Ser Gly Gln Ser Ala Gly Val Val Cys Thr Met Ser
405 410 415

Gly Gln Ile Val Ser Glu Gly His Ile Asn Trp Lys Leu Gln Pro Trp
420 425 430

Gln Arg Arg Leu Ala Thr Arg Cys Ile Ser Ile Ile Pro Cys Leu Val
435 440 445

Ile Ser Ile Cys Ile Gly Arg Glu Ala Leu Ser Lys Ala Leu Asn Ala
450 455 460

Ser Gln Val Val Leu Ser Ile Val Leu Pro Phe Leu Val Ala Pro Leu
465 470 475 480

Ile Phe Phe Thr Cys Lys Lys Ser Ile Met Lys Thr Glu Ile Thr Val
485 490 495

Asp His Thr Glu Glu Asp Ser His Asn His Gln Asn Asn Asn Asp Arg
500 505 510

Ser Ala Gly Ser Val Ile Glu Gln Asp Gly Ser Ser Gly Met Glu Ile
515 520 525

[0159]

Glu Asn Gly Lys Asp Val Lys Ile Val Tyr Met Ala Asn Asn Trp Ile
530 535 540

Ile Thr Val Ile Ala Ile Ile Val Trp Leu Phe Leu Ser Leu Leu Asn
545 550 555 560

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

<210> 69
<211> 313
<212> PRT
<213> 酿酒酵母

<400> 69

Met Lys Phe Leu Gly Val Ile Leu Leu Ala Ser Phe Leu Leu Ile Ala
1 5 10 15

Thr Phe Leu Ile Gly Leu Ile Pro Leu Tyr Tyr Ile Asp Lys Gln Lys
20 25 30

Ser Ser Ile Val Thr Asn Gln Glu Gly Ala Asp Ser Ile Ser Asp Phe
35 40 45

Thr Thr Asn Ala Asp Thr Gln Thr Ile Asn Asp Asp Val Ser Ser Tyr
50 55 60

```
Arg Val Lys Ile Ala Val Leu Ser Gln Phe Gly Ile Gly Met Leu Leu
65                  70                  75                  80

Gly Thr Ser Phe Met Leu Val Ile Pro Glu Gly Ile Lys Ala Cys Val
                85                  90                  95

Glu His Asp Gly Asn Val Gly Val Asn Leu Leu Ile Gly Phe Leu Gly
            100                 105                 110

Val Tyr Val Leu Asp Arg Leu Val Thr Leu Trp Val Ser Arg Lys Gln
        115                 120                 125

Thr Val Tyr Thr His Asp Ala Val Lys Phe Gln Ser Trp Lys Asp Ile
    130                 135                 140

Ile Asn His Pro Arg Gln Ile Trp Met Asn Leu Ile Gln Asn Asn Val
145                 150                 155                 160

Val Phe Ala Leu Phe Ile His Gly Leu Ser Asp Gly Ile Ala Leu Gly
                165                 170                 175

Thr Thr Thr Asn Asn Asp Ser Leu Leu Ile Val Val Leu Ile Ala Ile
            180                 185                 190

Val Ile His Lys Ile Pro Ala Val Leu Ser Leu Thr Ser Leu Met Val
        195                 200                 205
```

[0160]

```
Ser Arg Gln Asn Leu Met Lys Trp Glu Val Ile Cys Asn Val Phe Leu
    210                 215                 220

Phe Ala Ser Ser Thr Pro Ile Gly Tyr Ile Val Leu Ser Leu Leu Asn
225                 230                 235                 240

Leu Ser His Ser Pro Thr Met Asp Trp Ile Ser Gly Asn Leu Leu Leu
                245                 250                 255

Met Ser Gly Gly Ser Leu Leu Tyr Ala Ser Phe Thr Ala Phe Val Gly
            260                 265                 270

Gly Asp Ser His Asp His Asp Leu Ser Val Glu Gln Glu Val Val Leu
        275                 280                 285

Pro His Asp Glu Ser Val Tyr Val Leu Ile Gly Val Cys Ile Pro Leu
    290                 295                 300

Val Ile Ser Tyr Cys Ile Ser Glu Glu
305                 310

<210> 70
<211> 675
<212> PRT
<213> 酿酒酵母

<400> 70
```

```
Met Val Ser Ala Asn Gly Asp Leu His Leu Pro Ile Ser Asn Glu Gln
1               5                  10                  15

Cys Met Pro Glu Asn Asn Gly Ser Leu Gly Phe Glu Ala Pro Thr Pro
            20                  25                  30

Arg Gln Ile Leu Arg Val Thr Leu Asn Leu Lys Tyr Leu Ile Asp Lys
        35                  40                  45

Val Val Pro Ile Val Tyr Asp Pro Asn Asp Ile Val Cys Asp His Ser
    50                  55                  60

Glu Ile Leu Ser Pro Lys Val Val Lys Leu Ala Tyr Glu Ala Cys Gly
65                  70                  75                  80

Gly Asn Pro Lys Asp Lys Ala Asn Lys Arg Lys Tyr Gln Ser Val Ile
                85                  90                  95

Ile Phe Ser Leu Leu Lys Val Cys Glu Trp Tyr Ser Ile Leu Ala Thr
            100                 105                 110

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

Gln Gln Leu Cys Lys Leu Leu Ile Glu Arg Glu Glu Thr Arg Asp Leu
    130                 135                 140
```

[0161]

```
Gln Phe Leu Phe Met Gln Leu Leu Leu Arg Arg Tyr Val Ile Asn Glu
145                 150                 155                 160

Asn Asp Glu Asp Gln Glu Pro Leu Asn Ala Leu Glu Leu Ala Thr Asp
                165                 170                 175

Met His Cys Thr Thr Val Ile Gly Ser Ser Gly Phe Gln Arg Cys Leu
            180                 185                 190

Lys Trp Ile Trp Arg Gly Trp Ile Val Gln Asn Gly Leu Asp Pro Thr
        195                 200                 205

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

Phe Asn Pro Val Arg Leu Lys Ala Pro Val Tyr Gln Asn Tyr Leu Gln
225                 230                 235                 240

Met Ile Phe Ser Phe Leu Phe Leu Gly Leu Tyr Thr Leu Val Val Asn
                245                 250                 255

Gly Lys Asp Ser Glu Arg Val Gln Ser Phe Asp Leu Leu Glu Ser Ile
            260                 265                 270

Phe Tyr Val Phe Asn Thr Gly Phe Ile Leu Asp Glu Leu Thr Lys Leu
        275                 280                 285
```

```
Tyr Tyr Ile Gly Tyr Ala His Leu Ser Phe Trp Asn Leu Phe Asn Asp
    290                 295                 300

Thr Thr Tyr Leu Ile Ile Thr Phe Ala Met Gly Phe Arg Ala Met Ser
305                 310                 315                 320

Val Thr Pro Leu Asn Ala Lys Tyr Ser Ser Glu Asp Trp Asp Lys Ile
                325                 330                 335

Ser Tyr Arg Val Leu Ser Cys Ala Ala Pro Phe Val Trp Ser Arg Leu
            340                 345                 350

Leu Leu Tyr Leu Glu Ser Gln Arg Phe Ile Gly Ile Met Leu Val Ile
        355                 360                 365

Leu Lys His Met Met Lys Glu Ser Ile Val Phe Phe Phe Leu Leu Phe
    370                 375                 380

Leu Ile Met Ile Gly Phe Thr Gln Gly Phe Leu Gly Leu Asp Ser Ala
385                 390                 395                 400

Asp Gly Lys Arg Asp Ile Thr Gly Pro Ile Leu Gly Asn Leu Thr Ile
                405                 410                 415

Thr Val Leu Gly Leu Gly Ser Phe Asp Val Phe Glu Glu Phe Ala Pro
            420                 425                 430
```

[0162]

```
Pro Tyr Ala Ala Ile Leu Tyr Tyr Gly Tyr Tyr Phe Ile Val Ser Val
        435                 440                 445

Ile Leu Leu Asn Ile Leu Ile Ala Leu Tyr Ser Thr Ala Tyr Gln Lys
    450                 455                 460

Val Ile Asp Asn Ala Asp Asp Glu Tyr Met Ala Leu Met Ser Gln Lys
465                 470                 475                 480

Thr Leu Arg Tyr Ile Arg Ala Pro Asp Glu Asp Val Tyr Val Ser Pro
                485                 490                 495

Leu Asn Leu Ile Glu Val Phe Met Thr Pro Ile Phe Arg Ile Leu Pro
            500                 505                 510

Pro Lys Arg Ala Lys Asp Leu Ser Tyr Thr Val Met Thr Ile Val Tyr
        515                 520                 525

Ser Pro Phe Leu Leu Leu Ile Ser Val Lys Glu Thr Arg Glu Ala Arg
    530                 535                 540

Arg Ile Lys Tyr Asn Arg Met Lys Arg Leu Asn Asp Asp Ala Asn Glu
545                 550                 555                 560

Tyr Asp Thr Pro Trp Asp Leu Thr Asp Gly Tyr Leu Asp Asp Asp Asp
                565                 570                 575
```

Gly Leu Phe Ser Asp Asn Arg Asn Ser Gly Met Arg Ala Thr Gln Leu
580 585 590

Lys Asn Ser Arg Ser Leu Lys Leu Gln Arg Thr Ala Glu Gln Glu Asp
595 600 605

Val His Phe Lys Val Pro Lys Lys Trp Tyr Lys Asn Val Lys Lys Cys
610 615 620

Ser Pro Ser Phe Glu Gln Tyr Asp Asn Asp Asp Thr Glu Asp Asp Ala
625 630 635 640

Gly Glu Asp Lys Asp Glu Val Lys Glu Leu Thr Lys Lys Val Glu Asn
645 650 655

Leu Thr Ala Val Ile Thr Asp Leu Leu Glu Lys Leu Asp Ile Lys Asp
660 665 670

Lys Lys Glu
675

<210> 71
<211> 613
<212> PRT
<213> 酿酒酵母

<400> 71

[0163]

Met Thr His Ile Thr Leu Gly Gln Ala Ile Trp Ala Ser Val Arg Pro
1 5 10 15

Ile Ile Lys Ile Tyr Leu Ile Ile Gly Val Gly Phe Gly Leu Cys Lys
20 25 30

Met Asn Ile Leu Thr Val Gln Ala Thr Arg Ser Ile Ser Asp Ile Val
35 40 45

Leu Thr Ile Leu Leu Pro Cys Leu Ser Phe Asn Lys Ile Val Ala Asn
50 55 60

Ile Glu Asp Asn Asp Ile Lys Asp Val Gly Ile Ile Cys Leu Thr Ser
65 70 75 80

Val Ile Leu Phe Ala Thr Gly Leu Gly Phe Ala Phe Ile Val Arg Ser
85 90 95

Val Leu Pro Val Pro Lys Arg Trp Arg Gly Gly Ile Leu Ala Gly Gly
100 105 110

Met Phe Pro Asn Ile Ser Asp Leu Pro Ile Ala Tyr Leu Gln Ser Met
115 120 125

Asp Gln Gly Phe Ile Phe Thr Glu Ala Glu Gly Glu Lys Gly Val Ala
130 135 140

```
Asn Val Ile Ile Phe Leu Ala Met Phe Leu Ile Cys Val Phe Asn Leu
145                 150                 155                 160

Gly Gly Phe Arg Leu Ile Glu Asn Asp Phe His Tyr Lys Gly Asp Asp
                165                 170                 175

Asp Glu Glu Asn Thr Leu Thr Asn Asp Asp Ser Ala Gln Gln Pro Thr
            180                 185                 190

Gln Pro Ile Glu Gly Asn Ser Ser Ser Ser Ser Asn Gln Asp Ile Leu
        195                 200                 205

Lys Glu Pro Asn Glu Ser Thr Val Pro Asn Ser Ser Gln Ala Ser Tyr
    210                 215                 220

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

Pro Thr His Thr Ala Pro Pro Ala Ile Asp Asp Arg Ser Ser Asn Ser
                245                 250                 255

Ser Ala Val Val Ser Ile Asp Ser Ile Thr His Ser Leu Arg Thr Asn
            260                 265                 270

His Val Asp Ala Gln Ser Val Ser Glu Leu Asn Asp Pro Thr Tyr Arg
        275                 280                 285
```

[0164]

```
Thr Arg Ser Gln Pro Ile Ala Tyr Thr Thr Glu Ser Arg Thr Ser His
    290                 295                 300

Val His Asn Asn Arg Arg Asn Ser Ile Thr Gly Ser Leu Arg Ser Ile
305                 310                 315                 320

Asp Met Arg Glu Leu Pro Ala Glu Gly Met Ser Asp Leu Ile Arg Glu
                325                 330                 335

Tyr Ser Asn Val Asp Gln Tyr Gly Arg Arg Arg Lys Ser Ser Ile Ser
            340                 345                 350

Ser Gln Gly Ala Pro Ser Val Leu Gln Ala Asp Gly Thr Ile Ser Pro
        355                 360                 365

Asn Leu Thr Arg Thr Ser Thr Leu Gln Arg Val Lys Thr Ser Asn Leu
    370                 375                 380

Thr Arg Ile Ile Thr Ser Asp Ala Thr Val Ser Lys Lys Asp Ile Glu
385                 390                 395                 400

Thr Ser Gly Ser Ser Leu Pro Lys Trp Leu Gln Lys Phe Pro Leu Thr
                405                 410                 415

Lys Phe Phe Val Phe Phe Leu Lys Asn Cys Leu Arg Pro Cys Ser Met
```

420 425 430

Ala Val Ile Leu Ala Leu Ile Ile Ala Phe Ile Pro Trp Val Lys Ala
435 440 445

Leu Phe Val Thr Thr Ser Asn Thr Pro Lys Ile Lys Gln Ala Pro Asp
450 455 460

Asn Ala Pro Ala Leu Thr Phe Ile Met Asp Phe Thr Ser Tyr Val Gly
465 470 475 480

Ala Ala Ser Val Pro Phe Gly Leu Ile Leu Leu Gly Ala Thr Leu Gly
485 490 495

Arg Leu Lys Ile Gly Lys Leu Tyr Pro Gly Phe Trp Lys Ser Ala Val
500 505 510

Val Leu Val Phe Leu Arg Gln Cys Ile Met Pro Ile Phe Gly Val Leu
515 520 525

Trp Cys Asp Arg Leu Val Lys Ala Gly Trp Leu Asn Trp Glu Asn Asp
530 535 540

Lys Met Leu Leu Phe Val Thr Ala Ile Thr Trp Asn Leu Pro Thr Met
545 550 555 560

[0165] Thr Thr Leu Ile Tyr Phe Thr Ala Ser Tyr Thr Pro Glu Asp Glu Thr
565 570 575

Glu Pro Val Gln Met Glu Cys Thr Ser Phe Phe Leu Met Leu Gln Tyr
580 585 590

Pro Leu Met Val Val Ser Leu Pro Phe Leu Val Ser Tyr Phe Ile Lys
595 600 605

Val Gln Met Lys Leu
610

<210> 72
<211> 292
<212> PRT
<213> 酿酒酵母

<400> 72

Met Glu Asp Ser Lys Lys Lys Gly Leu Ile Glu Gly Ala Ile Leu Asp
1 5 10 15

Ile Ile Asn Gly Ser Ile Ala Gly Ala Cys Gly Lys Val Ile Glu Phe
20 25 30

Pro Phe Asp Thr Val Lys Val Arg Leu Gln Thr Gln Ala Ser Asn Val
35 40 45

Phe Pro Thr Thr Trp Ser Cys Ile Lys Phe Thr Tyr Gln Asn Glu Gly

50 55 60

Ile Ala Arg Gly Phe Phe Gln Gly Ile Ala Ser Pro Leu Val Gly Ala
65 70 75 80

Cys Leu Glu Asn Ala Thr Leu Phe Val Ser Tyr Asn Gln Cys Ser Lys
85 90 95

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

Ser Gly Gly Val Ala Gly Ser Cys Ala Ser Leu Val Leu Thr Pro Val
115 120 125

Glu Leu Val Lys Cys Lys Leu Gln Val Ala Asn Leu Gln Val Ala Ser
130 135 140

Ala Lys Thr Lys His Thr Lys Val Leu Pro Thr Ile Lys Ala Ile Ile
145 150 155 160

Thr Glu Arg Gly Leu Ala Gly Leu Trp Gln Gly Gln Ser Gly Thr Phe
165 170 175

Ile Arg Glu Ser Phe Gly Gly Val Ala Trp Phe Ala Thr Tyr Glu Ile
180 185 190

[0166] Val Lys Lys Ser Leu Lys Asp Arg His Ser Leu Asp Asp Pro Lys Arg
195 200 205

Asp Glu Ser Lys Ile Trp Glu Leu Leu Ile Ser Gly Gly Ser Ala Gly
210 215 220

Leu Ala Phe Asn Ala Ser Ile Phe Pro Ala Asp Thr Val Lys Ser Val
225 230 235 240

Met Gln Thr Glu His Ile Ser Leu Thr Asn Ala Val Lys Lys Ile Phe
245 250 255

Gly Lys Phe Gly Leu Lys Gly Phe Tyr Arg Gly Leu Gly Ile Thr Leu
260 265 270

Phe Arg Ala Val Pro Ala Asn Ala Ala Val Phe Tyr Ile Phe Glu Thr
275 280 285

Leu Ser Ala Leu
290

<210> 73
<211> 307
<212> PRT
<213> 酿酒酵母

<400> 73

Met Ser Ser Asp Ser Asn Ala Lys Pro Leu Pro Phe Ile Tyr Gln Phe

```
1               5                  10                  15

Ile Ser Gly Ala Val Ala Gly Ile Ser Glu Leu Thr Val Met Tyr Pro
            20                  25                  30

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

Ala Ala Ala Val Gly Lys Gln Val Glu Arg Tyr Asn Gly Val Ile Asp
    50                  55                  60

Cys Leu Lys Lys Ile Val Lys Lys Glu Gly Phe Ser Arg Leu Tyr Arg
65                  70                  75                  80

Gly Ile Ser Ser Pro Met Leu Met Glu Ala Pro Lys Arg Ala Thr Lys
                85                  90                  95

Phe Ala Cys Asn Asp Gln Tyr Gln Lys Ile Phe Lys Asn Leu Phe Asn
            100                 105                 110

Thr Asn Glu Thr Thr Gln Lys Ile Ser Ile Ala Ala Gly Ala Ser Ala
        115                 120                 125

Gly Met Thr Glu Ala Ala Val Ile Val Pro Phe Glu Leu Ile Lys Ile
    130                 135                 140
```

[0167]

```
Arg Met Gln Asp Val Lys Ser Ser Tyr Leu Gly Pro Met Asp Cys Leu
145                 150                 155                 160

Lys Lys Thr Ile Lys Asn Glu Gly Ile Met Gly Leu Tyr Lys Gly Ile
                165                 170                 175

Glu Ser Thr Met Trp Arg Asn Ala Leu Trp Asn Gly Gly Tyr Phe Gly
            180                 185                 190

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

Gln Lys Thr Arg Asn Asp Leu Ile Ala Gly Ala Ile Gly Gly Thr Val
    210                 215                 220

Gly Thr Met Leu Asn Thr Pro Phe Asp Val Val Lys Ser Arg Ile Gln
225                 230                 235                 240

Ser Val Asp Ala Val Ser Ser Ala Val Lys Lys Tyr Asn Trp Cys Leu
                245                 250                 255

Pro Ser Leu Leu Val Ile Tyr Arg Glu Glu Gly Phe Arg Ala Leu Tyr
            260                 265                 270

Lys Gly Phe Val Pro Lys Val Cys Arg Leu Ala Pro Gly Gly Ser Leu
        275                 280                 285
```

Met Leu Val Val Phe Thr Gly Met Met Asn Phe Phe Arg Asp Leu Lys
290 295 300

Tyr Gly His
305

<210> 74
<211> 1472
<212> PRT
<213> 酿酒酵母

<400> 74

Met Asp Ile Pro Ser Ser Asn Gln Ile Gln His Gly Gln Arg Ser Glu
1 5 10 15

Arg Asn Arg Arg Met Pro Arg Ala Ser Phe Ser Ser Thr Ala Thr Thr
20 25 30

Ser Thr Ala Ala Thr Leu Thr Ser Ala Met Val Leu Asp Gln Asn Asn
35 40 45

Ser Glu Pro Tyr Ala Gly Ala Thr Phe Glu Ala Val Pro Ser Ser Ile
50 55 60

Val Ser Phe His His Pro His Ser Phe Gln Ser Ser Asn Leu Pro Ser
65 70 75 80

[0168]

Pro His Ser Ser Gly Asn Leu Glu Gln Arg Gly Arg Arg Leu Thr Glu
85 90 95

Ser Glu Pro Leu Val Leu Ser Ser Ala Glu Gln Ser Arg Ser Ser Ser
100 105 110

Arg Asn Pro Ser His Phe Arg Phe Phe Thr Gln Glu Gln Ile Ser Asn
115 120 125

Ala Glu Gly Ala Ser Thr Leu Glu Asn Thr Asp Tyr Asp Met Ala Trp
130 135 140

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

Ser Ser Arg Arg Ser Ser Ile Arg Ser Phe Ser Arg Ala Ser Ser Leu
165 170 175

Ser Asn Ala Lys Ser Tyr Gly Ser Phe Ser Lys Arg Gly Arg Ser Gly
180 185 190

Ser Arg Ala Pro Gln Arg Leu Gly Glu Asn Ser Asp Thr Gly Phe Val
195 200 205

Tyr His Ser Ala Thr His Ser Ser Ser Ser Leu Ser Arg Tyr Thr Thr
210 215 220

```
Arg Glu Arg Ile Pro Ile Glu Leu Glu Ser Gln Thr Asp Glu Ile Leu
225                 230                 235                 240

Glu Asp Glu Ser Ser Thr His Ser Leu Glu Ser Ser Asp Ser Arg Arg
                245                 250                 255

Ser Ala Ser Glu Asn Asn Arg Gly Ser Phe Ser Gly His Asp Asp Val
            260                 265                 270

His Asn Gln His Ser Glu Tyr Leu Lys Pro Asp Tyr His Glu Lys Phe
        275                 280                 285

Tyr Pro Gln Tyr Ala Pro Asn Leu His Tyr Gln Arg Phe Tyr Ile Ala
    290                 295                 300

Glu Glu Asp Leu Val Ile Gly Ile Ala Ala Tyr Gln Thr Ser Lys Phe
305                 310                 315                 320

Trp Tyr Ile Ile Tyr Asn Leu Cys Cys Phe Leu Thr Phe Gly Leu Val
                325                 330                 335

Tyr Leu Leu Thr Arg Trp Leu Pro His Leu Lys Val Lys Leu Tyr Gly
            340                 345                 350

Val Lys Val Pro Leu Ala Lys Ala Glu Trp Val Val Ile Glu Asn Glu
        355                 360                 365
```

[0169]

```
Phe Gly Glu Phe Val Ile Gln Pro Ile Asp Arg Gln Trp Tyr Asn Arg
    370                 375                 380

Pro Leu Ser Thr Val Leu Pro Phe Glu Asn Tyr Pro Asn Pro Ser Tyr
385                 390                 395                 400

Glu Pro Asn Asp Ile Asn Leu Ser His His His Ala Asn Glu Ile Asn
                405                 410                 415

Pro Asn Val Pro Ile Leu Ile Thr Phe Glu Tyr Arg Tyr Ile Lys Phe
            420                 425                 430

Ile Tyr Ser Pro Leu Asp Asp Leu Phe Lys Thr Asn Asn Asn Trp Ile
        435                 440                 445

Asp Pro Asp Trp Val Asp Leu Ser Thr Val Ser Asn Gly Leu Thr Lys
    450                 455                 460

Gly Val Gln Glu Asp Arg Glu Leu Ala Phe Gly Lys Asn Gln Ile Asn
465                 470                 475                 480

Leu Arg Met Lys Thr Thr Ser Glu Ile Leu Phe Asn Glu Val Leu His
                485                 490                 495

Pro Phe Tyr Val Phe Gln Val Phe Ser Ile Ile Leu Trp Gly Ile Asp
            500                 505                 510
```

Glu Tyr Tyr Tyr Tyr Ala Ala Cys Ile Phe Leu Ile Ser Val Leu Ser
515 520 525

Ile Phe Asp Ser Leu Asn Glu Gln Lys Lys Val Ser Arg Asn Leu Ala
530 535 540

Glu Met Ser His Phe His Cys Asp Val Arg Val Leu Arg Asp Lys Phe
545 550 555 560

Trp Thr Thr Ile Ser Ser Ser Glu Leu Val Pro Gly Asp Ile Tyr Glu
565 570 575

Val Ser Asp Pro Asn Ile Thr Ile Leu Pro Cys Asp Ser Ile Leu Leu
580 585 590

Ser Ser Asp Cys Ile Val Asn Glu Ser Met Leu Thr Gly Glu Ser Val
595 600 605

Pro Val Ser Lys Phe Pro Ala Thr Glu Glu Thr Met Tyr Gln Leu Cys
610 615 620

Asp Asp Phe Gln Ser Thr Gln Ile Ser Ser Phe Val Ser Lys Ser Phe
625 630 635 640

Leu Tyr Asn Gly Thr Asn Ile Ile Arg Ala Arg Ile Ala Pro Gly Gln
645 650 655

[0170]

Thr Ala Ala Leu Ala Met Val Val Arg Thr Gly Phe Ser Thr Thr Lys
660 665 670

Gly Ser Leu Val Arg Ser Met Val Phe Pro Lys Pro Thr Gly Phe Lys
675 680 685

Phe Tyr Arg Asp Ser Phe Lys Tyr Ile Gly Phe Met Ser Leu Ile Ala
690 695 700

Ile Phe Gly Phe Cys Val Ser Cys Val Gln Phe Ile Lys Leu Gly Leu
705 710 715 720

Asp Lys Lys Thr Met Ile Leu Arg Ala Leu Asp Ile Ile Thr Ile Val
725 730 735

Val Pro Pro Ala Leu Pro Ala Thr Leu Thr Ile Gly Thr Asn Phe Ala
740 745 750

Leu Ser Arg Leu Lys Glu Lys Gly Ile Phe Cys Ile Ser Pro Thr Arg
755 760 765

Leu Asn Ile Ser Gly Lys Ile Asp Val Met Cys Phe Asp Lys Thr Gly
770 775 780

Thr Leu Thr Glu Asp Gly Leu Asp Val Leu Gly Val Gln Ile Ser Glu
785 790 795 800

Pro Asn Gly Val Arg Gly Gln Lys Phe Gly Glu Leu Leu Ser Asp Ile
805 810 815

Arg Gln Val Phe Pro Lys Phe Ser Leu Asn Asp Cys Ser Ser Pro Leu
820 825 830

Asp Phe Lys Ser Arg Asn Phe Phe Met Ser Leu Leu Thr Cys His Ser
835 840 845

Leu Arg Ser Val Asp Gly Asn Leu Leu Gly Asp Pro Leu Asp Phe Lys
850 855 860

Met Phe Gln Phe Thr Gly Trp Ser Phe Glu Glu Asp Phe Gln Lys Arg
865 870 875 880

Ala Phe His Ser Leu Tyr Glu Gly Arg His Glu Asp Asp Val Phe Pro
885 890 895

Glu Asn Ser Glu Ile Ile Pro Ala Val Val His Pro Asp Ser Asn Asn
900 905 910

Arg Glu Asn Thr Phe Thr Asp Asn Asp Pro His Asn Phe Leu Gly Val
915 920 925

Val Arg Ser Phe Glu Phe Leu Ser Glu Leu Arg Arg Met Ser Val Ile
930 935 940

[0171]

Val Lys Thr Asn Asn Asp Asp Val Tyr Trp Ser Phe Thr Lys Gly Ala
945 950 955 960

Pro Glu Val Ile Ser Glu Ile Cys Asn Lys Ser Thr Leu Pro Ala Asp
965 970 975

Phe Glu Glu Val Leu Arg Cys Tyr Thr His Asn Gly Tyr Arg Val Ile
980 985 990

Ala Cys Ala Gly Lys Thr Leu Pro Lys Arg Thr Trp Leu Tyr Ser Gln
995 1000 1005

Lys Val Ser Arg Glu Glu Val Glu Ser Asn Leu Glu Phe Leu Gly
1010 1015 1020

Phe Ile Ile Phe Gln Asn Lys Leu Lys Lys Glu Thr Ser Glu Thr
1025 1030 1035

Leu Lys Ser Leu Gln Asp Ala Asn Ile Arg Thr Ile Met Cys Thr
1040 1045 1050

Gly Asp Asn Ile Leu Thr Ala Ile Ser Val Gly Arg Glu Ala Gly
1055 1060 1065

Leu Ile Gln Cys Ser Arg Val Tyr Val Pro Ser Ile Asn Asp Thr

1070 1075 1080

Pro Leu His Gly Glu Pro Val Ile Val Trp Arg Asp Val Asn Glu
1085 1090 1095

Pro Asp Lys Ile Leu Asp Thr Lys Thr Leu Lys Pro Val Lys Leu
1100 1105 1110

Gly Asn Asn Ser Val Glu Ser Leu Arg Glu Cys Asn Tyr Thr Leu
1115 1120 1125

Ala Val Ser Gly Asp Val Phe Arg Leu Leu Phe Arg Asp Glu Asn
1130 1135 1140

Glu Ile Pro Glu Glu Tyr Leu Asn Glu Ile Leu Leu Asn Ser Ser
1145 1150 1155

Ile Tyr Ala Arg Met Ser Pro Asp Glu Lys His Glu Leu Met Ile
1160 1165 1170

Gln Leu Gln Lys Leu Asp Tyr Thr Val Gly Phe Cys Gly Asp Gly
1175 1180 1185

Ala Asn Asp Cys Gly Ala Leu Lys Ala Ala Asp Val Gly Ile Ser
1190 1195 1200

[0172]

Leu Ser Glu Ala Glu Ala Ser Val Ala Ala Pro Phe Thr Ser Lys
1205 1210 1215

Ile Phe Asn Ile Ser Cys Val Leu Asp Val Ile Arg Glu Gly Arg
1220 1225 1230

Ala Ala Leu Val Thr Ser Phe Ala Cys Phe Gln Tyr Met Ser Leu
1235 1240 1245

Tyr Ser Ala Ile Gln Phe Ile Thr Ile Thr Ile Leu Tyr Ser Arg
1250 1255 1260

Gly Ser Asn Leu Gly Asp Phe Gln Phe Leu Tyr Ile Asp Leu Leu
1265 1270 1275

Leu Ile Val Pro Ile Ala Ile Cys Met Ser Trp Ser Lys Ser Tyr
1280 1285 1290

Glu Lys Ile Asp Lys Lys Arg Pro Ser Ala Asn Leu Val Ser Pro
1295 1300 1305

Lys Ile Leu Val Pro Leu Leu Ile Ser Val Phe Leu Val Phe Leu
1310 1315 1320

Phe Gln Phe Ile Pro Trp Ile Ile Val Gln Lys Met Ser Trp Tyr
1325 1330 1335

Ile Lys Pro Ile Val Gly Gly Asp Asp Ala Val Gln Ser Ser Asp
1340 1345 1350

Asn Thr Val Leu Phe Phe Val Ser Asn Phe Gln Tyr Ile Leu Thr
1355 1360 1365

Ala Ile Val Leu Ser Val Gly Pro Pro Tyr Arg Glu Pro Met Ser
1370 1375 1380

Lys Asn Phe Glu Phe Ile Val Asp Ile Thr Val Ser Ile Gly Ala
1385 1390 1395

Ser Leu Leu Leu Met Thr Leu Asp Thr Glu Ser Tyr Leu Gly Lys
1400 1405 1410

Met Leu Gln Leu Thr Pro Ile Ser Asn Ser Phe Thr Met Phe Ile
1415 1420 1425

Ile Val Trp Val Ile Leu Asn Tyr Tyr Ala Gln Leu Tyr Ile Pro
1430 1435 1440

Pro Ser Ile Lys Gly Trp Leu Lys Lys Lys Lys Ser Ser Lys Lys
1445 1450 1455

Tyr Lys Leu Leu Ile Gln Glu Glu Met Lys Leu Lys Glu Val
1460 1465 1470

[0173]

<210> 75
<211> 521
<212> PRT
<213> 酿酒酵母

<400> 75

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

Gln Thr Asn Gln Leu Arg Gln Pro Asp Leu Asp Glu Asp Ser Ile His
20 25 30

Tyr Asp Pro Glu Ala Asp Asp Leu Glu Ser Leu Glu Thr Thr Ala Ser
35 40 45

Tyr Ala Ser Thr Ser Val Ser Ala Lys Val Tyr Thr Lys Lys Glu Val
50 55 60

Asn Lys Gly Thr Asp Ile Glu Ser Gln Pro His Trp Gly Glu Asn Thr
65 70 75 80

Ser Ser Thr His Asp Ser Asp Lys Glu Glu Asp Ser Asn Glu Glu Ile
85 90 95

Glu Ser Phe Pro Glu Gly Gly Phe Lys Ala Trp Val Val Thr Phe Gly
100 105 110

Cys Phe Leu Gly Leu Ile Ala Cys Phe Gly Leu Leu Asn Ser Thr Gly
115 120 125

Val Ile Glu Ser His Leu Gln Asp Asn Gln Leu Ser Ser Glu Ser Val
130 135 140

Ser Thr Ile Gly Trp Leu Phe Ser Leu Phe Leu Phe Val Cys Ser Ala
145 150 155 160

Ser Cys Ile Ile Ser Gly Thr Tyr Phe Asp Arg Asn Gly Phe Arg Thr
165 170 175

Ile Met Ile Val Gly Thr Val Phe His Val Ala Gly Leu Phe Ala Thr
180 185 190

Ala Asn Ser Thr Lys Tyr Trp His Phe Ile Leu Ser Phe Ala Ile Val
195 200 205

Cys Gly Phe Gly Asn Gly Ile Val Leu Ser Pro Leu Val Ser Val Pro
210 215 220

Ala His Tyr Phe Phe Lys Arg Arg Gly Thr Ala Leu Ala Met Ala Thr
225 230 235 240

Ile Gly Gly Ser Val Gly Gly Val Val Phe Pro Ile Met Leu Arg Ser
245 250 255

[0174]

Phe Phe Ser Met Lys Ser Asp Thr Asp Pro Thr Tyr Gly Phe Val Trp
260 265 270

Gly Ile Arg Thr Leu Gly Phe Leu Asp Leu Ala Leu Leu Thr Leu Ser
275 280 285

Ile Ile Leu Val Lys Glu Arg Leu Pro His Val Ile Glu Asn Ser Lys
290 295 300

Asp Gly Glu Ser Arg Trp Arg Tyr Ile Leu Arg Val Tyr Ile Leu Gln
305 310 315 320

Cys Phe Asp Ala Lys Ala Phe Leu Asp Met Lys Tyr Leu Phe Cys Val
325 330 335

Leu Gly Thr Val Phe Ser Glu Leu Ser Ile Asn Ser Ala Leu Thr Tyr
340 345 350

Tyr Gly Ser Tyr Ala Thr Ser His Gly Ile Ser Ala Asn Asp Ala Tyr
355 360 365

Thr Leu Ile Met Ile Ile Asn Val Cys Gly Ile Pro Gly Arg Trp Val
370 375 380

Pro Gly Tyr Leu Ser Asp Lys Phe Gly Arg Phe Asn Val Ala Ile Ala
385 390 395 400

Thr Leu Leu Thr Leu Phe Ile Val Met Phe Val Gly Trp Leu Pro Phe
405 410 415

Gly Thr Asn Leu Thr Asn Met Tyr Val Ile Ser Ala Leu Tyr Gly Phe
420 425 430

Cys Ser Gly Ser Val Phe Ser Leu Leu Pro Val Cys Cys Gly Gln Ile
435 440 445

Ser Lys Thr Glu Glu Phe Gly Lys Arg Tyr Ser Thr Met Tyr Phe Val
450 455 460

Val Gly Phe Gly Thr Leu Val Gly Ile Pro Ile Thr Gly Ala Ile Ile
465 470 475 480

Ser Ile Lys Thr Thr Ala Asp Tyr Gln His Tyr Ile Ile Phe Cys Gly
485 490 495

Leu Ala Thr Phe Val Ser Ala Val Cys Tyr Ile Ile Ser Arg Ala Tyr
500 505 510

Cys Val Gly Phe Lys Trp Val Arg Phe
515 520

[0175]

<210> 76
<211> 439
<212> PRT
<213> 酿酒酵母

<400> 76

Met Lys Leu Gly Ser Lys Gln Val Lys Ile Ile Ser Leu Leu Leu Leu
1 5 10 15

Asp Thr Val Phe Phe Gly Ile Glu Ile Thr Thr Gly Tyr Leu Ser His
20 25 30

Ser Leu Ala Leu Ile Ala Asp Ser Phe His Met Leu Asn Asp Ile Ile
35 40 45

Ser Leu Val Val Ala Leu Trp Ala Val Asn Val Ala Lys Asn Arg Asn
50 55 60

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

Ala Leu Ile Asn Ala Val Phe Leu Ile Ala Leu Cys Val Ser Ile Leu
85 90 95

Ile Glu Ala Leu Gln Arg Ile Ile Ala Pro Pro Val Ile Glu Asn Pro
100 105 110

Lys Phe Val Leu Tyr Val Gly Val Ala Gly Leu Ile Ser Asn Thr Val
115 120 125

Gly Leu Phe Leu Phe His Asp Asn Asp Gln Glu His Gly His Gly His
130 135 140

Gly His Ser His Gly Gly Ile Phe Ala Asp His Glu Met His Met Pro
145 150 155 160

Ser Ser His Thr His Thr His Ala His Val Asp Gly Ile Glu Asn Thr
165 170 175

Thr Pro Met Asp Ser Thr Asp Asn Ile Ser Glu Ile Met Pro Asn Ala
180 185 190

Ile Val Asp Ser Phe Met Asn Glu Asn Thr Arg Leu Leu Thr Pro Glu
195 200 205

Asn Ala Ser Lys Thr Pro Ser Tyr Ser Thr Ser Ser His Thr Ile Ala
210 215 220

Ser Gly Gly Asn Tyr Thr Glu His Asn Lys Arg Lys Arg Ser Leu Asn
225 230 235 240

Met His Gly Val Phe Leu His Val Leu Gly Asp Ala Leu Gly Asn Ile
245 250 255

Gly Val Met Leu Ser Ala Phe Phe Ile Trp Lys Thr Asp Tyr Ser Trp
260 265 270

[0176]

Lys Tyr Tyr Thr Asp Pro Leu Val Ser Leu Ile Ile Thr Gly Ile Ile
275 280 285

Phe Ser Ser Ala Leu Pro Leu Ser Cys Lys Ala Ser Lys Ile Leu Leu
290 295 300

Gln Ala Thr Pro Ser Thr Leu Ser Gly Asp Gln Val Glu Gly Asp Leu
305 310 315 320

Leu Lys Ile Pro Gly Ile Ile Ala Ile His Asp Phe His Ile Trp Asn
325 330 335

Leu Thr Glu Ser Ile Phe Ile Ala Ser Leu His Ile Gln Leu Asp Ile
340 345 350

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

His Arg Tyr Gly Ile His Ser Ala Thr Leu Gln Pro Glu Phe Ile Thr
370 375 380

Arg Glu Val Thr Ser Thr Glu Arg Ala Gly Asp Ser Gln Gly Asp His
385 390 395 400

Leu Gln Asn Asp Pro Leu Ser Leu Arg Pro Lys Thr Tyr Gly Thr Gly
405 410 415

Ile Ser Gly Ser Thr Cys Leu Ile Asp Asp Ala Ala Asn Cys Asn Thr
420 425 430

Ala Asp Cys Leu Glu Asp His
435

<210> 77
<211> 470
<212> PRT
<213> 酿酒酵母

<400> 77

Met Asn Arg Arg Leu Leu Val Arg Ser Ile Ser Cys Phe Gln Pro Leu
1 5 10 15

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

Ala Asp Thr Ser Thr Ala Ala Asn Thr Asn Ser Thr Ile Leu Arg Lys
35 40 45

Gln Leu Leu Ser Leu Lys Pro Ile Ser Ala Ser Asp Ser Leu Phe Ile
50 55 60

Ser Cys Thr Val Phe Asn Ser Lys Gly Asn Ile Ile Ser Met Ser Glu
65 70 75 80

[0177]

Lys Phe Pro Lys Trp Ser Phe Leu Thr Glu His Ser Leu Phe Pro Arg
85 90 95

Asp Leu Arg Lys Ile Asp Asn Ser Ser Ile Asp Ile Ile Pro Thr Ile
100 105 110

Met Cys Lys Pro Asn Cys Ile Val Ile Asn Leu Leu His Ile Lys Ala
115 120 125

Leu Ile Glu Arg Asp Lys Val Tyr Val Phe Asp Thr Thr Asn Pro Ser
130 135 140

Ala Ala Ala Lys Leu Ser Val Leu Met Tyr Asp Leu Glu Ser Lys Leu
145 150 155 160

Ser Ser Thr Lys Asn Asn Ser Gln Phe Tyr Glu His Arg Ala Leu Glu
165 170 175

Ser Ile Phe Ile Asn Val Met Ser Ala Leu Glu Thr Asp Phe Lys Leu
180 185 190

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

Asn Arg Leu Lys Leu Arg His Leu Leu Ile Lys Ser Lys Asp Leu Thr
210 215 220

Leu Phe Tyr Gln Lys Thr Leu Leu Ile Arg Asp Leu Leu Asp Glu Leu
225 230 235 240

Leu Glu Asn Asp Asp Asp Leu Ala Asn Met Tyr Leu Thr Val Lys Lys
245 250 255

Ser Pro Lys Asp Asn Phe Ser Asp Leu Glu Met Leu Ile Glu Thr Tyr
260 265 270

Tyr Thr Gln Cys Asp Glu Tyr Val Gln Gln Ser Glu Ser Leu Ile Gln
275 280 285

Asp Ile Lys Ser Thr Glu Glu Ile Val Asn Ile Ile Leu Asp Ala Asn
290 295 300

Arg Asn Ser Leu Met Leu Leu Glu Leu Lys Val Thr Ile Tyr Thr Leu
305 310 315 320

Gly Phe Thr Val Ala Ser Val Leu Pro Ala Phe Tyr Gly Met Asn Leu
325 330 335

Lys Asn Phe Ile Glu Glu Ser Glu Trp Gly Phe Thr Ser Val Ala Val
340 345 350

Phe Ser Ile Val Ser Ala Leu Tyr Ile Thr Lys Lys Asn Phe Asn Ser
355 360 365

[0178]

Leu Arg Ser Val Thr Lys Met Thr Met Tyr Pro Asn Ser Pro Ala Asn
370 375 380

Ser Ser Val Tyr Pro Lys Thr Ser Ala Ser Ile Ala Leu Thr Asn Lys
385 390 395 400

Leu Lys Arg Arg Arg Lys Trp Trp Lys Ser Thr Lys Gln Arg Leu Gly
405 410 415

Val Leu Leu Tyr Gly Ser Ser Tyr Thr Asn Lys Ala Asn Leu Ser Asn
420 425 430

Asn Lys Ile Asn Lys Gly Phe Ser Lys Val Lys Lys Phe Asn Met Glu
435 440 445

Asn Asp Ile Lys Asn Lys Gln Asn Arg Asp Met Ile Trp Lys Trp Leu
450 455 460

Ile Glu Asp Lys Lys Asn
465 470

<210> 78
<211> 244
<212> PRT
<213> 酿酒酵母

<400> 78

Met Ser Met Ser Met Gly Val Arg Gly Leu Ala Leu Arg Ser Val Ser
1 5 10 15

Lys Thr Leu Phe Ser Gln Gly Val Arg Cys Pro Ser Met Val Ile Gly
20 25 30

Ala Arg Tyr Met Ser Ser Thr Pro Glu Lys Gln Thr Asp Pro Lys Ala
35 40 45

Lys Ala Asn Ser Ile Ile Asn Ala Ile Pro Gly Asn Asn Ile Leu Thr
50 55 60

Lys Thr Gly Val Leu Gly Thr Ser Ala Ala Ala Val Ile Tyr Ala Ile
65 70 75 80

Ser Asn Glu Leu Tyr Val Ile Asn Asp Glu Ser Ile Leu Leu Leu Thr
85 90 95

Phe Leu Gly Phe Thr Gly Leu Val Ala Lys Tyr Leu Ala Pro Ala Tyr
100 105 110

Lys Asp Phe Ala Asp Ala Arg Met Lys Lys Val Ser Asp Val Leu Asn
115 120 125

[0179] Ala Ser Arg Asn Lys His Val Glu Ala Val Lys Asp Arg Ile Asp Ser
130 135 140

Val Ser Gln Leu Gln Asn Val Ala Glu Thr Thr Lys Val Leu Phe Asp
145 150 155 160

Val Ser Lys Glu Thr Val Glu Leu Glu Ser Glu Ala Phe Glu Leu Lys
165 170 175

Gln Lys Val Glu Leu Ala His Glu Ala Lys Ala Val Leu Asp Ser Trp
180 185 190

Val Arg Tyr Glu Ala Ser Leu Arg Gln Leu Glu Gln Arg Gln Leu Ala
195 200 205

Lys Ser Val Ile Ser Arg Val Gln Ser Glu Leu Gly Asn Pro Lys Phe
210 215 220

Gln Glu Lys Val Leu Gln Gln Ser Ile Ser Glu Ile Glu Gln Leu Leu
225 230 235 240

Ser Lys Leu Lys

<210> 79
<211> 773
<212> PRT
<213> 酿酒酵母

<400> 79

Met Leu Asn Gly Arg Leu Pro Leu Leu Arg Leu Gly Ile Cys Arg Asn
1 5 10 15

Met Leu Ser Arg Pro Arg Leu Ala Lys Leu Pro Ser Ile Arg Phe Arg
20 25 30

Ser Leu Val Thr Pro Ser Ser Ser Gln Leu Ile Pro Leu Ser Arg Leu
35 40 45

Cys Leu Arg Ser Pro Ala Val Gly Lys Ser Leu Ile Leu Gln Ser Phe
50 55 60

Arg Cys Asn Ser Ser Lys Thr Val Pro Glu Thr Ser Leu Pro Ser Ala
65 70 75 80

Ser Pro Ile Ser Lys Gly Ser Ala Arg Ser Ala His Ala Lys Glu Gln
85 90 95

Ser Lys Thr Asp Asp Tyr Lys Asp Ile Ile Arg Leu Phe Met Leu Ala
100 105 110

Lys Arg Asp Trp Lys Leu Leu Leu Thr Ala Ile Leu Leu Leu Thr Ile
115 120 125

[0180] Ser Cys Ser Ile Gly Met Ser Ile Pro Lys Val Ile Gly Ile Val Leu
130 135 140

Asp Thr Leu Lys Thr Ser Ser Gly Ser Asp Phe Phe Asp Leu Lys Ile
145 150 155 160

Pro Ile Phe Ser Leu Pro Leu Tyr Glu Phe Leu Ser Phe Phe Thr Val
165 170 175

Ala Leu Leu Ile Gly Cys Ala Ala Asn Phe Gly Arg Phe Ile Leu Leu
180 185 190

Arg Ile Leu Ser Glu Arg Val Val Ala Arg Leu Arg Ala Asn Val Ile
195 200 205

Lys Lys Thr Leu His Gln Asp Ala Glu Phe Phe Asp Asn His Lys Val
210 215 220

Gly Asp Leu Ile Ser Arg Leu Gly Ser Asp Ala Tyr Val Val Ser Arg
225 230 235 240

Ser Met Thr Gln Lys Val Ser Asp Gly Val Lys Ala Leu Ile Cys Gly
245 250 255

Val Val Gly Val Gly Met Met Cys Ser Leu Ser Pro Gln Leu Ser Ile
260 265 270

Leu Leu Leu Phe Phe Thr Pro Pro Val Leu Phe Ser Ala Ser Val Phe

275 280 285

Gly Lys Gln Ile Arg Asn Thr Ser Lys Asp Leu Gln Glu Ala Thr Gly
290 295 300

Gln Leu Thr Arg Val Ala Glu Glu Gln Leu Ser Gly Ile Lys Thr Val
305 310 315 320

Gln Ser Phe Val Ala Glu Gly Asn Glu Leu Ser Arg Tyr Asn Val Ala
325 330 335

Ile Arg Asp Ile Phe Gln Val Gly Lys Thr Ala Ala Phe Thr Asn Ala
340 345 350

Lys Phe Phe Thr Thr Thr Ser Leu Leu Gly Asp Leu Ser Phe Leu Thr
355 360 365

Val Leu Ala Tyr Gly Ser Tyr Leu Val Leu Gln Ser Gln Leu Ser Ile
370 375 380

Gly Asp Leu Thr Ala Phe Met Leu Tyr Thr Glu Tyr Thr Gly Asn Ala
385 390 395 400

Val Phe Gly Leu Ser Thr Phe Tyr Ser Glu Ile Met Gln Gly Ala Gly
405 410 415

[0181]

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

Pro Thr Val Gly His Lys Tyr Lys Pro Asp Arg Gly Val Ile Glu Phe
435 440 445

Lys Asp Val Ser Phe Ser Tyr Pro Thr Arg Pro Ser Val Gln Ile Phe
450 455 460

Lys Asn Leu Asn Phe Lys Ile Ala Pro Gly Ser Ser Val Cys Ile Val
465 470 475 480

Gly Pro Ser Gly Arg Gly Lys Ser Thr Ile Ala Leu Leu Leu Leu Arg
485 490 495

Tyr Tyr Asn Pro Thr Thr Gly Thr Ile Thr Ile Asp Asn Gln Asp Ile
500 505 510

Ser Lys Leu Asn Cys Lys Ser Leu Arg Arg His Ile Gly Ile Val Gln
515 520 525

Gln Glu Pro Val Leu Met Ser Gly Thr Ile Arg Asp Asn Ile Thr Tyr
530 535 540

Gly Leu Thr Tyr Thr Pro Thr Lys Glu Glu Ile Arg Ser Val Ala Lys
545 550 555 560

Gln Cys Phe Cys His Asn Phe Ile Thr Lys Phe Pro Asn Thr Tyr Asp
565 570 575

Thr Val Ile Gly Pro His Gly Thr Leu Leu Ser Gly Gly Gln Lys Gln
580 585 590

Arg Ile Ala Ile Ala Arg Ala Leu Ile Lys Lys Pro Thr Ile Leu Ile
595 600 605

Leu Asp Glu Ala Thr Ser Ala Leu Asp Val Glu Ser Glu Gly Ala Ile
610 615 620

Asn Tyr Thr Phe Gly Gln Leu Met Lys Ser Lys Ser Met Thr Ile Val
625 630 635 640

Ser Ile Ala His Arg Leu Ser Thr Ile Arg Arg Ser Glu Asn Val Ile
645 650 655

Val Leu Gly His Asp Gly Ser Val Val Glu Met Gly Lys Phe Lys Glu
660 665 670

Leu Tyr Ala Asn Pro Thr Ser Ala Leu Ser Gln Leu Leu Asn Glu Lys
675 680 685

Ala Ala Pro Gly Pro Ser Asp Gln Gln Leu Gln Ile Glu Lys Val Ile
690 695 700

[0182]

Glu Lys Glu Asp Leu Asn Glu Ser Lys Glu His Asp Asp Gln Lys Lys
705 710 715 720

Asp Asp Asn Asp Asp Asn Asp Asn Asn His Asp Asn Asp Ser Asn Asn
725 730 735

Gln Ser Pro Glu Thr Lys Asp Asn Asn Ser Asp Asp Ile Glu Lys Ser
740 745 750

Val Glu His Leu Leu Lys Asp Ala Ala Lys Glu Ala Asn Pro Ile Lys
755 760 765

Ile Thr Pro Gln Pro
770

<210> 80
<211> 587
<212> PRT
<213> 酿酒酵母

<400> 80

Met Asp Ile Leu Lys Arg Gly Asn Glu Ser Asp Lys Phe Thr Lys Ile
1 5 10 15

Glu Thr Glu Ser Thr Thr Ile Pro Asn Asp Ser Asp Arg Ser Gly Ser
20 25 30

Leu Ile Arg Arg Met Lys Asp Ser Phe Lys Gln Ser Asn Leu His Val
35 40 45

Ile Pro Glu Asp Leu Glu Asn Ser Glu Gln Thr Glu Gln Glu Lys Ile
50 55 60

Gln Trp Lys Leu Ala Ser Gln Pro Tyr Gln Lys Val Leu Ser Gln Arg
65 70 75 80

His Leu Thr Met Ile Ala Ile Gly Gly Thr Leu Gly Thr Gly Leu Phe
85 90 95

Ile Gly Leu Gly Tyr Ser Leu Ala Ser Gly Pro Ala Ala Leu Leu Ile
100 105 110

Gly Phe Leu Leu Val Gly Thr Ser Met Phe Cys Val Val Gln Ser Ala
115 120 125

Ala Glu Leu Ser Cys Gln Phe Pro Val Ser Gly Ser Tyr Ala Thr His
130 135 140

Val Ser Arg Phe Ile Asp Glu Ser Val Gly Phe Thr Val Ala Thr Asn
145 150 155 160

Tyr Ala Leu Ala Trp Leu Ile Ser Phe Pro Ser Glu Leu Ile Gly Cys
165 170 175

[0183]

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

Val Ala Ile Phe Tyr Val Phe Ile Met Val Leu Asn Leu Phe Gly Val
195 200 205

Arg Gly Phe Ala Glu Thr Glu Phe Ala Leu Ser Ile Ile Lys Val Ile
210 215 220

Ala Ile Phe Ile Phe Ile Ile Ile Gly Ile Val Leu Ile Ala Gly Gly
225 230 235 240

Gly Pro Asn Ser Thr Gly Tyr Ile Gly Ala Lys Tyr Trp His Asp Pro
245 250 255

Gly Ala Phe Ala Lys Pro Val Phe Lys Asn Leu Cys Asn Thr Phe Val
260 265 270

Ser Ala Ala Phe Ser Phe Gly Gly Ser Glu Leu Val Leu Leu Thr Ser
275 280 285

Thr Glu Ser Lys Asn Ile Ser Ala Ile Ser Arg Ala Ala Lys Gly Thr
290 295 300

Phe Trp Arg Ile Ala Ile Phe Tyr Ile Thr Thr Val Val Ile Ile Gly
305 310 315 320

Cys Leu Val Pro Tyr Asn Asp Pro Arg Leu Leu Ser Gly Ser Asn Ser
325 330 335

Glu Asp Val Ser Ala Ser Pro Phe Val Ile Ala Leu Ser Asn Thr Gly
340 345 350

Ser Met Gly Ala Lys Val Ser Asn Phe Met Asn Val Val Ile Leu Val
355 360 365

Ala Val Val Ser Val Cys Asn Ser Cys Val Tyr Ala Ser Ser Arg Leu
370 375 380

Ile Gln Ala Leu Gly Ala Ser Gly Gln Leu Pro Ser Val Cys Ser Tyr
385 390 395 400

Met Asp Arg Lys Gly Arg Pro Leu Val Gly Ile Gly Ile Ser Gly Ala
405 410 415

Phe Gly Leu Leu Gly Phe Leu Val Ala Ser Lys Lys Glu Asp Glu Val
420 425 430

Phe Thr Trp Leu Phe Ala Leu Cys Ser Ile Ser Ser Phe Phe Thr Trp
435 440 445

Phe Cys Ile Cys Met Ser Gln Ile Arg Phe Arg Met Ala Leu Lys Ala
450 455 460

[0184]

Gln Gly Arg Ser Asn Asp Glu Ile Ala Tyr Lys Ser Ile Leu Gly Val
465 470 475 480

Tyr Gly Gly Ile Leu Gly Cys Val Leu Asn Ala Leu Leu Ile Ala Gly
485 490 495

Glu Ile Tyr Val Ser Ala Ala Pro Val Gly Ser Pro Ser Ser Ala Glu
500 505 510

Ala Phe Phe Glu Tyr Cys Leu Ser Ile Pro Ile Met Ile Val Val Tyr
515 520 525

Phe Ala His Arg Phe Tyr Arg Arg Asp Trp Lys His Phe Tyr Ile Lys
530 535 540

Arg Ser Glu Ile Asp Leu Asp Thr Gly Cys Ser Val Glu Asn Leu Glu
545 550 555 560

Leu Phe Lys Ala Gln Lys Glu Ala Glu Glu Gln Leu Ile Ala Ser Lys
565 570 575

Pro Phe Tyr Tyr Lys Ile Tyr Arg Phe Trp Cys
580 585

<210> 81
<211> 754

<212> PRT
<213> 酿酒酵母

<400> 81

Met Thr Ser Asn Asn Ser Leu Leu Gly Arg Gly Arg Met Ser Tyr Ser
1 5 10 15

Ser Thr Ala Pro Pro Arg Phe Lys Arg Ser Val Asp Gln Arg Asp Thr
20 25 30

Phe Ser Asp Asn Phe Asp Tyr Asp Lys Asp Ser Ser Asn Arg Gly Arg
35 40 45

Thr Tyr Ile Ala Ala Ser Asn Ser Thr Thr Gly Val Pro Pro Pro Asn
50 55 60

Asn Ser Arg Ser Gly Cys Thr Asn Asn Thr Asn Asn Thr Asn Asn Thr
65 70 75 80

Ser Asn Thr Ser Asn Thr Asn Asn Asn Asp Ser Val Asp Glu Asn Thr
85 90 95

Val Phe Glu Thr Leu Pro Tyr Tyr Leu Pro Cys Phe Ser Trp Leu Pro
100 105 110

Glu Tyr Thr Phe Asn Lys Leu Trp Gly Asp Val Ile Ala Gly Ile Ser
115 120 125

[0185]

