



(19) 대한민국특허청(KR)
(12) 공개특허공보(A)

(11) 공개번호 10-2010-0089370
(43) 공개일자 2010년08월12일

(51) Int. Cl.

C12N 15/31 (2006.01) C12N 15/53 (2006.01)

C07K 14/37 (2006.01)

(21) 출원번호 10-2009-0008583

(22) 출원일자 2009년02월03일

심사청구일자 없음

(71) 출원인

인하대학교 산학협력단

인천 남구 용현동 253 인하대학교

(주)차바이오앤디오스텍

경기 용인시 처인구 남사면 복리 151-21

(72) 발명자

김용수

서울특별시 송파구 방이동 올림픽선수촌아파트
120동 501호

한규범

대전광역시 유성구 신성동 럭키하나아파트 102동
1002호

(뒷면에 계속)

(74) 대리인

서근복, 김순용

전체 청구항 수 : 총 37 항

(54) 슈도노카디아 오토트로피카의 신규한 폴리엔 생합성 유전자

(57) 요약

본 발명은 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*)의 폴리엔 생합성 유전자군 및 이의 염기서열에 관한 것으로, 보다 구체적으로 폴리케타이드(PKS) 유전자와, 마이코사민(mycosamine) 생성 단백질, 4-포스포판테틴 트랜스퍼라제(4-Phosphopantetheine transferases), 시토크롬 P-450 모노옥시게나제(cytochrome P-450 monooxygenase), ABC 트랜스포터(ABC transporter), 티오에스터라제(thioesterase), 디카르복실레이즈(decarboxylase), 페레독신(ferredoxin) 단백질을 코딩하는 유전자를 모두 포함하고 있다.

본 발명에 따른 상기 유전자 염기서열은 일부 변형을 통하여 기존의 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔의 생산성 증가 또는 신규한 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔의 변이체 제조에 이용할 수 있으며, 본 발명에 따른 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*)의 신규 폴리엔은 항진균 및 항바이러스 활성을 지닌 폴리엔 항생제로서 유용하게 사용될 수 있다.

대표도 - 도1

서열 번호	Protein	aa	Proposed Function	Homologs, Origins	Identities, Positives (%)
2	CypF	224	Phosphopantetheine transferase	NysF, <i>Streptomyces noursei</i>	63.73
3	CypG	592	ABC transporter	NysG, <i>Streptomyces noursei</i>	76.83
4	CypH	584	ABC transporter	NysH, <i>Streptomyces noursei</i>	76.84
5	CypDIII	345	GDP-mannose-4,6-dehydratase	NysDIII, <i>Streptomyces noursei</i>	89.93
6	CypI	9499	Type I PKS	NysI, <i>Streptomyces noursei</i>	73.80
7	CypJ	5425	Type I PKS	AnphJ, <i>Streptomyces nodosus</i>	61.67
8	CypK	2031	Type I PKS	NysK, <i>Streptomyces noursei</i>	84.89
9	CypL	403	P450 monooxygenase	NysL, <i>Streptomyces noursei</i>	68.77
10	CypM	413	P450 monooxygenase	NysM, <i>Streptomyces noursei</i>	74.83
11	CypDII	352	Aminotransferase	NysDII, <i>Streptomyces noursei</i>	82.90
12	CypDI	489	Glycosyltransferase	NysDI, <i>Streptomyces noursei</i>	79.85
13	CypA	1097	Type I PKS	NysA, <i>Streptomyces noursei</i>	62.69
14	CypB	3175	Type I PKS	NysB, <i>Streptomyces noursei</i>	71.78
15	CypC	10876	Type I PKS	NysC, <i>Streptomyces noursei</i>	71.77
16	CypE	274	Thioesterase	discrete thioesterase, <i>Streptomyces nodosus</i>	77.83
17	CypRI	946	Regulation	NysRI, <i>Streptomyces noursei</i>	45.58
18	CypRII	765	Regulation	FsCRII, <i>Streptomyces sp. PR-008</i>	35.44
19	CypRIII	925	Regulation	NysRIII, <i>Streptomyces noursei</i>	38.48
20	CypO	526	Decarboxylase	putative acyl CoA decarboxylase, <i>Streptomyces griseus</i>	77.85
21	CypRIV	213	Regulation	ORF4, <i>Streptomyces noursei</i>	45.86
22	CypR	138	Ferredoxin	4Fe-4S ferredoxin, <i>Kineococcus radiotolerans</i> SR530216	35.45
23	CypRV	963	Regulation	FsCRII, <i>Streptomyces sp. PR-008</i>	35.46
24	CypRVI	884	Regulation	FsCRII, <i>Streptomyces sp. PR-008</i>	32.42

(72) 발명자

이미진

인천광역시 남구 용현4동 49-21 뉴캐슬빌 302호

김병균

서울특별시 동대문구 회경1동 183-104 구암빌라 102호

이 발명을 지원한 국가연구개발사업

과제고유번호 M102KK010016-08K1101-01620

부처명 과학기술부

연구사업명 21세기프론티어연구개발사업

연구과제명 회소 방선균 *Pseudonocardia autotrophica* 유전체 재설계 및 조절기작 최적화를 통한 폴리
케타이드계 Cryptic 폴리엔생합성 분자공정 개발

주관기관 인하대학교 산학협력단

연구기간 2008년 05월 01일 ~ 2011년 03월 31일

특허청구의 범위

청구항 1

서열번호 1의 염기서열로 표시되는 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔 생합성 유전자 클러스터.

청구항 2

다음을 포함하는 슈도노카디아 오토트로피카의 모듈라 PKS(polyketide synthase):

(a)서열번호 13의 KS, AT, ACP 영역으로 구성된 아미노산 서열;

(b)서열번호 14의 KS1, mAT1, KR1, ACP1, KS2, mAT2, KR2, ACP2영역으로 구성된 아미노산 서열;

(c)서열번호 15의 KS3, AT3, DH3, KR3, ACP3, KS4, AT4, DH4, KR4, ACP4, KS5, AT5, DH5, ER5, KR5, ACP5, KS6, AT6, DH6, KR6, ACP6, KS7, AT7, DH7, KR7, ACP7, KS8, AT8, DH8, KR8, ACP8영역으로 구성된 아미노산 서열;

(d)서열번호 6의 KS9, AT9, DH9, KR9, ACP9, KS10, AT10, KR10, ACP10, KS11, mAT11, KR11, ACP11, KS12, AT12, KR12, ACP12, KS13, AT13, KR13, ACP13, KS14, AT14, KR14, ACP14영역으로 구성된 아미노산 서열;

(e)서열번호 7의 KS15, AT15, DH15, ER15, KR15, ACP15, KS16, AT16, KR16, ACP16, KS17, AT17, DH17, KR17, ACP17영역으로 구성된 아미노산 서열; 및

(f) 서열번호 8의 KS18, AT18, DH18, KR18, ACP18, TE18영역으로 구성된 아미노산 서열.

청구항 3

제2항의 슈도노카디아 오토트로피카의 모듈라 PKS를 코딩하는 유전자.

청구항 4

제3항에 있어서, 상기 유전자는 서열번호 1의 6673-35172(cppI), 35193-51470(cppJ), 51508-57603(cppK), 62823-66116(cppA), 66162-75689(cppB), 및 75724-108354(cppC)의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 5

제2항에 있어서, KR12 및 KR13은 비활성인 것을 특징으로 하는 슈도노카디아 오토트로피카의 모듈라 PKS.

청구항 6

제2항에 있어서, AT15, AT16 및 AT17은 아세테이트 특이적인(acetate-specific) AT를 포함하는 것을 특징으로 하는 슈도노카디아 오토트로피카의 모듈라 PKS.

청구항 7

제2항에 있어서, DH17은 비활성인 것을 특징으로 하는 슈도노카디아 오토트로피카의 모듈라 PKS.

청구항 8

제2항에 있어서, 서열번호 8의 아미노산 서열에서, 위치 944의 히스티딘이 글루탐산으로 치환된 것을 특징으로 하는 슈도노카디아 오토트로피카의 모듈라 PKS.

청구항 9

서열번호 5, 11 또는 12의 아미노산 서열로 표시되는 마이코사민 생성 단백질.

청구항 10

제9항의 마이코사민 생성 단백질을 코딩하는 유전자(cppD I, cppD II 또는 cppD III).

청구항 11

제10항에 있어서, 상기 cppDI, cppDII 및 cppDIII 유전자는 각각 서열번호 1의, 61190-62659, 60100-61158, 5466-6500 영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 12

서열번호 9 또는 10의 아미노산 서열로 표시되는 시토크롬 P-450 모노옥시게나제(cytochrome P-450 monooxygenase).

청구항 13

제12항의 시토크롬 P-450 모노옥시게나제를 코딩하는 유전자(cppL, cppN).

청구항 14

제13항에 있어서, 상기 cppL 및 cppN 유전자는 각각 서열번호 1의 57600-58811 및 58862-60103영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 15

서열번호 3 또는 4의 아미노산 서열로 표시되는 ABC 트랜스포터(ABC transporter) 단백질.

청구항 16

제15항의 ABC 트랜스포터 단백질을 코딩하는 유전자(cppG, cppH).

청구항 17

제16항에 있어서, 상기 cppG 및 cppH 유전자는 각각 서열번호 1의 1551-3329 및 3421-5175영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 18

서열번호 2의 아미노산 서열로 표시되는 4-포스포판테틴 트랜스퍼라제(4-Phosphopantetheine transferases).

청구항 19

제18항의 4-포스포판테틴 트랜스퍼라제를 코딩하는 유전자(cppF)

청구항 20

제19항에 있어서, 상기 cppF유전자는 서열번호1의 1-675영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 21

서열번호 16의 아미노산 서열로 표시되는 티오에스터라제(thioesterase)

청구항 22

제21항의 티오에스터라제를 코딩하는 유전자(cppE)

청구항 23

제22항에 있어서, 상기 cppE유전자는 서열번호 1의 108432-109256영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 24

서열번호 20의 아미노산 서열로 표시되는 디카르복실레이즈(decarboxylase)

청구항 25

제24항의 디카르복실레이즈를 코딩하는 유전자(cpp0)

청구항 26

제25항에 있어서, 상기 cpp0 유전자는 서열번호 1의 117603-119183영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 27

서열번호 22의 아미노산 서열로 표시되는 페레독신(ferredoxin) 단백질.

청구항 28

제27항의 페레독신 단백질을 코딩하는 유전자(cppM).

청구항 29

제28항에 있어서, 상기 cppM 유전자는 서열번호 1의 120205-120621영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 30

서열번호 17, 18, 19, 21, 23 또는 24의 아미노산 서열로 표시되는 전사조절 단백질.

청구항 31

제30항의 전사조절 단백질을 코딩하는 유전자(cppR I, cppR II, cppR III, cppR IV, cppR V 또는 cppR VI).

청구항 32

제31항에 있어서, 상기 cppR I, cppR II, cppR III, cppR IV, cppR V 및 cppR VI 유전자는 각각 서열번호 1의 109391-112231, 112240-114537, 114555-117332, 119224-119865, 120734-123625 및 123663-125717영역의 염기서열로 표시되는 것을 특징으로 하는 유전자.

청구항 33

제30항에 있어서, 상기 전사조절 단백질은 C 터미널 부분에 에이치티에이치 디엔에이 결합 모티프(HTH DNA binding motif)를 갖는 것을 특징으로 하는 단백질.

청구항 34

제1항의 유전자 클러스터를 포함하는 벡터.

청구항 35

제34항의 벡터에 의해 형질전환된 세균.

청구항 36

제35항의 세균에 의한 폴리엔의 제조방법.

청구항 37

제36항의 방법에 의하여 제조된 폴리엔.

명세서

발명의 상세한 설명

기술분야

[0001] 본 발명은 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*)의 폴리엔 합성을 위한 유전자군 및 이의 염기서열에 관한 것이다.

배경 기술

[0002] 항진균 및 항바이러스 활성을 지닌 폴리엔 항생제는, 일반적으로 20 내지 40개의 탄소로 이루어진 거대한 매크로락톤(macrolactone) 링 구조를 지니며, 분자 내에 약 3 내지 8개의 접합된 이중결합(conjugated double bond)을 갖는 전형적인 유형 I 폴리케타이드 매크로라이드(polyketide macrolide) 화합물이다.

[0003] 폴리케타이드란 폴리케타이드 합성효소들의 작용으로 일련의 축합과 후속 변형을 통해 2-탄소 유닛으로부터 합성되는 화합물로서, 곰팡이나 방선균을 포함한 몇몇 박테리아에서 생산된다 (Robinson, J.A., *Philos. Trans. R. Soc. Lond. B.Biol. Sci.*, 332:107-14, 1991; Hopwood, D.A., *Curr. Opin. Biotechnol.*, 4:531-537, 1993). 폴리케타이드는 매우 다양한 구조를 갖는 생리적 활성 분자이고, 미생물, 곰팡이, 식물 등에서 두루 발견되었는데, 임상에서 유용하게 이용되고 있는 항생제(erythromycin, tetracycline, rifampin), 항진균제(amphotericin B), 항암제(daunorubicin, epothilone), 면역억제제(FK-506, rapamycin), 고지혈치료제(lovastatin) 뿐 아니라 가축용이나 농업에 이용되는 성장촉진제(monensin 등의 polyethers), 살충제(spinosin), 및 구충제(ivermectin) 등 다양한 구조의 생리 활성물질들을 포함한다.

[0004] 일반적으로 이러한 자연상태의 폴리케타이드를 이용한 생산방법은 그 효율이 낮아 산업적 이용이 어려웠으며 종래의 화학적 방법에 의해 폴리케타이드 화합물을 생산하는 데는 또한 많은 경제적·기술적 어려움이 있었다.

[0005] 이러한 관심들로 인해 자연상태의 폴리케타이드를 효율적으로 생합성하고자 하는 연구들이 진행되었으며 그 관련 유전자를 이용한 재조합 생산방식이 개발되기 시작하였다. 즉, 폴리케타이드 생합성 효소를 코딩하는 유전자의 재조합 기술을 이용한 클로닝, 분석 및 조작 등의 연구가 수행되었으며, 이들 기술로 인해 폴리케타이드를 생산하지 않는 자연 또는 숙주에서 발생하는 것보다 높은 수준으로 폴리케타이드의 생산이 가능하게 되었다 (WO 93/13663; 95/08548; 96/40968; 97/02358; 98/27203; 및 98/49315; US 4,874,748; 5,063,155; 5,098,837; 5,149,639; 5,672,491; 5,712,146; 5,830,750; 5,843,718; Fu, H. et al., *Biochem.*, 33:9321-6, 1994; McDaniel, R. et al., *Science*, 262:1546-50, 1993; Kuhstoss, S. et al. *Gene*. 183:231-6, 1996).

[0006] 자연상태의 폴리케타이드는 폴리케타이드 합성효소(polyketide synthase, PKS)라고 하는 50여종의 여러 효소와 캐리어단백질의 연속적인 활성에 의해 합성되는데 이는 지방산의 합성과 유사하다 (Robinson, J.A., *Philos. Trans. R. Soc.Lond. B. Biol. Sci.*, 332:107-14, 1991; Hopwood, D.A., *Curr. Opin. Biotechnol.*, 4:531-7, 1993).

[0007] PKS에는 두 가지 형태가 있는 데 하나는 모듈형태의 것이고, 다른 하나는 반복적(iterative)인 것이다 (Khosla, C., *Chem. Rev.*, 97:2577-90, 1997). 모듈라 PKS(type I)는 폴리케타이드 탄소 사슬의 조립과 변형의 모든 단계가 각기 다른 촉매자리에 의해 일어나는 반면에, 반복적 PKS(type 2)는 한 촉매자리가 생합성 경로 상에서 한번이상 사용된다. 전형적인 모듈라 PKS는 여러 개의 커다란 폴리펩티드 사슬로 이루어져 있는데, 이들은 N-말단에서 C-말단 방향으로 부하모듈 (loading module), 다중 확장모듈 (multiple modules), 그리고 방출모듈 (releasing module)로 구분되어 진다 (Hopwood and Sherman, *Annu. Rev. Genet.*, 24:37-66, 1990). 부하모듈은 아실트랜스퍼라제(acyl-transferase; AT)와 아실캐리어 단백질(acyl carrier protein; ACP)로 이루어져 있다. 또 다중 확장모듈은 기본적으로 케토신세아제(ketosynthase; KS), AT, ACP를 포함하고 있으며, 이러한 기본 모듈 이외에 신장되는 폴리케타이드 사슬의 β -탄소를 변형시키는 효소를 포함하기도 한다. 마지막으로 방출모듈은 티오에스테라제(thioesterase; TE)와 일부에서는 사이클라제 활성을 포함하기도 한다.

[0008] 현재까지 보고된 대부분의 폴리엔 계열의 항생물질들은 토양미생물인 방선균(actinomycetes)에 의해 생합성 되고, 진균류의 세포막에 존재하는 스테롤(sterol)과 결합하여 채널을 형성함으로써 K^+ 및 Mg^{2+} 등의 세포 내 성분을 세포 외로 누출시키기 때문에 곰팡이 및 효모와 같은 진균류의 대사장애를 일으킴으로써, 우수한 항진균 활성을 보유하고 있다는 사실이 밝혀졌으며, (Aparicio, J. F. et al., *Appl Microbiol Biothchnol.* 61, 179-188, 2003; Zotchev, S. B., *Curr Med Chem.* 10, 211-223, 2003), 최근에는 미생물 유래 생물농약이 인체에 무해하면서도 병충해를 방제할 수 있으며, 환경오염을 최소화 할 수 있다는 점에서 화학농약의 대체제로서 각광받으면서 폴리엔 관련 연구가 활발하게 진행되고 있다.

[0009] 전술한 바와 같이, 신규 폴리엔의 확보는 그 자체로서 항진균 및 항바이러스 활성을 지닌 폴리엔 항생제로서 유용하게 사용될 수 있을 뿐만 아니라, 폴리엔 유전자 염기서열의 일부 변형을 통하여 기존의 폴리엔의 생산성 증

가 또는 신규한 폴리엔생산 변이체 제조에 이용할 수 있기 때문에, 신규 폴리엔 생합성 유전자를 규명하는 것은 매우 시급한 연구 과제이다.

[0010] 방선균은 포자를 형성하고, 필라멘트 형태의 균사체를 이루며 주위의 환경 변화에 따라 독특한 형태적 분화를 거치는 대표적인 그람 양성 토양미생물로서, 항생제, 항암제와 같은 다양한 종류의 유용한 생리적 활성 물질을 생산해 내는 균주이다.

[0011] 특히 희소 방선균인 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*)는 비타민 D3 하이드록실레이즈의 기능을 갖는 균주로서 생리활성 물질 변형과 관련하여 매우 유용한 균주로 알려져 있다. 그러나, 슈도노카디아 오토트로피카는 방선균 자체의 존재가 극미하고 생존조건이나 배양 조건이 매우 까다로움기 때문에 상기 미생물에 관한 생태학적 및 유전적 연구가 미비하였으며, 폴리엔 생합성에 관여하는 유전자의 염기서열은 보고되지 않았다.

[0012] 따라서 본 발명자들은 슈도노카디아 오토트로피카에서 신규 폴리엔 생합성에 관여하는 유전자를 규명하고자 예의 연구 노력한 결과, 슈도노카디아 오토트로피카 코스미드 라이브러리를 이용하여 신규 유전자군을 확인하고 염기서열의 특성을 규명함으로써 본 발명을 완성하였다.

발명의 내용

해결 하고자하는 과제

[0013] 본 발명의 목적은 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*)의 폴리엔 합성을 위한 유전자군 및 이의 염기서열을 제공하는 것이다.

과제 해결수단

[0014] 본 발명의 목적을 달성하기 위해서, 본 발명은 서열번호 1의 염기서열로 표시되는 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔 생합성 유전자 클러스터, 슈도노카디아 오토트로피카의 모듈라 PKS(polyketide synthase) 및 폴리엔 생합성에 관련하는 서열번호 2 내지 24의 아미노산 서열을 제공한다.

[0015] 본 발명의 유전자군에서 생합성될 신규 폴리엔 물질을 Cryptic *Pseudonocardia* Polyene (이하 CPP) 라고 나타낸다.

[0016] 본 발명은 보다 구체적으로 폴리케타이드(PKS) 유전자와, 마이코사민(mycosamine) 생성 단백질, 4-포스포판테틴 트랜스퍼라제(4-Phosphopantetheine transferases), 시토크롬 P-450 모노옥시게나제(cytochrome P-450 monooxygenase), ABC 트랜스포터(ABC transporter), 티오에스터라제(thioesterase), 디카르복실레이즈(decarboxylase), 페레독신(ferredoxin) 단백질, 전자조절 단백질 등을 코딩하는 유전자를 모두 포함하고 있다.

[0017] 본 발명은 서열번호 1의 염기서열로 표시되는 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔 생합성 유전자 클러스터의 전체 염기서열을 제공한다. 서열번호 1은 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔 생합성에 관여하는 cppA, cppB, cppC, cppD I, cppD II, cppDIII, cppE, cppF, cppG, cppH, cppI, cppJ, cppK, cppL, cppM, cppN, cppO, cppR I, cppR II, cppRIII, cppRIV, cppRV 및 cppRVI으로 구성된 23개의 해독 프레임(open reading frame)을 갖고 있는 125,717bp의 유전자 염기서열이다.

[0018] 본 발명에 있어서, 폴리케타이드(PKS) 유전자는 모듈라(type I) PKS로서, cppA, cppB, cppC, cppI, cppJ 및 cppK 의 폴리케타이드 신세아제를 나타내고, ketosynthase(KS), acyl transferase(AT), acyl carrier protein(ACP), ketoreductase(KR), dehydrate(DH) 및 enoylreductase(ER) 도메인을 포함하고 있다.

[0019] 본 발명은 또한

[0020] (a)서열번호 13의 KS, AT, ACP 영역으로 구성된 아미노산 서열;

[0021] (b)서열번호 14의 KS1, mAT1, KR1, ACP1, KS2, mAT2, KR2, ACP2영역으로 구성된 아미노산 서열;

[0022] (c)서열번호 15의 KS3, AT3, DH3, KR3, ACP3, KS4, AT4, DH4, KR4, ACP4, KS5, AT5, DH5, ER5, KR5, ACP5, KS6, AT6, DH6, KR6, ACP6, KS7, AT7, DH7, KR7, ACP7, KS8, AT8, DH8, KR8, ACP8영역으로 구성된 아미노산 서열;

[0023] (d)서열번호 6의 KS9, AT9, DH9, KR9, ACP9, KS10, AT10, KR10, ACP10, KS11, mAT11, KR11, ACP11, KS12,

AT12, KR12, ACP12, KS13, AT13, KR13, ACP13, KS14, AT14, KR14, ACP14영역으로 구성된 아미노산 서열;

[0024] (e)서열번호 7의 KS15, AT15, DH15, ER15, KR15, ACP15, KS16, AT16, KR16, ACP16, KS17, AT17, DH17, KR17, ACP17영역으로 구성된 아미노산 서열; 및

[0025] (f) 서열번호 8의 KS18, AT18, DH18, KR18, ACP18, TE18영역으로 구성된 아미노산 서열을 포함하는 슈도노카디아 오토트로피카의 모듈라 PKS(polyketide synthase) 및 이를 코딩하는 유전자를 제공한다.

[0026] 상기 모듈라 PKS(polyketide synthase)의 KR 도메인 중 KR12 및 KR13이 비활성(inactive)화 되어 있기 때문에, 본 발명의 폴리엔이 nystatin과 구조적으로 차이점을 가지게 된다. 서열번호 7의 아미노산 서열을 코딩하는 유전자는 cppJ로서, 3개의 모듈(module)을 갖고 5425aa의 단백질을 코딩하는 매우 큰 유전자로 분석되었다. cppJ의 모든 AT 도메인은 아세테이트 특이적인(acetate-specific) AT를 포함하고 있음을 확인하였으며, (도 3). cppJ의 DH 도메인의 보존 모티프(conserved motif)를 비교해본 결과, DH15는 활성이며, DH17의 경우 보존 히스티딘 잔기(conserved histidine residue)가 프롤린(proline)으로 변경되어 비활성(inactive) DH임을 확인하였다.(도 3). cppK는 모듈라 PKS(polyketide synthase)의 마지막인 18번째 모듈로서 1개의 DH가 존재하며, DH 18의 경우 활성 사이트인 HXXXGXXXP에서의 보존 히스티딘 잔기(conserved histidine residue) (서열번호 8의 944번째 잔기) 글루탐산 (glutamic acid)으로 변경되어 있으며, 마지막 부분에 폴리엔의 backbone 부분을 고리화 반응시키는 티오에스테라제(thioesterase) 유전자가 존재한다. 상기의 PKS 시퀀스를 분석한 구성도는 도 4에 도시하였다.

[0027] 본 발명에 있어서, cppDI, cppDII, cppDIII는 폴리엔의 당부분인 마이코사민(mycosamine)을 코딩하는 유전자로서, 폴리엔의 당 부분은 항진균 활성에 매우 중요한 역할을 한다고 보고 알려져 있다. 그 중 cppDI 유전자는 489aa 길이의 UDP-글리코실트랜스퍼라제(UDP-glycosyltransferase)를 코딩하고 있으며 그 단백질의 역할은 생성된 마이코사민(mycosamine)을 폴리엔 backbone에 붙여주는 역할을 한다고 알려져 있다. cppDII 유전자는 352aa 길이의 아미노트랜스퍼라제(Aminotransferase)를 코딩하고 있으며 그 단백질은 마이코사민(mycosamine)을 생성하는데 중요한 역할을 한다고 알려져 있다. 마지막으로 cppDIII 유전자는 344aa 길이의 GDP-만노오스-4,6-디하이드레이트(GDP-mannose-4,6-dehydratases)를 코딩하고 있으며 그 단백질은 마이코사민(mycosamine)을 생성하는데 중요한 역할을 한다고 알려져 있다. 이러한 3개의 유전자가 마이코사민(mycosamine)을 폴리엔의 backbone에 결합시키는데 관여될 것이다.

[0028] 본 발명에 있어서, cppL은 시토크롬 P-450 모노옥시게나제(cytochrome P-450 monooxygenase)를 코딩하는 유전자로 밝혀졌으며 이것은 CPP의 10번 탄소를 하이드록실레이션(hydroxylation)시키는 것으로 보인다. cppN도 cppL과 마찬가지로 시토크롬 P-450 모노옥시게나제(cytochrome P-450 monooxygenase)를 코딩하는 유전자로 밝혀졌으며, 이것은 CPP의 16번 탄소를 하이드록실레이션(hydroxylation)시키는 것으로 보인다.

[0029] cppH와 cppG 유전자는 ABC 트랜스포터(ABC transporter)를 코딩하는 것으로 분석되었고, 이 단백질들은 CPP를 세포 밖으로 유출시키는 역할을 할 것으로 보이며, cppF 유전자는 4-포스포판테틴 트랜스퍼라제(4-Phosphopantetheine transferases)를 코딩하는 것으로 분석되었고, 이 단백질은 번역 후 변경(Post translational PKS modification)을 담당하는 것으로 보인다.

[0030] cppC의 downstream에 위치하는 cppE는 티오에스테라제(thioesterase)를 코딩하고 있으며, nystatin의 nysE와 매우 높은 유사성 (69% identity) 을 나타내었다. 이러한 티오에스테라제(thioesterase)는 PKS의 카르복실(carboxyl) 말단에 위치하는 티오에스테라제(thioesterase)와는 달리 폴리케타이드(polyketide)의 체인 신장(chain elongation) 과정에서 확장 유닛(extension unit)의 'Proof-reading'역할을 하는 것으로 알려져 있다 (Reynolds, K. A et al., *J. Biol. Chem.*, 277 (50) : 48028-48034, 2002).

[0031] cppRIII의 downstream에 위치하는 cppO의 염기서열을 분석한 결과 putative acyl CoA decarboxylase를 코딩하고 있으며 프레드리카마이신(fredericamycin)의 upstream에 존재하는 orf1과 매우 높은 유사성 (77% identity)을 보이고, 또한 ghrG (73% identity) 및 jadN (72% identity)와도 매우 높은 유사성을 나타낸다. 이러한 family의 유전자는 말로닐 코에이(malonyl CoA) 생합성에 관여하는 트랜스카르복실레이즈(transcarboxylase)와 유사하며, jadomycin 생산성에 긍정적인 영향을 준다고 알려져 있다(Vining, L. C et al, *Microbiology*, 146 (4) : 903-910 2000).

[0032] cppM은 cppRIV의 upstream에 위치하며 Kineococcus radiotolerans SRS30216에서의 4Fe-4S 페레독신(ferredoxin)의 N-terminal 일부와 35%의 identity를 나타내었고, 그 외에 유사성을 보이는 유전자는 찾을 수 없었다. 일반적으로 폴리엔 화합물에서는 페레독신(ferredoxin) 유전자가 존재하나, 본 발명의 슈도노카디아 오토트로피카

(*Pseudonocardia autotrophica*) 폴리엔 생합성 유전자군에서의 염기서열 분석결과 cppM은 보편적인 폴리엔의 페레독신(ferredoxin) 유전자를 비롯한 방선균에서의 페레독신(ferredoxin) 유전자와의 유사성이 거의 없음을 확인하였으며, 상기 페레독신(ferredoxin)의 영향으로 폴리엔 생합성 과정에서는 nysN에 의해 C-10 부분의 메틸(methyl)기가 COOH로 전환되는 카르복실레이션(carboxylation) 단계가 post-PKS modification 과정에서 일어나지 않을 것으로 보인다(도 5).

[0033] 결과적으로 본 발명의 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔의 페레독신(ferredoxin)의 구조의 상이성으로 인하여 전체적인 폴리엔 구조에서 Nystatin 등 종래의 폴리엔과 차이가 발생한다. 폴리엔 계열 항진균 물질은 작은 구조적 차이로도 활성과 독성의 큰 차이를 나타내며, amphotericin의 경우 폴리엔의 carboxyl group이 methyl group으로 치환된 analogue가 기존의 amphotericin에 비해 독성이 약 33배 정도 감소된 점에서 (Caffrey, P. et. al., *J Biol Chem*, 280 (41):34420-34426 2005), 본 발명에 따른 페레독신(ferredoxin)은 폴리엔 생합성 과정에서 그 역할을 하지 못할 것이기 때문에 본 발명의 신규 폴리엔은 종래의 기존 산업적으로 활용되고 있는 폴리엔 항진균 물질에 비해 유리한 구조를 가질 것으로 보인다.(도 7)

[0034] In silico analysis를 수행한 결과 폴리엔 생합성의 조절 유전자들은 모두 nystatin 및 amphotericin 생합성 조절 유전자와 매우 유사한 구조를 갖고 있음을 확인하였으며, 본 발명에 있어서, 전사조절 단백질을 코딩하는 유전자를 각각 cppR I, cppR II, cppR III, cppR IV, cppR V 및 cppR VI라고 나타내었다. cppR I, cppR II, cppR III는 티오에스테라제(thioesterase)를 코딩하는 cppE의 downstream에 위치하며 염기서열 분석결과 nysR I, nysR II, nysR III를 비롯한 다수의 LAL (large ATP-binding regulators of the LuxR) family 계열의 전사 활성화인자(transcriptional activator)와 높은 상동성(homology)을 갖고 있음이 확인되었다. cppR I, cppR II, cppR III 폴리펩티드의 예상되는 구조를 분석해본 결과 이들은 모두 C 터미널 부분에 LuxR type의 에이치티에이치 디엔에이 결합 모티프(HTH DNA binding motif)를 갖고 또한 cppR I 과 cppR III는 N 터미널 부분에 Walker A 및 Walker B NTP binding motif를 보유하고 있다.(도 6A)

[0035] cppR IV는 cppO의 upstream에 위치하며 nysR IV와 유사성 (45% identity)을 보인다. 염기서열 분석결과 CppR IV의 N-terminal 부분에 PAS-like domain이 있으며, C 터미널 부분에 LuxR type의 에이치티에이치 모티프(HTH motif)가 존재함을 확인하였다(도 6A). 추가적으로 페레독신(ferredoxin) 유전자를 코딩하는 cppM의 Upstream 부분에 존재하는 cppR V 및 cppR IV 또한 C 터미널 부분에 LuxR type의 에이치티에이치 모티프(HTH motif)가 존재하며, CppR V는 N-terminal 부분에 Walker A 및 Walker B NTP binding motif를 보유하고 있음을 확인하였다.(도 6A)

[0036] 상기 염기서열 분석 결과, 전사 조절 단백질인 cppR I, cppR II, cppR III 및 cppR IV는 nystatin 생합성 조절단백질인 NysR I, NysR II, NysR III 및 NysR IV와 각각 서로 매우 유사함을 확인하였으며(도 6B), NysR I, NysR II, NysR III 및 NysR IV 모두 nystatin 생합성에 전사 활성화 인자(transcriptional activator)로서 작용됨이 알려져 있는 점에서(Zotchev, S. B et al, *J Bacteriol*, 186, 1345-1354, 2004), CppR I, CppR II, CppR III 및 cppR IV 또한 본 발명의 폴리엔 생합성에서 전사 활성화 인자(transcriptional activator)로서의 작용할 것으로 보인다.

효 과

[0037] 본 발명에 따른 상기 유전자 염기서열은 일부 변형을 통하여 기존의 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔의 생산성 증가 또는 신규한 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔의 변이체 제조에 이용할 수 있으며, 본 발명에 따른 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*)의 신규 폴리엔은 항진균 및 항바이러스 활성을 지닌 폴리엔 항생제로서 유용하게 사용될 수 있다.

발명의 실시를 위한 구체적인 내용

[0038] 이하, 본 발명의 이해를 돕기 위하여 바람직한 실시예 및 실험예를 제시한다. 그러나 하기의 실시예 및 실험예는 본 발명을 보다 쉽게 이해하기 위하여 제공되는 것일 뿐, 실시예에 의해 본 발명의 내용이 한정되는 것은 아니다.

[0039] <실시예 1>균주 및 플라스미드 배양방법

[0040] 본 실험에서 사용된 균주는 슈도노카디아 오토트로피카 KCTC9441로서 R2YE 액체배지에서 균사체(mycelium)상태

로 성장시킨 후 20% glycerol stock으로 -20에 냉동보관하여 사용하였다. 슈도토카디아 오토트로피카의 유전체 DNA군(genomic library) 분리에 사용될 균체를 얻기 위하여 YEME (Sucrose 340g, Yeast extract 3g, Bacto-peptone 5g, Malt extract 3g, Glucose 10g, D.W. 1L) 액체 배지에 stock을 충분히 접종하였다.

[0041] 28℃에서 5일간 배양한 후, 원심분리기 (8000rpm)를 이용하여 균체를 수확하였다. 코스미드 라이브러리 제작과 클로닝에 사용된 E. coli DH5 α는 LB 배지 (0.5% yeast extract, 1% tryptone peptone, 0.5% NaCl, 0.1% glucose)에서 성장시켰고, 필요에 따라 항생제인 아프라마이신(apramycin) 50 µg/ml 또는 앰피실린(ampicillin) 100 µg/ml 가 첨가된 LB 배지에서 배양하였다.

[0042] <실시예 2>코스미드 라이브러리 제작

[0043] 코스미드 라이브러리는 Streptomyces-E. coli shuttle 코스미드 벡터인 pOJ446을 이용하여 제작되었다. YEME에서 배양된 슈도토카디아 오토트로피카부터 전체 염색체(total chromosomal DNA)를 순수하게 분리하여, EcoRV로 처리한 후 40kb이상의 DNA 절편을 pOJ446에 클로닝 하였으며, 제작된 재조합 콜로니는 10⁴ 이상의 농도(titer)가 확인되었다.

[0044] <실시예 3>폴리엔 생합성 관련 코스미드 스크리닝

[0045] microplate reader로서 미생물성장 과정 중의 O.D (Optical density) 값의 변화를 측정하여 미생물의 성장상태를 분석하는 Bioscreen C (Transgalatic Ltd., Finland)를 이용하여 재조합 콜로니들을 배양한 후, 재조합 cosmid DNA를 분리하여 template로 사용하고 CYP degenerated primer(서열번호 25 및 26)와 PCR 실험(denaturing [96, 30초], annealing [40, 30초], extension [72, 35초], 30 cycle)을 수행하였다. CYP degenerated primer는 Xenotech(한국)에서 주문 제작하였으며, mixed base를 포함하여 제작되었다. 이러한 PCR-based method로 약 1000여개의 재조합 콜로니들을 추가적으로 screening 하였다. 약 1000개의 재조합 콜로니들을 PCR 방법을 통해서 screening한 결과, CYP의 central region인 350bp 크기의 DNA 단편이 증폭된 4개의 재조합 cosmid를 확보하였고, 이들을 각각 pESK601, pESK611, pESK612, pESK621, pESK622이라 명명 하였다.

[0046] CYP forward primer : TGGATCGGCGACGACCGSVYCGT(서열번호 25)

[0047] CYP reverse primer : CCGWASAGSAYSCCGTCGTACTT(서열번호 26)

[0048] S:(G/C);V:(A/G/C);Y:(T/C);W:(T/A)

[0049] <실시예 4>코스미드 클론으로부터 PKS 유전자 염기서열 분석

[0050] PCR을 통해 선별된 코스미드의 서열분석은 shotgun approach에 의해 Xenotech사에 의뢰하여 수행되었고 각 DNA 서열은 National Center for Biotechnology Information (NCBI) BLAST search를 이용하여 assemble되었다. 또한 Streptomyces DNA의 codon bias 정보에 따라 web-based program Frameplot 2.3.2(<http://www.nih.go.jp/~jun/cgi-bin/frameplot.pl>)을 이용하여 분석되었으며 각 PKS 도메인은 web site program Modular Polyketide Synthase Databae (<http://linux1.nii.res.in/~pkscdb/DBASE/page.html>)를 이용하여 분석되었다.

[0051] 각각의 유전자에 대해 분석한 결과는 다음과 같다. 서열번호 1은 슈도노카디아 오토트로피카(Pseudonocardia autotrophica) 폴리엔 생합성에 관여하는 cppA, cppB, cppC, cppD I, cppD II, cppDIII, cppE, cppF, cppG, cppH, cppI, cppJ, cppK, cppL, cppM, cppN, cppO, cppR I, cppR II, cppRIII, cppRIV, cppRV 및 cppRVI으로 구성된 23개의 해독 프레임(open reading frame)을 갖고 있는 125,717bp의 유전자 염기서열이다.

[0052] 본 발명에 있어서, 6개의 폴리케타이드(PKS) 유전자는 모듈라(type I) PKS로서, cppA, cppB, cppC, cppI, cppJ 및 cppK의 폴리케타이드 신세아제를 나타내고, ketosynthase(KS), acyl transferase(AT), acyl carrier protein(ACP), ketoreductase(KR), dehydrate(DH) 및 enoylreductase(ER) 도메인을 포함하고 있다. 각 PKS 유전자들의 염기서열 및 아미노산 서열을 표 1에 정리하였다.

표 1

[0053] 각 PKS 유전자들의 염기서열 및 아미노산 서열 위치

유전자	서열번호 1에서의 영역	대응하는 아미노산 서열번호
cppA	62823-66116	13
cppB	66162-75689	14
cppC	75724-108354	15
cppI	6673-35172	6
cppJ	35193-51470	7
cppK	51508-57603	8

[0054] cppA는 로딩모듈을 코딩하고 있으며, cppA의 PKS 도메인에 대한 아미노산 서열 영역의 경우는 종래 논문(M.-Y. Lee et al., Isolation and partial characterization of a cryptic polyene gene cluster in *Pseudonocardia autotrophica*. *J Ind Microbiol Biotechnol* 33 (2): 84-87, 2005) 에 개시된 바와 같다.

[0055] cppB는 모듈 1 및 2를 코딩하고, KS1, mAT1, KR1, ACP1, KS2, mAT2, KR2, ACP2영역을 가지고 있으며, PKS 도메인의 핵심서열을 표 2에 정리하였다.

[0056] cppC는 모듈 3 4, 5, 6, 7 및 8을 코딩하고, KS3, AT3, DH3, KR3, ACP3, KS4, AT4, DH4, KR4, ACP4, KS5, AT5, DH5, ER5, KR5, ACP5, KS6, AT6, DH6, KR6, ACP6, KS7, AT7, DH7, KR7, ACP7, KS8, AT8, DH8, KR8, ACP8 영역을 가지며, PKS 도메인의 핵심서열을 표 3에 정리하였다.

[0057] cppI는 모듈 9,10,11,12,13 및 14를 코딩하고, KS9, AT9, DH9, KR9, ACP9, KS10, AT10, KR10, ACP10, KS11, mAT11, KR11, ACP11, KS12, AT12, KR12, ACP12, KS13, AT13, KR13, ACP13, KS14, AT14, KR14, ACP14영역을 가지며, PKS 도메인의 핵심서열을 표 4에 정리하였다.

[0058] cppJ는 모듈 15, 16 및 17을 코딩하고, KS15, AT15, DH15, ER15, KR15, ACP15, KS16, AT16, KR16, ACP16, KS17, AT17, DH17, KR17, ACP17영역을 가지며, PKS 도메인의 핵심서열을 표 5에 정리하였다.

[0059] cppK는 모듈 18을 코딩하고, KS18, AT18, DH18, KR18, ACP18, TE18영역을 가지며, PKS 도메인의 핵심서열을 표 6에 정리하였다.

표 2

[0060] cppB의 PKS도메인의 핵심 서열

도메인	핵심 서열
mAT1	ALDELGA ~~V~~ LDGEGIRVRRVAVDYASHSHQVEELRAEILETLAGLSPQPSAVPLYST
KR1	RG ~~T~~ TLVTGG ~~S~~ GT ~~L~~ APDLARRLAADGAEHVLLSRR-GPE
mAT2	ALDALLPACESAGVRARRVSV ~~D~~ YASHGPHVEAVRDELA ~~E~~ VL ~~A~~ GITPRTP ~~T~~ VPFYST
KR2	RG ~~T~~ VLVTGG ~~T~~ GG ~~I~~ GGRTAVWAAGRGA ~~E~~ HL ~~L~~ LSRR-GED

표 3

[0061] cppC의 PKS도메인의 핵심 서열

도메인	핵심 서열	도메인	핵심 서열
AT3	GIAAVEEHARARGWRSTR ~~L~~ RVSHAFH SPLMEPMLAEFR ~~A~~ VAGLT ~~Y~~ HEPRIP VVS ~~N~~	AT6	AVLAVAEQLRAQGRSVTT ~~L~~ RVSHAFH SPLMDPML ~~E~~ EFRAVAEQLTYTEPVVP VVS ~~N~~
DH3	RLSVRTHPW ~~L~~ ADHGVQGRALLPGTAF VELAVRAGDEVG	DH6	RISTRTQPW ~~L~~ ADH ~~A~~ VGGRVLLPGTAF VELVLRAGEEVG
KR3	DGTVLITGGTGG ~~L~~ GGVLARHLVAEHG VRQ ~~L~~ LLAGRRGPD	KR6	AGTVLVTGGTGG ~~L~~ GAVLARHLVA ~~A~~ HD VRELL ~~L~~ VSRRGPD
AT4	GVDAAVAALAE ~~G~~ GRRTSRLRVSHAFH SPLMEPMLAEFRSVVAGLSPEAPAVP VVSS	AT7	AVREVAARFTADGHRATALRVSHAFH SPLMDPMLSEFGAVAAGITYREPSIP VVS ~~N~~

DH4	RLSASAPW LADHTVAGTVVLP GTAL LELAVRAGDEVG	DH7	RMSLRTHPW LADHTVAGRVVVP GTAL LEMAVRAGDEVG
KR4	EGTVLVTG GTGGLG LL ARHL VATHG VRHLL TSRSGAD	KR7	DGTVLVTG GTGGLGAQLARHL VEVHG VRHLV LASRRGAD
AT5	AVTAVGEQL-- AGRRTRLAVSHAFHSPLMDPMLAEF RAVAEQLSYAEPVVPVVS	AT8	AVLAVGTRLAEQGRRTTRLQVSHAFH SPLMDPMLLEGFRAVAERLTYAEPVVP VVS
DH5	RLSLATHPW LTDHAVRGTVLV PGTAL LELALRAGDEVG	DH8	RLSRGSHPW LVDHTVLGHVLV PGTAL LDMAIRAGDQVG
ER5	EKVLVHAG GGVGM AA QIARHL GAE VYATASEPKQHV	KR8	DGTVLVTG GTGGLGSLV ARHLVTGRG VRDLV LAGRRGPS
KR5	EGTVLVTG GTGGLG LL ARHL VATHG VRHLL TSRSGAD		

표 4

cppI의 PKS도메인의 핵심 서열

도메인	핵심 서열	도메인	핵심 서열
AT9	AVTAVAGLLADQGRRTRLRVSHAF HSPLMEPMLDEFRAVVEGLDLQAPL IPIVSD	AT12	EVDAAARLAAQGRRTRLRVSHAFH SPLMEPMLDEFRAVVSGLDYAAPAIP IVST
DH9	RLSLQTHPW LADHTVRGT TLLPGTA FLELAVRAGDEVG	KR12	TGTVLITG GTGGIGHV ARRLAAREGA AHL LAARR -GPD
KR9	DGAVLVTG GTGGLG AV ARHL ATTH GVTDLL LVGRRG PA	AT13	GVGALADRLAADGRRTRRLRVSHAFH SPLMDAMLDFGFAAASGITFAAPRIP LVST
AT10	ATAALAATFAEQGRRTRLRVSHAF HSPHMDGMLDFRAVAERIEYHAPR IPVVS	KR13	HGTVLVVG GTGALGRRA ARRLAADGA THLV LAPS -AAA
KR10	TGSVLVTG GTGGLG AEV ARWL ARSG VAHLV LSRR -GPD	AT14	AVTALAVALAGEGRRTSRLQVSHAFH SARMDPMLAEFRTVAEELDYHEPRIP VVS
mAT11	ALDELLAAFDAADVRARRIAVDYAS HSHQVEDLRDELATTLAAGLAPQPSQ VPVFST	KR14	TGTVLITG GTGALGHV ARRLAADGA QHLV LGR -GPD
KR11	RGTTLV TGSG T LAPHL ARRLAERG AEHV VLSRR -GPD		

표 5

cppJ의 PKS도메인의 핵심 서열

도메인	핵심 서열	도메인	핵심 서열
KS15	QGTVLITG GTGGLAAAL ARHLVAT HGVAHL LAGRRG PD	KR16	SGTVLITG GTGALGHV ARRLAADGA EHLV LGR -GPD
AT15	ATLAVAARLAEQGRRTSRLRVSHA FHSPLMDPMLAEFAVAEGLSYAE PRIPLVST	AT17	EVSAVADALAARGCRTRALRVSHAFH SPLMEPMLDGFDDVAGLNPNVEPRIPV VST
DH15	TLSTLTHPW LADHVVGGM VFFPGT GFLELAVRAADQAG	DH17	RLT---PT LVDPAAGDLPAL PAAVL AELAVRAGDEAG
ER15	EKVLIHAG GGVGM AA QIAHHL G AEVYATASEPKQDVL	KR17	DGTVLVTG GTGGLG ALL ARHL VTTGRG VRHLL LAGRRG PD
AT16	EVDAAAEALAARGRTTALRVSHA FHSPLMDPVLDEFRAVVRDLGYEL PAIPVVS		

표 6

[0064] cppK의 PKS도메인의 핵심 서열

도메인	핵심 서열
AT18	AVAAVAARFEDRGRRIITLSVSHAF HSPLIDPMLAEFARVVDGLTFAEPR IPVVS
DH18	RLSPRTQPWLGPERTDGRVDVPGAV FAELAIRAGDQVG
KR18	DGTVLVTGGTGGGALLARHLVTTG RTRNLLASRRGPD

[0065] 상기 핵심 서열 들 중 보존서열은 밑줄 친 붉은글씨로 표현되었다.

[0066] 슈도노카디아 오토트로피카(Pseudonocardia autotrophica) 폴리엔 생합성에 관여하는 유전자들이 코딩하는 단백질의 기능에 대하여 표 7에 정리하였다.

표 7

[0067] 슈도노카디아 오토트로피카(Pseudonocardia autotrophica) 폴리엔 생합성에 관여하는 유전자들이 코딩하는 단백질의 기능 및 nystatin 생합성 유전자와의 상동성 비교

서열 번호	Protein	aa	Proposed Function	Homologs, Origins	Identities, Positives (%)
2	CppF	224	Phosphopanthetheine transferase	NysF, <i>Streptomyces noursei</i>	63,73
3	CppG	592	ABC transporter	NysG, <i>Streptomyces noursei</i>	75,83
4	CppH	584	ABC transporter	NysH, <i>Streptomyces noursei</i>	76,84
5	CppDIII	345	GDP-mannose-4,6-dehydratase	NysDIII, <i>Streptomyces noursei</i>	89,93
6	CppI	9499	Type I PKS	NysI, <i>Streptomyces noursei</i>	73,80
7	CppJ	5425	Type I PKS	AmphJ, <i>Streptomyces nodosus</i>	61,67
8	CppK	2031	Type I PKS	NysK, <i>Streptomyces noursei</i>	64,69
9	CppL	403	P450 monooxygenase	NysL, <i>Streptomyces noursei</i>	68,77
10	CppN	413	P450 monooxygenase	NysN, <i>Streptomyces noursei</i>	74,83
11	CppDII	352	Aminotransferase	NysDII, <i>Streptomyces noursei</i>	82,90
12	CppDI	489	Glycosyltransferase	NysDI, <i>Streptomyces noursei</i>	79,85
13	CppA	1097	Type I PKS	NysA, <i>Streptomyces noursei</i>	62,69
14	CppB	3175	Type I PKS	NysB, <i>Streptomyces noursei</i>	71,78
15	CppC	10876	Type I PKS	NysC, <i>Streptomyces noursei</i>	71,77
16	CppE	274	Thioesterase	discrete thioesterase, <i>Streptomyces nodosus</i>	77,83
17	CppRI	946	Regulation	NysRI, <i>Streptomyces noursei</i>	45,58
18	CppRII	765	Regulation	FscRIV, <i>Streptomyces sp. FR-008</i>	35,44
19	CppRIII	925	Regulation	NysRIII, <i>Streptomyces noursei</i>	38,48
20	CppO	526	Decarboxylase	putative acyl CoA decarboxylase, <i>Streptomyces griseus</i>	77,85
21	CppRIV	213	Regulation	ORF4, <i>Streptomyces noursei</i>	45,66
22	CppM	138	Ferredoxin	4Fe-4S ferredoxin, <i>Kineococcus radiotolerans SRS30216</i>	35,45
23	CppRV	963	Regulation	FsCRII, <i>Streptomyces sp. FR-008</i>	35,46
24	CppRVI	684	Regulation	FsCRII, <i>Streptomyces sp. FR-008</i>	32,42

- [0068] 표 7에서 볼 수 있듯이, 본 발명의 슈도노카디아 오토트로피카(Pseudonocardia autotrophica) 폴리엔 생합성 유전자군은 nystatin 생합성 PKS 유전자와 상당한 유사성을 나타내고 있으며(도 1), 이들 유전자들의 배열 또한 유사성이 높음을 확인할 수 있다.(도 2)
- [0069] <실시예 5>슈도노카디아 오토트로피카(Pseudonocardia autotrophica) 폴리엔 생합성에 관여하는 유전자들의 기능
- [0070] 모듈라 PKS(polyketide synthase)의 KR 도메인 중 KR12 및 KR13이 비활성(inactive)화 되어 있기 때문에, 본 발명의 폴리엔이 nystatin과 구조적으로 차이점을 가지게 된다. 서열번호 7의 아미노산 서열을 코딩하는 유전자는 cppJ로서, 3개의 모듈(module)을 갖고 5425aa의 단백질을 코딩하는 매우 큰 유전자로 분석되었다. cppJ의 모든 AT 도메인은 아세테이트 특이적인(acetate-specific) AT를 포함하고 있음을 확인하였으며, (도 3). cppJ의 DH 도메인의 보존 모티프(conserved motif)를 비교해본 결과, DH15는 활성이며, DH17의 경우 보존 히스티딘 잔기(conserved histidine residue)가 프롤린(proline)으로 변경되어 비활성(inactive) DH임을 확인하였다.(도 3). cppK는 모듈라 PKS(polyketide synthase)의 마지막인 18번째 모듈로서 1개의 DH가 존재하며, DH 18의 경우 활성 사이트인 HXXXGXXXP에서의 보존 히스티딘 잔기(conserved histidine residue)가 글루탐산 (glutamic acid)으로 변경되어 있으며, 마지막 부분에 폴리엔의 backbone 부분을 고리화 반응시키는 티오에스터라제(thioesterase) 유전자가 존재한다. 상기의 PKS 시퀀스를 분석한 구성도는 도 4에 도시하였다.
- [0071] cppDI, cppDII, cppDIII는 폴리엔의 당부분인 마이코사민(mycosamine)을 코딩하는 유전자로서, 폴리엔의 당 부분은 항진균 활성에 매우 중요한 역할을 한다고 보고 알려져 있다. 그 중 cppDI 유전자는 489aa 길이의 UDP-글리코실트랜스퍼라제(UDP-glycosyltransferase)를 코딩하고 있으며 그 단백질의 역할은 생성된 마이코사민(mycosamine)을 폴리엔 backbone에 붙여주는 역할을 한다고 알려져 있다. cppDII 유전자는 352aa 길이의 아미노트랜스퍼라제(Aminotransferase)를 코딩하고 있으며 그 단백질은 마이코사민(mycosamine)을 생성하는데 중요한 역할을 한다고 알려져 있다. 마지막으로 cppDIII 유전자는 344aa 길이의 GDP-만노오스-4,6-디하이드레이트(GDP-mannose-4,6-dehydratases)를 코딩하고 있으며 그 단백질은 마이코사민(mycosamine)을 생성하는데 중요한 역할을 한다고 알려져 있다. 이러한 3개의 유전자가 마이코사민(mycosamine)을 폴리엔의 backbone에 결합시키는데 관여될 것이다.
- [0072] 본 발명에 있어서, cppL은 시토크롬 P-450 모노옥시게나제(cytochrome P-450 monooxygenase)를 코딩하는 유전자로 밝혀졌으며 이것은 CPP의 10번 탄소를 하이드록실레이션(hydroxylation)시키는 것으로 보인다. cppN도 cppL과 마찬가지로 시토크롬 P-450 모노옥시게나제(cytochrome P-450 monooxygenase)를 코딩하는 유전자로 밝혀졌으며, 이것은 CPP의 16번 탄소를 하이드록실레이션(hydroxylation)시키는 것으로 보인다.
- [0073] cppH와 cppG 유전자는 ABC 트랜스포터(ABC transporter)를 코딩하는 것으로 분석되었고, 이 단백질들은 CPP를 세포 밖으로 유출시키는 역할을 할 것으로 보이며, cppF 유전자는 4-포스포판테틴 트랜스퍼라제(4-Phosphopantetheine transferases)를 코딩하는 것으로 분석되었고, 이 단백질은 번역 후 변경(Post translational PKS modification)을 담당하는 것으로 보인다.
- [0074] cppC의 downstream에 위치하는 cppE는 티오에스터라제(thioesterase)를 코딩하고 있으며, nystatin의 nysE와 매우 높은 유사성 (69% identity) 을 나타내었다. 이러한 티오에스터라제(thioesterase)는 PKS의 카르복실(carboxyl) 말단에 위치하는 티오에스터라제(thioesterase)와는 달리 폴리케타이드(polyketide)의 체인 신장(chain elongation) 과정에서 확장 유닛(extension unit)의 'Proof-reading'역할을 하는 것으로 알려져 있다(Reynolds, K. A et al., *J. Biol. Chem.*, 277 (50) : 48028-48034, 2002).
- [0075] cppRIII의 downstream에 위치하는 cppO의 염기서열을 분석한 결과 putative acyl CoA decarboxylase를 코딩하고 있으며 프레드리카마이신(fredericamycin)의 upstream에 존재하는 orf1과 매우 높은 유사성 (77% identity)을 보이고, 또한 ghrG (73% identity) 및 jadN (72% identity)와도 매우 높은 유사성을 나타낸다. 이러한 family의 유전자는 말로닐 코에이(malonyl CoA) 생합성에 관여하는 트랜스카르복실레이즈(transcarboxylase)와 유사하며, jadomycin 생산성에 긍정적인 영향을 준다고 알려져 있다(Vining, L. C et al., *Microbiology*, 146 (4) : 903-910 2000).
- [0076] cppM은 cppRIV의 upstream에 위치하며 Kineococcus radiotolerans SRS30216에서의 4Fe-4S 페레독신(ferredoxin)

n)의 N-terminal 일부와 35%의 identity를 나타내었고, 그 외에 유사성을 보이는 유전자는 찾을 수 없었다. 일반적으로 폴리엔 화합물에서는 페레독신(ferredoxin) 유전자가 존재하나, 본 발명의 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔 생합성 유전자군에서의 염기서열 분석결과 cppM은 보편적인 폴리엔의 페레독신(ferredoxin) 유전자를 비롯한 방선균에서의 페레독신(ferredoxin) 유전자와의 유사성이 거의 없음을 확인하였으며, 상기 페레독신(ferredoxin)의 영향으로 폴리엔 생합성 과정에서는 nysN에 의해 C-10 부분의 메틸(methyl)기가 COOH로 전환되는 카르복실레이션(carboxylation) 단계가 post-PKS modification 과정에서 일어나지 않을 것으로 보인다(도 5).

[0077] 결과적으로 본 발명의 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔의 페레독신(ferredoxin)의 구조의 상이성으로 인하여 전체적인 폴리엔 구조에서 Nystatin 등 종래의 폴리엔과 차이가 발생한다. 폴리엔 계열 항진균 물질은 작은 구조적 차이로도 활성과 독성의 큰 차이를 나타내며, amphotericin의 경우 폴리엔의 carboxyl group이 methyl group으로 치환된 analogue가 기존의 amphotericin에 비해 독성이 약 33배 정도 감소된 점에서 (Caffrey, P. et. al., *J Biol Chem*, 280 (41):34420-34426 2005), 본 발명에 따른 페레독신(ferredoxin)은 폴리엔 생합성 과정에서 그 역할을 하지 못할 것이기 때문에 본 발명의 신규 폴리엔은 종래의 기존 산업적으로 활용되고 있는 폴리엔 항진균 물질에 비해 유리한 구조를 가질 것으로 보인다.(도 7)

[0078] In silico analysis를 수행한 결과 폴리엔 생합성의 조절 유전자들은 모두 nystatin 및 amphotericin 생합성 조절 유전자와 매우 유사한 구조를 갖고 있음을 확인하였으며, 본 발명에 있어서, 전사조절 단백질을 코딩하는 유전자를 각각 cppRI, cppRII, cppRIII, cppRIV, cppRV 및 cppRVI라고 나타내었다. cppRI, cppRII, cppRIII는 티오에스터라제(thioesterase)를 코딩하는 cppE의 downstream에 위치하며 염기서열 분석결과 nysRI, nysRII, nysRIII를 비롯한 다수의 LAL (large ATP-binding regulators of the LuxR) family 계열의 전사 활성화인자(transcriptional activator)와 높은 상동성(homology)을 갖고 있음이 확인되었다. cppRI, cppRII, cppRIII 폴리펩티드의 예상되는 구조를 분석해본 결과 이들은 모두 C 터미널 부분에 LuxR type의 에이치티에이치 디엔에이 결합 모티프(HTH DNA binding motif)를 갖고 또한 cppRI 과 cppRIII는 N 터미널 부분에 Walker A 및 Walker B NTP binding motif를 보유하고 있다.(도 6A)

[0079] cppRIV는 cppO의 upstream에 위치하며 nysRIV와 유사성 (45% identity)을 보인다. 염기서열 분석결과 CppRIV의 N-terminal 부분에 PAS-like domain이 있으며, C 터미널 부분에 LuxR type의 에이치티에이치 모티프(HTH motif)가 존재함을 확인하였다(도 6A). 추가적으로 페레독신(ferredoxin) 유전자를 코딩하는 cppM의 Upstream 부분에 존재하는 cppRV 및 cppRIV 또한 C 터미널 부분에 LuxR type의 에이치티에이치 모티프(HTH motif)가 존재하며, CppRV는 N-terminal 부분에 Walker A 및 Walker B NTP binding motif를 보유하고 있음을 확인하였다.(도 6A)

[0080] 상기 염기서열 분석 결과, 전사 조절 단백질인 cppRI, cppRII, cppRIII 및 cppRIV는 nystatin 생합성 조절단백질인 NysRI, NysRII, NysRIII 및 NysRIV와 각각 서로 매우 유사함을 확인하였으며(도 6B), NysRI, NysRII, NysRIII 및 NysRIV 모두 nystatin 생합성에 전사 활성화 인자(transcriptional activator)로서 작용됨이 알려져 있는 점에서(Zotchev, S. B et al, *J Bacteriol*, 186, 1345-1354, 2004), CppRI, CppRII, CppRIII 및 cppRIV 또한 본 발명의 폴리엔 생합성에서 전사 활성화 인자(transcriptional activator)로서의 작용할 것으로 보인다.

도면의 간단한 설명

[0081] 도 1 및 도 2는 각각 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔 생합성 유전자군의 유전자들과 기능 및 유전자 배열을 나타낸 것이고, 도 3은 PKS의 활성 도메인을 비교분석한 것이며, 도 4는 PKS 부분의 시퀀스를 분석하여 폴리엔의 PKS의 구성을 도식화한 것이다.

[0082] 도 5는 방선균에서 여러 페레독신 유전자들의 계통을 분석한 것이며, 도 6의 A는 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*)에서의 조절 유전자들의 배열을 도시한 것이고, B는cppRI, cppRII, cppRIII, cppRIV, cppRV 및 cppRVI 단백질들의 구조 예측분석 결과를 나타낸 것이다.

[0083] 도 7은 슈도노카디아 오토트로피카(*Pseudonocardia autotrophica*) 폴리엔 생합성 유전자군의 시퀀스에 기반하여 생성된 폴리엔의 구조를 규명한 것이다.

도면

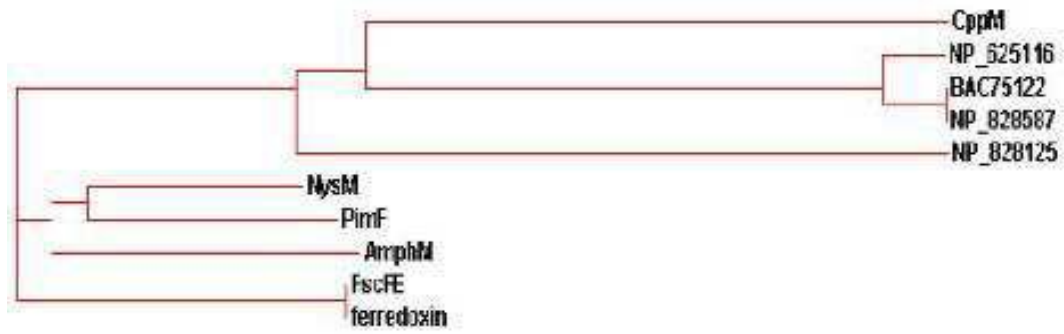
도면1

서열 번호	Protein	aa	Proposed Function	Homologs, Origins	Identities, Positives (%)
2	CppF	224	Phosphopanthetheine transferase	NysF, <i>Streptomyces noursei</i>	63,73
3	CppG	592	ABC transporter	NysG, <i>Streptomyces noursei</i>	75,83
4	CppH	584	ABC transporter	NysH, <i>Streptomyces noursei</i>	76,84
5	CppDIII	345	GDP-mannose-4,6-dehydratase	NysDIII, <i>Streptomyces noursei</i>	89,93
6	CppI	9499	Type I PKS	NysI, <i>Streptomyces noursei</i>	73,80
7	CppJ	5425	Type I PKS	AmphJ, <i>Streptomyces nodosus</i>	61,67
8	CppK	2031	Type I PKS	NysK, <i>Streptomyces noursei</i>	64,69
9	CppL	403	P450 monooxygenase	NysL, <i>Streptomyces noursei</i>	68,77
10	CppN	413	P450 monooxygenase	NysN, <i>Streptomyces noursei</i>	74,83
11	CppDII	352	Aminotransferase	NysDII, <i>Streptomyces noursei</i>	82,90
12	CppDI	489	Glycosyltransferase	NysDI, <i>Streptomyces noursei</i>	79,85
13	CppA	1097	Type I PKS	NysA, <i>Streptomyces noursei</i>	62,69
14	CppB	3175	Type I PKS	NysB, <i>Streptomyces noursei</i>	71,78
15	CppC	10876	Type I PKS	NysC, <i>Streptomyces noursei</i>	71,77
16	CppE	274	Thioesterase	discrete thioesterase, <i>Streptomyces nodosus</i>	77,83
17	CppRI	946	Regulation	NysRI, <i>Streptomyces noursei</i>	45,58
18	CppRII	765	Regulation	FscRII, <i>Streptomyces sp. FR-008</i>	35,44
19	CppRIII	925	Regulation	NysRIII, <i>Streptomyces noursei</i>	38,48
20	CppO	526	Decarboxylase	putative acyl CoA decarboxylase, <i>Streptomyces griseus</i>	77,85
21	CppRIV	213	Regulation	ORF4, <i>Streptomyces noursei</i>	45,66
22	CppM	138	Ferredoxin	4Fe-4S ferredoxin, <i>Kineococcus radiotolerans</i> SRS30216	35,45
23	CppRV	963	Regulation	FscRII, <i>Streptomyces sp. FR-008</i>	35,46
24	CppRVI	684	Regulation	FscRII, <i>Streptomyces sp. FR-008</i>	32,42

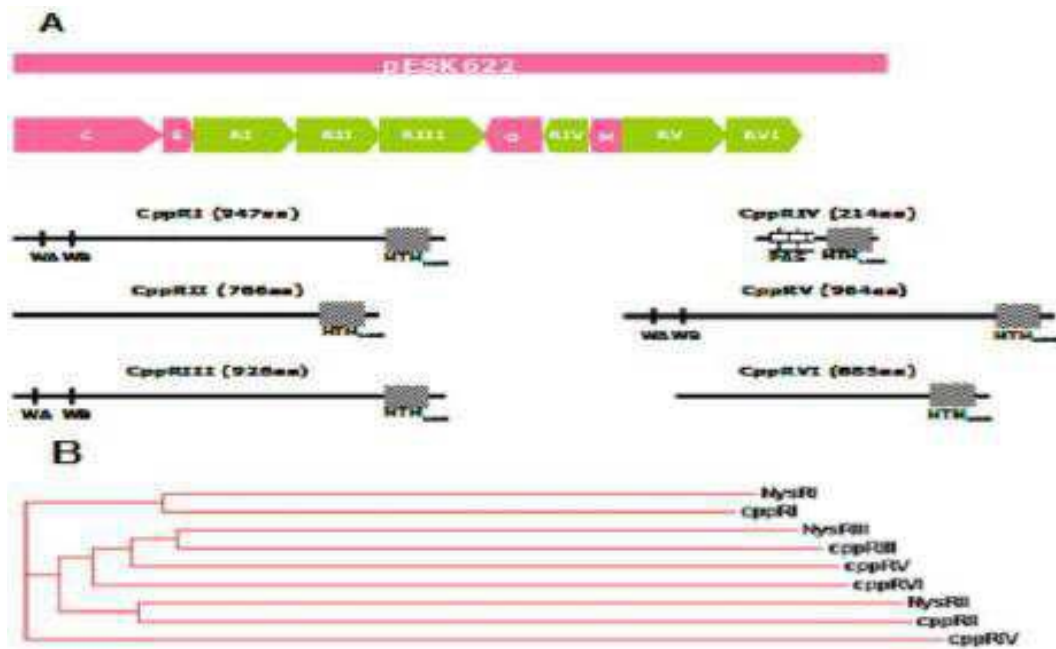
도면2



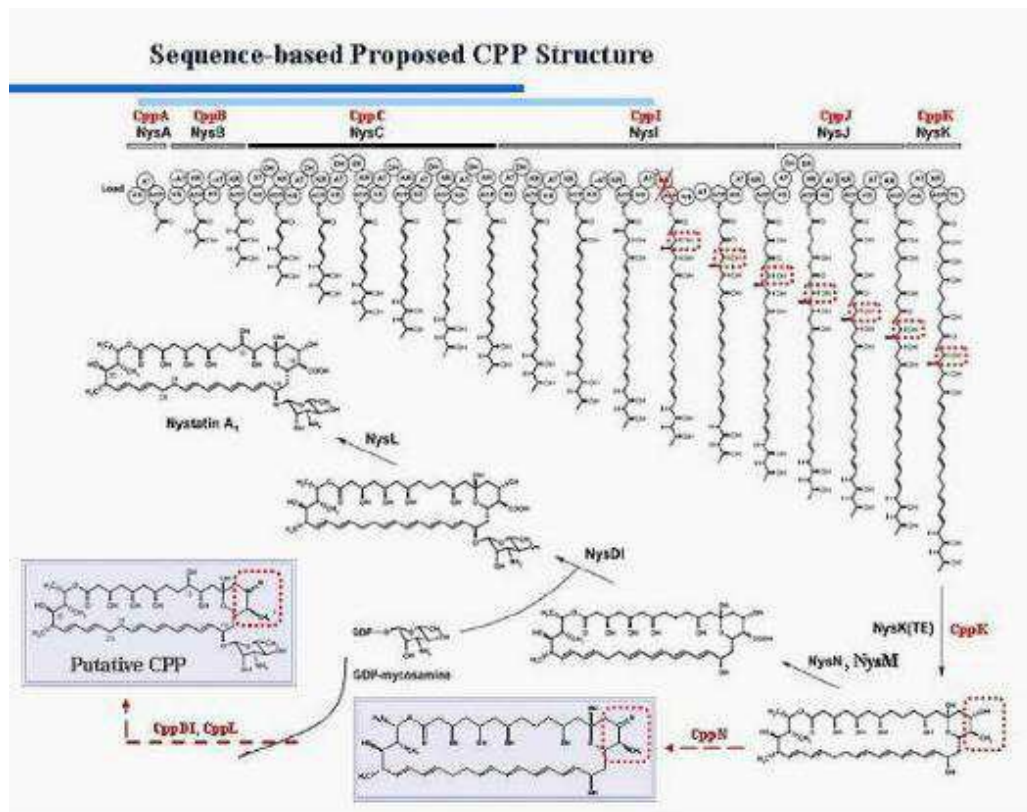
도면5



도면6



도면7



서열 목록

SEQUENCE LISTING

<110> INHA-INDUSTRY PARTNERSHIP INSTITUTE
HANSON BIOTECH CO., LTD.

