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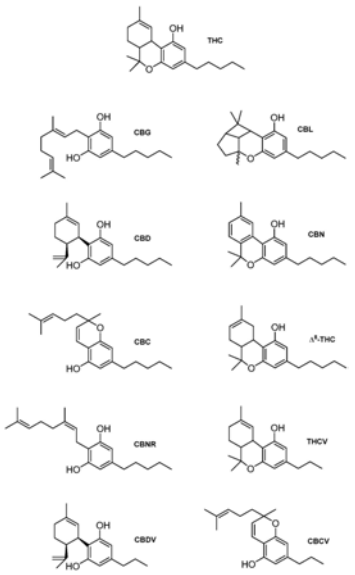
(54)发明名称

用于产生大麻素的微生物细胞及方法

(57)摘要

参与大麻素生物合成的酶以重组方式表达于宿主细胞中。所述宿主细胞可以是原核细胞(例如大肠埃希氏菌)或真核细胞(例如解脂耶氏酵母)。所述酶包括异源大麻萜酚酸合酶以及参与诸如以下大麻素前体的生物合成的另外的酶:香叶基二磷酸、3,5-二羟基戊苯、3,5-二羟基戊基苯甲酸、2,4-二羟基丙苯和/或2,4-二羟基丙基苯甲酸。提供通过使重组宿主细胞发酵来产生C5-大麻素和/或C3-大麻素的方法。或者,能通过对重组细胞中的大麻素前体进行生物转化或通过破裂重组细胞产生大麻素。



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1.一种用于产生一种或多种大麻素的微生物细胞,所述微生物细胞表达大麻素生物合成途径,所述途径包含具有大麻萜酚酸合酶(CBGAS)或次大麻萜酚酸合酶(CBGVAS)活性的异源异戊烯基转移酶,

所述微生物细胞进一步包含一种或多种修饰,从而增加香叶基二磷酸(GPP)的碳通量和/或己酸、己酰基-CoA、丁酸、丁酰基-CoA和/或乙酰基-CoA的碳通量;并且/或者

所述微生物细胞从一种或多种选自以下的供给前体产生所述大麻素:3,5-二羟基戊苯、3,5-二羟基戊基苯甲酸、2,4-二羟基丙苯、2,4-二羟基丙基苯甲酸、己酸、丁酸、己酰基-CoA、丁酰基-CoA或其衍生物和/或GPP前体。

2.根据权利要求1所述的微生物细胞,其中所述CBGAS或CBGVAS酶包含SEQ ID NO:60的氨基酸序列或其衍生物。

3.根据权利要求1所述的微生物细胞,其中所述CBGAS或CBGVAS包含选自SEQ ID NO:60至94的氨基酸序列或其衍生物。

4.根据权利要求3所述的微生物细胞,其中所述CBGAS包含选自SEQ ID NO:63、74、77、84至91、93的氨基酸序列或其衍生物。

5.根据权利要求4所述的微生物细胞,其中所述衍生物包含SEQ ID NO:84的氨基酸序列,所述氨基酸序列包含G286S突变。

6.根据权利要求1至5所述的微生物细胞,其中所述微生物细胞从异戊烯基焦磷酸(IPP)和/或二甲基烯丙基焦磷酸(DMAPP)产生GPP。

7.根据权利要求6所述的微生物细胞,其中所述微生物细胞表达一种或多种用于将所供给的异异戊烯醇和/或异戊烯醇转化为异戊烯基焦磷酸(IPP)和/或二甲基烯丙基焦磷酸(DMAPP)的酶,且其中所述一种或多种酶是任选的激酶。

8.根据权利要求1至7中任一项所述的微生物细胞,其中所述微生物细胞包含一种或多种修饰,从而增加香叶基二磷酸(GPP)、己酸、己酰基-CoA、丁酸、丁酰基-CoA和/或乙酰基-CoA的碳通量。

9.根据权利要求8所述的微生物细胞,其中所述微生物细胞包含基因修饰以增加(a)GPP及己酸或己酰基-CoA两者、或(b)GPP及丁酸或丁酰基-CoA两者的碳通量。

10.根据权利要求8或9所述的微生物细胞,其中所述大麻素是C5大麻素或C3大麻素,其任选地选自四氢大麻酚酸(THCA)、大麻二酚酸(CBDA)、大麻色原烯酸(CBCA)、四氢次大麻酚酸(THCVA)、次大麻二酚酸(CBDVA)及次大麻色原烯酸(CNCVA)。

11.根据权利要求10所述的微生物细胞,其中所述生物合成途径包含3,5-二羟基戊苯合酶(OLS)及3,5-二羟基戊基苯甲酸环化酶(OAC)。

12.根据权利要求10所述的微生物细胞,其中所述生物合成途径包含2,4-二羟基丙苯合酶(DS)及2,4-二羟基丙基苯甲酸环化酶(DAC)。

13.根据权利要求10或11所述的微生物细胞,其中所述生物合成途径包含异源3,5-二羟基戊基苯甲酸环化酶(OAC)。

14.根据权利要求13所述的微生物细胞,其中所述OAC包含SEQ ID NO:52的氨基酸序列或其衍生物。

15.根据权利要求13所述的微生物细胞,其中所述OAC包含选自SEQ ID NO:52至59的氨基酸序列或其衍生物。

16.根据权利要求10或11所述的微生物细胞，其中所述生物合成途径包含异源3,5-二羟基戊苯合酶(OLS)。

17.根据权利要求16所述的微生物细胞，其中所述OLS包含SEQ ID NO:49的氨基酸序列或其衍生物。

18.根据权利要求16所述的微生物细胞，其中所述OLS包含选自SEQ ID NO:49至51的氨基酸序列或其衍生物。

19.根据权利要求8至18中任一项所述的微生物细胞，其中所述生物合成途径包含作为己酰基-CoA合酶的重组酰基活化酶(AAE)。

20.根据权利要求19所述的微生物细胞，其中所述AAE包含SEQ ID NO:26或SEQ ID NO:27的氨基酸序列或其衍生物。

21.根据权利要求19所述的微生物细胞，其中所述AAE包含选自SEQ ID NO:26至48的氨基酸序列或其衍生物。

22.根据权利要求8至21中任一项所述的微生物细胞，其中所述生物合成途径包含选自以下的酶：大麻二酚酸合酶(CBDAS)、大麻色原烯酸合酶(CBCAS)及四氢大麻酚酸合酶(THCAS)。

23.根据权利要求8至22中任一项所述的微生物细胞，其中所述生物合成途径包含异源四氢大麻酚酸合酶(THCAS)。

24.根据权利要求23所述的微生物细胞，其中所述THCAS包含SEQ ID NO:99的氨基酸序列或其衍生物。

25.根据权利要求23所述的微生物细胞，其中所述THCAS包含选自SEQ ID NO:99至101的氨基酸序列或其衍生物。

26.根据权利要求8至22中任一项所述的微生物细胞，其中所述生物合成途径包含异源大麻色原烯酸合酶(CBCAS)。

27.根据权利要求26所述的微生物细胞，其中所述CBCAS包含SEQ ID NO:98的氨基酸序列或其衍生物。

28.根据权利要求8至22中任一项所述的微生物细胞，其中所述生物合成途径包含异源大麻二酚酸合酶(CBDAS)。

29.根据权利要求28所述的微生物细胞，其中所述CBDAS酶包含SEQ ID NO:95的氨基酸序列或其衍生物。

30.根据权利要求28所述的微生物细胞，其中所述CBDAS酶包含选自SEQ ID NO:95至97的氨基酸序列或其衍生物。

31.根据权利要求8至30中任一项所述的微生物细胞，其中所述细胞过度表达香叶基二磷酸合酶(GPPS)。

32.根据权利要求31所述的微生物细胞，其中微生物宿主细胞过度表达甲基赤藓糖醇磷酸(MEP)或甲羟戊酸(MVA)途径中的一种或多种酶。

33.根据权利要求32所述的微生物细胞，其中所述微生物细胞为细菌，且过度表达所述MEP途径中的一种或多种酶。

34.根据权利要求33所述的微生物细胞，其中所述细菌选自埃希氏菌属、芽孢杆菌属、棒状杆菌属、红细菌属、发酵单胞菌属、弧菌属、假单胞菌属、农杆菌属、短杆菌属和副球菌

属。

35.根据权利要求34所述的微生物细胞，其中所述细菌选自大肠埃希氏菌、枯草芽孢杆菌、谷氨酸棒状杆菌、荚膜红细菌、类球红细菌、运动发酵单胞菌、需钠弧菌或恶臭假单胞菌。

36.根据权利要求32所述的微生物细胞，其中所述微生物细胞为酵母，且过度表达所述MVA途径中的一种或多种酶。

37.根据权利要求36所述的微生物细胞，其中所述酵母选自耶氏酵母属、酿酒酵母属及毕赤酵母属。

38.根据权利要求37所述的微生物细胞，其中所述微生物细胞为啤酒酵母或巴斯德毕赤酵母。

39.根据权利要求37所述的微生物细胞，其中所述微生物细胞为解脂耶氏酵母。

40.根据权利要求36至39中任一项所述的微生物细胞，其包含一种或多种增加乙酰基-CoA或丙二酰基-CoA水平或通量的基因修饰。

41.根据权利要求40所述的微生物细胞，其中所述一种或多种基因修饰选自增加脂质的β氧化速率的修饰和导致丙酮酸脱氢酶复合物的一个或多个亚单位过度产生的修饰。

42.根据权利要求41所述的微生物细胞，其中所述一种或多种基因修饰导致丙酮酸脱羧酶(PDC)、乙醛脱氢酶(ALD)及乙酰基-CoA合酶(ACS)中的一种或多种的过度产生。

43.根据权利要求40至42中任一项所述的微生物细胞，其中所述细胞具有以下中的一种或多种的过度表达：乙酰基-CoA羧化酶、丙酮酸脱羧酶、二氢硫辛酰胺脱氢酶、二氢硫辛酰胺乙酰基转移酶、苹果酸脱氢酶、乙酰基-CoA合酶、丙酮酸脱氢酶E1组分亚单位α、ATP-柠檬酸裂解酶亚单位1、ATP-柠檬酸裂解酶亚单位2、AMP脱氨酶、乙酰基-CoA水解酶、假定丙酮酸脱羧酶2、乙酰基-CoA合酶1、乙醛脱氢酶1、乙醛脱氢酶2、乙醛脱氢酶3、乙醛脱氢酶4、乙醛脱氢酶5、乙醛脱氢酶6、丙酮酸脱氢酶E1组分亚单位α、丙酮酸脱氢酶E1组分亚单位β、过氧化物酶体生物发生因子10、多功能β氧化蛋白(氧化还原酶及水解酶)、初级油酸调节剂。

44.根据权利要求40至43中任一项所述的微生物细胞，其中所述细胞具有以下中的一种或多种的缺失或失活：天冬氨酰蛋白酶、液泡蛋白酶B、液泡蛋白酶B、葡萄糖-淀粉葡糖基转移酶异型体1、葡萄糖-6-磷酸脱氢酶、丙酮酸羧化酶1、磷酸烯醇丙酮酸羧激酶、果糖-1,6-二磷酸酶、线粒体载体、线粒体载体蛋白、醇脱氢酶1、醇脱氢酶2、醇脱氢酶3、C1-四氢叶酸合酶、蛋白C1-四氢叶酸合酶前体线粒体、葡萄糖磷酸变位酶、甘油-3-磷酸脱氢酶、脂肪酸合酶亚单位α、脂肪酸合酶亚单位β及磷脂酸磷酸酶。

45.一种产生一种或多种大麻素的方法，其包含培养权利要求8至44中任一项所述的微生物细胞及回收所述大麻素。

46.根据权利要求45所述的方法，其中用C1、C2、C3、C4、C5和/或C6碳底物培养所述微生物细胞。

47.根据权利要求46所述的方法，其中所述碳源是葡萄糖、蔗糖、果糖、木糖和/或甘油。

48.根据权利要求45至47中任一项所述的方法，其中向所述微生物细胞供给萜烯或萜烯前体，且其任选地为异异戊烯醇和/或异戊烯醇。

49.根据权利要求48所述的方法，其中所述微生物细胞表达一种或多种将异异戊烯醇和/或异戊烯醇转化为异戊烯基焦磷酸(IPP)和/或二甲基烯丙基焦磷酸(DMAPP)的激酶。

50.根据权利要求45至48中任一项所述的方法，其中培养条件选自好氧、微好氧和厌氧。

51.根据权利要求49所述的方法，其中在22℃与37℃之间的温度下培养所述微生物细胞。

52.根据权利要求45至50中任一项所述的方法，其中从所述微生物细胞中回收所述大麻素或大麻素混合物。

53.根据权利要求45至50中任一项所述的方法，其中从细胞培养基中回收所述大麻素或大麻素混合物。

54.根据权利要求1至5中任一项所述的微生物细胞，其中所述微生物细胞从一种或多种选自以下的供给前体产生所述大麻素：3,5-二羟基戊苯、3,5-二羟基戊基苯甲酸、2,4-二羟基丙苯、2,4-二羟基丙基苯甲酸、己酸、丁酸、己酰基-CoA、丁酰基-CoA及GPP前体。

55.根据权利要求54所述的微生物细胞，其中所述生物合成途径包含3,5-二羟基戊基苯甲酸环化酶(OAC)。

56.根据权利要求54或55所述的微生物细胞，其中所述生物合成途径包含大麻二酚酸合酶(CBDAS)、大麻色原烯酸合酶(CBCAS)及四氢大麻酚酸合酶(THCAS)中的一种或多种。

57.根据权利要求54至56中任一项所述的微生物细胞，其中所述大麻素是C5大麻素或C3大麻素，其任选地选自四氢大麻酚酸(THCA)、大麻二酚酸(CBDA)、大麻色原烯酸(CBCA)、四氢次大麻酚酸(THCVA)及次大麻色原烯酸(CNCVA)。

58.根据权利要求57所述的微生物细胞，其中所述生物合成途径包含异源3,5-二羟基戊基苯甲酸环化酶(OAC)。

59.根据权利要求58所述的微生物细胞，其中所述OAC包含SEQ ID NO:52的氨基酸序列或其衍生物。

60.根据权利要求57所述的微生物细胞，其中所述OAC包含选自SEQ ID NO:52至59的氨基酸序列或其衍生物。

61.根据权利要求54至60中任一项所述的微生物细胞，其中所述生物合成途径包含异源四氢大麻酚酸合酶(THCAS)。

62.根据权利要求61所述的微生物细胞，其中所述THCAS包含SEQ ID NO:99的氨基酸序列或其衍生物。

63.根据权利要求61所述的微生物细胞，其中所述THCAS包含选自SEQ ID NO:99至101的氨基酸序列或其衍生物。

64.根据权利要求54至60中任一项所述的微生物细胞，其中所述生物合成途径包含异源大麻色原烯酸合酶(CBCAS)。

65.根据权利要求64所述的微生物细胞，其中所述CBCAS包含SEQ ID NO:98的氨基酸序列或其衍生物。

66.根据权利要求54至60中任一项所述的微生物细胞，其中所述生物合成途径包含异源大麻二酚酸合酶(CBDAS)。

67.根据权利要求66所述的微生物细胞，其中所述CBDAS包含SEQ ID NO:95的氨基酸序列或其衍生物。

68.根据权利要求66所述的微生物细胞，其中所述CBDAS包含选自SEQ ID NO:95至97的

氨基酸序列或其衍生物。

69.根据权利要求54至67中任一项所述的微生物细胞，其中所述微生物细胞为细菌，其任选地选自埃希氏菌属、芽孢杆菌属、棒状杆菌属、红细菌属、发酵单胞菌属、弧菌属、假单胞菌属、农杆菌属、短杆菌属和副球菌属。

70.根据权利要求69所述的微生物细胞，其中所述细菌选自大肠埃希氏菌、枯草芽孢杆菌、谷氨酸棒状杆菌、荚膜红细菌、类球红细菌、运动发酵单胞菌、需钠弧菌和恶臭假单胞菌。

71.根据权利要求54至68中任一项所述的微生物细胞，其中所述微生物细胞为酵母，任选地选自耶氏酵母属、酿酒酵母属及毕赤酵母属。

72.根据权利要求71所述的微生物细胞，其中所述微生物细胞为啤酒酵母或巴斯德毕赤酵母。

73.根据权利要求71所述的微生物细胞，其中所述微生物细胞为解脂耶氏酵母。

74.根据权利要求54至73中任一项所述的微生物细胞，其中所述微生物细胞过度表达香叶基二磷酸合酶(GPPS)。

75.根据权利要求74所述的微生物细胞，其中所述微生物细胞过度表达甲基赤藓糖醇磷酸(MEP)或甲羟戊酸(MVA)途径中的一种或多种酶。

76.根据权利要求75所述的微生物细胞，其中所述微生物细胞为细菌，且过度表达所述MEP途径中的一种或多种酶。

77.根据权利要求75所述的微生物细胞，其中所述微生物细胞为酵母，且过度表达所述MVA途径中的一种或多种酶。

78.一种产生一种或多种大麻素的方法，其包含：在3,5-二羟基戊苯、3,5-二羟基戊基苯甲酸、2,4-二羟基丙苯、2,4-二羟基丙基苯甲酸、己酸、丁酸、己酰基-CoA、丁酰基-CoA及其衍生物中的一种或多种的存在下培养权利要求54至77中任一项所述的微生物细胞。

79.根据权利要求78所述的方法，其中培养条件选自好氧、微好氧和厌氧。

80.根据权利要求79所述的方法，其中在22℃与37℃之间的温度下培养所述微生物细胞。

81.根据权利要求78至80中任一项所述的方法，其中从所述微生物细胞中回收所述一种或多种大麻素。

82.根据权利要求78至80中任一项所述的方法，其中从细胞培养基中回收所述大麻素或大麻素混合物。

83.权利要求78至82中任一项所述的方法，其中向所述微生物细胞供给萜烯或萜烯前体。

用于产生大麻素的微生物细胞及方法

[0001] 相关申请

[0002] 本申请要求于2018年11月14日提交的美国临时专利申请第62/767,056号的权益和优先权,所述申请的全部内容特此以引用的方式整体并入。

[0003] 序列表

[0004] 本申请含有序列表,所述序列表以ASCII格式通过EFS-Web提交并且特此以引用的方式整体并入。所述ASCII副本,创建于2019年11月13日,命名为MAN-021PC_Sequence_Listing.txt,并且大小为393,114个字节。

背景技术

[0005] 大麻(Cannabis sativa)(大麻属(cannabis))是一种已经栽培超过10,000年的开花植物。其最为人所知的是具有精神作用效果的大麻素(如四氢大麻酚(tetrahydrocannabinol,THC))的来源。大麻属是一种一年生植物,一般是雌雄异株的风媒草本植物,其雄花和雌花在不同植株上生长。大麻素可以在除了种子以外的整个植株中找到,但主要集中在雌花的腺毛中。

[0006] 最近已发现低丰度天然大麻素的有益特性。例如,大麻二酚(Cannabidiol,CBD)已经被研究用于治疗多种疾病,并且已由美国联邦药检局(Federal Drug Administration,FDA)批准用于治疗与两种罕见及严重型癫痫有关的癫痫发作:伦-格综合征(Lennox-Gastaut syndrome)和Dravet综合征。其它可能有用的大麻素包含大麻酚(cannabinol,CBN),一种有望作为镇静剂和安眠药的非精神作用大麻素;Δ8-THC,一种被研究用于治疗与化疗有关的恶心的异构物;以及四氢次大麻酚(Tetrahydrocannabivarin,THCV),其具有提神和食欲抑制作用。

[0007] 鉴于这些和其它罕见大麻素的公认及潜在价值,其生产需要成本效益高、可扩展和/或可持续的过程。

发明内容

[0008] 本发明涉及大麻素的产生。在各个方面,本发明提供用于大麻素生物分析的酶、编码所述酶的聚核苷酸、表达所述酶的重组宿主细胞以及产生大麻素的重组宿主细胞。在其它方面,本发明提供使用酶或宿主细胞产生大麻素的方法。例如,可以通过使重组宿主细胞发酵,或者通过全细胞、破裂细胞、或分离酶或部分纯化酶对大麻素前体进行生物转化来产生大麻素。根据本发明产生的分离大麻素的纯度和/或产率可能比天然大麻素高,因为重组细胞可被工程改造为通过表达特定生物合成酶而产生特定大麻素化合物。如此产生的大麻素可以合并于诸如药品、膳食补充剂、烘焙食品及其它的产品中。

[0009] 在一些实施方案中,本发明提供产生大麻素的方法、酶以及重组宿主细胞,所述大麻素诸如Δ9-四氢大麻酚(THC或Δ9-THC)、大麻萜酚(cannabigerol,CBG)、大麻环酚(cannabicyclol,CBL)、大麻二酚(cannabidiol,CBD)、大麻酚(cannabinol,CBN)、大麻环萜酚(cannabichromene,CBC)、Δ8-四氢大麻酚(Δ8-THC)、大麻醇酚(cannabinerol,CBNR)、

Δ9-四氢次大麻酚(THCV)、次大麻二酚(cannabidivarin,CBDV)和/或大麻次色烯酚(cannabichrovarin,CBCV)及其衍生物。在一些实施方案中,向重组宿主细胞供给诸如以下的大麻素生物合成中间物:3,5-二羟基戊苯(olivetol)、3,5-二羟基戊基苯甲酸(olivetolic acid,OA)、2,4-二羟基丙苯(divarin)、2,4-二羟基丙基苯甲酸(divarinic acid,DA)、己酸、丁酸、己酰基-CoA、丁酰基-CoA、GPP前体或其衍生物。或者,宿主细胞从C1-C6碳底物(诸如葡萄糖)产生大麻素。在一些实施方案中,从重组宿主细胞或其培养基中回收大麻素。

[0010] 在一些实施方案中,宿主细胞以重组方式表达具有大麻萜酚酸合酶(CBGAS)和/或次大麻萜酚酸合酶(CBGVAS)活性的异戊烯化酶(prenylating enzyme)、用于所有大麻素的生物合成的中心酶,以及一种或多种其它提高CBGAS反应物的可用率的酶,诸如香叶基二磷酸合酶(GPPS)、酰基活化酶(AAE)、3,5-二羟基戊苯合酶(OLS)、3,5-二羟基戊基苯甲酸环化酶(OAC)、2,4-二羟基丙苯合酶(DS)、2,4-二羟基丙基苯甲酸环化酶(DAS)。宿主细胞还可表达作用于CBGAS和/或CBGVAS产品的酶,诸如四氢大麻酚酸合酶(THCAS)、大麻酚酸合酶(CBDAS)及大麻环萜酚酸合酶(CBCAS)。在一些实施方案中,宿主细胞中所表达的一种或多种酶源于产生大麻素的植物,如大麻。

[0011] 在一些实施方案中,宿主细胞进一步表达或过度表达甲基赤藻糖醇磷酸(MEP)和/或甲羟戊酸(MVA)途径中的一种或多种酶,以催化葡萄糖转化为异戊烯基焦磷酸(IPP)和/或二甲基烯丙基焦磷酸(DMAPP)。在一些实施方案中,宿主细胞进一步表达催化IPP和/或DMAPP转化为香叶基二磷酸(GPP),从而使一种或多种大麻素从糖或其它碳源(碳底物,诸如C1、C2、C3、C4、C5,和/或C6碳底物)产生的酶。在一些实施方案中,宿主细胞可表达一种或多种能够将异异戊烯醇(isoprenol)转化为IPP和/或将异戊烯醇(prenol)转化为DMAPP的酶。

[0012] 在一些实施方案中,宿主细胞被工程改造为提高对大麻素前体的合成。在一些实施方案中,宿主细胞被工程改造为通过竞争生物合成途径来降低大麻素前体的利用率。宿主细胞可被工程改造为提高通过MEP途径的碳流量或提高乙酰基-CoA、丙二酰基-CoA、脂肪酸和/或其它生物分子的产量。

[0013] 在一些实施方案中,宿主细胞是微生物细胞,其可为原核细胞或真核细胞(例如细菌或酵母)。例如,宿主细胞可以是大肠埃希氏菌(Escherichia coli)、啤酒酵母(Saccharomyces cerevisiae)或耶氏解脂酵母(Yarrowia lipolytica)细胞。

[0014] 本发明的其它方面和实施方案根据下面的详细公开内容将是显而易见的。

[0015] 附图简述

[0016] 图1提供大麻素的实施例。化合物缩写:THC,Δ9-四氢大麻酚;CBG,大麻萜酚;CBD,大麻二酚;CBC,大麻环萜酚;CBNR,大麻醇酚;CBL,大麻环酚;CBN,大麻酚;Δ8-THC,Δ8-四氢大麻酚;THCV,Δ9-四氢次大麻酚;CBDV,次大麻二酚;CBCV,大麻次色烯酚。

[0017] 图2显示C5大麻素生物合成途径。CBD是经由CBDA的非酶类转化产生的,其前体化合物为由两种前体(GPP及3,5-二羟基戊基苯甲酸)产生的CBGA。这些前体分别通过萜类途径和基于脂肪酸的多聚酮途径产生。可以从MEP或MVA途径获得萜类前体。酶缩写:AAE,酰基活化酶(或己酰基-CoA合酶);GPPS,香叶基二磷酸合酶;OLS,3,5-二羟基戊苯合酶;OAC,3,5-二羟基戊基苯甲酸环化酶;CBGAS,大麻萜酚酸合酶;CBCAS,大麻环萜酚酸合酶;CBDAS,大麻二酚酸合酶;THCAS,四氢大麻酚酸合酶。化合物缩写:G3P,甘油醛3-磷酸;IPP,异戊烯基

二磷酸;DMAPP,二甲基烯丙二磷酸;GPP,香叶基二磷酸;CBGA,大麻萜酚酸;CBCA,大麻环萜酚酸;CBDA,大麻二酚酸;THCA,四氢大麻酚酸;CBC,大麻环萜酚;CBD,大麻二酚;THC,四氢大麻酚。

[0018] 图3显示C3-大麻素生物合成途径。所述途径类似于C5-大麻素途径,但是用2,4-二羟基丙基苯甲酸代替3,5-二羟基戊基苯甲酸来进行。酶接受具有较短侧链的前体并且在替代底物上继续进行相同酶反应。酶缩写:AAE,酰基活化酶;DS,2,4-二羟基丙苯合成酶;DAC,2,4-二羟基丙基苯甲酸环化酶;CBGAS,大麻萜酚酸合成酶;CBCAS,大麻色原烯酸合成酶;CBDAS,大麻二酚酸合成酶;THCAS,四氢大麻酚酸合成酶。化合物缩写:GPP,香叶基二磷酸;CBGVA,次大麻萜酚酸;CBCVA,次大麻色原烯酸;CBDA,次大麻二酚;THCVA,四氢次大麻酚酸;CBCV,次大麻色原烯;CBDV,次大麻二酚;THCV,四氢次大麻酚。

[0019] 图4显示用以产生大麻萜酚酸(CBGA)产物的异戊烯基转移酶酶类测定的液相色谱(LC)质谱MS/MS分析。图4A显示可信的CBGA标准。图4B显示不含酶的对照。图4C显示代表性酶A。图4D显示代表性酶B。图4E显示产生副产物1(SP1)作为主要产物的代表性酶C。

具体实施方式

[0020] 大麻的雌花中所产生的各种大麻素的结构显示于图1中。这些化合物可由以下两种可能的中间体之一产生:C5-大麻素的大麻萜酚酸(CBGA)或C3-大麻素的次大麻萜酚酸(CBGVA)。图2及图3C5-途径与C3-途径之间的主要差异在于,3,5-二羟基戊基苯甲酸(OA)是C5-大麻素的前体,而2,4-二羟基丙基苯甲酸(DA)是C3-大麻素的前体。两个途径中的中心酶分别是向OA或DA添加香叶基二磷酸(GPP)的异戊烯基转移酶、大麻萜酚酸合酶(CBGAS)或次大麻萜酚酸合酶(CBGVAS)。随后通过THCAS、CBDAS或CBCAS在不同位置环化所得产物。在环化后,通过在有热量或紫外光的情况下进行非酶类脱羰基作用,发生向活性化合物(如THC)的进一步转化。

[0021] 根据各种实施方案,本发明提供一种用于产生一种或多种大麻素的微生物细胞,其中所述微生物细胞表达大麻素生物合成途径,所述途径包含具有大麻萜酚酸合酶(CBGAS)活性或次大麻萜酚酸合酶(CBGVAS)的异源异戊烯基转移酶。微生物细胞进一步包含一种或多种修饰,从而增加香叶基二磷酸(GPP)的碳通量和/或己酸、己酰基-CoA、丁酸、丁酰基-CoA和/或乙酰基-CoA的碳通量。替代或除了包含一种或多种增加GPP的碳通量的修饰以外,微生物细胞从选自以下的供给前体中产生大麻素:3,5-二羟基戊苯、3,5-二羟基戊基苯甲酸、2,4-二羟基丙苯、2,4-二羟基丙基苯甲酸、己酸、丁酸、己酰基-CoA、丁酰基-CoA、GPP前体或其衍生物。

[0022] CBGAS,又被称为香叶基焦磷酸:3,5-二羟基戊基苯甲酸香叶基转移酶,是一种使用GPP催化OA或DA的C-异戊烯化(CBGVAS活性)的异戊烯基转移酶。在一些实施方案中,CBGAS或CBGVAS酶可为具有SEQ ID NO:60的大麻CBGAS或其衍生物。或者,异戊烯基转移酶活性可由包含选自SEQ ID NO:61至94的氨基酸序列或其衍生物的酶提供。在一些实施方案中,衍生物包含与选自SEQ ID NO:60至94的氨基酸序列具有至少60%、至少70%、至少80%、至少90%、至少95%或至少98%同一性的氨基酸序列。在一些实施方案中,衍生物包含相对于选自SEQ ID NO:60至94的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0023] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:63的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:63的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:63的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0024] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:74的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:74的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:74的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0025] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:77的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:77的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:77的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0026] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:84的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:84的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:84的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。在一些实施方案中，衍生物包含在对应于SEQ ID NO:84的G286的位置处的突变。在一些实施方案中，在对应于SEQ ID NO:84的G286的位置处的突变是具有极性氨基酸的取代。在实施方案中，在对应于SEQ ID NO:84的G286的位置处的取代是选自精氨酸、天冬酰胺、天冬氨酸、谷氨酰胺、谷氨酸、组氨酸、赖氨酸、丝氨酸、苏氨酸以及酪氨酸。在一些实施方案中，在对应于SEQ ID NO:84的G286的位置处的取代是丝氨酸。

[0027] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:85的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:85的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:85的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0028] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:86的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:86的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:86的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0029] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:87的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:87的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:87的序列具有1至20个或1至10个氨基酸修饰的

氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0030] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:88的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:88的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:88的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0031] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:89的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:89的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:89的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0032] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:90的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:90的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:90的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0033] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:91的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:91的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:91的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0034] 在一些实施方案中，异戊烯基转移酶活性可由包含SEQ ID NO:93的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与SEQ ID NO:93的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:93的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。在各种实施方案中，酶类途径进一步包含一种或多种参与GPP产生的酶，诸如GPP合酶(GPPS)，和/或甲基赤藓糖醇磷酸(MEP)和/或甲羟戊酸(MVA)途径的酶。在各种实施方案中，酶类途径进一步包含一种或多种参与OA产生的酶，诸如酰基活化酶(AAE)、3,5-二羟基戊苯合酶(OLS)和/或3,5-二羟基戊基苯甲酸环化酶(OAC)。在各种实施方案中，酶类途径进一步包含一种或多种参与DA产生的酶，诸如酰基活化酶(AAE)、2,4-二羟基丙苯合酶(DS)/或2,4-二羟基丙基苯甲酸环化酶(DAC)。

[0035] 在一些实施方案中，CBGAS或CBGVAS高效地引导前体流入大麻素中而非其它化合物中。例如，在一些实施方案中，至少50％、60％、70％、80％或90％的OA转化为CBGA。同样，至少50％、60％、70％、80％或90％的DA可以转化为CBGVA。

[0036] 在各种实施方案中，酶类途径进一步包含一种或多种使用CBGA作为底物且催化CBGA的单萜部分的氧化环化的酶，并且这种酶可具有立体选择性。这种酶包括四氢大麻酚酸合酶(THCAS)，其产生四氢大麻酚酸(THCA)；大麻二酚酸合酶(CBDAS)，其产生大麻二酚酸(CBDA)；以及大麻色原烯酸合酶(CBCAS)，其产生大麻色原烯酸(CBCA)。

[0037] 在各种实施方案中，酶类途径进一步包含一种或多种使用CBGVA作为底物且催化CBGVA的单萜部分的氧化环化的酶，并且这种酶可具有立体选择性。这种酶包括THCAS，其产生四氢次大麻酚酸(THCVA)；CBDAS，其产生次大麻二酚酸(CBDVA)；以及CBCAS，其产生次大麻色原烯酸((CBCVA)。

[0038] 在各种实施方案中，酶类途径进一步包含一种或多种参与香叶基二磷酸(GPP)产生的酶，诸如GPPS，和/或甲基赤藓糖醇磷酸(MEP)和/或甲羟戊酸(MVA)途径中的酶。GPPS催化异戊烯二磷酸(IPP)与二甲基烯丙基二磷酸(DMAPP)之间的反应以形成GPP。GPPS活性可由包含选自SEQ ID NO:1至25的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与选自SEQ ID NO:1至25的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:1至25的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0039] 在一些实施方案中，微生物宿主细胞经工程改造为表达或过度表达MEP和/或MVA途径中的一种或多种酶，以催化从葡萄糖或其它碳源对IPP及DMAPP进行生物合成。在一些实施方案中，微生物宿主细胞经工程改造为表达或过度表达MEP途径中的一种或多种酶。在一些实施方案中，MEP途径通过提供某些限速酶的复制本而增加下游途径并且与其相平衡。MEP(2-C-甲基-D-赤藓糖醇4-磷酸)途径，也称为MEP/DOXP(2-C-甲基-D-赤藓糖醇4-磷酸/1-脱氧-D-木酮糖5-磷酸)途径或非甲羟戊酸途径或非甲羟戊酸依赖性途径，是指将甘油醛-3-磷酸和丙酮酸转化为IPP和DMAPP的途径。所述途径通常涉及以下酶的作用：1-脱氧-D-木酮糖-5-磷酸合酶(Dxs)、1-脱氧-D-木酮糖-5-磷酸还原异构酶(IspC)、4-二磷酸胞苷-2-C-甲基-D-赤藓糖醇合酶(IspD)、4-二磷酸胞苷-2-C-甲基-D-赤藓糖醇激酶(IspE)、2C-甲基-D-赤藓糖醇2,4-环二磷酸合酶(IspF)、1-羟基-2-甲基-2-(E)-丁烯基4-二磷酸合酶(IspG)以及异戊烯基二磷酸异构酶(IspH)。MEP途径以及构成MEP途径的基因和酶在US 8,512,988中有描述，所述文献特此通过引用的方式整体并入。例如，构成MEP途径的基因包括dxs、ispC、ispD、ispE、ispF、ispG、ispH、idi及ispA。在一些实施方案中，微生物宿主细胞表达或过度表达dxs、ispC、ispD、ispE、ispF、ispG、ispH、idi、ispA或其经修饰的变体中的一种或多种，从而导致IPP和DMAPP产量增加。在一些实施方案中，GPP至少部分地通过经由MEP途径的代谢通量产生，并且其中微生物宿主细胞具有dxs、ispC、ispD、ispE、ispF、ispG、ispH、idi、ispA或其经修饰的变体中的一种或多种的至少一个另外的基因拷贝。

[0040] 在一些实施方案中，微生物宿主细胞经工程改造为表达或过度表达MVA途径中的一种或多种酶。MVA途径是指将乙酰基-CoA转化为IPP的生物合成途径。甲羟戊酸途径通常包含催化以下步骤的酶：(a)将两个乙酰基-CoA分子缩合为乙酰乙酰基-CoA(例如，通过乙酰乙酰基-CoA硫解酶的作用)；(b)将乙酰乙酰基-CoA与乙酰基-CoA缩合形成羟甲基戊二酰基-辅酶A(HMG-CoA)(例如，通过HMG-CoA合酶(HMGS)的作用)；(c)将HMG-CoA转化为甲羟戊酸(例如，通过HMG-CoA还原酶(HMGR)的作用)；(d)将甲羟戊酸磷酸化为甲羟戊酸5-磷酸(例如，通过甲羟戊酸激酶(MK)的作用)；(e)将甲羟戊酸5-磷酸转化为甲羟戊酸5-焦磷酸(例如，通过磷酸甲羟戊酸激酶(PMK)的作用)；以及(f)将甲羟戊酸5-焦磷酸转化为异戊烯基焦磷酸(例如，通过甲羟戊酸焦磷酸脱羧酶(MPD)的作用)。MVA途径以及构成MVA途径的基因和酶在US 7,667,017中有所描述，所述文献特此通过引用的方式整体并入。在一些实施方案

中，微生物宿主细胞表达或过度表达乙酰乙酰基-CoA硫解酶、HMGS、HMGR、MK、PMK及MPD或其经修饰的变体中的一种或多种，从而使得IPP和DMAPP产量增加。在一些实施方案中，GPP至少部分地通过经由MVA途径的代谢通量产生，并且其中微生物宿主细胞具有乙酰乙酰基-CoA硫解酶、HMGS、HMGR、MK、PMK、MPD其经修饰的变体中的一种或多种的至少一个另外的基因拷贝。

[0041] 在一些实施方案中，微生物宿主细胞的MEP途径经工程改造以增加由葡萄糖产生IPP和DMAPP的产量，如US 2018/0245103或US2018/0216137所述，所述文献的内容特此通过引用的方式整体并入。例如，在一些实施方案中，微生物宿主细胞过度表达MEP途径的酶，并且平衡表达以向IPP和DMAPP推/拉碳通量。在一些实施方案中，微生物宿主细胞经工程改造以增加Fe-S簇蛋白的可用率或活性，以便支持作为Fe-S酶的IspG和IspH的更高活性。在一些实施方案中，宿主细胞经工程改造以过度表达IspG和IspH，以便向1-羟基-2-甲基-2-(E)-丁烯基4-二磷酸(HMBPP)中间体提供更多的碳通量，但进行平衡表达以防止HMBPP以降低细胞生长或活力的量或以抑制MEP途径通量的量积聚。

[0042] 在替代实施方案中，并未将微生物宿主细胞工程改造为增加由MEP或MVA途径前体产生GPP的产量，而是向所述细胞供给GPP或前体化合物(例如萜烯或萜烯前体)以提供GPP底物以用于产生CBD。

[0043] 在各种实施方案中，酶类途径进一步包含参与OA产生的酶，诸如OAC、OLS或AAE。

[0044] OAC为多聚酮环化酶，其可通过催化C2→C7分子内醇醛缩合从而保留羧酸盐部分来将3,5-二羟基戊苯转化为OA。OAC可包含SEQ ID NO:52的氨基酸序列或其衍生物。或者，OAC活性可由包含选自SEQ ID NO:53至59的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与选自SEQ ID NO:52至59的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:52至59的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0045] OLS通过己酰基-CoA与三个丙二酰基-CoA分子的醇醛缩合来催化3,5-二羟基戊苯的形成。OLS可包含SEQ ID NO:49的氨基酸序列或其衍生物。或者，OLS活性可由包含选自SEQ ID NO:49至51的氨基酸序列或其衍生物的酶提供。OLS酶可另外具有，或替代地具有，或经工程改造以具有DS活性，且因此适用于产生C3大麻素。在一些实施方案中，衍生物包含与选自SEQ ID NO:49至51的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:49至51的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0046] 乙酰基活化酶(AAE)，也称为己酰基-CoA合酶，从己酸盐及CoA合成己酰基-CoA。或者，AAE可具有或经工程改造以具有用于产生丁酸而不是己酸的活性，且因此适用于产生C3大麻素。AAE可包含SEQ ID NO:26的氨基酸序列或其衍生物。或者，AAE可包含SEQ ID NO:27的氨基酸序列或其衍生物。或者，AAE活性可由包含选自SEQ ID NO:26至48的氨基酸序列或其衍生物的酶提供。在一些实施方案中，衍生物包含与选自SEQ ID NO:26至48的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:26至48的序列具有1至20个或1

至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0047] 在各种实施方案中，酶类途径进一步包含参与DA产生的酶，诸如DAC、DS或AAE。具有OAC活性的酶也可具有或经工程改造以具有DAC活性，且因此适用于产生C3大麻素。同样，具有OLS活性的酶也可具有或经工程改造以具有DS活性；且对己酸具有AAE活性的酶也可具有或经工程改造以对丁酸具有AAE活性。

[0048] 在一些实施方案中，用于产生C5或C3大麻素的酶类途径包含OAC或DAC酶，其包含选自SEQ ID NO:52至59的氨基酸序列或其衍生物。在一些实施方案中，衍生物包含与选自SEQ ID NO:52至59的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:52至59的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0049] 在一些实施方案中，用于产生C5或C3大麻素的酶类途径包含OLS或DS酶，其包含选自SEQ ID NO:49至51的氨基酸序列或其衍生物。在一些实施方案中，衍生物包含与选自SEQ ID NO:49至51的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:49至51的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0050] 在各种实施方案中，酶类途径进一步包含一种或多种将CBGA或CBGVA转化为大麻素衍生物的酶，所述大麻素衍生物任选地通过非酶类过程转化为另外的大麻素化合物。在各种实施方案中，一种或多种非酶类反应将THCA转化为THC，将CBDA转化为CBD，将CBCA转化为CBC，将THCVA转化为THCV，将CBDVA转化为CBDV，和/或将CBCVA转化为CBCV。

[0051] 在一些实施方案中，在途径中表达酶组合以产生多种大麻素化合物。由这些过程产生的各种大麻素化合物中的每一种具有独特且潜在有益的生物活性。

[0052] 对CBGA或CBGVA具有底物特异性的酶包括THCAS、CBDAS以及CBCAS，包括本文所述的衍生物。这些酶可源自产生大麻素的植物(诸如大麻)或由所述植物工程改造而来。