Val Ala Ser Phe Gln Ile Pro Leu Ala Leu Ser Tyr Thr Thr Ser Ile
130 135 140

Ala His Val Pro Pro Leu Cys Gly Leu Tyr Ser Leu Ala Ile Ser Pro
145 150 155 160

Phe Val Tyr Gly Ile Leu Gly Ser Val Pro Gln Met Ile Val Gly Pro
165 170 175

Glu Ser Ala Ile Ser Leu Val Val Gly Gln Ala Val Glu Ser Ile Thr
180 185 190

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

Phe Val Ser Gly Thr Ile Leu Leu Phe Ser Gly Ile Ser Arg Phe Gly
210 215 220

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

Ser Val Gly Leu Val Met Ile Ile Asn Ser Leu Ile Ser Glu Leu Lys
245 250 255

Leu Asp Lys Phe Leu Val Ser Leu Pro Gln His Tyr His Thr Pro Phe
260 265 270

Glu Lys Ile Leu Phe Leu Ile Asp Tyr Ala Pro Ala Gln Tyr His Ile
275 280 285

Pro Thr Ala Ile Phe Ser Gly Cys Cys Leu Ile Val Leu Phe Leu Thr
290 295 300

Arg Leu Leu Lys Arg Lys Leu Met Lys Tyr His Lys Ser Ala Ile Phe
305 310 315 320

Phe Pro Asp Ile Leu Leu Val Val Ile Val Thr Ile Leu Ile Ser Met
325 330 335

Lys Phe Asn Leu Lys His Arg Tyr Gly Ile Ser Ile Ile Gly Asp Phe
340 345 350

Ser Met Asp Asn Phe Asp Glu Leu Lys Asn Pro Leu Thr Arg Pro Arg
355 360 365

Arg Lys Leu Ile Pro Asp Leu Phe Ser Ala Ser Leu Ile Val Ala Met
370 375 380

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

Tyr Asn Leu Thr Val Ser Ser Asn Arg Glu Leu Val Ala Leu Gly Phe
405 410 415

[0186]

Met Asn Ile Val Ile Ser Leu Phe Gly Ala Leu Pro Ala Phe Gly Gly
420 425 430

Tyr Gly Arg Ser Lys Ile Asn Ala Leu Ser Gly Ala Gln Ser Val Met
435 440 445

Ser Gly Val Phe Met Gly Val Ile Thr Leu Ile Thr Met Asn Leu Leu
450 455 460

Leu Gln Phe Val His Tyr Ile Pro Asn Cys Val Leu Ser Val Ile Thr
465 470 475 480

Thr Ile Ile Gly Ile Ser Leu Leu Glu Glu Val Pro Gly Asp Ile Lys
485 490 495

Phe His Leu Arg Cys Gly Gly Phe Ser Glu Leu Phe Val Phe Ala Val
500 505 510

Thr Phe Cys Thr Thr Ile Phe Tyr Ser Ile Glu Ala Gly Ile Cys Ile
515 520 525

Gly Cys Val Tyr Ser Ile Ile Asn Ile Ile Lys His Ser Ala Lys Ser
530 535 540

Arg Ile Gln Ile Leu Ala Arg Val Ala Gly Thr Ser Asn Phe Thr Asn

545 550 555 560

Leu Asp Asp Tyr Met Met Asn Met Lys Arg Asn Ser Leu Asp Val Glu
565 570 575

Gly Thr Glu Glu Ile Glu Gly Cys Met Ile Val Arg Ile Pro Glu Pro
580 585 590

Leu Thr Phe Thr Asn Ser Glu Asp Leu Lys Gln Arg Leu Asp Arg Ile
595 600 605

Glu Arg Tyr Gly Ser Ser Lys Ile His Pro Gly Arg Lys Ser Leu Arg
610 615 620

Ser Lys Asp Ser Ile Lys Tyr Val Ile Phe Asp Leu Gly Gly Met Thr
625 630 635 640

Ser Ile Asp Ser Ser Ala Ala Gln Val Leu Glu Glu Ile Ile Thr Ser
645 650 655

Tyr Lys Arg Arg Asn Val Phe Ile Tyr Leu Val Asn Val Ser Ile Asn
660 665 670

Asp Lys Val Arg Arg Arg Leu Phe Lys Ala Gly Val Ala Ala Ser Val
675 680 685

[0187] Glu Arg Ala Gln Ala Asn Asn Asn Glu Asn Asn Thr Ser Asn Thr Phe
690 695 700

Ser Asp Ala Gly Glu Thr Tyr Ser Pro Tyr Phe Asp Ser Ile Asp Ala
705 710 715 720

Ala Leu Tyr Glu Ile Glu Lys Met Lys Ile Lys Gly Asn Asn Val Pro
725 730 735

Asn Asn Asp Ser Glu Ser Phe Met Ser Asn Thr Leu Phe Asn Ser Ser
740 745 750

Leu Val

<210> 82
<211> 326
<212> PRT
<213> 酿酒酵母

<400> 82

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

Phe Leu Lys Gln Asp Ser Asn Ile Ala Phe Leu Ala Gly Gly Val Ala
20 25 30

Gly Ala Val Ser Arg Thr Val Val Ser Pro Phe Glu Arg Val Lys Ile

35 40 45

Leu Leu Gln Val Gln Ser Ser Thr Thr Ser Tyr Asn Arg Gly Ile Phe
50 55 60

Ser Ser Ile Arg Gln Val Tyr His Glu Glu Gly Thr Lys Gly Leu Phe
65 70 75 80

Arg Gly Asn Gly Leu Asn Cys Ile Arg Ile Phe Pro Tyr Ser Ala Val
85 90 95

Gln Phe Val Val Tyr Glu Ala Cys Lys Lys Lys Leu Phe His Val Asn
100 105 110

Gly Asn Asn Gly Gln Glu Gln Leu Thr Asn Thr Gln Arg Leu Phe Ser
115 120 125

Gly Ala Leu Cys Gly Gly Cys Ser Val Val Ala Thr Tyr Pro Leu Asp
130 135 140

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

Asn Arg Ser Lys Ala Lys Ser Ile Ser Lys Pro Pro Gly Ile Trp Gln
165 170 175

[0188]

Leu Leu Ser Glu Thr Tyr Arg Leu Glu Gly Gly Leu Arg Gly Leu Tyr
180 185 190

Arg Gly Val Trp Pro Thr Ser Leu Gly Val Val Pro Tyr Val Ala Leu
195 200 205

Asn Phe Ala Val Tyr Glu Gln Leu Arg Glu Phe Gly Val Asn Ser Ser
210 215 220

Asp Ala Gln Pro Ser Trp Lys Ser Asn Leu Tyr Lys Leu Thr Ile Gly
225 230 235 240

Ala Ile Ser Gly Gly Val Ala Gln Thr Ile Thr Tyr Pro Phe Asp Leu
245 250 255

Leu Arg Arg Arg Phe Gln Val Leu Ala Met Gly Gly Asn Glu Leu Gly
260 265 270

Phe Arg Tyr Thr Ser Val Trp Asp Ala Leu Val Thr Ile Gly Arg Ala
275 280 285

Glu Gly Val Ser Gly Tyr Tyr Lys Gly Leu Ala Ala Asn Leu Phe Lys
290 295 300

Val Val Pro Ser Thr Ala Val Ser Trp Leu Val Tyr Glu Val Val Cys
305 310 315 320

Asp Ser Val Arg Asn Trp
325

<210> 83
<211> 307
<212> PRT
<213> 酿酒酵母

<400> 83

Met Ser Glu Glu Phe Pro Ser Pro Gln Leu Ile Asp Asp Leu Glu Glu
1 5 10 15

His Pro Gln His Asp Asn Ala Arg Val Val Lys Asp Leu Leu Ala Gly
20 25 30

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

Thr Lys Val Arg Leu Gln Thr Ser Ser Thr Pro Thr Thr Ala Met Glu
50 55 60

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

Gly Thr Leu Thr Pro Leu Ile Gly Val Gly Ala Cys Val Ser Leu Gln
85 90 95

[0189]

Phe Gly Val Asn Glu Ala Met Lys Arg Phe Phe His His Arg Asn Ala
100 105 110

Asp Met Ser Ser Thr Leu Ser Leu Pro Gln Tyr Tyr Ala Cys Gly Val
115 120 125

Thr Gly Gly Ile Val Asn Ser Phe Leu Ala Ser Pro Ile Glu His Val
130 135 140

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

Lys Gly Pro Leu Glu Cys Ile Lys Lys Leu Arg His Asn Lys Ala Leu
165 170 175

Leu Arg Gly Leu Thr Pro Thr Ile Leu Arg Glu Gly His Gly Cys Gly
180 185 190

Thr Tyr Phe Leu Val Tyr Glu Ala Leu Ile Ala Asn Gln Met Asn Lys
195 200 205

Arg Arg Gly Leu Glu Arg Lys Asp Ile Pro Ala Trp Lys Leu Cys Ile
210 215 220

Phe Gly Ala Leu Ser Gly Thr Ala Leu Trp Leu Met Val Tyr Pro Leu
225 230 235 240

Asp Val Ile Lys Ser Val Met Gln Thr Asp Asn Leu Gln Lys Pro Lys
245 250 255

Phe Gly Asn Ser Ile Ser Ser Val Ala Lys Thr Leu Tyr Ala Asn Gly
260 265 270

Gly Ile Gly Ala Phe Phe Lys Gly Phe Gly Pro Thr Met Leu Arg Ala
275 280 285

Ala Pro Ala Asn Gly Ala Thr Phe Ala Thr Phe Glu Leu Ala Met Arg
290 295 300

Leu Leu Gly
305

<210> 84
<211> 328
<212> PRT
<213> 酿酒酵母

<400> 84

Met Leu Thr Leu Glu Ser Ala Leu Thr Gly Ala Val Ala Ser Ala Met
1 5 10 15

Ala Asn Ile Ala Val Tyr Pro Leu Asp Leu Ser Lys Thr Ile Ile Gln
20 25 30

[0190]

Ser Gln Val Ser Pro Ser Ser Ser Glu Asp Ser Asn Glu Gly Lys Val
35 40 45

Leu Pro Asn Arg Arg Tyr Lys Asn Val Val Asp Cys Met Ile Asn Ile
50 55 60

Phe Lys Glu Lys Gly Ile Leu Gly Leu Tyr Gln Gly Met Thr Val Thr
65 70 75 80

Thr Val Ala Thr Phe Val Gln Asn Phe Val Tyr Phe Phe Trp Tyr Thr
85 90 95

Phe Ile Arg Lys Ser Tyr Met Lys His Lys Leu Leu Gly Leu Gln Ser
100 105 110

Leu Lys Asn Arg Asp Gly Pro Ile Thr Pro Ser Thr Ile Glu Glu Leu
115 120 125

Val Leu Gly Val Ala Ala Ala Ser Ile Ser Gln Leu Phe Thr Ser Pro
130 135 140

Met Ala Val Val Ala Thr Arg Gln Gln Thr Val His Ser Ala Glu Ser
145 150 155 160

Ala Lys Phe Thr Asn Val Ile Lys Asp Ile Tyr Arg Glu Asn Asn Gly
165 170 175

Asp Ile Thr Ala Phe Trp Lys Gly Leu Arg Thr Gly Leu Ala Leu Thr
180 185 190

Ile Asn Pro Ser Ile Thr Tyr Ala Ser Phe Gln Arg Leu Lys Glu Val
195 200 205

Phe Phe His Asp His Ser Asn Asp Ala Gly Ser Leu Ser Ala Val Gln
210 215 220

Asn Phe Ile Leu Gly Val Leu Ser Lys Met Ile Ser Thr Leu Val Thr
225 230 235 240

Gln Pro Leu Ile Val Ala Lys Ala Met Leu Gln Ser Ala Gly Ser Lys
245 250 255

Phe Thr Thr Phe Gln Glu Ala Leu Leu Tyr Leu Tyr Lys Asn Glu Gly
260 265 270

Leu Lys Ser Leu Trp Lys Gly Val Leu Pro Gln Leu Thr Lys Gly Val
275 280 285

Ile Val Gln Gly Leu Leu Phe Ala Phe Arg Gly Glu Leu Thr Lys Ser
290 295 300

Leu Lys Arg Leu Ile Phe Leu Tyr Ser Ser Phe Phe Leu Lys His Asn
305 310 315 320

[0191]

Gly Gln Arg Lys Leu Ala Ser Thr
325

<210> 85
<211> 404
<212> PRT
<213> 酿酒酵母

<400> 85

Met Ser Glu Asp Gln Lys Ser Glu Asn Ser Val Pro Ser Lys Val Asn
1 5 10 15

Met Val Asn Arg Thr Asp Ile Leu Thr Thr Ile Lys Ser Leu Ser Trp
20 25 30

Leu Asp Leu Met Leu Pro Phe Thr Ile Ile Leu Ser Ile Ile Ile Ala
35 40 45

Val Ile Ile Ser Val Tyr Val Pro Ser Ser Arg His Thr Phe Asp Ala
50 55 60

Glu Gly His Pro Asn Leu Met Gly Val Ser Ile Pro Leu Thr Val Gly
65 70 75 80

Met Ile Val Met Met Ile Pro Pro Ile Cys Lys Val Ser Trp Glu Ser
85 90 95

```
Ile His Lys Tyr Phe Tyr Arg Ser Tyr Ile Arg Lys Gln Leu Ala Leu
            100                 105                 110

Ser Leu Phe Leu Asn Trp Val Ile Gly Pro Leu Leu Met Thr Ala Leu
        115                 120                 125

Ala Trp Met Ala Leu Phe Asp Tyr Lys Glu Tyr Arg Gln Gly Ile Ile
    130                 135                 140

Met Ile Gly Val Ala Arg Cys Ile Ala Met Val Leu Ile Trp Asn Gln
145                 150                 155                 160

Ile Ala Gly Gly Asp Asn Asp Leu Cys Val Val Leu Val Ile Thr Asn
                165                 170                 175

Ser Leu Leu Gln Met Val Leu Tyr Ala Pro Leu Gln Ile Phe Tyr Cys
            180                 185                 190

Tyr Val Ile Ser His Asp His Leu Asn Thr Ser Asn Arg Val Leu Phe
        195                 200                 205

Glu Glu Val Ala Lys Ser Val Gly Val Phe Leu Gly Ile Pro Leu Gly
    210                 215                 220

Ile Gly Ile Ile Ile Arg Leu Gly Ser Leu Thr Ile Ala Gly Lys Ser
225                 230                 235                 240
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[0192]

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Asn Tyr Glu Lys Tyr Ile Leu Arg Phe Ile Ser Pro Trp Ala Met Ile
                245                 250                 255

Gly Phe His Tyr Thr Leu Phe Val Ile Phe Ile Ser Arg Gly Tyr Gln
            260                 265                 270

Phe Ile His Glu Ile Gly Ser Ala Ile Leu Cys Phe Val Pro Leu Val
        275                 280                 285

Leu Tyr Phe Phe Ile Ala Trp Phe Leu Thr Phe Ala Leu Met Arg Tyr
    290                 295                 300

Leu Ser Ile Ser Arg Ser Asp Thr Gln Arg Glu Cys Ser Cys Asp Gln
305                 310                 315                 320

Glu Leu Leu Leu Lys Arg Val Trp Gly Arg Lys Ser Cys Glu Ala Ser
                325                 330                 335

Phe Ser Ile Thr Met Thr Gln Cys Phe Thr Met Ala Ser Asn Asn Phe
            340                 345                 350

Glu Leu Ser Leu Ala Ile Ala Ile Ser Leu Tyr Gly Asn Asn Ser Lys
        355                 360                 365

Gln Ala Ile Ala Ala Thr Phe Gly Pro Leu Leu Glu Val Pro Ile Leu
    370                 375                 380
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Leu Ile Leu Ala Ile Val Ala Arg Ile Leu Lys Pro Tyr Tyr Ile Trp
385 390 395 400

Asn Asn Arg Asn

<210> 86
<211> 548
<212> PRT
<213> 酿酒酵母

<400> 86

Met Val Tyr Thr Ser Thr Tyr Arg His Thr Ile Val Val Asp Leu Leu
1 5 10 15

Glu Tyr Leu Gly Ile Val Ser Asn Leu Glu Thr Leu Gln Ser Ala Arg
20 25 30

Glu Asp Glu Thr Arg Lys Pro Glu Asn Thr Asp Lys Lys Glu Cys Lys
35 40 45

Pro Asp Tyr Asp Ile Glu Cys Gly Pro Asn Arg Ser Cys Ser Glu Ser
50 55 60

Ser Thr Asp Ser Asp Ser Ser Gly Ser Gln Ile Glu Lys Asn Asp Pro
65 70 75 80

[0193]

Phe Arg Val Asp Trp Asn Gly Pro Ser Asp Pro Glu Asn Pro Gln Asn
85 90 95

Trp Pro Leu Leu Lys Lys Ser Leu Val Val Phe Gln Ile Met Leu Leu
100 105 110

Thr Cys Val Thr Tyr Met Gly Ser Ser Ile Tyr Thr Pro Gly Gln Glu
115 120 125

Tyr Ile Gln Glu Glu Phe His Val Gly His Val Val Ala Thr Leu Asn
130 135 140

Leu Ser Leu Tyr Val Leu Gly Tyr Gly Leu Gly Pro Ile Ile Phe Ser
145 150 155 160

Pro Leu Ser Glu Thr Ala Arg Tyr Gly Arg Leu Asn Leu Tyr Met Val
165 170 175

Thr Leu Phe Phe Phe Met Ile Phe Gln Val Gly Cys Ala Thr Val His
180 185 190

Asn Ile Gly Gly Leu Ile Val Met Arg Phe Ile Ser Gly Ile Leu Cys
195 200 205

Ser Pro Ser Leu Ala Thr Gly Gly Gly Thr Val Ala Asp Ile Ile Ser
210 215 220

Pro Glu Met Val Pro Leu Val Leu Gly Met Trp Ser Ala Gly Ala Val
225 230 235 240

Ala Ala Pro Val Leu Ala Pro Leu Leu Gly Ala Ala Met Val Asp Ala
245 250 255

Lys Asn Trp Arg Phe Ile Phe Trp Leu Leu Met Trp Leu Ser Ala Ala
260 265 270

Thr Phe Ile Leu Leu Ala Phe Phe Phe Pro Glu Thr Gln His His Asn
275 280 285

Ile Leu Tyr Arg Arg Ala Leu Lys Leu Arg Lys Glu Thr Gly Asp Asp
290 295 300

Arg Tyr Tyr Thr Glu Gln Asp Lys Leu Asp Arg Glu Val Asp Ala Arg
305 310 315 320

Thr Phe Leu Ile Asn Thr Leu Tyr Arg Pro Leu Lys Met Ile Ile Lys
325 330 335

Glu Pro Ala Ile Leu Ala Phe Asp Leu Tyr Ile Ala Val Ala Tyr Gly
340 345 350

Cys Phe Tyr Leu Phe Phe Glu Ala Phe Pro Ile Val Phe Val Gly Ile
355 360 365

[0194]

Tyr His Phe Ser Leu Val Glu Val Gly Leu Ala Tyr Met Gly Phe Cys
370 375 380

Val Gly Cys Val Leu Ala Tyr Gly Leu Phe Gly Ile Leu Asn Met Arg
385 390 395 400

Ile Ile Val Pro Arg Phe Arg Asn Gly Thr Phe Thr Pro Glu Ala Phe
405 410 415

Leu Ile Val Ala Met Cys Val Cys Trp Cys Leu Pro Leu Ser Leu Phe
420 425 430

Leu Phe Gly Trp Thr Ala Arg Val His Trp Ile Leu Pro Val Ile Ser
435 440 445

Glu Val Phe Phe Val Leu Ala Val Phe Asn Ile Phe Gln Ala Thr Phe
450 455 460

Ala Tyr Leu Ala Thr Cys Tyr Pro Lys Tyr Val Ala Ser Val Phe Ala
465 470 475 480

Gly Asn Gly Phe Cys Arg Ala Ser Phe Ala Cys Ala Phe Pro Leu Phe
485 490 495

Gly Arg Ala Met Tyr Asp Asn Leu Ala Thr Lys Asn Tyr Pro Val Ala
500 505 510

Trp Gly Ser Ser Leu Val Gly Phe Leu Thr Leu Gly Leu Ala Ile Ile
515 520 525

Pro Phe Ile Leu Tyr Lys Tyr Gly Pro Ser Leu Arg Thr Arg Ser Ser
530 535 540

Tyr Thr Glu Glu
545

<210> 87
<211> 633
<212> PRT
<213> 酿酒酵母

<400> 87

Met Pro Asp Asn Leu Ser Leu His Leu Ser Gly Ser Ser Lys Arg Leu
1 5 10 15

Asn Ser Arg Gln Leu Met Glu Ser Ser Asn Glu Thr Phe Ala Pro Asn
20 25 30

Asn Val Asp Leu Glu Lys Glu Tyr Lys Ser Ser Gln Ser Asn Ile Thr
35 40 45

Thr Glu Val Tyr Glu Ala Ser Ser Phe Glu Glu Lys Val Ser Ser Glu
50 55 60

[0195]

Lys Pro Gln Tyr Ser Ser Phe Trp Lys Lys Ile Tyr Tyr Glu Tyr Val
65 70 75 80

Val Val Asp Lys Ser Ile Leu Gly Val Ser Ile Leu Asp Ser Phe Met
85 90 95

Tyr Asn Gln Asp Leu Lys Pro Val Glu Lys Glu Arg Arg Val Trp Ser
100 105 110

Trp Tyr Asn Tyr Cys Tyr Phe Trp Leu Ala Glu Cys Phe Asn Ile Asn
115 120 125

Thr Trp Gln Ile Ala Ala Thr Gly Leu Gln Leu Gly Leu Asn Trp Trp
130 135 140

Gln Cys Trp Ile Thr Ile Trp Ile Gly Tyr Gly Phe Val Gly Ala Phe
145 150 155 160

Val Val Leu Ala Ser Arg Val Gly Ser Ala Tyr His Leu Ser Phe Pro
165 170 175

Ile Ser Ser Arg Ala Ser Phe Gly Ile Phe Phe Ser Leu Trp Pro Val
180 185 190

Ile Asn Arg Val Val Met Ala Ile Val Trp Tyr Ser Val Gln Ala Tyr
195 200 205

Ile Ala Ala Thr Pro Val Ser Leu Met Leu Lys Ser Ile Phe Gly Lys
210 215 220

Asp Leu Gln Asp Lys Ile Pro Asp His Phe Gly Ser Pro Asn Ala Thr
225 230 235 240

Thr Tyr Glu Phe Met Cys Phe Phe Ile Phe Trp Ala Ala Ser Leu Pro
245 250 255

Phe Leu Leu Val Pro Pro His Lys Ile Arg His Leu Phe Thr Val Lys
260 265 270

Ala Val Leu Val Pro Phe Ala Ser Phe Gly Phe Leu Ile Trp Ala Ile
275 280 285

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

Pro His Gly Ser Ala Phe Ser Trp Ala Phe Leu Arg Ser Leu Met Gly
305 310 315 320

Cys Met Ala Asn Phe Ser Thr Met Val Ile Asn Ala Pro Asp Phe Ser
325 330 335

Arg Phe Ser Lys Asn Pro Asn Ser Ala Leu Trp Ser Gln Leu Val Cys
340 345 350

[0196]

Ile Pro Phe Leu Phe Ser Ile Thr Cys Leu Ile Gly Ile Leu Val Thr
355 360 365

Ala Ala Gly Tyr Glu Ile Tyr Gly Ile Asn Tyr Trp Ser Pro Leu Asp
370 375 380

Val Leu Glu Lys Phe Leu Gln Thr Thr Tyr Asn Lys Gly Thr Arg Ala
385 390 395 400

Gly Val Phe Leu Ile Ser Phe Val Phe Ala Val Ala Gln Leu Gly Thr
405 410 415

Asn Ile Ser Ala Asn Ser Leu Ser Cys Gly Thr Asp Met Ser Ala Ile
420 425 430

Phe Pro Lys Phe Ile Asn Ile Lys Arg Gly Ser Leu Phe Cys Ala Ala
435 440 445

Met Ala Leu Cys Ile Cys Pro Trp Asn Leu Met Ala Thr Ser Ser Lys
450 455 460

Phe Thr Met Ala Leu Ser Ala Tyr Ala Ile Phe Leu Ser Ser Ile Ala
465 470 475 480

Gly Val Val Cys Ser Asp Tyr Phe Val Val Arg Arg Gly Tyr Ile Lys

485 490 495

Leu Thr His Ile Tyr Ser His Gln Lys Gly Ser Phe Tyr Met Tyr Gly
500 505 510

Asn Arg Phe Gly Ile Asn Trp Arg Ala Leu Ala Ala Tyr Leu Cys Gly
515 520 525

Val Ala Pro Cys Leu Pro Gly Phe Ile Ala Glu Val Gly Ala Pro Ala
530 535 540

Ile Lys Val Ser Asp Gly Ala Met Lys Leu Tyr Tyr Leu Ser Tyr Trp
545 550 555 560

Val Gly Tyr Gly Leu Ser Phe Ser Ser Tyr Thr Ala Leu Cys Tyr Phe
565 570 575

Phe Pro Val Pro Gly Cys Pro Val Asn Asn Ile Ile Lys Asp Lys Gly
580 585 590

Trp Phe Gln Arg Trp Ala Asn Val Asp Asp Phe Glu Glu Glu Trp Lys
595 600 605

Asp Thr Ile Glu Arg Asp Asp Leu Val Asp Asp Asn Ile Ser Val Tyr
610 615 620

[0197] Glu His Glu His Glu Lys Thr Phe Ile
625 630

<210> 88
<211> 689
<212> PRT
<213> 酿酒酵母

<400> 88

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

Cys Ser Asp Asn Ser Leu Pro Asn Asn His Val Met Met His Cys Asp
20 25 30

Glu Ser Ser Gly Ser Pro His Ser Glu His Asn Asp Tyr Ser Tyr Glu
35 40 45

Lys Thr Asn Leu Glu Ser Thr Ala Ser Asn Ser Arg Glu His Arg Asp
50 55 60

Asn Gln Leu Ser Arg Leu Lys Ser Glu Glu Tyr Val Val Pro Lys Asn
65 70 75 80

Gln Arg Arg Gly Leu Leu Pro Gln Leu Ala Ile Ile Pro Glu Phe Lys
85 90 95

Asp Ala Arg Asp Tyr Pro Pro Met Met Lys Lys Met Ile Val Phe Leu

100 105 110

Ile Ala Phe Ser Ser Met Met Gly Pro Met Gly Thr Ser Ile Ile Phe
115 120 125

Pro Ala Ile Asn Ser Ile Thr Thr Glu Phe Lys Thr Ser Val Ile Met
130 135 140

Val Asn Val Ser Ile Gly Val Tyr Leu Leu Ser Leu Gly Val Phe Pro
145 150 155 160

Leu Trp Trp Ser Ser Leu Ser Glu Leu Glu Gly Arg Arg Thr Thr Tyr
165 170 175

Ile Thr Ser Phe Ala Leu Leu Phe Ala Phe Asn Ile Gly Ser Ala Leu
180 185 190

Ala Pro Asp Ile Asn Ser Phe Ile Ala Leu Arg Met Leu Cys Gly Ala
195 200 205

Ala Ser Ala Ser Val Gln Ser Val Gly Ala Gly Thr Val Ala Asp Leu
210 215 220

Tyr Ile Ser Glu Asp Arg Gly Lys Asn Leu Ser Tyr Tyr Tyr Leu Gly
225 230 235 240

[0198]

Pro Leu Leu Ala Pro Leu Leu Ser Pro Ile Phe Gly Ser Leu Leu Val
245 250 255

Asn Arg Trp Pro Trp Arg Ser Thr Gln Trp Phe Met Val Ile Leu Ser
260 265 270

Gly Cys Asn Val Ile Leu Leu Thr Val Leu Leu Pro Glu Thr Leu Arg
275 280 285

Lys Gln Asp Ser Lys Gly Ala Ile Ala Gln Ile Leu Ala Glu Arg Arg
290 295 300

Ile Gln Val Asp Asn Asn Glu Arg Gly Glu Ile Gln Glu Asp Tyr Gln
305 310 315 320

Arg Gly Glu Asp Glu Thr Asp Arg Ile Glu Asn Gln Val Ala Thr Leu
325 330 335

Ser Thr Glu Lys His Asn Tyr Val Gly Glu Val Arg Asp Gln Asp Ser
340 345 350

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

Gly Glu Thr Gln Leu Gln Arg Ile Tyr Thr Glu Ala Ser Arg Ser Leu
370 375 380

Tyr Glu Tyr Gln Leu Asp Asp Ser Gly Ile Asp Ala Thr Thr Ala Gln
385 390 395 400

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

Glu Asn Ser Leu Arg Lys Leu Gln Thr Asn Leu Glu Glu Gln Val Lys
420 425 430

Lys Val Leu Ser Ser Asn Gly Gly Glu Ile Ala Pro Lys Gln Val Ser
435 440 445

Ala Val Arg Lys Val Trp Asp Thr Phe Phe Val Tyr Phe Ile Lys Pro
450 455 460

Leu Lys Ser Leu His Phe Leu Glu Tyr Pro Pro Val Ala Leu Ala Ile
465 470 475 480

Thr Phe Ser Ala Ile Ser Phe Ser Thr Val Tyr Phe Val Asn Met Thr
485 490 495

Val Glu Tyr Lys Tyr Ser Arg Pro Pro Tyr Asn Phe Lys Pro Leu Tyr
500 505 510

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

[0199]

Ile Tyr Gly Gly Arg Trp Val Asp Met Leu Leu Lys Arg Tyr Lys Glu
530 535 540

Lys Tyr Gly Ile Leu Ala Pro Glu Ala Arg Ile Ser Trp Asn Val Val
545 550 555 560

Thr Ser Val Ile Ser Phe Pro Ile Ala Leu Leu Ile Phe Gly Trp Cys
565 570 575

Leu Asp Lys Lys Cys His Trp Val Thr Pro Leu Ile Gly Thr Ala Leu
580 585 590

Phe Gly Tyr Ala Ala Met Met Thr Ile Gly Ala Thr Leu Ser Tyr Leu
595 600 605

Val Asp Ser Leu Pro Gly Lys Gly Ala Thr Gly Val Ala Leu Asn Asn
610 615 620

Leu Ile Arg Gln Ile Leu Ala Ala Thr Ala Val Phe Val Thr Thr Pro
625 630 635 640

Met Leu Asn Gly Met Gly Thr Gly Trp Ala Phe Thr Met Leu Ala Phe
645 650 655

Ile Val Leu Gly Ala Ser Ser Val Leu Ile Ile Leu Lys Lys His Gly
660 665 670

Asp Tyr Trp Arg Glu Asn Tyr Asp Leu Gln Lys Leu Tyr Asp Lys Ile
675 680 685

Asp

<210> 89
<211> 427
<212> PRT
<213> 酿酒酵母

<400> 89

Met Val Glu Thr Phe Ser Phe Ala His Leu Ala Tyr Leu Val Phe Glu
1 5 10 15

Ser Val Leu Gln Val Val Ile Ile Ala Leu Ala Gly Phe Trp Ser Ala
20 25 30

Ser Ser Gly Leu Leu Pro Lys Gln Ser Gln Lys Ile Ile Ser Leu Leu
35 40 45

Asn Val Asp Leu Phe Thr Pro Cys Leu Ile Phe Ser Lys Leu Ala Lys
50 55 60

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

[0200]

Phe Gly Leu Thr Thr Gly Ile Ser Phe Ile Ser Gly Lys Ile Met Ser
85 90 95

Arg Ile Leu Asp Leu Asp Lys Asp Glu Thr Asn Phe Val Val Ala Asn
100 105 110

Ser Val Phe Gly Asn Ser Asn Ser Leu Pro Val Ser Leu Thr Leu Ser
115 120 125

Leu Ala Tyr Thr Leu Pro Asn Leu Thr Trp Asp Gln Ile Pro Asn Asp
130 135 140

Asn Arg Asp Asn Val Ala Ser Arg Gly Ile Leu Tyr Leu Leu Ile Phe
145 150 155 160

Gln Gln Ile Gly Gln Met Leu Arg Trp Ser Trp Gly Tyr Asn Lys Leu
165 170 175

Met Lys Trp Ser Gly Glu Asn Thr Gln His Met Pro Pro Ser Gln Val
180 185 190

Gln Ser Leu Leu Glu Arg Thr Pro Asn Ile Asp Asn Glu Glu Leu Val
195 200 205

Asn Glu Glu Gln Glu Glu Gln Glu Leu Leu Glu Glu Glu Asn Asn Arg
210 215 220

Met Asn Ser Ser Phe Leu Ser Ser Ser Ser Ile Gly Asp Lys Ile Trp
225 230 235 240

Gln Lys Ser Cys Thr Val Phe Glu Arg Ile Arg Ala Asn Leu Asn Pro
245 250 255

Pro Leu Tyr Ser Met Ile Phe Ala Val Val Val Ala Ala Ile Gly Pro
260 265 270

Leu Gln Arg Glu Leu Phe Met Glu Asp Gly Phe Ile Asn Asn Thr Phe
275 280 285

Ala Glu Ala Val Thr Gln Leu Gly Ser Val Ser Ile Pro Leu Ile Leu
290 295 300

Val Val Leu Gly Ser Asn Leu Tyr Pro Ser Ala Glu Val Phe Pro Lys
305 310 315 320

Thr Val His His Ser Lys Leu Leu Ile Gly Ser Ile Ile Gly Arg Met
325 330 335

Ile Leu Pro Ser Cys Phe Leu Leu Pro Ile Ile Ala Ile Ala Val Lys
340 345 350

Tyr Ile Asn Val Ser Ile Leu Asp Asp Pro Ile Phe Leu Val Val Gly
355 360 365

[0201]

Phe Leu Leu Thr Val Ser Pro Pro Ala Ile Gln Leu Thr Gln Ile Thr
370 375 380

Gln Leu Asn Glu Phe Phe Glu Ala Glu Met Ala Asp Ile Leu Phe Trp
385 390 395 400

Gly Tyr Ala Val Leu Ser Leu Pro Val Ser Ile Ile Val Val Ser Gly
405 410 415

Ala Ile Tyr Val Leu Gln Trp Ala Asn Pro Thr
420 425

<210> 90
<211> 1216
<212> PRT
<213> 酿酒酵母

<400> 90

Met Lys Pro Glu Lys Leu Phe Ser Gly Leu Gly Thr Ser Asp Gly Glu
1 5 10 15

Tyr Gly Val Val Asn Ser Glu Asn Ile Ser Ile Asp Ala Met Gln Asp
20 25 30

Asn Arg Gly Glu Cys His Arg Arg Ser Ile Glu Met His Ala Asn Asp
35 40 45

Asn Leu Gly Leu Val Ser Gln Arg Asp Cys Thr Asn Arg Pro Lys Ile
50 55 60

Thr Pro Gln Glu Cys Leu Ser Glu Thr Glu Gln Ile Cys His His Gly
65 70 75 80

Glu Asn Arg Thr Lys Ala Gly Leu Asp Val Asp Asp Ala Glu Thr Gly
85 90 95

Gly Asp His Thr Asn Glu Ser Arg Val Asp Glu Cys Cys Ala Glu Lys
100 105 110

Val Asn Asp Thr Glu Thr Gly Leu Asp Val Asp Ser Cys Cys Gly Asp
115 120 125

Ala Gln Thr Gly Gly Asp His Thr Asn Glu Ser Cys Val Asp Gly Cys
130 135 140

Cys Val Arg Asp Ser Ser Val Met Val Glu Glu Val Thr Gly Ser Cys
145 150 155 160

Glu Ala Val Ser Ser Lys Glu Gln Leu Leu Thr Ser Phe Glu Val Val
165 170 175

Pro Ser Lys Ser Glu Gly Leu Gln Ser Ile His Asp Ile Arg Glu Thr
180 185 190

[0202]

Thr Arg Cys Asn Thr Asn Ser Asn Gln His Thr Gly Lys Gly Arg Leu
195 200 205

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

Ser Arg Gln Lys Ile Glu Val Ser Ser Lys Pro Glu Cys Cys Asn Ile
225 230 235 240

Ser Cys Val Glu Arg Ile Ala Ser Arg Ser Cys Glu Lys Arg Thr Phe
245 250 255

Lys Gly Ser Thr Asn Val Gly Ile Ser Gly Ser Ser Ser Thr Asp Ser
260 265 270

Leu Ser Glu Lys Phe Phe Ser Glu Gln Tyr Ser Arg Met Tyr Asn Arg
275 280 285

Tyr Ser Ser Ile Leu Lys Asn Leu Gly Cys Ile Cys Asn Tyr Leu Arg
290 295 300

Thr Leu Gly Lys Glu Ser Cys Cys Leu Pro Lys Val Arg Phe Cys Ser
305 310 315 320

Gly Glu Gly Ala Ser Lys Lys Thr Lys Tyr Ser Tyr Arg Asn Ser Ser
325 330 335

Gly Cys Leu Thr Lys Lys Lys Thr His Gly Asp Lys Glu Arg Leu Ser
340 345 350

Asn Asp Asn Gly His Ala Asp Phe Val Cys Ser Lys Ser Cys Cys Thr
355 360 365

Lys Met Lys Asp Cys Ala Val Thr Ser Thr Ile Ser Gly His Ser Ser
370 375 380

Ser Glu Ile Ser Arg Ile Val Ser Met Glu Pro Ile Glu Asn His Leu
385 390 395 400

Asn Leu Glu Ala Gly Ser Thr Gly Thr Glu His Ile Val Leu Ser Val
405 410 415

Ser Gly Met Ser Cys Thr Gly Cys Glu Ser Lys Leu Lys Lys Ser Phe
420 425 430

Gly Ala Leu Lys Cys Val His Gly Leu Lys Thr Ser Leu Ile Leu Ser
435 440 445

Gln Ala Glu Phe Asn Leu Asp Leu Ala Gln Gly Ser Val Lys Asp Val
450 455 460

Ile Lys His Leu Ser Lys Thr Thr Glu Phe Lys Tyr Glu Gln Ile Ser
465 470 475 480

[0203]

Asn His Gly Ser Thr Ile Asp Val Val Val Pro Tyr Ala Ala Lys Asp
485 490 495

Phe Ile Asn Glu Glu Trp Pro Gln Gly Val Thr Glu Leu Lys Ile Val
500 505 510

Glu Arg Asn Ile Ile Arg Ile Tyr Phe Asp Pro Lys Val Ile Gly Ala
515 520 525

Arg Asp Leu Val Asn Glu Gly Trp Ser Val Pro Val Ser Ile Ala Pro
530 535 540

Phe Ser Cys His Pro Thr Ile Glu Val Gly Arg Lys His Leu Val Arg
545 550 555 560

Val Gly Cys Thr Thr Ala Leu Ser Ile Ile Leu Thr Ile Pro Ile Leu
565 570 575

Val Met Ala Trp Ala Pro Gln Leu Arg Glu Lys Ile Ser Thr Ile Ser
580 585 590

Ala Ser Met Val Leu Ala Thr Ile Ile Gln Phe Val Ile Ala Gly Pro
595 600 605

Phe Tyr Leu Asn Ala Leu Lys Ser Leu Ile Phe Ser Arg Leu Ile Glu

610 615 620

Met Asp Leu Leu Ile Val Leu Ser Thr Ser Ala Ala Tyr Ile Phe Ser
625 630 635 640

Ile Val Ser Phe Gly Tyr Phe Val Val Gly Arg Pro Leu Ser Thr Glu
645 650 655

Gln Phe Phe Glu Thr Ser Ser Leu Leu Val Thr Leu Ile Met Val Gly
660 665 670

Arg Phe Val Ser Glu Leu Ala Arg His Arg Ala Val Lys Ser Ile Ser
675 680 685

Val Arg Ser Leu Gln Ala Ser Ser Ala Ile Leu Val Asp Lys Thr Gly
690 695 700

Lys Glu Thr Glu Ile Asn Ile Arg Leu Leu Gln Tyr Gly Asp Ile Phe
705 710 715 720

Lys Val Leu Pro Asp Ser Arg Ile Pro Thr Asp Gly Thr Val Ile Ser
725 730 735

Gly Ser Ser Glu Val Asp Glu Ala Leu Ile Thr Gly Glu Ser Met Pro
740 745 750

[0204]

Val Pro Lys Lys Cys Gln Ser Ile Val Val Ala Gly Ser Val Asn Gly
755 760 765

Thr Gly Thr Leu Phe Val Lys Leu Ser Lys Leu Pro Gly Asn Asn Thr
770 775 780

Ile Ser Thr Ile Ala Thr Met Val Asp Glu Ala Lys Leu Thr Lys Pro
785 790 795 800

Lys Ile Gln Asn Ile Ala Asp Lys Ile Ala Ser Tyr Phe Val Pro Thr
805 810 815

Ile Ile Gly Ile Thr Val Val Thr Phe Cys Val Trp Ile Ala Val Gly
820 825 830

Ile Arg Val Glu Lys Gln Ser Arg Ser Asp Ala Val Ile Gln Ala Ile
835 840 845

Ile Tyr Ala Ile Thr Val Leu Ile Val Ser Cys Pro Cys Val Ile Gly
850 855 860

Leu Ala Val Pro Ile Val Phe Val Ile Ala Ser Gly Val Ala Ala Lys
865 870 875 880

Arg Gly Val Ile Phe Lys Ser Ala Glu Ser Ile Glu Val Ala His Asn
885 890 895

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Thr Ser His Val Val Phe Asp Lys Thr Gly Thr Leu Thr Glu Gly Lys
            900                 905                 910

Leu Thr Val Val His Glu Thr Val Arg Gly Asp Arg His Asn Ser Gln
        915                 920                 925

Ser Leu Leu Leu Gly Leu Thr Glu Gly Ile Lys His Pro Val Ser Met
    930                 935                 940

Ala Ile Ala Ser Tyr Leu Lys Glu Lys Gly Val Ser Ala Gln Asn Val
945                 950                 955                 960

Ser Asn Thr Lys Ala Val Thr Gly Lys Arg Val Glu Gly Thr Ser Tyr
                965                 970                 975

Ser Gly Leu Lys Leu Gln Gly Gly Asn Cys Arg Trp Leu Gly His Asn
            980                 985                 990

Asn Asp Pro Asp Val Arg Lys Ala  Leu Glu Gln Gly Tyr  Ser Val Phe
        995                 1000                1005

Cys Phe  Ser Val Asn Gly Ser  Val Thr Ala Val Tyr  Ala Leu Glu
    1010                1015                1020

Asp Ser  Leu Arg Ala Asp Ala  Val Ser Thr Ile Asn  Leu Leu Arg
    1025                1030                1035
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[0205]

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Gln Arg  Gly Ile Ser Leu His  Ile Leu Ser Gly Asp  Asp Asp Gly
    1040                1045                1050

Ala Val  Arg Ser Met Ala Ala  Arg Leu Gly Ile Glu  Ser Ser Asn
    1055                1060                1065

Ile Arg  Ser His Ala Thr Pro  Ala Glu Lys Ser Glu  Tyr Ile Lys
    1070                1075                1080

Asp Ile  Val Glu Gly Arg Asn  Cys Asp Ser Ser Ser  Gln Ser Lys
    1085                1090                1095

Arg Pro  Val Val Val Phe Cys  Gly Asp Gly Thr Asn  Asp Ala Ile
    1100                1105                1110

Gly Leu  Thr Gln Ala Thr Ile  Gly Val His Ile Asn  Glu Gly Ser
    1115                1120                1125

Glu Val  Ala Lys Leu Ala Ala  Asp Val Val Met Leu  Lys Pro Lys
    1130                1135                1140

Leu Asn  Asn Ile Leu Thr Met  Ile Thr Val Ser Gln  Lys Ala Met
    1145                1150                1155

Phe Arg  Val Lys Leu Asn Phe  Leu Trp Ser Phe Thr  Tyr Asn Leu
    1160                1165                1170
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Phe Ala Ile Leu Leu Ala Ala Gly Ala Phe Val Asp Phe His Ile
1175 1180 1185

Pro Pro Glu Tyr Ala Gly Leu Gly Glu Leu Val Ser Ile Leu Pro
1190 1195 1200

Val Ile Phe Val Ala Ile Leu Leu Arg Tyr Ala Lys Ile
1205 1210 1215

<210> 91
<211> 574
<212> PRT
<213> 酿酒酵母

<400> 91

Met Ala Leu His Gln Phe Asp Tyr Ile Phe Ala Ile Ala Met Leu Phe
1 5 10 15

Ala Phe Leu Asp Ala Phe Asn Ile Gly Ala Asn Asp Val Ala Asn Ser
20 25 30

Phe Ala Ser Ser Ile Ser Ser Arg Ser Leu Lys Tyr Trp Gln Ala Met
35 40 45

Val Leu Ala Gly Leu Cys Glu Phe Leu Gly Ala Val Leu Ala Gly Ala
50 55 60

[0206]

Arg Val Ser Gly Thr Ile Lys Asn Asn Ile Ile Asp Ser Ser Ile Phe
65 70 75 80

Thr Asn Asp Pro Ala Val Leu Met Leu Thr Met Thr Ser Ala Leu Ile
85 90 95

Gly Ser Ser Cys Trp Leu Thr Phe Ala Thr Ala Ile Gly Met Pro Val
100 105 110

Ser Thr Thr His Ser Ile Val Gly Gly Thr Ile Gly Ala Gly Ile Ala
115 120 125

Ala Gly Gly Ala Asn Gly Val Val Trp Gly Trp Ser Gly Val Ser Gln
130 135 140

Ile Ile Ala Ser Trp Phe Ile Ala Pro Ile Leu Ala Gly Ala Ile Ala
145 150 155 160

Ala Ile Val Phe Ser Ile Ser Arg Phe Ser Val Leu Glu Val Lys Ser
165 170 175

Leu Glu Arg Ser Ile Lys Asn Ala Leu Leu Leu Val Gly Val Leu Val
180 185 190

Phe Ala Thr Phe Ser Ile Leu Thr Met Leu Ile Val Trp Lys Gly Ser
195 200 205

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

Ile Val Leu Thr Gly Ala Ile Ala Ser Ile Val Tyr Phe Ile Phe Phe
225 230 235 240

Tyr Pro Phe Tyr Arg Arg Lys Val Leu Asp Gln Asp Trp Thr Leu Lys
245 250 255

Leu Ile Asp Ile Phe Arg Gly Pro Ser Phe Tyr Phe Lys Ser Thr Asp
260 265 270

Asp Ile Pro Pro Met Pro Glu Gly His Gln Leu Thr Ile Asp Tyr Tyr
275 280 285

Glu Gly Arg Arg Asn Leu Gly Thr Thr Val Ser Val Glu Asp Glu Glu
290 295 300

Asn Lys Ala Ala Ser Asn Ser Asn Asp Ser Val Lys Asn Lys Glu Asp
305 310 315 320

Ile Gln Glu Val Asp Leu Val Arg Thr Glu Thr Glu Pro Glu Thr Lys
325 330 335

Leu Ser Thr Lys Gln Tyr Trp Trp Ser Leu Leu Lys Gln Gly Pro Lys
340 345 350

[0207]

Lys Trp Pro Leu Leu Phe Trp Leu Val Ile Ser His Gly Trp Thr Gln
355 360 365

Asp Val Ile His Ala Gln Val Asn Asp Arg Asp Met Leu Ser Gly Asp
370 375 380

Leu Lys Gly Met Tyr Glu Arg Ser Lys Phe Tyr Asp Asn Arg Val Glu
385 390 395 400

Tyr Ile Tyr Ser Val Leu Gln Ala Ile Thr Ala Ala Thr Met Ser Phe
405 410 415

Ala His Gly Ala Asn Asp Val Ala Asn Ala Thr Gly Pro Leu Ser Ala
420 425 430

Val Tyr Val Ile Trp Lys Thr Asn Thr Ile Gly Ala Lys Ser Glu Val
435 440 445

Pro Val Trp Val Leu Ala Tyr Gly Gly Val Ala Leu Val Ile Gly Cys
450 455 460

Trp Thr Tyr Gly Tyr Asn Ile Ile Lys Asn Leu Gly Asn Lys Met Ile
465 470 475 480

Leu Gln Ser Pro Ser Arg Gly Phe Ser Ile Glu Leu Ala Val Ala Ile
485 490 495

Thr Thr Val Met Ala Thr Gln Leu Gly Ile Pro Thr Ser Thr Thr Gln
500 505 510

Ile Ala Val Gly Gly Ile Val Ala Val Gly Leu Cys Asn Lys Asp Leu
515 520 525

Lys Ser Val Asn Trp Arg Met Val Ala Trp Cys Tyr Ser Gly Trp Phe
530 535 540

Leu Thr Leu Pro Ile Ala Gly Leu Ile Ala Gly Ile Ile Asn Gly Ile
545 550 555 560

Ile Leu Asn Ala Pro Arg Phe Gly Val Glu Tyr Gln Met Thr
565 570

<210> 92
<211> 528
<212> PRT
<213> 酿酒酵母

<400> 92

Met Ser Tyr Gly Thr Ile Asn Asp Met Asn Glu Ser Val Thr Asn Tyr
1 5 10 15

Arg Ile Lys Lys Ala Gln Asn Asn Ile Lys Gly Trp Tyr Ala Tyr Ser
20 25 30

[0208]

Phe Ser Ser Glu Pro Phe Val Val Ser Ala Val Ser Thr Tyr Ile Pro
35 40 45

Leu Leu Leu Gln Gln Phe Ala Ser Ile Asn Gly Val Lys Val His Asp
50 55 60

His Ser Ile Pro Cys Leu Ser Glu Thr Gly Ser Asp Ser Asp Lys Cys
65 70 75 80

Val Leu Gly Leu Phe Asn Asn Arg Ile Phe Val Asp Thr Ser Ser Phe
85 90 95

Ala Leu Tyr Val Phe Ser Leu Ser Val Leu Phe Gln Thr Ile Ile Val
100 105 110

Ile Ser Val Ser Gly Ile Val Asp Leu Trp Gly Ser Val Lys Phe Lys
115 120 125

Gly Arg Ile Leu Val Trp Phe Gly Ile Val Gly Ala Leu Ser Thr Val
130 135 140

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

Tyr Ile Val Ala Asn Gly Cys Phe Gly Val Ile Asn Val Val Gly Asn
165 170 175

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Ser Leu Leu Pro Ile Phe Val Lys Asp Ser Leu Lys Cys Gln Ser Gln
            180                 185                 190

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

Gly Arg Gly Ala Ser Leu Gly Tyr Ser Ser Ala Leu Ile Val Gln Ile
    210                 215                 220

Val Ser Met Phe Leu Val Ala Ser Lys Lys Gly Ser Lys Gln Asp Val
225                 230                 235                 240

Gln Val Ala Val Leu Phe Val Gly Ile Trp Trp Phe Val Trp Gln Leu
                245                 250                 255

Pro Met Ile Trp Leu Ile Asp Asp Val Thr Ile Pro Ile Arg Val Asp
            260                 265                 270

Asp Ser Thr Leu Ala Ser Ala Arg Ser Pro Tyr Pro Gly Glu Gln Asp
        275                 280                 285

Ala Leu Gly Gln Leu Asn Trp Lys Asn Tyr Leu Ser Tyr Gly Trp Val
    290                 295                 300

Ser Leu Phe Glu Ser Phe Lys His Ala Arg Leu Leu Lys Asp Val Met
305                 310                 315                 320
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[0209]

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Ile Phe Leu Ile Ala Trp Phe Ile Ile Ser Asp Ser Ile Thr Thr Ile
                325                 330                 335

Asn Ser Thr Ala Val Leu Phe Ser Lys Ala Glu Leu His Met Ser Thr
            340                 345                 350

Leu Asn Leu Ile Met Ile Ser Val Leu Thr Val Val Asn Ala Met Leu
        355                 360                 365

Gly Ala Phe Met Ile Pro Gln Phe Leu Ala Thr Lys Phe Arg Trp Thr
    370                 375                 380

Ser Ser Gln Thr Leu Met Tyr Ile Ile Ile Trp Ala Ser Phe Ile Pro
385                 390                 395                 400

Phe Tyr Gly Ile Leu Gly Phe Phe Phe Asn Ala Phe Gly Leu Lys His
                405                 410                 415

Lys Phe Glu Met Phe Leu Leu Ala Ile Trp Tyr Gly Leu Ser Leu Gly
            420                 425                 430

Gly Leu Ser Ala Val Ser Arg Ser Val Phe Ser Leu Ile Val Pro Pro
        435                 440                 445

Gly Lys Glu Ser Thr Phe Phe Ser Met Phe Ser Ile Thr Asp Lys Gly
```

450 455 460

Ser Ser Ile Leu Gly Pro Phe Leu Val Gly Leu Leu Thr Asp Lys Thr
465 470 475 480

His Asn Ile Arg Tyr Ser Phe Tyr Phe Phe Phe Leu Leu Leu Met Leu
485 490 495

Ser Leu Pro Val Leu Asn Cys Leu Asp Val Lys Arg Gly Arg Arg Glu
500 505 510

Ala Glu Glu Leu Ser Gln Val Leu Pro Glu Ser Glu Arg Arg Leu Asp
515 520 525

<210> 93
<211> 1049
<212> PRT
<213> 酿酒酵母

<400> 93

Met Gly Ser His Arg Arg Tyr Leu Tyr Tyr Ser Ile Leu Ser Phe Leu
1 5 10 15

Leu Leu Ser Cys Ser Val Val Leu Ala Lys Gln Asp Lys Thr Pro Phe
20 25 30

[0210]

Phe Glu Gly Thr Ser Ser Lys Asn Ser Arg Leu Thr Ala Gln Asp Lys
35 40 45

Gly Asn Asp Thr Cys Pro Pro Cys Phe Asn Cys Met Leu Pro Ile Phe
50 55 60

Glu Cys Lys Gln Phe Ser Glu Cys Asn Ser Tyr Thr Gly Arg Cys Glu
65 70 75 80

Cys Ile Glu Gly Phe Ala Gly Asp Asp Cys Ser Leu Pro Leu Cys Gly
85 90 95

Gly Leu Ser Pro Asp Glu Ser Gly Asn Lys Asp Arg Pro Ile Arg Ala
100 105 110

Gln Asn Asp Thr Cys His Cys Asp Asn Gly Trp Gly Gly Ile Asn Cys
115 120 125

Asp Val Cys Gln Glu Asp Phe Val Cys Asp Ala Phe Met Pro Asp Pro
130 135 140

Ser Ile Lys Gly Thr Cys Tyr Lys Asn Gly Met Ile Val Asp Lys Val
145 150 155 160

Phe Ser Gly Cys Asn Val Thr Asn Glu Lys Ile Leu Gln Ile Leu Asn
165 170 175

Gly Lys Ile Pro Gln Ile Thr Phe Ala Cys Asp Lys Pro Asn Gln Glu

180 185 190

Cys Asn Phe Gln Phe Trp Ile Asp Gln Leu Glu Ser Phe Tyr Cys Gly
195 200 205

Leu Ser Asp Cys Ala Phe Glu Tyr Asp Leu Glu Gln Asn Thr Ser His
210 215 220

Tyr Lys Cys Asn Asp Val Gln Cys Lys Cys Val Pro Asp Thr Val Leu
225 230 235 240

Cys Gly Ala Lys Gly Ser Ile Asp Ile Ser Asp Phe Leu Thr Glu Thr
245 250 255

Ile Lys Gly Pro Gly Asp Phe Ser Cys Asp Leu Glu Thr Arg Gln Cys
260 265 270

Lys Phe Ser Glu Pro Ser Met Asn Asp Leu Ile Leu Thr Val Phe Gly
275 280 285

Asp Pro Tyr Ile Thr Leu Lys Cys Glu Ser Gly Glu Cys Val His Tyr
290 295 300

Ser Glu Ile Pro Gly Tyr Lys Ser Pro Ser Lys Asp Pro Thr Val Ser
305 310 315 320

[0211]

Trp Gln Gly Lys Leu Val Leu Ala Leu Thr Ala Val Met Val Leu Ala
325 330 335

Leu Phe Thr Phe Ala Thr Phe Tyr Ile Ser Lys Ser Pro Leu Phe Arg
340 345 350

Asn Gly Leu Gly Ser Ser Lys Ser Pro Ile Arg Leu Pro Asp Glu Asp
355 360 365

Ala Val Asn Asn Phe Leu Gln Asn Glu Asp Asp Thr Leu Ala Thr Leu
370 375 380

Ser Phe Glu Asn Ile Thr Tyr Ser Val Pro Ser Ile Asn Ser Asp Gly
385 390 395 400

Val Glu Glu Thr Val Leu Asn Glu Ile Ser Gly Ile Val Lys Pro Gly
405 410 415

Gln Ile Leu Ala Ile Met Gly Gly Ser Gly Ala Gly Lys Thr Thr Leu
420 425 430

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

Ile Lys Val Asn Gly Ile Ser Met Asp Arg Lys Ser Phe Ser Lys Ile
450 455 460

```
Ile Gly Phe Val Asp Gln Asp Asp Phe Leu Leu Pro Thr Leu Thr Val
465                 470                 475                 480

Phe Glu Thr Val Leu Asn Ser Ala Leu Leu Arg Leu Pro Lys Ala Leu
                485                 490                 495

Ser Phe Glu Ala Lys Lys Ala Arg Val Tyr Lys Val Leu Glu Glu Leu
            500                 505                 510

Arg Ile Ile Asp Ile Lys Asp Arg Ile Ile Gly Asn Glu Phe Asp Arg
        515                 520                 525

Gly Ile Ser Gly Gly Glu Lys Arg Arg Val Ser Ile Ala Cys Glu Leu
    530                 535                 540

Val Thr Ser Pro Leu Val Leu Phe Leu Asp Glu Pro Thr Ser Gly Leu
545                 550                 555                 560

Asp Ala Ser Asn Ala Asn Asn Val Ile Glu Cys Leu Val Arg Leu Ser
                565                 570                 575

Ser Asp Tyr Asn Arg Thr Leu Val Leu Ser Ile His Gln Pro Arg Ser
            580                 585                 590

Asn Ile Phe Tyr Leu Phe Asp Lys Leu Val Leu Leu Ser Lys Gly Glu
        595                 600                 605
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[0212]

```
Met Val Tyr Ser Gly Asn Ala Lys Lys Val Ser Glu Phe Leu Arg Asn
    610                 615                 620

Glu Gly Tyr Ile Cys Pro Asp Asn Tyr Asn Ile Ala Asp Tyr Leu Ile
625                 630                 635                 640

Asp Ile Thr Phe Glu Ala Gly Pro Gln Gly Lys Arg Arg Arg Ile Arg
                645                 650                 655

Asn Ile Ser Asp Leu Glu Ala Gly Thr Asp Thr Asn Asp Ile Asp Asn
            660                 665                 670

Thr Ile His Gln Thr Thr Phe Thr Ser Ser Asp Gly Thr Thr Gln Arg
        675                 680                 685

Glu Trp Ala His Leu Ala Ala His Arg Asp Glu Ile Arg Ser Leu Leu
    690                 695                 700