<120> Novel polyene gene cluster from Pseudonocardia autotrophica

<130> inha1.25p

<160> 26

<170> PatentIn version 3.2

<210> 1

<211> 125717

<212> DNA

<213> Pseudonocardia autotrophica

<400> 1

tcacgccgcc ggtggcgccg gcagatgcac cgcggtgacg agcaggcccc ggtcggcgtg 60

ccagcgcccc gggaacaccg gcacgtccg tccgccgacg accgggcccgg ggacgagcag 120

acgggaggag aacgtgccgg ccgcggcgtc gaacgcgacg tcggcctcgt cgaagtccag 180

ctcgcgaccg gtcaacgggt accaggcctt gaagacgctc tccttggcgc tgaagtacat 240

ccggtccac gcgatgtccg gccgccgccc tcccagcccg gcgagcagcg cccgctcgga 300

gggcagggtg acggtctcca ggaccccggc gggcagcggt gcgtccggct cggcgtcgat 360

gtcaccgcg gcggactcgg cgaccgagga caccgcggcc gcccggtacc cgggtgcagtg 420

cgtcattgtg ccgaccaccc caggcggcca ctgcggggct ccgcgacggt tcgggaggat 480

cggggcgggg gagcggccga gccggcccag cgcgcgccgg gcgagcctgc gcaccgtggt 540

gaactcgcgc cgccgggact ccacggcccg ggcgacgagc tcgcgctcct gggggaagag 600

gccctcgccg ggggtctcct cgtcgtcgta ggcgactcgt gtgacgaccc gcccgggcag 660

cacgtgctcg atcaccgcac acccccggcg accggcagcg gcagcaccgc gcgcaacggt 720

tcccggggcg gccggggccg ccattcgccg ggatagccca ccgacacctc ctgaaacgg 780

accccgctgt agtaggtgac gcgggggatg tgcaggtggc cgtagacgac ggccgcggcg 840

cgaaccgga cgtgccagtc ggccgtcagc tcggtgccgc accactgcgc gaactccggg 900

taccgcagca cccgcgtcgg atgacgcagc agcggccagt ggttcaccag caccgtcggc 960

aggtccgggt cgaccgcggc caggcgggtc tcggtcagcg cggcccggcg tcggcaccag 1020

gtggcgcggt ccgggtaggg gtcgggatgc agcaggaact cgtcggaaca gacgacaccc 1080

gcgtcgtgag cgatccggag cgactccgcc gccgtcgtcg cgccgggggc gcggaaggag 1140

tagtcgtagc cgacgaacag cggggcgacg gcgaccggtc cgccgggacc gtcccacacc 1200

gggtacgggt cctccggagt ggtgacgcc agctcccggc aggtctcgac gagcgcccgg 1260

tagcgcgct cgccgcgag cgtgcagggg tcctgcggat gggtccacag gtcgtggttg 1320

cccgggggtc agagcacgcg tgcgaagcgg ctgcgagca gacgcagggt cgactcgatg 1380

tcggcgta ca tctgccgac gtcaccggcg acgatcagcc agtcgcgctc ggtggacggg 1440

cgcagcgact cgacgagcgc ccggttctcg gcgtgcacga cgtggaggtc ggcgacggcg 1500

agcagctggg gtctgggcac ggtgggtcct cccggtcggc cggggaacgg tcagggggcc 1560

agggtgtcgg cgtcgtggt acgcgcggcg tgcagccggg cgtaggcgcc accggcgcg 1620

agcagtgtgt cgtgggtgcc ctgctcgacg atccggccgg cgtccatgac cacgatccgg 1680

tcggcgctcg ggatcgtca cagccgggtc gcgatcacga agctggtccg cccggtccgc 1740

accgtggcca tcgcgcgtg gatcagcagc tcggtgcggg tgtcgacga gctggtggcc 1800

tcgtcgagga cgagcacgcg ggggtcggcg aggaacccc gcgccaccgt gatcagctgc 1860

ttctgtccgg cgtggcgcc gccggagtcc tcgtcgagga cgggtctgta gccgtcgggc 1920

agcgtcgca cgaacgtgc gacgcaggcg gcgcgggccg cctgctcgat ctgctcgctg 1980

gtcgcgccgg gcgcgccga ggcatgttc tcggcgatgg tcccgcgaa cagccagggtg 2040

tcctgcagga cgagcccga ccgggaccgc aggtcggcg gggtcatcgt cgcggtgtcc 2100

acgccgtcga gcaggatctg cccgccctcg atctcgtaga agcgcacgag gaggttgccc 2160

agggtggtct tccccgcgc ggtggatccg acgatcgca ccgtgctgcc cggctccacg 2220

gtcagcgaca ggtcctcgat gagcgggacg tcggggacgt agcggaacga caccggcgcg 2280

aactcgacc gcccccggg tccgcgggc acggcagggc gggccggctc gggcgactgt 2340

tcgggcgct cgagcagct gaacacccgc ttcccgaca ccaccccgga ctggagccgc 2400

ccggccaccg aggcgatctc gacgatcggc tggctgaact ggcgggcgta gaggatgaac 2460

gcctgcacgt cgccgagggt gagcgagccg gagagcacct tccacgcgcc gaggacggcc 2520

accaccaggt acccgagggt cgccacgaac atcatcaccg gctccatcgc gccggacgag 2580

gtctgggccc acgccccggc ccggtacacc gcgtcgttgc actcggcgaa ccggcgccgc 2640

gcctcgtccc ggcggtgggt gccgcggatg agggagtgcc cggtgcagac ctctcgcagc 2700

tggcggttga gcgcgccgtt ggcctccac tgtgtggtga actcggggtg cgcgtggcga 2760

cccagcccga ccgcgagcag ccccgccagc ggcacgtga ggatcatcac catcgccagc 2820

gacggcgaga tcaccacat cagcgtgagc atcgcgacca gcgacaggag cgaggtgatc 2880

agctcggcca gggctctgtg gagggtctgc tggaggttgt cgacgtcggt ggtggtacgt 2940

ccgagggctc cgccggccgc atgccggtcg tagtgccga gcgggaggcg ggacagtttc 3000

gccccggccc ggccccgcag gtcgtggatc acctgccaca ccacggatgc gacgatccgg 3060

ccctggacga gcgtgaacag cgaccccc aggtagacca cgagcaggac cagcagcaac 3120

ctggcgaccg agtcgaagtc gacaccgtcg gcggggccgg ggctgcccgc tgcgggccccg 3180

cccgtccgc ccggaccag gacgccgacc gcgatcaggt cggtcacccg gccagtagc 3240

agcgggccga cggcgttag cgcgatccg gccacgccg tcaggacggc cagcgccacc 3300

ggcccgcggt gcggccgcag cagccccacg agccggcgcg ccgggcggtc acccggcgcg 3360

ggtccgtcgg gtggtccgc cgggccctcc cccggccggg tggccgccga cggggcgggc 3420

tcagtacgt ccggcgaggc catgggcgac gtctctctcg gtgggtggg agttcgcat 3480

ctcgcgtag gtcgggtgt gcgcaggac gtcgtcgtgg gtaccgtcgg cgaccagccg 3540

tccggcgctcg aggacgacga cccggtcggc gtcgcgcgcg gtggcgaccc gctgggtcac 3600

ggtagalcacg gtggcgctcg cgggtccacgg ggccagcgcc gccgcagtg cggcgtcggt 3660

ggcctgggcc aacgcggaga agcagtcgtc gaacaggtag atctcgggcc ggcggaccag 3720

ggtgcgggcg atgcacagcc gctggcgctg gccaccggac acggtggtgc cgccctgcgc 3780

gatctccgcg tcagaccgc ccggcatccg cgcgacgaag ccgtcggcct gcgcgacgcg 3840

caatgcctcc cagagctcgt cgtcggtcgc gtccgtccgc ccgaaccga gattgctcgc 3900

gaccgtgccg gcgaacaggt aggggcgctg cggcacgaac ccgacgacgc cggtagcac 3960

cgcggggtcg agccgtcgca cgtcggtgcc acccaccgg accgtgcccg cggtcggatc 4020

gaccagccgc agcacaggt tcagcagggt cgacttgccg ctcccgtgc cgcccagcac 4080

cgcgagccgc tcgcccggt cgacgaccag gtcgaccccg cgcagcacgc cagctccgc 4140

gcccgggtag cggaactcgg cgtcccggt ctcgacccgt cccgcggggc cgtggagcgg 4200

agccggggtc gccggtgcgg ccacggccgg ctcggtgtcg agcacctcca ggatccggcc 4260

cgccccacc cgggcccgcg gcacctgcag gaacacgaac gcgagcatca cgaccgacat 4320

gagaatcaac gacaggtaga acaggaatgc gctgagcgcg ccagctgca tcacgcctgc 4380

gtcgatgcgg tggcgccga gccacatcag gacgaccgtg aacacgttca tcacgacgag 4440

caccagcggc agcatcgtgg cgatcagccg gccgacctgc cgggagaggt cgaggaacgc 4500

gtcgttgctg cgggtgaagc gcacctgtc gtggtcctca cggacgaacg agcggaccac 4560

ccgcaccccc gtgatcgact cccggagcag ccgtccgagg tcgtcgagg cgagctgcat 4620

ccggccgtag aggccacca tcgggaccag cagcagaccg aaggccacc cgacgaccag 4680

cagaggacg accagcaga gtgccagcgg tacgtcctgc gccagcgga gcacgatgct 4740

gccgatgcac atcagggggg cggacacgac gacaccgaac ccggaacggg cgaggttctg 4800

cacctgttgg acgtcgttga ccgtgcgggt cagcagcgac gccgtcccga acctgccgat 4860

ctcgcgggcg gagaagtcca ggatgcgggtc gaacaccgcg gcgcgcaggt cccggccac 4920

cgcggtggag gtgcgtgccc ccagggcggt cgccgccagc gccgccgga tctggaccac 4980

ggcgggtgcc gccatcagca ccccgagctc ggcgatccgg ccggggtcgg cgcggaccac 5040

accctcgtcg atgagggccg cgccgagcgt cggcagcagc agcgttcgg cgatctgcgc 5100

ggtctggagg acgacgagg cgcccgcgg cccggcgtag ccgcgcagcc ggtgctgcgc 5160

gagtctccac agcacgtcag gacacccccg gttcacggcg accgccggc cgcccgttg 5220

acgatgccgg tggcacaccg gccaggacag ccgaccagac cgcggaccg gaatcccca 5280

gttctgctca ccatttcctg cgccgcact cgtgaattcc ctacatccg gcgattcgt 5340

tgacaccgtc tcgccatct tgccagcgtg cggcgtgtct ctctccgga cagcgtattc 5400

gccgccgtgc cgacggccgg tcgacgcgia tgggcgggcc cgtaacgt cgaaaggga 5460

tcccgatgtc caaacgcga ctgatcaccg gaatcaccg tcaggacggc tcctacctgg 5520

cggagcacct gctgtcgag ggctaccagg tctgggcct gatccgggg caggccaacc 5580

cccgaagac gcgggtcagc cggtggcgt ccgagctgga gttcgtcgac ggcgacctga 5640

tggaccaggc cagcctggtc tcggccgtcg acacggtgca gcccgacgag gtctacaacc 5700

tggcgcgat ctcttctgc ccgatgtcct ggcagcaggc cgagctctc accgaggtca 5760

acggcacccg tgtgtccgg gtgtcgagg cgatccgat ggtctccgc ctctcgatgt 5820

cgcgcacggc gtcgcgaac gggcagatcc gcttctacca ggctcgtcg tcggagatgt 5880

tcggcaaggc cgcgagacc ccgcagcggg agacgacgt gttccaccg cgcagcccct 5940

acggcgccgc caaggcctac ggccactaca tcaccgcaa ctaccgcgag tcgttcggca 6000

tgtacgcgtt gtcgggcatg ctgttcaacc acgagtcgcc gcgccgtggc caggagttcg 6060

tcaccggaa gatctccctg gcggtcgccc ggatcaagct cggcctgcag cgcgacctcg 6120

cgctgggcaa cctcgacgcg gtgcgcgact ggggctacgc gggtgactac gtccgcgca 6180

tgcacctcat gtcgagcag ggcgagcccg acgactacgt gatcggcacc ggccagatgc 6240

actcggtgcg ggacgcggtg cagatcgctt tcgagcacgt ggggctggac tggcgggaca 6300

aggtcgtcat cgacccggcg ctggtgcgcc cggccgaggt cgaggtgctg tgcgccgaca 6360

gcctgcgggc ccggcggtg ctgactgga cggccgaggt cgacttccc gagtcatgc 6420

ggatgatggt cgactccgac ctcgagcacg tggcgcgga gaacgagtac ggccacctgc 6480

tgttgccgc caactggtga accggcgac gacacactag ggatttcgg cccggtcct 6540

ccgcagaatc atctcgatg agccctccg ccgtacggcg ggaacggggc ggcgattcgg 6600

ttctgtcgg atgtgtcgg aattccggcg cgattgtcag cggcgctcgg cggcgagacg 6660

ggtggagtgt gaatggacaa cgaacagaag ctccgggact acctcaagct ggccacggcc 6720

gacctgcgcc gtacccgcg gcgggtgagc gagctcgagt ccgccgcca ggagccgatc 6780

gccgtcgtcg ggatggcctg ccgtatccc ggcggtgtcc gcagcccga ggacctgtgg 6840

cggatggtcg aggcggggga ggacggcgtc acgccgttcc ccaccgaccg cggctgggac 6900

accgccggt tcgccggtc cccgacgaga tccggcgggt tctgcacga cgcgccgac 6960

ttcgacgcg agttcttcgg catctccccg cgcgagccg tcgcatgga cccgcagcag 7020

cgggtcgtcc tggagtccg ctgggaggcg ttcgagcggc ccgggatcga cccggtctcg 7080

ctgcaggga cccgcaccgg tgtgttcgtc ggccgcatgg cgcaggacta ccgggtcggc 7140

ccggcggacg gcgccgaggg ttccagctc accggcaaca ccggcagcgt cctatcgggg 7200

cgcattcctt acaccttcgg caccgtcggc ccgccgtta cggtcgacac cgcgtgctcg 7260

tctcgtctgg tggcggtgca cctcggcacc caggccctgc ggggcgggtga gtgctcgtg 7320

gcactggcgg gcggtgtcac cgtgatgtcc gggcccgga ccttcacga gatggccgc 7380

caggaggac tgtcccca cggccgtgc cgatccttcg gcgacacggc cgacggaacc 7440

ggctgggccc agggcgtcgg cctgctcgtc ctggagcggc tgtccgacgc gcgcccaac 7500

gggcacgagg tctcggcgt cgtcccgcc tcccggtca accaggacgg cgcgtccaac 7560

gggtcaccg cccgaacgg ccctcccag cagcaggtca tcgaacaggc gctggtcaac 7620

gcccggctgt cggctggcga cgtcagctc gtcgagcgc acggcaccg aaccacctc 7680

ggcgaccgg tcgaggcga ggcgtgctg gccacctacg gacgggaccg ggacgtcgag 7740

cgcccgtgc tgcctggctc ggtcaagtgc aacatcagcc acaccaggc cgcccgccg 7800

gtcgcgggg tgatcaagat ggtgatggcg atgcggcacg gggtactgcc ccgcacgtg 7860

ctcgcgagg acccagccg gcacgtcgc tggccccgg acaccgtccg catcctcacc 7920

gagaacaccg actggccggc caccggagcc ccgcgccg cgcgggtctc ctggttcggg 7980

atcagcgga ccaacgcca caccatcgc gagcaggccc ccgccccga gaccgtacc 8040

cctgccccg aggacgacgg ccggccgtc ggcgagccc gcccgaccga gcccgcacc 8100

gtcccggtc tgcctcgg gcgcacccc gaggcgtgc agggccaggc cgccgcgtc 8160

ggcgaggcac tcgccgcgc cccgacacc ccgtgaccg acgtcgcgtg gtcgtggcc 8220

acaaccgga ccgcgttcgc ccaccgcgcc gtgctgctcg ccgccgacg cgacgccctc 8280

gccggtggtc tcgacgcgct ggccgcgggc gatcccgcg cgcccggtga cacggtgacc 8340

gccgaggccc ggccggacag ccggtcgcgc gtgctgttca ccgggcaggg ctgcgacgg 8400

atcggcgcgc ggcgcgagct cgccgcccgc ttcccgtgt tcgccgaggc cctggacacg 8460

gtgctgtccg cgttcgacct ggagctgcag cggcgcctgc gcgagatcct ccggcgact 8520

accgacggca ccacccccga cgagaccgcc gccgcgtgc tcgacgacac cgcgtacgcc 8580

cagcccgca tcttcgccgt cgaggtggcg ctgtaccggc tcgtcacctc cctcgcgctc 8640

accccgggcc acctgctcgg aactcggtc ggcgagatcg ccgccgaca cgtcgccggg 8700

gtgctcgcg tcgacgacgc cgccacctg gtgcgcgcc gcggccgcct gatggcgcg 8760

ctgccaccg gtggcgccat ggtcgggtg caggccaccg aggcgaggt cgaggccctg 8820

ctcgacgggt accgcgaccg ggtctcggtc gccgcgtca acggccgctc ggcggtcgtg 8880

ctgtccggcg ccgacgagc ggtcaccgcc gtgcgcggcc tgctcgccga ccaggacgc 8940

cggacccggc ggctcggggt gagccacgcg ttccactcgc cgctgatgga accgatgctc 9000

gacgagttcc gcgccgtcgt cgaggccctc gacctgcagg caccgtgat cccgatcgtc 9060

tccgacgtga ccggcgagct cgcgaccgtc gcccaactca cctcgccga ctactgggtc 9120

gagcacgtcc gcagcgccgt ccggttcgcc gacggcgtcg actggctcgc ccgccacgac 9180

gtcaccgct tctcagagct cggcccgac ggccccctgt ccgcatgac gcgcgactgc 9240

ctcgacgcc cggaacccgg cgcgccgcc tcggtcgccg tgcccgcgt gcgcgccggg 9300

cgcgccgagg agcacacct caccgccga ctggccgcgc tgcacacca cggcaccgcc 9360

gtcgactggg caccctggtt cgccggcacc ggcccgcc gcaccgacct gccacctac 9420

gccttcgggc gccgcgggtt ctggcccaag gccctccaga ccggtgccgc cgacctgcgc 9480

tccggccgggc tcggcgccgc ccggcatccg ctgctgtcgg ccacggtgtc gctcgccgac 9540

tccgaggcg cgctgtcac cggacggctg tcctgcaga cccaccctg gctcgccgac 9600

cacacctgc gcggcaccac cctgtgtccc ggcaccgct tcctggagct ggccgtgcgg 9660

gccggcgacg aggtcggctg cgaccgggtg gaggagctga ccctcgccgc cccgtggcc 9720

ctgcccgacg agggcggggt cgcggtccag ctgtgggtcg gggccccga gcccggtggc 9780

gccgcaccc tgacctcta cggccggccg gacaccgacg ccgacgccga gcacgacgtt 9840

ccctggacc cgcacgccac cggcgctctc gccgcgggcg gcccggtccc ggcgaccccg 9900

gacgcgaccg agtggccgcc cggcggggcc gagccgtcg gggtcgagga cctctacgac 9960

cgcttggcg aggccggtt cggctacggc ccgccttcc gggcctcac cgcggcctgg 10020

cgccacgacc acgccgtgct cgccgagatc gtgctgcccg aggcaggccg taccgacgtc 10080

gacgccttcg gcctgcaccc cgccgcgtc gacgccgac tgcacgccgc agggttcgtc 10140

gagctggcg agcgcagccg cgggggtatg ccttctcct gggaggcggt gacgtgcac 10200

gcgagcgcg cggggacct gcgggtgcgc ctgaccccg tcgccgacga cgcgatcgcc 10260

gtcgccgtcg ccgacgggac cgggtgcaccg gtcgtaccg tcgactcgt ggtgctgcgc 10320

ggagtcggcg agctcgacct cgactccgc ggtgccgtcg cccgggacgc gctgttcgg 10380

ctcgactgga cggcgtcac cccgcgggt gaggtccccg gcagcgtcgt gatcgccgc 10440

gacgacgtc tcgggtcgc cagcaccac ggctcggcg ccgcgcacgg cggcgtcgcc 10500

ggaccgacgg acctggcgac gtcgtgacc gcagacggtc cggccccga cgtcgtgctg 10560

ctcgccctgg ccgggggagc ggaggccgcg caggcgccacc gctgtgccgc cgacgcgctc 10620

gccgccgtcc gcacctggct cgaccacgcc gaccgcctgg acggctcccg cctggctgtg 10680

gtgacccggg gcgccaccac cggtgacgac gtggccgccg cggccgcgtg gggcctgctc 10740

cgctccgcc gctcggagaa ccccgcccgg ttcgcgtgc tcgacctgc cccggacgtc 10800

gaccccgccg acctgccgt caccgcgtc acggccgacg agcccgagct gctgctgacc 10860

cgcgacggtc tgcggggcgc cgggtcgtg cgccgccccg ccccgcgca ggcggcgcc 10920

accccgctgt tcggggacgg gcgcgtgtg gtcaccggcg gcaccggcg cctgggtgcc 10980

gtcgtcgccc ggcacctggc caccaccac ggcgtagccg acctgtgtgt ggtcgggcgc 11040

cgcgccccgg cggccgacgg cgcgccgag ctggtctccg acctcaccgc cgccggtgcg 11100

cgggcccagg tcgtgcctg cgacgtgagc gaccccgcg cggtgaccga gttgctcggc 11160

gcgcaccggg tgacctcgtt ggtgcacgcc gccggggtgc tcgacgacgc caccgtcgtt 11220

tcgtgaccc cgcagcggct cgcgccggtg ctgcgcccga aggtcgacgc cgcgtggaac 11280

ctgcacaccg cggccgcggc cctgggtctc gacctcgacg cgttcgtgtt gttctcctcg 11340

gtcgccgggg tggtcggcag ccccgggcag gcgaactacg cggcgggcaa cgccgcctc 11400

gacgcgctcg ccgcgcaccg tcgggccgcg ggcctggcag gtctgtcgtt ggcctgggga 11460

ccgtgggagc ggaccggcgg gatgaccgtt ggcgtctccg acgaggacat ggcgcgaatg 11520

gcccgcgcc ggacccccgc cctcaccgtg gagcaggggc tgacctgtt cgacgccgcg 11580

ctcggcgcc ccgagccgc cctggtgccg gtcgtcttg acctccccgc cctgccccgc 11640

ggcggcgagg tcccgcgtt gctccggtcc ctgatccgta cccgggcccg gcgcaccgcg 11700

gccaccggt cggcgacggc gaacggtctc gccagcggc tggccccctt ggacgccgag 11760

ggacgcgagg agatggctct ggacctggtc cgcggccagg tcgccctggt gctcgggcac 11820

gccggtgcgg ccgacgtcga cgccggccgc gcgttcgcg acctcgggtt cgactcgttg 11880

accgccgtcg agctgcgcaa ccggctcggg accgtcaccg ggctgcggct gcccgccaca 11940

ctcgtgttcg accacccgac ggtccggcac ctccggccc acgtcaccga cgagctgctg 12000

ggcgccgaga ccgaggccgt cccggccgcc cgcgtcgcgg tggacgtcga ggaccgatc 12060

gtcatcgtcg gcatggcctg ccgtaccg ggccgggtgt ccaccccga cgagctgtgg 12120

gcctggtea ccgaggcac cgacgcgatc tccggtttcc cgaccaaccg gaactgggac 12180

ctcgaggcgc tgcaccacc ggaccggac caccggca ccactacac ccgtccggc 12240

gggttcctgc acgaggcgg cgagtcgac ccggccttct tcgggatgag cccgcgcgag 12300

gcgtggcca ccgactcga gcagcgcag ctgctggaga cctcgtggga ggccgtcgag 12360

cgggcgggca tcgaccgtc gacgtgcgc ggcaccgca ccggcgtgtt cgccgtgtc 12420

atgtacagcg actacaacgc cgtcctggcc ggggggccc agttcgaggg ctccagggg 12480

gtcggcagct cgccgagcct ggcctcgggc cgggtgcct acaccctcg gctggagggg 12540

cccgcgtca ccgtcgacac cgcgtgctcg tcctcgtgg tcgcatgca ctgggcgatg 12600

caggcgtgc ggaccgggga gtgctcgtc gcgtggccg gcgtgtcac cgtcatgtc 12660

acccggcgg cgttcgtcga ctccgccgc cagcgcggc tgtccccga cgggcgtgc 12720

aaggccttct ccgacgacgc cgacggcgtc ggctggccg agggcgtcg catgctggtg 12780

ctggaacggc agtccgacgc gctgcgccac ggccagaca tctggccgt ggtccgccc 12840

tccgcgtca actccgacg gcctccaac gggatcaccg cccgaacgg gccgtcccag 12900

cagcggtga tccgccaggc gctggcgagc gcggggctgt ccaccgacga cgtcgacgtc 12960

gtcgaggcgc acggcacccg cacctcgctg ggcgaccca tcgaggcca ggcgtgctg 13020

gccacctacg gccgggaccg ggacaccgac cggccgctgc acctggggtc gctgaagtcc 13080

aacatcgggc acaccaggc cgcccgccgc gtcgccggcg tgatcaagat ggtgctggcg 13140

atgggcacg gcgtgctgcc ccgcacgtg cagcggaca cccgttcctc gcacgtggac 13200

tggaccgagg gcgccgtgga gctgctcacc gagcagaccg cgtggccgga gaccggccgt 13260

ccgcgccggg ccgcggtgtc gtcgttcggg atcagcggca ccaacgtga cacggtgctg 13320

gagcaggac cgactccgc gcccgcctcc gaccccggtc ccggggccac cccggccgtg 13380

gtcccgtgc tgctctcggg ccgcggccgc cccgcgtgc gcgccaggc cggccggctg 13440

ctcgaccacc tgcgggacca cccggcgctc cgcacggccg acctcgcca ctactcgcc 13500

accacccga ccgcttcga ccagcgcgc gccgtgctgg cgggtgaccg cgaggacctg 13560

ctcgccgcgc tcggcgctc cgcccccga cgtccggacc cgcgcgtcgt ggagggggag 13620

gccgcggggc gtgcccggac cgcggtgctg ttaccggcc agggcagcca gcgcgccgcg 13680

atgggcccgc agctgtacg ccccagccg gtgttcgcc ccgcgttcga cgaggtctgc 13740

gccgcgtgg acccgctgt cgagggccg ctgcgcagg tcgtgttcgc cgaggggggc 13800

accgcggagg ccgcgtgct cgacgagacc ggctggacc agcccgcgt gttcgcggtc 13860

gaggtcgcgc tgtaccgct cgtcgagagc tggggcgtgc gggccgacct cgtggccggg 13920

cactcgatcg gcgagatcac cgcccgctac gtcgccggg tggtcacct ggccgacgc 13980

gcccgtggtg tcgcccccgc cgcacggctc atgcaggcgc tgcccaccg tggcgcctg 14040

gtcgcatcg cgccggcgga ggacagggtc acccgctgc tcgacgagc ggtgtcgatc 14100

gcggcgggtga acgcgccggg atcgggtggtc gtctccggcg acgccgacgc caccgcccg 14160

ctcgccgcga cgttcgccga gcagggccgc cggaccgcga cactgcgggt cagccacgcg 14220

ttccactcgc cgcacatgga cggcatgctc gaggacttcc gggccgtggc cgagcggatc 14280

gagtaccacg cgcgccgat cccggtggtc tccaacctca ccggcgcccg ggccgccgac 14340

accgagctgt gcgagcccgg gtactgggtg cggcacgtgc gcgaggcggt ccggttcgcc 14400

gactgcgtca ccacgtgca cgaccagggc gcgaccgtcc ttctggagct gggaccgcac 14460

gcaccgtca ccgcgatggc ccgcgagacc ctcggggacg gcgccgacac cgcgtggtg 14520

cccttcctgc gcgccaccg gggcgaggag ctcgccgccg cgacggccgc cgcgggctg 14580

caggtccacg gcctggacct cgacccgcc gcgtgctgc acgggaccgg tgcccgcgc 14640

accgccctgc cgacctagc ctccagcac gatttctact ggccgcagct gcccgcgcc 14700

gccgctccg ccggggagga caccgaccgc gccgaccggc agctctgggc cgcctcgag 14760

cgcggggacg ccgccgagct cgccggcatc ctcggcctcg acgccgacga cgtcgccacc 14820

ccgtgctgc ccgcactgac cactggcggc gcgggcaacc gggagaaggc ccggctcgac 14880

accctgcgt acccgctga gtggaccgg ctgcggcgcc ccgcccgcc ggtcctcgac 14940

ggcacctggc tgctggtgc caccggcgcc accaccgacg ccgagaccac gctgctcgac 15000

gggctcgcc acaccctcg cgcgcacggc gcccggtcc gccggtcgt cctcgacgac 15060

gactccccg ccgaccgcgc cgcggtcgcc gcgcggctgg ccgcgggcac cgcgacggt 15120

gacccgccc acgtgctgc cctgtgccc ctgcagagc gcccgtgc gggcgccgc 15180

ccgtgacc gcggcctgc cctgaccgtc gcgtcgtcc agccctcgc cgacgccgac 15240

gccggtgaca gcaccgggac gaccgcacgg ctgtggaccg cgaccgcgg gccgtctcc 15300

accggtcccg ccgaccgggt caccaccccg gtgcaggcca ccgcatgggg cctgggccgc 15360

agcgtcgctc tggagcaccg gcggctgtgg ggccgcctgg tcgacctccc ggccgagctg 15420

gaccgcgcga gcgcccagcg cctcgcgggg gtgctcgccg acaaggacac cccggacggg 15480

gaggaccagg tcgctgtgcg cgccgccggg gtgtccgggc gccggctcgt ccggcacacc 15540

gtcgacgcgc tgccgccgc caccgcgttc accgcgaccg gctcggctct ggtcaccggt 15600

ggtaccggtg ggctcggcgc cgaggtcgcc cgatggctgg cccgctccgg cgtggccac 15660

ctggtgctca ccagccgtcg tggccccgac gcaccgggg ccgccgagct gcgcgacgag 15720

ctcaccgcgc tgggcgcctc ggtcgcgatc gaggcctgcg acgtgaccga ccgcgacgcg 15780

ctcgccgcgc tgctggacgc cgtaccgcc gacgcgccgc tgaccggcgt cgtgcacacc 15840

gcgggcgtcg gccactacga cgcgtcgac accctcgacg tcgagggtgt cggcccccgc 15900

acggccgcca agatcgccgg cgccgcgcac ctcgacgacc tgctggccga ccgcgagctc 15960

gacctgttcg tgctgttcgg ctccgtcgcc ggggtgtggg ggagcggcgg gcagagcgcc 16020

tacggcgccg ccaacgccta cctcgacgca ctgcgccgc accgccgcgc ccgcggcgcc 16080

accgccacca gcatcgctg gggcccggtg gccgggtccg gcatggccac cgaggagtcc 16140

gtggccacga cctgcagcg gcagggactc ggctgtctcg accccggccc ggccatgacc 16200

gagctcggc gcgccgtcgt cgacgccgac acccaggtca ccgtcgccga cgtcgactgg 16260

gaccgtacg caccgtgtt cacctcgcc cgccgagcg cactgatcgc cgtctcgcg 16320

gacctcgcg agccggagtc cggcgtcgcc gccaccgaga tcgtcaccg ggtccgcgc 16380

ctcgacgagc ccgccggat gcgcctgctc accgagctgg tccgcggtgc ggccgcggcc 16440

gtgctgggcc acgggtcggc cgagtcctgc gccgggtcgc gcgcgttcgc cgacctcggg 16500

ttcgactcgc tgaccgggggt cgagctgcgc agccgtctcg ccgccgcgac cggcctgacg 16560

ctgccagca cgctggtgtt cgaccacccg agcccgtgg agctcgccc gcacctgcgt 16620

gccgagatcc tcggcacgc gccggagggc accggcccgg tcgccgtcgg gcccgccgac 16680

gccgagccga tcgcatcat cggcatggcc tgccggttcc ccggcggcgt ctctcgccg 16740

gaggcgctct gggacctggt cactccggt accgacgca tctccgactt cccggtcaac 16800

ctgggtggg acaccgccgc gctgttcgac cgcgaccgg accgccccg gaccacctac 16860

tccaccagg gcgggttctt gcacaccgc gacgagtcg accgtcgtt ctccggcatc 16920

tcgccgcgc aggcgtggt gatgatccg cagcagcggc tgctgctgga gaccacctgg 16980

gagtccttcg agcgggccgg gatccgtccc gacaccgtgc gcggcagcct gaccggcacc 17040

ttcatcggtt ccagctacca ggagtacgc ctgggtgccg gtgacggcgc cgagggtcac 17100

ctggtcaccg gcaccagccc cagcgtgctg tccggcaggt tgtcctacgt gtccgggctg 17160

gagggcccg ccgtcacgt cgacacggcg tgctcgtcgt cgctggtggc actgcacctg 17220

gcctgccagt cgctgcgca cggggagagc accctcgggg tcgccggcgg gccaccgtc 17280

atgaccaccc ccaaccgtt catcgcttc agccgccagc gcgcgtggc ccgcgacgc 17340

cgctgaagg cttctccga cgacccgac ggcatgacc tcgccgagg cgtgggcac 17400

gtgctggtcg aacgccttc cgacccgag gccacggcc acccggtcct cgcggtgatc 17460

cgcggtcgc ccatcaacca ggacggcgcc tccaacggcc tgaccgccc gaacgggccc 17520

tcccagcagc ggtcatccg ccaggcactg gccaacgcc ggctcgagcc cggcgacgtc 17580

gagcgctcg aggcgcacgg caccggcacc ccgctgggcg acccgatcga ggcccaggcc 17640
 ctgcagacca cctacggcgg cgaccgcgac gcggcgcgcg cgctgctgct gggctcgggtg 17700
 aagtccaaca tcgggcacac ccagtcggcc gcgggctcg cctcgggtgat caagacgggtg 17760
 atggcgctgc ggacgggggt gctgccccgc acgctgcacg ccgacgagcc gtcctcgac 17820
 gtggactggt cggcaggcag cgtcgagctg ctgcccagc agaccgatg gccggagacc 17880
 ggtcgtcccc gccgggccc ggtgtcgtcg ttgggatca gcggcaccaa cggccacacc 17940
 gtgctggagc aggcgcccga ggccgccccg gtggccccg cgaccccgtc ggggcccgtc 18000
 ctgccgtcgg cggcggagcc ggtcctgccc tgggtgctcg gcggccgagg tgccgcccgg 18060
 ctgcgaggcc aggcggaccg cctgtctgcc cactcgaga cgaccgacg ccgccccgcc 18120
 gacatcggtt tctccctggt gagtgcgagg atccgttcg agcaccgagc cgtcgtcgtc 18180
 gcgaccgacc ccgaggaccg ggccgcccgg ctgcgagcgg tcgcccga cggcccgcc 18240
 ggcgtcgtcg ccccggtgt cgccgacgtc gagggccgca ccgtgttcgt cttccccgtt 18300
 cagggatcgc atgggtcgg gatggcgca cgcctgctcg aggagtcccc ggtgttcgcc 18360
 gaccgggtcg ccgagtgcg cgaggccctc gccgagttca ccgactggtc gtcgacgac 18420
 gtgctccgag gcggcgagg ggccgccc gtcgagcggg tcgacgtcgt ccagcccgc 18480
 accttcgcc tcatggtcgg actggccgag ctgtggcgcg cgcacggcgt cgagcccagc 18540
 gcggtcgtcg gccactccca gggcgagatc gccgcccgg tcgtctccgg tgcgtgtcg 18600
 ctgcgagcgt gtccccgggt ggtcgcgtg cgcagccggg cgatcgcgcg gtcgtggcc 18660
 gggcgaggcg gcatgatgtc ggtcgcgtg ccggtcgccg acgcccagg gcacctgcc 18720
 ggctacgagg gccgggtgtc ggtggccgag gtcaacggcc cccgttcgc ggtgtcgc 18780

ggcgagcccg acgcgtcga cgagctgtc gccgcgttcg acgccgccga tgtccgcgc 18840

cgccggatcg cggaggacta cgcctgcac tcgcaccagg tcgaggacct gcgcgacgag 18900

ctcgccacga ccctgcgcg gctcgcgccg cagccgtcgc aggtgccggt gttctccacg 18960

gtcacggcg acaggctga caccaccac atggacgcct cctactggtg cgagaacctg 19020

cgcaaccggg tcgggttcgc cgacgcgtc gaggccctgc aggccgccga gtaccgcacg 19080

ttcgtcgaac cgagcccgca cccggtgtg tcgatgtcgg tgcaggacgt gtcgacgac 19140

gccggcgctc cgggtgtgc ggggtggcac ctgcgccgtg accagggcgg ctaccaccgg 19200

ttcgtgtgtt ccggggcgga gctctacgtc cggggggcgg ccgtcgactg gaccgggtc 19260

ttcgacggga ccggcgctc ccgcaccgac ctgcccacgt atgcgttcgc ccaccaccag 19320

ctgtgggtcc tgccccccgc ggtcaccgc gccgccgacc cgcaggacga ggcgttctgg 19380

gccgcgtcg aggacggcga cgtcgcgcc ctgaccagca ccctggacac cgaccggac 19440

gcggtcgccg cggctctgcc cgcgtgtgtc agctggcgcc gcggccgccc ggaccgtcc 19500

accctggact cctggcgcta ccgcgtgtc tggaaccgg ccgggtcgct gccgcagcg 19560

agcctggcgg gcacctggct ggtcgtctcg gccgaggga ccgacgacac cgagggtgcc 19620

ggtgcgttg ccgcgcacgg ggccgacgtg cgcgcgtcg tctcgacga gacctgcacc 19680

gaccgcgcc tctggccgg gcggtcgc gccgcgacc gggacgactc cgcgccgac 19740

ccggccgccc tctggggat cgtctcgtg ctggccgagg ccgacaccac gacctgccg 19800

cggaccggcc tggtcaccg ggtggcgtg accgtcgc tgatccaggc gctggcgac 19860

agcggcatcg acgcgccat gtgggcactg agccgtggcg ccgtcgccac cggacgcgc 19920

gacgaggtea tcgccccggt ccaggcccag gtccctgggca tcggttggaac cgcggcgctg 19980

gagcaccgc agcgctgggg cgggacgac gacctgccgg tcgccctgga cgagcgcggg 20040

gccgcgcggc tggtcgccgt cctcgccggg gagctgggcg ccgaggacca gctcgcgctg 20100

cgccccaccg ggggtgttac ccggcggaac gtgcggggcg agcccgcggg cggcgggccg 20160

gccccgacgt gggaccgcg ggggaccacg ctggtcaccg gcgggtccgg caccctcgcg 20220

ccgcacctgg cgcgccgct ggccgagcgg ggcccgagc acgtcgtgct gctgtcgcg 20280

ctgggccccg acgccccgg cgcgccgag ctgctcgccg agttcgacgg cagcgacacc 20340

acggtcgagg ccgtggcctg cgacatcacc gaccgcgccg ccgtcgcggg cctgctggag 20400

cggtcgacg cccacggcgc cagggtgcgc accgtcctgc acaccgccg caccatcgag 20460

ctcgccacc tcgacggcac gaccaggag gagctcgccc gggactgca cgccaaggtc 20520

accggcgcg aggtgtgac cgagctgctc gacgagcggg gcggcgacc agccgaggtg 20580

gtcctgttct cctccaccgc gggcatgtgg ggccagggg cgacgccgc ctacgtcgcg 20640

ggcaacgcc acctcgccg cctcgccgag caccggcggg ccgcggcct gccgaccacg 20700

tcgatgcct ggggcatctg ggccgacgac ctgaagctcg gccgggtcga ccgcgccgc 20760

atccggggca gcggcctggt gttcatggac ccgagctcg cgctgaacgg gctcgagcgg 20820

gccctcgacg acgcccagac cgtcgtcgcg gtcgccgacg tcgactggga cactaccac 20880

ccggtctaca cctccgacg gccacacgg ctctacgac agatccccga ggtcgtggcg 20940

ctcaccgcc cgcggaacg gaccggggc acggtcgccg cggcgagtt cgccgccacg 21000

ctggacggg tgaccgacg cgaggcgctg cgccgctcc tcgacgtggt ccgggccgag 21060

gccgcggcg tgcctgggat ggctccgcc gacgacctca ccgaccagc ggcgttcgc 21120

gacgtcgggt tcgactcgct gaccgccgtc gcgtgcgga accggctcgc ctccgtcacc 21180

ggcctgacgc tgcctcgac gatggtcttc gaccaccca caccgcggc gctcgccgag 21240

ttcctgaggg ccgagctggc cggggccacc ccggtcgcgg ccggcgccgg gtccaccgcg 21300

gccgcccagg accaggacga cccgatctc gtctcggca tgagctgcc ctacccggc 21360

ggggtcgcct ccgccagga cctgtggcgg gtgccctcg acgaggtgga cgcgatctc 21420

gggttcccc acgaccgcgg ctgggacgc gcctcgtct acgaccgga ccccgaccg 21480

gccgggcaca cctactcgac gcaggcgagg ttctgcgag acgtcgcca cttcgaccc 21540

gggttcttcg ggatctcgcc gcgcgaggcg ctgtcgatgg accgcagca gcggtgctg 21600

ctggagacca cctgggagac cttcgagcac gccggcatcg acccgaccg gcagcgtggg 21660

agccggaccg gcacgttcat cggcgccagc taccaggact atgcctccg gccgcccgc 21720

gccgaggggg ccgagggcca catgatcacc ggcacgtcc cgagcgtgct gtccggcg 21780

gtcaactacc tggtcggtt cgaggggccg gccgtcacc tggacaccg gtgctcgtcg 21840

tcgtcgttg cgatgcacct ggcgtgccag tcgtgcgca ccggggagag caccctcgc 21900

ctggccggtg gcgtcagcat catgtccacc ccgatgtct tcgtcgggtt cagccgccg 21960

cgcgcgttg ccgaggacgg ccgtgcaag gcctacccg acggcgccga cggcatgaca 22020

ctcgccgaag gcgtcgtct ggtcctgctg gagcgactgt ccgacgcgt ccgcaacggg 22080

cacgaggtac tggccgtcgt gcgtggctcc gcgtcaacc aggacggtgc ctccaacggg 22140

ctcaccgcgc ccaacggccc gtccagcag cgcgtgatcc gccaggcgt cgcggggcc 22200

ggggtcgac cggaggagat cgacgtcctg gagggccac ggaccggcac cgcgtgggc 22260

gacccgatcg aggccccaggc gctgttcgcg acctacgggc gggaccggga caccgaccgg 22320

ccgctgctgc tcgggtcggg gaagtccaac atcgggcaca cccagatggc ctccggtgtc 22380

gcgagcgtga tcaagctggg ccgtgcgctg caggagggtg tcgtcccag ctgctgcac 22440

atcgaccagc cctccacgca cgtcgactgg tcctccgggg cgatcgacct gtcaccgag 22500

cgcaccgctg ggcccagac cggccgcccg cgcggggcgg cgggtgtcgtc gttcgggatc 22560

agcggcacca acgtgcacac gatcctcgag caggccccgg ccgtccccgc gccgcaccc 22620

gccgtgccgc tcccggacga cgtcgtggcc ccggtgtcgg tctccggccg cggcgagacc 22680

gcgttgccgc accaggccgg ccgcctgctg gacctgtcgc acgagcggcc gcagctgcgg 22740

cccgcgagc tggcgcacgc gctgggcacc acccgcgagg ccctggagca gcgtggcgcc 22800

gtggtgcgcg gcgaccgga cgagctggc cgcggcctca ccgcgtgcg cgacggcggc 22860

accgcgcccg ggaccgtccg gggcaccgcc ggtcgtggcc gcaccgcgtt cctgttcacc 22920

ggacagggca gccagcgggc cggggcgggc gccgagctgt acgcccggta cccggtgttc 22980

gccgacgcc tcgacgactg cgcggcccgg ctggacaccg acgcccggcg cccgccgctg 23040

cgcgaggtcc tgttcgcga gcccggctcc gacgaggccg ccttctgga gcgcaccggg 23100

cacgcccagc ccgcgtgtt cgcgtcgag gtcgcgtgt tccggtcct cgagtcgtgg 23160

ggcgtcgtcc ccgacctgct cgccgggcac tcggtcggcg agatcgccgc cgcgcacgtc 23220

gcgggcgctc tgtccctcga cgacgcctgc accctggtgg ccgcccggcg ccggtcatg 23280

gaggcgctgc ccgaggggg cgcgatggtc gccgtcgagg cggccgagga cgaggtggcg 23340

ccgtgctca ccgacggcgt cggcatcgcc gcggtgaacg gcccggccgc ggtcgtcgtc 23400

tccggcgacg tcgacgaggt cgacgggtc gccgccggc tcgccgcga gggccggcgc 23460

acccaccggc tgcgggtctc ccacgcgttc cactcgccgc tgatggagcc gatgctcgac 23520
 gagttccgcg ccgtgggtctc ggggctggac tacgcggcac cggcgatccc gatcgtctcc 23580
 accgtcaccg gcacccctggc caccgccgac cggctcaccg accccggcta ctgggtcgag 23640
 cacgtccggg ccaccgtacg ttctgccgac ggggtcgcca ccctggccgg gcagcacgac 23700
 gtgcgcacct tcgtcgagct cggaccggac ggctgtactgt ccgcggccgc gcgcgacacc 23760
 gtccgcgacg agccgggcac cgcgtgtctc gcgtgtctgc gcaaggaccg ccccaggtg 23820
 cgcacggtgc tcgcccggt cgccggcgcc cactgccacg gcgccgcct cgaccggcgg 23880
 gcgtgtctcg ccgggtacgg ccacgggcgg gtccccctcc cgtcgtatgc gtccagcga 23940
 gacgggtact ggccggagac ggccggccgc gccgtgcccg agggcaccgg tgccgacgc 24000
 gagttctggg ccgccgtcga gcgcgacgac gtccagggac tggctggctc gtcggcctg 24060
 gacgacgcca ccgtctccgc gatgttcccg gcgtgaccg catggcgtcg ccgcccggc 24120
 gagcaggcca cccgggacgg ctggcgctac cgcattacct gggccccgcg cggcgggtcc 24180
 ccggccggcg gcgacctga cggccgccgc ctctgtctgg tcccgcagac ctaccgcgac 24240
 gacgcgaccg ccgcgtgggc cgccgatgtc gaggccgcc tcggcggggg cgggctcgag 24300
 cgcgtcaccg tgaccggcac cgaccgcgc acgtggccg cggcgggtac cgcggccgcg 24360
 ggggagggcc cggagttcgc gggcgtcctg tccctgtgc cgttcgccga cggcgacgc 24420
 ggacaccccg gcgtgcccgc cgcgtgagc ctaccacga ccgccgtcca ggcactcggc 24480
 gacgccggtg tcgacgccc gctgtggacc gtcaccggg gtgcggtggc cgtcggacgc 24540
 tccgaggagg tcaccgagct ggaccaggcc gccgtctggg gtctgtctgc gaccgccgc 24600

ctggagctcc ccggccggat cggcggcacc gtcgacctgc ccgccgtggt cgacgcaccg 24660

gccgccccgc ggctgcgcgg cgtgctcgcc gcgaccgacg gcgaggacgc ggtcgccgtg 24720

cgggcctccg gggctttcct gcgcaggctc gtgcacgcac ccgccgcgc cggggccaca 24780

ccggccccgt tcgacgccac caccggcacc gtctgatca ccggcggcac cggcgggatc 24840

ggcggtcacg tcgcgcgcgg gctcgccgcg gagggagccg cgcacctgct gctcgccgcg 24900

cgcccgggcc ccgacgcccc cggcgcgcgc gccctgcgcg ccgagctgga ggagctcggc 24960

gccccgggtca ccgtcgccgc ctgtgacgtc gccgaccgcg aggcgctcgc cgcgtgctc 25020

gacacggtgc ccgccgagct gccgtggtc ggggtcttcc acaccgcggg cgtgctcgag 25080

gaccgtgtcc tcgacgcgt gacccgcag agctactccg ggggtgctgc ggccaagacc 25140

gtcgccgcc agcacctcga cgagctgacc cgcgacagcg acctcgccgc ctctgtgctg 25200

ttctctcga ccgcaggcat gatcggcgcc gccggtcagg gcaactacgc ccccaccaac 25260

gcctacctcg acgcccctgc cgagaccgc cgcgccgcg gcctgccgc gttgtcggtg 25320

gcgtggggcc cgtgggacgg ctccggcatg gtcgccgacg ccgccgaggt cggcccccgc 25380

glacggcgcg gcggcttcgc accgctcgac ccggagacgg cggcggtcgc gctgctcgcg 25440

gccgtcgacg ggagccggga aggtggggag accaccctcg cgatcgccga catggactgg 25500

gagcggttcc tgcgcgcgtt cgggtccgtc cggccgatgc cgctggtcgc cgatctccc 25560

gaggtcgccc ggctcgccgc cccaccacc ggtggggaca ccgtaccgg gctcggggc 25620

cggctcgcg cctgccccga cgacgaacgc ctggcgctg tgctcgacgt actgcgcacc 25680

caggtcgcg ccgtgctcg acacgccgac ccgcgcaccg tcgacgacga ccgcgcgttc 25740

cgcgacctcg gcttcgaetc gctgaccatc ctggagctgc gcaacgcgt caacccgcc 25800

accgggctgt cgctgccgc gacgttggtc tacgaccggc ccaccccgcg ggagatggcc 25860

gggttcctgc tcggcgagct gtcggcacg ctgccgagc agcggggccc ggtccgcacg 25920

agcgccgccc tggacgaccc gatcgtcgtc gtccggatgg cctgccggtt ccccggcggg 25980

gtccgacccc ccgaggacct gtgggagctc gtggcccgcg gcgatgacgg catcacggg 26040

ttccccgacg accgcggtg ggacctgcc gcgtcggcg acggggcctc gcccacgtg 26100

cgggttggtt tcttgacgg cgtcgcggc ttcgacccc ggttcttcgg catctcccc 26160

cgcgaggcgc tcgcatgga ccccagcag cggtgtgtc tggagaccac ctgggaggcc 26220

gtcgagcggg ccgggatcga cccggcgacg ctgcgcggct cggccaccgg cgtcttcgtc 26280

ggcaccaacg gccaggacta cgcgacgtg ctgcgcgggt cggccgacga cgtctccggc 26340

tacgcgcga ccggcaacac cgccagcgtc atgtccggc ggctgtccta caccctcggc 26400

ctggaggggc ccgccgtcac catcgacacc gctgtctct cgtcgttgt cgcctgcac 26460

tgggccggac gggcactgac cgacggggag gccgacctgg tcttgcccgg tggggtctcg 26520

gtcatgtccg gaccggactc gtctgtcag ttctccacc agggcggcct cccccggac 26580

gggcactgca agccttctc cgacgacgc gacggcacc cctggtccga gggcgtcggc 26640

atgttgtgc tggagcgct gtccgacgc cgccgccacg gccaccgct gcacggcgtg 26700

atcgcggtc cgcgatcaa ccaggacggc gcctccaac ggctcaccg cccagcggg 26760

ccgtcccagc agcgggtcat ccgccaggcg ctggccgac cggggtcac cccggccgac 26820

gtcgacaccg tcgaggcgca cggcaccggg accacctcg gcgaccgat cgaggcccag 26880

gccctgatcg ccacctagg ccgcgaccg gacaccgacc gcccgctgca cctgggcacg 26940

gtcaagtcca acatcggtca caccagggcc gccgccggcg tcgccggggt gatcaagatg 27000

ctgctcgga tgcggcacgc cacgtgccc cgcacctgc acgccggcac gccgtcctcg 27060

cacgtcgact ggagcgccgg caccgtggcc ctgctcgacg agggccggga ctggccggag 27120

accggcggca cccgccgggc cgggtgtctcg gcgttcgggg tcagcggcac caacggccac 27180

gtcatcgctg agcaggcacc gccgccccg gagaccgccg ccgccgagct gcccgcgag 27240

gtcccgctgg tgctgtccg ccgcaccccc gcggccctgc aggagcaggt cgaccgcgtg 27300

gtcggcgctg ccggtgggca caccgccacc gacgtcgccg cgacctggc cgggtggccg 27360

acctgttcg gccaccgcgc cgtgtctctc gccggcccgg acgggatccg cgaggccgc 27420

cgcgccaccg cccccgcac ccccgccgg acggcgctcc tgttctccgg gcaggcgcc 27480

cagcacgccg ggaatggccg tgcgtccac gagcgccacc ccgctacgc cgaggccctc 27540

gacgaggtec tgcgccggtt cgacacctg ctcgacgac cgctcgggga cgcgtgttc 27600

gccgagcccc gtcagcggc cgccgaccgg ctcgacgaga ccggcaccac ccagcccgcg 27660

ctgttcgccg tcgaggtggc gctgtaccgg ctcttgaggt cctggggcg caccgccgac 27720

ctggtcgccg ggcatcgggt cggtagatc gccgccgcgc acgtggccgg cgtgtctctc 27780

ctcgacgacg cctgcgcgt cgtcgccgc cgggcctcgc tgatgcaggc gtcgccggc 27840

gggggcgcga tggtcgcggt cgaggccacc gaggacgagg tcacaccgt gtcaccgac 27900

ggcgtcgca tgcgccggt caacgggccc gcctcgctgg tctctccgg ggacgccgac 27960

ggggtcggcg cgtcgccga ccggtggcg gccgacggc gccggaccg gcggtcgcg 28020

gtcagccacg cttccactc gccgtgatg gacgcgatgc tcgacgggtt cgccgccgcg 28080

atctcgggga tcacctcgc cgcaccggg atccactgg tctccacgt caccgtgcc 28140

ctcgccgggc cggagctggg cgagcccggc tactgggtgc gtcacgtgcg ggaggccgtg 28200

cggttcgccg acggtgtccg cgccctgcac gaggccgggg cgaccgtgtt cgccgagatc 28260

ggcccggacg cggcgtctgt cgccccggcc cagcagaccc tggacacggt ggcaccggcc 28320

gacggcccgg cagcgggtgt cgtcgcgtc cagcggcgcg accgcgacgc cggcaccgcg 28380

ctgctcgagg gcctcgccgt cctgcacgtc cagggcgccg gaccggactg ggcggccgtg 28440

ctgccgccc gcgggcccgt cgagctgccg acctaccgt tccagcggga acgtactgg 28500

cccagcccc gcacgccggg cggcggcgcc ggaccggccg acccgccga ctccgccttc 28560

tggcgggctg tcgagcggga ggacctggag agcctgtcgg gctcgtcgg tgtcgacggc 28620

gacacgtcgc ccacgatgtt ccctgcgtg tccgcctggc gccgcccca cggcgccgag 28680

tccgcggccg cgacctggg ttaccgcgag acgtggaccc cggtcgccac cccggcgcc 28740

gcggtcaccg ggcggacgt cgtgctggtg tccgccgtg ccgacgcctg gaccgacgcc 28800

ctcgtgaccg cgctcgacgc cgagaccgtg gtcgtcggcg acggctccac cgacgagctc 28860

accgtggccc tcggcgtcct cgacgacgcc gaccggccc tggaccgggt ggtgtcgtg 28920

ctcgcccgcg ggacgtccgg gctgccgtcc gggccccccc gggcgtcggc gctgctcgcc 28980

gcgctcgccg cggccgggat cgacgcaccc ctgtggtgcg tcaccgcgg cgcggtcgcc 29040

gccgaggga ccacccccgc ccccgccag gccgcgtgt ggggatggg ccgggtcgcc 29100

gcgctggaga cccgcagcg gttcggcggt ctgccgacc tgcccgggg ccccgacgcc 29160

gtcgcccgcg ccgccgcac gcactcgcc gcgtgctca ccgagccgg cggggagagc 29220

gagatcggg tgcgcgccac cggcgccctac gccgcgcc tegtgcgggc gggcggtgcc 29280

gagggcacgg ccgccgcccg ctggcgcccg cacggcaccg tgctggtcgt cggcggcacc 29340

ggggcgctgg gccgcgcgc cgcgcgccgg ctggccgccc acggcgccac gcacctgggtg 29400

ctcacgcgc cctcggccgc ggctcgggtc gacaccgacg ccgtcaccgc cgagctggcc 29460

gacctcggcg tcgcggtcac cgtgtccgac gccgaccccg ccgacccggc cgcgctcgcg 29520

gcgctgctcg acggtgcccc cgacgccccg acccggtcgc tccacgccgg tgaggcgctc 29580

ggcgacgcgc gcctcgccga cgtcctggcc cccgtcgagg ccctcgccac ggcgctcacc 29640

ggccccgcga ccgcacacga cctcgacgcg gtctcctgt tcggctcgat cgccggggtc 29700

tgggggggtgc gcggacgggc ggtcgaggcc gccgcgggcg cccacctcga cgcagtcgcc 29760

cgcagcctgc gcggcgccgg tgccccgcg acggccgtcg cctggggcgc ctggaccgat 29820

cttgccgacc gtcgacggc ggccccacta cggatgaacg gcctgcccgc gatggacggc 29880

gacgcggcga tggccgcgt cggccgcgc gtcgccgacg ggtcggctgc cgagaccgtg 29940

gccgacgtgc gctgggagac cttcgccccg gcacaccacg acgcccgcgc caccaccctg 30000

ttcgacgcgc tgcccaggcg ccgcaccgcg ctgtccggcg cggcccgcga gcgggccggc 30060

cgcgaggccg ccgcgagcgg gtacgggcag tggctcgccg agcagcccga ggcggagcgg 30120

gacacgatcc tgctcgacct cgtcgccgcg acggcgacga cggctcctgg tctgaccgac 30180

ggcgagccgc tcgaaccga cctgcccttc cgggacctcg gcttcgactc gtcaccgcg 30240

gtggacctgc gcaaccagct caccgccgc accggtgtcg cgctgcccgc caccctggtc 30300

ttcgaccacc cgaacccgc cgctgtggcc gcgcacctgc gcggcgagct gtcggcggg 30360

ggtgacggtg ccgccgagcc cgtcacctc gccgcgtccg ccaccgggga cgaccgatc 30420

gtcatcgtcg gcatggcctg ccggtaccgc ggtggcgtcg cctcgcccga ggacctgtgg 30480

cagctcatgg ccgacgacgt cgacgccgtc ggggcgttcc ccgacgacgg cggctgggac 30540

ctggagaccc tcgccgttga cggccccggc cgacgcgcca cggcccaggc cgggttcctg 30600

cacgacgcca ccgacttcga cccgggaccg ttcggcgtct cgccgcgcga ggcactgggtg 30660

atggaccgcg agcagcggtat cctgctggag acctcgtggg aggcgctgga gcgcactggg 30720

atcgaccctg cgtcgttcg gggcagcgcc gactacggcg tgttcgtcgg cggcggctcc 30780

ggtgactacc ggccggccgc cgagccggg cagtggcaga ccgccagtc cgccagcctg 30840

ctgtcgggcc gctcgccta caccttcggt gtccagggcc cgacggtctc ggtggacacc 30900

gcctgtcctt cgtcgtcgtt cgcgttcac ctcgcggcgc aggccttcgc ggcgggggag 30960

tgtcgtatcg cgtcggccgg cggcgtcacc gtcatggcca ccccggtcgg gttcgtcag 31020

ttcagcggc agggcgctt gtcccggaac ggtcgttcgc gcgccttctc cgacgacgcg 31080

aacggcaccg gctcgttcga gggcgtcggc atcctggtcg tcgaacggct ctccgacgcc 31140

cgccggcgcg gccaccgct ccacgcgggt ctcgcgggt cggccatcaa ccaggacggc 31200

gcctccaacg gcctaccgc acccagcggc cggcccagc agcgcgtcat ccgccaggcg 31260

ctggccaacg cccggctcac cccgggcgag gtcgacgcc tcgaggcgca cggcaccggc 31320

accacctcg gcgatccgat cgagggccag gccctgctcg ccacctacgg gcaggaccgc 31380

gaccggccgg tctcgtcgg ctcgtgaag tcgaacatcg gccacacca ggccgcgtcg 31440

ggcgtcggcg gcgtcatcaa gatgtgtct gccatggagc acggcgtgct gccgcgtcg 31500

ctgtacggc agaaccgtc ctcgcactg gactggaccg cgggcgacgc acagtgtctc 31560

accgcgcca cgggtggcc cgagaccggg cgtccgcgc gggccgcggt gtcctccttc 31620

ggcgcgagcg gcacgaacgc gcacccatc ctggagcagc cccgcacgc cgacgtcgtc 31680

cggcgcgccc acgacacccc cgacgacccc ggcgcggtcg cggtcctgct gtccggccgc 31740

accgaggccg cgctgcgtgc ccaggccgac gagctggtcg cccacctcgg cgagcacccg 31800

gacctgcggc tgcgcgacct ggcccgcgcc ctggccacga gccgtgcgac gttcgaccac 31860

cgggcggcgg tcaccgccac ctgccgcgac gagctcctcg cagggtcac gccctgcgc 31920

cacggcgaca ccgaccgca ggtcgcgacc caccgcctgg agcgagcgg ccgcagcgcc 31980

gccctgttct ccgggcaggg cgcgcagcgg ctgggatgg gccgcgagct gtacgaacgg 32040

caccgggtgt tcgccagcg cgctgacgcg gtgctcgccc ggctcgacgg tcacctgac 32100

cgcccgctgc gcgacacgat gtgggggacc gacgccgacg ccctcgccga gaccggggcg 32160

accagccgg cgctgttcgc cgctgaggtc gcgctgtacc ggctcgtcga gtctggggg 32220

gtccgcccgg acttcgtggc cgggcactcg atcggcgaga tcagcgccgc gcacgtcgcc 32280

ggggtcctcg acctcgacga cgcctgccgg ctggtcgccg cccgcgccg tctgatgcag 32340

gcgtccccgg ccgggggcgc gatggtcgcc gtcgaggccg acgaggacga ggtgaccccc 32400

ctgctcaccg acggcgtcgc gatcgccggg gtgaacgggc ccggctcggt ggtcctgtcc 32460

ggtgacgacg acgcggtgac cgccctggcg gcggtcctcg ccggcgaggg acggcgaccc 32520

agcaggctgc aggtcagcca cgcgttcac tcggcccga tggacccgat gtcgcccag 32580

ttccgcacgg tcgccgagga gtcgactac cagagccgc gcatcccgt ggtgtccaac 32640

ctgaccggcg ccgtcgccgc ggcgacgag ctctgctcgg cggagtactg ggtgcgccac 32700

gtccggggca ccgtccggtt cgccgacggt gtcggtgac tcgcccccg cggcgtcagc 32760

accttcctcg agctcgccc ggacgcggtc ctgtcgccac tcgtgcccg cagcgcgccg 32820

gacgcgtcgc ccgtccccgc cctgcgccgc gaccgcgacg aggaggcgac cctggtcgcc 32880
gcgtcgcgc ggctgcacac ccacggcgcg ggcccccggt gggaggcggt cttcgccgcg 32940
cacgacaccc gccgggtcga cctgccgacc taccgttcc agcgcgaccg gtcttgccgc 33000
gacgtcatgc ccggccagga gaccggggcg gtgcgccccg ccggccccggg ccccccgac 33060
gagatcgacg ccgccttctg ggaggccgtc gcgcaggagg acttctccgc actcgagaca 33120
cagctcgacg tcgaggcgcg ggcgtgtcgc gcgtgtcgc cgccctgat ggactggcg 33180
agccgccggg cgcaggaggc ccggctggcc cgtggcgcg accggatcgt ctggaagcgg 33240
ctgaccggct ccgcgaccgg gcggcgccgc acccccgagg gcacctggct ggccgtgtc 33300
ccggagggca ccgcctcga cccgtgggtg accacgtgc tcgacgggat cggcacgcc 33360
gtcgtgaccg tcgagaccgg ctccaccgac cgcgcgtgg tcgcgccgc actcaccgcg 33420
cagctccccg ccgggacccc ggtgccggg gtctgtcgc tgctcgct gcgcgacgag 33480
ctcaccggcg acgtccccga cgggtcggg ctaccaccg gcctgtcca ggccctcggg 33540
gacgcgggg tcgacgccc gctgtggtgc ctaccgcg gcgcggtct caccgggacc 33600
accgaccgcc cggcacggc gctgcaggc gcgatctgg gcctggggcg ggtcgcgcg 33660
ctggagtacc cgcagcgtg gggtgccctg gccgacctgc ccgaggacc cgaccgcgg 33720
gccgccgcg cgtcggcg ggtactggc gggtcgacg acgaggacca ggtcgccgtc 33780
cgccggcgcg cgttctggc gcggcggtc gtccggccc cgcccgggga ggacacgacg 33840
acggcgtgga cccgaccgg caccgtctg atcaccgcg gcaccgtgc ctcggcggg 33900
cacgtggcg gacggctgc cgccagcgg gcgcagcacc tgggtctgt cggtcgccg 33960

ggcccgacg ctcccggtgt ggacggactg cgtgcggagc tggaggcact cggtagcggc 34020

gtgaccgtgg cggcctgtga cgccgccgac cgggggcagc tgtccgcggt gctcgcggcg 34080

atcccgccg accggccgct gaccggcgtc gtgcacgccg cgggcgtgct cgacgacggg 34140

atcctggacc gcctcacccc cgagcgggtac cgggaggtct tccggtcaa ggtcacgcg 34200

gcgtgctgc tcgacgagct gaccgcggc ctgcacctg acgcgttcgt cctgttctcc 34260

tccggtcct cggccgtcgg caaccccggt caggccaact acgccgcggc caacgccgtg 34320

ctcgacgcg tcgccagca gcgccgggc cgggcgacg cggccacctc gatctcctgg 34380

ggtgtctggg gcggcggcg aatggcggg gccggctccg ccgacgacg ggcgccgcg 34440

accgggatcg gtccgatga cccggcgtc gcggtcgaga ccatgctccg cctgatcgcg 34500

gggaccgcg ccaccgcggt cgtgccgag gtgcagctcg accggttcg cggcgcttc 34560

ggcggcacc gccccagccc gctgtgcgc gagttccccg gctacgccga gtcgtcgcc 34620

ggccgggccc ggaccggcc cggcgcggcg gaggacgacc tcgccgcgac gtcgttgca 34680

ctgcccccc cgccggcggt ggacacggtc gtggacctgg tgcggtcgcg tgccgcgag 34740

gtcctcggt atcccgagc cgacgacgtc gggggcgaac ggtccttcg tgacctcggg 34800

atcgactccc tggggcggt cgagctgcg aaccagctcg gcgccccac cggcctgggc 34860

ctgccggcca cgtggtctt cgaccacccg acccccgccg ccgtcgccc gtacctgtc 34920

gacgagctgg ccggagacga caccggggc gacggcgagg aggccgggat ccgggcagca 34980

ctggccaccg tgccctgga acggtgcgc gagctcggcg tgctggagcc gctgtgcgg 35040

ctcgtcgcc gcggcgagga aaccgagcc gacgacgaca ccgggaccgg tcccggtggc 35100

agcgaggtcg acgcatgtc cgtcgacgac ctggtgcggg ccgcgctga cggccggccc 35160

gacgacctgt agcgcgagtg agggaaacaga cgatgaacga gaagcacgcg tccggcacccg 35220

ccggtggcaa cgacgtcgtc accgcgctcc gcgccgcggt gaaggagacc gaccggctgc 35280

gccggcagaa ccggatgctg cagtccgcgg ccaccgaacc gatcgccgtc gtcggcatgg 35340

gctgccggtt ccccgggggc gtcgactgc ccgaggcgct ctgggacatg gtcgccgccg 35400

gcaccgacgt gatctccggg ttccccaccg accgtggctg ggacctgac gcgctgcacg 35460

ccggcggcac cgacccccgc gacaccgaga tcagcatgca gggcgggttc ctggacgggg 35520

tcgccgactt cgacccccgc ttcttcggta tctcaccgcg cgaggccgtc accatggacc 35580

cgcagcagcg gctgctgctg accaccgcct gggaggcgat cgagcgcgcc ggcctgcacg 35640

ggcccgggct gcgcggcagc cgcaccggcg cgttcacgga caccaacggg caggactacg 35700

cctacctggt ggtccgctcg ctgcagcagc cgaccggcga cgtcggcacc gggatcgccg 35760

ccagcgcctg gtcggggcgg ctgtcctaca cctcgggct cgagggtccc gcgctcacg 35820

tcgacaccgc ctgctcgtcc tcgttggtcg cgtgcacct cgccgtggcc tcgctgcga 35880

acggcgagag ctccctggcc ctggccggcg gcgtcaacgt catgtcgacg cccgggtcgc 35940

tggtcgagtt cagccgccag ggtgggctgg cccgcgacgg gcgtgcaag gccttcgccg 36000

aggcgccga cggcaccggc tggtcgagg gcgccggat cctggtgctg gagcggtgt 36060

ccgacgcccg ccgtctcggg caccgggtgc tcgcggtcgt ccgcgggtcc gcggtcaacc 36120

aggacggcgc gtccaacggg ttaccgcgc cgaacgggcc gtccagcag cgtgtcatcc 36180

gggccgcgct cgccaacgcc gagctgtccg ccggcgacgt cgacgccgtg gaggcgcacg 36240

gcaccggcac accgtcggc gaccgatcg aggcgagag catcctgcc acctacggc 36300

gggaccgcga gcggccgctc gcgctcggtc cggtaagtc gaacatggga cacaccagg 36360

ccgcgtccgg tgcgccggg gtcataaga tgatcatggc gatgcagcac ggtgagctgc 36420

ccaggacact gcacgtggac cgccctcga cccacgtcga ctgggccg gcgcgggtcg 36480

agctgctcac gcaggcgcgc ccgtggccgg ccgtggagcg gccgcggcgc agcgggtgtgt 36540

cctccttcgg ggtcagcggc accaacgccc acgtgatcgt cgagcaggcg cctgccccgg 36600

ccgagcccg gcgcgagccc gcccccgc tcccgcaggc gctggcctgg acggtctcgg 36660

cccgacccc cgccgccctg cgcgaccagg ccgccgcgt gctcgccac gtcgagcgcg 36720

accacgccc gaccgcgtg gacaccgggt actccctgc caccaccgc gccgtgcagg 36780

aacaccggt cgccgtcgtc accggaccgg acggacgggc cgggcgcgcg gcgctgcgcg 36840

gttggttga gcacgggagc gcgcggggcg tcgccctcgg ccacgtacc ggacgcccc 36900

ggctcgccgc gctgttctcc gggcagggcg cccagcggct cggcatgggc cgcgagctgt 36960

acgagcggca cccggtgttc gccccgcgt tcgacgaggt cctcacgtg ctcggggacg 37020

acctgcggga cgtcgtgtgg ggcaccgacg ccgccgcgt cgacgagacc ggggcgaccc 37080

agcccgact gtcgccgtc gaggtcgcgc tglaccggt cgtcgagtcc tggggcgtga 37140

ccccggacct cgtcgccgc cactgatcg gcgagatcg cgcccccac gtggcggcg 37200

tggttccct cgacgacgc tgccgggtgg tcaccgcgc gcctcgtg atgcaggcg 37260

tgccccgg cggcgccatg gtcgccgtgg aggcgaccga ggacgagtc acccgctgc 37320

tcaccgacgg tgcgcgac gcggcggtga acgggccgtc gtcggtcgtc gtgtccggcg 37380

aggaggacgc caccctgcc gtcgccgcc ggtcgccga gcagggccgg cgcaccagca 37440

ggctgcgggt gtcgcacgc ttccactgc cgtgatgga cccatgctg gccgagttcg 37500

cggccgtcgc cgagggcctg tctacgccg agccccggat cccgtggtc tccacctga 37560

ccggggcacc cgccacggtg gagctgtgcg atccccggta ctgggtgcgc cacgtccgtg 37620

aggccgtcgc gttcgccgac ggggtcggcg ccctaccga cgccggcgcc cggatgttcc 37680

tggagatcgg cccggccggg gtgctaccg cgtggccgc acggtccgc cccgaggcca 37740

ccgccgtcgc gctgcagcg accgaccgc gtgaggagga ggcgaccgtc gccgcgtcg 37800

gtgcgtgca cgtgccggc accgccgtc actgggaggc cgtccagcc ggcaccggcg 37860

ccccccgac cgacctgcc acctacgct tccagtacga gcgttactgg ccgaaggcgg 37920

tgcagcgtc gggcgacgc gccgggctc ggtggcccc cgccgaccac ccgtgctcg 37980

gcgccccat gtccgtggc gggtcgacg agtctgtgt caccggcag ctgtccctga 38040

ccacccacc gtggctgcc gaccacgtc tcggcgggat ggtcttctc cccggcacgc 38100

gttctctga gtcgccgtc cgcccgccg accaggccgg ctgcgaccg gtcgaggagc 38160

tcatgtcgc cgcccgctc gtgtgcccc ccaccggcg ggtccagatg cagatcgccg 38220

tcggcgcggc cgacccgac ggcacccgc agtcagcgt gtacggcg cccgcgcagg 38280

accccgacgc cgactggacc cggcacgcca ccggccgggt cgcccccgc gagcaggtcg 38340

cggagtcca cccccgacc tggccgccc ccggggccga gcccgtagc atcgacggc 38400

tctacgacc ctacgccgc aacgggctc agtacggccc ggtcttccg gccctgcagg 38460

cgggtgtggc ccgtggcgac gaggtcctc ccgaggtcgc gctgcctcc gccggggccg 38520

aggacgcggg cgacttcgc ctgcacccg cctgttcca cgccgtctg cacagcacgg 38580

gttctgcctc cgccgacggg gacgaccga gcctgtgcc gttcgctgg aacggggtgt 38640

ccctgcacgc cgcgggcgcg accgcgctgc gggtgcgctg cacctccgcg gggcccgcacg 38700

ccgtccggat cagcgcggcc gaccgcagg gcaaccgggt gatctcgggt gactcgtga 38760

ccctgcgcgc cgccggggcg gacgcggcgg gcccgaccg ccgggacccg ggatcgtgt 38820

tccggatggg ctgggtgccg cagaccctca cccccggca caccggcg acctgggcgg 38880

tcctcgacgg cgcgggagcc ggcgatgtcg ccgccgctg gaccgccgag ccgcccgcg 38940

tgtccaccgt gcggacggtc accggtctcg cggacctca cgacgccgac ccgcccgacc 39000

tggtcgccgt ccgctgacc gccccggct ccgtcgacac cggccccgcc gccgcacaca 39060

ccctgaccg cgaggtcctc gcgtgctcc agcagtggct cgccgacgac cggtcgtccc 39120

ggaccgcct cgtcgtactc acccgggcg ccgtcgcca cggctccgga tcgccgtcg 39180

acctgccac cgcaccgtg tggggcctgc tgcgtccgc gcagtcggag aaccggcc 39240

ggctgctggt cgccgacctc gacgacacc cggcgtcgt cgccgggtc gcgcagctgc 39300

ccgccctgtt cgacgccgac gagccgagg cgatcgtccg ggacgggcc gtgcgggtcg 39360

ggcggctcgc cagctgctg tccggcgccg cgtcgtccc gccggccggg accccctggc 39420

ggctcggctg ccgcgccaag ggcagcctcg acggcctga gctggcgccg caccggacg 39480

tcctgcccc ctgcgcggg cagaggtcc gcgtcggat ccgcgccg gggctgaact 39540

tccgcgacgt cctcaacgcg ctcgggatgt acccgcgga cgcggggctg ttcggctccg 39600

aggccgccg cgtcgtcacc ggggtcgggc ccgaggtcac cagctcgcc ccggcgacc 39660

gcgtcaccg catgctgtt ggccgggttc gcccgcacgg cgtcaccgac gagcggtgc 39720

tcaccacgt gcccgacgc tgggactggg agaccgccg gtcggcca ctggtgttc 39780

tcaccgcta ccacgcctg gtcgacctg ccgacctga gcccggtgag aaggtgtga 39840

tccacgccgg agcggggcgc gtcggcatgg ccgcggtgca gatcgcgcac cacctcgggg 39900

ccgaggtgta cgcgacggcg tcggagccca agcaggatgt cctgcgcggg ctgggcgtcg 39960

caccggacca catgcctcc tcgcggaacc tggagttcgc cgggaccttc gccggggccg 40020

ggatcgacgt ggtcctcaac gccctgtccg gggagttcgt cgacgcctcg atgggcctgc 40080

tgggcgacgg tggccggttc ctggagatgg gcaagaccga catccgcgac cccgcggacc 40140

tccccgacgc gatcacctac cggttcttcg acctcggcgc cgtcgaccg caccgcatcc 40200

agcagatgct ggtcgcgtg gccgggctgt tcgccgacgg cgcgtgtcc ccgctgccg 40260

tgcgcagctg ggacgtgcgc caccgcgtcg aggcgttcg gttcatgagc tccgccgcc 40320

acgtcggcaa gctcgtgctc accgtcccgc cgcgctcga cccgcagggc accgtgctga 40380

taccggcgg caccggcggg ctgcgcgcg cgtggcgcg ccacctcgtc gccacccacg 40440

gcgtggcgca cctcgtgctc gccggccgcc gggggccga cgcgccggc gcgaccgcgc 40500

tgcgggagga gctgaccgc gccggtgcgc aggtcacctg cgcgcctgc gacgtcgccg 40560

accgcgacgc gctggccgcc ctgctcgacg gcgtcgacc ggcgacccg ctacccgcc 40620

tcgtgcacac cgcgggcgtc ctgcgacg gcaccgtcac ctccctgacc cccgccgccg 40680

tcgacgccgt gctggccccc aaggtcgacg ccgcctggca cctgcacgac ctacccgcg 40740

accacgagct cgcgcgttc gtcctctact ctccaccgc cggggtgatg ggcggaccg 40800

gccagggcaa ctacgccgc ggcaacacct tcctcgacgc actcgccgc caccgccacg 40860

cactggggct gccgccacc tcgttgccct ggggcgcctg ggagcagggc gccgggatga 40920

ccggtggcct gtccgaccac gacgtcgccc gggtcgggtc cggcgcatg ccgtgctga 40980

gtgtggagcg cgggctcgcc ctctacgacg ccgcgaccct cgccgaggag cccctcgtcg 41040

tcccgtcgg cctgaccggc ggagggaacc cgccgaccgc aggcggcgtc cccgccgtgc 41100

tgcgcggcct ggiccgtcc ggaggccgcc gccgcgccgg caccgcgggc gtcgcccggg 41160

ccgggctggc cgagcgctc gccgggctcc ccgccgacgg ccggggcgcg ttcctcgtcg 41220

agctggtcgg tgccgaggcc gcgaccgtgc tggcctcgg ctccggggac ggcgtcgacg 41280

cccgtcacga gtccggcgg atcgggttcg actcgctcac cgcgatcgag ctgcgcaacc 41340

ggctgggcag cggtccggg ctgaccctgc ccgcgacgt gatcttcgac taccgaccc 41400

cggagcggct ggccgcctac ctgctcgagg agtcgcggg cgaggacacc gggcccgtcg 41460

gcgacggccc cgtggtcgcc cgcccgacg ccgacgaccc ggtcgtggtc gtcgggatcg 41520

gtgcccgtt ccccgccgc gtgggctccc cggagcagct gtgggacctc gtcgcaacg 41580

gcaccgacgc gatcaccggc tcccaccgg accgcgagtg ggaccggcac ccgccgtgg 41640

gtggcggtag gcccgccgac ctaccggcc agggcgggtt cctcgacgac atcgcgggct 41700

tcgacgcgga gtcttcggt atcgccccgc gtgaggcgct ggccatggac cccagcagc 41760

ggatcctgct ggaggtcgcg tgggaggccg ccgagcgcgc cgggatcgac ccgcacacgc 41820

tgcgcggcag ccgtaccggg gtgttcattg gggtgtccgg tcaggactac tccggcctgg 41880

tgatgcgctc cgccgacgac atcgcgagcc acgcgaccac cggcctcgcc gtcagcgtcg 41940

tgtccggcg gtcgcctac gtctcggcc tggagggcc cgcgctctcg gtcgacaccg 42000

cctgtctctc gtcgtggtg tccctgcacc tcgccgggc cgcactcgcg tcgggcgagt 42060

gcgacatggc actcgccgc ggcgtcaccg tgatgacgac ccccgcaac ttcaccggct 42120

tctccggat gggcgggctg gcggcgacg ggcgctgcaa ggcttctcc gactccgccc 42180

acggcacggg ctggtcgag ggtgcggctg tgcaccct cgaacggctc tccgccgcgc 42240

gccgccacgg gcaccgggta ctgccgtgg tccgcgggtc cgcggtgaac caggacggtg 42300

cctcgaacgg gtcaccgt ccgaacgggc cgcgccagca gcgggtcatc gccaggcgc 42360

tggccgacgc cgggctggag cccggtgacg tcgacccgt cgaggcgac gccaccggca 42420

ccccgtggg cgaccgatc gaggcccagg ccgtgctgc cacctacggc ggggagcggg 42480

accgcagcg gccgttgctg ctggggtcgg tgaagtcgaa catcgggcac acccagtcg 42540

cggcgggcgc cgcgggactg atcaagatga tcatgtcgat ggcgacggg gagctgccgc 42600

ggacctgca cgtaccgag ccgtcctgc acgtggactg gtccgacggc accgtgccc 42660

tggtcaccga gcggacccc tggccggaga ccggacacgc ccgccgcgc ggggtgtcgt 42720

gttcgggat cagcggcacg aacgccacg tgggtctga acagccccc gccacgcagc 42780

cggcacctcc ggacgcccc accccggaig ccgcccccc ggacgcccc gccccggatg 42840

ccgcccccc ggaggtcgtc gcctggccgg tgcgcccg gaccgaggcc gccctcgacg 42900

cccagctga ccgcctgcgc accgccgttc ccggcctgac ccgaccgcc gtcgcgcga 42960

ccctgccac cggacgggcc ctgttcgagc accgcgccgt gctgctgcc gggcccggcg 43020

ggaccaccga ggccgccgc ggccgcccg ccaccgcgg caccgcgttc ctgttctccg 43080

gacagggcgc ccagccctg ggcatgggc ggagctgca cggccgttc ccggtgttcg 43140

ccgacgcgtt cgacaggcc gtcgccctgc tcgacccga gctgggcgc acgtgcgcg 43200

acgtcgtgtg gggcgaggac ccggaagccc tggaccgac ccggcacacc cagccggcg 43260

tggtgccct cgaggtggcc ctgtaccgc tcgtacctc ctgggggatc cggcccgtc 43320

ggctcgcggg ccactcgatc ggtgagatcg ccgccgcga cgtcgccggg gtgtttctcc 43380

tcgccgacgc gtgccgcctg gtgccgcgcc gcgccgcct gatggacgca ctgcccgcg 43440

gcggcgcat gaccgccgtc gaggcggcg aggacgaggt gaccccgctg ctaccgacg 43500

gcgtcgcat cgccgggtg aacgggccc cgccgtcgt cgtgtccggg gcggccgcc 43560

aggtcgacgc cgtgccgcc gagctggccg ccgcggcag gcgcaccacc gcgtcgggg 43620

tcagccacgc ctccactcg ccgtgatgg acccggtcct cgacgagttc cgtgccgtcg 43680

tccgggacct cgctacgag ctgccgcga tcccggtcgt gtcgtgctc gccggggcgg 43740

gacgccga cgacctggcc accccggagc actgggtgcg ccacgtccgg gagacgtcc 43800

gttcgccga cgccctggcg accctgaccg cgggcggggc caccggttc ctggagatcg 43860

gtccggacgg cgtgtgtcc gcgccggccc gcgccgtgct ccccgcggtc ggcgacgacg 43920

ccgccgtcgt cccccggcc ctgcgcgcc ggacggcga accggcccg ctgtcaccg 43980

cgctcgcccg cctgcacgtg gccggggtcg acgtcgactg ggccggccggg ctccggcgcg 44040

ccgtgccgg ccccggcgcc gacctgccca cctacgcctt ccagcacgaa cggttctggc 44100

cgcggtcgc cgccggccc gccaccggca ccggcgagga caccgagttc tgggcggccg 44160

tcgagcggga ggacctggc ctgtggccg ccacctcga cgtcgacggc gagcggtcg 44220

gcgccgtgct gcccgcactc gcggcctggc gcagcccg gcgcagcgac gcatcgctcg 44280

accggtccg ttaccgcgag tctggcgcc cgtgacgt gccacggcc gtggaaccgg 44340

gccgccact cgtgtctgc ccggccgtcg cggccgggga cccctgggtc ggcgaggtcg 44400

tggacgacct cggaccggac accgtccggg tcgacctga cggcaccggc accgaccggg 44460

ccggcctgc cgcggtgtc accgggcacg ccgacgccg gtcaccggg atcgtgtcc 44520

tgctggccct cgacgagacc ccgtgcgggt ccgccccgca ggacgccgca tccggtgcgg 44580
 acgcggtgcc cgggtgtggac gcggtgcccc ccgggctcgc cgcgaccgcg gcactcgccg 44640
 cggcgctcgc cgacaccggc gtcaccacc gcgtgcacgc cgtgaccgcg ggccgctgg 44700
 caccggcggg cgacggcccc gccgccccg tgcaggccgc ggtctggggg ctcggacggg 44760
 tcgccgcgct cgagctgccc cgccggtggg gtggtctggt cgacctgccc gccgagctcg 44820
 acgccgccac cctgcgcagg ctgcccgcgg tgctggcggg cgaggaggac caagtgcgc 44880
 tgccgccac cggtgccac ggccgccgga tgacccggc gccgaccgc cccgcggacg 44940
 gccccgacac cgcggacacc cccgcctgga ccccgctcgg cacggtgctg atcaccgggg 45000
 gcaccggtgc gctgggcggc cacgtgcgc ggccgctggc cgccgacggc gcggagcacc 45060
 tgggtgctgt gggccgact ggtccggacg cgcgggctgt ggacgcctt cgtgccgaac 45120
 tggaggcctc cggccgcgcg gtcacggtgc tcgctgcga cgcggccgac cgcgcacagc 45180
 tgcaggcggc gctggccgcg atcccgccg atcggccgct gaccggcgtc gtgcacgccg 45240
 ccggcgtcct cgacgacggc gtcctaccg gcctgaccac cgaccgtctc gccggggtgt 45300
 tccacgcaa ggtcaccccc gcgctcctgc tcgacgaact gaccgcgac ctcgacctcg 45360
 acggttctgt cctgttctcc tcggtggcgc gcagcgtcgc caaccccgcc caggccggt 45420
 acgcggccgc gaacgccgc ctcgacgcgc tcgcggcgc ccgggttgcc gacggccgac 45480
 cggccaccgc tgtggcctgg ggccgctggg cgggtgccg catggccgc gcgcacaccg 45540
 gcaccggcac cgtcccggac gggcagctgg accccgacct cgccgtgcgg gcgtggtcc 45600
 gcgcggtcgc cgagccggcc ccgaccctgg tggtcgccga cctcaccac ccgcgcctgc 45660