[0053] 在一些实施方案中，酶类途径包含THCAS酶，其包含SEQ ID NO:99的氨基酸序列或其衍生物。或者，酶类途径包含THCAS酶，其包含选自SEQ ID NO:99至101的氨基酸序列或其衍生物。在一些实施方案中，衍生物包含与选自SEQ ID NO:99至101的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:99至101的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0054] 在一些实施方案中，酶类途径包含CBDAS酶，其包含SEQ ID NO:95的氨基酸序列或其衍生物。或者，CBDAS酶包含选自SEQ ID NO:96或97的氨基酸序列或其衍生物。在一些实施方案中，衍生物包含与选自SEQ ID NO:95至97的氨基酸序列具有至少60％、至少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于选自SEQ ID NO:95至97的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0055] 在一些实施方案中，酶类途径包含CBCAS酶，其包含SEQ ID NO:98的氨基酸序列或其衍生物。在一些实施方案中，衍生物包含与SEQ ID NO:98的氨基酸序列具有至少60％、至

少70％、至少80％、至少90％、至少95％或至少98％同一性的氨基酸序列。在一些实施方案中，衍生物包含相对于SEQ ID NO:98的序列具有1至20个或1至10个氨基酸修饰的氨基酸序列。氨基酸修饰可以独立地选自取代、缺失及插入。

[0056] 术语“或其衍生物”指示衍生物或具有所叙述序列的“亲代”酶之间的一定程度的相似性。衍生物可与亲代酶具有至少40％、50％、60％、70％、75％、80％、85％、90％、95％、98％或99％序列同一性。衍生物也可与亲代酶共享结构相似性，诸如在二级、三级或四级结构中的相似性。在各种实施方案中，衍生物或亲代酶具有相似的底物和/或辅因子结合位点、活性位点或反应机制。

[0057] 氨基酸序列的同一性，即序列同一性百分比，可以通过序列比对来测定。这种比对可以通过数种本领域已知的算法进行，诸如通过Karlin及Altschul的数学算法(Karlin&Altschul(1993)Proc.Natl.Acad.Sci.USA 90:5873-5877)、通过hmmalign(HMMER包，http://hmmer.wustl.edu/)、或通过CLUSTAL算法(Thompson,J.D.,Higgins,D.G.&Gibson,T.J.(1994)Nucleic Acids Res.22,4673-80)进行。可以使用例如BLAST、BLAT或BlastZ(或BlastX)计算序列同一性(序列匹配)等级。将相似算法并入到Altschul等人(1990)J.Mol.Biol.215:403-410的BLASTN和BLASTP程序中。可以用BLASTP程序执行BLAST蛋白质搜索，评分＝50，字长＝3。为获得空位比对以供比较，如Altschul等人(1997)Nucleic Acids Res.25:3389-3402中所述来利用Gapped BLAST。在利用BLAST和Gapped BLAST程序时，使用各个程序的默认参数。可以通过已建立的同源性映射技术如Shuffle-LAGAN(Brudno M.,Bioinformatics 2003b,19增刊1:154-162)或Markov随机场来补充序列匹配分析。

[0058] 在各种实施方案中，两个或更多个异源酶一起表达于操纵元中或经单独表达。酶可以由染色体外元件(诸如质粒或细菌人工染色体)表达，或可以在染色体上整合。

[0059] 可以测量重组宿主细胞中各种大麻素及大麻素前体的量，以鉴别生物合成途径中限速步骤。一旦鉴别了限速步骤，则可以通过本领域中已知的各种方法，诸如密码子优化、使用更强的启动子、表达对应基因的多个拷贝以及构筑稳定性和/或活性增加的变体来增加限制酶的表达或活性。

[0060] 在一些实施方案中，将由重组宿主细胞产生的一种或多种大麻素部分地或完全地输出到培养基。在其它实施方案中，将由重组宿主细胞产生的一种或多种大麻素保留在重组细胞中。可以从培养基或重组宿主细胞中回收大麻素。

[0061] 在各种实施方案中，微生物细胞为细菌，且可属于选自以下的属：埃希氏杆菌(Escherichia)、芽孢杆菌(Bacillus)、棒状杆菌(Corynebacterium)、红细菌(Rhodobacter)、发酵单胞菌(Zymomonas)、弧菌(Vibrio)、假单胞菌(Pseudomonas)、农杆菌(Agrobacterium)、短杆菌(Brevibacterium)以及副球菌(Paracoccus)。在一些实施方案中，细菌是选自以下的物种：大肠埃希氏菌(Escherichia coli)、枯草芽孢杆菌(Bacillus subtilis)、谷氨酸棒状杆菌(Corynebacterium glutamicum)、荚膜红细菌(Rhodobacter capsulatus)、类球红细菌(Rhodobacter sphaeroides)、运动发酵单胞菌(Zymomonas mobilis)、需钠弧菌(Vibrio natriegens)或恶臭假单胞菌(Pseudomonas putida)。在一些实施方案中，细菌是大肠埃希氏菌。在各种实施方案中，微生物细胞是酵母细胞，其是属于以下的物种：酿酒酵母属(Saccharomyces)、毕赤酵母属(Pichia)或耶氏酵母属

(Yarrowia)。例如,微生物细胞可以是选自以下的物种:啤酒酵母(Saccharomyces cerevisiae)、巴斯德毕赤酵母(Pichia pastoris)及解脂耶氏酵母(Yarrowia lipolytica)。

[0062] 在各种实施方案中,重组宿主细胞并入增加乙酰基-CoA前体池以使得能够高效价产生OA及DA途径中间体的修饰。在这些或其它实施方案中,修饰宿主细胞以提高GPP产量。在一些实施方案中,重组大肠埃希氏菌细胞过度表达MEP途径中的一种或多种酶。大肠埃希氏菌可能具有对MEP途径的酶的经工程改造的表达及其它修饰,如US 2018/0245103或US 2018/0216137中所述,其内容特此通过引用的方式整体并入。

[0063] 在一些实施方案中,微生物细胞是选自属于以下的物种:酿酒酵母、毕赤酵母或耶氏酵母,包括(但不限于)啤酒酵母、巴斯德毕赤酵母以及解脂耶氏酵母。

[0064] 在一些实施方案中,宿主细胞是产油酵母(解脂耶氏酵母),其可利用多种多样的碳源并且具有通过关键大麻素前体(乙酰基-CoA及丙二酰基-CoA)的高通量潜力。PCT/US2017/022252呈现各种通过代谢工程改造增加酵母中多聚酮(诸如OA及DA)的生物合成的方法,其特此通过引用的方式整体并入。通过减少或消除某些基因的表达或通过过度表达其它基因来增强多聚酮合成。

[0065] 在酵母物种(诸如解脂耶氏酵母)中,用ACC1(将乙酰基-CoA转化为丙二酰基-CoA的酶)协调丙酮酸脱氢酶复合组分PDA1、PDE2、PDE3及PDB1的过度表达适用于增加多聚酮合成。丙酮酸旁路途径酶的增强表达会进一步增加多聚酮合成。这些酶通过丙酮酸脱羧酶(PDC1、PDC2)将丙酮酸转化为乙醛,接着通过乙醛脱氢酶(ALD2、ALD3、ALD5)转化为乙酸,并最终经由乙酰基-CoA合酶(ACS1)转化为乙酰基-CoA。例如,在一些实施方案中,多聚酮合成可以在过度表达ACS1、ALD2、ALD3、ALD5、PDC1、PDC2及ACC1的各种组合后增加。另外,诸如过氧化酶体基质蛋白10(PEX10)、多功能β氧化蛋白(MFE1)、初级油酸调节剂(POR1)或磷脂酸磷酸酶(PAH)的过度产生等基因修饰可以增加脂肪酸的β-氧化并由此增加乙酰基-CoA及丙二酰基-CoA的可用率。

[0066] 在一些实施例中,重组酵母(例如解脂耶氏酵母)宿主细胞经工程改造以并入增加乙酰基-CoA前驱物池以使得能够高效价产生OA或DA途径中间体的修饰。在各种实施方案中,修饰重组酵母细胞以增强GPP产量,其可以为通过MVA途径中的一种或多种酶的过度表达进行。在替代实施方案中,酵母细胞并未过度表达MVA途径的酶,或并未工程改造为提高MVA途径产物的产量,且实际上所述细胞可为供给的GPP或萜烯或萜烯前体化合物以支持大麻素生物合成。在一些实施方案中,细胞从IPP和/或DMAPP中产生GPP。在实施方案中,微生物细胞表达一种或多种酶,其用于将供给的异异戊烯醇和/或异戊烯醇转化为异戊烯基焦磷酸(IPP)和/或二甲基烯丙基焦磷酸(DMAPP),并且在一些实施方案中,一种或多种酶是任选的激酶。

[0067] 在一些实施方案中,重组宿主细胞可从糖(例如葡萄糖)及存在于生长培养基中的其它组分产生大麻素。在其它实施方案中,大麻素是通过从诸如3,5-二羟基戊苯、OA、2,4-二羟基丙苯、DA、己酸、丁酸、己酰基-CoA、丁酰基-CoA及GPP前体等供给重组细胞的前体的生物转化产生。在各种实施方案中,大麻素是由一种或多种替代碳源(包括例如C1、C2、C3、C4、C5和/或C6碳底物、甘油、木糖、果糖、甘露糖、核糖、蔗糖、木质纤维素生物质、乙醇、乙酸盐、甜菜浆、黑液、玉米淀粉或柳枝稷)产生。

[0068] 在一些实施方案中，重组宿主细胞表达具有CBGAS及CBDAS活性的酶，并因此产生可转化为CBD的CBDA。

[0069] 在一些实施方案中，重组宿主细胞表达具有CBGAS及CBDAS活性的酶，并且在供给有包含糖(诸如葡萄糖)或其它碳C1至C6碳底物的培养基时产生CBDA和/或CBD。这种重组宿主细胞可进一步表达具有GPPS、OAC、OLS和/或AAE活性的酶。在一些实施方案中，表达CBGAS及CBDAS酶的重组宿主细胞在供给有3,5-二羟基戊苯或OA时产生CBDA和/或CBD。在一些实施方案中，通过暴露于热量和/或UV光将从重组宿主细胞中回收的CBDA转化为CBD。

[0070] 在一些实施方案中，重组宿主细胞表达具有CBGAS及THCAS活性的酶，所述宿主细胞产生可转化为THC的THCA。在一些实施方案中，表达具有CBGAS及THCAS活性的酶的重组宿主细胞在供给有包含糖(诸如葡萄糖)或其它C1至C6碳底物的培养基时产生可转化为THC的THCA。在此类实施方案中，重组宿主细胞进一步表达GPPS、OLS和/或OAC酶。在一些实施方案中，重组宿主细胞表达具有CBGAS及THCAS活性的酶，所述宿主细胞在供给有3,5-二羟基戊苯或OA时产生可转化为THC的THCA。在一些实施方案中，通过暴露于热量和/或UV光将从重组宿主细胞中回收的THCA转化为THC。

[0071] 在一些实施方案中，重组宿主细胞表达具有CBGAS及CBCAS活性的酶，所述宿主细胞产生可转化为CBC的CBCA。在一些实施方案中，表达具有CBGAS及CBCAS活性的酶的重组宿主细胞在供给有包含糖(诸如葡萄糖)或其它C1至C6碳底物的培养基时产生可转化为CBC的CBCA。在此类实施方案中，重组宿主细胞进一步表达GPPS、OLS和/或OAC酶。在一些实施方案中，重组宿主细胞表达具有CBGAS及CBCAS活性的酶，所述宿主细胞在供给有3,5-二羟基戊苯或OA时产生可转化为CBC的CBCA。在一些实施方案中，通过暴露于热量和/或UV光将从重组宿主细胞中回收的CBCA转化为CBC。

[0072] 在一些实施方案中，重组宿主细胞表达具有CBGVAS及THCAS活性的酶，所述宿主细胞产生可转化为THCV的THCVA。在一些实施方案中，表达具有CBGVAS及THCAS活性的酶的重组宿主细胞在供给有包含糖(诸如葡萄糖)或其它C1至C6碳底物的培养基时产生可转化为THCV的THCVA。在此类实施方案中，重组宿主细胞进一步表达GPPS、DS和/或DAC酶。在一些实施方案中，重组宿主细胞表达具有CBGVAS及THCAS活性的酶，所述宿主细胞在供给有2,4-二羟基丙苯或DA时产生可转化为THCV的THCVA。在一些实施方案中，通过暴露于热量和/或UV光将从重组宿主细胞中回收的THCVA转化为THCV。

[0073] 在一些实施方案中，重组宿主细胞表达具有CBGVAS及CBDAS活性的酶，所述宿主细胞产生可转化为CBDV的CBDVA。在一些实施方案中，表达具有CBGVAS及CBDAS活性的酶的重组宿主细胞在供给有包含糖(诸如葡萄糖)或其它C1至C6碳底物的培养基时产生可转化为CBDV的CBDVA。在此类实施方案中，重组宿主细胞进一步表达GPPS、DS和/或DAC酶。在一些实施方案中，重组宿主细胞表达具有CBGVAS及CBDAS活性的酶，所述宿主细胞在供给有2,4-二羟基丙苯或DA时产生可转化为CBDV的CBDVA。在一些实施方案中，通过暴露于热量和/或UV光将从重组宿主细胞中回收的CBDVA转化为CBDV。

[0074] 在一些实施方案中，重组宿主细胞表达具有CBGVAS及CBCAS活性的酶，所述宿主细胞产生可转化为CBCV的CBCVA。在一些实施方案中，表达具有CBGVAS及CBCAS活性的酶的重组宿主细胞在供给有包含糖(诸如葡萄糖)或其它C1至C6碳底物的培养基时产生可转化为CBCV的CBCVA。在此类实施方案中，重组宿主细胞进一步表达GPPS、DS和/或DAC酶。在一些实

施方案中，重组宿主细胞表达具有CBGVAS及CBCAS活性的酶，所述宿主细胞在供给有2,4-二羟基丙苯或DA时产生可转化为CBCV的CBCVA。在一些实施方案中，通过暴露于热量和/或UV光将从重组宿主细胞中回收的CBCVA转化为CBCV。

[0075] 在各个实施方案中，宿主细胞是在22℃至37℃之间的温度下培养。虽然在诸如大肠埃希氏菌等宿主细胞中的商业生物合成可受到过度表达的酶和/或外来酶(例如，源自植物的酶)稳定时的温度的限制，但是可以对重组酶(包括萜类合酶)进行工程改造以使培养物维持在较高温度下，从而得到更高的产率和更高的总产生力。在一些实施方案中，在约22℃或更高、约23℃或更高、约24℃或更高、约25℃或更高、约26℃或更高、约27℃或更高、约28℃或更高、约29℃更高、约30℃或更高、约31℃或更高、约32℃或更高、约33℃或更高、约34℃或更高、约35℃或更高、约36℃或更高或约37℃下培养宿主细胞(细菌或酵母宿主细胞)。

[0076] 大麻素可以从培养基和/或全细胞中提取并进行回收。在一些实施方案中，回收大麻素，并任选地通过分级(例如分馏)来富集。产物可通过任何合适的过程回收，包括将所需产物分配至有机相中。各种大麻素制备方法为本领域中已知的，诸如离心分配色谱法。可以例如通过气相色谱法(例如，GC-MS)或高压液相色谱法(HPLC-MS)测定和/或定量所需产物的产生。

[0077] 所需产物可以在分批或连续生物反应器系统中产生。产物的产生、回收和/或产物的分析可以如US 2012/0246767中所述进行，所述文献特此通过引用的方式整体并入。例如，在一些实施方案中，从含水反应介质中提取氧化油，这可以通过分配到有机相中，然后分馏来进行。馏分的大麻素组分可以通过GC/MS或HPLC/MS定量测量，然后将馏分共混。

[0078] 在一些实施方案中，本文所公开的微生物宿主细胞和方法适合于一种或多种大麻素的商业生产，即微生物宿主细胞和方法在商业规模上富有生产力。在一些实施方案中，培养物的大小为至少约100L、至少约200L、至少约500L、至少约1,000L、至少约10,000L、至少约100,000L或至少约1,000,000L。在一些实施方案中，培养可以分批培养、连续培养或半连续培养形式进行。

[0079] 在一些方面，本发明提供制造包含一种或多种大麻素的产品的方法。在各个方面，所述产品是医药组合物、膳食补充剂或烘焙食品。本发明的大麻素可以与一种或多种赋形剂混合形成医药产品，其可为丸剂、胶囊、口喷或口服溶液。

[0080] 除非内容另外明确指出，否则如本说明书和所附权利要求书中所用，单数形式“一(a、an)”和“所述(该)”包括复数指示物。例如，对“细胞”的提及包括两个或更多个细胞等的组合。

[0081] 实施例

[0082] 实施例1：通过异戊烯基转移酶产生大麻萜酚酸

[0083] 使用液相色谱法(LC)质谱分析(MS/MS)筛选数种候选异戊烯基转移酶(表1)产生大麻萜酚酸(CBGA)的能力。

[0084] 3,5-二羟基戊基苯甲酸(OA)及香叶基焦磷酸(GPP)(两者皆为底物)与每种候选异戊烯基转移酶混合，并且在适用于产生CBGA的条件下进行反应。通过多反应监测鉴别从每种候选异戊烯基转移酶的反应产生的产物，并且将其停留时间与可信的CBGA标准相比较。针对每种候选异戊烯基转移酶获得的结果显示于下表1中。

[0085] 图4中的各分图在X轴上显示停留时间且在Y轴上显示离子计数(m/z 361.0>219.0)。SP(1或2)表示由反应获得的副产物。图4A显示停留时间为4.952min的可信CBGA标准。图4B显示由未向反应混合物中添加酶的对照获得的产物。对照没有产生CBGA。图4C显示从酶A获得的反应产物;CBGA是如图中所示的停留时间为4.952min的产物。图4D显示从酶B获得的反应产物,且图4E显示从酶C获得的反应产物。

[0086] 表1:芳族异戊烯基转移酶候选物及其大麻萜酚酸(CBGA)活性的列表。

[0087]

酶(SEQ ID NO)	CBGA 活性
1 (SEQ ID NO: 63)	是
2 (SEQ ID NO: 64)	否
3 (SEQ ID NO: 65)	否
4 (SEQ ID NO: 66)	否
5 (SEQ ID NO: 67)	否
6 (SEQ ID NO: 68)	否
7 (SEQ ID NO: 69)	否

[0088]

8 (SEQ ID NO: 70)	否
9 (SEQ ID NO: 71)	否
10 (SEQ ID NO: 72)	否
11 (SEQ ID NO: 73)	否
12 (SEQ ID NO: 74)	是
13 (SEQ ID NO: 75)	否
14 (SEQ ID NO: 76)	否
15 (SEQ ID NO: 77)	是
16 (SEQ ID NO: 78)	否
17 (SEQ ID NO: 79)	否
18 (SEQ ID NO: 80)	否
19 (SEQ ID NO: 81)	否
20 (SEQ ID NO: 82)	否
21 (SEQ ID NO: 83)	否
22 (SEQ ID NO: 60)	否
23 (SEQ ID NO: 61)	否
24 (SEQ ID NO: 62)	否
25 (SEQ ID NO: 84)	是
26 (SEQ ID NO: 85)	是
27 (SEQ ID NO: 86)	是
28 (SEQ ID NO: 87)	是
29 (SEQ ID NO: 88)	是
30 (SEQ ID NO: 89)	是
31 (SEQ ID NO: 90)	是
32 (SEQ ID NO: 91)	是
33 (SEQ ID NO: 92)	否
34 (SEQ ID NO: 93)	是
35 (SEQ ID NO: 94)	否
36 (SEQ ID NO: 84，包含单个突变： G286S)	是

[0089] 序列

[0090] GPPS

[0091] SEQ ID NO:1(坚龙胆(Gentiana rigescens))

[0092] MALIYSTPSWVQAHTISIYHGNGSSFFPCYLSKNKAPVFLSNPCKKPNLGRSPLSICAILTKEESKIKK
AHDFSFNFKDYMLEKADSVNKALEQAVSIREPLKIHESMRYSLLAGGKRVRPMLCIAACELFGGDESVAMPSACAVE
MIHTMSLMHDDLPCMDNDDLRRGKPTNHKVYGEDVAVLAGDALLAFAFEHIATSTKGVTSERIVRVIGELAKCIGSE
GLVAGQIVDVCSEGISDVGLQHLEFIHIHKTAALLEGSVAMGAILGGADDEEVSKLRKFARGIGLLFQVVDDILDVT

KSSKELGKTAAKDLVADKVTYPKLIGIDKSREFAEKLNREAQDQLAGFDSEKAAPLIALANYIAYRDN

[0093] SEQ ID NO:2(川西獐牙菜(Swertia mussotii))

[0094] MSLVNSTATSWLQAHTISNYYGGNGSNLSPYYLCHTFKNKLGPPISQKESTFRYSSFSICAILTKEESK IKKAHDFSSFNFEDYMIEKANSVNKALESAVSIREPLKIHESMRYSLLAGGKRIRPMLCIAACELFGGDESIAMPSA CAVEMIHTMSLMHDDLPCMDNDDLRRGKPTNHKVFGEDVAVLAGDALLAFAFEHIATSTKGVSSDRIVRVIGELARF VGSEGLVAGQIVDVCSEGKSDVGLKHLEFIHIHKTAALLEGSVALGAILGGANDEQVLKLKKFARGIGLLFQVVDDI LDVTKSSKELGKTAGKDLVADKVTYPKLIGIEKSREFADKLNREAQEQLSGFDPEKAAPLIALANYIAYRDN

[0095] SEQ ID NO:3(喜树(Camptotheca acuminate))

[0096] MLFYRGLSRISRTSLNHGWWLLSFRNEQQLVPSNNFHYPRYTAEKVLGCRETYSWASHTFHGVGHQIHH QSCTIDEEQLDPFSLVADELSVLANRLRSMVVAEVPKLASAAEYLFKMGVEGKRFRPTVLLLMATALNVPIPGPAPD RSVDSLSMELRTRQQCIAEITEMIHVASLLHDDVLDDADTRRGIGSLNFIMGNKLAVLGGDFLLSRACVALASLKNT EVVSLLATVVEHLVTGETMQMTTSSEQRCSMEYYLQKTYYKTASLISNSCKAVALLAGQTAEVSLLAYEYGKNLGLA YQLIDDVLDFIGTSTSLGKGSLSDIRHGIVTAPILYAIEEFPQLRAVVDEGFDKPANVDLALQYLGRSCGIQRTREL ATKHANLASAAIDSLPESNDEDVQKSRRALVGLTHRVITRTK

[0097] SEQ ID NO:4(拟南芥(Arabidopsis thaliana))

[0098] MLFTRSVARISSKFLRNRSFYGSSQSLASHRFAIIPDQGHSCSDSPHKGYVCRTTYSLKSPVFGGFSHQ LYHQSSSLVEEELDPFSLVADELSLLSNKLREMVLAEVPKLASAAEYFFKRGVQGKQFRSTILLLMATALNVRVPEA LIGESTDIVTSELRVRQRGIAEITEMIHVASLLHDDVLDDADTRRGVGSLNVVMGNKMSVLAGDFLLSRACGALAAL KNTEVVALLATAVEHLVTGETMEITSSTEQRYSMDYYMQKTYYKTASLISNSCKAVAVLTGQTAEVAVLAFEYGRNL GLAFQLIDDILDFTGTSASLGKGSLSDIRHGVITAPILFAMEEFPQLREVVDQVEKDPRNVDIALEYLGKSKGIQRA RELAMEHANLAAAAIGSLPETDNEDVKRSRRALIDLTHRVITRNK

[0099] SEQ ID NO:5(拟南芥(Arabidopsis thaliana))

[0100] MVLAEVPKLASAAEYFFKRGVQGKQFRSTILLLMATALNVRVPEALIGESTDIVTSELRVRQRGIAEIT EMIHVASLLHDDVLDDADTRRGVGSLNVVMGNKMSVLAGDFLLSRACGALAALKNTEVVALLATAVEHLVTGETMEI TSSTEQRYSMDYYMQKTYYKTASLISNSCKAVAVLTGQTAEVAVLAFEYGRNLGLAFQLIDDILDFTGTSASLGKGS LSDIRHGVITAPILFAMEEFPQLREVVDQVEKDPRNVDIALEYLGKSKGIQRARELAMEHANLAAAAIGSLPETDNE DVKRSRRALIDLTHRVITRNK

[0101] SEQ ID NO:6(大豆(Glycine max))

[0102] MLGALLLNANFKIHFSLISCQARVPLPVKPAPLRMPSPHYPHWASLQADIEAHLKQTIPLKEPLEVFEP MLHLAFSAPRTTVPALCLAACELVGGHRQQAMAAASALLLNLANAHAHEHLTDGPMYGPNIELLTGDGIVPFGFELL ARPDGPASASPERVLRVMIEISRAVGSVGLQDAQYVKKTLWDGGEEVQNVESMQRFVLEKRDGGLHACGAASGAILG GGSEDQIERLRNFGFHVGMMRGMLQMGFMEKHVQEERHLALKELQFFMDRDVHVISSFIY

[0103] SEQ ID NO:7(向日葵(Helianthus annuus))

[0104] MSIYRAISRITRTASSYNRCRWFYSSAPHQQLSPYSGFRSSEQVLGCRVISPWFSRSFRSGGPQPQYED DQEDPFSLVADELSIVANRLRSMVVAEVPKLASAAEYFFKMGVEGKRFRPTVILLMATALNNQISKPPSEGVVDMLS TEFRTRLQSIAEITEMIHVASLLHDDVLDDADTRRGIGSLNFVMGNKISVLAGDFLLSRACITLASLKNTEVVSLIA TAVEHLVTGETMQMSSSAEQRSSMDYYLQKTYYKTASLISNSCKSIALLTGQTAEVAMLAYEYGKNLGLAFQLIDDV LDFTGTSSSLGKGSLSDIRHGIVTAPLLYAMEEFPELRSVVDRGLDNPANVDLALEYLGKSHGIQRTRELAAKHASL ASAAIDSFPENDDEDVQRSRRALIELTHRVINRTK

[0105] SEQ ID NO:8(南非醉茄(Withania somnifera))

[0106] MIFSRVLSQISRNRFSRCRWLFSLPPHQQLHHSNNIYASQKVLGCRVIHSWVSNALSGIGQQIHHQTSA
VAEEQVDPFSLVADELSLLTNRLRSMVVAEVPKLASAAEYFFKMGVEGKRFRPTVLLLMATALNVQIPRSAPHVDVD
SLSGDLRTRQQCIAEITEMIHVASLLHDDVLDDAETRRGIGSLNYVMGNKLAVLAGDFLLSRACVALASLKNTEVVS
LLATVVEHLVTGETMQMTTSSDERCSMEYYMQKTYYKTASLISNSCKAIALLAGHTAEVSVLAFDYGKNLGLAFQLI
DDVLDFTGTSATLGKGSLSDIRHGIVTAPILYAMEEFPQLRTLVDRGFDDPVNVEIALDYLGKSRGIQRTRELARKH
ASLASAAIDSLPESHDEEVQRSRRALVELTHRVITRTK

[0107] SEQ ID NO:9(江南卷柏(Selaginella moellendorffii))

[0108] MAQLGRRLRDMVAAEVPKLASAAEYFFKLGVEGKRFRPMVLLLMSSSLTMVLPSAAAATSDEKNWRHHK
LAEITEMIHVASLLHDDVLDHADTRRGIASLNFIMGNKLAVLAGDFLLARAAFSLSTLQNDEVVGLMSKVLEHLVAG
EVMQWTVDAEKSSSMDYYLQKTFYKTASLIANSCKCIAILAGHPKEVAALAFDYGRHLGLAYQLVDDLLDFTGTKAS
LGKPALSDLREGIATAPVLYALEEHPALQELIDRKFKDPGDVDSALKMVLASSGIRKTKELAREHASKAADAVAGFP
PTTSEKASLCRRALTELTEQVITRSNRGRMCCEAVNLSARFN

[0109] SEQ ID NO:10(芍药(Paeonia lactiflora))

[0110] MLYSRGFSRIPRNSLIRCCKWFLSSQQYHQQSFLSIKFQPPTDHTQKVLGCREIYSRGLLALHGIQHQS
YHGGSSVIEERLDPFSLVADELSVIANRLRAMVVAKVPKLGSAAEYFFKIGVEGKRFRPTILLLMATALNVSIPGRA
HAVLGDTLATELRTRQQCIAEITEMIHVASLLHDDVLDDADTRRGISSLNSVVGNKVAVLAGDFLLSRACVALASLR
NTDVVILLATVVEHLVTGETMQMTTTSEQRCSMDYYMEKTYYKTASLISNSCKAIALLAGQTAEVAMLAFEYGKNLG
LAFQLIDDVLDFTGTSASLGKGSLSDIRRGIVTAPILFAVEEFPQLRALVDRGFHDPKDVDIALDYLGKSCGIQKTR
ELATKHANLAAAAIDSLPESDDEEVVKSRRALVDLTQRVITRTK

[0111] SEQ ID NO:11(长春花(Catharanthus roseus))

[0112] MLFSRGLYRIARTSLNRSRLLYPLQSQSPELLQSFQFRSPIGSSQKVSGFRVIYSWVSSALANVGQQVQ
RQSNSVAEEPLDPFSLVADELSILANRLRSMVVAEVPKLASAAEYFFKLGVEGKRFRPTVLLLMATAIDAPISRTPP
DTSLDTLSTELRLRQQTIAEITKMIHVASLLHDDVLDDAETRRGIGSLNFVMGNKLAVLAGDFLLSRACVALASLKN
TEVVSLLATVVEHLVTGETMQMTTTSDQRCSMEYYMQKTYYMTASLISNSCKAIALLAGQTSEVAMLAYEYGKNLGL
AFQLIDDVLDFTGTSASLGKGSLSDIRHGIVTAPILFAIEEFPELRAVVDEGFENPYNVDLALHYLGKSRGIQRTRE
LAIKHANLASDAIDSLPVTDDEHVLRSRRALVELTQRVITRRK

[0113] SEQ ID NO:12(微拟球藻(Nannochloropsis gaditana))

[0114] MPAPRKVGLRRLRGLVQSCSTGFRGGVQPSLISSRTAISYVNRAVDHIYYSHASIGSTTNIVHRSIRSG
WAKTAADASIDVIVNAVTRPEIDEPTVKVAEPRRAIIKADQAGELEEDLALDLQRKPRLDLLAGWAGAARGVDPFKI
VESDMRSLSAGIKSLLGSDHPVLEACAKYFFELDGGKKIRPTMVLLISRAVAAHAPAQGVNGSRAFTSTSESSTPLP
SQKRLAEITEMIHTASLFHDDVIDEADERRGVPSINKIYGNKMAILAGDFLLARASVSLARLRNIEVVELLSTVIEH
LVKGEVMQSRPQALVDGSGTGENGQAALEYYLHKNFYKTGSLMANSCRAAVLLAGGGDALQNQAFAYGRHVGLAFQL
VDDVLDFEQTSETLGKPALNDLRQGLATAPVLLAARTFPDEVGDMVKRKFASEGDVERVREMAFFSIAMTSPRPRYN
SSYLGTLL

[0115] SEQ ID NO:13(丹参(Salvia miltiorrhiza))

[0116] MISVRGLARLARSGYARRRWVYSSLGCSGSAPLQLEHSSHFRNPIQSSREVLGCRVIYSWVSNAISTVG
QQVHLQSSSAVEEQLDPFSLVADELSILADRLRSMVVAEVPKLASAAEYFFKFGVEGKRFRPTVLLLMATALDLPIA
RQTSEVAVNTLSTELRTRQQCVAEITEMIHVASLLHDDVLDDADTRRGIGSLNYVMGNKLAVLAGDFLLSRACVALA

SLKNTEVVTLIAQVVEHLVTGETMQMTTTSEQRCSMEYYMEKTYYKTASLICNSCKSIALIAGQTAEVSNLAYEYGK
NLGLAFQIIDDVLDFTGTSASLGKGSLSDIRHGIVTAPILFAIEEYPELRKIVDQGFEKSSNVDRALEILSKSSGIQ
RARELAAKHARLASAAIDALPENEDEVVQRSMRALVELTHIVITRTK

[0117] SEQ ID NO:14(酿酒葡萄(Vitis vinifera))

[0118] MVVAEVPKLASAAEYFFKMGVEGKRXRPTVLLLMATALNVPLPRPALAEVPETLSTELRTRQQCIAEIT
EMIHVASLLHDDVLDDAETRRGIGSLNIMMGNKVAVLAGDFLLSRACVALASLKNTEVVSLLATVVEHLVTGETMQM
TSTSEQRVSMEYYLQKTYYKTASLISNSCKAIALLAGQTAEVSMLAFEYGKNLGLAFQLIDDXLDFTGTSASLGKGS
LSDIRHGIITAPILFAIEEFPQLDAVVKRGLDNPADIDLALDYLGRSRGIQRTRELAMKHANLAAEAIDSLPESGDE
DVLRSRRALIDLTHRVITRTK

[0119] SEQ ID NO:15(松小蠹(Ips pini))

[0120] MFKLAQRLPKSVSSLGSQLSKNAPNQLAAATTSQLINTPGIRHKSRSSAVPSSLSKSMYDHNEEMKAAM
KYMDEIYPEVMGQIEKVPQYEEIKPILVRLREAIDYTVPYGKRFKGVHIVSHFKLLADPKFITPENVKLSGVLGWCA
EIIQAYFCMLDDIMDDSDTRRGKPTWYKLPGIGLNAVTDVCLMEMFTFELLKRYFPKHPSYADIHEILRNLLFLTHM
GQGYDFTFIDPVTRKINFNDFTEENYTKLCRYKIIFSTFHNTLELTSAMANVYDPKKIKQLDPVLMRIGMMHQSQND
FKDLYRDQGEVLKQAEKSVLGTDIKTGQLTWFAQKALSICNDRQRKIIMDNYGKEDNKNSEAVREVYEELDLKGKFM
EFEEESFEWLKKEIPKINNGIPHKVFQDYTYGVFKRRPE

[0121] SEQ ID NO:16(夏栎(Quercus robur))

[0122] MLFSRISRIRRPGSNGFRWFLSHKTHLQFLNPPAYSYSSTHKVLGCREIFSWGLPALHGFRHNIHHQSS
SIVEEQNDPFSLVADELSMVANRLRSMVVTEVPKLASAAEYFFKMGVEGKRFRPTVLLLMATAMNISILEPSLRGPG
DALTTELRARQQRIAEITEMIHVASLLHDDVLDDADTRRGIGSLNFVMGNKLAVLAGDFLLSRACVALASLKNTEVV
SLLAKVVEHLVTGETMQMTTTCEQRCSMEYYMQKTYYKTASLISNSCKAIALLGGQTSEVAMLAYEYGKNLGLAYQL
IDDVLDFTGTSASLGKGSLSDIRHGIITAPILFAMEEFPQLREVVDRGFDDPANVDVALDYLGKSRGIQRARELAKK
HANIAAEAIDSLPESNDEDVRKSRRALLDLTERVITRTK

[0123] SEQ ID NO:17(甜橙(Citrus sinensis))

[0124] MVIAEVPKLASAAEYFFKMGVEGKRFRPTVLLLMATALNVRVPEPLHDGVEDASATELRTRQQCIAEIT
EMIHVASLLHDDVLDDADTRRGIGSLNFVMGNKLAVLAGDFLLSRACVALASLKNTEVVTLLATVVEHLVTGETMQM
TTSSDQRCSMDYYMQKTYYKTASLISNSCKAIALLAGQTAEVAILAFDYGKNLGLAYQLIDDVLDFTGTSASLGKGS
LSDIRHGIITAPILFAMEEFPQLRTVVEQGFEDSSNVDIALEYLGKSRGIQKTRELAVKHANLAAAAIDSLPENNDE
DVTKSRRALLDLTHRVITRNK

[0125] SEQ ID NO:18(大麻(Cannabis sativa))

[0126] MHRVSLLCSFSQNQKASIFVKTKKMSTVNLTWVQTCSMFNQGGRSRSLSTFNLNLYHPLKKTPFSIQTP
KQKRPTSPFSSISAVLTEQEAVKEGDEEKSIFNFKSYMVQKANSVNQALDSAVLLRDPIMIHESMRYSLLAGGKRVR
PMLCLSACELVGGKESVAMPAACAVEMIHTMSLIHDDLPCMDNDDLRRGKPTNHKVFGEDVAVLAGDALLAFAFEHM
AVSTVGVPAAKIVRAIGELAKSIGSEGLVAGQVVDIDSEGLANVGLEQLEFIHLHKTGALLEASVVLGAILGGGTDE
EVEKLRSFARCIGLLFQVVDDILDVTKSSQELGKTAGKDLVADKVTYPRLMGIDKSREFAEQLNTEAKQHLSGFDPI
KAAPLIALANYIAYRQN

[0127] SEQ ID NO:19(白桑Morus alba))

[0128] MSCVNLSTWVQTCSLFNQAGGRSRLSSSSALNNLFHPLKNNFPVPLSSIPKRHRPSPSSSLSTVSAVLT
QQETETVTEVLEEEKAPFNFKAYMIQKANSVNQALDDAVSLREPQTIHEAMRYSLLAGGKRVRPVLCLTACELVGGD

ESVAMPAALAVEMIHTMSLIHDDLPCMDNDDLRRGKPTNHKVFGEDVAVLAGDALLAFAFEHIAVSTAGVTPSRIVR
AIGELAKSIGTEGLVAGQVVDIDSEGSDDAGLEKLEFIHIHKTAALLEASVVLGAILGGGTDDEVEKLRSFARCIGL
LFQVVDDILDVTKSSQELGKTAGKDLVADKVTYPKLIGIEKSKEFAAKLNKEAQEQLSGFDPHKAAPLIALANYIAN
RQN

[0129] SEQ ID NO:20(泊库岛食烷菌(Alcanivorax borkumensis SK2))

[0130] MSSKATREFAALNQLTDTAKARLEQALDHYLPAHSAASRLSHAMRYAALSGGKRIRPLLVYGAAQLAGA
PLAKADVPAVAVELIHAYSLVHDDLPAMDDDDLRRGQPTCHKAFDEATAILAGDTLHTRAFELLACHGDYRDGSRIS
LIQHLCQAAGVDGMAAGQMQDMLAQGQQQTVAALEEMHYLKTGRLITASLQLGYFVAEKDDPSLLANLTEFGDAIGL
AFQIQDDILDVTAATEQLGKPSGSDEKLQKSTFPSLLGLEQSQQRARQLCDQAQQTLAGYGPRALPLQQLAQYIITR
NH

[0131] SEQ ID NO:21(小球藻(Chlorella variabilis))

[0132] MGQVSAPVVEDMDICRQNLLNVVGERHPMLLAAANQIFSAGGKRLRPLIVLLVARATFPLTGLSDITE
RHRRLAEISEMLHTASLVHDDVLDECDVRRGKETVNSLYGTRVAVLAGDFLFAQSSWFLANLDNMEVIKLISQVIA
DFADGEISQAASLFDAYIDLRRYLDKSFWKTASLIAASCRSAAVFSDCDTEARPPNRSCSLPPRLPPPRRVALPAH
LAGRCPWPPLLRRVQDEMVGDGLLQLIQGRFKEEGSLQRALELVSLGGGIDKARTLAREQGDLALASLACLPDTPA
KRSLELMVDLVLERLYSEQ ID NO:22(混点齿小蠹(Ips confuses))

[0133] MFKLAQRLPKSVGSLGNQLSKVSNAPNQLMSQMVPVTFQVMNTPIRHKSKSSAVPSSLSKSMYEHNEEM
KDAMKYMDEIYSEVMGQIEKVPQYEEVKPILVRLRDAIDYTVPYGKRFKGVHIVSHFKLLADPKFITPENVKLSGVL
GWCAEIIQAYFCMLDDIMDDSDTRRGKPTWYKLPGIGLNAVTDVCLMEMFTFELLKRYFFQHPSCADIHEIFRNLLF
LTHMGQGCDFTFIDPVTRKINFKEFTEENYTKLCRYKIIFSTFHNTLELTSAMANVYDPKKIQELDPVLMRIGMMHQ
SQNDFKDLYRDQGEVLKQVEKSVLGTDIRTGQLTWFAQKALSICNDRQRKIIMDNYGKEDTKHSEAVREVYEELDLK
GKFMEFEEESFQWLKKEIPKINNGVPHKIFQDYTYGVFKRRPE

[0134] SEQ ID NO:23(白云杉(Picea glauca))

[0135] MYTRCILKDKYSRFNLRRKFFTSTKSINALNGLPDSRNPRGESNGISQFKIQQVFPCKEYIWIDRHKFH
DVGFQAQHKRSITDEEQVDPFSLVADELSILANRLRSMILTEIPKLGTAAEYFFKLGVEGKRFRPMVLLLMASSLTI
GIPEVAADCLRKGLDEEQRLRQQRIAEITEMIHVASLLHDDVLDDADTRRGVGSLNFVMGNKLAVLAGDFLLSRASV
ALASLKNTEVVELLSKVLEHLVTGEIMQMTNTNEQRCSMEYYMQKTFYKTASLMANSCKAIALIAGQPAEVCMLAYD
YGRNLGLAYQLVDDVLDFTGTTASLGKGSLSDIRQGIVTAPILFALEEFPQLHDVINRKFKKPGDIDLALEFLGKSD
GIRKAKQLAAQHAGFATFSVESFPPSESEYVKLCRKALIDLSEKVITRTK

[0136] SEQ ID NO:24(华山松大小蠹(Dendroctonus armandi))