Arg Asp Glu Glu Asp Val Glu Gly Thr Asp Gly Arg Arg Gly Ala Thr
705                 710                 715                 720

Glu Ile Asp Leu Asn Thr Lys Leu Leu His Asp Lys Tyr Lys Asp Ser
                725                 730                 735

Val Tyr Tyr Ala Glu Leu Ser Gln Glu Ile Glu Glu Val Leu Ser Glu
            740                 745                 750
```

Gly Asp Glu Glu Ser Asn Val Leu Asn Gly Asp Leu Pro Thr Gly Gln
755 760 765

Gln Ser Ala Gly Phe Leu Gln Gln Leu Ser Ile Leu Asn Ser Arg Ser
770 775 780

Phe Lys Asn Met Tyr Arg Asn Pro Lys Leu Leu Leu Gly Asn Tyr Leu
785 790 795 800

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

Ser Asn Asp Ile Ser Gly Phe Gln Asn Arg Met Gly Leu Phe Phe Phe
820 825 830

Ile Leu Thr Tyr Phe Gly Phe Val Thr Phe Thr Gly Leu Ser Ser Phe
835 840 845

Ala Leu Glu Arg Ile Ile Phe Ile Lys Glu Arg Ser Asn Asn Tyr Tyr
850 855 860

Ser Pro Leu Ala Tyr Tyr Ile Ser Lys Ile Met Ser Glu Val Val Pro
865 870 875 880

Leu Arg Val Val Pro Pro Ile Leu Leu Ser Leu Ile Val Tyr Pro Met
885 890 895

[0213]

Thr Gly Leu Asn Met Lys Asp Asn Ala Phe Phe Lys Cys Ile Gly Ile
900 905 910

Leu Ile Leu Phe Asn Leu Gly Ile Ser Leu Glu Ile Leu Thr Ile Gly
915 920 925

Ile Ile Phe Glu Asp Leu Asn Asn Ser Ile Ile Leu Ser Val Leu Val
930 935 940

Leu Leu Gly Ser Leu Leu Phe Ser Gly Leu Phe Ile Asn Thr Lys Asn
945 950 955 960

Ile Thr Asn Val Ala Phe Lys Tyr Leu Lys Asn Phe Ser Val Phe Tyr
965 970 975

Tyr Ala Tyr Glu Ser Leu Leu Ile Asn Glu Val Lys Thr Leu Met Leu
980 985 990

Lys Glu Arg Lys Tyr Gly Leu Asn Ile Glu Val Pro Gly Ala Thr Ile
995 1000 1005

Leu Ser Thr Phe Gly Phe Val Val Gln Asn Leu Val Phe Asp Ile
1010 1015 1020

Lys Ile Leu Ala Leu Phe Asn Val Val Phe Leu Ile Met Gly Tyr
1025 1030 1035

Leu Ala Leu Lys Trp Ile Val Val Glu Gln Lys
1040 1045

<210> 94
<211> 486
<212> PRT
<213> 酿酒酵母

<400> 94

Met Pro Leu Ser Lys Val Glu His Tyr Leu Ser Tyr His Thr Arg Leu
1 5 10 15

Leu Leu Pro His Val Leu Ser Leu Gln Ser Ser His Arg Val Ala Tyr
20 25 30

Ile Phe Ser Leu Leu Ser Ala Val Ser Thr Gly Phe Ile Thr Leu Ile
35 40 45

Ser Leu Tyr Ser Gln Pro Trp Gln Lys His Leu Asn Tyr Ser Ser Trp
50 55 60

Gln Ile Asn Thr Ile Ala Ser Met Thr Asn Leu Gly Met Tyr Leu Thr
65 70 75 80

Pro Pro Ile Leu Gly Met Ile Ala Asp Ser His Gly Pro Ile Thr Leu
85 90 95

[0214]

Ser Leu Leu Ala Ile Ile Gly Phe Ile Pro Ser Tyr Ser Tyr Leu Ala
100 105 110

Tyr Val Phe Asn His Pro Glu Leu Ser Leu Gly Gly Asn Gly Asp Ser
115 120 125

Ser Phe Asn Leu Ser Ile Ile Cys Phe Val Phe Ile Gly Ile Ser Thr
130 135 140

Ser Ala Leu Tyr Phe Ser Ala Leu Leu Thr Cys Thr Lys Leu Tyr Pro
145 150 155 160

His Thr Lys Leu Leu Ser Ile Ser Leu Pro Thr Thr Cys Tyr Gly Ile
165 170 175

Ser Ser Val Val Gly Ser Gln Leu Leu Arg Ile Lys Trp Phe Trp Ser
180 185 190

Ser Asn Ala Ser Ser Ser Ser Ser Asn Ser Asp Leu Asn Leu Gly Arg
195 200 205

Val Phe Gln Thr Phe Ala Leu Val Tyr Val Val Ile Gly Leu Leu Ala
210 215 220

Trp Ile Ala Thr Ser Val Val Ser Leu Leu His Phe Asn Glu Glu Gln
225 230 235 240

Asp Asn Gln Lys Arg Leu Asp Asp Gln Thr Asp Val Glu Gln Ser Pro
245 250 255

Leu Leu Glu Arg Ser Asn His Val Gln Glu Lys Phe Thr Gln Thr Met
260 265 270

Leu Arg Ile Phe Ser Asp Pro Val Thr Tyr Ile Leu Ala Val Ser Ile
275 280 285

Leu Leu Ser Leu Gly Pro Leu Glu Met Phe Ile Ala Asn Met Gly Ser
290 295 300

Leu Thr Asn Leu Leu Val Gln Leu Asp Ala Pro Thr Leu Ser Thr Lys
305 310 315 320

Leu Leu Ser Thr Tyr Ala Leu Ser Ser Thr Phe Thr Arg Leu Leu Thr
325 330 335

Gly Ile Val Ala Asp Phe Phe Ala Lys Lys Lys Ile Ser Ile Lys Trp
340 345 350

Ile Leu Leu Thr Phe Leu Ser Leu Gly Val Cys Ala Gln Leu Phe Leu
355 360 365

Leu Lys Met Thr Ser Ser Ala Ser Pro Trp Gly Leu Val Pro Thr Gly
370 375 380

[0215]

Ser Leu Val Gly Ile Val Tyr Gly Gly Leu Phe Thr Val Tyr Pro Thr
385 390 395 400

Leu Val Leu Leu Val Trp Gly Glu Arg Ser Phe Gly Thr Val Tyr Gly
405 410 415

Ser Leu Leu Ile Ala Pro Ala Ile Gly Ser Met Ile Phe Cys Met Leu
420 425 430

Tyr Ala Lys Phe Tyr Asp Ser Arg Cys Met Ser Gly Gly Gly Asp Leu
435 440 445

Arg Asn Pro Ser Cys Ile Ser Ala Val Tyr Lys Tyr Ser Ser Ile Ala
450 455 460

Phe Val Val Ser Ala Val Leu Ser Ala Val Val Phe Trp Lys Leu Lys
465 470 475 480

Ser Arg Lys Leu Arg Ile
485

<210> 95
<211> 354
<212> PRT
<213> 酿酒酵母

<400> 95

Met Asp Leu Thr Val Glu Pro Asn Leu His Ser Leu Ile Thr Ser Thr
1 5 10 15

Thr His Lys Trp Ile Phe Val Gly Gly Lys Gly Gly Val Gly Lys Thr
20 25 30

Thr Ser Ser Cys Ser Ile Ala Ile Gln Met Ala Leu Ser Gln Pro Asn
35 40 45

Lys Gln Phe Leu Leu Ile Ser Thr Asp Pro Ala His Asn Leu Ser Asp
50 55 60

Ala Phe Gly Glu Lys Phe Gly Lys Asp Ala Arg Lys Val Thr Gly Met
65 70 75 80

Asn Asn Leu Ser Cys Met Glu Ile Asp Pro Ser Ala Ala Leu Lys Asp
85 90 95

Met Asn Asp Met Ala Val Ser Arg Ala Asn Asn Asn Gly Ser Asp Gly
100 105 110

Gln Gly Asp Asp Leu Gly Ser Leu Leu Gln Gly Gly Ala Leu Ala Asp
115 120 125

[0216] Leu Thr Gly Ser Ile Pro Gly Ile Asp Glu Ala Leu Ser Phe Met Glu
130 135 140

Val Met Lys His Ile Lys Arg Gln Glu Gln Gly Glu Gly Glu Thr Phe
145 150 155 160

Asp Thr Val Ile Phe Asp Thr Ala Pro Thr Gly His Thr Leu Arg Phe
165 170 175

Leu Gln Leu Pro Asn Thr Leu Ser Lys Leu Leu Glu Lys Phe Gly Glu
180 185 190

Ile Thr Asn Lys Leu Gly Pro Met Leu Asn Ser Phe Met Gly Ala Gly
195 200 205

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

Thr Ile Arg Gln Gln Phe Thr Asp Pro Asp Leu Thr Thr Phe Val Cys
225 230 235 240

Val Cys Ile Ser Glu Phe Leu Ser Leu Tyr Glu Thr Glu Arg Leu Ile
245 250 255

Gln Glu Leu Ile Ser Tyr Asp Met Asp Val Asn Ser Ile Ile Val Asn
260 265 270

Gln Leu Leu Phe Ala Glu Asn Asp Gln Glu His Asn Cys Lys Arg Cys

275 280 285

Gln Ala Arg Trp Lys Met Gln Lys Lys Tyr Leu Asp Gln Ile Asp Glu
290 295 300

Leu Tyr Glu Asp Phe His Val Val Lys Met Pro Leu Cys Ala Gly Glu
305 310 315 320

Ile Arg Gly Leu Asn Asn Leu Thr Lys Phe Ser Gln Phe Leu Asn Lys
325 330 335

Glu Tyr Asn Pro Ile Thr Asp Gly Lys Val Ile Tyr Glu Leu Glu Asp
340 345 350

Lys Glu

<210> 96
<211> 567
<212> PRT
<213> 酿酒酵母

<400> 96

Met Ala Ser Glu Gln Ser Ser Pro Glu Ile Asn Ala Asp Asn Leu Asn
1 5 10 15

[0217] Ser Ser Ala Ala Asp Val His Val Gln Pro Pro Gly Glu Lys Glu Trp
20 25 30

Ser Asp Gly Phe Tyr Asp Lys Glu Val Ile Asn Gly Asn Thr Pro Asp
35 40 45

Ala Pro Lys Arg Gly Phe Leu Gly Tyr Leu Ile Ile Tyr Leu Leu Cys
50 55 60

Tyr Pro Val Ser Phe Gly Gly Phe Leu Pro Gly Trp Asp Ser Gly Ile
65 70 75 80

Thr Ala Gly Phe Ile Asn Met Asp Asn Phe Lys Met Asn Phe Gly Ser
85 90 95

Tyr Lys His Ser Thr Gly Glu Tyr Tyr Leu Ser Asn Val Arg Met Gly
100 105 110

Leu Leu Val Ala Met Phe Ser Val Gly Cys Ser Ile Gly Gly Val Ala
115 120 125

Phe Ala Arg Leu Ala Asp Thr Leu Gly Arg Arg Leu Ala Ile Val Ile
130 135 140

Val Val Leu Val Tyr Met Val Gly Ala Ile Ile Gln Ile Ser Ser Asn
145 150 155 160

His Lys Trp Tyr Gln Tyr Phe Val Gly Lys Ile Ile Tyr Gly Leu Gly

165 170 175

Ala Gly Gly Cys Ser Val Leu Cys Pro Met Leu Leu Ser Glu Ile Ala
180 185 190

Pro Thr Asp Leu Arg Gly Gly Leu Val Ser Leu Tyr Gln Leu Asn Met
195 200 205

Thr Phe Gly Ile Phe Leu Gly Tyr Cys Ser Val Tyr Gly Thr Arg Lys
210 215 220

Tyr Ser Asn Thr Ala Gln Trp Arg Ile Pro Val Gly Leu Cys Phe Leu
225 230 235 240

Trp Ala Leu Ile Ile Ile Val Gly Met Leu Leu Val Pro Glu Ser Pro
245 250 255

Arg Tyr Leu Ile Glu Cys Glu Arg His Glu Glu Ala Cys Val Ser Ile
260 265 270

Ala Lys Ile Asn Lys Val Ser Pro Glu Asp Pro Trp Val Leu Lys Gln
275 280 285

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

[0218]

Ala Ser Trp Lys Glu Leu Phe Ser Val Lys Thr Lys Val Leu Gln Arg
305 310 315 320

Leu Ile Thr Gly Ile Leu Val Gln Thr Phe Leu Gln Leu Thr Gly Glu
325 330 335

Asn Tyr Phe Phe Phe Tyr Gly Thr Thr Ile Phe Lys Ser Val Gly Leu
340 345 350

Thr Asp Gly Phe Glu Thr Ser Ile Val Leu Gly Thr Val Asn Phe Phe
355 360 365

Ser Thr Ile Ile Ala Val Met Val Val Asp Lys Ile Gly Arg Arg Lys
370 375 380

Cys Leu Leu Phe Gly Ala Ala Ser Met Met Ala Cys Met Val Ile Phe
385 390 395 400

Ala Ser Ile Gly Val Lys Cys Leu Tyr Pro His Gly Gln Asp Gly Pro
405 410 415

Ser Ser Lys Gly Ala Gly Asn Ala Met Ile Val Phe Thr Cys Phe Tyr
420 425 430

Ile Phe Cys Phe Ala Thr Thr Trp Ala Pro Val Ala Tyr Ile Val Val
435 440 445

```
Ala Glu Ser Phe Pro Ser Lys Val Lys Ser Lys Ala Met Ser Ile Ser
    450                 455                 460

Thr Ala Phe Asn Trp Leu Trp Gln Phe Leu Ile Gly Phe Phe Thr Pro
465                 470                 475                 480

Phe Ile Thr Gly Ser Ile His Phe Tyr Tyr Gly Tyr Val Phe Val Gly
                485                 490                 495

Cys Leu Val Ala Met Phe Leu Tyr Val Phe Phe Phe Leu Pro Glu Thr
            500                 505                 510

Ile Gly Leu Ser Leu Glu Glu Ile Gln Leu Leu Tyr Glu Glu Gly Ile
        515                 520                 525

Lys Pro Trp Lys Ser Ala Ser Trp Val Pro Pro Ser Arg Arg Gly Ala
    530                 535                 540

Ser Ser Arg Glu Thr Glu Ala Lys Lys Lys Ser Trp Lys Glu Val Leu
545                 550                 555                 560

Lys Phe Pro Lys Ser Phe Asn
                565
```

[0219]

```
<210>  97
<211>  609
<212>  PRT
<213>  酿酒酵母

<400>  97

Met Lys Asn Leu Ser Phe Leu Ile Asn Arg Arg Lys Glu Asn Thr Ser
1               5                   10                  15

Asp Ser Asn Val Tyr Pro Gly Lys Ala Lys Ser His Glu Pro Ser Trp
            20                  25                  30

Ile Glu Met Asp Asp Gln Thr Lys Lys Asp Gly Leu Asp Ile Val His
        35                  40                  45

Val Glu Phe Ser Pro Asp Thr Arg Ala Pro Ser Asp Ser Asn Lys Val
    50                  55                  60

Ile Thr Glu Ile Phe Asp Ala Thr Glu Asp Ala Lys Glu Ala Asp Glu
65                  70                  75                  80

Ser Glu Arg Gly Met Pro Leu Ala Thr Ala Leu Asn Thr Tyr Pro Lys
                85                  90                  95

Ala Ala Ala Trp Ser Leu Leu Val Ser Thr Thr Leu Ile Met Glu Gly
            100                 105                 110

Tyr Asp Thr Ala Ile Leu Gly Ala Phe Tyr Ala Leu Pro Ile Phe Gln
        115                 120                 125
```

Arg Lys Phe Gly Ser Gln Asn Asp Lys Thr Gly Glu Trp Glu Ile Ser
130 135 140

Ala Ser Trp Gln Ile Gly Leu Thr Leu Cys Tyr Met Ala Gly Glu Ile
145 150 155 160

Val Gly Leu Gln Leu Thr Gly Pro Ser Val Asp Leu Val Gly Asn Arg
165 170 175

Tyr Thr Leu Ile Ile Ala Leu Phe Phe Leu Ala Ala Phe Thr Phe Ile
180 185 190

Leu Tyr Phe Cys Asn Ser Leu Gly Met Ile Ala Val Gly Gln Ala Leu
195 200 205

Cys Gly Met Pro Trp Gly Cys Phe Gln Cys Leu Thr Val Ser Tyr Ala
210 215 220

Ser Glu Ile Cys Pro Leu Ala Leu Arg Tyr Tyr Leu Thr Thr Tyr Ser
225 230 235 240

Asn Leu Cys Trp Leu Phe Gly Gln Leu Phe Ala Ala Gly Ile Met Lys
245 250 255

Asn Ser Gln Lys Lys Tyr Ala Asp Ser Glu Leu Gly Tyr Lys Leu Pro
260 265 270

[0220]

Phe Ala Leu Gln Trp Ile Leu Pro Val Pro Leu Ala Leu Gly Ile Phe
275 280 285

Phe Ala Pro Glu Ser Pro Trp Trp Leu Val Lys Lys Gly Arg Phe Asp
290 295 300

Glu Ala Arg Arg Ser Leu Arg Arg Thr Leu Ser Gly Lys Gly Pro Glu
305 310 315 320

Lys Glu Ile Leu Val Thr Leu Glu Val Asp Lys Ile Lys Val Thr Ile
325 330 335

Asp Lys Glu Lys Arg Leu Thr Ser Lys Glu Gly Ser Tyr Ser Asp Cys
340 345 350

Phe Glu Asp Lys Ile Asn Arg Arg Arg Thr Arg Ile Thr Cys Leu Cys
355 360 365

Trp Ala Gly Gln Ala Thr Cys Gly Ser Ile Leu Ile Gly Tyr Ser Thr
370 375 380

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

Ser Ile Ile Gln Tyr Cys Leu Gly Ile Cys Ala Thr Phe Leu Ser Trp
405 410 415

Trp Ala Ser Lys Tyr Phe Gly Arg Tyr Asp Leu Tyr Ala Phe Gly Leu
420 425 430

Ala Phe Gln Thr Ile Val Phe Phe Ile Ile Gly Gly Leu Gly Cys Ser
435 440 445

Ser Thr His Gly Ser Lys Met Gly Ser Gly Ser Leu Leu Met Ala Val
450 455 460

Ala Phe Phe Tyr Asn Leu Gly Ile Ala Pro Val Val Phe Cys Leu Val
465 470 475 480

Ser Glu Met Pro Ser Ser Arg Leu Arg Thr Lys Thr Ile Ile Leu Ala
485 490 495

Arg Asn Thr Tyr Asn Val Val Ser Ile Ile Cys Ser Val Leu Ile Leu
500 505 510

Tyr Gln Leu Asn Ser Lys Lys Trp Asn Trp Gly Ala Lys Ser Gly Phe
515 520 525

Phe Trp Gly Val Leu Cys Phe Cys Thr Leu Ile Trp Ala Val Val Asp
530 535 540

Leu Pro Glu Thr Ala Gly Lys Thr Phe Val Glu Ile Asn Glu Leu Phe
545 550 555 560

[0221]

Lys Leu Gly Val Ser Ala Arg Lys Phe Lys Ser Thr Lys Val Asp Pro
565 570 575

Phe Val Val Lys Thr Pro Leu Lys Thr Ser Leu Ile Thr Thr Pro Arg
580 585 590

Glu Ile Ser Lys Leu Pro Leu Gln Arg Asn Ser Asn Val Ser His His
595 600 605

Leu

<210> 98
<211> 1501
<212> PRT
<213> 酿酒酵母

<400> 98

Met Ser Asn Ile Lys Ser Thr Gln Asp Ser Ser His Asn Ala Val Ala
1 5 10 15

Arg Ser Ser Ser Ala Ser Phe Ala Ala Ser Glu Glu Ser Phe Thr Gly
20 25 30

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

```
Thr Lys Met Leu Thr Gly Pro Ala Arg Asp Thr Ala Ser Gln Ile Ser
    50                  55                  60

Ala Thr Val Ser Glu Met Ala Pro Asp Val Val Ser Lys Val Glu Ser
65                  70                  75                  80

Phe Ala Asp Ala Leu Ser Arg His Thr Thr Arg Ser Gly Ala Phe Asn
                85                  90                  95

Met Asp Ser Asp Ser Asp Asp Gly Phe Asp Ala His Ala Ile Phe Glu
            100                 105                 110

Ser Phe Val Arg Asp Ala Asp Glu Gln Gly Ile His Ile Arg Lys Ala
        115                 120                 125

Gly Val Thr Ile Glu Asp Val Ser Ala Lys Gly Val Asp Ala Ser Ala
    130                 135                 140

Leu Glu Gly Ala Thr Phe Gly Asn Ile Leu Cys Leu Pro Leu Thr Ile
145                 150                 155                 160

Phe Lys Gly Ile Lys Ala Lys Arg His Gln Lys Met Arg Gln Ile Ile
                165                 170                 175

Ser Asn Val Asn Ala Leu Ala Glu Ala Gly Glu Met Ile Leu Val Leu
            180                 185                 190
```

[0222]

```
Gly Arg Pro Gly Ala Gly Cys Ser Ser Phe Leu Lys Val Thr Ala Gly
        195                 200                 205

Glu Ile Asp Gln Phe Ala Gly Gly Val Ser Gly Glu Val Ala Tyr Asp
    210                 215                 220

Gly Ile Pro Gln Glu Glu Met Met Lys Arg Tyr Lys Ala Asp Val Ile
225                 230                 235                 240

Tyr Asn Gly Glu Leu Asp Val His Phe Pro Tyr Leu Thr Val Lys Gln
                245                 250                 255

Thr Leu Asp Phe Ala Ile Ala Cys Lys Thr Pro Ala Leu Arg Val Asn
            260                 265                 270

Asn Val Ser Lys Lys Glu Tyr Ile Ala Ser Arg Arg Asp Leu Tyr Ala
        275                 280                 285

Thr Ile Phe Gly Leu Arg His Thr Tyr Asn Thr Lys Val Gly Asn Asp
    290                 295                 300

Phe Val Arg Gly Val Ser Gly Gly Glu Arg Lys Arg Val Ser Ile Ala
305                 310                 315                 320

Glu Ala Leu Ala Ala Lys Gly Ser Ile Tyr Cys Trp Asp Asn Ala Thr
                325                 330                 335
```

Arg Gly Leu Asp Ala Ser Thr Ala Leu Glu Tyr Ala Lys Ala Ile Arg
340 345 350

Ile Met Thr Asn Leu Leu Lys Ser Thr Ala Phe Val Thr Ile Tyr Gln
355 360 365

Ala Ser Glu Asn Ile Tyr Glu Thr Phe Asp Lys Val Thr Val Leu Tyr
370 375 380

Ser Gly Lys Gln Ile Tyr Phe Gly Leu Ile His Glu Ala Lys Pro Tyr
385 390 395 400

Phe Ala Lys Met Gly Tyr Leu Cys Pro Pro Arg Gln Ala Thr Ala Glu
405 410 415

Phe Leu Thr Ala Leu Thr Asp Pro Asn Gly Phe His Leu Ile Lys Pro
420 425 430

Gly Tyr Glu Asn Lys Val Pro Arg Thr Ala Glu Glu Phe Glu Thr Tyr
435 440 445

Trp Leu Asn Ser Pro Glu Phe Ala Gln Met Lys Lys Asp Ile Ala Ala
450 455 460

Tyr Lys Glu Lys Val Asn Thr Glu Lys Thr Lys Glu Val Tyr Asp Glu
465 470 475 480

[0223]

Ser Met Ala Gln Glu Lys Ser Lys Tyr Thr Arg Lys Lys Ser Tyr Tyr
485 490 495

Thr Val Ser Tyr Trp Glu Gln Val Lys Leu Cys Thr Gln Arg Gly Phe
500 505 510

Gln Arg Ile Tyr Gly Asn Lys Ser Tyr Thr Val Ile Asn Val Cys Ser
515 520 525

Ala Ile Ile Gln Ser Phe Ile Thr Gly Ser Leu Phe Tyr Asn Thr Pro
530 535 540

Ser Ser Thr Ser Gly Ala Phe Ser Arg Gly Gly Val Leu Tyr Phe Ala
545 550 555 560

Leu Leu Tyr Tyr Ser Leu Met Gly Leu Ala Asn Ile Ser Phe Glu His
565 570 575

Arg Pro Ile Leu Gln Lys His Lys Gly Tyr Ser Leu Tyr His Pro Ser
580 585 590

Ala Glu Ala Ile Gly Ser Thr Leu Ala Ser Phe Pro Phe Arg Met Ile
595 600 605

Gly Leu Thr Cys Phe Phe Ile Ile Leu Phe Phe Leu Ser Gly Leu His

610 615 620

Arg Thr Ala Gly Ser Phe Phe Thr Ile Tyr Leu Phe Leu Thr Met Cys
625 630 635 640

Ser Glu Ala Ile Asn Gly Leu Phe Glu Met Val Ser Ser Val Cys Asp
645 650 655

Thr Leu Ser Gln Ala Asn Ser Ile Ser Gly Ile Leu Met Met Ser Ile
660 665 670

Ser Met Tyr Ser Thr Tyr Met Ile Gln Leu Pro Ser Met His Pro Trp
675 680 685

Phe Lys Trp Ile Ser Tyr Val Leu Pro Ile Arg Tyr Ala Phe Glu Ser
690 695 700

Met Leu Asn Ala Glu Phe His Gly Arg His Met Asp Cys Ala Asn Thr
705 710 715 720

Leu Val Pro Ser Gly Gly Asp Tyr Asp Asn Leu Ser Asp Asp Tyr Lys
725 730 735

Val Cys Ala Phe Val Gly Ser Lys Pro Gly Gln Ser Tyr Val Leu Gly
740 745 750

[0224]

Asp Asp Tyr Leu Lys Asn Gln Phe Gln Tyr Val Tyr Lys His Thr Trp
755 760 765

Arg Asn Phe Gly Ile Leu Trp Cys Phe Leu Leu Gly Tyr Val Val Leu
770 775 780

Lys Val Ile Phe Thr Glu Tyr Lys Arg Pro Val Lys Gly Gly Gly Asp
785 790 795 800

Ala Leu Ile Phe Lys Lys Gly Ser Lys Arg Phe Ile Ala His Ala Asp
805 810 815

Glu Glu Ser Pro Asp Asn Val Asn Asp Ile Asp Ala Lys Glu Gln Phe
820 825 830

Ser Ser Glu Ser Ser Gly Ala Asn Asp Glu Val Phe Asp Asp Leu Glu
835 840 845

Ala Lys Gly Val Phe Ile Trp Lys Asp Val Cys Phe Thr Ile Pro Tyr
850 855 860

Glu Gly Gly Lys Arg Met Leu Leu Asp Asn Val Ser Gly Tyr Cys Ile
865 870 875 880

Pro Gly Thr Met Thr Ala Leu Met Gly Glu Ser Gly Ala Gly Lys Thr
885 890 895

Thr Leu Leu Asn Thr Leu Ala Gln Arg Asn Val Gly Ile Ile Thr Gly
900 905 910

Asp Met Leu Val Asn Gly Arg Pro Ile Asp Ala Ser Phe Glu Arg Arg
915 920 925

Thr Gly Tyr Val Gln Gln Gln Asp Ile His Ile Ala Glu Leu Thr Val
930 935 940

Arg Glu Ser Leu Gln Phe Ser Ala Arg Met Arg Arg Pro Gln His Leu
945 950 955 960

Pro Asp Ser Glu Lys Met Asp Tyr Val Glu Lys Ile Ile Arg Val Leu
965 970 975

Gly Met Glu Glu Tyr Ala Glu Ala Leu Val Gly Glu Val Gly Cys Gly
980 985 990

Leu Asn Val Glu Gln Arg Lys Lys Leu Ser Ile Gly Val Glu Leu Val
995 1000 1005

Ala Lys Pro Asp Leu Leu Leu Phe Leu Asp Glu Pro Thr Ser Gly
1010 1015 1020

Leu Asp Ser Gln Ser Ser Trp Ala Ile Ile Gln Leu Leu Arg Lys
1025 1030 1035

[0225]

Leu Ser Lys Ala Gly Gln Ser Ile Leu Cys Thr Ile His Gln Pro
1040 1045 1050

Ser Ala Thr Leu Phe Glu Glu Phe Asp Arg Leu Leu Leu Leu Arg
1055 1060 1065

Lys Gly Gly Gln Thr Val Tyr Phe Gly Asp Ile Gly Lys Asn Ser
1070 1075 1080

Ala Thr Ile Leu Asn Tyr Phe Glu Arg Asn Gly Ala Arg Lys Cys
1085 1090 1095

Asp Ser Ser Glu Asn Pro Ala Glu Tyr Ile Leu Glu Ala Ile Gly
1100 1105 1110

Ala Gly Ala Thr Ala Ser Val Lys Glu Asp Trp His Glu Lys Trp
1115 1120 1125

Leu Asn Ser Val Glu Phe Glu Gln Thr Lys Glu Lys Val Gln Asp
1130 1135 1140

Leu Ile Asn Asp Leu Ser Lys Gln Glu Thr Lys Ser Glu Val Gly
1145 1150 1155

Asp Lys Pro Ser Lys Tyr Ala Thr Ser Tyr Ala Tyr Gln Phe Arg
1160 1165 1170

```
Tyr Val Leu Ile Arg Thr Ser Thr Ser Phe Trp Arg Ser Leu Asn
1175                1180                1185

Tyr Ile Met Ser Lys Met Met Leu Met Leu Val Gly Gly Leu Tyr
1190                1195                1200

Ile Gly Phe Thr Phe Phe Asn Val Gly Lys Ser Tyr Val Gly Leu
1205                1210                1215

Gln Asn Ala Met Phe Ala Ala Phe Ile Ser Ile Ile Leu Ser Ala
1220                1225                1230

Pro Ala Met Asn Gln Ile Gln Gly Arg Ala Ile Ala Ser Arg Glu
1235                1240                1245

Leu Phe Glu Val Arg Glu Ser Gln Ser Asn Met Phe His Trp Ser
1250                1255                1260

Leu Val Leu Ile Thr Gln Tyr Leu Ser Glu Leu Pro Tyr His Leu
1265                1270                1275

Phe Phe Ser Thr Ile Phe Phe Val Ser Ser Tyr Phe Pro Leu Arg
1280                1285                1290

Ile Phe Phe Glu Ala Ser Arg Ser Ala Val Tyr Phe Leu Asn Tyr
1295                1300                1305
```

[0226]

```
Cys Ile Met Phe Gln Leu Tyr Tyr Val Gly Leu Gly Leu Met Ile
1310                1315                1320

Leu Tyr Met Ser Pro Asn Leu Pro Ser Ala Asn Val Ile Leu Gly
1325                1330                1335

Leu Cys Leu Ser Phe Met Leu Ser Phe Cys Gly Val Thr Gln Pro
1340                1345                1350

Val Ser Leu Met Pro Gly Phe Trp Thr Phe Met Trp Lys Ala Ser
1355                1360                1365

Pro Tyr Thr Tyr Phe Val Gln Asn Leu Val Gly Ile Met Leu His
1370                1375                1380

Lys Lys Pro Val Val Cys Lys Lys Lys Glu Leu Asn Tyr Phe Asn
1385                1390                1395

Pro Pro Asn Gly Ser Thr Cys Gly Glu Tyr Met Lys Pro Phe Leu
1400                1405                1410

Glu Lys Ala Thr Gly Tyr Ile Glu Asn Pro Asp Ala Thr Ser Asp
1415                1420                1425

Cys Ala Tyr Cys Ile Tyr Glu Val Gly Asp Asn Tyr Leu Thr His
1430                1435                1440
```

Ile Ser Ser Lys Tyr Ser Tyr Leu Trp Arg Asn Phe Gly Ile Phe
1445 1450 1455

Trp Ile Tyr Ile Phe Phe Asn Ile Ile Ala Met Val Cys Val Tyr
1460 1465 1470

Tyr Leu Phe His Val Arg Gln Ser Ser Phe Leu Ser Pro Val Ser
1475 1480 1485

Ile Leu Asn Lys Ile Lys Asn Ile Arg Lys Lys Lys Gln
1490 1495 1500

<210> 99
<211> 621
<212> PRT
<213> 酿酒酵母

<400> 99

Met Phe Asp Gln Leu Ala Val Phe Thr Pro Gln Gly Gln Val Leu Tyr
1 5 10 15

Gln Tyr Asn Cys Leu Gly Lys Lys Phe Ser Glu Ile Gln Ile Asn Ser
20 25 30

Phe Ile Ser Gln Leu Ile Thr Ser Pro Val Thr Arg Lys Glu Ser Val
35 40 45

[0227]

Ala Asn Ala Asn Thr Asp Gly Phe Asp Phe Asn Leu Leu Thr Ile Asn
50 55 60

Ser Glu His Lys Asn Ser Pro Ser Phe Asn Ala Leu Phe Tyr Leu Asn
65 70 75 80

Lys Gln Pro Glu Leu Tyr Phe Val Val Thr Phe Ala Glu Gln Thr Leu
85 90 95

Glu Leu Asn Gln Glu Thr Gln Gln Thr Leu Ala Leu Val Leu Lys Leu
100 105 110

Trp Asn Ser Leu His Leu Ser Glu Ser Ile Leu Lys Asn Arg Gln Gly
115 120 125

Gln Asn Glu Lys Asn Lys His Asn Tyr Val Asp Ile Leu Gln Gly Ile
130 135 140

Glu Asp Asp Leu Lys Lys Phe Glu Gln Tyr Phe Arg Ile Lys Tyr Glu
145 150 155 160

Glu Ser Ile Lys Gln Asp His Ile Asn Pro Asp Asn Phe Thr Lys Asn
165 170 175

Gly Ser Val Pro Gln Ser His Asn Lys Asn Thr Lys Lys Lys Leu Arg
180 185 190

Asp Thr Lys Gly Lys Lys Gln Ser Thr Gly Asn Val Gly Ser Gly Arg
195 200 205

Lys Trp Gly Arg Asp Gly Gly Met Leu Asp Glu Met Asn His Glu Asp
210 215 220

Ala Ala Lys Leu Asp Phe Ser Ser Ser Asn Ser His Asn Ser Ser Gln
225 230 235 240

Val Ala Leu Asp Ser Thr Ile Asn Lys Asp Ser Phe Gly Asp Arg Thr
245 250 255

Glu Gly Gly Asp Phe Leu Ile Lys Glu Ile Asp Asp Leu Leu Ser Ser
260 265 270

His Lys Asp Glu Ile Thr Ser Gly Asn Glu Ala Lys Asn Ser Gly Tyr
275 280 285

Val Ser Thr Ala Phe Gly Phe Leu Gln Lys His Val Leu Gly Asn Lys
290 295 300

Thr Ile Asn Glu Ser Asp Leu Lys Ser Val Leu Glu Lys Leu Thr Gln
305 310 315 320

Gln Leu Ile Thr Lys Asn Val Ala Pro Glu Ala Ala Asp Tyr Leu Thr
325 330 335

[0228]

Gln Gln Val Ser His Asp Leu Val Gly Ser Lys Thr Ala Asn Trp Thr
340 345 350

Ser Val Glu Asn Thr Ala Arg Glu Ser Leu Thr Lys Ala Leu Thr Gln
355 360 365

Ile Leu Thr Pro Gly Val Ser Val Asp Leu Leu Arg Glu Ile Gln Ser
370 375 380

Lys Arg Ser Lys Lys Asp Glu Glu Gly Lys Cys Asp Pro Tyr Val Phe
385 390 395 400

Ser Ile Val Gly Val Asn Gly Val Gly Lys Ser Thr Asn Leu Ser Lys
405 410 415

Leu Ala Phe Trp Leu Leu Gln Asn Asn Phe Lys Val Leu Ile Val Ala
420 425 430

Cys Asp Thr Phe Arg Ser Gly Ala Val Glu Gln Leu Arg Val His Val
435 440 445

Glu Asn Leu Ala Gln Leu Met Asp Asp Ser His Val Arg Gly Ser Lys
450 455 460

Asn Lys Arg Gly Lys Thr Gly Asn Asp Tyr Val Glu Leu Phe Glu Ala

```
465                 470                 475                 480

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

Lys Tyr Ser Arg Asp Gln Asn Phe Asp Ile Val Leu Met Asp Thr Ala
            500                 505                 510

Gly Arg Arg His Asn Asp Pro Thr Leu Met Ser Pro Leu Lys Ser Phe
        515                 520                 525

Ala Asp Gln Ala Lys Pro Asp Lys Ile Ile Met Val Gly Glu Ala Leu
    530                 535                 540

Val Gly Thr Asp Ser Val Gln Gln Ala Lys Asn Phe Asn Asp Ala Phe
545                 550                 555                 560

Gly Lys Gly Arg Asn Leu Asp Phe Phe Ile Ile Ser Lys Cys Asp Thr
                565                 570                 575

Val Gly Glu Met Leu Gly Thr Met Val Asn Met Val Tyr Ala Thr Gly
            580                 585                 590

Ile Pro Ile Leu Phe Val Gly Val Gly Gln Thr Tyr Thr Asp Leu Arg
        595                 600                 605
```

[0229]

```
Thr Leu Ser Val Lys Trp Ala Val Asn Thr Leu Met Ser
    610                 615                 620
```

<210> 100
<211> 584
<212> PRT
<213> 酿酒酵母

<400> 100

```
Met Gly Ile His Ile Pro Tyr Leu Thr Ser Lys Thr Ser Gln Ser Asn
1               5                   10                  15

Val Gly Asp Ala Val Gly Asn Ala Asp Ser Val Glu Phe Asn Ser Glu
            20                  25                  30

His Asp Ser Pro Ser Lys Arg Gly Lys Ile Thr Leu Glu Ser His Glu
        35                  40                  45

Ile Gln Arg Ala Pro Ala Ser Asp Asp Glu Asp Arg Ile Gln Ile Lys
    50                  55                  60

Pro Val Asn Asp Glu Asp Asp Thr Ser Val Met Ile Thr Phe Asn Gln
65                  70                  75                  80

Ser Leu Ser Pro Phe Ile Ile Thr Leu Thr Phe Val Ala Ser Ile Ser
                85                  90                  95

Gly Phe Met Phe Gly Tyr Asp Thr Gly Tyr Ile Ser Ser Ala Leu Ile
```

100 105 110

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

Glu Ile Val Thr Ala Ala Thr Ser Leu Gly Ala Leu Ile Thr Ser Ile
130 135 140

Phe Ala Gly Thr Ala Ala Asp Ile Phe Gly Arg Lys Arg Cys Leu Met
145 150 155 160

Gly Ser Asn Leu Met Phe Val Ile Gly Ala Ile Leu Gln Val Ser Ala
165 170 175

His Thr Phe Trp Gln Met Ala Val Gly Arg Leu Ile Met Gly Phe Gly
180 185 190

Val Gly Ile Gly Ser Leu Ile Ala Pro Leu Phe Ile Ser Glu Ile Ala
195 200 205

Pro Lys Met Ile Arg Gly Arg Leu Thr Val Ile Asn Ser Leu Trp Leu
210 215 220

Thr Gly Gly Gln Leu Val Ala Tyr Gly Cys Gly Ala Gly Leu Asn Tyr
225 230 235 240

[0230]

Val Asn Asn Gly Trp Arg Ile Leu Val Gly Leu Ser Leu Ile Pro Thr
245 250 255

Ala Val Gln Phe Thr Cys Leu Cys Phe Leu Pro Asp Thr Pro Arg Tyr
260 265 270

Tyr Val Met Lys Gly Asp Leu Ala Arg Ala Thr Glu Val Leu Lys Arg
275 280 285

Ser Tyr Thr Asp Thr Ser Glu Glu Ile Ile Glu Arg Lys Val Glu Glu
290 295 300

Leu Val Thr Leu Asn Gln Ser Ile Pro Gly Lys Asn Val Pro Glu Lys
305 310 315 320

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

Ala Leu Ile Ile Gly Cys Gly Leu Gln Ala Ile Gln Gln Phe Thr Gly
340 345 350

Trp Asn Ser Leu Met Tyr Phe Ser Gly Thr Ile Phe Glu Thr Val Gly
355 360 365

Phe Lys Asn Ser Ser Ala Val Ser Ile Ile Val Ser Gly Thr Asn Phe
370 375 380

```
Ile Phe Thr Leu Val Ala Phe Phe Ser Ile Asp Lys Ile Gly Arg Arg
385                 390                 395                 400

Thr Ile Leu Leu Ile Gly Leu Pro Gly Met Thr Met Ala Leu Val Val
                405                 410                 415

Cys Ser Ile Ala Phe His Phe Leu Gly Ile Lys Phe Asp Gly Ala Val
            420                 425                 430

Ala Val Val Val Ser Ser Gly Phe Ser Ser Trp Gly Ile Val Ile Ile
        435                 440                 445

Val Phe Ile Ile Val Phe Ala Ala Phe Tyr Ala Leu Gly Ile Gly Thr
    450                 455                 460

Val Pro Trp Gln Gln Ser Glu Leu Phe Pro Gln Asn Val Arg Gly Ile
465                 470                 475                 480

Gly Thr Ser Tyr Ala Thr Ala Thr Asn Trp Ala Gly Ser Leu Val Ile
                485                 490                 495

Ala Ser Thr Phe Leu Thr Met Leu Gln Asn Ile Thr Pro Ala Gly Thr
            500                 505                 510

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

[0231]

```
Phe Cys Tyr Pro Glu Leu Ser Gly Leu Glu Leu Glu Glu Val Gln Thr
    530                 535                 540

Ile Leu Lys Asp Gly Phe Asn Ile Lys Ala Ser Lys Ala Leu Ala Lys
545                 550                 555                 560

Lys Arg Lys Gln Gln Val Ala Arg Val His Glu Leu Lys Tyr Glu Pro
                565                 570                 575

Thr Gln Glu Ile Ile Glu Asp Ile
            580

<210>  101
<211>  335
<212>  PRT
<213>  酿酒酵母

<400>  101

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

Ser Leu Ala Asn Gly Asn Tyr Ala Ile Pro Thr Lys Leu Asn Arg Leu
            20                  25                  30

Lys Lys Asn Ala Asp Pro Arg Val Ala Ala Ile Ser Gly Ala Leu Ser
        35                  40                  45
```

```
Gly Ala Leu Ser Ala Met Leu Val Cys Pro Phe Asp Val Ala Lys Thr
    50                  55                  60

Arg Leu Gln Ala Gln Gly Leu Gln Asn Met Thr His Gln Ser Gln His
65                  70                  75                  80

Tyr Lys Gly Phe Phe Gly Thr Phe Ala Thr Ile Phe Lys Asp Glu Gly
                85                  90                  95

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

Pro Thr Leu Met Ile Tyr Phe Ser Val Tyr Asp Phe Cys Arg Lys Tyr
        115                 120                 125

Ser Val Asp Ile Phe Pro His Ser Pro Phe Leu Ser Asn Ala Ser Ser
    130                 135                 140

Ala Ile Thr Ala Gly Ala Ile Ser Thr Val Ala Thr Asn Pro Ile Trp
145                 150                 155                 160

Val Val Lys Thr Arg Leu Met Leu Gln Thr Gly Ile Gly Lys Tyr Ser
                165                 170                 175

Thr His Tyr Lys Gly Thr Ile Asp Thr Phe Arg Lys Ile Ile Gln Gln
            180                 185                 190
```

[0232]

```
Glu Gly Ala Lys Ala Leu Tyr Ala Gly Leu Val Pro Ala Leu Leu Gly
        195                 200                 205

Met Leu Asn Val Ala Ile Gln Phe Pro Leu Tyr Glu Asn Leu Lys Ile
    210                 215                 220

Arg Phe Gly Tyr Ser Glu Ser Thr Asp Val Ser Thr Asp Val Thr Ser
225                 230                 235                 240

Ser Asn Phe Gln Lys Leu Ile Leu Ala Ser Met Leu Ser Lys Met Val
                245                 250                 255

Ala Ser Thr Val Thr Tyr Pro His Glu Ile Leu Arg Thr Arg Met Gln
            260                 265                 270

Leu Lys Ser Asp Leu Pro Asn Thr Val Gln Arg His Leu Leu Pro Leu
        275                 280                 285

Ile Lys Ile Thr Tyr Arg Gln Glu Gly Phe Ala Gly Phe Tyr Ser Gly
    290                 295                 300

Phe Ala Thr Asn Leu Val Arg Thr Val Pro Ala Ala Val Val Thr Leu
305                 310                 315                 320

Val Ser Phe Glu Tyr Ser Lys Lys Tyr Leu Thr Thr Phe Phe Gln
                325                 330                 335
```

<210> 102
<211> 160
<212> PRT
<213> 酿酒酵母

<400> 102

Met Thr Glu Leu Cys Pro Val Tyr Ala Pro Phe Phe Gly Ala Ile Gly
1 5 10 15

Cys Ala Ser Ala Ile Ile Phe Thr Ser Leu Gly Ala Ala Tyr Gly Thr
20 25 30

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

Leu Leu Phe Lys Asn Ile Val Pro Val Ile Met Ala Gly Ile Ile Ala
50 55 60

Ile Tyr Gly Leu Val Val Ser Val Leu Val Cys Tyr Ser Leu Gly Gln
65 70 75 80

Lys Gln Ala Leu Tyr Thr Gly Phe Ile Gln Leu Gly Ala Gly Leu Ser
85 90 95

Val Gly Leu Ser Gly Leu Ala Ala Gly Phe Ala Ile Gly Ile Val Gly
100 105 110

[0233]

Asp Ala Gly Val Arg Gly Ser Ser Gln Gln Pro Arg Leu Phe Val Gly
115 120 125

Met Ile Leu Ile Leu Ile Phe Ala Glu Val Leu Gly Leu Tyr Gly Leu
130 135 140

Ile Val Ala Leu Leu Leu Asn Ser Arg Ala Thr Gln Asp Val Val Cys
145 150 155 160

<210> 103
<211> 628
<212> PRT
<213> 酿酒酵母

<400> 103

Met Asp Pro Gly Ile Ala Asn His Thr Leu Pro Glu Glu Phe Glu Glu
1 5 10 15

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

Val Lys Pro Thr Leu Thr Thr Ser Ser Pro Ala Pro Ser Tyr Ile Glu
35 40 45

Leu Ile Asp Pro Gly Val His Asn Ile Glu Ile Tyr Ala Glu Met Tyr
50 55 60

Asn Arg Pro Ile Tyr Arg Val Ala Leu Phe Phe Ser Leu Phe Leu Ile
65 70 75 80

Ala Tyr Ala Tyr Gly Leu Asp Gly Asn Ile Arg Tyr Thr Phe Gln Ala
85 90 95

Tyr Ala Thr Ser Ser Tyr Ser Gln His Ser Leu Leu Ser Thr Val Asn
100 105 110

Cys Ile Lys Thr Val Ile Ala Ala Val Gly Gln Ile Phe Phe Ala Arg
115 120 125

Leu Ser Asp Ile Phe Gly Arg Phe Ser Ile Met Ile Val Ser Ile Ile
130 135 140

Phe Tyr Ser Met Gly Thr Ile Ile Glu Ser Gln Ala Val Asn Ile Thr
145 150 155 160

Arg Phe Ala Val Gly Gly Cys Phe Tyr Gln Leu Gly Leu Thr Gly Ile
165 170 175

Ile Leu Ile Leu Glu Val Ile Ala Ser Asp Phe Ser Asn Leu Asn Trp
180 185 190

Arg Leu Leu Ala Leu Phe Ile Pro Ala Leu Pro Phe Ile Ile Asn Thr
195 200 205

[0234]

Trp Ile Ser Gly Asn Val Thr Ser Ala Ile Asp Ala Asn Trp Lys Trp
210 215 220

Gly Ile Gly Met Trp Ala Phe Ile Leu Pro Leu Ala Cys Ile Pro Leu
225 230 235 240

Gly Ile Cys Met Leu His Met Arg Tyr Leu Ala Arg Lys His Ala Lys
245 250 255

Asp Arg Leu Lys Pro Glu Phe Glu Ala Leu Asn Lys Leu Lys Trp Lys
260 265 270

Ser Phe Cys Ile Asp Ile Ala Phe Trp Lys Leu Asp Ile Ile Gly Met
275 280 285

Leu Leu Ile Thr Val Phe Phe Gly Cys Val Leu Val Pro Phe Thr Leu
290 295 300

Ala Gly Gly Leu Lys Glu Glu Trp Lys Thr Ala His Ile Ile Val Pro
305 310 315 320

Glu Val Ile Gly Trp Val Val Val Leu Pro Leu Tyr Met Leu Trp Glu
325 330 335

Ile Lys Tyr Ser Arg His Pro Leu Thr Pro Trp Asp Leu Ile Gln Asp
340 345 350

```
Arg Gly Ile Phe Phe Ala Leu Leu Ile Ala Phe Phe Ile Asn Phe Asn
        355                 360                 365

Trp Tyr Met Gln Gly Asp Tyr Met Tyr Thr Val Leu Val Val Ala Val
    370                 375                 380

His Glu Ser Ile Lys Ser Ala Thr Arg Ile Thr Ser Leu Tyr Ser Phe
385                 390                 395                 400

Val Ser Val Ile Val Gly Thr Ile Leu Gly Phe Ile Leu Ile Lys Val
                405                 410                 415

Arg Arg Thr Lys Pro Phe Ile Ile Phe Gly Ile Ser Cys Trp Ile Val
            420                 425                 430

Ser Phe Gly Leu Leu Val His Tyr Arg Gly Asp Ser Gly Ala His Ser
        435                 440                 445

Gly Ile Ile Gly Ser Leu Cys Leu Leu Gly Phe Gly Ala Gly Ser Phe
    450                 455                 460

Thr Tyr Val Thr Gln Ala Ser Ile Gln Ala Ser Ala Lys Thr His Ala
465                 470                 475                 480

Arg Met Ala Val Val Thr Ser Leu Tyr Leu Ala Thr Tyr Asn Ile Gly
                485                 490                 495
```

[0235]

```
Ser Ala Phe Gly Ser Ser Val Ser Gly Ala Val Trp Thr Asn Ile Leu
            500                 505                 510

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

Ala Tyr Gly Ser Pro Phe Thr Phe Ile Thr Thr Tyr Thr Trp Gly Thr
    530                 535                 540

Pro Glu Arg Ile Ala Leu Val Met Ser Tyr Arg Tyr Val Gln Lys Ile
545                 550                 555                 560

Leu Cys Ile Ile Gly Leu Val Phe Cys Phe Pro Leu Leu Gly Cys Ala
                565                 570                 575

Phe Met Leu Arg Asn His Lys Leu Thr Asp Ser Ile Ala Leu Glu Gly
            580                 585                 590

Asn Asp His Leu Glu Ser Lys Asn Thr Phe Glu Ile Glu Glu Lys Glu
        595                 600                 605

Glu Ser Phe Leu Lys Asn Lys Phe Phe Thr His Phe Thr Ser Ser Lys
    610                 615                 620

Asp Arg Lys Asp
625
```

<210> 104
<211> 88
<212> PRT
<213> 酿酒酵母

<400> 104

Met Ala Ala Ser Val Pro Pro Gly Gly Gln Arg Ile Leu Gln Lys Arg
1 5 10 15

Arg Gln Ala Gln Ser Ile Lys Glu Lys Gln Ala Lys Gln Thr Pro Thr
20 25 30

Ser Thr Arg Gln Ala Gly Tyr Gly Gly Ser Ser Ser Ser Ile Leu Lys
35 40 45

Leu Tyr Thr Asp Glu Ala Asn Gly Phe Arg Val Asp Ser Leu Val Val
50 55 60

Leu Phe Leu Ser Val Gly Phe Ile Phe Ser Val Ile Ala Leu His Leu
65 70 75 80

Leu Thr Lys Phe Thr His Ile Ile
85

<210> 105
<211> 300
<212> PRT
[0236] <213> 酿酒酵母

<400> 105

Met Glu Ser Asn Lys Gln Pro Arg Lys Ile Gln Leu Tyr Thr Lys Glu
1 5 10 15

Phe Tyr Ala Thr Cys Thr Leu Gly Gly Ile Ile Ala Cys Gly Pro Thr
20 25 30

His Ser Ser Ile Thr Pro Leu Asp Leu Val Lys Cys Arg Leu Gln Val
35 40 45

Asn Pro Lys Leu Tyr Thr Ser Asn Leu Gln Gly Phe Arg Lys Ile Ile
50 55 60

Ala Asn Glu Gly Trp Lys Lys Val Tyr Thr Gly Phe Gly Ala Thr Phe
65 70 75 80

Val Gly Tyr Ser Leu Gln Gly Ala Gly Lys Tyr Gly Gly Tyr Glu Tyr
85 90 95

Phe Lys His Leu Tyr Ser Ser Trp Leu Ser Pro Gly Val Thr Val Tyr
100 105 110

Leu Met Ala Ser Ala Thr Ala Glu Phe Leu Ala Asp Ile Met Leu Cys
115 120 125

Pro Phe Glu Ala Ile Lys Val Lys Gln Gln Thr Thr Met Pro Pro Phe
130 135 140

Cys Asn Asn Val Val Asp Gly Trp Lys Lys Met Tyr Ala Glu Ser Gly
145 150 155 160

Gly Met Lys Ala Phe Tyr Lys Gly Ile Val Pro Leu Trp Cys Arg Gln
165 170 175

Ile Pro Tyr Thr Met Cys Lys Phe Thr Ser Phe Glu Lys Ile Val Gln
180 185 190

Lys Ile Tyr Ser Val Leu Pro Lys Lys Lys Glu Glu Met Asn Ala Leu
195 200 205

Gln Gln Ile Ser Val Ser Phe Val Gly Gly Tyr Leu Ala Gly Ile Leu
210 215 220

Cys Ala Ala Val Ser His Pro Ala Asp Val Met Val Ser Lys Ile Asn
225 230 235 240

Ser Glu Arg Lys Ala Asn Glu Ser Met Ser Val Ala Ser Lys Arg Ile
245 250 255

Tyr Gln Lys Ile Gly Phe Thr Gly Leu Trp Asn Gly Leu Met Val Arg
260 265 270

[0237]

Ile Val Met Ile Gly Thr Leu Thr Ser Phe Gln Trp Leu Ile Tyr Asp
275 280 285

Ser Phe Lys Ala Tyr Val Gly Leu Pro Thr Thr Gly
290 295 300

<210> 106
<211> 448
<212> PRT
<213> 酿酒酵母

<400> 106

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

Cys Gly Ala Gly Ile Leu Ala Met Pro Tyr Ala Phe Lys Pro Phe Gly
20 25 30

Leu Ile Pro Gly Val Ile Met Ile Val Leu Cys Gly Ala Cys Ala Met
35 40 45

Gln Ser Leu Phe Ile Gln Ala Arg Val Ala Lys Tyr Val Pro Gln Gly
50 55 60

Arg Ala Ser Phe Ser Ala Leu Thr Arg Leu Ile Asn Pro Asn Leu Gly
65 70 75 80

Ile Val Phe Asp Leu Ala Ile Ala Ile Lys Cys Phe Gly Val Gly Val
85 90 95

Ser Tyr Met Ile Val Val Gly Asp Leu Met Pro Gln Ile Met Ser Val
100 105 110

Trp Thr Arg Asn Ala Trp Leu Leu Asn Arg Asn Val Gln Ile Ser Leu
115 120 125

Ile Met Leu Phe Phe Val Ala Pro Leu Ser Phe Leu Lys Lys Leu Asn
130 135 140

Ser Leu Arg Tyr Ala Ser Met Val Ala Ile Ser Ser Val Ala Tyr Leu
145 150 155 160

Cys Val Leu Val Leu Leu His Tyr Val Ala Pro Ser Asp Glu Ile Leu
165 170 175

Arg Leu Lys Gly Arg Ile Ser Tyr Leu Leu Pro Pro Gln Ser His Asp
180 185 190

Leu Asn Val Leu Asn Thr Leu Pro Ile Phe Val Phe Ala Tyr Thr Cys
195 200 205

His His Asn Met Phe Ser Ile Ile Asn Glu Gln Arg Ser Ser Arg Phe
210 215 220

[0238]

Glu His Val Met Lys Ile Pro Leu Ile Ala Ile Ser Leu Ala Leu Ile
225 230 235 240

Leu Tyr Ile Ala Ile Gly Cys Ala Gly Tyr Leu Thr Phe Gly Asp Asn
245 250 255

Ile Ile Gly Asn Ile Ile Met Leu Tyr Pro Gln Ala Val Ser Ser Thr
260 265 270

Ile Gly Arg Ile Ala Ile Val Leu Leu Val Met Leu Ala Phe Pro Leu
275 280 285

Gln Cys His Pro Ala Arg Ala Ser Ile His Gln Ile Leu Gln His Phe
290 295 300

Ala Glu Glu Asn Val Ser Ile Ser Ala Thr Ser Ala Asp Glu Pro Thr
305 310 315 320

Val Ala Thr Glu Ser Ser Pro Leu Ile Arg Asp Ser Ser Leu Asp Leu
325 330 335

Asn Glu Val Ile Glu Glu Glu Ser Ile Tyr Gln Pro Lys Glu Thr Pro
340 345 350

Leu Arg Gly Lys Ser Phe Ile Val Ile Thr Cys Ser Ile Leu Val Ala
355 360 365

Ser Tyr Leu Val Ala Ile Ser Val Ser Ser Leu Ala Arg Val Leu Ala
370 375 380

Ile Val Gly Ala Thr Gly Ser Thr Ser Ile Ser Phe Ile Leu Pro Gly
385 390 395 400

Leu Phe Gly Tyr Lys Leu Ile Gly Thr Glu His Lys Thr Ala Val Pro
405 410 415

Leu Thr Thr Lys Ile Phe Lys Tyr Thr Gly Leu Leu Leu Phe Ile Trp
420 425 430

Gly Leu Ile Ile Met Ile Thr Cys Leu Thr Ala Ala Leu Lys Leu Asn
435 440 445

<210> 107
<211> 289
<212> PRT
<213> 酿酒酵母

<400> 107

Met Val Ser Gln Phe Ala Ile Glu Val Arg Asn Leu Thr Tyr Lys Phe
1 5 10 15

Lys Glu Ser Ser Asp Pro Ser Val Val Asp Ile Asn Leu Gln Ile Pro
20 25 30

[0239]