tggaggcgct gctctcggtg cgccccagcc cactgctcgc cgacctgcc ggcgcacggg 45720

acatcgcccg ggccgcgcag gagaccgcc gccgccgca cgacgtgcc ggcgggttgg 45780

gtgcccggtt ggccgcggcc ggaccggagg agcgcggggc cgtcctgctc gacctggtgc 45840

gcgacaccgc cgccggggta ctgggacaca ccggcccga ggcatccgc cccgggaaac 45900

cgttcggcga cctgggcttc gactcgtca ccgcggtgga gctcagcaac gcgtgcccc 45960

ccgcgaccgg gctgtccctg cccgcgagcc tggctcttga ccacccacc ccccggtgc 46020

tggccgcaca cctggtcacc gagctcaccg gtgacaccgg cggcgcggac ggcgccgggc 46080

ccgtcgagca caccgcggtc gacggcgacg acccggtcgt cgtcgtgcc acggcctgcc 46140

ggttccccgg cggcgtcagc acgcccagg agttcttgca gctgctgcc gacggcggcg 46200

acggcatcac cggttcccc accgaccgcg gctgggacct cgacgtctc gccggtgacg 46260

ggcagggccg cagcgcacc cgaggaggcg gcttcttga cgacgccgc gggttcgacc 46320

ccgcttctt cgacatctc ccccgaggg ccgtcgccat ggacccgcag cagcggtgc 46380

tgctggagac cacctgggag gcgttcgaac gcaccgggac cgacccgcc cggctgcgcg 46440

gcagccgcac cggcgtgttc gtcggcacca acgggcagga ctacgcgaac ctgctgctgc 46500

gctccccgga cgacgtcgag ggccacgcc gcaccgcct cgccgcgagc gtcattctccg 46560

gccggtcgc ctacgcgtc ggactggagg ggcgcgggt caccgtgac accgctgct 46620

cgctcgtcgt ggtcgcggtg cactgggcgg ccagggcgt gcgcgcgggg gagtgcgacg 46680

ccgcgtcgc cggtgccgtc accgtcatgt cgacctccac cagcttcgcc gggttcacc 46740

ggcagggcgg cctcgcccc gacgggcggt gcaaggcgtt ctccgatgac gccgacggca 46800

ccggtggtc cgagggcgtc ggcgtgctgg tctggagcg gcagtcgacc gccctcgccc 46860

gcgggcacga catcctcgcc gtcgtccgcg gtcggcggt caactccgac ggcgcctcga 46920

acggcctcac cgcgcccaac gggccgtccc agcagcgggt catccgtcag gcgctcgctt 46980

ccggcgggct gaccccgcc gacgtcgacg ccgtcaggc gcacggcacc ggcacgtgc 47040

tcggcgacc gatcgaggcc caggcgctgc tcgcccta cggccgggac cgggagcacc 47100

cgctgtgtgt cggctcgggt aagtccaaca tcggccacac ccaggccgcg gccggcgccg 47160

ccggactgat caagatgatc ctgcgctgc agcacggcac gtcgccgcg acgtccacg 47220

tcaccgacc gtcgagccgg gtcgactgga ccgccgtgc ggtcgagctg gtcaccgagc 47280

aggtgccgtg gccggagacg ggccgtgcc gccgggccgg ggtctcgtcg ttcgggatca 47340

gcggcaccaa cccccacgtc gtgctggagc agccccgca gtcgccggag cccacgcggg 47400

caccggcgcc cgtggtcacc ccgtgggtgg tctccgccg gtcggcgcc gcgctcgacg 47460

cccagctga ccggctcgc gcccgaccg gcggtccgga cctcaccacc gccgccgagg 47520

tcggacacgc gctggccgtc ggccgtcgc tgttcgagca ccgtgccgtg ctgctcgccg 47580

acgccgacgg cgtcaccgag gtcgcccgcg gcgagcggc cgaacggtcc accgcgttc 47640

tgttctccgg gcagggtgcc cagcgctcg gcatgggccg cgcgtgcac gccgccacc 47700

cgggtgtcgc cgacgcgtg gacacgacg tggccacct ggaccgacg gtgcgcgccg 47760

tgtgtgggg cgaggacccc accgcgtcg acgacaccg tgtcaccag cccgcgtgt 47820

tcgggtcga ggtcgcgtg ttccggctgc tggagtcgtg gggcgtgacc tcggacgccg 47880

tcgccggca ctcggtcgtg gaggtcgccg ccgcgcacgt ggccgggtg ttcaccctcg 47940

acgagcctg cagctcgtc accgccagg cccgtctgat ggccgcgtg ccggtcgcg 48000

gcgcgatggt cgccgtcgag gcggaccccg gcgacgtcac accactgctg accggcggcg 48060

tggccgtcgc cgccgtgaac ggcccgtccg cgggtgtcct ctccggggcc acggacgagg 48120

tctccgccgt cgccgacgcg ctccggccc gcggtgccg cacgcgggcg ctgcgggtca 48180

gccacgcctt cactcgccg ctgatggagc cgatgctcga cgggttccgt gacgtcgtcg 48240

ccggtctgaa ccccgctgag ccgcggatcc ccgtggtctc gacggtgacc ggccgcgcgg 48300

ccaccaccga gctgtgcgac ccgcagcact ggggtcgggg cgtgcgcgac accgtgcgct 48360

tcgccgacgc ggtgcggaca ctgaccggga gcgggatcac cgcgttcctc gagatcggcc 48420

cggacgcggt gctgtccgcg ccgaccgcg cgtgcgtcga ggacaccgcg gtggtcgtcc 48480

ggccctcgc cgcccgac accgaggagc gcgcgtgct caccgcgtg ggcaggctgc 48540

acgtcgccgg gaccggggtg gactggacgg cgttcctcgc cgggaccgcg gccggccggg 48600

tggcgctccc gacctaccc ttccagcggg agcggttctg gcccacggtc gccgccacgg 48660

ccccgccga cgccggcggc ctccgcctgc gcgccggcgg acaccgcgtg ctccgcccgc 48720

cgaccaccgt cgccgggtcc ggcgagatcc tctgaccgg ccgtctcacg cccaccctcg 48780

tggaccggc cgccggcgac ctgccgcgc tgcccgggc ggtgctcgcc gagctcgccg 48840

tccgcgcggg cgacgaggcc ggcgtgacga ccgtcgagga gctgacgatc accgcccccc 48900

tgggcagcgg gacggcgag ctgctgcagg tccgcgtcgg ggaaccggac gacgacggcc 48960

gccgcacgct ggccgtgcac gcccgcccg ccgacgaccc ggacggcccg tggaccggc 49020

acgccggcg cagctgtcc gcggccgcg cgcgggtgcc cgagccggag cccgtgtggc 49080

ccccgaggg cgccgaggcg ctgaccggc tgcccgacac cgtcggaccg gtgcgggtcc 49140

gcggggggtg gcggcacgac ggtgacctgc tcgccgagct cgagctcacc gagcagcccg 49200

ccggttacac cctgcacccg gcgctgctcg acgtcgccgt ccggttcggc gccgccaccg 49260

acgtcgccga cctcaccgcg ctgcgggggc tcaccctgca cgcctcggac gccaccgtgc 49320

tgcgggtccg cctcaccgac cgcggcgacg gcacccgggc actcgccgca tgggacgcgc 49380

agggcgacac ggctcctgacc gccggtgagc tgaccctggc cgagcccacc gccgcggacg 49440

gccccgccgc gtccaccgac gcggtcctgc tcaccctgca ctggaccgcc gcgcccgcgg 49500

tggaccgggc gggcacggcc gggtggggga tcctcggtga cgcgcccgc gagctcggcg 49560

ccgccttggc cgcgtccggc ccgaccccg cgttcgcgc cggtcggtc ggcgcgtcc 49620

tcgactccgg cgaccgctg cccccggtcg tcctcgccgc gatcacccgg gcgccgatca 49680

ccggggcgcc gatcacccgg gcgccgatca ccggggcgcc gggagccggg acaccggaca 49740

tggggggcgc ggacctccc gcccggaacc gcgccaccac cggtgccgtg ctggagctgc 49800

tgcagcgctg gtccggtgac tcccgcacgg cgggtccccg gctcgtctc gtcacccggg 49860

gtgcggtcgc caccggaccg gccgaggacg tccacgacct cggcgccgc ccggtgtggg 49920

ggctcgtacg ctccgccag tcggaggctc cgggcagcat gctgctgctc gacctgacc 49980

cggccgaccc cggcgccggt ccgacgcgc cactggcggc actgcccggc ctggcccgcg 50040

ccggggagac ccaggccgcc gtgcgcggcg gcgccctcac cgtcgcccgg ctgacccggg 50100

ccaccccga cgcaccgca ccggcgggcg cgtgggcccc ggacggcacc gtcctggtca 50160

ccggcggcac cggaggcctg ggccgctgc tcgcccggca cctggtcacc acacgcggtg 50220

tgcggcact gctgctgcc ggccgtcggg gcccggaacg gcccggcgc gcgcagctgc 50280

gtgccgagct cgcgcgctc ggagccgagg tcaccctgc ggctgcgac gtcgccgacc 50340

cgcgcgcggt cgcgagctg gtcggcgccg tgccggccgc ccaccgctg accgcggtgg 50400

tgcacaccgc aggggtactc gacgaccca ccgtcggctc gctggacgcc gcccggtgg 50460

accgggtact gcggccgaag gccgacgcgg cgtggcacct gcacgaggcc acccgggacc 50520

tgccgtggc cggttctgc ctgtactcct cgtcggccg gatcacggc ggccccggc 50580

agggaacta cgggccgcc aacacctgc tcgacgcgt cgccgcgat cgcgcgccac 50640

acggcctgcc cgggctctcg ctggcctggg ggccgtggtc ggccgacgcc ggcattgaccg 50700

gcacctcga cgccgccga cgggagcggc acgaacggtc cgggatgcc ccgtgcagc 50760

ccgcgcaggg cctcgccctg ttgacaccg ccttgccccg gggcgaccg ttgcgcgtcg 50820

cgccccggtt cgccgccggg gccgggaccg ccgtcgacga cgtcccgcc gtgtcccg 50880

ccctggtgag cagcatgcgc cggaccgcgg ccgccaccga gggcgcgggc ggtctgctcc 50940

gcaggtctgc cgggatggag cccggcgccc ggcacgccga gctgctggcg ctgctccgcg 51000

ccgagaccgc ggcggtgctc gggcacaccg gtgccgaggc ggtccccgcc gaccggcact 51060

tcagccggct cgggttcgac tcgtcacccg gtctggagct gcggatgcgg ctggcgcccg 51120

ccaccgggtc caggctcccg gcaacgtgg tgttcgacca cccaccccg gccgaggtgg 51180

cccgccact cgacgaggag gtgctcggct cggcggaccg gggggcgctc tccccgtgg 51240

ccgagctgga cgggtggag gccgcgtgt ccccgacgg tgccgacgcc gagaccgta 51300

gcggggtcgc cgccggctg cgccgactgc tggagcagt ggacggggcc cgcaccgacg 51360

gcgccgacc cgacggccgc accgcgtcg acgaacgct cgaatcgcg agcaccgagc 51420

aggtcctcgc cttcatcgac aacgaactcg gccggtcgtc ggcgcgctga ccccgaccc 51480

ccacgaacga gagaggcga caggacatg cccgacgaac agaagctcgt cgactacctg 51540

aagtgggtca cgcccgatct gcacgacacc cggcgacgac tggccgaggc ggaggcagcc 51600

cggcacgagc cggtcgcat cgtcgggatg gctgcccgt tccccggcgg ggtgcgtcc 51660

ccggaagacc tgtgggagct gctcaccgcc ggccgcgacg gcatcgccc gttccccgac 51720

gaccgaggct gggacctga cgcgtggcc ggcgacggtc ccgcgcgag gccaccag 51780

cggggcgggt tctgcccgg cgccgccgag ttgaccccg cgttcttga catctcccc 51840

cgcgaggcgc tcgcatgga cccgcagcag cggctgctgc tggagaccgc gtgggaggcg 51900

ttcgaacggt cgggatcga ccccgccggg ctgcgcggca gccgcaccgg ggtcttcgtc 51960

ggcaccaacg gccaggacta caccacctc gtctctgct cgcgcgacga catgggcggc 52020

tacgcggca acggcctgc cgccagctg ctgtccggc ggggtgtgtt cgcctcggg 52080

ctgcaggcc ccgcgtcac cctggacacg gcgtgctgt cggcgctgt ggggatgcac 52140

ctgcgcgcc aggcctgag cagcggcgag tgcggtctgg cgtcgccgg tggcgtgacc 52200

gtgatgacca ccccgcgaa ctctccggg ttgagcctgc acggcgccct cccccggac 52260

ggacgtgca aggccttgc cgacggcgc gacggcaccg gctggtccga ggggatcgcc 52320

ctgctcgtg tcgagaagct cgccgacgc cgcgcgacg ggcacccgt gctcgccgtg 52380

ctcccggtc ccgcgtgaa ctccgacggc gcgtcgaac ggctcagcg cccgaacggg 52440

ccggcccagc agcgggtgat ccgccaggcg ctggccagcg gcgggctgt cccggccgac 52500

gtcgacgcc tcgaggcgca cggcaccggc accgcgtcg gcgacccgat cgaggcccag 52560

gcctgctcg ccacctacg gcgcgaccgt gacccgacc ggccgtgct gctcggtcg 52620

gtgaagtcca acctcgcca caccaggcc gccgccggt cgccgggggt gatccggacc 52680

gtgctggcgc tgcagcatcg gacgtgccc cgcacctgc acgtcgacgc gccgtcgagc 52740

cacgtcgact ggiccgcggg ggccgtccgg ctgctcaccg ggagaccgc gtggccggac 52800

accgggcgtg cgcggcgtgc aggggtgtcg tcgttcggga tcagcggcac caaccccac 52860

gtcgtgctgg aacaggctcc caccgacctg gcggagccca cggggtccac ggtccccacc 52920

gggcccgcgg tgcgccgca ggccgtcgcc tggccgtct cggcgcgtc gccacggca 52980

ctggacgcc agctggaacg ggtccgcgc ctgcggcgg cggcgtccc gcccgacgtc 53040

ggccaggcgc tggccaccac ccgcacccg ttgcgcacc gcgcgtgct cgtccacacc 53100

ggcgacgggc tcaccaggc cggccgcac gtcgtccca ccgtgaccg cggcgggctc 53160

gccgtcctgt tctccggca gggctcgcag cggctcggc caggctcga gtcgcacgc 53220

cggttcgcgg ttgtcgcgc ggcttcgac gagaccgtc cctgctga cggcggctc 53280

ggtgcgtgc tgcgcagggt cgtctgggc agcgaccgg ccgcgtcga cgaccccgg 53340

ttcaccagc ccgcttgtt cgcgaccgag gtcgcgtcc accggtcgt cgagtctgg 53400

ggggtgcgc ccggccagt cgggggccac tcggtcggc agatcaccg cgcacacgtc 53460

gccgggatcc tgcctcga cgacccgtc accctcgtc ccgccgcgc cgggtcatg 53520

gccgacctgc ccgcggcgg ggcatggtc gcgtgcagg ccgcgagga cgaggtcgc 53580

ccgtgctgg gcgacgacgt cgcgacgcc gccgtcaac gtcccacgc ggtcgtggtc 53640

tcgggcgac ccgacccgt cggccgtc gcggccggt tcgaggaccg gggccggcgc 53700

atccgaccc tgcctcag ccacgcttc cactcgcgc tgatcgacc gatgctgc 53760

gagttgcgc gggtcgtga cggctcacc ttgcgcgag caggatccc cgtcgtctc 53820

aacctgacc gcgaggtgt cggcgagtc accgacccg gctactgggt gcggcacgc 53880

cgcggcgcgcg tccgcttcgg cgacggggtc gcggccctgg ccggcctggg cgtgcggacc 53940

ttcctcgagc tcggcccga cgccgtgctg tccgcgtgg tcgccagaa cggcccggc 54000

gccgtgcgcg tccccgact gcggcgcggc ggggggagg aggccacct gctcgtcgcg 54060

gccggtgcgc tgtggaccgc cgggaccgac gtcgactggg cggccgtcgc cgaggggacc 54120

accaccccg gcgcccccc ggtcacgctg ccacactacg ccttcgaccg cgagcggtac 54180

tggccgacgc tgcgtgccgc caccggcgat gccgccgggc tcggcctgac cgcggccggg 54240

caccgctgc tcggcgccgc cgtcgtctc gccgacgcg accgcacct cctcaccga 54300

cggtctccc ccgtaccca gccgtggctc gggccggaac ggaccgacgg ccgctcgac 54360

gtgccggcg cgggtgtcgc cgagctcgcg atccgcgcg gcgaccaggt cggtgcccc 54420

cacatcgccg agctcgacct cctcgcgcg ctggccgtcg gtcgcgacgg cggcgtcctg 54480

caggtcggcg tcggcgcccc cggtgaccgc ggccgcggg acctcacct gcacgcccg 54540

tcctcgacg acgtccgtg gacctgcac gcccgcgcg tcctcgcgca cgaggccgac 54600

cgggtcggca cgaccgacc gggggagtgg ccacccgcg acgccgcgc ggtgccggcc 54660

cgggacaccg ggccgacca ggtgtgggtg cgggacgggg aggtcctcgc cgaggtcacc 54720

ctgccaccg gtccgcgcg cgacggctac ggctgcacc cggcgtgct gggcgccgcg 54780

ctggccaccg catccgcgt cgacggtggc ccgaccgca ccgcggacc cggggcgggc 54840

ccggcgcgca tcgaggcct gacctgcac gccaccgtg ccaccacgt gcgctgcg 54900

ctcaccggga ccggcaccg cagttcggc ctgctgcca ccgacccac cggggcaccg 54960

gtgctcaccg ccgacgcgt gcacaccgc acggcgaca cgcaggcacc cggcgcgacc 55020

gggcaggcg ggctgttcgg cctgcactgg acaccgtcg agtcggtga ccgcgccgcg 55080

ggtaccgcgt ggcccgctgt cggcgacgac gagctcgacc tcggctacgc gatgcaccgc 55140

gccgacgaga ccgtcagcgc ctacgccgag tccctgggcg gcgccgtcgg cgacaccggt 55200

ctcgccccg acgtcttctt catccccgtc gtccggcgacc ccgacggcgg tcgggccgcc 55260

gtgcacaccc tcaccaccg ggtgtctggc ctgttcgagg agtggctcgc cgagccgcgc 55320

ctcgccgacg cgcgcctggt cgtcgtcacc cggggggcgg tcgccgccga cggcgagacc 55380

gtcaccgacc cggcgccgc gcgcgtctgg ggtctggtgc gtgccgcga gaccgagaac 55440

ccgggccgga tcggctggt cgacctcgac gacacgttc gtcggccgg ggtcctgccg 55500

cacctgtgc tgctcgacga gcagcagctg ctggtccgcg agcacgaggt ccgcgccgcc 55560

cgcttggccc ggttgcgga gatcgcgcg gacaccgtgc cggacaccgc gcgtacggcg 55620

gcggactggg accccgacgg caccgtctg gtaccggcg gcaccggcgg gtcggcgcg 55680

ctgtcgccc ggcacctgt caccaccgc cgcaccgga acctgtgtt gccagccgc 55740

cgcgccccg acgccccgg tgccgccgag ctgtgcgagg agctgaccga gtcggcgcc 55800

gccgtcgccg tcaccgcgtg cgacccggg gacccgacg ccgtcgccgc gctggtcggc 55860

tccgtcccgg ccgggcaccc gctgaccgc gtcgtgcaca ccgccggcgt cctcgacgac 55920

ggcctgaccg gtcgtctac cccggagcgc ctgcggggg tgctgcgcc caagctcgac 55980

gcggcgtggc acctgcacg cgcgaccgc gagctgccg tggccggttt cgtcctgtac 56040

tcgtcggtgt cggggatcct cggcagcgc gggcaggcca actacgccgc cgccaacgcc 56100

ggactcgacg gcctcgccg gtaccgggc gggtcggc tgcccgcgt gtcgtggc 56160

tggggccgt ggggcgcgg gagcggcatg accgagcagg tcaccgacg cgacctcgac 56220

cggatggccc gggcgggcct gccgcacctc gacgccgccg acggcctcgc cctgttcgac 56280
 gccgcactcg cccgcccga accggctcgc gtcccgaccc ggatcaacgt cggcggtctc 56340
 gccgtgcagc aggcgtgcc cgcgtgtgg cgcgacctgg tgccccgcac ccgccgcacc 56400
 gccgccgtcg ccggctctc gccgtcacg gtgcgcgaac ggctgcaccg cctcgacgcc 56460
 gccggccggg aggcactgct cgtcgagctc gtcaccggct acacggccgg actgctcggg 56520
 cagcaggacg cggcgccggt cgaccggag cgcggcttc tcgagctggg cttcgactcg 56580
 ctgctgcgg tcgggtcg caaccagctc ggcgaggtcc tcgggtcg gctggccggg 56640
 tcgatcgtct tcgacagcac caccgggtg aagctcgccc gccggtgca cgagctcgc 56700
 gagcaggccc cggccccgg gcctcgccc gccgtcgtcg ccggcgggc cgcacagccc 56760
 gccgaggaga cctcgtcgg cctgttccac gccgccgtcc gccggcgcaa gctggtcgag 56820
 gcgatcgga tgtcaaggc cgcggcgaac acccgaccga tgttcgagtc ccggccgag 56880
 ctggaggagc tgtccgacc ggtcacgctc gccgaggggc ccgccgccc ccggctgac 56940
 ttctcagcg ccccgcgcc caccggcggg gtgcaccagt acgccgcat cggcgcgac 57000
 ttccgcgga gccggcacgt gtccgcgtg ccgtgatgg gcttcgcacc cggcgagctg 57060
 ctgcctgcca ccagcgaggc cgcggcccgg atcgtcgccg agagcgtgct gtcgccagt 57120
 gacggcgagc cgttcgtgat ggtcgggcac tccaccggcg ggtcgtggtc ctacctggc 57180
 gcagggtgc tggaggagac ctgggggtg cggcccagg cggtggtgct gtcgacacc 57240
 gcctcgatcc ggtgggacgc ggccgaggc aacgacctgg accgcacgac ccggttctac 57300
 ctggccgaca tcgactgcc gtcgtcacc ctcaacagcg cgcggatgc gccgatggcg 57360

cactggttca tgacgatgac cgagatcgac tcgccgccga cgacggcgcc gacgtgtctg 57420
 gtgcgcgcgc cgcgcgacgt cgagggttc atcctggaca cctccgccgt gcccgcgcac 57480
 accgtggtcg acatcgacgc cgaccacctg tcgtggcca tggagcactc cgcgctcacc 57540
 gccgacgcga tcgagacctg gctcgccgag ctgcccaccc cgacgacgga ggacgcgtca 57600
 tgaccagccc gacgacctgc ccggtcaccg gcggcgggcc cccgccgtcc ctggagggcc 57660
 agaccccgcc gggtgtgcgg ctgagcccg tcgtgcggga gctgcagcag caggcacccg 57720
 tgtgccgggt ccggaccccc accggcgacg aggcctggct ggtcacccgc tacgccgagc 57780
 tgaaagcact gctgcacgac gagcgctcg gccgcgcgca cgccgatccg gcgaacgcgc 57840
 cgcggtacgt gcgaacccc ttcttgacc tgttggtcgt cgacgacgcc cagcaggccc 57900
 gggacttga caccgagatg cggcgctgc tcacccgca gttctccgc gcccggtgc 57960
 tgggcctggc gccacgggtg tcgcggctg ccgagcaggt gctcgacggg ttctgcgcgc 58020
 cgggcaaccc cggcgacctg cacggcgggt tctccatgct cgctactcgc atgacggtgc 58080
 tgtgcgaact catcgggatc ccgccgcagg accgaccga gactggtgcg tgcacatca 58140
 tgacgatggg ggaggtggac gacgtcgagc gattcgccac ggtccaggcc gagctgttcg 58200
 ggctgtgtc cgccgtcccc cggcgcaagc gggccgagcc caccgacgac gtcgtgtccc 58260
 ggctgttcgc gcaggtgccc gacgagcgga tcggccgat cgccgccgt gtgctgttag 58320
 ccgggtcga cagcgtcccc agccacgtcg acctgggcgt actgtgttc gcgaccacc 58380
 ccgaccagct ggcgccgcgc ctgcccagc agcgacccat gcgcgaggcc gtcgaggaga 58440
 tctgcgctg cgcaaggcg ggcgatcgg tctgccccg ctatgccacc gacgacgtcg 58500
 agatcggtag cgtcacctg cgcacggcg acctggtgct gctggacttc accctggtca 58560

acttcgacac ccaggtgttc gacgagccgg aggtgttcga catccgccgg gagtccaacc 58620

cgcacctgac cticggacac ggcatgtggc actgcatcgg cgcaccgtg gcccggtatg 58680

cgctgcggac cgccttcacc cggctgttca cccggctgcc ggacctgcgc cgggccctc 58740

cgggtgcagga gatgcgccgc ggctccgagg gactgtccgg tggctgacg gagctgccc 58800

tcacctggtg acggccgggg cacaccgcc cggcacgcg gtcacgatgg cgcgggtgtg 58860

ctcagcccca ggtcaccggg agctcgtgca gaccgaacaa cacgccgtc tacttcacgc 58920

gcaggtcatc ggccgggcacc gccaggcgca ggtcgggat ccggtcgaac agcgtgcggt 58980

aggcgatctc catctccagc cgcaccaggt tctggcccag gcactggtgc acgcctagc 59040

cgaagccac gtgcgagcgc gcggagcgtt ccgggtcgaa cgcgccggcg ccgtcgaagg 59100

cgctcgtcgc gtggttggcg gcggccagca gcggcaggat gccctcgccc gcgcggatcg 59160

tgcgcccgc gatctcgacg tcggccagcg cgaccggaa cgcgaccagg tcggccaccg 59220

agtagtagcg cagcagctcc tcgacgacgc ggtcgtcgcc gatccactgc gggttcgtca 59280

glagtggac gatgccgagg ccgatgtgt tgcctcgt ctctgaccg gcgatcagca 59340

gcagcatggc cacaccggag agctcctggc gcgacaacgt cccggtcgcg gcgagccggc 59400

tgatcaggtc ggtgccgggg cgccgtcct tgatccggat gagccggccc aggtagcgca 59460

gcagggccgc ggtcgccgcg tcgcgttcct cgtcgtgga gctgagagt accaggacgc 59520

gggtcttcgc ctgaagaag tcgcggtcgg cccgcgggac gccagcatg cccgcgatca 59580

ccagggacgg caccggcagc gcgaagtct cgatcaggtc ggcgcgccg tccttcgcga 59640

ggatgcctc gatccggtcg tcgacgatct gctggatctc cgggcgcagc gcgcgcacct 59700

tgcggacggt gaactcgggg atcagggtcc ggcggaaccg gtcgtgctcc ggcgggtcca 59760
 tcgacacgaa ccagccgggc acctcgtccg cggacggggc cccaccggtc cgggccgcct 59820
 tcgggaagcc cggtcgggag gggtcgggcg tgatcccgcg gtcggtgagc acggcacgca 59880
 cgtcggcgtg ccgggtgacc agccagaccg ggccgctggg cagctcggac cggacgggct 59940
 caccgccgtc gcggtatgct gcgtactccg ggggcgggaa cggctctccc ggacggcgca 60000
 gcgggaacgc caccgggcag gtggcggcac ctccccggc cccggtgacg gggcagccgg 60060
 tggcgggtgc cgacggcgtg gacctcgcgg tgccggtgct catgccactc cgtagaacgc 60120
 gcggacctgc ccggtgatga actcctggtc ctggcggtc agcccgtgt ggggtggggag 60180
 gtagaagccg tcggcagcca gcccgatgc gttgagcgtc ggccagaccg ggtcgaggta 60240
 catcggttg cggctcatcg gcttgaagaa caccgggtg tcgatcccc gggcggcgag 60300
 gtggcgagg agctcgtgc ggcgtcggc gcgcaggtcg tacatccaga gcacgtcccg 60360
 cgggtggcatc agcgtgatgc cggggacgtc gcggaggcg tcgtcgtagc gcttctcgat 60420
 gtgcgccgg gtgccagga tgccctcgag ctgctcggtc tggcgagcg cgacggcggc 60480
 ctgcatgttg gtcatcggt agttgtaggc gagcttcttg tgcaggaagc tgtggtcgcg 60540
 ggtgaacgcc atcgcgca ggtgcgccat ctgctcgcc aggtgcgggt cgcgggtcac 60600
 gcagatccc cctcgcgcc cagtgatgat cttgttggcg aacagcgaga agcaggcgat 60660
 gtccccggtg ggcagcacgc cgtgcgcctc ggcggagtcc tcgacgacc gcaggttgta 60720
 ctgtaggcg agctccagga tcggctccat gtcgcaccg cgcccgtaga cgtgcaccg 60780
 catgatcacc ctggtgcgcg gggatgattt ctctcgagc agcgtgacgt cgatgttcag 60840
 gtgctcgccg cagtgcagc acaccggtgt cgcgccggtg taggtcacg cccacgccga 60900

ggcgatcatc gtgaactccg ggacgatcac ctctctgccc ggcccgacgc ccagggcgcg 60960

cagggcgagg gtcagcgccg tcgtcccga cgagcaggcg acccctgcg ggacgccgtt 61020

ccaggcgcg aacgcctcct cgaaccgtgc gatgtagggg ccctgcgagg agatccagcc 61080

gccgccgacg gcgtcgtga cgtagtcgag ctctgtggccg tcgagccacg gcttggacac 61140

cggttgggtg aaggacatcg tgactccctg gtctcgtggg ggccgctggt caggcggtcc 61200

gggcggccgg ggctcgtgc ccggcgagca cgggcaggcg caggatcagg tcggcgccgg 61260

cgccgcgccc gccgcctcg tgcagcagcc gacctatgc cgccgcacgc tcggtgaagg 61320

ccgggtctc gaggaccgg gtgacctgt cgaggacgtc gtcggtgtcg acggtctccg 61380

ggtggtcgac ggtgaggtg accccaagt cctggccgcg gatcgcttg tcgtcacagt 61440

ccaccagag cggcgccgacc accagcggt tcccgaagta gaggccctcg tggtagccgt 61500

tgccgccggc gtgggtgaag aacaccttca cgtcgggtg ggccagcag tcgagctggg 61560

agggcacca gctctgac cgagggccg cgggcagctc ggtggcgggt ggcagcatct 61620

cctgtctctc gcgcggcagc ttccacagca cctggtgacc ccgggcgtcg agccggcgtg 61680

ccacctcgac cagcgacgcg acctggggcc gggtcagccg ggtgatcgtg ccgaatcca 61740

tgtagaccac cgacgactgc gcgtcgagcc agtcggtgag ctaccaccg tcggcgacct 61800

ggggcagcgg cggcaccatc gtgccgacga gacgcatcct ctccggcagc tcgaacgggt 61860

agtcagctc cggcaccgag tagcagagca cctgctcggc gtggtcgatg cgggccatca 61920

tctgccgggc ctccggcgcg atgccgagct cggcccgac ggctcgtcg cgctcgacga 61980

ccttgcgggt ctcttgggtg acgaacatgc cgagcgtccg gatccgaac agctggttgg 62040

cgatcttctg gcgcagcgtc atgggtggccg gcagcccga gtgcggcacc gggaaccg 62100

acggcgtgta ggacctcgcg aacgggacgt gcgaggtgag cacgttgctg gggacgaacg 62160

gcacgccgag cacgaacggg atcccccttg tgatcgcgag ctctagccg tactggcaca 62220

tgtctctgat caccatcagg gccgggcgga cctcgtcgac gacgcgttcg agcggccggt 62280

acttctcgat ccgggactcg ggggcgaagg agtgccgat gaccgcggcg tgcggccgga 62340

accgtcccc ctgggtcacc gcggcgtagg tctcgtcgtc ccaggtcacc gccgacatct 62400

ccgacacggt gtgcggcagc gaggcgaagg tgacggggct gcccgtgctc gcggcccgca 62460

cgctcgtcgc ggccttttcg tcggcgcgga agtacaggtc cccgacctcg cgccgggaca 62520

gttccccggc gaggaccagg agcggattga gcagtccgt ctccgcatag ctgacgaaca 62580

ggatcggccg ccgattcgcg cccatgggta gacacctct ccgactgtga cgggccgggt 62640

gacccgtcgc gtggcgaccc gcggcgcggt gcagcgatca ggtagttgat cccacggccg 62700

acgccgggga atccctagtc ctcggtcccc gcccgccgca ttcataggg aaaaccacag 62760

ccgcgccgac cgtacggtcg gcgccacatc gagacgaccg cattcgtgtg caggggtgag 62820

glatgacggc aggacacggc agcgacccgg tggtagtctg cggaatggcg tgccgtatc 62880

cgggtggtgt gcgcgacgcc gacggcctct gggacctgct gtgctcgac cgggagacgg 62940

cctccgggtt cccggacgac cggggctggg acctcgacgc cctgcacggc gacgggccgg 63000

ggcgtcgcgc gaccgcact gccgggttcc tcgacggcgc cggggacttc gacgcgcct 63060

tcttcgggat gtgcggcgc gaagccgtct ccaccagcc gcagcagcgc ctctgtctcg 63120

agaccgctg ggaggcggtc gagcacgcc ggatcgaccc gtctcgtctg cgcggcacc 63180

ggaccgggtt gtctcgtggg gccggtgggc aggactacgc gggcgtcgtc cagaactcgc 63240

ccgacgacct cgccggacac gccctcaccg gcctgatccc cggctctacc tccggccggc 63300
 tcgcccacct gctcgggctg gaggggcccg cgtgaccgt ggacacgacg tcgtcgtcgt 63360
 cgctggtggc gctgcacctc gcgatccggt cgtggacgc gggggagtgc accgccgcgc 63420
 tggccggcgg ggtgtgcgtg atgtccacc cggccgcgt ggtcgggcac tcccgccagg 63480
 gcggcctggc ccccgacgga cgcgccaagg tcttcgccga cgacgccgac ggcaccgcct 63540
 gggcggaggg ggtcggcgtc gtcctgtca agcgcctctc ccacccccg gcggacggtg 63600
 acccggtcct cgtgtgtctg cgcggtcgg cgtcaccgc cgacggcgcc accgacggcc 63660
 tgaccgcgc gagcggggcc gcgcaggagc ggatgatccg cgacgcgtc gctgacgcgg 63720
 gtctgaccgc ggccgaggtc gacgccgtc aggcgcacgg caccggcacc ccggtcggcg 63780
 acccggtgga ggccgcgcgc ctgctcgcca cctacgggca ggaccgggac ccgggccgcc 63840
 cgctgtgggt cggctcgtg aaatcggtgg tcgggcacgc ccaggccgcg gccggggtcg 63900
 ccgggctgat cgcgaccgtg caggccctgc gccacgagct gctgcccgcg acccggcacg 63960
 ccgtcacccc cagcacccgg gtcactggt cggccggggc ggtcgcgtg cgtaccgcgc 64020
 cggtgccgtg gccgcgcggg ggccgcccgc gccgcgcggg ggtgtcgtc ttcgggatca 64080
 gcggcaccaa cgcgcacgtg atcgtcgagg aggccccggc cgccgacggg cccgaggccg 64140
 cggaccgggg caccgcgcgc ccggccgtga cgccctggcc ggtctcggcc gccgcgcgcc 64200
 gcgatctcga cccccagatc gagcggtgc gggcgcacac cgccggggcc ggcgcaccgg 64260
 acccgcgca cgtcggctgg tcgtggcca ccggccgggc cgcgtgcgc caccgcgcgg 64320
 tcctgtgtct cggcgagcac ggccccgtc aggtggcccg cgaacaggcg gcgccccgcc 64380

gcgccgcggt gctgtttctcc ggacagggca gtcagcggct ggggaccggc cgcgcctcg 64440

ccgcccgctt cccggtattc gcccgcgcct tcgacgacgt caccgcggcc ctcgacgccc 64500

acctcgaccg gcccgctcgc gacgtcgcct ggggcaccgg ggacgacgcc gccgccctgc 64560

tcgacgagac cggttgacc cagcccgcgc tgttcgccgt cgaggtggcg ctgttccgcc 64620

tggtcacggc gctggggctg cgtccggccg cggtcggcgg ccactccatc ggtgagatca 64680

ccgccgcgca cgtggccggg gtgctgtcgc tcgacgacgc cccccgcctg gtcgccgccc 64740

gccccacact catgcaggcg ctaccggccg gcggggcgat ggtcgcggtc gaggcgtccg 64800

aggacgaggt cgcgccgtg ctcggtgacc gggtcgact ggccgcggtg aacgggcccg 64860

cctcggtggt cgtcgccggc gacgacgacg ccgtcaccgc gtcgccgccc gagctggcgg 64920

accggggccg tcgtaccagc aggctcgcg tgctgcacgc gttccactca ccgcggatgg 64980

agccgatgct cgaggagtgc cgcggcgctg tcgcggggct gaccttctgc gaaccgcgga 65040

tcccgtggt ctgaacctg acgggcgagc tcggcccgc cgcggcgacc gaccccggct 65100

actgggtgcg gcacgtgcgc gggaccgtcc ggttcgccga cggcgtccgc tccctggccg 65160

ccgacggggt cgacgtgttc gtcgagctcg gcccgggcgg ggtgctctcg gcgatggccc 65220

gggagaccct cggaccggac accgcggcgc acgtcgtccc ggtgctgcgc cgcgaccggc 65280

cggaggagac gtcgttcgcc gtcgcgtgg gtcggctgca cgcgctcggc gtgccgatgg 65340

actggcacgc ctccacgcc gggaccggcg ctcgccgggt accgtgccc acctacgct 65400

tccgcggcgt gcgttactgg cccgcgccgc cgacaccgg gaaccccgtt ggtcgccgg 65460

gcctgttccc ggcctccggg gcccgaccg cgacggagcc cgggcccgat gcccggtcg 65520

tcacgaacct ggttccgcg accgccggc cggatccggt acctaccgg accgcggccg 65580

gggatcccg cgaggaccgc gcgggcaccg atcccggcgc acgtacgcc gtgatgcccc 65640

ccgcggtgcg cgagcgggcg ctgctcgacc tggtcgcac gcacaccgcc gccgtgctcg 65700

ggcaccccg cccggccgag atcggcgctc gcagcgtgtt caaggagctg ggcctcgact 65760

cgctcgccgg ggtcgagctc tgcgaccgcc tccccgcga caccgggctg cggctgcccc 65820

cgacgtggt gticggcttc ccgaccccg agctcgccgc ccgcgaggtg agcgactgc 65880

tcggaccggg cccgcaggag ccctgcgggc ccgaactggc cgggctggag gcggcgctgg 65940

acgggtgtc cgcgacggt ccgaccgcc ggcccgctgc cgatcggctg gagtgctgg 66000

ccgccgggct gcgccgtccc gccgcgcagc cgggaggccc gcccgacgag gacctcgact 66060

cgggtgctgg cgaccggtg ctgcacatca tcgacgaaga gttcgacacc gcatgacgaa 66120

tctgctgcct ccgcgcgga ccgatgacg aggacgagct gatgcaggaa tcgcaggacc 66180

agcagaacag aatcgtcgac tcgtccgcc gggtcacgac ggatctgcgc cgcgcccgc 66240

gccgtatcga cgaattgaa tcggtcggga acgaaccggt cgcgatctc ggaatgggct 66300

gccggctgcc cggcgggtgc gattccccgg agtcgttggt ggatctggtg tccgcaggcg 66360

gcgacgggat cgcggagttc ccggccgacc gcggctggga cctcgacgcg ctccggagca 66420

ccggcgacgg cggcagcgcc accgcccgc gcgggttctt cgacgacgcc gccgggttcg 66480

acgcggcggt cttcgggac tccccgcgc aggcggccgc gatggaccg cagcagcgcc 66540

tgtgtctcga ggtctctgg gaggcctcg aacgcgccg gatcgaccc acctcgctc 66600

gggcagccg ggccggcgtc ttcgtcggt cctaccactg gggcagccg tccgccgacg 66660

ccggcaccga gctggcgga cagccctga ccggcaccgc cgcgagctc ctgtccggc 66720

ggctgtccta caccctcggg ctcgagggcc ccgcgtcac ggtggacacg gcgtgctcgt 66780

cgctcgttgt cgcgctgcac ctggcggcgc actcgctgcg cagcggggag tcctcgtcgc 66840

cggtcgtcgg cggggtgacg atcctcgccg acccgctcgt gtctgtggag ttcagcgccc 66900

agggtgggct gtcggtggac gggcgctgca aggcgttctc cgacgacgc gacggcacgc 66960

gctgggcgga gggcgctcgc gtcctggctg ccgagcggct ctccgacgc cgtgcgaacg 67020

ggcaccgggt cctcgcggtc ctgcgcggtt ccgcggtgaa ccaggacggc gcctcgaacg 67080

gcctgaccgc cccgcacggg ccgtcccagg aacgcgtcat caccagggc ctggagcggg 67140

ccgcgtcac cgcgcgcgac gtcgacgcg tcgaggcgca cggcacggc acccgctcgc 67200

gcgacccgat cgaggccag gccctgctgg ccacctacgg ccggggccgg gacaccgacc 67260

gcccgtgta cctggggctg ctgaagtcca acatcgcca caccagggc gccgcgggtg 67320

tcgcggggt gatcaagatg gtgcaggccc tcgggcacag ggtgctccc cgacgtgc 67380

acgccggcac gccgtcgtc cacgtcgact ggtcgccgg cagggtacgg ctgctcacgc 67440

agcgcacgc gtggccggag accggccgc cgcgccggc cgcggtctc tcgttcggga 67500

tcagcggcac caacggccac gccgtgctgg agcaggcccc cgccggccag gaggagcccc 67560

cgccggcggg gggggccacc ggtgtcctc cctgggtcct gtccgggcac accgtgcagg 67620

cccgcgcga cggggccgc acgtgcacg cccggctccg cgaggacggc accgccgacc 67680

cgcacgacgt cgccacgcg ctgctgacca cccgcggcg gcacgagcac cgggcccgtc 67740

tcgtcgttac cggccgcgac gagctgctc acggggtcgg cgcgttggt gcggggacac 67800

ccgccccga cgtcgccac ggcgtcgcc acgtcgagg ccgcaccgtg ttcgtcttc 67860

ccggccaggg ggcgcagtgg atcgggatgg gcgcacggct gctcgaggag tccccggtgt 67920

tcgccgcgcg tatggccgag tgcgtgcgg ccctcgaccc gatcacccgc tggctcgtgc 67980

acgacgtgct gcgccgcgc gagggggcac cagacgccga ccgggtggac gtggtccagc 68040

cggcgtcgtt cgcggatgag gtcgccctcg ccgcgtgtg gcgtgccac ggggtggagc 68100

cggacgcggt cgtcggccat tcgcaggggg agatcgcggc cgcgctcgtc tccggggcgc 68160

tgtcgtgcc cgacggcgcc ggggtcgtcg cgtcgcgag ccgcgcgac ggacggtcgc 68220

tggccggcg gggcggcatg atgtcggtcg cgtgccggt cgacgagtc tccggacgc 68280

tcgaggagta cgcgggccg gtctcgggtg ccgcggtcaa cgggccccgc tcggtcgtcg 68340

ttccgggga gccgcaggcg ctgcacgagc tcggcgcggt gctcgacgc gaggggatcc 68400

gggtccgcc cgtcgcggtc gactacgct cgactccca ccaggtcgag gagtcgcgc 68460

cggagatcct ggagaccctc gcggccctgt ccccgagcc ctccggcgtg ccgtgtact 68520

ccacgtgac cggcgggctg ctggacacct cgacgatgga cgcgcgtac tggtagaga 68580

acctcgcaa ccgcgtccg ttccgcgacg cgtggccgc gtcaccgc accggacacc 68640

gggtgttcgt cgagtccgc gcgcacccgg tgctgtccc ggccgtccag gacgcgtcg 68700

acgacccgg catcacgggt gtcgggcg gcacgtcg ccgcgaccag ggcggctacg 68760

accggttct gctgtccgc gccagctgc acgtccggg actcgacgc gactggtcgg 68820

tcctgttga cgacgccgc gcggcccg tcgacctgc cactaccg ttccagcac 68880

agcgtactg gagcaccgc acccgaccg ccgccccc ggacaccgt gccctggaca 68940

ccgagtctg ggacgccgc gagcggcg acctgccgc cctgaccgc gcgtcggca 69000

ccgacagga cgcggtcac gcgacctgc ccggcctgc cgctggcg cgtcccgcg 69060

ccgaccgcgc ggacctcgac acctggcgct acccgctcga gtgggcgcgc accccgcagc 69120

cgccccgcac cggaccacc ggcacctggc tcgtgggtcac cgccgcgcgc accgaccccg 69180

ccgacgtcgt cggcgctcctg gagcgccacg gcgccgtggc cctgcccctc gtgctcgacg 69240

agagcaccga ccgggacgac accgaccggg aggtgctgcg cgcccgatc gcggacgcca 69300

ccgcggacgg ggacatgcc ggtgtgggtct cgtgctcgc cgccgccgag gacgacgacc 69360

cccgtaacc ggggctcacc cgcggcctcg cctgtcggt ggccctggtc caggcactcg 69420

gcgacgccgg gatcgacgtc gcgctctggc acctacccg tggtagcgcc accgccgcgc 69480

ccggcgacac cgtgaccgg cccctgcaga gccaggtcgc cgcgctcggc tggaccgccg 69540

ccgtcgagca gccgcaccgc cggggcggca ccgccgacct gccggaggtc ctcgacgccc 69600

ggaccggatga ccggctcgcc gccgtcctgg ccgggcggct cggcgacgag gaccagctcg 69660

ccgtccgcc cggggcgctg ctgcgcgcc gcatcgctcg cgccgatcgt ggccggccggg 69720

ccccggcccg gcgtggagc ccgcggggca ccacgtggt caccggcggg tccggcacc 69780

tggcccccga cctggccgc aggcctggccg ccgacggtgc ggagcacgtc gtgctgctgt 69840

ccgcgcgcgg ccccgaggcc ccggtgcgg ccgcgctggt cgccgagctg gccgaggccg 69900

gcaccgaggc cgaggcggtg gcctgcgaca tcaccgaccg ggatgcggtc gcggccctgg 69960

tggcgcggtt ggccgcgag gggcgcacgg tcggcacct cctgcacacc gcggcggtga 70020

tcgggtggc cgcgatgcc gacacgacc tcgacagtt cgccgaggtc gtgcacgcca 70080

aggtgaccgg tgcccgatc ctgcagagc tgctcgacga cccggccacc gacctcgtgc 70140

tgtactctc gacggccgc atgtggggca gcggcgtgca cgccgctac gccgccggga 70200

acggttctt gtccgactg gccgagcag gccgcgcgc cgggtgcgc gccacctcg 70260

tgcactgggg caagtggccc gacgccgacc ccgagcgac ggaggccgac ccgcaccgga 70320
 tccggcgag cgccctggag tacctcgacc cgcagcgggc actgaccggg ctgcgtgcg 70380
 tgctcgacga cgacgagacc gtcgtcggcc tgatggacgt cgactgggac gtctaccacg 70440
 acgtcttcac cgccggccgg gtctcgacc tgttcgacc ggtcccggag gtccggggcc 70500
 ggctcaccca cgccgggca ccggccggg gcccgcgcg tgccctcgcc ggccgcctgg 70560
 gccccctgtc ggccggccgag cggaccggc tgcgtgtcac cctggtccg accgaggccg 70620
 ccgggtcct cgggcacgcc tccgccgacg cttcggcga gcccgcgcc ttccgcgacg 70680
 ccgggttcga ctcggtgacc gcggtcgacc tgcgcaaccg gctcgccgc gcgaccggtc 70740
 tgacgtgcc ctccacctg gtcttcgacc accccagccc cgccgtgctc gccggccgcc 70800
 tggaggagct cgcgctcgcc gcccgggacg ggtgcccga gcccgggcc gctccggccg 70860
 ggagacgacg cccgatcgcc gtgatcgga tgagtgccg ctaccgggc gccgcccaca 70920
 cccccaggc gctgctgag ctgcactcg acggggtcga cgcgatcacc ggcttcccca 70980
 ccggccggg ctgggacgg gcccgctgc acgacccga ccccgaccg cacggtcgca 71040
 cctactccgt gcagggcgcc ttctgcacg acgtggcca cttcgacgc ggcttcttcg 71100
 ggatctcccc gcgcgaggc gtcgcgatg acccgagca gcgcatectg ctggagacct 71160
 cgtgggaggc gttcgagcg gccgggatc accccacctc gtcgcgggc accagcacgg 71220
 gcaccttcgt gggcgccacc taccaggact acgcgacgac cgtcgcgac gcccgggcg 71280
 acaccgagac gcacatggtg accggcaccg ccgccagct gctgtccgc cgggtggcct 71340
 acctgtggg cctcgagggt ccccggtca cctggacac ggctgtctg tcgtcgtgg 71400

tcgcatgca cctggcctgc cggtcgctgc gcagcgggga gagctcgtc gccctggccg 71460

gaggcgccgc ggtgatggcg accccgcagg ccttcgtcgg gttcagccgg cagcgggcac 71520

tggccgccga cggccgctgc aagcccttct ccgaggccgc cgacggcatg accctcgccg 71580

aggcgctcgg cgtcgtcttc ctcgagcggc tgtccgacgc gcgccgaag gggcaccccg 71640

tgctcggcgt gatccgccc tccggcatca actcggacgg cgcgtcgaac gggatgaccg 71700

cccccaacgg cccgtcccag cagcgggtga tccgccgggc actggccgag gcgggactga 71760

ccgccgccga cgtcgacgtc gtcgaggcgc acggcaccgg caccggctc ggcgaccga 71820

tcgagccca ggcgtgtc gccacctac gccgcgaccg ggacgagccg ctgcggctgg 71880

gctcgtgaa gtccgcgac ggacacacc aggcgccgc gggcgtgcc ggcgtgatca 71940

cgatgtggc cgccatgcgc gccggtgagc tgcccgcat ccagcacctc gacgcgccgt 72000

cgagccatgt cgaactgtcc accggggccg tcgagctgct caccgggcgc accggtggc 72060

cggagaccga ccgccccgc cgggccgggg tctcgtcgtt cgccatcagc gggaccaacg 72120

cccacgtcgt gctggaacag gcgcccccg ccgaggcgac cccgccggcc ggtgcaccg 72180

gaccgtccc gtgggtggtc tccgccgtt cggccgacgc gctgcgcgc caggcgggcc 72240

ggctgcgcga cgcgtggcc cgcgaccgc aggaccggc caggaccggg cacccttg 72300

ccaccaccg cgcgcgttc gaccaccgc ccgtcgtcgt cggggagacc tccgacgac 72360

tctcccgcg cctggccgc ctggccgac gcacgtcgt cgccggtctg gtcaccgca 72420

ccgccgccga ggacccgcc ggcccgtgt tcgtgttccc cgggcagggc gccagtgt 72480

gggggatggg ccgcgacctg ctcacgacgt cggaggcctt ccgtgccgc gtcgacgact 72540

gcgccgccg gctggcccc cagtcgact ggtcgtgca cgaggcttc accggcgacg 72600

gcgacccggc gctgctggag cgctggagc tggccagcc cgctgttc gcgatgatgg 72660

tcggcctgc cgcggtctgg cgccccacg gcgtcgagcc ggctcggtc gtcggccact 72720

cgagggcga gatcgccgc gccacgtgg cgggtgcgt cgacctgac gacgcggcgc 72780

gggtggtggc gctgcgcagc cgcgctgc cccggctgtc cgggcacggc gggatggtct 72840

cggtcgggc gcccgctggc cgggtcaccg agctcatct gccctggggc ggcgctgt 72900

cggtcgccgc ggtcaacggc ccgtcgtcg tctcgtctc cgcgacgcg gacgcctcg 72960

acgcgtgct gcccgctgc ggtccgcg gggtcgggc ccggcgggtc tcggtggact 73020

acgcctgca cgccccgac gtcgagggc tgcgcgacg gtcgcccag gtcctcgccg 73080

gcatcactcc gcgaccccg acggtgccg tctactccac cgtcacggc gggcgctcg 73140

acaccgcca ggacgtggc ctgacggca cctactggt caccacctc gcaccaccg 73200

tccggatga ggacgccac gagcgctcc tcgcgccgg gcaccgatc ttcgtggagg 73260

tcagccccga cccggtgtc gccggaccg tccaggagac ccaggaggc gccgacccg 73320

acggcacgc cgccgggtc gtgctggga cgctgcggc cgacagggc gggccgccc 73380

gggtgtgac ctgctggcc gaggcctatg tgcacggc caccgtgac tggaccacca 73440

ccctgcccga caccggcgc acagacgtc aactgccgac ctacgcttc cggcgccga 73500

gctactggc cgagccgaag gcggaccgt cggcgccgc cgacgacgc gcgttctggg 73560

cactggtga cgggcaggac ccggcggtc tgcggacgc gtcggcgtg cccggcggcg 73620

cactgacac cgtgtgccc gcgtgtccg catggcggc cgggtcccgc gccgcaccc 73680

ggccaacga cctgcgtac cgggtcgact gggcacggc cccgagccc gcccggggc 73740

cgccggccgg gcgggtactg gtcacggcc acgacgggg gaccggcacc gacgacgacg 73800

ggctgctcgc ggcggttcggc cccggcgccg tccgggtcac cgaccccggg accggcccg 73860

ccgctggggc cgccgagctg gcccggcacg ccggcgacgg cccggtcacc gcggtcgtgg 73920

ccctcccga cccgacggga cgccgcacac cggggcaccc ggcggtcccc ggtgcgtgg 73980

cccgaccct cacgtggtc caggcactcg gcgacggca cgtcacggcg ccgctgtgtg 74040

gcctgaccg cggtgccgtc gggacggcg ccggtgacgc ggtcacgat cccgagcagg 74100

gcacctgtg gggcctcggc cgggtcgtcg cgtcagca cccgaccgg tggggcggt 74160

tgatcgacct gccggggacc ccggacccc ggaccggcg gcgggtcgcc gggtgtgca 74220

ccggggccgg gaccgaggac cagctggcg tccggccga cgggtcctc gcccgacggc 74280

tcgttcacgc gggcccgcc gcgcgcgcc ccggacacgg cggtgacgc cgggcaccg 74340

tgctgtgac cggcgggacc gggcgatcg gcggacggc ggcggtgtgg gccgcggcc 74400

ggcgccga gacctgtg ctgaccagc gcccgccga ggacgcccc ggcgcggcc 74460

cactgcgac cgagctggag tcgctggcg cccgggtcac gatcgccg tgcgacggc 74520

ccgaccggga cgactcgcc accctgctcg acgagctgcc cgggacctg ccgctgaccg 74580

ccgtctcca ctggcgggc gtcgccgac gggaccccc cgtcgcgac ctgaccgtgg 74640

accggtcga cgctgtgtg cgggccaagc tgaccggcg ccggaacctg cacgactca 74700

cccgcgggac ggagctgac gcgttcgtg tgtacgctc cggggcgcg gtcgtgggca 74760

ggcgcgcca gccgggtac gcccgcca acgctacct cgacgacct gccgcgacc 74820

gacgcgggt cgggtcccc gcgacgtcg tcgctgggg gacgttcgc gaggtcgga 74880

tggccaccga tccgaggtg cagagcggc tgcaccgca gggcgcccc gcgatggacc 74940

cggccgacgc actggccgcg ctggagctgg ccctcggcga gggcgacacc ggcgtggcgg 75000

tgaccgcgat ggactgggag gtcttcgcgc cgagcttcac cgcgtgcgc ccagcccg 75060

tgctgggcac ggtgcccag gcggtcgccg cgtcgccga cgggcccggc cgggtcccc 75120

gcgaccccgg cgccgacgcg gccgtccgc cgtcgccgg gcgcctggag gcgttgccga 75180

ccgcggaacg ggcccgggcg ctctcgagg cggtcgcg cgaggcggcg gccaccctcg 75240

gccacgacgg cccgacgcg atcccccg ggcgcgctt ccgcgacgtc gggttcgact 75300

cggtagccgc ggtggagctg cgcaaccggc tgcgtggcgg gtcgggctg ccgctgccc 75360

cggcgtcgt ctctgaccac ccgacacca ccgacctggc ccgccacctg gggacgtgc 75420

tgttcgtga cccccggc gagcaggga ccaccgcac cgacgaccc gacgcccaca 75480

tccgtgaggt cctcgctcc gtcccatcg gacggctgc ggggcccggc ctgctggaca 75540

tggtgctgg cctcgccgac gccgaaccg gtgccgcca cgacccgac cccgacgcg 75600

gccggaccga cgacggcggc gcggagtccc tcgacgacat ggatgccga gcgctgctgc 75660

ggctcgtcac cgagaactcg gcgaactgac ctggcggaac tgaacgaca gcaggagatt 75720

ctgatgagca cgtcggaaca gaagtacgtc gaggcactcc ggtcgtccct caaggaggtc 75780

gagcggctcc gcaggcagaa cgagcagctg gtcgcccg cgtccgagcc ggtcgcggtc 75840

gtcggcatcg gtcgccgtt ccccggtggc gtcgcctcg cgaggacct gtgggacgtc 75900

gtcggcacg gccgggacgt cctcgggcgg ttcccagcg acccggtg ggacctgac 75960

gcgctgcgg gtgacggcga gggcggcagc ctggcccagg tcggcggtt cgtcgacgac 76020

gtcgccggt tcgacccgg ctcttcggg atctccccg gcgagccgt cgcgatggac 76080

ccgcagcagc ggatcctgct ggagatcacc tgggaggcgc tggagcgggc cggcatcgac 76140

ccgacgtcgc tgcgcggcac cgacaccggg gtcttcgtcg gcaccaccgg ccaggactac 76200

ggcgagggtga tccgcgcctc cgacaggagc gtggcgggtct actcgaccac cgggcacgcc 76260

gcgagcgtca tctccgggcg actgtcctac accctgggcg ccgagggccc ggcggtcacc 76320

gtcgacaccg gctgctcgtc gtcgtgtgtc gccatgcacc aggcgggtgca ggcgctgcgg 76380

gccggggagt gctcgacggc gctggccggt ggcgctcgg tgatggccac ccccgcccg 76440

tctgtgcct tcaccgcca gagcgggctg gccgccgacg gccgtgcaa gccgttcgcc 76500

gacggcgagg acggcaccgg ctgggccgag ggccgccgga tgctcgtgct gatgcggctc 76560

tccgacgcc gccggcagg ccgcgaggtc ctgcgggtcc tgcgcgggtc cgcgatcaac 76620

caggacggcg cctccaacgg cctgaccgcc cccaacggcc cgtcccagca gcgggtgatc 76680

cgggcgcgc tggagagcgc gcggctgggc tccggtgacg tcgacgccgt cgaggcgac 76740

ggcacccgca ccacctggg cgaccgatc gaggcgcagg ccctgctcgc gacctacggc 76800

gcggaaccgc cgaccccgct gctgtgtggc tcggtgaagt ccaacatggg ccacaccag 76860

gccgcgtcgg gcgtcgccgg cgtcatcaag atgatcatgg cgctgcggca cggggtgctg 76920

ccccgcagcc tgcacgccga gcgcccctcg gccgacgtcg actggaccgc gggcgccgtg 76980

gcactgctcg acgtgccgt cgactggccg gagaccggcc gcccgcccg ggcaggggtc 77040

tcctcgttcg ggatcagcgg cacgaacgcc cacgtcatcc tggagcagc cccgcacacc 77100

gacgcgcagg cacctgccgc cgaggtgtcc gccccggcgg tgggtgccgtg gccgtgtcc 77160

gcacgcaccg ccaccgcaact ggacacctg cgggccccgc tcacgggatc ggtcaccgga 77220

ctgagccgc tcgacgtcgg tgctcgtcg gccaccggcc gtgcgacctt cgagcaccgc 77280

gccgtgctgc tcggctccgg ggacgaggtc accgagatcg cccgcggtgt cgcgggggag 77340

ggcctgaccg cgtgctgtt ctccgggcag ggctcccagc gcctgggcgc cggccgggag 77400

ctgcacgcc gcttcccgtt gttcgccgag gcgttcgacg agaccgccgc gctgctcgac 77460

gcggcgctgc ccgacaacga cgccaccttg cgtgaggtcc tgtggggcac cgacgccgag 77520

gcgctcgacg acaccggccg ggcgagccc gcgtgttcg cgatcgaggt cgcctctac 77580

gccttggtca cctcgctggg cgtggtcccg gacctcgtcg gcgggcactc gatcggcgag 77640

atgccgcgc cgcacgtgc gggcgtgctg tccctcgacg acgccccac gctcgtcgcc 77700

gcccgcgcc ggtgatggc cgcgtgccg cgcggcggcg cgatgctggc cgtgggcgcg 77760

accgaggacg aggtcgacc cctgctacc gccgtgtct cgctcgccgc ggtcaacggg 77820

ccgtcgtcgg tcgtggtggc cggggacacc gacgggatcg ccgccgtcga ggagcacgcc 77880

cgccccggg ggtggcgag caccggctg cgggtcagcc acgcgttcca ctgccgctg 77940

atggagccga tgctcgcca gtccgggcc gtcgcccg gactcaccta ccacagcca 78000

cgatcccgg tcgtctcaa cctgaccggc tcggtcgccg aggtcgccga catctgctc 78060

gccgactact ggtgcgcca cgtccgggc accgtccgt tcgccgacgg cgtcacgcc 78120

ctggccgcgc gcggcgtcac caccctggtc gagctcgcc cgacggcgt gctctgcgc 78180

atggcgcagg agtccctgcc cgagggcgcc gtcgccgtac cgctgctcg ccgcgaccg 78240

cccgaggagc tgctgctggt caccggactc gccacggccc acgtccggg gacgaccgtg 78300

gactgggcc ggctcttcga cggcaccgt gcgtccggg tcgacctgcc cactacccc 78360

ttcgagcaca cccgctactg gcccgcccc gtccggggcg ccgccgacgt caccgccgc 78420

gggctgacca ccgccgacca cccgctgctc ggtgccgccg tcgagctcgc cggtagacgac 78480
 ggcgtgctgt tcaccagcag gctctcggtc cgcacccacc cgtggctcgc cgaccacggc 78540
 gtgcagggac gtgcgctgct gccgggtacc gcgttcgtcg agctggcggt gcgcgccggt 78600
 gacgaggctc gctgcacccg ggtggaggag ctgacctgg ccgcgccct cgtgctcccc 78660
 gagcgcggtg gcgtgcgggt gcaggtccgc gtcggtccgg cggacgccg tggccgccgc 78720
 accctcggcg tgttctcccg gccggaggac gccgacggcc tgccttggtc gcagcacgcc 78780
 accggtgtgc tcggctcggg aacgacggcg ccgacgggc tcgacacgac cgctggccg 78840
 cccgccggcg ccgagccggt cgacctgag ggctgctacg agcggtcgc cgggatcggc 78900
 ttcgactacg ggccctcctt ccgggggctg caccgccgt ggccgccga cggcgaggtg 78960
 ttgcgcgagg tcacgtgcc cgacggcgcc gggaccgaca cgaccgttt cggcctgcac 79020
 cccgccctgc tcgacgcgc gcagcacgcc gccgcctacg gcgacctggg tgcgatcagc 79080
 cgtggcggcc tgccttcac ctgggagggc gtccagctgt tcgcgcggg gcccgccacc 79140
 gtccgcgcc ggatcgcggc caccggcgag gacaccgtgt cgatcacggt gtacgacgcc 79200
 gcgggcgggc cggtagctac ggcggactcc ctggtctccc gcgaggtccc ggcgacacc 79260
 ggccgccgacc ggtacgacga ctccctgttc cgccaggact gggccccgt ggccggcccc 79320
 gccggccgga ccccgccggc ggtcgccgtc gtcggcgccg agaccggcgg ccccgcccc 79380
 gtcggcacgg ccgactgcg ggccgcgggc gtccccgtgc gcacctacc ggatctcacc 79440
 gcgtggccg cctccggcga cccgtcccc gagctcgtgc tggccgggac cgcgtcctgc 79500
 ggccgcaccg tcgccgacgc cgcgcacacc gtcgccacc cggccctgga gctggtgcag 79560
 cagtggctgt ccggcgagga gttcgccgac gcccggtcgt tgctgctcac ccgcggcgcc 79620