[0137] MFSMKVCRNRSCREFLREARRTISKTSTDKNSDAISRAQDHKLNVESDSNGSYSRWKKQMHHNNIRALS
TIQQSMVRPVQSSALVTKEQSRDFMALFPDLVRELTEVGRSQELPDVMRRFARVLQYNTPTGKKNRGLIVLSTYRML
EDPEKLTPENIRLASILGWCVEMVHAYFLILDDIMDGSETRRGALCWYRQSGIGLSAINDAIMMENAVYLLLKRHLK
DHPMYVPMMELFHEGTIKTTLGQSLDAMCLDTNGKPKLDMFTMSRYTSIVKYKTAYYSFQMPVAIAMYLAGMSDEEQ
HRQAKTILMEMGQFFQIQDDFLDCFGDPTVTGKVGTDIQDGKCSWLAVVALQRASAAQRKIMEEYYGRPEPESVAQI
KNLYVDLCLPNTYAIYEEESFNIIKTHIQQISKGLRHDLFFKIMEKIYKREC

[0138] SEQ ID NO:25(紫花苜蓿(Medicago sativa))

[0139] MATTTSHLTNVKSTVHFSCISNQHRSHLTTKLKPTTVRMSMTQTPYWASLHADVEAHLKQTITIKEPLL
VFEPMHHLIFTAPKTTVPALCLAACELVGGQRQEAISAASALLLMEAATYTHEHLPLSDRPGPKPGPMIDHVYGPNV

ELLTGDGIVPFGFELLARSDGGENSERILKVMVEISRAVGSGGGVIDAQYMKTLGGGSDGDEICHVEEIRRVVEKYE
GRLHSCGAVCGGVLGGGCEEEIERLRKFGFYVGIIQGMIKWGFKEDHKEVVEARNLAIQELKFFKDKEVDAIKTFLN
I

[0140] AAE

[0141] SEQ ID NO:26(大麻AAE1)

[0142] MGKNYKSLDSVVASDFIALGITSEVAETLHGRLAEIVCNYGAATPQTWINIANHILSPDLPFSLHQMLF
YGCYKDFGPAPPAWIPDPEKVKSTNLGALLEKRGKEFLGVKYKDPISSFSHFQEFSVRNPEVYWRTVLMDEMKISFS
KDPECILRRDDINNPGGSEWLPGGYLNSAKNCLNVNSNKKLNDTMIVWRDEGNDDLPLNKLTLDQLRKRVWLVGYAL
EEMGLEKGCAIAIDMPMHVDAVVIYLAIVLAGYVVVSIADSFSAPEISTRLRLSKAKAIFTQDHIIRGKKRIPLYSR
VVEAKSPMAIVIPCSGSNIGAELRDGDISWDYFLERAKEFKNCEFTAREQPVDAYTNILFSSGTTGEPKAIPWTQAT
PLKAAADGWSHLDIRKGDVIVWPTNLGWMMGPWLVYASLLNGASIALYNGSPLVSGFAKFVQDAKVTMLGVVPSIVR
SWKSTNCVSGYDWSTIRCFSSSGEASNVDEYLWLMGRANYKPVIEMCGGTEIGGAFSAGSFLQAQSLSSFSSQCMGC
TLYILDKNGYPMPKNKPGIGELALGPVMFGASKTLLNGNHHDVYFKGMPTLNGEVLRRHGDIFELTSNGYYHAHGRA
DDTMNIGGIKISSIEIERVCNEVDDRVFETTAIGVPPLGGGPEQLVIFFVLKDSNDTTIDLNQLRLSFNLGLQKKLN
PLFKVTRVVPLSSLPRTATNKIMRRVLRQQFSHFE

[0143] SEQ ID NO:27(大麻AAE3)

[0144] MEKSGYGRDGIYRSLRPPLHLPNNNNLSMVSFLFRNSSSYPQKPALIDSETNQILSFSHFKSTVIKVSH
GFLNLGIKKNDVVLIYAPNSIHFPVCFLGIIASGAIATTSNPLYTVSELSKQVKDSNPKLIITVPQLLEKVKGFNLP
TILIGPDSEQESSSDKVMTFNDLVNLGGSSGSEFPIVDDFKQSDTAALLYSSGTTGMSKGVVLTHKNFIASSLMVTM
EQDLVGEMDNVFLCFLPMFHVFGLAIITYAQLQRGNTVISMARFDLEKMLKDVEKYKVTHLWVVPPVILALSKNSMV
KKFNLSSIKYIGSGAAPLGKDLMEECSKVVPYGIVAQGYGMTETCGIVSMEDIRGGKRNSGSAGMLASGVEAQIVSV
DTLKPLPPNQLGEIWVKGPNMMQGYFNNPQATKLTIDKKGWVHTGDLGYFDEDGHLYVVDRIKELIKYKGFQVAPAE
LEGLLVSHPEILDAVVIPFPDAEAGEVPVAYVVRSPNSSLTENDVKKFIAGQVASFKRLRKVTFINSVPKSASGKIL
RRELIQKVRSNM

[0145] SEQ ID NO:28(大麻AAE12)

[0146] MYMYQEVYLVPTLSYLYLVVVLLPSIFFSFRRMAFKSLDSVTSSDIAALGIEPQLAHSLHGRLAEIVSN
HGSATPHTWRCISSHLLSPDLPFSLHQMLYYGCYKDFGPDPPAWIPDAENAISTNVGKLLEKRGKEFLGVKYKDPIS
NFSDFQEFSVTNPEVYWRTILDEMNISFSKPPECILRENFSRDGQILNPGGEWLPGAFINPAKNCLDLNCKSLDDTM
ILWRDEGKDDLPVNKMTLKELRSEVWLVAYALKELELEGGSAIAIDMPMNVHSVVIYLAIVLAGYVVVSIADSFAAP
EISTRLKISKAKAIFTQDLIVRGEKTIPLYSRIVEAQSPLAIVIPSKGFSVSAQLRHGDVSWHDFLNRANKFKNYEF
AAVEQPIDAYTNILFSSGTTGEPKAIPWTQATPFKAAADAWCHMDIQKGDVVAWPTNLGWMMGPWLVYASLLNGASI
ALYNGSPLGSGFAKFVQDAKVTMLGVIPSIVRTWKSTNCVAGYDWSTIRCFSSTGEASNIDEYLWLMGRAYYKPVIE
YCGGTEIGGGFVTGSLLQAQSLAAFSTPAMGCSLFILGSDGYPIPKHKPGIGELALGPLMFGASKTLLNADHYDVYF
KRMPSLNGKVLRRHGDMFELTSKGYYHAHGRADDTMNLGGIKVSSVEIERICNEADEKVLETAAIGVPPLAGGPEQL
VIAVVLKNSDRTTVDLNQLRLSFNSAVQKKLNPLFRVSRVVPLSSLPRTATNKVMRRILRQQFTQLDKSSKI

[0147] SEQ ID NO:29(金丝枣(Ziziphus jujube))

[0148] MAHKSLDGITASDIEALGIEPEVAKSLHGRLTKIIRNYGTATPDTWSNISRHILSPDLPFSFHQMMYYG
CYKDFGPDPPAWIPDLEAAVSTNVGQLLERQGKEFLGSRYKDPISSFSDFQEFSVKNPEVYWKTILDEMNVSFSIPP
QCILRENVSGERHFSHPGGEWLPGAFVNPANNCLSLNYKRNLDDSMVLWRDEGKDDLPINKMTLKELREEVWLVAHA

LEKLGLDKGSAIAIDMPMDVRSVIIYLAIVLAGYVVVSIADSFAPLEISTRLRISQAKAIFTQDLIIRGEKCIPLYS
RIVEAESPMAIVIPTRGSSFSIKLRDGDVAWNDFLERVGDFKKIEFAAVDQPIEAFTNILFSSGTTGEPKAIPWTHA
TPFKAAADAWCHMDIQKGDVVCWPTNLGWMMGPWLVYASLLNGASIALYNGSPLGSGFAKFVQDAKVTMLGVIPSIV
RTWKSSNCVAGYDWSTIRCFGSTGEASNVDEYLWLMGRACYKPVIEYCGGTEIGGGFVSGSLLQAQSLAAFSTPAMG
CSLYILGSNGLPIPQNQPGIGELALDPLMFGASRTLLNADHYDVYFKGMPVWNGKVLRRHGDMFELTSRGYYHAHGR
ADDTMNIGGIKVSSVEIERICNEVDDSVLETAAIGVPPLGGGPEQLVIAVVFKDSNNPKEDLNQLRISFNSAVQKKL
NPLFRVSRVVPLLSLPRTATNKVMRRILREQFSQHDQSSKI

[0149] SEQ ID NO:30(东方苎草(Trema orientale))

[0150] MGYKSLDSVTASDIAALGIDPELAETLHGRLADVIRNYASATPPDTWRYVSANILSPHLPFSFHQMMYY
GCYQDFGPDPPAWIPDLENAISTNVGKLLERRGKEFLGSSYKDPISNFSDFQEFSVTNPEVYWKTILDEMNVSFSKP
PQCILLENFPGDGKLLHPGGEWLPGAYVNPAKNCLSLNSKRSLDDTMIIWRDEGKDDLPVNKMTLEELRSEVWLVAY
ALKELGLEGGSAIAIDMPMNVHSVVIYLAIVLAGYVVVSIADSFAAREISTRLKISNAKAIFTQDLIIRGEKSIPLY
SRIVEAQSPTAIVIPTRGSSFSAKLRQDDISWHDFLERAKAFKKREFAAIEQPVDAYTNILFSSGTTGEPKAIPWTH
ATPFKAAADAWCHMDIQKGDVVAWPTNLGWMMGPWLVYASLLNGASIALYNGSPLGSGFAKFVQDAKVTMLGVIPSI
VRTWKSTNSIASYDWSTIRCFSSTGEASNVDEYLWLMGRACYKPVIEYCGGTEIGGGFVTGSLLQAQSLAAFSTPAM
GCSLFVLGSDGYPIPKNKPGIGELALGPLMLGASKTLLNADHYDVYFKGMPSWNGKVLRRHGDMFEFTSRGYYRAHG
RADDTMNLGGIKVSSVEIERICNEADDEVLETAAIGVPPPTGGPEKLVIAVVFKNPENTGADLNQLRLSFNSAVQKK
LNPLFRVSHVVPLPSLPRTATNKVMRRILRQQLAQLDQSSKI

[0151] SEQ ID NO:31(糙叶山黄麻(Parasponia andersonii))

[0152] MGYKSLDSVTASDIAALGIDPELAETLHGRLADVIRNYASATPPDTWRYVSANILSPHLPFSFHQMMYY
GCYQDFGPDPPAWIPDLENAISTNVGKLLERRGKEFLGSSYKDPISNFSDFQEFSVTNPEVYWKTILDEMNISFSKP
PQCILRENFPGDGQLLHPGGEWLPGAYVNPAKNCLSLNSKRSLDDTMIIWRDEGKDDLPVNKMTLEEFRSEVWLVAY
ALKELGLERGSAIAIDMPMNVHSVVIYLAIVLAGYVVVSIADSFAAREISTRLKISKAKAIFTQDLIIRGEKSIPLY
SRIVEAQSPTAIVIPTRGFSFSAKLRQGDISWHDFLERAKAFEKREFAASEQPVDAYTNILFSSGTTGEPKAIPWTQ
ATPFKAAADAWCHMDIQKGDVVAWPTNLGWMMGPWLVYASLLNGASIALYNGSPLGSGFAKFVQDAKVTMLGVIPSI
VRTWKSTNSVAFYDWSTIRCFSSTGEASNVDEYLWLMGRACYKPVIEYCGGTEIGGGFVTGSLLQAQSLAAFSTPAM
GCSLFILGSDGYPIPKNKPGIGELALGPLMLGASKTLLNFDHYDVYFKGMPWWNGKVLRRHGDMFEFTSSGYYRAHG
RADDTMNLGGIKVSSVEIERICNEADDEVLETAAIGVPPPTGGPEKLVIAVVFKNPENTGADLNPLRLSFNSAVQRK
LNPLFRVSHVVPLPSLPRTATNKVMRRILRQQLAQLDQSSKI

[0153] SEQ ID NO:32(欧洲甜樱桃(Prunus avium))

[0154] MAYKSLDHVTVSDIEALGIESEAAKRLHASLTNIIQNYGPATPDTWRNITAHVLSPELPFSFHQMLYYG
CYKDFGPDPPAWLPDSETTNLTNVGQLLERRGKEFLGSRYKDPMSSFSDFQEFSVSNPEVYWKAVLDEMNASFSIPP
QCILRENLSGDGQLSVLGGQWLPGAFGNPAKNCLSLNRKRSLNDTMVIWRDEGNDDLPLNKMTLKELRTEVWLVAHA
LKALGLEKGSAIAIDMPMHVNSVIIYLAIVLAGYVVVSIADSFAPPEISTRLKISEAKAIFTQDLIVRGEKSLPLYS
KIVAAQSPMAIVILTKGSNSSMKLRDGDISWHDFLETVKDFKEDEFAAVEQPIEAFTNILFSSGTTGEPKAIPWTHA
TPFKAAADAWCHMDIQIGDVVSWPTNLGWMMGPWLVYASLLNGASIALYNGSPLGSGFPKFVQDAKVTMLGVIPSIV
RTWKSTNSVSGYDWSTIRCFGSTGEASNVDEYLWLMGRARYKPIIEYCGGTEIGGGFVSGSLLQAQSLAAFSTPAMG
CSLFILGNDGVPIPQNEPGVGELALGPLIFGASSTLLNADHYDVYFKGMPFWNGKVLRRHGDVFERTSRGYYHAHGR
ADDTMNLGGIKVSSVEIERICNEVDSEVLETAAIGVPPAVGGPEQLVLAVVFKNSDNQTADLNQLRTSFNSAVQKKL

NPLFKVSRVVPLPSLPRTATNKVMRRILREQFAQLDQSAKL

[0155] SEQ ID NO:33(川桑(Morus notabilis))

[0156] MTDKSLDGVTASNIAALGIAPDVADGLHGRIAEVVRIYGPANPDTWRQISTRVLSPDLPFAFHQMLYHS
CFNGFGPDPPAWIPDPEAAILTNVGKLLERRGKEFLGSRYKDPISNFSDFQEFSVTNPEVYWRTIFNEMNVSFSNPP
ECIFHENVPGGGQVSHPGGQWLPGAYVNPAMNCLSVNSKRSLDDASIVWRDEGKDDLPVNTMTLEELRSEVWLVAHA
LKELGLERGSAIAIDMPMHVHSVVIYLAIVLAGYVVVSIADSFAAGEISTRLKISKAKAIFTQDLIIRGEKSIPLYR
RVVEAQSPMAIVIPTRGSSFSTQLRHGDIGWHDFLERVKEFKKCEFTAAEQPVDAFTNILFSSGTTGDPKAIPWTQA
TPFKAAADAWCHMDIQKGDVVAWPTNLGWMMGPWLVYASLLNGASIALYNGSPLGSSFAKFIQDAKVTMLGVIPSIV
RTWKSMNSVSGYDWSTIRCFGSTGEASNVDEYLWLMGRACYKPVIEYCGGTEIGGGFVTGSLLQAQALAAFSTPAMG
CSLFILGSDGYPIPKNKPGIGELALGPVMFGSSMTLLNADHYDVYFKGMPLWNGKVLRRHGDMFEITSRGYYRAHGR
ADDTMNLGGIKVSSVEIERLCNEVDNSILETAAIGVPPPAGGPEQLVIAVVFKDPDSNITTDLNQLRMSLNSAVQKK
LNPLFRVSRVVPLQSLPRTATNKVMRRILRQQFVQLDQTSKM

[0157] SEQ ID NO:34(月季(Rosa chinensis))

[0158] MSYKSLDAVTVADIAALGIEPELANRLHGSLAKIIADHGAATPDTWRSITGHVLSPDLPFSFHQMMYYG
CYKDFGPDPPAWLPDPETAVLTNAGQLLERRGKEFLGSQYKDPISSFSDFQEFSVSNPEVYWKTVLDEMNVSFYKPP
QCILRENLSGDGHLLVPGVQWLPGACVNPAKNCLSLNSKRSLNDTMVVWRDEGKDDLPLNKMTLKELRAEVWLVAHA
LQAQGLEKGSAIAIDMPMNVISVVIYLAIVLAGYVVVSIADSFAPPEISTRLKISEAKAIFTQDVIVRGEKSLPLYS
KIVDAQSPMAIVLLTRGSKSSVKLRDGDISWHDFLNTVKDFKDEFAAVEQPVEAFTNILFSSGTTGDPKAIPWTHST
PFKAAADAWCHMDIRKGDVIAWPTNLGWMMGPWLVYASLLNVASIALYNGSPLGPGFSKFVQDAKVTMLGVIPSIVR
TWKSTNSTSGYDWSAIRCFSSTGEASNVDEYLWLMGRAGYKPIIEYCGGTEIGGAFVSGSLLQAQSLASFSTPAMGC
SLFILGTDGSPIPQNEPGVGELALGPLMFGASSTLLNADHYEVYFKGMPLWNGKVLRRHGDLFERTSRGYYHAHGRA
DDTMNLGGIKVSSVEIERICNAIDTNILETAAIGVPPAGGGPEQLVIAVVFKNSDNPPADLNQLRASFNSAVQKKLN
PLFKVSRVVPLPSLPRTATNKVMRRILRQQFAQVDQGAKL

[0159] SEQ ID NO:35(甜橙)

[0160] MATYNYKALDCITSCDIEALGIPSKLAEQLHEKLAEIVNTHGAATPATWQNITTHILSPDLPFSFHQLL
YYGCYKDFGPDPPAWIPDPEAAKVTNVGKLLQTRGEEFLGSGYKDPISSFSNFQEFSVSNPEVYWKTVLNEMSTSFS
VPPQCILRENPNGENHLSNPGGQWLPGAFVNPAKNCLSVNSKRSLDDIVIRWRDEGDSGLPVKSMTLKELRAEVWLV
AYALNALGLDKGSAIAIDMPMNVNSVVIYLAIVLAGYIVVSIADSFASLEISTRLRISKAKAIFTQDLIIRGDKSIP
LYSRVIDAQAPLAIVIPAKGSSFSMKLRDGDISWFDFLERVRKLKENEFAAVEQPVEAFTNILFSSGTTGEPKAIPW
TNATPFKAAADAWCHMDIRKADIVAWPTNLGWMMGPWLVYASLLNGASIALYNGSPLGSGFAKFVQDAKVTMLGVVP
SIVRTWKSTNCIDGYDWSSIRCFGSTGEASNVDEYLWLMGRALYKPVIEYCGGTEIGGGFITGSLLQAQSLAAFSTP
AMGCKLFILGNDGCPIPQNVPGMGELALSPLIFGASSTLLNANHYDVYFSGMPSRNGQILRRHGDVFERTSGGYYRA
HGRADDTMNLGGIKVSSVEIERICNAVDSNVLETAAIGVPPPDGGPEQLTIVVVFKDSNYTPPDLNQLRMSFNSAVQ
KKLNPLFKVSHVVPLPSLPRTATNKVMRRVLRKQLAQLDQNSKL

[0161] SEQ ID NO:36(克莱门柚(Citrus clementina))

[0162] MATCNYKALDCITSYDIEALGIPSKLAEQLHEKLAEIVNTHGAATPATWQNITTHILSPDLPFSFHQLL
YYGCYKDFGPDPPAWIPDPEAAKVTNVGKLLETRGEEFLGSGYKDPISSFSNFQEFSVSNPEVYWKTVLNEMSTSFS
VPPQCILRENPNGENHLSNPGGQWLPGAFVNPAKNCLSVNSKRSLDDIVIRWCDEGDGGLPVKSMTLKELRAEVWLV
AYALNALGLDKGSAIAIDMPMNVNSVVIYLAIVLAGYIVVSIADSFASLEISARLRISKAKAIFTQDLIIRGDKSIP

LYSRVIDAQAPLAIVIPAKGSSFSMKLRDGDISWLDFLERVRKLKENEFAAVEQPVEAFTNILFSSGTTGEPKAIPW
TNATPFKAAADAWCHMDIRKADIVAWPTNLGWMMGPWLVYASLLNGASVALYNGSPLGSGFAKFVQDAKVTMLGVVP
SIVRTWKSTNCIDGYDWSSIRCFGSTGEASNVDEYLWLMGRALYKPVIEYCGGTEIGGGFITGSLLQAQSLAAFSTP
AMGCKLFILGNDGCPIPQNVPGMGELALSPLIFGASSTLLNANHYDVYFSGMPSWNGQILRRHGDVFERTSGGYYRA
HGRADDTMNLGGIKVSSVEIERICNAVDSNVLETAAIGVPPPDGGPEHLTIVVVFKDSNYRPPDLNQLRMSFNSAVQ
KKLNPLFKVSHVVPLPSLPRTATNKVMRRVLRKQLAQLDQNSKL

[0163] SEQ ID NO:37(蔓花生(Arachis duranensis))

[0164] MAYKSLTSITVSDIESVGISTEVASAFHRRLKEIIATHGAGTPATWHNITNTILTPDLPFSFHQMLYYA
CYIDFGPDPPAWIPDPECALSTNVGQLLERRGKEFLGSAYKDPISSFSDFQKFSVSNPEVFWKNVLDEMNISFSTPP
ECILRENLPGESSLTHPGGQWLPGASINPAKNCLVENAKRSLNDTAIIWRDEHHDDLPVQRMTFKELQEEVWLVAYA
LEALGLEKGSAIAIDMPMHVKSVVIYLAIVLAGYVVVSIADSFAAGEISTRLNISNAKVIFTQDLIIRGDKSIPLYS
RVVEAKSPLAVVIPTRGSEFSMELRNGDFSWHDFLDRANSLKGKEFVAVEQPVEAFTNILFSSGTTGEPKAIPWTNI
TPLKAAADAWCHLDIRKGDVVSWPTNLGWMMGPWLVYASLINGASMALYNGSPLGSGFAKFVQDAKVTMLGVIPSIV
RSWKSANSTSGYDWSAIRCFGSTGEASNVDEYLWLMGRALYKPVIEYCGGTEIGGGFITGSLLQPQSVAAFSTPAMC
CSLFILDEEGHPIPQDVPGMGELALGPIMFGASITLLNADHYAVYFKGMPVYNGKVLRRHGDVFERTAKGYYHAHGR
ADDTMNLGGIKVSSVEIERLCNGVDSSILETAAIGVPPSGGGPEQLVVAVVFKNPSTTTQDLHQLRISFNSALQKKL
NPLFRVSRVVSLPSLPRTASNKVMRRVLRQQLSENNQSSKI

[0165] SEQ ID NO:38(夏栎)

[0166] MGYKALDRITRSDIEEEVGIAAAAGVAERIHERLTEIVRNYGADTPDTWRSICERVLSPDLPFSLHQMM
FYGCYNGYGTDPPAWIPDPKTAILTNVGQLLERRGKEFLGSKYKDPISSFSDLQEFSVSNPEVYWKTVLDEMSISFS
VPPQCILRDSPFGESHSSYPGGQWLPGAFLNPAENCLSLNSKRSLEDIAVIWRDEGDDILPVNRMTVREFRAEVWLV
AHAIKTLGLDKGSAIAIDMPMNVNSVVIYLAIVLAGYVVVSIADSFAPREISTRLKISEAKAIFTQDLIIRGDKSIP
LYSRIVEAQSPMAVVIPARGSSFSMKLRDGDISWHDFLGRVKNFKECEFAAVEQPVEAFTNILFSSGTTGEPKAIPW
TSATPLKAAADAWCHLDIQKGDVVAWPTNLGWMMGPWLVYASLLNGASMALYNGSPLSSGFAKFVQDAKVTMLGVIP
SIVRAWKSTNCMAGYDWSAIRCFGSTGEASNVDEYLWLMGRACYKPIIEYCGGTEIGGGFITGSFLQAQSLAAFSTP
AMGCSLFILGSDGYPIPENVPGIGELALGPLMFGASNKLLNADHHDVYFKGMPLWKGRVLRRHGDVFERTSRGYYHA
HGRADDTMNLGGIKVSSVEIERICNAADNSVLETAAIGVPPSGGGPEQLVIAVVFKESENMTADLNQLRISFNSAVQ
KKLNPLFRVSQVVPLSSLPRTASNKVMRRVLRQQLTQGDRNPKL

[0167] SEQ ID NO:39(可可树(Theobroma cacao))

[0168] MVYKSLDSVTVKDIEASGISSQLAEEIHRKVTEIVDGYGAATPESWNRISKHVLTPNLPFSLHQMMYYG
CYKDFGPDPPAWMPDPESALLTYVGLLLEKHGKEFLGSKYKDPISSFSHLQEFSVSNPEVYWKTVLDEMCVNFSVPP
DCILHESTSEESRILNPGGKWLPGAFVNPAKNCLIVNSKRGLDDIVIRWRDEGDDDLPVKSMTLKELQLEVWLVAHA
LNALGLERGSAIAIDMPMNVYSVIIYLAIVLAGYIVVSIADSFAPLEISTRLKISEAKAIFTQDLIIRGEKSIPLYS
RVVEAEAPMAIVIPARGFSCSAKLRDGDISWSDFLERVRELKGDVFEAVEQPVEAFTNVLFSSGTTGEPKAIPWTHV
TPLKAAADAWCHMDIHSGDIVAWPTNLGWMMGPWLVYASLLNGASMALYNGSPLSSGLAKFVQDAKVTMLGVIPSIV
RAWKSTNCVAGYDWSSIRCFSSTGEASNVDEYLWLMGRACYKPIIEYCGGTEIGGGFVSGSFLQPQSLAAFSTPAMG
CRLFILGDDGHPIPQDAPGMGELALGPLMFGSSSTLLNASHYDVYFKEMPSWNGLILRRHGDVFERTSRGYYHAHGR
ADDTMNIGGIKVSSVEIERICNAVDSSVLETAAIGVPPADGGPERLVIAVVFKDPDNATPDLNQLRKSFNSAVQKNL
NPLFRVSHVVALSALPRTASNKVMRRVLRKQLAQVDQNSKL

[0169] SEQ ID NO:40(麻风树(Jatropha curcas))

[0170] MAHNALGAISVSDIEALGISSELAEKLYTHVSQIINNYGSATPETWSRISKHVLTPDLPFSFHQMMFYG
CYKDFGPDPPAWLPDPKSAALTNVGQLLQRRGKEFLGEGYVDPISSFSAFQEFSVSNPEVYWKTVLDEMDVAFSVPP
QCILREDLSGESSFLNPGGQWLPGAYVNPAKNCLSLNSKRILDDTVIRWRCEGSDDLPVSSMTLEELRTEVWLVAYA
LNSLGLDRGSAIAIDMPMNVKAVVIYLAIVLAGYVVVSIADSFAPLEISTRLKISKAKAIFTQDLIIRGDKNIPLYS
RVVDAQSPMAIVIPTKGSSFSMKLRDGDISWHDFLEKVQNLRGNEFAAVEQPIEAFTNILFSSGTTGEPKAIPWTSA
TPFKAAADAWCHMDIRKGDIVAWPTNLGWMMGPWLVYASLLNGACIALYNGSPLGSSFAKFVQDAKVTMLGVIPSIV
RTWKTANTTAGYDWSAIRCFGSTGEASNVDEHLWLMGRALYKPIIEYCGGTEIGGGFVSGSFLQPQSLAAFSTPAMG
CSLFILGDDGHPIPHDVPGIGELALGPLMFGASSSLLNADHYNVYYKGMPVWNGKILRRHGDVFERTSRGYYHAHGR
ADDTMNLGGIKVSSVEIERICNVVDSSILETAAIGVPPPQGGPEQLVIAVVFKNLENSTTDLEQLRKSFNSAVQKKL
NPLFRVSRVVPHPSLPRTASNKVMRRILRQQFVQQEQNSKL

[0171] SEQ ID NO:41(毛果杨(Populus trichocarpa))

[0172] MASLHYKALDSISVSDIEALGISSSIALQLYEDISEIINTHGPSSPQTWTLLSKRLLHPLLPFSFHQMM
YYGCFKDFGPDPPAWSPDPEAAMLTNVGQLLERRGKEFLGSAYKDPISSFSNFQEFSVSNPEVYWKTILDEMSISFS
VPPQCILSENTSRESSLANPGGQWLPGAYVNPAKTCLTLNCKRNLDDVVIRWRDEGNDDMPVSSLTLEELRSEVWLV
AYALNALGLDRGSAIAIDMPMNVESVIIYLAIVLAGHVVVSIADSFAPLEISTRLKISEAKAIFTQDLIIRGDKSIP
LYSRVVHAQAPMAIVLPTKGCSFSMNLRDGDISWHDFLEKATDLRGDEFAAVEQPVEAFTNILFSSGTTGEPKAIPW
THLTPFKAAADAWCHMDIRKGDIVAWPTNLGWMMGPWLVYASLLNGASIALYNGSPLGSGFAKFVQDASVTMLGVIP
SIVRIWKSANSTSGYDWSAIRCFASTGEASSVDEYLWLMGRAQYKPIIEYCGGTEIGGGFVSGSLLQPQSLAAFSTP
AMGCSLFILGDDGHPIPQNVPGMGELALGPLMFGASSTLLNADHYNVYFKGMPLWNGKILRRHGDVFERTSRGYYHA
HGRADDTMNLGGIKVSSVEIERVCNAVDSNVLETAAVGVPPPQGGPEQLVIAVVFKDSDESTVDLDKLRISYNSAVQ
KKLNPLFRISHVVPFSSLPRTATNKVMRRVLRQQLSQQDQNSKL

[0173] SEQ ID NO:42(橡胶树(Hevea brasiliensis))

[0174] MSSYKALDAISVSDIEALGISSKLADKLYKDVADIIANYGASTPQTWTHISKHVLNPDLPFSLHRMMFY
ACYKDFGSDPAAWSPDPKTAALTNVGQLLERRGKEFLGSLYVDPISSFSAFQEFSVSNPEVYWKTVLDEMSISFSVP
PQCILLENPESPGGQWLPGAYVNPARNCLSLNRERTLDDTVITWRDEGSDDLPLSSMTLGELRTEVWLVAYALNTLG
LDRGSAIAIDMPMNVKSVVIYLAIVLAGYAVVSIADSFASPEMSTRLKISEAKAIFTQDLIIRGDKSIPLYSRVVDA
QSPMAIVIPTKGSSFSMKLRGGDISWHDFLERVENIRGDEFAAVEQPIEAFTNILFSSGTTGDPKAIPWTNATPFKA
AADAWCHMDIRRGDVVAWPTNLGWMMGPWLVYASLLNGACIALYNGSPLGSGFAKFVQDAKVTMLGVIPSIVRTWKS
ANSTAGYDWSAIRCFGSTGEASNVDEYLWLMGRAHYKPIIEYCGGTEIGGGFVSGSLLQPQSLAAFSTPAMGCSLFI
LGDDGHPFPQNVPVMGELALGPLMFGASSSLLNANHYNVYYKGMPVWNGKILRRHGDVFEHTSRGYYRAHGRADDTM
NLGGIKVSSVEIERICNAVDSSILETAAIGVPPPQGGPERLVIAVVFNDPDNSTTDLEQLRKSFNSAVQKKLNPLFR
VSHVVALPSLPRTATNKVMRRILRQQFVQQEQNSKL

[0175] SEQ ID NO:43(酿酒葡萄)

[0176] MAGKTLDSITSQDIAALGIPSEEAEKLHQTLLQIITSCGAATPQTWSRISKELLNPDLPYSLHQMMYYG
CYSHFGPDPPAWLPDPENVMLTNVGQLLERRGKEFLGSRYKDPISSFSDFQKFSVSNPEVYWKTVLDELSISFSVPP
QCVLYDNPSRENGLSYPGGQWLPGAFINPARNCLSVNDKRTLDDTVVIWHDEGDDGMPINRMTLEELRREVWSVAYA
LDTLGLEKGSAIAIDMPMNASSVVIYLAIVLAGYIVVSIADSFASREISTRLKISNAKAIFTQDFIIRGDKSLPLYS
RVVDAQSPTAIVIPAGGSSFSMKLRDGDMSWHDFLQRAINSRDDEFAAIEQPIEAFMNILFSSGTTGEPKAIPWTNA

TPLKAAADAWCHMDIRKGDIVAWPTNLGWMMGPWLVYASLLNGATIALYNGAPLGSGFAKFVQDAKVTMLGVIPSIV
RTWKSTNCTAGLDWSSIRCFASTGEASSVDEYLWLMGRAQYKPIIEYCGGTEIGGGFVTGSLLQAQSLASFSTPAMG
CSLFIIGDDGNLLPQDASGMGELALGPLMFGASTTLLNADHYDVYFKGMPIWNGKVLRRHGDVFERTSRGYYRAHGR
ADDTMNIGGIKVSSVEIERICNTVHSSVLETAAIGMPPPAGGPERLMIVVVFKDSNNSIPDLNELRIAFNSEVQKKL
NPLFRVSHTVPVPSLPRTATNKVMRRVLRQQLAQLSSTSKF

[0177] SEQ ID NO:44(木薯(Manihot esculenta))

[0178] MDNKVLDAISVSDIEALGISSPLAHKLCKDVADIVANYGAATPQTWTHISKHVLHPDLPFSFHQMMFNA
CYKDFGTDPPAWSPDLKSAALTNVGHLLERRGKEFLGSLYVDPISSFSAFQEFSVSNPELYWKTVLDEMNISFSVPA
QCILLENSYGESPGGQWLPGAYVNPAKNCLSLNCKRTLDDTVIRWRDEGSDELPLSSMTLDELRTEVWLVAYALNRL
GLDRGSAIAIDMPMNVKSVVIYLAIVLAGYVVVSIADSFAPLEIATRLKISEAKAIFTQDLIIRGDKSIPLYSRVVD
AQSPMAVVIPAKGSSFSMKLRDGDISWHDFLERVENRRGDEFAAVEQPIEAFTNILFSSGTTGEPKAIPWTNATPFK
AAADAWCHMDIHKGDVVAWPTNLGWMMGPWLVYASLLNGACIALYNGSPLGSGFAKFVQDAEVTMLGVIPSIVRTWK
SANSTAGYDWSSIRCFGSTGEASNIDEYLWLMGRAHYKPVIEYCGGTEIGGGFVSGSLLQPQSLAAFSTPAMGCSLF
ILGDDGHPIPHNAPGMGELALGPLMFGASSSLLNADHYNVYFKGMPVWNGKILRRHGDVFERTSRGYYHAHGRADDT
MNLGGIKVSSVEIERICNAVDNSILETAAIGVPPSQGGPERLVIAVVFKNPDNTTRDLEQLRKTFNSAVQKKLNPLF
RVSHVVALPTLPRTATNKVMRRILRQQFVQQEQTAKL

[0179] SEQ ID NO:45(野生烟草(Nicotiana attenuate))

[0180] MAHQNYKGLDSVTVADVEALGIASELAGEIHEKLTRIVRNYSATTPQTWHHISKEILTPKLPFSLHQMM
YYGCYKDFGPDPPAWLPDSKNVGLTNIGQLLERRGKEFLGSNYEDPISSFSDFQRFSVSEPEVYWKTILEEMNVSFS
VPPECILRESPSHPGGQWLPGARVNPAKNCLSFRKRTLSDVAIVWRSEGNDEAPVEKMTLKELCESVWAVAYALETL
GLEKGSAIAIDMPMDVNSVVIYLAIVLAGYVVVSIADSFAPSEISTRLILSKAKAIFTQDFIFRGDKKIPLYSRVVD
ARSPTAIVIPNRASSLSIQLRDGDISWPEFLERVKDSRGLEFVAVEQPITAFTNILFSSGTTGEPKAIPWSLLSPFK
SAADGWCHMDIKKGDVVAWPTNLGWMMGPWLVYASLLNGASIALYNGSPLDSGFAKFVQDAKVTMLGVIPSIVRTWK
AKNSPDGFDWSTIRCFGSTGEASSVDEYLWLMGRAEYKPIIEYCGGTEIGGSFVSGSLLQPQSLAAFSTAVMGCSLH
ILGEDGLPIPSDVPGTGELALGPLMFGASSTLLNADHNEIYFKGMPVLNGKVLRRHGDVFERTSKGYYHAHGRADDT
MNLGGIKVSSLEIERICNAADENILETAAVGVPPAGGGPEKLVIAVVFKDSANLEHNMDKLMISFNTALQRKLNPLF
KVSSIVPLPLLPRTATNKVMRRVLRQQFSQAEQGSKL

[0181] SEQ ID NO:46(潘那利番茄(Solanum pennellii))

[0182] MANQNYRTLDSVTVADVEALGIPTELAEKLHEELTRIVRNYGSVTPQTWHHISKELLTPNLPFSFHQMM
YYGCYKDFGSDPPAWLPDPKTARLTNIGQLLERRGMEFLGSKYDDPISSFSDFQRFSVSDQEVFWKTILEEMNISFS
VPPECILRESPSHPGGQWLPGSRANPAKNCLSLRKRTLSDVAIIWRSEGNDEAPVEKMTCQELRESVWEVAYALESL
GLEKGSAIAIDMPMDVNSVVIYLAIVLAGYVVVSIADSFAPSEISTRLILSKAKAIFTQDFIPRGEKKIPLYSRVVE
AHSPMAIVIPNRVSSLSIELRDGDISWPDFLDRVKDSKGLEFVAVEQPIDAFTNILFSSGTTGDPKAIPWTLLTPFK
AAADGWCHMDIKNGDVVAWPTNLGWMMGPWLVYAALLNGASIALYNGSPLGSGFAKFVQDAKVTMLGVIPSIVRTWK
AKNSPDGYDWSTIRCFGSTGEASSVDEYLWLMGRAEYKPIMEYCGGTEIGGSFVSGSMLQPQSLAAFSTAVMGCSLH
ILGDDGFPIPSDVPGIGELALGPLMFGASSTLLNADHNEIYFKGMPVLNGKVLRRHGDVFERTSKGYYHAHGRADDT
MNLGGIKVSSLEIERICNVVDENILETAAVGVPPAAGGPEKLVIAVVFKDSDNLEQKLVNLLISFNTALQRKLNPLF
KVSSIVPLPSLPRTATNKVMRRVLRQQFSQADQGSRL

[0183] SEQ ID NO:47(中国莲(Nelumbo nucifera))

[0184] MAIKSLDCVTVEDITGLGISSDAAKKLHGDLTEILRENANSAADTWKKISKRILNPNLPFAFHQMMYYG
CFKDFGSDPPAWIPDQETAILTNVGRFLEKRGKEFLGSKYKDPITSFLDFQEFSVSNPEVYWKMVLDEMNISFSVPP
SCILYEHTSEGGHLSYPGGQWLPGAILNCAENCLNLNGKRSLNDTMIIWRDEGDDNLPVKHMMLKQLRSEVWLVAYA
LDTLGLAKGSAIAIDMPMNVTAVVIYLAIVLAGYIVVSIADSFAPLEISTRLKISNAKAIFTQDVIIRGDKILPLYS
RVVDAQAPLAIVVPSRGSSLKMELRGCDMSWHAFLERVEHFKKDEFAAVQQPVDAFTNILFSSGTTGEPKAIPWTHA
TPLKAAADAWCHMDIQKGDVVAWPTNLGWMMGPWLVYASLLNGASMALYNGSPLGSGFAKFVQDAKVTMLGVVPSIV
RAWKNTNCTAGFDWSSIRCFSSTGEASNVDEYLWLMGRAHYKPVIEYCGGTEIGGGFVSGSLLQAQSLAAFSTPAMG
CTLFILCSDGNPILQNTPGIGELALAPIMLGASNTLLNANHYDVYFRGMPMWNGKVLRRHGDEFECTSKGYYRAHGR
ADDTMNLGGIKVSSIEIERICNGVDDTILETAAIGVPPVGGGPEKLAIAVVFKDSNSLPDVDQLKMKFNSSLQKKLN
PLFRVSAVVPVSSLPRTASNKVMRRVLRQQFSQLYQASTSRIASGFLLQSPPQRPSTSL

[0185] SEQ ID NO:48(苦瓜(Momordica charantia))

[0186] MDYKTLDSITVIDIEALGVASEVAEKLHGLLSEIIRSHGNGTPETWRHISKRVLSPDLPFSFHQMMYYG
CYKHYGPDPPAWIPEPENAVFTNVGQLLKRRGKEFLGSNYRDPLSSFSSFQEFSVSNPEVYWRTMLDEMHITFSKPP
HCILQMNDSTESQFSSPGGQWLPGAVFNPAKDCLSLNENRSLDDVAIIWRDEGCDNLPVKRLTLGELRTDVWLIAHA
LNSIGFEKGTAIAIDMPMNVNAVVIYLGIVLAGHVVVSIADSFSAREISTRLDISKAKAIFTQDLIIRGDKSIPLYS
RVVDAQSPMAIVIPSRSTGFSRKLRDEDISWHAFLERVEDLRGVEFAAVEQAAESFTNILFSSGTTGEPKAIPWTLV
TPLKAAADAWCYMDIHKGDVVAWPTNLGWMMGPWLVYASLLNSASMALYNGSPLGSGFVKFVQDAKVTMLGVIPSIV
RSWKSTNCTSGYDWSSIRCFASTGEASNVDENLWLMGRACYKPVIEICGGTEIGGGFITGSLLQPQALAAFSTPAMG
CSLFILGNDGFPIPQNMPGIGELALGPFLFGASSTLLNADHYDIYFKGMPHWNGMVLRRHGDVFERSPRGYYRAHGR
ADDAMNLGGIKVSSVEIERICNTIDDSILETAAIGVPPLGGGPEQLVIAVVLKNPGETSPDLDKLKLCFNSSLQKNL
NPLFRVHRVVPYPSLPRTATNKVMRRILRQQLAVERRTKL

[0187] OLS

[0188] SEQ ID NO:49(大麻)

[0189] MNHLRAEGPASVLAIGTANPENILLQDEFPDYYFRVTKSEHMTQLKEKFRKICDKSMIRKRNCFLNEEH
LKQNPRLVEHEMQTLDARQDMLVVEVPKLGKDACAKAIKEWGQPKSKITHLIFTSASTTDMPGADYHCAKLLGLSPS
VKRVMMYQLGCYGGGTVLRIAKDIAENNKGARVLAVCCDIMACLFRGPSESDLELLVGQAIFGDGAAAVIVGAEPDE
SVGERPIFELVSTGQTILPNSEGTIGGHIREAGLIFDLHKDVPMLISNNIEKCLIEAFTPIGISDWNSIFWITHPGG
KAILDKVEEKLHLKSDKFVDSRHVLSEHGNMSSSTVLFVMDELRKRSLEEGKSTTGDGFEWGVLFGFGPGLTVERVV
VRSVPIKY