Trp Asn Thr Arg Ser Leu Val Val Gly Ala Asn Gly Ala Gly Lys Ser
35 40 45

Thr Leu Leu Lys Leu Leu Ser Gly Lys His Leu Cys Leu Asp Gly Lys
50 55 60

Ile Leu Val Asn Gly Leu Asp Pro Phe Ser Pro Leu Ser Met Asn Gln
65 70 75 80

Val Asp Asp Asp Glu Ser Val Glu Asp Ser Thr Asn Tyr Gln Thr Thr
85 90 95

Thr Tyr Leu Gly Thr Glu Trp Cys His Met Ser Ile Ile Asn Arg Asp
100 105 110

Ile Gly Val Leu Glu Leu Leu Lys Ser Ile Gly Phe Asp His Phe Arg
115 120 125

Glu Arg Gly Glu Arg Leu Val Arg Ile Leu Asp Ile Asp Val Arg Trp
130 135 140

Arg Met His Arg Leu Ser Asp Gly Gln Lys Arg Arg Val Gln Leu Ala
145 150 155 160

Met Gly Leu Leu Lys Pro Trp Arg Val Leu Leu Leu Asp Glu Val Thr
165 170 175

Val Asp Leu Asp Val Ile Ala Arg Ala Arg Leu Leu Glu Phe Leu Lys
180 185 190

Trp Glu Thr Glu Thr Arg Arg Cys Ser Val Val Tyr Ala Thr His Ile
195 200 205

Phe Asp Gly Leu Ala Lys Trp Pro Asn Gln Val Tyr His Met Lys Ser
210 215 220

Gly Lys Ile Val Asp Asn Leu Asp Tyr Gln Lys Asp Val Glu Phe Ser
225 230 235 240

Glu Val Val Asn Ala Lys Val Asn Gly Gln Val Ala Phe Glu Asn Asp
245 250 255

Asn Asn Lys Val Val Ile Ser Lys Val Asn Ser Leu His Pro Leu Ala
260 265 270

Leu Glu Trp Leu Lys Arg Asp Asn Gln Ile Pro Asp Lys Glu Ile Gly
275 280 285

Ile

[0240]

<210> 108
<211> 309
<212> PRT
<213> 酿酒酵母

<400> 108

Met Ala Asn Gln Asn Ser Asp Leu Tyr Lys Gln Ile Thr Ala Gly Ser
1 5 10 15

Val Ala Ala Val Phe Gln Thr Thr Met Thr Tyr Pro Phe Glu Tyr Leu
20 25 30

Lys Thr Gly Leu Gln Leu Gln Pro Lys Gly Thr Ala Phe Glu Ile Ile
35 40 45

Leu Pro Gln Ile Lys Ser Tyr Phe Val Gly Cys Ser Ala Leu Asn Val
50 55 60

Ala Ala Phe Gly Lys Thr Ile Leu Arg Phe Val Thr Phe Asp Lys Leu
65 70 75 80

Cys His Ser Leu Asn Asn Asn Ile Asp Asn Asn Asp Asn Phe Gln Arg
85 90 95

Leu Thr Gly Tyr Asn Leu Leu Ile Ala Gly Thr Leu Thr Gly Ile Val
100 105 110

Glu Ser Leu Phe Ile Ile Pro Phe Glu Asn Ile Lys Thr Thr Leu Ile
115 120 125

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

Val Asn Ala Lys Ala Thr Phe His Lys Val Ala Thr Lys Ser Thr Pro
145 150 155 160

Val Ala Arg Ile Glu Lys Leu Leu Pro Ala Val Lys His Met Tyr Gln
165 170 175

Thr Arg Gly Pro Ala Ala Phe Val Gln Gly Thr Thr Ala Thr Ile Phe
180 185 190

Arg Gln Ile Ala Asn Thr Ser Ile Gln Phe Thr Ala Tyr Thr Ala Phe
195 200 205

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

Gly Leu Ala Thr Ser Phe Thr Leu Val Ala Met Thr Gln Pro Ile Asp
225 230 235 240

Val Val Lys Thr Arg Met Met Ser Gln Asn Ala Lys Thr Glu Tyr Lys
245 250 255

Asn Thr Leu Asn Cys Met Tyr Arg Ile Phe Val Gln Glu Gly Met Ala
260 265 270

[0241]

Thr Phe Trp Lys Gly Ser Ile Phe Arg Phe Met Lys Val Gly Ile Ser
275 280 285

Gly Gly Leu Thr Phe Thr Val Tyr Glu Gln Val Ser Leu Leu Leu Gly
290 295 300

Phe Ser Ser Arg Ser
305

<210> 109
<211> 560
<212> PRT
<213> 酿酒酵母

<400> 109

Met Ser Leu Ile Ser Ile Leu Ser Pro Leu Ile Thr Ser Glu Gly Leu
1 5 10 15

Asp Ser Arg Ile Lys Pro Ser Pro Lys Lys Asp Ala Ser Thr Thr Thr
20 25 30

Lys Pro Ser Leu Trp Lys Thr Thr Glu Phe Lys Phe Tyr Tyr Ile Ala
35 40 45

Phe Leu Val Val Val Pro Leu Met Phe Tyr Ala Gly Leu Gln Ala Ser
50 55 60

```
Ser Pro Glu Asn Pro Asn Tyr Ala Arg Tyr Glu Arg Leu Leu Ser Gln
65                  70                  75                  80

Gly Trp Leu Phe Gly Arg Lys Val Asp Asn Ser Asp Ser Gln Tyr Arg
                85                  90                  95

Phe Phe Arg Asp Asn Phe Ala Leu Leu Ser Val Leu Met Leu Val His
            100                 105                 110

Thr Ser Ile Lys Arg Ile Val Leu Tyr Ser Thr Asn Ile Thr Lys Leu
        115                 120                 125

Arg Phe Asp Leu Ile Phe Gly Leu Ile Phe Leu Val Ala Ala His Gly
    130                 135                 140

Val Asn Ser Ile Arg Ile Leu Ala His Met Leu Ile Leu Tyr Ala Ile
145                 150                 155                 160

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

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

Pro Phe Gly Asn Ile Cys Ser Phe Leu Ser Pro Leu Asp His Trp Tyr
        195                 200                 205
```

[0242]

```
Arg Gly Ile Ile Pro Arg Trp Asp Val Phe Phe Asn Phe Thr Leu Leu
    210                 215                 220

Arg Val Leu Ser Tyr Asn Leu Asp Phe Leu Glu Arg Trp Glu Asn Leu
225                 230                 235                 240

Gln Lys Lys Lys Ser Pro Ser Tyr Glu Ser Lys Glu Ala Lys Ser Ala
                245                 250                 255

Ile Leu Leu Asn Glu Arg Ala Arg Leu Thr Ala Ala His Pro Ile Gln
            260                 265                 270

Asp Tyr Ser Leu Met Asn Tyr Ile Ala Tyr Val Thr Tyr Thr Pro Leu
        275                 280                 285

Phe Ile Ala Gly Pro Ile Ile Thr Phe Asn Asp Tyr Val Tyr Gln Ser
    290                 295                 300

Lys His Thr Leu Pro Ser Ile Asn Phe Lys Phe Ile Phe Tyr Tyr Ala
305                 310                 315                 320

Val Arg Phe Val Ile Ala Leu Leu Ser Met Glu Phe Ile Leu His Phe
                325                 330                 335

Leu His Val Val Ala Ile Ser Lys Thr Lys Ala Trp Glu Asn Asp Thr
```

340 345 350

Pro Phe Gln Ile Ser Met Ile Gly Leu Phe Asn Leu Asn Ile Ile Trp
355 360 365

Leu Lys Leu Leu Ile Pro Trp Arg Leu Phe Arg Leu Trp Ala Leu Leu
370 375 380

Asp Gly Ile Asp Thr Pro Glu Asn Met Ile Arg Cys Val Asp Asn Asn
385 390 395 400

Tyr Ser Ser Leu Ala Phe Trp Arg Ala Trp His Arg Ser Tyr Asn Lys
405 410 415

Trp Val Val Arg Tyr Ile Tyr Ile Pro Leu Gly Gly Ser Lys Asn Arg
420 425 430

Val Leu Thr Ser Leu Ala Val Phe Ser Phe Val Ala Ile Trp His Asp
435 440 445

Ile Glu Leu Lys Leu Leu Leu Trp Gly Trp Leu Ile Val Leu Phe Leu
450 455 460

Leu Pro Glu Ile Phe Ala Thr Gln Ile Phe Ser His Tyr Thr Asp Ala
465 470 475 480

[0243] Val Trp Tyr Arg His Val Cys Ala Val Gly Ala Val Phe Asn Ile Trp
485 490 495

Val Met Met Ile Ala Asn Leu Phe Gly Phe Cys Leu Gly Ser Asp Gly
500 505 510

Thr Lys Lys Leu Leu Ser Asp Met Phe Cys Thr Val Ser Gly Phe Lys
515 520 525

Phe Val Ile Leu Ala Ser Val Ser Leu Phe Ile Ala Val Gln Ile Met
530 535 540

Phe Glu Ile Arg Glu Glu Glu Lys Arg His Gly Ile Tyr Leu Lys Cys
545 550 555 560

<210> 110
<211> 486
<212> PRT
<213> 酿酒酵母

<400> 110

Met Asn Arg Ile Leu Ser Ser Ala Ser Leu Leu Ser Asn Val Ser Met
1 5 10 15

Pro Arg Gln Asn Lys His Lys Ile Thr Lys Ala Leu Cys Tyr Ala Ile
20 25 30

Ile Val Ala Ser Ile Gly Ser Ile Gln Phe Gly Tyr His Leu Ser Glu

35 40 45

Leu Asn Ala Pro Gln Gln Val Leu Ser Cys Ser Glu Phe Asp Ile Pro
50 55 60

Met Glu Gly Tyr Pro Tyr Asp Arg Thr Trp Leu Gly Lys Arg Gly Tyr
65 70 75 80

Lys Gln Cys Ile Pro Leu Asn Asp Glu Gln Ile Gly Ile Val Thr Ser
85 90 95

Val Phe Cys Ile Gly Gly Ile Leu Gly Ser Tyr Phe Ala Thr Ser Leu
100 105 110

Ala Asn Ile Tyr Gly Arg Lys Phe Ser Ser Leu Ile Asn Cys Thr Leu
115 120 125

Asn Ile Val Gly Ser Leu Ile Ile Phe Asn Ser Asn Ser Tyr Arg Gly
130 135 140

Leu Ile Ile Gly Arg Ile Leu Val Gly Ile Ser Cys Gly Ser Leu Ile
145 150 155 160

Val Ile Ile Pro Leu Phe Ile Lys Glu Val Ala Pro Ser Gly Trp Glu
165 170 175

[0244]

Gly Leu Leu Gly Ser Met Thr Gln Ile Cys Ile Arg Leu Gly Val Leu
180 185 190

Leu Thr Gln Gly Ile Ala Leu Pro Leu Thr Asp Ser Tyr Arg Trp Arg
195 200 205

Trp Ile Leu Phe Gly Ser Phe Leu Ile Ala Val Leu Asn Phe Phe Met
210 215 220

Trp Phe Ile Val Asp Glu Ser Pro Lys Trp Leu Leu Ala His Gly Arg
225 230 235 240

Val Thr Asp Ala Lys Leu Ser Leu Cys Lys Leu Arg Gly Val Thr Phe
245 250 255

Asp Glu Ala Ala Gln Glu Ile Gln Asp Trp Gln Leu Gln Ile Glu Ser
260 265 270

Gly Asp Pro Leu Ile Glu Pro Thr Thr Thr Asn Ser Ile Ser Gly Ser
275 280 285

Asn Ser Leu Trp Lys Tyr Leu Arg Asp Arg Thr Asn Val Lys Ser Arg
290 295 300

His Val Ile Thr Val Leu Leu Phe Gly Gln Gln Phe Cys Gly Ile Asn
305 310 315 320

Ser Ile Val Leu Tyr Gly Thr Lys Ile Ile Ser Gln Leu Tyr Pro Gln
325 330 335

His Ala Ile Arg Ile Asn Phe Phe Ile Ser Met Val Asn Val Leu Val
340 345 350

Thr Ile Leu Val Ser Leu Leu Ile His Ser Leu Pro Arg Lys Pro Leu
355 360 365

Leu Met Thr Ser Thr Val Leu Val Ser Val Thr Ala Phe Ile Met Gly
370 375 380

Ile Ala Met Asn His Asn Lys Met Asn Leu Leu Ile Val Phe Ser Phe
385 390 395 400

Ile Tyr Met Gly Val Phe Thr Met Gly Leu Asn Pro Leu Pro Phe Ile
405 410 415

Ile Met Arg Glu Val Ser Lys Pro Gln Asp Met Val Leu Ala Gln Arg
420 425 430

Tyr Gly Thr Ile Cys Asn Trp Val Gly Thr Phe Ile Ile Ala Tyr Thr
435 440 445

Phe Pro Ile Ile His Asp Val Leu Ser Gly Tyr Val Phe Ile Ile Phe
450 455 460

[0245]

Ala Ile Ile Ala Cys Ser Ile Ser Ala Phe Ile Trp Lys Lys Val Pro
465 470 475 480

Glu Thr Lys Arg Ser Gly
485

<210> 111
<211> 725
<212> PRT
<213> 酿酒酵母

<400> 111

Met Pro Gln Ser Thr Pro Ser Gln Glu Val Gln Arg Val Pro Trp Asp
1 5 10 15

Asn Lys Pro Ala Leu Lys Gln Ile Thr Leu Arg Ala Thr Ile Ala Gly
20 25 30

Ile Ala Ile Gly Ser Leu Val Leu Thr Ser Asn Phe Gln Phe Gly Leu
35 40 45

Gln Thr Gly Trp Val Ser Met Met Ser Leu Pro Ser Ala Leu Leu Ala
50 55 60

Cys Ala Phe Phe Lys Asn Ile Trp Pro Leu Ile Phe Pro Asn Asp Arg
65 70 75 80

```
Pro Phe Ser Asp Val Glu Asn Val Tyr Val Gln Ser Met Ala Val Ala
                85                  90                  95

Val Gly Thr Gly Pro Leu Ala Phe Gly Phe Val Gly Val Ile Pro Ala
            100                 105                 110

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

Gly Gln Ser Phe Thr Phe Arg Glu Leu Leu Ile Trp Ser Thr Ala Leu
    130                 135                 140

Ala Phe Phe Gly Ile Phe Phe Ala Val Pro Leu Arg Lys Gln Val Ile
145                 150                 155                 160

Val Arg Glu Lys Leu Pro Phe Pro Ser Gly Ser Ala Thr Ala Thr Leu
                165                 170                 175

Ile Ser Val Leu Asn Gly Thr Glu Ile Leu Gln Glu Val Ser Lys Ser
            180                 185                 190

Glu Leu Leu Glu Met Arg Gln Arg Arg Leu Asn Glu Cys Pro Glu Val
        195                 200                 205

Leu Gln Pro Asn Arg Asp Pro Glu Glu Ala Asp Tyr Leu Met Asn Ser
    210                 215                 220
```

[0246]

```
Ser His Ser Glu Leu Gly Asp Tyr Thr Ala Thr Ser Gln Asp Gly Ser
225                 230                 235                 240

Ser Ile Leu Ser Thr Gly Ser Glu Asn Tyr Arg Ala Asn Ile Ile Ile
                245                 250                 255

Leu Leu Lys Thr Phe Val Val Ser Ser Leu Tyr Thr Met Val Ser Tyr
            260                 265                 270

Phe Val Pro Val Ile Arg Ser Ile Pro Val Phe Gly Lys Tyr Leu Ser
        275                 280                 285

Asn Asn Tyr Leu Trp Asn Phe Gln Pro Ser Pro Ala Tyr Ile Gly Gln
    290                 295                 300

Gly Ile Ile Met Gly Leu Pro Thr Val Ser Tyr Met Leu Ile Gly Cys
305                 310                 315                 320

Phe Leu Gly Trp Gly Val Leu Ala Pro Leu Ala Arg Tyr Lys Arg Trp
                325                 330                 335

Val Pro Pro Asp Ala Asp Val His Asp Trp Glu Glu Gly Val Gln Gly
            340                 345                 350

Trp Ile Leu Trp Ser Ser Leu Ser Ile Met Val Ala Asp Ser Val Val
        355                 360                 365
```

```
Ala Phe Ile Val Val Thr Val Lys Ser Ile Val Lys Phe Ile Leu Ile
    370                 375                 380

Asp Asp Lys Ala Ala Leu Leu Asn Asn Ile Ile Asp Asp Thr Phe Gln
385                 390                 395                 400

Ser Met Leu Leu Glu Glu Glu Arg Ala Ile Asn Ser Ser Arg Arg Asn
                405                 410                 415

Thr Tyr Val Asp Gly Arg Gln Asp Thr Val Arg Leu Val Ser Arg Asp
            420                 425                 430

Asn Glu Ile Glu Val Asp Ser Lys His Leu Val Arg Tyr Thr Thr Val
        435                 440                 445

Ile Ser Gly Cys Leu Val Ser Ser Ile Ile Cys Ile Val Ser Ile Ile
    450                 455                 460

Tyr Leu Phe Gly Ile Gln Val Ile Pro Leu Tyr Ala Ile Ile Thr Ala
465                 470                 475                 480

Leu Ile Leu Ala Leu Phe Leu Ser Ile Leu Gly Ile Arg Ala Leu Gly
                485                 490                 495

Glu Thr Asp Leu Asn Pro Val Ser Gly Ile Gly Lys Ile Ser Gln Leu
            500                 505                 510
```

[0247]

```
Ile Phe Ala Phe Ile Ile Pro Arg Asp Arg Pro Gly Ser Val Leu Met
        515                 520                 525

Asn Val Val Ser Gly Gly Ile Ala Glu Ala Ser Ala Gln Gln Ala Gly
    530                 535                 540

Asp Leu Met Gln Asp Leu Lys Thr Gly His Leu Leu Gly Ala Ser Pro
545                 550                 555                 560

Arg Ala Gln Phe Cys Ala Gln Leu Ile Gly Ala Cys Trp Ser Ile Ile
                565                 570                 575

Leu Ser Ser Phe Met Tyr Leu Cys Tyr Asn Lys Val Tyr Ser Ile Pro
            580                 585                 590

Ser Glu Gln Phe Arg Ile Pro Thr Ala Val Val Trp Ile Asp Cys Ala
        595                 600                 605

Arg Leu Val Thr Gly Lys Gly Leu Pro Asp Lys Ala Leu Glu Cys Ser
    610                 615                 620

Met Ile Leu Gly Val Ile Phe Ala Val Leu Ser Leu Ile Arg Asn Thr
625                 630                 635                 640

Tyr Arg Asp Tyr Gly Tyr Gly Trp Ile Leu Tyr Ile Pro Ser Gly Val
                645                 650                 655
```

Ala Val Gly Val Gly Ile Phe Asn Ser Pro Ser Phe Thr Ile Ala Arg
660 665 670

Phe Ile Gly Gly Trp Ala Ser His Phe Trp Leu Lys Asn His Arg Gly
675 680 685

Asp Leu Asn Ala Lys Thr Lys Met Ile Val Phe Ser Ser Gly Leu Val
690 695 700

Leu Gly Glu Gly Ile Phe Ser Val Ile Asn Met Leu Phe Ile Cys Leu
705 710 715 720

Asn Val Pro His Tyr
725

<210> 112
<211> 950
<212> PRT
<213> 酿酒酵母

<400> 112

Met Ser Asp Asn Pro Phe Asn Ala Ser Leu Leu Asp Glu Asp Ser Asn
1 5 10 15

Arg Glu Arg Glu Ile Leu Asp Ala Thr Ala Glu Ala Leu Ser Lys Pro
20 25 30

[0248]

Ser Pro Ser Leu Glu Tyr Cys Thr Leu Ser Val Asp Glu Ala Leu Glu
35 40 45

Lys Leu Asp Thr Asp Lys Asn Gly Gly Leu Arg Ser Ser Asn Glu Ala
50 55 60

Asn Asn Arg Arg Ser Leu Tyr Gly Pro Asn Glu Ile Thr Val Glu Asp
65 70 75 80

Asp Glu Ser Leu Phe Lys Lys Phe Leu Ser Asn Phe Ile Glu Asp Arg
85 90 95

Met Ile Leu Leu Leu Ile Gly Ser Ala Val Val Ser Leu Phe Met Gly
100 105 110

Asn Ile Asp Asp Ala Val Ser Ile Thr Leu Ala Ile Phe Ile Val Val
115 120 125

Thr Val Gly Phe Val Gln Glu Tyr Arg Ser Glu Lys Ser Leu Glu Ala
130 135 140

Leu Asn Lys Leu Val Pro Ala Glu Cys His Leu Met Arg Cys Gly Gln
145 150 155 160

Glu Ser His Val Leu Ala Ser Thr Leu Val Pro Gly Asp Leu Val His
165 170 175

Phe Arg Ile Gly Asp Arg Ile Pro Ala Asp Ile Arg Ile Ile Glu Ala
180 185 190

Ile Asp Leu Ser Ile Asp Glu Ser Asn Leu Thr Gly Glu Asn Glu Pro
195 200 205

Val His Lys Thr Ser Gln Thr Ile Glu Lys Ser Ser Phe Asn Asp Gln
210 215 220

Pro Asn Ser Ile Val Pro Ile Ser Glu Arg Ser Cys Ile Ala Tyr Met
225 230 235 240

Gly Thr Leu Val Lys Glu Gly His Gly Lys Gly Ile Val Val Gly Thr
245 250 255

Gly Thr Asn Thr Ser Phe Gly Ala Val Phe Glu Met Met Asn Asn Ile
260 265 270

Glu Lys Pro Lys Thr Pro Leu Gln Leu Thr Met Asp Lys Leu Gly Lys
275 280 285

Asp Leu Ser Leu Val Ser Phe Ile Val Ile Gly Met Ile Cys Leu Val
290 295 300

Gly Ile Ile Gln Gly Arg Ser Trp Leu Glu Met Phe Gln Ile Ser Val
305 310 315 320

[0249]

Ser Leu Ala Val Ala Ala Ile Pro Glu Gly Leu Pro Ile Ile Val Thr
325 330 335

Val Thr Leu Ala Leu Gly Val Leu Arg Met Ala Lys Arg Lys Ala Ile
340 345 350

Val Arg Arg Leu Pro Ser Val Glu Thr Leu Gly Ser Val Asn Val Ile
355 360 365

Cys Ser Asp Lys Thr Gly Thr Leu Thr Ser Asn His Met Thr Val Ser
370 375 380

Lys Leu Trp Cys Leu Asp Ser Met Ser Asn Lys Leu Asn Val Leu Ser
385 390 395 400

Leu Asp Lys Asn Lys Lys Thr Lys Asn Ser Asn Gly Asn Leu Lys Asn
405 410 415

Tyr Leu Thr Glu Asp Val Arg Glu Thr Leu Thr Ile Gly Asn Leu Cys
420 425 430

Asn Asn Ala Ser Phe Ser Gln Glu His Ala Ile Phe Leu Gly Asn Pro
435 440 445

Thr Asp Val Ala Leu Leu Glu Gln Leu Ala Asn Phe Glu Met Pro Asp

```
          450                 455                 460

Ile Arg Asn Thr Val Gln Lys Val Gln Glu Leu Pro Phe Asn Ser Lys
465                 470                 475                 480

Arg Lys Leu Met Ala Thr Lys Ile Leu Asn Pro Val Asp Asn Lys Cys
                485                 490                 495

Thr Val Tyr Val Lys Gly Ala Phe Glu Arg Ile Leu Glu Tyr Ser Thr
            500                 505                 510

Ser Tyr Leu Lys Ser Lys Gly Lys Lys Thr Glu Lys Leu Thr Glu Ala
        515                 520                 525

Gln Lys Ala Thr Ile Asn Glu Cys Ala Asn Ser Met Ala Ser Glu Gly
    530                 535                 540

Leu Arg Val Phe Gly Phe Ala Lys Leu Thr Leu Ser Asp Ser Ser Thr
545                 550                 555                 560

Pro Leu Thr Glu Asp Leu Ile Lys Asp Leu Thr Phe Thr Gly Leu Ile
                565                 570                 575

Gly Met Asn Asp Pro Pro Arg Pro Asn Val Lys Phe Ala Ile Glu Gln
            580                 585                 590
```

[0250]

```
Leu Leu Gln Gly Gly Val His Ile Ile Met Ile Thr Gly Asp Ser Glu
        595                 600                 605

Asn Thr Ala Val Asn Ile Ala Lys Gln Ile Gly Ile Pro Val Ile Asp
    610                 615                 620

Pro Lys Leu Ser Val Leu Ser Gly Asp Lys Leu Asp Glu Met Ser Asp
625                 630                 635                 640

Asp Gln Leu Ala Asn Val Ile Asp His Val Asn Ile Phe Ala Arg Ala
                645                 650                 655

Thr Pro Glu His Lys Leu Asn Ile Val Arg Ala Leu Arg Lys Arg Gly
            660                 665                 670

Asp Val Val Ala Met Thr Gly Asp Gly Val Asn Asp Ala Pro Ala Leu
        675                 680                 685

Lys Leu Ser Asp Ile Gly Val Ser Met Gly Arg Ile Gly Thr Asp Val
    690                 695                 700

Ala Lys Glu Ala Ser Asp Met Val Leu Thr Asp Asp Asp Phe Ser Thr
705                 710                 715                 720

Ile Leu Thr Ala Ile Glu Glu Gly Lys Gly Ile Phe Asn Asn Ile Gln
                725                 730                 735
```

Asn Phe Leu Thr Phe Gln Leu Ser Thr Ser Val Ala Ala Leu Ser Leu
740 745 750

Val Ala Leu Ser Thr Ala Phe Lys Leu Pro Asn Pro Leu Asn Ala Met
755 760 765

Gln Ile Leu Trp Ile Asn Ile Leu Met Asp Gly Pro Pro Ala Gln Ser
770 775 780

Leu Gly Val Glu Pro Val Asp His Glu Val Met Lys Lys Pro Pro Arg
785 790 795 800

Lys Arg Thr Asp Lys Ile Leu Thr His Asp Val Met Lys Arg Leu Leu
805 810 815

Thr Thr Ala Ala Cys Ile Ile Val Gly Thr Val Tyr Ile Phe Val Lys
820 825 830

Glu Met Ala Glu Asp Gly Lys Val Thr Ala Arg Asp Thr Thr Met Thr
835 840 845

Phe Thr Cys Phe Val Phe Phe Asp Met Phe Asn Ala Leu Ala Cys Arg
850 855 860

His Asn Thr Lys Ser Ile Phe Glu Ile Gly Phe Phe Thr Asn Lys Met
865 870 875 880

[0251]

Phe Asn Tyr Ala Val Gly Leu Ser Leu Leu Gly Gln Met Cys Ala Ile
885 890 895

Tyr Ile Pro Phe Phe Gln Ser Ile Phe Lys Thr Glu Lys Leu Gly Ile
900 905 910

Ser Asp Ile Leu Leu Leu Leu Leu Ile Ser Ser Ser Val Phe Ile Val
915 920 925

Asp Glu Leu Arg Lys Leu Trp Thr Arg Lys Lys Asn Glu Glu Asp Ser
930 935 940

Thr Tyr Phe Ser Asn Val
945 950

<210> 113
<211> 366
<212> PRT
<213> 酿酒酵母

<400> 113

Met Ser Asp Arg Asn Thr Ser Asn Ser Leu Thr Leu Lys Glu Arg Met
1 5 10 15

Leu Ser Ala Gly Ala Gly Ser Val Leu Thr Ser Leu Ile Leu Thr Pro
20 25 30

```
Met Asp Val Val Arg Ile Arg Leu Gln Gln Gln Met Ile Pro Asp
        35                  40                  45

Cys Ser Cys Asp Gly Ala Ala Glu Val Pro Asn Ala Val Ser Ser Gly
    50                  55                  60

Ser Lys Met Lys Thr Phe Thr Asn Val Gly Gly Gln Asn Leu Asn Asn
65                  70                  75                  80

Ala Lys Ile Phe Trp Glu Ser Ala Cys Phe Gln Glu Leu His Cys Lys
                85                  90                  95

Asn Ser Ser Leu Lys Phe Asn Gly Thr Leu Glu Ala Phe Thr Lys Ile
            100                 105                 110

Ala Ser Val Glu Gly Ile Thr Ser Leu Trp Arg Gly Ile Ser Leu Thr
        115                 120                 125

Leu Leu Met Ala Ile Pro Ala Asn Met Val Tyr Phe Ser Gly Tyr Glu
    130                 135                 140

Tyr Ile Arg Asp Val Ser Pro Ile Ala Ser Thr Tyr Pro Thr Leu Asn
145                 150                 155                 160

Pro Leu Phe Cys Gly Ala Ile Ala Arg Val Phe Ala Ala Thr Ser Ile
                165                 170                 175
```

[0252]

```
Ala Pro Leu Glu Leu Val Lys Thr Lys Leu Gln Ser Ile Pro Arg Ser
            180                 185                 190

Ser Lys Ser Thr Lys Thr Trp Met Met Val Lys Asp Leu Leu Asn Glu
        195                 200                 205

Thr Arg Gln Glu Met Lys Met Val Gly Pro Ser Arg Ala Leu Phe Lys
    210                 215                 220

Gly Leu Glu Ile Thr Leu Trp Arg Asp Val Pro Phe Ser Ala Ile Tyr
225                 230                 235                 240

Trp Ser Ser Tyr Glu Leu Cys Lys Glu Arg Leu Trp Leu Asp Ser Thr
                245                 250                 255

Arg Phe Ala Ser Lys Asp Ala Asn Trp Val His Phe Ile Asn Ser Phe
            260                 265                 270

Ala Ser Gly Cys Ile Ser Gly Met Ile Ala Ala Ile Cys Thr His Pro
        275                 280                 285

Phe Asp Val Gly Lys Thr Arg Trp Gln Ile Ser Met Met Asn Asn Ser
    290                 295                 300

Asp Pro Lys Gly Gly Asn Arg Ser Arg Asn Met Phe Lys Phe Leu Glu
305                 310                 315                 320
```

Thr Ile Trp Arg Thr Glu Gly Leu Ala Ala Leu Tyr Thr Gly Leu Ala
325 330 335

Ala Arg Val Ile Lys Ile Arg Pro Ser Cys Ala Ile Met Ile Ser Ser
340 345 350

Tyr Glu Ile Ser Lys Lys Val Phe Gly Asn Lys Leu His Gln
355 360 365

<210> 114
<211> 1592
<212> PRT
<213> 酿酒酵母

<400> 114

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

Val Asp Asp Phe Thr Arg Leu Gly Arg Thr Gln Leu Leu Ser Tyr Tyr
20 25 30

Leu Pro Leu Ala Ile Ile Ala Ser Ile Gly Ile Phe Ala Leu Cys Arg
35 40 45

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

[0253]

Glu Tyr Leu Phe Gly Ala Gln Glu Glu Arg Lys Glu Asp Asn Ser Ile
65 70 75 80

Glu Arg Leu Leu Arg Asn Ser Asn Thr Gln Ala Asn Tyr Val Asn Val
85 90 95

Lys Lys Gln Gly Arg Ile Leu Lys Leu Arg His Phe Asp Ile Thr Thr
100 105 110

Ile Asp Val Lys Gln Ile Asp Ala Lys Asn His Gly Gly Leu Thr Phe
115 120 125

Ser Arg Pro Ser Thr Ser Asp His Leu Arg Lys Ser Ser Glu Ile Val
130 135 140

Leu Met Ser Leu Gln Ile Ile Gly Leu Ser Phe Leu Arg Val Thr Lys
145 150 155 160

Ile Asn Ile Glu Leu Thr Asn Arg Asp Val Thr Thr Leu Leu Leu Phe
165 170 175

Trp Leu Ile Leu Leu Ser Leu Ser Ile Leu Arg Val Tyr Lys Arg Ser
180 185 190

Thr Asn Leu Trp Ala Ile Cys Phe Thr Ala His Thr Thr Ile Trp Ile
195 200 205

```
Ser Thr Trp Ile Pro Ile Arg Ser Val Tyr Ile Gly Asn Ile Asp Asp
    210                 215                 220

Val Pro Ser Gln Ile Phe Tyr Ile Phe Glu Phe Val Ile Thr Ser Thr
225                 230                 235                 240

Leu Gln Pro Ile Lys Leu Thr Ser Pro Ile Lys Asp Asn Ser Ser Ile
                245                 250                 255

Ile Tyr Val Arg Asp Asp His Thr Ser Pro Ser Arg Glu His Ile Ser
            260                 265                 270

Ser Ile Leu Ser Cys Ile Thr Trp Ser Trp Ile Thr Asn Phe Ile Trp
        275                 280                 285

Glu Ala Gln Lys Asn Thr Ile Lys Leu Lys Asp Ile Trp Gly Leu Ser
    290                 295                 300

Met Glu Asp Tyr Ser Ile Phe Ile Leu Lys Gly Phe Thr Arg Arg Asn
305                 310                 315                 320

Lys His Ile Asn Asn Leu Thr Leu Ala Leu Phe Glu Ser Phe Lys Thr
                325                 330                 335

Tyr Leu Leu Ile Gly Met Leu Trp Val Leu Val Asn Ser Ile Val Asn
            340                 345                 350
```

[0254]

```
Leu Leu Pro Thr Ile Leu Met Lys Arg Phe Leu Glu Ile Val Asp Asn
        355                 360                 365

Pro Asn Arg Ser Ser Ser Cys Met Asn Leu Ala Trp Leu Tyr Ile Ile
    370                 375                 380

Gly Met Phe Ile Cys Arg Leu Thr Leu Ala Ile Cys Asn Ser Gln Gly
385                 390                 395                 400

Gln Phe Val Ser Asp Lys Ile Cys Leu Arg Ile Arg Ala Ile Leu Ile
                405                 410                 415

Gly Glu Ile Tyr Ala Lys Gly Leu Arg Arg Arg Leu Phe Thr Ser Pro
            420                 425                 430

Lys Thr Ser Ser Asp Ser Asp Ser Ile Ser Ala Asn Leu Gly Thr Ile
        435                 440                 445

Ile Asn Leu Ile Ser Ile Asp Ser Phe Lys Val Ser Glu Leu Ala Asn
    450                 455                 460

Tyr Leu Tyr Val Thr Val Gln Ala Val Ile Met Ile Ile Val Val Val
465                 470                 475                 480

Gly Leu Leu Phe Asn Phe Leu Gly Val Ser Ala Phe Ala Gly Ile Ser
                485                 490                 495
```

Ile Ile Leu Val Met Phe Pro Leu Asn Phe Leu Leu Ala Asn Leu Leu
500 505 510

Gly Lys Phe Gln Lys Gln Thr Leu Lys Cys Thr Asp Gln Arg Ile Ser
515 520 525

Lys Leu Asn Glu Cys Leu Gln Asn Ile Arg Ile Val Lys Tyr Phe Ala
530 535 540

Trp Glu Arg Asn Ile Ile Asn Glu Ile Lys Ser Ile Arg Gln Lys Glu
545 550 555 560

Leu Arg Ser Leu Leu Lys Lys Ser Leu Val Trp Ser Val Thr Ser Phe
565 570 575

Leu Trp Phe Val Thr Pro Thr Leu Val Thr Gly Val Thr Phe Ala Ile
580 585 590

Cys Thr Phe Val Gln His Glu Asp Leu Asn Ala Pro Leu Ala Phe Thr
595 600 605

Thr Leu Ser Leu Phe Thr Leu Leu Lys Thr Pro Leu Asp Gln Leu Ser
610 615 620

Asn Met Leu Ser Phe Ile Asn Gln Ser Lys Val Ser Leu Lys Arg Ile
625 630 635 640

[0255]

Ser Asp Phe Leu Arg Met Asp Asp Thr Glu Lys Tyr Asn Gln Leu Thr
645 650 655

Ile Ser Pro Asp Lys Asn Lys Ile Glu Phe Lys Asn Ala Thr Leu Thr
660 665 670

Trp Asn Glu Asn Asp Ser Asp Met Asn Ala Phe Lys Leu Cys Gly Leu
675 680 685

Asn Ile Lys Phe Gln Ile Gly Lys Leu Asn Leu Ile Leu Gly Ser Thr
690 695 700

Gly Ser Gly Lys Ser Ala Leu Leu Leu Gly Leu Leu Gly Glu Leu Asn
705 710 715 720

Leu Ile Ser Gly Ser Ile Ile Val Pro Ser Leu Glu Pro Lys His Asp
725 730 735

Leu Ile Pro Asp Cys Glu Gly Leu Thr Asn Ser Phe Ala Tyr Cys Ser
740 745 750

Gln Ser Ala Trp Leu Leu Asn Asp Thr Val Lys Asn Asn Ile Ile Phe
755 760 765

Asp Asn Phe Tyr Asn Glu Asp Arg Tyr Asn Lys Val Ile Asp Ala Cys

770 775 780

Gly Leu Lys Arg Asp Leu Glu Ile Leu Pro Ala Gly Asp Leu Thr Glu
785 790 795 800

Ile Gly Glu Lys Gly Ile Thr Leu Ser Gly Gly Gln Lys Gln Arg Ile
805 810 815

Ser Leu Ala Arg Ala Val Tyr Ser Ser Ala Lys His Val Leu Leu Asp
820 825 830

Asp Cys Leu Ser Ala Val Asp Ser His Thr Ala Val Trp Ile Tyr Glu
835 840 845

Asn Cys Ile Thr Gly Pro Leu Met Lys Asn Arg Thr Cys Ile Leu Val
850 855 860

Thr His Asn Val Ser Leu Thr Leu Arg Asn Ala His Phe Ala Ile Val
865 870 875 880

Leu Glu Asn Gly Lys Val Lys Asn Gln Gly Thr Ile Thr Glu Leu Gln
885 890 895

Ser Lys Gly Leu Phe Lys Glu Lys Tyr Val Gln Leu Ser Ser Arg Asp
900 905 910

[0256]

Ser Ile Asn Glu Lys Asn Ala Asn Arg Leu Lys Ala Pro Arg Lys Asn
915 920 925

Asp Ser Gln Lys Ile Glu Pro Val Thr Glu Asn Ile Asn Phe Asp Ala
930 935 940

Asn Phe Val Asn Asp Gly Gln Leu Ile Glu Glu Glu Glu Lys Ser Asn
945 950 955 960

Gly Ala Ile Ser Pro Asp Val Tyr Lys Trp Tyr Leu Lys Phe Phe Gly
965 970 975

Gly Phe Lys Ala Leu Thr Ala Leu Phe Ala Leu Tyr Ile Thr Ala Gln
980 985 990

Ile Leu Phe Ile Ser Gln Ser Trp Trp Ile Arg His Trp Val Asn Asp
995 1000 1005

Thr Asn Val Arg Ile Asn Ala Pro Gly Phe Ala Met Asp Thr Leu
1010 1015 1020

Pro Leu Lys Gly Met Thr Asp Ser Ser Lys Asn Lys His Asn Ala
1025 1030 1035

Phe Tyr Tyr Leu Thr Val Tyr Phe Leu Ile Gly Ile Ile Gln Ala
1040 1045 1050

Met Leu Gly Gly Phe Lys Thr Met Met Thr Phe Leu Ser Gly Met
1055 1060 1065

Arg Ala Ser Arg Lys Ile Phe Asn Asn Leu Leu Asp Leu Val Leu
1070 1075 1080

His Ala Gln Ile Arg Phe Phe Asp Val Thr Pro Val Gly Arg Ile
1085 1090 1095

Met Asn Arg Phe Ser Lys Asp Ile Glu Gly Val Asp Gln Glu Leu
1100 1105 1110

Ile Pro Tyr Leu Glu Val Thr Ile Phe Cys Leu Ile Gln Cys Ala
1115 1120 1125

Ser Ile Ile Phe Leu Ile Thr Val Ile Thr Pro Arg Phe Leu Thr
1130 1135 1140

Val Ala Val Ile Val Phe Val Leu Tyr Phe Phe Val Gly Lys Trp
1145 1150 1155

Tyr Leu Thr Ala Ser Arg Glu Leu Lys Arg Leu Asp Ser Ile Thr
1160 1165 1170

Lys Ser Pro Ile Phe Gln His Phe Ser Glu Thr Leu Val Gly Val
1175 1180 1185

[0257]

Cys Thr Ile Arg Ala Phe Gly Asp Glu Arg Arg Phe Ile Leu Glu
1190 1195 1200

Asn Met Asn Lys Ile Asp Gln Asn Asn Arg Ala Phe Phe Tyr Leu
1205 1210 1215

Ser Val Thr Val Lys Trp Phe Ser Phe Arg Val Asp Met Ile Gly
1220 1225 1230

Ala Phe Ile Val Leu Ala Ser Gly Ser Phe Ile Leu Leu Asn Ile
1235 1240 1245

Ala Asn Ile Asp Ser Gly Leu Ala Gly Ile Ser Leu Thr Tyr Ala
1250 1255 1260

Ile Leu Phe Thr Asp Gly Ala Leu Trp Leu Val Arg Leu Tyr Ser
1265 1270 1275

Thr Phe Glu Met Asn Met Asn Ser Val Glu Arg Leu Lys Glu Tyr
1280 1285 1290

Ser Ser Ile Glu Gln Glu Asn Tyr Leu Gly His Asp Glu Gly Arg
1295 1300 1305

Ile Leu Leu Leu Asn Glu Pro Ser Trp Pro Lys Asp Gly Glu Ile
1310 1315 1320

Glu Ile Glu Asn Leu Ser Leu Arg Tyr Ala Pro Asn Leu Pro Pro
1325 1330 1335

Val Ile Arg Asn Val Ser Phe Lys Val Asp Pro Gln Ser Lys Ile
1340 1345 1350

Gly Ile Val Gly Arg Thr Gly Ala Gly Lys Ser Thr Ile Ile Thr
1355 1360 1365

Ala Leu Phe Arg Leu Leu Glu Pro Ile Thr Gly Cys Ile Lys Ile
1370 1375 1380

Asp Gly Gln Asp Ile Ser Lys Ile Asp Leu Val Thr Leu Arg Arg
1385 1390 1395

Ser Ile Thr Ile Ile Pro Gln Asp Pro Ile Leu Phe Ala Gly Thr
1400 1405 1410

Ile Lys Ser Asn Val Asp Pro Tyr Asp Glu Tyr Asp Glu Lys Lys
1415 1420 1425

Ile Phe Lys Ala Leu Ser Gln Val Asn Leu Ile Ser Ser His Glu
1430 1435 1440

Phe Glu Glu Val Leu Asn Ser Glu Glu Arg Phe Asn Ser Thr His
1445 1450 1455

[0258]

Asn Lys Phe Leu Asn Leu His Thr Glu Ile Ala Glu Gly Gly Leu
1460 1465 1470

Asn Leu Ser Gln Gly Glu Arg Gln Leu Leu Phe Ile Ala Arg Ser
1475 1480 1485

Leu Leu Arg Glu Pro Lys Ile Ile Leu Leu Asp Glu Ala Thr Ser
1490 1495 1500

Ser Ile Asp Tyr Asp Ser Asp His Leu Ile Gln Gly Ile Ile Arg
1505 1510 1515

Ser Glu Phe Asn Lys Ser Thr Ile Leu Thr Ile Ala His Arg Leu
1520 1525 1530

Arg Ser Val Ile Asp Tyr Asp Arg Ile Ile Val Met Asp Ala Gly
1535 1540 1545

Glu Val Lys Glu Tyr Asp Arg Pro Ser Glu Leu Leu Lys Asp Glu
1550 1555 1560

Arg Gly Ile Phe Tyr Ser Met Cys Arg Asp Ser Gly Gly Leu Glu
1565 1570 1575

Leu Leu Lys Gln Ile Ala Lys Gln Ser Ser Lys Met Met Lys
1580 1585 1590

<210> 115
<211> 546
<212> PRT
<213> 酿酒酵母

<400> 115

Met Glu Pro Leu Leu Phe Asn Ser Gly Lys Ala Asn Pro Ser Gln Asp
1 5 10 15

Val Phe Ile Asp Val Glu Val Gly Asp Ile Thr Thr Lys Tyr Gly Ser
20 25 30

Thr Asn Thr Gly Ser Phe Ser Ser Met Asp Thr Val Glu Ala Gln Ala
35 40 45

Ile Lys Ala Glu Thr Ala Arg Phe Met Glu Val Pro Gln Gly Arg His
50 55 60

Leu Gly Val Phe Ser Thr Val Val Leu Phe Val Ser Arg Ile Met Gly
65 70 75 80

Ser Gly Ile Phe Ala Val Pro Ser Val Ile Leu Leu Asn Thr Gly Gly
85 90 95

Asn Lys Leu Ile Tyr Phe Ala Ile Trp Val Phe Ser Ala Ala Ile Ala
100 105 110

[0259]

Phe Ala Gly Leu Tyr Leu Phe Leu Glu Phe Gly Ser Trp Ile Pro Lys
115 120 125

Ser Gly Gly Arg Lys Asn Phe Leu Glu Arg Ser Phe Glu Arg Pro Arg
130 135 140

Leu Leu Ile Ser Val Val Phe Ser Cys Tyr Ser Val Leu Thr Gly Tyr
145 150 155 160

Ala Leu Thr Gly Ser Ile Val Phe Gly Lys Tyr Val Leu Ser Ala Phe
165 170 175

Gly Val Thr Asp Asp Ser Trp Ser Lys Tyr Val Ser Ile Ser Phe Ile
180 185 190

Ile Phe Ala Val Leu Ile His Gly Val Ser Val Arg His Gly Val Phe
195 200 205

Ile Gln Asn Ala Leu Gly Gly Leu Lys Leu Ile Met Ile Val Leu Met
210 215 220

Cys Phe Ala Gly Leu Tyr Thr Leu Phe Phe Tyr Lys Ser Thr Gly Gln
225 230 235 240

Val Ala Trp Asp Leu Pro Val Thr Gln Val Glu Lys Asp Ser Leu Leu
245 250 255

Ser Val Ser Ser Ile Ala Thr Ala Phe Ile Ser Ser Phe Phe Cys Phe
260 265 270

Ser Gly Trp Asp Thr Val His Thr Val Thr Ser Glu Ile Lys Asn Pro
275 280 285

Val Lys Thr Leu Lys Val Ser Gly Pro Leu Ser Leu Ile Ile Cys Phe
290 295 300

Val Cys Tyr Thr Met Met Asn Val Ala Tyr Leu Lys Val Leu Thr Tyr
305 310 315 320

Glu Glu Ile Val Ser Ala Gly Pro Leu Val Gly Ser Val Leu Phe Thr
325 330 335

Lys Leu Phe Gly Pro Arg Val Gly Gly Lys Phe Ile Ala Phe Ser Ile
340 345 350

Ala Ile Ser Ala Ala Ser Asn Ile Leu Val Val Ile Tyr Ser Ile Ser
355 360 365

Arg Val Asn Gln Glu Ile Phe Lys Glu Gly Tyr Leu Pro Phe Ser Ile
370 375 380

His Met Ser Lys Asn Trp Pro Phe Asp Ala Pro Leu Pro Ser Ile Ser
385 390 395 400

[0260]

Leu Cys Gly Phe Ile Thr Ile Ala Trp Ile Leu Ile Leu Pro Lys Glu
405 410 415

Gly Glu Ser Phe Asn Tyr Leu Val Ser Met Asp Gly Tyr Gly Asn Gln
420 425 430

Phe Phe Leu Leu Leu Val Ala Ile Gly Leu Phe Ile Trp Arg Phe Lys
435 440 445

His Lys Asn Glu Val Pro Glu Ile Arg Ala Ser Thr Phe Gly Val Leu
450 455 460

Ala Ile Ile Thr Leu Ser Leu Tyr Met Leu Met Ala Pro Phe Phe Ala
465 470 475 480

Asp Pro Ser Leu Asn Arg Val Gly Phe Leu Pro Pro Tyr Gln Ile Met
485 490 495

Ser Leu Leu Val Ile Val Ala Cys Phe Phe Phe Trp Leu Val Lys Phe
500 505 510

Val Leu Leu Pro Lys Phe Phe His Tyr Lys Leu Leu Pro Lys Ile Thr
515 520 525

Tyr Leu His Asp Gly Leu Ile Val Thr Glu Trp Val Lys Lys Pro Cys

530 535 540

Leu Cys
545

<210> 116
<211> 357
<212> PRT
<213> 酿酒酵母

<400> 116

Met Thr Arg Asp Ser Pro Asp Ser Asn Asp Ser Tyr Lys His Ile Asn
1 5 10 15

Lys Asn Thr Thr Gln Lys Thr Ser Phe Asp Arg Asn Ser Phe Asp Tyr
20 25 30

Ile Val Arg Ser Gly Leu Ala Gly Gly Ile Ser Gly Ser Cys Ala Lys
35 40 45

Thr Leu Ile Ala Pro Leu Asp Arg Ile Lys Ile Leu Phe Gln Thr Ser
50 55 60

Asn Pro His Tyr Thr Lys Tyr Thr Gly Ser Leu Ile Gly Leu Val Glu
65 70 75 80

[0261] Ala Ala Lys His Ile Trp Ile Asn Asp Gly Val Arg Gly Phe Phe Gln
85 90 95

Gly His Ser Ala Thr Leu Leu Arg Ile Phe Pro Tyr Ala Ala Val Lys
100 105 110

Phe Val Ala Tyr Glu Gln Ile Arg Asn Thr Leu Ile Pro Ser Lys Glu
115 120 125

Phe Glu Ser His Trp Arg Arg Leu Val Ser Gly Ser Leu Ala Gly Leu
130 135 140

Cys Ser Val Phe Ile Thr Tyr Pro Leu Asp Leu Val Arg Val Arg Leu
145 150 155 160

Ala Tyr Glu Thr Glu His Lys Arg Val Lys Leu Gly Arg Ile Ile Lys
165 170 175

Lys Ile Tyr Lys Glu Pro Ala Ser Ala Thr Leu Ile Lys Asn Asp Tyr
180 185 190

Ile Pro Asn Trp Phe Cys His Trp Cys Asn Phe Tyr Arg Gly Tyr Val
195 200 205

Pro Thr Val Leu Gly Met Ile Pro Tyr Ala Gly Val Ser Phe Phe Ala
210 215 220

His Asp Leu Leu His Asp Val Leu Lys Ser Pro Phe Phe Ala Pro Tyr

225 230 235 240

Ser Val Leu Glu Leu Ser Glu Asp Asp Glu Leu Glu Arg Val Gln Lys
245 250 255

Lys Gln Arg Arg Pro Leu Arg Thr Trp Ala Glu Leu Ile Ser Gly Gly
260 265 270

Leu Ala Gly Met Ala Ser Gln Thr Ala Ala Tyr Pro Phe Glu Ile Ile
275 280 285

Arg Arg Arg Leu Gln Val Ser Ala Leu Ser Pro Lys Thr Met Tyr Asp
290 295 300

His Lys Phe Gln Ser Ile Ser Glu Ile Ala His Ile Ile Phe Lys Glu
305 310 315 320

Arg Gly Val Arg Gly Phe Phe Val Gly Leu Ser Ile Gly Tyr Ile Lys
325 330 335

Val Thr Pro Met Val Ala Cys Ser Phe Phe Val Tyr Glu Arg Met Lys
340 345 350

Trp Asn Phe Gly Ile
355

[0262] <210> 117
<211> 592
<212> PRT
<213> 酿酒酵母

<400> 117

Met Ser Glu Leu Glu Asn Ala His Gln Gly Pro Leu Glu Gly Ser Ala
1 5 10 15

Thr Val Ser Thr Asn Ser Asn Ser Tyr Asn Glu Lys Ser Gly Asn Ser
20 25 30

Thr Ala Pro Gly Thr Ala Gly Tyr Asn Asp Asn Leu Ala Gln Ala Lys
35 40 45

Pro Val Ser Ser Tyr Ile Ser His Glu Gly Pro Pro Lys Asp Glu Leu
50 55 60

Glu Glu Leu Gln Lys Glu Val Asp Lys Gln Leu Glu Lys Lys Ser Lys
65 70 75 80

Ser Asp Leu Leu Phe Val Ser Val Cys Cys Leu Met Val Ala Phe Gly
85 90 95

Gly Phe Val Phe Gly Trp Asp Thr Gly Thr Ile Ser Gly Phe Val Arg
100 105 110

Gln Thr Asp Phe Ile Arg Arg Phe Gly Ser Thr Arg Ala Asn Gly Thr

115 120 125

Thr Tyr Leu Ser Asp Val Arg Thr Gly Leu Met Val Ser Ile Phe Asn
130 135 140

Ile Gly Cys Ala Ile Gly Gly Ile Val Leu Ser Lys Leu Gly Asp Met
145 150 155 160

Tyr Gly Arg Lys Ile Gly Leu Met Thr Val Val Val Ile Tyr Ser Ile
165 170 175

Gly Ile Ile Ile Gln Ile Ala Ser Ile Asp Lys Trp Tyr Gln Tyr Phe
180 185 190

Ile Gly Arg Ile Ile Ser Gly Leu Gly Val Gly Gly Ile Thr Val Leu
195 200 205

Ala Pro Met Leu Ile Ser Glu Val Ser Pro Lys Gln Leu Arg Gly Thr
210 215 220

Leu Val Ser Cys Tyr Gln Leu Met Ile Thr Phe Gly Ile Phe Leu Gly
225 230 235 240

Tyr Cys Thr Asn Phe Gly Thr Lys Asn Tyr Ser Asn Ser Val Gln Trp
245 250 255

[0263]

Arg Val Pro Leu Gly Leu Cys Phe Ala Trp Ser Ile Phe Met Ile Val
260 265 270

Gly Met Thr Phe Val Pro Glu Ser Pro Arg Tyr Leu Val Glu Val Gly
275 280 285

Lys Ile Glu Glu Ala Lys Arg Ser Leu Ala Arg Ala Asn Lys Thr Thr
290 295 300

Glu Asp Ser Pro Leu Val Thr Leu Glu Met Glu Asn Tyr Gln Ser Ser
305 310 315 320

Ile Glu Ala Glu Arg Leu Ala Gly Ser Ala Ser Trp Gly Glu Leu Val
325 330 335

Thr Gly Lys Pro Gln Met Phe Arg Arg Thr Leu Met Gly Met Met Ile
340 345 350

Gln Ser Leu Gln Gln Leu Thr Gly Asp Asn Tyr Phe Phe Tyr Tyr Gly
355 360 365

Thr Thr Ile Phe Gln Ala Val Gly Leu Glu Asp Ser Phe Glu Thr Ala
370 375 380

Ile Val Leu Gly Val Val Asn Phe Val Ser Thr Phe Phe Ser Leu Tyr
385 390 395 400

Thr Val Asp Arg Phe Gly Arg Arg Asn Cys Leu Leu Trp Gly Cys Val
405 410 415

Gly Met Ile Cys Cys Tyr Val Val Tyr Ala Ser Val Gly Val Thr Arg
420 425 430

Leu Trp Pro Asn Gly Gln Asp Gln Pro Ser Ser Lys Gly Ala Gly Asn
435 440 445

Cys Met Ile Val Phe Ala Cys Phe Tyr Ile Phe Cys Phe Ala Thr Thr
450 455 460

Trp Ala Pro Val Ala Tyr Val Leu Ile Ser Glu Ser Tyr Pro Leu Arg
465 470 475 480

Val Arg Gly Lys Ala Met Ser Ile Ala Ser Ala Cys Asn Trp Ile Trp
485 490 495

Gly Phe Leu Ile Ser Phe Phe Thr Pro Phe Ile Thr Ser Ala Ile Asn
500 505 510

Phe Tyr Tyr Gly Tyr Val Phe Met Gly Cys Met Val Phe Ala Tyr Phe
515 520 525

Tyr Val Phe Phe Phe Val Pro Glu Thr Lys Gly Leu Thr Leu Glu Glu
530 535 540

[0264]

Val Asn Glu Met Tyr Glu Glu Asn Val Leu Pro Trp Lys Ser Thr Lys
545 550 555 560

Trp Ile Pro Pro Ser Arg Arg Thr Thr Asp Tyr Asp Leu Asp Ala Thr
565 570 575

Arg Asn Asp Pro Arg Pro Phe Tyr Lys Arg Met Phe Thr Lys Glu Lys
580 585 590

<210> 118
<211> 373
<212> PRT
<213> 酿酒酵母

<400> 118

Met Thr Gln Thr Asp Asn Pro Val Pro Asn Cys Gly Leu Leu Pro Glu
1 5 10 15

Gln Gln Tyr Cys Ser Ala Asp His Glu Glu Pro Leu Leu Leu His Glu
20 25 30

Glu Gln Leu Ile Phe Pro Asp His Ser Ser Gln Leu Ser Ser Ala Asp
35 40 45

Ile Ile Glu Pro Ile Lys Met Asn Ser Ser Thr Glu Ser Ile Ile Gly
50 55 60

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Thr Thr Leu Arg Lys Lys Trp Val Pro Leu Ser Ser Thr Gln Ile Thr
65                  70                  75                  80

Ala Leu Ser Gly Ala Phe Ala Gly Phe Leu Ser Gly Val Ala Val Cys
                85                  90                  95

Pro Leu Asp Val Ala Lys Thr Arg Leu Gln Ala Gln Gly Leu Gln Thr
            100                 105                 110

Arg Phe Glu Asn Pro Tyr Tyr Arg Gly Ile Met Gly Thr Leu Ser Thr
        115                 120                 125

Ile Val Arg Asp Glu Gly Pro Arg Gly Leu Tyr Lys Gly Leu Val Pro
    130                 135                 140

Ile Val Leu Gly Tyr Phe Pro Thr Trp Met Ile Tyr Phe Ser Val Tyr
145                 150                 155                 160

Glu Phe Ser Lys Lys Phe Phe His Gly Ile Phe Pro Gln Phe Asp Phe
                165                 170                 175

Val Ala Gln Ser Cys Ala Ala Ile Thr Ala Gly Ala Ala Ser Thr Thr
            180                 185                 190

Leu Thr Asn Pro Ile Trp Val Val Lys Thr Arg Leu Met Leu Gln Ser
        195                 200                 205
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[0265]

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Asn Leu Gly Glu His Pro Thr His Tyr Lys Gly Thr Phe Asp Ala Phe
    210                 215                 220