accgacggcg ccgaccggc cgcgcgcg gtgcacggcc tcgtccgcac cccccgcacc 79680

gagaaccgg gccggctggc ggtcctcgac ctgcccgcac acgccaccgg cgcgatccg 79740

gtcgtggccc ccgcccact ggtcgcgcg ctgcgcgcca ccgaggacga gcccgcctc 79800

gccgtccgc ccgacacggt gctcgtgccg cggctggtcc gggtccgcac cgacccgag 79860

ccgcaccggt ggaacccga cggcacctc ctgatcaccg gcgggaccgg cggcctcggc 79920

ggtgtcctgg cccggcacct cgtcgccgag cacggcgtac ggcagctgt gctggccggc 79980

ctcgcggtc cggacgcccc cggcgccgc gagctggtcg acgagctcac cgcgtgggc 80040

gcgaccgcg acgccgtggc ctgcgacgtc accgaccggg ccgcggtcgc cgcgtgtc 80100

gccggcatcc ccgacacga cccgtgacc gccgtcgtgc acaccgagg cgtcgtcgac 80160

gacggcgtga tcggctcgt gacccggag cgcctcgaca ccgtgctgc ccccaaggc 80220

gacgcggcct ggcacctga cgagtcacc cgcgacctgg acctggacgc ctctgtctg 80280

ttctctcgg tcgcccac ctctggcagc cccgggcagg ccaactacg cgcggggaac 80340

gccttctcg acgcgtggc cgtgcaccga cggtcggccg ggctccccgc cgtcgcgctg 80400

gcctgggggc cgtggagccg cgtcgtcggc atgacgggt cgtcagcga cgtcgacgtg 80460

gagcgatcg cccgtccgg gatgccaccg ctgaccccg agcaggggac ggccctgtt 80520

gacgcgccc tcgggcgac cgcgacgga accgcgcgc tcgcccgggt ccggtcgac 80580

ctgcccgcc tcgcgccca gggcgagccc gcgccgtgc tcgcggcct gatccggcg 80640

ccgcgcggc gcgccgcgc ccaggcgtc ccgtccaccg gtgacctgc cgagcggtc 80700

cgcgcgtgg acgggtccac ccgtgacgag gcgtgctcg acctgtccg cgagcggtc 80760

gcccacgtcc tcggccacgc cgaccccggc caggctcaga ccggccgtca gtccaggac 80820

ctcggcttcg actcgtcac cgcggtcagc ctgcgcaacg gactcaccgc cgccaccggg 80880

ctgcgcctgc ccgcgacatc ggtcttcgac tacccgacgc cgggcgtgct ggcccggcac 80940

ctgcgcgacg agctgctcgg tgccgacgac gcccccgacg acaccggcga ccgaccccc 81000

gacaggaccg ccgcttcctc ggccgacgac ggcgacgac ccgtcgtgat cgtcgggatg 81060

gcgtgccgct accccggcgg tgctggctcc ccggaggacc tgtggcggct cgtcggcgac 81120

ggtgccgacg cgaccggccc gttcccgacc gaccgcggct gggacctggc caacctgttc 81180

gacgcggacc cggaccgtcc cgggcacacc cacgtccgcg ccggcgggtt cctgcacacc 81240

gcccccgagt tcgacgccgg gttcttcggg atgagccgcg gcgaggcgct gtccaccgac 81300

tcgcagcagc ggtcgtgct ggagacgagc tgggaggcga tcgagcgggc cgggatcgac 81360

ccgaccgggc tcgcgggcag cgccaccggt gtgttcgccg gtgtcatgta caacgactac 81420

ggcaccacgc tgaccggcga cgagcacgag gccttcgcg gcaacggcag ccccccgac 81480

gtcgcgtccg gccgcgtgct ctacacctg ggcctggagg gccctgcggt caccgtcgac 81540

accgcgtgct cgtcgtcgt ggtcgggatg cacctggccg cgcaggcgct gcgggcgggg 81600

gagtgcaccc tcgccctgc cgggggcgtg acggtcatgt cgacaccag cacgttcgtc 81660

gacttctccc gccagcgcg actcgcgcc gacggccgct ccaaggcctt cgccgacgcc 81720

gccgacggcg tcgcctggtc cgagggcgtc ggcgtgctcg tcctggagcg gcggtccgac 81780

gcactccga acggtcacga gatcctcgcg gtgctgcgcg ggtcggcggt caaccaggac 81840

ggcgccctga acgggtcac ggcccggaac ggcccgctcc agcagcgggt catccgccg 81900

gcgtggcga acgccgtct gtccaccgac gacgtcgac tcgtcgagc acacggcacc 81960

ggcaccaccc tcggcgaccg gatcgaggcc caggccctga tcgcgaccta cgggcgggac 82020

cgggaccgcg agcggccgct gctgctcggg tcggtgaagt ccaacatcgg ccacaccag 82080

gccgcgcggt gtgtggcggg tgtgatcaag atggtgctgg cgatgcggca cgggacggtg 82140

ccgcgcacgt tgcacgtgga cgcgcgctcc tcgcacgtgg actggtccga cggcacggtc 82200

gcgtgctca ccgagccgac gccgtggccc gagaccgggc gccccgcggt ggccggcgctg 82260

tcgtcgttcg gcatcagcgg caccaacgcc cagtcacg tcgagcagcc ggagccgacg 82320

ccgaccaccg ccaccgtcgg tggccgggag ctccccgcg tgccgtgggc gctgtcgggc 82380

gcctccgccc acgcgtcgcg cgaccaggcc gccgcctgc tcacccacgt ccgcgacggc 82440

cacgcgtcg accccgcgat cgatcccgcg atcgaccccg ccgacgtcgg ctggtccctg 82500

ctgcgcaccc gcgccgccct cgatcagcgc gcggtcgtcg tcggcaccgg ggccggagcag 82560

accctgcgcg gcctggcggc gctcggcgcg ggccgagccg acccgccgt cgtcacgggc 82620

accaccgga ccggccgtac cgcgttcctg ttctccgggc agggctcgca gcgcctcggc 82680

atgggcccgc agctgcacgc ccgtaccgc gccttcgccc acgccttcga cggcgactg 82740

tccgcgtgg acgccgagct gggctccgac ctgcgtcggg tcgtctgggg ccacggtgac 82800

agcgcggggg ccgcactgga cgcgaccggc gccaccaac cggcgctgtt cgcgtggag 82860

gtcgcgtgt accggtgct ggagtcctgg ggcgtcgccc ccgacctgt cgcggccac 82920

tccgtcggcg agatcgccg cgcacactg gcgggggtgt tcacctgc cgacgccgcg 82980

cggctggtcg cgcgccgagg caccctgatg caggcgtgc ccgccggcg cgcgatggtc 83040

gccgtcgagg cgaccgagga cgaggtcgcc gctctgtca cccgcgacga cgtcgcgatc 83100

gccgcggta acggcccgtc ggccgtcgtc gtgtccggct cgcaggacgg cgtcgacgcc 83160

gtcgcggcgg cgtcgcgga gggcgggcca cggaccagca ggctgagggt cagccacgcg 83220

ttccactcgc cgtgatgga gccgatgtc gccgagttcc gtcctgtggt cggcggcctg 83280

tccccggagg ccccgccggt gccctgtgtc tctccctga ccgtgacct cggcgtgcc 83340

gacgagctgt gcgaccccg gtactgggtg cggcacgtcc gcgaaccgt ccggttcgcc 83400

gacgccgtca ccacctcgc cggccgcggc gccgtacct tcgtcgagat cggccccggc 83460

ggcgtgctgt cggccatggc ccaggactcg ctccccccg acgggaccgt caccgtgcc 83520

gtgtgcacg gcgagggtc cgaggacgt gccgtcgtc ccgcgtcgc cgcgtgcac 83580

gtccgcggcg tacggatcga ctgggacgcc gtgttcgacg gcaccggcgc cggcccgtc 83640

gacctgccga cctacgctt ccagaccgc cgtactggc cgggtgccac cgcggcccc 83700

ggcgacgtcc gtcgcgcgg gtcggcgcc gccgggcacc cgtgctcgg cggcccgtc 83760

gcgttccccg acggcgcggg cgcgtgctg accggccgtc tctcggcgtc cgcgcagccg 83820

tggctgcgg accacacggt cggcgggacc gtggtgctgc ccgggaccgc gctgctcgag 83880

ctcgcgtcc gcgcgggcca cgaggtcggc tgcaccggcg tcaggagct caccctgcc 83940

acgccgtga cctgcccc cgcgggtggc gccgtaccg tgcaggtcg cggcgtgcc 84000

gacgacggtt ccggccgacg cccgtcacc gtgcacgcc gccccagggt ctcgacgag 84060

tggaccgagc acgccaccg caccctcacc accctcgcgc cgggcccagt gcggttcgac 84120

gccacgacct ggccgccac cggcgcggc gagctcgac tcagggtctg ctacgagcg 84180

ttcgccgagg cgggttcgg ctacgtccg gtgttcggg ggctgaccg gcctggcgg 84240

gacggcgaca ccgtctacg cgaggtgtc ctgccgacc ccgacaccac cggcaggac 84300

gcggcccgct tcgggtgca ccccgccctg ctgacgccg ccctgcacgc cggcctgctc 84360

accggtgacg gcgcccggg ccttcctgg gcctgggagg acgtaccct gcacgccgc 84420

ggggccaccg cgctcggggt gcgcctcgca ccggccaccg acggcggcgg cctggccgtc 84480

gccgtcgccg accccgaggg tcgtccgttc gccaccgcc gccgtctgcg cgcgcgccc 84540

gtcgaccctg ccgccctcg caccgggacg gccgtgcgcg acggcctgtt ccggctcgac 84600

tggacggcgg tcacggcgcc gtcggaccag tccgtgccg cggcgccgtt cgcggtgctc 84660

ggcgcgcccg gcgaccgggt caccgacgtc ctgcgcccg ggacacccg gtacgacac 84720

gtcgacgacc tgctcgccga ccccggcagc accgtcccgg cgaccgtgct cggccgctc 84780

ccggccggcc ccggcgacga cagccgcgg gacgtgcgcg accgcaccgg cgcgaccctg 84840

gacctgtcc ggcgctggtc gaccgaggac cggctcgccg gctcccggct ggtactgtc 84900

accgcggcg ccgtcacgga cgccggtgag cccgtcgccg acctcgccgc cgcccggtg 84960

tgggggctgg tccgtccgc gcagaccgag aaccggcg ccttcggcct gctcgacctc 85020

gacccggcgg ccgccgtgcc cgcgaccggt gccctgccg tcgcgtgtc cccggacgag 85080

ccgcagctcg ccgtccgcgg ggacgacgtc ctgcgccccc gtctgaccg cgccggggcc 85140

cccaccggcg ccacgacgtg gtcgaccgag ggacacgtcc tggtcaccg cggcaccggt 85200

ggcctcgcg gtctgtcgc ccgtcacctc gtcgccaccc acggggtgcg ccacctgtg 85260

ctgaccagcc ggtccgtgc ggacgcaccg ggggccgcgg agctggtgc cgagctggag 85320

ggccatggcg cccgggtgtc ggtcgccgc tcgacgtca ccgacgccga cgccgtcacc 85380

gcgtggtgg ccggtgtgcc cggtcgcac ccgtcgctg ccgtcgtgca caccgccggg 85440

atcctcgacg acggggtgct gagctcgctc acccccgggc gtctggcccg ggtgctggcg 85500

ccgaaggtag acggtgcgtg gaacctgcac cgcgcgaccg cgggtctgga cctggacgcg 85560

ttcgtgctgt tctcctcggc cgccgggggtg ttcggcgggtg ccggccaggc gaactatgcc 85620

gccggcaacg cgttcctcga cgccctggcc ggcacccg cgcgcgccgg cctgcccgcc 85680

accgcgctgg cctggggccc ctggcagcag ggctctggca tgaccgccga cctcgaccag 85740

cgcgacgtcg cccggggccg cgccgccggg atgccgtgc tcaccgccga cgagggcctc 85800

gccctcttcg acgccgcacc ggccaccggc gacctgcgc tggtcaccgc ccgcctcgac 85860

ctgcccgcgt tcgcgcccc gaccccggtc ccgcgctgc tgcgcggact ggtcaccgcc 85920

ccccgccga cgcgcccg cgccgcgag gccaccgacg cggggtcgt cgcgggctc 85980

gcccggctcg acgacgaccg gcgccacgag gtctctctcg acgtcgtccg cgacgccgc 86040

gccctcgtgc tcgggcacac ctccggcgcc gacatcgacg ccgaccgcgc ctcccgcat 86100

ctcgggttcg actccctgac cgccgtcag ctgcgcaaca ggctcgcgac ggccgaccgg 86160

ctcgggttgc ccgcgacgac ggtctctgac caccgaccc tctccgcgt cgccaccac 86220

ctgcgctccg agctgctcgg ctcccgggc cgcgccgac cggagcgccc ggtcgtgacg 86280

ccgctcgacg acgacccggt cgtcatcgtg ggaatggcgt gccgttccc cggcggggtc 86340

acgtcccccg aggacctctg gcagctcgtc ggcgacggcg tcgacgcat caccgggttc 86400

cccaccggcc ggggtggga cctcgacggc ctctacgacc cggacccga ccacgccgc 86460

acctctaca cccgcgaggg tggcttctg cagcagccg ccgagttcga tgccgggttc 86520

ttcgggatga gcccgcgga ggccaccgc accgacgcgc agcagcggt gctgctggag 86580

acgagctggg aggcgtcga gagggccggg atcgaccgg tctcgctgcg cggcagcgcc 86640

accggcgctct tcgccggcgt catgtaccac gactacgccg acaacctcgg cggaccggag 86700

cacgagggga tccagggcca gggcagcgcg ggcagcgctg cctcgggccc ggtgtcctac 86760

accctggggc tggagggccc ggcggtcacc gtcgacaccg cgtgctcgtc gtcgctggtc 86820

gcgatgcact gggcgatgca ggccttcgag accggcgagt gcacgctcgc cctcgccggc 86880

ggcgtaaccg tcatgtccac cccggccacg ttcgtcgagt tctcccggca gggcgccctc 86940

gccgccgacg gccggtccaa gcccttcgcc gacgccgccg acggcgctcg ctgggccgag 87000

ggcgccggca tgcctgtgct ggagcgccgg tcggacgcgc tgcggaacgg tcacgagatc 87060

ctcgccgtgg tgcgcgggtc ggcggtgaac caggacggtg cgtccaacgg gtcacggca 87120

ccgaacgggc cgtcccagca gcgggtcacc cgcagggcac tggccagcgc cgggctgcgg 87180

gcatcgagc tgcagcggt cgagggccac ggcaccggca ccacctcgg cgaccccatc 87240

gaggcgagg cgctcatgc gacctacggc gccgaccgcg accccgcgca gccgctgcac 87300

ctgggttcgc tgaagtccaa catcgggcac acccaggccg ccgcccggct cggcggtgtg 87360

atcaagatgg tgcaggcgct gcggcacggg gtgctgccgc ggacgctgca cgtggacgcg 87420

ccgtcctcgc acgtggactg gtccgacggc accgtcgcgt tgctcaccga gccgaccgtg 87480

tggccggaga ccggccgtgt ccgccgggcg ggtgtgtcgt cgttcgggat cagcggcacc 87540

aacggccacg tcacgtcga gcagccgcc gacggcccg cccctcccc ggcagagccc 87600

ggaccgcag gcccgctgcc gtggtgtctg tccgcgaggt ccccgaggc gctgcgcgac 87660

caggcggccc ggctccgca cgccgtcacc gggcgggcgg acctgcgcc gatcgacgtc 87720

gcccactccc tggcgaccgg ccggtccgcg ttcgaccacc gcgcgctcgt cctcgcggcc 87780

gacgccgacg acgccgtgcg tgctctcacc gcgctcgccg acggcgacag cgacccggcg 87840

gtcgtcaccg gccgtgcccg cggcgggccg accgccatgc tgttctccgg gcagggttcg 87900

cagcggctcg gcatgggccc ggagctgcac gcccggttcc cgggtttcgc cgacgcgttc 87960

gacgccgtcg tcgccgcgct ggacgccgag ctggcggtg acctgcgggc ggtcgtgtgg 88020

ggcaccgacg ccgccgcgct ggacgagacc ggcgcgacc agcccgcgct gtccgcggtc 88080

gaggtcgcgc tgcaccggct cgtcagatcc tggggggtcc gtccgacct ggtcggcggg 88140

cactcgatcg gcgagatcg cgcgccccc gtggccgggg tgttctcgct ggccgacgcg 88200

gcgcgcctgg tcggcgcgcg ggctgcgtg atgcaggcgc tgccgaccgg gggcgccatg 88260

ctcgccgtgc agcgagcgga ggacgaggtg cggccgacc tcaccgacgg cgtcgcgac 88320

ggcgcggtca acggcccgtc cgctgtcgtc gtctccggtg acgaggatgc cgtgacggcg 88380

gtggcgagc agctggccgg ccgcaggaca cggcggtcgc cgggtgccca cgcgttcac 88440

tcgccgtga tggaccgat gctggcggag ttccgggccg tcgccgagca gctgagctac 88500

gccgagccgg tggtgccggt ggtgtcgaac ctgaccggtg cgctcgccga gccccggcag 88560

ctgtgcgacc cggagtactg ggtgcgccac gtccgcgagg ccgtccgctt cggcgacggc 88620

gtcggggcgc tggccggggc cgggtgcgacc acgttcttgg agctcgccc ggacggggtg 88680

ctctcggcga tggcccgca gtccctgcc gacgacacga ccgcgacggt gcccgtcctg 88740

cgcgcgacc gggcgaggt cgacccgca ctgaccgcgc tggcccggt gcacgtcggc 88800

ggcaccgcg tcggttgga ggagctgtc ccgggcggcc gccgggtcga cctcccgacc 88860

tacgccttc agcacccac ctactggccc accgcgacc gcccgggcgc cgacgccggc 88920

gcgctcgga tcaccgccac cgggcacccc gtctgcacg gcgtggtcga gctcgccgag 88980

ggcgaggcg tgctctgcac cggtcggtg tgcctcgga cccaccgtg gctgaccgac 89040

cacgccgtcc ggggcaccgt cctcgtgcc ggacggcg tgctcgaact ggccctgcgc 89100

gccggcgacg aggtcggtg cgaccgctc gaggagctca ccctcgccgc cccgtggtg 89160

gtgcccacc gtggtgccgt gcggaccag gtccgggtcg gcgtcgccga cgacgacggc 89220

cgccgcaccg tcaccgtgca cgccggccc gacgacccg gcgacgcacc ctggaccag 89280

cacgcccg gcacctgac cagggccga ccggagccga ccggttcga cgccacgacc 89340

tggcccca ccggtgcgc cgagctgcc ctccgggtt gctacgagc gtccgagc 89400

gccgggttcg gttacggccc ggtgtccag ggactgaccg gcgcctggca ggacggcgac 89460

accgtctac ccgaggtgc actgcccggg caggccaccg acgacggcg ccggttcggg 89520

ctgaccccc cctgctga cgcccccgt cagccggga tgctcgaca cgacgcacc 89580

gcaggcctc cgttctctg ggacgggtc actctgcac ccaccggcg cgtcgcgctg 89640

cgctgcggc tgaccgcac cggcgccgc atcgcatcg ccgcgccga cccggcgggc 89700

caccggctc cgaccgtga cagctcgcc gtccggcgg tcgcccaggc acagctcga 89760

cccaccgga ccggcgacg actgttcgc ctgactgga cccgggtga cgacccccg 89820

gccggcatc cggcgccgc gacgtcgcc gtgctggca tcggcgtcg ggacgaccac 89880

ggggacagc cagccgccga ggtcgccgc ggctgtccg ccgcgggcac cgacgcgacc 89940

gtccacacc gccccccac ggcatcgag gagtggggg acacggtgt cgtaccgtg 90000

gacgtgaag gtccgacac ggacggcc gccacaccc tgaccggcg cgtcctcgac 90060

ctgctgcagc agtggaccg cgggaccgt tccggcggc tcgctcgt caccggggc 90120

gccgtcgccg ccggggggac cgcaccacc gacgtcgccg ccgcccggt gcacggcctc 90180

gtccgtccg cccggtccga gtccccgac ggcatcgtgc tcgtcgacct cgatccggcg 90240

accgccggcg ccgcggacga cggtcgcgtg ctgctcgccg cgctgcacac cggtagaccg 90300

cagatcgcg tgcgcgacgg tgccctgctc gccggcgcc tgacccgggc gcagaccggc 90360

tccggtctcg tcgtgccggc ggtggacgcc tggtcctcg acagcaccac cccgggcagc 90420

atcgacggc tcgccctgt gcccaccgc gagggggcg cccgctcac cggtcaccag 90480

gtcggggtcg cgatccgcgc cgcgggcctg aacttcgcg acgtgctcaa gtccctcgac 90540

atgtacccc gcgacgccg ccgctacggc cacgagcgcg cgggggtggt cctcgcgacc 90600

ggcccggacg tcaccgggt cgcgggggc gaccgcgtc tgggcatgat ctgggcagc 90660

ttctctcgg tggcgtcga cgaccccc gcctcacc ggatcccga cggctgggac 90720

tgggagaccg ccgctcggt cccgtggtc ttctcaccg cctggcacgc cctgcgccag 90780

ctcggaacc tgacggcggg ggagaagggt ctcgtccacg ccggtgccgg tggcgtcggc 90840

atggcccg tccagatcg ccggcacctc ggtgccgagg tgtacgcgac ggcgtcggag 90900

cccaagcagc acgtgctcg cagcctgggc gtcgccgagg accacatcg ctcctcgcg 90960

accctggagt tcgccgagac cttgccggg acggacctcg acgtgctct caactcgctg 91020

gccggggagt tcgtcgacgc ctgatgggg ctgctcgcg acggcgccg gttcctggag 91080

atgggcaaga ccgacatccg cgacgcggac tccgcgccg ccggcgtctc ctaccaggcc 91140

ttcgacctg cctgggtcga gcccaggcc atcggcgcca tgttcgccga gctgatggac 91200

ctcttcggg ccggcgtgct ggacccgtg ccggtccga cctgggacgt ccgcgacgc 91260

ccgcgcggt tccgttcat gagcgccgc cagcacatcg gcaagatcgt cctgaccctc 91320

ccgcggccgt ggaccaccga gggcaccgtc ctggtcaccg gcggcaccgg tggcctgggc 91380

gggctgctcg cccgtcacct ggtcgcgacc cacggggtgc ggcatctgct gctgaccagc 91440

cggctcgggtg cggacgcgcc gggctgctcg gagctggtgt ccgagctcgg tgagctgggt 91500

gcgcaggtgt cggtagcgcc gtgtgacgtc accgacgccg atgcggtcgc cgcgttggtg 91560

gccggtgtgc ccggtggcca cccgtcgtgt gccgtcgtgc acaccgccgg tgtgctggac 91620

gacggggtgc tggcctcgct cacgcccggg cgtctggcgc gggctgctggc gccgaaggtg 91680

gacggtgcgt ggaacctgca ccgcgcgacc gagcacctgg atctggacgc gtctgtgctg 91740

ttctcctcgg tggccggggt gttagcgggg gccgggcagg cgaactatgc cgccggcaac 91800

gcgttccctg acgccctggc cgcgcaccgc gccgccgccc gcctgcccgg cgtgtccctg 91860

gcctggggcg cgtggggcca ggagccggc atgaccgccg gtctcgacga gcgcgacgtc 91920

cgccgggccc ccgagtcagg gatgccgtg ctgcgcgag gccagggcct cgccctgttc 91980

gacgcgccc tcgccacggg gcgtcccgcg ctgctcccgg tgcggctcga cctggccacg 92040

ctgcaccgtc gggggaccgt cccgccgtg ctgcgcgggc tcgtccgcgc ccccgcccgc 92100

cgcgccgga cgaccacggc ggccgacgcc ggccgctgg ccgggcccgt cggtagccctc 92160

ggccgcgcc agcggcgccg cgccctgtc gacctgtcc gcggtgagc cgcgaccgtg 92220

ctcgggcacg cgggcggtga ccgcatcgac cccgagctgg ccttcgcga cctcggttc 92280

gactcgtga ccgccgtga gctgcgaac aagctcggcg ccgccaccgg tctgcggctg 92340

cccgccaccg cgatcttcga ctaccgacg gtcgtcgcgc tcgccgagca cctgctcgtc 92400

gggctcctcg gcccgacgc cgacggcgac tccgggaccg gcgccgacat cgccgggac 92460

accacggccg acgaccccggt cgtcgtcgtg gggatgagct gccgtttccc cggcggggtc 92520

ggctcgcgccg aggacctgtg gcgggtcctc gacgaggga ccgacgtgat cgccgggttc 92580

ccgaccgacc gcggctggga cctcgacgac ctgttcgacg acgatcccgc gcaccgcggc 92640

acctctacg cccgctccgg cgggttcctc gacgacgccg ccggcttcga cgcggacttc 92700

ttcgggatga gcccgcgca ggcgatggcg accgacgcc agcagcggct gctgctggag 92760

tcgtcgtggg aggcgatcga gcgcgccggg ctggaccgc acagcctgcg ggacagccgg 92820

accggtgtgt tcgccggcgt catgtactcg ggctacggca cccgtctgga cggcgacgag 92880

ttcgagggt tccaggcca gggcagcgcg ctgtcgtgg cctcgggccg catctctac 92940

tcgttcggct tcgagggtcc ggcatgacg gtggacacgg cgtgctcgtc gtcgtggtc 93000

gccctgcacc tcgccgca ggcgtcgc gcgggggagt gcgaccggc gctcgccggc 93060

ggtgtcaccg tcattggcggg ccccgagacc ttctcgtgagt tctcccgca gcgcggcctc 93120

gccccgacg ggcatccaa gccgttctc ggtccgccg acggcgtcgg ctggtccgag 93180

ggcgtcggca tgctcctgt ggagcggcag tccgacgcgc tccgccacgg ccaccgcatc 93240

ctcgccgtgg tccgcgctc ggcggtcaac caggacggcg cctccaacgg gtcaccgcg 93300

cccaacgggc cgtcccagca gcgggtcatc cggcaggcac tggcctccgg tgggtgtcc 93360

accgccgacg tcgacgccgt cgaggcgac gccaccggca ccacctggg cgaccgac 93420

gaggcccagg cctgctcgc gacctacga caggaccgc agcagccgt gctgctcggc 93480

tcggtcaagt ccaacatggg ccacaccag gccgcccg gtgtcgccg tgtgatcaag 93540

atgatcatgg cgatgcagca cggggtgctg cccgcaccc tcggggtcac cgagccctc 93600

tcgcacgtc actgggacgc cggggcggtc gagctgtca ccgacgac gccgtggccg 93660

gagaccgggc gtgcccgcgc gcccgggatc tcctcggttc gcatcagcgg caccaacgcc 93720

cacgtcgtgc tggagcagcc gtcgccggtg gaacccgcgc acgcggtcgc cccggcaccc 93780

gcccgggacg gcctggcgcc gctggtgctg tccggcagga ccccgaggc gctgcgcggg 93840

caggccgacc ggttgcgcgc gcacctgcag gaccggtccg gcctcgtccc ggccgacgtc 93900

gcgtcggcac tggcgagcag ccggtcgcgg ttgccccacc gggccgccgt cctggccgga 93960

gaccgcgacg acgccctgcg cgcgttgcc gcgtcgcgc cgacacccc cgaccggcc 94020

gtcgtgaccg ggaccgccc gcccgccgc accgcggtgg tgttctccgg gcagggttcg 94080

cagcgctcgc ggatgggccc cgagctgtac gggcggttcc cgtgttcgc cgaggcgttc 94140

gacgcgctgc tcgcggtgct ggacccgag ctggcggtg acctgcgggc cctggtatgg 94200

ggcacgcagc ccgcggcgt ggacgagacc ggcacggccc agcccgctt gttcgcggtc 94260

gaggtcgcgc tgcaccgct ggtggagtcc tggggtgtgc gggccgacct ggtggcgggg 94320

cactcgatcg gtgagatgc ggccgacgc gtggccgggg tgttctcgt gcccgacgcg 94380

gcgcgcctgg tcgcggcgc ggcgtcgtg atgcaggcgt tgccgaccgg gggcgcatg 94440

gtcgccgtcc gtgcgaccga ggagcagggt cggccgacc tgaccgacga cgtggcggtc 94500

gccgcggtca acggaccgc ctgcctcgt ctggccgggg cagagacgc cgtcctggcc 94560

gtcgcggaac agctgcgcgc gcagggccgc tcggtacca cgtgcgggt ctgcacgcg 94620

ttccactgc cgtgatgga cccgatgtc gaggagtcc gagccgtgc cgagcagtc 94680

acctacacc agccggtggt gccggtggt tcgaacgtga ccggtgcgt ggccggggccg 94740

ggtcagctgt gcgtcccgg gtactgggtg cggcacgtcc gcaggccgt ccgcttcggc 94800

gacgggggtgc gggcgctggc cgagggccggc gcgaccacgt tcttgagct gggtcggac 94860

ggggtgctct cgcgatggc ccgaggtcc ctgcccagg acacgaccgt gacggtcgg 94920

gtgctgcgc gcgaccgca cgaggagcgc accgccctca ccgctcgc cacgtgcac 94980

accacgggcg tccccgtca ctggaccgcc ctgctccgg ccgggcccga ccacgtcac 95040

ctgccgacct acgccttcca gcaccggcac ttctggcgt ccggagcgac cggcgaccg 95100

gccgggaccg ggacgaccg gcacccgtg gccggcagcg tcgtcgcgt cggcgaccg 95160

gagggcctcg tgctaccgg tcggtatctg accgcaccc agccgtggct ggccgaccac 95220

gccgtcggcg gccgggtgct gctgcccgc accgcgttcg tcgagctgt cctgcgcgc 95280

ggtgaggagg tcggctgca ccacgtcgag gagctcacgc tcaccgcacc gctggtgctg 95340

cccgcgacg agaccgtcc gaccaggtc cgcctcgggg cggccgacgc cggggccgc 95400

aggcccgta ccgtccactc ccgccccac ggacccgacg acgaccgga cccgcgacc 95460

gggtggacc tgcacgccac cggcacgtg gtcaccgcc tcccgcggt cccggaccg 95520

ctcgacggga tctggccgc cggcgccgc gaaccggtg acctcgacg ctctaccg 95580

gcccgcgcg ccgagggtt cgcctacgg ccgtccttc agggcctgc gccgcctg 95640

cggcgcgac gcgaggtgt cgcgagctc gccctgccc aaccgcccga cgggaccgc 95700

acggcctac cctgcaccc cgcctgtc gacgcgccc tgcagtcgg atggtggc 95760

gaggaccggg gcggggacac ggccggcacc accgccgcg gcgtcccgt cgcctggagc 95820

ggtgtctgc tggcccgcc cggctgcgt gcgtgcggg cccggtgc ccgcgaccc 95880

gacggcacc tcaccgtct cgcgaccgac accggcgcg caccgtcgc cgaggtccg 95940

gcgtggaga tgcggccgt cgttactcc gacgacgtc ccccggtgt cgggacgcc 96000

ctgttcggcc tcgactggac ccccgctccc gatgccggac cgtccccga cgccaccacg 96060

gccgtcctgg tcggggacga tccgttcgac ctgaccggcg cactggccga gctcggcgcg 96120

accgtcgagc accacgacga cctgccggcc ggaacgcccg ccggaccggt gctgctgcc 96180

gtcgccgcg ccgcggaacc cggcggcgag gacgcccgcg cagcggccca cacgtcacc 96240

gcccgggtgc tcggcctggt ccgcgcccgc ctggagcagg agcgtttcgc cgggacccgc 96300

ttcctggtcg tcaccgcgg cgcgacaacc gggcacgacc cggcggcgcg cgcggtgtgg 96360

ggcctggtcc ggtcggcgca gtcggagaac cccggcgcggt tcggcctgct cgacctcgac 96420

ccgcacgccg cgccacgct gccggccgcg gcgctggcg gcgacgagcc gcagctgcgc 96480

accacggcg gggagctgcg ggccggcccgc ctggcccgc gcgcacccgc cggcgacgac 96540

accgcggcg ccggcctcg cccggcacc gtcctggtga ccggcggaac cgggtgtctc 96600

ggcgccgtgc tcgcccga cctggtggcc gcgcacgacg tgcgtgagct gctgctggtc 96660

agccgccg cgccggacgc cgaggcgcc gccgacctg tcgccgacct ggccgacgcc 96720

ggggcacg cgaccgtcgt cgcctcgac gtgtccgacc gcgacgcggt caccgcgctc 96780

ctcgacgacc acccggtgca cgcggtggtc cagcccgcg gcgtgctcga cgacgggctg 96840

gtcgcgacgc tgacccccga gcggtcgcc gcggtgctcc gccgaaggt cgacgccgc 96900

tggcacctcc acgaggcgac ccgcgaccgc gacctcgcg cgttcgtgat gttctcctcg 96960

gtcgccggag tgctcgga cccgggacag gcgaactac ccgccgcaa cgcgttcctc 97020

gacgcctgg cgtcgcgcg ccgcaccgag ggcttcccg gcaccgccct ggctggggc 97080

ccctgggagc agggcatggc gggagagctg accgaggccg aggcggcgcg cctcgcgcg 97140

tccgggggtcc cggcgctgac cgtcgagcac ggactcgccc tgttcgacgc cggcctggcc 97200

accggggaac cggcgctcgc gccgatgctg ctcgaccggg ccgcgctgcg tgcccacggg 97260

gaggtgcccc cggtcctgcg ggcgctggtc cggggccgct cccgccgcgc cgcggtcgcc 97320

ggctcggcgc ccgcctcggg gctcgctgac cgtctggccc cgctacccc cgaggagcgg 97380

cgcgaggtgc tcttcgacct cgtccgcggc caggtcgcg tggtcctggg ccacgcgggc 97440

gccgccgacg tcgacgccgg gcgcgcgttc cgcgacctcg gtttcgactc gtcacctcg 97500

giggagctgc gcaaccggct caacaccgtc accgggctgc gactgcccgc cacgatgttc 97560

ttcgaccacc cgaccgtcga cctgtctgtc gacgtgatcg ccgacgacct gtccggcacc 97620

gacgacgacc tcccggccgc cccggtgcgg accgccggg tcgccgacga cccgatcgtc 97680

atcgtcgga tggcgtcgc ctaccccggc ggtgtcgcca cccggacga cctgtggacc 97740

ctggtcacct cgggcggcga cgcgatcacc gggttcccca ccgaccgagg ctgggacctg 97800

gagaacctct accacccga cgccgaccac ctcggcacct cctacaccg cgagggtggc 97860

ttcctgcacg acgcccgca gttcgatgcc gggttcttcg ggatgagccc gcgggaggcc 97920

accgcgaccg acgcgcagca gcggtgctg ctggagacga gctgggaggc ggtcgagagg 97980

gccgggatcg acccggtctc gctgcgcggc agcgcgaccg gtgtgttcgc cggggtcatg 98040

tacagcgact acggcacggt gctcgccggg cccgagtacg agggcttcca gggcagcggc 98100

agttccccga gcgtgcctc gggccgggtg tcctacacc tcgggctgga gggcccggcg 98160

gtcaccatcg acaccgctg ctcgtcgtcg ctggtcgca tgcactgggc gatgcaggcc 98220

ctgcgtcgg gggagtgtc gctcgactc gccggcggcg tgacggtcat gtcgacccc 98280

ggcgtgttcg tcgacttcgc ccgccagcgc ggctgtccc cggacggacg ctgcaaggcg 98340

ttctccgacg acgccgacgg cgtcggctgg gccgagggcg ccggcatgct ggtgctggag 98400
 cggcagtcgg acgcgtccg gaacggtcac gagatcctgg ccgtggcgcg cgggtcggcg 98460
 gtcaaccagg acggtgcgtc caacggcttc accgcgcca acggcccgtc gcagcagcgc 98520
 gtgatccgcc aggcactcgc cagcgggtggg ctgtccaccg gcgacgtcga cgtcgtcgag 98580
 gcgcacggca ccggcaccac cctgggcgac ccgatcgagg cccaggcgct gatcgcgacc 98640
 tacgggcggg accgcgacac cgaccggccg ctgctgctcg ggtcgggtcaa gtcgaacatc 98700
 ggccacaccc aggccgccg cggcgtcgcc ggtgtgatca agatggtgca ggcgatgcgg 98760
 caccgcacc tgccggcgac gttgcacgcc ggtgtccct cgtcgacgt ggactggtcc 98820
 gacggcacgg tcgcgtgct caccgagcag agggcgtggc cggagaccgg gcgggcccgc 98880
 cgggcggcgg tgtcgtcgtt cgggatcagc ggcaccaacg cccacgtgat cctggagcag 98940
 ccggccacgg acgcatccgg gccggtcgcg acccccgacg gcaccgacca cgaccgggcc 99000
 gtgccctggg tgctgtccgg ccgcacgccc gaggcactgg ccgggcaggc cgggaagctg 99060
 gccgaggcgc tggaacggcg ccccgactg cggcccgcg acgtcgtct gtccctggcg 99120
 accggccgca cgctgttcga ccaccgcgc gccgtcctgg ccgccgacc cgaggaggca 99180
 ctgcgcgggc tgaccgcgt cgccgcggac ctcccggacc cggcggctgt caccggggcc 99240
 gtccggagcg gccggaccgc ggtgtcttc tccggtcagg ggtcgacgc gcccggcatg 99300
 ggccgtgagc tccacgacc gttcccgtta ttcgccgagg cgttcgacgc ggtcatggcc 99360
 gcgctggagg ccgagctggg ctccgacctg cgcgcggtcg tgtggggctc cgacacgaag 99420
 ccgctggacg agaccggggc ggcgcagccg gactgttcg cggtcgaggt cgccctgttc 99480

cggttggtgg agtcgtgggg gatcaccccc gacgtcctgg ccgggcactc gatcggcgag 99540
 atcgccgcgg ccacgtggc cggggtgttc tccctggccg acgccgcgcg gctggtcgcg 99600
 gcgcgggctg cgctgatgca ggcgctcccg gcgggcggcg cgatgatcgc cgtccgcgcg 99660
 accgaggacg acgtggcccc gtacgtcacc gaccggctgt cgatcgcggc ggtcaacggc 99720
 ccggagtcgg tcgtcgtctc cggcgacgag caccgcgtcc gcgaggtggc cccccgttc 99780
 accgccgacg ggcaccgggc caccgcgtg cgggtgtcgc acgcgttcca ctgccgctg 99840
 atggaccgca tgctctccga gttcggggcc gtcgccgcgc ggatcaccta ccgcgaaccg 99900
 tcgatcccg tggtgtcgaa cgtgaccggc gcgtcgcgcg ggccggggga gctgtgcgac 99960
 cccgggtact ggttgccca cgtccgcgag accgtccgt tcgccgacgg cgtcaccgcc 100020
 ctgcaggcg ccggcgtcgg cacttctctg gagctcggac cggacggcgt gctgtccgcg 100080
 ctggtcagca gccagacggc cgacggcgtc gtcgtccgc tgctgcgcaa ggaccgccc 100140
 gagccggcg cggcgctgc cgcgctggcc cggctgcaca ccgcgggcac ggacgtcgac 100200
 tggccggcg tgctcaccg cggacgccg gtcgagctgc ccactacgc ctccagcgg 100260
 gagcgtact gggccgcgg gccgctcggc gggacggccg acctgaggc ggtcgggctc 100320
 ggcgccggcg ggcaccgct gctcggcgcc gccgtcggcc tggccgccga cgacggatgc 100380
 ctgttcaccg ggcggatgtc gctgcgcacc caccgtggc tggccgacca caccgtcgc 100440
 ggccgggtcg tcgtgccgg caccgcgtg ctggagatgg ccgtgcgtc cggcgacgag 100500
 gtcggctgc accgggtcga cgagtcacc ctggcgccc cgtggtcct gccacctcc 100560
 gggtcggtc aggtccaggt gccgtcgag gcaccgacg agcccgacg ccgcaccgtg 100620
 ggtgtctggt cccgtccgg tgacgacggg acctggaccc ggcacgcgac cggagcgctc 100680

agcacgccc ggagccccg cgttggcgag gtgacgaccg aatggccgcc cgccggggcc 100740
 gagccggtcg aggtccaggg ctgctacgac gccttcgccg acgccggatt cggctacggc 100800
 ccggtgttcc gcggcctgcg tgcggcctgg cgccgcggcg aggagctgtt cgccgaggtc 100860
 gcgctgcccc aggagacggc cgggtccgcc gacgcgttcg gcctgcaccc ggcgctgctc 100920
 gacgcggcgt tgcacacctc cctgctcacc gggctcgggtg acggcgggac ggcggcgctg 100980
 cctttctcct ggcagggcgt gtcctgcac cgctccgggg ccacggcgct gcgggtgcgg 101040
 ctgccccgt ccggcgccga cgcgatgtcg gtgcgggcga gcgaccggc cggggcaccg 101100
 gtgctcaccg tggactcgct ggtcaccgg gccgtcgccg ccgacgcggc gaccacggc 101160
 gtcggtgacg cgtgttcca ggtcaccgg cagcccgtcg cgccaccgg ggcaccgcg 101220
 acggtcgcg tgctcggtga ggacccctc ggtctcgccg gcccgctcg ggcgcgggt 101280
 gtgcccgtcg gcaccggcac cgatgtcgcc gtgatcgcc cgcgcgacga ggtcccggag 101340
 gtggtcgctc tcggtgtgga cggcgccggc gaccgggtgt ccggtacca ccggaccacc 101400
 gccgaggtcc tggggacgt gcaggaatgg ctccggcacg acgcactcg cgggtcccgg 101460
 ctggtcgctg tgaccgggg tgcaccgac ggcagcgacc tcgcgccgc cgccgtcgcc 101520
 gggctggtgc ggtcggcgca gaccgagcac cccggcgccg tcggccacct cgatctcgcc 101580
 ggtgacggca ccgtcgacgc ggacgccctc gcctcggtc tcggtccga cgagcctcg 101640
 ctgacgtct cggcgcgga gatccgtgcc cccgcctca cccggtgcc cgtcggggc 101700
 gaccggccg tctggaatcc ggacggcacg gtgctgtca ccggtgggac cggcgccctc 101760
 ggcgcgcagc tcgcgcgca tctggtcgag gtccacgggg tccggacct ggtgctcgcg 101820

agccgccgcg gggccgacgc ccccggcagc gccgtgctcg tcgacgagct caccgcccgc 101880

ggcgccctcg tgctcgtgac ggtctgcgac gtgtccgacc ccgcccgggt caccgtcttc 101940

gtcgccgacg ccggcgcgga ccggtcgctg acccggtcg tcgacaccgc gggcgctcctg 102000

gacgacgggtg tgctgcctc gctcaccgcc gagcggtcg gcaccgtgct ggcgccgaag 102060

gccgacgcgg cctggtagct gcacgagcg acccggcacc tggacctga cgcgttcgtc 102120

gtgttctcgt cggtagcggg cgtgtgggc ggcgccggac aagcgaacta cggcggggc 102180

aacgccttc tcgacccct cgcggcgac cgcgtgccg cgggactgcc cggctctcgc 102240

ctggcctggg ggcgtggga gcaggcgac ggtatgacc gcacctga cgacccgag 102300

ggcgcgcc tggccgttc cgggatgcc cgcgtgctgg cgcaggacgg cctgtcgtg 102360

ttcgacggg cctggccgt gagcgacacc gccgacggc cctcgtcgt cgtccgggtg 102420

cggctggaca ccgcgcgct ggcggagtcc ggtgaggtcc ctgcgacct gcgcggcctg 102480

gtccggaccc gcacccgcc cgcgcggcc ggcggtgctg cgaccgtcg cggcctggtg 102540

gaccggctcg tggccctcg gcccgacgtg cgtcaccggg agtcctcga cctggtcgc 102600

accggatcg cgatggtcct ggggcacgc gaccggccg tggtcgacga gcgggcaccg 102660

ctgcgcgacc tcgggttga ctgcgtcacc gcggtcgagc tccgaaccg gctgagcacg 102720

gccaccggcc tgcggctcac cgcgacctg gtgttcgacc accgaccgc caccgcgtc 102780

gccgagcacc tgcacgagga gctgttcggc gccgacggag tagtgccgc cccgctcgcg 102840

gccccggccg cggtcgccga cgaccggtc gtcgtcgtg ggatggcgtg ccggttccc 102900

ggcggggtgt cctgccgga ggacctgtgg cggctgctg acgacggcgt cgacgcggtc 102960

tccgggttc ccacgaacc gaactgggat ctcgggtcgg tctacgacc ggacccgac 103020

cacatcgga cctcctccac ccgccacggt gggttcctgc acgacgccg tgggttcgac 103080
 gccggtttct tcgggatgag ccccggtgag gcgacggcca ccgacgccca gcagcggctg 103140
 ctgctggaga cctcctggga ggcggtcgag cgggccggga tcgacccggt ctccctgcgt 103200
 ggacgcgcca ccggtgtgtt cgccggggtc atgtacagcg actacggctc gatcctgggc 103260
 ggccgggagt tcgaggggct ccagggccag ggacgctcgc cgagcgtcgc ctccggcccg 103320
 gtgtcctaca cctgggcct ggagggcccgc gcgtcaccg tcgacaccgc gtgctcgtcg 103380
 tcgtcgttg ggatgcacct ggccgcgcag gcgtgcggg cgggggagtg cacgctggcc 103440
 ctgcgggag gcgtgacgt gatgtcgacg ccgggcacgt tcgtcgagtt ctccggcag 103500
 cggggcctgt ccccgacgg gcgtgcaag gcgttcgcc acgccccga cggcgtcggc 103560
 tggctcgagg gcgtcggat gctggtgctg gagcggcggt ccgacgcgt gcggaacgt 103620
 cacgagatcc tggcggtgct gcgcgggtcg gcggtgaacc aggacggtgc gtcgaacggg 103680
 ctgaccgcgc cgaacggtcc gtcgcagcag cgggtgatcc gccgggcgt gcggaacgcc 103740
 ggccctgggtg tgggtgacgt ggacgtggtg gaggcgcacg gcaccggcac gacgctgggt 103800
 gaccgatcg aggcgcaggc cctgatcgcg acctacgggc gggaccggga catcgaccgg 103860
 ccgctgctgc tgggctcgt gaagtgaac ctgggtcaca cgcaggccgc gcccggtgtg 103920
 gcgggtgtga tcaagatggt gctggcgatg cggcacggga cggtgccgcg cacgttgac 103980
 gtggacgcgc cgtcctcgca cgtggactgg tccgacggca cggtcgctg gtcaccgag 104040
 ccgacgccgt ggccggagac cggccgtcgc cgcggggcgg gtgtgtcgtc gttcgcatc 104100
 agcggcacca acgcccacat cgtgtggag cagccgctc ccgtgccga gcccggcgag 104160

cctgccgagc ccgaaccccg cgtggtgccg tgggtgctgt ccggccggtc gccggaggca 104220

gtgcgcgccc aggcggcgcg gctgcgcgac gcgtcaccg agcagcccgg cccgcgccgg 104280

gtcgacgtgg cccacgcgct cgcgaccacc cggtcggagt tcgcccacg cggcgtcgtc 104340

ctggccgggg ccggtccga tccgtcgcg gcgtcgcgac cggtcgcctg cggccgcccc 104400

gacccggcgg cggtcaccgg ggagagcgac ggccggccga cggccctgct gttctccggg 104460

cagggttcg agcgtcccgg catgggccgg gatctctacg cccggttccc ggtgttcgcc 104520

gaggcgttcg acgcggtcgt cggcgcgctg gacgccgagc tggagccggc agacggcggc 104580

acgtcgcgcg aggtgatgtg gggtgccgac aacggggagt ccggtcgctt ggacgagacc 104640

ggctggacc agcccgcgct cttcgcggtc gaggtcgcgg cgcaccggtc cgtggagtcg 104700

tggggtgtgc ggccggacct ggtggccggg cactcgatcg gcgagatcg cgcggcgcac 104760

gtggccgggg tgttctcgct ggccgacgcg gcccgctcgt tggcggcgcg ggcccgctctg 104820

atgcaggcgc tcccgaccgg cggcgcgatg atcgcggtgc aggcgagggc ggacgaggtc 104880

accccgctgc tcaccggtga cgtcgcgatc gcggcggtga accggccggc ctcggtggtg 104940

gtgtccggca ccgaggacgc cgtgtctggc gtcgggaccc ggctcgccga gcagggcagg 105000

cggaccacca ggctgcaggt gtcgcacgcg ttccactcgc cgctgatgga cccgatgctc 105060

gaggggttcc gggcggtcgc cgagcggctg acctatgccg agccggtggt gcctgtggtg 105120

tcgaacctga ccggtgcgct cgcgcggccg ggtcagctgt gcgatccga gtactgggtg 105180

cgtcacgtcc gcgagaccgt ccgttcgcc gacggtctcg cgtcgtgga cgcgcgggc 105240

gtcacgcct acctggagat cggaccggac ggggtcctgt cggcactggc cgcacagacc 105300

gtcccgagg gcgcgtcac ggtgcccctg ctgcgcgcg accgcgacga ggagacgacc 105360

gcgctcaccg cgcgggcgca gctgcacgct gccggggcgca ccggcggctg gcacgacctg 105420

ttcacgggga cccggccggc ccgtgtcgac ctcccgacgt acgcgttcca gcaccagtgg 105480

ttctggccgg cgccccggac cgcgggacggc gacgtccg cgcccgggct cggcgcgccc 105540

gagcacccgc tgctcgcg cgccgtggag ctgcgtccg gcgggggagt ggtgttcacc 105600

ggacggctgt cccggcgctc gcaccgtgg ctggtcgacc acacggtgct ggggcacgta 105660

ctggtccccg gcacggcgct gctcgacatg gcgatccggg ccggtgacca ggtcggatgc 105720

gaccgggtcg aggagctgac cctggccgcc ccgtggccc tgcccagca gggggccctg 105780

cagctgcagg tgaccgtga cgcgccggac cccgacggga accgggcat cgcatccac 105840

tcccggccgg agggcgcggg cgaggacgcc tggaccggc acgcggccgg tgcgtggcg 105900

ccggcgggtc ccccgcccc cctcggggcg gacgcggcgg tgtggccgcc gccggacgcc 105960

gtcgagatcg acacggaggg ctgctacgac accttcgcc acgcggctt cgtctacggc 106020

ccggtgttcc gggccctcg cgagcctgg ccgctggcg aggagctctt cgccgagtc 106080

gagctcccc acggcgccgg tggaccgac ggttcggcc tgcatccgc cctgctcgac 106140

gcggcactgc acgtgtcgt gctggcggca ctgcttcg acggcaccgg cggcaccggc 106200

ggcggggcgt tgcccttctc ctggtccggg gtgtcgtga tggccggcg agccgagcc 106260

ctgcgggtgc ggatcgccc gagcgggac ggtgtcctgt cggtcgggc cgtcgacggg 106320

gccggtgcgc cggtcgtgac cgtcgaggcc ctgcacacc ggaggtcgg cgccgaacag 106380

ctgcgtgcc cccggaccga ccgtgacgc ctgttcgggc tggactggac ggtcgtcgac 106440

gccgcggagg gggccgctcc cgtggtcgcc gtctcgggg ccgaccgtt cgggctggcc 106500

ggggcgggtgc cggacgccgt gcaggtcgac gacctggcca cactcgtgtc ggccacggac 106560
 ccggtgccgg acgtggtgct gttcccgttc gcggccgagc cgggcgtcac cgggcggccc 106620
 gaggaggtgc gcgcctgcac cgtccgggtc ctggagcagc tccagcggtg gctcgccacc 106680
 gaggagctcg cgacggcccc gctggtgggtc gtcaccgtg gcgcgtcac ggtggacgac 106740
 ggcggtgtcg gcgacctgcc ggcccgcggtc gtccgtgggtc tggtcgggtc ggctccccc 106800
 gagaacccgg gcaccttcgg gctgctcgac ctgacccgg acgcagccgg cacggatttc 106860
 tccgggttgg ccgcggcgct gaccgcgtc gccaccgagc ccgagctggc ggtgcgcgac 106920
 ggcgctgtcg gcccccgcg cctggcccgg atcgcccgga cgcacgagca gcccgatgga 106980
 tccgacgcgc gcccggccct gcggaccgac ggaccgtgc tcgtaccgg cgggaccggc 107040
 gggtcggca gcctggtcgc ccggcacctc gtcaccggac gcggtgtgcg ggacctggtc 107100
 ctgcgcggcc gccgcggacc gtccgaccg ggcgccggcg agctcgtcgc cgacctcgag 107160
 gcgctcggcg cccgggtccg ggtggtggcc tgcgacgtc ccgaccgga cccgtggcg 107220
 gcgctggtcg ccgaggccgg gcgggagcgt ccgctgcggg gcgtcgtgca caccgccgt 107280
 gtgctcgacg acggcgtgct cggctccctc gacgcggccc ggctcgacac cgtgctgcgg 107340
 cccaaggccg acgcccgctg gcacctgcac gaggcgaccc gggacctgga cctcgacgcg 107400
 ttcgtgttgt tctcctcgtt cgcgggtgtg ctgcggcgcg ccgggcaggc caactacgcg 107460
 gccggcaacg cctacctga cgcgtggcg gcgagccgcc gcgccgacgg gctcgcgggg 107520
 ctgtccatgg cctgggggcc gtgggagcag ggcagcggca tgaccggaac cctgggcgag 107580
 gccgaggcac agcgcctggc ccgctccggg atgcgcctg tgcgccga gcaggccctc 107640
 gagctgttcg acacgtgct cgcggccggc tccaccggcc gggcgctggt cctgccggtc 107700

cgctcgacc tggccgcgt gcgcgcgtc gacgaggtcc cggcgtgct gcggggcctg 107760

gtccggacca cgcgcggcg gaccgccgc gcgggcaccg caccggacgc cgacgcgtc 107820

gtcccccgc tcgccgggt cggtgcccca gacgaggacg agatcctgct cgcgtcgtg 107880

cggggcgggg ccgccacgt gctcgggcac accgaccca ccgcggtggg ggtccgtcag 107940

cagttccagg aactggggtt cgactcgtc accgcggtcg agtaccgaa ccggtcaac 108000

gcagccaccg ggctgcggct gcccgcaacc ctgctgttcg atttccgac cccggccgag 108060

gtcgtcggc atctgcggag caggctcgtc gtcgccgagc ccgcgggcgc cgacccgtc 108120

ctgccgcgc tcgacggcct ggagcgggcc atcgcgggcc tgcacgtcga cgacagggg 108180

gagcaccgcc gggtcgcggg ccggtcgcg gtgctgcgga ccaagtggc cgggctgcac 108240

gccgaggacc ggccgtcga ccccgacgc gacggcgccg gggacgacac cctcgacgac 108300

gcctccgacg acgacatgtt cgccctgtc aacgacgagc tcgggctcgg ctgaggtgcc 108360

tcccgggggg gcgggccggc cggcgcggtc gtccccccc cgaggccagg actagggtt 108420

caccggccgc ggtgccggtt cactggctac gtcgtccgc agcacgccg gtgcgtccgc 108480

gaggaaggaa ccccatgacg acgaccgcca ccgaggagag cctgtgggtc cgtgtcttc 108540

accggcacc ggagcggccc gtgcagctc tctgttccc gcacgcggc ggttcggcct 108600

cgttctactt cccggtctc gcgcagctc agaccaccgc ggaggtgttc gccgtgcagt 108660

accggggccg gcaggaccgg cgcgcgaga ccagccccg tgacctcac accctgccg 108720

accagtgcca cggcgcgtc cgggactgc tgcggggcca ccgccctac gtcttcttcg 108780

gccacagcat gggcgcgacc ctggcgttc aggtcgcgc gcggcacgag gccagggcg 108840

ggcggatcgc ccacctgttc gcctccggcc ggccgcgacc ctcgctgtc cgtgacgagc 108900

acgtgcaccg gctgagcgac gagcagatcg tcgaggagct gaagctgctg gcgggtaccg 108960

acaccgcgt gctcggcgac gacgagatcc tccgatgat cctgcccga atccgcagcg 109020

attacgaggc gatcgagacc taccctgca cgcgggggc caccgtggcc gcgccgatca 109080

ccgtcctgac cggggacagc gacccaaga cctcacggga cgaggcggag tcctggcgcg 109140

accacacctc cggaccgttc gatctgcacg tccgtccggg cgggcacttc ttctcggct 109200

ccgaccccc ggcgatcatc gccatgtgc gcacgtcct caccgcgtcg tcctgatccc 109260

gcaggagcga gcgggtcac cgtaccgaca cgcggcgcc ggtatccgc acgggtggga 109320

ttctctaggc tcaagatcgt cgagccgggt cgcggcgcc gggaccgtc gctcgtggag 109380

gtagccagg atgtccgatg ccaccgatcg cggcgtgcgc ctggtgggtc ggggtccga 109440

gtcggcgtgg ctggcctcg ccggtgccg cgcgcgcgc ggatcacacg tcgtgcggct 109500

gctcgtcgga ccgccggga tcggcaagtc ggtgtgtc gcacgcttct gcaccgaggt 109560

cccggcgggc gtgcgggccc cccgtgccca tggcggggaa cggacctcg acatctcgtt 109620

cgcctgggtc cgggagctgt tcggggccct ggccggcgcg ggcccggtcg acccgcgct 109680

gctcgagggc ggtccccgt ggagtgcacc ggcgtggac gaggcgacgg gcggtgccg 109740

accggacaac ctctaccgg tgctgcacgg cctctactgg ctaccgtga accacaccgc 109800

tcgggcccc ctggtcctcg tcgtcgacga cctgcagtgg tgcgacgacg cctcgtggc 109860

cttctcggg ttctgtctgc gccgtcgga gggctcccc ctcgggtgg tgctgcctc 109920

gcggaccgac ggagcggcg cactgcccga ccggtcgcc gagatccga cccaggccg 109980

tgcggcggtg accgaggtg gccgctgga ccggtccgc gtcgcccggc tcgctggc 110040

ccgcggtgcc ggtacgggag ccgagccgcc gcaggcgccg ttgctcgacg cgctcaccga 110100

ggcctccggc gggaaccgcg tgctggtcga gcagctggtc gccgagctgg gcccggtagc 110160

cggcgacggc gcgaccgacc ggatccaccg gctcgggcgc gaggtggtcg acggtctcgt 110220

ggaacggcac gtgttcgacg ccccgccgca cgtccgcgc gtggccgccg ccgtcgcggt 110280

cgtgggtgcc gagcagacca cggtcctcgc gaccctgtcc ggggtgcccg ccgggtcggg 110340

ggccgacgcg gtgcgcagcg tcgtccggac cgaggtcttc gccccgacc ggtcggactt 110400

ccggcacgac ctgctgcgca ccgcggtgtt gcgtggactc cccggggacg agctcgacga 110460

cctgcgccgg cgccggcgccc ggggtctgag cgacgcgggg cgcccgccg aggtggtggc 110520

ggcggctctg ctgctcctgc ccggcgccgg cgagccctgg atggtcgacg tgctgctgga 110580

ggccgcggcc gcccgggcg accgcggtgc ccggccgcc gtcgcccgt acctggaacc 110640

ggtggtcgcg gcccgaaccg acgacgtggg cgcgcgacc cggtggccg cggcgtggc 110700

ccagcacgag ccggagcgtg ccgtcgcgca gctgcgcgac gcgctcgacc ggcccggtga 110760

cctgccctcg cgtgcccagg ccgccgtgca gctggccatg acctcgctgg cgggtgcagca 110820

ggccccccgt gcggtgcggg tgctgcagga cgtcctggac acgatggacc gcgagttccc 110880

ggccgacccc ggtcccagg cgaccgagct gcgcacgcac gtggaggccg cgctgctggt 110940

cgtcgggctc gacgagaaga agaccgtggc cgcgacgac gaccggatgg gacggatggc 111000

ccggccccgc ggccgcactc ccgccgagcg ccagaagctc gcgatgatga cggtagacct 111060

ggcgatggac ggtgacgacg cgcccgcggc cgtggacctc gcgcgccggg tgctcctggt 111120

cgacgaggcc accctcggcg gctgggcggt gctggcctcg tcgtggtgc tgcggtggc 111180

cgacgaggtg gaggagtca cagcgtgtct cgaccggctc gtcgtgcaga gccgcgagca 111240

ggcctcggcg tggacctaca gcctcgccgt ggggacccgc gcgaccaacc acgtcgtcgt 111300

cgggagcctg gccgaggcg aggccgacgc ccgcacggcg ctcgacatcg ccgagcagga 111360

ggcgtggcgg gggaacaccg tgggtcccac gatcgactg gcgaacgtgc gccagcagca 111420

gggcgacccg gaggcggcgc tcgagctgct cgacgggatc gtccggcccc ggctcgagga 111480

cttcgcctgg gatlaccacg actacctgat ggcgcgggcg ggggcgaccg ccgacgtcgg 111540

cgacgtcgac cgggccctgt cgacctaccg ccgtgcggg gacagcctcg acgcggcccg 111600

tatcggaac ccgtcctgg cgccgtggtg ggtgcacgcc gccgtcctgc tcgccgacac 111660

cggccgggcg cagcaggcac acgggatcgt cgaggaggc gccgaacggg cggcgcgctg 111720

ggggaccggc cgcgggcggg ggctcgctgt gctggcccgc ggtgtggtca ccgccggtcc 111780

gcgcggcgag gacatgtcc gggaggcgtt ggaggtgtc gagggctcg ccgcccgac 111840

cgagctgac ctcgccacc acctgtggg ccgggcgatg ctggtgtccg accacgccga 111900

ggacccccgc gagcagctgc gccggcggc gacctggcc gcccggtgc gggcgctgcg 111960

ggcgccccg gtgccccgg aactgtctgt gcaggccggt ggccggatgc gtccgccac 112020

cggtccccg ctggaccgc tgaccggtgc cgaacccgg gtggtcgccc tcgccccga 112080

gggcgccccg aaccgcgaga tcgcggaggc gctgttcgt acgtcgca ccgtggaggt 112140

ccatctacc agcgcgttc gcaagctcg cgtaccgac cgggccgccc tggccgggat 112200

cgctgatgcc gcccggtcc gcagcgtat atcgacggc tgttcgcga acgggacgcc 112260

gcctgcgcg agctcgacc gccctcgac gcgtgtgtg cggggggatc gccgttcgtc 112320

gcgatcacc gcgagcccg tacggggcgc tcggccctgc tccgccgtgc gtcggggcgt 112380

gccgcgcgacc gcgcggtacg ggtgctgtcc gcgcgggccc tccccaccga gaccgggtgc 112440

ccgctcgca cgggccacgg tctggtcgag cggctcggcc cggtaaccgc gccgccccgg 112500

tccggggccgg tgggcgccga cgtcctgcac gagtgggtgcc gtgctgtgct cgacctcgcc 112560

cgcaccggcc cggctgtcct ggtcgtcgac gacctgcact gggccgacga ggacacggga 112620

cagtggctgc agatgtgct ccggcgacgg cgcgaggcgc cggtcggcct tctggtcgcc 112680

ctgaacggca cgcacgacgg tctcggctgg gccgtctgc cgaccggccc gtcggacgtc 112740

gtgctcgga cggggccgct ctccctcggc gcggtgcggg aggtggtcac cgccagtagc 112800

ccgacgctc ccgaccgcgc ttccaccgtc ctgcccgtc gctgcaccgg cggcaaccgc 112860

gcggtgctgc gggcgacct ggccgggctc gaccgcgagg tgccccgac cgcggccgcc 112920

gtgccggagc tgggtgcgtc cgcggccacc gcccggcgcg accacgtgc ccgggtcctc 112980

gacgggctgc cccccgcct ggtcgaggcg ttgcgcgagg cggcgggtgtg cggatccgag 113040

ctgcagccgg tgcgacacc ggtcggcgcc cccgtagcgt ccaccggtgc cggggcccgg 113100

gcagcgctgg ccgccaccgg cctggtccgc ggcaccgacc acgcgctgcc cgccgaccgc 113160

agcgtcaccg acgtcgtcct ggccggcatc gagccggggc accggagggc gctgttcggc 113220

tccgcgcgcg gcctcgcgcg gcgggccggg ctgcccagg agcgcatgc ccgcgcctg 113280

ctcgacgtc ccgcgtcgg cgagccctgg gcggccgagc tctgcaccg ggtcgcggtc 113340

cggcaccggg ccgaggaccg gcccgccgac gccgcgcgg ctgccgagc cgcgctgcag 113400

gagccctgc cggaccgct ccgcggggcg ctgctggtgg agctggcgt gtcgcgtcg 113460

cacaccgcgc ccggtacggc cgcgcgggtg ctctcccga tcacctgga caccgaccgc 113520

gcggcgagcc ggtacggggc ccgagcggtc gacctgtctc tgtccgccgg ggaggtcggc 113580

gcggcccgcc aggcgttga catcgcggtc cgtcgtatgc cggaggacgc gccggcgccg 113640

gcggacctgc tctcgttgc ccggctgacc gacgagctcg gcttcgaccg gcggaccgtg 113700

ctgcacggcc cggtcgccac ggccgcagcc ggctccgacg acgacggctc ggtcgcccg 113760

gggaccaccg cgtggctcgt ggtcctgcgc ggccgcgacc gggaccgtgc caccggctg 113820

gcccgcgcca cgctgaccgg ccgagcggc gtcctcccgg cgataccga ggtggctcgc 113880

gcgctcacc tcgacccgt gggctgtgcc gacgagcgg gcgagcgat gcaccacac 113940

ctgctcgaga tcaccggga gcgcccgtc cggcccgcc tactcgcggt gtcggcactg 114000

gtcgagctgc ggacggggga cctcgacggc gcacgacggg acctcgggc cggcccgctc 114060

gccccggtct cctccgacgg gcccgaaccg ctgcccggg ccgcccgggt gctgggtcac 114120

ctggcggagc ccgacttga ggctccgac gccgcggcct tcgccgacct cggcccggg 114180

ggagtacggc ccggtgcggc cctgctggag tacgcgccc ggccgctgcg gtcgggtcac 114240

ggcccaccac gcgacgcggt ggagcactac atgggggtgcg gtcggtgct gctggaccgg 114300

ggccgggtca atccggtcct ggcccggtgg ccgtcccgcc cggcgacctc gctgctggcc 114360

tgtgggtcgc ccgcccgcgc ccgcccgttg gccgcgacg agctccggct ggccgtccgg 114420

tggggcgcg cggccccggt cgcggcggcc gaggcggctc tggccgggt ggacgccgag 114480

cccaccgccg tcggggagcc gctcggggac ggggtggcgc gtgctgcac gccgtgaccg 114540

ggagctgggc acccctgcgc gacgccgtca cccgggccc gcacgggagc ggccggccg 114600

tcgtcgtcgg ccgccgtgtc ggcagcggcc ggaccgcct gctcgacgc gtgggggtcg 114660

cggcgggcag ggccgggctg acggtgctgc gggccgcctc ggccgtcgtc gagcgcgact 114720

tcgagttcgg cgtcccccg cagctgttcg acccgctcct cgccgcgcg ggtgcggacg 114780

cccgaccccg gtggctggcg gcgtcccgcc cgaggctgcc cgcgcgctc gcggcggaac 114840

cgctcgacc ggcgagacc cagcaggagc aggaccgggt gcgcgagctg caggcgctgt 114900

tggcgaccgt gggcgccgaa cggccgggtc ttgtgctggt cgacgatctc cagtgggcgg 114960

acacggcgtc gctgcggtgg ctgaaccggc tcgtcgcgcg gatcccgac ctgcccgtgt 115020

ccttcgtcgg caccacctg cagcgcgacc cggcgcccg gcggcccggt gtacgcggtc 115080

tggccgggtc cgccgtaccg ctgcgggtcc ggccgctggg acccgcccg gtcccgggga 115140

tggtcgccgg gcgttcggt cgcgcgggcg acccgagtt cctgcaggtg tgcgaggagg 115200

tctcgggagg tgtccgtcg gtgctcgcg ccgtgctcga cgaggctcgc gcggccggcg 115260

gtggcccggt cgcgcggtgc atcccccg tgcgtcggc ccggccggcc ggcctgcggg 115320

agcgcttcgc ccggtgcctg cgggcacagg acgacgcggc gcgcgggtac ctgggcgccc 115380

tggccgtgct cgggccccgc gccgacccgg cggctgtggc gcggctggcg gagctggacc 115440

cgcacggcct gcgtgcggtg caggggcagc tgacggaaca gggtctgctc accgacgacc 115500

acaccgggtt caccacccg ctggtcccg acgtcgccgc cgaccccgcc gagcgcgagc 115560

ggctgcacct gcgcgcggcg cggctgctgc acgagaccgg gcaccagcc caggaggtgg 115620

ccgcgcacct gctcgcggtc gccgccccgc tcgacggctg ggccgtcgag gtcctgcggg 115680

ccgcggccca ccagacgac accgcgtcc gcccgacac ggccgacgac cagcagcag 115740

accggtcgc ggtccggtac ctgcgcggg cctgctcga cagcgacgtg cgtggccacg 115800

agcgcggggc cctgctggtc gagctggcgc cggcgagcg gttcacgag cccggcacg 115860

ccgtccggca cgtgtcccag gcgctgccgc tgcctgcctc gccgcaggac cgggcggctc 115920

cgctcacct gatcgacccg tcgacgggtc gggagggtgc ggcgcggtc caggaggcgg 115980

tccgtcggc cgacgccga acggacccgg tcgtcgacga cgagtgcacg gtggccgtcc 116040

ggatcctgc ccgcgccgg cggctggacg agcagcacc ggaggggctg gcccggtcct 116100

gcgcgtgct gcgcgaggtc gtggccgcac cggacgagca cctcagacc gcggccggtc 116160

gcgagctggt cggcgtgctg ctgcacgccg cggcgtgac cggcgggta ccggcggccg 116220

acgtcgcca cctcgggaa cgcctgctgc ggatcacacc ggcgcgag gtgcggccc 116280

cgacggcat ccgcgggc gacgggccac gtggcctgct ggtgctgcc ctgctgccg 116340

ccgaccggc cggcgctg gaggactggc tggccccga cccgacatc ccgcggcgg 116400

ccaccgca cgagctgcc ctggctctgc tggcccgg gcggcccgc gcggcggcg 116460

cgctccccg tgggtcctg cgtgagcgc gggccccgc atcgccgcc ttccacaccg 116520

cgctgatgc cgcggcgtc gaggccggg cgcggcact cggccggag ccgcgggc 116580

ggccccgg cgggtgtctg gtgcgcacg cgaccacca gctcgtgcgc gcggccggcg 116640

cgctgcgtgc gggccggcag gacctgggc tggagtgcct gctcactgc gggcgacac 116700

tggagacct cggctgtcc aaccggccc tgtcccgtg gcggagctgg gcggccggc 116760

tgtgcgccg ccgtggtgc acgggggccc cgtggaatg ggccgacgag gagctggcac 116820

tggcgggc gtgggtgcc cccgccgcac tcggcgctc cctgcgggtg cgggctgc 116880

tcgtcgccg gcccgcgga gcgaccagc tgaggaggc cgtcgagtg ctcagggact 116940

cggcgacac gccgcgctc ggtcgccgc agatcgtgt gggcgacac ctgcggca 117000

cggcgcccc cgaggcgag gcgctgctgc gtcgggtct gcgccctc gaggaggccg 117060

gggccgggga cccggacacc gcgacgccgg taccgacggt cgagccggcg gccggtaccg 117120

gcgacgacgg ggaggagtc ccagcgtggc gcgtcgtcga cgcctgacc gacgccgagc 117180

ggcaggtggt ggaccgggtg gtcggcgggg cgaccaacaa gatgatcgcc gaggagctgg 117240

gggtcagccg ccgggccgtg gagaacggc tgaccagcgc ctaccgaag ctcggggtca 117300

gcgggcgcag tgcgttcgg ggggcggact gaccgccgt cccggtgccg ggggcggcgc 117360

tcgtcacgtg cgcgcgtcc agtcgcggg cgctgtgtac ccgcctggc cggaccagct 117420

cgtcggggcc cggtagccgt ccgcacccgg ccaggacgcg gccgccggt gccggtgggg 117480

tgccgcggcg acccggtcc gcccgccag ggtgcacagc gccacggtca cggcgccac 117540

ctcgccggg gtcgggttc caccgtgat caggatccgc ggtccgggc ccgccggt 117600

ggtcacgtcg ggggttgc gtgcttcgg accggcagct cggcgctt ggcacgcagc 117660

atcgacagcg cgtcgacgag gaccgcgcgc gtgtcggagg ggtcgatcac gtcgtcgacg 117720

agaccggcct cggcggcgta gtaggatgc ataggctgt tgcggtactg cttgatccgc 117780

tgggctcggg cgatctcggg gtcgggcgcg gcggcgatct cgcgccgaa gacgacgttg 117840

gcccggtt cggcgcccat caccgcgatc tcgttggtcg gccaggcgag ggacaggtcc 117900

gctccgatcg agcggaatc catgacgat taggcgccac cgtaggcctt gcgcaggatg 117960

agctggacc gcgggacggt ggccgcgcag taggcgtaga gcagcttgcc gccgtgccg 118020

atgatcccc cgcgtcctg gtcgcccg gcgaggaac ccggcacgtc gacgagggtg 118080

accagcgga tctgaacga gtcacagtg gagacgaacc gggccgctt ctccaggcg 118140

tggatgtcga gcacccggc cagcgaggcc ggttggttcg ccacgatcc gaccgtgtgc 118200

ccgtcgagcc gggccagacc gcacacgatg ttggtggccc agttggcgtg cacctcgaac 118260

aggtcgccgt cgtcgaccac ctccgcatc acgtcccga tctcgtaggc gcgggtggtg 118320

tccgccggga cgatgtcgag cagcgacggg gtggcccgtt ccgtgggtc gccgggtggg 118380

gccacggcg gctgctcgc gttgttcgac ggacgcagc acacaggtg ccgcacgtc 118440

gcgaagcagg actcctcgtc gtcgtagac aaggcgccc ccccgactc cgtggcgtgc 118500

acctggcg cgccgagtt ctcgtcgtg atctctcac cgtcacgc ggacaccac 118560

tccgtccgg tgatgtacat ctggcgatg tccggacca tgaacacgt gtcgtgagg 118620

ggggcgagt aggtcgccc cccgcacac gggccagca tgacgtgat ctggggacg 118680

acccggagg ccgcacgtt gcggcggaag atcccgccg aaccggccag cgcgtgacg 118740

ccctcctgga tccggcgccc cgcgcgtc ctcaggtga tcaacgtgc gccggcgac 118800

tccgccgat ccacacatt gtggatctt gtggcgtgc ctcgccgag cgaaccgcg 118860

aagatccga agtcgtggc gtagacgaac acggtgcgc cgtcgatgt gcccagccg 118920

gtcacgacg cgtcgtgtg cggacggcg tctccaggc cgaagccgt gccgcgtgc 118980

ctcggaact gtcgatctc acggaagct cctcgtcga gcagcatgc gaggcgtc 119040

tgcaggtca gcttgcgcg ggcgtgctg tgctcgtc cggcgtgga cgggccggag 119100

cggatctgt cgcgggccg gtgcagctc gccaccgc accgcagtc cgcgtcgtc 119160

cggatgtgt cgtggcggt catgttctc cctctgcct cgggacgtc tcgggtcgag 119220

cagtacttc acgtgatcg gcacacctg gggcgccac gaaccagct cgaagaaac 119280

catcgagtag gccttgaga tcagcgagg ccgtttctg accgcatct tccggagcag 119340

ggcggtcac tggtaactga ccccgccgc gctgaggaac aggtggagg ccagctcac 119400

ggtggaggca ccggaggcga cccctccag gatcttggcg tccatgtccg acaggatccg 119460
 gcgtggtccg ctccaggccg tggacggctc ggcggtcccc gtacgcagga cgacgacgac 119520
 cccctcgacc cggcccgctg tccgcgcgat cgcggtcgcc atcaggctgc cccgcagcga 119580
 cgagccggcc ccggcgatcg cgaccgaccg ctcttgaaa cggggctgct gaccgtccag 119640
 caaccgttcc atctggtgcc ggacacgggt acggatgctt ccgtcgagga ggtcgagaa 119700
 gccgatccg cacacgtgc cggaaccgat gtgcacatc cggcggaaca tctctggtt 119760
 gcccgacg acgcgcaggc ctcggtcgag cgataccatg caggcactgg tggattcctg 119820
 ggaaatgcgc tcggtggtgt cgccgtcata gggcaggact cgcacgaat aactccccga 119880
 agttcaacgg aacacgtctg tccgggagcg gaccggacag tcgcggtagc cgttctcgat 119940
 aaccgattcg accgtatggg ggccgctcga caggggtcaa cggcagcgga gcgtaagcg 120000
 ttaacactgt ggccgccgga gtgcgggggt tcggtggggt gtggtgcggt atgtgatcta 120060
 gatcactacg gtgtggggtg tgggtgctgg ggttctgctg gtcccagccg tggttcgac 120120
 ggggtgcgcg aacgtcccg ggacaaccgg ggtgcccgtc cgtgcgatgc cgcaacgacc 120180
 gctccggcgg caccggcgct cgcgtcagta ccggacgagg ccggcttcgc gcaggtcgtc 120240
 cagccagtgc tccatcatgt cccgcacgc ccagggtcg gtgtcccaga ggtcggccag 120300
 gtgggcggcc gcgtcgccga ggttccacgc cgtccgcac agcgcgagcc acatggcggt 120360
 gccgacctcg tcgcacagca ggcggtcgca ccggtcgga tggcccagct ccatccagcc 120420
 ggtatcgagc acccgacgg tcagtcccgg aacgggttcc acgtcgatcc cctcggtgt 120480
 cggacgggct cgccccaga gtccgggacc ggccacgtcg ccggtcgtc gcattcccga 120540