[0190] SEQ ID NO:50(啤酒花(Humulus lupulus))

[0191] MSSSITVDQIRKAQRAEGPATILAIGTATPANFIIQADYPDYYFRVTKSEHMTNLKKRFQRICDRTMIK
KRHLVLSEDHLKENPNMCEFMAPSLDVRQDILVVEVPKLGKEACMKAIKEWDQPKSKITHFIFATTSGVDMPGADYQ
CAKLLGLSSSVKRVMMYQQGCFAGGTVLRIAKDIAENNKGARVLALCSEITTCMFHGPTESHLDSMVGQALFGDGAS
AVIVGAEPDESAGERPIYELVSAAQTILPNSEGAIDGHLMETRLTFHLLKDVPGLISNNIEKSLIEAFTPIGINDWN
SIFWVTHPGGPAILDEVEAKLELKKEKLAISRHVLSEYGNMSSASVFFVMDELRKRSLEEGKSTTGDGLDWGVLFGF
GPGLTVEMVVLHSVENKVKSET

[0192] SEQ ID NO:51(川桑)

[0193] MSMTPSVHEIRKAQRSEGPATVLSIGTATPTNFVSQADYPDYYFRITNSDHMTDLKDKFKRMCEKSMIT
KRHMYLTEEILKENPKMCEYMAPSLDARQDIVVVEVPKLGKEAAAKAIKEWGQPKSKITHLIFCTTSGVDMPGADYQ

LTKLLGLRPSVKRFMMYQQGCFAGGTVLRLAKDLAENNKGARVLVVCSEITAVTFRGPSHTHLDSLVGQALFGDGAA
AVIVGADPDTSVERPIFELVSAAQTILPDSEGAIDGHLREVGLTFHLLKDVPGLISKNIEKSLVEAFTPIGISDWNS
IFWIAHPGGPAILDQVETKLGLKQEKLSATRHVLSEYGNMSSACVLFILDEMRKKSVEEGKATTGEGLEWGVLFGFG
PGLTVETVVLHSLPAV

[0194] OAC

[0195] SEQ ID NO:52(大麻)

[0196] MAVKHLIVLKFKDEITEAQKEEFFKTYVNLVNIIPAMKDVYWGKDVTQKNKEEGYTHIVEVTFESVETI
QDYIIHPAHVGFGDVYRSFWEKLLIFDYTPRK

[0197] SEQ ID NO:53(大麻)

[0198] MAVKHLIVLKFKDEITEAQKEEFFKTYVNLVNIIPAMKDVYWGKDVTQKKEEGYTHIVEVTFESVETIQ
DYIIHPAHVGFGDVYRSFWEKLLIFDYTPRKLKPK

[0199] SEQ ID NO:54(球孢白僵菌(Beauveria bassiana))

[0200] MAPVTHIVLFEFKPDVTKAQRDEFSAEMLGLKDKCIHAKTQKPYILRSSGGTDNSIEGLQHGITHAFVV
EFASVEDRQYYVKEDPAHIAFVNKLFPFLAKPYIIDFTPGEFN

[0201] SEQ ID NO:55(布氏虫草(Cordyceps brongniartii)RCEF 3172)

[0202] MAPVTHIVLFEFKPEVTKAQRDEFSAEMLGLKDKCIHSKTQKPYILRSSGGTDNSIEGLQHGITHAFVV
EFASVEDRQYYVKEDPAHIAFVNKLFPSLAKPYIIDFTPGEFN

[0203] SEQ ID NO:56(粗糙虫草(Cordyceps confragosa)RCEF 1005)

[0204] MAPITHVVLFEFKPEVDKAERDELSAEMLGLKDKCLHATTQKPYIIRSSGGTDNSIEGMQHGVTHAFVV
EFASAEDRQYYVKEDPVHIAFVKKVFPRLAKPYIIDFTPGEFN

[0205] SEQ ID NO:57(玫烟色虫草(Cordyceps fumosorosea)ARSEF 2679)

[0206] MAPVTHIVMFEFKPEVTKAQRDEFSAEMLDLKNKCIHPKTNQAYILRSTGGTDNSIEGFQHGISHAFVV
EFASPEDREYYVKEDPAHLAFVQKLFPSLAKPYVVDFTPGEFN

[0207] SEQ ID NO:58(蛹虫草(Cordyceps militaris)CM01)

[0208] MAPITHIVMFEFKSDVTKAQRDELSKEMLALKDNCIHAATQKPYIVHSHGGTDNSIEGFQHGISHVFVV
EFASVEDRTYYVKEDPVHSRYVQKLLPFLVKPTVVDFTPGEFH

[0209] SEQ ID NO:59(锥壳半翼菌(Torrubiella hemipterigena))

[0210] MAPVIHIVMFQFKEDVSTETIKEMSDRMLGLKTNCIHATTKQPYILSSRGGTDMSIEGLTQGYTHAYVV
EFASKEDRDYYVKEDPVHAAYVKDVVPLLIKPCIFDYHPGEFTHTKL

[0211] CBGAS/CBGVAS

[0212] SEQ ID NO:60(大麻)

[0213] MGLSSVCTFSFQTNYHTLLNPHNNNPKTSLLCYRHPKTPIKYSYNNFPSKHCSTKSFHLQNKCSESLSI
AKNSIRAATTNQTEPPESDNHSVATKILNFGKACWKLQRPYTIIAFTSCACGLFGKELLHNTNLISWSLMFKAFFFL
VAILCIASFTTTINQIYDLHIDRINKPDLPLASGEISVNTAWIMSIIVALFGLIITIKMKGGPLYIFGYCFGIFGGI
VYSVPPFRWKQNPSTAFLLNFLAHIITNFTFYYASRAALGLPFELRPSFTFLLAFMKSMGSALALIKDASDVEGDTK
FGISTLASKYGSRNLTLFCSGIVLLSYVAAILAGIIWPQAFNSNVMLLSHAILAFWLILQTRDFALTNYDPEAGRRF
YEFMWKLYYAEYLVYVFI

[0214] SEQ ID NO:61(啤酒花)

[0215] MELSSVSSFSLGTNPFISIPHNNNNLKVSSYCCKSKSRVINSTNSKHCSPNNNTSNKTTHLLGLYGQSR

CLLKPLSFISCNDQRGNSIRASAQIEDRPPESGNLSALTNVKDFVSVCWEYVRPYTAKGVIICSSCLFGRELLENPN
LFSWPLIFRALLGMLAILGSCFYTAGINQIFDMDIDRINKPDLPLVSGRISVESAWLLTLSPAIIGFILILKLNSGP
LLTSLYCLAILSGTIYSVPPFRWKKNPITAFLCILMIHAGLNFSVYYASRAALGLAFAWSPSFSFITAFITFMTLTL
ASSKDLSDINGDRKFGVETFATKLGAKNITLLGTGLLLLNYVAAISTAIIWPKAFKSNIMLLSHAILAFSLIFQARE
LDRTNYTPEACKSFYEFIWILFSAEYVVYLFI

[0216] SEQ ID NO:62(啤酒酵母(Saccharomyces cerevisiae))

[0217] MASEKEIRRERFLNVFPKLVEELNASLLAYGMPKEACDWYAHSLNYNTPGGKLNRGLSVVDTYAILSNK
TVEQLGQEEYEKVAILGWCIELLQAYFLVADDMMDKSITRRGQPCWYKVPEVGEIAINDAFMLEAAIYKLLKSHFRN
EKYYIDITELFHEVTFQTELGQLMDLITAPEDKVDLSKFSLKKHSFIVTFETAYYSFYLPVALAMYVAGITDEKDLK
QARDVLIPLGEYFQIQDDYLDCFGTPEQIGKIGTDIQDNKCSWVINKALELASAEQRKTLDENYGKKDSVAEAKCKK
IFNDLKIEQLYHEYEESIAKDLKAKISQVDESRGFKADVLTAFLNKVYKRSK

[0218] SEQ ID NO:63(土曲霉(Aspergillus terreus))

[0219] MLPPSDSKDPRPWQILSQALGFPNYDQELWWQNTAETLNRVLEQCDYSVHLQYKYLAFYHKYILPSLGP
FRRPGVEPEYISGLSHGGHPLEISVKIDKSKTICRLGLQAIGPLAGTARDPLNSFGDRELLKNLATLLPHVDLRLFD
HFNAQVGLDRAQCAVATTKLIKESHNIVCTSLDLKDGEVIPKVYFSTIPKGLVTETPLFDLTFAAIEQMEVYHKDAP
LRTALSSLKDFLRPRVPTDASITPPLTGLIGVDCIDPMLSRLKVYLATFRMDLSLIRDYWTLGGLLTDAGTMKGLEM
VETLAKTLKLGDEACETLDAERLPFGINYAMKPGTAELAPPQIYFPLLGINDGFIADALVEFFQYMGWEDQANRYKD
ELKAKFPNVDISQTKNVHRWLGVAYSETKGPSMNIYYDVVAGNVARV

[0220] SEQ ID NO:64(稻瘟霉素链霉菌(Streptomyces blastmyceticus))

[0221] MESAGPGTGPQPPRTSGDFTPDTGVIAEMTGRPMRFDSDRYRPTDTYAEVACDKVCRAYEGLGADGGDR
ESLLAFLRDLTDPWGELPVGTPPEDACWVSIDGMPLETSVAWAGRKAGVRLSLESPRGPAKRRMEDGMALTRRLAGR
PGVSVDPCLRVEDLFTDDDPQGYFTIAHAVAWTPGGHPRYKIFLNPAVRGREQAAARTEEAMIRLGLEQPWRALTEH
LGGAYGPEHEPAALAMDLVPGDDFRVQVYLAHSGVSAEAIDAKSAVAADHVPGSFARALRGINGADDTPEWKRKPPV
TAFSFGPGRAVPGATLYVPMIPVHGSDAAARDRVAAFLRSEGMDAVGYEAVLDAISDRSLPESHTQNFISYRGGDSP
RFSVYLAPGVYREA

[0222] SEQ ID NO:65(海洋放线菌(Marinactinospora thermotolerans))

[0223] MAGDPFVDNGTVSSQRPLRAVPGRYPPGATHLDAAVDTLVRCHAALGRAPSEAEAAVCLLRRLWGRWGN
TPVERPGWRSYVAVDGSPFELSAAWNGDGPAEVRVTVEATADPPTPEGNQEAGWEYLRGLSRHPGAATARVLALEDL
FRPQTPHDRCWIMHGMASRPGADPLFKVYLDPDARGAAEAPSVLDEAMDRLGVRAAWQGLRGWLDEHGGSGRIGSLA
LDLADTDDARVKVYVQHAGLDWADIDRQAAVARGHVPGAFSAALEEITGTEVPPHKPPVTCFAFHRGVGVPTAATLY
IPMPAGVPESDARRRSAAFMRRSGLDSAAYLAFLAAATGDGEGVRALQNFVAYRPAAPGGRPRFACYVAPGLYR

[0224] SEQ ID NO:66(无花果拟盘多毛孢(Pestalotiopsis fici)W106-1)

[0225] MAISTPSNGVSHVAKPLPNLKEVNKGIETDSEDRAFWWGALSEPLASLLEANHYTKEVQLHYLRWFYQW
ILPALGPRPLDGKPYYGSWITHDLSPFEYSLNWKEKSSKQTIRFTIEAVTKQSGTASDPINQLGAKEFLEAVSKDVP
GMDLTRFNQFLEATNVPNDCVDDAIAKHPAHFPRSRVWIAFDLEHSGNLMAKSYFLPHWRAIQSGISANTIIGDTVK
ECNKADGSSYDGSLNAIESYLATFTRPEEAPQMGLLSNDCVAETPGSRLKVYFRSSADTLAKAKDMYNLGGRLKGPK
MDASLKGISDFWYHLFGLDSSDPASDDKVCIGNHKCIFVYEMRSSQGSEPDIDVKFHIPMWQLGKTDGQISELLASW
FESHGHPDLASRYKSDLGTAFPKHNITGKSVGTHTYISITHTPKTGLYMTMYLSPKLPEFYY

[0226] SEQ ID NO:67(链霉菌属(Streptomyces sp.)CNZ306)

[0227] MIGIDFLECLVSEGIEAEGLYSAIEESARMVDAPFSRDKVWPILSAFGGGFSDAGGVIFSLQAGKDVPE MEYSAQISAEVGDPYAHALATGVLNETDHPVSTVLAEIVSLAPTSEHYIDCGIVGGFKKIYANFPHDQQKVSRLADL PAMPRAVGANAEFFDRYGLDNVALIGVDYRNKTINLYFQAPAETAGNLDPKTVSAMLRETGMSTPSEEMVAYADRAY RIYATLGWDSPEVMRLAFAPQPRRSIDLAELPARLEPRIEQFMRATPHKYPGALINATAAKWSKKHEVLDLAAYYQV SALHLKAIQAEEGQSS

[0228] SEQ ID NO:68(肉桂链霉菌(Streptomyces cinnamonensis))

[0229] MMSGTADLAGVYAAVEESAGLLDVSCAREKVWPILAAFEDVLPTAVIAFRVATNARHEGEFDCRFTVPG SIDPYAVALDKGLTHRSGHPIETLVADVQKHCAVDSYGVDFGVVGGFKKIWVYFPGGRHESLAHLGEIPSMPPGLAA TEGFFARYGLADKVDLIGVDYASKTMNVYFAASPEVVSAPTVLAMHREIGLPDPSEQMLDFCSRAFGVYTTLNWDSS KVERIAYSVKTEDPLELSARLGSKVEQFLKSVPYGIDTPKMVYAAVTAGGEEYYKLQSYYQWRTDSRLNLSYIGGRS

[0230] SEQ ID NO:69(链霉菌属KO-3988)

[0231] MPGTDDVAVDVASVYSAIEKSAGLLDVTAAREVVWPVLTAFEDVLEQAVIAFRVATNARHEGDFDVRFT VPEEVDPYAVALSRSLIAKTDHPVGSLLSDIQQLCSVDTYGVDLGVKSGFKKVWVYFPAGEHETLARLTGLTSMPGS LAGNVDFFTRYGLADKVDVIGIDYRSRTMNVYFAAPSECFERETVLAMHRDIGLPSPSEQMFKFCENSFGLYTTLNW DTMEIERISYGVKTENPMTFFARLGTKVEHFVKNVPYGVDTQKMVYAAVTSSGEEYYKLQSYYRWRSVSRLNAAYIA ARDKEST

[0232] SEQ ID NO:70(杂色曲霉(Aspergillus versicolor))

[0233] MTAPELRAPAGHPQEPPARSSPAQALSSYHHFPTSDQERWYQETGSLCSRFLEAGQYGLHQQYQFMFFF MHHLIPALGPYPQKWRSTISRSGLPIEFSLNFQKGSHRLLRIGFEPVNFLSGSSQDPFNRIPIADLLAQLARLQLRG FDTQCFQQLLTRFQLSLDEVRQLPPDDQPLKSQGAFGFDFNPDGAILVKGYVFPYLKAKAAGVPVATLIAESVRAID ADRNQFMHAFSLINDYMQESTGYNEYTFLSCDLVEMSRQRVKIYGAHTEVTWAKIAEMWTLGGRLIEEPEIMEGLAR LKQIWSLLQIGEGSRAFKGGFDYGKASATDQIPSPIIWNYEISPGSSFPVPKFYLPVHGENDLRVARSLAQFWDSLG WSEHACAYPDMLQQLYPDLDVSRTSRLQSWISYSYTAKKGVYMSVYFHSQSTYLWEED

[0234] SEQ ID NO:71(烟曲霉(Aspergillus fumigatus)Af293)

[0235] MSIGAEIDSLVPAPPGLNGTAAGYPAKTQKELSNGDFDAHDGLSLAQLTPYDVLTAALPLPAPASSTGF WWRETGPVMSKLLAKANYPLYTHYKYLMLYHTHILPLLGPRPPLENSTHPSPSNAPWRSFLTDDFTPLEPSWNVNGN SEAQSTIRLGIEPIGFEAGAAADPFNQAAVTQFMHSYEATEVGATLTLFEHFRNDMFVGPETYAALRAKIPEGEHTT QSFLAFDLDAGRVTTKAYFFPILMSLKTGQSTTKVVSDSILHLALKSEVWGVQTIAAMSVMEAWIGSYGGAAKTEMI SVDCVNEADSRIKIYVRMPHTSLRKVKEAYCLGGRLTDENTKEGLKLLDELWRTVFGIDDEDAELPQNSHRTAGTIF NFELRPGKWFPEPKVYLPVRHYCESDMQIASRLQTFFGRLGWHNMEKDYCKHLEDLFPHHPLSSSTGTHTFLSFSYK KQKGVYMTMYYNLRVYST

[0236] SEQ ID NO:72(烟曲霉)

[0237] MDGEMTASPPDISACDTSAVDEQTGQSGQSQAPIPKDIAYHTLTKALLFPDIDQYQHWHHVAPMLAKML VDGKYSIHQQYEYLCLFAQLVAPVLGPYPSPGRDVYRCTLGGNMTVELSQNFQRSGSTTRIAFEPVRYQASVGHDRF NRTSVNAFFSQLQLLVKSVNIELHHLLSEHLTLTAKDERNLNEEQLTKYLTNFQVKTQYVVALDLRKTGIVAKEYFF PGIKCAATGQTGSNACFGAIRAVDKDGHLDSLCQLIEAHFQQSKIDDAFLCCDLVDPAHTRFKVYIADPLVTLARAE EHWTLGGRLTDEDAAVGLEIIRGLWSELGIIQGPLEPSAMMEKGLLPIMLNYEMKAGQRLPKPKLYMPLTGIPETKI ARIMTAFFQRHDMPEQAEVFMENLQAYYEGKNLEEATRYQAWLSFAYTKEKGPYLSIYYFWPE

[0238] SEQ ID NO:73(米曲霉(Aspergillus oryzae)RIB40)

[0239] MSLRNDLDNGRPTKRLESWDIASMWLSDRKDEIQDWWDFSGPQLATLAHEAGYSTMTQIELLLFFRSVV
LPRMGRFPDACRPRACAQSRSILTYDGSPIEYSWKWNNSANDHPEIRFCVEPVGDGLCADGIVGGKLRATDEILVQL
AKRVPSTDLEWYHHFRDSFGLGHWTDGPLHEDAGTWQVRRPRMPVAFEFTPKGIVTKVYFTPPATLDDMPSFNMFAD
VVRPIGDKDTTALDESMEYLSRDPVGATLRPDVLAIDCISPLKSRIKLYAGTAMTTFTSAISVLTLGGRIPVTRHSI
DEMWALFRMVLGLHDKFLQDEELPVQNPFQPSRAHPEDYYSGLLYYFNLAPGALLPDVKLYLPVIRYGRSDADIALG
LQRFMASRHRGQYVDGFQRAMEIISQRHKSGNGHRIQTYIACSFDKDGSLSLTSYLNPGVYFSSETVDV

[0240] SEQ ID NO:74(土曲霉NIH2624)

[0241] MLPPSDSKDPRPWQILSQALGFPNYDQELWWQNTAETLNRVLEQCDYSVHLQYKYLAFYHKYILPSLGP
FRRPGVEPEYISGLSHGGHPLEISVKIDKSKTICRLGLQAIGPLAGTARDPLNSFGDRELLKNLATLLPHVDLRLFD
HFNAQVGLDRAQCAVATTKLIKESHNIVCTSLDLKDGEVIPKVYFSTIPKGLVTETPLFDLTFAAIEQMEVYHKDAP
LRTALSSLKDFLRPRVPTDASITPPLTGLIGVDCIDPMLSRLKVYLATFRMDLSLIRDYWTLGGLLKDEGTMKGLEM
VETLAKTLKLGDEACETLDAERLPFGINYAMKPGTAELAPPQIYFPLLGINDGFIADALVEFFQYMGWEDQASRYKD
ELKAKFPNVDISQTKNVHRWLGVAYSETKGPSMNIYYDVVAGNVARV

[0242] SEQ ID NO:75(烟曲霉)

[0243] MKAANASSAEAYRVLSRAFRFDNEDQKLWWHSTAPMFAKMLETANYTTPCQYQYLITYKECVIPSLGCY
PTNSAPRWLSILTRYGTPFELSLNCSNSIVRYTFEPINQHTGTDKDPFNTHAIWESLQHLLPLEKSIDLEWFRHFKH
DLTLNSEESAFLAHNDRLVGGTIRTQNKLALDLKDGRFALKTYIYPALKAVVTGKTIHELVFGSVRRLAVREPRILP
PLNMLEEYIRSRGSKSTASPRLVSCDLTSPAKSRIKIYLLEQMVSLEAMEDLWTLGGRRRDASTLEGLSLVRELWDL
IQLSPGLKSYPAPYLPLGVIPDERLPLMANFTLHQNDPVPEPQVYFTTFGMNDMAVADALTTFFERRGWSEMARTYE
TTLKSYYPHADHDKLNYLHAYISFSYRDRTPYLSVYLQSFETGDWAVANLSESKVKCQDAACQPTALPPDLSKTGVY
YSGLH

[0244] SEQ ID NO:76(烟曲霉)

[0245] MPPAPPDQKPCHQLQPAPYRALSESILFGSVDEERWWHSTAPILSRLLISSNYDVDVQYKYLSLYRHLV
LPALGPYPQRDPETGIIATQWRSGMVLTGLPIEFSNNVARALIRIGVDPVTADSGTAQDPFNTTRPKVYLETAARLL
PGVDLTRFYEFETELVITKAEEAVLQANPDLFRSPWKSQILTAMDLQKSGTVLVKAYFYPQPKSAVTGRSTEDLLVN
AIRKVDREGRFETQLANLQRYIERRRRGLHVPGVTADKPPATAADKAFDACSFFPHFLSTDLVEPGKSRVKFYASER
HVNLQMVEDIWTFGGLRRDPDALRGLELLRHFWADIQMREGYYTMPRGFCELGKSSAGFEAPMMFHFHLDGSQSPFP
DPQMYVCVFGMNSRKLVEGLTTYRRVGWEEMASHYQGNFLANYPDEDFEKAAHLCAYVSFAYKNGGAYVTLYNHSFN
PVGDVSFPN

[0246] SEQ ID NO:77(费氏曲霉(Aspergillus fischeri)NRRL_181)

[0247] MSPLSMQTDSVQGTAENKSLETNGTSNDQQLPWKVLGKSLGLPTIEQEQYWLNTAPYFNNLLIQCGYDV
HQQYQYLAFYHRHVLPVLGPFIRSSAEANYISGFSAEGYPMELSVNYQASKATVRLGCEPVGEFAGTSQDPMNQFMT
REVLGRLSRLDPTFDLRLFDYFDSQFSLTTSEANLAASKLIKQRRQSKVIAFDLKDGAIIPKAYFFLKGKSLASGIP
VQDVAFNAIESIAPKQIESPLRVLRTFVTKLFSKPTVTSDVFILAVDCIVPEKSRIKLYVADSQLSLATLREFWTLG
GSVTDSATMKGLEIAEELWRILQYDDAVCSHSNMDQLPLVVNYELSSGSATPKPQLYLPLHGRNDEAMANALTKFWD
YLGWKGLAAQYKKDLYANNPCRNLAETTTVQRWVAFSYTESGGAYLTVYFHAVGGMKGNL

[0248] SEQ ID NO:78(橡胶木菌(Xylona heveae)TC161)

[0249] MAPSMTANYPYSQISEFSKTIATSSDLDPNFGGGVSFKPSSCGGITTARKPWQILQDALGFRNEDEHFW
WETTASVLGCLLEKAGYDVHLQYQYLSLYYRYVLPSYGPRPLQPGVPHWKSFMCDDFSPFEPSWNWDGSKSIIRFSF

EPINRASGTSADPFNQIKPREVLAEISDISAGLDTQWYDHFAREFFLPSETASIIRSRLPEGEHMSQSFLAWDLNGG
EASTKAYFFPILRSLETGRSTRDIVVDAITKLDSEKTSLRPSLTVLEDYMSSLPTEWQAKYEMIAIDCTDPSKSRIK
IYVRMPSMAFNKVRDMYCLGGRLHGPNVDAAMKILDDLWPRVLYIPEGTGPDDELPSNTHRTAGAIFNFELKPGNPL
PDPKLYLPVRHYAKSDLDIARGLQSFFRLQGWDEMADSYVEDLKNIFPTHDLANTAGSHTYLSYSYKKKTGAAVTMY
YNPRIYECPPVVDEVF

[0250] SEQ ID NO:79(波兰青霉(Penicillium polonicum))

[0251] MTYSTATPKDSTPVSLLSLYLTFRSKDDKLWWDNTAPVIGGFLAAAHYKVASQFEFLLFYHKYILPSLG
HYPSPENEGDRWKSFLYRRGEPLELSFNYQKDSNCTVRLALEPVGPNAGTKDDPLNEFEAKILVEKIAQLDSNIDLQ
WVDFLDKEILLHNDELSQIKNTELEGSAHMSQRLVGVDFMSGGMKIKPYFVPWLKSLVTGVPTLQLMFQAIRKLDSV
GSFSNGLSEVEAYLASTDQLLWSEENYLSFDCVDPGKSRIKLYVAEKVTCFNRIQSHWTLGGQLRSQANQEGLLLLK
KLWNLLGYPGDPAQQTDRYLPFNFNWELRPSNPIPLPKVYFALGNEPDSLVSKALIGLFTELGWSDQIHAHKRSVEF
AFPDCNLEETTHVLTWITVTYEEEKGAYITTYCNAIGGGHKLQFR

[0252] SEQ ID NO:80(台中曲霉(Aspergillus taichungensis))

[0253] MLLSRTTSSQNPFHLLLSGTPRLPKMRPEQEPSIQAPSKKVPLPIADGDARPWQVLSLLLPFHNPDQKL
WWDKVGPLIEIYLNCSGYNVGAQYRYLLMLHSIILPVLGPFPNSTRTHTSWPYFMNNGDPCDLSINYQGGSAPCVRL
GIEPIGPMAGTNQDPMNEYAGRRLLEDLSRIQPGIDFQLFDHFRDTLTLSNYKARLCWHAVQEHGIKAQGHVALDLH
EHSFKVKAYSIPLLRSLTSGVHYVRMMIDSIKMISRDQAITIGLSKVDEYLAATKHLLVDSRSCFSFDCADLQHSRY
KIYVGANVKSLGEAYDFWTLGGRLKGEAIDRGFQLMETIWKTMYARSLPDRKPREYIPFIWNWEVSPTDSDPIPKAY
FLVLNDYDILVSEVINCLFGELGWTEHAMTHQIIQKMAYPNHDFGSSTEIYSWISLAYSQSKGPYITIYSNPAASL

[0254] SEQ ID NO:81(格氏锥虫(Trypanosoma grayi))

[0255] MQLREELRDAVCVFYLVLRALDTVEDDMSLAVDLKLRELPVFHEHLRDPSWRMCGVGAGRERELLERFP
HVTRVYARLGKAYQDVITDICARMASGMCEFLTRRVESRADYDLYCHYVAGLVGHGLTRLYVSGGFEDPNLADDLTN
ANHMGLFLQKTNIIRDFYEDICESPPRIFWPREIWAQYTDDLHAFKEEAHEAKALECLNAMVADALVHVPHVIEYMA
ALRDPSVFAFCAIPQLMAMATLALVFNNRNVFHSKVKLTRGSTCSIILYSTQLQSAMQTMRTQAQNLLARTGPDDVC
YDKIAELVGEAVRAVDAHLQPETDGVARSMLTRYPALGGRLLYTLIDNVVGYLGK

[0256] SEQ ID NO:82(产油皮状新丝孢酵母(Cutaneotrichosporon oleaginosum))

[0257] MATLYPSIQSLQKFPYPGDGVVSSTLTDQHDTEGLIADVLDEQPPAHVPRLGLQNATTTLDSVNHLKFI
QGAMMSLPSGFVGLDASRPWLVFWTVHSLDLLGVLLPQNIRDRAVSTILHFLHPTGGFCGGAANTHMPHLLPTYASV
VSLAIVGNAGKGGGWERLVDARQDIYNFFMRCKRPDGGFVVGDNCEVDVRGTYCLLVVATLLDIITPELLHNVDKAI
AAGQTFEGGFACSSFTFKDGNRVAMSEAHGGYTSCSVFSHFLLSSVQPPRRLESLPESFPVPIDVDSVVRWSAMMQG
EAADGGGFRGRSNKLVDGCYSWWVGGTFPVLEELRRREAEVKTSPNGPTATKIVAVDDDGEDEWADEASMHALFNRG
MCDSEVRLMAVALQEYTLLVAQSVTRGGLRDKPGKGPDLYHTCNNLSGLSVAQHRLTHTPEEVQKQREAFKADRGLP
AVKPTTPGGGWKSEEERQAARREVWANVRAWVEDESDTLVVGGQMSQVNTTVPPFNMLEVRLQPFIDYFYCQ

[0258] SEQ ID NO:83(罗塞塔领鞭毛虫(Salpingoeca rosetta))

[0259] MGYDGLVKLDPEQHLPYVTGGLGTLPSGFETLDASRPWLVYWSLNALVILGGTISPELKRRVINTLRMC
QAETGGFGGGVGQVAHAAPTYAAVNALAIIGTEEAWSIINREKLASWLSSLIEDDGSMHMHDDGEIDVRAVYCGASA
ARLCGLDVDTIFAKCPQWVARCQTYEGGFAAIPGLEAHGGYTFCGFAAMSILCSTHLIDIPRLTEWLANRQMPMSGG
FQGRPNKLVDGCYSFWVGGCFPILADLLEAQGLPGDVVNAEALIDYVVCVCQCPSGFRDKPGKRQDYYHTSYCLSGL
ASMKRFAPNHPILSQLNATHPIHNVPPANAERMIQAMSSQTTTRH

[0260] SEQ ID NO:84(链霉菌属菌株CL190)

[0261] MSEAADVERVYAAMEEAAGLLGVACARDKIYPLLSTFQDTLVEGGSVVVFSMASGRHSTELDFSISVPT SHGDPYATVVEKGLFPATGHPVDDLLADTQKHLPVSMFAIDGEVTGGFKKTYAFFPTDNMPGVAELSAIPSMPPAVA ENAELFARYGLDKVQMTSMDYKKRQVNLYFSELSAQTLEAESVLALVRELGLHVPNELGLKFCKRSFSVYPTLNWET GKIDRLCFAVISNDPTLVPSSDEGDIEKFHNYATKAPYAYVGEKRTLVYGLTLSPKEEYYKLGAYYHITDVQRGLLK AFDSLED

[0262] SEQ ID NO:85(链霉菌属Act143)

[0263] MSGAADVERVYAAMEEAAGLLGVTCAREKIYPLLTEFQDTLTDGVVVFSMASGRRSTELDFSISVPTSQ GDPYATVVEKGLFPATGHPVDDLLADTQKHLPVSMFAIDGEVTGGFKKTYAFFPTDDMPGVAQLSAIPSMPSSVAEN AELFARYGLDKVQMTSMDYKKRQVNLYFSELSEQTLAPESVLALVRELGLHVPTELGLEFCKRSFSVYPTLNWDTGK IDRLCFAVISTDPTLVPSTDERDIEQFRAYGTKAPYAYVGEKRTLVYGLTLSPTEEYYKLGAYYHITDIQRRLLKAF DALED

[0264] SEQ ID NO:86(抗生链霉菌(Streptomyces antibioticus))

[0265] MTSRVCSTSQRQSILQRGSRPMAEAEARTDRQDRSVEVCMSGAADVERVYAAMEEAAGLLGVTCAREKI YPLLTEFQDTLTDGVVVFSMASGRRSTELDFSISVPTSQGDPYATVVDKGLFPATGHPVDDLLADTQKHLPVSMFAI DGEVTGGFKKTYAFFPTDDMPGVAQLSAIPSMPSSVAENAELFARYGLDKVQMTSMDYKKRQVNLYFSELSEQTLAP ESVLALVRELGLHVPTELGLEFCKRSFSVYPTLNWDTGKIDRLCFAVISTDPTLVPSTDERDIEQFRHYGTKAPYAY VGENRTLVYGLTLSPTEEYYKLGAYYHITDIQRRLLKAFDALED

[0266] SEQ ID NO:87(抗生链霉菌)

[0267] MSGAADVERVYAAMEEAAGLLGVTCAREKIYPLLTEFQDTLTDGVVVFSMASGRRSTELDFSISVPTSQ GDPYATVVDKGLFPATGHPVDDLLADTQKHLPVSMFAIDGEVTGGFKKTYAFFPTDDMPGVAQLSAIPSMPSSVAEN AELFARYGLDKVQMTSMDYKKRQVNLYFSELSEQTLAPESVLALVRELGLHVPTELGLEFCKRSFSVYPTLNWDTGK IDRLCFAVISTDPTLVPSTDERDIEQFRHYGTKAPYAYVGENRTLVYGLTLSPTEEYYKLGAYYHITDIQRRLLKAF DALED

[0268] SEQ ID NO:88(放线菌(Actinobacteria bacterium)OV320)

[0269] MEVSMSGAADVERVYAAMEEAAGLLDVSCAREKIYPLLTVFQDTLTDGVVVFSMASGRRSTELDFSISV PVSQGDPYATVVREGLFRATGSPVDELLADTVKHLPVSMFAIDGEVTGGFKKTYAFFPTDDMPGVAQLTGIPSMPAS VAENAELFARYGLDKVQMTSMDYKKRQVNLYFSDLKQEYLQPEAVVALARELGLQVPGELGLEFCKRSFAVYPTLNW DTGKIDRLCFAAISTDPTLVPSTDERDIEMFREYATKAPYAYVGEKRTLVYGLTLSPTEEYYKLGAYYHITDIQRQL LKAFDALED

[0270] SEQ ID NO:89(链霉菌属Root1310)

[0271] MEVSMSGAADVERVYAAMEEAAGLLDVSCAREKIYPLLTVFQDTLTDGVVVFSMASGRRSTELDFSISV PVSQGDPYATVVKEGLFQATGSPVDELLADTVAHLPVSMFAIDGEVTGGFKKTYAFFPTDDMPGVAQLAAIPSMPAS VAENAELFARYGLDKVQMTSMDYKKRQVNLYFSDLKQEYLQPESVVALARELGLRVPGELGLEFCKRSFAVYPTLNW DTGKIDRLCFAAISTDPTLVPSEDERDIEMFRNYATKAPYAYVGEKRTLVYGLTLSSTEEYYKLGAYYHITDIQRQL LKAFDALED

[0272] SEQ ID NO:90(链霉菌属Root1310)

[0273] MSGAADVERVYAAMEEAAGLLDVSCAREKIYPLLTVFQDTLTDGVVVFSMASGRRSTELDFSISVPVSQ GDPYATVVKEGLFQATGSPVDELLADTVAHLPVSMFAIDGEVTGGFKKTYAFFPTDDMPGVAQLAAIPSMPASVAEN

AELFARYGLDKVQMTSMDYKKRQVNLYFSDLKQEYLQPESVVALARELGLRVPGELGLEFCKRSFAVYPTLNWDTGK
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[0274] SEQ ID NO:91(放线菌OV320)

[0275] MSGAADVERVYAAMEEAAGLLDVSCAREKIYPLLTVFQDTLTDGVVVFSMASGRRSTELDFSISVPVSQ
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AELFARYGLDKVQMTSMDYKKRQVNLYFSDLKQEYLQPEAVVALARELGLQVPGELGLEFCKRSFAVYPTLNWDTGK
IDRLCFAAISTDPTLVPSTDERDIEMFREYATKAPYAYVGEKRTLVYGLTLSPTEEYYKLGAYYHITDIQRQLLKAF
DALED

[0276] SEQ ID NO:92(唐德链霉菌(Streptomyces tendae))

[0277] MSGAADVERVYAAMEEAAGLLDVSCAREKIYPLLTVFQDTLTDGVVVFSMASGRRSTELDFSISVPVSQ
GDPYATVVKEGLFRATGSPVDELLADTVKHLPVSMFAIDGEVTGGFKKTYAFFPTDDMPGVAQLTEIPSMPASVAEN
AELFARYGLDKVQMTSMDYKKRQVNLYFSDLKQEYLQPEAVVALARELGLQVPGELGLEFCKRSFAVYPTLNWDTGK
IDRLCFAAISTDPTLVPSTDERDIEMFREYATKAPYAYVGEKRTLVYGLTLSSTEEYYKLGAYYHITDIQRQLLKAF
DALED

[0278] SEQ ID NO:93(链霉菌属URHA0041)

[0279] MSGAAEVERVYSAMEESAGLLDVACSREKIQPILTAFQDVLADGVIVFSMANGRHATELDFSISVPAGH
GDPYAAALEHGLIPATGHPVGDLLADTQKALPVSMFAVDGEVTSGFKKTYAFFPTDDMPGLAQLIDIPSMPPSVAEN
AELFGRYGLDKVQMISLDYKKNQVNLYFSNLNPEFLQPEPVQAMVREMGLQLPADKGLAFAKRSFAVYPTLSWDSAK
IERLCFAVISTDPTLAPAQEQADLDLFSTYANNAPYAYAGEKRTLVYGLTLSPSEEYYKLGSYYQISDIQRKLLKAF
DALTD

[0280] SEQ ID NO:94(寡孢链霉菌(Streptomyces paucisporeus))

[0281] MSGAAEVERVYSAMEEAAGLLDVACSPEKVRPILTAFQDVLSDGVIVYSMASGRHATELDFSISVPADH
GDPYTAALAHGLIPETDHPVGNLLADTQKALPVSMFAVDGEVTGGFKKTYAFFPTDDMPGLAQLIDIPSMPPSVAEN
AELFARYGLDKVQMTSLDYKRKQVNLYFSNLQPEFLAPEPVLSMVREMGLELPGEKGLKFARRSFAIYPTLGWESGK
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[0282] CBDAS

[0283] SEQ ID NO:95(大麻)

[0284] MKCSTFSFWFVCKIIFFFFSFNIQTSIANPRENFLKCFSQYIPNNATNLKLVYTQNNPLYMSVLNSTIH
NLRFTSDTTPKPLVIVTPSHVSHIQGTILCSKKVGLQIRTRSGGHDSEGMSYISQVPFVIVDLRNMRSIKIDVHSQT
AWVEAGATLGEVYYWVNEKNENLSLAAGYCPTVCAGGHFGGGGYGPLMRNYGLAADNIIDAHLVNVHGKVLDRKSMG
EDLFWALRGGGAESFGIIVAWKIRLVAVPKSTMFSVKKIMEIHELVKLVNKWQNIAYKYDKDLLLMTHFITRNITDN
QGKNKTAIHTYFSSVFLGGVDSLVDLMNKSFPELGIKKTDCRQLSWIDTIIFYSGVVNYDTDNFNKEILLDRSAGQN
GAFKIKLDYVKKPIPESVFVQILEKLYEEDIGAGMYALYPYGGIMDEISESAIPFPHRAGILYELWYICSWEKQEDN
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[0285] SEQ ID NO:96(大麻)

[0286] MKCSTFCFWYVCKIIFFFLSFNIQISIANPQENFLKCFSQYIPTNVTNAKLVYTQHDQFYMSILNSTIQ

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NEKHINWIRNVYNFTTPYVSQNPRMAYLNYRDLDLGKTNFESPNNYTQARIWGEKYFGKNFNRLVKVKTKVDPDNFF
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[0287] SEQ ID NO:97(大麻)

[0288] MKCSTFCFWYVCKIIFFFLSFNIQISIANPQENFLKCLSQYIPTNVTNAKLVYTQHDQFYMSILNSTVQ
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AWVESGATLGEVYYWINENNNENLSFPAGYCPTVGTGGHFSGGGYGALMRNYGLAADNIIDAHLVNVDGKVLDRKSMG
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[0289] CBCAS

[0290] SEQ ID NO:98(大麻)

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KTAFSIKLDYVKKLIPETAMVKILEKLYEEEVGVGMYVLYPYGGIMDEISESAIPFPHRAGIMYELWYTATWEKQED
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[0292] THCAS

[0293] SEQ ID NO:99(大麻)

[0294] MNCSAFSFWFVCKIIFFFLSFHIQISIANPRENFLKCFSKHIPNNVANPKLVYTQHDQLYMSILNSTIQ
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[0295] SEQ ID NO:100(中华猕猴桃变种(Actinidia chinensis var.chinensis))

[0296] MQKHKNLKTYKMKTPTTLLSFAFVVLFLFSFSWGALAQNHEDFLQCLSLHSQNSTSITKVIYTPNNSSY
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IVVDSENGTAWVQSGATIGQLYYRIAEKSRNYGFPAGGCPTVGVGGHFSGGGYGMMLRKYGLAADNVVDARIIDVNG
NILDRKSMGEDLFWAIRGGGGASFGVIVAWKINLVVVPSKVTVFTINRTLEQNATNLIHKWQSIAHKFPQELLVAIL
IKRVDSSHDNGEDTMQAFFTSLYLGGIDQLIPLMQESFPELGLTREDCTEMSWIESILYFAGFPSGSSLDVLLNRTQ
LSTRYFKAKSDYVKEPIPLFGWKGIWDLFFKDEGELAEMALIPYGGKMNEISESSIPFPHRAGNLYKILHMVYWDEE
GAEESEKHISWIRKLYSYMAPYVSKFPRAAYINYRDLDVGVNNKNGNTSYAQASIWGMKYFKNNFNRLVHVKTKVDP
SNFFKNEQSIPTLPSWWKKRGN

[0297] SEQ ID NO:101(毛果杨)