Arg Lys Leu Phe Tyr Gln Glu Gly Phe Lys Ala Leu Tyr Ala Gly Leu
225                 230                 235                 240

Val Pro Ser Leu Leu Gly Leu Phe His Val Ala Ile His Phe Pro Ile
                245                 250                 255

Tyr Glu Asp Leu Lys Val Arg Phe His Cys Tyr Ser Arg Glu Asn Asn
            260                 265                 270

Thr Asn Ser Ile Asn Leu Gln Arg Leu Ile Met Ala Ser Ser Val Ser
        275                 280                 285

Lys Met Ile Ala Ser Ala Val Thr Tyr Pro His Glu Ile Leu Arg Thr
    290                 295                 300

Arg Met Gln Leu Lys Ser Asp Ile Pro Asp Ser Ile Gln Arg Arg Leu
305                 310                 315                 320

Phe Pro Leu Ile Lys Ala Thr Tyr Ala Gln Glu Gly Leu Lys Gly Phe
                325                 330                 335

Tyr Ser Gly Phe Thr Thr Asn Leu Val Arg Thr Ile Pro Ala Ser Ala
            340                 345                 350
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Ile Thr Leu Val Ser Phe Glu Tyr Phe Arg Asn Arg Leu Glu Asn Ile
355 360 365

Ser Thr Met Val Ile
370

<210> 119
<211> 563
<212> PRT
<213> 酿酒酵母

<400> 119

Met Thr Lys Gln Gln Thr Ser Val Met Arg Asn Ala Ser Ile Ala Lys
1 5 10 15

Glu Glu Arg Glu Gly Ser Asp Asn Asn Asn Val Asp Arg Ser Ser Ser
20 25 30

Asp Ala Ile Ser Asp Asn Asp Ala Glu Arg Ser Asn Ser His Ser Glu
35 40 45

Ile Asp Asn Glu Ser Asn Phe Asp Met Val Pro Tyr Ser Arg Phe Ser
50 55 60

His Lys Gln Lys Met Leu Leu Val Val Gln Cys Ala Phe Thr Gly Phe
65 70 75 80

[0266]

Phe Ser Thr Val Ala Gly Ser Ile Tyr Tyr Pro Val Leu Thr Ile Ile
85 90 95

Glu Arg Lys Phe Asn Ile Thr Glu Glu Leu Ala Asn Val Thr Ile Val
100 105 110

Val Tyr Phe Ile Phe Gln Gly Val Ala Pro Ser Ile Met Gly Gly Leu
115 120 125

Ala Asp Thr Phe Gly Arg Arg Pro Ile Val Leu Trp Ala Ile Leu Ala
130 135 140

Tyr Phe Cys Ala Cys Ile Gly Leu Ala Cys Ala His Asn Tyr Ala Gln
145 150 155 160

Ile Leu Ala Leu Arg Cys Leu Gln Ala Ala Gly Ile Ser Pro Val Ile
165 170 175

Ala Ile Asn Ser Gly Ile Met Gly Asp Val Thr Thr Lys Val Glu Arg
180 185 190

Gly Gly Tyr Val Gly Leu Val Ala Gly Phe Gln Val Val Gly Thr Ala
195 200 205

Phe Gly Ala Leu Ile Gly Ala Gly Leu Ser Ser Lys Trp Gly Trp Arg
210 215 220

```
Ala Ile Phe Trp Phe Leu Ala Ile Gly Ser Gly Ile Cys Leu Val Phe
225                 230                 235                 240

Ser Thr Leu Leu Met Pro Glu Thr Lys Arg Thr Leu Val Gly Asn Gly
                245                 250                 255

Ser Val Thr Pro Arg Ser Phe Leu Asn Arg Ser Leu Ile Leu His Val
            260                 265                 270

Gly Ser Val Lys Lys Thr Leu His Leu Asp Asp Pro Asp Pro Glu Thr
        275                 280                 285

Leu Glu Pro Arg Thr Ser Val Asp Phe Leu Ala Pro Leu Lys Ile Leu
    290                 295                 300

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

Ser Thr Trp Thr Thr His Gln Thr Ala Leu Thr Ile Val Leu Ser Lys
                325                 330                 335

Lys Tyr Asn Leu Ser Val Ala Lys Ile Gly Leu Cys Phe Leu Pro Ala
            340                 345                 350

Gly Ile Ser Thr Leu Thr Ser Ile Ile Ser Ala Gly Arg Tyr Leu Asn
        355                 360                 365
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[0267]

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Trp Ser Tyr Arg Thr Arg Lys Val Lys Tyr Asn Arg Trp Ile Lys Glu
    370                 375                 380

Gln Glu Leu Gln Leu Met Glu Lys Tyr Lys Gly Asp Lys Asn Lys Val
385                 390                 395                 400

Ala Glu Leu Ile His Ser Asn Ser His Tyr Ala Phe Asn Leu Val Glu
                405                 410                 415

Ala Arg Leu His Pro Ala Phe Val Thr Leu Leu Leu Ser Ser Ile Gly
            420                 425                 430

Phe Thr Ala Phe Gly Trp Cys Ile Ser Val Lys Thr Pro Leu Ala Ala
        435                 440                 445

Val Leu Cys Thr Ser Ala Phe Ala Ser Leu Phe Ser Asn Cys Ile Leu
    450                 455                 460

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

Thr Ala Thr Gly Cys Leu Asn Leu Phe Arg Cys Leu Leu Ser Ala Ile
                485                 490                 495

Phe Ile Ala Ala Leu Thr Lys Met Val Glu Lys Met Arg Tyr Gly Gly
            500                 505                 510
```

Val Phe Thr Phe Leu Ser Ala Ile Thr Ser Ser Ser Ser Leu Leu Leu
515 520 525

Phe Tyr Leu Leu Lys Asn Gly Lys Gln Leu Ser Phe Asp Arg Ile Arg
530 535 540

Ala Asn Asp Lys Ser Ala Gly Arg Ser Val Gly Lys Asn Ser Glu Lys
545 550 555 560

Val Ser Thr

<210> 120
<211> 542
<212> PRT
<213> 酿酒酵母

<400> 120

Met Ala Gly Ala Thr Ser Ser Ile Ile Arg Glu Asn Asp Phe Glu Asp
1 5 10 15

Glu Leu Ala Glu Ser Met Gln Ser Tyr Asn Arg Glu Thr Ala Asp Lys
20 25 30

Leu Ala Leu Thr Arg Thr Glu Ser Val Lys Pro Glu Pro Glu Ile Thr
35 40 45

[0268]

Ala Pro Pro His Ser Arg Phe Ser Arg Ser Phe Lys Thr Val Leu Ile
50 55 60

Ala Gln Cys Ala Phe Thr Gly Phe Phe Ser Thr Ile Ala Gly Ala Ile
65 70 75 80

Tyr Tyr Pro Val Leu Ser Val Ile Glu Arg Lys Phe Asp Ile Asp Glu
85 90 95

Glu Leu Val Asn Val Thr Val Val Val Tyr Phe Val Phe Gln Gly Leu
100 105 110

Ala Pro Thr Phe Met Gly Gly Phe Ala Asp Ser Leu Gly Arg Arg Pro
115 120 125

Val Val Leu Val Ala Ile Val Ile Tyr Phe Gly Ala Cys Ile Gly Leu
130 135 140

Ala Cys Ala Gln Thr Tyr Ala Gln Ile Ile Val Leu Arg Cys Leu Gln
145 150 155 160

Ala Ala Gly Ile Ser Pro Val Ile Ala Ile Asn Ser Gly Ile Met Gly
165 170 175

Asp Val Thr Thr Arg Ala Glu Arg Gly Gly Tyr Val Gly Tyr Val Ala
180 185 190

Gly Phe Gln Val Leu Gly Ser Ala Phe Gly Ala Leu Ile Gly Ala Gly
195 200 205

Leu Ser Ser Arg Trp Gly Trp Arg Ala Ile Phe Trp Phe Leu Ala Ile
210 215 220

Gly Ser Gly Ile Cys Phe Leu Ala Ser Phe Leu Ile Leu Pro Glu Thr
225 230 235 240

Lys Arg Asn Ile Ser Gly Asn Gly Ser Val Thr Pro Lys Ser Tyr Leu
245 250 255

Asn Arg Ala Pro Ile Leu Val Leu Pro Thr Val Arg Lys Ser Leu His
260 265 270

Leu Asp Asn Pro Asp Tyr Glu Thr Leu Glu Leu Pro Thr Gln Leu Asn
275 280 285

Leu Leu Ala Pro Phe Lys Ile Leu Lys Ala Tyr Glu Ile Cys Ile Leu
290 295 300

Met Leu Val Ala Gly Leu Gln Phe Ala Met Tyr Thr Thr His Leu Thr
305 310 315 320

Ala Leu Ser Thr Ala Leu Ser Lys Gln Tyr His Leu Thr Val Ala Lys
325 330 335

[0269]

Val Gly Leu Cys Tyr Leu Pro Ser Gly Ile Cys Thr Leu Cys Ser Ile
340 345 350

Val Ile Ala Gly Arg Tyr Leu Asn Trp Asn Tyr Arg Arg Arg Leu Lys
355 360 365

Tyr Tyr Gln Asn Trp Leu Gly Lys Lys Arg Ser Lys Leu Leu Glu Glu
370 375 380

His Asp Asn Asp Leu Asn Leu Val Gln Arg Ile Ile Glu Asn Asp Pro
385 390 395 400

Lys Tyr Thr Phe Asn Ile Phe Lys Ala Arg Leu Gln Pro Ala Phe Val
405 410 415

Thr Leu Leu Leu Ser Ser Ser Gly Phe Cys Ala Tyr Gly Trp Cys Ile
420 425 430

Thr Val Lys Ala Pro Leu Ala Ala Val Leu Cys Met Ser Gly Phe Ala
435 440 445

Ser Leu Phe Ser Asn Cys Ile Leu Thr Phe Ser Thr Thr Leu Ile Val
450 455 460

Asp Leu Phe Pro Thr Lys Thr Ser Thr Ala Thr Gly Cys Leu Asn Leu

465 470 475 480

Phe Arg Cys Ile Leu Ser Ala Val Phe Ile Ala Ala Leu Ser Lys Met
485 490 495

Val Glu Lys Met Lys Phe Gly Gly Val Phe Thr Phe Leu Gly Ala Leu
500 505 510

Thr Ser Ser Ser Ser Ile Leu Leu Phe Ile Leu Leu Arg Lys Gly Lys
515 520 525

Glu Leu Ala Phe Lys Arg Lys Lys Gln Glu Leu Gly Val Asn
530 535 540

<210> 121
<211> 542
<212> PRT
<213> 酿酒酵母

<400> 121

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

Ser Val Ser Ala Glu Ser Leu Thr Ser Asp Ser Glu Ser Ile Ser His
20 25 30

[0270]

Asn Pro Phe Asp Asp Phe His Lys Ala Glu Arg Trp Arg Lys Val Tyr
35 40 45

Glu Ser Ser Gly Tyr Glu Gly Leu Ser Lys Phe Asp Pro Glu Phe Thr
50 55 60

Trp Thr Lys Asp Glu Glu Lys Lys Leu Val Arg Lys Met Asp Leu Lys
65 70 75 80

Ile Phe Leu Trp Val Phe Ile Met Phe Ala Phe Leu Asp Leu Ile Arg
85 90 95

Lys Asn Ile Ala Arg Ala Val Ser Asp Asn Phe Ile Val Asp Leu Lys
100 105 110

Met Asn Thr Asn Asp Tyr Asn Leu Gly Gln Thr Val Tyr Leu Val Ile
115 120 125

Phe Leu Ala Ser Glu Leu Pro Gly Asn Leu Leu Ser Lys Arg Phe Gly
130 135 140

Pro Glu Arg Val Ile Pro Val Gln Ile Val Leu Trp Ser Val Ile Cys
145 150 155 160

Ile Thr Gln Ala Gly Leu Lys Asn Arg Gly Gln Phe Ile Ala Thr Arg
165 170 175

Cys Leu Leu Gly Met Val Gln Gly Gly Phe Ile Pro Asp Asn Ile Leu

180 185 190

Tyr Leu Ser Tyr Tyr Tyr Thr Gly Ala Glu Leu Thr Phe Arg Leu Ser
195 200 205

Phe Phe Trp Cys Ala Ile Pro Leu Phe Gln Ile Leu Gly Ser Leu Leu
210 215 220

Ala Ser Gly Ile Ile Glu Met Arg Gly Ile His Asn Leu Ala Gly Trp
225 230 235 240

Gln Tyr Leu Phe Ile Ile Glu Gly Phe Leu Ser Leu Ser Val Gly Val
245 250 255

Ala Ser Phe Tyr Leu Met Arg Arg Gly Pro Thr Gln Thr Gly Glu Ser
260 265 270

Ala Phe His Lys Gly Lys Ser Leu Phe Thr Glu Tyr Glu Glu Lys Ile
275 280 285

Met Val Asn Arg Ile Leu Arg Asp Asp Pro Ser Lys Gly Asp Met Ser
290 295 300

Asn Arg Gln Pro Val Thr Phe Lys Glu Ile Leu Tyr Thr Leu Thr Glu
305 310 315 320

[0271]

Phe Asp Leu Trp Pro Leu Phe Ile Gln Gly Ile Thr Ala Phe Ile Ser
325 330 335

Leu Gln Thr Val Gly Ser Tyr Leu Ser Leu Ile Leu Lys Ser Leu Asn
340 345 350

Tyr Ser Thr Phe Leu Ser Asn Ile Leu Ala Ile Pro Gly Gln Ala Leu
355 360 365

Leu Leu Ile Asn Leu Pro Leu Ala Ala Leu Leu Ser Arg Lys Leu Lys
370 375 380

Glu Lys Ser Leu Cys Val Gly Ile Ala Asn Val Trp Val Leu Pro Phe
385 390 395 400

Ile Val Ser Leu Val Ala Leu Pro Thr Asp Thr Asn Pro Trp Ile Lys
405 410 415

Tyr Ile Leu Leu Thr Gly Ile Leu Gly Leu Pro Tyr Thr His Ser Ile
420 425 430

Leu Ala Gly Trp Val Ser Glu Ile Ser Asn Ser Val Arg Ser Arg Thr
435 440 445

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

Ala Ser Asn Met Tyr Arg Asn Asp Asp Lys Pro Tyr Tyr Thr Arg Gly
465 470 475 480

Asn Lys Ile Leu Leu Gly Phe Thr Cys Phe Asn Ile Cys Met Ala Val
485 490 495

Ala Thr Lys Phe Tyr Tyr Ile Ser Arg Asn Lys Tyr Lys Asp Arg Lys
500 505 510

Trp Asn Ser Met Thr Lys Glu Glu Gln Ile Asn Tyr Leu Asp Thr Thr
515 520 525

Lys Asp Lys Gly Met Lys Arg Leu Asp Tyr Arg Phe Ile His
530 535 540

<210> 122
<211> 314
<212> PRT
<213> 酿酒酵母

<400> 122

Met Val Glu Asn Ser Ser Ser Asn Asn Ser Thr Arg Pro Ile Pro Ala
1 5 10 15

Ile Pro Met Asp Leu Pro Asp Tyr Glu Ala Leu Pro Thr His Ala Pro
20 25 30

[0272]

Leu Tyr His Gln Leu Ile Ala Gly Ala Phe Ala Gly Ile Met Glu His
35 40 45

Ser Val Met Phe Pro Ile Asp Ala Leu Lys Thr Arg Ile Gln Ser Ala
50 55 60

Asn Ala Lys Ser Leu Ser Ala Lys Asn Met Leu Ser Gln Ile Ser His
65 70 75 80

Ile Ser Thr Ser Glu Gly Thr Leu Ala Leu Trp Lys Gly Val Gln Ser
85 90 95

Val Ile Leu Gly Ala Gly Pro Ala His Ala Val Tyr Phe Gly Thr Tyr
100 105 110

Glu Phe Cys Lys Lys Asn Leu Ile Asp Ser Ser Asp Thr Gln Thr His
115 120 125

His Pro Phe Lys Thr Ala Ile Ser Gly Ala Cys Ala Thr Thr Ala Ser
130 135 140

Asp Ala Leu Met Asn Pro Phe Asp Thr Ile Lys Gln Arg Ile Gln Leu
145 150 155 160

Asn Thr Ser Ala Ser Val Trp Gln Thr Thr Lys Gln Ile Tyr Gln Ser
165 170 175

```
Glu Gly Leu Ala Ala Phe Tyr Tyr Ser Tyr Pro Thr Thr Leu Val Met
            180                 185                 190

Asn Ile Pro Phe Ala Ala Phe Asn Phe Val Ile Tyr Glu Ser Ser Thr
        195                 200                 205

Lys Phe Leu Asn Pro Ser Asn Glu Tyr Asn Pro Leu Ile His Cys Leu
    210                 215                 220

Cys Gly Ser Ile Ser Gly Ser Thr Cys Ala Ala Ile Thr Thr Pro Leu
225                 230                 235                 240

Asp Cys Ile Lys Thr Val Leu Gln Ile Arg Gly Ser Gln Thr Val Ser
                245                 250                 255

Leu Glu Ile Met Arg Lys Ala Asp Thr Phe Ser Lys Ala Ala Ser Ala
            260                 265                 270

Ile Tyr Gln Val Tyr Gly Trp Lys Gly Phe Trp Arg Gly Trp Lys Pro
        275                 280                 285

Arg Ile Val Ala Asn Met Pro Ala Thr Ala Ile Ser Trp Thr Ala Tyr
    290                 295                 300

Glu Cys Ala Lys His Phe Leu Met Thr Tyr
305                 310
```

[0273]

<210> 123
<211> 567
<212> PRT
<213> 酿酒酵母

<400> 123

```
Met Ser Gly Val Asn Asn Thr Ser Ala Asn Asp Leu Ser Thr Thr Glu
1               5                   10                  15

Ser Asn Ser Asn Ser Val Ala Asn Ala Pro Ser Val Lys Thr Glu His
            20                  25                  30

Asn Asp Ser Lys Asn Ser Leu Asn Leu Asp Ala Thr Glu Pro Pro Ile
        35                  40                  45

Asp Leu Pro Gln Lys Pro Leu Ser Ala Tyr Thr Thr Val Ala Ile Leu
    50                  55                  60

Cys Leu Met Ile Ala Phe Gly Gly Phe Ile Phe Gly Trp Asp Thr Gly
65                  70                  75                  80

Thr Ile Ser Gly Phe Val Asn Leu Ser Asp Phe Ile Arg Arg Phe Gly
                85                  90                  95

Gln Lys Asn Asp Lys Gly Thr Tyr Tyr Leu Ser Lys Val Arg Met Gly
            100                 105                 110
```

```
Leu Ile Val Ser Ile Phe Asn Ile Gly Cys Ala Ile Gly Gly Ile Val
        115                 120                 125

Leu Ser Lys Val Gly Asp Ile Tyr Gly Arg Arg Ile Gly Leu Ile Thr
    130                 135                 140

Val Thr Ala Ile Tyr Val Val Gly Ile Leu Ile Gln Ile Thr Ser Ile
145                 150                 155                 160

Asn Lys Trp Tyr Gln Tyr Phe Ile Gly Arg Ile Ile Ser Gly Leu Gly
                165                 170                 175

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

Pro Lys Gln Ile Arg Gly Thr Leu Val Gln Leu Tyr Gln Leu Met Cys
        195                 200                 205

Thr Met Gly Ile Phe Leu Gly Tyr Cys Thr Asn Tyr Gly Thr Lys Asn
    210                 215                 220

Tyr His Asn Ala Thr Gln Trp Arg Val Gly Leu Gly Leu Cys Phe Ala
225                 230                 235                 240

Trp Thr Thr Phe Met Val Ser Gly Met Met Phe Val Pro Glu Ser Pro
                245                 250                 255
```

[0274]

```
Arg Tyr Leu Ile Glu Val Gly Lys Asp Glu Glu Ala Lys Arg Ser Leu
            260                 265                 270

Ser Lys Ser Asn Lys Val Ser Val Asp Asp Pro Ala Leu Leu Ala Glu
        275                 280                 285

Tyr Asp Thr Ile Lys Ala Gly Ile Glu Leu Glu Lys Leu Ala Gly Asn
    290                 295                 300

Ala Ser Trp Ser Glu Leu Leu Ser Thr Lys Thr Lys Val Phe Gln Arg
305                 310                 315                 320

Val Leu Met Gly Val Met Ile Gln Ser Leu Gln Gln Leu Thr Gly Asp
                325                 330                 335

Asn Tyr Phe Phe Tyr Tyr Gly Thr Thr Ile Phe Lys Ser Val Gly Leu
            340                 345                 350

Lys Asp Ser Phe Gln Thr Ser Ile Ile Ile Gly Val Val Asn Phe Phe
        355                 360                 365

Ser Ser Phe Ile Ala Val Tyr Thr Ile Glu Arg Phe Gly Arg Arg Thr
    370                 375                 380

Cys Leu Leu Trp Gly Ala Ala Ser Met Leu Cys Cys Phe Ala Val Phe
385                 390                 395                 400
```

Ala Ser Val Gly Val Thr Lys Leu Trp Pro Gln Gly Ser Ser His Gln
405 410 415

Asp Ile Thr Ser Gln Gly Ala Gly Asn Cys Met Ile Val Phe Thr Met
420 425 430

Phe Phe Ile Phe Ser Phe Ala Thr Thr Trp Ala Gly Gly Cys Tyr Val
435 440 445

Ile Val Ser Glu Thr Phe Pro Leu Arg Val Lys Ser Arg Gly Met Ala
450 455 460

Ile Ala Thr Ala Ala Asn Trp Met Trp Gly Phe Leu Ile Ser Phe Phe
465 470 475 480

Thr Pro Phe Ile Thr Gly Ala Ile Asn Phe Tyr Tyr Gly Tyr Val Phe
485 490 495

Leu Gly Cys Leu Val Phe Ala Tyr Phe Tyr Val Phe Phe Phe Val Pro
500 505 510

Glu Thr Lys Gly Leu Thr Leu Glu Glu Val Asn Thr Met Trp Leu Glu
515 520 525

Gly Val Pro Ala Trp Lys Ser Ala Ser Trp Val Pro Pro Glu Arg Arg
530 535 540

[0275]

Thr Ala Asp Tyr Asp Ala Asp Ala Ile Asp His Asp Asp Arg Pro Ile
545 550 555 560

Tyr Lys Arg Phe Phe Ser Ser
565

<210> 124
<211> 174
<212> PRT
<213> 酿酒酵母

<400> 124

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

Ile Ser Ser Leu Arg Ile Thr Gly Ser Thr Ala Thr Gln Leu Ser Ser
20 25 30

Phe Lys Lys Arg Asn Asp Glu Ala Arg Arg Gln Leu Leu Glu Leu Gln
35 40 45

Ser Gln Pro Thr Glu Val Asp Phe Ser His Tyr Arg Ser Val Leu Lys
50 55 60

Asn Thr Ser Val Ile Asp Lys Ile Glu Ser Tyr Val Lys Gln Tyr Lys
65 70 75 80

Pro Val Lys Ile Asp Ala Ser Lys Gln Leu Gln Val Ile Glu Ser Phe
85 90 95

Glu Lys His Ala Met Thr Asn Ala Lys Glu Thr Glu Ser Leu Val Ser
100 105 110

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

Arg Pro Phe Asp Glu Leu Thr Val Asp Asp Leu Thr Lys Ile Lys Pro
130 135 140

Glu Ile Asp Ala Lys Val Glu Glu Met Val Lys Lys Gly Lys Trp Asp
145 150 155 160

Val Pro Gly Tyr Lys Asp Arg Phe Gly Asn Leu Asn Val Met
165 170

<210> 125
<211> 922
<212> PRT
<213> 酿酒酵母

<400> 125

Met Ser Leu Ile Ser Ala Leu Gln Thr Thr Asp Val Glu Ser Val Gln
1 5 10 15

[0276]

Thr Ser Pro Glu Gln Ile Thr Glu Arg Lys Ala Val Arg Val Ser Thr
20 25 30

Leu Gln Glu Ser Leu His Ser Ser Glu Met His Arg Ala Ala Pro Glu
35 40 45

Thr Pro Arg Ser Ile Ser Asn Ser Val His Lys Leu Lys Thr Ile Tyr
50 55 60

Ser Thr Tyr Gln Gln Ser Gly Gln Pro Leu Ser Lys Glu Ala Ile Phe
65 70 75 80

Arg Ala Lys Gln Lys Tyr Gly Ile Leu Asn Thr Pro Ala Asn Tyr Lys
85 90 95

Thr Leu Gly Leu Gly Asp Ser Lys Ser Glu Ser Val Asp Leu Ala Ala
100 105 110

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

Thr Ala Ile Glu Gln Lys Ala Arg Gly Glu Ala Phe Lys Val Thr Phe
130 135 140

Ser Lys Ile Pro Leu Thr Pro Pro Glu Asp Val Pro Ile Thr Val Asn
145 150 155 160

Leu Gly Leu Lys Gly Arg Arg Asp Phe Leu Thr Arg Leu Ala Ala Gln
165 170 175

Lys Ala Leu Ala Phe Ser Pro Ser Leu Asp Asn Ser Met Lys Gly Thr
180 185 190

Ser Asp Ser Ser Ser Val Lys Lys Lys Arg Phe Ser Gly Ala Pro Ile
195 200 205

Gly Asn Glu Phe Asp Ala Asn Leu Val Asn Pro Gln His Pro Ala Gly
210 215 220

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

Ala Ile Ser Arg Val Asn Asp Arg Leu Tyr Pro Gln Lys Val Asn Phe
245 250 255

Lys Asn Gly Leu Gln Ser Ser Asp Gln Ser Gly Val Ser Lys Ala Asn
260 265 270

Lys Glu Val Phe Lys Lys Gly Thr Leu Glu Lys Leu Glu His Ser Ala
275 280 285

Glu Gln Phe Leu Glu Ser His Ala Gly Asn Glu Arg Gln Arg Leu Ser
290 295 300

[0277]

Asp Gln Gln Tyr Met Cys Ala Lys Gly Ala Ala Asp Ala Val Lys Asp
305 310 315 320

Leu Asp Pro Lys Thr Leu Glu Asp Pro Asp Phe Ala Ala Arg Glu Ala
325 330 335

Gln Lys Lys Leu Tyr Ile Lys Gln Val Ala Ser Pro Val Val Leu Asn
340 345 350

Glu Ala Gln Lys Leu Ala Asn Arg Lys Leu Gln Asp Ile Asp Ser Arg
355 360 365

Asp Thr Tyr Met Leu Leu Phe Gly Asn Gln Ala Tyr Asn Lys Leu Ala
370 375 380

Val Asn Ile Ala Leu Gln His Tyr Ser Val Lys Gln Glu Glu Lys Lys
385 390 395 400

Lys Ile Tyr Leu Gly Gly Gly Leu Trp Met Thr Pro Glu Glu Val Asn
405 410 415

Ala Val Ala Lys Lys Leu Ile Ser Pro Val Val Asn Glu Ile Asp Glu
420 425 430

Arg Ala Ser Arg Gln Arg Asp Val Asp Lys Asp Ile Glu Arg Arg Ser
435 440 445

```
Arg Val Leu Asp Gln Glu Tyr Glu Asp Gly Asn Ser Met Glu Arg Ala
    450                 455                 460

Lys Glu Gln Asn Asp Gly Gln Leu Leu Leu Ala Met Ala Ser Lys Gln
465                 470                 475                 480

Gln Gln Glu Lys Glu Ala Lys Lys Ala Glu Glu Gly Gln Arg Tyr Asp
                485                 490                 495

Gln Phe Val Gln Lys Met Asn Ile Lys Leu Gln Gln Lys Glu Lys Glu
            500                 505                 510

Leu Glu Asn Ala Arg Glu Asn Arg Glu Asn Leu Arg Asn Glu Leu Gln
        515                 520                 525

Glu Arg Leu Ser Lys Asn Leu Ser Gly Glu Asn Asp Glu Leu Asn Asp
    530                 535                 540

Trp Asn Asp Ala Cys Glu Arg Asp Leu Lys Asn Ser Ser Ile Glu His
545                 550                 555                 560

Tyr Tyr Ala Val Arg Ser His Phe Asp Asn Leu Gly Asn Ser Glu Arg
                565                 570                 575

Gly Tyr Asp Glu Leu Leu Glu Glu Arg Ser Lys Ile Gln Val Glu Ile
            580                 585                 590
```

[0278]

```
Glu Arg Leu Val Ala Ser Ile Ala Glu His Lys Thr Ala Ile His Gly
        595                 600                 605

Phe Gly Glu Thr Ala Asp Ala Gly Gly Ala Ile Pro Ala Val Gln Lys
    610                 615                 620

Gln Lys Ile Pro Thr Arg Lys Asp Leu Leu Asp Ala Thr Val Asn Asp
625                 630                 635                 640

Pro Leu Val Ile Ser Ala Glu Met Ala Lys Glu Glu Ala Glu Met Ala
                645                 650                 655

Thr Glu Glu Cys Met Leu Lys Glu Leu Gln Val Asp Glu Met Ile Ile
            660                 665                 670

Ile Arg Asn Ile Met Leu Arg Glu Cys Glu Lys Lys Leu Glu Glu Glu
        675                 680                 685

Lys Glu Thr Ala Lys Arg Ser Arg Arg Gly Thr Glu Glu Ser Lys Asn
    690                 695                 700

Asn Ser Asn Phe Ser Arg Asp Val Ile Met Ser Thr Pro Asp Asn Asn
705                 710                 715                 720

Glu Lys Val Thr Pro Ile Gly Lys Ser Ala Ser Pro Lys Asp Val Val
```

725 730 735

Lys Ser Arg Phe Leu Ser Thr Tyr Asn Thr Gly Lys Asp Ile Asp Ser
740 745 750

Ser Ala Ser Ala Arg Ser Ile Thr Gly Val Ser Gly Val Leu Asp Asp
755 760 765

Gly Pro Lys Thr Pro Thr Ser Asn Lys Glu Asn Glu Leu Ile Asp Asp
770 775 780

Glu Val Lys Ser Tyr Lys Val His Gln Ala Val Asp Gly Thr Gly Glu
785 790 795 800

Asp Ser Ile Ala Asn Lys Arg Asp Lys Ser Ser Arg Pro Ala Ala Asn
805 810 815

Ser Gly Gly Ser Ile Thr Ile Glu Gln Phe Leu Phe Asn Lys Asn Ala
820 825 830

Asp Lys Gln Gly Leu Ser Lys Thr Glu Ser Val Thr Met Lys Arg Glu
835 840 845

Pro Val Val Asp Gln Met Asp Ser Lys Lys Gly His Asp Phe Thr His
850 855 860

[0279] Cys Asn Asp Asn Gly Arg Arg Ser Phe Ser Gly Phe Ser Gln Gly Ser
865 870 875 880

Ile Glu Asn Asp Tyr Ser Asn Glu Val Thr Asp Asp Gln Asp Asp Gln
885 890 895

Glu Gly Ser Glu Ile Arg Val Arg Asp Ser Asn Asp Ser Asn Thr Ser
900 905 910

Pro Lys Glu Ser Phe Phe Lys Glu Val Ile
915 920

<210> 126
<211> 324
<212> PRT
<213> 酿酒酵母

<400> 126

Met Ser Ser Asp Asn Ser Lys Gln Asp Lys Gln Ile Glu Lys Thr Ala
1 5 10 15

Ala Gln Lys Ile Ser Lys Phe Gly Ser Phe Val Ala Gly Gly Leu Ala
20 25 30

Ala Cys Ile Ala Val Thr Val Thr Asn Pro Ile Glu Leu Ile Lys Ile
35 40 45

Arg Met Gln Leu Gln Gly Glu Met Ser Ala Ser Ala Ala Lys Val Tyr

```
     50                  55                  60

Lys Asn Pro Ile Gln Gly Met Ala Val Ile Phe Lys Asn Glu Gly Ile
65                  70                  75                  80

Lys Gly Leu Gln Lys Gly Leu Asn Ala Ala Tyr Ile Tyr Gln Ile Gly
                85                  90                  95

Leu Asn Gly Ser Arg Leu Gly Phe Tyr Glu Pro Ile Arg Ser Ser Leu
            100                 105                 110

Asn Gln Leu Phe Phe Pro Asp Gln Glu Pro His Lys Val Gln Ser Val
        115                 120                 125

Gly Val Asn Val Phe Ser Gly Ala Ala Ser Gly Ile Ile Gly Ala Val
    130                 135                 140

Ile Gly Ser Pro Leu Phe Leu Val Lys Thr Arg Leu Gln Ser Tyr Ser
145                 150                 155                 160

Glu Phe Ile Lys Ile Gly Glu Gln Thr His Tyr Thr Gly Val Trp Asn
                165                 170                 175

Gly Leu Val Thr Ile Phe Lys Thr Glu Gly Val Lys Gly Leu Phe Arg
            180                 185                 190
```

[0280]

```
Gly Ile Asp Ala Ala Ile Leu Arg Thr Gly Ala Gly Ser Ser Val Gln
        195                 200                 205

Leu Pro Ile Tyr Asn Thr Ala Lys Asn Ile Leu Val Lys Asn Asp Leu
    210                 215                 220

Met Lys Asp Gly Pro Ala Leu His Leu Thr Ala Ser Thr Ile Ser Gly
225                 230                 235                 240

Leu Gly Val Ala Val Val Met Asn Pro Trp Asp Val Ile Leu Thr Arg
                245                 250                 255

Ile Tyr Asn Gln Lys Gly Asp Leu Tyr Lys Gly Pro Ile Asp Cys Leu
            260                 265                 270

Val Lys Thr Val Arg Ile Glu Gly Val Thr Ala Leu Tyr Lys Gly Phe
        275                 280                 285

Ala Ala Gln Val Phe Arg Ile Ala Pro His Thr Ile Met Cys Leu Thr
    290                 295                 300

Phe Met Glu Gln Thr Met Lys Leu Val Tyr Ser Ile Glu Ser Arg Val
305                 310                 315                 320

Leu Gly His Asn
```

<210> 127
<211> 692
<212> PRT
<213> 酿酒酵母

<400> 127

Met Asn Gly Lys Glu Val Ser Ser Gly Ser Gly Arg Thr Gln Ser Asn
1 5 10 15

Asn Asn Lys Lys Asn Asn Asn Gly Gly Ser Thr Gly Ile Ser His Ala
20 25 30

Ser Gly Ser Pro Leu Thr Asp Gly Asn Gly Gly Asn Ser Asn Gly Asn
35 40 45

Ser Arg Ser Arg Ser Arg Ser Arg Lys Ser Ser Gly Thr Thr Gly Gly
50 55 60

Leu Leu Lys Lys Pro Pro Leu Leu Val Asn Asn Glu Ala Val His Ala
65 70 75 80

Ser Val Pro Asp Ala Ser His Thr Ser Cys Asn Asn Gly Thr Leu Glu
85 90 95

Val Ser Ile Asn Asn Pro Glu Pro His Val Val Asp Ala Val Ala Arg
100 105 110

[0281]

His Leu Ile Arg Asn Pro Ser Asn Ser Leu Gln Leu Gln Gly Gly Asp
115 120 125

Ile Thr Arg Asp Leu Tyr Lys Trp Thr Asn Asp His Pro Ser Ser Pro
130 135 140

Ser Gln Tyr Gln Tyr Pro Ser Gln Pro Ala Leu Ser Thr Ser Ile Pro
145 150 155 160

Ser Gln Ala Pro Ser Phe Ser Asn Arg Lys Arg Ser Met Ser Phe Ser
165 170 175

Ala Ala Ser Ile Ala Ser Ser Ser His Leu Asn Asn Asn Ser Glu Ala
180 185 190

Asn Gly Asn Pro Leu Ala Ala Ile Gly Leu Ala Pro Ala Pro Met Thr
195 200 205

His Glu Glu Ile Arg Ala Pro Gly Gly Phe Arg Arg Ser Phe Ile Ile
210 215 220

Gln Lys Arg Arg Lys His Asn Val Asp Ala Pro Ile Pro Asn Phe Phe
225 230 235 240

Thr Arg Asn Phe Ile Glu Phe Leu Thr Leu Tyr Gly His Phe Ala Gly
245 250 255

```
Glu Asp Leu Ser Glu Glu Glu Glu Glu Glu Glu Glu Thr Glu Glu Glu
            260                 265                 270

Pro Glu Glu Glu Ala Leu Glu Thr Glu Ser Thr Gln Leu Val Ser Arg
        275                 280                 285

Glu His Gly Arg His Pro His Lys Ser Ser Thr Val Lys Ala Val Leu
    290                 295                 300

Leu Leu Leu Lys Ser Phe Val Gly Thr Gly Val Leu Phe Leu Pro Lys
305                 310                 315                 320

Ala Phe His Asn Gly Gly Trp Gly Phe Ser Ala Leu Cys Leu Leu Ser
                325                 330                 335

Cys Ala Leu Ile Ser Tyr Gly Cys Phe Val Ser Leu Ile Thr Thr Lys
            340                 345                 350

Asp Lys Val Gly Val Asp Gly Tyr Gly Asp Met Gly Arg Ile Leu Tyr
        355                 360                 365

Gly Pro Lys Met Lys Phe Ala Ile Leu Ser Ser Ile Ala Leu Ser Gln
    370                 375                 380

Ile Gly Phe Ser Ala Ala Tyr Thr Val Phe Thr Ala Thr Asn Leu Gln
385                 390                 395                 400
```

[0282]

```
Val Phe Ser Glu Asn Phe Phe His Leu Lys Pro Gly Ser Ile Ser Leu
                405                 410                 415

Ala Thr Tyr Ile Phe Ala Gln Val Leu Ile Phe Val Pro Leu Ser Leu
            420                 425                 430

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

Phe Ile Leu Leu Gly Leu Val Tyr Val Tyr Val Tyr Ser Ile Tyr Tyr
    450                 455                 460

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

Ala Asp Trp Ser Leu Phe Ile Gly Thr Ala Ile Phe Thr Phe Glu Gly
                485                 490                 495

Ile Gly Leu Leu Ile Pro Ile Gln Glu Ser Met Lys His Pro Lys His
            500                 505                 510

Phe Arg Pro Ser Leu Ser Ala Val Met Cys Ile Val Ala Val Ile Phe
        515                 520                 525

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

Thr Val Val Leu Leu Asn Phe Pro Gln Asp Thr Ser Tyr Thr Leu Thr
545 550 555 560

Val Gln Leu Leu Tyr Ala Leu Ala Ile Leu Leu Ser Thr Pro Leu Gln
565 570 575

Leu Phe Pro Ala Ile Arg Ile Leu Glu Asn Trp Thr Phe Pro Ser Asn
580 585 590

Ala Ser Gly Lys Tyr Asn Pro Lys Val Lys Trp Leu Lys Asn Tyr Phe
595 600 605

Arg Cys Ala Ile Val Val Leu Thr Ser Ile Leu Ala Trp Val Gly Ala
610 615 620

Asn Asp Leu Asp Lys Phe Val Ser Leu Val Gly Ser Phe Ala Cys Ile
625 630 635 640

Pro Leu Ile Tyr Ile Tyr Pro Pro Leu Leu His Tyr Lys Ala Ser Ile
645 650 655

Leu Ser Gly Thr Ser Arg Ala Arg Leu Leu Leu Asp Leu Ile Val Ile
660 665 670

Val Phe Gly Val Ala Val Met Ala Tyr Thr Ser Trp Gln Thr Ile Lys
675 680 685

[0283]

Met Trp Ser Gln
690

<210> 128
<211> 1290
<212> PRT
<213> 酿酒酵母

<400> 128

Met Asn Phe Leu Ser Phe Lys Thr Thr Lys His Tyr His Ile Phe Arg
1 5 10 15

Tyr Val Asn Ile Arg Asn Asp Tyr Arg Leu Leu Met Ile Met Ile Ile
20 25 30

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

Gly Arg Val Phe Asp Leu Leu Ser Val Phe Val Ala Asn Gly Ser His
50 55 60

Gln Gly Leu Tyr Ser Gln Leu Val Gln Arg Ser Met Ala Val Met Ala
65 70 75 80

Leu Gly Ala Ala Ser Val Pro Val Met Trp Leu Ser Leu Thr Ser Trp
85 90 95

```
Met His Ile Gly Glu Arg Gln Gly Phe Arg Ile Arg Ser Gln Ile Leu
            100                 105                 110

Glu Ala Tyr Leu Glu Glu Lys Pro Met Glu Trp Tyr Asp Asn Asn Glu
        115                 120                 125

Lys Leu Leu Gly Asp Phe Thr Gln Ile Asn Arg Cys Val Glu Glu Leu
    130                 135                 140

Arg Ser Ser Ser Ala Glu Ala Ser Ala Ile Thr Phe Gln Asn Leu Val
145                 150                 155                 160

Ala Ile Cys Ala Leu Leu Gly Thr Ser Phe Tyr Tyr Ser Trp Ser Leu
                165                 170                 175

Thr Leu Ile Ile Leu Cys Ser Ser Pro Ile Ile Thr Phe Phe Ala Val
            180                 185                 190

Val Phe Ser Arg Met Ile His Val Tyr Ser Glu Lys Glu Asn Ser Glu
        195                 200                 205

Thr Ser Lys Ala Ala Gln Leu Leu Thr Trp Ser Met Asn Ala Ala Gln
    210                 215                 220

Leu Val Arg Leu Tyr Cys Thr Gln Arg Leu Glu Arg Lys Lys Phe Lys
225                 230                 235                 240
```

[0284]

```
Glu Ile Ile Leu Asn Cys Asn Thr Phe Phe Ile Lys Ser Cys Phe Phe
                245                 250                 255

Val Ala Ala Asn Ala Gly Ile Leu Arg Phe Leu Thr Leu Thr Met Phe
            260                 265                 270

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

Asn Ile Asn Asp Val Ile Thr Cys Phe His Ser Cys Ile Met Leu Gly
    290                 295                 300

Ser Thr Leu Asn Asn Thr Leu His Gln Ile Val Val Leu Gln Lys Gly
305                 310                 315                 320

Gly Val Ala Met Glu Lys Ile Met Thr Leu Leu Lys Asp Gly Ser Lys
                325                 330                 335

Arg Asn Pro Leu Asn Lys Thr Val Ala His Gln Phe Pro Leu Asp Tyr
            340                 345                 350

Ala Thr Ser Asp Leu Thr Phe Ala Asn Val Ser Phe Ser Tyr Pro Ser
        355                 360                 365

Arg Pro Ser Glu Ala Val Leu Lys Asn Val Ser Leu Asn Phe Ser Ala
    370                 375                 380
```

Gly Gln Phe Thr Phe Ile Val Gly Lys Ser Gly Ser Gly Lys Ser Thr
385 390 395 400

Leu Ser Asn Leu Leu Leu Arg Phe Tyr Asp Gly Tyr Asn Gly Ser Ile
405 410 415

Ser Ile Asn Gly His Asn Ile Gln Thr Ile Asp Gln Lys Leu Leu Ile
420 425 430

Glu Asn Ile Thr Val Val Glu Gln Arg Cys Thr Leu Phe Asn Asp Thr
435 440 445

Leu Arg Lys Asn Ile Leu Leu Gly Ser Thr Asp Ser Val Arg Asn Ala
450 455 460

Asp Cys Ser Thr Asn Glu Asn Arg His Leu Ile Lys Asp Ala Cys Gln
465 470 475 480

Met Ala Leu Leu Asp Arg Phe Ile Leu Asp Leu Pro Asp Gly Leu Glu
485 490 495

Thr Leu Ile Gly Thr Gly Gly Val Thr Leu Ser Gly Gly Gln Gln Gln
500 505 510

Arg Val Ala Ile Ala Arg Ala Phe Ile Arg Asp Thr Pro Ile Leu Phe
515 520 525

[0285]

Leu Asp Glu Ala Val Ser Ala Leu Asp Ile Val His Arg Asn Leu Leu
530 535 540

Met Lys Ala Ile Arg His Trp Arg Lys Gly Lys Thr Thr Ile Ile Leu
545 550 555 560

Thr His Glu Leu Ser Gln Ile Glu Ser Asp Asp Tyr Leu Tyr Leu Met
565 570 575

Lys Glu Gly Glu Val Val Glu Ser Gly Thr Gln Ser Glu Leu Leu Ala
580 585 590

Asp Pro Thr Thr Thr Phe Ser Thr Trp Tyr His Leu Gln Asn Asp Tyr
595 600 605

Ser Asp Ala Lys Thr Ile Val Asp Thr Glu Thr Glu Glu Lys Ser Ile
610 615 620

His Thr Val Glu Ser Phe Asn Ser Gln Leu Glu Thr Pro Lys Leu Gly
625 630 635 640

Ser Cys Leu Ser Asn Leu Gly Tyr Asp Glu Thr Asp Gln Leu Ser Phe
645 650 655

Tyr Glu Ala Ile Tyr Gln Lys Arg Ser Asn Val Arg Thr Arg Arg Val

660 665 670

Lys Val Glu Glu Glu Asn Ile Gly Tyr Ala Leu Lys Gln Gln Lys Asn
675 680 685

Thr Glu Ser Ser Thr Gly Pro Gln Leu Leu Ser Ile Ile Gln Ile Ile
690 695 700

Lys Arg Met Ile Lys Ser Ile Arg Tyr Lys Lys Ile Leu Ile Leu Gly
705 710 715 720

Leu Leu Cys Ser Leu Ile Ala Gly Ala Thr Asn Pro Val Phe Ser Tyr
725 730 735

Thr Phe Ser Phe Leu Leu Glu Gly Ile Val Pro Ser Thr Asp Gly Lys
740 745 750

Thr Gly Ser Ser His Tyr Leu Ala Lys Trp Ser Leu Leu Val Leu Gly
755 760 765

Val Ala Ala Ala Asp Gly Ile Phe Asn Phe Ala Lys Gly Phe Leu Leu
770 775 780

Asp Cys Cys Ser Glu Tyr Trp Val Met Asp Leu Arg Asn Glu Val Met
785 790 795 800

[0286]

Glu Lys Leu Thr Arg Lys Asn Met Asp Trp Phe Ser Gly Glu Asn Asn
805 810 815

Lys Ala Ser Glu Ile Ser Ala Leu Val Leu Asn Asp Leu Arg Asp Leu
820 825 830

Arg Ser Leu Val Ser Glu Phe Leu Ser Ala Met Thr Ser Phe Val Thr
835 840 845

Val Ser Thr Ile Gly Leu Ile Trp Ala Leu Val Ser Gly Trp Lys Leu
850 855 860

Ser Leu Val Cys Ile Ser Met Phe Pro Leu Ile Ile Ile Phe Ser Ala
865 870 875 880

Ile Tyr Gly Gly Ile Leu Gln Lys Cys Glu Thr Asp Tyr Lys Thr Ser
885 890 895

Val Ala Gln Leu Glu Asn Cys Leu Tyr Gln Ile Val Thr Asn Ile Lys
900 905 910

Thr Ile Lys Cys Leu Gln Ala Glu Phe His Phe Gln Leu Thr Tyr His
915 920 925

Asp Leu Lys Ile Lys Met Gln Gln Ile Ala Ser Lys Arg Ala Ile Ala
930 935 940

Thr Gly Phe Gly Ile Ser Met Thr Asn Met Ile Val Met Cys Ile Gln
945 950 955 960

Ala Ile Ile Tyr Tyr Tyr Gly Leu Lys Leu Val Met Ile His Glu Tyr
965 970 975

Thr Ser Lys Glu Met Phe Thr Thr Phe Thr Leu Leu Leu Phe Thr Ile
980 985 990

Met Ser Cys Thr Ser Leu Val Ser Gln Ile Pro Asp Ile Ser Arg Gly
995 1000 1005

Gln Arg Ala Ala Ser Trp Ile Tyr Arg Ile Leu Asp Glu Lys His
1010 1015 1020

Asn Thr Leu Glu Val Glu Asn Asn Asn Ala Arg Thr Val Gly Ile
1025 1030 1035

Ala Gly His Thr Tyr His Gly Lys Glu Lys Lys Pro Ile Val Ser
1040 1045 1050

Ile Gln Asn Leu Thr Phe Ala Tyr Pro Ser Ala Pro Thr Ala Phe
1055 1060 1065

Val Tyr Lys Asn Met Asn Phe Asp Met Phe Cys Gly Gln Thr Leu
1070 1075 1080

[0287]

Gly Ile Ile Gly Glu Ser Gly Thr Gly Lys Ser Thr Leu Val Leu
1085 1090 1095

Leu Leu Thr Lys Leu Tyr Asn Cys Glu Val Gly Lys Ile Lys Ile
1100 1105 1110

Asp Gly Thr Asp Val Asn Asp Trp Asn Leu Thr Ser Leu Arg Lys
1115 1120 1125

Glu Ile Ser Val Val Glu Gln Lys Pro Leu Leu Phe Asn Gly Thr
1130 1135 1140

Ile Arg Asp Asn Leu Thr Tyr Gly Leu Gln Asp Glu Ile Leu Glu
1145 1150 1155

Ile Glu Met Tyr Asp Ala Leu Lys Tyr Val Gly Ile His Asp Phe
1160 1165 1170

Val Ile Ser Ser Pro Gln Gly Leu Asp Thr Arg Ile Asp Thr Thr
1175 1180 1185

Leu Leu Ser Gly Gly Gln Ala Gln Arg Leu Cys Ile Ala Arg Ala
1190 1195 1200

Leu Leu Arg Lys Ser Lys Ile Leu Ile Leu Asp Glu Cys Thr Ser
1205 1210 1215

Ala Leu Asp Ser Val Ser Ser Ser Ile Ile Asn Glu Ile Val Lys
1220 1225 1230

Lys Gly Pro Pro Ala Leu Leu Thr Met Val Ile Thr His Ser Glu
1235 1240 1245

Gln Met Met Arg Ser Cys Asn Ser Ile Ala Val Leu Lys Asp Gly
1250 1255 1260

Lys Val Val Glu Arg Gly Asn Phe Asp Thr Leu Tyr Asn Asn Arg
1265 1270 1275

Gly Glu Leu Phe Gln Ile Val Ser Asn Gln Ser Ser
1280 1285 1290

<210> 129
<211> 602
<212> PRT
<213> 酿酒酵母

<400> 129

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

His Asn Gly Ile Thr Ile Asp Ser Glu Phe Leu Thr Gln Glu Pro Ile
20 25 30

[0288]

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

Gly Ser Lys Trp Gln Asp Phe Lys Asp Ser Phe Lys Arg Val Lys Pro
50 55 60

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

Thr Ala Gln Thr Pro Leu Lys His His Leu Lys Asn Arg His Leu Gln
85 90 95

Met Ile Ala Ile Gly Gly Ala Ile Gly Thr Gly Leu Leu Val Gly Ser
100 105 110

Gly Thr Ala Leu Arg Thr Gly Gly Pro Ala Ser Leu Leu Ile Gly Trp
115 120 125

Gly Ser Thr Gly Thr Met Ile Tyr Ala Met Val Met Ala Leu Gly Glu
130 135 140

Leu Ala Val Ile Phe Pro Ile Ser Gly Gly Phe Thr Thr Tyr Ala Thr
145 150 155 160

Arg Phe Ile Asp Glu Ser Phe Gly Tyr Ala Asn Asn Phe Asn Tyr Met
165 170 175

```
Leu Gln Trp Leu Val Val Leu Pro Leu Glu Ile Val Ser Ala Ser Ile
            180                 185                 190

Thr Val Asn Phe Trp Gly Thr Asp Pro Lys Tyr Arg Asp Gly Phe Val
        195                 200                 205

Ala Leu Phe Trp Leu Ala Ile Val Ile Ile Asn Met Phe Gly Val Lys
    210                 215                 220

Gly Tyr Gly Glu Ala Glu Phe Val Phe Ser Phe Ile Lys Val Ile Thr
225                 230                 235                 240

Val Val Gly Phe Ile Ile Leu Gly Ile Ile Leu Asn Cys Gly Gly Gly
                245                 250                 255

Pro Thr Gly Gly Tyr Ile Gly Gly Lys Tyr Trp His Asp Pro Gly Ala
            260                 265                 270

Phe Ala Gly Asp Thr Pro Gly Ala Lys Phe Lys Gly Val Cys Ser Val
        275                 280                 285

Phe Val Thr Ala Ala Phe Ser Phe Ala Gly Ser Glu Leu Val Gly Leu
    290                 295                 300

Ala Ala Ser Glu Ser Val Glu Pro Arg Lys Ser Val Pro Lys Ala Ala
305                 310                 315                 320
```

[0289]

```
Lys Gln Val Phe Trp Arg Ile Thr Leu Phe Tyr Ile Leu Ser Leu Leu
                325                 330                 335

Met Ile Gly Leu Leu Val Pro Tyr Asn Asp Lys Ser Leu Ile Gly Ala
            340                 345                 350

Ser Ser Val Asp Ala Ala Ala Ser Pro Phe Val Ile Ala Ile Lys Thr
        355                 360                 365

His Gly Ile Lys Gly Leu Pro Ser Val Val Asn Val Val Ile Leu Ile
    370                 375                 380

Ala Val Leu Ser Val Gly Asn Ser Ala Ile Tyr Ala Cys Ser Arg Thr
385                 390                 395                 400

Met Val Ala Leu Ala Glu Gln Arg Phe Leu Pro Glu Ile Phe Ser Tyr
                405                 410                 415

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

Phe Gly Leu Ile Ala Phe Val Ala Ala Ser Lys Lys Glu Gly Glu Val
        435                 440                 445

Phe Asn Trp Leu Leu Ala Leu Ser Gly Leu Ser Ser Leu Phe Thr Trp
    450                 455                 460
```

```
Gly Gly Ile Cys Ile Cys His Ile Arg Phe Arg Lys Ala Leu Ala Ala
465                 470                 475                 480

Gln Gly Arg Gly Leu Asp Glu Leu Ser Phe Lys Ser Pro Thr Gly Val
                485                 490                 495

Trp Gly Ser Tyr Trp Gly Leu Phe Met Val Ile Ile Met Phe Ile Ala
            500                 505                 510

Gln Phe Tyr Val Ala Val Phe Pro Val Gly Asp Ser Pro Ser Ala Glu
        515                 520                 525

Gly Phe Phe Glu Ala Tyr Leu Ser Phe Pro Leu Val Met Val Met Tyr
    530                 535                 540

Ile Gly His Lys Ile Tyr Lys Arg Asn Trp Lys Leu Phe Ile Pro Ala
545                 550                 555                 560

Glu Lys Met Asp Ile Asp Thr Gly Arg Arg Glu Val Asp Leu Asp Leu
                565                 570                 575

Leu Lys Gln Glu Ile Ala Glu Glu Lys Ala Ile Met Ala Thr Lys Pro
            580                 585                 590

Arg Trp Tyr Arg Ile Trp Asn Phe Trp Cys
        595                 600
```

[0290]

<210> 130
<211> 241
<212> PRT
<213> 酿酒酵母

<400> 130

```
Met Asn Met Gly Gly Ser Ser Ser Thr Ala Ala Lys Lys Ala Thr Cys
1               5                   10                  15

Lys Ile Ser Met Leu Trp Asn Trp Tyr Thr Ile Asp Thr Cys Phe Ile
            20                  25                  30

Ala Arg Ser Trp Arg Asn Asp Thr Lys Gly Lys Phe Ala Gly Ser Cys
        35                  40                  45

Ile Gly Cys Phe Ala Leu Val Val Val Ala Gln Trp Leu Thr Arg Phe
    50                  55                  60

Ser Arg Gln Phe Asp Val Glu Leu Leu Lys Arg Gln Lys Ile Lys His
65                  70                  75                  80

Leu Ala Ser Tyr Ser Pro Glu Glu Tyr Val Val Lys Cys Gly Glu Glu
                85                  90                  95