catgatgcgt tcatgttggc cgtccccgat cgtcatcgag ggaggactat gccgccgatg 120600

tcgcccgat accaccagta tccactgcgt ggatcgaacc cgggcaggtc catggaggag 120660

gaactgggtg ttccccgacg aattccgtgg tggtgctccg ttccacgacg caccggggta 120720

aaatgatcac cgaatcgctg gcacgtccgt cggacggagg tcgtatgagt gtcgggggcc 120780

cacctggggg agccgtccgt cgggcggacc gcgcggtgct ccgcgagccc gtcgtccgac 120840

tgcggggccg tcgtgatgc cccgtccgtg gctgctcggc cgcgccggcg acctggcgga 120900

ggtcgacggc gcgctcgcg cggccgtcgg cggcacggcg agcctgctcg tgttcaccgg 120960

cccgatcggc atcgggcgca ccgcactgct caggagatgc gcgcgccggg gcgccccc 121020

cgggatgcag gtcgcgcgag cggggggcac cgacgaggag ggtggcatcc cgctgggcac 121080

cgcgcgcaa ctgctcgcg cgtgcggcgg tcccggcccg tcgccccct gcggagagcc 121140

cgacggggac gacaccggcg ccctctcgc gcgctcgcc ggtcgcgcg cggtcggacc 121200

ggtgctcctg ctgctgacg acgcggccc cgtgacgcc cggctcgctg gctggctggc 121260

ccgcctgtgc tgccgcggg cctgcctgcg cgtggcggtg gtcctcacgg tgctcgacgg 121320

cgatgccgga cagacggcg gtaccgaca cggcggcgcc accgggggac tcccacgga 121380

gctcgcgcg gtggccgacg cggtcggcc gtcgggtccc ctctcgacg aggcgatctc 121440

ggtgacggcc cgtgcggtac tcgggcggga cgcgacccc gagctcgtgg ccgcgtgtc 121500

cgcggccacg gaggggaacc cgctccacct cacctgcgtg ctggaggagc tcgtgccc 121560

gccgcagtgc accacggagc cgccggcgcg ccgggtggcc ggccgccgc cggcacggct 121620

gcgggaccgg ttgcccacg ccgtgcgacg gctgcccgc accgagcgcc ggtacctgc 121680

tgcggtcgcc gtcgggggg agaaggccga cgacgtgatg ctggcccgc tcgccgagct 121740

ggacgcgacc gatctcgccg tggccggtgc tgtcacccgc agcatggggc tcaccgggcc 121800

cgagggccac cggctgcgcc acggcctcgt cggcgccgcc ctcggagtcg tccagtcctc 121860

gcaccagcgc cgcgatctgc acctgcgtgc cggccgatg ctgcgggacg cgggcgcgcc 121920

gtccgaccgg atcgccgcgc accttctcac ggccggcggg gcggtccgg cctggacggt 121980

cgaggcgctc cgcgacgcgg cggggaccgc ggtgcggcgc ggagagtcgt ggaccgccgt 122040

ccgctatctg cgacacgcc tgctcgccgg accggacgag ccggggcggg ccgccgtgct 122100

gctcgacctg gcgggcctcg agcgtcgcg cgacaccggg ctgccctgc gccggatcgt 122160

ccaggcagtg ccgttgctcg ggtcgtcgc ggaacgggcc gcggcgttgt gccgggtgac 122220

cccgtcgcg ctggaggcg ccgcgccgcc ggtgatcgcg ctgctgcggg ggggtgccga 122280

ggagctgggc cggtagggg gcaccgggga cacagagacc cgcgagtcg ccctccgggt 122340

cgaggcccggt ctgcactacg tcgacaagca caccctgcc ggactgtccg ccgccgcggc 122400

ccggctcgac gaactcgagg cactcccga cgggctaccg atccggacc cgggggagcg 122460

ggagctcgcc tgcgtcctgc tgcactccg cgcgctcggc ggacaccggc cggcgagcgt 122520

ggtggccgcc gcctgccggg cggctctggc ccgtgagccg gcgtcgtcgg accacgtcca 122580

cagcacggtc gggatgctgg tgacctgtct gtgcatggc gacgcggtc aggacctccc 122640

gtcctggctg tcggtcgcgc tcgaacaggc gcgggccgag cgcgctcgg tggtcgagc 122700

ggtgctgcac gccgagtcg ccgcggtcct cgtgtgtcc ggtcgcgtc aggaggccgc 122760

cgagcaggtg cggtcggcgg tcgagctggt cgacgagtc gccgacgact cgctgctgcc 122820

cgggacggtg ctggccccg tgctgaccgc ggtgccgcac gggccccggg cggaccgggt 122880

gttgccccgg tacggcgga cgccgtcgtt cccccggga ttccgggcct gcctgcagat 122940

gttgcgggcc cgggtggccg ccgagggcgg cgacggggag accgcgtgg agtactgcct 123000

cgacggcgcc cgccggttcg accagggcgg atggaccgcc accccgtgc cgtggcgtcc 123060

gtggcggtc gagatcctgg ccgagcgccg ccgcagggcc gagggccggg cactcggca 123120

gcaggagctg gcgcgggcac gccgtgggg ggaccggca cagctgggcc ggccctgcg 123180

gatgctcggg cagctggcg ggaccgaccg gggcgcgaa ctctcgaac aggcgacat 123240

gtcctgcgg acctcgggg accggtcga gcccgagcg gcgaccagg cgtgaccgc 123300

acaccgccc ccaccggac ccggtgacct cccggccgg accggggacc cggcgggacc 123360

gcccgcgcc ctgcacgaca ccgtgggac gccgtaccc ggacaccgc ccacctccg 123420

tgcctcgcc gcctgacc gggtcgagga acgggtcgc acgcgcct cccgggcct 123480

gaccaaccac gagatcgcc ctgacctgc cgtcagcgc cgggcccgtg agaagacct 123540

gaccggcgtc taccgaagc tgggggtgc gggcgcgcc gcgtccgcc agctccgga 123600

gagtgttcc gatcgtatc cctgaccgc cggggagcgg cgcaccgcc cccggggacc 123660

ggctggccgc gatgctgc caccaccgc ccggcgtgt cgagctggc agggccgtc 123720

ccgtgtcga gccggaccc gatgccgca cccgcgccg ggtggccgg ctggacgac 123780

tggcgccgc ccacggcg gagegcctc tggagctgg tgtgctgac ggacaccgt 123840

gcgggcacga tccggccgc accgccgtt tcgagggcc cgtgcgac cgtgccc 123900

gactgcacgc ccgcggcc cgggtgctc acagcgagg tgcaccgct gaccgggtg 123960

ccgaccacca cctggcgcc gggcgcccc ggacggggg cgtggtcgag ctgctgcac 124020

tcggggcgc ccgcgggag cagcgcggt accgcgtac ggcgagacgt ctgttgagc 124080

acacgtgac cgggccggtg ggccgcccgc gccggggccgc actgttggtg gacctcagcg 124140

tcgtcgagcg ggtcgccgcc ccggcgacgg ccgcggcca cctggtcgag gcgctgtccc 124200

tgctgccctg cgcgcgggaa cgggccgagc tgctcgcgcg gacggtcgcc cggtcgccc 124260

ggggcgcggt ggacctgcc ccgctgctgg aggacgtcct gcgtgacctg gccgacgcgg 124320

gcacggggac gagcgggcag gacctgagc tgcgccagcg gctggaggcg ctggtgctgc 124380

acgccgcctg cgaggacccc tcgggtgccg ccgggtctg ggaatgggtc gcgcggaccg 124440

atcccgcgca gctgggggcg ggagccggcg ccgacgtgct gcgcagcgcc cacctgctct 124500

tctccgcgt ggcctgcac accgacgccg cgacggcggc tgcccggacc gccgaggcga 124560

tgcccgcgga cctggaggac gacgcgtacc tgcacccgat gcaggtggcg gcgctcgcc 124620

tgctgtgctg ggccgaggcc accaccgtc tcgacgtgt ccgtcgacgg accctcgacg 124680

ccgccaccg cagcaccgg acggacgtcg agcggttcct gcgcggggtc gacgcgatgc 124740

tgctgttgcg gcgcgggcag gtgcctgcgg cgctcgccgc cgccggggcc tcgctcgacg 124800

tactgaccgg tgcgaccgg ttgatggtgc tccgcgcggc gacactggcc ctggtcgagc 124860

tggggcggac ggccgaggcg gagcggttgc tcgtccggt cgacgaccgg agcagcgccg 124920

accggacctg gcggtggaac tacctgctcg acgcccgtgc cgcggtcctc gcggcgaccg 124980

ggcggacccg cgaggcgctc gcgctgacgc tggagtgcgg acatcgctg atggtgtcg 125040

ggatcgtaa cccggtggtg ctgactggc gacggcgggc cgtcgagctc caccacgagc 125100

tcggtgagca cgaggcgcg acggcgggcg ccgaggagta cgtcacgctc tgccggtgt 125160

gggggcccga ggggtacggc ggtgcggcg tacgggtgct ggggctcgtg caggcgggg 125220

agcggggact cgcgacgtg cattcgggcc gtgccgagct cggcgctcg ccgctggccc 125280

tcgaccgggc acggtgcacg gtggacctgg gcgcgcggat gcgcgcgcac ggcgccgcgcg 125340

gcgaggcgcg tgcctgtctg cggcacgggc tggagctggc agtcgactgc ggcgctccga 125400

tcctggcggc tcgcgccgc accgagctcg cggccgccgg cgggcggcgc ggcgcggcg 125460

gctcgtctc cctgacaccg gccgagctcg gtgtcgccc gctggccca gggggagcga 125520

ccaaccggga catcgccgcg gtgctgggga cgtcacagcg ggcggtcgag ggacacctca 125580

cgcggtctta ccgaaactg gagatcgacg gtgcgcaggg gttggcatcc gcaccgggtc 125640

tcgggtcgg tacctgtcga ccgggtgggc aggtgacgt cgatgctccg acccgggcgg 125700

tcgcgccacg gccgtag 125717

<210> 2
 <211> 224
 <212> PRT
 <213> Pseudonocardia autotrophica

<400> 2

Met Ile Glu His Val Leu Pro Gly Arg Val Val Thr Glu Cys Ala Tyr
 1 5 10 15

Asp Asp Glu Glu His Pro Gly Glu Gly Leu Phe Pro Gln Glu Arg Glu
 20 25 30

Leu Val Ala Arg Ala Val Glu Ser Arg Arg Arg Glu Phe Thr Thr Val
 35 40 45

Arg Arg Leu Ala Arg Arg Ala Leu Gly Arg Leu Gly Arg Ser Pro Ala
 50 55 60

Pro Ile Leu Pro Asn Arg Arg Gly Ala Pro Gln Trp Pro Pro Gly Val

65 70 75 80

Val Gly Ser Met Thr His Cys Thr Gly Tyr Arg Ala Ala Ala Val Ser

85 90 95

Ser Val Ala Glu Ser Ala Ala Val Ser Ile Asp Ala Glu Pro Asp Ala
100 105 110

Pro Leu Pro Ala Gly Val Leu Glu Thr Val Thr Leu Pro Ser Glu Arg
115 120 125

Ala Leu Leu Ala Gly Leu Gly Arg Arg Arg Pro Asp Ile Ala Trp Asp
130 135 140

Arg Met Tyr Phe Ser Ala Lys Glu Ser Val Phe Lys Ala Trp Tyr Pro
145 150 155 160

Leu Thr Gly Arg Glu Leu Asp Phe Asp Glu Ala Glu Ile Ala Phe Asp
165 170 175

Ala Ala Ala Gly Thr Phe Ser Ala Arg Leu Leu Val Pro Gly Pro Val
180 185 190

Val Gly Gly Arg Ser Val Pro Val Phe Pro Gly Arg Trp His Ala Asp
195 200 205

Arg Gly Leu Leu Val Thr Ala Val His Leu Pro Pro Pro Pro Ala Ala
210 215 220

<210>	3
<211>	592
<212>	PRT
<213>	Pseudonocardia autotrophica

<400> 3

Met Gly Leu Leu Arg Pro His Arg Gly Pro Val Ala Leu Ala Val Leu

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

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

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

<210> 4
 <211> 584
 <212> PRT
 <213> *Pseudonocardia autotrophica*

<400> 4

Met Leu Trp Arg Leu Ala Arg Thr Arg Leu Arg Gly Tyr Ala Gly Pro
 1 5 10 15

Ala Gly Ala Leu Val Val Leu Gln Thr Ala Gln Ile Ala Gly Thr Leu
 20 25 30

Leu Leu Pro Thr Leu Gly Ala Ala Leu Ile Asp Glu Gly Val Val Arg
 35 40 45

Ala Asp Pro Gly Arg Ile Ala Glu Leu Gly Val Leu Met Ala Gly Thr
 50 55 60

Ala Val Val Gln Ile Ala Ala Ala Leu Ala Ala Thr Ala Leu Gly Ala
 65 70 75 80

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

Arg Ile Leu Asp Phe Ser Ala Arg Glu Ile Gly Arg Phe Gly Thr Ala
 100 105 110

Ser Leu Leu Thr Arg Thr Val Asn Asp Val Gln Gln Val Gln Asn Leu
 115 120 125

Ala Arg Ser Gly Phe Gly Val Val Val Ser Ala Pro Leu Met Cys Ile
 130 135 140

Gly Ser Ile Val Leu Ala Leu Ala Gln Asp Val Pro Leu Ala Leu Leu

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

Gly Val Asp Leu Val Val Glu Pro Gly Glu Arg Leu Ala Val Leu Gly
355 360 365

Gly Thr Gly Ser Gly Lys Ser Thr Leu Leu Asn Leu Val Leu Arg Leu
370 375 380

Val Asp Pro Thr Ala Gly Thr Val Arg Val Gly Gly Thr Asp Val Arg
385 390 395 400

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

Arg Pro Tyr Leu Phe Ala Gly Thr Val Ala Ser Asn Leu Arg Phe Gly
420 425 430

Arg Thr Asp Ala Thr Asp Asp Glu Leu Trp Glu Ala Leu Arg Val Ala
435 440 445

Gln Ala Asp Gly Phe Val Ala Arg Met Pro Gly Gly Leu Asp Ala Glu
450 455 460

Ile Ala Gln Gly Gly Thr Thr Val Ser Gly Gly Gln Arg Gln Arg Leu
465 470 475 480

Cys Ile Ala Arg Thr Leu Val Arg Arg Pro Glu Ile Tyr Leu Phe Asp
485 490 495

Asp Cys Phe Ser Ala Leu Asp Gln Ala Thr Asp Ala Ala Leu Arg Ala
500 505 510

Ala Leu Ala Pro Trp Thr Ala Gly Ala Thr Val Ile Thr Val Thr Gln
515 520 525

Arg Val Ala Thr Ala Arg Asp Ala Asp Arg Val Val Val Leu Asp Ala
530 535 540

Gly Arg Leu Val Ala Asp Gly Thr His Asp Asp Val Leu Arg Asp Ser
545 550 555 560

Pro Thr Tyr Arg Glu Ile Ala Asn Ser Gln Pro Thr Glu Glu Asp Val
565 570 575

Ala His Gly Leu Ala Gly Arg His
580

<210> 5
<211> 344
<212> PRT
<213> Pseudonocardia autotrophica

<400> 5

Met Ser Lys Arg Ala Leu Ile Thr Gly Ile Thr Gly Gln Asp Gly Ser
1 5 10 15

Tyr Leu Ala Glu His Leu Leu Ser Gln Gly Tyr Gln Val Trp Gly Leu
20 25 30

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

Ser Glu Leu Glu Phe Val Asp Gly Asp Leu Met Asp Gln Ala Ser Leu
50 55 60

Val Ser Ala Val Asp Thr Val Gln Pro Asp Glu Val Tyr Asn Leu Gly
65 70 75 80

Ala Ile Ser Phe Val Pro Met Ser Trp Gln Gln Ala Glu Leu Val Thr
85 90 95

Glu Val Asn Gly Thr Gly Val Leu Arg Val Leu Glu Ala Ile Arg Met
100 105 110

Val Ser Gly Leu Ser Met Ser Arg Thr Ala Ser Pro Asn Gly Gln Ile
115 120 125

Arg Phe Tyr Gln Ala Ser Ser Ser Glu Met Phe Gly Lys Ala Ala Glu
130 135 140

Thr Pro Gln Arg Glu Thr Thr Leu Phe His Pro Arg Ser Pro Tyr Gly
145 150 155 160

Ala Ala Lys Ala Tyr Gly His Tyr Ile Thr Arg Asn Tyr Arg Glu Ser
165 170 175

Phe Gly Met Tyr Ala Val Ser Gly Met Leu Phe Asn His Glu Ser Pro
180 185 190

Arg Arg Gly Gln Glu Phe Val Thr Arg Lys Ile Ser Leu Ala Val Ala
195 200 205

Arg Ile Lys Leu Gly Leu Gln Arg Asp Leu Ala Leu Gly Asn Leu Asp
210 215 220

Ala Val Arg Asp Trp Gly Tyr Ala Gly Asp Tyr Val Arg Ala Met His
225 230 235 240

Leu Met Leu Gln Gln Gly Glu Pro Asp Asp Tyr Val Ile Gly Thr Gly
245 250 255

Gln Met His Ser Val Arg Asp Ala Val Gln Ile Ala Phe Glu His Val
260 265 270

Gly Leu Asp Trp Arg Asp Lys Val Val Ile Asp Pro Ala Leu Val Arg
275 280 285

Pro Ala Glu Val Glu Val Leu Cys Ala Asp Ser Leu Arg Ala Arg Arg
290 295 300

Leu Leu Asp Trp Thr Pro Glu Val Asp Phe Pro Glu Leu Met Arg Met
305 310 315 320

Met Val Asp Ser Asp Leu Glu His Val Ala Arg Glu Asn Glu Tyr Gly
325 330 335

His Leu Leu Leu Ala Ala Asn Trp
340

<210> 6

<211> 9499

<212> PRT

<213> Pseudonocardia autotrophica

<400> 6

Met Asp Asn Glu Gln Lys Leu Arg Asp Tyr Leu Lys Leu Ala Thr Ala
1 5 10 15

Asp Leu Arg Arg Thr Arg Arg Arg Val Ser Glu Leu Glu Ser Ala Ala
20 25 30

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

Val Arg Ser Pro Glu Asp Leu Trp Arg Met Val Glu Ala Gly Glu Asp
50 55 60

Gly Val Thr Pro Phe Pro Thr Asp Arg Gly Trp Asp Thr Ala Ala Phe
65 70 75 80

Ala Gly Ser Pro Thr Arg Ser Gly Gly Phe Leu His Asp Ala Pro Asp
85 90 95

Phe Asp Ala Glu Phe Phe Gly Ile Ser Pro Arg Glu Ala Val Ala Met
100 105 110

Asp Pro Gln Gln Arg Val Val Leu Glu Ser Ala Trp Glu Ala Phe Glu
115 120 125

Arg Ser Gly Ile Asp Pro Val Ser Leu Gln Gly Thr Arg Thr Gly Val
130 135 140

Phe Val Gly Ala Met Ala Gln Asp Tyr Arg Val Gly Pro Ala Asp Gly
145 150 155 160

Ala Glu Gly Phe Gln Leu Thr Gly Asn Thr Gly Ser Val Leu Ser Gly
165 170 175

Arg Ile Ser Tyr Thr Phe Gly Thr Val Gly Pro Ala Val Thr Val Asp
180 185 190

Thr Ala Cys Ser Ser Ser Leu Val Ala Val His Leu Ala Thr Gln Ala
195 200 205

Leu Arg Gly Gly Glu Cys Ser Leu Ala Leu Ala Gly Gly Val Thr Val
210 215 220

Met Ser Gly Pro Gly Thr Phe Ile Glu Met Gly Arg Gln Gly Gly Leu
225 230 235 240

Ser Ala Asp Gly Arg Cys Arg Ser Phe Gly Asp Thr Ala Asp Gly Thr
245 250 255

Gly Trp Ala Glu Gly Val Gly Leu Leu Val Leu Glu Arg Leu Ser Asp
260 265 270

Ala Arg Arg Asn Gly His Glu Val Leu Ala Val Val Arg Gly Ser Ala
275 280 285

Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro
290 295 300

Ser Gln Gln Gln Val Ile Glu Gln Ala Leu Val Asn Ala Arg Leu Ser
305 310 315 320

Ala Gly Asp Val Asp Val Val Glu Ala His Gly Thr Gly Thr Thr Leu
325 330 335

Gly Asp Pro Val Glu Ala Gln Ala Leu Leu Ala Thr Tyr Gly Arg Asp
340 345 350

Arg Asp Val Glu Arg Pro Leu Leu Leu Gly Ser Val Lys Ser Asn Ile
355 360 365

Ser His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val
370 375 380

Met Ala Met Arg His Gly Val Leu Pro Arg Thr Leu Leu Ala Glu Asp
385 390 395 400

Pro Ser Arg His Val Asp Trp Ser Pro Asp Thr Val Arg Ile Leu Thr
405 410 415

Glu Asn Thr Asp Trp Pro Ala Thr Gly Ala Pro Arg Arg Ala Ala Val
420 425 430

Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Thr Ile Ile Glu Gln
435 440 445

Ala Pro Ala Pro Glu Thr Gly Thr Pro Ala Pro Glu Asp Asp Gly Pro
450 455 460

Ala Val Gly Glu Pro Gly Pro Thr Glu Pro Gly Thr Val Pro Val Leu
465 470 475 480

Leu Ser Gly Arg Thr Pro Glu Ala Leu Gln Ala Gln Ala Ala Ala Leu
485 490 495

Gly Glu Ala Leu Ala Ala Ala Pro Asp Thr Pro Leu Thr Asp Val Ala
500 505 510

Trp Ser Leu Ala Thr Thr Arg Thr Ala Phe Ala His Arg Ala Val Leu
515 520 525

Leu Ala Ala Asp Arg Asp Ala Leu Ala Gly Gly Leu Asp Ala Leu Ala
530 535 540

Ala Gly Asp Pro Ala Ala Ala Gly Asp Thr Val Thr Ala Glu Ala Arg
545 550 555 560

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

Ile Gly Ala Gly Arg Glu Leu Ala Ala Arg Phe Pro Val Phe Ala Glu
580 585 590

Ala Leu Asp Thr Val Leu Ser Ala Phe Asp Pro Glu Leu Gln Arg Pro
595 600 605

Leu Arg Glu Ile Leu Arg Arg Thr Thr Asp Gly Thr Thr Pro Asp Glu
610 615 620

Thr Ala Ala Ala Leu Leu Asp Asp Thr Ala Tyr Ala Gln Pro Ala Ile
625 630 635 640

Phe Ala Val Glu Val Ala Leu Tyr Arg Leu Val Thr Ser Leu Gly Val
645 650 655

Thr Pro Gly His Leu Leu Gly His Ser Val Gly Glu Ile Ala Ala Ala
660 665 670

His Val Ala Gly Val Leu Ala Leu Asp Asp Ala Ala Thr Leu Val Ala
675 680 685

Ala Arg Gly Arg Leu Met Ala Ala Leu Pro Thr Gly Gly Ala Met Val
690 695 700

Ala Val Gln Ala Thr Glu Ala Glu Val Glu Ala Leu Leu Asp Gly Tyr
705 710 715 720

Arg Asp Arg Val Ser Val Ala Ala Val Asn Gly Pro Ser Ala Val Val
725 730 735

Leu Ser Gly Ala Asp Glu Ala Val Thr Ala Val Ala Gly Leu Leu Ala
740 745 750

Asp Gln Gly Arg Arg Thr Arg Arg Leu Arg Val Ser His Ala Phe His
755 760 765

Ser Pro Leu Met Glu Pro Met Leu Asp Glu Phe Arg Ala Val Val Glu
770 775 780

Gly Leu Asp Leu Gln Ala Pro Leu Ile Pro Ile Val Ser Asp Val Thr
785 790 795 800

Gly Glu Leu Ala Thr Val Ala Gln Leu Thr Ser Ala Asp Tyr Trp Val
805 810 815

Glu His Val Arg Ser Ala Val Arg Phe Ala Asp Gly Val Asp Trp Leu
820 825 830

Ala Arg His Asp Val Thr Ala Phe Leu Glu Leu Gly Pro Asp Gly Pro
835 840 845

Leu Ser Ala Met Thr Arg Asp Cys Leu Asp Ala Ala Asp Pro Gly Ala
850 855 860

Pro Ala Ser Val Ala Val Pro Ala Leu Arg Ala Gly Arg Pro Glu Glu
865 870 875 880

His Thr Leu Thr Ala Ala Leu Ala Ala Leu His Thr His Gly Thr Ala
885 890 895

Val Asp Trp Ala Pro Trp Phe Ala Gly Thr Gly Ala Arg Arg Thr Asp
900 905 910

Leu Pro Thr Tyr Ala Phe Arg Arg Arg Arg Phe Trp Pro Lys Ala Leu
915 920 925

Gln Thr Gly Ala Ala Asp Leu Arg Ser Ala Gly Leu Gly Ala Ala Arg
930 935 940

His Pro Leu Leu Ser Ala Thr Val Ser Leu Ala Asp Ser Glu Gly Ala
945 950 955 960

Leu Leu Thr Gly Arg Leu Ser Leu Gln Thr His Pro Trp Leu Ala Asp
965 970 975

His Thr Val Arg Gly Thr Thr Leu Leu Pro Gly Thr Ala Phe Leu Glu
980 985 990

Leu Ala Val Arg Ala Gly Asp Glu Val Gly Cys Asp Arg Val Glu Glu
995 1000 1005

Leu Thr Leu Ala Ala Pro Leu Ala Leu Pro Asp Glu Gly Gly Val
1010 1015 1020

Ala Val Gln Leu Trp Val Gly Ala Pro Asp Ala Gly Gly Arg Arg
1025 1030 1035

Thr Leu Thr Val Tyr Ala Arg Pro Asp Thr Asp Ala Asp Ala Glu
1040 1045 1050

His Asp Val Pro Trp Thr Pro His Ala Thr Gly Val Leu Ala Ala
1055 1060 1065

Gly Gly Ala Val Pro Ala Thr Pro Asp Ala Thr Glu Trp Pro Pro
1070 1075 1080

Ala Gly Ala Glu Pro Leu Gly Val Glu Asp Leu Tyr Asp Arg Leu
1085 1090 1095

Ala Gln Ala Gly Phe Gly Tyr Gly Pro Ala Phe Arg Gly Leu Thr
1100 1105 1110

Ala Ala Trp Arg His Asp His Ala Val Leu Ala Glu Ile Val Leu
1115 1120 1125

Pro Glu Ala Gly Arg Thr Asp Val Asp Ala Phe Gly Leu His Pro
1130 1135 1140

Ala Ala Leu Asp Ala Ala Leu His Ala Ala Gly Phe Val Glu Leu
1145 1150 1155

Gly Glu Arg Ser Arg Gly Gly Met Pro Phe Ser Trp Glu Gly Val
1160 1165 1170

Thr Leu His Ala Ser Gly Ala Gly Thr Leu Arg Val Arg Leu Thr
1175 1180 1185

Pro Val Ala Asp Asp Ala Ile Ala Val Ala Val Ala Asp Gly Thr
1190 1195 1200

Gly Ala Pro Val Val Thr Val Asp Ser Leu Val Leu Arg Gly Val
1205 1210 1215

Gly Glu Leu Asp Leu Asp Ser Ala Gly Ala Val Ala Arg Asp Ala
1220 1225 1230

Leu Phe Arg Leu Asp Trp Thr Pro Val Thr Pro Ala Gly Glu Val
1235 1240 1245

Pro Gly Ser Val Val Ile Ala Gly Asp Asp Val Leu Gly Leu Ala
1250 1255 1260

Thr His Pro Gly Leu Gly Ala Ala His Gly Gly Val Ala Gly Pro
1265 1270 1275

Thr Asp Leu Ala Thr Leu Val Thr Ala Asp Gly Pro Ala Pro Asp
1280 1285 1290

Val Val Leu Leu Gly Leu Ala Gly Gly Ala Glu Ala Ala Gln Ala
1295 1300 1305

His Arg Cys Ala Ala Asp Ala Leu Ala Ala Val Arg Thr Trp Leu
1310 1315 1320

Asp His Ala Asp Arg Leu Asp Gly Ser Arg Leu Val Val Val Thr
1325 1330 1335

Arg Gly Ala Thr Thr Gly Asp Asp Val Ala Ala Ala Ala Ala Trp
1340 1345 1350

Gly Leu Leu Arg Ser Ala Arg Ser Glu Asn Pro Gly Arg Phe Ala
1355 1360 1365

Leu Leu Asp Leu Ala Pro Asp Val Asp Pro Ala Asp Leu Pro Leu
1370 1375 1380

Thr Ala Leu Thr Ala Asp Glu Pro Glu Leu Leu Leu Thr Arg Asp
1385 1390 1395

Gly Leu Arg Ala Ala Arg Leu Val Arg Arg Pro Ala Pro Arg Glu
1400 1405 1410

Ala Gly Ala Thr Pro Ser Phe Gly Asp Gly Ala Val Leu Val Thr

1415

1420

1425

Gly Gly Thr Gly Gly Leu Gly Ala Val Val Ala Arg His Leu Ala
1430 1435 1440

Thr Thr His Gly Val Thr Asp Leu Leu Leu Val Gly Arg Arg Gly
1445 1450 1455

Pro Ala Ala Asp Gly Ala Ala Glu Leu Val Ser Asp Leu Thr Ala
1460 1465 1470

Ala Gly Ala Arg Ala Gln Val Val Ala Cys Asp Val Ser Asp Pro
1475 1480 1485

Ala Ala Val Thr Glu Leu Leu Gly Ala His Arg Val Thr Ser Val
1490 1495 1500

Val His Ala Ala Gly Val Leu Asp Asp Ala Thr Val Gly Ser Leu
1505 1510 1515

Thr Pro Gln Arg Leu Ala Ala Val Leu Arg Pro Lys Val Asp Ala
1520 1525 1530

Ala Trp Asn Leu His Thr Ala Ala Ala Ala Leu Gly Leu Asp Leu
1535 1540 1545

Asp Ala Phe Val Leu Phe Ser Ser Val Ala Gly Val Phe Gly Ser
1550 1555 1560

Pro Gly Gln Ala Asn Tyr Ala Ala Gly Asn Ala Ala Leu Asp Ala
1565 1570 1575

Leu Ala Ala His Arg Arg Ala Ala Gly Leu Ala Gly Leu Ser Leu
1580 1585 1590

Ala Trp Gly Pro Trp Glu Arg Thr Gly Gly Met Thr Gly Gly Val
1595 1600 1605

Ser Asp Glu Asp Met Ala Arg Met Ala Arg Ala Gly Thr Pro Ala
1610 1615 1620

Leu Thr Val Glu Gln Gly Leu Thr Leu Phe Asp Ala Ala Leu Gly
1625 1630 1635

Ala Pro Glu Pro Ala Leu Val Pro Val Arg Leu Asp Leu Pro Ala
1640 1645 1650

Leu Arg Ala Gly Gly Glu Val Pro Pro Leu Leu Arg Ser Leu Ile
1655 1660 1665

Arg Thr Arg Ala Arg Arg Thr Ala Ala Thr Gly Ser Ala Thr Ala
1670 1675 1680

Asn Gly Leu Ala Gln Arg Leu Ala Arg Leu Asp Ala Glu Gly Arg
1685 1690 1695

Glu Glu Met Val Leu Asp Leu Val Arg Gly Gln Val Ala Leu Val
1700 1705 1710

Leu Gly His Ala Gly Ala Ala Asp Val Asp Ala Gly Arg Ala Phe
1715 1720 1725

Arg Asp Leu Gly Phe Asp Ser Leu Thr Ala Val Glu Leu Arg Asn
1730 1735 1740

Arg Leu Gly Thr Val Thr Gly Leu Arg Leu Pro Ala Thr Leu Val
1745 1750 1755

Phe Asp His Pro Thr Val Arg His Leu Ala Ala His Val Thr Asp
1760 1765 1770

Glu Leu Leu Gly Ala Glu Thr Glu Ala Val Pro Ala Ala Arg Val
1775 1780 1785

Ala Val Asp Val Glu Asp Pro Ile Val Ile Val Gly Met Ala Cys
1790 1795 1800

Arg Tyr Pro Gly Gly Val Ser Thr Pro Asp Glu Leu Trp Arg Leu
1805 1810 1815

Val Thr Glu Gly Thr Asp Ala Ile Ser Gly Phe Pro Thr Asn Arg
1820 1825 1830

Asn Trp Asp Leu Glu Ala Leu His His Pro Asp Pro Asp His Pro
1835 1840 1845

Gly Thr Thr Tyr Thr Arg Ser Gly Gly Phe Leu His Glu Ala Gly
1850 1855 1860

Glu Phe Asp Pro Ala Phe Phe Gly Met Ser Pro Arg Glu Ala Leu
1865 1870 1875

Ala Thr Asp Ser Gln Gln Arg Gln Leu Leu Glu Thr Ser Trp Glu
1880 1885 1890

Ala Val Glu Arg Ala Gly Ile Asp Pro Ser Thr Leu Arg Gly Thr
1895 1900 1905

Ala Thr Gly Val Phe Ala Gly Val Met Tyr Ser Asp Tyr Asn Ala
1910 1915 1920

Val Leu Ala Gly Gly Pro Glu Phe Glu Gly Phe Gln Gly Val Gly
1925 1930 1935

Ser Ser Pro Ser Leu Ala Ser Gly Arg Val Ala Tyr Thr Leu Gly

1940	1945	1950
Leu Glu Gly Pro Ala Val Thr	Val Asp Thr Ala Cys	Ser Ser Ser
1955	1960	1965
Leu Val Ala Met His Trp Ala	Met Gln Ala Leu Arg	Thr Gly Glu
1970	1975	1980
Cys Ser Leu Ala Leu Ala Gly	Gly Val Thr Val Met	Ser Thr Pro
1985	1990	1995
Ala Ala Phe Val Asp Phe Ala	Arg Gln Arg Gly Leu	Ser Pro Asp
2000	2005	2010
Gly Arg Cys Lys Ala Phe Ser	Asp Asp Ala Asp Gly	Val Gly Trp
2015	2020	2025
Ser Glu Gly Val Gly Met Leu	Val Leu Glu Arg Gln	Ser Asp Ala
2030	2035	2040
Leu Arg His Gly His Asp Ile	Leu Ala Val Val Arg	Gly Ser Ala
2045	2050	2055
Val Asn Ser Asp Gly Ala Ser	Asn Gly Ile Thr Ala	Pro Asn Gly
2060	2065	2070
Pro Ser Gln Gln Arg Val Ile	Arg Gln Ala Leu Ala	Ser Ala Gly
2075	2080	2085
Leu Ser Thr Asp Asp Val Asp	Val Val Glu Ala His	Gly Thr Gly
2090	2095	2100
Thr Ser Leu Gly Asp Pro Ile	Glu Ala Gln Ala Leu	Leu Ala Thr
2105	2110	2115

Tyr Gly Arg Asp Arg Asp Thr Asp Arg Pro Leu His Leu Gly Ser
2120 2125 2130

Leu Lys Ser Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala
2135 2140 2145

Gly Val Ile Lys Met Val Leu Ala Met Arg His Gly Val Leu Pro
2150 2155 2160

Arg Thr Leu His Ala Asp Thr Arg Ser Ser His Val Asp Trp Thr
2165 2170 2175

Glu Gly Ala Val Glu Leu Leu Thr Glu Gln Thr Ala Trp Pro Glu
2180 2185 2190

Thr Gly Arg Pro Arg Arg Ala Ala Val Ser Ser Phe Gly Ile Ser
2195 2200 2205

Gly Thr Asn Val His Thr Val Leu Glu Gln Gly Pro Asp Ser Ala
2210 2215 2220

Pro Ala Pro Asp Pro Gly Pro Gly Ala Thr Pro Ala Val Val Pro
2225 2230 2235

Leu Leu Leu Ser Gly Arg Gly Arg Pro Ala Leu Arg Ala Gln Ala
2240 2245 2250

Gly Arg Leu Leu Asp His Leu Arg Asp His Pro Gly Val Arg Thr
2255 2260 2265

Ala Asp Leu Ala His Ser Leu Ala Thr Thr Arg Thr Arg Phe Asp
2270 2275 2280

Gln Arg Ala Ala Val Leu Ala Gly Asp Arg Glu Asp Leu Leu Ala
2285 2290 2295

Ala Leu Gly Ala Leu Ala Ala Gly Arg Pro Asp Pro Arg Val Val
2300 2305 2310

Glu Gly Glu Ala Ala Gly Arg Ala Arg Thr Ala Val Leu Phe Thr
2315 2320 2325

Gly Gln Gly Ser Gln Arg Ala Ala Met Gly Arg Glu Leu Tyr Ala
2330 2335 2340

Ala Gln Pro Val Phe Ala Ala Ala Phe Asp Glu Val Cys Ala Ala
2345 2350 2355

Leu Asp Pro Leu Leu Glu Arg Pro Leu Ala Glu Val Val Phe Ala
2360 2365 2370

Glu Gly Gly Thr Ala Glu Ala Ala Leu Leu Asp Glu Thr Gly Trp
2375 2380 2385

Thr Gln Pro Ala Leu Phe Ala Val Glu Val Ala Leu Tyr Arg Leu
2390 2395 2400

Val Glu Ser Trp Gly Val Arg Ala Asp Leu Val Ala Gly His Ser
2405 2410 2415

Ile Gly Glu Ile Thr Ala Ala Tyr Val Ala Gly Val Phe Thr Leu
2420 2425 2430

Ala Asp Ala Ala Arg Leu Val Ala Ala Arg Ala Arg Leu Met Gln
2435 2440 2445

Ala Leu Pro Thr Gly Gly Ala Met Val Ala Ile Ala Ala Gly Glu
2450 2455 2460

Asp Glu Val Thr Pro Leu Leu Asp Glu Arg Val Ser Ile Ala Ala

2465

2470

2475

Val Asn Ala Pro Gly Ser Val Val Val Ser Gly Asp Ala Asp Ala
2480 2485 2490

Thr Ala Ala Leu Ala Ala Thr Phe Ala Glu Gln Gly Arg Arg Thr
2495 2500 2505

Arg Thr Leu Arg Val Ser His Ala Phe His Ser Pro His Met Asp
2510 2515 2520

Gly Met Leu Glu Asp Phe Arg Ala Val Ala Glu Arg Ile Glu Tyr
2525 2530 2535

His Ala Pro Arg Ile Pro Val Val Ser Asn Leu Thr Gly Ala Arg
2540 2545 2550

Ala Ala Asp Thr Glu Leu Cys Glu Pro Gly Tyr Trp Val Arg His
2555 2560 2565

Val Arg Glu Ala Val Arg Phe Ala Asp Cys Val Thr Thr Leu His
2570 2575 2580

Asp Gln Gly Ala Thr Val Leu Leu Glu Leu Gly Pro Asp Ala Pro
2585 2590 2595

Leu Thr Ala Met Ala Arg Glu Thr Leu Gly Asp Gly Ala Asp Thr
2600 2605 2610

Ala Leu Val Pro Phe Leu Arg Ala Asp Arg Gly Glu Glu Leu Ala
2615 2620 2625

Ala Ala Thr Ala Ala Ala Arg Leu Gln Val His Gly Leu Asp Leu
2630 2635 2640

Asp Pro Ala Ala Leu Leu His Gly Thr Gly Ala Arg Arg Thr Ala
2645 2650 2655

Leu Pro Thr Tyr Ala Phe Gln His Glu Phe Tyr Trp Pro Gln Leu
2660 2665 2670

Pro Ala Ala Ala Ala Ser Ala Gly Glu Asp Thr Asp Pro Ala Asp
2675 2680 2685

Arg Gln Leu Trp Ala Ala Val Glu Arg Gly Asp Ala Ala Glu Leu
2690 2695 2700

Ala Gly Ile Leu Gly Leu Asp Ala Asp Asp Val Ala Thr Pro Leu
2705 2710 2715

Leu Pro Ala Leu Thr Thr Trp Arg Arg Gly Asn Arg Glu Lys Ala
2720 2725 2730

Arg Leu Asp Thr Leu Arg Tyr Arg Val Glu Trp Thr Arg Leu Arg
2735 2740 2745

Arg Pro Ala Ala Pro Val Leu Asp Gly Thr Trp Leu Leu Val Ala
2750 2755 2760

Thr Gly Ala Thr Thr Asp Ala Glu Thr Thr Leu Leu Asp Gly Leu
2765 2770 2775

Ala Asp Thr Leu Gly Ala His Gly Ala Arg Val Arg Arg Leu Val
2780 2785 2790

Leu Asp Asp Asp Cys Pro Ala Asp Arg Ala Ala Val Ala Ala Arg
2795 2800 2805

Leu Ala Ala Gly Thr Ala Asp Gly Asp Pro Ala His Val Leu Ser
2810 2815 2820

Leu Leu Pro Leu Asp Glu Arg Pro Ala Ala Gly Ala Ala Pro Leu
2825 2830 2835

Thr Arg Gly Leu Ala Leu Thr Val Ala Leu Val Gln Ala Leu Ala
2840 2845 2850

Asp Ala Asp Ala Gly Asp Ser Thr Gly Thr Thr Ala Arg Leu Trp
2855 2860 2865

Thr Ala Thr Arg Gly Ala Val Ser Thr Gly Pro Ala Asp Pro Val
2870 2875 2880

Thr His Pro Val Gln Ala Thr Ala Trp Gly Leu Gly Arg Ser Val
2885 2890 2895

Ala Leu Glu His Pro Arg Leu Trp Gly Gly Leu Val Asp Leu Pro
2900 2905 2910

Ala Glu Leu Asp Pro Arg Ser Ala Gln Arg Leu Ala Gly Val Leu
2915 2920 2925

Ala Asp Lys Asp Thr Pro Asp Gly Glu Asp Gln Val Ala Leu Arg
2930 2935 2940

Ala Ala Gly Val Ser Gly Arg Arg Leu Val Arg His Thr Val Asp
2945 2950 2955

Ala Leu Pro Pro Ala Thr Ala Phe Thr Ala Thr Gly Ser Val Leu
2960 2965 2970

Val Thr Gly Gly Thr Gly Gly Leu Gly Ala Glu Val Ala Arg Trp
2975 2980 2985

Leu Ala Arg Ser Gly Val Ala His Leu Val Leu Thr Ser Arg Arg

2990				2995				3000						
Gly	Pro	Asp	Ala	Pro	Gly	Ala	Ala	Glu	Leu	Arg	Asp	Glu	Leu	Thr
3005				3010				3015						
Ala	Leu	Gly	Ala	Ser	Val	Ala	Ile	Glu	Ala	Cys	Asp	Val	Thr	Asp
3020				3025				3030						
Arg	Asp	Ala	Leu	Ala	Ala	Val	Leu	Asp	Ala	Val	Pro	Ala	Asp	Ala
3035				3040				3045						
Pro	Leu	Thr	Gly	Val	Val	His	Thr	Ala	Gly	Val	Gly	His	Tyr	Asp
3050				3055				3060						
Ala	Leu	Asp	Thr	Leu	Asp	Val	Glu	Gly	Val	Ala	Ala	Arg	Thr	Ala
3065				3070				3075						
Ala	Lys	Ile	Ala	Gly	Ala	Ala	His	Leu	Asp	Asp	Leu	Leu	Ala	Asp
3080				3085				3090						
Arg	Glu	Leu	Asp	Leu	Phe	Val	Leu	Phe	Gly	Ser	Val	Ala	Gly	Val
3095				3100				3105						
Trp	Gly	Ser	Gly	Gly	Gln	Ser	Ala	Tyr	Gly	Ala	Ala	Asn	Ala	Tyr
3110				3115				3120						
Leu	Asp	Ala	Leu	Ala	Ala	His	Arg	Arg	Ala	Arg	Gly	Ala	Thr	Ala
3125				3130				3135						
Thr	Ser	Ile	Ala	Trp	Gly	Pro	Trp	Ala	Gly	Ser	Gly	Met	Ala	Thr
3140				3145				3150						
Glu	Glu	Ser	Val	Ala	Thr	Thr	Leu	Gln	Arg	Gln	Gly	Leu	Gly	Leu
3155				3160				3165						

Leu Asp Pro Gly Pro Ala Met Thr Glu Leu Arg Arg Ala Val Val
3170 3175 3180

Asp Ala Asp Thr Gln Val Thr Val Ala Asp Val Asp Trp Asp Arg
3185 3190 3195

Tyr Ala Pro Leu Phe Thr Ser Ala Arg Pro Ser Ala Leu Ile Ala
3200 3205 3210

Gly Leu Ala Asp Leu Ala Glu Pro Glu Ser Gly Val Ala Ala Thr
3215 3220 3225

Glu Ile Val Thr Arg Val Arg Ala Leu Asp Glu Pro Ala Gly Met
3230 3235 3240

Arg Leu Leu Thr Glu Leu Val Arg Gly Ala Ala Ala Ala Val Leu
3245 3250 3255

Gly His Gly Ser Ala Glu Ser Val Ala Gly Ser Arg Ala Phe Arg
3260 3265 3270

Asp Leu Gly Phe Asp Ser Leu Thr Gly Val Glu Leu Arg Ser Arg
3275 3280 3285

Leu Ala Ala Ala Thr Gly Leu Thr Leu Pro Ser Thr Leu Val Phe
3290 3295 3300

Asp His Pro Ser Pro Leu Glu Leu Ala Arg His Leu Arg Ala Glu
3305 3310 3315

Ile Leu Gly Thr Ala Ala Glu Gly Thr Gly Pro Val Ala Val Gly
3320 3325 3330

Ala Ala Asp Ala Glu Pro Ile Ala Ile Ile Gly Met Ala Cys Arg
3335 3340 3345

Phe Pro Gly Gly Val Ser Ser Pro Glu Ala Leu Trp Asp Leu Val
3350 3355 3360

Thr Ser Gly Thr Asp Ala Ile Ser Asp Phe Pro Val Asn Arg Gly
3365 3370 3375

Trp Asp Thr Ala Ala Leu Phe Asp Arg Asp Pro Asp Arg Pro Gly
3380 3385 3390

Thr Thr Tyr Ser Thr Gln Gly Gly Phe Leu His Thr Ala Asp Glu
3395 3400 3405

Phe Asp Pro Ser Phe Phe Gly Ile Ser Pro Arg Glu Ala Leu Val
3410 3415 3420

Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Thr Thr Trp Glu Ser
3425 3430 3435

Phe Glu Arg Ala Gly Ile Arg Pro Asp Thr Val Arg Gly Ser Leu
3440 3445 3450

Thr Gly Thr Phe Ile Gly Ser Ser Tyr Gln Glu Tyr Gly Leu Gly
3455 3460 3465

Ala Gly Asp Gly Ala Glu Gly His Leu Val Thr Gly Thr Ser Pro
3470 3475 3480

Ser Val Leu Ser Gly Arg Leu Ser Tyr Val Phe Gly Leu Glu Gly
3485 3490 3495

Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala
3500 3505 3510

Leu His Leu Ala Cys Gln Ser Leu Arg Asn Gly Glu Ser Thr Leu

3515	3520										3525				
Gly	Val	Ala	Gly	Gly	Ala	Thr	Val	Met	Thr	Thr	Pro	Asn	Pro	Phe	
3530						3535						3540			
Ile	Ala	Phe	Ser	Arg	Gln	Arg	Ala	Leu	Ala	Arg	Asp	Gly	Arg	Cys	
3545						3550						3555			
Lys	Ala	Phe	Ser	Asp	Asp	Ala	Asp	Gly	Met	Thr	Leu	Ala	Glu	Gly	
3560						3565						3570			
Val	Gly	Ile	Val	Leu	Val	Glu	Arg	Leu	Ser	Asp	Ala	Glu	Arg	His	
3575						3580						3585			
Gly	His	Pro	Val	Leu	Ala	Val	Ile	Arg	Gly	Ser	Ala	Ile	Asn	Gln	
3590						3595						3600			
Asp	Gly	Ala	Ser	Asn	Gly	Leu	Thr	Ala	Pro	Asn	Gly	Pro	Ser	Gln	
3605						3610						3615			
Gln	Arg	Val	Ile	Arg	Gln	Ala	Leu	Ala	Asn	Ala	Gly	Leu	Glu	Pro	
3620						3625						3630			
Gly	Asp	Val	Asp	Ala	Val	Glu	Ala	His	Gly	Thr	Gly	Thr	Pro	Leu	
3635						3640						3645			
Gly	Asp	Pro	Ile	Glu	Ala	Gln	Ala	Leu	Gln	Thr	Thr	Tyr	Gly	Arg	
3650						3655						3660			
Asp	Arg	Asp	Ala	Ala	Arg	Ala	Leu	Leu	Leu	Gly	Ser	Val	Lys	Ser	
3665						3670						3675			
Asn	Ile	Gly	His	Thr	Gln	Ser	Ala	Ala	Gly	Val	Ala	Ser	Val	Ile	
3680						3685						3690			

Lys Thr Val Met Ala Leu Arg His Gly Val Leu Pro Arg Thr Leu
3695 3700 3705

His Ala Asp Glu Pro Ser Ser His Val Asp Trp Ser Ala Gly Ser
3710 3715 3720

Val Glu Leu Leu Ala Glu Gln Thr Ala Trp Pro Glu Thr Gly Arg
3725 3730 3735

Pro Arg Arg Ala Ala Val Ser Ser Phe Gly Ile Ser Gly Thr Asn
3740 3745 3750

Ala His Thr Val Leu Glu Gln Ala Pro Glu Ala Ala Pro Val Ala
3755 3760 3765

Pro Ala Thr Pro Ser Gly Pro Val Leu Pro Ser Ala Pro Glu Pro
3770 3775 3780

Val Leu Pro Trp Val Leu Gly Ala Arg Gly Ala Ala Ala Leu Arg
3785 3790 3795

Gly Gln Ala Asp Arg Leu Leu Ala His Leu Glu Thr Thr Asp Ala
3800 3805 3810

Arg Pro Ala Asp Ile Gly Phe Ser Leu Val Ser Ala Arg Met Pro
3815 3820 3825

Phe Glu His Arg Ala Val Val Val Ala Thr Asp Pro Ala Asp Arg
3830 3835 3840

Ala Ala Gly Leu Arg Ala Val Ala Ala Asp Gly Pro Ser Gly Val
3845 3850 3855

Val Ala Arg Gly Val Ala Asp Val Glu Gly Arg Thr Val Phe Val
3860 3865 3870

Phe Pro Gly Gln Gly Ser Gln Trp Leu Gly Met Gly Ala Arg Leu
3875 3880 3885

Leu Glu Glu Ser Pro Val Phe Ala Asp Arg Val Ala Glu Cys Ala
3890 3895 3900

Glu Ala Leu Ala Glu Phe Thr Asp Trp Ser Leu Asp Asp Val Leu
3905 3910 3915

Arg Gly Ala Glu Gly Ala Pro Pro Val Glu Arg Val Asp Val Val
3920 3925 3930

Gln Pro Ala Thr Phe Ala Val Met Val Gly Leu Ala Ala Leu Trp
3935 3940 3945

Arg Ala His Gly Val Glu Pro Asp Ala Val Val Gly His Ser Gln
3950 3955 3960

Gly Glu Ile Ala Ala Ala Val Val Ser Gly Ala Leu Ser Leu Arg
3965 3970 3975

Asp Gly Ala Arg Val Val Ala Leu Arg Ser Arg Ala Ile Ala Arg
3980 3985 3990

Ser Leu Ala Gly Arg Gly Gly Met Met Ser Val Ala Leu Pro Val
3995 4000 4005

Ala Asp Ala Glu Gly His Leu Ala Gly Tyr Glu Gly Arg Val Ser
4010 4015 4020

Val Ala Ala Val Asn Gly Pro Arg Ser Ala Val Leu Ala Gly Glu
4025 4030 4035

Pro Asp Ala Leu Asp Glu Leu Leu Ala Ala Phe Asp Ala Ala Asp

4040	4045	4050
Val Arg Ala Arg Arg Ile Ala	Val Asp Tyr Ala Ser	His Ser His
4055	4060	4065
Gln Val Glu Asp Leu Arg Asp	Glu Leu Ala Thr Thr	Leu Ala Gly
4070	4075	4080
Leu Ala Pro Gln Pro Ser Gln	Val Pro Val Phe Ser	Thr Val Thr
4085	4090	4095
Gly Asp Trp Leu Asp Thr Thr	Thr Met Asp Ala Ser	Tyr Trp Tyr
4100	4105	4110
Glu Asn Leu Arg Asn Arg Val	Arg Phe Ala Asp Ala	Val Glu Ala
4115	4120	4125
Leu Gln Ala Ala Glu Tyr Arg	Thr Phe Val Glu Thr	Ser Pro His
4130	4135	4140
Pro Val Leu Ser Met Ser Val	Gln Asp Val Leu Asp	Asp Ala Gly
4145	4150	4155
Val Ala Gly Val Ala Gly Gly	Thr Leu Arg Arg Asp	Gln Gly Gly
4160	4165	4170
Tyr Asp Arg Phe Val Leu Ser	Ala Ala Glu Leu Tyr	Val Arg Gly
4175	4180	4185
Ala Ala Val Asp Trp Thr Arg	Val Phe Asp Gly Thr	Gly Ala Ser
4190	4195	4200
Arg Thr Asp Leu Pro Thr Tyr	Ala Phe Ala His Asp	Gln Leu Trp
4205	4210	4215

Val Leu Pro Pro Ala Val Thr Ala Ala Ala Asp Pro Gln Asp Glu
4220 4225 4230

Ala Phe Trp Ala Ala Val Glu Asp Gly Asp Val Ala Ala Leu Thr
4235 4240 4245

Ser Thr Leu Asp Thr Asp Pro Asp Ala Val Ala Ala Val Leu Pro
4250 4255 4260

Ala Leu Val Ser Trp Arg Arg Gly Arg Arg Asp Arg Ser Thr Leu
4265 4270 4275

Asp Ser Trp Arg Tyr Arg Val Ser Trp Lys Pro Ala Gly Ser Leu
4280 4285 4290

Pro Gln Arg Ser Leu Ala Gly Thr Trp Leu Val Val Ser Ala Glu
4295 4300 4305

Gly Thr Asp Asp Thr Glu Val Ala Gly Ala Leu Ala Ala His Gly
4310 4315 4320

Ala Asp Val Arg Arg Val Val Leu Asp Glu Thr Cys Thr Asp Arg
4325 4330 4335

Ala Val Leu Ala Gly Arg Leu Ala Ala Ala Thr Gly Asp Asp Ser
4340 4345 4350

Ala Ala Asp Pro Ala Ala Val Ser Gly Ile Val Ser Val Leu Ala
4355 4360 4365

Glu Ala Asp Thr Thr Thr Val Pro Arg Thr Gly Leu Val Thr Gly
4370 4375 4380

Val Ala Leu Thr Val Ala Leu Ile Gln Ala Leu Gly Asp Ser Gly
4385 4390 4395

Ile Asp Ala Pro Met Trp Ala Leu Ser Arg Gly Ala Val Ala Thr
4400 4405 4410

Gly Arg Ala Asp Glu Val Ile Ala Pro Val Gln Ala Gln Val Leu
4415 4420 4425

Gly Ile Gly Trp Thr Ala Ala Leu Glu His Pro Gln Arg Trp Gly
4430 4435 4440

Gly Thr Ile Asp Leu Pro Val Ala Leu Asp Glu Arg Gly Ala Ala
4445 4450 4455

Arg Leu Val Ala Val Leu Ala Gly Glu Leu Gly Ala Glu Asp Gln
4460 4465 4470

Leu Ala Leu Arg Pro Thr Gly Val Phe Thr Arg Arg Ile Val Arg
4475 4480 4485

Ala Glu Pro Ala Gly Ala Arg Pro Ala Arg Thr Trp Asp Pro Arg
4490 4495 4500

Gly Thr Thr Leu Val Thr Gly Gly Ser Gly Thr Leu Ala Pro His
4505 4510 4515

Leu Ala Arg Arg Leu Ala Glu Arg Gly Ala Glu His Val Val Leu
4520 4525 4530

Leu Ser Arg Arg Gly Pro Asp Ala Pro Gly Ala Ala Glu Leu Leu
4535 4540 4545

Ala Glu Phe Asp Gly Ser Asp Thr Thr Val Glu Ala Val Ala Cys
4550 4555 4560

Asp Ile Thr Asp Arg Ala Ala Val Ala Gly Leu Leu Glu Arg Leu

4565

4570

4575

Asp Ala His Gly Ala Thr Val Arg Thr Val Leu His Thr Ala Ala
4580 4585 4590

Thr Ile Glu Leu Ala Thr Leu Asp Ala Thr Thr Gln Glu Glu Leu
4595 4600 4605

Ala Arg Val Leu His Ala Lys Val Thr Gly Ala Gln Val Leu Thr
4610 4615 4620

Glu Leu Leu Asp Glu Arg Gly Gly Asp Pro Ala Glu Val Val Leu
4625 4630 4635

Phe Ser Ser Thr Ala Gly Met Trp Gly Ser Gly Ala His Ala Ala
4640 4645 4650

Tyr Val Ala Gly Asn Ala His Leu Ala Ala Leu Ala Glu His Arg
4655 4660 4665

Arg Ala Arg Gly Leu Pro Thr Thr Ser Ile Ala Trp Gly Ile Trp
4670 4675 4680

Ala Asp Asp Leu Lys Leu Gly Arg Val Asp Pro Ala Ala Ile Arg
4685 4690 4695

Gly Ser Gly Leu Val Phe Met Asp Pro Gln Leu Ala Leu Asn Gly
4700 4705 4710

Leu Glu Arg Ala Leu Asp Asp Ala Glu Thr Val Val Ala Val Ala
4715 4720 4725

Asp Val Asp Trp Asp Thr Tyr His Pro Val Tyr Thr Ser Gly Arg
4730 4735 4740

Pro Thr Arg Leu Tyr Asp Glu Ile Pro Glu Val Val Ala Leu Thr
4745 4750 4755

Ala Ala Ala Glu Arg Thr Ala Gly Thr Val Ala Ala Gly Glu Phe
4760 4765 4770

Ala Ala Thr Leu Asp Gly Leu Thr Asp Ala Glu Ala Leu Arg Arg
4775 4780 4785

Val Leu Asp Val Val Arg Ala Glu Ala Ala Gly Val Leu Gly Met
4790 4795 4800

Ala Ser Ala Asp Asp Leu Thr Asp Gln Arg Ala Phe Arg Asp Val
4805 4810 4815

Gly Phe Asp Ser Leu Thr Ala Val Ala Leu Arg Asn Arg Leu Ala
4820 4825 4830

Ser Val Thr Gly Leu Thr Leu Pro Ser Thr Met Val Phe Asp His
4835 4840 4845

Pro Thr Pro Ala Ala Leu Ala Glu Phe Leu Arg Ala Glu Leu Ala
4850 4855 4860

Gly Ala Thr Pro Val Ala Ala Gly Ala Gly Ser Thr Ala Ala Ala
4865 4870 4875

Gln Asp Gln Asp Asp Pro Ile Val Val Val Gly Met Ser Cys Arg
4880 4885 4890

Tyr Pro Gly Gly Val Ala Ser Ala Glu Asp Leu Trp Arg Val Ala
4895 4900 4905

Leu Asp Glu Val Asp Ala Ile Ser Gly Phe Pro Asp Asp Arg Gly
4910 4915 4920

Trp Asp Ala Ala Ser Leu Tyr Asp Pro Asp Pro Asp Arg Ala Gly
4925 4930 4935

His Thr Tyr Ser Thr Gln Gly Gly Phe Leu Arg Asp Val Ala Asp
4940 4945 4950

Phe Asp Pro Gly Phe Phe Gly Ile Ser Pro Arg Glu Ala Leu Ser
4955 4960 4965

Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Thr Thr Trp Glu Thr
4970 4975 4980

Phe Glu His Ala Gly Ile Asp Pro Thr Ala Gln Arg Gly Ser Arg
4985 4990 4995

Thr Gly Thr Phe Ile Gly Ala Ser Tyr Gln Asp Tyr Ala Ser Gly
5000 5005 5010

Ala Pro Ala Ala Glu Gly Ala Glu Gly His Met Ile Thr Gly Thr
5015 5020 5025

Leu Pro Ser Val Leu Ser Gly Arg Val Asn Tyr Leu Phe Gly Phe
5030 5035 5040

Glu Gly Pro Ala Val Thr Leu Asp Thr Ala Cys Ser Ser Ser Leu
5045 5050 5055

Val Ala Met His Leu Ala Cys Gln Ser Leu Arg Thr Gly Glu Ser
5060 5065 5070

Thr Leu Ala Leu Ala Gly Gly Val Ser Ile Met Ser Thr Pro Met
5075 5080 5085

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

5090

5095

5100

Arg Cys Lys Ala Tyr Ala Asp Gly Ala Asp Gly Met Thr Leu Ala
5105 5110 5115

Glu Gly Val Gly Leu Val Leu Leu Glu Arg Leu Ser Asp Ala Val
5120 5125 5130

Arg Asn Gly His Glu Val Leu Ala Val Val Arg Gly Ser Ala Val
5135 5140 5145

Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro
5150 5155 5160

Ser Gln Gln Arg Val Ile Arg Gln Ala Leu Ala Gly Ala Gly Val
5165 5170 5175

Ala Pro Glu Glu Ile Asp Val Leu Glu Gly His Gly Thr Gly Thr
5180 5185 5190

Ala Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu Phe Ala Thr Tyr
5195 5200 5205

Gly Arg Asp Arg Asp Thr Asp Arg Pro Leu Leu Leu Gly Ser Val
5210 5215 5220

Lys Ser Asn Ile Gly His Thr Gln Met Ala Ser Gly Val Ala Ser
5225 5230 5235

Val Ile Lys Leu Val Arg Ala Leu Gln Glu Gly Val Val Pro Ser
5240 5245 5250

Ser Leu His Ile Asp Gln Pro Ser Thr His Val Asp Trp Ser Ser
5255 5260 5265

Gly Ala Ile Asp Leu Leu Thr Glu Arg Thr Ala Trp Pro Glu Thr
5270 5275 5280

Gly Arg Pro Arg Arg Ala Ala Val Ser Ser Phe Gly Ile Ser Gly
5285 5290 5295

Thr Asn Val His Thr Ile Leu Glu Gln Ala Pro Ala Val Pro Ala
5300 5305 5310

Ala Ala Pro Ala Val Pro Leu Pro Asp Asp Val Val Ala Pro Val
5315 5320 5325

Leu Val Ser Gly Arg Gly Glu Thr Ala Leu Arg Asp Gln Ala Gly
5330 5335 5340

Arg Leu Leu Asp Leu Leu Asp Glu Arg Pro Gln Leu Arg Pro Ala
5345 5350 5355

Glu Leu Ala His Ala Leu Gly Thr Thr Arg Ala Ala Leu Glu Gln
5360 5365 5370

Arg Gly Ala Val Val Ala Gly Asp Arg Asp Glu Leu Val Arg Gly
5375 5380 5385

Leu Thr Ala Leu Arg Asp Gly Gly Thr Ala Pro Gly Thr Val Arg
5390 5395 5400

Gly Thr Ala Gly Arg Gly Arg Thr Ala Phe Leu Phe Thr Gly Gln
5405 5410 5415

Gly Ser Gln Arg Ala Gly Ala Gly Ala Glu Leu Tyr Ala Arg Tyr
5420 5425 5430

Pro Val Phe Ala Asp Ala Leu Asp Asp Val Ala Ala Arg Leu Asp
5435 5440 5445

Thr Asp Ala Gly Gly Pro Pro Leu Arg Glu Val Leu Phe Ala Glu
5450 5455 5460

Pro Gly Ser Asp Glu Ala Ala Leu Leu Glu Arg Thr Gly His Ala
5465 5470 5475

Gln Pro Ala Leu Phe Ala Leu Glu Val Ala Leu Phe Arg Leu Leu
5480 5485 5490

Glu Ser Trp Gly Val Val Pro Asp Leu Leu Ala Gly His Ser Val
5495 5500 5505

Gly Glu Ile Ala Ala Ala His Val Ala Gly Val Leu Ser Leu Asp
5510 5515 5520

Asp Ala Cys Thr Leu Val Ala Ala Arg Gly Arg Leu Met Glu Ala
5525 5530 5535

Leu Pro Ala Gly Gly Ala Met Val Ala Val Glu Ala Ala Glu Asp
5540 5545 5550

Glu Val Ala Pro Leu Leu Thr Asp Gly Val Gly Ile Ala Ala Val
5555 5560 5565

Asn Gly Pro Ala Ala Val Val Val Ser Gly Asp Val Asp Glu Val
5570 5575 5580

Asp Ala Val Ala Ala Arg Leu Ala Ala Gln Gly Arg Arg Thr His
5585 5590 5595

Arg Leu Arg Val Ser His Ala Phe His Ser Pro Leu Met Glu Pro
5600 5605 5610

Met Leu Asp Glu Phe Arg Ala Val Val Ser Gly Leu Asp Tyr Ala

5615	5620	5625
Ala Pro 5630	Ala Ile Pro Ile Val 5635	Gly Thr Leu Ala 5640
Thr Ala 5645	Asp Arg Leu Thr 5650	Val Glu His Val 5655
Arg Ala 5660	Thr Val Arg Phe Ala 5665	Thr Leu Ala Gly 5670
Gln His 5675	Asp Val Arg Thr 5680	Asp Gly Val 5685
Leu Ser 5690	Ala Ala Ala Arg Asp 5695	Glu Pro Gly Thr 5700
Ala Leu 5705	Leu Ala Leu Leu Arg 5710	Lys Asp Arg Pro Glu Val Arg Thr 5715
Val Leu 5720	Ala Ala Val Ala Gly 5725	Ala His Cys His Gly Ala Arg Leu 5730
Asp Arg 5735	Arg Ala Leu Leu Ala 5740	Gly Tyr Gly His Gly Arg Val Ala 5745
Leu Pro 5750	Ser Tyr Ala Phe Gln 5755	Arg Glu Arg Tyr Trp Pro Glu Thr 5760
Ala Ala 5765	Ala Ala Val Pro Glu 5770	Gly Thr Gly Ala Asp Ala Glu Phe 5775
Trp Ala 5780	Ala Val Glu Arg Asp 5785	Asp Val Glu Gly Leu Val Gly Ser 5790

Leu Gly Leu Asp Asp Ala Thr Val Ser Ala Met Val Pro Ala Leu
5795 5800 5805

Thr Ala Trp Arg Arg Arg Arg Gly Glu Gln Ala Thr Arg Asp Gly
5810 5815 5820

Trp Arg Tyr Arg Ile Thr Trp Ala Pro Arg Gly Gly Ser Pro Ala
5825 5830 5835

Gly Gly Asp Leu Asp Gly Arg Arg Leu Val Leu Val Pro Gln Thr
5840 5845 5850

Tyr Arg Asp Asp Ala Thr Ala Ala Trp Ala Ala Asp Val Glu Ala
5855 5860 5865

Ala Leu Gly Gly Gly Gly Leu Glu Arg Val Thr Val Thr Gly Thr
5870 5875 5880

Asp Arg Ala Thr Leu Ala Ala Ala Val Thr Ala Ala Ala Gly Glu
5885 5890 5895

Gly Pro Glu Phe Ala Gly Val Leu Ser Leu Leu Pro Phe Ala Asp
5900 5905 5910

Gly Asp Ala Gly His Pro Gly Val Pro Ala Ala Leu Ser Leu Thr
5915 5920 5925

Thr Thr Ala Val Gln Ala Leu Gly Asp Ala Gly Val Asp Ala Pro
5930 5935 5940

Leu Trp Thr Val Thr Arg Gly Ala Val Ala Val Gly Arg Ser Glu
5945 5950 5955

Glu Val Thr Glu Leu Asp Gln Ala Ala Val Trp Gly Leu Leu Arg
5960 5965 5970

Thr Ala Ala Leu Glu Leu Pro Gly Arg Ile Gly Gly Thr Val Asp
5975 5980 5985

Leu Pro Ala Val Val Asp Ala Pro Ala Ala Arg Arg Leu Arg Gly
5990 5995 6000

Val Leu Ala Ala Thr Asp Gly Glu Asp Ala Val Ala Val Arg Ala
6005 6010 6015

Ser Gly Val Phe Leu Arg Arg Leu Val His Ala Pro Ala Arg Ala
6020 6025 6030

Gly Ala Thr Pro Ala Pro Phe Asp Ala Thr Thr Gly Thr Val Leu
6035 6040 6045

Ile Thr Gly Gly Thr Gly Gly Ile Gly Gly His Val Ala Arg Arg
6050 6055 6060

Leu Ala Arg Glu Gly Ala Ala His Leu Leu Leu Ala Ala Arg Arg
6065 6070 6075

Gly Pro Asp Ala Pro Gly Ala Ala Ala Leu Arg Ala Glu Leu Glu
6080 6085 6090

Glu Leu Gly Ala Arg Val Thr Val Ala Ala Cys Asp Val Ala Asp
6095 6100 6105

Arg Glu Ala Leu Ala Ala Leu Leu Asp Thr Val Pro Ala Glu Leu
6110 6115 6120

Pro Leu Val Gly Val Phe His Thr Ala Gly Val Leu Glu Asp Arg
6125 6130 6135

Val Leu Asp Ala Leu Thr Pro Gln Ser Tyr Ser Gly Val Leu Arg

6140	6145	6150
Ala Lys Thr Val Ala Ala Gln His Leu Asp Glu Leu Thr Arg Asp		
6155	6160	6165
Ser Asp Leu Ala Ala Phe Val Leu Phe Ser Ser Thr Ala Gly Met		
6170	6175	6180
Ile Gly Ala Ala Gly Gln Gly Asn Tyr Ala Ala Ala Asn Ala Tyr		
6185	6190	6195
Leu Asp Ala Leu Ala Glu His Arg Arg Ala Arg Gly Leu Pro Ala		
6200	6205	6210
Leu Ser Val Ala Trp Gly Pro Trp Asp Gly Ser Gly Met Val Ala		
6215	6220	6225
Asp Ala Ala Glu Val Ala Ala Arg Val Arg Arg Gly Gly Phe Ala		
6230	6235	6240
Pro Leu Asp Pro Glu Thr Ala Ala Val Ala Leu Leu Arg Ala Val		
6245	6250	6255
Asp Gly Ser Arg Glu Gly Gly Glu Thr Thr Leu Ala Ile Ala Asp		
6260	6265	6270
Met Asp Trp Glu Arg Phe Leu Arg Ala Phe Gly Ser Val Arg Pro		
6275	6280	6285
Met Pro Leu Val Ala Asp Leu Pro Glu Val Ala Arg Leu Ala Ala		
6290	6295	6300
Pro Thr Thr Gly Gly Asp Thr Gly Thr Gly Leu Arg Gly Arg Leu		
6305	6310	6315

Ala Ala Leu Pro Asp Asp Glu Arg Leu Gly Val Val Leu Asp Val
6320 6325 6330

Leu Arg Thr Gln Val Ala Ala Val Leu Gly His Ala Asp Pro Arg
6335 6340 6345

Thr Val Asp Asp Asp Arg Ala Phe Arg Asp Leu Gly Phe Asp Ser
6350 6355 6360

Leu Thr Ile Leu Glu Leu Arg Asn Ala Leu Asn Ala Ala Thr Gly
6365 6370 6375

Leu Ser Leu Pro Ala Thr Leu Val Tyr Asp Arg Pro Thr Pro Arg
6380 6385 6390

Glu Met Ala Gly Phe Leu Leu Gly Glu Leu Leu Gly Thr Leu Pro
6395 6400 6405

Glu Gln Arg Gly Pro Val Arg Thr Ser Ala Ala Val Asp Asp Pro
6410 6415 6420

Ile Val Val Val Gly Met Ala Cys Arg Phe Pro Gly Gly Val Arg
6425 6430 6435

Thr Pro Glu Asp Leu Trp Glu Leu Val Ala Arg Gly Asp Asp Gly
6440 6445 6450

Ile Thr Gly Phe Pro Asp Asp Arg Gly Trp Asp Leu Ala Ala Leu
6455 6460 6465

Gly Asp Gly Ala Ser Ala Thr Leu Arg Gly Gly Phe Leu Asp Gly
6470 6475 6480

Val Ala Asp Phe Asp Ala Arg Phe Phe Gly Ile Ser Pro Arg Glu
6485 6490 6495

Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Thr Thr
6500 6505 6510

Trp Glu Ala Val Glu Arg Ala Gly Ile Asp Pro Ala Thr Leu Arg
6515 6520 6525

Gly Ser Ala Thr Gly Val Phe Val Gly Thr Asn Gly Gln Asp Tyr
6530 6535 6540

Ala Thr Leu Leu Arg Arg Ser Ala Asp Asp Val Ser Gly Tyr Ala
6545 6550 6555

Ala Thr Gly Asn Thr Ala Ser Val Met Ser Gly Arg Leu Ser Tyr
6560 6565 6570

Thr Leu Gly Leu Glu Gly Pro Ala Val Thr Ile Asp Thr Ala Cys
6575 6580 6585

Ser Ser Ser Leu Val Ala Leu His Trp Ala Gly Arg Ala Leu Thr
6590 6595 6600

Asp Gly Glu Ala Asp Leu Val Leu Ala Gly Gly Val Ser Val Met
6605 6610 6615

Ser Gly Pro Asp Ser Phe Val Glu Phe Ser Thr Gln Gly Gly Leu
6620 6625 6630

Ala Pro Asp Gly His Cys Lys Pro Phe Ser Asp Asp Ala Asp Gly
6635 6640 6645

Thr Ala Trp Ser Glu Gly Val Gly Met Leu Val Leu Glu Arg Leu
6650 6655 6660

Ser Asp Ala Arg Arg His Gly His Arg Val His Gly Val Ile Gly

6665

6670

6675

Gly Ser Ala Ile Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala
6680 6685 6690