[0298] MTCLKASMLPFLLCLLISFSWVISAHPREDFLKCLSLHFEDPAAMSNAIHTPYNSSYSSILQFSIRNLR
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WAIRGGGGQSFGVVVAWKISLVEVPSTVTMFSVSRTLEQNATKLLHRWQYVANTLPEDLVIDVQVTRVNSSQEGNTT
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SEQUENCE LISTING

<110> 马努斯生物合成股份有限公司

<120> 微生物细胞及产生大麻素的方法

<130> AJ3171PT2105

<150> US 62/767,056

<151> 2018-11-14

<160> 101

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Asp Lys Pro Ala Asn Val Asp Leu Ala Leu Gln Tyr Leu Gly Arg Ser
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Val Arg Gln Arg Gly Ile Ala Glu Ile Thr Glu Met Ile His Val Ala
165 170 175
Ser Leu Leu His Asp Asp Val Leu Asp Asp Ala Asp Thr Arg Arg Gly
180 185 190
Val Gly Ser Leu Asn Val Val Met Gly Asn Lys Met Ser Val Leu Ala
195 200 205
Gly Asp Phe Leu Leu Ser Arg Ala Cys Gly Ala Leu Ala Ala Leu Lys
210 215 220
Asn Thr Glu Val Val Ala Leu Leu Ala Thr Ala Val Glu His Leu Val
225 230 235 240
Thr Gly Glu Thr Met Glu Ile Thr Ser Ser Thr Glu Gln Arg Tyr Ser
245 250 255
Met Asp Tyr Tyr Met Gln Lys Thr Tyr Tyr Lys Thr Ala Ser Leu Ile
260 265 270
Ser Asn Ser Cys Lys Ala Val Ala Val Leu Thr Gly Gln Thr Ala Glu
275 280 285
Val Ala Val Leu Ala Phe Glu Tyr Gly Arg Asn Leu Gly Leu Ala Phe
290 295 300
Gln Leu Ile Asp Asp Ile Leu Asp Phe Thr Gly Thr Ser Ala Ser Leu
305 310 315 320
Gly Lys Gly Ser Leu Ser Asp Ile Arg His Gly Val Ile Thr Ala Pro
325 330 335
Ile Leu Phe Ala Met Glu Glu Phe Pro Gln Leu Arg Glu Val Val Asp
340 345 350
Gln Val Glu Lys Asp Pro Arg Asn Val Asp Ile Ala Leu Glu Tyr Leu
355 360 365
Gly Lys Ser Lys Gly Ile Gln Arg Ala Arg Glu Leu Ala Met Glu His
370 375 380
Ala Asn Leu Ala Ala Ala Ala Ile Gly Ser Leu Pro Glu Thr Asp Asn
385 390 395 400
Glu Asp Val Lys Arg Ser Arg Arg Ala Leu Ile Asp Leu Thr His Arg
405 410 415
Val Ile Thr Arg Asn Lys
420

<210> 5
<211> 321
<212> PRT
<213> 拟南芥

<400> 5

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

Ser Arg Arg Ala Leu Ile Asp Leu Thr His Arg Val Ile Thr Arg Asn
305 310 315 320
Lys

<210> 6
<211> 283
<212> PRT
<213> 大豆
<400> 6

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

245 250 255

Gln Glu Glu Arg His Leu Ala Leu Lys Glu Leu Gln Phe Phe Met Asp
260 265 270

Arg Asp Val His Val Ile Ser Ser Phe Ile Tyr
275 280

<210> 7

<211> 412

<212> PRT

<213> 向日葵

<400> 7

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

Tyr Asn Arg Cys Arg Trp Phe Tyr Ser Ser Ala Pro His Gln Gln Leu
20 25 30

Ser Pro Tyr Ser Gly Phe Arg Ser Ser Glu Gln Val Leu Gly Cys Arg
35 40 45

Val Ile Ser Pro Trp Phe Ser Arg Ser Phe Arg Ser Gly Gly Pro Gln
50 55 60

Pro Gln Tyr Glu Asp Asp Gln Glu Asp Pro Phe Ser Leu Val Ala Asp
65 70 75 80

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

Val Pro Lys Leu Ala Ser Ala Ala Glu Tyr Phe Phe Lys Met Gly Val
100 105 110

Glu Gly Lys Arg Phe Arg Pro Thr Val Ile Leu Leu Met Ala Thr Ala
115 120 125

Leu Asn Asn Gln Ile Ser Lys Pro Pro Ser Glu Gly Val Val Asp Met
130 135 140

Leu Ser Thr Glu Phe Arg Thr Arg Leu Gln Ser Ile Ala Glu Ile Thr
145 150 155 160

Glu Met Ile His Val Ala Ser Leu Leu His Asp Asp Val Leu Asp Asp
165 170 175

Ala Asp Thr Arg Arg Gly Ile Gly Ser Leu Asn Phe Val Met Gly Asn
180 185 190

Lys Ile Ser Val Leu Ala Gly Asp Phe Leu Leu Ser Arg Ala Cys Ile
195 200 205

Thr Leu Ala Ser Leu Lys Asn Thr Glu Val Val Ser Leu Ile Ala Thr
210 215 220

Ala Val Glu His Leu Val Thr Gly Glu Thr Met Gln Met Ser Ser Ser

225 230 235 240
Ala Glu Gln Arg Ser Ser Met Asp Tyr Tyr Leu Gln Lys Thr Tyr Tyr
245 250 255
Lys Thr Ala Ser Leu Ile Ser Asn Ser Cys Lys Ser Ile Ala Leu Leu
260 265 270
Thr Gly Gln Thr Ala Glu Val Ala Met Leu Ala Tyr Glu Tyr Gly Lys
275 280 285
Asn Leu Gly Leu Ala Phe Gln Leu Ile Asp Asp Val Leu Asp Phe Thr
290 295 300
Gly Thr Ser Ser Ser Leu Gly Lys Gly Ser Leu Ser Asp Ile Arg His
305 310 315 320
Gly Ile Val Thr Ala Pro Leu Leu Tyr Ala Met Glu Glu Phe Pro Glu
325 330 335
Leu Arg Ser Val Val Asp Arg Gly Leu Asp Asn Pro Ala Asn Val Asp
340 345 350
Leu Ala Leu Glu Tyr Leu Gly Lys Ser His Gly Ile Gln Arg Thr Arg
355 360 365
Glu Leu Ala Ala Lys His Ala Ser Leu Ala Ser Ala Ala Ile Asp Ser
370 375 380
Phe Pro Glu Asn Asp Asp Glu Asp Val Gln Arg Ser Arg Arg Ala Leu
385 390 395 400
Ile Glu Leu Thr His Arg Val Ile Asn Arg Thr Lys
405 410

<210> 8
<211> 415
<212> PRT
<213> 南非醉茄
<400> 8

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

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

Arg Ala Leu Val Glu Leu Thr His Arg Val Ile Thr Arg Thr Lys
405 410 415

<210> 9

<211> 342

<212> PRT

<213> 江南卷柏

<400> 9

Met Ala Gln Leu Gly Arg Arg Leu Arg Asp Met Val Ala Ala Glu Val
1 5 10 15

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

Gly Lys Arg Phe Arg Pro Met Val Leu Leu Leu Met Ser Ser Ser Leu
35 40 45

Thr Met Val Leu Pro Ser Ala Ala Ala Ala Thr Ser Asp Glu Lys Asn
50 55 60

Trp Arg His His Lys Leu Ala Glu Ile Thr Glu Met Ile His Val Ala
65 70 75 80

Ser Leu Leu His Asp Asp Val Leu Asp His Ala Asp Thr Arg Arg Gly
85 90 95

Ile Ala Ser Leu Asn Phe Ile Met Gly Asn Lys Leu Ala Val Leu Ala
100 105 110

Gly Asp Phe Leu Leu Ala Arg Ala Ala Phe Ser Leu Ser Thr Leu Gln
115 120 125

Asn Asp Glu Val Val Gly Leu Met Ser Lys Val Leu Glu His Leu Val
130 135 140

Ala Gly Glu Val Met Gln Trp Thr Val Asp Ala Glu Lys Ser Ser Ser
145 150 155 160

Met Asp Tyr Tyr Leu Gln Lys Thr Phe Tyr Lys Thr Ala Ser Leu Ile
165 170 175

Ala Asn Ser Cys Lys Cys Ile Ala Ile Leu Ala Gly His Pro Lys Glu
180 185 190

Val Ala Ala Leu Ala Phe Asp Tyr Gly Arg His Leu Gly Leu Ala Tyr
195 200 205

Gln Leu Val Asp Asp Leu Leu Asp Phe Thr Gly Thr Lys Ala Ser Leu
210 215 220

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

Val Leu Tyr Ala Leu Glu Glu His Pro Ala Leu Gln Glu Leu Ile Asp
245 250 255

Arg Lys Phe Lys Asp Pro Gly Asp Val Asp Ser Ala Leu Lys Met Val
260 265 270
Leu Ala Ser Ser Gly Ile Arg Lys Thr Lys Glu Leu Ala Arg Glu His
275 280 285
Ala Ser Lys Ala Ala Asp Ala Val Ala Gly Phe Pro Pro Thr Thr Ser
290 295 300
Glu Lys Ala Ser Leu Cys Arg Arg Ala Leu Thr Glu Leu Thr Glu Gln
305 310 315 320
Val Ile Thr Arg Ser Asn Arg Gly Arg Met Cys Cys Glu Ala Val Asn
325 330 335
Leu Ser Ala Arg Phe Asn
340

<210> 10
<211> 421
<212> PRT
<213> 芍药
<400> 10

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

Leu Leu His Asp Asp Val Leu Asp Asp Ala Asp Thr Arg Arg Gly Ile
180 185 190
Ser Ser Leu Asn Ser Val Val Gly Asn Lys Val Ala Val Leu Ala Gly
195 200 205
Asp Phe Leu Leu Ser Arg Ala Cys Val Ala Leu Ala Ser Leu Arg Asn
210 215 220
Thr Asp Val Val Ile Leu Leu Ala Thr Val Val Glu His Leu Val Thr
225 230 235 240
Gly Glu Thr Met Gln Met Thr Thr Thr Ser Glu Gln Arg Cys Ser Met
245 250 255
Asp Tyr Tyr Met Glu Lys Thr Tyr Tyr Lys Thr Ala Ser Leu Ile Ser
260 265 270
Asn Ser Cys Lys Ala Ile Ala Leu Leu Ala Gly Gln Thr Ala Glu Val
275 280 285
Ala Met Leu Ala Phe Glu Tyr Gly Lys Asn Leu Gly Leu Ala Phe Gln
290 295 300
Leu Ile Asp Asp Val Leu Asp Phe Thr Gly Thr Ser Ala Ser Leu Gly
305 310 315 320
Lys Gly Ser Leu Ser Asp Ile Arg Arg Gly Ile Val Thr Ala Pro Ile
325 330 335
Leu Phe Ala Val Glu Glu Phe Pro Gln Leu Arg Ala Leu Val Asp Arg
340 345 350
Gly Phe His Asp Pro Lys Asp Val Asp Ile Ala Leu Asp Tyr Leu Gly
355 360 365
Lys Ser Cys Gly Ile Gln Lys Thr Arg Glu Leu Ala Thr Lys His Ala
370 375 380
Asn Leu Ala Ala Ala Ala Ile Asp Ser Leu Pro Glu Ser Asp Asp Glu
385 390 395 400
Glu Val Val Lys Ser Arg Arg Ala Leu Val Asp Leu Thr Gln Arg Val
405 410 415
Ile Thr Arg Thr Lys
420

<210> 11
<211> 420
<212> PRT
<213> 长春花
<400> 11

Met Leu Phe Ser Arg Gly Leu Tyr Arg Ile Ala Arg Thr Ser Leu Asn
1 5 10 15

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

325 330 335
Phe Ala Ile Glu Glu Phe Pro Glu Leu Arg Ala Val Val Asp Glu Gly
340 345 350
Phe Glu Asn Pro Tyr Asn Val Asp Leu Ala Leu His Tyr Leu Gly Lys
355 360 365
Ser Arg Gly Ile Gln Arg Thr Arg Glu Leu Ala Ile Lys His Ala Asn
370 375 380
Leu Ala Ser Asp Ala Ile Asp Ser Leu Pro Val Thr Asp Asp Glu His
385 390 395 400
Val Leu Arg Ser Arg Arg Ala Leu Val Glu Leu Thr Gln Arg Val Ile
405 410 415
Thr Arg Arg Lys
420

<210> 12
<211> 462
<212> PRT
<213> 微拟球藻
<400> 12
Met Pro Ala Pro Arg Lys Val Gly Leu Arg Arg Leu Arg Gly Leu Val
1 5 10 15
Gln Ser Cys Ser Thr Gly Phe Arg Gly Gly Val Gln Pro Ser Leu Ile
20 25 30
Ser Ser Arg Thr Ala Ile Ser Tyr Val Asn Arg Ala Val Asp His Ile
35 40 45
Tyr Tyr Ser His Ala Ser Ile Gly Ser Thr Thr Asn Ile Val His Arg
50 55 60
Ser Ile Arg Ser Gly Trp Ala Lys Thr Ala Ala Asp Ala Ser Ile Asp
65 70 75 80
Val Ile Val Asn Ala Val Thr Arg Pro Glu Ile Asp Glu Pro Thr Val
85 90 95
Lys Val Ala Glu Pro Arg Arg Ala Ile Ile Lys Ala Asp Gln Ala Gly
100 105 110
Glu Leu Glu Glu Asp Leu Ala Leu Asp Leu Gln Arg Lys Pro Arg Leu
115 120 125
Asp Leu Leu Ala Gly Trp Ala Gly Ala Ala Arg Gly Val Asp Pro Phe
130 135 140
Lys Ile Val Glu Ser Asp Met Arg Ser Leu Ser Ala Gly Ile Lys Ser
145 150 155 160
Leu Leu Gly Ser Asp His Pro Val Leu Glu Ala Cys Ala Lys Tyr Phe

165 170 175

Phe Glu Leu Asp Gly Gly Lys Lys Ile Arg Pro Thr Met Val Leu Leu
180 185 190

Ile Ser Arg Ala Val Ala Ala His Ala Pro Ala Gln Gly Val Asn Gly
195 200 205

Ser Arg Ala Phe Thr Ser Thr Ser Glu Ser Ser Thr Pro Leu Pro Ser
210 215 220

Gln Lys Arg Leu Ala Glu Ile Thr Glu Met Ile His Thr Ala Ser Leu
225 230 235 240

Phe His Asp Asp Val Ile Asp Glu Ala Asp Glu Arg Arg Gly Val Pro
245 250 255

Ser Ile Asn Lys Ile Tyr Gly Asn Lys Met Ala Ile Leu Ala Gly Asp
260 265 270

Phe Leu Leu Ala Arg Ala Ser Val Ser Leu Ala Arg Leu Arg Asn Ile
275 280 285

Glu Val Val Glu Leu Leu Ser Thr Val Ile Glu His Leu Val Lys Gly
290 295 300

Glu Val Met Gln Ser Arg Pro Gln Ala Leu Val Asp Gly Ser Gly Thr
305 310 315 320

Gly Glu Asn Gly Gln Ala Ala Leu Glu Tyr Tyr Leu His Lys Asn Phe
325 330 335

Tyr Lys Thr Gly Ser Leu Met Ala Asn Ser Cys Arg Ala Ala Val Leu
340 345 350

Leu Ala Gly Gly Gly Asp Ala Leu Gln Asn Gln Ala Phe Ala Tyr Gly
355 360 365

Arg His Val Gly Leu Ala Phe Gln Leu Val Asp Asp Val Leu Asp Phe
370 375 380

Glu Gln Thr Ser Glu Thr Leu Gly Lys Pro Ala Leu Asn Asp Leu Arg
385 390 395 400

Gln Gly Leu Ala Thr Ala Pro Val Leu Leu Ala Ala Arg Thr Phe Pro
405 410 415

Asp Glu Val Gly Asp Met Val Lys Arg Lys Phe Ala Ser Glu Gly Asp
420 425 430

Val Glu Arg Val Arg Glu Met Ala Phe Phe Ser Ile Ala Met Thr Ser
435 440 445

Pro Arg Pro Arg Tyr Asn Ser Ser Tyr Leu Gly Thr Leu Leu
450 455 460

<210> 13

<211> 424

<212> PRT
<213> 丹参
<400> 13

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

Ala Glu Val Ser Asn Leu Ala Tyr Glu Tyr Gly Lys Asn Leu Gly Leu
290 295 300
Ala Phe Gln Ile Ile Asp Asp Val Leu Asp Phe Thr Gly Thr Ser Ala
305 310 315 320
Ser Leu Gly Lys Gly Ser Leu Ser Asp Ile Arg His Gly Ile Val Thr
325 330 335
Ala Pro Ile Leu Phe Ala Ile Glu Glu Tyr Pro Glu Leu Arg Lys Ile
340 345 350
Val Asp Gln Gly Phe Glu Lys Ser Ser Asn Val Asp Arg Ala Leu Glu
355 360 365
Ile Leu Ser Lys Ser Ser Gly Ile Gln Arg Ala Arg Glu Leu Ala Ala
370 375 380
Lys His Ala Arg Leu Ala Ser Ala Ala Ile Asp Ala Leu Pro Glu Asn
385 390 395 400
Glu Asp Glu Val Val Gln Arg Ser Met Arg Ala Leu Val Glu Leu Thr
405 410 415
His Ile Val Ile Thr Arg Thr Lys
420

<210> 14
<211> 321
<212> PRT
<213> 酿酒葡萄
<220>
<221> misc_feature
<222> (26)..(26)
<223> Xaa可为任何天然存在的氨基酸
<220>
<221> misc_feature
<222> (209)..(209)
<223> Xaa可为任何天然存在的氨基酸
<400> 14
Met Val Val Ala Glu Val Pro Lys Leu Ala Ser Ala Ala Glu Tyr Phe
1 5 10 15
Phe Lys Met Gly Val Glu Gly Lys Arg Xaa Arg Pro Thr Val Leu Leu
20 25 30
Leu Met Ala Thr Ala Leu Asn Val Pro Leu Pro Arg Pro Ala Leu Ala
35 40 45
Glu Val Pro Glu Thr Leu Ser Thr Glu Leu Arg Thr Arg Gln Gln Cys
50 55 60

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

<210> 15
<211> 416
<212> PRT
<213> 松小蠹
<400> 15
Met Phe Lys Leu Ala Gln Arg Leu Pro Lys Ser Val Ser Ser Leu Gly

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

Gly Thr Asp Ile Lys Thr Gly Gln Leu Thr Trp Phe Ala Gln Lys Ala
325 330 335
Leu Ser Ile Cys Asn Asp Arg Gln Arg Lys Ile Ile Met Asp Asn Tyr
340 345 350
Gly Lys Glu Asp Asn Lys Asn Ser Glu Ala Val Arg Glu Val Tyr Glu
355 360 365
Glu Leu Asp Leu Lys Gly Lys Phe Met Glu Phe Glu Glu Glu Ser Phe
370 375 380
Glu Trp Leu Lys Lys Glu Ile Pro Lys Ile Asn Asn Gly Ile Pro His
385 390 395 400
Lys Val Phe Gln Asp Tyr Thr Tyr Gly Val Phe Lys Arg Arg Pro Glu
405 410 415

<210> 16
<211> 416
<212> PRT
<213> 夏栎
<400> 16

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

Val Leu Asp Asp Ala Asp Thr Arg Arg Gly Ile Gly Ser Leu Asn Phe
180 185 190
Val Met Gly Asn Lys Leu Ala Val Leu Ala Gly Asp Phe Leu Leu Ser
195 200 205
Arg Ala Cys Val Ala Leu Ala Ser Leu Lys Asn Thr Glu Val Val Ser
210 215 220
Leu Leu Ala Lys Val Val Glu His Leu Val Thr Gly Glu Thr Met Gln
225 230 235 240
Met Thr Thr Thr Cys Glu Gln Arg Cys Ser Met Glu Tyr Tyr Met Gln
245 250 255
Lys Thr Tyr Tyr Lys Thr Ala Ser Leu Ile Ser Asn Ser Cys Lys Ala
260 265 270
Ile Ala Leu Leu Gly Gly Gln Thr Ser Glu Val Ala Met Leu Ala Tyr
275 280 285
Glu Tyr Gly Lys Asn Leu Gly Leu Ala Tyr Gln Leu Ile Asp Asp Val
290 295 300
Leu Asp Phe Thr Gly Thr Ser Ala Ser Leu Gly Lys Gly Ser Leu Ser
305 310 315 320
Asp Ile Arg His Gly Ile Ile Thr Ala Pro Ile Leu Phe Ala Met Glu
325 330 335
Glu Phe Pro Gln Leu Arg Glu Val Val Asp Arg Gly Phe Asp Asp Pro
340 345 350
Ala Asn Val Asp Val Ala Leu Asp Tyr Leu Gly Lys Ser Arg Gly Ile
355 360 365
Gln Arg Ala Arg Glu Leu Ala Lys Lys His Ala Asn Ile Ala Ala Glu
370 375 380
Ala Ile Asp Ser Leu Pro Glu Ser Asn Asp Glu Asp Val Arg Lys Ser
385 390 395 400
Arg Arg Ala Leu Leu Asp Leu Thr Glu Arg Val Ile Thr Arg Thr Lys
405 410 415

<210> 17
<211> 321
<212> PRT
<213> 甜橙
<400> 17

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

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

<210> 18

<211> 394

<212> PRT
<213> 大麻
<400> 18

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

Val Leu Gly Ala Ile Leu Gly Gly Gly Thr Asp Glu Glu Val Glu Lys
290 295 300
Leu Arg Ser Phe Ala Arg Cys Ile Gly Leu Leu Phe Gln Val Val Asp
305 310 315 320
Asp Ile Leu Asp Val Thr Lys Ser Ser Gln Glu Leu Gly Lys Thr Ala
325 330 335
Gly Lys Asp Leu Val Ala Asp Lys Val Thr Tyr Pro Arg Leu Met Gly
340 345 350
Ile Asp Lys Ser Arg Glu Phe Ala Glu Gln Leu Asn Thr Glu Ala Lys
355 360 365
Gln His Leu Ser Gly Phe Asp Pro Ile Lys Ala Ala Pro Leu Ile Ala
370 375 380
Leu Ala Asn Tyr Ile Ala Tyr Arg Gln Asn
385 390

<210> 19
<211> 380
<212> PRT
<213> 白桑
<400> 19

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

His Thr Met Ser Leu Ile His Asp Asp Leu Pro Cys Met Asp Asn Asp
165 170 175
Asp Leu Arg Arg Gly Lys Pro Thr Asn His Lys Val Phe Gly Glu Asp
180 185 190
Val Ala Val Leu Ala Gly Asp Ala Leu Leu Ala Phe Ala Phe Glu His
195 200 205
Ile Ala Val Ser Thr Ala Gly Val Thr Pro Ser Arg Ile Val Arg Ala
210 215 220
Ile Gly Glu Leu Ala Lys Ser Ile Gly Thr Glu Gly Leu Val Ala Gly
225 230 235 240
Gln Val Val Asp Ile Asp Ser Glu Gly Ser Asp Asp Ala Gly Leu Glu
245 250 255
Lys Leu Glu Phe Ile His Ile His Lys Thr Ala Ala Leu Leu Glu Ala
260 265 270
Ser Val Val Leu Gly Ala Ile Leu Gly Gly Gly Thr Asp Asp Glu Val
275 280 285
Glu Lys Leu Arg Ser Phe Ala Arg Cys Ile Gly Leu Leu Phe Gln Val
290 295 300
Val Asp Asp Ile Leu Asp Val Thr Lys Ser Ser Gln Glu Leu Gly Lys
305 310 315 320
Thr Ala Gly Lys Asp Leu Val Ala Asp Lys Val Thr Tyr Pro Lys Leu
325 330 335
Ile Gly Ile Glu Lys Ser Lys Glu Phe Ala Ala Lys Leu Asn Lys Glu
340 345 350
Ala Gln Glu Gln Leu Ser Gly Phe Asp Pro His Lys Ala Ala Pro Leu
355 360 365
Ile Ala Leu Ala Asn Tyr Ile Ala Asn Arg Gln Asn
370 375 380

<210> 20
<211> 302
<212> PRT
<213> 泊库岛食烷菌SK2
<400> 20

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

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

<210> 21
<211> 312
<212> PRT
<213> 小球藻
<400> 21

Met Gly Gln Val Ser Ala Pro Val Val Glu Asp Met Asp Ile Cys Arg
1 5 10 15

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

<210> 22

<211> 420
<212> PRT
<213> 混点齿小蠹
<400> 22

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

275 280 285

Asp Pro Val Leu Met Arg Ile Gly Met Met His Gln Ser Gln Asn Asp

290 295 300

Phe Lys Asp Leu Tyr Arg Asp Gln Gly Glu Val Leu Lys Gln Val Glu

305 310 315 320

Lys Ser Val Leu Gly Thr Asp Ile Arg Thr Gly Gln Leu Thr Trp Phe

325 330 335

Ala Gln Lys Ala Leu Ser Ile Cys Asn Asp Arg Gln Arg Lys Ile Ile

340 345 350

Met Asp Asn Tyr Gly Lys Glu Asp Thr Lys His Ser Glu Ala Val Arg

355 360 365

Glu Val Tyr Glu Glu Leu Asp Leu Lys Gly Lys Phe Met Glu Phe Glu

370 375 380

Glu Glu Ser Phe Gln Trp Leu Lys Lys Glu Ile Pro Lys Ile Asn Asn

385 390 395 400

Gly Val Pro His Lys Ile Phe Gln Asp Tyr Thr Tyr Gly Val Phe Lys

405 410 415

Arg Arg Pro Glu

420

<210> 23

<211> 427

<212> PRT

<213> 白云杉

<400> 23

Met Tyr Thr Arg Cys Ile Leu Lys Asp Lys Tyr Ser Arg Phe Asn Leu

1 5 10 15

Arg Arg Lys Phe Phe Thr Ser Thr Lys Ser Ile Asn Ala Leu Asn Gly

20 25 30

Leu Pro Asp Ser Arg Asn Pro Arg Gly Glu Ser Asn Gly Ile Ser Gln

35 40 45

Phe Lys Ile Gln Gln Val Phe Pro Cys Lys Glu Tyr Ile Trp Ile Asp

50 55 60

Arg His Lys Phe His Asp Val Gly Phe Gln Ala Gln His Lys Arg Ser

65 70 75 80

Ile Thr Asp Glu Glu Gln Val Asp Pro Phe Ser Leu Val Ala Asp Glu

85 90 95

Leu Ser Ile Leu Ala Asn Arg Leu Arg Ser Met Ile Leu Thr Glu Ile

100 105 110

Pro Lys Leu Gly Thr Ala Ala Glu Tyr Phe Phe Lys Leu Gly Val Glu

115 120 125

Gly Lys Arg Phe Arg Pro Met Val Leu Leu Leu Met Ala Ser Ser Leu

130 135 140

Thr Ile Gly Ile Pro Glu Val Ala Ala Asp Cys Leu Arg Lys Gly Leu

145 150 155 160

Asp Glu Glu Gln Arg Leu Arg Gln Gln Arg Ile Ala Glu Ile Thr Glu

165 170 175

Met Ile His Val Ala Ser Leu Leu His Asp Asp Val Leu Asp Asp Ala

180 185 190

Asp Thr Arg Arg Gly Val Gly Ser Leu Asn Phe Val Met Gly Asn Lys

195 200 205

Leu Ala Val Leu Ala Gly Asp Phe Leu Leu Ser Arg Ala Ser Val Ala

210 215 220

Leu Ala Ser Leu Lys Asn Thr Glu Val Val Glu Leu Leu Ser Lys Val

225 230 235 240

Leu Glu His Leu Val Thr Gly Glu Ile Met Gln Met Thr Asn Thr Asn

245 250 255

Glu Gln Arg Cys Ser Met Glu Tyr Tyr Met Gln Lys Thr Phe Tyr Lys

260 265 270

Thr Ala Ser Leu Met Ala Asn Ser Cys Lys Ala Ile Ala Leu Ile Ala

275 280 285

Gly Gln Pro Ala Glu Val Cys Met Leu Ala Tyr Asp Tyr Gly Arg Asn

290 295 300

Leu Gly Leu Ala Tyr Gln Leu Val Asp Asp Val Leu Asp Phe Thr Gly

305 310 315 320

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

325 330 335

Ile Val Thr Ala Pro Ile Leu Phe Ala Leu Glu Glu Phe Pro Gln Leu

340 345 350

His Asp Val Ile Asn Arg Lys Phe Lys Lys Pro Gly Asp Ile Asp Leu

355 360 365

Ala Leu Glu Phe Leu Gly Lys Ser Asp Gly Ile Arg Lys Ala Lys Gln

370 375 380

Leu Ala Ala Gln His Ala Gly Phe Ala Thr Phe Ser Val Glu Ser Phe

385 390 395 400

Pro Pro Ser Glu Ser Glu Tyr Val Lys Leu Cys Arg Lys Ala Leu Ile

405 410 415

Asp Leu Ser Glu Lys Val Ile Thr Arg Thr Lys

420 425

<210> 24
<211> 429
<212> PRT
<213> 华山松大小蠹
<400> 24

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

Val Lys Tyr Lys Thr Ala Tyr Tyr Ser Phe Gln Met Pro Val Ala Ile
275 280 285
Ala Met Tyr Leu Ala Gly Met Ser Asp Glu Glu Gln His Arg Gln Ala
290 295 300
Lys Thr Ile Leu Met Glu Met Gly Gln Phe Phe Gln Ile Gln Asp Asp
305 310 315 320
Phe Leu Asp Cys Phe Gly Asp Pro Thr Val Thr Gly Lys Val Gly Thr
325 330 335
Asp Ile Gln Asp Gly Lys Cys Ser Trp Leu Ala Val Val Ala Leu Gln
340 345 350
Arg Ala Ser Ala Ala Gln Arg Lys Ile Met Glu Glu Tyr Tyr Gly Arg
355 360 365
Pro Glu Pro Glu Ser Val Ala Gln Ile Lys Asn Leu Tyr Val Asp Leu
370 375 380
Cys Leu Pro Asn Thr Tyr Ala Ile Tyr Glu Glu Glu Ser Phe Asn Ile
385 390 395 400
Ile Lys Thr His Ile Gln Gln Ile Ser Lys Gly Leu Arg His Asp Leu
405 410 415
Phe Phe Lys Ile Met Glu Lys Ile Tyr Lys Arg Glu Cys
420 425

<210> 25
<211> 301
<212> PRT
<213> 紫花苜蓿
<400> 25

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

Leu Met Glu Ala Ala Thr Tyr Thr His Glu His Leu Pro Leu Ser Asp
115 120 125
Arg Pro Gly Pro Lys Pro Gly Pro Met Ile Asp His Val Tyr Gly Pro
130 135 140
Asn Val Glu Leu Leu Thr Gly Asp Gly Ile Val Pro Phe Gly Phe Glu
145 150 155 160
Leu Leu Ala Arg Ser Asp Gly Gly Glu Asn Ser Glu Arg Ile Leu Lys
165 170 175
Val Met Val Glu Ile Ser Arg Ala Val Gly Ser Gly Gly Gly Val Ile
180 185 190
Asp Ala Gln Tyr Met Lys Thr Leu Gly Gly Gly Ser Asp Gly Asp Glu
195 200 205
Ile Cys His Val Glu Glu Ile Arg Arg Val Val Glu Lys Tyr Glu Gly
210 215 220
Arg Leu His Ser Cys Gly Ala Val Cys Gly Gly Val Leu Gly Gly Gly
225 230 235 240
Cys Glu Glu Glu Ile Glu Arg Leu Arg Lys Phe Gly Phe Tyr Val Gly
245 250 255
Ile Ile Gln Gly Met Ile Lys Trp Gly Phe Lys Glu Asp His Lys Glu
260 265 270
Val Val Glu Ala Arg Asn Leu Ala Ile Gln Glu Leu Lys Phe Phe Lys
275 280 285
Asp Lys Glu Val Asp Ala Ile Lys Thr Phe Leu Asn Ile
290 295 300

<210> 26
<211> 720
<212> PRT
<213> 大麻AAE1
<400> 26

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

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

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

Asn Lys Ile Met Arg Arg Val Leu Arg Gln Gln Phe Ser His Phe Glu
705 710 715 720

<210> 27

<211> 543

<212> PRT

<213> 大麻AAE3

<400> 27

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

Pro Pro Leu His Leu Pro Asn Asn Asn Asn Leu Ser Met Val Ser Phe
20 25 30

Leu Phe Arg Asn Ser Ser Ser Tyr Pro Gln Lys Pro Ala Leu Ile Asp
35 40 45

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

Ile Lys Val Ser His Gly Phe Leu Asn Leu Gly Ile Lys Lys Asn Asp
65 70 75 80

Val Val Leu Ile Tyr Ala Pro Asn Ser Ile His Phe Pro Val Cys Phe
85 90 95

Leu Gly Ile Ile Ala Ser Gly Ala Ile Ala Thr Thr Ser Asn Pro Leu
100 105 110

Tyr Thr Val Ser Glu Leu Ser Lys Gln Val Lys Asp Ser Asn Pro Lys
115 120 125

Leu Ile Ile Thr Val Pro Gln Leu Leu Glu Lys Val Lys Gly Phe Asn
130 135 140

Leu Pro Thr Ile Leu Ile Gly Pro Asp Ser Glu Gln Glu Ser Ser Ser
145 150 155 160

Asp Lys Val Met Thr Phe Asn Asp Leu Val Asn Leu Gly Gly Ser Ser
165 170 175

Gly Ser Glu Phe Pro Ile Val Asp Asp Phe Lys Gln Ser Asp Thr Ala
180 185 190

Ala Leu Leu Tyr Ser Ser Gly Thr Thr Gly Met Ser Lys Gly Val Val
195 200 205

Leu Thr His Lys Asn Phe Ile Ala Ser Ser Leu Met Val Thr Met Glu
210 215 220

Gln Asp Leu Val Gly Glu Met Asp Asn Val Phe Leu Cys Phe Leu Pro
225 230 235 240

Met Phe His Val Phe Gly Leu Ala Ile Ile Thr Tyr Ala Gln Leu Gln
245 250 255

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

<210> 28
<211> 757
<212> PRT

<213> 大麻AAE12

<400> 28

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

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

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

<210> 29
<211> 726
<212> PRT
<213> 金丝枣
<400> 29

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

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

420 425 430

Ser Gly Phe Ala Lys Phe Val Gln Asp Ala Lys Val Thr Met Leu Gly

435 440 445

Val Ile Pro Ser Ile Val Arg Thr Trp Lys Ser Ser Asn Cys Val Ala

450 455 460

Gly Tyr Asp Trp Ser Thr Ile Arg Cys Phe Gly Ser Thr Gly Glu Ala

465 470 475 480

Ser Asn Val Asp Glu Tyr Leu Trp Leu Met Gly Arg Ala Cys Tyr Lys

485 490 495

Pro Val Ile Glu Tyr Cys Gly Gly Thr Glu Ile Gly Gly Gly Phe Val

500 505 510

Ser Gly Ser Leu Leu Gln Ala Gln Ser Leu Ala Ala Phe Ser Thr Pro

515 520 525

Ala Met Gly Cys Ser Leu Tyr Ile Leu Gly Ser Asn Gly Leu Pro Ile

530 535 540

Pro Gln Asn Gln Pro Gly Ile Gly Glu Leu Ala Leu Asp Pro Leu Met

545 550 555 560

Phe Gly Ala Ser Arg Thr Leu Leu Asn Ala Asp His Tyr Asp Val Tyr

565 570 575

Phe Lys Gly Met Pro Val Trp Asn Gly Lys Val Leu Arg Arg His Gly

580 585 590

Asp Met Phe Glu Leu Thr Ser Arg Gly Tyr Tyr His Ala His Gly Arg

595 600 605

Ala Asp Asp Thr Met Asn Ile Gly Gly Ile Lys Val Ser Ser Val Glu

610 615 620

Ile Glu Arg Ile Cys Asn Glu Val Asp Asp Ser Val Leu Glu Thr Ala

625 630 635 640

Ala Ile Gly Val Pro Pro Leu Gly Gly Gly Pro Glu Gln Leu Val Ile

645 650 655

Ala Val Val Phe Lys Asp Ser Asn Asn Pro Lys Glu Asp Leu Asn Gln

660 665 670

Leu Arg Ile Ser Phe Asn Ser Ala Val Gln Lys Lys Leu Asn Pro Leu

675 680 685

Phe Arg Val Ser Arg Val Val Pro Leu Leu Ser Leu Pro Arg Thr Ala

690 695 700

Thr Asn Lys Val Met Arg Arg Ile Leu Arg Glu Gln Phe Ser Gln His

705 710 715 720

Asp Gln Ser Ser Lys Ile

725

<210> 30
<211> 727
<212> PRT
<213> 东方苔草
<400> 30

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

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

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

<210> 31
<211> 727
<212> PRT
<213> 糙叶山黄麻
<400> 31
Met Gly Tyr Lys Ser Leu Asp Ser Val Thr Ala Ser Asp Ile Ala Ala
1 5 10 15
Leu Gly Ile Asp Pro Glu Leu Ala Glu Thr Leu His Gly Arg Leu Ala
20 25 30
Asp Val Ile Arg Asn Tyr Ala Ser Ala Thr Pro Pro Asp Thr Trp Arg
35 40 45
Tyr Val Ser Ala Asn Ile Leu Ser Pro His Leu Pro Phe Ser Phe His
50 55 60
Gln Met Met Tyr Tyr Gly Cys Tyr Gln Asp Phe Gly Pro Asp Pro Pro
65 70 75 80
Ala Trp Ile Pro Asp Leu Glu Asn Ala Ile Ser Thr Asn Val Gly Lys
85 90 95
Leu Leu Glu Arg Arg Gly Lys Glu Phe Leu Gly Ser Ser Tyr Lys Asp
100 105 110
Pro Ile Ser Asn Phe Ser Asp Phe Gln Glu Phe Ser Val Thr Asn Pro

115 120 125

Glu Val Tyr Trp Lys Thr Ile Leu Asp Glu Met Asn Ile Ser Phe Ser
130 135 140

Lys Pro Pro Gln Cys Ile Leu Arg Glu Asn Phe Pro Gly Asp Gly Gln
145 150 155 160

Leu Leu His Pro Gly Gly Glu Trp Leu Pro Gly Ala Tyr Val Asn Pro
165 170 175

Ala Lys Asn Cys Leu Ser Leu Asn Ser Lys Arg Ser Leu Asp Asp Thr
180 185 190

Met Ile Ile Trp Arg Asp Glu Gly Lys Asp Asp Leu Pro Val Asn Lys
195 200 205

Met Thr Leu Glu Glu Phe Arg Ser Glu Val Trp Leu Val Ala Tyr Ala
210 215 220

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

Pro Met Asn Val His Ser Val Val Ile Tyr Leu Ala Ile Val Leu Ala
245 250 255

Gly Tyr Val Val Val Ser Ile Ala Asp Ser Phe Ala Ala Arg Glu Ile
260 265 270

Ser Thr Arg Leu Lys Ile Ser Lys Ala Lys Ala Ile Phe Thr Gln Asp
275 280 285

Leu Ile Ile Arg Gly Glu Lys Ser Ile Pro Leu Tyr Ser Arg Ile Val
290 295 300

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

Phe Ser Ala Lys Leu Arg Gln Gly Asp Ile Ser Trp His Asp Phe Leu
325 330 335

Glu Arg Ala Lys Ala Phe Glu Lys Arg Glu Phe Ala Ala Ser Glu Gln
340 345 350

Pro Val Asp Ala Tyr Thr Asn Ile Leu Phe Ser Ser Gly Thr Thr Gly
355 360 365

Glu Pro Lys Ala Ile Pro Trp Thr Gln Ala Thr Pro Phe Lys Ala Ala
370 375 380

Ala Asp Ala Trp Cys His Met Asp Ile Gln Lys Gly Asp Val Val Ala
385 390 395 400

Trp Pro Thr Asn Leu Gly Trp Met Met Gly Pro Trp Leu Val Tyr Ala
405 410 415

Ser Leu Leu Asn Gly Ala Ser Ile Ala Leu Tyr Asn Gly Ser Pro Leu
420 425 430

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

<210> 32

<211> 726
<212> PRT
<213> 欧洲甜樱桃
<400> 32

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

275 280 285

Ile Val Arg Gly Glu Lys Ser Leu Pro Leu Tyr Ser Lys Ile Val Ala

290 295 300

Ala Gln Ser Pro Met Ala Ile Val Ile Leu Thr Lys Gly Ser Asn Ser

305 310 315 320

Ser Met Lys Leu Arg Asp Gly Asp Ile Ser Trp His Asp Phe Leu Glu

325 330 335

Thr Val Lys Asp Phe Lys Glu Asp Glu Phe Ala Ala Val Glu Gln Pro

340 345 350

Ile Glu Ala Phe Thr Asn Ile Leu Phe Ser Ser Gly Thr Thr Gly Glu

355 360 365

Pro Lys Ala Ile Pro Trp Thr His Ala Thr Pro Phe Lys Ala Ala Ala

370 375 380

Asp Ala Trp Cys His Met Asp Ile Gln Ile Gly Asp Val Val Ser Trp

385 390 395 400

Pro Thr Asn Leu Gly Trp Met Met Gly Pro Trp Leu Val Tyr Ala Ser

405 410 415

Leu Leu Asn Gly Ala Ser Ile Ala Leu Tyr Asn Gly Ser Pro Leu Gly

420 425 430

Ser Gly Phe Pro Lys Phe Val Gln Asp Ala Lys Val Thr Met Leu Gly

435 440 445

Val Ile Pro Ser Ile Val Arg Thr Trp Lys Ser Thr Asn Ser Val Ser

450 455 460

Gly Tyr Asp Trp Ser Thr Ile Arg Cys Phe Gly Ser Thr Gly Glu Ala

465 470 475 480

Ser Asn Val Asp Glu Tyr Leu Trp Leu Met Gly Arg Ala Arg Tyr Lys

485 490 495

Pro Ile Ile Glu Tyr Cys Gly Gly Thr Glu Ile Gly Gly Gly Phe Val

500 505 510

Ser Gly Ser Leu Leu Gln Ala Gln Ser Leu Ala Ala Phe Ser Thr Pro

515 520 525

Ala Met Gly Cys Ser Leu Phe Ile Leu Gly Asn Asp Gly Val Pro Ile

530 535 540

Pro Gln Asn Glu Pro Gly Val Gly Glu Leu Ala Leu Gly Pro Leu Ile

545 550 555 560

Phe Gly Ala Ser Ser Thr Leu Leu Asn Ala Asp His Tyr Asp Val Tyr

565 570 575

Phe Lys Gly Met Pro Phe Trp Asn Gly Lys Val Leu Arg Arg His Gly

580 585 590

Asp Val Phe Glu Arg Thr Ser Arg Gly Tyr Tyr His Ala His Gly Arg
595 600 605
Ala Asp Asp Thr Met Asn Leu Gly Gly Ile Lys Val Ser Ser Val Glu
610 615 620
Ile Glu Arg Ile Cys Asn Glu Val Asp Ser Glu Val Leu Glu Thr Ala
625 630 635 640
Ala Ile Gly Val Pro Pro Ala Val Gly Gly Pro Glu Gln Leu Val Leu
645 650 655
Ala Val Val Phe Lys Asn Ser Asp Asn Gln Thr Ala Asp Leu Asn Gln
660 665 670
Leu Arg Thr Ser Phe Asn Ser Ala Val Gln Lys Lys Leu Asn Pro Leu
675 680 685
Phe Lys Val Ser Arg Val Val Pro Leu Pro Ser Leu Pro Arg Thr Ala
690 695 700
Thr Asn Lys Val Met Arg Arg Ile Leu Arg Glu Gln Phe Ala Gln Leu
705 710 715 720
Asp Gln Ser Ala Lys Leu
725