Asp Ala Lys Ser Asp Ile Glu Glu Leu Gln Gly Phe Tyr Asn Glu Pro
            100                 105                 110
```

Ser Trp Lys Thr Thr Leu Ile Ser Leu Gln Lys Ser Phe Ile Tyr Ser
115 120 125

Phe Tyr Val Trp Gly Pro Arg Arg Leu Asn Glu Pro Glu Asp Asp Leu
130 135 140

Leu Lys Lys Val Leu Ser Cys Cys Thr Leu Ile Thr Pro Val Asp Leu
145 150 155 160

Tyr Pro Thr Phe Leu Asp His Met Ile Arg Val Thr Ile Phe Val Leu
165 170 175

Gln Trp Gly Leu Ser Tyr Ile Ile Met Leu Leu Phe Met Tyr Tyr Asn
180 185 190

Gly Tyr Ile Ile Ile Ser Cys Leu Ile Gly Ala Ile Val Gly Arg Phe
195 200 205

Ile Phe Cys Tyr Glu Pro Leu Gly Ser Leu Gly Ala Asn Gly Ser Ala
210 215 220

Gln Gly Thr Val Ser Tyr Asp Lys Glu Ser Asp Asp Arg Lys Cys Cys
225 230 235 240

Leu

[0291]

<210> 131
<211> 442
<212> PRT
<213> 酿酒酵母

<400> 131

Met Asn Arg Thr Val Phe Leu Ala Phe Val Phe Gly Trp Tyr Phe Cys
1 5 10 15

Ser Ile Ala Leu Ser Ile Tyr Asn Arg Trp Met Phe Asp Pro Lys Asp
20 25 30

Gly Leu Gly Ile Gly Tyr Pro Val Leu Val Thr Thr Phe His Gln Ala
35 40 45

Thr Leu Trp Leu Leu Ser Gly Ile Tyr Ile Lys Leu Arg His Lys Pro
50 55 60

Val Lys Asn Val Leu Arg Lys Asn Asn Gly Phe Asn Trp Ser Phe Phe
65 70 75 80

Leu Lys Phe Leu Leu Pro Thr Ala Val Ala Ser Ala Gly Asp Ile Gly
85 90 95

Leu Ser Asn Val Ser Phe Gln Tyr Val Pro Leu Thr Ile Tyr Thr Ile
100 105 110

Ile Lys Ser Ser Ser Ile Ala Phe Val Leu Leu Phe Gly Cys Ile Phe
115 120 125

Lys Leu Glu Lys Phe His Trp Lys Leu Ala Leu Ser Val Ile Ile Met
130 135 140

Phe Val Gly Val Ala Leu Met Val Phe Lys Pro Ser Asp Ser Thr Ser
145 150 155 160

Thr Lys Asn Asp Gln Ala Leu Val Ile Phe Gly Ser Phe Leu Val Leu
165 170 175

Ala Ser Ser Cys Leu Ser Gly Leu Arg Trp Val Tyr Thr Gln Leu Met
180 185 190

Leu Arg Asn Asn Pro Ile Gln Thr Asn Thr Ala Ala Ala Val Glu Glu
195 200 205

Ser Asp Gly Ala Leu Phe Thr Glu Asn Glu Asp Asn Val Asp Asn Glu
210 215 220

Pro Val Val Asn Leu Ala Asn Asn Lys Met Leu Glu Asn Phe Gly Glu
225 230 235 240

Ser Lys Pro His Pro Ile His Thr Ile His Gln Leu Ala Pro Ile Met
245 250 255

[0292]

Gly Ile Thr Leu Leu Leu Thr Ser Leu Leu Val Glu Lys Pro Phe Pro
260 265 270

Gly Ile Phe Ser Ser Ser Ile Phe Arg Leu Asp Thr Ser Asn Gly Gly
275 280 285

Val Gly Thr Glu Thr Thr Val Leu Ser Ile Val Arg Gly Ile Val Leu
290 295 300

Leu Ile Leu Pro Gly Phe Ala Val Phe Leu Leu Thr Ile Cys Glu Phe
305 310 315 320

Ser Ile Leu Glu Gln Thr Pro Val Leu Thr Val Ser Ile Val Gly Ile
325 330 335

Val Lys Glu Leu Leu Thr Val Ile Phe Gly Ile Ile Ile Leu Ser Glu
340 345 350

Arg Leu Ser Gly Phe Tyr Asn Trp Leu Gly Met Leu Ile Ile Met Ala
355 360 365

Asp Val Cys Tyr Tyr Asn Tyr Phe Arg Tyr Lys Gln Asp Leu Leu Gln
370 375 380

Lys Tyr His Ser Val Ser Thr Gln Asp Asn Arg Asn Glu Leu Lys Gly

385 390 395 400

Phe Gln Asp Phe Glu Gln Leu Gly Ser Lys Lys Ile Ala Pro Tyr Ser
405 410 415

Ile Ser Val Asp Leu Thr Asn Gln Glu Tyr Glu Leu Asp Met Ile Ala
420 425 430

Gln Asn Val Ser Arg Ser Ser Gln Gln Val
435 440

<210> 132
<211> 368
<212> PRT
<213> 酿酒酵母

<400> 132

Met Asn Ser Trp Asn Leu Ser Ser Ser Ile Pro Ile Ile His Thr Pro
1 5 10 15

His Asp His Pro Pro Thr Ser Glu Gly Thr Pro Asp Gln Pro Asn Asn
20 25 30

Asn Arg Lys Asp Asp Lys Leu His Lys Lys Arg Gly Asp Ser Asp Glu
35 40 45

[0293] Asp Leu Ser Pro Ile Trp His Cys Val Val Ser Gly Gly Ile Gly Gly
50 55 60

Lys Ile Gly Asp Ser Ala Met His Ser Leu Asp Thr Val Lys Thr Arg
65 70 75 80

Gln Gln Gly Ala Pro Asn Val Lys Lys Tyr Arg Asn Met Ile Ser Ala
85 90 95

Tyr Arg Thr Ile Trp Leu Glu Glu Gly Val Arg Arg Gly Leu Tyr Gly
100 105 110

Gly Tyr Met Ala Ala Met Leu Gly Ser Phe Pro Ser Ala Ala Ile Phe
115 120 125

Phe Gly Thr Tyr Glu Tyr Thr Lys Arg Thr Met Ile Glu Asp Trp Gln
130 135 140

Ile Asn Asp Thr Ile Thr His Leu Ser Ala Gly Phe Leu Gly Asp Phe
145 150 155 160

Ile Ser Ser Phe Val Tyr Val Pro Ser Glu Val Leu Lys Thr Arg Leu
165 170 175

Gln Leu Gln Gly Arg Phe Asn Asn Pro Phe Phe Gln Ser Gly Tyr Asn
180 185 190

Tyr Ser Asn Leu Arg Asn Ala Ile Lys Thr Val Ile Lys Glu Glu Gly

195 200 205

Phe Arg Ser Leu Phe Phe Gly Tyr Lys Ala Thr Leu Ala Arg Asp Leu
210 215 220

Pro Phe Ser Ala Leu Gln Phe Ala Phe Tyr Glu Lys Phe Arg Gln Leu
225 230 235 240

Ala Phe Lys Ile Glu Gln Lys Asp Gly Arg Asp Gly Glu Leu Ser Ile
245 250 255

Pro Asn Glu Ile Leu Thr Gly Ala Cys Ala Gly Gly Leu Ala Gly Ile
260 265 270

Ile Thr Thr Pro Met Asp Val Val Lys Thr Arg Val Gln Thr Gln Gln
275 280 285

Pro Pro Ser Gln Ser Asn Lys Ser Tyr Ser Val Thr His Pro His Val
290 295 300

Thr Asn Gly Arg Pro Ala Ala Leu Ser Asn Ser Ile Ser Leu Ser Leu
305 310 315 320

Arg Thr Val Tyr Gln Ser Glu Gly Val Leu Gly Phe Phe Ser Gly Val
325 330 335

[0294] Gly Pro Arg Phe Val Trp Thr Ser Val Gln Ser Ser Ile Met Leu Leu
340 345 350

Leu Tyr Gln Met Thr Leu Arg Gly Leu Ser Asn Ala Phe Pro Thr Asp
355 360 365

<210> 133
<211> 540
<212> PRT
<213> 酿酒酵母

<400> 133

Met Phe Ser Ile Phe Lys Lys Lys Thr Ser Val Gln Gly Thr Asp Ser
1 5 10 15

Glu Ile Asp Glu Lys Ile Thr Val Lys Ala Lys Asp Lys Val Val Val
20 25 30

Ser Thr Glu Asp Glu Glu Val Thr Thr Ile Val Ser Ser Thr Lys Ser
35 40 45

Thr Gln Val Thr Asn Asp Ser Pro Trp Gln Asp Pro Thr Tyr Phe Ser
50 55 60

Ser Phe Gly Lys Glu Leu Met Phe Ile Ala Thr Cys Met Leu Ala Gln
65 70 75 80

Leu Leu Asn Gln Ala Gly Gln Thr His Ala Leu Cys Ile Met Asn Val

85 90 95

Leu Ser Lys Ser Phe Asn Ser Glu Ala Asn Asn Gln Ala Trp Leu Met
100 105 110

Ala Ser Phe Pro Leu Ala Ala Gly Ser Phe Ile Leu Ile Ser Gly Arg
115 120 125

Leu Gly Asp Ile Tyr Gly Leu Lys Lys Met Leu Ile Val Gly Tyr Val
130 135 140

Ile Val Ile Val Trp Ser Ile Ile Ser Gly Leu Ser Lys Tyr Ser Asn
145 150 155 160

Ser Asp Ala Phe Phe Ile Thr Ser Arg Ala Phe Gln Gly Val Gly Ile
165 170 175

Ala Phe Ile Leu Pro Asn Ile Met Gly Leu Val Gly His Val Tyr Lys
180 185 190

Val Gly Ser Phe Arg Lys Asn Ile Val Ile Ser Phe Ile Gly Ala Cys
195 200 205

Ala Pro Thr Gly Gly Met Phe Gly Gly Leu Phe Gly Gly Leu Ile Val
210 215 220

[0295]

Thr Glu Asp Pro Asn Gln Trp Pro Trp Val Phe Tyr Ala Phe Gly Ile
225 230 235 240

Ala Thr Phe Leu Ser Leu Leu Met Ala Trp Tyr Ser Ile Pro Asn Asn
245 250 255

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

Leu Ala Ile Ile Gly Leu Ile Leu Phe Asn Phe Val Trp Asn Gln Ala
275 280 285

Pro Ile Val Gly Trp Asp Lys Pro Tyr Ile Ile Val Leu Leu Ile Ile
290 295 300

Ser Val Ile Phe Leu Val Ala Phe Phe Val Tyr Glu Ser Lys Tyr Ala
305 310 315 320

Glu Val Pro Leu Leu Pro Arg Ala Met Thr Lys Asn Arg His Met Ile
325 330 335

Met Ile Leu Leu Ala Val Phe Leu Gly Trp Gly Ser Phe Gly Ile Trp
340 345 350

Thr Phe Tyr Tyr Val Ser Phe Gln Leu Asn Leu Arg His Tyr Ser Pro
355 360 365

Val Trp Thr Gly Gly Thr Tyr Phe Val Phe Val Ile Phe Gly Ser Met
370 375 380

Ala Ala Phe Phe Val Ala Phe Ser Ile Lys Arg Leu Gly Pro Ala Leu
385 390 395 400

Leu Leu Cys Phe Ser Leu Met Ala Phe Asp Ala Gly Ser Ile Met Phe
405 410 415

Ser Val Leu Pro Val Glu Gln Ser Tyr Trp Lys Leu Asn Phe Ala Met
420 425 430

Gln Ala Ile Leu Cys Phe Gly Met Asp Leu Ser Phe Pro Ala Ser Ser
435 440 445

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

Ser Leu Val Asn Thr Val Ile Asn Tyr Ser Ala Ser Leu Cys Leu Gly
465 470 475 480

Met Gly Gly Thr Val Glu His Gln Ile Asn Lys Ser Gly Asn Asp Leu
485 490 495

Leu Lys Gly Tyr Arg Ala Ala Val Tyr Leu Gly Val Gly Leu Ala Ser
500 505 510

[0296]

Leu Gly Val Val Ile Ser Val Thr Tyr Met Leu Glu Asn Leu Trp Asn
515 520 525

Arg His Arg Lys Ser Glu Asp Arg Ser Leu Glu Ala
530 535 540

<210> 134
<211> 284
<212> PRT
<213> 酿酒酵母

<400> 134

Met Asn Thr Phe Phe Leu Ser Leu Leu Ser Gly Ala Ala Ala Gly Thr
1 5 10 15

Ser Thr Asp Leu Val Phe Phe Pro Ile Asp Thr Ile Lys Thr Arg Leu
20 25 30

Gln Ala Lys Gly Gly Phe Phe Ala Asn Gly Gly Tyr Lys Gly Ile Tyr
35 40 45

Arg Gly Leu Gly Ser Ala Val Val Ala Ser Ala Pro Gly Ala Ser Leu
50 55 60

Phe Phe Ile Ser Tyr Asp Tyr Met Lys Val Lys Ser Arg Pro Tyr Ile
65 70 75 80

Ser Lys Leu Tyr Ser Gln Gly Ser Glu Gln Leu Ile Asp Thr Thr Thr
85 90 95

His Met Leu Ser Ser Ser Ile Gly Glu Ile Cys Ala Cys Leu Val Arg
100 105 110

Val Pro Ala Glu Val Val Lys Gln Arg Thr Gln Val His Ser Thr Asn
115 120 125

Ser Ser Trp Gln Thr Leu Gln Ser Ile Leu Arg Asn Asp Asn Lys Glu
130 135 140

Gly Leu Arg Lys Asn Leu Tyr Arg Gly Trp Ser Thr Thr Ile Met Arg
145 150 155 160

Glu Ile Pro Phe Thr Cys Ile Gln Phe Pro Leu Tyr Glu Tyr Leu Lys
165 170 175

Lys Thr Trp Ala Lys Ala Asn Gly Gln Ser Gln Val Glu Pro Trp Lys
180 185 190

Gly Ala Ile Cys Gly Ser Ile Ala Gly Gly Ile Ala Ala Ala Thr Thr
195 200 205

Thr Pro Leu Asp Phe Leu Lys Thr Arg Leu Met Leu Asn Lys Thr Thr
210 215 220

[0297]

Ala Ser Leu Gly Ser Val Ile Ile Arg Ile Tyr Arg Glu Glu Gly Pro
225 230 235 240

Ala Val Phe Phe Ser Gly Val Gly Pro Arg Thr Met Trp Ile Ser Ala
245 250 255

Gly Gly Ala Ile Phe Leu Gly Met Tyr Glu Thr Val His Ser Leu Leu
260 265 270

Ser Lys Ser Phe Pro Thr Ala Gly Glu Met Arg Ala
275 280

<210> 135
<211> 611
<212> PRT
<213> 酿酒酵母

<400> 135

Met Gly Arg Phe Ser Asn Ile Ile Thr Ser Asn Lys Trp Asp Glu Lys
1 5 10 15

Gln Asn Asn Ile Gly Glu Gln Ser Met Gln Glu Leu Pro Glu Asp Gln
20 25 30

Ile Glu His Glu Met Glu Ala Ile Asp Pro Ser Asn Lys Thr Thr Pro
35 40 45

```
Tyr Ser Ile Asp Glu Lys Gln Tyr Asn Thr Lys Lys Lys His Gly Ser
    50                  55                  60

Leu Gln Gly Gly Ala Ile Ala Asp Val Asn Ser Ile Thr Asn Ser Leu
65                  70                  75                  80

Thr Arg Leu Gln Val Val Ser His Glu Thr Asp Ile Asn Glu Asp Glu
                85                  90                  95

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

Arg His Ile Gly Met Ile Ala Leu Gly Gly Thr Ile Gly Thr Gly Leu
        115                 120                 125

Phe Val Gly Ile Ser Thr Pro Leu Ser Asn Ala Gly Pro Val Gly Ser
    130                 135                 140

Leu Ile Ala Tyr Ile Phe Met Gly Thr Ile Val Tyr Phe Val Thr Gln
145                 150                 155                 160

Ser Leu Gly Glu Met Ala Thr Phe Ile Pro Val Thr Ser Ser Ile Thr
                165                 170                 175

Val Phe Ser Lys Arg Phe Leu Ser Pro Ala Phe Gly Val Ser Asn Gly
            180                 185                 190
```

[0298]

```
Tyr Met Tyr Trp Phe Asn Trp Ala Ile Thr Tyr Ala Val Glu Val Ser
        195                 200                 205

Val Ile Gly Gln Val Ile Glu Tyr Trp Thr Asp Lys Val Pro Leu Ala
    210                 215                 220

Ala Trp Ile Ala Ile Phe Trp Val Ile Ile Thr Leu Met Asn Phe Phe
225                 230                 235                 240

Pro Val Lys Val Tyr Gly Glu Phe Glu Phe Trp Val Ala Ser Val Lys
                245                 250                 255

Val Leu Ala Ile Met Gly Tyr Leu Ile Tyr Ala Leu Ile Ile Val Cys
            260                 265                 270

Gly Gly Ser His Gln Gly Pro Ile Gly Phe Arg Tyr Trp Arg Asn Pro
        275                 280                 285

Gly Ala Trp Gly Pro Gly Ile Ile Ser Ser Asp Lys Ser Glu Gly Arg
    290                 295                 300

Phe Leu Gly Trp Val Ser Ser Leu Ile Asn Ala Ala Phe Thr Tyr Gln
305                 310                 315                 320

Gly Thr Glu Leu Val Gly Ile Thr Ala Gly Glu Ala Ala Asn Pro Arg
                325                 330                 335
```

Lys Thr Val Pro Arg Ala Ile Asn Lys Val Val Phe Arg Ile Val Leu
340 345 350

Phe Tyr Ile Met Ser Leu Phe Phe Ile Gly Leu Leu Val Pro Tyr Asn
355 360 365

Asp Ser Arg Leu Ser Ala Ser Ser Ala Val Ile Ala Ser Ser Pro Phe
370 375 380

Val Ile Ser Ile Gln Asn Ala Gly Thr Tyr Ala Leu Pro Asp Ile Phe
385 390 395 400

Asn Ala Val Val Leu Ile Thr Val Val Ser Ala Ala Asn Ser Asn Val
405 410 415

Tyr Val Gly Ser Arg Val Leu Tyr Ser Leu Ala Arg Thr Gly Asn Ala
420 425 430

Pro Lys Gln Phe Gly Tyr Val Thr Arg Gln Gly Val Pro Tyr Leu Gly
435 440 445

Val Val Cys Thr Ala Ala Leu Gly Leu Leu Ala Phe Leu Val Val Asn
450 455 460

Asn Asn Ala Asn Thr Ala Phe Asn Trp Leu Ile Asn Ile Ser Thr Leu
465 470 475 480

[0299]

Ala Gly Leu Cys Ala Trp Leu Phe Ile Ser Leu Ala His Ile Arg Phe
485 490 495

Met Gln Ala Leu Lys His Arg Gly Ile Ser Arg Asp Asp Leu Pro Phe
500 505 510

Lys Ala Lys Leu Met Pro Tyr Gly Ala Tyr Tyr Ala Ala Phe Phe Val
515 520 525

Thr Val Ile Ile Phe Ile Gln Gly Phe Gln Ala Phe Cys Pro Phe Lys
530 535 540

Val Ser Glu Phe Phe Thr Ser Tyr Ile Ser Leu Ile Leu Leu Ala Val
545 550 555 560

Val Phe Ile Gly Cys Gln Ile Tyr Tyr Lys Cys Arg Phe Ile Trp Lys
565 570 575

Leu Glu Asp Ile Asp Ile Asp Ser Asp Arg Arg Glu Ile Glu Ala Ile
580 585 590

Ile Trp Glu Asp Asp Glu Pro Lys Asn Leu Trp Glu Lys Phe Trp Ala
595 600 605

Ala Val Ala
610

<210> 136
<211> 586
<212> PRT
<213> 酿酒酵母

<400> 136

Met Asp Lys Tyr Thr Asn Arg Asp His Pro Asp Tyr Ile Pro Gly Thr
1 5 10 15

Phe Asn Ile Tyr Ser Ser Gln Asn Leu Glu Asn Gly Ile Ile Tyr Glu
20 25 30

Ser Lys Leu Lys Lys Thr Ser Ser Gly Val Val Leu Ile Pro Gln Pro
35 40 45

Ser Tyr Ser Pro Asn Asp Pro Leu Asn Trp Ser Ser Trp Arg Lys Leu
50 55 60

Ala His Phe Gly Leu Met Ala Phe Ile Thr Ala Phe Thr Ala Ala Thr
65 70 75 80

Ser Asn Asp Ala Gly Ala Ala Gln Asp Ser Leu Asn Glu Ile Tyr Gly
85 90 95

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

[0300]

Ile Gly Trp Ser Thr Leu Phe Leu Ala Pro Phe Ala Asn Leu Tyr Gly
115 120 125

Arg Lys Ile Thr Tyr Ile Val Cys Thr Thr Leu Gly Leu Phe Gly Ala
130 135 140

Leu Trp Phe Ala Leu Ala Lys Arg Thr Ser Asp Thr Ile Trp Ser Gln
145 150 155 160

Leu Phe Val Gly Ile Ser Glu Ser Cys Ala Glu Ala Gln Val Gln Leu
165 170 175

Ser Leu Ser Asp Ile Phe Phe Gln His Gln Leu Gly Ser Val Leu Thr
180 185 190

Val Tyr Ile Met Cys Thr Ser Ile Gly Thr Phe Leu Gly Pro Leu Ile
195 200 205

Ala Gly Tyr Ile Ser Ala Phe Thr Asn Phe Arg Trp Val Gly Trp Val
210 215 220

Ala Val Ile Ile Ser Gly Gly Leu Leu Ile Thr Ile Ile Phe Gly Cys
225 230 235 240

Glu Glu Thr Tyr Phe Asp Arg Gly Gln Tyr Met Thr Pro Leu Thr Ser
245 250 255

```
Cys Gln Ser Gly Tyr Glu Asp Gly Thr Thr Leu Gln Asn Ser Asp Asn
            260                 265                 270

Thr Ala Val Ser Arg Arg Lys Arg His Leu Asp Ala Lys Leu Ser Thr
        275                 280                 285

Pro Gly Ala Met Gly Glu Lys Gly Val Asp Leu Ser Glu Thr Ala Glu
    290                 295                 300

Phe Glu Val Asn Asn Glu Glu Glu Val Thr Ile Pro Glu Thr Arg Glu
305                 310                 315                 320

Leu Ile Asp Gly Ser Lys Glu His Leu Lys Pro Tyr Pro Lys Arg Val
                325                 330                 335

Ala Ile Leu Thr Lys Ala Thr Asn Leu Lys Gly Tyr Gly Phe Lys Gln
            340                 345                 350

Tyr Phe Lys Tyr Leu Lys Ile Asn Leu Arg Met Phe Leu Phe Pro Pro
        355                 360                 365

Val Trp Leu Ser Gly Met Phe Trp Gly Ile Gln Asp Val Phe Leu Thr
    370                 375                 380

Phe Tyr Leu Thr Thr Gln Glu Ser Ala Tyr Tyr Glu Pro Pro Trp Asn
385                 390                 395                 400
```

[0301]

```
Tyr Ser Asp Phe Gly Val Ala Ile Met Asn Val Pro Thr Leu Ile Gly
                405                 410                 415

Ala Val Ile Gly Cys Ile Cys Ala Gly Ile Val Ser Asp Tyr Phe Val
            420                 425                 430

Leu Trp Met Ala Arg His Asn Arg Gly Ile Leu Glu Ala Glu Phe Arg
        435                 440                 445

Leu Tyr Phe Ser Ile Ala Thr Ala Ile Ile Gly Pro Ala Gly Leu Leu
    450                 455                 460

Met Phe Gly Ile Gly Thr Ala Arg Gln Trp Pro Trp Gln Ala Ile Tyr
465                 470                 475                 480

Val Gly Leu Gly Phe Val Gly Phe Ala Trp Gly Cys Ser Gly Asp Ile
                485                 490                 495

Ala Met Ala Tyr Leu Met Asp Cys Tyr Pro Asp Met Val Leu Glu Gly
            500                 505                 510

Met Val Cys Thr Ala Ile Ile Asn Asn Thr Ile Ser Cys Ile Phe Thr
        515                 520                 525

Phe Thr Cys Ser Asp Trp Leu Ala Ala Ser Gly Thr Glu Asn Thr Tyr
```

530 535 540

Ile Ala Leu Ala Val Ile Asn Phe Gly Ile Thr Ala Phe Ala Leu Pro
545 550 555 560

Met Tyr Tyr Tyr Gly Lys Arg Ile Arg Leu Trp Thr Lys Arg Trp Tyr
565 570 575

Leu Gln Ser Val Asn Leu Arg Asp Gly Val
580 585

<210> 137
<211> 606
<212> PRT
<213> 酿酒酵母

<400> 137

Met Leu Glu Thr Asp His Ser Arg Asn Asp Asn Leu Asp Asp Lys Ser
1 5 10 15

Thr Val Cys Tyr Ser Glu Lys Thr Asp Ser Asn Val Glu Lys Ser Thr
20 25 30

Thr Ser Gly Leu Arg Arg Ile Asp Ala Val Asn Lys Val Leu Ser Asp
35 40 45

[0302] Tyr Ser Ser Phe Thr Ala Phe Gly Val Thr Phe Ser Ser Leu Lys Thr
50 55 60

Ala Leu Leu Val Ala Leu Phe Leu Gln Gly Tyr Cys Thr Gly Leu Gly
65 70 75 80

Gly Gln Ile Ser Gln Ser Ile Gln Thr Tyr Ala Ala Asn Ser Phe Gly
85 90 95

Lys His Ser Gln Val Gly Ser Ile Asn Thr Val Lys Ser Ile Val Ala
100 105 110

Ser Val Val Ala Val Pro Tyr Ala Arg Ile Ser Asp Arg Phe Gly Arg
115 120 125

Ile Glu Cys Trp Ile Phe Ala Leu Val Leu Tyr Thr Ile Gly Glu Ile
130 135 140

Ile Ser Ala Ala Thr Pro Thr Phe Ser Gly Leu Phe Ala Gly Ile Val
145 150 155 160

Ile Gln Gln Phe Gly Tyr Ser Gly Phe Arg Leu Leu Ala Thr Ala Leu
165 170 175

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

Phe Leu Ile Pro Val Ile Ile Asn Thr Trp Val Ser Gly Asn Ile Val

195 200 205

Ser Ser Val Ala Gly Asn Val Ala Pro Tyr Lys Trp Arg Trp Gly Tyr
210 215 220

Gly Ile Phe Cys Ile Ile Val Pro Ile Ser Thr Leu Ile Leu Val Leu
225 230 235 240

Pro Tyr Val Tyr Ala Gln Tyr Ile Ser Trp Arg Ser Gly Lys Leu Pro
245 250 255

Pro Leu Lys Leu Lys Glu Lys Gly Gln Thr Leu Arg Gln Thr Leu Trp
260 265 270

Lys Phe Ala Asp Asp Ile Asn Leu Ile Gly Val Ile Leu Phe Thr Ala
275 280 285

Phe Leu Val Leu Val Leu Leu Pro Leu Thr Ile Ala Gly Gly Ala Thr
290 295 300

Ser Lys Trp Arg Glu Gly His Ile Ile Ala Met Ile Val Val Gly Gly
305 310 315 320

Cys Leu Gly Phe Ile Phe Leu Ile Trp Glu Leu Lys Phe Ala Lys Asn
325 330 335

[0303]

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

Leu Leu Met Glu Phe Val Trp Arg Leu Gly Leu Gln Ile Glu Leu Glu
355 360 365

Tyr Leu Val Thr Val Leu Met Val Ala Phe Gly Glu Ser Thr Leu Ser
370 375 380

Ala Gln Arg Ile Ala Gln Leu Tyr Asn Phe Leu Gln Ser Cys Thr Asn
385 390 395 400

Ile Val Val Gly Ile Met Leu His Phe Tyr Pro His Pro Lys Val Phe
405 410 415

Val Val Ala Gly Ser Leu Leu Gly Val Ile Gly Met Gly Leu Leu Tyr
420 425 430

Lys Tyr Arg Val Val Tyr Asp Gly Ile Ser Gly Leu Ile Gly Ala Glu
435 440 445

Ile Val Val Gly Ile Ala Gly Gly Met Ile Arg Phe Pro Met Trp Thr
450 455 460

Leu Val His Ala Ser Thr Thr His Asn Glu Met Ala Thr Val Thr Gly
465 470 475 480

Leu Leu Met Ser Val Tyr Gln Ile Gly Asp Ala Val Gly Ala Ser Ile
485 490 495

Ala Gly Ala Ile Trp Thr Gln Arg Leu Ala Lys Glu Leu Ile Gln Arg
500 505 510

Leu Gly Ser Ser Leu Gly Met Ala Ile Tyr Lys Ser Pro Leu Asn Tyr
515 520 525

Leu Lys Lys Tyr Pro Ile Gly Ser Glu Val Arg Val Gln Met Ile Glu
530 535 540

Ser Tyr Ser Lys Ile Gln Arg Leu Leu Ile Ile Val Ser Ile Ser Phe
545 550 555 560

Ala Ala Phe Asn Ala Val Leu Cys Phe Phe Leu Arg Gly Phe Thr Val
565 570 575

Asn Lys Lys Gln Ser Leu Ser Ala Glu Glu Arg Glu Lys Glu Lys Leu
580 585 590

Lys Ile Lys Gln Gln Ser Trp Leu Arg Arg Val Ile Gly Tyr
595 600 605

[0304]

<210> 138
<211> 327
<212> PRT
<213> 酿酒酵母

<400> 138

Met Ser Ser Asp Thr Ser Leu Ser Glu Ser Ser Leu Leu Lys Glu Glu
1 5 10 15

Ser Gly Ser Leu Thr Lys Ser Arg Pro Pro Ile Lys Ser Asn Pro Val
20 25 30

Arg Glu Asn Ile Lys Ser Phe Val Ala Gly Gly Val Gly Gly Val Cys
35 40 45

Ala Val Phe Thr Gly His Pro Phe Asp Leu Ile Lys Val Arg Cys Gln
50 55 60

Asn Gly Gln Ala Asn Ser Thr Val His Ala Ile Thr Asn Ile Ile Lys
65 70 75 80

Glu Ala Lys Thr Gln Val Lys Gly Thr Leu Phe Thr Asn Ser Val Lys
85 90 95

Gly Phe Tyr Lys Gly Val Ile Pro Pro Leu Leu Gly Val Thr Pro Ile
100 105 110

Phe Ala Val Ser Phe Trp Gly Tyr Asp Val Gly Lys Lys Leu Val Thr
115 120 125

Phe Asn Asn Lys Gln Gly Gly Ser Asn Glu Leu Thr Met Gly Gln Met
130 135 140

Ala Ala Ala Gly Phe Ile Ser Ala Ile Pro Thr Thr Leu Val Thr Ala
145 150 155 160

Pro Thr Glu Arg Val Lys Val Val Leu Gln Thr Ser Ser Lys Gly Ser
165 170 175

Phe Ile Gln Ala Ala Lys Thr Ile Val Lys Glu Gly Gly Ile Ala Ser
180 185 190

Leu Phe Lys Gly Ser Leu Ala Thr Leu Ala Arg Asp Gly Pro Gly Ser
195 200 205

Ala Leu Tyr Phe Ala Ser Tyr Glu Ile Ser Lys Asn Tyr Leu Asn Ser
210 215 220

Arg Gln Pro Arg Gln Asp Ala Gly Lys Asp Glu Pro Val Asn Ile Leu
225 230 235 240

Asn Val Cys Leu Ala Gly Gly Ile Ala Gly Met Ser Met Trp Leu Ala
245 250 255

Val Phe Pro Ile Asp Thr Ile Lys Thr Lys Leu Gln Ala Ser Ser Thr
260 265 270

[0305]

Arg Gln Asn Met Leu Ser Ala Thr Lys Glu Ile Tyr Leu Gln Arg Gly
275 280 285

Gly Ile Lys Gly Phe Phe Pro Gly Leu Gly Pro Ala Leu Leu Arg Ser
290 295 300

Phe Pro Ala Asn Ala Ala Thr Phe Leu Gly Val Glu Met Thr His Ser
305 310 315 320

Leu Phe Lys Lys Tyr Gly Ile
325

<210> 139
<211> 1511
<212> PRT
<213> 酿酒酵母

<400> 139

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

Ser Ser Ala Ser Ser Ser Thr Glu Asn Ala Ala Asp Leu His Asn Tyr
20 25 30

Asn Gly Phe Asp Glu His Thr Glu Ala Arg Ile Gln Lys Leu Ala Arg
35 40 45

```
Thr Leu Thr Ala Gln Ser Met Gln Asn Ser Thr Gln Ser Ala Pro Asn
    50                  55                  60

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

Pro Ile Phe Ser Asp Pro Glu Ala Pro Gly Tyr Asp Pro Lys Leu Asp
                85                  90                  95

Pro Asn Ser Glu Asn Phe Ser Ser Ala Ala Trp Val Lys Asn Met Ala
            100                 105                 110

His Leu Ser Ala Ala Asp Pro Asp Phe Tyr Lys Pro Tyr Ser Leu Gly
        115                 120                 125

Cys Ala Trp Lys Asn Leu Ser Ala Ser Gly Ala Ser Ala Asp Val Ala
    130                 135                 140

Tyr Gln Ser Thr Val Val Asn Ile Pro Tyr Lys Ile Leu Lys Ser Gly
145                 150                 155                 160

Leu Arg Lys Phe Gln Arg Ser Lys Glu Thr Asn Thr Phe Gln Ile Leu
                165                 170                 175

Lys Pro Met Asp Gly Cys Leu Asn Pro Gly Glu Leu Leu Val Val Leu
            180                 185                 190
```

[0306]

```
Gly Arg Pro Gly Ser Gly Cys Thr Thr Leu Leu Lys Ser Ile Ser Ser
        195                 200                 205

Asn Thr His Gly Phe Asp Leu Gly Ala Asp Thr Lys Ile Ser Tyr Ser
    210                 215                 220

Gly Tyr Ser Gly Asp Asp Ile Lys Lys His Phe Arg Gly Glu Val Val
225                 230                 235                 240

Tyr Asn Ala Glu Ala Asp Val His Leu Pro His Leu Thr Val Phe Glu
                245                 250                 255

Thr Leu Val Thr Val Ala Arg Leu Lys Thr Pro Gln Asn Arg Ile Lys
            260                 265                 270

Gly Val Asp Arg Glu Ser Tyr Ala Asn His Leu Ala Glu Val Ala Met
        275                 280                 285

Ala Thr Tyr Gly Leu Ser His Thr Arg Asn Thr Lys Val Gly Asn Asp
    290                 295                 300

Ile Val Arg Gly Val Ser Gly Gly Glu Arg Lys Arg Val Ser Ile Ala
305                 310                 315                 320

Glu Val Ser Ile Cys Gly Ser Lys Phe Gln Cys Trp Asp Asn Ala Thr
                325                 330                 335
```

```
Arg Gly Leu Asp Ser Ala Thr Ala Leu Glu Phe Ile Arg Ala Leu Lys
            340                 345                 350

Thr Gln Ala Asp Ile Ser Asn Thr Ser Ala Thr Val Ala Ile Tyr Gln
        355                 360                 365

Cys Ser Gln Asp Ala Tyr Asp Leu Phe Asn Lys Val Cys Val Leu Asp
    370                 375                 380

Asp Gly Tyr Gln Ile Tyr Tyr Gly Pro Ala Asp Lys Ala Lys Lys Tyr
385                 390                 395                 400

Phe Glu Asp Met Gly Tyr Val Cys Pro Ser Arg Gln Thr Thr Ala Asp
                405                 410                 415

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

Met Leu Lys Lys Gly Ile His Ile Pro Gln Thr Pro Lys Glu Met Asn
        435                 440                 445

Asp Tyr Trp Val Lys Ser Pro Asn Tyr Lys Glu Leu Met Lys Glu Val
    450                 455                 460

Asp Gln Arg Leu Leu Asn Asp Asp Glu Ala Ser Arg Glu Ala Ile Lys
465                 470                 475                 480
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[0307]

```
Glu Ala His Ile Ala Lys Gln Ser Lys Arg Ala Arg Pro Ser Ser Pro
                485                 490                 495

Tyr Thr Val Ser Tyr Met Met Gln Val Lys Tyr Leu Leu Ile Arg Asn
            500                 505                 510

Met Trp Arg Leu Arg Asn Asn Ile Gly Phe Thr Leu Phe Met Ile Leu
        515                 520                 525

Gly Asn Cys Ser Met Ala Leu Ile Leu Gly Ser Met Phe Phe Lys Ile
    530                 535                 540

Met Lys Lys Gly Asp Thr Ser Thr Phe Tyr Phe Arg Gly Ser Ala Met
545                 550                 555                 560

Phe Phe Ala Ile Leu Phe Asn Ala Phe Ser Ser Leu Leu Glu Ile Phe
                565                 570                 575

Ser Leu Tyr Glu Ala Arg Pro Ile Thr Glu Lys His Arg Thr Tyr Ser
            580                 585                 590

Leu Tyr His Pro Ser Ala Asp Ala Phe Ala Ser Val Leu Ser Glu Ile
        595                 600                 605

Pro Ser Lys Leu Ile Ile Ala Val Cys Phe Asn Ile Ile Phe Tyr Phe
    610                 615                 620
```

Leu Val Asp Phe Arg Arg Asn Gly Gly Val Phe Phe Phe Tyr Leu Leu
625 630 635 640

Ile Asn Ile Val Ala Val Phe Ser Met Ser His Leu Phe Arg Cys Val
645 650 655

Gly Ser Leu Thr Lys Thr Leu Ser Glu Ala Met Val Pro Ala Ser Met
660 665 670

Leu Leu Leu Ala Leu Ser Met Tyr Thr Gly Phe Ala Ile Pro Lys Lys
675 680 685

Lys Ile Leu Arg Trp Ser Lys Trp Ile Trp Tyr Ile Asn Pro Leu Ala
690 695 700

Tyr Leu Phe Glu Ser Leu Leu Ile Asn Glu Phe His Gly Ile Lys Phe
705 710 715 720

Pro Cys Ala Glu Tyr Val Pro Arg Gly Pro Ala Tyr Ala Asn Ile Ser
725 730 735

Ser Thr Glu Ser Val Cys Thr Val Val Gly Ala Val Pro Gly Gln Asp
740 745 750

Tyr Val Leu Gly Asp Asp Phe Ile Arg Gly Thr Tyr Gln Tyr Tyr His
755 760 765

[0308]

Lys Asp Lys Trp Arg Gly Phe Gly Ile Gly Met Ala Tyr Val Val Phe
770 775 780

Phe Phe Phe Val Tyr Leu Phe Leu Cys Glu Tyr Asn Glu Gly Ala Lys
785 790 795 800

Gln Lys Gly Glu Ile Leu Val Phe Pro Arg Ser Ile Val Lys Arg Met
805 810 815

Lys Lys Arg Gly Val Leu Thr Glu Lys Asn Ala Asn Asp Pro Glu Asn
820 825 830

Val Gly Glu Arg Ser Asp Leu Ser Ser Asp Arg Lys Met Leu Gln Glu
835 840 845

Ser Ser Glu Glu Glu Ser Asp Thr Tyr Gly Glu Ile Gly Leu Ser Lys
850 855 860

Ser Glu Ala Ile Phe His Trp Arg Asn Leu Cys Tyr Glu Val Gln Ile
865 870 875 880

Lys Ala Glu Thr Arg Arg Ile Leu Asn Asn Val Asp Gly Trp Val Lys
885 890 895

Pro Gly Thr Leu Thr Ala Leu Met Gly Ala Ser Gly Ala Gly Lys Thr

900 905 910

Thr Leu Leu Asp Cys Leu Ala Glu Arg Val Thr Met Gly Val Ile Thr
915 920 925

Gly Asp Ile Leu Val Asn Gly Ile Pro Arg Asp Lys Ser Phe Pro Arg
930 935 940

Ser Ile Gly Tyr Cys Gln Gln Gln Asp Leu His Leu Lys Thr Ala Thr
945 950 955 960

Val Arg Glu Ser Leu Arg Phe Ser Ala Tyr Leu Arg Gln Pro Ala Glu
965 970 975

Val Ser Ile Glu Glu Lys Asn Arg Tyr Val Glu Glu Val Ile Lys Ile
980 985 990

Leu Glu Met Glu Lys Tyr Ala Asp Ala Val Val Gly Val Ala Gly Glu
995 1000 1005

Gly Leu Asn Val Glu Gln Arg Lys Arg Leu Thr Ile Gly Val Glu
1010 1015 1020

Leu Thr Ala Lys Pro Lys Leu Leu Val Phe Leu Asp Glu Pro Thr
1025 1030 1035

[0309]

Ser Gly Leu Asp Ser Gln Thr Ala Trp Ser Ile Cys Gln Leu Met
1040 1045 1050

Lys Lys Leu Ala Asn His Gly Gln Ala Ile Leu Cys Thr Ile His
1055 1060 1065

Gln Pro Ser Ala Ile Leu Met Gln Glu Phe Asp Arg Leu Leu Phe
1070 1075 1080

Met Gln Arg Gly Gly Lys Thr Val Tyr Phe Gly Asp Leu Gly Glu
1085 1090 1095

Gly Cys Lys Thr Met Ile Asp Tyr Phe Glu Ser His Gly Ala His
1100 1105 1110

Lys Cys Pro Ala Asp Ala Asn Pro Ala Glu Trp Met Leu Glu Val
1115 1120 1125

Val Gly Ala Ala Pro Gly Ser His Ala Asn Gln Asp Tyr Tyr Glu
1130 1135 1140

Val Trp Arg Asn Ser Glu Glu Tyr Arg Ala Val Gln Ser Glu Leu
1145 1150 1155

Asp Trp Met Glu Arg Glu Leu Pro Lys Lys Gly Ser Ile Thr Ala
1160 1165 1170

Ala Glu Asp Lys His Glu Phe Ser Gln Ser Ile Ile Tyr Gln Thr
1175 1180 1185

Lys Leu Val Ser Ile Arg Leu Phe Gln Gln Tyr Trp Arg Ser Pro
1190 1195 1200

Asp Tyr Leu Trp Ser Lys Phe Ile Leu Thr Ile Phe Asn Gln Leu
1205 1210 1215

Phe Ile Gly Phe Thr Phe Phe Lys Ala Gly Thr Ser Leu Gln Gly
1220 1225 1230

Leu Gln Asn Gln Met Leu Ala Val Phe Met Phe Thr Val Ile Phe
1235 1240 1245

Asn Pro Ile Leu Gln Gln Tyr Leu Pro Ser Phe Val Gln Gln Arg
1250 1255 1260

Asp Leu Tyr Glu Ala Arg Glu Arg Pro Ser Arg Thr Phe Ser Trp
1265 1270 1275

Ile Ser Phe Ile Phe Ala Gln Ile Phe Val Glu Val Pro Trp Asn
1280 1285 1290

Ile Leu Ala Gly Thr Ile Ala Tyr Phe Ile Tyr Tyr Tyr Pro Ile
1295 1300 1305

[0310]

Gly Phe Tyr Ser Asn Ala Ser Ala Ala Gly Gln Leu His Glu Arg
1310 1315 1320

Gly Ala Leu Phe Trp Leu Phe Ser Cys Ala Phe Tyr Val Tyr Val
1325 1330 1335

Gly Ser Met Gly Leu Leu Val Ile Ser Phe Asn Gln Val Ala Glu
1340 1345 1350

Ser Ala Ala Asn Leu Ala Ser Leu Leu Phe Thr Met Ser Leu Ser
1355 1360 1365

Phe Cys Gly Val Met Thr Thr Pro Ser Ala Met Pro Arg Phe Trp
1370 1375 1380

Ile Phe Met Tyr Arg Val Ser Pro Leu Thr Tyr Phe Ile Gln Ala
1385 1390 1395

Leu Leu Ala Val Gly Val Ala Asn Val Asp Val Lys Cys Ala Asp
1400 1405 1410

Tyr Glu Leu Leu Glu Phe Thr Pro Pro Ser Gly Met Thr Cys Gly
1415 1420 1425

Gln Tyr Met Glu Pro Tyr Leu Gln Leu Ala Lys Thr Gly Tyr Leu
1430 1435 1440

Thr Asp Glu Asn Ala Thr Asp Thr Cys Ser Phe Cys Gln Ile Ser
1445 1450 1455

Thr Thr Asn Asp Tyr Leu Ala Asn Val Asn Ser Phe Tyr Ser Glu
1460 1465 1470

Arg Trp Arg Asn Tyr Gly Ile Phe Ile Cys Tyr Ile Ala Phe Asn
1475 1480 1485

Tyr Ile Ala Gly Val Phe Phe Tyr Trp Leu Ala Arg Val Pro Lys
1490 1495 1500

Lys Asn Gly Lys Leu Ser Lys Lys
1505 1510

<210> 140
<211> 327
<212> PRT
<213> 酿酒酵母

<400> 140

Met Ala Ser Ser Val Pro Gly Pro Ile Asp Leu Pro Glu Ser Arg Tyr
1 5 10 15

Asp Leu Ser Thr Tyr Trp Gly Arg Ile Arg His Cys Ala Glu Ile Ser
20 25 30

[0311]

Asp Pro Thr Met Leu Leu Thr Thr Glu Lys Asp Leu Ala His Ala Arg
35 40 45

Glu Ile Ile Ser Ala Tyr Arg His Gly Glu Leu Lys Glu Thr Thr Pro
50 55 60

Glu Phe Trp Arg Ala Lys Lys Gln Leu Asp Ser Thr Val His Pro Asp
65 70 75 80

Thr Gly Lys Thr Val Leu Leu Pro Phe Arg Met Ser Ser Asn Val Leu
85 90 95

Ser Asn Leu Val Val Thr Val Gly Met Leu Thr Pro Gly Leu Gly Thr
100 105 110

Ala Gly Thr Val Phe Trp Gln Trp Ala Asn Gln Ser Leu Asn Val Ala
115 120 125

Val Asn Ser Ala Asn Ala Asn Lys Ser His Pro Met Ser Thr Ser Gln
130 135 140

Leu Leu Thr Asn Tyr Ala Ala Ala Val Thr Ala Ser Cys Gly Val Ala
145 150 155 160

Leu Gly Leu Asn Asn Leu Val Pro Arg Leu Lys Asn Ile Ser Pro His
165 170 175

Ser Lys Leu Ile Leu Gly Arg Leu Val Pro Phe Ala Ala Val Val Ser
180 185 190

Ala Gly Ile Val Asn Val Phe Leu Met Arg Gly Asn Glu Ile Arg Lys
195 200 205

Gly Ile Ser Val Phe Asp Ser Asn Gly Asp Glu Val Gly Lys Ser Lys
210 215 220

Lys Ala Ala Phe Met Ala Val Gly Glu Thr Ala Leu Ser Arg Val Ile
225 230 235 240

Asn Ala Thr Pro Thr Met Val Ile Pro Pro Leu Ile Leu Val Arg Leu
245 250 255

Gln Arg Gly Val Leu Lys Gly Lys Ser Leu Gly Val Gln Thr Leu Ala
260 265 270

Asn Leu Gly Leu Ile Ser Val Thr Met Phe Ser Ala Leu Pro Phe Ala
275 280 285

Leu Gly Ile Phe Pro Gln Arg Gln Ala Ile His Leu Asn Lys Leu Glu
290 295 300

Pro Glu Leu His Gly Lys Lys Asp Lys Asp Gly Lys Pro Ile Glu Lys
305 310 315 320

[0312]

Val Tyr Phe Asn Arg Gly Ile
325

<210> 141
<211> 659
<212> PRT
<213> 酿酒酵母

<400> 141

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

Asn Ile Gln Gln Val Pro Lys Ala Leu Asp Lys Asn Val Thr Asn Ser
20 25 30

Gly Asn Leu Asp Ser Thr Ser Ser Ser Thr Gly Ser Ile Thr Glu Asp
35 40 45

Glu Lys Arg Ser Glu Pro Asn Ala Asp Ser Asn Asn Met Thr Gly Gly
50 55 60

Glu Pro Ile Asp Pro Arg Asp Leu Asp Trp Asp Gly Pro Asp Asp Pro
65 70 75 80

Asp Asn Pro His Asn Trp Ser Ser Leu Lys Lys Trp Tyr Thr Thr Met
85 90 95

Thr Ser Ala Phe Leu Cys Leu Val Val Thr Met Gly Ser Ser Leu Tyr
100 105 110

Val Ser Ser Val Pro Glu Leu Val Glu Arg Tyr His Val Ser Gln Thr
115 120 125

Leu Ala Leu Ala Gly Leu Thr Phe Tyr Leu Leu Gly Leu Ser Thr Val
130 135 140

Ile Gly Ala Pro Leu Ser Glu Val Phe Gly Arg Lys Pro Val Tyr Leu
145 150 155 160

Phe Ser Leu Pro Val Ser Met Leu Phe Thr Met Gly Val Gly Leu Ser
165 170 175

Asn Gly His Met Arg Ile Ile Leu Pro Leu Arg Phe Leu Ser Gly Val
180 185 190

Phe Ala Ser Pro Ala Leu Ser Val Gly Ser Gly Thr Ile Leu Asp Ile
195 200 205

Phe Asp Val Asp Gln Val Ser Val Ala Met Thr Tyr Phe Val Leu Ser
210 215 220

Pro Phe Leu Gly Pro Val Leu Ser Pro Ile Met Ala Gly Phe Ala Thr
225 230 235 240

[0313]

Glu Ala Lys Gly Trp Arg Trp Ser Glu Trp Ile Gln Leu Ile Ala Gly
245 250 255

Gly Leu Ile Leu Pro Phe Ile Ala Leu Met Pro Glu Thr His Lys Gly
260 265 270

Ile Ile Leu Arg Lys Arg Ala Lys Lys Arg Asn Ile Ala Leu Lys Lys
275 280 285

Phe Ser Arg Glu Ala Gln Lys Glu Phe Leu Lys Thr Thr Val Thr Ile
290 295 300

Thr Ile Leu Arg Pro Leu Lys Met Leu Val Val Glu Pro Ile Val Phe
305 310 315 320

Val Phe Ser Val Tyr Val Ala Phe Ile Phe Ala Ile Leu Phe Gly Phe
325 330 335

Phe Glu Ala Tyr Ala Val Ile Tyr Arg Gly Val Tyr His Met Ser Met
340 345 350

Gly Ile Ser Gly Leu Pro Phe Ile Gly Ile Gly Val Gly Leu Trp Ile
355 360 365

Gly Ala Phe Phe Tyr Leu Tyr Ile Asp Arg Lys Tyr Leu Phe Pro Lys
370 375 380

Pro Pro Ala Gly Thr Gln Pro Leu Thr Glu Lys Glu Arg Thr Ser Lys
385 390 395 400

Arg Thr Thr Pro Tyr Arg Gly Ala Arg Asp Ala Glu Thr Gly Glu Leu
405 410 415

Leu Pro Val Val Pro Glu Lys Phe Leu Ile Ala Cys Lys Phe Gly Ser
420 425 430

Val Ala Leu Pro Ile Gly Leu Phe Trp Gln Ala Trp Thr Ala Arg Ser
435 440 445

Asp Val His Trp Met Ala Pro Val Ala Ala Gly Val Pro Phe Gly Phe
450 455 460

Gly Leu Ile Leu Ile Phe Phe Ser Val Leu Met Tyr Phe Ser Thr Cys
465 470 475 480

Tyr Pro Pro Leu Thr Val Ala Ser Cys Leu Ala Ala Asn Asn Leu Leu
485 490 495

Arg Tyr Val Met Ser Ser Val Phe Pro Leu Phe Thr Ile Gln Met Tyr
500 505 510

Thr Lys Met Lys Ile Lys Trp Ala Ser Thr Leu Phe Ala Leu Val Cys
515 520 525

[0314]

Val Val Met Ile Pro Ile Pro Trp Val Phe Glu Lys Trp Gly Ser Lys
530 535 540

Leu Arg His Lys Ser Gln Phe Gly Tyr Ala Ala Met Glu Lys Glu Ala
545 550 555 560

Glu Thr Glu Gly Gly Ile Asp Asp Val Asn Ala Val Asp Gly Glu Leu
565 570 575

Asn Leu Thr Arg Met Thr Thr Leu Arg Thr Met Glu Thr Asp Pro Ser
580 585 590

Thr Arg Glu Lys Pro Gly Glu Arg Leu Ser Leu Arg Arg Thr His Thr
595 600 605

Gln Pro Val Pro Ala Ser Phe Asp Arg Glu Asp Gly Gln His Ala Gln
610 615 620

Asn Arg Asn Glu Pro Ile Ser Asn Ser Leu Tyr Ser Ala Ile Lys Asp
625 630 635 640

Asn Glu Asp Gly Tyr Ser Tyr Thr Glu Met Ala Thr Asp Ala Ser Ala
645 650 655

Arg Met Val

<210> 142
<211> 453
<212> PRT
<213> 酿酒酵母

<400> 142

Met Ile Gln Thr Gln Ser Thr Ala Ile Lys Arg Arg Asn Ser Val His
1 5 10 15

Lys Asn Leu Phe Asp Pro Ser Leu Tyr Gln Ile Pro Glu Pro Pro Arg
20 25 30

Gly Gly Phe Gln His Gln Lys Lys Glu Tyr Ser Lys Glu Thr Phe Ser
35 40 45

Asn Gln Val Phe Gly Tyr Asp Ile Thr Ser Leu Lys Lys Arg Phe Thr
50 55 60

Gln Leu Phe Pro Ser Asn Ile Gln Gly Tyr Leu Pro Glu Val Asp Leu
65 70 75 80

Arg Ile Thr Ile Ile Cys Ser Ile Trp Tyr Val Thr Ser Ser Ile Ser
85 90 95

Ser Asn Leu Ser Lys Ala Ile Leu Arg Thr Phe Asn His Pro Ile Ala
100 105 110

[0315]

Leu Thr Glu Leu Gln Phe Leu Val Ser Ala Val Leu Cys Val Gly Phe
115 120 125

Ala Ser Ile Val Asn Leu Phe Arg Leu Pro Arg Leu Lys His Thr Lys
130 135 140

Phe Ser Lys Ala Leu Asn Ser Phe Pro Asp Gly Ile Leu Pro Glu Tyr
145 150 155 160

Leu Asp Gly Asn Phe Arg Ser Ser Ile Leu His Lys Phe Leu Val Pro
165 170 175

Ser Lys Leu Val Leu Met Thr Thr Phe Pro Met Gly Ile Phe Gln Phe
180 185 190

Ile Gly His Ile Thr Ser His Lys Ala Val Ser Met Ile Pro Val Ser
195 200 205

Leu Val His Ser Val Lys Ala Leu Ser Pro Ile Ile Thr Val Gly Tyr
210 215 220

Tyr Lys Phe Phe Glu His Arg Tyr Tyr Asn Ser Met Thr Tyr Tyr Thr
225 230 235 240

Leu Leu Leu Leu Ile Phe Gly Val Met Thr Thr Cys Trp Ser Thr His

245 250 255

Gly Ser Lys Arg Ala Ser Asp Asn Lys Ser Gly Ser Ser Leu Ile Gly
260 265 270

Leu Leu Phe Ala Phe Ile Ser Met Ile Ile Phe Val Ala Gln Asn Ile
275 280 285

Phe Ala Lys Asn Ile Leu Thr Ile Arg Arg Lys Val Gly Ile Leu Pro
290 295 300

Ser Ser Ser Thr Asp Asp Val Thr Ser Lys Glu Gly Gln Pro Ser Leu
305 310 315 320

Asp Lys Thr Arg Phe Ser Pro Leu Gln Val Asp Lys Ile Thr Ile Leu
325 330 335

Phe Tyr Cys Ser Cys Ile Gly Phe Ser Leu Thr Leu Leu Pro Phe Leu
340 345 350

Thr Gly Glu Leu Met His Gly Gly Ser Val Ile Asn Asp Leu Thr Leu
355 360 365

Glu Thr Val Ala Leu Val Ala Ile His Gly Ile Ala His Phe Phe Gln
370 375 380

[0316] Ala Met Leu Ala Phe Gln Leu Ile Gly Leu Leu Ser Ser Ile Asn Tyr
385 390 395 400

Ser Val Ala Asn Ile Met Lys Arg Ile Val Val Ile Ser Val Ala Leu
405 410 415

Phe Trp Glu Thr Lys Leu Asn Phe Phe Gln Val Phe Gly Val Ile Leu
420 425 430

Thr Ile Ala Gly Leu Tyr Gly Tyr Asp Lys Trp Gly Leu Ser Lys Lys
435 440 445

Asp Gly Arg Gln Ala
450

<210> 143
<211> 233
<212> PRT
<213> 酿酒酵母

<400> 143

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

Leu Asn Lys Met Gln Ala Phe Ile Arg Lys Glu Ala Glu Glu Lys Ala
20 25 30

Lys Glu Ile Gln Leu Lys Ala Asp Gln Glu Tyr Glu Ile Glu Lys Thr

35 40 45

Asn Ile Val Arg Asn Glu Thr Asn Asn Ile Asp Gly Asn Phe Lys Ser
50 55 60

Lys Leu Lys Lys Ala Met Leu Ser Gln Gln Ile Thr Lys Ser Thr Ile
65 70 75 80

Ala Asn Lys Met Arg Leu Lys Val Leu Ser Ala Arg Glu Gln Ser Leu
85 90 95

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

Asn Arg Asp Glu Tyr Lys Pro Ile Leu Gln Ser Leu Ile Val Glu Ala
115 120 125

Leu Leu Lys Leu Leu Glu Pro Lys Ala Ile Val Lys Ala Leu Glu Arg
130 135 140

Asp Val Asp Leu Ile Glu Ser Met Lys Asp Asp Ile Met Arg Glu Tyr
145 150 155 160

Gly Glu Lys Ala Gln Arg Ala Pro Leu Glu Glu Ile Val Ile Ser Asn
165 170 175

[0317] Asp Tyr Leu Asn Lys Asp Leu Val Ser Gly Gly Val Val Val Ser Asn
180 185 190

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

Leu Leu Ser Glu Glu Ala Leu Pro Ala Ile Arg Leu Glu Leu Tyr Gly
210 215 220

Pro Ser Lys Thr Arg Lys Phe Phe Asp
225 230

<210> 144
<211> 627
<212> PRT
<213> 酿酒酵母

<400> 144

Met Val Asn Ile Leu Pro Phe His Lys Asn Asn Arg His Ser Ala Gly
1 5 10 15

Val Val Thr Cys Ala Asp Asp Val Ser Gly Asp Gly Ser Gly Gly Asp
20 25 30

Thr Lys Lys Glu Glu Asp Val Val Gln Val Thr Glu Ser Pro Ser Ser
35 40 45

Gly Ser Arg Asn Asn His Arg Ser Asp Asn Glu Lys Asp Asp Ala Ile

50 55 60

Arg Met Glu Lys Ile Ser Lys Asn Gln Ser Ala Ser Ser Asn Gly Thr
65 70 75 80

Ile Arg Glu Asp Leu Ile Met Asp Val Asp Leu Glu Lys Ser Pro Ser
85 90 95

Val Asp Gly Asp Ser Glu Pro His Lys Leu Lys Gln Gly Leu Gln Ser
100 105 110

Arg His Val Gln Leu Ile Ala Leu Gly Gly Ala Ile Gly Thr Gly Leu
115 120 125

Leu Val Gly Thr Ser Ser Thr Leu His Thr Cys Gly Pro Ala Gly Leu
130 135 140

Phe Ile Ser Tyr Ile Ile Ile Ser Ala Val Ile Tyr Pro Ile Met Cys
145 150 155 160

Ala Leu Gly Glu Met Val Cys Phe Leu Pro Gly Asp Gly Ser Asp Ser
165 170 175

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

[0318]