Pro Ser Gly Pro Ser Gln Gln Arg Val Ile Arg Gln Ala Leu Ala
6695 6700 6705

Asp Ala Gly Leu Thr Pro Ala Asp Val Asp Thr Val Glu Ala His
6710 6715 6720

Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu
6725 6730 6735

Ile Ala Thr Tyr Gly Arg Asp Arg Asp Thr Asp Arg Pro Leu His
6740 6745 6750

Leu Gly Thr Val Lys Ser Asn Ile Gly His Thr Gln Ala Ala Ala
6755 6760 6765

Gly Val Ala Gly Val Ile Lys Met Leu Leu Ala Met Arg His Ala
6770 6775 6780

Thr Leu Pro Arg Thr Leu His Ala Gly Thr Pro Ser Ser His Val
6785 6790 6795

Asp Trp Ser Ala Gly Thr Val Ala Leu Leu Asp Glu Ala Arg Asp
6800 6805 6810

Trp Pro Glu Thr Gly Gly Thr Arg Arg Ala Gly Val Ser Ala Phe
6815 6820 6825

Gly Val Ser Gly Thr Asn Ala His Val Ile Val Glu Gln Ala Pro
6830 6835 6840

Pro Ala Pro Glu Thr Ala Ala Ala Glu Leu Pro Gly Glu Val Pro
6845 6850 6855

Trp Val Leu Ser Ala Arg Thr Pro Ala Ala Leu Gln Glu Gln Val
6860 6865 6870

Asp Arg Val Val Gly Ala Ala Gly Gly His Thr Ala Thr Asp Val
6875 6880 6885

Ala Ala Thr Leu Ala Gly Gly Arg Thr Leu Phe Gly His Arg Ala
6890 6895 6900

Val Leu Leu Ala Gly Pro Asp Gly Ile Arg Glu Ala Ala Arg Gly
6905 6910 6915

Thr Ala Pro Arg Thr Pro Gly Arg Thr Ala Phe Leu Phe Ser Gly
6920 6925 6930

Gln Gly Ala Gln His Ala Gly Met Gly Arg Ala Leu His Glu Arg
6935 6940 6945

His Pro Ala Tyr Ala Glu Ala Leu Asp Glu Val Leu Ala Arg Phe
6950 6955 6960

Asp Thr Leu Leu Asp Ala Pro Leu Arg Asp Ala Leu Phe Ala Glu
6965 6970 6975

Pro Gly Ser Ala Ala Ala Asp Arg Leu Asp Glu Thr Gly Thr Thr
6980 6985 6990

Gln Pro Ala Leu Phe Ala Val Glu Val Ala Leu Tyr Arg Leu Leu
6995 7000 7005

Glu Ser Trp Gly Arg Thr Pro Asp Leu Val Ala Gly His Ser Val
7010 7015 7020

Gly Glu Ile Ala Ala Ala His Val Ala Gly Val Leu Ser Leu Asp
7025 7030 7035

Asp Ala Cys Ala Leu Val Ala Ala Arg Ala Ser Leu Met Gln Ala
7040 7045 7050

Leu Pro Ala Gly Gly Ala Met Val Ala Val Glu Ala Thr Glu Asp
7055 7060 7065

Glu Val Thr Pro Leu Leu Thr Asp Gly Val Ala Ile Ala Ala Val
7070 7075 7080

Asn Gly Pro Ala Ser Leu Val Leu Ser Gly Asp Ala Asp Gly Val
7085 7090 7095

Gly Ala Leu Ala Asp Arg Leu Ala Ala Asp Gly Arg Arg Thr Arg
7100 7105 7110

Arg Leu Arg Val Ser His Ala Phe His Ser Pro Leu Met Asp Ala
7115 7120 7125

Met Leu Asp Gly Phe Ala Ala Ala Ile Ser Gly Ile Thr Phe Ala
7130 7135 7140

Ala Pro Arg Ile Pro Leu Val Ser Thr Leu Thr Gly Ala Leu Ala
7145 7150 7155

Gly Pro Glu Leu Gly Glu Pro Gly Tyr Trp Val Arg His Val Arg
7160 7165 7170

Glu Ala Val Arg Phe Ala Asp Gly Val Arg Ala Leu His Glu Ala
7175 7180 7185

Gly Ala Thr Val Phe Ala Glu Ile Gly Pro Asp Ala Ala Leu Leu

7190

7195

7200

Ala Pro Ala Gln Gln Thr Leu Asp Thr Val Ala Pro Ala Asp Gly
7205 7210 7215

Pro Ala Ala Val Val Val Ala Leu Gln Arg Arg Asp Arg Asp Ala
7220 7225 7230

Gly Thr Ala Leu Leu Glu Gly Leu Ala Val Leu His Val His Gly
7235 7240 7245

Ala Gly Pro Asp Trp Ala Ala Val Leu Pro Ala Arg Gly Pro Val
7250 7255 7260

Glu Leu Pro Thr Tyr Pro Phe Gln Arg Glu Arg Tyr Trp Pro Glu
7265 7270 7275

Pro Gly Thr Pro Gly Gly Gly Ala Gly Pro Ala Asp Pro Ala Asp
7280 7285 7290

Ser Ala Phe Trp Ala Ala Val Glu Arg Glu Asp Leu Glu Ser Leu
7295 7300 7305

Ser Gly Ser Leu Gly Val Asp Gly Asp Thr Leu Ala Thr Met Val
7310 7315 7320

Pro Ala Leu Ser Ala Trp Arg Arg Arg His Gly Ala Glu Ser Ala
7325 7330 7335

Ala Ala Thr Trp Arg Tyr Arg Glu Thr Trp Thr Pro Val Pro Thr
7340 7345 7350

Pro Ala Ala Ala Val Thr Gly Arg Thr Leu Val Leu Val Ser Ala
7355 7360 7365

Gly Ala Asp Ala Trp Thr Asp Ala Leu Val Thr Ala Leu Asp Ala
7370 7375 7380

Glu Thr Val Val Val Gly Asp Gly Ser Thr Asp Glu Leu Thr Val
7385 7390 7395

Ala Leu Gly Val Leu Asp Asp Ala Asp Arg Pro Val Asp Arg Val
7400 7405 7410

Val Ser Leu Leu Ala Ala Gly Thr Ser Gly Leu Pro Ser Gly Pro
7415 7420 7425

Ala Arg Ala Ser Ala Leu Leu Ala Ala Leu Ala Ala Ala Gly Ile
7430 7435 7440

Asp Ala Pro Leu Trp Cys Val Thr Arg Gly Ala Val Ala Ala Glu
7445 7450 7455

Gly Thr Thr Pro Ala Pro Gly Gln Ala Ala Leu Trp Gly Met Gly
7460 7465 7470

Arg Val Ala Ala Leu Glu Thr Pro Gln Arg Phe Gly Gly Leu Ala
7475 7480 7485

Asp Leu Pro Ala Gly Pro Asp Ala Val Ala Ala Ala Ala Ala Thr
7490 7495 7500

Ala Leu Ala Ala Leu Leu Thr Glu Pro Gly Gly Glu Ser Glu Ile
7505 7510 7515

Ala Val Arg Ala Thr Gly Ala Tyr Ala Arg Arg Leu Val Arg Ala
7520 7525 7530

Gly Gly Ala Glu Gly Thr Ala Ala Ala Arg Trp Arg Pro His Gly
7535 7540 7545

Thr Val Leu Val Val Gly Gly Thr Gly Ala Leu Gly Arg Arg Ala
7550 7555 7560

Ala Arg Arg Leu Ala Ala Asp Gly Ala Thr His Leu Val Leu Thr
7565 7570 7575

Ala Pro Ser Ala Ala Ala Ser Val Asp Thr Asp Ala Val Thr Ala
7580 7585 7590

Glu Leu Ala Asp Leu Gly Val Ala Val Thr Val Ser Asp Ala Asp
7595 7600 7605

Pro Ala Asp Pro Ala Ala Leu Ala Ala Leu Leu Asp Gly Ala Pro
7610 7615 7620

Asp Ala Pro Thr Ala Val Val His Ala Gly Glu Ala Leu Gly Asp
7625 7630 7635

Ala Gly Leu Ala Asp Val Leu Ala Pro Val Glu Ala Leu Ala Thr
7640 7645 7650

Ala Leu Thr Gly Pro Ala Thr Ala His Asp Leu Asp Ala Val Val
7655 7660 7665

Leu Phe Gly Ser Ile Ala Gly Val Trp Gly Val Arg Gly Arg Ala
7670 7675 7680

Val Glu Ala Ala Ala Gly Ala His Leu Asp Ala Val Ala Arg Ser
7685 7690 7695

Leu Arg Gly Arg Gly Val Pro Ala Thr Ala Val Ala Trp Gly Ala
7700 7705 7710

Trp Thr Asp Leu Ala Asp Arg Ser Thr Ala Ala His Leu Arg Met

7715

7720

7725

Asn Gly Leu Pro Ala Met Asp Gly Asp Ala Ala Met Ala Ala Leu
7730 7735 7740

Gly Arg Ala Val Ala Asp Gly Ser Val Ala Glu Thr Val Ala Asp
7745 7750 7755

Val Arg Trp Glu Thr Phe Ala Pro Ala His His Asp Ala Arg Ala
7760 7765 7770

Thr Thr Leu Phe Asp Ala Leu Pro Glu Ala Arg Thr Ala Leu Ser
7775 7780 7785

Gly Ala Ala Arg Glu Arg Ala Gly Arg Glu Ala Ala Ala Ser Gly
7790 7795 7800

Tyr Gly Gln Trp Leu Ala Glu Gln Pro Glu Ala Glu Arg Asp Thr
7805 7810 7815

Ile Leu Leu Asp Leu Val Ala Ala Thr Ala Thr Thr Val Leu Gly
7820 7825 7830

Leu Thr Asp Gly Glu Pro Leu Glu Pro Asp Leu Pro Phe Arg Asp
7835 7840 7845

Leu Gly Phe Asp Ser Leu Thr Ala Val Asp Leu Arg Asn Gln Leu
7850 7855 7860

Thr Ala Ala Thr Gly Val Ala Leu Pro Ala Thr Leu Val Phe Asp
7865 7870 7875

His Pro Asn Pro Ala Ala Leu Ala Ala His Leu Arg Gly Glu Leu
7880 7885 7890

Leu Gly Gly Gly Asp Gly Ala Ala Glu Pro Val Thr Leu Ala Ala
7895 7900 7905

Ser Ala Thr Gly Asp Asp Pro Ile Val Ile Val Gly Met Ala Cys
7910 7915 7920

Arg Tyr Pro Gly Gly Val Ala Ser Pro Glu Asp Leu Trp Gln Leu
7925 7930 7935

Met Ala Asp Asp Val Asp Ala Val Gly Ala Phe Pro Asp Asp Arg
7940 7945 7950

Gly Trp Asp Leu Glu Thr Leu Ala Gly Asp Gly Pro Gly Arg Ser
7955 7960 7965

Ala Thr Ala Gln Gly Gly Phe Leu His Asp Ala Thr Asp Phe Asp
7970 7975 7980

Pro Gly Pro Phe Gly Val Ser Pro Arg Glu Ala Leu Val Met Asp
7985 7990 7995

Pro Gln Gln Arg Ile Leu Leu Glu Thr Ser Trp Glu Ala Leu Glu
8000 8005 8010

Arg Thr Gly Ile Asp Pro Ser Ser Leu Arg Gly Ser Ala Glu Tyr
8015 8020 8025

Gly Val Phe Val Gly Gly Gly Ser Gly Asp Tyr Arg Pro Pro Ala
8030 8035 8040

Glu Ala Gly Gln Trp Gln Thr Ala Gln Ser Ala Ser Leu Leu Ser
8045 8050 8055

Gly Arg Val Ala Tyr Thr Phe Gly Val Gln Gly Pro Thr Val Ser
8060 8065 8070

Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala
8075 8080 8085

Ala Gln Ala Leu Arg Ala Gly Glu Cys Ser Ile Ala Leu Ala Gly
8090 8095 8100

Gly Val Thr Val Met Ala Thr Pro Val Gly Phe Val Glu Phe Ser
8105 8110 8115

Ala Gln Gly Ala Leu Ser Pro Asp Gly Arg Cys Arg Ala Phe Ser
8120 8125 8130

Asp Asp Ala Asn Gly Thr Gly Trp Ser Glu Gly Val Gly Met Leu
8135 8140 8145

Val Val Glu Arg Leu Ser Asp Ala Arg Arg Arg Gly His Arg Val
8150 8155 8160

His Ala Val Leu Arg Gly Ser Ala Ile Asn Gln Asp Gly Ala Ser
8165 8170 8175

Asn Gly Leu Thr Ala Pro Ser Gly Pro Ala Gln Gln Arg Val Ile
8180 8185 8190

Arg Gln Ala Leu Ala Asn Ala Arg Leu Thr Pro Gly Glu Val Asp
8195 8200 8205

Ala Val Glu Ala His Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile
8210 8215 8220

Glu Ala Gln Ala Leu Leu Ala Thr Tyr Gly Gln Asp Arg Asp Arg
8225 8230 8235

Pro Val Leu Leu Gly Ser Leu Lys Ser Asn Ile Gly His Thr Gln

8240	8245										8250									
Ala	Ala	Ser	Gly	Val	Gly	Gly	Val	Ile	Lys	Met	Val	Leu	Ala	Met						
8255						8260						8265								
Glu	His	Gly	Val	Leu	Pro	Arg	Ser	Leu	Tyr	Ala	Glu	Asn	Pro	Ser						
8270						8275						8280								
Ser	His	Val	Asp	Trp	Thr	Ala	Gly	Asp	Ala	Gln	Leu	Leu	Thr	Ala						
8285						8290						8295								
Pro	Thr	Gly	Trp	Pro	Glu	Thr	Gly	Arg	Pro	Arg	Arg	Ala	Ala	Val						
8300						8305						8310								
Ser	Ser	Phe	Gly	Ala	Ser	Gly	Thr	Asn	Ala	His	Ala	Ile	Leu	Glu						
8315						8320						8325								
Gln	Pro	Pro	His	Ala	Asp	Val	Val	Arg	Arg	Ala	Asp	Asp	Thr	Pro						
8330						8335						8340								
Asp	Asp	Pro	Gly	Ala	Val	Ala	Val	Leu	Leu	Ser	Gly	Arg	Thr	Glu						
8345						8350						8355								
Ala	Ala	Leu	Arg	Ala	Gln	Ala	Asp	Glu	Leu	Val	Ala	His	Leu	Gly						
8360						8365						8370								
Glu	His	Pro	Asp	Leu	Arg	Leu	Arg	Asp	Leu	Ala	Arg	Ala	Leu	Ala						
8375						8380						8385								
Thr	Ser	Arg	Ala	Thr	Phe	Asp	His	Arg	Ala	Ala	Val	Thr	Ala	Thr						
8390						8395						8400								
Cys	Arg	Asp	Glu	Leu	Leu	Ala	Gly	Leu	Thr	Ala	Val	Ala	His	Gly						
8405						8410						8415								

Asp Thr Ala Pro Gln Val Ala Thr His Arg Leu Glu Arg Ser Gly
8420 8425 8430

Arg Ser Ala Ala Leu Phe Ser Gly Gln Gly Ala Gln Arg Leu Gly
8435 8440 8445

Met Gly Arg Glu Leu Tyr Glu Arg His Pro Val Phe Ala Asp Ala
8450 8455 8460

Val Asp Ala Val Leu Ala Arg Leu Asp Gly His Leu Asp Arg Pro
8465 8470 8475

Leu Arg Asp Thr Met Trp Gly Thr Asp Ala Asp Ala Leu Ala Glu
8480 8485 8490

Thr Gly Ala Thr Gln Pro Ala Leu Phe Ala Val Glu Val Ala Leu
8495 8500 8505

Tyr Arg Leu Val Glu Ser Trp Gly Val Arg Pro Asp Phe Val Ala
8510 8515 8520

Gly His Ser Ile Gly Glu Ile Ser Ala Ala His Val Ala Gly Val
8525 8530 8535

Leu Asp Leu Asp Asp Ala Cys Arg Leu Val Ala Ala Arg Ala Arg
8540 8545 8550

Leu Met Gln Ala Leu Pro Ala Gly Gly Ala Met Val Ala Val Glu
8555 8560 8565

Ala Asp Glu Asp Glu Val Thr Pro Leu Leu Thr Asp Gly Val Ala
8570 8575 8580

Ile Ala Gly Val Asn Gly Pro Gly Ser Val Val Leu Ser Gly Asp
8585 8590 8595

Asp Asp Ala Val Thr Ala Leu Ala Ala Val Leu Ala Gly Glu Gly
8600 8605 8610

Arg Arg Thr Ser Arg Leu Gln Val Ser His Ala Phe His Ser Ala
8615 8620 8625

Arg Met Asp Pro Met Leu Ala Glu Phe Arg Thr Val Ala Glu Glu
8630 8635 8640

Leu Asp Tyr His Glu Pro Arg Ile Pro Val Val Ser Asn Leu Thr
8645 8650 8655

Gly Ala Val Ala Ala Ala His Glu Leu Cys Ser Ala Glu Tyr Trp
8660 8665 8670

Val Arg His Val Arg Gly Thr Val Arg Phe Ala Asp Gly Val Arg
8675 8680 8685

Ala Leu Ala Ala Arg Gly Val Ser Thr Phe Leu Glu Leu Gly Pro
8690 8695 8700

Asp Ala Val Leu Ser Ala Leu Val Pro Arg Ser Ala Pro Asp Ala
8705 8710 8715

Leu Ala Val Pro Ala Leu Arg Arg Asp Arg Asp Glu Glu Ala Thr
8720 8725 8730

Leu Val Ala Ala Leu Ala Arg Leu His Thr His Gly Ala Gly Pro
8735 8740 8745

Arg Trp Glu Ala Phe Phe Ala Gly His Asp Thr Arg Arg Val Asp
8750 8755 8760

Leu Pro Thr Tyr Pro Phe Gln Arg Asp Arg Phe Trp Pro Asp Val

8765

8770

8775

Met Pro Gly Gln Glu Thr Arg Ala Val Ala Pro Ala Gly Pro Gly
8780 8785 8790

Thr Pro Asp Glu Ile Asp Ala Ala Phe Trp Glu Ala Val Ala Gln
8795 8800 8805

Glu Asp Phe Ser Ala Leu Glu Thr Gln Leu Asp Val Glu Gly Ala
8810 8815 8820

Ala Leu Ser Ala Val Leu Pro Ala Leu Met Asp Trp Arg Ser Arg
8825 8830 8835

Arg Ala Gln Glu Ala Arg Leu Ala Arg Trp Arg His Arg Ile Val
8840 8845 8850

Trp Lys Arg Leu Thr Gly Ser Ala Thr Gly Arg Arg Arg Thr Pro
8855 8860 8865

Glu Gly Thr Trp Leu Ala Val Leu Pro Glu Gly Thr Ala Val Asp
8870 8875 8880

Pro Trp Val Thr Thr Val Leu Asp Gly Ile Gly Thr Ala Val Val
8885 8890 8895

Thr Val Glu Thr Gly Ser Thr Asp Arg Ala Val Val Ala Ala Ala
8900 8905 8910

Leu Thr Ala Gln Leu Pro Ala Gly Thr Pro Val Ala Gly Val Val
8915 8920 8925

Ser Leu Leu Ala Leu Arg Asp Glu Leu Thr Gly Asp Val Pro Asp
8930 8935 8940

Gly Val Gly Leu Thr Thr Gly Leu Leu Gln Ala Leu Gly Asp Ala
8945 8950 8955

Gly Val Asp Ala Pro Leu Trp Cys Leu Thr Arg Gly Ala Val Ser
8960 8965 8970

Thr Gly Thr Thr Asp Arg Pro Ala Arg Pro Leu Gln Ala Ala Ile
8975 8980 8985

Trp Gly Leu Gly Arg Val Ala Ala Leu Glu Tyr Pro Gln Arg Trp
8990 8995 9000

Gly Gly Leu Ala Asp Leu Pro Glu Asp Pro Asp Pro Arg Ala Ala
9005 9010 9015

Ala Ala Leu Gly Ala Val Leu Ala Gly Leu Asp Asp Glu Asp Gln
9020 9025 9030

Val Ala Val Arg Gly Ala Ala Val Leu Ala Arg Arg Leu Val Pro
9035 9040 9045

Ala Pro Pro Arg Glu Asp Thr Thr Thr Ala Trp Thr Pro Thr Gly
9050 9055 9060

Thr Val Leu Ile Thr Gly Gly Thr Gly Ala Leu Gly Gly His Val
9065 9070 9075

Ala Arg Arg Leu Ala Ala Asp Gly Ala Gln His Leu Val Leu Leu
9080 9085 9090

Gly Arg Arg Gly Pro Asp Ala Pro Gly Val Asp Gly Leu Arg Ala
9095 9100 9105

Glu Leu Glu Ala Leu Gly Ala Gly Val Thr Val Ala Ala Cys Asp
9110 9115 9120

Ala Ala Asp Arg Gly Gln Leu Ser Ala Val Leu Ala Ala Ile Pro
9125 9130 9135

Ala Asp Arg Pro Leu Thr Gly Val Val His Ala Ala Gly Val Leu
9140 9145 9150

Asp Asp Gly Ile Leu Asp Arg Leu Thr Pro Glu Arg Tyr Arg Glu
9155 9160 9165

Val Phe Arg Ser Lys Val Thr Ala Ala Leu Leu Leu Asp Glu Leu
9170 9175 9180

Thr Arg Gly Leu Asp Leu Asp Ala Phe Val Leu Phe Ser Ser Ala
9185 9190 9195

Ser Ser Ala Val Gly Asn Pro Gly Gln Ala Asn Tyr Ala Ala Ala
9200 9205 9210

Asn Ala Val Leu Asp Ala Leu Ala Glu Gln Arg Arg Ala Arg Gly
9215 9220 9225

Asp Ala Ala Thr Ser Ile Ser Trp Gly Val Trp Gly Gly Gly Gly
9230 9235 9240

Met Ala Gly Ala Gly Ser Ala Asp Asp Ala Ala Arg Arg Thr Gly
9245 9250 9255

Ile Gly Ala Met Asp Pro Ala Leu Ala Val Glu Thr Met Leu Arg
9260 9265 9270

Leu Ile Ala Gly Thr Ala Pro Thr Ala Val Val Ala Glu Val Glu
9275 9280 9285

Leu Asp Arg Phe Ala Gly Ala Phe Gly Gly Thr Arg Pro Ser Pro

9290 9295 9300

Leu Leu Arg Glu Phe Pro Gly Tyr Ala Glu Leu Val Ala Gly Arg
9305 9310 9315

Ala Gly Thr Arg Pro Gly Ala Ala Glu Asp Asp Leu Ala Ala Thr
9320 9325 9330

Leu Val Ala Leu Pro Pro Ala Arg Arg Leu Asp Thr Val Val Asp
9335 9340 9345

Leu Val Arg Ser Arg Ala Ala Gln Val Leu Gly Tyr Pro Gly Ser
9350 9355 9360

Asp Asp Val Gly Ala Glu Arg Ser Phe Arg Asp Leu Gly Ile Asp
9365 9370 9375

Ser Leu Gly Ala Val Glu Leu Arg Asn Gln Leu Gly Ala Ala Thr
9380 9385 9390

Gly Leu Gly Leu Pro Ala Thr Leu Val Phe Asp His Pro Thr Pro
9395 9400 9405

Ala Ala Val Ala Arg Tyr Leu Leu Asp Glu Leu Ala Gly Asp Asp
9410 9415 9420

Thr Gly Ala Asp Gly Glu Glu Ala Gly Ile Arg Ala Ala Leu Ala
9425 9430 9435

Thr Val Pro Leu Glu Arg Leu Arg Glu Leu Gly Val Leu Glu Pro
9440 9445 9450

Leu Leu Arg Leu Val Gly Arg Gly Glu Glu Thr Ala Ala Asp Asp
9455 9460 9465

Asp Thr Gly Thr Gly Pro Gly Gly Ser Glu Val Asp Ala Met Ser
9470 9475 9480

Val Asp Asp Leu Val Arg Ala Ala Leu Asp Gly Arg Pro Asp Asp
9485 9490 9495

Leu

<210> 7
<211> 5425
<212> PRT
<213> Pseudonocardia autotrophica

<400> 7

Met Asn Glu Lys His Ala Ser Gly Thr Ala Gly Gly Asn Asp Val Val
1 5 10 15

Thr Ala Leu Arg Ala Ala Val Lys Glu Thr Asp Arg Leu Arg Arg Gln
20 25 30

Asn Arg Met Leu Gln Ser Ala Ala Thr Glu Pro Ile Ala Val Val Gly
35 40 45

Met Gly Cys Arg Phe Pro Gly Gly Val Asp Ser Pro Glu Ala Leu Trp
50 55 60

Asp Met Val Ala Ala Gly Thr Asp Val Ile Ser Gly Phe Pro Thr Asp
65 70 75 80

Arg Gly Trp Asp Leu Asp Ala Leu His Ala Gly Gly Thr Asp Ala Arg
85 90 95

Asp Thr Glu Ile Ser Met Gln Gly Gly Phe Leu Asp Gly Val Ala Asp
100 105 110

Phe Asp Pro Gly Phe Phe Gly Ile Ser Pro Arg Glu Ala Val Thr Met
115 120 125

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

Arg Ala Gly Ile Asp Ala Ala Gly Leu Arg Gly Ser Arg Thr Gly Ala
145 150 155 160

Phe Ile Gly Thr Asn Gly Gln Asp Tyr Ala Tyr Leu Val Val Arg Ser
165 170 175

Leu Asp Asp Ala Thr Gly Asp Val Gly Thr Gly Ile Ala Ala Ser Ala
180 185 190

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

Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala
210 215 220

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

Val Asn Val Met Ser Thr Pro Gly Ser Leu Val Glu Phe Ser Arg Gln
245 250 255

Gly Gly Leu Ala Arg Asp Gly Arg Cys Lys Ala Phe Ala Glu Gly Ala
260 265 270

Asp Gly Thr Gly Trp Ser Glu Gly Ala Gly Ile Leu Val Leu Glu Arg
275 280 285

Leu Ser Asp Ala Arg Arg Leu Gly His Pro Val Leu Ala Val Val Arg
290 295 300

Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Phe Thr Ala Pro

305	310	315	320
Asn Gly Pro Ser Gln Gln Arg Val Ile Arg Ala Ala Leu Ala Asn Ala			
	325	330	335
Glu Leu Ser Ala Gly Asp Val Asp Ala Val Glu Ala His Gly Thr Gly			
	340	345	350
Thr Pro Leu Gly Asp Pro Ile Glu Ala Gln Ser Ile Leu Ala Thr Tyr			
	355	360	365
Gly Arg Asp Arg Glu Arg Pro Leu Ala Leu Gly Ser Val Lys Ser Asn			
	370	375	380
Met Gly His Thr Gln Ala Ala Ser Gly Val Ala Gly Val Met Lys Met			
	385	390	395
Ile Met Ala Met Gln His Gly Glu Leu Pro Arg Thr Leu His Val Asp			
	405	410	415
Arg Pro Ser Thr His Val Asp Trp Ser Ala Gly Ala Val Glu Leu Leu			
	420	425	430
Thr Gln Ala Arg Pro Trp Pro Ala Val Glu Arg Pro Arg Arg Ser Gly			
	435	440	445
Val Ser Ser Phe Gly Val Ser Gly Thr Asn Ala His Val Ile Val Glu			
	450	455	460
Gln Ala Pro Ala Pro Ala Glu Pro Ala Ala Glu Pro Ala Ala Arg Leu			
	465	470	475
Pro Gln Ala Leu Ala Trp Thr Val Ser Ala Arg Thr Pro Ala Ala Leu			
	485	490	495
Arg Asp Gln Ala Ala Ala Leu Leu Ala His Val Glu Arg Asp His Ala			
	500	505	510

Pro Thr Ala Leu Asp Thr Gly Tyr Ser Leu Ala Thr Thr Arg Ala Val
515 520 525

Gln Glu His Arg Leu Ala Val Val Thr Gly Pro Asp Gly Arg Ala Gly
530 535 540

Arg Ala Ala Leu Ala Gly Trp Leu Glu His Gly Ser Ala Pro Gly Val
545 550 555 560

Ala Leu Gly His Val Thr Gly Arg Pro Arg Leu Ala Ala Leu Phe Ser
565 570 575

Gly Gln Gly Ala Gln Arg Leu Gly Met Gly Arg Glu Leu Tyr Glu Arg
580 585 590

His Pro Val Phe Ala Ala Ala Phe Asp Glu Val Leu Thr Leu Leu Gly
595 600 605

Asp Asp Leu Arg Asp Val Val Trp Gly Thr Asp Ala Ala Ala Leu Asp
610 615 620

Glu Thr Gly Ala Thr Gln Pro Ala Leu Phe Ala Val Glu Val Ala Leu
625 630 635 640

Tyr Arg Leu Val Glu Ser Trp Gly Val Thr Pro Asp Leu Val Ala Gly
645 650 655

His Ser Ile Gly Glu Ile Ala Ala Ala His Val Ala Gly Val Phe Ser
660 665 670

Leu Asp Asp Ala Cys Arg Leu Val Thr Ala Arg Ala Ser Leu Met Gln
675 680 685

Ala Leu Pro Arg Gly Gly Ala Met Val Ala Val Glu Ala Thr Glu Asp
690 695 700

Glu Val Thr Pro Leu Leu Thr Asp Gly Val Ala Ile Ala Ala Val Asn
705 710 715 720

Gly Pro Ser Ser Val Val Val Ser Gly Glu Glu Asp Ala Thr Leu Ala
725 730 735

Val Ala Ala Arg Leu Ala Glu Gln Gly Arg Arg Thr Ser Arg Leu Arg
740 745 750

Val Ser His Ala Phe His Ser Pro Leu Met Asp Pro Met Leu Ala Glu
755 760 765

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

Leu Val Ser Thr Leu Thr Gly Ala Pro Ala Thr Val Glu Leu Cys Asp
785 790 795 800

Pro Gly Tyr Trp Val Arg His Val Arg Glu Ala Val Arg Phe Ala Asp
805 810 815

Gly Val Gly Ala Leu Thr Asp Ala Gly Ala Arg Met Phe Leu Glu Ile
820 825 830

Gly Pro Ala Gly Val Leu Thr Ala Leu Ala Ala Arg Ser Ala Pro Glu
835 840 845

Ala Thr Ala Val Ala Leu Gln Arg Thr Asp Arg Gly Glu Glu Glu Ala
850 855 860

Thr Val Ala Ala Leu Gly Ala Leu His Val Ala Gly Thr Ala Val Asp
865 870 875 880

Trp Glu Ala Val His Ala Gly Thr Gly Ala Arg Arg Thr Asp Leu Pro
885 890 895

Thr Tyr Ala Phe Gln Tyr Glu Arg Tyr Trp Pro Lys Ala Val Gln Arg
900 905 910

Ser Gly Asp Ala Ala Gly Leu Gly Leu Ala Pro Ala Asp His Pro Leu
915 920 925

Leu Gly Ala Ala Met Ser Val Ala Gly Ser Asp Glu Leu Leu Leu Thr
930 935 940

Gly Thr Leu Ser Leu Thr Thr His Pro Trp Leu Ala Asp His Val Val
945 950 955 960

Gly Gly Met Val Phe Phe Pro Gly Thr Gly Phe Leu Glu Leu Ala Val
965 970 975

Arg Ala Ala Asp Gln Ala Gly Cys Asp Arg Val Glu Glu Leu Met Leu
980 985 990

Ala Ala Pro Leu Val Leu Pro Ala Thr Gly Ala Val Gln Met Gln Ile
995 1000 1005

Ala Val Gly Ala Ala Asp Pro Asp Gly Thr Arg Asp Val Ser Val
1010 1015 1020

Tyr Ala Arg Pro Ala Gln Asp Pro Asp Ala Asp Trp Thr Arg His
1025 1030 1035

Ala Thr Gly Arg Val Ala Pro Gly Glu Gln Val Ala Glu Phe Asp
1040 1045 1050

Ala Arg Thr Trp Pro Pro Ala Gly Ala Glu Pro Val Asp Ile Asp
1055 1060 1065

Gly Leu Tyr Asp Arg Tyr Ala Gly Asn Gly Leu Gln Tyr Gly Pro
1070 1075 1080

Val Phe Arg Gly Leu Gln Ala Val Trp Arg Arg Gly Asp Glu Val
1085 1090 1095

Leu Ala Glu Val Ala Leu Pro Pro Ala Gly Ala Glu Asp Ala Gly
1100 1105 1110

Asp Phe Gly Leu His Pro Ala Leu Phe Asp Ala Val Leu His Ser
1115 1120 1125

Thr Val Phe Ala Ser Ala Asp Gly Asp Asp Arg Ser Leu Leu Pro
1130 1135 1140

Phe Ala Trp Asn Gly Val Ser Leu His Ala Gly Gly Ala Thr Ala
1145 1150 1155

Leu Arg Val Arg Val Thr Ser Ala Gly Pro Asp Ala Val Arg Ile
1160 1165 1170

Ser Ala Ala Asp Pro Gln Gly Asn Pro Val Ile Ser Val Asp Ser
1175 1180 1185

Leu Thr Leu Arg Ala Ala Gly Pro Asp Ala Ala Gly Pro Asp Arg
1190 1195 1200

Arg Asp Pro Gly Ser Leu Phe Arg Met Gly Trp Val Pro Gln Thr
1205 1210 1215

Leu Thr Pro Arg His Thr Pro Ala Thr Trp Ala Val Leu Asp Gly
1220 1225 1230

Ala Gly Ala Gly Asp Val Ala Ala Ala Leu Thr Ala Glu Pro Ala
1235 1240 1245

Ala Val Ser Thr Val Arg Thr Val Thr Gly Leu Ala Asp Leu His

1250	1255	1260
Asp Ala Asp Pro Pro Asp Leu Val Ala Val Pro Leu Thr Ala Pro		
1265	1270	1275
Gly Ser Val Asp Thr Gly Pro Ala Ala Ala His Thr Leu Thr Arg		
1280	1285	1290
Glu Val Leu Ala Leu Leu Gln Gln Trp Leu Ala Asp Asp Arg Leu		
1295	1300	1305
Ala Arg Thr Arg Leu Val Val Leu Thr Arg Gly Ala Val Ala Asp		
1310	1315	1320
Gly Ser Gly Ser Pro Leu Asp Leu Ala Thr Ala Pro Val Trp Gly		
1325	1330	1335
Leu Leu Arg Ser Ala Gln Ser Glu Asn Pro Gly Arg Leu Leu Val		
1340	1345	1350
Ala Asp Leu Asp Asp Thr Pro Ala Ser Leu Ala Ala Val Ala Gln		
1355	1360	1365
Leu Pro Ala Leu Phe Asp Ala Asp Glu Pro Gln Ala Ile Val Arg		
1370	1375	1380
Asp Gly Ala Val Arg Val Gly Arg Leu Ala Thr Leu Leu Ser Gly		
1385	1390	1395
Ala Ala Leu Val Pro Pro Ala Gly Thr Pro Trp Arg Leu Gly Cys		
1400	1405	1410
Arg Ala Lys Gly Ser Leu Asp Gly Leu Glu Leu Ala Pro His Pro		
1415	1420	1425

Asp Val Leu Ala Pro Leu Arg Gly His Glu Val Arg Val Gly Ile
1430 1435 1440

Arg Ala Ala Gly Leu Asn Phe Arg Asp Val Leu Asn Ala Leu Gly
1445 1450 1455

Met Tyr Pro Gly Asp Ala Gly Leu Phe Gly Ser Glu Ala Ala Gly
1460 1465 1470

Val Val Thr Gly Val Gly Pro Glu Val Thr Thr Leu Ala Pro Gly
1475 1480 1485

Asp Arg Val Thr Gly Met Leu Phe Gly Gly Phe Gly Pro His Gly
1490 1495 1500

Val Thr Asp Glu Arg Leu Leu Thr Thr Val Pro Asp Gly Trp Asp
1505 1510 1515

Trp Glu Thr Ala Ala Ser Val Pro Leu Val Phe Leu Thr Ala Tyr
1520 1525 1530

His Ala Leu Val Asp Leu Ala Asp Leu Gln Pro Gly Glu Lys Val
1535 1540 1545

Leu Ile His Ala Gly Ala Gly Gly Val Gly Met Ala Ala Val Gln
1550 1555 1560

Ile Ala His His Leu Gly Ala Glu Val Tyr Ala Thr Ala Ser Glu
1565 1570 1575

Pro Lys Gln Asp Val Leu Arg Gly Leu Gly Val Ala Pro Asp His
1580 1585 1590

Ile Ala Ser Ser Arg Thr Leu Glu Phe Ala Gly Thr Phe Ala Gly
1595 1600 1605

Ala Gly Ile Asp Val Val Leu Asn Ala Leu Ser Gly Glu Phe Val
1610 1615 1620

Asp Ala Ser Met Gly Leu Leu Gly Asp Gly Gly Arg Phe Leu Glu
1625 1630 1635

Met Gly Lys Thr Asp Ile Arg Asp Pro Ala Asp Leu Pro Asp Ala
1640 1645 1650

Ile Thr Tyr Arg Phe Phe Asp Leu Gly Ala Val Asp Pro His Arg
1655 1660 1665

Ile Gln Gln Met Leu Val Ala Leu Ala Gly Leu Phe Ala Asp Gly
1670 1675 1680

Ala Leu Ser Pro Leu Pro Val Arg Ser Trp Asp Val Arg His Ala
1685 1690 1695

Val Glu Ala Phe Arg Phe Met Ser Ser Ala Arg His Val Gly Lys
1700 1705 1710

Leu Val Leu Thr Val Pro Pro Pro Leu Asp Pro Gln Gly Thr Val
1715 1720 1725

Leu Ile Thr Gly Gly Thr Gly Gly Leu Ala Ala Ala Leu Ala Arg
1730 1735 1740

His Leu Val Ala Thr His Gly Val Ala His Leu Leu Leu Ala Gly
1745 1750 1755

Arg Arg Gly Pro Asp Ala Pro Gly Ala Thr Ala Leu Arg Glu Glu
1760 1765 1770

Leu Thr Ala Ala Gly Ala Gln Val Thr Val Ala Ala Cys Asp Val

1775

1780

1785

Ala Asp Arg Asp Ala Leu Ala Ala Leu Leu Asp Gly Val Asp Pro
1790 1795 1800

Ala His Pro Leu Thr Ala Val Val His Thr Ala Gly Val Leu Asp
1805 1810 1815

Asp Gly Thr Val Thr Ser Leu Thr Pro Ala Ala Val Asp Ala Val
1820 1825 1830

Leu Ala Pro Lys Val Asp Ala Ala Trp His Leu His Asp Leu Thr
1835 1840 1845

Arg Asp His Glu Leu Ala Ala Phe Val Leu Tyr Ser Ser Thr Ala
1850 1855 1860

Gly Val Met Gly Gly Pro Gly Gln Gly Asn Tyr Ala Ala Gly Asn
1865 1870 1875

Thr Phe Leu Asp Ala Leu Ala Ala His Arg His Ala Leu Gly Leu
1880 1885 1890

Pro Ala Thr Ser Leu Ala Trp Gly Ala Trp Glu Gln Gly Ala Gly
1895 1900 1905

Met Thr Gly Gly Leu Ser Asp His Asp Val Ala Arg Val Gly Ser
1910 1915 1920

Gly Gly Met Pro Leu Leu Ser Val Glu Arg Gly Leu Ala Leu Tyr
1925 1930 1935

Asp Ala Ala Thr Leu Ala Ala Glu Pro Leu Val Val Pro Leu Gly
1940 1945 1950

Leu Thr Gly Gly Gly Thr Pro Pro Thr Ala Gly Gly Val Pro Ala
1955 1960 1965

Val Leu Arg Gly Leu Val Arg Ser Gly Gly Arg Arg Arg Ala Gly
1970 1975 1980

Thr Ala Gly Val Ala Arg Ala Gly Leu Ala Glu Arg Leu Ala Gly
1985 1990 1995

Leu Pro Ala Asp Gly Arg Gly Ala Phe Leu Val Glu Leu Val Arg
2000 2005 2010

Ala Glu Ala Ala Thr Val Leu Gly Leu Gly Ser Gly Asp Gly Val
2015 2020 2025

Asp Ala Arg His Glu Phe Arg Arg Ile Gly Phe Asp Ser Leu Thr
2030 2035 2040

Ala Ile Glu Leu Arg Asn Arg Leu Gly Ser Ala Ser Gly Leu Thr
2045 2050 2055

Leu Pro Ala Thr Leu Ile Phe Asp Tyr Pro Thr Pro Glu Arg Leu
2060 2065 2070

Ala Ala Tyr Leu Leu Glu Glu Leu Ala Gly Glu Asp Thr Gly Pro
2075 2080 2085

Val Gly Asp Gly Pro Val Val Ala Arg Ala Asp Ala Asp Asp Pro
2090 2095 2100

Val Val Val Val Gly Ile Gly Cys Arg Phe Pro Gly Gly Val Gly
2105 2110 2115

Ser Pro Glu Gln Leu Trp Asp Leu Val Ala Asn Gly Thr Asp Ala
2120 2125 2130

Ile Thr Gly Phe Pro Pro Asp Arg Glu Trp Asp Arg His Pro Pro
2135 2140 2145

Leu Gly Gly Gly Glu Pro Ala Asp Leu Thr Gly Gln Gly Gly Phe
2150 2155 2160

Leu Asp Asp Ile Ala Gly Phe Asp Ala Glu Phe Phe Gly Ile Ala
2165 2170 2175

Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg Ile Leu Leu
2180 2185 2190

Glu Val Ala Trp Glu Ala Ala Glu Arg Ala Gly Ile Asp Pro His
2195 2200 2205

Thr Leu Arg Gly Ser Arg Thr Gly Val Phe Met Gly Val Ser Gly
2210 2215 2220

Gln Asp Tyr Ser Gly Leu Val Met Arg Ser Ala Asp Asp Ile Ala
2225 2230 2235

Ser His Ala Thr Thr Gly Leu Ala Val Ser Val Val Ser Gly Arg
2240 2245 2250

Leu Ala Tyr Val Leu Gly Leu Glu Gly Pro Ala Leu Ser Val Asp
2255 2260 2265

Thr Ala Cys Ser Ser Ser Leu Val Ser Leu His Leu Ala Ala Ala
2270 2275 2280

Ala Leu Arg Ser Gly Glu Cys Asp Met Ala Leu Ala Gly Gly Val
2285 2290 2295

Thr Val Met Thr Thr Pro Ala Asn Phe Thr Gly Phe Ser Arg Met

2300				2305				2310						
Gly	Gly	Leu	Ala	Gly	Asp	Gly	Arg	Cys	Lys	Ala	Phe	Ser	Asp	Ser
2315				2320				2325						
Ala	Asp	Gly	Thr	Gly	Trp	Ser	Glu	Gly	Ala	Ala	Val	Leu	Thr	Leu
2330				2335				2340						
Glu	Arg	Leu	Ser	Ala	Ala	Arg	Arg	His	Gly	His	Arg	Val	Leu	Ala
2345				2350				2355						
Val	Val	Arg	Gly	Ser	Ala	Val	Asn	Gln	Asp	Gly	Ala	Ser	Asn	Gly
2360				2365				2370						
Leu	Thr	Ala	Pro	Asn	Gly	Pro	Ala	Gln	Gln	Arg	Val	Ile	Arg	Gln
2375				2380				2385						
Ala	Leu	Ala	Asp	Ala	Gly	Leu	Glu	Pro	Gly	Asp	Val	Asp	Ala	Val
2390				2395				2400						
Glu	Ala	His	Gly	Thr	Gly	Thr	Pro	Leu	Gly	Asp	Pro	Ile	Glu	Ala
2405				2410				2415						
Gln	Ala	Val	Leu	Ala	Thr	Tyr	Gly	Arg	Glu	Arg	Asp	Pro	Gln	Arg
2420				2425				2430						
Pro	Leu	Leu	Leu	Gly	Ser	Val	Lys	Ser	Asn	Ile	Gly	His	Thr	Gln
2435				2440				2445						
Ser	Ala	Ala	Gly	Ala	Ala	Gly	Leu	Ile	Lys	Met	Ile	Met	Ser	Met
2450				2455				2460						
Ala	His	Gly	Glu	Leu	Pro	Arg	Thr	Leu	His	Val	Thr	Glu	Pro	Ser
2465				2470				2475						

Ser His Val Asp Trp Ser Asp Gly Thr Val Ala Leu Val Thr Glu
2480 2485 2490

Arg Thr Pro Trp Pro Glu Thr Gly His Ala Arg Arg Val Gly Val
2495 2500 2505

Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Val Leu Glu
2510 2515 2520

Gln Pro Pro Ala Thr Gln Pro Ala Pro Pro Asp Ala Ala Thr Pro
2525 2530 2535

Asp Ala Ala Ala Pro Asp Ala Ala Gly Pro Asp Ala Ala Ala Pro
2540 2545 2550

Glu Val Val Ala Trp Pro Val Ser Ala Arg Thr Glu Ala Ala Leu
2555 2560 2565

Asp Ala Gln Leu Asp Arg Leu Arg Thr Ala Val Pro Gly Leu Thr
2570 2575 2580

Pro Thr Ala Val Ala Arg Thr Leu Ala Thr Gly Arg Ala Leu Phe
2585 2590 2595

Glu His Arg Ala Val Leu Leu Ala Gly Pro Gly Gly Thr Thr Glu
2600 2605 2610

Ala Ala Arg Gly Ala Ala Ala Thr Arg Gly Thr Ala Phe Leu Phe
2615 2620 2625

Ser Gly Gln Gly Ala Gln Arg Leu Gly Met Gly Arg Glu Leu His
2630 2635 2640

Ala Arg Phe Pro Val Phe Ala Asp Ala Phe Asp Glu Ala Val Ala
2645 2650 2655

Leu Leu Asp Ala Glu Leu Gly Gly Thr Leu Arg Asp Val Val Trp
2660 2665 2670

Gly Glu Asp Pro Glu Ala Leu Asp Arg Thr Arg His Thr Gln Pro
2675 2680 2685

Ala Leu Phe Ala Leu Glu Val Ala Leu Tyr Arg Leu Val Thr Ser
2690 2695 2700

Trp Gly Ile Arg Pro Gly Arg Leu Ala Gly His Ser Ile Gly Glu
2705 2710 2715

Ile Ala Ala Ala His Val Ala Gly Val Phe Ser Leu Ala Asp Ala
2720 2725 2730

Cys Arg Leu Val Ala Ala Arg Ala Arg Leu Met Asp Ala Leu Pro
2735 2740 2745

Ala Gly Gly Ala Met Thr Ala Val Glu Ala Gly Glu Asp Glu Val
2750 2755 2760

Thr Pro Leu Leu Thr Asp Gly Val Ala Ile Ala Ala Val Asn Gly
2765 2770 2775

Pro Ala Ala Val Val Val Ser Gly Ala Ala Ala Glu Val Asp Ala
2780 2785 2790

Val Ala Ala Glu Leu Ala Ala Arg Gly Arg Arg Thr Thr Ala Leu
2795 2800 2805

Arg Val Ser His Ala Phe His Ser Pro Leu Met Asp Pro Val Leu
2810 2815 2820

Asp Glu Phe Arg Ala Val Val Arg Asp Leu Gly Tyr Glu Leu Pro

2825						2830						2835					
Ala	Ile	Pro	Val	Val	Ser	Leu	Leu	Ala	Gly	Ala	Gly	Ser	Pro	His			
2840						2845						2850					
Asp	Leu	Ala	Thr	Pro	Glu	His	Trp	Val	Arg	His	Val	Arg	Glu	Thr			
2855						2860						2865					
Val	Arg	Phe	Ala	Asp	Gly	Leu	Ala	Thr	Leu	Thr	Ala	Gly	Gly	Ala			
2870						2875						2880					
Thr	Ala	Phe	Leu	Glu	Ile	Gly	Pro	Asp	Gly	Val	Leu	Ser	Ala	Pro			
2885						2890						2895					
Ala	Arg	Ala	Val	Leu	Pro	Ala	Val	Gly	Asp	Asp	Ala	Ala	Val	Val			
2900						2905						2910					
Thr	Pro	Ala	Leu	Arg	Ala	Gly	His	Gly	Glu	Pro	Ala	Ala	Leu	Leu			
2915						2920						2925					
Thr	Ala	Leu	Ala	Arg	Leu	His	Val	Ala	Gly	Val	Asp	Val	Asp	Trp			
2930						2935						2940					
Ala	Ala	Gly	Leu	Gly	Gly	Ala	Ala	Ala	Gly	Pro	Gly	Ala	Asp	Leu			
2945						2950						2955					
Pro	Thr	Tyr	Ala	Phe	Gln	His	Glu	Arg	Phe	Trp	Pro	Arg	Leu	Ala			
2960						2965						2970					
Ala	Gly	Pro	Ala	Thr	Gly	Thr	Gly	Glu	Asp	Thr	Glu	Phe	Trp	Ala			
2975						2980						2985					
Ala	Val	Glu	Arg	Glu	Asp	Leu	Gly	Leu	Leu	Ala	Ala	His	Leu	Asp			
2990						2995						3000					

Val Asp Gly Glu Arg Leu Gly Ala Val Leu Pro Ala Leu Ala Ala
3005 3010 3015

Trp Arg Ser Arg Arg Arg Ser Asp Ala Ser Leu Asp Arg Leu Arg
3020 3025 3030

Tyr Arg Glu Ser Trp Arg Pro Leu Thr Leu Pro Thr Ala Val Glu
3035 3040 3045

Pro Gly Arg His Leu Val Leu Val Pro Ala Val Ala Ala Gly Asp
3050 3055 3060

Pro Trp Val Gly Glu Val Val Asp Ala Leu Gly Pro Asp Thr Val
3065 3070 3075

Arg Val Asp Leu Asp Gly Thr Gly Thr Asp Arg Ala Gly Leu Ala
3080 3085 3090

Ala Val Leu Thr Gly His Ala Asp Ala Gly Leu Thr Gly Ile Val
3095 3100 3105

Ser Leu Leu Ala Leu Asp Glu Thr Pro Cys Gly Ser Ala Pro Gln
3110 3115 3120

Asp Ala Ala Ser Gly Ala Asp Ala Val Pro Gly Val Asp Ala Val
3125 3130 3135

Pro Ala Gly Leu Ala Ala Thr Ala Ala Leu Ala Ala Ala Leu Ala
3140 3145 3150

Asp Thr Gly Val Thr Thr Arg Val His Ala Val Thr Arg Gly Ala
3155 3160 3165

Val Ala Pro Ala Gly Asp Gly Pro Ala Ala Pro Val Gln Ala Ala
3170 3175 3180

Val Trp Gly Leu Gly Arg Val Ala Ala Leu Glu Leu Pro Arg Arg
3185 3190 3195

Trp Gly Gly Leu Val Asp Leu Pro Ala Glu Leu Asp Ala Ala Thr
3200 3205 3210

Leu Arg Arg Leu Pro Ala Val Leu Ala Gly Glu Glu Asp Gln Val
3215 3220 3225

Ala Leu Arg Ala Thr Gly Ala His Gly Arg Arg Met Thr Pro Ala
3230 3235 3240

Pro Thr Arg Pro Ala Asp Gly Pro Asp Thr Ala Asp Thr Pro Ala
3245 3250 3255

Trp Thr Pro Ser Gly Thr Val Leu Ile Thr Gly Gly Thr Gly Ala
3260 3265 3270

Leu Gly Gly His Val Ala Arg Arg Leu Ala Ala Asp Gly Ala Glu
3275 3280 3285

His Leu Val Leu Leu Gly Arg Arg Gly Pro Asp Ala Pro Gly Val
3290 3295 3300

Asp Ala Leu Arg Ala Glu Leu Glu Ala Ser Gly Ala Ala Val Thr
3305 3310 3315

Val Leu Ala Cys Asp Ala Ala Asp Arg Ala Gln Leu Gln Ala Ala
3320 3325 3330

Leu Ala Ala Ile Pro Ala Asp Arg Pro Leu Thr Gly Val Val His
3335 3340 3345

Ala Ala Gly Val Leu Asp Asp Gly Val Leu Thr Gly Leu Thr Thr

3350

3355

3360

Asp Arg Leu Ala Gly Val Phe His Ala Lys Val Thr Pro Ala Leu
3365 3370 3375

Leu Leu Asp Glu Leu Thr Arg Asp Leu Asp Leu Asp Ala Phe Val
3380 3385 3390

Leu Phe Ser Ser Val Ala Gly Ser Val Gly Asn Pro Gly Gln Ala
3395 3400 3405

Gly Tyr Ala Ala Ala Asn Ala Ala Leu Asp Ala Leu Ala Ala Arg
3410 3415 3420

Arg Val Ala Asp Gly Arg Pro Ala Thr Ala Val Ala Trp Gly Ala
3425 3430 3435

Trp Ala Gly Ala Gly Met Ala Ala Ala His Thr Gly Thr Gly Thr
3440 3445 3450

Val Pro Asp Gly Gln Leu Asp Pro Asp Leu Ala Val Arg Ala Leu
3455 3460 3465

Val Arg Ala Val Ala Glu Pro Ala Pro Thr Leu Val Val Ala Asp
3470 3475 3480

Leu Thr His Pro Arg Leu Leu Glu Ala Leu Leu Ser Val Arg Pro
3485 3490 3495

Ser Pro Leu Leu Ala Asp Leu Pro Ala Ala Arg Asp Ile Ala Arg
3500 3505 3510

Ala Ala Gln Glu Thr Arg Arg Arg Arg Asp Asp Val Ala Gly Gly
3515 3520 3525

Leu Gly Ala Arg Leu Ala Ala Ala Gly Pro Glu Glu Arg Arg Ala
3530 3535 3540

Val Leu Leu Asp Leu Val Arg Asp Thr Ala Ala Gly Val Leu Gly
3545 3550 3555

His Thr Gly Pro Gln Ala Ile Arg Pro Gly Lys Pro Phe Gly Asp
3560 3565 3570

Leu Gly Phe Asp Ser Leu Thr Ala Val Glu Leu Ser Asn Ala Leu
3575 3580 3585

Pro Ala Ala Thr Gly Leu Ser Leu Pro Ala Ser Leu Val Phe Asp
3590 3595 3600

His Pro Thr Pro Arg Val Leu Ala Ala His Leu Val Thr Glu Leu
3605 3610 3615

Thr Gly Asp Thr Gly Gly Ala Asp Gly Ala Gly Pro Val Glu His
3620 3625 3630

Thr Ala Val Asp Gly Asp Asp Pro Val Val Val Val Ala Thr Ala
3635 3640 3645

Cys Arg Phe Pro Gly Gly Val Ser Thr Pro Glu Glu Phe Trp Gln
3650 3655 3660

Leu Leu Ala Asp Gly Gly Asp Gly Ile Thr Gly Phe Pro Thr Asp
3665 3670 3675

Arg Gly Trp Asp Leu Asp Val Leu Ala Gly Asp Gly Gln Gly Arg
3680 3685 3690

Ser Ala Thr Arg Glu Gly Gly Phe Leu His Asp Ala Ala Gly Phe
3695 3700 3705

Asp Pro Ala Phe Phe Asp Ile Ser Pro Arg Glu Ala Val Ala Met
3710 3715 3720

Asp Pro Gln Gln Arg Leu Leu Leu Glu Thr Thr Trp Glu Ala Phe
3725 3730 3735

Glu Arg Thr Gly Thr Asp Pro Ala Arg Leu Arg Gly Ser Arg Thr
3740 3745 3750

Gly Val Phe Val Gly Thr Asn Gly Gln Asp Tyr Ala Asn Leu Leu
3755 3760 3765

Leu Arg Ser Pro Asp Asp Val Glu Gly His Ala Gly Thr Gly Leu
3770 3775 3780

Ala Ala Ser Val Ile Ser Gly Arg Leu Ala Tyr Ala Phe Gly Leu
3785 3790 3795

Glu Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser Ser Leu
3800 3805 3810

Val Ala Val His Trp Ala Ala Gln Ala Leu Arg Ala Gly Glu Cys
3815 3820 3825

Asp Ala Ala Leu Ala Gly Gly Val Thr Val Met Ser Thr Ser Thr
3830 3835 3840

Ser Phe Ala Gly Phe Thr Arg Gln Gly Gly Leu Ala Pro Asp Gly
3845 3850 3855

Arg Cys Lys Ala Phe Ser Asp Asp Ala Asp Gly Thr Gly Trp Ser
3860 3865 3870

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

3875 3880 3885

Ala Arg Gly His Asp Ile Leu Ala Val Val Arg Gly Ser Ala Val
3890 3895 3900

Asn Ser Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro
3905 3910 3915

Ser Gln Gln Arg Val Ile Arg Gln Ala Leu Ala Ser Gly Gly Leu
3920 3925 3930

Thr Pro Ala Asp Val Asp Ala Val Glu Ala His Gly Thr Gly Thr
3935 3940 3945

Val Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu Leu Ala Ala Tyr
3950 3955 3960

Gly Arg Asp Arg Glu His Pro Leu Leu Leu Gly Ser Val Lys Ser
3965 3970 3975

Asn Ile Gly His Thr Gln Ala Ala Ala Gly Ala Ala Gly Leu Ile
3980 3985 3990

Lys Met Ile Leu Ala Leu Gln His Gly Thr Leu Pro Arg Thr Leu
3995 4000 4005

His Val Thr Asp Pro Ser Ser Arg Val Asp Trp Thr Ala Gly Ala
4010 4015 4020

Val Glu Leu Val Thr Glu Gln Val Pro Trp Pro Glu Thr Gly Arg
4025 4030 4035

Ala Arg Arg Ala Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn
4040 4045 4050

Ala His Val Val Leu Glu Gln Ala Pro Gln Leu Pro Glu Pro Thr
4055 4060 4065

Arg Ala Pro Ala Pro Val Val Thr Pro Trp Val Val Ser Ala Arg
4070 4075 4080

Ser Ala Ala Ala Leu Asp Ala Gln Leu Asp Arg Leu Arg Ala Ala
4085 4090 4095

Thr Gly Gly Pro Asp Leu Thr Thr Ala Ala Glu Val Gly His Ala
4100 4105 4110

Leu Ala Val Gly Arg Ser Leu Phe Glu His Arg Ala Val Leu Leu
4115 4120 4125

Ala Asp Ala Asp Gly Val Thr Glu Val Ala Arg Gly Glu Ala Ala
4130 4135 4140

Glu Arg Ser Thr Ala Phe Leu Phe Ser Gly Gln Gly Ala Gln Arg
4145 4150 4155

Leu Gly Met Gly Arg Ala Leu His Ala Arg His Pro Val Phe Ala
4160 4165 4170

Asp Ala Leu Asp Thr Thr Leu Ala His Leu Asp Pro Thr Val Arg
4175 4180 4185

Ala Val Leu Trp Gly Glu Asp Pro Thr Ala Leu Asp Asp Thr Gly
4190 4195 4200

Val Thr Gln Pro Ala Leu Phe Ala Val Glu Val Ala Leu Phe Arg
4205 4210 4215

Leu Leu Glu Ser Trp Gly Val Thr Ser Asp Ala Val Ala Gly His
4220 4225 4230

Ser Val Gly Glu Val Ala Ala Ala His Val Ala Gly Val Phe Thr
4235 4240 4245

Leu Asp Glu Ala Cys Thr Leu Val Thr Ala Arg Ala Arg Leu Met
4250 4255 4260

Ala Ala Leu Pro Val Gly Gly Ala Met Val Ala Val Glu Ala Asp
4265 4270 4275

Pro Gly Asp Val Thr Pro Leu Leu Thr Gly Gly Val Ala Val Ala
4280 4285 4290

Ala Val Asn Gly Pro Ser Ala Val Val Leu Ser Gly Pro Thr Asp
4295 4300 4305

Glu Val Ser Ala Val Ala Asp Ala Leu Ala Ala Arg Gly Cys Arg
4310 4315 4320

Thr Arg Ala Leu Arg Val Ser His Ala Phe His Ser Pro Leu Met
4325 4330 4335

Glu Pro Met Leu Asp Gly Phe Arg Asp Val Val Ala Gly Leu Asn
4340 4345 4350

Pro Val Glu Pro Arg Ile Pro Val Val Ser Thr Val Thr Gly Ala
4355 4360 4365

Ala Ala Thr Thr Glu Leu Cys Asp Pro Gln His Trp Val Arg Gly
4370 4375 4380

Val Arg Asp Thr Val Arg Phe Ala Asp Ala Val Arg Thr Leu Thr
4385 4390 4395

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

4400						4405						4410					
Leu	Ser	Ala	Pro	Thr	Arg	Ala	Cys	Val	Glu	Asp	Thr	Ala	Val	Val			
4415					4420					4425							
Val	Pro	Ala	Leu	Arg	Gly	Pro	Asp	Thr	Glu	Glu	Arg	Ala	Leu	Leu			
4430					4435					4440							
Thr	Ala	Leu	Gly	Arg	Leu	His	Val	Ala	Gly	Thr	Gly	Val	Asp	Trp			
4445					4450					4455							
Thr	Ala	Val	Leu	Ala	Gly	Thr	Ala	Ala	Gly	Arg	Val	Ala	Leu	Pro			
4460					4465					4470							
Thr	Tyr	Pro	Phe	Gln	Arg	Glu	Arg	Phe	Trp	Pro	Thr	Val	Ala	Ala			
4475					4480					4485							
Thr	Ala	Pro	Ala	Asp	Ala	Gly	Gly	Leu	Gly	Leu	Arg	Ala	Gly	Gly			
4490					4495					4500							
His	Pro	Leu	Leu	Gly	Ala	Ala	Thr	Thr	Val	Ala	Gly	Ser	Gly	Glu			
4505					4510					4515							
Ile	Leu	Leu	Thr	Gly	Arg	Leu	Thr	Pro	Thr	Leu	Val	Asp	Pro	Ala			
4520					4525					4530							
Ala	Gly	Asp	Leu	Pro	Ala	Leu	Pro	Ala	Ala	Val	Leu	Ala	Glu	Leu			
4535					4540					4545							
Ala	Val	Arg	Ala	Gly	Asp	Glu	Ala	Gly	Val	Thr	Thr	Val	Glu	Glu			
4550					4555					4560							
Leu	Thr	Ile	Thr	Ala	Pro	Leu	Gly	Ser	Gly	Thr	Ala	Gln	Leu	Leu			
4565					4570					4575							

Gln Val Arg Val Gly Glu Pro Asp Asp Asp Gly Arg Arg Thr Leu
4580 4585 4590

Ala Val His Ala Arg Ala Ala Asp Asp Pro Asp Gly Pro Trp Thr
4595 4600 4605

Arg His Ala Gly Gly Thr Leu Ser Ala Ala Ala Ala Pro Val Pro
4610 4615 4620

Glu Pro Glu Pro Val Trp Pro Pro Gln Gly Ala Glu Ala Leu Thr
4625 4630 4635

Gly Leu Pro Asp Thr Val Gly Pro Val Arg Val Arg Gly Gly Trp
4640 4645 4650

Arg His Asp Gly Asp Leu Leu Ala Glu Leu Glu Leu Thr Glu Gln
4655 4660 4665

Pro Ala Gly Tyr Thr Leu His Pro Ala Leu Leu Asp Val Ala Val
4670 4675 4680

Arg Phe Gly Ala Ala Thr Asp Val Ala Asp Leu Thr Ala Leu Arg
4685 4690 4695

Gly Leu Thr Leu His Ala Ser Asp Ala Thr Val Leu Arg Val Arg
4700 4705 4710

Leu Thr Asp Arg Gly Asp Gly Thr Arg Ala Leu Ala Ala Trp Asp
4715 4720 4725

Ala Gln Gly Ala Pro Val Leu Thr Ala Gly Glu Leu Thr Leu Ala
4730 4735 4740

Glu Pro Thr Ala Ala Asp Gly Pro Ala Ala Ser Thr Asp Ala Val
4745 4750 4755

Leu Leu Thr Leu Asp Trp Thr Ala Ala Pro Ala Val Asp Arg Ala
4760 4765 4770

Gly Thr Ala Gly Trp Gly Ile Leu Gly Asp Ala Pro Ala Glu Leu
4775 4780 4785

Gly Ala Ala Leu Ala Ala Ser Gly Pro Thr Pro Pro Val Arg Ala
4790 4795 4800

Gly Ser Val Gly Ala Leu Leu Asp Ser Gly Asp Pro Leu Pro Pro
4805 4810 4815

Val Val Leu Ala Pro Ile Thr Gly Ala Pro Ile Thr Gly Ala Pro
4820 4825 4830

Ile Thr Gly Ala Pro Ile Thr Gly Ala Pro Gly Ala Gly Thr Pro
4835 4840 4845

Asp Met Gly Gly Ala Asp Leu Pro Gly Arg Thr Arg Ala Thr Thr
4850 4855 4860

Gly Ala Val Leu Glu Leu Leu Gln Arg Trp Ser Gly Asp Ser Arg
4865 4870 4875

Thr Ala Gly Ser Arg Leu Val Val Val Thr Arg Gly Ala Val Ala
4880 4885 4890

Thr Gly Pro Ala Glu Asp Val His Asp Leu Gly Ala Ala Pro Val
4895 4900 4905

Trp Gly Leu Val Arg Ser Ala Gln Ser Glu Val Pro Gly Ser Met
4910 4915 4920

Leu Leu Leu Asp Leu Asp Pro Ala Asp Pro Gly Ala Gly Pro Asp

4925

4930

4935

Ala Ala Leu Ala Ala Leu Pro Gly Leu Ala Ala Ala Gly Glu Thr
4940 4945 4950

Gln Ala Ala Val Arg Gly Gly Ala Leu Thr Val Ala Arg Leu Thr
4955 4960 4965

Arg Ala Thr Pro Asp Ala Pro Ala Pro Ala Ala Ala Trp Ala Pro
4970 4975 4980

Asp Gly Thr Val Leu Val Thr Gly Gly Thr Gly Gly Leu Gly Ala
4985 4990 4995

Leu Leu Ala Arg His Leu Val Thr Thr Arg Gly Val Arg His Leu
5000 5005 5010

Leu Leu Ala Gly Arg Arg Gly Pro Asp Ala Pro Gly Ala Ala Gln
5015 5020 5025

Leu Arg Ala Glu Leu Ala Ala Leu Gly Ala Glu Val Thr Leu Ala
5030 5035 5040

Ala Cys Asp Val Ala Asp Pro Ala Ala Val Ala Glu Leu Val Gly
5045 5050 5055

Ala Val Pro Ala Ala His Pro Leu Thr Ala Val Val His Thr Ala
5060 5065 5070

Gly Val Leu Asp Asp Ala Thr Val Gly Ser Leu Asp Ala Ala Arg
5075 5080 5085

Met Asp Arg Val Leu Arg Pro Lys Ala Asp Ala Ala Trp His Leu
5090 5095 5100

His Glu Ala Thr Arg Asp Leu Pro Leu Ala Ala Phe Val Leu Tyr
5105 5110 5115

Ser Ser Val Ala Gly Ile Thr Gly Gly Pro Gly Gln Gly Asn Tyr
5120 5125 5130

Ala Ala Ala Asn Thr Leu Leu Asp Ala Leu Ala Ala His Arg Ala
5135 5140 5145

Ala His Gly Leu Pro Gly Leu Ser Leu Ala Trp Gly Pro Trp Ser
5150 5155 5160

Ala Asp Ala Gly Met Thr Gly Thr Leu Asp Ala Ala Glu Arg Glu
5165 5170 5175

Arg His Glu Arg Ser Gly Met Pro Pro Leu Gln Pro Ala Gln Gly
5180 5185 5190

Leu Ala Leu Phe Asp Thr Ala Leu Ala Arg Gly Asp Arg Phe Ala
5195 5200 5205

Val Ala Ala Arg Phe Ala Ala Gly Ala Gly Thr Ala Val Asp Asp
5210 5215 5220

Val Pro Ala Val Leu Arg Ala Leu Val Arg Ser Met Arg Arg Thr
5225 5230 5235

Ala Ala Ala Thr Glu Gly Ala Gly Gly Leu Leu Arg Arg Leu Ala
5240 5245 5250

Gly Met Glu Pro Gly Ala Arg His Ala Glu Leu Leu Ala Leu Val
5255 5260 5265

Arg Ala Glu Thr Ala Ala Val Leu Gly His Thr Gly Ala Glu Ala
5270 5275 5280

Val Pro Ala Asp Arg His Phe Ser Arg Leu Gly Phe Asp Ser Leu
5285 5290 5295

Thr Gly Leu Glu Leu Arg Met Arg Leu Ala Ala Ala Thr Gly Ser
5300 5305 5310

Arg Leu Pro Ala Thr Leu Val Phe Asp His Pro Thr Pro Ala Glu
5315 5320 5325

Val Ala Arg His Leu Asp Glu Glu Val Leu Gly Ser Ala Asp Arg
5330 5335 5340

Gly Ala Ser Ser Pro Leu Ala Glu Leu Asp Arg Leu Glu Ala Ala
5345 5350 5355

Leu Ser Pro Asp Gly Ala Asp Ala Glu Thr Arg Ser Gly Val Ala
5360 5365 5370

Arg Arg Leu Arg Arg Leu Leu Glu Gln Trp Asp Gly Ala Arg Thr
5375 5380 5385

Asp Gly Ala Asp Pro Asp Gly Arg Thr Ala Val Asp Glu Arg Leu
5390 5395 5400

Glu Ser Ala Ser Thr Glu Gln Val Leu Ala Phe Ile Asp Asn Glu
5405 5410 5415

Leu Gly Arg Ser Ser Ala Arg
5420 5425

<210> 8
<211> 2031
<212> PRT
<213> Pseudonocardia autotrophica

<400> 8

Met Pro Asp Glu Gln Lys Leu Val Asp Tyr Leu Lys Trp Val Thr Ala
1 5 10 15

Asp Leu His Asp Thr Arg Arg Arg Leu Ala Glu Ala Glu Ala Ala Arg
20 25 30

His Glu Pro Val Ala Ile Val Gly Met Ala Cys Arg Phe Pro Gly Gly
35 40 45

Val Arg Ser Pro Glu Asp Leu Trp Glu Leu Leu Thr Ala Gly Arg Asp
50 55 60

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

Ala Gly Asp Gly Pro Ala Ala Ser Ala Thr Gln Arg Gly Gly Phe Leu
85 90 95

Pro Gly Ala Ala Glu Phe Asp Pro Ala Phe Phe Asp Ile Ser Pro Arg
100 105 110

Glu Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Thr Ala
115 120 125

Trp Glu Ala Phe Glu Arg Ser Gly Ile Asp Pro Ala Gly Leu Arg Gly
130 135 140

Ser Arg Thr Gly Val Phe Val Gly Thr Asn Gly Gln Asp Tyr Thr His
145 150 155 160

Leu Val Leu Ala Ser Ala Asp Asp Met Gly Gly Tyr Ala Gly Asn Gly
165 170 175

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

180 185 190

Gln Gly Pro Ala Val Thr Leu Asp Thr Ala Cys Ser Ser Ala Leu Val
195 200 205

Gly Met His Leu Ala Ala Gln Ala Val Arg Ser Gly Glu Cys Gly Leu
210 215 220

Ala Leu Ala Gly Gly Val Thr Val Met Thr Thr Pro Ala Asn Phe Ser
225 230 235 240

Gly Phe Ser Leu His Gly Gly Leu Ala Pro Asp Gly Arg Cys Lys Ala
245 250 255

Phe Ala Asp Gly Ala Asp Gly Thr Gly Trp Ser Glu Gly Ile Gly Leu
260 265 270

Leu Val Val Glu Lys Leu Ala Asp Ala Arg Ala His Gly His Pro Val
275 280 285

Leu Ala Val Leu Arg Gly Ser Ala Val Asn Ser Asp Gly Ala Ser Asn
290 295 300

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

Ala Leu Ala Ser Gly Gly Leu Ser Pro Ala Asp Val Asp Ala Val Glu
325 330 335

Ala His Gly Thr Gly Thr Ala Leu Gly Asp Pro Ile Glu Ala Gln Ala
340 345 350

Leu Leu Ala Thr Tyr Gly Ala Asp Arg Asp Pro Asp Arg Pro Leu Leu
355 360 365

Leu Gly Ser Val Lys Ser Asn Leu Gly His Thr Gln Ala Ala Ala Gly

370

375

380

Ala Ala Gly Val Ile Arg Thr Val Leu Ala Leu Gln His Arg Thr Leu
385 390 395 400

Pro Arg Thr Leu His Val Asp Ala Pro Ser Ser His Val Asp Trp Ser
405 410 415

Ala Gly Ala Val Arg Leu Leu Thr Gly Gln Thr Ala Trp Pro Asp Thr
420 425 430

Gly Arg Ala Arg Arg Ala Gly Val Ser Ser Phe Gly Ile Ser Gly Thr
435 440 445

Asn Ala His Val Val Leu Glu Gln Ala Pro Thr Asp Pro Ala Glu Pro
450 455 460

Thr Gly Ser Thr Val Pro Thr Gly Pro Ala Val Arg Pro Gln Ala Val
465 470 475 480

Ala Trp Pro Val Ser Ala Arg Ser Ala Thr Ala Leu Asp Ala Gln Leu
485 490 495

Glu Arg Val Arg Ala Leu Ala Ala Pro Val Pro Ala Asp Val Gly
500 505 510

Gln Ala Leu Ala Thr Thr Arg Thr Pro Phe Ala His Arg Ala Leu Leu
515 520 525

Val His Thr Gly Asp Gly Leu Thr Glu Ala Ala Arg Asp Val Val Pro
530 535 540

Thr Gly Asp Arg Gly Gly Leu Ala Val Leu Phe Ser Gly Gln Gly Ser
545 550 555 560

Gln Arg Leu Gly Ala Gly Cys Glu Leu His Ala Arg Phe Ala Val Phe
565 570 575

Ala Ala Ala Phe Asp Glu Thr Val Ala Leu Leu Asp Ala Arg Leu Gly
580 585 590

Ala Ser Leu Arg Glu Val Val Trp Gly Ser Asp Arg Ala Ala Leu Asp
595 600 605

Asp Thr Arg Phe Thr Gln Pro Ala Leu Phe Ala Thr Glu Val Ala Leu
610 615 620

His Arg Leu Val Glu Ser Trp Gly Val Arg Pro Gly His Val Gly Gly
625 630 635 640

His Ser Val Gly Glu Ile Thr Ala Ala His Val Ala Gly Ile Leu Ser
645 650 655

Leu Asp Asp Ala Cys Thr Leu Val Ala Ala Arg Ala Arg Leu Met Ala
660 665 670

Asp Leu Pro Ala Gly Gly Ala Met Val Ala Leu Gln Ala Arg Glu Asp
675 680 685

Glu Val Ala Pro Leu Leu Gly Asp Asp Val Ala Ile Ala Ala Val Asn
690 695 700

Gly Pro Asp Ala Val Val Val Ser Gly Asp Ala Asp Ala Val Ala Ala
705 710 715 720

Val Ala Ala Arg Phe Glu Asp Arg Gly Arg Arg Ile Arg Thr Leu Ser
725 730 735

Val Ser His Ala Phe His Ser Pro Leu Ile Asp Pro Met Leu Ala Glu
740 745 750

Phe Ala Arg Val Val Asp Gly Leu Thr Phe Ala Glu Pro Arg Ile Pro
755 760 765

Val Val Ser Asn Leu Thr Gly Glu Val Ser Gly Glu Leu Thr Asp Pro
770 775 780

Gly Tyr Trp Val Arg His Ala Arg Gly Ala Val Arg Phe Gly Asp Gly
785 790 795 800

Val Ala Ala Leu Ala Gly Leu Gly Val Arg Thr Phe Leu Glu Leu Gly
805 810 815

Pro Asp Ala Val Leu Ser Ala Leu Val Ala Glu Asn Ala Pro Gly Ala
820 825 830

Val Ala Val Pro Ala Leu Arg Arg Gly Ala Gly Glu Glu Ala Thr Leu
835 840 845

Leu Val Ala Ala Gly Ala Leu Trp Thr Arg Gly Thr Asp Val Asp Trp
850 855 860

Ala Ala Val Ala Glu Gly Thr Thr Thr Pro Gly Ala Ala Pro Val Thr
865 870 875 880

Leu Pro Thr Tyr Ala Phe Asp Arg Glu Arg Tyr Trp Pro Thr Leu Arg
885 890 895

Ala Ala Thr Gly Asp Ala Ala Gly Leu Gly Leu Thr Ala Ala Gly His
900 905 910

Pro Leu Leu Gly Ala Ala Val Val Leu Ala Asp Ala Asp Arg Thr Val
915 920 925

Leu Thr Gly Arg Leu Ser Pro Arg Thr Gln Pro Trp Leu Gly Pro Glu
930 935 940

Arg Thr Asp Gly Arg Val Asp Val Pro Gly Ala Val Phe Ala Glu Leu
945 950 955 960

Ala Ile Arg Ala Gly Asp Gln Val Gly Ala Pro His Ile Ala Glu Leu
965 970 975

Asp Leu Leu Ala Pro Leu Ala Val Gly Arg Asp Gly Ala Val Leu Gln
980 985 990

Val Gly Val Gly Ala Pro Gly Asp Arg Gly Arg Arg Asp Leu Thr Val
995 1000 1005

His Ala Arg Ser Ser Asp Asp Ala Pro Trp Thr Leu His Ala Arg
1010 1015 1020

Gly Val Leu Ala His Glu Ala Asp Arg Val Gly Thr Thr Asp Pro
1025 1030 1035

Gly Glu Trp Pro Pro Arg Asp Ala Arg Ala Val Pro Ala Arg Asp
1040 1045 1050

Thr Gly Pro Asp Gln Val Trp Val Arg Asp Gly Glu Val Leu Ala
1055 1060 1065

Glu Val Thr Leu Pro Thr Gly Ala Ala Ala Asp Gly Tyr Gly Leu
1070 1075 1080

His Pro Ala Leu Leu Gly Ala Ala Leu Ala Thr Ala Ser Ala Leu
1085 1090 1095

Asp Gly Gly Pro Thr Ala Thr Ala Asp Pro Gly Ala Gly Pro Ala
1100 1105 1110

Arg Ile Glu Gly Leu Thr Leu His Ala Thr Gly Ala Thr Thr Leu
1115 1120 1125

Arg Val Arg Leu Thr Gly Thr Gly Thr Gly Thr Phe Gly Leu Val

1130	1135	1140
Ala Thr Asp Pro Thr Gly Ala Pro Val Leu Thr Ala Asp Ala Val		
1145	1150	1155
His Thr Gly Thr Gly Asp Thr Gln Ala Pro Ala Ala Thr Gly Gln		
1160	1165	1170
Gly Gly Leu Phe Gly Leu His Trp Thr Pro Val Glu Leu Gly Asp		
1175	1180	1185
Arg Ala Ala Gly Thr Arg Trp Ala Val Val Gly Asp Asp Glu Leu		
1190	1195	1200
Asp Leu Gly Tyr Ala Met His Arg Ala Asp Glu Thr Val Ser Ala		
1205	1210	1215
Tyr Ala Glu Ser Leu Gly Gly Ala Val Gly Asp Thr Gly Leu Ala		
1220	1225	1230
Pro Asp Val Phe Leu Ile Pro Val Val Gly Asp Pro Asp Gly Gly		
1235	1240	1245
Ala Ala Ala Val His Thr Leu Thr Thr Arg Val Leu Gly Leu Leu		
1250	1255	1260
Gln Glu Trp Leu Ala Glu Pro Arg Leu Ala Asp Ala Arg Leu Val		
1265	1270	1275
Val Val Thr Arg Gly Ala Val Ala Ala Asp Gly Glu Thr Val Thr		
1280	1285	1290
Asp Pro Ala Ala Ala Ala Val Trp Gly Leu Val Arg Ala Ala Gln		
1295	1300	1305