<210> 33
<211> 727
<212> PRT
<213> 川桑
<400> 33

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

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

435 440 445

Val Ile Pro Ser Ile Val Arg Thr Trp Lys Ser Met Asn Ser Val Ser
450 455 460

Gly Tyr Asp Trp Ser Thr Ile Arg Cys Phe Gly Ser Thr Gly Glu Ala
465 470 475 480

Ser Asn Val Asp Glu Tyr Leu Trp Leu Met Gly Arg Ala Cys Tyr Lys
485 490 495

Pro Val Ile Glu Tyr Cys Gly Gly Thr Glu Ile Gly Gly Gly Phe Val
500 505 510

Thr Gly Ser Leu Leu Gln Ala Gln Ala Leu Ala Ala Phe Ser Thr Pro
515 520 525

Ala Met Gly Cys Ser Leu Phe Ile Leu Gly Ser Asp Gly Tyr Pro Ile
530 535 540

Pro Lys Asn Lys Pro Gly Ile Gly Glu Leu Ala Leu Gly Pro Val Met
545 550 555 560

Phe Gly Ser Ser Met Thr Leu Leu Asn Ala Asp His Tyr Asp Val Tyr
565 570 575

Phe Lys Gly Met Pro Leu Trp Asn Gly Lys Val Leu Arg Arg His Gly
580 585 590

Asp Met Phe Glu Ile Thr Ser Arg Gly Tyr Tyr Arg Ala His Gly Arg
595 600 605

Ala Asp Asp Thr Met Asn Leu Gly Gly Ile Lys Val Ser Ser Val Glu
610 615 620

Ile Glu Arg Leu Cys Asn Glu Val Asp Asn Ser Ile Leu Glu Thr Ala
625 630 635 640

Ala Ile Gly Val Pro Pro Pro Ala Gly Gly Pro Glu Gln Leu Val Ile
645 650 655

Ala Val Val Phe Lys Asp Pro Asp Ser Asn Ile Thr Thr Asp Leu Asn
660 665 670

Gln Leu Arg Met Ser Leu Asn Ser Ala Val Gln Lys Lys Leu Asn Pro
675 680 685

Leu Phe Arg Val Ser Arg Val Val Pro Leu Gln Ser Leu Pro Arg Thr
690 695 700

Ala Thr Asn Lys Val Met Arg Arg Ile Leu Arg Gln Gln Phe Val Gln
705 710 715 720

Leu Asp Gln Thr Ser Lys Met
725

<210> 34

<211> 725

<212> PRT

<213> 月季

<400> 34

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

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

595 600 605

Asp Asp Thr Met Asn Leu Gly Gly Ile Lys Val Ser Ser Val Glu Ile
610 615 620

Glu Arg Ile Cys Asn Ala Ile Asp Thr Asn Ile Leu Glu Thr Ala Ala
625 630 635 640

Ile Gly Val Pro Pro Ala Gly Gly Gly Pro Glu Gln Leu Val Ile Ala
645 650 655

Val Val Phe Lys Asn Ser Asp Asn Pro Pro Ala Asp Leu Asn Gln Leu
660 665 670

Arg Ala Ser Phe Asn Ser Ala Val Gln Lys Lys Leu Asn Pro Leu Phe
675 680 685

Lys Val Ser Arg Val Val Pro Leu Pro Ser Leu Pro Arg Thr Ala Thr
690 695 700

Asn Lys Val Met Arg Arg Ile Leu Arg Gln Gln Phe Ala Gln Val Asp
705 710 715 720

Gln Gly Ala Lys Leu
725

<210> 35

<211> 729

<212> PRT

<213> 甜橙

<400> 35

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

Ile Glu Ala Leu Gly Ile Pro Ser Lys Leu Ala Glu Gln Leu His Glu
20 25 30

Lys Leu Ala Glu Ile Val Asn Thr His Gly Ala Ala Thr Pro Ala Thr
35 40 45

Trp Gln Asn Ile Thr Thr His Ile Leu Ser Pro Asp Leu Pro Phe Ser
50 55 60

Phe His Gln Leu Leu Tyr Tyr Gly Cys Tyr Lys Asp Phe Gly Pro Asp
65 70 75 80

Pro Pro Ala Trp Ile Pro Asp Pro Glu Ala Ala Lys Val Thr Asn Val
85 90 95

Gly Lys Leu Leu Gln Thr Arg Gly Glu Glu Phe Leu Gly Ser Gly Tyr
100 105 110

Lys Asp Pro Ile Ser Ser Phe Ser Asn Phe Gln Glu Phe Ser Val Ser
115 120 125

Asn Pro Glu Val Tyr Trp Lys Thr Val Leu Asn Glu Met Ser Thr Ser

130 135 140

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

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

<210> 36
<211> 729
<212> PRT

<213> 克莱门柚

<400> 36

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

290 295 300

Val Ile Asp Ala Gln Ala Pro Leu Ala Ile Val Ile Pro Ala Lys Gly
305 310 315 320

Ser Ser Phe Ser Met Lys Leu Arg Asp Gly Asp Ile Ser Trp Leu Asp
325 330 335

Phe Leu Glu Arg Val Arg Lys Leu Lys Glu Asn Glu Phe Ala Ala Val
340 345 350

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

Thr Gly Glu Pro Lys Ala Ile Pro Trp Thr Asn Ala Thr Pro Phe Lys
370 375 380

Ala Ala Ala Asp Ala Trp Cys His Met Asp Ile Arg Lys Ala Asp Ile
385 390 395 400

Val Ala Trp Pro Thr Asn Leu Gly Trp Met Met Gly Pro Trp Leu Val
405 410 415

Tyr Ala Ser Leu Leu Asn Gly Ala Ser Val Ala Leu Tyr Asn Gly Ser
420 425 430

Pro Leu Gly Ser Gly Phe Ala Lys Phe Val Gln Asp Ala Lys Val Thr
435 440 445

Met Leu Gly Val Val Pro Ser Ile Val Arg Thr Trp Lys Ser Thr Asn
450 455 460

Cys Ile Asp Gly Tyr Asp Trp Ser Ser Ile Arg Cys Phe Gly Ser Thr
465 470 475 480

Gly Glu Ala Ser Asn Val Asp Glu Tyr Leu Trp Leu Met Gly Arg Ala
485 490 495

Leu Tyr Lys Pro Val Ile Glu Tyr Cys Gly Gly Thr Glu Ile Gly Gly
500 505 510

Gly Phe Ile Thr Gly Ser Leu Leu Gln Ala Gln Ser Leu Ala Ala Phe
515 520 525

Ser Thr Pro Ala Met Gly Cys Lys Leu Phe Ile Leu Gly Asn Asp Gly
530 535 540

Cys Pro Ile Pro Gln Asn Val Pro Gly Met Gly Glu Leu Ala Leu Ser
545 550 555 560

Pro Leu Ile Phe Gly Ala Ser Ser Thr Leu Leu Asn Ala Asn His Tyr
565 570 575

Asp Val Tyr Phe Ser Gly Met Pro Ser Trp Asn Gly Gln Ile Leu Arg
580 585 590

Arg His Gly Asp Val Phe Glu Arg Thr Ser Gly Gly Tyr Tyr Arg Ala
595 600 605

His Gly Arg Ala Asp Asp Thr Met Asn Leu Gly Gly Ile Lys Val Ser
610 615 620
Ser Val Glu Ile Glu Arg Ile Cys Asn Ala Val Asp Ser Asn Val Leu
625 630 635 640
Glu Thr Ala Ala Ile Gly Val Pro Pro Pro Asp Gly Gly Pro Glu His
645 650 655
Leu Thr Ile Val Val Val Phe Lys Asp Ser Asn Tyr Arg Pro Pro Asp
660 665 670
Leu Asn Gln Leu Arg Met Ser Phe Asn Ser Ala Val Gln Lys Lys Leu
675 680 685
Asn Pro Leu Phe Lys Val Ser His Val Val Pro Leu Pro Ser Leu Pro
690 695 700
Arg Thr Ala Thr Asn Lys Val Met Arg Arg Val Leu Arg Lys Gln Leu
705 710 715 720
Ala Gln Leu Asp Gln Asn Ser Lys Leu
725

<210> 37
<211> 726
<212> PRT
<213> 蔓花生
<400> 37
Met Ala Tyr Lys Ser Leu Thr Ser Ile Thr Val Ser Asp Ile Glu Ser
1 5 10 15
Val Gly Ile Ser Thr Glu Val Ala Ser Ala Phe His Arg Arg Leu Lys
20 25 30
Glu Ile Ile Ala Thr His Gly Ala Gly Thr Pro Ala Thr Trp His Asn
35 40 45
Ile Thr Asn Thr Ile Leu Thr Pro Asp Leu Pro Phe Ser Phe His Gln
50 55 60
Met Leu Tyr Tyr Ala Cys Tyr Ile Asp Phe Gly Pro Asp Pro Pro Ala
65 70 75 80
Trp Ile Pro Asp Pro Glu Cys Ala Leu Ser Thr Asn Val Gly Gln Leu
85 90 95
Leu Glu Arg Arg Gly Lys Glu Phe Leu Gly Ser Ala Tyr Lys Asp Pro
100 105 110
Ile Ser Ser Phe Ser Asp Phe Gln Lys Phe Ser Val Ser Asn Pro Glu
115 120 125
Val Phe Trp Lys Asn Val Leu Asp Glu Met Asn Ile Ser Phe Ser Thr
130 135 140

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

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

<210> 38
<211> 729
<212> PRT
<213> 欧洲栓皮栎

<400> 38

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

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

610 615 620
Ser Val Glu Ile Glu Arg Ile Cys Asn Ala Ala Asp Asn Ser Val Leu
625 630 635 640
Glu Thr Ala Ala Ile Gly Val Pro Pro Ser Gly Gly Gly Pro Glu Gln
645 650 655
Leu Val Ile Ala Val Val Phe Lys Glu Ser Glu Asn Met Thr Ala Asp
660 665 670
Leu Asn Gln Leu Arg Ile Ser Phe Asn Ser Ala Val Gln Lys Lys Leu
675 680 685
Asn Pro Leu Phe Arg Val Ser Gln Val Val Pro Leu Ser Ser Leu Pro
690 695 700
Arg Thr Ala Ser Asn Lys Val Met Arg Arg Val Leu Arg Gln Gln Leu
705 710 715 720
Thr Gln Gly Asp Arg Asn Pro Lys Leu
725

<210> 39
<211> 726
<212> PRT
<213> 可可树
<400> 39
Met Val Tyr Lys Ser Leu Asp Ser Val Thr Val Lys Asp Ile Glu Ala
1 5 10 15
Ser Gly Ile Ser Ser Gln Leu Ala Glu Glu Ile His Arg Lys Val Thr
20 25 30
Glu Ile Val Asp Gly Tyr Gly Ala Ala Thr Pro Glu Ser Trp Asn Arg
35 40 45
Ile Ser Lys His Val Leu Thr Pro Asn Leu Pro Phe Ser Leu His Gln
50 55 60
Met Met Tyr Tyr Gly Cys Tyr Lys Asp Phe Gly Pro Asp Pro Pro Ala
65 70 75 80
Trp Met Pro Asp Pro Glu Ser Ala Leu Leu Thr Tyr Val Gly Leu Leu
85 90 95
Leu Glu Lys His Gly Lys Glu Phe Leu Gly Ser Lys Tyr Lys Asp Pro
100 105 110
Ile Ser Ser Phe Ser His Leu Gln Glu Phe Ser Val Ser Asn Pro Glu
115 120 125
Val Tyr Trp Lys Thr Val Leu Asp Glu Met Cys Val Asn Phe Ser Val
130 135 140
Pro Pro Asp Cys Ile Leu His Glu Ser Thr Ser Glu Glu Ser Arg Ile

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

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

<210> 40
<211> 726
<212> PRT
<213> 麻风树
<400> 40

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

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

Ile Glu Arg Ile Cys Asn Val Val Asp Ser Ser Ile Leu Glu Thr Ala
625 630 635 640
Ala Ile Gly Val Pro Pro Pro Gln Gly Gly Pro Glu Gln Leu Val Ile
645 650 655
Ala Val Val Phe Lys Asn Leu Glu Asn Ser Thr Thr Asp Leu Glu Gln
660 665 670
Leu Arg Lys Ser Phe Asn Ser Ala Val Gln Lys Lys Leu Asn Pro Leu
675 680 685
Phe Arg Val Ser Arg Val Val Pro His Pro Ser Leu Pro Arg Thr Ala
690 695 700
Ser Asn Lys Val Met Arg Arg Ile Leu Arg Gln Gln Phe Val Gln Gln
705 710 715 720
Glu Gln Asn Ser Lys Leu
725

<210> 41
<211> 729
<212> PRT
<213> 毛果杨
<400> 41

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

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

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

<210> 42
<211> 721
<212> PRT
<213> 橡胶树
<400> 42
Met Ser Ser Tyr Lys Ala Leu Asp Ala Ile Ser Val Ser Asp Ile Glu

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

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

625 630 635 640
Pro Pro Gln Gly Gly Pro Glu Arg Leu Val Ile Ala Val Val Phe Asn
645 650 655
Asp Pro Asp Asn Ser Thr Thr Asp Leu Glu Gln Leu Arg Lys Ser Phe
660 665 670
Asn Ser Ala Val Gln Lys Lys Leu Asn Pro Leu Phe Arg Val Ser His
675 680 685
Val Val Ala Leu Pro Ser Leu Pro Arg Thr Ala Thr Asn Lys Val Met
690 695 700
Arg Arg Ile Leu Arg Gln Gln Phe Val Gln Gln Glu Gln Asn Ser Lys
705 710 715 720
Leu

<210> 43
<211> 726
<212> PRT
<213> 酿酒葡萄
<400> 43
Met Ala Gly Lys Thr Leu Asp Ser Ile Thr Ser Gln Asp Ile Ala Ala
1 5 10 15
Leu Gly Ile Pro Ser Glu Glu Ala Glu Lys Leu His Gln Thr Leu Leu
20 25 30
Gln Ile Ile Thr Ser Cys Gly Ala Ala Thr Pro Gln Thr Trp Ser Arg
35 40 45
Ile Ser Lys Glu Leu Leu Asn Pro Asp Leu Pro Tyr Ser Leu His Gln
50 55 60
Met Met Tyr Tyr Gly Cys Tyr Ser His Phe Gly Pro Asp Pro Pro Ala
65 70 75 80
Trp Leu Pro Asp Pro Glu Asn Val Met Leu Thr Asn Val Gly Gln Leu
85 90 95
Leu Glu Arg Arg Gly Lys Glu Phe Leu Gly Ser Arg Tyr Lys Asp Pro
100 105 110
Ile Ser Ser Phe Ser Asp Phe Gln Lys Phe Ser Val Ser Asn Pro Glu
115 120 125
Val Tyr Trp Lys Thr Val Leu Asp Glu Leu Ser Ile Ser Phe Ser Val
130 135 140
Pro Pro Gln Cys Val Leu Tyr Asp Asn Pro Ser Arg Glu Asn Gly Leu
145 150 155 160
Ser Tyr Pro Gly Gly Gln Trp Leu Pro Gly Ala Phe Ile Asn Pro Ala
165 170 175

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

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

<210> 44
<211> 722
<212> PRT
<213> 木薯
<400> 44
Met Asp Asn Lys Val Leu Asp Ala Ile Ser Val Ser Asp Ile Glu Ala
1 5 10 15
Leu Gly Ile Ser Ser Pro Leu Ala His Lys Leu Cys Lys Asp Val Ala

20 25 30

Asp Ile Val Ala Asn Tyr Gly Ala Ala Thr Pro Gln Thr Trp Thr His
35 40 45

Ile Ser Lys His Val Leu His Pro Asp Leu Pro Phe Ser Phe His Gln
50 55 60

Met Met Phe Asn Ala Cys Tyr Lys Asp Phe Gly Thr Asp Pro Pro Ala
65 70 75 80

Trp Ser Pro Asp Leu Lys Ser Ala Ala Leu Thr Asn Val Gly His Leu
85 90 95

Leu Glu Arg Arg Gly Lys Glu Phe Leu Gly Ser Leu Tyr Val Asp Pro
100 105 110

Ile Ser Ser Phe Ser Ala Phe Gln Glu Phe Ser Val Ser Asn Pro Glu
115 120 125

Leu Tyr Trp Lys Thr Val Leu Asp Glu Met Asn Ile Ser Phe Ser Val
130 135 140

Pro Ala Gln Cys Ile Leu Leu Glu Asn Ser Tyr Gly Glu Ser Pro Gly
145 150 155 160

Gly Gln Trp Leu Pro Gly Ala Tyr Val Asn Pro Ala Lys Asn Cys Leu
165 170 175

Ser Leu Asn Cys Lys Arg Thr Leu Asp Asp Thr Val Ile Arg Trp Arg
180 185 190

Asp Glu Gly Ser Asp Glu Leu Pro Leu Ser Ser Met Thr Leu Asp Glu
195 200 205

Leu Arg Thr Glu Val Trp Leu Val Ala Tyr Ala Leu Asn Arg Leu Gly
210 215 220

Leu Asp Arg Gly Ser Ala Ile Ala Ile Asp Met Pro Met Asn Val Lys
225 230 235 240

Ser Val Val Ile Tyr Leu Ala Ile Val Leu Ala Gly Tyr Val Val Val
245 250 255

Ser Ile Ala Asp Ser Phe Ala Pro Leu Glu Ile Ala Thr Arg Leu Lys
260 265 270

Ile Ser Glu Ala Lys Ala Ile Phe Thr Gln Asp Leu Ile Ile Arg Gly
275 280 285

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

Met Ala Val Val Ile Pro Ala Lys Gly Ser Ser Phe Ser Met Lys Leu
305 310 315 320

Arg Asp Gly Asp Ile Ser Trp His Asp Phe Leu Glu Arg Val Glu Asn
325 330 335

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

645 650 655
Lys Asn Pro Asp Asn Thr Thr Arg Asp Leu Glu Gln Leu Arg Lys Thr
660 665 670
Phe Asn Ser Ala Val Gln Lys Lys Leu Asn Pro Leu Phe Arg Val Ser
675 680 685
His Val Val Ala Leu Pro Thr Leu Pro Arg Thr Ala Thr Asn Lys Val
690 695 700
Met Arg Arg Ile Leu Arg Gln Gln Phe Val Gln Gln Glu Gln Thr Ala
705 710 715 720
Lys Leu

<210> 45
<211> 722
<212> PRT
<213> 野生烟草
<400> 45
Met Ala His Gln Asn Tyr Lys Gly Leu Asp Ser Val Thr Val Ala Asp
1 5 10 15
Val Glu Ala Leu Gly Ile Ala Ser Glu Leu Ala Gly Glu Ile His Glu
20 25 30
Lys Leu Thr Arg Ile Val Arg Asn Tyr Ser Ala Thr Thr Pro Gln Thr
35 40 45
Trp His His Ile Ser Lys Glu Ile Leu Thr Pro Lys Leu Pro Phe Ser
50 55 60
Leu His Gln Met Met Tyr Tyr Gly Cys Tyr Lys Asp Phe Gly Pro Asp
65 70 75 80
Pro Pro Ala Trp Leu Pro Asp Ser Lys Asn Val Gly Leu Thr Asn Ile
85 90 95
Gly Gln Leu Leu Glu Arg Arg Gly Lys Glu Phe Leu Gly Ser Asn Tyr
100 105 110
Glu Asp Pro Ile Ser Ser Phe Ser Asp Phe Gln Arg Phe Ser Val Ser
115 120 125
Glu Pro Glu Val Tyr Trp Lys Thr Ile Leu Glu Glu Met Asn Val Ser
130 135 140
Phe Ser Val Pro Pro Glu Cys Ile Leu Arg Glu Ser Pro Ser His Pro
145 150 155 160
Gly Gly Gln Trp Leu Pro Gly Ala Arg Val Asn Pro Ala Lys Asn Cys
165 170 175
Leu Ser Phe Arg Lys Arg Thr Leu Ser Asp Val Ala Ile Val Trp Arg
180 185 190

Ser Glu Gly Asn Asp Glu Ala Pro Val Glu Lys Met Thr Leu Lys Glu
195 200 205
Leu Cys Glu Ser Val Trp Ala Val Ala Tyr Ala Leu Glu Thr Leu Gly
210 215 220
Leu Glu Lys Gly Ser Ala Ile Ala Ile Asp Met Pro Met Asp Val Asn
225 230 235 240
Ser Val Val Ile Tyr Leu Ala Ile Val Leu Ala Gly Tyr Val Val Val
245 250 255
Ser Ile Ala Asp Ser Phe Ala Pro Ser Glu Ile Ser Thr Arg Leu Ile
260 265 270
Leu Ser Lys Ala Lys Ala Ile Phe Thr Gln Asp Phe Ile Phe Arg Gly
275 280 285
Asp Lys Lys Ile Pro Leu Tyr Ser Arg Val Val Asp Ala Arg Ser Pro
290 295 300
Thr Ala Ile Val Ile Pro Asn Arg Ala Ser Ser Leu Ser Ile Gln Leu
305 310 315 320
Arg Asp Gly Asp Ile Ser Trp Pro Glu Phe Leu Glu Arg Val Lys Asp
325 330 335
Ser Arg Gly Leu Glu Phe Val Ala Val Glu Gln Pro Ile Thr Ala Phe
340 345 350
Thr Asn Ile Leu Phe Ser Ser Gly Thr Thr Gly Glu Pro Lys Ala Ile
355 360 365
Pro Trp Ser Leu Leu Ser Pro Phe Lys Ser Ala Ala Asp Gly Trp Cys
370 375 380
His Met Asp Ile Lys Lys Gly Asp Val Val Ala Trp Pro Thr Asn Leu
385 390 395 400
Gly Trp Met Met Gly Pro Trp Leu Val Tyr Ala Ser Leu Leu Asn Gly
405 410 415
Ala Ser Ile Ala Leu Tyr Asn Gly Ser Pro Leu Asp Ser Gly Phe Ala
420 425 430
Lys Phe Val Gln Asp Ala Lys Val Thr Met Leu Gly Val Ile Pro Ser
435 440 445
Ile Val Arg Thr Trp Lys Ala Lys Asn Ser Pro Asp Gly Phe Asp Trp
450 455 460
Ser Thr Ile Arg Cys Phe Gly Ser Thr Gly Glu Ala Ser Ser Val Asp
465 470 475 480
Glu Tyr Leu Trp Leu Met Gly Arg Ala Glu Tyr Lys Pro Ile Ile Glu
485 490 495
Tyr Cys Gly Gly Thr Glu Ile Gly Gly Ser Phe Val Ser Gly Ser Leu

500 505 510
Leu Gln Pro Gln Ser Leu Ala Ala Phe Ser Thr Ala Val Met Gly Cys
515 520 525
Ser Leu His Ile Leu Gly Glu Asp Gly Leu Pro Ile Pro Ser Asp Val
530 535 540
Pro Gly Thr Gly Glu Leu Ala Leu Gly Pro Leu Met Phe Gly Ala Ser
545 550 555 560
Ser Thr Leu Leu Asn Ala Asp His Asn Glu Ile Tyr Phe Lys Gly Met
565 570 575
Pro Val Leu Asn Gly Lys Val Leu Arg Arg His Gly Asp Val Phe Glu
580 585 590
Arg Thr Ser Lys Gly Tyr Tyr His Ala His Gly Arg Ala Asp Asp Thr
595 600 605
Met Asn Leu Gly Gly Ile Lys Val Ser Ser Leu Glu Ile Glu Arg Ile
610 615 620
Cys Asn Ala Ala Asp Glu Asn Ile Leu Glu Thr Ala Ala Val Gly Val
625 630 635 640
Pro Pro Ala Gly Gly Gly Pro Glu Lys Leu Val Ile Ala Val Val Phe
645 650 655
Lys Asp Ser Ala Asn Leu Glu His Asn Met Asp Lys Leu Met Ile Ser
660 665 670
Phe Asn Thr Ala Leu Gln Arg Lys Leu Asn Pro Leu Phe Lys Val Ser
675 680 685
Ser Ile Val Pro Leu Pro Leu Leu Pro Arg Thr Ala Thr Asn Lys Val
690 695 700
Met Arg Arg Val Leu Arg Gln Gln Phe Ser Gln Ala Glu Gln Gly Ser
705 710 715 720
Lys Leu

<210> 46
<211> 722
<212> PRT
<213> 潘那利番茄
<400> 46
Met Ala Asn Gln Asn Tyr Arg Thr Leu Asp Ser Val Thr Val Ala Asp
1 5 10 15
Val Glu Ala Leu Gly Ile Pro Thr Glu Leu Ala Glu Lys Leu His Glu
20 25 30
Glu Leu Thr Arg Ile Val Arg Asn Tyr Gly Ser Val Thr Pro Gln Thr
35 40 45

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

355 360 365

Pro Trp Thr Leu Leu Thr Pro Phe Lys Ala Ala Ala Asp Gly Trp Cys
370 375 380

His Met Asp Ile Lys Asn Gly Asp Val Val Ala Trp Pro Thr Asn Leu
385 390 395 400

Gly Trp Met Met Gly Pro Trp Leu Val Tyr Ala Ala Leu Leu Asn Gly
405 410 415

Ala Ser Ile Ala Leu Tyr Asn Gly Ser Pro Leu Gly Ser Gly Phe Ala
420 425 430

Lys Phe Val Gln Asp Ala Lys Val Thr Met Leu Gly Val Ile Pro Ser
435 440 445

Ile Val Arg Thr Trp Lys Ala Lys Asn Ser Pro Asp Gly Tyr Asp Trp
450 455 460

Ser Thr Ile Arg Cys Phe Gly Ser Thr Gly Glu Ala Ser Ser Val Asp
465 470 475 480

Glu Tyr Leu Trp Leu Met Gly Arg Ala Glu Tyr Lys Pro Ile Met Glu
485 490 495

Tyr Cys Gly Gly Thr Glu Ile Gly Gly Ser Phe Val Ser Gly Ser Met
500 505 510

Leu Gln Pro Gln Ser Leu Ala Ala Phe Ser Thr Ala Val Met Gly Cys
515 520 525

Ser Leu His Ile Leu Gly Asp Asp Gly Phe Pro Ile Pro Ser Asp Val
530 535 540

Pro Gly Ile Gly Glu Leu Ala Leu Gly Pro Leu Met Phe Gly Ala Ser
545 550 555 560

Ser Thr Leu Leu Asn Ala Asp His Asn Glu Ile Tyr Phe Lys Gly Met
565 570 575

Pro Val Leu Asn Gly Lys Val Leu Arg Arg His Gly Asp Val Phe Glu
580 585 590

Arg Thr Ser Lys Gly Tyr Tyr His Ala His Gly Arg Ala Asp Asp Thr
595 600 605

Met Asn Leu Gly Gly Ile Lys Val Ser Ser Leu Glu Ile Glu Arg Ile
610 615 620

Cys Asn Val Val Asp Glu Asn Ile Leu Glu Thr Ala Ala Val Gly Val
625 630 635 640

Pro Pro Ala Ala Gly Gly Pro Glu Lys Leu Val Ile Ala Val Val Phe
645 650 655

Lys Asp Ser Asp Asn Leu Glu Gln Lys Leu Val Asn Leu Leu Ile Ser
660 665 670

Phe Asn Thr Ala Leu Gln Arg Lys Leu Asn Pro Leu Phe Lys Val Ser
675 680 685
Ser Ile Val Pro Leu Pro Ser Leu Pro Arg Thr Ala Thr Asn Lys Val
690 695 700
Met Arg Arg Val Leu Arg Gln Gln Phe Ser Gln Ala Asp Gln Gly Ser
705 710 715 720
Arg Leu

<210> 47
<211> 744
<212> PRT
<213> 中国莲
<400> 47

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

210 215 220

Asp Thr Leu Gly Leu Ala Lys Gly Ser Ala Ile Ala Ile Asp Met Pro
225 230 235 240

Met Asn Val Thr Ala Val Val Ile Tyr Leu Ala Ile Val Leu Ala Gly
245 250 255

Tyr Ile Val Val Ser Ile Ala Asp Ser Phe Ala Pro Leu Glu Ile Ser
260 265 270

Thr Arg Leu Lys Ile Ser Asn Ala Lys Ala Ile Phe Thr Gln Asp Val
275 280 285

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

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

Lys Met Glu Leu Arg Gly Cys Asp Met Ser Trp His Ala Phe Leu Glu
325 330 335

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

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

Pro Lys Ala Ile Pro Trp Thr His Ala Thr Pro Leu Lys Ala Ala Ala
370 375 380

Asp Ala Trp Cys His Met Asp Ile Gln Lys Gly Asp Val Val Ala Trp
385 390 395 400

Pro Thr Asn Leu Gly Trp Met Met Gly Pro Trp Leu Val Tyr Ala Ser
405 410 415

Leu Leu Asn Gly Ala Ser Met Ala Leu Tyr Asn Gly Ser Pro Leu Gly
420 425 430

Ser Gly Phe Ala Lys Phe Val Gln Asp Ala Lys Val Thr Met Leu Gly
435 440 445

Val Val Pro Ser Ile Val Arg Ala Trp Lys Asn Thr Asn Cys Thr Ala
450 455 460

Gly Phe Asp Trp Ser Ser Ile Arg Cys Phe Ser Ser Thr Gly Glu Ala
465 470 475 480

Ser Asn Val Asp Glu Tyr Leu Trp Leu Met Gly Arg Ala His Tyr Lys
485 490 495

Pro Val Ile Glu Tyr Cys Gly Gly Thr Glu Ile Gly Gly Gly Phe Val
500 505 510

Ser Gly Ser Leu Leu Gln Ala Gln Ser Leu Ala Ala Phe Ser Thr Pro
515 520 525

Ala Met Gly Cys Thr Leu Phe Ile Leu Cys Ser Asp Gly Asn Pro Ile
530 535 540
Leu Gln Asn Thr Pro Gly Ile Gly Glu Leu Ala Leu Ala Pro Ile Met
545 550 555 560
Leu Gly Ala Ser Asn Thr Leu Leu Asn Ala Asn His Tyr Asp Val Tyr
565 570 575
Phe Arg Gly Met Pro Met Trp Asn Gly Lys Val Leu Arg Arg His Gly
580 585 590
Asp Glu Phe Glu Cys Thr Ser Lys Gly Tyr Tyr Arg Ala His Gly Arg
595 600 605
Ala Asp Asp Thr Met Asn Leu Gly Gly Ile Lys Val Ser Ser Ile Glu
610 615 620
Ile Glu Arg Ile Cys Asn Gly Val Asp Asp Thr Ile Leu Glu Thr Ala
625 630 635 640
Ala Ile Gly Val Pro Pro Val Gly Gly Gly Pro Glu Lys Leu Ala Ile
645 650 655
Ala Val Val Phe Lys Asp Ser Asn Ser Leu Pro Asp Val Asp Gln Leu
660 665 670
Lys Met Lys Phe Asn Ser Ser Leu Gln Lys Lys Leu Asn Pro Leu Phe
675 680 685
Arg Val Ser Ala Val Val Pro Val Ser Ser Leu Pro Arg Thr Ala Ser
690 695 700
Asn Lys Val Met Arg Arg Val Leu Arg Gln Gln Phe Ser Gln Leu Tyr
705 710 715 720
Gln Ala Ser Thr Ser Arg Ile Ala Ser Gly Phe Leu Leu Gln Ser Pro
725 730 735
Pro Gln Arg Pro Ser Thr Ser Leu
740

<210> 48
<211> 725
<212> PRT
<213> 苦瓜
<400> 48
Met Asp Tyr Lys Thr Leu Asp Ser Ile Thr Val Ile Asp Ile Glu Ala
1 5 10 15
Leu Gly Val Ala Ser Glu Val Ala Glu Lys Leu His Gly Leu Leu Ser
20 25 30
Glu Ile Ile Arg Ser His Gly Asn Gly Thr Pro Glu Thr Trp Arg His
35 40 45

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

355 360 365

Pro Lys Ala Ile Pro Trp Thr Leu Val Thr Pro Leu Lys Ala Ala Ala

370 375 380

Asp Ala Trp Cys Tyr Met Asp Ile His Lys Gly Asp Val Val Ala Trp

385 390 395 400

Pro Thr Asn Leu Gly Trp Met Met Gly Pro Trp Leu Val Tyr Ala Ser

405 410 415

Leu Leu Asn Ser Ala Ser Met Ala Leu Tyr Asn Gly Ser Pro Leu Gly

420 425 430

Ser Gly Phe Val Lys Phe Val Gln Asp Ala Lys Val Thr Met Leu Gly

435 440 445

Val Ile Pro Ser Ile Val Arg Ser Trp Lys Ser Thr Asn Cys Thr Ser

450 455 460

Gly Tyr Asp Trp Ser Ser Ile Arg Cys Phe Ala Ser Thr Gly Glu Ala

465 470 475 480

Ser Asn Val Asp Glu Asn Leu Trp Leu Met Gly Arg Ala Cys Tyr Lys

485 490 495

Pro Val Ile Glu Ile Cys Gly Gly Thr Glu Ile Gly Gly Gly Phe Ile

500 505 510

Thr Gly Ser Leu Leu Gln Pro Gln Ala Leu Ala Ala Phe Ser Thr Pro

515 520 525

Ala Met Gly Cys Ser Leu Phe Ile Leu Gly Asn Asp Gly Phe Pro Ile

530 535 540

Pro Gln Asn Met Pro Gly Ile Gly Glu Leu Ala Leu Gly Pro Phe Leu

545 550 555 560

Phe Gly Ala Ser Ser Thr Leu Leu Asn Ala Asp His Tyr Asp Ile Tyr

565 570 575

Phe Lys Gly Met Pro His Trp Asn Gly Met Val Leu Arg Arg His Gly

580 585 590

Asp Val Phe Glu Arg Ser Pro Arg Gly Tyr Tyr Arg Ala His Gly Arg

595 600 605

Ala Asp Asp Ala Met Asn Leu Gly Gly Ile Lys Val Ser Ser Val Glu

610 615 620

Ile Glu Arg Ile Cys Asn Thr Ile Asp Asp Ser Ile Leu Glu Thr Ala

625 630 635 640

Ala Ile Gly Val Pro Pro Leu Gly Gly Gly Pro Glu Gln Leu Val Ile

645 650 655

Ala Val Val Leu Lys Asn Pro Gly Glu Thr Ser Pro Asp Leu Asp Lys

660 665 670

Leu Lys Leu Cys Phe Asn Ser Ser Leu Gln Lys Asn Leu Asn Pro Leu
675 680 685
Phe Arg Val His Arg Val Val Pro Tyr Pro Ser Leu Pro Arg Thr Ala
690 695 700
Thr Asn Lys Val Met Arg Arg Ile Leu Arg Gln Gln Leu Ala Val Glu
705 710 715 720
Arg Arg Thr Lys Leu
725

<210> 49
<211> 385
<212> PRT
<213> 大麻
<400> 49

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

Gly Asp Gly Ala Ala Ala Val Ile Val Gly Ala Glu Pro Asp Glu Ser
210 215 220
Val Gly Glu Arg Pro Ile Phe Glu Leu Val Ser Thr Gly Gln Thr Ile
225 230 235 240
Leu Pro Asn Ser Glu Gly Thr Ile Gly Gly His Ile Arg Glu Ala Gly
245 250 255
Leu Ile Phe Asp Leu His Lys Asp Val Pro Met Leu Ile Ser Asn Asn
260 265 270
Ile Glu Lys Cys Leu Ile Glu Ala Phe Thr Pro Ile Gly Ile Ser Asp
275 280 285
Trp Asn Ser Ile Phe Trp Ile Thr His Pro Gly Gly Lys Ala Ile Leu
290 295 300
Asp Lys Val Glu Glu Lys Leu His Leu Lys Ser Asp Lys Phe Val Asp
305 310 315 320
Ser Arg His Val Leu Ser Glu His Gly Asn Met Ser Ser Ser Thr Val
325 330 335
Leu Phe Val Met Asp Glu Leu Arg Lys Arg Ser Leu Glu Glu Gly Lys
340 345 350
Ser Thr Thr Gly Asp Gly Phe Glu Trp Gly Val Leu Phe Gly Phe Gly
355 360 365
Pro Gly Leu Thr Val Glu Arg Val Val Val Arg Ser Val Pro Ile Lys
370 375 380
Tyr
385

<210> 50
<211> 399
<212> PRT
<213> 啤酒花
<400> 50

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

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

385 390 395

<210> 51

<211> 393

<212> PRT

<213> 川桑

<400> 51

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

Glu Gly Pro Ala Thr Val Leu Ser Ile Gly Thr Ala Thr Pro Thr Asn
20 25 30

Phe Val Ser Gln Ala Asp Tyr Pro Asp Tyr Tyr Phe Arg Ile Thr Asn
35 40 45

Ser Asp His Met Thr Asp Leu Lys Asp Lys Phe Lys Arg Met Cys Glu
50 55 60

Lys Ser Met Ile Thr Lys Arg His Met Tyr Leu Thr Glu Glu Ile Leu
65 70 75 80

Lys Glu Asn Pro Lys Met Cys Glu Tyr Met Ala Pro Ser Leu Asp Ala
85 90 95

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

Ala Ala Lys Ala Ile Lys Glu Trp Gly Gln Pro Lys Ser Lys Ile Thr
115 120 125

His Leu Ile Phe Cys Thr Thr Ser Gly Val Asp Met Pro Gly Ala Asp
130 135 140

Tyr Gln Leu Thr Lys Leu Leu Gly Leu Arg Pro Ser Val Lys Arg Phe
145 150 155 160

Met Met Tyr Gln Gln Gly Cys Phe Ala Gly Gly Thr Val Leu Arg Leu
165 170 175

Ala Lys Asp Leu Ala Glu Asn Asn Lys Gly Ala Arg Val Leu Val Val
180 185 190

Cys Ser Glu Ile Thr Ala Val Thr Phe Arg Gly Pro Ser His Thr His
195 200 205

Leu Asp Ser Leu Val Gly Gln Ala Leu Phe Gly Asp Gly Ala Ala Ala
210 215 220

Val Ile Val Gly Ala Asp Pro Asp Thr Ser Val Glu Arg Pro Ile Phe
225 230 235 240

Glu Leu Val Ser Ala Ala Gln Thr Ile Leu Pro Asp Ser Glu Gly Ala
245 250 255

Ile Asp Gly His Leu Arg Glu Val Gly Leu Thr Phe His Leu Leu Lys

260 265 270

Asp Val Pro Gly Leu Ile Ser Lys Asn Ile Glu Lys Ser Leu Val Glu

275 280 285

Ala Phe Thr Pro Ile Gly Ile Ser Asp Trp Asn Ser Ile Phe Trp Ile

290 295 300

Ala His Pro Gly Gly Pro Ala Ile Leu Asp Gln Val Glu Thr Lys Leu

305 310 315 320

Gly Leu Lys Gln Glu Lys Leu Ser Ala Thr Arg His Val Leu Ser Glu

325 330 335

Tyr Gly Asn Met Ser Ser Ala Cys Val Leu Phe Ile Leu Asp Glu Met

340 345 350

Arg Lys Lys Ser Val Glu Glu Gly Lys Ala Thr Thr Gly Glu Gly Leu

355 360 365

Glu Trp Gly Val Leu Phe Gly Phe Gly Pro Gly Leu Thr Val Glu Thr

370 375 380

Val Val Leu His Ser Leu Pro Ala Val

385 390

<210> 52

<211> 101

<212> PRT

<213> 大麻

<400> 52

Met Ala Val Lys His Leu Ile Val Leu Lys Phe Lys Asp Glu Ile Thr

1 5 10 15

Glu Ala Gln Lys Glu Glu Phe Phe Lys Thr Tyr Val Asn Leu Val Asn

20 25 30

Ile Ile Pro Ala Met Lys Asp Val Tyr Trp Gly Lys Asp Val Thr Gln

35 40 45

Lys Asn Lys Glu Glu Gly Tyr Thr His Ile Val Glu Val Thr Phe Glu

50 55 60

Ser Val Glu Thr Ile Gln Asp Tyr Ile Ile His Pro Ala His Val Gly

65 70 75 80

Phe Gly Asp Val Tyr Arg Ser Phe Trp Glu Lys Leu Leu Ile Phe Asp

85 90 95

Tyr Thr Pro Arg Lys

100

<210> 53

<211> 104

<212> PRT

<213> 大麻
<400> 53
Met Ala Val Lys His Leu Ile Val Leu Lys Phe Lys Asp Glu Ile Thr
1 5 10 15
Glu Ala Gln Lys Glu Glu Phe Phe Lys Thr Tyr Val Asn Leu Val Asn
20 25 30
Ile Ile Pro Ala Met Lys Asp Val Tyr Trp Gly Lys Asp Val Thr Gln
35 40 45
Lys Lys Glu Glu Gly Tyr Thr His Ile Val Glu Val Thr Phe Glu Ser
50 55 60
Val Glu Thr Ile Gln Asp Tyr Ile Ile His Pro Ala His Val Gly Phe
65 70 75 80
Gly Asp Val Tyr Arg Ser Phe Trp Glu Lys Leu Leu Ile Phe Asp Tyr
85 90 95
Thr Pro Arg Lys Leu Lys Pro Lys
100
<210> 54
<211> 112
<212> PRT
<213> 球孢白僵菌
<400> 54
Met Ala Pro Val Thr His Ile Val Leu Phe Glu Phe Lys Pro Asp Val
1 5 10 15
Thr Lys Ala Gln Arg Asp Glu Phe Ser Ala Glu Met Leu Gly Leu Lys
20 25 30
Asp Lys Cys Ile His Ala Lys Thr Gln Lys Pro Tyr Ile Leu Arg Ser
35 40 45
Ser Gly Gly Thr Asp Asn Ser Ile Glu Gly Leu Gln His Gly Ile Thr
50 55 60
His Ala Phe Val Val Glu Phe Ala Ser Val Glu Asp Arg Gln Tyr Tyr
65 70 75 80
Val Lys Glu Asp Pro Ala His Ile Ala Phe Val Asn Lys Leu Phe Pro
85 90 95
Phe Leu Ala Lys Pro Tyr Ile Ile Asp Phe Thr Pro Gly Glu Phe Asn
100 105 110
<210> 55
<211> 112
<212> PRT
<213> 布氏虫草RCEF 3172