Gly Phe Ala Thr Gly Trp Asn Tyr Phe Tyr Cys Tyr Val Ile Leu Val
195 200 205

Ala Ala Glu Cys Thr Ala Ala Ser Gly Val Val Glu Tyr Trp Thr Thr
210 215 220

Ala Val Pro Lys Gly Val Trp Ile Thr Ile Phe Leu Cys Val Val Val
225 230 235 240

Ile Leu Asn Phe Ser Ala Val Lys Val Tyr Gly Glu Ser Glu Phe Trp
245 250 255

Phe Ala Ser Ile Lys Ile Leu Cys Ile Val Gly Leu Ile Ile Leu Ser
260 265 270

Phe Ile Leu Phe Trp Gly Gly Gly Pro Asn His Asp Arg Leu Gly Phe
275 280 285

Arg Tyr Trp Gln His Pro Gly Ala Phe Ala His His Leu Thr Gly Gly
290 295 300

Ser Leu Gly Asn Phe Thr Asp Ile Tyr Thr Gly Ile Ile Lys Gly Ala
305 310 315 320

Phe Ala Phe Ile Leu Gly Pro Glu Leu Val Cys Met Thr Ser Ala Glu
325 330 335

Cys Ala Asp Gln Arg Arg Asn Ile Ala Lys Ala Ser Arg Arg Phe Val
340 345 350

Trp Arg Leu Ile Phe Phe Tyr Val Leu Gly Thr Leu Ala Ile Ser Val
355 360 365

Ile Val Pro Tyr Asn Asp Pro Thr Leu Val Asn Ala Leu Ala Gln Gly
370 375 380

Lys Pro Gly Ala Gly Ser Ser Pro Phe Val Ile Gly Ile Gln Asn Ala
385 390 395 400

Gly Ile Lys Val Leu Pro His Ile Ile Asn Gly Cys Ile Leu Thr Ser
405 410 415

Ala Trp Ser Ala Ala Asn Ala Phe Met Phe Ala Ser Thr Arg Ser Leu
420 425 430

Leu Thr Met Ala Gln Thr Gly Gln Ala Pro Lys Cys Leu Gly Arg Ile
435 440 445

Asn Lys Trp Gly Val Pro Tyr Val Ala Val Gly Val Ser Phe Leu Cys
450 455 460

Ser Cys Leu Ala Tyr Leu Asn Val Ser Ser Ser Thr Ala Asp Val Phe
465 470 475 480

[0319]

Asn Trp Phe Ser Asn Ile Ser Thr Ile Ser Gly Phe Leu Gly Trp Met
485 490 495

Cys Gly Cys Ile Ala Tyr Leu Arg Phe Arg Lys Ala Ile Phe Tyr Asn
500 505 510

Gly Leu Tyr Asp Arg Leu Pro Phe Lys Thr Trp Gly Gln Pro Tyr Thr
515 520 525

Val Trp Phe Ser Leu Ile Val Ile Gly Ile Ile Thr Ile Thr Asn Gly
530 535 540

Tyr Ala Ile Phe Ile Pro Lys Tyr Trp Arg Val Ala Asp Phe Ile Ala
545 550 555 560

Ala Tyr Ile Thr Leu Pro Ile Phe Leu Val Leu Trp Phe Gly His Lys
565 570 575

Leu Tyr Thr Arg Thr Trp Arg Gln Trp Trp Leu Pro Val Ser Glu Ile
580 585 590

Asp Val Thr Thr Gly Leu Val Glu Ile Glu Glu Lys Ser Arg Glu Ile
595 600 605

Glu Glu Met Arg Leu Pro Pro Thr Gly Phe Lys Asp Lys Phe Leu Asp
610 615 620

Ala Leu Leu
625

<210> 145
<211> 947
<212> PRT
<213> 酿酒酵母

<400> 145

Met Ser Ser Thr Glu Ala Lys Gln Tyr Lys Glu Lys Pro Ser Lys Glu
1 5 10 15

Tyr Leu His Ala Ser Asp Gly Asp Asp Pro Ala Asn Asn Ser Ala Ala
20 25 30

Ser Ser Ser Ser Ser Ser Ser Thr Ser Thr Ser Ala Ser Ser Ser Ala
35 40 45

Ala Ala Val Pro Arg Lys Ala Ala Ala Ala Ser Ala Ala Asp Asp Ser
50 55 60

Asp Ser Asp Glu Asp Ile Asp Gln Leu Ile Asp Glu Leu Gln Ser Asn
65 70 75 80

Tyr Gly Glu Gly Asp Glu Ser Gly Glu Glu Glu Val Arg Thr Asp Gly
85 90 95

[0320]

Val His Ala Gly Gln Arg Val Val Pro Glu Lys Asp Leu Ser Thr Asp
100 105 110

Pro Ala Tyr Gly Leu Thr Ser Asp Glu Val Ala Arg Arg Arg Lys Lys
115 120 125

Tyr Gly Leu Asn Gln Met Ala Glu Glu Asn Glu Ser Leu Ile Val Lys
130 135 140

Phe Leu Met Phe Phe Val Gly Pro Ile Gln Phe Val Met Glu Ala Ala
145 150 155 160

Ala Ile Leu Ala Ala Gly Leu Ser Asp Trp Val Asp Val Gly Val Ile
165 170 175

Cys Ala Leu Leu Leu Leu Asn Ala Ser Val Gly Phe Ile Gln Glu Phe
180 185 190

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

Ala Thr Val Ile Arg Asp Gly Gln Leu Ile Glu Ile Pro Ala Asn Glu
210 215 220

Val Val Pro Gly Glu Ile Leu Gln Leu Glu Ser Gly Thr Ile Ala Pro
225 230 235 240

Ala Asp Gly Arg Ile Val Thr Glu Asp Cys Phe Leu Gln Ile Asp Gln
245 250 255

Ser Ala Ile Thr Gly Glu Ser Leu Ala Ala Glu Lys His Tyr Gly Asp
260 265 270

Glu Val Phe Ser Ser Ser Thr Val Lys Thr Gly Glu Ala Phe Met Val
275 280 285

Val Thr Ala Thr Gly Asp Asn Thr Phe Val Gly Arg Ala Ala Ala Leu
290 295 300

Val Gly Gln Ala Ser Gly Val Glu Gly His Phe Thr Glu Val Leu Asn
305 310 315 320

Gly Ile Gly Ile Ile Leu Leu Val Leu Val Ile Ala Thr Leu Leu Leu
325 330 335

Val Trp Thr Ala Cys Phe Tyr Arg Thr Val Gly Ile Val Ser Ile Leu
340 345 350

Arg Tyr Thr Leu Gly Ile Thr Ile Ile Gly Val Pro Val Gly Leu Pro
355 360 365

Ala Val Val Thr Thr Thr Met Ala Val Gly Ala Ala Tyr Leu Ala Lys
370 375 380

[0321]

Lys Gln Ala Ile Val Gln Lys Leu Ser Ala Ile Glu Ser Leu Ala Gly
385 390 395 400

Val Glu Ile Leu Cys Ser Asp Lys Thr Gly Thr Leu Thr Lys Asn Lys
405 410 415

Leu Ser Leu His Glu Pro Tyr Thr Val Glu Gly Val Ser Pro Asp Asp
420 425 430

Leu Met Leu Thr Ala Cys Leu Ala Ala Ser Arg Lys Lys Lys Gly Leu
435 440 445

Asp Ala Ile Asp Lys Ala Phe Leu Lys Ser Leu Ile Glu Tyr Pro Lys
450 455 460

Ala Lys Asp Ala Leu Thr Lys Tyr Lys Val Leu Glu Phe His Pro Phe
465 470 475 480

Asp Pro Val Ser Lys Lys Val Thr Ala Val Val Glu Ser Pro Glu Gly
485 490 495

Glu Arg Ile Val Cys Val Lys Gly Ala Pro Leu Phe Val Leu Lys Thr
500 505 510

Val Glu Glu Asp His Pro Ile Pro Glu Asp Val His Glu Asn Tyr Glu
515 520 525

Asn Lys Val Ala Glu Leu Ala Ser Arg Gly Phe Arg Ala Leu Gly Val
530 535 540

Ala Arg Lys Arg Gly Glu Gly His Trp Glu Ile Leu Gly Val Met Pro
545 550 555 560

Cys Met Asp Pro Pro Arg Asp Asp Thr Ala Gln Thr Ile Asn Glu Ala
565 570 575

Arg Asn Leu Gly Leu Arg Ile Lys Met Leu Thr Gly Asp Ala Val Gly
580 585 590

Ile Ala Lys Glu Thr Cys Arg Gln Leu Gly Leu Gly Thr Asn Ile Tyr
595 600 605

Asn Ala Glu Arg Leu Gly Leu Gly Gly Gly Gly Asp Met Pro Gly Ser
610 615 620

Glu Leu Ala Asp Phe Val Glu Asn Ala Asp Gly Phe Ala Glu Val Phe
625 630 635 640

Pro Gln His Lys Tyr Arg Val Val Glu Ile Leu Gln Asn Arg Gly Tyr
645 650 655

Leu Val Ala Met Thr Gly Asp Gly Val Asn Asp Ala Pro Ser Leu Lys
660 665 670

[0322]

Lys Ala Asp Thr Gly Ile Ala Val Glu Gly Ala Thr Asp Ala Ala Arg
675 680 685

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

Asp Ala Leu Lys Thr Ser Arg Gln Ile Phe His Arg Met Tyr Ser Tyr
705 710 715 720

Val Val Tyr Arg Ile Ala Leu Ser Leu His Leu Glu Ile Phe Leu Gly
725 730 735

Leu Trp Ile Ala Ile Leu Asn Asn Ser Leu Asp Ile Asn Leu Ile Val
740 745 750

Phe Ile Ala Ile Phe Ala Asp Val Ala Thr Leu Thr Ile Ala Tyr Asp
755 760 765

Asn Ala Pro Tyr Ala Pro Glu Pro Val Lys Trp Asn Leu Pro Arg Leu
770 775 780

Trp Gly Met Ser Ile Ile Leu Gly Ile Val Leu Ala Ile Gly Ser Trp
785 790 795 800

Ile Thr Leu Thr Thr Met Phe Leu Pro Asn Gly Gly Ile Ile Gln Asn

805 810 815

Phe Gly Ala Met Asn Gly Val Met Phe Leu Gln Ile Ser Leu Thr Glu
820 825 830

Asn Trp Leu Ile Phe Val Thr Arg Ala Ala Gly Pro Phe Trp Ser Ser
835 840 845

Ile Pro Ser Trp Gln Leu Ala Gly Ala Val Phe Ala Val Asp Ile Ile
850 855 860

Ala Thr Met Phe Thr Leu Phe Gly Trp Trp Ser Glu Asn Trp Thr Asp
865 870 875 880

Ile Val Ser Val Val Arg Val Trp Ile Trp Ser Ile Gly Ile Phe Cys
885 890 895

Val Leu Gly Gly Phe Tyr Tyr Ile Met Ser Thr Ser Gln Ala Phe Asp
900 905 910

Arg Leu Met Asn Gly Lys Ser Leu Lys Glu Lys Lys Ser Thr Arg Ser
915 920 925

Val Glu Asp Phe Met Ala Ala Met Gln Arg Val Ser Thr Gln His Glu
930 935 940

[0323] Lys Ser Ser
945

<210> 146
<211> 300
<212> PRT
<213> 酿酒酵母

<400> 146

Met Pro His Thr Asp Lys Lys Gln Ser Gly Leu Ala Arg Leu Leu Gly
1 5 10 15

Ser Ala Ser Ala Gly Ile Met Glu Ile Ala Val Phe His Pro Val Asp
20 25 30

Thr Ile Ser Lys Arg Leu Met Ser Asn His Thr Lys Ile Thr Ser Gly
35 40 45

Gln Glu Leu Asn Arg Val Ile Phe Arg Asp His Phe Ser Glu Pro Leu
50 55 60

Gly Lys Arg Leu Phe Thr Leu Phe Pro Gly Leu Gly Tyr Ala Ala Ser
65 70 75 80

Tyr Lys Val Leu Gln Arg Val Tyr Lys Tyr Gly Gly Gln Pro Phe Ala
85 90 95

Asn Glu Phe Leu Asn Lys His Tyr Lys Lys Asp Phe Asp Asn Leu Phe

100 105 110

Gly Glu Lys Thr Gly Lys Ala Met Arg Ser Ala Ala Ala Gly Ser Leu
115 120 125

Ile Gly Ile Gly Glu Ile Val Leu Leu Pro Leu Asp Val Leu Lys Ile
130 135 140

Lys Arg Gln Thr Asn Pro Glu Ser Phe Lys Gly Arg Gly Phe Ile Lys
145 150 155 160

Ile Leu Arg Asp Glu Gly Leu Phe Asn Leu Tyr Arg Gly Trp Gly Trp
165 170 175

Thr Ala Ala Arg Asn Ala Pro Gly Ser Phe Ala Leu Phe Gly Gly Asn
180 185 190

Ala Phe Ala Lys Glu Tyr Ile Leu Gly Leu Lys Asp Tyr Ser Gln Ala
195 200 205

Thr Trp Ser Gln Asn Phe Ile Ser Ser Ile Val Gly Ala Cys Ser Ser
210 215 220

Leu Ile Val Ser Ala Pro Leu Asp Val Ile Lys Thr Arg Ile Gln Asn
225 230 235 240

[0324] Arg Asn Phe Asp Asn Pro Glu Ser Gly Leu Arg Ile Val Lys Asn Thr
245 250 255

Leu Lys Asn Glu Gly Val Thr Ala Phe Phe Lys Gly Leu Thr Pro Lys
260 265 270

Leu Leu Thr Thr Gly Pro Lys Leu Val Phe Ser Phe Ala Leu Ala Gln
275 280 285

Ser Leu Ile Pro Arg Phe Asp Asn Leu Leu Ser Lys
290 295 300

<210> 147
<211> 646
<212> PRT
<213> 酿酒酵母

<400> 147

Met Ser Tyr Glu Ser Gly Arg Ser Ser Ser Ser Ser Glu Ser Thr Arg
1 5 10 15

Pro Pro Thr Leu Lys Glu Glu Pro Asn Gly Lys Ile Ala Trp Glu Glu
20 25 30

Ser Val Lys Lys Ser Arg Glu Asn Asn Glu Asn Asp Ser Thr Leu Leu
35 40 45

Arg Arg Lys Leu Gly Glu Thr Arg Lys Ala Ile Glu Thr Gly Gly Ser

50 55 60

Ser Arg Asn Lys Leu Ser Ala Leu Thr Pro Leu Lys Lys Val Val Asp
65 70 75 80

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

Tyr Ser Leu Pro Asn Leu Lys Thr Leu Asn Ser Phe Ser Asp Ala Glu
100 105 110

Gln Ala Arg Ile Met Gln Asp Tyr Leu Ser Arg Gly Val Asn Gln Gly
115 120 125

Asn Ser Asn Asn Tyr Val Asp Pro Leu Tyr Arg Gln Leu Asn Pro Thr
130 135 140

Met Gly Ser Ser Arg Asn Arg Pro Val Trp Ser Leu Asn Gln Pro Leu
145 150 155 160

Pro His Val Leu Asp Arg Gly Leu Ala Ala Lys Met Ile Gln Lys Asn
165 170 175

Met Asp Ala Arg Ser Arg Ala Ser Ser Arg Arg Gly Ser Thr Asp Ile
180 185 190

[0325]

Ser Arg Gly Gly Ser Thr Thr Ser Val Lys Asp Trp Lys Arg Leu Leu
195 200 205

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

Gln Arg Asp Asn Thr Val Gly Ala Asp Val Lys Pro Thr Lys Leu Glu
225 230 235 240

Pro Glu Asn Pro Gln Lys Pro Ser Asn Thr His Ile Glu Asn Val Ser
245 250 255

Arg Lys Lys Lys Arg Thr Ser His Asn Val Asn Phe Ser Leu Gly Asp
260 265 270

Glu Ser Tyr Ala Ser Ser Ile Ala Asp Ala Glu Ser Arg Lys Leu Lys
275 280 285

Asn Met Gln Thr Leu Asp Gly Ser Thr Pro Val Tyr Thr Lys Leu Pro
290 295 300

Glu Glu Leu Ile Glu Glu Glu Asn Lys Ser Thr Ser Ala Leu Asp Gly
305 310 315 320

Asn Glu Ile Gly Ala Ser Glu Asp Glu Asp Ala Asp Ile Met Thr Phe
325 330 335

```
Pro Asn Phe Trp Ala Lys Ile Arg Tyr His Met Arg Glu Pro Phe Ala
            340                 345                 350

Glu Phe Leu Gly Thr Leu Val Leu Val Ile Phe Gly Val Gly Gly Asn
        355                 360                 365

Leu Gln Ala Thr Val Thr Lys Gly Ser Gly Gly Ser Tyr Glu Ser Leu
    370                 375                 380

Ser Phe Ala Trp Gly Phe Gly Cys Met Leu Gly Val Tyr Val Ala Gly
385                 390                 395                 400

Gly Ile Ser Gly Gly His Ile Asn Pro Ala Val Thr Ile Ser Met Ala
                405                 410                 415

Ile Phe Arg Lys Phe Pro Trp Lys Lys Val Pro Val Tyr Ile Val Ala
            420                 425                 430

Gln Ile Ile Gly Ala Tyr Phe Gly Gly Ala Met Ala Tyr Gly Tyr Phe
        435                 440                 445

Trp Ser Ser Ile Thr Glu Phe Glu Gly Gly Pro His Ile Arg Thr Thr
    450                 455                 460

Ala Thr Gly Ala Cys Leu Phe Thr Asp Pro Lys Ser Tyr Val Thr Trp
465                 470                 475                 480
```

[0326]

```
Arg Asn Ala Phe Phe Asp Glu Phe Ile Gly Ala Ser Ile Leu Val Gly
                485                 490                 495

Cys Leu Met Ala Leu Leu Asp Asp Ser Asn Ala Pro Pro Gly Asn Gly
            500                 505                 510

Met Thr Ala Leu Ile Ile Gly Phe Leu Val Ala Ala Ile Gly Met Ala
        515                 520                 525

Leu Gly Tyr Gln Thr Ser Phe Thr Ile Asn Pro Ala Arg Asp Leu Gly
    530                 535                 540

Pro Arg Ile Phe Ala Ser Met Ile Gly Tyr Gly Pro His Ala Phe His
545                 550                 555                 560

Leu Thr His Trp Trp Trp Thr Trp Gly Ala Trp Gly Gly Pro Ile Ala
                565                 570                 575

Gly Gly Ile Ala Gly Ala Leu Ile Tyr Asp Ile Phe Ile Phe Thr Gly
            580                 585                 590

Cys Glu Ser Pro Val Asn Tyr Pro Asp Asn Gly Tyr Ile Glu Asn Arg
        595                 600                 605

Val Gly Lys Leu Leu His Ala Glu Phe His Gln Asn Asp Gly Thr Val
    610                 615                 620
```

Ser Asp Glu Ser Gly Val Asn Ser Asn Ser Asn Thr Gly Ser Lys Lys
625 630 635 640

Ser Val Pro Thr Ser Ser
645

<210> 148
<211> 462
<212> PRT
<213> 稻 (Oryza sativa)

<400> 148

Met Asp Ser Gly Tyr Ser Ser Ser Tyr Ala Ala Ala Ala Gly Met His
1 5 10 15

Val Val Ile Cys Pro Trp Leu Ala Phe Gly His Leu Leu Pro Cys Leu
20 25 30

Asp Leu Ala Gln Arg Leu Ala Ser Arg Gly His Arg Val Ser Phe Val
35 40 45

Ser Thr Pro Arg Asn Ile Ser Arg Leu Pro Pro Val Arg Pro Ala Leu
50 55 60

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

[0327]

Leu Pro Asp Gly Ala Glu Ser Thr Asn Asp Val Pro His Asp Arg Pro
85 90 95

Asp Met Val Glu Leu His Arg Arg Ala Phe Asp Gly Leu Ala Ala Pro
100 105 110

Phe Ser Glu Phe Leu Gly Thr Ala Cys Ala Asp Trp Val Ile Val Asp
115 120 125

Val Phe His His Trp Ala Ala Ala Ala Ala Leu Glu His Lys Val Pro
130 135 140

Cys Ala Met Met Leu Leu Gly Ser Ala His Met Ile Ala Ser Ile Ala
145 150 155 160

Asp Arg Arg Leu Glu Arg Ala Glu Thr Glu Ser Pro Ala Ala Ala Gly
165 170 175

Gln Gly Arg Pro Ala Ala Ala Pro Thr Phe Glu Val Ala Arg Met Lys
180 185 190

Leu Ile Arg Thr Lys Gly Ser Ser Gly Met Ser Leu Ala Glu Arg Phe
195 200 205

Ser Leu Thr Leu Ser Arg Ser Ser Leu Val Val Gly Arg Ser Cys Val
210 215 220

Glu Phe Glu Pro Glu Thr Val Pro Leu Leu Ser Thr Leu Arg Gly Lys
225 230 235 240

Pro Ile Thr Phe Leu Gly Leu Met Pro Pro Leu His Glu Gly Arg Arg
245 250 255

Glu Asp Gly Glu Asp Ala Thr Val Arg Trp Leu Asp Ala Gln Pro Ala
260 265 270

Lys Ser Val Val Tyr Val Ala Leu Gly Ser Glu Val Pro Leu Gly Val
275 280 285

Glu Lys Val His Glu Leu Ala Leu Gly Leu Glu Leu Ala Gly Thr Arg
290 295 300

Phe Leu Trp Ala Leu Arg Lys Pro Thr Gly Val Ser Asp Ala Asp Leu
305 310 315 320

Leu Pro Ala Gly Phe Glu Glu Arg Thr Arg Gly Arg Gly Val Val Ala
325 330 335

Thr Arg Trp Val Pro Gln Met Ser Ile Leu Ala His Ala Ala Val Gly
340 345 350

Ala Phe Leu Thr His Cys Gly Trp Asn Ser Thr Ile Glu Gly Leu Met
355 360 365

[0328]

Phe Gly His Pro Leu Ile Met Leu Pro Ile Phe Gly Asp Gln Gly Pro
370 375 380

Asn Ala Arg Leu Ile Glu Ala Lys Asn Ala Gly Leu Gln Val Ala Arg
385 390 395 400

Asn Asp Gly Asp Gly Ser Phe Asp Arg Glu Gly Val Ala Ala Ala Ile
405 410 415

Arg Ala Val Ala Val Glu Glu Glu Ser Ser Lys Val Phe Gln Ala Lys
420 425 430

Ala Lys Lys Leu Gln Glu Ile Val Ala Asp Met Ala Cys His Glu Arg
435 440 445

Tyr Ile Asp Gly Phe Ile Gln Gln Leu Arg Ser Tyr Lys Asp
450 455 460

<210> 149
<211> 297
<212> PRT
<213> 聚球藻属

<400> 149

Met Val Ala Gln Thr Phe Asn Leu Asp Thr Tyr Leu Ser Gln Arg Gln
1 5 10 15

```
Gln Gln Val Glu Glu Ala Leu Ser Ala Ala Leu Val Pro Ala Tyr Pro
            20                  25                  30

Glu Arg Ile Tyr Glu Ala Met Arg Tyr Ser Leu Leu Ala Gly Gly Lys
        35                  40                  45

Arg Leu Arg Pro Ile Leu Cys Leu Ala Ala Cys Glu Leu Ala Gly Gly
    50                  55                  60

Ser Val Glu Gln Ala Met Pro Thr Ala Cys Ala Leu Glu Met Ile His
65                  70                  75                  80

Thr Met Ser Leu Ile His Asp Asp Leu Pro Ala Met Asp Asn Asp Asp
                85                  90                  95

Phe Arg Arg Gly Lys Pro Thr Asn His Lys Val Phe Gly Glu Asp Ile
            100                 105                 110

Ala Ile Leu Ala Gly Asp Ala Leu Leu Ala Tyr Ala Phe Glu His Ile
        115                 120                 125

Ala Ser Gln Thr Arg Gly Val Pro Pro Gln Leu Val Leu Gln Val Ile
    130                 135                 140

Ala Arg Ile Gly His Ala Val Ala Ala Thr Gly Leu Val Gly Gly Gln
145                 150                 155                 160
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[0329]

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

Glu Tyr Ile His Ser His Lys Thr Gly Ala Leu Leu Glu Ala Ser Val
            180                 185                 190

Val Ser Gly Gly Ile Leu Ala Gly Ala Asp Glu Glu Leu Leu Ala Arg
        195                 200                 205

Leu Ser His Tyr Ala Arg Asp Ile Gly Leu Ala Phe Gln Ile Val Asp
    210                 215                 220

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

Gly Lys Asp Gln Ala Ala Ala Lys Ala Thr Tyr Pro Ser Leu Leu Gly
                245                 250                 255

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

Glu Ala Leu Arg Pro Tyr Gly Ser Gln Ala Glu Pro Leu Leu Ala Leu
        275                 280                 285

Ala Asp Phe Ile Thr Arg Arg Gln His
    290                 295
```

<210> 150
<211> 778
<212> PRT
<213> 玉蜀黍

<400> 150

Met Ala Gln His Thr Ser Glu Ser Ala Ala Val Ala Lys Gly Ser Ser
1 5 10 15

Leu Thr Pro Ile Val Arg Thr Asp Ala Glu Ser Arg Arg Thr Arg Trp
20 25 30

Pro Thr Asp Asp Asp Asp Ala Glu Pro Leu Val Asp Glu Ile Arg Ala
35 40 45

Met Leu Thr Ser Met Ser Asp Gly Asp Ile Ser Val Ser Ala Tyr Asp
50 55 60

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

Gln Phe Pro Ala Ala Val Arg Trp Ile Arg Asn Asn Gln Leu Pro Asp
85 90 95

Gly Ser Trp Gly Asp Ala Ala Leu Phe Ser Ala Tyr Asp Arg Leu Ile
100 105 110

[0330]

Asn Thr Leu Ala Cys Val Val Thr Leu Thr Arg Trp Ser Leu Glu Pro
115 120 125

Glu Met Arg Gly Arg Gly Leu Ser Phe Leu Gly Arg Asn Met Trp Lys
130 135 140

Leu Ala Thr Glu Asp Glu Glu Ser Met Pro Ile Gly Phe Glu Leu Ala
145 150 155 160

Phe Pro Ser Leu Ile Glu Leu Ala Lys Ser Leu Gly Val His Asp Phe
165 170 175

Pro Tyr Asp His Gln Ala Leu Gln Gly Ile Tyr Ser Ser Arg Glu Ile
180 185 190

Lys Met Lys Arg Ile Pro Lys Glu Val Met His Thr Val Pro Thr Ser
195 200 205

Ile Leu His Ser Leu Glu Gly Met Pro Gly Leu Asp Trp Ala Lys Leu
210 215 220

Leu Lys Leu Gln Ser Ser Asp Gly Ser Phe Leu Phe Ser Pro Ala Ala
225 230 235 240

Thr Ala Tyr Ala Leu Met Asn Thr Gly Asp Asp Arg Cys Phe Ser Tyr
245 250 255

Ile Asp Arg Thr Val Lys Lys Phe Asn Gly Gly Val Pro Asn Val Tyr
260 265 270

Pro Val Asp Leu Phe Glu His Ile Trp Ala Val Asp Arg Leu Glu Arg
275 280 285

Leu Gly Ile Ser Arg Tyr Phe Gln Lys Glu Ile Glu Gln Cys Met Asp
290 295 300

Tyr Val Asn Arg His Trp Thr Glu Asp Gly Ile Cys Trp Ala Arg Asn
305 310 315 320

Ser Asp Val Lys Glu Val Asp Asp Thr Ala Met Ala Phe Arg Leu Leu
325 330 335

Arg Leu His Gly Tyr Ser Val Ser Pro Asp Val Phe Lys Asn Phe Glu
340 345 350

Lys Asp Gly Glu Phe Phe Ala Phe Val Gly Gln Ser Asn Gln Ala Val
355 360 365

Thr Gly Met Tyr Asn Leu Asn Arg Ala Ser Gln Ile Ser Phe Pro Gly
370 375 380

Glu Asp Val Leu His Arg Ala Gly Ala Phe Ser Tyr Glu Phe Leu Arg
385 390 395 400

[0331]

Arg Lys Glu Ala Glu Gly Ala Leu Arg Asp Lys Trp Ile Ile Ser Lys
405 410 415

Asp Leu Pro Gly Glu Val Val Tyr Thr Leu Asp Phe Pro Trp Tyr Gly
420 425 430

Asn Leu Pro Arg Val Glu Ala Arg Asp Tyr Leu Glu Gln Tyr Gly Gly
435 440 445

Gly Asp Asp Val Trp Ile Gly Lys Thr Leu Tyr Arg Met Pro Leu Val
450 455 460

Asn Asn Asp Val Tyr Leu Glu Leu Ala Arg Met Asp Phe Asn His Cys
465 470 475 480

Gln Ala Leu His Gln Leu Glu Trp Gln Gly Leu Lys Arg Trp Tyr Thr
485 490 495

Glu Asn Arg Leu Met Asp Phe Gly Val Ala Gln Glu Asp Ala Leu Arg
500 505 510

Ala Tyr Phe Leu Ala Ala Ala Ser Val Tyr Glu Pro Cys Arg Ala Ala
515 520 525

Glu Arg Leu Ala Trp Ala Arg Ala Ala Ile Leu Ala Asn Ala Val Ser

530 535 540

Thr His Leu Arg Asn Ser Pro Ser Phe Arg Glu Arg Leu Glu His Ser
545 550 555 560

Leu Arg Cys Arg Pro Ser Glu Glu Thr Asp Gly Ser Trp Phe Asn Ser
565 570 575

Ser Ser Gly Ser Asp Ala Val Leu Val Lys Ala Val Leu Arg Leu Thr
580 585 590

Asp Ser Leu Ala Arg Glu Ala Gln Pro Ile His Gly Gly Asp Pro Glu
595 600 605

Asp Ile Ile His Lys Leu Leu Arg Ser Ala Trp Ala Glu Trp Val Arg
610 615 620

Glu Lys Ala Asp Ala Ala Asp Ser Val Cys Asn Gly Ser Ser Ala Val
625 630 635 640

Glu Gln Glu Gly Ser Arg Met Val His Asp Lys Gln Thr Cys Leu Leu
645 650 655

Leu Ala Arg Met Ile Glu Ile Ser Ala Gly Arg Ala Ala Gly Glu Ala
660 665 670

[0332] Ala Ser Glu Asp Gly Asp Arg Arg Ile Ile Gln Leu Thr Gly Ser Ile
675 680 685

Cys Asp Ser Leu Lys Gln Lys Met Leu Val Ser Gln Asp Pro Glu Lys
690 695 700

Asn Glu Glu Met Met Ser His Val Asp Asp Glu Leu Lys Leu Arg Ile
705 710 715 720

Arg Glu Phe Val Gln Tyr Leu Leu Arg Leu Gly Glu Lys Lys Thr Gly
725 730 735

Ser Ser Glu Thr Arg Gln Thr Phe Leu Ser Ile Val Lys Ser Cys Tyr
740 745 750

Tyr Ala Ala His Cys Pro Pro His Val Val Asp Arg His Ile Ser Arg
755 760 765

Val Ile Phe Glu Pro Val Ser Ala Ala Lys
770 775

<210> 151
<211> 785
<212> PRT
<213> 拟南芥

<400> 151

Met Ser Ile Asn Leu Arg Ser Ser Gly Cys Ser Ser Pro Ile Ser Ala

1 5 10 15

Thr Leu Glu Arg Gly Leu Asp Ser Glu Val Gln Thr Arg Ala Asn Asn
20 25 30

Val Ser Phe Glu Gln Thr Lys Glu Lys Ile Arg Lys Met Leu Glu Lys
35 40 45

Val Glu Leu Ser Val Ser Ala Tyr Asp Thr Ser Trp Val Ala Met Val
50 55 60

Pro Ser Pro Ser Ser Gln Asn Ala Pro Leu Phe Pro Gln Cys Val Lys
65 70 75 80

Trp Leu Leu Asp Asn Gln His Glu Asp Gly Ser Trp Gly Leu Asp Asn
85 90 95

His Asp His Gln Ser Leu Lys Lys Asp Val Leu Ser Ser Thr Leu Ala
100 105 110

Ser Ile Leu Ala Leu Lys Lys Trp Gly Ile Gly Glu Arg Gln Ile Asn
115 120 125

Lys Gly Leu Gln Phe Ile Glu Leu Asn Ser Ala Leu Val Thr Asp Glu
130 135 140

[0333]

Thr Ile Gln Lys Pro Thr Gly Phe Asp Ile Ile Phe Pro Gly Met Ile
145 150 155 160

Lys Tyr Ala Arg Asp Leu Asn Leu Thr Ile Pro Leu Gly Ser Glu Val
165 170 175

Val Asp Asp Met Ile Arg Lys Arg Asp Leu Asp Leu Lys Cys Asp Ser
180 185 190

Glu Lys Phe Ser Lys Gly Arg Glu Ala Tyr Leu Ala Tyr Val Leu Glu
195 200 205

Gly Thr Arg Asn Leu Lys Asp Trp Asp Leu Ile Val Lys Tyr Gln Arg
210 215 220

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

Thr Gln Phe Gly Asn Asp Gly Cys Leu Arg Tyr Leu Cys Ser Leu Leu
245 250 255

Gln Lys Phe Glu Ala Ala Val Pro Ser Val Tyr Pro Phe Asp Gln Tyr
260 265 270

Ala Arg Leu Ser Ile Ile Val Thr Leu Glu Ser Leu Gly Ile Asp Arg
275 280 285

Asp Phe Lys Thr Glu Ile Lys Ser Ile Leu Asp Glu Thr Tyr Arg Tyr
290 295 300

Trp Leu Arg Gly Asp Glu Glu Ile Cys Leu Asp Leu Ala Thr Cys Ala
305 310 315 320

Leu Ala Phe Arg Leu Leu Leu Ala His Gly Tyr Asp Val Ser Tyr Asp
325 330 335

Pro Leu Lys Pro Phe Ala Glu Glu Ser Gly Phe Ser Asp Thr Leu Glu
340 345 350

Gly Tyr Val Lys Asn Thr Phe Ser Val Leu Glu Leu Phe Lys Ala Ala
355 360 365

Gln Ser Tyr Pro His Glu Ser Ala Leu Lys Lys Gln Cys Cys Trp Thr
370 375 380

Lys Gln Tyr Leu Glu Met Glu Leu Ser Ser Trp Val Lys Thr Ser Val
385 390 395 400

Arg Asp Lys Tyr Leu Lys Lys Glu Val Glu Asp Ala Leu Ala Phe Pro
405 410 415

Ser Tyr Ala Ser Leu Glu Arg Ser Asp His Arg Arg Lys Ile Leu Asn
420 425 430

[0334]

Gly Ser Ala Val Glu Asn Thr Arg Val Thr Lys Thr Ser Tyr Arg Leu
435 440 445

His Asn Ile Cys Thr Ser Asp Ile Leu Lys Leu Ala Val Asp Asp Phe
450 455 460

Asn Phe Cys Gln Ser Ile His Arg Glu Glu Met Glu Arg Leu Asp Arg
465 470 475 480

Trp Ile Val Glu Asn Arg Leu Gln Glu Leu Lys Phe Ala Arg Gln Lys
485 490 495

Leu Ala Tyr Cys Tyr Phe Ser Gly Ala Ala Thr Leu Phe Ser Pro Glu
500 505 510

Leu Ser Asp Ala Arg Ile Ser Trp Ala Lys Gly Gly Val Leu Thr Thr
515 520 525

Val Val Asp Asp Phe Phe Asp Val Gly Gly Ser Lys Glu Glu Leu Glu
530 535 540

Asn Leu Ile His Leu Val Glu Lys Trp Asp Leu Asn Gly Val Pro Glu
545 550 555 560

Tyr Ser Ser Glu His Val Glu Ile Ile Phe Ser Val Leu Arg Asp Thr
565 570 575

Ile Leu Glu Thr Gly Asp Lys Ala Phe Thr Tyr Gln Gly Arg Asn Val
580 585 590

Thr His His Ile Val Lys Ile Trp Leu Asp Leu Leu Lys Ser Met Leu
595 600 605

Arg Glu Ala Glu Trp Ser Ser Asp Lys Ser Thr Pro Ser Leu Glu Asp
610 615 620

Tyr Met Glu Asn Ala Tyr Ile Ser Phe Ala Leu Gly Pro Ile Val Leu
625 630 635 640

Pro Ala Thr Tyr Leu Ile Gly Pro Pro Leu Pro Glu Lys Thr Val Asp
645 650 655

Ser His Gln Tyr Asn Gln Leu Tyr Lys Leu Val Ser Thr Met Gly Arg
660 665 670

Leu Leu Asn Asp Ile Gln Gly Phe Lys Arg Glu Ser Ala Glu Gly Lys
675 680 685

Leu Asn Ala Val Ser Leu His Met Lys His Glu Arg Asp Asn Arg Ser
690 695 700

Lys Glu Val Ile Ile Glu Ser Met Lys Gly Leu Ala Glu Arg Lys Arg
705 710 715 720

[0335]

Glu Glu Leu His Lys Leu Val Leu Glu Glu Lys Gly Ser Val Val Pro
725 730 735

Arg Glu Cys Lys Glu Ala Phe Leu Lys Met Ser Lys Val Leu Asn Leu
740 745 750

Phe Tyr Arg Lys Asp Asp Gly Phe Thr Ser Asn Asp Leu Met Ser Leu
755 760 765

Val Lys Ser Val Ile Tyr Glu Pro Val Ser Leu Gln Lys Glu Ser Leu
770 775 780

Thr
785

<210> 152
<211> 513
<212> PRT
<213> 甜叶菊

<400> 152

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

Ile Gly Gly Thr Ala Val Ala Leu Ala Val Ala Leu Ile Phe Trp Tyr
20 25 30

```
Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser Asn His Leu Pro
        35                  40                  45

Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly Asn Leu Leu Gln
    50                  55                  60

Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg Trp Ala Ala Thr
65                  70                  75                  80

Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr Ser Met Val Val
                85                  90                  95

Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val Thr Arg Phe Gln
            100                 105                 110

Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys Val Leu Thr Ala
        115                 120                 125

Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp Tyr His Lys Thr
    130                 135                 140

Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro Asn Ala Gln Lys
145                 150                 155                 160

Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn Ile Ser Thr Gln
                165                 170                 175
```

[0336]

```
Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu Glu Val Asp Leu
            180                 185                 190

Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala Met Arg Gln Ala
        195                 200                 205

Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp Leu Lys Ile Thr
    210                 215                 220

Met Asn Arg Asp Glu Ile Phe Gln Val Leu Val Val Asp Pro Met Met
225                 230                 235                 240

Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Lys Trp
                245                 250                 255

Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln Met Tyr Ile Arg
            260                 265                 270

Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu His Lys Lys Arg Ile
        275                 280                 285

Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr Leu Leu Ser Glu
    290                 295                 300

Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser Leu Trp Glu Pro
305                 310                 315                 320
```

Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr Glu Trp Ala Met
325 330 335

Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg Leu Tyr Arg Asp
340 345 350

Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu Glu His Leu Ser
355 360 365

Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr Leu Arg Arg His
370 375 380

Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His Glu Asp Thr Val
385 390 395 400

Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu Ala Val Asn Ile
405 410 415

Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn Pro Glu Glu Trp
420 425 430

Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile Asp Phe Gln Lys
435 440 445

Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala Gly Ser Leu Gln
450 455 460

[0337]

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

Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val Asn Thr Ile Gly
485 490 495

Leu Thr Thr Gln Met Leu Arg Pro Leu Arg Ala Ile Ile Lys Pro Arg
500 505 510

Ile

<210> 153
<211> 712
<212> PRT
<213> 拟南芥

<400> 153

Met Ser Ser Ser Ser Ser Ser Ser Thr Ser Met Ile Asp Leu Met Ala
1 5 10 15

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

Ser Ala Tyr Glu Ser Val Ala Ala Glu Leu Ser Ser Met Leu Ile Glu
35 40 45

Asn Arg Gln Phe Ala Met Ile Val Thr Thr Ser Ile Ala Val Leu Ile
50 55 60

Gly Cys Ile Val Met Leu Val Trp Arg Arg Ser Gly Ser Gly Asn Ser
65 70 75 80

Lys Arg Val Glu Pro Leu Lys Pro Leu Val Ile Lys Pro Arg Glu Glu
85 90 95

Glu Ile Asp Asp Gly Arg Lys Lys Val Thr Ile Phe Phe Gly Thr Gln
100 105 110

Thr Gly Thr Ala Glu Gly Phe Ala Lys Ala Leu Gly Glu Glu Ala Lys
115 120 125

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

Ala Ala Asp Asp Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Asp Val
145 150 155 160

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

Ala Ala Arg Phe Tyr Lys Trp Phe Thr Glu Gly Asn Asp Arg Gly Glu
180 185 190

[0338]

Trp Leu Lys Asn Leu Lys Tyr Gly Val Phe Gly Leu Gly Asn Arg Gln
195 200 205

Tyr Glu His Phe Asn Lys Val Ala Lys Val Val Asp Asp Ile Leu Val
210 215 220

Glu Gln Gly Ala Gln Arg Leu Val Gln Val Gly Leu Gly Asp Asp Asp
225 230 235 240

Gln Cys Ile Glu Asp Asp Phe Thr Ala Trp Arg Glu Ala Leu Trp Pro
245 250 255

Glu Leu Asp Thr Ile Leu Arg Glu Glu Gly Asp Thr Ala Val Ala Thr
260 265 270

Pro Tyr Thr Ala Ala Val Leu Glu Tyr Arg Val Ser Ile His Asp Ser
275 280 285

Glu Asp Ala Lys Phe Asn Asp Ile Thr Leu Ala Asn Gly Asn Gly Tyr
290 295 300

Thr Val Phe Asp Ala Gln His Pro Tyr Lys Ala Asn Val Ala Val Lys
305 310 315 320

Arg Glu Leu His Thr Pro Glu Ser Asp Arg Ser Cys Ile His Leu Glu

325 330 335

Phe Asp Ile Ala Gly Ser Gly Leu Thr Met Lys Leu Gly Asp His Val
340 345 350

Gly Val Leu Cys Asp Asn Leu Ser Glu Thr Val Asp Glu Ala Leu Arg
355 360 365

Leu Leu Asp Met Ser Pro Asp Thr Tyr Phe Ser Leu His Ala Glu Lys
370 375 380

Glu Asp Gly Thr Pro Ile Ser Ser Ser Leu Pro Pro Pro Phe Pro Pro
385 390 395 400

Cys Asn Leu Arg Thr Ala Leu Thr Arg Tyr Ala Cys Leu Leu Ser Ser
405 410 415

Pro Lys Lys Ser Ala Leu Val Ala Leu Ala Ala His Ala Ser Asp Pro
420 425 430

Thr Glu Ala Glu Arg Leu Lys His Leu Ala Ser Pro Ala Gly Lys Asp
435 440 445

Glu Tyr Ser Lys Trp Val Val Glu Ser Gln Arg Ser Leu Leu Glu Val
450 455 460

[0339]

Met Ala Glu Phe Pro Ser Ala Lys Pro Pro Leu Gly Val Phe Phe Ala
465 470 475 480

Gly Val Ala Pro Arg Leu Gln Pro Arg Phe Tyr Ser Ile Ser Ser Ser
485 490 495

Pro Lys Ile Ala Glu Thr Arg Ile His Val Thr Cys Ala Leu Val Tyr
500 505 510

Glu Lys Met Pro Thr Gly Arg Ile His Lys Gly Val Cys Ser Thr Trp
515 520 525

Met Lys Asn Ala Val Pro Tyr Glu Lys Ser Glu Lys Leu Phe Leu Gly
530 535 540

Arg Pro Ile Phe Val Arg Gln Ser Asn Phe Lys Leu Pro Ser Asp Ser
545 550 555 560

Lys Val Pro Ile Ile Met Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe
565 570 575

Arg Gly Phe Leu Gln Glu Arg Leu Ala Leu Val Glu Ser Gly Val Glu
580 585 590

Leu Gly Pro Ser Val Leu Phe Phe Gly Cys Arg Asn Arg Arg Met Asp
595 600 605

Phe Ile Tyr Glu Glu Glu Leu Gln Arg Phe Val Glu Ser Gly Ala Leu
610 615 620

Ala Glu Leu Ser Val Ala Phe Ser Arg Glu Gly Pro Thr Lys Glu Tyr
625 630 635 640

Val Gln His Lys Met Met Asp Lys Ala Ser Asp Ile Trp Asn Met Ile
645 650 655

Ser Gln Gly Ala Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala
660 665 670

Arg Asp Val His Arg Ser Leu His Thr Ile Ala Gln Glu Gln Gly Ser
675 680 685

Met Asp Ser Thr Lys Ala Glu Gly Phe Val Lys Asn Leu Gln Thr Ser
690 695 700

Gly Arg Tyr Leu Arg Asp Val Trp
705 710

<210> 154
<211> 500
<212> PRT
<213> 甜叶菊

<400> 154

[0340]

Met Glu Ala Ser Tyr Leu Tyr Ile Ser Ile Leu Leu Leu Leu Ala Ser
1 5 10 15

Tyr Leu Phe Thr Thr Gln Leu Arg Arg Lys Ser Ala Asn Leu Pro Pro
20 25 30

Thr Val Phe Pro Ser Ile Pro Ile Ile Gly His Leu Tyr Leu Leu Lys
35 40 45

Lys Pro Leu Tyr Arg Thr Leu Ala Lys Ile Ala Ala Lys Tyr Gly Pro
50 55 60

Ile Leu Gln Leu Gln Leu Gly Tyr Arg Arg Val Leu Val Ile Ser Ser
65 70 75 80

Pro Ser Ala Ala Glu Glu Cys Phe Thr Asn Asn Asp Val Ile Phe Ala
85 90 95

Asn Arg Pro Lys Thr Leu Phe Gly Lys Ile Val Gly Gly Thr Ser Leu
100 105 110

Gly Ser Leu Ser Tyr Gly Asp Gln Trp Arg Asn Leu Arg Arg Val Ala
115 120 125

Ser Ile Glu Ile Leu Ser Val His Arg Leu Asn Glu Phe His Asp Ile
130 135 140

```
Arg Val Asp Glu Asn Arg Leu Leu Ile Arg Lys Leu Arg Ser Ser Ser
145                 150                 155                 160

Ser Pro Val Thr Leu Ile Thr Val Phe Tyr Ala Leu Thr Leu Asn Val
                165                 170                 175

Ile Met Arg Met Ile Ser Gly Lys Arg Tyr Phe Asp Ser Gly Asp Arg
            180                 185                 190

Glu Leu Glu Glu Glu Gly Lys Arg Phe Arg Glu Ile Leu Asp Glu Thr
        195                 200                 205

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

Asn Trp Leu Gly Val Lys Ser Leu Glu Lys Lys Leu Ile Ala Leu Gln
225                 230                 235                 240

Lys Lys Arg Asp Asp Phe Phe Gln Gly Leu Ile Glu Gln Val Arg Lys
                245                 250                 255

Ser Arg Gly Ala Lys Val Gly Lys Gly Arg Lys Thr Met Ile Glu Leu
            260                 265                 270

Leu Leu Ser Leu Gln Glu Ser Glu Pro Glu Tyr Tyr Thr Asp Ala Met
        275                 280                 285
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[0341]

```
Ile Arg Ser Phe Val Leu Gly Leu Leu Ala Ala Gly Ser Asp Thr Ser
    290                 295                 300

Ala Gly Thr Met Glu Trp Ala Met Ser Leu Leu Val Asn His Pro His
305                 310                 315                 320

Val Leu Lys Lys Ala Gln Ala Glu Ile Asp Arg Val Ile Gly Asn Asn
                325                 330                 335

Arg Leu Ile Asp Glu Ser Asp Ile Gly Asn Ile Pro Tyr Ile Gly Cys
            340                 345                 350

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

Pro His Glu Ser Ser Ala Asp Cys Val Ile Ser Gly Tyr Asn Ile Pro
    370                 375                 380

Arg Gly Thr Met Leu Ile Val Asn Gln Trp Ala Ile His His Asp Pro
385                 390                 395                 400

Lys Val Trp Asp Asp Pro Glu Thr Phe Lys Pro Glu Arg Phe Gln Gly
                405                 410                 415

Leu Glu Gly Thr Arg Asp Gly Phe Lys Leu Met Pro Phe Gly Ser Gly
            420                 425                 430
```

Arg Arg Gly Cys Pro Gly Glu Gly Leu Ala Ile Arg Leu Leu Gly Met
435 440 445

Thr Leu Gly Ser Val Ile Gln Cys Phe Asp Trp Glu Arg Val Gly Asp
450 455 460

Glu Met Val Asp Met Thr Glu Gly Leu Gly Val Thr Leu Pro Lys Ala
465 470 475 480

Val Pro Leu Val Ala Lys Cys Lys Pro Arg Ser Glu Met Thr Asn Leu
485 490 495

Leu Ser Glu Leu
500

<210> 155
<211> 707
<212> PRT
<213> 甜叶菊

<400> 155

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

Leu Phe Ser Gly Lys Val Leu Asp Thr Ser Asn Ala Ser Glu Ser Gly
20 25 30

[0342]

Glu Ser Ala Met Leu Pro Thr Ile Ala Met Ile Met Glu Asn Arg Glu
35 40 45

Leu Leu Met Ile Leu Thr Thr Ser Val Ala Val Leu Ile Gly Cys Val
50 55 60

Val Val Leu Val Trp Arg Arg Ser Ser Thr Lys Lys Ser Ala Leu Glu
65 70 75 80

Pro Pro Val Ile Val Val Pro Lys Arg Val Gln Glu Glu Glu Val Asp
85 90 95

Asp Gly Lys Lys Lys Val Thr Val Phe Phe Gly Thr Gln Thr Gly Thr
100 105 110

Ala Glu Gly Phe Ala Lys Ala Leu Val Glu Glu Ala Lys Ala Arg Tyr
115 120 125

Glu Lys Ala Val Phe Lys Val Ile Asp Leu Asp Asp Tyr Ala Ala Asp
130 135 140

Asp Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Ser Leu Ala Phe Phe
145 150 155 160

Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn Ala Ala Arg
165 170 175

Phe Tyr Lys Trp Phe Thr Glu Gly Asp Ala Lys Gly Glu Trp Leu Asn
180 185 190

Lys Leu Gln Tyr Gly Val Phe Gly Leu Gly Asn Arg Gln Tyr Glu His
195 200 205

Phe Asn Lys Ile Ala Lys Val Val Asp Asp Gly Leu Val Glu Gln Gly
210 215 220

Ala Lys Arg Leu Val Pro Val Gly Leu Gly Asp Asp Asp Gln Cys Ile
225 230 235 240

Glu Asp Asp Phe Thr Ala Trp Lys Glu Leu Val Trp Pro Glu Leu Asp
245 250 255

Gln Leu Leu Arg Asp Glu Asp Asp Thr Thr Val Ala Thr Pro Tyr Thr
260 265 270

Ala Ala Val Ala Glu Tyr Arg Val Val Phe His Glu Lys Pro Asp Ala
275 280 285

Leu Ser Glu Asp Tyr Ser Tyr Thr Asn Gly His Ala Val His Asp Ala
290 295 300

Gln His Pro Cys Arg Ser Asn Val Ala Val Lys Lys Glu Leu His Ser
305 310 315 320

[0343]

Pro Glu Ser Asp Arg Ser Cys Thr His Leu Glu Phe Asp Ile Ser Asn
325 330 335

Thr Gly Leu Ser Tyr Glu Thr Gly Asp His Val Gly Val Tyr Cys Glu
340 345 350

Asn Leu Ser Glu Val Val Asn Asp Ala Glu Arg Leu Val Gly Leu Pro
355 360 365

Pro Asp Thr Tyr Ser Ser Ile His Thr Asp Ser Glu Asp Gly Ser Pro
370 375 380

Leu Gly Gly Ala Ser Leu Pro Pro Pro Phe Pro Pro Cys Thr Leu Arg
385 390 395 400

Lys Ala Leu Thr Cys Tyr Ala Asp Val Leu Ser Ser Pro Lys Lys Ser
405 410 415

Ala Leu Leu Ala Leu Ala Ala His Ala Thr Asp Pro Ser Glu Ala Asp
420 425 430

Arg Leu Lys Phe Leu Ala Ser Pro Ala Gly Lys Asp Glu Tyr Ser Gln
435 440 445

Trp Ile Val Ala Ser Gln Arg Ser Leu Leu Glu Val Met Glu Ala Phe
450 455 460

Pro Ser Ala Lys Pro Ser Leu Gly Val Phe Phe Ala Ser Val Ala Pro
465 470 475 480

Arg Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro Lys Met Ala
485 490 495

Pro Asp Arg Ile His Val Thr Cys Ala Leu Val Tyr Glu Lys Thr Pro
500 505 510

Ala Gly Arg Ile His Lys Gly Val Cys Ser Thr Trp Met Lys Asn Ala
515 520 525

Val Pro Met Thr Glu Ser Gln Asp Cys Ser Trp Ala Pro Ile Tyr Val
530 535 540

Arg Thr Ser Asn Phe Arg Leu Pro Ser Asp Pro Lys Val Pro Val Ile
545 550 555 560

Met Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly Phe Leu Gln
565 570 575

Glu Arg Leu Ala Leu Lys Glu Ala Gly Thr Asp Leu Gly Leu Ser Ile
580 585 590

Leu Phe Phe Gly Cys Arg Asn Arg Lys Val Asp Phe Ile Tyr Glu Asn
595 600 605

[0344]

Glu Leu Asn Asn Phe Val Glu Thr Gly Ala Leu Ser Glu Leu Ile Val
610 615 620

Ala Phe Ser Arg Glu Gly Pro Thr Lys Glu Tyr Val Gln His Lys Met
625 630 635 640

Ser Glu Lys Ala Ser Asp Ile Trp Asn Leu Leu Ser Glu Gly Ala Tyr
645 650 655

Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Lys Asp Val His Arg
660 665 670

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

Ala Glu Leu Tyr Val Lys Asn Leu Gln Met Ser Gly Arg Tyr Leu Arg
690 695 700

Asp Val Trp
705

<210> 156
<211> 481
<212> PRT
<213> 甜叶菊

<400> 156

Met Asp Ala Met Ala Thr Thr Glu Lys Lys Pro His Val Ile Phe Ile
1 5 10 15

Pro Phe Pro Ala Gln Ser His Ile Lys Ala Met Leu Lys Leu Ala Gln
20 25 30

Leu Leu His His Lys Gly Leu Gln Ile Thr Phe Val Asn Thr Asp Phe
35 40 45

Ile His Asn Gln Phe Leu Glu Ser Ser Gly Pro His Cys Leu Asp Gly
50 55 60

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

Pro Glu Ala Ser Ile Pro Ile Arg Glu Ser Leu Leu Arg Ser Ile Glu
85 90 95

Thr Asn Phe Leu Asp Arg Phe Ile Asp Leu Val Thr Lys Leu Pro Asp
100 105 110

Pro Pro Thr Cys Ile Ile Ser Asp Gly Phe Leu Ser Val Phe Thr Ile
115 120 125

[0345] Asp Ala Ala Lys Lys Leu Gly Ile Pro Val Met Met Tyr Trp Thr Leu
130 135 140

Ala Ala Cys Gly Phe Met Gly Phe Tyr His Ile His Ser Leu Ile Glu
145 150 155 160

Lys Gly Phe Ala Pro Leu Lys Asp Ala Ser Tyr Leu Thr Asn Gly Tyr
165 170 175

Leu Asp Thr Val Ile Asp Trp Val Pro Gly Met Glu Gly Ile Arg Leu
180 185 190

Lys Asp Phe Pro Leu Asp Trp Ser Thr Asp Leu Asn Asp Lys Val Leu
195 200 205

Met Phe Thr Thr Glu Ala Pro Gln Arg Ser His Lys Val Ser His His
210 215 220

Ile Phe His Thr Phe Asp Glu Leu Glu Pro Ser Ile Ile Lys Thr Leu
225 230 235 240

Ser Leu Arg Tyr Asn His Ile Tyr Thr Ile Gly Pro Leu Gln Leu Leu
245 250 255

Leu Asp Gln Ile Pro Glu Glu Lys Lys Gln Thr Gly Ile Thr Ser Leu
260 265 270

His Gly Tyr Ser Leu Val Lys Glu Glu Pro Glu Cys Phe Gln Trp Leu

275 280 285

Gln Ser Lys Glu Pro Asn Ser Val Val Tyr Val Asn Phe Gly Ser Thr
290 295 300

Thr Val Met Ser Leu Glu Asp Met Thr Glu Phe Gly Trp Gly Leu Ala
305 310 315 320

Asn Ser Asn His Tyr Phe Leu Trp Ile Ile Arg Ser Asn Leu Val Ile
325 330 335

Gly Glu Asn Ala Val Leu Pro Pro Glu Leu Glu Glu His Ile Lys Lys
340 345 350

Arg Gly Phe Ile Ala Ser Trp Cys Ser Gln Glu Lys Val Leu Lys His
355 360 365

Pro Ser Val Gly Gly Phe Leu Thr His Cys Gly Trp Gly Ser Thr Ile
370 375 380

Glu Ser Leu Ser Ala Gly Val Pro Met Ile Cys Trp Pro Tyr Ser Trp
385 390 395 400

Asp Gln Leu Thr Asn Cys Arg Tyr Ile Cys Lys Glu Trp Glu Val Gly
405 410 415

[0346] Leu Glu Met Gly Thr Lys Val Lys Arg Asp Glu Val Lys Arg Leu Val
420 425 430

Gln Glu Leu Met Gly Glu Gly Gly His Lys Met Arg Asn Lys Ala Lys
435 440 445

Asp Trp Lys Glu Lys Ala Arg Ile Ala Ile Ala Pro Asn Gly Ser Ser
450 455 460

Ser Leu Asn Ile Asp Lys Met Val Lys Glu Ile Thr Val Leu Ala Arg
465 470 475 480

Asn

<210> 157
<211> 460
<212> PRT
<213> 甜叶菊

<400> 157

Met Ala Glu Gln Gln Lys Ile Lys Lys Ser Pro His Val Leu Leu Ile
1 5 10 15

Pro Phe Pro Leu Gln Gly His Ile Asn Pro Phe Ile Gln Phe Gly Lys
20 25 30

Arg Leu Ile Ser Lys Gly Val Lys Thr Thr Leu Val Thr Thr Ile His

35 40 45

Thr Leu Asn Ser Thr Leu Asn His Ser Asn Thr Thr Thr Thr Ser Ile
50 55 60

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

Ala Gly Glu Ser Tyr Leu Glu Thr Phe Lys Gln Val Gly Ser Lys Ser
85 90 95

Leu Ala Asp Leu Ile Lys Lys Leu Gln Ser Glu Gly Thr Thr Ile Asp
100 105 110

Ala Ile Ile Tyr Asp Ser Met Thr Glu Trp Val Leu Asp Val Ala Ile
115 120 125

Glu Phe Gly Ile Asp Gly Gly Ser Phe Phe Thr Gln Ala Cys Val Val
130 135 140

Asn Ser Leu Tyr Tyr His Val His Lys Gly Leu Ile Ser Leu Pro Leu
145 150 155 160

Gly Glu Thr Val Ser Val Pro Gly Phe Pro Val Leu Gln Arg Trp Glu
165 170 175

[0347]

Thr Pro Leu Ile Leu Gln Asn His Glu Gln Ile Gln Ser Pro Trp Ser
180 185 190

Gln Met Leu Phe Gly Gln Phe Ala Asn Ile Asp Gln Ala Arg Trp Val
195 200 205

Phe Thr Asn Ser Phe Tyr Lys Leu Glu Glu Glu Val Ile Glu Trp Thr
210 215 220

Arg Lys Ile Trp Asn Leu Lys Val Ile Gly Pro Thr Leu Pro Ser Met
225 230 235 240

Tyr Leu Asp Lys Arg Leu Asp Asp Asp Lys Asp Asn Gly Phe Asn Leu
245 250 255

Tyr Lys Ala Asn His His Glu Cys Met Asn Trp Leu Asp Asp Lys Pro
260 265 270

Lys Glu Ser Val Val Tyr Val Ala Phe Gly Ser Leu Val Lys His Gly
275 280 285

Pro Glu Gln Val Glu Glu Ile Thr Arg Ala Leu Ile Asp Ser Asp Val
290 295 300

Asn Phe Leu Trp Val Ile Lys His Lys Glu Glu Gly Lys Leu Pro Glu
305 310 315 320

Asn Leu Ser Glu Val Ile Lys Thr Gly Lys Gly Leu Ile Val Ala Trp
325 330 335

Cys Lys Gln Leu Asp Val Leu Ala His Glu Ser Val Gly Cys Phe Val
340 345 350

Thr His Cys Gly Phe Asn Ser Thr Leu Glu Ala Ile Ser Leu Gly Val
355 360 365

Pro Val Val Ala Met Pro Gln Phe Ser Asp Gln Thr Thr Asn Ala Lys
370 375 380

Leu Leu Asp Glu Ile Leu Gly Val Gly Val Arg Val Lys Ala Asp Glu
385 390 395 400

Asn Gly Ile Val Arg Arg Gly Asn Leu Ala Ser Cys Ile Lys Met Ile
405 410 415

Met Glu Glu Glu Arg Gly Val Ile Ile Arg Lys Asn Ala Val Lys Trp
420 425 430

Lys Asp Leu Ala Lys Val Ala Val His Glu Gly Gly Ser Ser Asp Asn
435 440 445

Asp Ile Val Glu Phe Val Ser Glu Leu Ile Lys Ala
450 455 460

[0348]

<210> 158
<211> 458
<212> PRT
<213> 甜叶菊

<400> 158

Met Glu Asn Lys Thr Glu Thr Thr Val Arg Arg Arg Arg Arg Ile Ile
1 5 10 15

Leu Phe Pro Val Pro Phe Gln Gly His Ile Asn Pro Ile Leu Gln Leu
20 25 30

Ala Asn Val Leu Tyr Ser Lys Gly Phe Ser Ile Thr Ile Phe His Thr
35 40 45

Asn Phe Asn Lys Pro Lys Thr Ser Asn Tyr Pro His Phe Thr Phe Arg
50 55 60

Phe Ile Leu Asp Asn Asp Pro Gln Asp Glu Arg Ile Ser Asn Leu Pro
65 70 75 80

Thr His Gly Pro Leu Ala Gly Met Arg Ile Pro Ile Ile Asn Glu His
85 90 95

Gly Ala Asp Glu Leu Arg Arg Glu Leu Glu Leu Leu Met Leu Ala Ser
100 105 110