Thr Glu Asn Pro Gly Arg Ile Arg Leu Val Asp Leu Asp Asp Thr
1310 1315 1320

Phe Arg Ser Ala Gly Val Leu Pro His Leu Leu Leu Leu Asp Glu
1325 1330 1335

Gln Gln Leu Leu Val Arg Glu His Glu Val Arg Ala Ala Arg Leu
1340 1345 1350

Ala Arg Leu Pro Glu Ile Ala Pro Asp Thr Val Pro Asp Thr Ala
1355 1360 1365

Arg Thr Ala Ala Asp Trp Asp Pro Asp Gly Thr Val Leu Val Thr
1370 1375 1380

Gly Gly Thr Gly Gly Leu Gly Ala Leu Leu Ala Arg His Leu Val
1385 1390 1395

Thr Thr Gly Arg Thr Arg Asn Leu Leu Leu Ala Ser Arg Arg Gly
1400 1405 1410

Pro Asp Ala Pro Gly Ala Ala Glu Leu Cys Glu Glu Leu Thr Glu
1415 1420 1425

Leu Gly Ala Ala Val Ala Val Thr Ala Cys Asp Ala Gly Asp Pro
1430 1435 1440

Asp Ala Val Ala Ala Leu Val Gly Ser Val Pro Ala Gly His Pro
1445 1450 1455

Leu Thr Ala Val Val His Thr Ala Gly Val Leu Asp Asp Gly Leu
1460 1465 1470

Thr Gly Ser Leu Thr Pro Glu Arg Leu Ala Gly Val Leu Arg Pro
1475 1480 1485

Lys Leu Asp Ala Ala Trp His Leu His Ala Ala Thr Arg Glu Leu
1490 1495 1500

Pro Leu Ala Gly Phe Val Leu Tyr Ser Ser Val Ser Gly Ile Leu
1505 1510 1515

Gly Ser Ala Gly Gln Ala Asn Tyr Ala Ala Ala Asn Ala Gly Leu
1520 1525 1530

Asp Gly Leu Ala Gly Tyr Arg Ala Gly Leu Gly Leu Pro Ala Val
1535 1540 1545

Ser Leu Gly Trp Gly Pro Trp Gly Arg Gly Ser Gly Met Thr Glu
1550 1555 1560

Gln Val Thr Asp Ala Asp Leu Asp Arg Met Ala Arg Gly Gly Leu
1565 1570 1575

Pro Ala Leu Asp Ala Ala Asp Gly Leu Ala Leu Phe Asp Ala Ala
1580 1585 1590

Leu Ala Arg Pro Glu Pro Val Val Val Pro Thr Arg Ile Asn Val
1595 1600 1605

Ala Gly Leu Ala Val Gln Gln Ala Leu Pro Ala Leu Trp Arg Asp
1610 1615 1620

Leu Val Pro Arg Thr Arg Arg Thr Ala Ala Val Ala Gly Ser Ser
1625 1630 1635

Pro Val Thr Val Arg Glu Arg Leu His Arg Leu Asp Ala Ala Gly
1640 1645 1650

Arg Glu Ala Leu Leu Val Glu Leu Val Thr Gly Tyr Thr Ala Gly

1655				1660				1665						
Leu	Leu	Gly	His	Glu	Asp	Ala	Ala	Ala	Val	Asp	Pro	Glu	Arg	Gly
1670				1675				1680						
Phe	Leu	Glu	Leu	Gly	Phe	Asp	Ser	Leu	Val	Ala	Val	Gly	Leu	Arg
1685				1690				1695						
Asn	Gln	Leu	Gly	Glu	Val	Leu	Gly	Leu	Arg	Leu	Ala	Gly	Ser	Ile
1700				1705				1710						
Val	Phe	Asp	Ser	Thr	Thr	Pro	Val	Lys	Leu	Ala	Arg	Arg	Leu	His
1715				1720				1725						
Glu	Leu	Val	Glu	Gln	Ala	Pro	Ala	Pro	Gly	Ala	Ser	Pro	Ala	Val
1730				1735				1740						
Val	Ala	Gly	Arg	Pro	Ala	Gln	Pro	Gly	Glu	Glu	Thr	Leu	Val	Gly
1745				1750				1755						
Leu	Phe	His	Ala	Ala	Val	Arg	Gly	Gly	Lys	Leu	Val	Glu	Ala	Met
1760				1765				1770						
Arg	Met	Leu	Lys	Ala	Ala	Ala	Asn	Thr	Arg	Pro	Met	Phe	Glu	Ser
1775				1780				1785						
Pro	Ala	Glu	Leu	Glu	Glu	Leu	Ser	Glu	Pro	Val	Thr	Leu	Ala	Glu
1790				1795				1800						
Gly	Pro	Ala	Ala	Pro	Arg	Leu	Ile	Phe	Val	Ser	Ala	Pro	Gly	Ala
1805				1810				1815						
Thr	Gly	Gly	Val	His	Gln	Tyr	Ala	Arg	Ile	Ala	Ala	His	Phe	Arg
1820				1825				1830						

Gly Ser Arg His Val Ser Ala Leu Pro Leu Met Gly Phe Ala Pro
1835 1840 1845

Gly Glu Leu Leu Pro Ala Thr Ser Glu Ala Ala Ala Arg Ile Val
1850 1855 1860

Ala Glu Ser Val Leu Leu Ala Ser Asp Gly Glu Pro Phe Val Met
1865 1870 1875

Val Gly His Ser Thr Gly Gly Ser Leu Ala Tyr Leu Ala Ala Gly
1880 1885 1890

Val Leu Glu Glu Thr Trp Gly Val Arg Pro Glu Ala Val Val Leu
1895 1900 1905

Leu Asp Thr Ala Ser Ile Arg Trp Asp Ala Ala Glu Gly Asn Asp
1910 1915 1920

Leu Asp Arg Thr Thr Arg Phe Tyr Leu Ala Asp Ile Asp Ser Pro
1925 1930 1935

Ser Val Thr Leu Asn Ser Ala Arg Met Ser Ala Met Ala His Trp
1940 1945 1950

Phe Met Thr Met Thr Glu Ile Asp Ser Pro Pro Thr Thr Ala Pro
1955 1960 1965

Thr Leu Leu Val Arg Ala Ala Arg Asp Val Glu Gly Phe Ile Leu
1970 1975 1980

Asp Thr Ser Ala Val Pro Ala Asp Thr Val Val Asp Ile Asp Ala
1985 1990 1995

Asp His Leu Ser Leu Ala Met Glu His Ser Ala Leu Thr Ala Asp
2000 2005 2010

Ala Ile Glu Thr Trp Leu Ala Glu Leu Pro Thr Pro Thr Thr Glu
2015 2020 2025

Asp Ala Ser
2030

<210> 9
<211> 403
<212> PRT
<213> Pseudonocardia autotrophica

<400> 9

Met Thr Ser Pro Thr Thr Cys Pro Val Thr Gly Gly Gly Pro Pro Pro
1 5 10 15

Ser Leu Glu Gly Gln Thr Pro Pro Val Leu Arg Leu Ser Pro Leu Leu
20 25 30

Arg Glu Leu Gln Gln Gln Ala Pro Val Cys Arg Val Arg Thr Pro Thr
35 40 45

Gly Asp Glu Ala Trp Leu Val Thr Arg Tyr Ala Glu Leu Lys Ala Leu
50 55 60

Leu His Asp Glu Arg Leu Gly Arg Ala His Ala Asp Pro Ala Asn Ala
65 70 75 80

Pro Arg Tyr Val Arg Asn Pro Phe Leu Asp Leu Leu Val Val Asp Asp
85 90 95

Ala Gln Gln Ala Arg Asp Leu His Thr Glu Met Arg Arg Leu Leu Thr
100 105 110

Pro Gln Phe Ser Ala Arg Arg Val Leu Gly Leu Ala Pro Thr Val Ser
115 120 125

Ala Val Ala Glu Gln Val Leu Asp Gly Phe Val Ala Ala Gly Asn Pro
130 135 140

Gly Asp Leu His Gly Gly Phe Ser Met Leu Ala Thr Arg Met Thr Val
145 150 155 160

Leu Cys Glu Leu Ile Gly Ile Pro Pro Gln Asp Arg Pro Glu Thr Gly
165 170 175

Ala Cys Thr Ile Met Thr Met Gly Glu Val Asp Asp Val Glu Arg Val
180 185 190

Ala Thr Val Gln Ala Glu Leu Phe Gly Leu Leu Ser Ala Val Pro Arg
195 200 205

Arg Lys Arg Ala Glu Pro Thr Asp Asp Val Val Ser Arg Leu Phe Ala
210 215 220

Gln Val Pro Asp Glu Arg Ile Gly Pro Ile Ala Ala Gly Val Leu Leu
225 230 235 240

Ala Gly Leu Asp Ser Val Pro Ser His Val Asp Leu Gly Val Leu Leu
245 250 255

Phe Ala Thr His Pro Asp Gln Leu Ala Ala Ala Leu Ala Asp Glu Arg
260 265 270

Thr Met Arg Glu Gly Val Glu Glu Ile Leu Arg Cys Ala Lys Ala Gly
275 280 285

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

Val Thr Leu Arg Thr Gly Asp Leu Val Leu Leu Asp Phe Thr Leu Val
305 310 315 320

Asn Phe Asp Thr Gln Val Phe Asp Glu Pro Glu Val Phe Asp Ile Arg
325 330 335

Arg Glu Ser Asn Pro His Leu Thr Phe Gly His Gly Met Trp His Cys
340 345 350

Ile Gly Ala Pro Leu Ala Arg Met Ala Leu Arg Thr Ala Phe Thr Arg
355 360 365

Leu Phe Thr Arg Leu Pro Asp Leu Arg Pro Ala Arg Pro Val Gln Glu
370 375 380

Met Arg Arg Gly Ser Glu Gly Leu Ser Gly Gly Leu Thr Glu Leu Pro
385 390 395 400

Val Thr Trp

<210> 10
<211> 413
<212> PRT
<213> Pseudonocardia autotrophica

<400> 10

Met Ser Thr Gly Thr Ala Arg Ser Thr Pro Ser Asp Thr Ala Thr Gly
1 5 10 15

Cys Pro Val Thr Gly Ala Gly Ala Gly Ala Ala Thr Cys Pro Val Ala
20 25 30

Phe Pro Leu Arg Arg Pro Gly Arg Pro Phe Pro Pro Pro Glu Tyr Ala
35 40 45

Asp Tyr Arg Asp Gly Gly Glu Pro Val Arg Ser Glu Leu Pro Ser Gly
50 55 60

Pro Val Trp Leu Val Thr Arg His Ala Asp Val Arg Ala Val Leu Thr
65 70 75 80

Asp Pro Arg Ile Ser Ala Asp Pro Ser Arg Pro Gly Phe Pro Lys Ala
85 90 95

Ala Arg Thr Gly Gly Ala Pro Ser Ala Asp Glu Val Pro Gly Trp Phe
100 105 110

Val Ser Met Asp Pro Pro Glu His Asp Arg Phe Arg Arg Thr Leu Ile
115 120 125

Pro Glu Phe Thr Val Arg Lys Val Arg Ala Leu Arg Pro Glu Ile Gln
130 135 140

Gln Ile Val Asp Asp Arg Ile Glu Ala Ile Leu Ala Lys Asp Gly Ala
145 150 155 160

Ala Asp Leu Ile Glu Asp Phe Ala Leu Pro Val Pro Ser Leu Val Ile
165 170 175

Ala Gly Met Leu Gly Val Pro Arg Ala Asp Arg Asp Phe Phe Glu Ala
180 185 190

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

Ala Ala Thr Ala Ala Leu Leu Arg Tyr Leu Gly Arg Leu Ile Arg Ile
210 215 220

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

Gly Thr Leu Ser Arg Gln Glu Leu Ser Gly Val Ala Met Leu Leu Leu
245 250 255

Ile Ala Gly His Glu Thr Thr Ala Asn Asn Ile Gly Leu Gly Ile Val
260 265 270

Gln Leu Leu Thr Asn Pro Gln Trp Ile Gly Asp Asp Arg Val Val Glu
275 280 285

Glu Leu Leu Arg Tyr Tyr Ser Val Ala Asp Leu Val Ala Phe Arg Val
290 295 300

Ala Leu Ala Asp Val Glu Ile Gly Gly Arg Thr Ile Arg Ala Gly Glu
305 310 315 320

Gly Ile Leu Pro Leu Leu Ala Ala Ala Asn His Asp Asp Asp Ala Phe
325 330 335

Asp Gly Ala Gly Ala Phe Asp Pro Glu Arg Ser Ala Arg Ser His Val
340 345 350

Ala Phe Gly Tyr Gly Val His Gln Cys Leu Gly Gln Asn Leu Val Arg
355 360 365

Leu Glu Met Glu Ile Ala Tyr Arg Thr Leu Phe Asp Arg Ile Pro Thr
370 375 380

Leu Arg Leu Ala Val Pro Ala Asp Asp Leu Arg Val Lys Tyr Asp Gly
385 390 395 400

Val Leu Phe Gly Leu His Glu Leu Pro Val Thr Trp Gly
405 410

<210> 11

<211> 352

<212> PRT

<213> Pseudonocardia autotrophica

<400> 11

Met Ser Phe Thr Gln Pro Val Ser Lys Pro Trp Leu Asp Gly His Glu
1 5 10 15

Leu Asp Tyr Val Thr Asp Ala Val Gly Gly Gly Trp Ile Ser Ser Gln
20 25 30

Gly Pro Tyr Ile Ala Arg Phe Glu Glu Ala Phe Ala Ala Trp Asn Gly
35 40 45

Val Pro His Gly Val Ala Cys Ser Ser Gly Thr Thr Ala Leu Thr Leu
50 55 60

Ala Leu Arg Ala Leu Gly Val Gly Pro Gly Asp Glu Val Ile Val Pro
65 70 75 80

Glu Phe Thr Met Ile Ala Ser Ala Trp Ala Val Thr Tyr Thr Gly Ala
85 90 95

Thr Pro Val Phe Val Asp Cys Gly Asp Asp Leu Asn Ile Asp Val Thr
100 105 110

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

His Val Tyr Gly Arg Arg Cys Asp Met Glu Pro Ile Leu Glu Leu Ala
130 135 140

Tyr Glu Tyr Asn Leu Arg Val Val Glu Asp Ser Ala Glu Ala His Gly
145 150 155 160

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

Ile Ile Thr Ala Gly Glu Gly Gly Ile Cys Val Thr Arg Asp Pro His
180 185 190

Leu Ala Glu Gln Met Ala His Leu Arg Ala Met Ala Phe Thr Arg Asp
195 200 205

His Ser Phe Leu His Lys Lys Leu Ala Tyr Asn Tyr Arg Met Thr Asn
210 215 220

Met Gln Ala Ala Val Ala Leu Ala Gln Thr Glu Gln Leu Glu Gly Ile
225 230 235 240

Leu Ala Thr Arg Arg Asp Ile Glu Lys Arg Tyr Asp Asp Ala Leu Arg
245 250 255

Asp Val Pro Gly Ile Thr Leu Met Pro Pro Arg Asp Val Leu Trp Met
260 265 270

Tyr Asp Leu Arg Ala Glu Arg Arg Asp Glu Leu Leu Ala His Leu Ala
275 280 285

Ala Arg Gly Ile Asp Thr Arg Val Phe Phe Lys Pro Met Ser Arg Gln
290 295 300

Pro Met Tyr Leu Asp Pro Val Trp Pro Thr Leu Asn Ala Ser Arg Leu
305 310 315 320

Ala Ala Asp Gly Phe Tyr Leu Pro Thr His Thr Gly Leu Thr Ala Glu
325 330 335

Asp Gln Glu Phe Ile Thr Gly Gln Val Arg Ala Phe Tyr Gly Val Ala
340 345 350

<210> 12
<211> 489
<212> PRT
<213> Pseudonocardia autotrophica

<400> 12

Met Arg His Ala Thr Gly His Pro Ala Arg His Ser Arg Arg Gly Cys

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

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

385 390 395 400

Val Arg Pro Leu Trp Val Asp Cys Asp Asp Gln Ala Ile Arg Gly Gln
405 410 415

Asp Phe Gly Val Ser Leu Thr Val Asp His Pro Glu Thr Val Asp Thr
420 425 430

Asp Asp Val Leu Asp Lys Val Thr Arg Val Leu Glu Thr Pro Ala Phe
435 440 445

Thr Glu Arg Ala Ala Arg Met Gly Arg Leu Leu His Glu Ala Gly Gly
450 455 460

Arg Ala Ala Ala Ala Asp Leu Ile Leu Arg Leu Pro Val Leu Ala Gly
465 470 475 480

Thr Asp Ala Pro Ala Ala Arg Thr Ala
485

<210> 13
<211> 1097
<212> PRT
<213> Pseudonocardia autotrophica

<400> 13

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

Cys Arg Tyr Pro Gly Gly Val Arg Asp Ala Asp Gly Leu Trp Asp Leu
20 25 30

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

Trp Asp Leu Asp Ala Leu His Gly Asp Gly Pro Gly Arg Cys Ala Thr
50 55 60

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

Phe Gly Met Ser Pro Arg Glu Ala Val Ser Thr Asp Pro Gln Gln Arg
85 90 95

Leu Val Leu Glu Thr Ala Trp Glu Ala Val Glu His Ala Gly Ile Asp
100 105 110

Pro Ser Ser Leu Arg Gly Thr Arg Thr Gly Val Phe Val Gly Ala Gly
115 120 125

Gly Gln Asp Tyr Ala Gly Val Val Gln Asn Ser Pro Asp Asp Leu Ala
130 135 140

Gly His Ala Leu Thr Gly Leu Ile Pro Gly Leu Thr Ser Gly Arg Leu
145 150 155 160

Ala His Leu Leu Gly Leu Glu Gly Pro Ala Leu Thr Val Asp Thr Thr
165 170 175

Ser Ser Ser Ser Leu Val Ala Leu His Leu Ala Ile Arg Ser Leu Asp
180 185 190

Ala Gly Glu Cys Thr Ala Ala Leu Ala Gly Gly Val Cys Val Met Ser
195 200 205

Thr Pro Ala Ala Leu Val Gly His Ser Arg Gln Gly Gly Leu Ala Pro
210 215 220

Asp Gly Arg Ala Lys Val Phe Ala Asp Asp Ala Asp Gly Thr Ala Trp
225 230 235 240

Ala Glu Gly Val Gly Val Val Leu Leu Lys Arg Leu Ser His Ala Arg
245 250 255

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

Ala Asp Gly Ala Thr Asp Gly Leu Thr Ala Pro Ser Gly Ala Ala Gln
275 280 285

Glu Arg Met Ile Arg Asp Ala Leu Ala Asp Ala Gly Leu Thr Ala Ala
290 295 300

Glu Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Pro Val Gly Asp
305 310 315 320

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

Pro Gly Arg Pro Leu Trp Val Gly Ser Leu Lys Ser Val Val Gly His
340 345 350

Ala Gln Ala Ala Ala Gly Val Ala Gly Leu Ile Ala Thr Val Gln Ala
355 360 365

Leu Arg His Glu Leu Leu Pro Ala Thr Arg His Ala Val Thr Pro Ser
370 375 380

Thr Arg Val Asp Trp Ser Ala Gly Ala Val Ala Leu Arg Thr Ala Pro
385 390 395 400

Val Pro Trp Pro Arg Gly Gly Arg Pro Arg Arg Ala Gly Val Ser Ser
405 410 415

Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile Val Glu Glu Ala Pro
420 425 430

Ala Ala Asp Gly Pro Glu Ala Ala Asp Arg Gly Thr Ala Pro Pro Ala
435 440 445

Val Thr Pro Trp Pro Val Ser Ala Ala Ala Ala Arg Asp Leu Asp Ala
450 455 460

Gln Ile Glu Arg Leu Arg Ala His Thr Ala Gly Pro Gly Ala Pro Asp
465 470 475 480

Pro Arg Asp Val Gly Trp Ser Leu Ala Thr Gly Arg Ala Ala Leu Arg
485 490 495

His Arg Ala Val Leu Leu Leu Gly Glu His Gly Pro Val Glu Val Ala
500 505 510

Arg Glu Gln Ala Ala Pro Arg Arg Ala Ala Val Leu Phe Ser Gly Gln
515 520 525

Gly Ser Gln Arg Leu Gly Thr Gly Arg Ala Leu Ala Ala Arg Phe Pro
530 535 540

Val Phe Ala Arg Ala Phe Asp Asp Val Thr Ala Ala Leu Asp Ala His
545 550 555 560

Leu Asp Arg Pro Val Arg Asp Val Ala Trp Gly Thr Gly Asp Asp Ala
565 570 575

Ala Ala Leu Leu Asp Glu Thr Gly Trp Thr Gln Pro Ala Leu Phe Ala
580 585 590

Val Glu Val Ala Leu Phe Arg Leu Val Thr Ala Leu Gly Leu Arg Pro
595 600 605

Ala Ala Val Gly Gly His Ser Ile Gly Glu Ile Thr Ala Ala His Val
610 615 620

Ala Gly Val Leu Ser Leu Asp Asp Ala Ala Arg Leu Val Ala Ala Arg
625 630 635 640

Ala Thr Leu Met Gln Ala Leu Pro Ala Gly Gly Ala Met Val Ala Val
645 650 655

Glu Ala Ser Glu Asp Glu Val Ala Pro Leu Leu Gly Asp Arg Val Ala
660 665 670

Leu Ala Ala Val Asn Gly Pro Ala Ser Val Val Val Ala Gly Asp Asp
675 680 685

Asp Ala Val Thr Ala Leu Ala Ala Glu Leu Ala Asp Arg Gly Arg Arg
690 695 700

Thr Ser Arg Leu Ala Val Ser His Ala Phe His Ser Pro Arg Met Glu
705 710 715 720

Pro Met Leu Glu Glu Phe Arg Gly Val Val Ala Gly Leu Thr Phe Cys
725 730 735

Glu Pro Arg Ile Pro Leu Val Ser Asn Leu Thr Gly Glu Leu Gly Pro
740 745 750

Thr Ala Ala Thr Asp Pro Gly Tyr Trp Val Arg His Val Arg Gly Thr
755 760 765

Val Arg Phe Ala Asp Gly Val Arg Ser Leu Ala Ala Asp Gly Val Asp
770 775 780

Val Phe Val Glu Leu Gly Pro Gly Gly Val Leu Ser Ala Met Ala Arg
785 790 795 800

Glu Thr Leu Gly Pro Asp Thr Ala Ala His Val Val Pro Val Leu Arg
805 810 815

Arg Asp Arg Pro Glu Glu Thr Ser Phe Ala Val Ala Leu Gly Arg Leu
820 825 830

His Ala Leu Gly Val Pro Met Asp Trp His Ala Phe His Ala Gly Thr
835 840 845

Gly Ala Arg Arg Val Pro Leu Pro Thr Tyr Ala Phe Arg Gly Val Arg
850 855 860

Tyr Trp Pro Ala Pro Pro Thr Pro Gly Asn Pro Gly Gly Ser Pro Gly
865 870 875 880

Leu Phe Pro Ala Ser Gly Ala Arg Thr Ala Thr Glu Pro Gly Pro Asp
885 890 895

Ala Arg Val Val Thr Asn Pro Ala Ser Ala Thr Ala Arg Pro Asp Pro
900 905 910

Val Pro Thr Gly Thr Ala Ala Gly Asp Pro Gly Glu Asp Arg Ala Gly
915 920 925

Thr Asp Pro Gly Ala Arg Tyr Ala Val Met Pro Pro Ala Val Arg Glu
930 935 940

Arg Ala Leu Leu Asp Leu Val Arg Thr His Thr Ala Ala Val Leu Gly
945 950 955 960

His Pro Asp Pro Ala Glu Ile Gly Val Arg Ser Val Phe Lys Glu Leu
965 970 975

Gly Leu Asp Ser Leu Ala Gly Val Glu Leu Cys Asp Arg Leu Ala Arg
980 985 990

Asp Thr Gly Leu Arg Leu Pro Ala Thr Leu Val Phe Gly Phe Pro Thr
995 1000 1005

Pro Glu Leu Ala Ala Arg Glu Val Ser Ala Leu Leu Gly Pro Gly
1010 1015 1020

Pro Gln Glu Pro Cys Gly Pro Glu Leu Ala Gly Leu Glu Ala Ala
1025 1030 1035

Leu Asp Gly Leu Ser Gly Asp Gly Pro Asp Arg Arg Ala Val Ala
1040 1045 1050

Asp Arg Leu Glu Val Leu Ala Ala Gly Leu Arg Arg Pro Ala Ala
1055 1060 1065

Gln Pro Gly Gly Pro Pro Asp Glu Asp Leu Asp Ser Val Ser Val
1070 1075 1080

Asp Arg Leu Leu Asp Ile Ile Asp Glu Glu Phe Asp Thr Ala
1085 1090 1095

<210> 14
<211> 3175
<212> PRT
<213> Pseudonocardia autotrophica

<400> 14

Met Gln Glu Ser Gln Asp Gln Gln Asn Arg Ile Val Asp Ser Leu Arg
1 5 10 15

Arg Val Thr Thr Asp Leu Arg Arg Ala Arg Arg Arg Ile Asp Glu Leu
20 25 30

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

Leu Pro Gly Gly Val Asp Ser Pro Glu Ser Leu Trp Asp Leu Val Ser
50 55 60

Ala Gly Gly Asp Gly Ile Ala Glu Phe Pro Ala Asp Arg Gly Trp Asp
65 70 75 80

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

Gly Gly Phe Leu Asp Asp Ala Ala Gly Phe Asp Ala Ala Phe Phe Gly
100 105 110

Ile Ser Pro Arg Glu Ala Ala Ala Met Asp Pro Gln Gln Arg Leu Leu
115 120 125

Leu Glu Val Ser Trp Glu Ala Leu Glu Arg Ala Gly Ile Asp Pro Thr
130 135 140

Ser Leu Arg Gly Ser Arg Ala Gly Val Phe Val Gly Ser Tyr His Trp
145 150 155 160

Gly Ser Pro Ser Ala Asp Ala Gly Thr Glu Leu Gly Gly His Ala Leu
165 170 175

Thr Gly Thr Ala Ala Ser Val Leu Ser Gly Arg Leu Ser Tyr Thr Leu
180 185 190

Gly Leu Glu Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser Ser
195 200 205

Leu Val Ala Leu His Leu Ala Ala His Ser Leu Arg Ser Gly Glu Ser
210 215 220

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

Phe Val Glu Phe Ser Ala Gln Gly Gly Leu Ser Val Asp Gly Arg Cys
245 250 255

Lys Ala Phe Ser Asp Asp Ala Asp Gly Thr Gly Trp Ala Glu Gly Val
260 265 270

Gly Val Leu Val Ala Glu Arg Leu Ser Asp Ala Arg Ala Asn Gly His
275 280 285

Arg Val Leu Ala Val Leu Arg Gly Ser Ala Val Asn Gln Asp Gly Ala
290 295 300

Ser Asn Gly Leu Thr Ala Pro His Gly Pro Ser Gln Glu Arg Val Ile
305 310 315 320

Thr Gln Ala Leu Glu Arg Ala Ala Leu Thr Ala Ala Asp Val Asp Ala
325 330 335

Val Glu Ala His Gly Thr Gly Thr Arg Leu Gly Asp Pro Ile Glu Ala
340 345 350

Gln Ala Leu Leu Ala Thr Tyr Gly Arg Gly Arg Asp Thr Asp Arg Pro
355 360 365

Leu Tyr Leu Gly Ser Leu Lys Ser Asn Ile Gly His Thr Gln Ala Ala
370 375 380

Ala Gly Val Ala Gly Val Ile Lys Met Val Gln Ala Leu Arg His Arg
385 390 395 400

Val Leu Pro Pro Thr Leu His Ala Gly Thr Pro Ser Ser His Val Asp
405 410 415

Trp Ser Ala Gly Thr Val Arg Leu Leu Thr Glu Arg Thr Ala Trp Pro
420 425 430

Glu Thr Gly Arg Pro Arg Arg Ala Ala Val Ser Ser Phe Gly Ile Ser
435 440 445

Gly Thr Asn Ala His Ala Val Leu Glu Gln Ala Pro Ala Ala Gln Glu
450 455 460

Glu Pro Ala Pro Gly Gly Gly Pro Thr Gly Val Leu Ala Trp Val Leu
465 470 475 480

Ser Gly His Thr Val Gln Ala Arg Arg Asp Arg Ala Ala Thr Leu His
485 490 495

Ala Arg Leu Arg Glu Asp Gly Thr Ala Asp Pro His Asp Val Gly His
500 505 510

Ala Leu Leu Thr Thr Arg Ala Arg His Glu His Arg Ala Val Val Val
515 520 525

Gly Thr Ala Arg Asp Glu Leu Leu Asp Gly Val Gly Ala Leu Ala Ala
530 535 540

Gly Thr Pro Ala Pro His Val Ala His Gly Val Ala Asp Val Glu Gly
545 550 555 560

Arg Thr Val Phe Val Phe Pro Gly Gln Gly Ala Gln Trp Ile Gly Met
565 570 575

Gly Ala Arg Leu Leu Glu Glu Ser Pro Val Phe Ala Ala Arg Met Ala
580 585 590

Glu Cys Ala Ala Ala Leu Asp Pro Ile Thr Gly Trp Ser Leu His Asp
595 600 605

Val Leu Arg Arg Ala Glu Gly Ala Pro Asp Ala Asp Arg Val Asp Val
610 615 620

Val Gln Pro Ala Ser Phe Ala Val Met Val Ala Leu Ala Ala Leu Trp
625 630 635 640

Arg Ala His Gly Val Glu Pro Asp Ala Val Val Gly His Ser Gln Gly
645 650 655

Glu Ile Ala Ala Ala Val Val Ser Gly Ala Leu Ser Leu Pro Asp Gly
660 665 670

Ala Gly Val Val Ala Leu Arg Ser Arg Ala Ile Gly Arg Ser Leu Ala
675 680 685

Gly Arg Gly Gly Met Met Ser Val Ala Leu Pro Val Asp Glu Val Ser
690 695 700

Gly Arg Leu Glu Glu Tyr Ala Gly Arg Val Ser Val Ala Ala Val Asn
705 710 715 720

Gly Pro Arg Ser Val Val Val Ser Gly Glu Pro Gln Ala Leu Asp Glu
725 730 735

Leu Gly Ala Val Leu Asp Gly Glu Gly Ile Arg Val Arg Arg Val Ala
740 745 750

Val Asp Tyr Ala Ser His Ser His Gln Val Glu Glu Leu Arg Ala Glu
755 760 765

Ile Leu Glu Thr Leu Ala Gly Leu Ser Pro Gln Pro Ser Ala Val Pro
770 775 780

Leu Tyr Ser Thr Leu Thr Gly Gly Leu Leu Asp Thr Ser Thr Met Asp
785 790 795 800

Ala Ala Tyr Trp Tyr Glu Asn Leu Arg Asn Arg Val Arg Phe Ala Asp
805 810 815

Ala Val Ala Ala Leu Thr Ala Thr Gly His Arg Val Phe Val Glu Ser
820 825 830

Ala Ala His Pro Val Leu Ser Pro Ala Val Gln Asp Ala Leu Asp Asp
835 840 845

Ala Gly Ile Thr Gly Val Ala Gly Gly Thr Leu Arg Arg Asp Gln Gly
850 855 860

Gly Tyr Asp Arg Phe Leu Leu Ser Ala Ala Gln Leu His Val Arg Gly
865 870 875 880

Leu Asp Val Asp Trp Ser Val Leu Phe Asp Asp Ala Ala Ala Ala Arg
885 890 895

Val Asp Leu Pro Thr Tyr Pro Phe Gln His Glu Arg Tyr Trp Ser Thr
900 905 910

Arg Thr Ala Thr Ala Ala Ala Pro Asp Thr Gly Ala Leu Asp Thr Glu
915 920 925

Phe Trp Asp Ala Val Glu Gln Ala Asp Leu Pro Ala Leu Thr Ala Ala
930 935 940

Leu Gly Thr Asp Glu Asp Ala Val Thr Ala Ile Leu Pro Gly Leu Ser
945 950 955 960

Ala Trp Arg Arg Ser Arg Ala Asp Arg Ala Asp Leu Asp Thr Trp Arg
965 970 975

Tyr Arg Val Glu Trp Ala Ala Thr Pro Gln Pro Pro Arg Thr Gly Pro
980 985 990

Thr Gly Thr Trp Leu Val Val Thr Ala Ala Gly Thr Asp Pro Ala Asp
995 1000 1005

Val Val Gly Val Leu Glu Arg His Gly Ala Val Ala Leu Pro Leu
1010 1015 1020

Val Leu Asp Glu Ser Thr Asp Arg Asp Asp Thr Asp Arg Glu Val
1025 1030 1035

Leu Arg Ala Arg Ile Ala Asp Ala Thr Ala Asp Gly Asp Ile Ala
1040 1045 1050

Gly Val Val Ser Leu Leu Ala Ala Ala Glu Asp Asp Asp Pro Arg
1055 1060 1065

His Pro Gly Leu Thr Arg Gly Leu Ala Leu Ser Val Ala Leu Val
1070 1075 1080

Gln Ala Leu Gly Asp Ala Gly Ile Asp Val Ala Leu Trp His Leu
1085 1090 1095

Thr Arg Gly Ala Ala Thr Ala Ala Pro Gly Asp Thr Val Thr Arg
1100 1105 1110

Pro Leu Gln Ser Gln Val Ala Ala Leu Gly Trp Thr Ala Ala Val
1115 1120 1125

Glu Gln Pro His Arg Arg Gly Gly Thr Ala Asp Leu Pro Glu Val
1130 1135 1140

Leu Asp Ala Arg Thr Gly Asp Arg Leu Ala Ala Val Leu Ala Gly
1145 1150 1155

Arg Leu Gly Asp Glu Asp Gln Leu Ala Val Arg Pro Ala Gly Val
1160 1165 1170

Leu Ala Arg Arg Ile Val Arg Ala Asp Arg Gly Gly Arg Ala Pro
1175 1180 1185

Ala Arg Arg Trp Ser Pro Arg Gly Thr Thr Leu Val Thr Gly Gly
1190 1195 1200

Ser Gly Thr Leu Ala Pro Asp Leu Ala Arg Arg Leu Ala Ala Asp

1205	1210	1215
Gly Ala Glu His Val Val Leu Leu Ser Arg Arg Gly Pro Glu Ala		
1220	1225	1230
Pro Gly Ala Ala Ala Leu Val Ala Glu Leu Ala Glu Ala Gly Thr		
1235	1240	1245
Glu Ala Glu Ala Val Ala Cys Asp Ile Thr Asp Arg Asp Ala Val		
1250	1255	1260
Ala Ala Leu Val Ala Arg Leu Ala Ala Gln Gly Arg Thr Val Gly		
1265	1270	1275
Thr Val Leu His Thr Ala Ala Val Ile Gly Leu Ala Ala Ile Ala		
1280	1285	1290
Asp Thr Thr Leu Asp Glu Phe Ala Glu Val Val His Ala Lys Val		
1295	1300	1305
Thr Gly Ala Arg Ile Leu Asp Glu Leu Leu Asp Asp Pro Ala Thr		
1310	1315	1320
Asp Leu Val Leu Tyr Ser Ser Thr Ala Gly Met Trp Gly Ser Gly		
1325	1330	1335
Val His Ala Ala Tyr Ala Ala Gly Asn Ala Phe Leu Ser Ala Leu		
1340	1345	1350
Ala Glu Gln Arg Arg Ala Arg Gly Leu Arg Ala Thr Ser Val His		
1355	1360	1365
Trp Gly Lys Trp Pro Asp Ala Asp Pro Glu Arg Thr Glu Ala Asp		
1370	1375	1380

Pro His Arg Ile Arg Arg Ser Gly Leu Glu Tyr Leu Asp Pro Gln
1385 1390 1395

Arg Ala Leu Thr Gly Leu Arg Cys Val Leu Asp Asp Asp Glu Thr
1400 1405 1410

Val Val Gly Leu Met Asp Val Asp Trp Asp Val Tyr His Asp Val
1415 1420 1425

Phe Thr Ala Gly Arg Val Ser His Leu Phe Asp Arg Val Pro Glu
1430 1435 1440

Val Arg Ala Arg Leu Thr His Ala Ala Ala Pro Ala Ala Gly Pro
1445 1450 1455

Arg Gly Ala Leu Ala Gly Arg Leu Ala Pro Leu Ser Ala Ala Glu
1460 1465 1470

Arg Thr Arg Leu Leu Val Thr Leu Val Arg Thr Glu Ala Ala Ala
1475 1480 1485

Val Leu Gly His Ala Ser Ala Asp Ala Phe Gly Glu Arg Arg Ala
1490 1495 1500

Phe Arg Asp Ala Gly Phe Asp Ser Val Thr Ala Val Asp Leu Arg
1505 1510 1515

Asn Arg Leu Ala Ala Ala Thr Gly Leu Thr Leu Pro Ser Thr Leu
1520 1525 1530

Val Phe Asp His Pro Ser Pro Ala Val Leu Ala Gly Arg Leu Glu
1535 1540 1545

Glu Leu Ala Leu Gly Ala Ala Asp Gly Leu Pro Gln Pro Ala Ala
1550 1555 1560

Ala Pro Ala Gly Asp Asp Asp Pro Ile Ala Val Ile Gly Met Ser
1565 1570 1575

Cys Arg Tyr Pro Gly Gly Ala Asp Thr Pro Glu Ala Leu Leu Gln
1580 1585 1590

Leu Ala Leu Asp Gly Val Asp Ala Ile Thr Gly Phe Pro Thr Gly
1595 1600 1605

Arg Gly Trp Asp Ala Ala Ala Leu His Asp Pro Asp Pro Asp Arg
1610 1615 1620

His Gly Arg Thr Tyr Ser Val Gln Gly Gly Phe Leu His Asp Val
1625 1630 1635

Ala Asp Phe Asp Ala Gly Phe Phe Gly Ile Ser Pro Arg Glu Ala
1640 1645 1650

Val Ala Met Asp Pro Gln Gln Arg Ile Leu Leu Glu Thr Ser Trp
1655 1660 1665

Glu Ala Phe Glu Arg Ala Gly Ile Asp Pro Thr Ser Leu Arg Gly
1670 1675 1680

Thr Ser Thr Gly Thr Phe Val Gly Ala Thr Tyr Gln Asp Tyr Ala
1685 1690 1695

Thr Thr Val Ala His Ala Ala Gly Asp Thr Glu Thr His Met Val
1700 1705 1710

Thr Gly Thr Ala Ala Ser Val Leu Ser Gly Arg Val Ala Tyr Leu
1715 1720 1725

Leu Gly Leu Glu Gly Pro Ala Val Thr Leu Asp Thr Ala Cys Ser

1730 1735 1740

Ser Ser Leu Val Ala Met His Leu Ala Cys Arg Ser Leu Arg Ser
1745 1750 1755

Gly Glu Ser Ser Leu Ala Leu Ala Gly Gly Ala Ala Val Met Ala
1760 1765 1770

Thr Pro Gln Ala Phe Val Gly Phe Ser Arg Gln Arg Ala Leu Ala
1775 1780 1785

Ala Asp Gly Arg Cys Lys Pro Phe Ser Glu Ala Ala Asp Gly Met
1790 1795 1800

Thr Leu Ala Glu Gly Val Gly Val Val Leu Leu Glu Arg Leu Ser
1805 1810 1815

Asp Ala Arg Arg Lys Gly His Pro Val Leu Gly Val Ile Arg Gly
1820 1825 1830

Ser Ala Ile Asn Ser Asp Gly Ala Ser Asn Gly Met Thr Ala Pro
1835 1840 1845

Asn Gly Pro Ser Gln Gln Arg Val Ile Arg Arg Ala Leu Ala Glu
1850 1855 1860

Ala Gly Leu Thr Ala Ala Asp Val Asp Val Val Glu Ala His Gly
1865 1870 1875

Thr Gly Thr Arg Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu Leu
1880 1885 1890

Ala Thr Tyr Gly Arg Asp Arg Asp Glu Pro Leu Arg Leu Gly Ser
1895 1900 1905

Val Lys Ser Ala Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala
1910 1915 1920

Gly Val Ile Thr Met Leu Ala Ala Met Arg Ala Gly Glu Leu Pro
1925 1930 1935

Gly Ile Gln His Leu Asp Ala Pro Ser Ser His Val Asp Trp Ser
1940 1945 1950

Thr Gly Ala Val Glu Leu Leu Thr Gly Arg Thr Ala Trp Pro Glu
1955 1960 1965

Thr Asp Arg Pro Arg Arg Ala Gly Val Ser Ser Phe Gly Ile Ser
1970 1975 1980

Gly Thr Asn Ala His Val Val Leu Glu Gln Ala Pro Pro Ala Glu
1985 1990 1995

Ala Thr Pro Pro Ala Gly Ala Pro Gly Pro Val Pro Trp Val Val
2000 2005 2010

Ser Ala Arg Ser Ala Asp Ala Leu Arg Ala Gln Ala Gly Arg Leu
2015 2020 2025

Arg Asp Ala Val Ala Arg Asp Pro Gln Asp Pro Ala Arg Thr Gly
2030 2035 2040

His Ala Leu Ala Thr Thr Arg Ala Ala Phe Asp His Arg Ala Val
2045 2050 2055

Val Val Gly Glu Thr Ser Asp Glu Leu Ser Arg Gly Leu Ala Ala
2060 2065 2070

Leu Ala Asp Gly Thr Ser Val Ala Gly Leu Val Thr Gly Thr Ala
2075 2080 2085

Ala Glu Asp Pro Ala Gly Pro Val Phe Val Phe Pro Gly Gln Gly
2090 2095 2100

Ala Gln Trp Trp Gly Met Gly Arg Asp Leu Leu Thr Thr Ser Glu
2105 2110 2115

Ala Phe Arg Ala Ala Val Asp Asp Cys Ala Ala Ala Leu Ala Pro
2120 2125 2130

His Val Asp Trp Ser Leu His Glu Val Leu Thr Gly Asp Gly Asp
2135 2140 2145

Pro Ala Leu Leu Glu Arg Val Asp Val Val Gln Pro Ala Leu Phe
2150 2155 2160

Ala Met Met Val Gly Leu Ala Ala Val Trp Arg Ala His Gly Val
2165 2170 2175

Glu Pro Ala Ala Val Val Gly His Ser Gln Gly Glu Ile Ala Ala
2180 2185 2190

Ala His Val Ala Gly Ala Leu Asp Leu Asp Asp Ala Ala Arg Val
2195 2200 2205

Val Ala Leu Arg Ser Arg Ala Leu Pro Arg Leu Ser Gly His Gly
2210 2215 2220

Gly Met Val Ser Val Ala Ala Pro Val Gly Arg Val Thr Glu Leu
2225 2230 2235

Ile Val Pro Trp Gly Gly Ala Leu Ser Val Ala Ala Val Asn Gly
2240 2245 2250

Pro Ser Ser Val Val Val Ser Gly Asp Ala Asp Ala Leu Asp Ala

2255

2260

2265

Leu Leu Pro Ala Cys Glu Ser Ala Gly Val Arg Ala Arg Arg Val
2270 2275 2280

Ser Val Asp Tyr Ala Ser His Gly Pro His Val Glu Ala Val Arg
2285 2290 2295

Asp Glu Leu Ala Glu Val Leu Ala Gly Ile Thr Pro Arg Thr Pro
2300 2305 2310

Thr Val Pro Phe Tyr Ser Thr Val Thr Gly Gly Arg Leu Asp Thr
2315 2320 2325

Ala Glu Asp Gly Gly Leu Asp Gly Thr Tyr Trp Tyr Thr Asn Leu
2330 2335 2340

Arg Thr Thr Val Arg Met Gln Asp Ala Thr Glu Ala Leu Leu Ala
2345 2350 2355

Ala Gly His Arg Ile Phe Val Glu Val Ser Pro His Pro Val Leu
2360 2365 2370

Ala Gly Pro Val Gln Glu Thr Gln Glu Ala Ala Asp Pro Asp Gly
2375 2380 2385

Thr Ala Ala Ala Val Val Leu Gly Thr Leu Arg Arg Asp Glu Gly
2390 2395 2400

Gly Pro Ala Arg Val Leu Thr Ser Leu Ala Glu Ala Tyr Val His
2405 2410 2415

Gly Ala Thr Val Asp Trp Thr Thr Thr Leu Pro Asp Thr Gly Gly
2420 2425 2430

Thr Asp Val Glu Leu Pro Thr Tyr Ala Phe Arg Arg Arg Ser Tyr
2435 2440 2445

Trp Pro Glu Pro Lys Ala Asp Pro Ser Gly Ala Ala Asp Asp Ala
2450 2455 2460

Ala Phe Trp Ala Leu Val Asp Gly Gln Asp Pro Ala Ala Phe Ala
2465 2470 2475

Asp Ala Leu Gly Val Pro Gly Gly Ala Leu Asp Thr Val Leu Pro
2480 2485 2490

Ala Leu Ser Ala Trp Arg Ala Gly Ser Arg Ala Arg Thr Arg Ala
2495 2500 2505

Asn Asp Leu Arg Tyr Arg Val Asp Trp Ala Pro Val Pro Glu Pro
2510 2515 2520

Ala Ala Gly Pro Pro Ala Gly Arg Val Leu Val Ile Gly His Asp
2525 2530 2535

Ala Gly Thr Gly Thr Asp Asp Asp Gly Leu Leu Ala Ala Phe Gly
2540 2545 2550

Pro Gly Ala Val Pro Val Thr Asp Pro Gly Thr Gly Arg Ala Ala
2555 2560 2565

Trp Ala Ala Glu Leu Ala Arg His Ala Ala Asp Gly Pro Val Thr
2570 2575 2580

Ala Val Val Ala Leu Pro Asp Pro Thr Gly Arg Pro His Pro Gly
2585 2590 2595

His Pro Gly Val Pro Gly Ala Leu Ala Arg Thr Leu Thr Leu Val
2600 2605 2610

Gln Ala Leu Gly Asp Ala Asp Val Thr Ala Pro Leu Trp Cys Leu
2615 2620 2625

Thr Arg Gly Ala Val Gly Thr Ala Pro Gly Asp Ala Val Thr Asp
2630 2635 2640

Pro Glu Gln Gly Thr Leu Trp Gly Leu Gly Arg Val Val Ala Leu
2645 2650 2655

Glu His Pro Asp Arg Trp Gly Gly Leu Ile Asp Leu Pro Gly Thr
2660 2665 2670

Pro Asp Pro Arg Thr Ala Ala Arg Val Ala Gly Leu Val Thr Gly
2675 2680 2685

Ala Gly Thr Glu Asp Gln Leu Ala Val Arg Pro His Gly Val Leu
2690 2695 2700

Ala Arg Arg Leu Val His Ala Ala Pro Ala Ala Pro Arg Pro Gly
2705 2710 2715

His Gly Gly Cys Asp Arg Gly Thr Val Leu Val Thr Gly Gly Thr
2720 2725 2730

Gly Gly Ile Gly Gly Arg Thr Ala Val Trp Ala Ala Gly Arg Gly
2735 2740 2745

Ala Glu His Leu Leu Leu Thr Ser Arg Arg Gly Glu Asp Ala Pro
2750 2755 2760

Gly Ala Ala Ala Leu Arg Thr Glu Leu Glu Ser Leu Gly Ala Arg
2765 2770 2775

Val Thr Ile Ala Ala Cys Asp Ala Ala Asp Arg Asp Ala Leu Ala

2780 2785 2790

Thr Leu Leu Asp Glu Leu Pro Ala Asp Leu Pro Leu Thr Ala Val
2795 2800 2805

Val His Ser Ala Gly Val Ala Asp Gly Asp Ala Pro Val Ala Asp
2810 2815 2820

Leu Thr Val Asp Arg Leu Asp Ala Leu Leu Arg Ala Lys Leu Thr
2825 2830 2835

Ala Ala Arg Asn Leu His Glu Leu Thr Arg Gly Thr Glu Leu Asp
2840 2845 2850

Ala Phe Val Leu Tyr Ser Ser Gly Ala Ala Val Trp Gly Ser Gly
2855 2860 2865

Gly Gln Pro Gly Tyr Ala Ala Ala Asn Ala Tyr Leu Asp Ala Leu
2870 2875 2880

Ala Ala His Arg Arg Gly Leu Gly Leu Pro Ala Thr Ser Val Ala
2885 2890 2895

Trp Gly Thr Phe Gly Glu Val Gly Met Ala Thr Asp Pro Gln Val
2900 2905 2910

His Glu Arg Leu His Arg Gln Gly Val Pro Ala Met Asp Pro Ala
2915 2920 2925

Asp Ala Leu Ala Ala Leu Glu Leu Ala Leu Gly Glu Gly Asp Thr
2930 2935 2940

Gly Val Ala Val Thr Arg Met Asp Trp Glu Val Phe Ala Pro Ser
2945 2950 2955

Phe Thr Ala Leu Arg Pro Ser Pro Leu Leu Gly Thr Val Pro Glu
2960 2965 2970

Ala Val Ala Ala Leu Ala Asp Gly Pro Ala Pro Val Pro Gly Asp
2975 2980 2985

Pro Gly Ala Asp Ala Ala Val Pro Pro Leu Arg Gly Arg Leu Glu
2990 2995 3000

Ala Leu Pro Thr Ala Glu Arg Ala Arg Ala Leu Val Glu Ala Val
3005 3010 3015

Arg Gly Glu Ala Ala Ala Thr Leu Gly His Asp Gly Ala Asp Ala
3020 3025 3030

Ile Pro Ala Gly Arg Ala Phe Arg Asp Val Gly Phe Asp Ser Val
3035 3040 3045

Thr Ala Val Glu Leu Arg Asn Arg Leu Arg Gly Gly Leu Gly Leu
3050 3055 3060

Pro Leu Pro Ala Ala Leu Val Phe Asp His Pro Thr Pro Thr Asp
3065 3070 3075

Leu Ala Arg His Leu Gly Thr Leu Leu Phe Gly Asp Thr Pro Gly
3080 3085 3090

Glu Gln Gly Thr Thr Arg Thr Asp Asp Pro Asp Ala His Ile Arg
3095 3100 3105

Glu Val Leu Ala Ser Val Pro Ile Gly Arg Leu Arg Arg Ala Gly
3110 3115 3120

Leu Leu Asp Met Val Leu Gly Leu Ala Asp Ala Glu Pro Gly Ala
3125 3130 3135

Ala Asp Asp Pro Asp Pro Asp Ala Gly Arg Thr Asp Asp Gly Gly
3140 3145 3150

Ala Glu Ser Leu Asp Asp Met Asp Ala Glu Ala Leu Leu Arg Leu
3155 3160 3165

Val Thr Glu Asn Ser Ala Asn
3170 3175

<210> 15
<211> 10876
<212> PRT
<213> Pseudonocardia autotrophica

<400> 15

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

Lys Glu Val Glu Arg Leu Arg Arg Gln Asn Glu Gln Leu Val Ala Ala
20 25 30

Ala Ser Glu Pro Val Ala Val Val Gly Ile Gly Cys Arg Phe Pro Gly
35 40 45

Gly Val Ala Ser Pro Glu Asp Leu Trp Asp Val Val Ala His Gly Arg
50 55 60

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

Leu Ala Gly Asp Gly Glu Gly Gly Ser Leu Ala Gln Val Gly Gly Phe
85 90 95

Val Asp Asp Val Ala Gly Phe Asp Pro Gly Phe Phe Gly Ile Ser Pro
100 105 110

Arg Glu Ala Val Ala Met Asp Pro Gln Gln Arg Ile Leu Leu Glu Ile
115 120 125

Thr Trp Glu Ala Leu Glu Arg Ala Gly Ile Asp Pro Thr Ser Leu Arg
130 135 140

Gly Thr Asp Thr Gly Val Phe Val Gly Thr Thr Gly Gln Asp Tyr Gly
145 150 155 160

Glu Val Ile Arg Ala Ser Asp Glu Asp Val Ala Val Tyr Ser Thr Thr
165 170 175

Gly His Ala Ala Ser Val Ile Ser Gly Arg Leu Ser Tyr Thr Leu Gly
180 185 190

Ala Glu Gly Pro Ala Val Thr Val Asp Thr Gly Cys Ser Ser Ser Leu
195 200 205

Val Ala Met His Gln Ala Val Gln Ala Leu Arg Ala Gly Glu Cys Ser
210 215 220

Thr Ala Leu Ala Gly Gly Ala Ser Val Met Ala Thr Pro Gly Pro Phe
225 230 235 240

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

Pro Phe Ala Asp Gly Ala Asp Gly Thr Gly Trp Ala Glu Gly Ala Gly
260 265 270

Met Leu Val Leu Met Arg Leu Ser Asp Ala Arg Arg Gln Gly Arg Glu
275 280 285

Val Leu Ala Val Leu Arg Gly Ser Ala Ile Asn Gln Asp Gly Ala Ser
290 295 300

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

Ala Ala Leu Glu Ser Ala Arg Leu Gly Ser Gly Asp Val Asp Ala Val
325 330 335

Glu Ala His Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile Glu Ala Gln
340 345 350

Ala Leu Leu Ala Thr Tyr Gly Ala Asp Arg Ala Thr Pro Leu Leu Leu
355 360 365

Gly Ser Val Lys Ser Asn Met Gly His Thr Gln Ala Ala Ser Gly Val
370 375 380

Ala Gly Val Ile Lys Met Ile Met Ala Leu Arg His Gly Val Leu Pro
385 390 395 400

Arg Ser Leu His Ala Glu Arg Pro Ser Ala Asp Val Asp Trp Thr Ala
405 410 415

Gly Ala Val Ala Leu Leu Asp Ala Ala Val Asp Trp Pro Glu Thr Gly
420 425 430

Arg Pro Arg Arg Ala Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn
435 440 445

Ala His Val Ile Leu Glu Gln Ala Pro His Thr Asp Ala Gln Ala Pro
450 455 460

Ala Ala Glu Val Ser Ala Pro Ala Val Val Pro Trp Pro Leu Ser Ala
465 470 475 480

Arg Thr Ala Thr Ala Leu Asp Thr Leu Arg Ala Arg Leu Thr Gly Ser
485 490 495

Val Thr Gly Leu Ser Pro Leu Asp Val Gly Ala Ser Leu Ala Thr Gly
500 505 510

Arg Ala Thr Phe Glu His Arg Ala Val Leu Leu Gly Ser Gly Asp Glu
515 520 525

Val Thr Glu Ile Ala Arg Gly Val Ala Gly Glu Gly Leu Thr Ala Leu
530 535 540

Leu Phe Ser Gly Gln Gly Ser Gln Arg Leu Gly Ala Gly Arg Glu Leu
545 550 555 560

His Ala Arg Phe Pro Val Phe Ala Glu Ala Phe Asp Glu Thr Ala Ala
565 570 575

Leu Leu Asp Ala Ala Leu Pro Asp Asn Asp Ala Thr Leu Arg Glu Val
580 585 590

Leu Trp Gly Thr Asp Ala Glu Ala Leu Asp Asp Thr Gly Arg Ala Gln
595 600 605

Pro Ala Leu Phe Ala Ile Glu Val Ala Leu Tyr Arg Leu Val Thr Ser
610 615 620

Leu Gly Val Val Pro Asp Leu Val Gly Gly His Ser Ile Gly Glu Ile
625 630 635 640

Ala Ala Ala His Val Ala Gly Val Leu Ser Leu Asp Asp Ala Ala Thr
645 650 655

Leu Val Ala Ala Arg Ala Arg Leu Met Ala Ala Leu Pro Arg Gly Gly
660 665 670

Ala Met Leu Ala Val Gly Ala Thr Glu Asp Glu Val Ala Pro Leu Leu
675 680 685

Thr Ala Gly Val Ser Leu Ala Ala Val Asn Gly Pro Ser Ser Val Val
690 695 700

Val Ala Gly Asp Thr Asp Gly Ile Ala Ala Val Glu Glu His Ala Arg
705 710 715 720

Ala Arg Gly Trp Arg Ser Thr Arg Leu Arg Val Ser His Ala Phe His
725 730 735

Ser Pro Leu Met Glu Pro Met Leu Ala Glu Phe Arg Ala Val Ala Ala
740 745 750

Gly Leu Thr Tyr His Glu Pro Arg Ile Pro Val Val Ser Asn Leu Thr
755 760 765

Gly Ser Val Ala Glu Val Ala Asp Ile Cys Ser Ala Asp Tyr Trp Val
770 775 780

Arg His Val Arg Gly Thr Val Arg Phe Ala Asp Gly Val Thr Ala Leu
785 790 795 800

Ala Ala Arg Gly Val Thr Thr Leu Val Glu Leu Gly Pro Asp Gly Val
805 810 815

Leu Cys Gly Met Ala Gln Glu Ser Leu Pro Glu Gly Ala Val Ala Val
820 825 830

Pro Leu Leu Arg Arg Asp Arg Pro Glu Glu Leu Ser Leu Val Thr Gly
835 840 845

Leu Ala Thr Ala His Val Arg Gly Thr Thr Val Asp Trp Ala Arg Leu
850 855 860

Phe Asp Gly Thr Gly Ala Ser Arg Val Asp Leu Pro Thr Tyr Pro Phe
865 870 875 880

Glu His Thr Arg Tyr Trp Pro Ala Pro Val Arg Gly Ala Ala Asp Val
885 890 895

Thr Ala Ala Gly Leu Thr Thr Ala Asp His Pro Leu Leu Gly Ala Ala
900 905 910

Val Glu Leu Ala Gly Asp Asp Gly Val Leu Phe Thr Ser Arg Leu Ser
915 920 925

Val Arg Thr His Pro Trp Leu Ala Asp His Gly Val Gln Gly Arg Ala
930 935 940

Leu Leu Pro Gly Thr Ala Phe Val Glu Leu Ala Val Arg Ala Gly Asp
945 950 955 960

Glu Val Gly Cys Thr Arg Val Glu Glu Leu Thr Leu Ala Ala Pro Leu
965 970 975

Val Leu Pro Glu Arg Gly Gly Val Arg Val Gln Val Arg Val Gly Pro
980 985 990

Ala Asp Ala Arg Gly Arg Arg Thr Leu Gly Val Phe Ser Arg Pro Glu
995 1000 1005

Asp Ala Asp Gly Leu Pro Trp Ser Gln His Ala Thr Gly Val Leu
1010 1015 1020

Gly Ser Gly Thr Thr Ala Pro Asp Gly Leu Asp Thr Thr Ala Trp
1025 1030 1035

Pro Pro Ala Gly Ala Glu Pro Val Asp Leu Glu Gly Cys Tyr Glu
1040 1045 1050

Arg Leu Ala Gly Ile Gly Phe Asp Tyr Gly Pro Ser Phe Arg Gly
1055 1060 1065

Leu His Ala Ala Trp Arg Arg Asp Gly Glu Val Phe Ala Glu Val
1070 1075 1080

Thr Leu Pro Asp Gly Ala Gly Thr Asp Thr Thr Gly Phe Gly Leu
1085 1090 1095

His Pro Ala Leu Leu Asp Ala Ala Gln His Ala Ala Ala Tyr Gly
1100 1105 1110

Asp Leu Gly Ala Ile Ser Arg Gly Gly Leu Pro Phe Thr Trp Glu
1115 1120 1125

Gly Val Gln Leu Phe Ala Ala Gly Ala Gly Thr Val Arg Ala Arg
1130 1135 1140

Ile Ala Ala Thr Gly Glu Asp Thr Val Ser Ile Thr Val Tyr Asp
1145 1150 1155

Ala Ala Gly Gly Pro Val Leu Thr Ala Asp Ser Leu Val Ser Arg
1160 1165 1170

Glu Val Pro Ala Asp Thr Gly Ala Asp Arg Tyr Asp Asp Ser Leu
1175 1180 1185

Phe Arg Gln Asp Trp Ala Pro Leu Gly Gly Pro Ala Gly Arg Thr
1190 1195 1200

Pro Ala Ala Val Ala Val Val Gly Ala Glu Thr Gly Gly Pro Gly
1205 1210 1215

Pro Val Gly Thr Ala Ala Leu Arg Ala Ala Gly Val Pro Val Arg
1220 1225 1230

Thr Tyr Pro Asp Leu Thr Ala Leu Ala Ala Ser Gly Asp Pro Val
1235 1240 1245

Pro Glu Leu Val Leu Ala Gly Ala Ala Ser Cys Gly Gly Thr Val
1250 1255 1260

Ala Asp Ala Ala His Thr Val Ala Thr Ala Ala Leu Glu Leu Val
1265 1270 1275

Gln Gln Trp Leu Ser Gly Glu Glu Phe Ala Asp Ala Arg Leu Val
1280 1285 1290

Leu Leu Thr Arg Gly Ala Thr Asp Gly Ala Asp Pro Ala Ala Ala
1295 1300 1305

Ala Val His Gly Leu Val Arg Thr Ala Arg Thr Glu Asn Pro Gly
1310 1315 1320

Arg Leu Ala Val Leu Asp Leu Pro Asp Asp Ala Thr Gly Ala Asp
1325 1330 1335

Pro Val Val Ala Pro Ala Ala Leu Val Ala Ala Leu Ala Ala Thr
1340 1345 1350

Glu Asp Glu Pro Asp Leu Ala Val Arg Ala Asp Thr Val Leu Val
1355 1360 1365

Pro Arg Leu Val Arg Val Arg Thr Asp Ala Glu Pro His Arg Trp
1370 1375 1380

Asn Pro Asp Gly Thr Val Leu Ile Thr Gly Gly Thr Gly Gly Leu
1385 1390 1395

Gly Gly Val Leu Ala Arg His Leu Val Ala Glu His Gly Val Arg
1400 1405 1410

Gln Leu Leu Leu Ala Gly Arg Arg Gly Pro Asp Ala Pro Gly Ala

1415

1420

1425

Ala Glu Leu Val Asp Glu Leu Thr Ala Leu Gly Ala Thr Ala His
1430 1435 1440

Ala Val Ala Cys Asp Val Thr Asp Arg Ala Ala Val Ala Ala Leu
1445 1450 1455

Leu Ala Gly Ile Pro Asp Thr His Pro Leu Thr Ala Val Val His
1460 1465 1470

Thr Ala Gly Val Val Asp Asp Gly Val Ile Gly Ser Leu Thr Pro
1475 1480 1485

Glu Arg Leu Asp Thr Val Leu Arg Pro Lys Ala Asp Ala Ala Trp
1490 1495 1500

His Leu His Glu Leu Thr Arg Asp Leu Asp Leu Asp Ala Phe Val
1505 1510 1515

Leu Phe Ser Ser Val Ala Ala Thr Phe Gly Ser Pro Gly Gln Ala
1520 1525 1530

Asn Tyr Ala Ala Gly Asn Ala Phe Leu Asp Ala Leu Ala Val His
1535 1540 1545

Arg Arg Ser Ala Gly Leu Pro Ala Val Ala Leu Ala Trp Gly Pro
1550 1555 1560

Trp Ser Arg Val Val Gly Met Thr Gly Ser Leu Ser Asp Val Asp
1565 1570 1575

Val Glu Arg Ile Ala Arg Ser Gly Met Pro Pro Leu Thr Pro Glu
1580 1585 1590

Gln Gly Thr Ala Leu Phe Asp Ala Ala Leu Ala Ala Thr Ala Asp
1595 1600 1605

Gly Thr Ala Ala Leu Ala Pro Val Arg Leu Asp Leu Pro Ala Leu
1610 1615 1620

Arg Ala Gln Gly Glu Pro Ala Pro Leu Leu Arg Gly Leu Ile Arg
1625 1630 1635

Arg Pro Ala Arg Arg Ala Ala Ala Gln Ala Ser Pro Ser Thr Gly
1640 1645 1650

Asp Leu Ala Glu Arg Leu Arg Ala Leu Asp Gly Ser Thr Arg Asp
1655 1660 1665

Glu Ala Leu Leu Asp Leu Val Arg Glu Arg Ile Ala His Val Leu
1670 1675 1680

Gly His Ala Asp Pro Gly Gln Val Glu Thr Gly Arg Gln Phe Gln
1685 1690 1695

Asp Leu Gly Phe Asp Ser Leu Thr Ala Val Glu Leu Arg Asn Gly
1700 1705 1710

Leu Thr Ala Ala Thr Gly Leu Arg Leu Pro Ala Thr Met Val Phe
1715 1720 1725

Asp Tyr Pro Thr Pro Gly Val Leu Ala Arg His Leu Arg Asp Glu
1730 1735 1740

Leu Leu Gly Ala Asp Asp Ala Pro Asp Asp Thr Ala Asp Arg Thr
1745 1750 1755

Pro Asp Arg Thr Ala Ala Ser Ser Ala Ala Thr Gly Asp Asp Pro
1760 1765 1770

Val Val Ile Val Gly Met Ala Cys Arg Tyr Pro Gly Gly Val Gly
1775 1780 1785

Ser Pro Glu Asp Leu Trp Arg Leu Val Gly Asp Gly Ala Asp Ala
1790 1795 1800

Thr Gly Pro Phe Pro Thr Asp Arg Gly Trp Asp Leu Ala Asn Leu
1805 1810 1815

Phe Asp Ala Asp Pro Asp Arg Pro Gly His Thr His Val Arg Ala
1820 1825 1830

Gly Gly Phe Leu His Thr Ala Pro Glu Phe Asp Ala Gly Phe Phe
1835 1840 1845

Gly Met Ser Pro Arg Glu Ala Leu Ser Thr Asp Ser Gln Gln Arg
1850 1855 1860

Leu Leu Leu Glu Thr Ser Trp Glu Ala Ile Glu Arg Ala Gly Ile
1865 1870 1875

Asp Pro Thr Gly Leu Arg Gly Ser Ala Thr Gly Val Phe Ala Gly
1880 1885 1890

Val Met Tyr Asn Asp Tyr Gly Thr Thr Leu Thr Gly Asp Glu His
1895 1900 1905

Glu Ala Phe Arg Gly Asn Gly Ser Ala Pro Ser Val Ala Ser Gly
1910 1915 1920

Arg Val Ser Tyr Thr Leu Gly Leu Glu Gly Pro Ala Val Thr Val
1925 1930 1935

Asp Thr Ala Cys Ser Ser Ser Leu Val Gly Met His Leu Ala Ala

1940

1945

1950

Gln Ala Leu Arg Ala Gly Glu Cys Thr Leu Ala Leu Ala Gly Gly
1955 1960 1965

Val Thr Val Met Ser Thr Pro Ser Thr Phe Val Asp Phe Ser Arg
1970 1975 1980

Gln Arg Gly Leu Ala Pro Asp Gly Arg Ser Lys Ala Phe Ala Asp
1985 1990 1995

Ala Ala Asp Gly Val Ala Trp Ser Glu Gly Val Gly Val Leu Val
2000 2005 2010

Leu Glu Arg Arg Ser Asp Ala Leu Arg Asn Gly His Glu Ile Leu
2015 2020 2025

Ala Val Leu Arg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn
2030 2035 2040

Gly Leu Thr Ala Pro Asn Gly Pro Ser Gln Gln Arg Val Ile Arg
2045 2050 2055

Arg Ala Leu Ala Asn Ala Gly Leu Ser Thr Gly Asp Val Asp Val
2060 2065 2070

Val Glu Ala His Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile Glu
2075 2080 2085