<400> 55

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

<210> 56

<211> 112

<212> PRT

<213> 粗糙虫草RCEF 1005

<400> 56

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

<210> 57

<211> 112

<212> PRT

<213> 玫烟色虫草ARSEF 2679

<400> 57

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

<210> 58
<211> 112
<212> PRT
<213> 蛹虫草CM01
<400> 58

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

<210> 59
<211> 116
<212> PRT
<213> 锥壳半翼菌
<400> 59

Met Ala Pro Val Ile His Ile Val Met Phe Gln Phe Lys Glu Asp Val

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

<210> 60
<211> 395
<212> PRT
<213> 大麻
<400> 60

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

145 150 155 160
Gln Ile Tyr Asp Leu His Ile Asp Arg Ile Asn Lys Pro Asp Leu Pro
165 170 175
Leu Ala Ser Gly Glu Ile Ser Val Asn Thr Ala Trp Ile Met Ser Ile
180 185 190
Ile Val Ala Leu Phe Gly Leu Ile Ile Thr Ile Lys Met Lys Gly Gly
195 200 205
Pro Leu Tyr Ile Phe Gly Tyr Cys Phe Gly Ile Phe Gly Gly Ile Val
210 215 220
Tyr Ser Val Pro Pro Phe Arg Trp Lys Gln Asn Pro Ser Thr Ala Phe
225 230 235 240
Leu Leu Asn Phe Leu Ala His Ile Ile Thr Asn Phe Thr Phe Tyr Tyr
245 250 255
Ala Ser Arg Ala Ala Leu Gly Leu Pro Phe Glu Leu Arg Pro Ser Phe
260 265 270
Thr Phe Leu Leu Ala Phe Met Lys Ser Met Gly Ser Ala Leu Ala Leu
275 280 285
Ile Lys Asp Ala Ser Asp Val Glu Gly Asp Thr Lys Phe Gly Ile Ser
290 295 300
Thr Leu Ala Ser Lys Tyr Gly Ser Arg Asn Leu Thr Leu Phe Cys Ser
305 310 315 320
Gly Ile Val Leu Leu Ser Tyr Val Ala Ala Ile Leu Ala Gly Ile Ile
325 330 335
Trp Pro Gln Ala Phe Asn Ser Asn Val Met Leu Leu Ser His Ala Ile
340 345 350
Leu Ala Phe Trp Leu Ile Leu Gln Thr Arg Asp Phe Ala Leu Thr Asn
355 360 365
Tyr Asp Pro Glu Ala Gly Arg Arg Phe Tyr Glu Phe Met Trp Lys Leu
370 375 380
Tyr Tyr Ala Glu Tyr Leu Val Tyr Val Phe Ile
385 390 395

<210> 61
<211> 409
<212> PRT
<213> 啤酒花
<400> 61

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

20 25 30

Cys Lys Ser Lys Ser Arg Val Ile Asn Ser Thr Asn Ser Lys His Cys
35 40 45

Ser Pro Asn Asn Asn Thr Ser Asn Lys Thr Thr His Leu Leu Gly Leu
50 55 60

Tyr Gly Gln Ser Arg Cys Leu Leu Lys Pro Leu Ser Phe Ile Ser Cys
65 70 75 80

Asn Asp Gln Arg Gly Asn Ser Ile Arg Ala Ser Ala Gln Ile Glu Asp
85 90 95

Arg Pro Pro Glu Ser Gly Asn Leu Ser Ala Leu Thr Asn Val Lys Asp
100 105 110

Phe Val Ser Val Cys Trp Glu Tyr Val Arg Pro Tyr Thr Ala Lys Gly
115 120 125

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

Pro Asn Leu Phe Ser Trp Pro Leu Ile Phe Arg Ala Leu Leu Gly Met
145 150 155 160

Leu Ala Ile Leu Gly Ser Cys Phe Tyr Thr Ala Gly Ile Asn Gln Ile
165 170 175

Phe Asp Met Asp Ile Asp Arg Ile Asn Lys Pro Asp Leu Pro Leu Val
180 185 190

Ser Gly Arg Ile Ser Val Glu Ser Ala Trp Leu Leu Thr Leu Ser Pro
195 200 205

Ala Ile Ile Gly Phe Ile Leu Ile Leu Lys Leu Asn Ser Gly Pro Leu
210 215 220

Leu Thr Ser Leu Tyr Cys Leu Ala Ile Leu Ser Gly Thr Ile Tyr Ser
225 230 235 240

Val Pro Pro Phe Arg Trp Lys Lys Asn Pro Ile Thr Ala Phe Leu Cys
245 250 255

Ile Leu Met Ile His Ala Gly Leu Asn Phe Ser Val Tyr Tyr Ala Ser
260 265 270

Arg Ala Ala Leu Gly Leu Ala Phe Ala Trp Ser Pro Ser Phe Ser Phe
275 280 285

Ile Thr Ala Phe Ile Thr Phe Met Thr Leu Thr Leu Ala Ser Ser Lys
290 295 300

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

Ala Thr Lys Leu Gly Ala Lys Asn Ile Thr Leu Leu Gly Thr Gly Leu
325 330 335

Leu Leu Leu Asn Tyr Val Ala Ala Ile Ser Thr Ala Ile Ile Trp Pro
340 345 350
Lys Ala Phe Lys Ser Asn Ile Met Leu Leu Ser His Ala Ile Leu Ala
355 360 365
Phe Ser Leu Ile Phe Gln Ala Arg Glu Leu Asp Arg Thr Asn Tyr Thr
370 375 380
Pro Glu Ala Cys Lys Ser Phe Tyr Glu Phe Ile Trp Ile Leu Phe Ser
385 390 395 400
Ala Glu Tyr Val Val Tyr Leu Phe Ile
405

<210> 62
<211> 352
<212> PRT
<213> 啤酒酵母
<400> 62

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

Ile Val Thr Phe Glu Thr Ala Tyr Tyr Ser Phe Tyr Leu Pro Val Ala
195 200 205
Leu Ala Met Tyr Val Ala Gly Ile Thr Asp Glu Lys Asp Leu Lys Gln
210 215 220
Ala Arg Asp Val Leu Ile Pro Leu Gly Glu Tyr Phe Gln Ile Gln Asp
225 230 235 240
Asp Tyr Leu Asp Cys Phe Gly Thr Pro Glu Gln Ile Gly Lys Ile Gly
245 250 255
Thr Asp Ile Gln Asp Asn Lys Cys Ser Trp Val Ile Asn Lys Ala Leu
260 265 270
Glu Leu Ala Ser Ala Glu Gln Arg Lys Thr Leu Asp Glu Asn Tyr Gly
275 280 285
Lys Lys Asp Ser Val Ala Glu Ala Lys Cys Lys Lys Ile Phe Asn Asp
290 295 300
Leu Lys Ile Glu Gln Leu Tyr His Glu Tyr Glu Glu Ser Ile Ala Lys
305 310 315 320
Asp Leu Lys Ala Lys Ile Ser Gln Val Asp Glu Ser Arg Gly Phe Lys
325 330 335
Ala Asp Val Leu Thr Ala Phe Leu Asn Lys Val Tyr Lys Arg Ser Lys
340 345 350

<210> 63
<211> 424
<212> PRT
<213> 土曲霉
<400> 63

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

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

420

<210> 64

<211> 391

<212> PRT

<213> 稻瘟霉素链霉菌

<400> 64

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

260 265 270
His Val Pro Gly Ser Phe Ala Arg Ala Leu Arg Gly Ile Asn Gly Ala
275 280 285
Asp Asp Thr Pro Glu Trp Lys Arg Lys Pro Pro Val Thr Ala Phe Ser
290 295 300
Phe Gly Pro Gly Arg Ala Val Pro Gly Ala Thr Leu Tyr Val Pro Met
305 310 315 320
Ile Pro Val His Gly Ser Asp Ala Ala Ala Arg Asp Arg Val Ala Ala
325 330 335
Phe Leu Arg Ser Glu Gly Met Asp Ala Val Gly Tyr Glu Ala Val Leu
340 345 350
Asp Ala Ile Ser Asp Arg Ser Leu Pro Glu Ser His Thr Gln Asn Phe
355 360 365
Ile Ser Tyr Arg Gly Gly Asp Ser Pro Arg Phe Ser Val Tyr Leu Ala
370 375 380
Pro Gly Val Tyr Arg Glu Ala
385 390

<210> 65
<211> 374
<212> PRT
<213> 海洋放线菌
<400> 65

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

130 135 140
Asp Leu Phe Arg Pro Gln Thr Pro His Asp Arg Cys Trp Ile Met His
145 150 155 160
Gly Met Ala Ser Arg Pro Gly Ala Asp Pro Leu Phe Lys Val Tyr Leu
165 170 175
Asp Pro Asp Ala Arg Gly Ala Ala Glu Ala Pro Ser Val Leu Asp Glu
180 185 190
Ala Met Asp Arg Leu Gly Val Arg Ala Ala Trp Gln Gly Leu Arg Gly
195 200 205
Trp Leu Asp Glu His Gly Gly Ser Gly Arg Ile Gly Ser Leu Ala Leu
210 215 220
Asp Leu Ala Asp Thr Asp Asp Ala Arg Val Lys Val Tyr Val Gln His
225 230 235 240
Ala Gly Leu Asp Trp Ala Asp Ile Asp Arg Gln Ala Ala Val Ala Arg
245 250 255
Gly His Val Pro Gly Ala Phe Ser Ala Ala Leu Glu Glu Ile Thr Gly
260 265 270
Thr Glu Val Pro Pro His Lys Pro Pro Val Thr Cys Phe Ala Phe His
275 280 285
Arg Gly Val Gly Val Pro Thr Ala Ala Thr Leu Tyr Ile Pro Met Pro
290 295 300
Ala Gly Val Pro Glu Ser Asp Ala Arg Arg Arg Ser Ala Ala Phe Met
305 310 315 320
Arg Arg Ser Gly Leu Asp Ser Ala Ala Tyr Leu Ala Phe Leu Ala Ala
325 330 335
Ala Thr Gly Asp Gly Glu Gly Val Arg Ala Leu Gln Asn Phe Val Ala
340 345 350
Tyr Arg Pro Ala Ala Pro Gly Gly Arg Pro Arg Phe Ala Cys Tyr Val
355 360 365
Ala Pro Gly Leu Tyr Arg
370

<210> 66
<211> 439
<212> PRT
<213> 无花果拟盘多毛孢W106-1
<400> 66
Met Ala Ile Ser Thr Pro Ser Asn Gly Val Ser His Val Ala Lys Pro
1 5 10 15
Leu Pro Asn Leu Lys Glu Val Asn Lys Gly Ile Glu Thr Asp Ser Glu

20 25 30

Asp Arg Ala Phe Trp Trp Gly Ala Leu Ser Glu Pro Leu Ala Ser Leu
35 40 45

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

Trp Phe Tyr Gln Trp Ile Leu Pro Ala Leu Gly Pro Arg Pro Leu Asp
65 70 75 80

Gly Lys Pro Tyr Tyr Gly Ser Trp Ile Thr His Asp Leu Ser Pro Phe
85 90 95

Glu Tyr Ser Leu Asn Trp Lys Glu Lys Ser Ser Lys Gln Thr Ile Arg
100 105 110

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

Ile Asn Gln Leu Gly Ala Lys Glu Phe Leu Glu Ala Val Ser Lys Asp
130 135 140

Val Pro Gly Met Asp Leu Thr Arg Phe Asn Gln Phe Leu Glu Ala Thr
145 150 155 160

Asn Val Pro Asn Asp Cys Val Asp Asp Ala Ile Ala Lys His Pro Ala
165 170 175

His Phe Pro Arg Ser Arg Val Trp Ile Ala Phe Asp Leu Glu His Ser
180 185 190

Gly Asn Leu Met Ala Lys Ser Tyr Phe Leu Pro His Trp Arg Ala Ile
195 200 205

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

Cys Asn Lys Ala Asp Gly Ser Ser Tyr Asp Gly Ser Leu Asn Ala Ile
225 230 235 240

Glu Ser Tyr Leu Ala Thr Phe Thr Arg Pro Glu Glu Ala Pro Gln Met
245 250 255

Gly Leu Leu Ser Asn Asp Cys Val Ala Glu Thr Pro Gly Ser Arg Leu
260 265 270

Lys Val Tyr Phe Arg Ser Ser Ala Asp Thr Leu Ala Lys Ala Lys Asp
275 280 285

Met Tyr Asn Leu Gly Gly Arg Leu Lys Gly Pro Lys Met Asp Ala Ser
290 295 300

Leu Lys Gly Ile Ser Asp Phe Trp Tyr His Leu Phe Gly Leu Asp Ser
305 310 315 320

Ser Asp Pro Ala Ser Asp Asp Lys Val Cys Ile Gly Asn His Lys Cys
325 330 335

Ile Phe Val Tyr Glu Met Arg Ser Ser Gln Gly Ser Glu Pro Asp Ile
340 345 350
Asp Val Lys Phe His Ile Pro Met Trp Gln Leu Gly Lys Thr Asp Gly
355 360 365
Gln Ile Ser Glu Leu Leu Ala Ser Trp Phe Glu Ser His Gly His Pro
370 375 380
Asp Leu Ala Ser Arg Tyr Lys Ser Asp Leu Gly Thr Ala Phe Pro Lys
385 390 395 400
His Asn Ile Thr Gly Lys Ser Val Gly Thr His Thr Tyr Ile Ser Ile
405 410 415
Thr His Thr Pro Lys Thr Gly Leu Tyr Met Thr Met Tyr Leu Ser Pro
420 425 430
Lys Leu Pro Glu Phe Tyr Tyr
435

<210> 67
<211> 316
<212> PRT
<213> 链霉菌属CNZ306
<400> 67

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

Asp Arg Tyr Gly Leu Asp Asn Val Ala Leu Ile Gly Val Asp Tyr Arg
165 170 175
Asn Lys Thr Ile Asn Leu Tyr Phe Gln Ala Pro Ala Glu Thr Ala Gly
180 185 190
Asn Leu Asp Pro Lys Thr Val Ser Ala Met Leu Arg Glu Thr Gly Met
195 200 205
Ser Thr Pro Ser Glu Glu Met Val Ala Tyr Ala Asp Arg Ala Tyr Arg
210 215 220
Ile Tyr Ala Thr Leu Gly Trp Asp Ser Pro Glu Val Met Arg Leu Ala
225 230 235 240
Phe Ala Pro Gln Pro Arg Arg Ser Ile Asp Leu Ala Glu Leu Pro Ala
245 250 255
Arg Leu Glu Pro Arg Ile Glu Gln Phe Met Arg Ala Thr Pro His Lys
260 265 270
Tyr Pro Gly Ala Leu Ile Asn Ala Thr Ala Ala Lys Trp Ser Lys Lys
275 280 285
His Glu Val Leu Asp Leu Ala Ala Tyr Tyr Gln Val Ser Ala Leu His
290 295 300
Leu Lys Ala Ile Gln Ala Glu Glu Gly Gln Ser Ser
305 310 315

<210> 68
<211> 300
<212> PRT
<213> 肉桂链霉菌

<400> 68
Met Met Ser Gly Thr Ala Asp Leu Ala Gly Val Tyr Ala Ala Val Glu
1 5 10 15
Glu Ser Ala Gly Leu Leu Asp Val Ser Cys Ala Arg Glu Lys Val Trp
20 25 30
Pro Ile Leu Ala Ala Phe Glu Asp Val Leu Pro Thr Ala Val Ile Ala
35 40 45
Phe Arg Val Ala Thr Asn Ala Arg His Glu Gly Glu Phe Asp Cys Arg
50 55 60
Phe Thr Val Pro Gly Ser Ile Asp Pro Tyr Ala Val Ala Leu Asp Lys
65 70 75 80
Gly Leu Thr His Arg Ser Gly His Pro Ile Glu Thr Leu Val Ala Asp
85 90 95
Val Gln Lys His Cys Ala Val Asp Ser Tyr Gly Val Asp Phe Gly Val
100 105 110

Val Gly Gly Phe Lys Lys Ile Trp Val Tyr Phe Pro Gly Gly Arg His
115 120 125
Glu Ser Leu Ala His Leu Gly Glu Ile Pro Ser Met Pro Pro Gly Leu
130 135 140
Ala Ala Thr Glu Gly Phe Phe Ala Arg Tyr Gly Leu Ala Asp Lys Val
145 150 155 160
Asp Leu Ile Gly Val Asp Tyr Ala Ser Lys Thr Met Asn Val Tyr Phe
165 170 175
Ala Ala Ser Pro Glu Val Val Ser Ala Pro Thr Val Leu Ala Met His
180 185 190
Arg Glu Ile Gly Leu Pro Asp Pro Ser Glu Gln Met Leu Asp Phe Cys
195 200 205
Ser Arg Ala Phe Gly Val Tyr Thr Thr Leu Asn Trp Asp Ser Ser Lys
210 215 220
Val Glu Arg Ile Ala Tyr Ser Val Lys Thr Glu Asp Pro Leu Glu Leu
225 230 235 240
Ser Ala Arg Leu Gly Ser Lys Val Glu Gln Phe Leu Lys Ser Val Pro
245 250 255
Tyr Gly Ile Asp Thr Pro Lys Met Val Tyr Ala Ala Val Thr Ala Gly
260 265 270
Gly Glu Glu Tyr Tyr Lys Leu Gln Ser Tyr Tyr Gln Trp Arg Thr Asp
275 280 285
Ser Arg Leu Asn Leu Ser Tyr Ile Gly Gly Arg Ser
290 295 300

<210> 69
<211> 307
<212> PRT
<213> 链霉菌属KO-3988
<400> 69

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

Leu Ser Arg Ser Leu Ile Ala Lys Thr Asp His Pro Val Gly Ser Leu
85 90 95
Leu Ser Asp Ile Gln Gln Leu Cys Ser Val Asp Thr Tyr Gly Val Asp
100 105 110
Leu Gly Val Lys Ser Gly Phe Lys Lys Val Trp Val Tyr Phe Pro Ala
115 120 125
Gly Glu His Glu Thr Leu Ala Arg Leu Thr Gly Leu Thr Ser Met Pro
130 135 140
Gly Ser Leu Ala Gly Asn Val Asp Phe Phe Thr Arg Tyr Gly Leu Ala
145 150 155 160
Asp Lys Val Asp Val Ile Gly Ile Asp Tyr Arg Ser Arg Thr Met Asn
165 170 175
Val Tyr Phe Ala Ala Pro Ser Glu Cys Phe Glu Arg Glu Thr Val Leu
180 185 190
Ala Met His Arg Asp Ile Gly Leu Pro Ser Pro Ser Glu Gln Met Phe
195 200 205
Lys Phe Cys Glu Asn Ser Phe Gly Leu Tyr Thr Thr Leu Asn Trp Asp
210 215 220
Thr Met Glu Ile Glu Arg Ile Ser Tyr Gly Val Lys Thr Glu Asn Pro
225 230 235 240
Met Thr Phe Phe Ala Arg Leu Gly Thr Lys Val Glu His Phe Val Lys
245 250 255
Asn Val Pro Tyr Gly Val Asp Thr Gln Lys Met Val Tyr Ala Ala Val
260 265 270
Thr Ser Ser Gly Glu Glu Tyr Tyr Lys Leu Gln Ser Tyr Tyr Arg Trp
275 280 285
Arg Ser Val Ser Arg Leu Asn Ala Ala Tyr Ile Ala Ala Arg Asp Lys
290 295 300
Glu Ser Thr
305

<210> 70
<211> 435
<212> PRT
<213> 杂色曲霉
<400> 70

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

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

340 345 350

Phe Tyr Leu Pro Val His Gly Glu Asn Asp Leu Arg Val Ala Arg Ser
355 360 365

Leu Ala Gln Phe Trp Asp Ser Leu Gly Trp Ser Glu His Ala Cys Ala
370 375 380

Tyr Pro Asp Met Leu Gln Gln Leu Tyr Pro Asp Leu Asp Val Ser Arg
385 390 395 400

Thr Ser Arg Leu Gln Ser Trp Ile Ser Tyr Ser Tyr Thr Ala Lys Lys
405 410 415

Gly Val Tyr Met Ser Val Tyr Phe His Ser Gln Ser Thr Tyr Leu Trp
420 425 430

Glu Glu Asp
435

<210> 71

<211> 472

<212> PRT

<213> 烟曲霉Af293

<400> 71

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

Leu Asn Gly Thr Ala Ala Gly Tyr Pro Ala Lys Thr Gln Lys Glu Leu
20 25 30

Ser Asn Gly Asp Phe Asp Ala His Asp Gly Leu Ser Leu Ala Gln Leu
35 40 45

Thr Pro Tyr Asp Val Leu Thr Ala Ala Leu Pro Leu Pro Ala Pro Ala
50 55 60

Ser Ser Thr Gly Phe Trp Trp Arg Glu Thr Gly Pro Val Met Ser Lys
65 70 75 80

Leu Leu Ala Lys Ala Asn Tyr Pro Leu Tyr Thr His Tyr Lys Tyr Leu
85 90 95

Met Leu Tyr His Thr His Ile Leu Pro Leu Leu Gly Pro Arg Pro Pro
100 105 110

Leu Glu Asn Ser Thr His Pro Ser Pro Ser Asn Ala Pro Trp Arg Ser
115 120 125

Phe Leu Thr Asp Asp Phe Thr Pro Leu Glu Pro Ser Trp Asn Val Asn
130 135 140

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

Gly Phe Glu Ala Gly Ala Ala Ala Asp Pro Phe Asn Gln Ala Ala Val

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

<210> 72
<211> 440
<212> PRT
<213> 烟曲霉
<400> 72

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

Leu Cys Cys Asp Leu Val Asp Pro Ala His Thr Arg Phe Lys Val Tyr
275 280 285
Ile Ala Asp Pro Leu Val Thr Leu Ala Arg Ala Glu Glu His Trp Thr
290 295 300
Leu Gly Gly Arg Leu Thr Asp Glu Asp Ala Ala Val Gly Leu Glu Ile
305 310 315 320
Ile Arg Gly Leu Trp Ser Glu Leu Gly Ile Ile Gln Gly Pro Leu Glu
325 330 335
Pro Ser Ala Met Met Glu Lys Gly Leu Leu Pro Ile Met Leu Asn Tyr
340 345 350
Glu Met Lys Ala Gly Gln Arg Leu Pro Lys Pro Lys Leu Tyr Met Pro
355 360 365
Leu Thr Gly Ile Pro Glu Thr Lys Ile Ala Arg Ile Met Thr Ala Phe
370 375 380
Phe Gln Arg His Asp Met Pro Glu Gln Ala Glu Val Phe Met Glu Asn
385 390 395 400
Leu Gln Ala Tyr Tyr Glu Gly Lys Asn Leu Glu Glu Ala Thr Arg Tyr
405 410 415
Gln Ala Trp Leu Ser Phe Ala Tyr Thr Lys Glu Lys Gly Pro Tyr Leu
420 425 430
Ser Ile Tyr Tyr Phe Trp Pro Glu
435 440

<210> 73
<211> 446
<212> PRT
<213> 米曲霉RIB40
<400> 73

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

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

405 410 415

Ile Ala Cys Ser Phe Asp Lys Asp Gly Ser Leu Ser Leu Thr Ser Tyr
420 425 430

Leu Asn Pro Gly Val Tyr Phe Ser Ser Glu Thr Val Asp Val
435 440 445

<210> 74

<211> 424

<212> PRT

<213> 土曲霉NIH2624

<400> 74

Met Leu Pro Pro Ser Asp Ser Lys Asp Pro Arg Pro Trp Gln Ile Leu
1 5 10 15

Ser Gln Ala Leu Gly Phe Pro Asn Tyr Asp Gln Glu Leu Trp Trp Gln
20 25 30

Asn Thr Ala Glu Thr Leu Asn Arg Val Leu Glu Gln Cys Asp Tyr Ser
35 40 45

Val His Leu Gln Tyr Lys Tyr Leu Ala Phe Tyr His Lys Tyr Ile Leu
50 55 60

Pro Ser Leu Gly Pro Phe Arg Arg Pro Gly Val Glu Pro Glu Tyr Ile
65 70 75 80

Ser Gly Leu Ser His Gly Gly His Pro Leu Glu Ile Ser Val Lys Ile
85 90 95

Asp Lys Ser Lys Thr Ile Cys Arg Leu Gly Leu Gln Ala Ile Gly Pro
100 105 110

Leu Ala Gly Thr Ala Arg Asp Pro Leu Asn Ser Phe Gly Asp Arg Glu
115 120 125

Leu Leu Lys Asn Leu Ala Thr Leu Leu Pro His Val Asp Leu Arg Leu
130 135 140

Phe Asp His Phe Asn Ala Gln Val Gly Leu Asp Arg Ala Gln Cys Ala
145 150 155 160

Val Ala Thr Thr Lys Leu Ile Lys Glu Ser His Asn Ile Val Cys Thr
165 170 175

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

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

Phe Ala Ala Ile Glu Gln Met Glu Val Tyr His Lys Asp Ala Pro Leu
210 215 220

Arg Thr Ala Leu Ser Ser Leu Lys Asp Phe Leu Arg Pro Arg Val Pro

225 230 235 240
Thr Asp Ala Ser Ile Thr Pro Pro Leu Thr Gly Leu Ile Gly Val Asp
245 250 255
Cys Ile Asp Pro Met Leu Ser Arg Leu Lys Val Tyr Leu Ala Thr Phe
260 265 270
Arg Met Asp Leu Ser Leu Ile Arg Asp Tyr Trp Thr Leu Gly Gly Leu
275 280 285
Leu Lys Asp Glu Gly Thr Met Lys Gly Leu Glu Met Val Glu Thr Leu
290 295 300
Ala Lys Thr Leu Lys Leu Gly Asp Glu Ala Cys Glu Thr Leu Asp Ala
305 310 315 320
Glu Arg Leu Pro Phe Gly Ile Asn Tyr Ala Met Lys Pro Gly Thr Ala
325 330 335
Glu Leu Ala Pro Pro Gln Ile Tyr Phe Pro Leu Leu Gly Ile Asn Asp
340 345 350
Gly Phe Ile Ala Asp Ala Leu Val Glu Phe Phe Gln Tyr Met Gly Trp
355 360 365
Glu Asp Gln Ala Ser Arg Tyr Lys Asp Glu Leu Lys Ala Lys Phe Pro
370 375 380
Asn Val Asp Ile Ser Gln Thr Lys Asn Val His Arg Trp Leu Gly Val
385 390 395 400
Ala Tyr Ser Glu Thr Lys Gly Pro Ser Met Asn Ile Tyr Tyr Asp Val
405 410 415
Val Ala Gly Asn Val Ala Arg Val
420

<210> 75
<211> 459
<212> PRT
<213> 烟曲霉
<400> 75
Met Lys Ala Ala Asn Ala Ser Ser Ala Glu Ala Tyr Arg Val Leu Ser
1 5 10 15
Arg Ala Phe Arg Phe Asp Asn Glu Asp Gln Lys Leu Trp Trp His Ser
20 25 30
Thr Ala Pro Met Phe Ala Lys Met Leu Glu Thr Ala Asn Tyr Thr Thr
35 40 45
Pro Cys Gln Tyr Gln Tyr Leu Ile Thr Tyr Lys Glu Cys Val Ile Pro
50 55 60
Ser Leu Gly Cys Tyr Pro Thr Asn Ser Ala Pro Arg Trp Leu Ser Ile

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

Pro His Ala Asp His Asp Lys Leu Asn Tyr Leu His Ala Tyr Ile Ser
385 390 395 400
Phe Ser Tyr Arg Asp Arg Thr Pro Tyr Leu Ser Val Tyr Leu Gln Ser
405 410 415
Phe Glu Thr Gly Asp Trp Ala Val Ala Asn Leu Ser Glu Ser Lys Val
420 425 430
Lys Cys Gln Asp Ala Ala Cys Gln Pro Thr Ala Leu Pro Pro Asp Leu
435 440 445
Ser Lys Thr Gly Val Tyr Tyr Ser Gly Leu His
450 455

<210> 76
<211> 463
<212> PRT
<213> 烟曲霉
<400> 76

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

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

<210> 77
<211> 437
<212> PRT
<213> 费氏曲霉NRRL_181
<400> 77

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

305 310 315 320
Ile Leu Gln Tyr Asp Asp Ala Val Cys Ser His Ser Asn Met Asp Gln
325 330 335
Leu Pro Leu Val Val Asn Tyr Glu Leu Ser Ser Gly Ser Ala Thr Pro
340 345 350
Lys Pro Gln Leu Tyr Leu Pro Leu His Gly Arg Asn Asp Glu Ala Met
355 360 365
Ala Asn Ala Leu Thr Lys Phe Trp Asp Tyr Leu Gly Trp Lys Gly Leu
370 375 380
Ala Ala Gln Tyr Lys Lys Asp Leu Tyr Ala Asn Asn Pro Cys Arg Asn
385 390 395 400
Leu Ala Glu Thr Thr Thr Val Gln Arg Trp Val Ala Phe Ser Tyr Thr
405 410 415
Glu Ser Gly Gly Ala Tyr Leu Thr Val Tyr Phe His Ala Val Gly Gly
420 425 430
Met Lys Gly Asn Leu
435

<210> 78
<211> 470
<212> PRT
<213> 橡胶木菌TC161
<400> 78
Met Ala Pro Ser Met Thr Ala Asn Tyr Pro Tyr Ser Gln Ile Ser Glu
1 5 10 15
Phe Ser Lys Thr Ile Ala Thr Ser Ser Asp Leu Asp Pro Asn Phe Gly
20 25 30
Gly Gly Val Ser Phe Lys Pro Ser Ser Cys Gly Gly Ile Thr Thr Ala
35 40 45
Arg Lys Pro Trp Gln Ile Leu Gln Asp Ala Leu Gly Phe Arg Asn Glu
50 55 60
Asp Glu His Phe Trp Trp Glu Thr Thr Ala Ser Val Leu Gly Cys Leu
65 70 75 80
Leu Glu Lys Ala Gly Tyr Asp Val His Leu Gln Tyr Gln Tyr Leu Ser
85 90 95
Leu Tyr Tyr Arg Tyr Val Leu Pro Ser Tyr Gly Pro Arg Pro Leu Gln
100 105 110
Pro Gly Val Pro His Trp Lys Ser Phe Met Cys Asp Asp Phe Ser Pro
115 120 125
Phe Glu Pro Ser Trp Asn Trp Asp Gly Ser Lys Ser Ile Ile Arg Phe

130 135 140

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

Ala Ala Val Thr Met Tyr Tyr Asn Pro Arg Ile Tyr Glu Cys Pro Pro
450 455 460
Val Val Asp Glu Val Phe
465 470

<210> 79
<211> 422
<212> PRT
<213> 波兰青霉
<400> 79

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

Asp Gln Leu Leu Trp Ser Glu Glu Asn Tyr Leu Ser Phe Asp Cys Val
245 250 255
Asp Pro Gly Lys Ser Arg Ile Lys Leu Tyr Val Ala Glu Lys Val Thr
260 265 270
Cys Phe Asn Arg Ile Gln Ser His Trp Thr Leu Gly Gly Gln Leu Arg
275 280 285
Ser Gln Ala Asn Gln Glu Gly Leu Leu Leu Leu Lys Lys Leu Trp Asn
290 295 300
Leu Leu Gly Tyr Pro Gly Asp Pro Ala Gln Gln Thr Asp Arg Tyr Leu
305 310 315 320
Pro Phe Asn Phe Asn Trp Glu Leu Arg Pro Ser Asn Pro Ile Pro Leu
325 330 335
Pro Lys Val Tyr Phe Ala Leu Gly Asn Glu Pro Asp Ser Leu Val Ser
340 345 350
Lys Ala Leu Ile Gly Leu Phe Thr Glu Leu Gly Trp Ser Asp Gln Ile
355 360 365
His Ala His Lys Arg Ser Val Glu Phe Ala Phe Pro Asp Cys Asn Leu
370 375 380
Glu Glu Thr Thr His Val Leu Thr Trp Ile Thr Val Thr Tyr Glu Glu
385 390 395 400
Glu Lys Gly Ala Tyr Ile Thr Thr Tyr Cys Asn Ala Ile Gly Gly Gly
405 410 415
His Lys Leu Gln Phe Arg
420

<210> 80
<211> 453
<212> PRT
<213> 台中曲霉
<400> 80

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

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

385 390 395 400
Trp Thr Glu His Ala Met Thr His Gln Ile Ile Gln Lys Met Ala Tyr
405 410 415
Pro Asn His Asp Phe Gly Ser Ser Thr Glu Ile Tyr Ser Trp Ile Ser
420 425 430
Leu Ala Tyr Ser Gln Ser Lys Gly Pro Tyr Ile Thr Ile Tyr Ser Asn
435 440 445
Pro Ala Ala Ser Leu
450

<210> 81
<211> 355
<212> PRT
<213> 格氏锥虫

<400> 81
Met Gln Leu Arg Glu Glu Leu Arg Asp Ala Val Cys Val Phe Tyr Leu
1 5 10 15
Val Leu Arg Ala Leu Asp Thr Val Glu Asp Asp Met Ser Leu Ala Val
20 25 30
Asp Leu Lys Leu Arg Glu Leu Pro Val Phe His Glu His Leu Arg Asp
35 40 45
Pro Ser Trp Arg Met Cys Gly Val Gly Ala Gly Arg Glu Arg Glu Leu
50 55 60
Leu Glu Arg Phe Pro His Val Thr Arg Val Tyr Ala Arg Leu Gly Lys
65 70 75 80
Ala Tyr Gln Asp Val Ile Thr Asp Ile Cys Ala Arg Met Ala Ser Gly
85 90 95
Met Cys Glu Phe Leu Thr Arg Arg Val Glu Ser Arg Ala Asp Tyr Asp
100 105 110
Leu Tyr Cys His Tyr Val Ala Gly Leu Val Gly His Gly Leu Thr Arg
115 120 125
Leu Tyr Val Ser Gly Gly Phe Glu Asp Pro Asn Leu Ala Asp Asp Leu
130 135 140
Thr Asn Ala Asn His Met Gly Leu Phe Leu Gln Lys Thr Asn Ile Ile
145 150 155 160
Arg Asp Phe Tyr Glu Asp Ile Cys Glu Ser Pro Pro Arg Ile Phe Trp
165 170 175
Pro Arg Glu Ile Trp Ala Gln Tyr Thr Asp Asp Leu His Ala Phe Lys
180 185 190
Glu Glu Ala His Glu Ala Lys Ala Leu Glu Cys Leu Asn Ala Met Val

195 200 205

Ala Asp Ala Leu Val His Val Pro His Val Ile Glu Tyr Met Ala Ala
210 215 220

Leu Arg Asp Pro Ser Val Phe Ala Phe Cys Ala Ile Pro Gln Leu Met
225 230 235 240

Ala Met Ala Thr Leu Ala Leu Val Phe Asn Asn Arg Asn Val Phe His
245 250 255

Ser Lys Val Lys Leu Thr Arg Gly Ser Thr Cys Ser Ile Ile Leu Tyr
260 265 270

Ser Thr Gln Leu Gln Ser Ala Met Gln Thr Met Arg Thr Gln Ala Gln
275 280 285

Asn Leu Leu Ala Arg Thr Gly Pro Asp Asp Val Cys Tyr Asp Lys Ile
290 295 300

Ala Glu Leu Val Gly Glu Ala Val Arg Ala Val Asp Ala His Leu Gln
305 310 315 320

Pro Glu Thr Asp Gly Val Ala Arg Ser Met Leu Thr Arg Tyr Pro Ala
325 330 335

Leu Gly Gly Arg Leu Leu Tyr Thr Leu Ile Asp Asn Val Val Gly Tyr
340 345 350

Leu Gly Lys
355

<210> 82
<211> 526
<212> PRT
<213> 产油皮状新丝孢酵母
<400> 82

Met Ala Thr Leu Tyr Pro Ser Ile Gln Ser Leu Gln Lys Phe Pro Tyr
1 5 10 15

Pro Gly Asp Gly Val Val Ser Ser Thr Leu Thr Asp Gln His Asp Thr
20 25 30

Glu Gly Leu Ile Ala Asp Val Leu Asp Glu Gln Pro Pro Ala His Val
35 40 45

Pro Arg Leu Gly Leu Gln Asn Ala Thr Thr Thr Leu Asp Ser Val Asn
50 55 60

His Leu Lys Phe Ile Gln Gly Ala Met Met Ser Leu Pro Ser Gly Phe
65 70 75 80

Val Gly Leu Asp Ala Ser Arg Pro Trp Leu Val Phe Trp Thr Val His
85 90 95

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

100 105 110

Ala Val Ser Thr Ile Leu His Phe Leu His Pro Thr Gly Gly Phe Cys
115 120 125

Gly Gly Ala Ala Asn Thr His Met Pro His Leu Leu Pro Thr Tyr Ala
130 135 140

Ser Val Val Ser Leu Ala Ile Val Gly Asn Ala Gly Lys Gly Gly Gly
145 150 155 160

Trp Glu Arg Leu Val Asp Ala Arg Gln Asp Ile Tyr Asn Phe Phe Met
165 170 175

Arg Cys Lys Arg Pro Asp Gly Gly Phe Val Val Gly Asp Asn Cys Glu
180 185 190

Val Asp Val Arg Gly Thr Tyr Cys Leu Leu Val Val Ala Thr Leu Leu
195 200 205

Asp Ile Ile Thr Pro Glu Leu Leu His Asn Val Asp Lys Ala Ile Ala
210 215 220

Ala Gly Gln Thr Phe Glu Gly Gly Phe Ala Cys Ser Ser Phe Thr Phe
225 230 235 240

Lys Asp Gly Asn Arg Val Ala Met Ser Glu Ala His Gly Gly Tyr Thr
245 250 255

Ser Cys Ser Val Phe Ser His Phe Leu Leu Ser Ser Val Gln Pro Pro
260 265 270

Arg Arg Leu Glu Ser Leu Pro Glu Ser Phe Pro Val Pro Ile Asp Val
275 280 285

Asp Ser Val Val Arg Trp Ser Ala Met Met Gln Gly Glu Ala Ala Asp
290 295 300

Gly Gly Gly Phe Arg Gly Arg Ser Asn Lys Leu Val Asp Gly Cys Tyr
305 310 315 320

Ser Trp Trp Val Gly Gly Thr Phe Pro Val Leu Glu Glu Leu Arg Arg
325 330 335

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

Ile Val Ala Val Asp Asp Asp Gly Glu Asp Glu Trp Ala Asp Glu Ala
355 360 365

Ser Met His Ala Leu Phe Asn Arg Gly Met Cys Asp Ser Glu Val Arg
370 375 380

Leu Met Ala Val Ala Leu Gln Glu Tyr Thr Leu Leu Val Ala Gln Ser
385 390 395 400

Val Thr Arg Gly Gly Leu Arg Asp Lys Pro Gly Lys Gly Pro Asp Leu
405 410 415

Tyr His Thr Cys Asn Asn Leu Ser Gly Leu Ser Val Ala Gln His Arg
420 425 430
Leu Thr His Thr Pro Glu Glu Val Gln Lys Gln Arg Glu Ala Phe Lys
435 440 445
Ala Asp Arg Gly Leu Pro Ala Val Lys Pro Thr Thr Pro Gly Gly Gly
450 455 460
Trp Lys Ser Glu Glu Glu Arg Gln Ala Ala Arg Arg Glu Val Trp Ala
465 470 475 480
Asn Val Arg Ala Trp Val Glu Asp Glu Ser Asp Thr Leu Val Val Gly
485 490 495
Gly Gln Met Ser Gln Val Asn Thr Thr Val Pro Pro Phe Asn Met Leu
500 505 510
Glu Val Arg Leu Gln Pro Phe Ile Asp Tyr Phe Tyr Cys Gln
515 520 525