```
Glu Glu Asp Glu Glu Val Ser Cys Leu Ile Thr Asp Ala Leu Trp Tyr
        115                 120                 125

Phe Ala Gln Ser Val Ala Asp Ser Leu Asn Leu Arg Arg Leu Val Leu
    130                 135                 140

Met Thr Ser Ser Leu Phe Asn Phe His Ala His Val Ser Leu Pro Gln
145                 150                 155                 160

Phe Asp Glu Leu Gly Tyr Leu Asp Pro Asp Asp Lys Thr Arg Leu Glu
                165                 170                 175

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

Ala Tyr Ser Asn Trp Gln Ile Leu Lys Glu Ile Leu Gly Lys Met Ile
        195                 200                 205

Lys Gln Thr Lys Ala Ser Ser Gly Val Ile Trp Asn Ser Phe Lys Glu
    210                 215                 220

Leu Glu Glu Ser Glu Leu Glu Thr Val Ile Arg Glu Ile Pro Ala Pro
225                 230                 235                 240

Ser Phe Leu Ile Pro Leu Pro Lys His Leu Thr Ala Ser Ser Ser Ser
                245                 250                 255
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[0349]

```
Leu Leu Asp His Asp Arg Thr Val Phe Gln Trp Leu Asp Gln Gln Pro
            260                 265                 270

Pro Ser Ser Val Leu Tyr Val Ser Phe Gly Ser Thr Ser Glu Val Asp
        275                 280                 285

Glu Lys Asp Phe Leu Glu Ile Ala Arg Gly Leu Val Asp Ser Lys Gln
    290                 295                 300

Ser Phe Leu Trp Val Val Arg Pro Gly Phe Val Lys Gly Ser Thr Trp
305                 310                 315                 320

Val Glu Pro Leu Pro Asp Gly Phe Leu Gly Glu Arg Gly Arg Ile Val
                325                 330                 335

Lys Trp Val Pro Gln Gln Glu Val Leu Ala His Gly Ala Ile Gly Ala
            340                 345                 350

Phe Trp Thr His Ser Gly Trp Asn Ser Thr Leu Glu Ser Val Cys Glu
        355                 360                 365

Gly Val Pro Met Ile Phe Ser Asp Phe Gly Leu Asp Gln Pro Leu Asn
    370                 375                 380

Ala Arg Tyr Met Ser Asp Val Leu Lys Val Gly Val Tyr Leu Glu Asn
385                 390                 395                 400
```

Gly Trp Glu Arg Gly Glu Ile Ala Asn Ala Ile Arg Arg Val Met Val
405 410 415

Asp Glu Glu Gly Glu Tyr Ile Arg Gln Asn Ala Arg Val Leu Lys Gln
420 425 430

Lys Ala Asp Val Ser Leu Met Lys Gly Gly Ser Ser Tyr Glu Ser Leu
435 440 445

Glu Ser Leu Val Ser Tyr Ile Ser Ser Leu
450 455

<210> 159
<211> 473
<212> PRT
<213> 甜叶菊

<400> 159

Met Ala Thr Ser Asp Ser Ile Val Asp Asp Arg Lys Gln Leu His Val
1 5 10 15

Ala Thr Phe Pro Trp Leu Ala Phe Gly His Ile Leu Pro Tyr Leu Gln
20 25 30

Leu Ser Lys Leu Ile Ala Glu Lys Gly His Lys Val Ser Phe Leu Ser
35 40 45

[0350]

Thr Thr Arg Asn Ile Gln Arg Leu Ser Ser His Ile Ser Pro Leu Ile
50 55 60

Asn Val Val Gln Leu Thr Leu Pro Arg Val Gln Glu Leu Pro Glu Asp
65 70 75 80

Ala Glu Ala Thr Thr Asp Val His Pro Glu Asp Ile Pro Tyr Leu Lys
85 90 95

Lys Ala Ser Asp Gly Leu Gln Pro Glu Val Thr Arg Phe Leu Glu Gln
100 105 110

His Ser Pro Asp Trp Ile Ile Tyr Asp Tyr Thr His Tyr Trp Leu Pro
115 120 125

Ser Ile Ala Ala Ser Leu Gly Ile Ser Arg Ala His Phe Ser Val Thr
130 135 140

Thr Pro Trp Ala Ile Ala Tyr Met Gly Pro Ser Ala Asp Ala Met Ile
145 150 155 160

Asn Gly Ser Asp Gly Arg Thr Thr Val Glu Asp Leu Thr Thr Pro Pro
165 170 175

Lys Trp Phe Pro Phe Pro Thr Lys Val Cys Trp Arg Lys His Asp Leu
180 185 190

```
Ala Arg Leu Val Pro Tyr Lys Ala Pro Gly Ile Ser Asp Gly Tyr Arg
        195                 200                 205

Met Gly Met Val Leu Lys Gly Ser Asp Cys Leu Leu Ser Lys Cys Tyr
    210                 215                 220

His Glu Phe Gly Thr Gln Trp Leu Pro Leu Leu Glu Thr Leu His Gln
225                 230                 235                 240

Val Pro Val Val Pro Val Gly Leu Leu Pro Pro Glu Ile Pro Gly Asp
                245                 250                 255

Glu Lys Asp Glu Thr Trp Val Ser Ile Lys Lys Trp Leu Asp Gly Lys
            260                 265                 270

Gln Lys Gly Ser Val Val Tyr Val Ala Leu Gly Ser Glu Ala Leu Val
        275                 280                 285

Ser Gln Thr Glu Val Val Glu Leu Ala Leu Gly Leu Glu Leu Ser Gly
    290                 295                 300

Leu Pro Phe Val Trp Ala Tyr Arg Lys Pro Lys Gly Pro Ala Lys Ser
305                 310                 315                 320

Asp Ser Val Glu Leu Pro Asp Gly Phe Val Glu Arg Thr Arg Asp Arg
                325                 330                 335
```

[0351]

```
Gly Leu Val Trp Thr Ser Trp Ala Pro Gln Leu Arg Ile Leu Ser His
            340                 345                 350

Glu Ser Val Cys Gly Phe Leu Thr His Cys Gly Ser Gly Ser Ile Val
        355                 360                 365

Glu Gly Leu Met Phe Gly His Pro Leu Ile Met Leu Pro Ile Phe Gly
    370                 375                 380

Asp Gln Pro Leu Asn Ala Arg Leu Leu Glu Asp Lys Gln Val Gly Ile
385                 390                 395                 400

Glu Ile Pro Arg Asn Glu Glu Asp Gly Cys Leu Thr Lys Glu Ser Val
                405                 410                 415

Ala Arg Ser Leu Arg Ser Val Val Val Glu Lys Glu Gly Glu Ile Tyr
            420                 425                 430

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

Glu Lys Glu Tyr Val Ser Gln Phe Val Asp Tyr Leu Glu Lys Asn Ala
    450                 455                 460

Arg Ala Val Ala Ile Asp His Glu Ser
465                 470
```

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<211> 1536
<212> DNA
<213> 人工序列

<220>
<223> 密码子优化的KO

<400> 160

[0352]

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gctttgtctt ggttgttttt gttctacatc aaggtttctt tcttctccaa caaatccgct 120

caagctaaat tgccaccagt tccagttgtt ccaggtttgc cagttattgg taatttgttg 180

caattgaaag aaaagaagcc ataccaaacc ttcactagat gggctgaaga atatggtcca 240

atctactcta ttagaactgg tgcttctact atggttgtct tgaacactac tcaagttgcc 300

aaagaagcta tggttaccag atacttgtct atctctacca gaaagttgtc caacgccttg 360

aaaattttga ccgctgataa gtgcatggtt gccatttctg attacaacga tttccacaag 420

atgatcaaga gatatatctt gtctaacgtt ttgggtccat ctgcccaaaa aagacataga 480

tctaacagag ataccttgag agccaacgtt tgttctagat tgcattccca agttaagaac 540

tctccaagag aagctgtcaa ctttagaaga gttttcgaat gggaattatt cggtatcgct 600

ttgaaacaag ccttcggtaa ggatattgaa aagccaatct acgtcgaaga attgggtact 660

actttgtcca gagatgaaat cttcaaggtt ttggtcttgg acattatgga aggtgccatt 720

gaagttgatt ggagagattt tttcccatac ttgcgttgga ttccaaacac cagaatggaa 780

actaagatcc aaagattata ctttagaaga aaggccgtta tgaccgcctt gattaacgaa 840

caaaagaaaa gaattgcctc cggtgaagaa atcaactgct acatcgattt cttgttgaaa 900

gaaggtaaga ccttgaccat ggaccaaatc tctatgttgt tgtgggaaac cgttattgaa 960

actgctgata ccacaatggt tactactgaa tgggctatgt acgaagttgc taaggattct 1020

aaaagacaag acagattata ccaagaaatc caaaaggtct gcggttctga aatggttaca 1080

gaagaatact tgtcccaatt gccatacttg aatgctgttt tccacgaaac tttgagaaaa 1140

cattctccag ctgctttggt tccattgaga tatgctcatg aagatactca attgggtggt 1200

tattacattc cagccggtac tgaaattgcc attaacatct acggttgcaa catggacaaa 1260

caccaatggg aatctccaga agaatggaag ccagaaagat ttttggatcc taagtttgac 1320

ccaatggact tgtacaaaac tatggctttt ggtgctggta aaagagtttg cgctggttct 1380

ttacaagcta tgttgattgc ttgtccaacc atcggtagat tggttcaaga atttgaatgg 1440

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tatccaatgc atgctatttt gaagccaaga tcttaa 1536

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<400> 161

```
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1               5                  10                  15

Ile Ala Leu Ala Ala Leu Ser Trp Leu Phe Leu Phe Tyr Ile Lys Val
            20                  25                  30

Ser Phe Phe Ser Asn Lys Ser Ala Gln Ala Lys Leu Pro Pro Val Pro
        35                  40                  45

Val Val Pro Gly Leu Pro Val Ile Gly Asn Leu Leu Gln Leu Lys Glu
    50                  55                  60

Lys Lys Pro Tyr Gln Thr Phe Thr Arg Trp Ala Glu Glu Tyr Gly Pro
65                  70                  75                  80

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

Thr Gln Val Ala Lys Glu Ala Met Val Thr Arg Tyr Leu Ser Ile Ser
            100                 105                 110

Thr Arg Lys Leu Ser Asn Ala Leu Lys Ile Leu Thr Ala Asp Lys Cys
        115                 120                 125

Met Val Ala Ile Ser Asp Tyr Asn Asp Phe His Lys Met Ile Lys Arg
    130                 135                 140
```

[0353]

```
Tyr Ile Leu Ser Asn Val Leu Gly Pro Ser Ala Gln Lys Arg His Arg
145                 150                 155                 160

Ser Asn Arg Asp Thr Leu Arg Ala Asn Val Cys Ser Arg Leu His Ser
                165                 170                 175

Gln Val Lys Asn Ser Pro Arg Glu Ala Val Asn Phe Arg Arg Val Phe
            180                 185                 190

Glu Trp Glu Leu Phe Gly Ile Ala Leu Lys Gln Ala Phe Gly Lys Asp
        195                 200                 205

Ile Glu Lys Pro Ile Tyr Val Glu Glu Leu Gly Thr Thr Leu Ser Arg
    210                 215                 220

Asp Glu Ile Phe Lys Val Leu Val Leu Asp Ile Met Glu Gly Ala Ile
225                 230                 235                 240

Glu Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Arg Trp Ile Pro Asn
                245                 250                 255

Thr Arg Met Glu Thr Lys Ile Gln Arg Leu Tyr Phe Arg Arg Lys Ala
            260                 265                 270

Val Met Thr Ala Leu Ile Asn Glu Gln Lys Lys Arg Ile Ala Ser Gly
        275                 280                 285
```

```
Glu Glu Ile Asn Cys Tyr Ile Asp Phe Leu Leu Lys Glu Gly Lys Thr
    290                 295                 300

Leu Thr Met Asp Gln Ile Ser Met Leu Leu Trp Glu Thr Val Ile Glu
305                 310                 315                 320

Thr Ala Asp Thr Thr Met Val Thr Thr Glu Trp Ala Met Tyr Glu Val
                325                 330                 335

Ala Lys Asp Ser Lys Arg Gln Asp Arg Leu Tyr Gln Glu Ile Gln Lys
            340                 345                 350

Val Cys Gly Ser Glu Met Val Thr Glu Glu Tyr Leu Ser Gln Leu Pro
        355                 360                 365

Tyr Leu Asn Ala Val Phe His Glu Thr Leu Arg Lys His Ser Pro Ala
    370                 375                 380

Ala Leu Val Pro Leu Arg Tyr Ala His Glu Asp Thr Gln Leu Gly Gly
385                 390                 395                 400
```

[0354]

```
Tyr Tyr Ile Pro Ala Gly Thr Glu Ile Ala Ile Asn Ile Tyr Gly Cys
                405                 410                 415

Asn Met Asp Lys His Gln Trp Glu Ser Pro Glu Glu Trp Lys Pro Glu
            420                 425                 430

Arg Phe Leu Asp Pro Lys Phe Asp Pro Met Asp Leu Tyr Lys Thr Met
        435                 440                 445

Ala Phe Gly Ala Gly Lys Arg Val Cys Ala Gly Ser Leu Gln Ala Met
    450                 455                 460

Leu Ile Ala Cys Pro Thr Ile Gly Arg Leu Val Gln Glu Phe Glu Trp
465                 470                 475                 480

Lys Leu Arg Asp Gly Glu Glu Glu Asn Val Asp Thr Val Gly Leu Thr
                485                 490                 495

Thr His Lys Arg Tyr Pro Met His Ala Ile Leu Lys Pro Arg Ser
            500                 505                 510
```

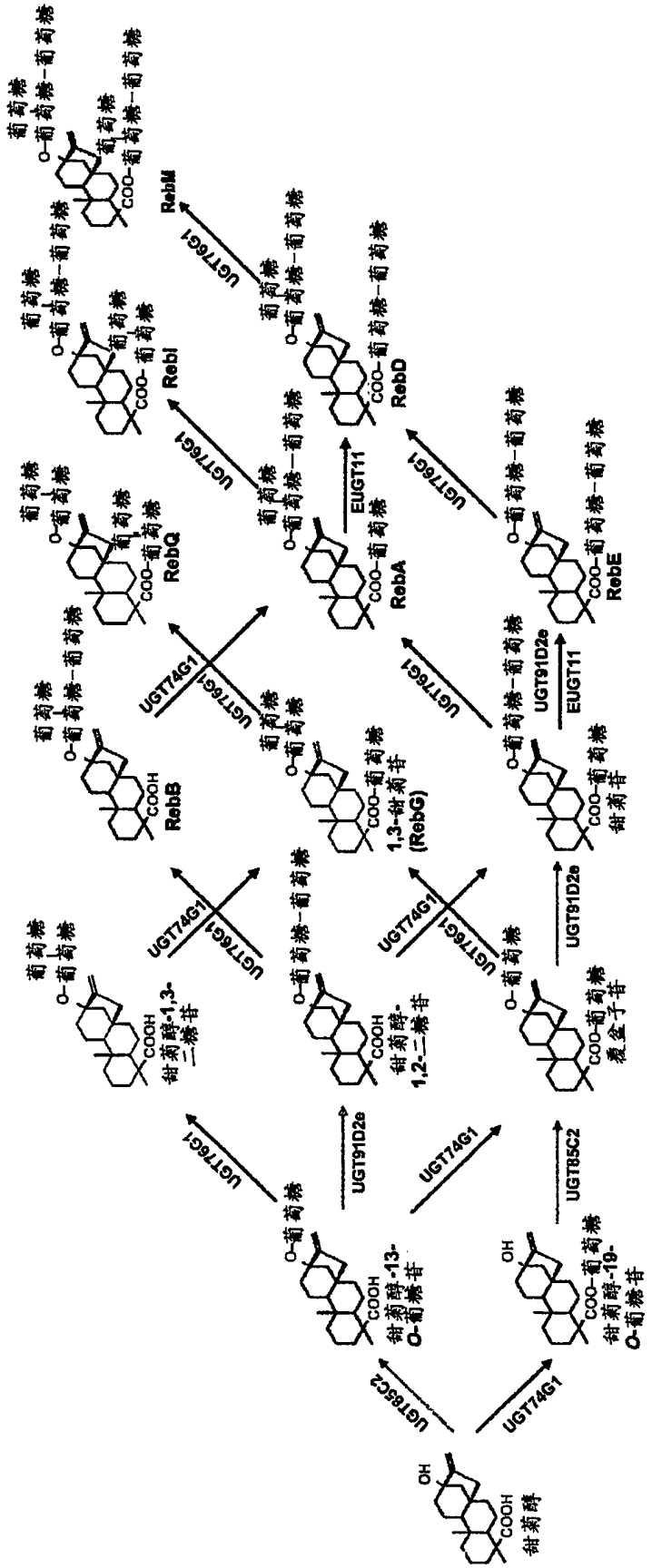
UGT85C2
UGT74G1
UGT91D2e
UGT76G1
RebM
RebI
RebD
RebA
RebQ
RebB
RebE
EUGT11
1,3-甜菊苷 (RebG)
甜菊醇
甜菊醇-13-O-葡糖苷
甜菊醇-19-O-葡糖苷
甜菊醇-1,3-二糖苷
甜菊醇-1,2-二糖苷
瘦金子苷
葡萄糖
COOH
OH
COO-

图1

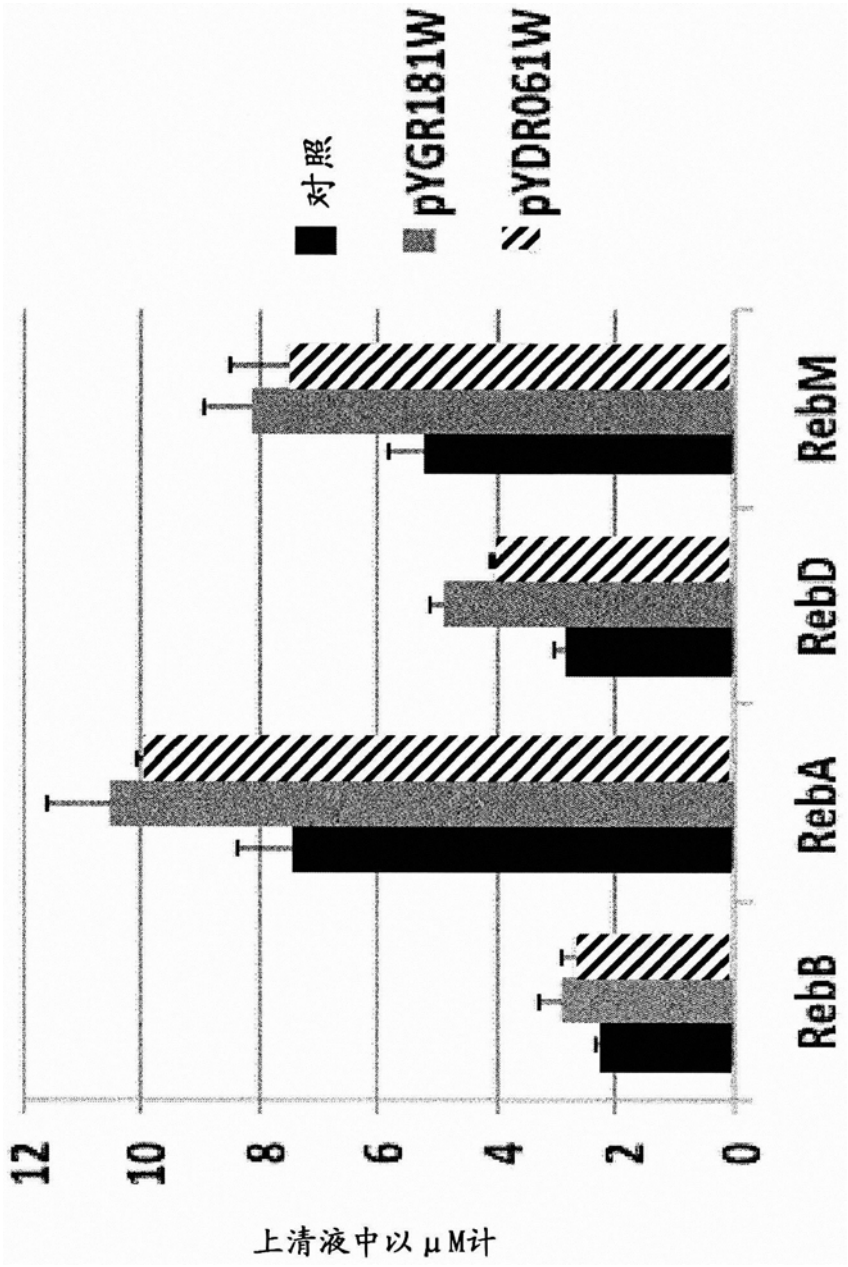
对照
pYGR181W
pYDR061W
RebM
RebD
RebA
RebB
12
10
8
6
4
2
0
上清液中以μM计

图2

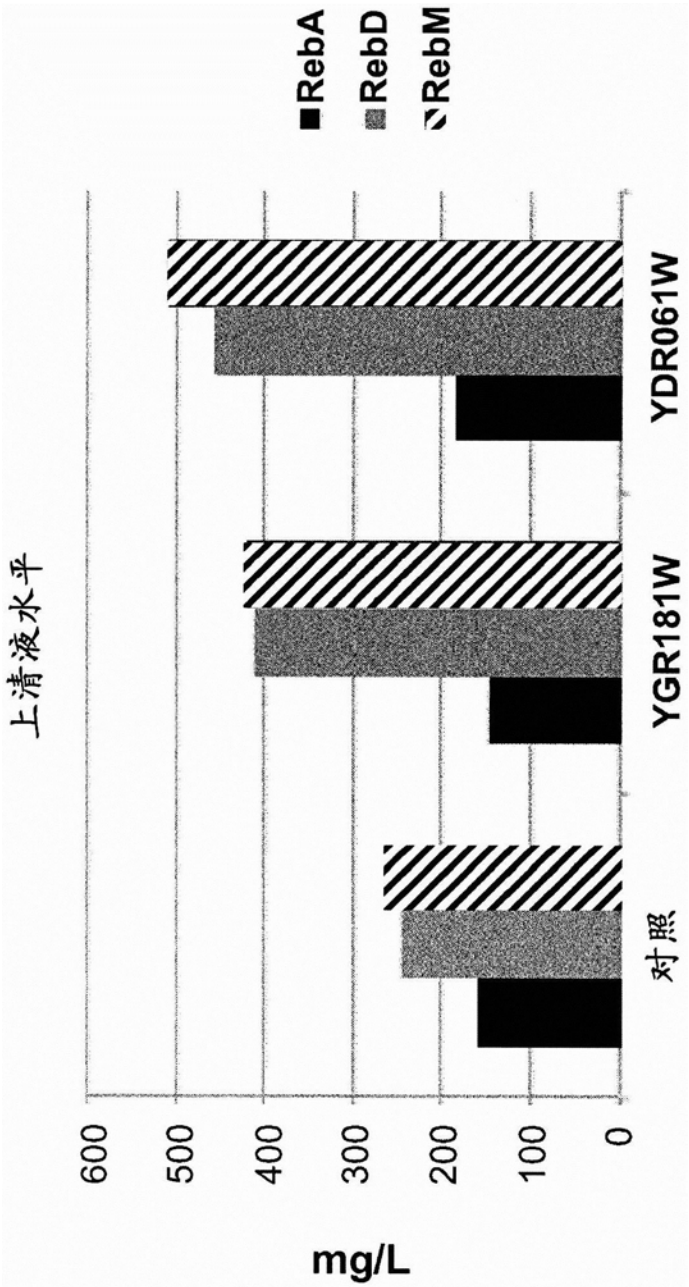
RebA
RebD
RebM
上清液水平
YDR061W
YGR181W
对照
600
500
400
300
200
100
0
mg/L

图3A

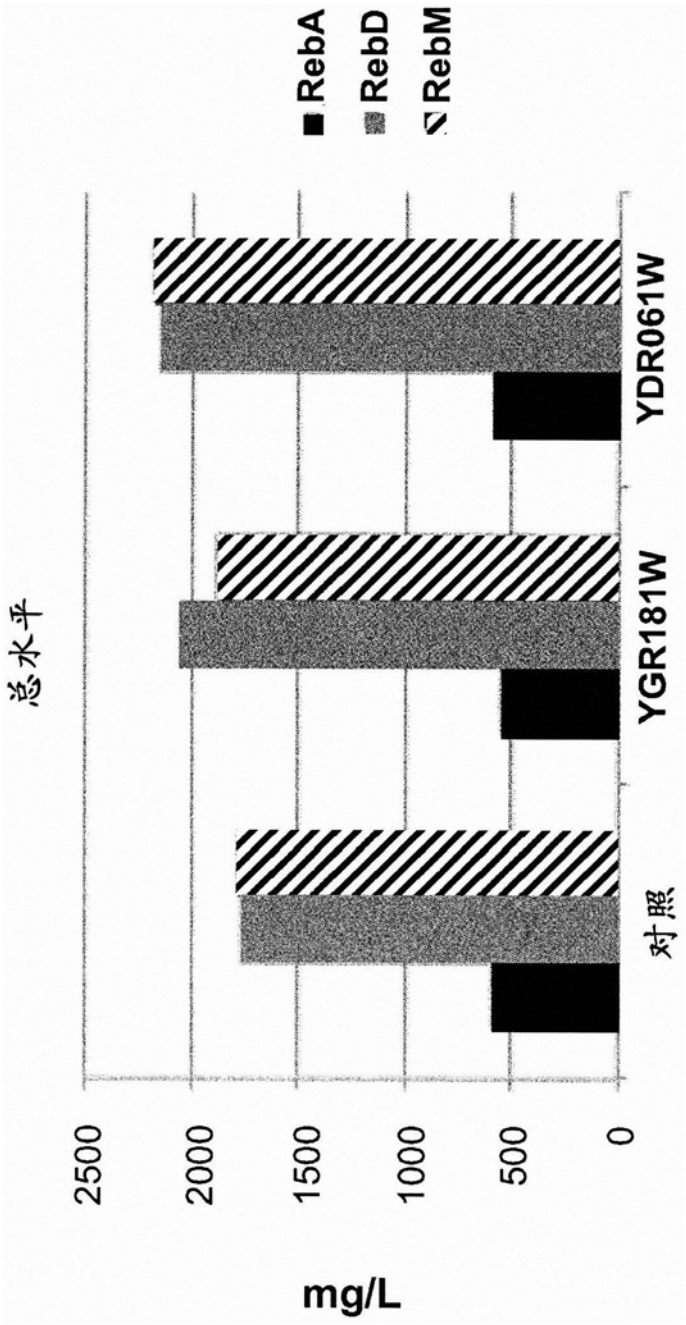
RebA
RebD
RebM
YDR061W
YGR181W
对照
总水平
2500
2000
1500
1000
500
0
mg/L

图3B

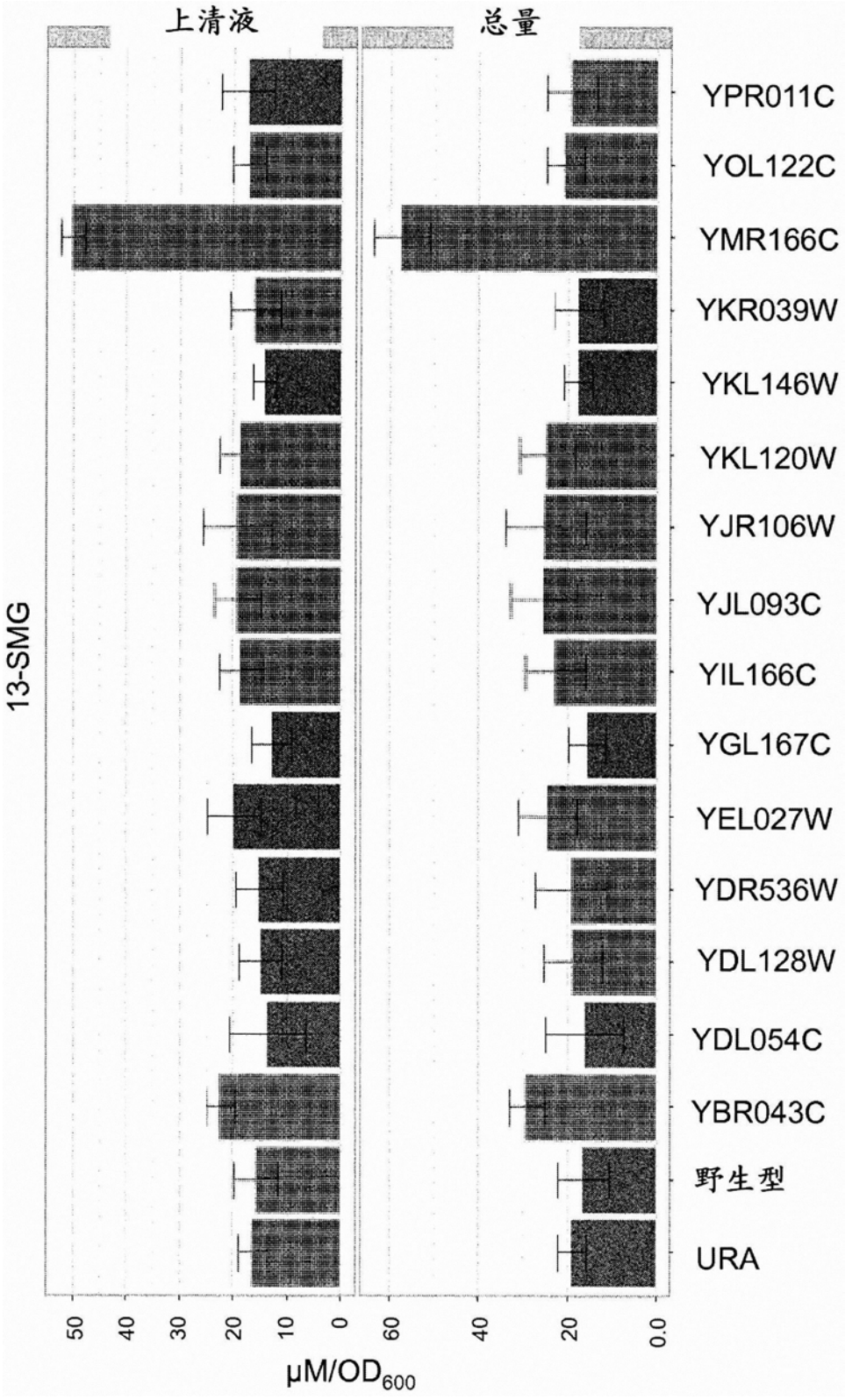
上清液
总量
13-SMG
YPR011C
YOL122C
YMR166C
YKR039W
YKL146W
YKL120W
YJR106W
YJL093C
YIL166C
YGL167C
YEL027W
YDR536W
YDL128W
YDL054C
YBR043C
野生型
URA
50
40
30
20
10
0
60
40
20
0.0
μM/OD600

图4A

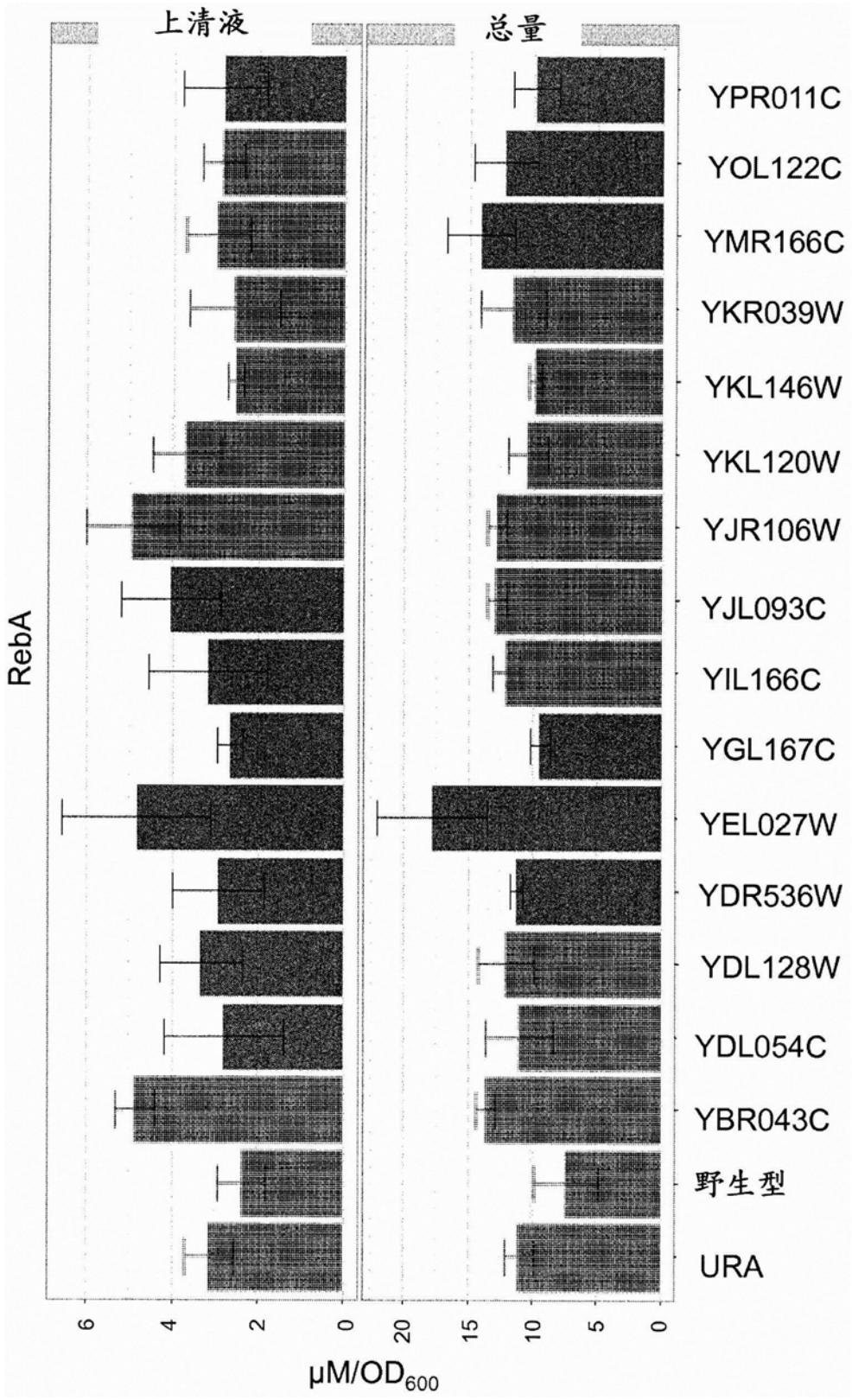
上清液
总量
RebA
YPR011C
YOL122C
YMR166C
YKR039W
YKL146W
YKL120W
YJR106W
YJL093C
YIL166C
YGL167C
YEL027W
YDR536W
YDL128W
YDL054C
YBR043C
野生型
URA
6
4
2
0
20
15
10
5
0
μM/OD600

图4B

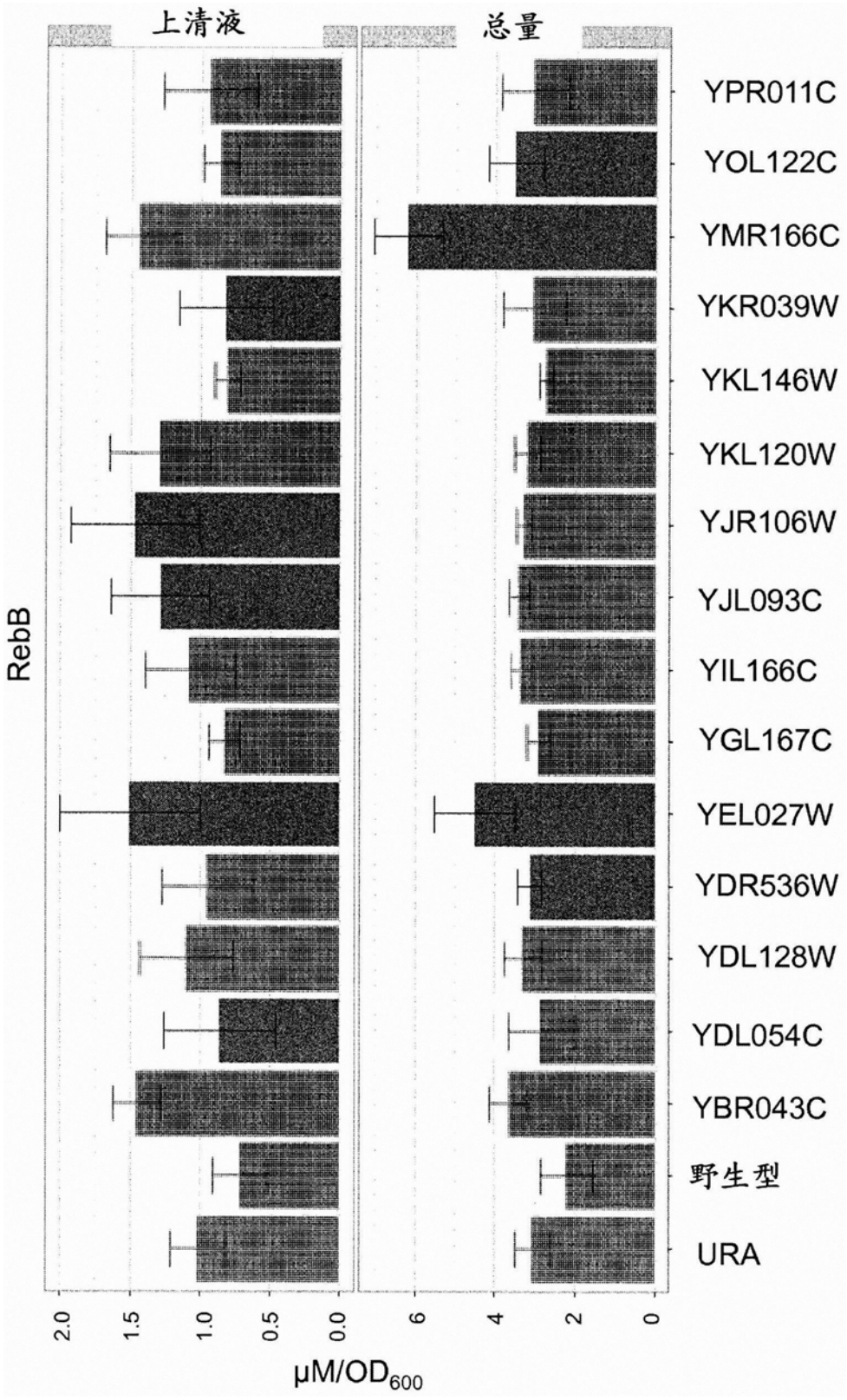
上清液
总量
RebB
YPR011C
YOL122C
YMR166C
YKR039W
YKL146W
YKL120W
YJR106W
YJL093C
YIL166C
YGL167C
YEL027W
YDR536W
YDL128W
YDL054C
YBR043C
野生型
URA
2.0
1.5
1.0
0.5
0.0
6
4
2
0
μM/OD600

图4C

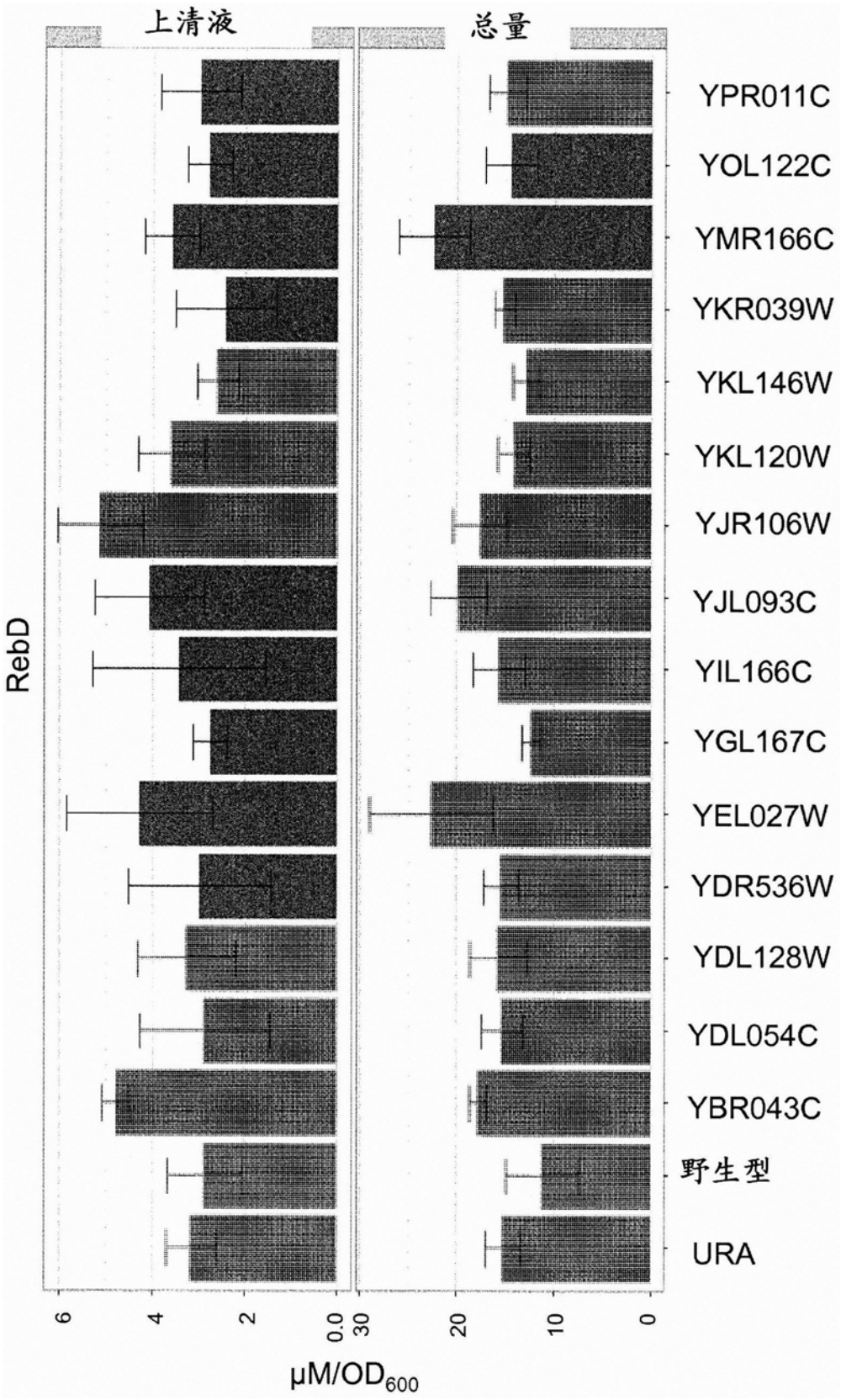
上清液
总量
RebD
YPR011C
YOL122C
YMR166C
YKR039W
YKL146W
YKL120W
YJR106W
YJL093C
YIL166C
YGL167C
YEL027W
YDR536W
YDL128W
YDL054C
YBR043C
野生型
URA
6
4
2
0.0
30
20
10
0
μM/OD600

图4D

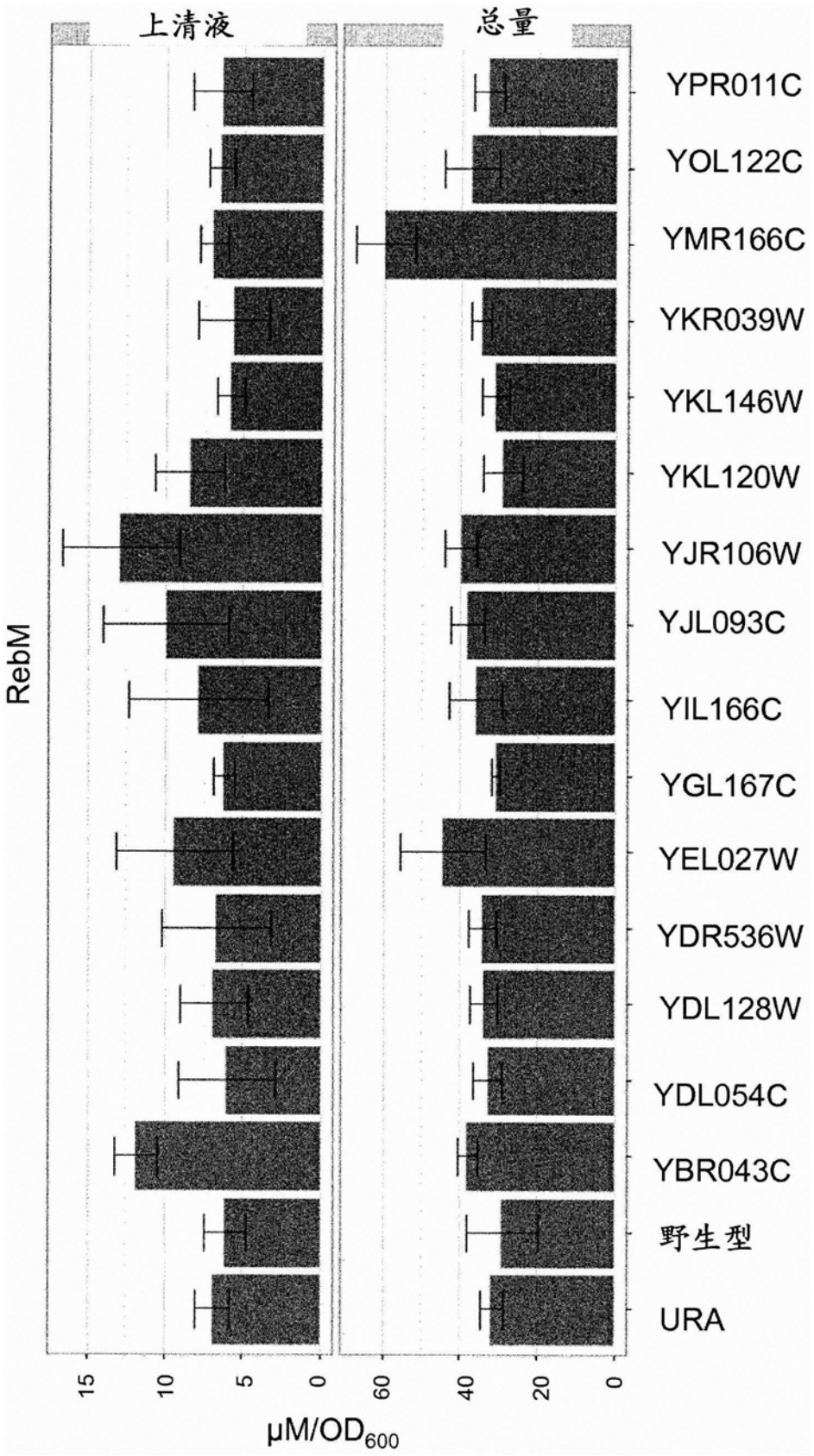
上清液
总量
RebM
YPR011C
YOL122C
YMR166C
YKR039W
YKL146W
YKL120W
YJR106W
YJL093C
YIL166C
YGL167C
YEL027W
YDR536W
YDL128W
YDL054C
YBR043C
野生型
URA
15
10
5
0
60
40
20
0
μM/OD600

图4E

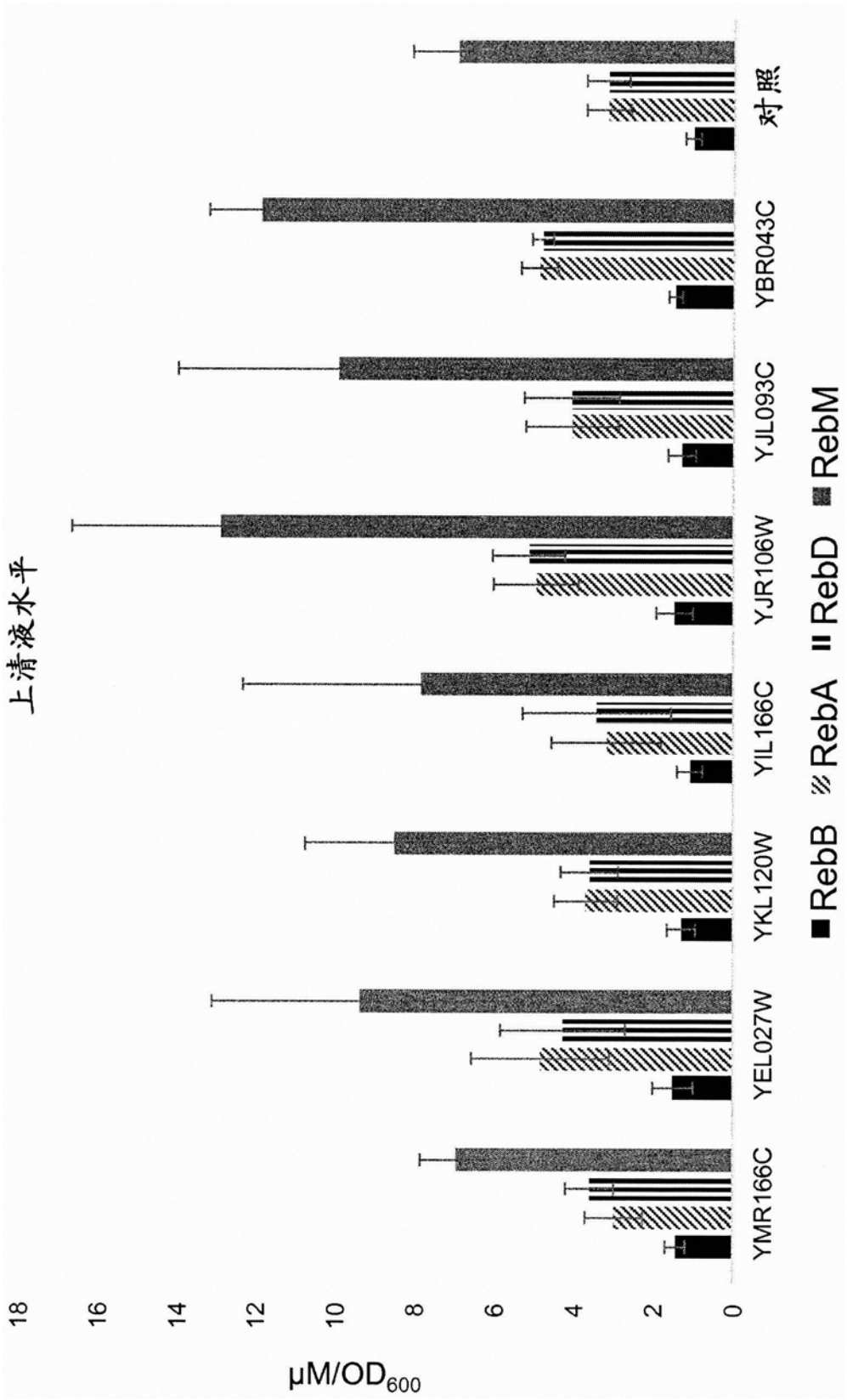
上清液水平
μM/OD600
0
2
4
6
8
10
12
14
16
18
YMR166C
YEL027W
YKL120W
YIL166C
YJR106W
YJL093C
YBR043C
对照
RebB
RebA
RebD
RebM

图5A

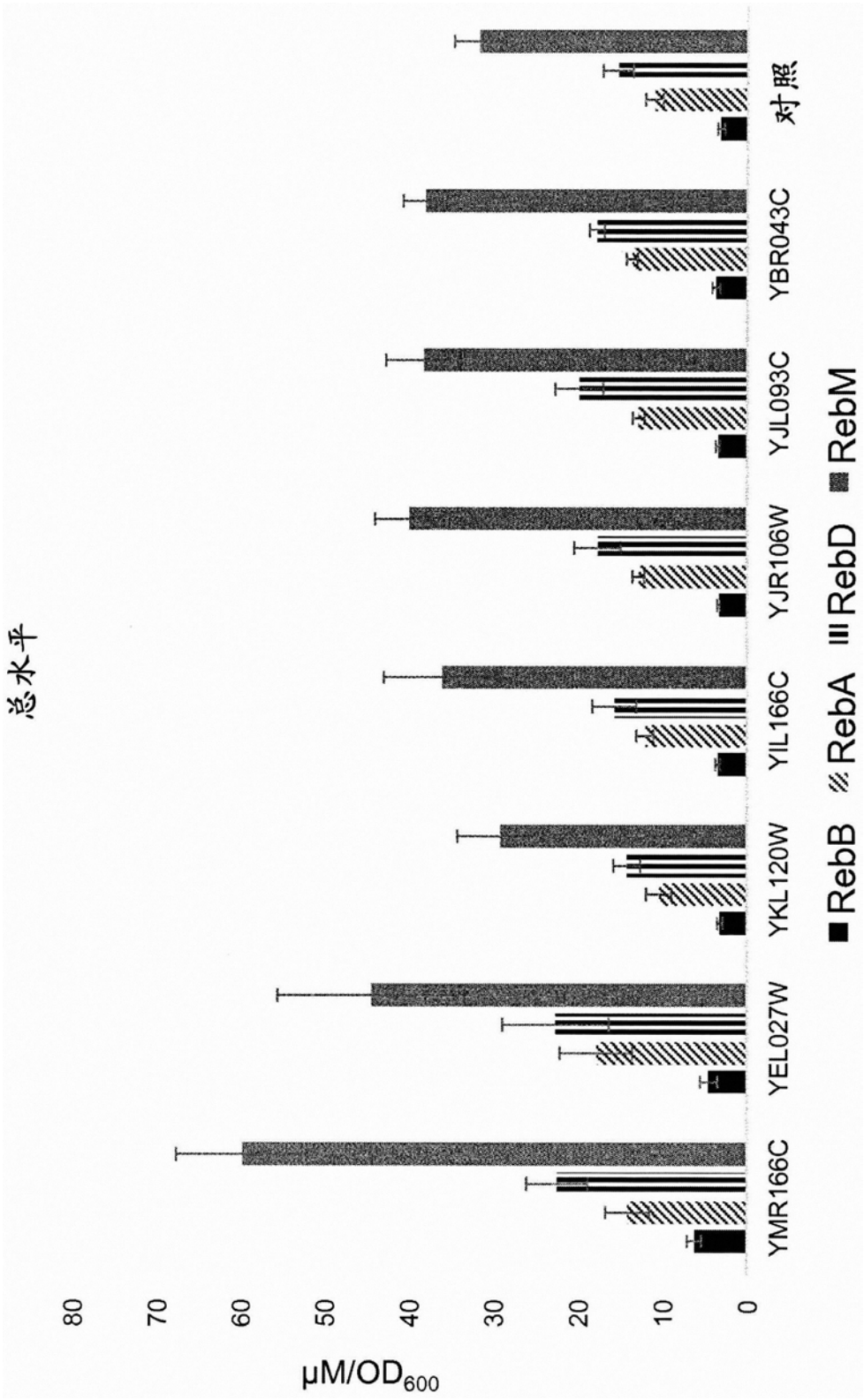
总水平
μM/OD600
80
70
60
50
40
30
20
10
0
YMR166C
YEL027W
YKL120W
YIL166C
YJR106W
YJL093C
YBR043C
对照
RebB
RebA
RebD
RebM

图5B