<210> 83
<211> 345
<212> PRT
<213> 罗塞塔领鞭毛
<400> 83

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

Cys Pro Gln Trp Val Ala Arg Cys Gln Thr Tyr Glu Gly Gly Phe Ala
165 170 175
Ala Ile Pro Gly Leu Glu Ala His Gly Gly Tyr Thr Phe Cys Gly Phe
180 185 190
Ala Ala Met Ser Ile Leu Cys Ser Thr His Leu Ile Asp Ile Pro Arg
195 200 205
Leu Thr Glu Trp Leu Ala Asn Arg Gln Met Pro Met Ser Gly Gly Phe
210 215 220
Gln Gly Arg Pro Asn Lys Leu Val Asp Gly Cys Tyr Ser Phe Trp Val
225 230 235 240
Gly Gly Cys Phe Pro Ile Leu Ala Asp Leu Leu Glu Ala Gln Gly Leu
245 250 255
Pro Gly Asp Val Val Asn Ala Glu Ala Leu Ile Asp Tyr Val Val Cys
260 265 270
Val Cys Gln Cys Pro Ser Gly Phe Arg Asp Lys Pro Gly Lys Arg Gln
275 280 285
Asp Tyr Tyr His Thr Ser Tyr Cys Leu Ser Gly Leu Ala Ser Met Lys
290 295 300
Arg Phe Ala Pro Asn His Pro Ile Leu Ser Gln Leu Asn Ala Thr His
305 310 315 320
Pro Ile His Asn Val Pro Pro Ala Asn Ala Glu Arg Met Ile Gln Ala
325 330 335
Met Ser Ser Gln Thr Thr Thr Arg His
340 345

<210> 84
<211> 307
<212> PRT
<213> 链霉菌属菌株CL190
<400> 84

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

Lys Gly Leu Phe Pro Ala Thr Gly His Pro Val Asp Asp Leu Leu Ala
85 90 95
Asp Thr Gln Lys His Leu Pro Val Ser Met Phe Ala Ile Asp Gly Glu
100 105 110
Val Thr Gly Gly Phe Lys Lys Thr Tyr Ala Phe Phe Pro Thr Asp Asn
115 120 125
Met Pro Gly Val Ala Glu Leu Ser Ala Ile Pro Ser Met Pro Pro Ala
130 135 140
Val Ala Glu Asn Ala Glu Leu Phe Ala Arg Tyr Gly Leu Asp Lys Val
145 150 155 160
Gln Met Thr Ser Met Asp Tyr Lys Lys Arg Gln Val Asn Leu Tyr Phe
165 170 175
Ser Glu Leu Ser Ala Gln Thr Leu Glu Ala Glu Ser Val Leu Ala Leu
180 185 190
Val Arg Glu Leu Gly Leu His Val Pro Asn Glu Leu Gly Leu Lys Phe
195 200 205
Cys Lys Arg Ser Phe Ser Val Tyr Pro Thr Leu Asn Trp Glu Thr Gly
210 215 220
Lys Ile Asp Arg Leu Cys Phe Ala Val Ile Ser Asn Asp Pro Thr Leu
225 230 235 240
Val Pro Ser Ser Asp Glu Gly Asp Ile Glu Lys Phe His Asn Tyr Ala
245 250 255
Thr Lys Ala Pro Tyr Ala Tyr Val Gly Glu Lys Arg Thr Leu Val Tyr
260 265 270
Gly Leu Thr Leu Ser Pro Lys Glu Glu Tyr Tyr Lys Leu Gly Ala Tyr
275 280 285
Tyr His Ile Thr Asp Val Gln Arg Gly Leu Leu Lys Ala Phe Asp Ser
290 295 300
Leu Glu Asp
305

<210> 85
<211> 305
<212> PRT
<213> 链霉菌属Act143
<400> 85

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

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

<210> 86
<211> 344
<212> PRT

<213> 抗生链霉菌

<400> 86

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

290 295 300

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

Lys Leu Gly Ala Tyr Tyr His Ile Thr Asp Ile Gln Arg Arg Leu Leu
325 330 335

Lys Ala Phe Asp Ala Leu Glu Asp
340

<210> 87

<211> 305

<212> PRT

<213> 抗生链霉菌

<400> 87

Met Ser Gly Ala Ala Asp Val Glu Arg Val Tyr Ala Ala Met Glu Glu
1 5 10 15

Ala Ala Gly Leu Leu Gly Val Thr Cys Ala Arg Glu Lys Ile Tyr Pro
20 25 30

Leu Leu Thr Glu Phe Gln Asp Thr Leu Thr Asp Gly Val Val Val Phe
35 40 45

Ser Met Ala Ser Gly Arg Arg Ser Thr Glu Leu Asp Phe Ser Ile Ser
50 55 60

Val Pro Thr Ser Gln Gly Asp Pro Tyr Ala Thr Val Val Asp Lys Gly
65 70 75 80

Leu Phe Pro Ala Thr Gly His Pro Val Asp Asp Leu Leu Ala Asp Thr
85 90 95

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

Gly Gly Phe Lys Lys Thr Tyr Ala Phe Phe Pro Thr Asp Asp Met Pro
115 120 125

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

Glu Asn Ala Glu Leu Phe Ala Arg Tyr Gly Leu Asp Lys Val Gln Met
145 150 155 160

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

Leu Ser Glu Gln Thr Leu Ala Pro Glu Ser Val Leu Ala Leu Val Arg
180 185 190

Glu Leu Gly Leu His Val Pro Thr Glu Leu Gly Leu Glu Phe Cys Lys
195 200 205

Arg Ser Phe Ser Val Tyr Pro Thr Leu Asn Trp Asp Thr Gly Lys Ile

210 215 220

Asp Arg Leu Cys Phe Ala Val Ile Ser Thr Asp Pro Thr Leu Val Pro
225 230 235 240
Ser Thr Asp Glu Arg Asp Ile Glu Gln Phe Arg His Tyr Gly Thr Lys
245 250 255
Ala Pro Tyr Ala Tyr Val Gly Glu Asn Arg Thr Leu Val Tyr Gly Leu
260 265 270
Thr Leu Ser Pro Thr Glu Glu Tyr Tyr Lys Leu Gly Ala Tyr Tyr His
275 280 285
Ile Thr Asp Ile Gln Arg Arg Leu Leu Lys Ala Phe Asp Ala Leu Glu
290 295 300
Asp
305

<210> 88
<211> 309
<212> PRT
<213> 放线菌OV320
<400> 88

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

165 170 175
Tyr Phe Ser Asp Leu Lys Gln Glu Tyr Leu Gln Pro Glu Ala Val Val
180 185 190
Ala Leu Ala Arg Glu Leu Gly Leu Gln Val Pro Gly Glu Leu Gly Leu
195 200 205
Glu Phe Cys Lys Arg Ser Phe Ala Val Tyr Pro Thr Leu Asn Trp Asp
210 215 220
Thr Gly Lys Ile Asp Arg Leu Cys Phe Ala Ala Ile Ser Thr Asp Pro
225 230 235 240
Thr Leu Val Pro Ser Thr Asp Glu Arg Asp Ile Glu Met Phe Arg Glu
245 250 255
Tyr Ala Thr Lys Ala Pro Tyr Ala Tyr Val Gly Glu Lys Arg Thr Leu
260 265 270
Val Tyr Gly Leu Thr Leu Ser Pro Thr Glu Glu Tyr Tyr Lys Leu Gly
275 280 285
Ala Tyr Tyr His Ile Thr Asp Ile Gln Arg Gln Leu Leu Lys Ala Phe
290 295 300
Asp Ala Leu Glu Asp
305

<210> 89
<211> 309
<212> PRT
<213> 链霉菌属Root1310
<400> 89
Met Glu Val Ser Met Ser Gly Ala Ala Asp Val Glu Arg Val Tyr Ala
1 5 10 15
Ala Met Glu Glu Ala Ala Gly Leu Leu Asp Val Ser Cys Ala Arg Glu
20 25 30
Lys Ile Tyr Pro Leu Leu Thr Val Phe Gln Asp Thr Leu Thr Asp Gly
35 40 45
Val Val Val Phe Ser Met Ala Ser Gly Arg Arg Ser Thr Glu Leu Asp
50 55 60
Phe Ser Ile Ser Val Pro Val Ser Gln Gly Asp Pro Tyr Ala Thr Val
65 70 75 80
Val Lys Glu Gly Leu Phe Gln Ala Thr Gly Ser Pro Val Asp Glu Leu
85 90 95
Leu Ala Asp Thr Val Ala His Leu Pro Val Ser Met Phe Ala Ile Asp
100 105 110
Gly Glu Val Thr Gly Gly Phe Lys Lys Thr Tyr Ala Phe Phe Pro Thr

115 120 125
Asp Asp Met Pro Gly Val Ala Gln Leu Ala Ala Ile Pro Ser Met Pro
130 135 140
Ala Ser Val Ala Glu Asn Ala Glu Leu Phe Ala Arg Tyr Gly Leu Asp
145 150 155 160
Lys Val Gln Met Thr Ser Met Asp Tyr Lys Lys Arg Gln Val Asn Leu
165 170 175
Tyr Phe Ser Asp Leu Lys Gln Glu Tyr Leu Gln Pro Glu Ser Val Val
180 185 190
Ala Leu Ala Arg Glu Leu Gly Leu Arg Val Pro Gly Glu Leu Gly Leu
195 200 205
Glu Phe Cys Lys Arg Ser Phe Ala Val Tyr Pro Thr Leu Asn Trp Asp
210 215 220
Thr Gly Lys Ile Asp Arg Leu Cys Phe Ala Ala Ile Ser Thr Asp Pro
225 230 235 240
Thr Leu Val Pro Ser Glu Asp Glu Arg Asp Ile Glu Met Phe Arg Asn
245 250 255
Tyr Ala Thr Lys Ala Pro Tyr Ala Tyr Val Gly Glu Lys Arg Thr Leu
260 265 270
Val Tyr Gly Leu Thr Leu Ser Ser Thr Glu Glu Tyr Tyr Lys Leu Gly
275 280 285
Ala Tyr Tyr His Ile Thr Asp Ile Gln Arg Gln Leu Leu Lys Ala Phe
290 295 300
Asp Ala Leu Glu Asp
305

<210> 90
<211> 305
<212> PRT
<213> 链霉菌属Root1310
<400> 90
Met Ser Gly Ala Ala Asp Val Glu Arg Val Tyr Ala Ala Met Glu Glu
1 5 10 15
Ala Ala Gly Leu Leu Asp Val Ser Cys Ala Arg Glu Lys Ile Tyr Pro
20 25 30
Leu Leu Thr Val Phe Gln Asp Thr Leu Thr Asp Gly Val Val Val Phe
35 40 45
Ser Met Ala Ser Gly Arg Arg Ser Thr Glu Leu Asp Phe Ser Ile Ser
50 55 60
Val Pro Val Ser Gln Gly Asp Pro Tyr Ala Thr Val Val Lys Glu Gly

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

<210> 91
<211> 305
<212> PRT
<213> 放线菌OV320
<400> 91
Met Ser Gly Ala Ala Asp Val Glu Arg Val Tyr Ala Ala Met Glu Glu
1 5 10 15
Ala Ala Gly Leu Leu Asp Val Ser Cys Ala Arg Glu Lys Ile Tyr Pro

20 25 30

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

<210> 92
<211> 305

<212> PRT

<213> 唐德链霉菌

<400> 92

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

Ile Thr Asp Ile Gln Arg Gln Leu Leu Lys Ala Phe Asp Ala Leu Glu
290 295 300
Asp
305
<210> 93
<211> 305
<212> PRT
<213> 链霉菌属URHA0041
<400> 93
Met Ser Gly Ala Ala Glu Val Glu Arg Val Tyr Ser Ala Met Glu Glu
1 5 10 15
Ser Ala Gly Leu Leu Asp Val Ala Cys Ser Arg Glu Lys Ile Gln Pro
20 25 30
Ile Leu Thr Ala Phe Gln Asp Val Leu Ala Asp Gly Val Ile Val Phe
35 40 45
Ser Met Ala Asn Gly Arg His Ala Thr Glu Leu Asp Phe Ser Ile Ser
50 55 60
Val Pro Ala Gly His Gly Asp Pro Tyr Ala Ala Ala Leu Glu His Gly
65 70 75 80
Leu Ile Pro Ala Thr Gly His Pro Val Gly Asp Leu Leu Ala Asp Thr
85 90 95
Gln Lys Ala Leu Pro Val Ser Met Phe Ala Val Asp Gly Glu Val Thr
100 105 110
Ser Gly Phe Lys Lys Thr Tyr Ala Phe Phe Pro Thr Asp Asp Met Pro
115 120 125
Gly Leu Ala Gln Leu Ile Asp Ile Pro Ser Met Pro Pro Ser Val Ala
130 135 140
Glu Asn Ala Glu Leu Phe Gly Arg Tyr Gly Leu Asp Lys Val Gln Met
145 150 155 160
Ile Ser Leu Asp Tyr Lys Lys Asn Gln Val Asn Leu Tyr Phe Ser Asn
165 170 175
Leu Asn Pro Glu Phe Leu Gln Pro Glu Pro Val Gln Ala Met Val Arg
180 185 190
Glu Met Gly Leu Gln Leu Pro Ala Asp Lys Gly Leu Ala Phe Ala Lys
195 200 205
Arg Ser Phe Ala Val Tyr Pro Thr Leu Ser Trp Asp Ser Ala Lys Ile
210 215 220
Glu Arg Leu Cys Phe Ala Val Ile Ser Thr Asp Pro Thr Leu Ala Pro
225 230 235 240

Ala Gln Glu Gln Ala Asp Leu Asp Leu Phe Ser Thr Tyr Ala Asn Asn
245 250 255
Ala Pro Tyr Ala Tyr Ala Gly Glu Lys Arg Thr Leu Val Tyr Gly Leu
260 265 270
Thr Leu Ser Pro Ser Glu Glu Tyr Tyr Lys Leu Gly Ser Tyr Tyr Gln
275 280 285
Ile Ser Asp Ile Gln Arg Lys Leu Leu Lys Ala Phe Asp Ala Leu Thr
290 295 300
Asp
305

<210> 94
<211> 305
<212> PRT
<213> 寡孢链霉菌

<400> 94
Met Ser Gly Ala Ala Glu Val Glu Arg Val Tyr Ser Ala Met Glu Glu
1 5 10 15
Ala Ala Gly Leu Leu Asp Val Ala Cys Ser Pro Glu Lys Val Arg Pro
20 25 30
Ile Leu Thr Ala Phe Gln Asp Val Leu Ser Asp Gly Val Ile Val Tyr
35 40 45
Ser Met Ala Ser Gly Arg His Ala Thr Glu Leu Asp Phe Ser Ile Ser
50 55 60
Val Pro Ala Asp His Gly Asp Pro Tyr Thr Ala Ala Leu Ala His Gly
65 70 75 80
Leu Ile Pro Glu Thr Asp His Pro Val Gly Asn Leu Leu Ala Asp Thr
85 90 95
Gln Lys Ala Leu Pro Val Ser Met Phe Ala Val Asp Gly Glu Val Thr
100 105 110
Gly Gly Phe Lys Lys Thr Tyr Ala Phe Phe Pro Thr Asp Asp Met Pro
115 120 125
Gly Leu Ala Gln Leu Ile Asp Ile Pro Ser Met Pro Pro Ser Val Ala
130 135 140
Glu Asn Ala Glu Leu Phe Ala Arg Tyr Gly Leu Asp Lys Val Gln Met
145 150 155 160
Thr Ser Leu Asp Tyr Lys Arg Lys Gln Val Asn Leu Tyr Phe Ser Asn
165 170 175
Leu Gln Pro Glu Phe Leu Ala Pro Glu Pro Val Leu Ser Met Val Arg
180 185 190

Glu Met Gly Leu Glu Leu Pro Gly Glu Lys Gly Leu Lys Phe Ala Arg
195 200 205
Arg Ser Phe Ala Ile Tyr Pro Thr Leu Gly Trp Glu Ser Gly Lys Ile
210 215 220
Glu Arg Leu Cys Phe Ala Val Ile Ser Thr Asp Pro Gly Leu Val Pro
225 230 235 240
Ala Pro Asp Glu Ala Asp Arg Ala Leu Phe Ser Thr Tyr Ala Asn Asn
245 250 255
Ala Pro Tyr Ala Tyr Ala Gly Glu Lys Arg Thr Leu Val Tyr Gly Leu
260 265 270
Thr Leu Ser Pro Thr Glu Glu Tyr Tyr Lys Leu Gly Ser Tyr Tyr Gln
275 280 285
Ile Thr Asp Ile Gln Arg Thr Leu Leu Lys Ala Phe Asp Ala Leu Thr
290 295 300
Asp
305

<210> 95
<211> 544
<212> PRT
<213> 大麻
<400> 95

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

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

450 455 460

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

Leu Asn Tyr Arg Asp Leu Asp Ile Gly Ile Asn Asp Pro Lys Asn Pro
485 490 495

Asn Asn Tyr Thr Gln Ala Arg Ile Trp Gly Glu Lys Tyr Phe Gly Lys
500 505 510

Asn Phe Asp Arg Leu Val Lys Val Lys Thr Leu Val Asp Pro Asn Asn
515 520 525

Phe Phe Arg Asn Glu Gln Ser Ile Pro Pro Leu Pro Arg His Arg His
530 535 540

<210> 96

<211> 545

<212> PRT

<213> 大麻

<400> 96

Met Lys Cys Ser Thr Phe Cys Phe Trp Tyr Val Cys Lys Ile Ile Phe
1 5 10 15

Phe Phe Leu Ser Phe Asn Ile Gln Ile Ser Ile Ala Asn Pro Gln Glu
20 25 30

Asn Phe Leu Lys Cys Phe Ser Gln Tyr Ile Pro Thr Asn Val Thr Asn
35 40 45

Ala Lys Leu Val Tyr Thr Gln His Asp Gln Phe Tyr Met Ser Ile Leu
50 55 60

Asn Ser Thr Ile Gln Asn Leu Arg Phe Thr Ser Asp Thr Thr Pro Lys
65 70 75 80

Pro Leu Val Ile Ile Thr Pro Leu Asn Val Ser His Ile Gln Gly Thr
85 90 95

Ile Leu Cys Ser Lys Lys Val Gly Leu Gln Ile Arg Thr Arg Ser Gly
100 105 110

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

Ile Val Asp Leu Arg Asn Met His Ser Val Lys Ile Asp Val His Ser
130 135 140

Gln Thr Ala Trp Val Glu Ala Gly Ala Thr Leu Gly Glu Val Tyr Tyr
145 150 155 160

Trp Ile Asn Glu Asn Asn Glu Asn Leu Ser Phe Pro Ala Gly Tyr Cys
165 170 175

Pro Thr Val Gly Ala Gly Gly His Phe Ser Gly Gly Gly Tyr Gly Ala

180 185 190

Leu Met Arg Asn Tyr Gly Leu Ala Ala Asp Asn Ile Ile Asp Ala His
195 200 205

Leu Val Asn Val Asp Gly Lys Val Leu Asp Arg Lys Ser Met Gly Glu
210 215 220

Asp Leu Phe Trp Ala Ile Arg Gly Gly Gly Gly Glu Asn Phe Gly Ile
225 230 235 240

Ile Ala Ala Trp Lys Ile Arg Leu Val Ala Val Pro Ser Met Ser Thr
245 250 255

Ile Phe Ser Val Lys Lys Asn Met Glu Ile His Glu Leu Val Lys Leu
260 265 270

Val Asn Lys Trp Gln Asn Ile Ala Tyr Met Tyr Glu Lys Glu Leu Leu
275 280 285

Leu Phe Thr His Phe Ile Thr Arg Asn Ile Thr Asp Asn Gln Gly Lys
290 295 300

Asn Lys Thr Thr Ile His Ser Tyr Phe Ser Ser Ile Phe His Gly Gly
305 310 315 320

Val Asp Ser Leu Val Asp Leu Met Asn Lys Ser Phe Pro Glu Leu Gly
325 330 335

Ile Lys Lys Thr Asp Cys Lys Gln Leu Ser Trp Ile Asp Thr Ile Ile
340 345 350

Phe Tyr Ser Gly Val Val Asn Tyr Asn Thr Thr Tyr Phe Lys Lys Glu
355 360 365

Ile Leu Leu Asp Arg Ser Gly Gly Arg Lys Ala Ala Phe Ser Ile Lys
370 375 380

Leu Asp Tyr Val Lys Lys Pro Ile Pro Glu Thr Ala Met Val Thr Ile
385 390 395 400

Leu Glu Lys Leu Tyr Glu Glu Asp Val Gly Val Gly Met Phe Val Phe
405 410 415

Tyr Pro Tyr Gly Gly Ile Met Asp Glu Ile Ser Glu Ser Ala Ile Pro
420 425 430

Phe Pro His Arg Ala Gly Ile Met Tyr Glu Ile Trp Tyr Ile Ala Ser
435 440 445

Trp Glu Lys Gln Glu Asp Asn Glu Lys His Ile Asn Trp Ile Arg Asn
450 455 460

Val Tyr Asn Phe Thr Thr Pro Tyr Val Ser Gln Asn Pro Arg Met Ala
465 470 475 480

Tyr Leu Asn Tyr Arg Asp Leu Asp Leu Gly Lys Thr Asn Phe Glu Ser
485 490 495

Pro Asn Asn Tyr Thr Gln Ala Arg Ile Trp Gly Glu Lys Tyr Phe Gly
500 505 510
Lys Asn Phe Asn Arg Leu Val Lys Val Lys Thr Lys Val Asp Pro Asp
515 520 525
Asn Phe Phe Arg Asn Glu Gln Ser Ile Pro Pro Leu Pro Leu Arg His
530 535 540
His
545

<210> 97
<211> 545
<212> PRT
<213> 大麻
<400> 97

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

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

515 520 525

Asn Phe Phe Arg Asn Glu Gln Ser Ile Pro Pro Leu Pro Leu Arg His
530 535 540

His
545

<210> 98
<211> 545
<212> PRT
<213> 大麻
<400> 98

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

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

His
545
<210> 99
<211> 545
<212> PRT
<213> 大麻
<400> 99

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

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

<210> 100

<211> 553
<212> PRT
<213> 中华猕猴桃变种
<400> 100

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

275 280 285

His Lys Phe Pro Gln Glu Leu Leu Val Ala Ile Leu Ile Lys Arg Val

290 295 300

Asp Ser Ser His Asp Asn Gly Glu Asp Thr Met Gln Ala Phe Phe Thr

305 310 315 320

Ser Leu Tyr Leu Gly Gly Ile Asp Gln Leu Ile Pro Leu Met Gln Glu

325 330 335

Ser Phe Pro Glu Leu Gly Leu Thr Arg Glu Asp Cys Thr Glu Met Ser

340 345 350

Trp Ile Glu Ser Ile Leu Tyr Phe Ala Gly Phe Pro Ser Gly Ser Ser

355 360 365

Leu Asp Val Leu Leu Asn Arg Thr Gln Leu Ser Thr Arg Tyr Phe Lys

370 375 380

Ala Lys Ser Asp Tyr Val Lys Glu Pro Ile Pro Leu Phe Gly Trp Lys

385 390 395 400

Gly Ile Trp Asp Leu Phe Phe Lys Asp Glu Gly Glu Leu Ala Glu Met

405 410 415

Ala Leu Ile Pro Tyr Gly Gly Lys Met Asn Glu Ile Ser Glu Ser Ser

420 425 430

Ile Pro Phe Pro His Arg Ala Gly Asn Leu Tyr Lys Ile Leu His Met

435 440 445

Val Tyr Trp Asp Glu Glu Gly Ala Glu Glu Ser Glu Lys His Ile Ser

450 455 460

Trp Ile Arg Lys Leu Tyr Ser Tyr Met Ala Pro Tyr Val Ser Lys Phe

465 470 475 480

Pro Arg Ala Ala Tyr Ile Asn Tyr Arg Asp Leu Asp Val Gly Val Asn

485 490 495

Asn Lys Asn Gly Asn Thr Ser Tyr Ala Gln Ala Ser Ile Trp Gly Met

500 505 510

Lys Tyr Phe Lys Asn Asn Phe Asn Arg Leu Val His Val Lys Thr Lys

515 520 525

Val Asp Pro Ser Asn Phe Phe Lys Asn Glu Gln Ser Ile Pro Thr Leu

530 535 540

Pro Ser Trp Trp Lys Lys Arg Gly Asn

545 550

<210> 101

<211> 533

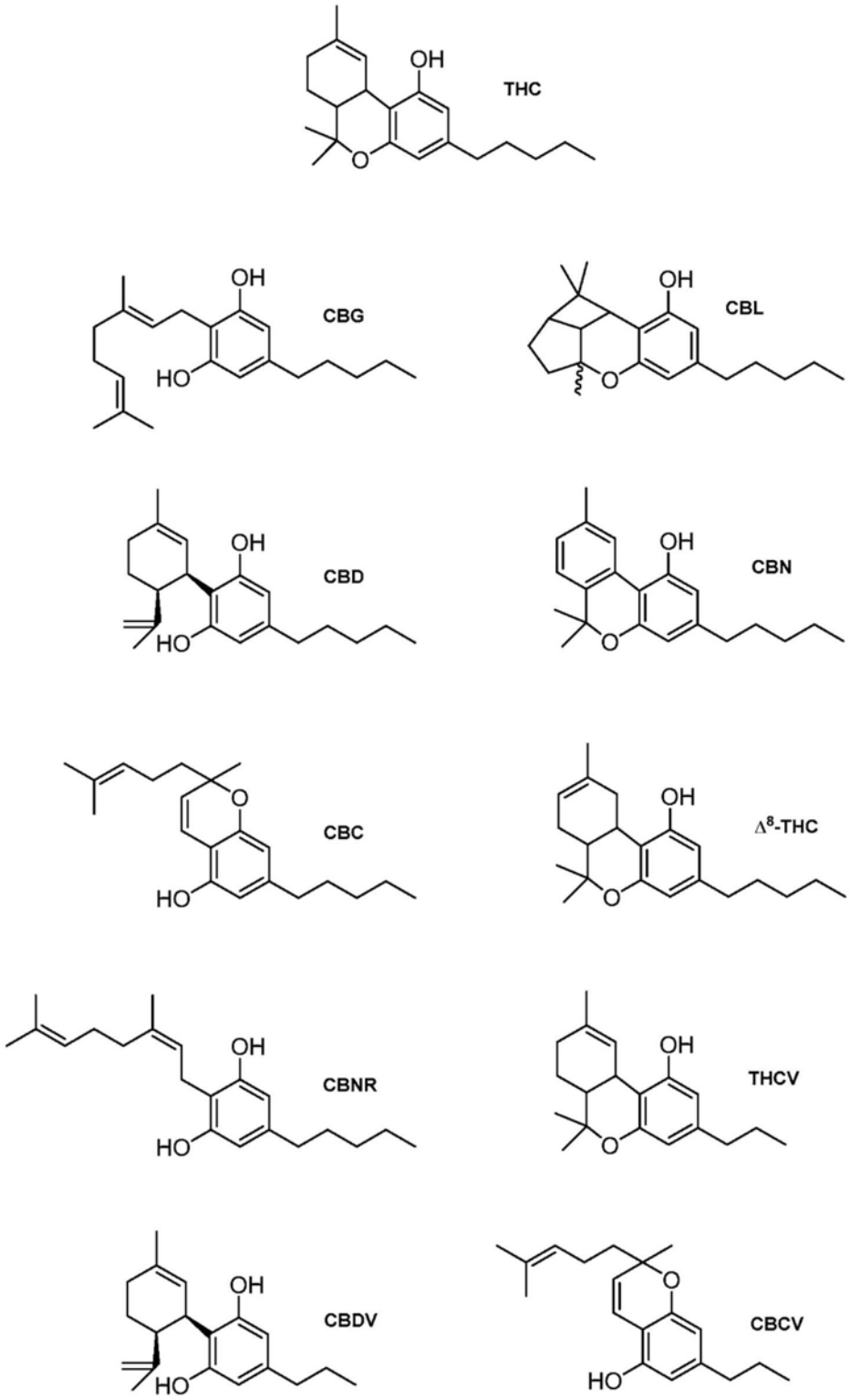
<212> PRT

<213> 毛果杨

<400> 101

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

Phe Phe Ser Leu Phe Leu Gly Glu Val Asp Gln Leu Leu Pro Val Met
305 310 315 320
Gln Glu Ser Phe Pro Glu Leu Gly Leu Val Lys Asp Asp Cys Phe Glu
325 330 335
Met Ser Trp Ile Glu Ser Val Phe Tyr Thr Gly Gly Phe Thr Ser Asn
340 345 350
Ala Ser Leu Asp Val Leu Leu Asn Arg Thr Pro Arg Ser Ile Pro Arg
355 360 365
Phe Lys Ala Lys Ser Asp Tyr Val Lys Glu Pro Met Pro Glu Ile Ala
370 375 380
Phe Glu Gly Ile Trp Glu Arg Phe Phe Glu Glu Asp Ile Glu Ala Pro
385 390 395 400
Thr Leu Ile Leu Ile Pro Tyr Gly Gly Lys Met Asp Glu Ile Ser Glu
405 410 415
Ser Ser Thr Pro Phe Pro His Arg Ala Gly Asn Leu Tyr Val Leu Val
420 425 430
Ser Ser Val Ser Trp Arg Glu Glu Ser Lys Glu Ala Ser Arg Arg His
435 440 445
Met Ala Trp Ile Arg Arg Leu Tyr Ser Tyr Leu Thr Lys Tyr Val Ser
450 455 460
Lys Asn Pro Arg Glu Ala Tyr Val Asn Tyr Arg Asp Leu Asp Leu Gly
465 470 475 480
Ile Asn Asn Leu Thr Gly Thr Thr Ser Tyr Lys Gln Ala Ser Ile Trp
485 490 495
Gly Arg Lys Tyr Phe Lys Asn Asn Phe Asp Arg Leu Val Arg Val Lys
500 505 510
Thr Glu Val Asp Pro Thr Asn Phe Phe Arg Asn Glu Gln Ser Ile Pro
515 520 525
Ser Leu Ser Ser Trp
530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HO
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CBN
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OH
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OH
THCV
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CBDV
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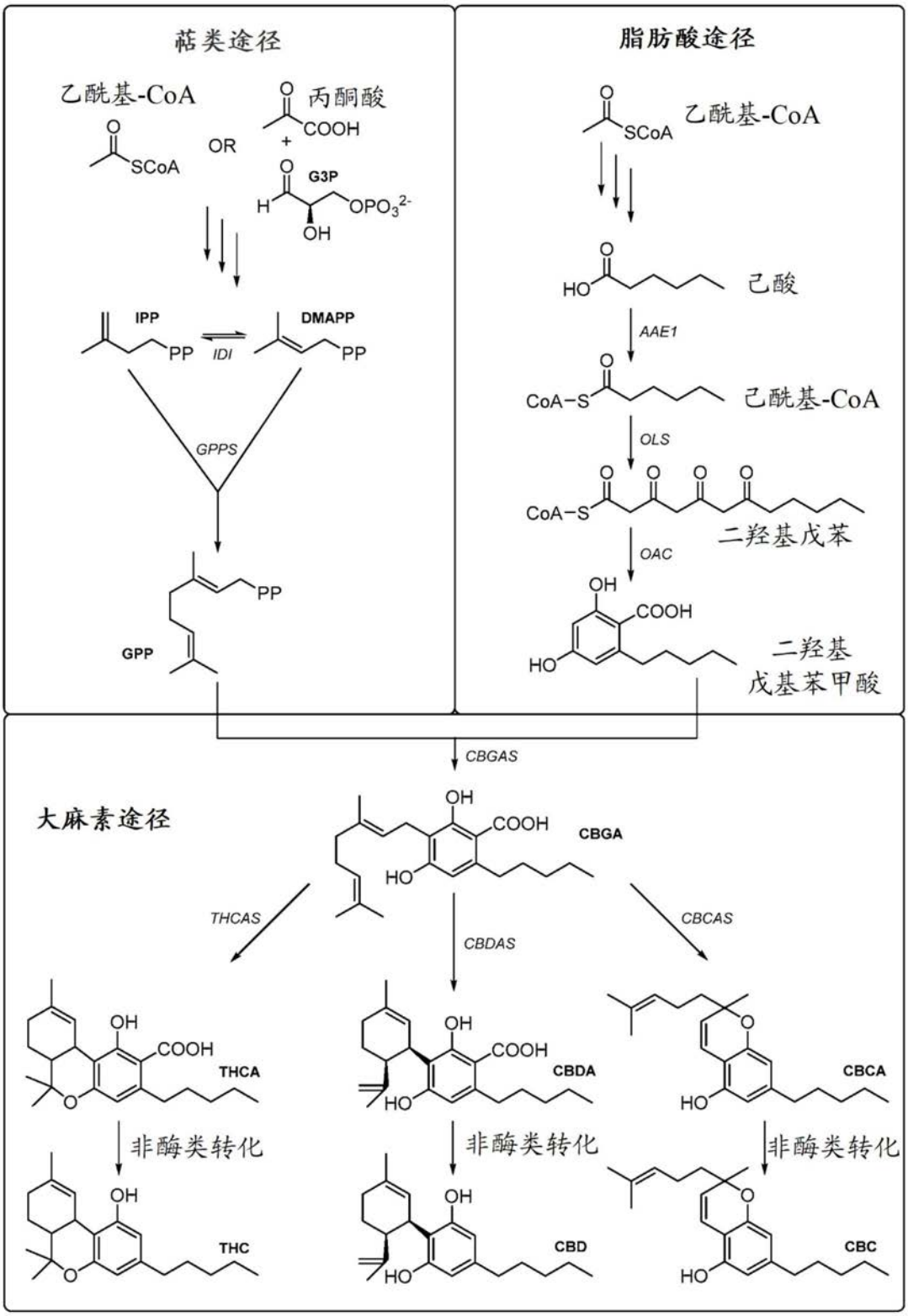
O
CBCV
HO

图1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OR
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乙酰基-CoA
己酸
AAE1
己酰基-CoA
OLS
二羟基戊苯
OAC
二羟基
戊基苯甲酸
CBGAS
大麻素途径
CBGA
THCAS
CBDAS
CBCAS
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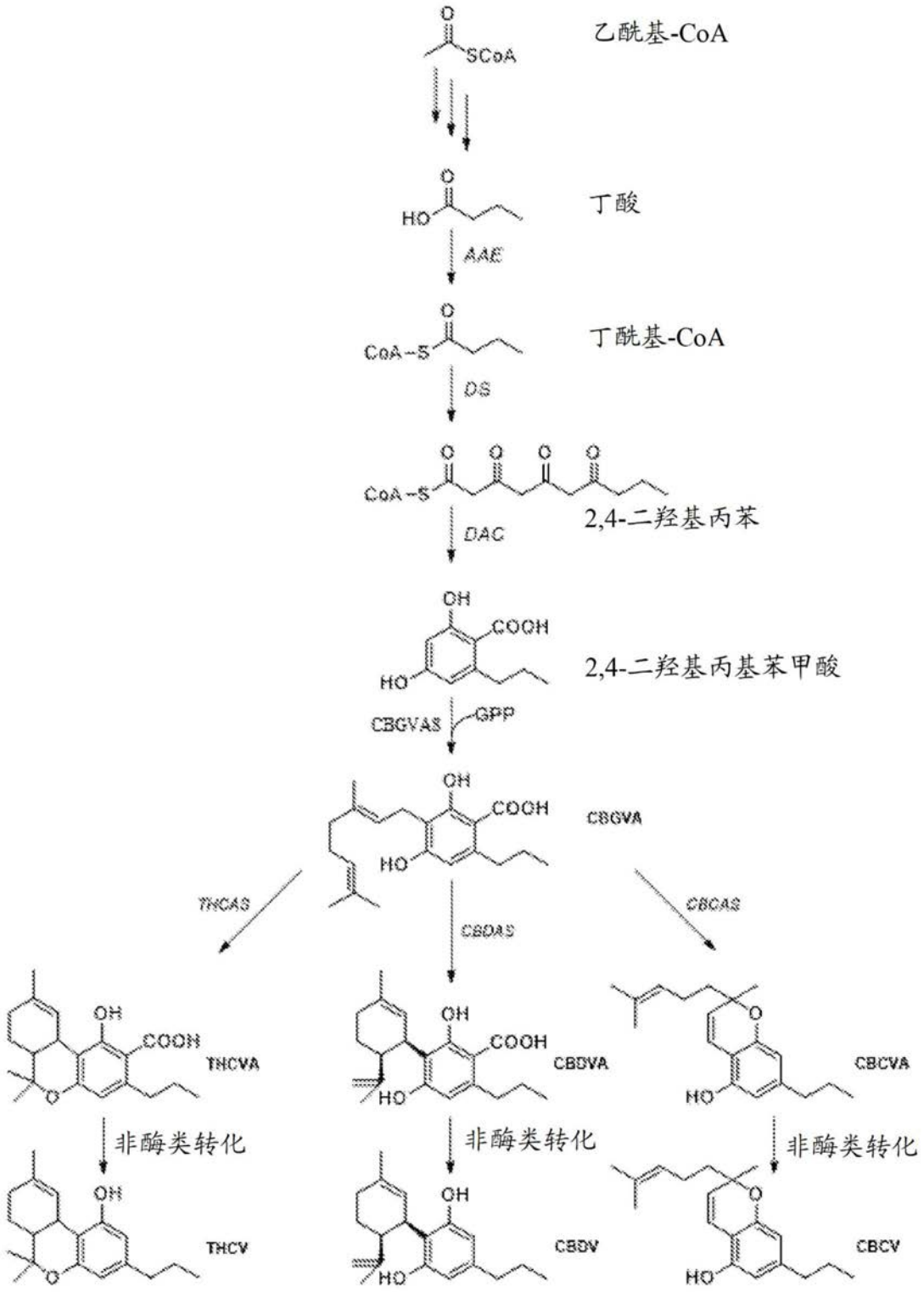
非酶类转化
THC
CBD
CBC

图2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SCoA
丁酸
HO
AAE
丁酰基-CoA
CoA-S
DS
2,4-二羟基丙苯
DAC
2,4-二羟基丙基苯甲酸
OH
COOH
CBGVAS
GPP
CBGVA
THCAS
CBDAS
CBCAS
THCVA
CBDVA
CBCVA
非酶类转化
非酶类转化
非酶类转化
THCV
CBDV
CBCV

图3

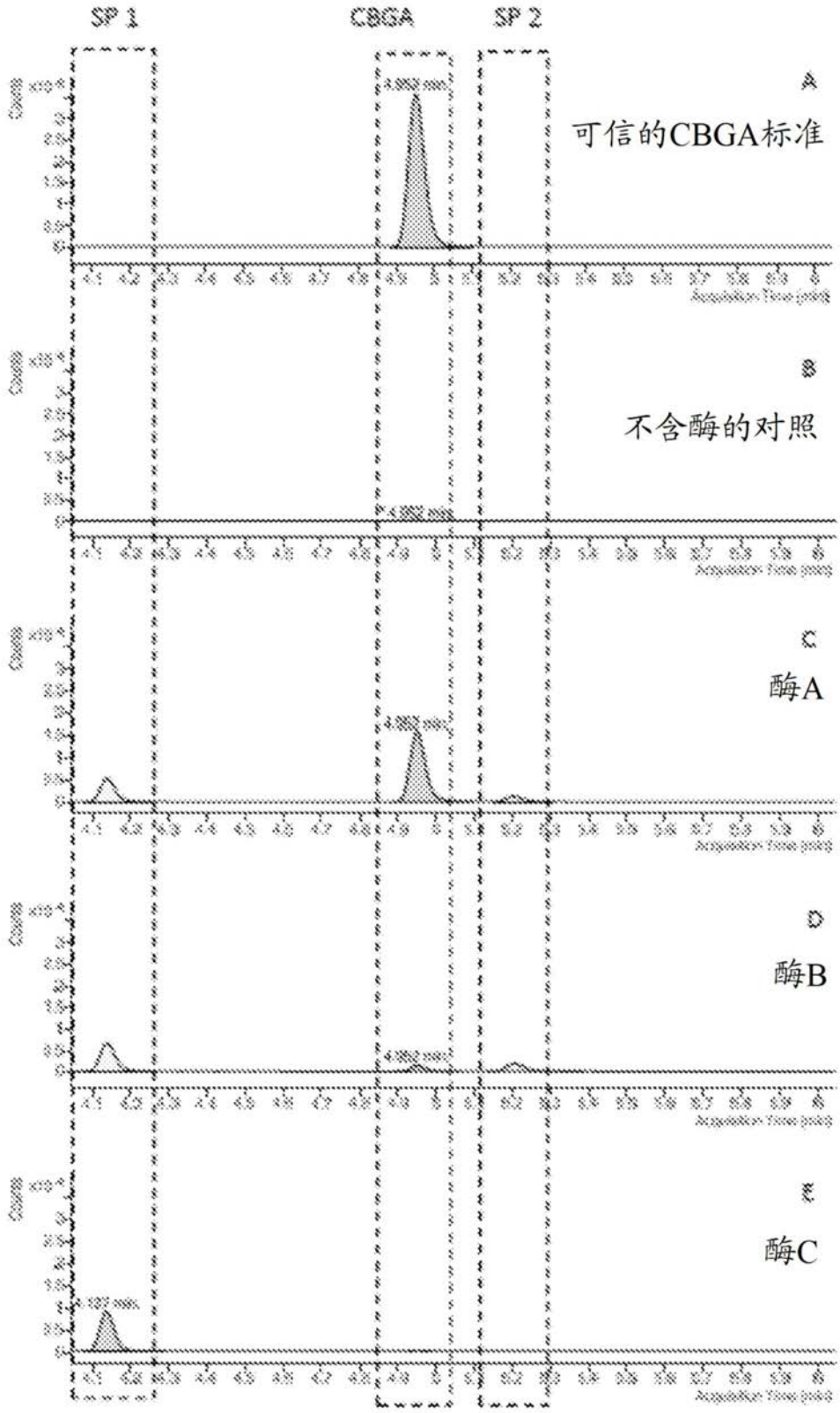

图4