Ala Gln Ala Leu Ile Ala Thr Tyr Gly Arg Asp Arg Asp Pro Gln
2090 2095 2100

Arg Pro Leu Leu Leu Gly Ser Val Lys Ser Asn Ile Gly His Thr
2105 2110 2115

Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val Leu Ala
2120 2125 2130

Met Arg His Gly Thr Val Pro Arg Thr Leu His Val Asp Ala Pro
2135 2140 2145

Ser Ser His Val Asp Trp Ser Asp Gly Thr Val Ala Leu Leu Thr
2150 2155 2160

Glu Pro Thr Pro Trp Pro Glu Thr Gly Arg Pro Arg Arg Ala Gly
2165 2170 2175

Val Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile Val
2180 2185 2190

Glu Gln Pro Glu Pro Thr Pro Thr Thr Ala Thr Val Gly Gly Arg
2195 2200 2205

Glu Leu Pro Ala Val Pro Trp Ala Leu Ser Gly Ala Ser Ala Asp
2210 2215 2220

Ala Leu Arg Asp Gln Ala Ala Arg Leu Leu Thr His Val Arg Asp
2225 2230 2235

Gly His Ala Val Asp Pro Ala Ile Asp Pro Ala Ile Asp Pro Ala
2240 2245 2250

Asp Val Gly Trp Ser Leu Leu Arg Thr Arg Ala Ala Leu Asp Gln
2255 2260 2265

Arg Ala Val Val Val Gly Thr Gly Ala Glu Gln Thr Leu Arg Gly
2270 2275 2280

Leu Ala Ala Leu Ala Ala Gly Glu Ala Asp Pro Ala Val Val Thr
2285 2290 2295

Gly Thr Thr Ala Thr Gly Arg Thr Ala Phe Leu Phe Ser Gly Gln
2300 2305 2310

Gly Ser Gln Arg Leu Gly Met Gly Arg Glu Leu His Ala Arg Tyr
2315 2320 2325

Pro Ala Phe Ala Asp Ala Phe Asp Ala Ala Leu Ser Ala Leu Asp
2330 2335 2340

Ala Glu Leu Gly Ser Asp Leu Arg Ala Val Val Trp Gly His Gly
2345 2350 2355

Asp Ser Ala Gly Ala Ala Leu Asp Ala Thr Gly Ala Thr Gln Pro
2360 2365 2370

Ala Leu Phe Ala Leu Glu Val Ala Leu Tyr Arg Leu Leu Glu Ser
2375 2380 2385

Trp Gly Val Ala Pro Asp Leu Val Ala Gly His Ser Val Gly Glu
2390 2395 2400

Ile Ala Ala Ala His Val Ala Gly Val Phe Thr Leu Ala Asp Ala
2405 2410 2415

Ala Arg Leu Val Ala Ala Arg Gly Thr Leu Met Gln Ala Leu Pro
2420 2425 2430

Ala Gly Gly Ala Met Val Ala Val Glu Ala Thr Glu Asp Glu Val
2435 2440 2445

Ala Ala Leu Leu Thr Arg Asp Asp Val Ala Ile Ala Ala Val Asn
2450 2455 2460

Gly Pro Ser Ala Val Val Val Ser Gly Ser Gln Asp Gly Val Asp

2465	2470										2475									
Ala Val	Ala Ala	Ala Leu	Ala	Glu Gly	Gly Arg	Arg Thr	Ser Arg													
2480	2485										2490									
Leu Arg	Val Ser	His Ala	Phe	His Ser	Pro Leu	Met	Glu Pro	Met												
2495	2500										2505									
Leu Ala	Glu Phe	Arg Ser	Val	Val Ala	Gly Leu	Ser	Pro Glu	Ala												
2510	2515										2520									
Pro Ala	Val Pro	Val Val	Ser	Ser Leu	Thr Gly	Asp	Leu Ala	Gly												
2525	2530										2535									
Ala Asp	Glu Leu	Cys Asp	Pro	Gly Tyr	Trp Val	Arg	His Val	Arg												
2540	2545										2550									
Glu Pro	Val Arg	Phe Ala	Asp	Ala Val	Thr Thr	Leu	Ala Gly	Arg												
2555	2560										2565									
Gly Ala	Val Thr	Phe Val	Glu	Ile Gly	Pro Gly	Gly	Val Leu	Ser												
2570	2575										2580									
Ala Met	Ala Gln	Asp Ser	Leu	Pro Ala	Asp Gly	Thr	Val Thr	Val												
2585	2590										2595									
Pro Val	Leu His	Gly Glu	Gly	Ser Glu	Asp Val	Ala	Val Val	Ala												
2600	2605										2610									
Ala Leu	Ala Ala	Leu His	Val	Arg Gly	Val Arg	Ile	Asp Trp	Asp												
2615	2620										2625									
Ala Val	Phe Asp	Gly Thr	Gly	Ala Ala	Arg Val	Asp	Leu Pro	Thr												
2630	2635										2640									

Tyr Ala Phe Gln His Arg Arg Tyr Trp Pro Gly Ala Thr Ala Ala
2645 2650 2655

Pro Gly Asp Val Arg Ser Ala Gly Leu Gly Ala Ala Gly His Pro
2660 2665 2670

Leu Leu Gly Ala Ala Val Ala Phe Pro Asp Gly Ala Gly Ala Leu
2675 2680 2685

Leu Thr Gly Arg Leu Ser Ala Ser Ala Gln Pro Trp Leu Ala Asp
2690 2695 2700

His Thr Val Ala Gly Thr Val Val Leu Pro Gly Thr Ala Leu Leu
2705 2710 2715

Glu Leu Ala Val Arg Ala Gly Asp Glu Val Gly Cys Thr Gly Val
2720 2725 2730

Glu Glu Leu Thr Leu Ala Thr Pro Leu Thr Leu Pro Thr Ala Gly
2735 2740 2745

Gly Ala Val Thr Val Gln Val Arg Ala Gly Ala Asp Asp Gly Ser
2750 2755 2760

Gly Arg Arg Pro Val Thr Val His Ala Arg Pro Glu Gly Ser Asp
2765 2770 2775

Glu Trp Thr Glu His Ala Thr Gly Thr Leu Thr Thr Leu Ala Pro
2780 2785 2790

Gly Pro Val Arg Phe Asp Ala Thr Thr Trp Pro Pro Thr Gly Ala
2795 2800 2805

Ala Glu Leu Asp Val Glu Gly Cys Tyr Glu Arg Phe Ala Glu Ala
2810 2815 2820

Gly Phe Gly Tyr Gly Pro Val Phe Arg Gly Leu Thr Gly Ala Trp
2825 2830 2835

Arg Asp Gly Asp Thr Val Tyr Ala Glu Val Ser Leu Pro Asp Pro
2840 2845 2850

Asp Thr Thr Ala Glu Asp Ala Ala Arg Phe Gly Leu His Pro Ala
2855 2860 2865

Leu Leu Asp Ala Ala Leu His Ala Ala Leu Leu Thr Gly Asp Gly
2870 2875 2880

Ala Ala Gly Leu Pro Trp Ala Trp Glu Asp Val Thr Leu His Ala
2885 2890 2895

Ala Gly Ala Thr Ala Leu Arg Val Arg Leu Ala Pro Ala Thr Asp
2900 2905 2910

Gly Gly Gly Leu Ala Val Ala Val Ala Asp Pro Glu Gly Arg Pro
2915 2920 2925

Val Ala Thr Ala Gly Arg Leu Arg Ala Arg Pro Val Asp Pro Ala
2930 2935 2940

Ala Leu Gly Thr Gly Thr Ala Val Arg Asp Gly Leu Phe Arg Leu
2945 2950 2955

Asp Trp Thr Ala Val Thr Ala Pro Ser Asp Gln Ser Val Pro Pro
2960 2965 2970

Ala Pro Val Ala Val Leu Gly Ala Pro Gly Asp Pro Val Thr Asp
2975 2980 2985

Val Leu Ala Ala Gly His Thr Arg Tyr Asp Thr Val Asp Asp Leu

2990

2995

3000

Leu Ala Asp Pro Gly Ser Thr Val Pro Ala Thr Val Leu Ala Pro
3005 3010 3015

Leu Pro Ala Gly Pro Gly Asp Asp Thr Pro Arg Asp Val Arg Asp
3020 3025 3030

Arg Thr Gly Ala Thr Leu Asp Leu Leu Arg Arg Trp Ser Thr Glu
3035 3040 3045

Asp Arg Leu Ala Gly Ser Arg Leu Val Leu Val Thr Arg Gly Ala
3050 3055 3060

Val Thr Asp Ala Gly Glu Pro Val Ala Asp Leu Ala Ala Ala Ala
3065 3070 3075

Val Trp Gly Leu Val Arg Ser Ala Gln Thr Glu Asn Pro Gly Ala
3080 3085 3090

Phe Gly Leu Leu Asp Leu Asp Pro Ala Ala Ala Val Pro Ala Thr
3095 3100 3105

Gly Ala Leu Pro Val Ala Leu Ser Pro Asp Glu Pro Gln Leu Ala
3110 3115 3120

Val Arg Gly Asp Asp Val Leu Ala Ala Arg Leu Thr Arg Ala Gly
3125 3130 3135

Ala Pro Thr Gly Ala Thr Thr Trp Ser Thr Glu Gly Thr Val Leu
3140 3145 3150

Val Thr Gly Gly Thr Gly Gly Leu Gly Gly Leu Leu Ala Arg His
3155 3160 3165

Leu Val Ala Thr His Gly Val Arg His Leu Leu Leu Thr Ser Arg
3170 3175 3180

Ser Gly Ala Asp Ala Pro Gly Ala Ala Glu Leu Val Ala Glu Leu
3185 3190 3195

Glu Gly His Gly Ala Arg Val Ser Val Ala Ala Cys Asp Val Thr
3200 3205 3210

Asp Ala Asp Ala Val Thr Ala Leu Val Ala Gly Val Pro Gly Ala
3215 3220 3225

His Pro Leu Arg Ala Val Val His Thr Ala Gly Ile Leu Asp Asp
3230 3235 3240

Gly Val Leu Ser Ser Leu Thr Pro Gly Arg Leu Ala Arg Val Leu
3245 3250 3255

Ala Pro Lys Val Asp Gly Ala Trp Asn Leu His Arg Ala Thr Ala
3260 3265 3270

Gly Leu Asp Leu Asp Ala Phe Val Leu Phe Ser Ser Val Ala Gly
3275 3280 3285

Val Phe Gly Gly Ala Gly Gln Ala Asn Tyr Ala Ala Gly Asn Ala
3290 3295 3300

Phe Leu Asp Ala Leu Ala Ala His Arg Ala Ala Ala Gly Leu Pro
3305 3310 3315

Ala Thr Ala Leu Ala Trp Gly Pro Trp Gln Gln Gly Leu Gly Met
3320 3325 3330

Thr Ala Asp Leu Asp Gln Arg Asp Val Ala Arg Ala Ala Ala Ala
3335 3340 3345

Gly Met Pro Leu Leu Thr Ala Asp Glu Gly Leu Ala Leu Phe Asp
3350 3355 3360

Ala Ala Pro Ala Thr Gly Asp Pro Ala Leu Val Thr Ala Arg Leu
3365 3370 3375

Asp Leu Ala Ala Phe Arg Ala Arg Thr Pro Val Pro Ala Leu Leu
3380 3385 3390

Arg Gly Leu Val Thr Ala Pro Arg Arg Thr Ala Ala Gly Ala Ala
3395 3400 3405

Gln Ala Thr Asp Ala Gly Leu Val Ala Arg Leu Ala Arg Leu Asp
3410 3415 3420

Asp Asp Arg Arg His Glu Val Leu Leu Asp Val Val Arg Asp Ala
3425 3430 3435

Ala Ala Leu Val Leu Gly His Thr Ser Gly Ala Asp Ile Asp Ala
3440 3445 3450

Asp Arg Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Thr Ala Val
3455 3460 3465

Glu Leu Arg Asn Arg Leu Ala Thr Ala Thr Gly Leu Arg Leu Pro
3470 3475 3480

Ala Thr Thr Val Phe Asp His Pro Thr Leu Ser Ala Leu Ala Thr
3485 3490 3495

His Leu Arg Ser Glu Leu Leu Gly Ser Ala Ala Pro Pro Ala Pro
3500 3505 3510

Glu Arg Pro Val Val Thr Pro Leu Asp Asp Asp Pro Val Val Ile

3515						3520						3525					
Val	Gly	Met	Ala	Cys	Arg	Phe	Pro	Gly	Gly	Val	Thr	Ser	Pro	Glu			
3530						3535						3540					
Asp	Leu	Trp	Gln	Leu	Val	Gly	Asp	Gly	Val	Asp	Ala	Ile	Thr	Gly			
3545						3550						3555					
Phe	Pro	Thr	Gly	Arg	Gly	Trp	Asp	Leu	Asp	Gly	Leu	Tyr	Asp	Pro			
3560						3565						3570					
Asp	Pro	Asp	His	Ala	Gly	Thr	Ser	Tyr	Thr	Arg	Glu	Gly	Gly	Phe			
3575						3580						3585					
Leu	His	Asp	Ala	Ala	Glu	Phe	Asp	Ala	Gly	Phe	Phe	Gly	Met	Ser			
3590						3595						3600					
Pro	Arg	Glu	Ala	Thr	Ala	Thr	Asp	Ala	Gln	Gln	Arg	Leu	Leu	Leu			
3605						3610						3615					
Glu	Thr	Ser	Trp	Glu	Ala	Val	Glu	Arg	Ala	Gly	Ile	Asp	Pro	Val			
3620						3625						3630					
Ser	Leu	Arg	Gly	Ser	Ala	Thr	Gly	Val	Phe	Ala	Gly	Val	Met	Tyr			
3635						3640						3645					
His	Asp	Tyr	Ala	Asp	Asn	Leu	Gly	Gly	Pro	Glu	His	Glu	Gly	Ile			
3650						3655						3660					
Gln	Gly	Gln	Gly	Ser	Ala	Gly	Ser	Val	Ala	Ser	Gly	Arg	Val	Ser			
3665						3670						3675					
Tyr	Thr	Leu	Gly	Leu	Glu	Gly	Pro	Ala	Val	Thr	Val	Asp	Thr	Ala			
3680						3685						3690					

Cys Ser Ser Ser Leu Val Ala Met His Trp Ala Met Gln Ala Leu
3695 3700 3705

Arg Thr Gly Glu Cys Thr Leu Ala Leu Ala Gly Gly Val Thr Val
3710 3715 3720

Met Ser Thr Pro Ala Thr Phe Val Glu Phe Ser Arg Gln Gly Gly
3725 3730 3735

Leu Ala Ala Asp Gly Arg Ser Lys Pro Phe Ala Asp Ala Ala Asp
3740 3745 3750

Gly Val Gly Trp Ala Glu Gly Ala Gly Met Leu Val Leu Glu Arg
3755 3760 3765

Arg Ser Asp Ala Leu Arg Asn Gly His Glu Ile Leu Ala Val Val
3770 3775 3780

Arg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr
3785 3790 3795

Ala Pro Asn Gly Pro Ser Gln Gln Arg Val Ile Arg Gln Ala Leu
3800 3805 3810

Ala Ser Ala Gly Leu Arg Ala Ser Asp Val Asp Ala Val Glu Ala
3815 3820 3825

His Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile Glu Ala Gln Ala
3830 3835 3840

Leu Ile Ala Thr Tyr Gly Ala Asp Arg Asp Pro Ala Gln Pro Leu
3845 3850 3855

His Leu Gly Ser Leu Lys Ser Asn Ile Gly His Thr Gln Ala Ala
3860 3865 3870

Ala Gly Val Ala Gly Val Ile Lys Met Val Gln Ala Leu Arg His
3875 3880 3885

Gly Val Leu Pro Arg Thr Leu His Val Asp Ala Pro Ser Ser His
3890 3895 3900

Val Asp Trp Ser Asp Gly Thr Val Ala Leu Leu Thr Glu Pro Thr
3905 3910 3915

Val Trp Pro Glu Thr Gly Arg Val Arg Arg Ala Gly Val Ser Ser
3920 3925 3930

Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile Val Glu Gln Pro
3935 3940 3945

Ala Asp Ala Pro Ala Pro Ser Pro Ala Glu Pro Gly Pro Asp Gly
3950 3955 3960

Pro Leu Pro Trp Leu Leu Ser Ala Arg Ser Pro Glu Ala Leu Arg
3965 3970 3975

Asp Gln Ala Ala Arg Leu Arg Asp Ala Val Thr Gly Arg Pro Asp
3980 3985 3990

Leu Arg Pro Ile Asp Val Ala His Ser Leu Ala Thr Gly Arg Ser
3995 4000 4005

Ala Phe Asp His Arg Ala Val Val Leu Ala Ala Asp Ala Asp Asp
4010 4015 4020

Ala Val Arg Ala Leu Thr Ala Leu Ala Asp Gly Asp Ser Asp Pro
4025 4030 4035

Ala Val Val Thr Gly Arg Ala Arg Gly Gly Arg Thr Ala Met Leu

4040

4045

4050

Phe Ser Gly Gln Gly Ser Gln Arg Leu Gly Met Gly Arg Glu Leu
4055 4060 4065

His Ala Arg Phe Pro Val Phe Ala Asp Ala Phe Asp Ala Val Val
4070 4075 4080

Ala Ala Leu Asp Ala Glu Leu Gly Gly Asp Leu Arg Ala Val Val
4085 4090 4095

Trp Gly Thr Asp Ala Ala Ala Leu Asp Glu Thr Gly Ala Thr Gln
4100 4105 4110

Pro Ala Leu Phe Ala Val Glu Val Ala Leu His Arg Leu Val Glu
4115 4120 4125

Ser Trp Gly Val Arg Ala Asp Leu Val Ala Gly His Ser Ile Gly
4130 4135 4140

Glu Ile Ala Ala Ala His Val Ala Gly Val Phe Ser Leu Ala Asp
4145 4150 4155

Ala Ala Arg Leu Val Ala Ala Arg Ala Ser Leu Met Gln Ala Leu
4160 4165 4170

Pro Thr Gly Gly Ala Met Leu Ala Val Gln Ala Ser Glu Asp Glu
4175 4180 4185

Val Arg Pro His Leu Thr Asp Gly Val Ala Ile Ala Ala Val Asn
4190 4195 4200

Gly Pro Ser Ala Val Val Val Ser Gly Asp Glu Asp Ala Val Thr
4205 4210 4215

Ala Val Gly Glu Gln Leu Ala Gly Arg Arg Thr Arg Arg Leu Ala
4220 4225 4230

Val Ser His Ala Phe His Ser Pro Leu Met Asp Pro Met Leu Ala
4235 4240 4245

Glu Phe Arg Ala Val Ala Glu Gln Leu Ser Tyr Ala Glu Pro Val
4250 4255 4260

Val Pro Val Val Ser Asn Leu Thr Gly Ala Leu Ala Glu Pro Arg
4265 4270 4275

Gln Leu Cys Asp Pro Glu Tyr Trp Val Arg His Val Arg Glu Ala
4280 4285 4290

Val Arg Phe Gly Asp Gly Val Arg Ala Leu Ala Gly Ala Gly Ala
4295 4300 4305

Thr Thr Phe Leu Glu Leu Gly Pro Asp Gly Val Leu Ser Ala Met
4310 4315 4320

Ala Arg Glu Ser Leu Pro Asp Asp Thr Thr Ala Thr Val Pro Val
4325 4330 4335

Leu Arg Arg Asp Arg Gly Glu Val Asp Ala Ala Leu Thr Ala Leu
4340 4345 4350

Ala Arg Leu His Val Gly Gly Thr Arg Val Gly Trp Thr Glu Leu
4355 4360 4365

Leu Pro Gly Gly Arg Arg Val Asp Leu Pro Thr Tyr Ala Phe Gln
4370 4375 4380

His Ala Thr Tyr Trp Pro Thr Ala Thr Arg Pro Ala Ala Asp Ala
4385 4390 4395

Gly Ala Leu Gly Leu Thr Ala Thr Gly His Pro Val Leu His Gly
4400 4405 4410

Val Val Glu Leu Ala Glu Gly Glu Gly Val Leu Cys Thr Gly Arg
4415 4420 4425

Leu Ser Leu Ala Thr His Pro Trp Leu Thr Asp His Ala Val Arg
4430 4435 4440

Gly Thr Val Leu Val Pro Gly Thr Ala Leu Leu Glu Leu Ala Leu
4445 4450 4455

Arg Ala Gly Asp Glu Val Gly Cys Asp Arg Val Glu Glu Leu Thr
4460 4465 4470

Leu Ala Ala Pro Leu Val Val Pro Thr Arg Gly Ala Val Arg Thr
4475 4480 4485

Gln Val Arg Val Gly Val Ala Asp Asp Asp Gly Arg Arg Thr Val
4490 4495 4500

Thr Val His Ala Arg Pro Asp Asp Ala Gly Asp Ala Pro Trp Thr
4505 4510 4515

Gln His Ala Ala Gly Thr Leu Thr Thr Ala Ala Pro Glu Pro Thr
4520 4525 4530

Gly Phe Asp Ala Thr Thr Trp Pro Pro Thr Gly Ala Arg Glu Leu
4535 4540 4545

Pro Leu Arg Gly Cys Tyr Glu Arg Phe Ala Glu Ala Gly Phe Gly
4550 4555 4560

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

4565

4570

4575

Asp Thr Val Tyr Ala Glu Val Ala Leu Pro Gly Gln Ala Thr Asp
4580 4585 4590

Asp Ala Ala Arg Phe Gly Leu His Pro Ala Leu Leu Asp Ala Ala
4595 4600 4605

Leu His Ala Gly Met Leu Asp Asp Asp Gly Thr Ala Gly Leu Pro
4610 4615 4620

Phe Ser Trp Asp Gly Val Thr Leu His Ala Thr Gly Ala Val Ala
4625 4630 4635

Leu Arg Val Arg Leu Thr Arg Thr Gly Gly Gly Ile Ala Ile Ala
4640 4645 4650

Ala Ala Asp Pro Ala Gly His Pro Val Ala Thr Val Asp Thr Leu
4655 4660 4665

Ala Val Arg Pro Val Ala Glu Ala Gln Leu Ala Pro Thr Gly Thr
4670 4675 4680

Gly Asp Ala Leu Phe Ala Leu Asp Trp Thr Pro Val Asp Asp Ala
4685 4690 4695

Pro Ala Gly Ile Pro Ala Pro Ala Thr Val Ala Val Val Gly Ile
4700 4705 4710

Gly Val Gly Asp Asp His Gly Asp Ser Ala Ala Ala Glu Val Ala
4715 4720 4725

Ala Gly Leu Ser Ala Ala Gly Thr Asp Ala Thr Val His Thr Gly
4730 4735 4740

Pro Ala Thr Ala Ile Glu Glu Leu Gly Asp Thr Val Val Val Thr
4745 4750 4755

Val Asp Gly Glu Gly Ala Asp Thr Ala Thr Ala Ala His Thr Leu
4760 4765 4770

Thr Ala Ala Val Leu Asp Leu Leu Gln Gln Trp Thr Ala Gly Thr
4775 4780 4785

Gly Ser Gly Arg Leu Ala Val Val Thr Arg Gly Ala Val Ala Ala
4790 4795 4800

Gly Gly Thr Ala Pro Thr Asp Val Ala Ala Ala Ala Val His Gly
4805 4810 4815

Leu Val Arg Ser Ala Arg Ser Glu Phe Pro Asp Gly Ile Val Leu
4820 4825 4830

Val Asp Leu Asp Pro Ala Thr Ala Gly Ala Ala Asp Asp Gly Pro
4835 4840 4845

Leu Leu Leu Ala Ala Leu His Thr Gly Glu Pro Gln Ile Ala Val
4850 4855 4860

Arg Asp Gly Ala Leu Leu Ala Gly Arg Leu Thr Arg Ala Gln Thr
4865 4870 4875

Gly Ser Gly Leu Val Val Pro Ala Val Asp Ala Trp Cys Leu Asp
4880 4885 4890

Ser Thr Thr Pro Gly Ser Ile Asp Gly Leu Ala Leu Val Pro His
4895 4900 4905

Pro Glu Ala Gly Ala Pro Leu Thr Gly His Gln Val Arg Val Ala
4910 4915 4920

Ile Arg Ala Ala Gly Leu Asn Phe Arg Asp Val Leu Lys Ser Leu
4925 4930 4935

Asp Met Tyr Pro Gly Asp Ala Gly Arg Tyr Gly His Glu Ala Ala
4940 4945 4950

Gly Val Val Leu Ala Thr Gly Pro Asp Val Thr Gly Leu Ala Pro
4955 4960 4965

Gly Asp Arg Val Leu Gly Met Ile Ser Gly Ser Phe Ser Ser Val
4970 4975 4980

Ala Val Asp Asp Ala Arg Arg Leu Thr Arg Ile Pro Asp Gly Trp
4985 4990 4995

Asp Trp Glu Thr Ala Ala Ser Val Pro Leu Val Phe Leu Thr Ala
5000 5005 5010

Trp His Ala Leu Arg Gln Leu Gly Asn Leu Thr Ala Gly Glu Lys
5015 5020 5025

Val Leu Val His Ala Gly Ala Gly Gly Val Gly Met Ala Ala Val
5030 5035 5040

Gln Ile Ala Arg His Leu Gly Ala Glu Val Tyr Ala Thr Ala Ser
5045 5050 5055

Glu Pro Lys Gln His Val Leu Arg Ser Leu Gly Val Ala Glu Asp
5060 5065 5070

His Ile Ala Ser Ser Arg Thr Leu Glu Phe Ala Glu Thr Phe Ala
5075 5080 5085

Gly Thr Asp Leu Asp Val Val Leu Asn Ser Leu Ala Gly Glu Phe

5090

5095

5100

Val Asp Ala Ser Met Gly Leu Leu Gly Asp Gly Gly Arg Phe Leu
5105 5110 5115

Glu Met Gly Lys Thr Asp Ile Arg Asp Ala Asp Ser Ala Pro Ala
5120 5125 5130

Gly Val Ser Tyr Gln Ala Phe Asp Leu Ala Trp Val Glu Pro Glu
5135 5140 5145

Ala Ile Gly Ala Met Phe Ala Glu Leu Met Asp Leu Phe Ala Ala
5150 5155 5160

Gly Val Leu Asp Pro Leu Pro Val Arg Thr Trp Asp Val Arg Asp
5165 5170 5175

Ala Pro Ala Ala Phe Arg Phe Met Ser Ala Ala Gln His Ile Gly
5180 5185 5190

Lys Ile Val Leu Thr Leu Pro Arg Pro Trp Thr Thr Glu Gly Thr
5195 5200 5205

Val Leu Val Thr Gly Gly Thr Gly Gly Leu Gly Gly Leu Leu Ala
5210 5215 5220

Arg His Leu Val Ala Thr His Gly Val Arg His Leu Leu Leu Thr
5225 5230 5235

Ser Arg Ser Gly Ala Asp Ala Pro Gly Ala Ala Glu Leu Val Ser
5240 5245 5250

Glu Leu Gly Glu Leu Gly Ala Gln Val Ser Val Ala Ala Cys Asp
5255 5260 5265

Val Thr Asp Ala Asp Ala Val Ala Ala Leu Val Ala Gly Val Pro
5270 5275 5280

Gly Gly His Pro Leu Arg Ala Val Val His Thr Ala Gly Val Leu
5285 5290 5295

Asp Asp Gly Val Leu Ala Ser Leu Thr Pro Gly Arg Leu Ala Arg
5300 5305 5310

Val Leu Ala Pro Lys Val Asp Gly Ala Trp Asn Leu His Arg Ala
5315 5320 5325

Thr Glu His Leu Asp Leu Asp Ala Phe Val Leu Phe Ser Ser Val
5330 5335 5340

Ala Gly Val Phe Gly Gly Ala Gly Gln Ala Asn Tyr Ala Ala Gly
5345 5350 5355

Asn Ala Phe Leu Asp Ala Leu Ala Ala His Arg Ala Ala Ala Gly
5360 5365 5370

Leu Pro Gly Val Ser Leu Ala Trp Gly Ala Trp Gly Gln Glu Ala
5375 5380 5385

Gly Met Thr Ala Gly Leu Asp Glu Arg Asp Val Arg Arg Ala Ala
5390 5395 5400

Glu Ser Gly Met Pro Leu Leu Ala Ala Gly Gln Ala Leu Ala Leu
5405 5410 5415

Phe Asp Ala Ala Leu Ala Thr Gly Arg Pro Ala Leu Val Pro Val
5420 5425 5430

Arg Leu Asp Leu Ala Thr Leu His Arg Arg Gly Thr Val Pro Pro
5435 5440 5445

Leu Leu Arg Gly Leu Val Arg Ala Pro Ala Arg Arg Ala Ala Thr
5450 5455 5460

Thr Thr Ala Ala Asp Ala Gly Gly Leu Ala Gly Arg Leu Gly Ala
5465 5470 5475

Leu Gly Arg Ala Glu Arg Arg Ala Ala Leu Leu Asp Leu Val Arg
5480 5485 5490

Gly Glu Ala Ala Thr Val Leu Gly His Ala Gly Gly Asp Arg Ile
5495 5500 5505

Asp Pro Glu Leu Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Thr
5510 5515 5520

Ala Val Glu Leu Arg Asn Lys Leu Gly Ala Ala Thr Gly Leu Arg
5525 5530 5535

Leu Pro Ala Thr Ala Ile Phe Asp Tyr Pro Thr Val Val Ala Leu
5540 5545 5550

Ala Glu His Leu Leu Val Gly Leu Leu Gly Pro Asp Ala Asp Gly
5555 5560 5565

Asp Ser Gly Thr Gly Ala Asp Ile Ala Gly Ile Thr Thr Ala Asp
5570 5575 5580

Asp Pro Val Val Val Val Gly Met Ser Cys Arg Phe Pro Gly Gly
5585 5590 5595

Ile Gly Ser Pro Glu Asp Leu Trp Arg Val Leu Asp Glu Gly Thr
5600 5605 5610

Asp Val Ile Ala Gly Phe Pro Thr Asp Arg Gly Trp Asp Leu Asp

5615				5620				5625						
Asp	Leu	Phe	Asp	Asp	Asp	Pro	Ala	His	Arg	Gly	Thr	Ser	Tyr	Ala
5630				5635				5640						
Arg	Ser	Gly	Gly	Phe	Leu	Asp	Asp	Ala	Ala	Gly	Phe	Asp	Ala	Asp
5645				5650				5655						
Phe	Phe	Gly	Met	Ser	Pro	Arg	Glu	Ala	Met	Ala	Thr	Asp	Ala	Gln
5660				5665				5670						
Gln	Arg	Leu	Leu	Leu	Glu	Ser	Ser	Trp	Glu	Ala	Ile	Glu	Arg	Ala
5675				5680				5685						
Gly	Leu	Asp	Pro	His	Ser	Leu	Arg	Asp	Ser	Arg	Thr	Gly	Val	Phe
5690				5695				5700						
Ala	Gly	Val	Met	Tyr	Ser	Gly	Tyr	Gly	Thr	Arg	Leu	Asp	Gly	Asp
5705				5710				5715						
Glu	Phe	Glu	Gly	Phe	Gln	Gly	Gln	Gly	Ser	Ala	Leu	Ser	Val	Ala
5720				5725				5730						
Ser	Gly	Arg	Ile	Ser	Tyr	Ser	Phe	Gly	Phe	Glu	Gly	Pro	Ala	Met
5735				5740				5745						
Thr	Val	Asp	Thr	Ala	Cys	Ser	Ser	Ser	Leu	Val	Ala	Leu	His	Leu
5750				5755				5760						
Ala	Ala	Gln	Ala	Leu	Arg	Gly	Gly	Glu	Cys	Asp	Arg	Ala	Leu	Ala
5765				5770				5775						
Gly	Gly	Val	Thr	Val	Met	Ala	Gly	Pro	Glu	Thr	Phe	Val	Glu	Phe
5780				5785				5790						

Ser Arg Gln Arg Gly Leu Ala Pro Asp Gly Arg Ser Lys Pro Phe
5795 5800 5805

Ser Glu Ser Ala Asp Gly Val Gly Trp Ser Glu Gly Val Gly Met
5810 5815 5820

Leu Leu Leu Glu Arg Gln Ser Asp Ala Leu Arg His Gly His Arg
5825 5830 5835

Ile Leu Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp Gly Ala
5840 5845 5850

Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro Ser Gln Gln Arg Val
5855 5860 5865

Ile Arg Gln Ala Leu Ala Ser Gly Gly Leu Ser Thr Ala Asp Val
5870 5875 5880

Asp Ala Val Glu Ala His Gly Thr Gly Thr Thr Leu Gly Asp Pro
5885 5890 5895

Ile Glu Ala Gln Ala Leu Leu Ala Thr Tyr Gly Gln Asp Arg Glu
5900 5905 5910

Gln Pro Leu Leu Leu Gly Ser Val Lys Ser Asn Met Gly His Thr
5915 5920 5925

Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Ile Met Ala
5930 5935 5940

Met Gln His Gly Val Leu Pro Arg Thr Leu Gly Val Thr Glu Pro
5945 5950 5955

Ser Ser His Val Asp Trp Asp Ala Gly Ala Val Glu Leu Leu Thr
5960 5965 5970

Glu Gln Thr Pro Trp Pro Glu Thr Gly Arg Ala Arg Arg Ala Gly
5975 5980 5985

Ile Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Val Leu
5990 5995 6000

Glu Gln Pro Ser Pro Val Glu Pro Ala Asp Ala Val Ala Pro Ala
6005 6010 6015

Pro Ala Arg Asp Gly Leu Ala Pro Leu Val Leu Ser Gly Arg Thr
6020 6025 6030

Pro Glu Ala Leu Arg Gly Gln Ala Asp Arg Leu Arg Ala His Leu
6035 6040 6045

Gln Asp Arg Ser Gly Leu Val Pro Ala Asp Val Ala Ser Ala Leu
6050 6055 6060

Ala Ser Ser Arg Ser Arg Phe Ala His Arg Ala Ala Val Leu Ala
6065 6070 6075

Gly Asp Arg Asp Asp Ala Leu Arg Ala Leu Ala Ala Leu Ala Ala
6080 6085 6090

Asp Thr Pro Asp Pro Ala Val Val Thr Gly Thr Ala Arg Pro Gly
6095 6100 6105

Arg Thr Ala Val Val Phe Ser Gly Gln Gly Ser Gln Arg Leu Gly
6110 6115 6120

Met Gly Arg Glu Leu Tyr Gly Arg Phe Pro Val Phe Ala Glu Ala
6125 6130 6135

Phe Asp Ala Val Val Ala Val Leu Asp Ala Glu Leu Gly Gly Asp

6140					6145					6150				
Leu	Arg	Ala	Leu	Val	Trp	Gly	Thr	Asp	Ala	Ala	Ala	Leu	Asp	Glu
6155					6160					6165				
Thr	Gly	Thr	Ala	Gln	Pro	Ala	Leu	Phe	Ala	Val	Glu	Val	Ala	Leu
6170					6175					6180				
His	Arg	Leu	Val	Glu	Ser	Trp	Gly	Val	Arg	Ala	Asp	Leu	Val	Ala
6185					6190					6195				
Gly	His	Ser	Ile	Gly	Glu	Ile	Ala	Ala	Ala	His	Val	Ala	Gly	Val
6200					6205					6210				
Phe	Ser	Leu	Ala	Asp	Ala	Ala	Arg	Leu	Val	Ala	Ala	Arg	Ala	Ser
6215					6220					6225				
Leu	Met	Gln	Ala	Leu	Pro	Thr	Gly	Gly	Ala	Met	Val	Ala	Val	Arg
6230					6235					6240				
Ala	Thr	Glu	Glu	Gln	Val	Arg	Pro	His	Leu	Thr	Asp	Asp	Val	Ala
6245					6250					6255				
Val	Ala	Ala	Val	Asn	Gly	Pro	Ala	Ser	Leu	Val	Leu	Ala	Gly	Ala
6260					6265					6270				
Arg	Asp	Ala	Val	Leu	Ala	Val	Ala	Glu	Gln	Leu	Arg	Ala	Gln	Gly
6275					6280					6285				
Arg	Ser	Val	Thr	Thr	Leu	Arg	Val	Ser	His	Ala	Phe	His	Ser	Pro
6290					6295					6300				
Leu	Met	Asp	Pro	Met	Leu	Glu	Glu	Phe	Arg	Ala	Val	Ala	Glu	Gln
6305					6310					6315				

Leu Thr Tyr Thr Glu Pro Val Val Pro Val Val Ser Asn Val Thr
6320 6325 6330

Gly Ala Leu Ala Gly Pro Gly Gln Leu Cys Val Pro Gly Tyr Trp
6335 6340 6345

Val Arg His Val Arg Glu Ala Val Arg Phe Gly Asp Gly Val Arg
6350 6355 6360

Ala Leu Ala Glu Ala Gly Ala Thr Thr Phe Leu Glu Leu Gly Pro
6365 6370 6375

Asp Gly Val Leu Ser Ala Met Ala Arg Glu Ser Leu Pro Glu Asp
6380 6385 6390

Thr Thr Val Thr Val Pro Val Leu Arg Arg Asp Arg Asp Glu Glu
6395 6400 6405

Arg Thr Ala Leu Thr Ala Leu Ala Thr Leu His Thr Thr Gly Val
6410 6415 6420

Pro Val Asp Trp Thr Ala Leu Leu Pro Ala Gly Pro Asp His Val
6425 6430 6435

Asp Leu Pro Thr Tyr Ala Phe Gln His Arg His Phe Trp Pro Ser
6440 6445 6450

Gly Ala Thr Gly Ala Pro Ala Gly Thr Gly Thr Thr Gly His Pro
6455 6460 6465

Leu Ala Gly Ser Val Val Ala Leu Ala Asp Gly Glu Gly Leu Val
6470 6475 6480

Leu Thr Gly Arg Ile Ser Thr Arg Thr Gln Pro Trp Leu Ala Asp
6485 6490 6495

His Ala Val Gly Gly Arg Val Leu Leu Pro Gly Thr Ala Phe Val
6500 6505 6510

Glu Leu Val Leu Arg Ala Gly Glu Glu Val Gly Cys Asp His Val
6515 6520 6525

Glu Glu Leu Thr Leu Thr Ala Pro Leu Val Leu Pro Asp Asp Glu
6530 6535 6540

Thr Val Arg Thr Gln Val Arg Leu Gly Ala Ala Asp Ala Ala Gly
6545 6550 6555

Arg Arg Pro Val Thr Val His Ser Arg Pro His Gly Thr Asp Asp
6560 6565 6570

Asp Pro Asp Pro Asp Ala Gly Trp Thr Leu His Ala Thr Gly Thr
6575 6580 6585

Leu Val Thr Ala Leu Pro Pro Val Pro Asp Pro Leu Asp Gly Ile
6590 6595 6600

Trp Pro Pro Ala Gly Ala Glu Pro Val Asp Leu Asp Gly Phe Tyr
6605 6610 6615

Pro Ala Arg Ala Ala Glu Gly Phe Ala Tyr Gly Pro Ser Phe Gln
6620 6625 6630

Gly Leu Arg Ala Ala Trp Arg Arg Asp Gly Glu Val Phe Ala Glu
6635 6640 6645

Leu Ala Leu Pro Glu Pro Ala Asp Gly Thr Ala Thr Ala Tyr Ala
6650 6655 6660

Leu His Pro Ala Leu Leu Asp Ala Ala Leu Gln Ser Ala Trp Leu

6665				6670				6675						
Ala	Glu	Asp	Arg	Gly	Gly	Asp	Thr	Ala	Gly	Thr	Thr	Ala	Ala	Gly
6680				6685				6690						
Val	Pro	Phe	Ala	Trp	Ser	Gly	Val	Ser	Leu	Ala	Ala	Ala	Gly	Ala
6695				6700				6705						
Ser	Ala	Leu	Arg	Ala	Arg	Leu	Arg	Arg	Asp	Pro	Asp	Gly	Thr	Leu
6710				6715				6720						
Thr	Val	Ser	Ala	Thr	Asp	Thr	Gly	Gly	Ala	Pro	Val	Ala	Glu	Val
6725				6730				6735						
Arg	Ala	Leu	Glu	Met	Arg	Pro	Val	Gly	Thr	Pro	Asp	Asp	Val	Ala
6740				6745				6750						
Pro	Gly	Val	Arg	Asp	Ala	Leu	Phe	Gly	Leu	Asp	Trp	Thr	Pro	Val
6755				6760				6765						
Pro	Asp	Ala	Gly	Pro	Leu	Pro	Asp	Ala	Thr	Thr	Ala	Val	Leu	Val
6770				6775				6780						
Gly	Asp	Asp	Pro	Phe	Asp	Leu	Thr	Gly	Ala	Leu	Ala	Glu	Leu	Gly
6785				6790				6795						
Ala	Thr	Val	Glu	His	His	Asp	Asp	Leu	Pro	Ala	Gly	Thr	Pro	Ala
6800				6805				6810						
Gly	Pro	Val	Leu	Leu	Pro	Val	Ala	Ala	Pro	Ala	Asp	Pro	Gly	Gly
6815				6820				6825						
Glu	Asp	Ala	Ala	Ala	Ala	Ala	His	Thr	Leu	Thr	Ala	Arg	Val	Leu
6830				6835				6840						

Gly Leu Val Arg Ala Arg Leu Glu Gln Glu Arg Phe Ala Gly Thr
6845 6850 6855

Arg Phe Leu Val Val Thr Arg Gly Ala Thr Thr Gly His Asp Pro
6860 6865 6870

Ala Ala Ala Ala Val Trp Gly Leu Val Arg Ser Ala Gln Ser Glu
6875 6880 6885

Asn Pro Gly Ala Phe Gly Leu Leu Asp Leu Asp Pro His Ala Ala
6890 6895 6900

Ala Thr Leu Pro Ala Ala Ala Leu Gly Gly Asp Glu Pro Gln Leu
6905 6910 6915

Arg Thr His Gly Gly Glu Leu Arg Ala Ala Arg Leu Ala Arg Arg
6920 6925 6930

Ala Pro Ala Gly Asp Asp Thr Ala Ala Ala Gly Leu Gly Ala Gly
6935 6940 6945

Thr Val Leu Val Thr Gly Gly Thr Gly Gly Leu Gly Ala Val Leu
6950 6955 6960

Ala Arg His Leu Val Ala Ala His Asp Val Arg Glu Leu Leu Leu
6965 6970 6975

Val Ser Arg Arg Gly Pro Asp Ala Glu Gly Ala Ala Asp Leu Val
6980 6985 6990

Ala Asp Leu Ala Asp Ala Gly Ala Arg Ala Thr Val Val Ala Cys
6995 7000 7005

Asp Val Ser Asp Arg Asp Ala Val Thr Ala Leu Leu Asp Asp His
7010 7015 7020

Pro Val His Ala Val Val His Ala Ala Gly Val Leu Asp Asp Gly
7025 7030 7035

Leu Val Ala Thr Leu Thr Pro Glu Arg Leu Ala Ala Val Leu Arg
7040 7045 7050

Pro Lys Val Asp Ala Ala Trp His Leu His Glu Ala Thr Arg Asp
7055 7060 7065

Arg Asp Leu Ala Ala Phe Val Met Phe Ser Ser Val Ala Gly Val
7070 7075 7080

Leu Gly Asn Pro Gly Gln Ala Asn Tyr Ala Ala Gly Asn Ala Phe
7085 7090 7095

Leu Asp Ala Leu Ala Leu Arg Arg Arg Thr Glu Gly Leu Pro Gly
7100 7105 7110

Thr Ala Leu Ala Trp Gly Pro Trp Glu Gln Gly Met Ala Gly Glu
7115 7120 7125

Leu Thr Glu Ala Glu Ala Ala Arg Leu Ala Arg Ser Gly Val Pro
7130 7135 7140

Ala Leu Thr Val Glu His Gly Leu Ala Leu Phe Asp Ala Ala Leu
7145 7150 7155

Ala Thr Gly Glu Pro Ala Leu Ala Pro Met Arg Leu Asp Pro Ala
7160 7165 7170

Ala Leu Arg Ala His Gly Glu Val Pro Ala Val Leu Arg Ala Leu
7175 7180 7185

Val Arg Gly Arg Ser Arg Arg Ala Ala Val Ala Gly Ser Ala Ala

7190 7195 7200

Ala Ser Gly Leu Arg Asp Arg Leu Ala Pro Leu Thr Pro Glu Glu
7205 7210 7215

Arg Arg Glu Val Leu Leu Asp Leu Val Arg Gly Gln Val Ala Leu
7220 7225 7230

Val Leu Gly His Ala Gly Ala Ala Asp Val Asp Ala Gly Arg Ala
7235 7240 7245

Phe Arg Asp Leu Gly Phe Asp Ser Leu Thr Ser Val Glu Leu Arg
7250 7255 7260

Asn Arg Leu Asn Thr Val Thr Gly Leu Arg Leu Pro Ala Thr Met
7265 7270 7275

Val Phe Asp His Pro Thr Val Asp Leu Leu Val Asp Val Ile Ala
7280 7285 7290

Asp Asp Leu Phe Gly Thr Asp Asp Asp Leu Pro Ala Ala Pro Val
7295 7300 7305

Arg Thr Ala Ala Val Ala Asp Asp Pro Ile Val Ile Val Gly Met
7310 7315 7320

Ala Ser Arg Tyr Pro Gly Gly Val Ala Thr Pro Asp Asp Leu Trp
7325 7330 7335

Thr Leu Val Thr Ser Gly Gly Asp Ala Ile Thr Gly Phe Pro Thr
7340 7345 7350

Asp Arg Gly Trp Asp Leu Glu Asn Leu Tyr His Pro Asp Ala Asp
7355 7360 7365

His Leu Gly Thr Ser Tyr Thr Arg Glu Gly Gly Phe Leu His Asp
7370 7375 7380

Ala Ala Glu Phe Asp Ala Gly Phe Phe Gly Met Ser Pro Arg Glu
7385 7390 7395

Ala Thr Ala Thr Asp Ala Gln Gln Arg Leu Leu Leu Glu Thr Ser
7400 7405 7410

Trp Glu Ala Val Glu Arg Ala Gly Ile Asp Pro Val Ser Leu Arg
7415 7420 7425

Gly Ser Ala Thr Gly Val Phe Ala Gly Val Met Tyr Ser Asp Tyr
7430 7435 7440

Gly Thr Val Leu Ala Gly Pro Glu Tyr Glu Gly Phe Gln Gly Ser
7445 7450 7455

Gly Ser Ser Pro Ser Val Ala Ser Gly Arg Val Ser Tyr Thr Leu
7460 7465 7470

Gly Leu Glu Gly Pro Ala Val Thr Ile Asp Thr Ala Cys Ser Ser
7475 7480 7485

Ser Leu Val Ala Met His Trp Ala Met Gln Ala Leu Arg Ser Gly
7490 7495 7500

Glu Cys Ser Leu Ala Leu Ala Gly Gly Val Thr Val Met Ser Thr
7505 7510 7515

Pro Gly Val Phe Val Asp Phe Ala Arg Gln Arg Gly Leu Ser Pro
7520 7525 7530

Asp Gly Arg Cys Lys Ala Phe Ser Asp Asp Ala Asp Gly Val Gly
7535 7540 7545

Trp Ala Glu Gly Ala Gly Met Leu Val Leu Glu Arg Gln Ser Asp
7550 7555 7560

Ala Leu Arg Asn Gly His Glu Ile Leu Ala Val Val Arg Gly Ser
7565 7570 7575

Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn
7580 7585 7590

Gly Pro Ser Gln Gln Arg Val Ile Arg Gln Ala Leu Ala Ser Gly
7595 7600 7605

Gly Leu Ser Thr Gly Asp Val Asp Val Val Glu Ala His Gly Thr
7610 7615 7620

Gly Thr Thr Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala
7625 7630 7635

Thr Tyr Gly Arg Asp Arg Asp Thr Asp Arg Pro Leu Leu Leu Gly
7640 7645 7650

Ser Val Lys Ser Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val
7655 7660 7665

Ala Gly Val Ile Lys Met Val Gln Ala Met Arg His Gly Thr Leu
7670 7675 7680

Pro Ala Thr Leu His Ala Gly Val Pro Ser Ser His Val Asp Trp
7685 7690 7695

Ser Asp Gly Thr Val Ala Leu Leu Thr Glu Gln Arg Ala Trp Pro
7700 7705 7710

Glu Thr Gly Arg Ala Arg Arg Ala Ala Val Ser Ser Phe Gly Ile

7715

7720

7725

Ser Gly Thr Asn Ala His Val Ile Leu Glu Gln Pro Ala Thr Asp
7730 7735 7740

Ala Ser Gly Pro Val Ala Thr Pro Asp Gly Thr Asp His Asp Arg
7745 7750 7755

Ala Val Pro Trp Val Leu Ser Gly Arg Thr Pro Glu Ala Leu Ala
7760 7765 7770

Gly Gln Ala Gly Lys Leu Ala Glu Ala Leu Glu Arg Arg Pro Gly
7775 7780 7785

Leu Arg Pro Ala Asp Val Gly Leu Ser Leu Ala Thr Gly Arg Thr
7790 7795 7800

Leu Phe Asp His Arg Ala Ala Val Leu Ala Ala Asp Arg Glu Glu
7805 7810 7815

Ala Leu Arg Gly Leu Thr Ala Leu Ala Ala Asp Leu Pro Asp Pro
7820 7825 7830

Ala Val Val Thr Gly Ala Val Arg Ser Gly Arg Thr Ala Val Leu
7835 7840 7845

Phe Ser Gly Gln Gly Ser Gln Arg Pro Gly Met Gly Arg Glu Leu
7850 7855 7860

His Asp Arg Phe Pro Val Phe Ala Glu Ala Phe Asp Ala Val Met
7865 7870 7875

Ala Ala Leu Glu Ala Glu Leu Gly Ser Asp Leu Arg Pro Val Val
7880 7885 7890

Trp Gly Ser Asp Thr Lys Pro Leu Asp Glu Thr Gly Ala Ala Gln
7895 7900 7905

Pro Ala Leu Phe Ala Val Glu Val Ala Leu Phe Arg Leu Val Glu
7910 7915 7920

Ser Trp Gly Ile Thr Pro Asp Val Leu Ala Gly His Ser Ile Gly
7925 7930 7935

Glu Ile Ala Ala Ala His Val Ala Gly Val Phe Ser Leu Ala Asp
7940 7945 7950

Ala Ala Arg Leu Val Ala Ala Arg Ala Ser Leu Met Gln Ala Leu
7955 7960 7965

Pro Ala Gly Gly Ala Met Ile Ala Val Arg Ala Thr Glu Asp Asp
7970 7975 7980

Val Ala Pro Tyr Val Thr Asp Arg Leu Ser Ile Ala Ala Val Asn
7985 7990 7995

Gly Pro Glu Ser Val Val Val Ser Gly Asp Glu His Ala Val Arg
8000 8005 8010

Glu Val Ala Ala Arg Phe Thr Ala Asp Gly His Arg Ala Thr Ala
8015 8020 8025

Leu Arg Val Ser His Ala Phe His Ser Pro Leu Met Asp Pro Met
8030 8035 8040

Leu Ser Glu Phe Gly Ala Val Ala Ala Gly Ile Thr Tyr Arg Glu
8045 8050 8055

Pro Ser Ile Pro Val Val Ser Asn Val Thr Gly Ala Leu Ala Gly
8060 8065 8070

Pro Gly Glu Leu Cys Asp Pro Gly Tyr Trp Val Arg His Val Arg
8075 8080 8085

Glu Thr Val Arg Phe Ala Asp Gly Val Thr Ala Leu Gln Gly Ala
8090 8095 8100

Gly Val Gly Thr Phe Leu Glu Leu Gly Pro Asp Gly Val Leu Ser
8105 8110 8115

Ala Leu Val Ser Ser Gln Thr Ala Asp Gly Val Val Val Pro Leu
8120 8125 8130

Leu Arg Lys Asp Arg Pro Glu Pro Gly Ala Ala Leu Ala Ala Leu
8135 8140 8145

Ala Arg Leu His Thr Ala Gly Thr Asp Val Asp Trp Pro Ala Leu
8150 8155 8160

Leu Thr Gly Gly Arg Arg Val Glu Leu Pro Thr Tyr Ala Phe Gln
8165 8170 8175

Arg Glu Arg Tyr Trp Pro Ala Gly Pro Leu Gly Gly Thr Ala Asp
8180 8185 8190

Leu Arg Ala Val Gly Leu Gly Ala Ala Gly His Pro Leu Leu Gly
8195 8200 8205

Ala Ala Val Gly Leu Ala Ala Asp Asp Gly Cys Leu Phe Thr Gly
8210 8215 8220

Arg Met Ser Leu Arg Thr His Pro Trp Leu Ala Asp His Thr Val
8225 8230 8235

Ala Gly Arg Val Val Val Pro Gly Thr Ala Leu Leu Glu Met Ala

8240

8245

8250

Val Arg Ala Gly Asp Glu Val Gly Cys Asp Arg Val Asp Glu Leu
8255 8260 8265

Thr Leu Gly Ala Pro Leu Val Leu Pro Thr Ser Gly Ser Val Gln
8270 8275 8280

Val Gln Val Ala Val Glu Ala Pro Asp Glu Ala Gly Arg Arg Thr
8285 8290 8295

Val Gly Val Trp Ser Arg Ser Gly Asp Asp Gly Thr Trp Thr Arg
8300 8305 8310

His Ala Thr Gly Ala Leu Ser Thr Ala Gly Ser Pro Ala Val Gly
8315 8320 8325

Glu Val Thr Thr Glu Trp Pro Pro Ala Gly Ala Glu Pro Val Glu
8330 8335 8340

Val Gln Gly Cys Tyr Asp Ala Phe Ala Asp Ala Gly Phe Gly Tyr
8345 8350 8355

Gly Pro Val Phe Arg Gly Leu Arg Ala Ala Trp Arg Arg Gly Glu
8360 8365 8370

Glu Leu Phe Ala Glu Val Ala Leu Pro Glu Glu Thr Ala Gly Ser
8375 8380 8385

Ala Asp Ala Phe Gly Leu His Pro Ala Leu Leu Asp Ala Ala Leu
8390 8395 8400

His Thr Ser Leu Leu Thr Gly Leu Gly Asp Gly Gly Thr Ala Ala
8405 8410 8415

Leu Pro Phe Ser Trp Gln Gly Val Ser Leu His Arg Ser Gly Ala
8420 8425 8430

Thr Ala Leu Arg Val Arg Leu Ala Pro Ser Gly Ala Asp Ala Met
8435 8440 8445

Ser Val Arg Ala Ser Asp Pro Ala Gly Ala Pro Val Val Thr Val
8450 8455 8460

Asp Ser Leu Val Thr Arg Ala Val Ala Ala Asp Ala Ala Thr His
8465 8470 8475

Gly Val Gly Asp Ala Leu Phe Glu Val Thr Arg Gln Pro Val Ala
8480 8485 8490

Ala Thr Gly Ala Pro Arg Thr Val Ala Val Leu Gly Glu Asp Pro
8495 8500 8505

Leu Gly Leu Ala Gly Pro Leu Ala Asp Ala Gly Val Pro Val Gly
8510 8515 8520

Thr Gly Thr Asp Val Ala Val Ile Ala Ala Arg Asp Glu Val Pro
8525 8530 8535

Glu Val Val Val Leu Gly Val Asp Gly Ala Gly Asp Pro Val Ser
8540 8545 8550

Gly Thr His Arg Thr Thr Ala Glu Val Leu Gly Thr Leu Gln Glu
8555 8560 8565

Trp Leu Arg His Asp Ala Leu Ala Gly Ser Arg Leu Val Val Val
8570 8575 8580

Thr Arg Gly Ala Thr Asp Gly Ser Asp Leu Ala Ala Ala Ala Val
8585 8590 8595

Ala Gly Leu Val Arg Ser Ala Gln Thr Glu His Pro Gly Ala Val
8600 8605 8610

Gly His Leu Asp Leu Gly Gly Asp Gly Thr Val Asp Ala Asp Ala
8615 8620 8625

Leu Ala Ser Ala Leu Gly Ser Asp Glu Pro Ala Leu Thr Leu Ser
8630 8635 8640

Gly Ala Glu Ile Arg Ala Pro Arg Leu Thr Arg Leu Pro Val Gly
8645 8650 8655

Gly Asp Pro Ala Val Trp Asn Pro Asp Gly Thr Val Leu Val Thr
8660 8665 8670

Gly Gly Thr Gly Gly Leu Gly Ala Gln Leu Ala Arg His Leu Val
8675 8680 8685

Glu Val His Gly Val Arg His Leu Val Leu Ala Ser Arg Arg Gly
8690 8695 8700

Ala Asp Ala Pro Gly Ser Ala Val Leu Val Asp Glu Leu Thr Ala
8705 8710 8715

Arg Gly Ala Ser Val Ser Val Arg Val Cys Asp Val Ser Asp Pro
8720 8725 8730

Ala Ala Val Thr Ala Leu Val Ala Asp Ala Gly Ala Asp Arg Ser
8735 8740 8745

Leu Thr Ala Val Val His Thr Ala Gly Val Leu Asp Asp Gly Val
8750 8755 8760

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

8765

8770

8775

Lys Ala Asp Ala Ala Trp Tyr Leu His Glu Ala Thr Arg His Leu
8780 8785 8790

Asp Leu Asp Ala Phe Val Val Phe Ser Ser Val Ala Gly Val Leu
8795 8800 8805

Gly Gly Ala Gly Gln Ala Asn Tyr Ala Ala Gly Asn Ala Phe Leu
8810 8815 8820

Asp Ala Leu Ala Ala His Arg Arg Ala Ala Gly Leu Pro Gly Leu
8825 8830 8835

Ser Leu Ala Trp Gly Pro Trp Glu Gln Gly Ser Gly Met Thr Gly
8840 8845 8850

Thr Leu Asp Asp Ala Glu Ala Ala Arg Leu Ala Arg Ser Gly Met
8855 8860 8865

Pro Pro Leu Ser Ala Gln Asp Gly Leu Ser Leu Phe Asp Ala Ala
8870 8875 8880

Leu Ala Val Ser Gly Thr Ala Asp Gly Pro Ser Leu Val Ala Pro
8885 8890 8895

Val Arg Leu Asp Thr Ala Ala Leu Ala Glu Ser Gly Glu Val Pro
8900 8905 8910

Ala Ile Leu Arg Gly Leu Val Arg Thr Arg Thr Arg Arg Ala Ala
8915 8920 8925

Ala Gly Gly Ala Ala Thr Val Ala Gly Leu Val Asp Arg Leu Val
8930 8935 8940

Ala Leu Gly Pro Asp Val Arg His Arg Glu Leu Leu Asp Leu Val
8945 8950 8955

Arg Thr Arg Ile Ala Met Val Leu Gly His Ala Asp Pro Ala Val
8960 8965 8970

Val Asp Glu Arg Ala Pro Leu Arg Asp Leu Gly Phe Asp Ser Leu
8975 8980 8985

Thr Ala Val Glu Leu Arg Asn Arg Leu Ser Thr Ala Thr Gly Leu
8990 8995 9000

Arg Leu Thr Ala Thr Leu Val Phe Asp His Pro Thr Ala Thr Ala
9005 9010 9015

Leu Ala Glu His Leu His Glu Glu Leu Phe Gly Ala Asp Gly Val
9020 9025 9030

Val Pro Ala Pro Val Ala Ala Pro Ala Ala Val Ala Asp Asp Pro
9035 9040 9045

Val Val Val Val Gly Met Ala Cys Arg Phe Pro Gly Gly Val Ser
9050 9055 9060

Ser Pro Glu Asp Leu Trp Arg Leu Leu Asp Asp Gly Val Asp Ala
9065 9070 9075

Val Ser Gly Phe Pro Thr Asn Arg Asn Trp Asp Leu Gly Ser Val
9080 9085 9090

Tyr Asp Pro Asp Pro Asp His Ile Gly Thr Ser Ser Thr Arg His
9095 9100 9105

Gly Gly Phe Leu His Asp Ala Gly Gly Phe Asp Ala Gly Phe Phe
9110 9115 9120

Gly Met Ser Pro Arg Glu Ala Thr Ala Thr Asp Ala Gln Gln Arg
9125 9130 9135

Leu Leu Leu Glu Thr Ser Trp Glu Ala Val Glu Arg Ala Gly Ile
9140 9145 9150

Asp Pro Val Ser Leu Arg Gly Ser Ala Thr Gly Val Phe Ala Gly
9155 9160 9165

Val Met Tyr Ser Asp Tyr Gly Ser Ile Leu Gly Gly Arg Glu Phe
9170 9175 9180

Glu Gly Leu Gln Gly Gln Gly Ser Ser Pro Ser Val Ala Ser Gly
9185 9190 9195

Arg Val Ser Tyr Thr Leu Gly Leu Glu Gly Pro Ala Val Thr Val
9200 9205 9210

Asp Thr Ala Cys Ser Ser Ser Leu Val Gly Met His Leu Ala Ala
9215 9220 9225

Gln Ala Leu Arg Ala Gly Glu Cys Thr Leu Ala Leu Ala Gly Gly
9230 9235 9240

Val Thr Val Met Ser Thr Pro Gly Thr Phe Val Glu Phe Ser Arg
9245 9250 9255

Gln Arg Gly Leu Ser Pro Asp Gly Arg Cys Lys Ala Phe Ala Asp
9260 9265 9270

Ala Ala Asp Gly Val Gly Trp Ser Glu Gly Val Gly Met Leu Val
9275 9280 9285

Leu Glu Arg Arg Ser Asp Ala Leu Arg Asn Gly His Glu Ile Leu

9290 9295 9300

Ala Val Leu Arg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn
9305 9310 9315

Gly Leu Thr Ala Pro Asn Gly Pro Ser Gln Gln Arg Val Ile Arg
9320 9325 9330

Arg Ala Leu Ala Asn Ala Gly Leu Gly Val Gly Asp Val Asp Val
9335 9340 9345

Val Glu Ala His Gly Thr Gly Thr Thr Leu Gly Asp Pro Ile Glu
9350 9355 9360

Ala Gln Ala Leu Ile Ala Thr Tyr Gly Arg Asp Arg Asp Ile Asp
9365 9370 9375

Arg Pro Leu Leu Leu Gly Ser Val Lys Ser Asn Leu Gly His Thr
9380 9385 9390

Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val Leu Ala
9395 9400 9405

Met Arg His Gly Thr Val Pro Arg Thr Leu His Val Asp Ala Pro
9410 9415 9420

Ser Ser His Val Asp Trp Ser Asp Gly Thr Val Ala Leu Leu Thr
9425 9430 9435

Glu Pro Thr Pro Trp Pro Glu Thr Gly Arg Ala Arg Arg Ala Gly
9440 9445 9450

Val Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Ile Val Leu
9455 9460 9465

Glu Gln Pro Val Ala Val Ala Glu Pro Gly Glu Pro Ala Glu Pro
9470 9475 9480

Glu Pro Arg Val Val Pro Trp Val Leu Ser Gly Arg Ser Pro Glu
9485 9490 9495

Ala Val Arg Ala Gln Ala Ala Arg Leu Arg Asp Ala Leu Thr Glu
9500 9505 9510

Gln Pro Gly Pro Arg Arg Val Asp Val Ala His Ala Leu Ala Thr
9515 9520 9525

Thr Arg Ser Glu Phe Ala His Arg Ala Val Val Leu Ala Gly Ala
9530 9535 9540

Gly Pro Asp Pro Leu Ala Ala Leu Asp Ala Val Ala Cys Gly Arg
9545 9550 9555

Pro Asp Pro Ala Ala Val Thr Gly Glu Ser Asp Gly Gly Arg Thr
9560 9565 9570

Ala Leu Leu Phe Ser Gly Gln Gly Ser Gln Arg Pro Gly Met Gly
9575 9580 9585

Arg Asp Leu Tyr Ala Arg Phe Pro Val Phe Ala Glu Ala Phe Asp
9590 9595 9600

Ala Val Val Ala Ala Leu Asp Ala Glu Leu Glu Pro Ala Asp Gly
9605 9610 9615

Gly Thr Leu Arg Glu Val Met Trp Ala Ala Asp Asn Gly Glu Ser
9620 9625 9630

Gly Arg Leu Asp Glu Thr Gly Trp Thr Gln Pro Ala Leu Phe Ala
9635 9640 9645

Val Glu Val Ala Ala His Arg Leu Val Glu Ser Trp Gly Val Arg
9650 9655 9660

Pro Asp Leu Val Ala Gly His Ser Ile Gly Glu Ile Ala Ala Ala
9665 9670 9675

His Val Ala Gly Val Phe Ser Leu Ala Asp Ala Ala Arg Leu Val
9680 9685 9690

Ala Ala Arg Ala Arg Leu Met Gln Ala Leu Pro Thr Gly Gly Ala
9695 9700 9705

Met Ile Ala Val Gln Ala Arg Ala Asp Glu Val Thr Pro Leu Leu
9710 9715 9720

Thr Gly Asp Val Ala Ile Ala Ala Val Asn Gly Pro Ala Ser Val
9725 9730 9735

Val Val Ser Gly Thr Glu Asp Ala Val Leu Ala Val Gly Thr Arg
9740 9745 9750

Leu Ala Glu Gln Gly Arg Arg Thr Thr Arg Leu Gln Val Ser His
9755 9760 9765

Ala Phe His Ser Pro Leu Met Asp Pro Met Leu Glu Gly Phe Arg
9770 9775 9780

Ala Val Ala Glu Arg Leu Thr Tyr Ala Glu Pro Val Val Pro Val
9785 9790 9795

Val Ser Asn Leu Thr Gly Ala Leu Ala Arg Pro Gly Gln Leu Cys
9800 9805 9810

Asp Pro Glu Tyr Trp Val Arg His Val Arg Glu Thr Val Arg Phe

9815											9820											9825		
Ala 9830	Asp	Gly	Leu	Ala	Ser	Leu 9835	Asp	Ala	Ala	Gly	Val 9840	Thr	Ala	Tyr										
Leu 9845	Glu	Ile	Gly	Pro	Asp	Gly 9850	Val	Leu	Ser	Ala	Leu 9855	Ala	Ala	Gln										
Thr 9860	Val	Pro	Glu	Gly	Ala	Val 9865	Thr	Val	Pro	Leu	Leu 9870	Arg	Arg	Asp										
Arg 9875	Asp	Glu	Glu	Thr	Thr	Ala 9880	Leu	Thr	Ala	Arg	Ala 9885	Gln	Leu	His										
Ala 9890	Ala	Gly	Arg	Thr	Gly	Gly 9895	Trp	His	Asp	Leu	Phe 9900	Thr	Gly	Thr										
Arg 9905	Pro	Ala	Arg	Val	Asp	Leu 9910	Pro	Thr	Tyr	Ala	Phe 9915	Gln	His	Gln										
Trp 9920	Phe	Trp	Pro	Ala	Ala	Arg 9925	Thr	Ala	Asp	Gly	Asp 9930	Val	Arg	Ala										
Ala 9935	Gly	Leu	Gly	Ala	Pro	Glu 9940	His	Pro	Leu	Leu	Gly 9945	Ala	Ala	Val										
Glu 9950	Leu	Ala	Ser	Gly	Gly	Gly 9955	Val	Val	Phe	Thr	Gly 9960	Arg	Leu	Ser										
Arg 9965	Gly	Ser	His	Pro	Trp	Leu 9970	Val	Asp	His	Thr	Val 9975	Leu	Gly	His										
Val 9980	Leu	Val	Pro	Gly	Thr	Ala 9985	Leu	Leu	Asp	Met	Ala 9990	Ile	Arg	Ala										

Gly Asp Gln Val Gly Cys Asp Arg Val Glu Glu Leu Thr Leu Ala
9995 10000 10005

Ala Pro Leu Ala Leu Pro Glu Gln Gly Ala Leu Gln Leu Gln Val
10010 10015 10020

Thr Val Asp Ala Pro Asp Pro Asp Gly Asn Arg Ala Ile Gly Ile
10025 10030 10035

His Ser Arg Pro Glu Gly Ala Gly Glu Asp Ala Trp Thr Arg His
10040 10045 10050

Ala Ala Gly Ala Leu Ala Pro Ala Gly Pro Ala Ala Pro Leu Gly
10055 10060 10065

Ala Asp Ala Ala Val Trp Pro Pro Pro Asp Ala Val Glu Ile Asp
10070 10075 10080

Thr Glu Gly Cys Tyr Asp Thr Phe Ala Asp Ala Gly Phe Val Tyr
10085 10090 10095

Gly Pro Val Phe Arg Gly Leu Arg Ala Ala Trp Arg Arg Gly Glu
10100 10105 10110

Glu Leu Phe Ala Glu Val Glu Leu Pro Asp Gly Ala Gly Gly Thr
10115 10120 10125

Asp Gly Phe Gly Leu His Pro Ala Leu Leu Asp Ala Ala Leu His
10130 10135 10140

Val Ser Leu Leu Ala Ala Leu Ala Ser Asp Gly Thr Gly Gly Thr
10145 10150 10155

Gly Gly Gly Ala Leu Pro Phe Ser Trp Ser Gly Val Ser Leu Met
10160 10165 10170

Ala Gly Gly Ala Ala Ala Leu Arg Val Arg Ile Ala Pro Ser Ala
10175 10180 10185

Asp Gly Val Leu Ser Val Arg Ala Val Asp Gly Ala Gly Ala Pro
10190 10195 10200

Val Val Thr Val Glu Ala Leu His Thr Arg Gln Val Gly Ala Glu
10205 10210 10215

Gln Leu Arg Ala Ala Arg Thr Asp Arg Asp Ala Leu Phe Gly Leu
10220 10225 10230

Asp Trp Thr Val Val Asp Ala Ala Glu Gly Ala Ala Pro Val Val
10235 10240 10245

Ala Val Leu Gly Ala Asp Pro Phe Gly Leu Ala Gly Ala Val Pro
10250 10255 10260

Asp Ala Val Gln Val Asp Asp Leu Ala Thr Leu Val Ser Ala Thr
10265 10270 10275

Asp Pro Val Pro Asp Val Val Leu Phe Pro Val Ala Ala Glu Pro
10280 10285 10290

Gly Val Thr Gly Arg Pro Glu Glu Val Arg Ala Cys Thr Val Arg
10295 10300 10305

Val Leu Glu Gln Leu Gln Arg Trp Leu Ala Thr Glu Glu Leu Ala
10310 10315 10320

Thr Ala Arg Leu Val Val Val Thr Arg Gly Ala Val Thr Val Asp
10325 10330 10335

Asp Gly Gly Val Gly Asp Leu Pro Ala Ala Ala Val Arg Gly Leu

10340	10345	10350
Val Arg Ser Ala Ser His Glu Asn Pro Gly Thr Phe Gly Leu Leu 10355 10360 10365		
Asp Leu Asp Pro Asp Ala Ala Gly Thr Asp Phe Ser Gly Leu Ala 10370 10375 10380		
Ala Ala Leu Thr Ala Leu Ala Thr Glu Pro Glu Leu Ala Val Arg 10385 10390 10395		
Asp Gly Ala Leu Arg Ala Pro Arg Leu Ala Arg Ile Ala Ala Thr 10400 10405 10410		
His Glu Gln Pro Asp Gly Ser Asp Ala Arg Pro Ala Leu Arg Thr 10415 10420 10425		
Asp Gly Thr Val Leu Val Thr Gly Gly Thr Gly Gly Leu Gly Ser 10430 10435 10440		
Leu Val Ala Arg His Leu Val Thr Gly Arg Gly Val Arg Asp Leu 10445 10450 10455		
Val Leu Ala Gly Arg Arg Gly Pro Ser Ala Pro Gly Ala Ala Glu 10460 10465 10470		
Leu Val Ala Asp Leu Glu Ala Leu Gly Ala Arg Val Arg Val Val 10475 10480 10485		
Ala Cys Asp Val Ala Asp Arg Asp Ala Val Ala Ala Leu Val Ala 10490 10495 10500		
Glu Ala Gly Arg Glu Arg Pro Leu Arg Gly Val Val His Thr Ala 10505 10510 10515		

Gly Val Leu Asp Asp Gly Val Leu Gly Ser Leu Asp Ala Ala Arg
10520 10525 10530

Leu Asp Thr Val Leu Arg Pro Lys Ala Asp Ala Ala Trp His Leu
10535 10540 10545

His Glu Ala Thr Arg Asp Leu Asp Leu Asp Ala Phe Val Leu Phe
 10550 10555 10560

Ser Ser Val Ala Gly Val Leu Gly Gly Ala Gly Gln Ala Asn Tyr
10565 10570 10575

Ala Ala Gly Asn Ala Tyr Leu Asp Ala Leu Ala Ala Ser Arg Arg
10580 10585 10590

Ala Asp Gly Leu Ala Gly Leu Ser Met Ala Trp Gly Pro Trp Glu
10595 10600 10605

Gln Gly Ser Gly Met Thr Gly Thr Leu Gly Glu Ala Glu Ala Gln
10610 10615 10620

Arg Leu Ala Arg Ser Gly Met Pro Pro Leu Pro Ala Glu Gln Gly
10625 10630 10635

Leu Glu Leu Phe Asp Thr Leu Leu Ala Ala Gly Ser Thr Gly Arg
10640 10645 10650

Ala Leu Val Leu Pro Val Arg Leu Asp Leu Ala Ala Leu Arg Ala
10655 10660 10665

Leu Asp Glu Val Pro Ala Leu Leu Arg Gly Leu Val Arg Thr Thr
10670 10675 10680

Pro Arg Arg Thr Ala Ala Ala Gly Thr Ala Pro Asp Ala Asp Ala
10685 10690 10695

Leu Val Arg Arg Leu Ala Gly Leu Gly Ala Pro Glu Gln Asp Glu
10700 10705 10710

Ile Leu Leu Ala Leu Val Arg Gly Gly Ala Ala Asp Val Leu Gly
10715 10720 10725

His Thr Asp Ala Thr Ala Val Gly Val Arg Gln Gln Phe Gln Glu
10730 10735 10740

Leu Gly Phe Asp Ser Leu Thr Ala Val Glu Tyr Arg Asn Arg Leu
10745 10750 10755

Asn Ala Ala Thr Gly Leu Arg Leu Pro Ala Thr Leu Leu Phe Asp
10760 10765 10770

Phe Pro Thr Pro Ala Glu Val Val Arg His Leu Arg Ser Arg Leu
10775 10780 10785

Val Val Ala Glu Pro Ala Gly Ala Asp Ala Val Leu Ala Ala Leu
10790 10795 10800

Asp Gly Leu Glu Arg Ala Ile Ala Gly Leu His Val Asp Asp Glu
10805 10810 10815

Gly Glu His Arg Arg Val Ala Gly Arg Ile Glu Val Leu Arg Thr
10820 10825 10830

Lys Trp Ala Gly Leu His Ala Glu Asp Arg Pro Ser Asp Pro Asp
10835 10840 10845

Gly Asp Gly Ala Gly Asp Asp Thr Leu Asp Asp Ala Ser Asp Asp
10850 10855 10860

Asp Met Phe Ala Leu Leu Asn Asp Glu Leu Gly Leu Gly

10865

10870

10875

<210> 16

<211> 274

<212> PRT

<213> *Pseudonocardia autotrophica*

<400> 16

Met Pro Val His Trp Leu Arg Arg Pro Ala Ala Arg Arg Val Arg Pro
1 5 10 15

Arg Gly Arg Asn Pro Met Thr Thr Thr Ala Thr Glu Glu Ser Leu Trp
20 25 30

Val Arg Cys Phe His Pro Ala Pro Glu Arg Pro Val Gln Leu Val Cys
35 40 45

Phe Pro His Ala Gly Gly Ser Ala Ser Phe Tyr Phe Pro Val Ser Ala
50 55 60

Gln Leu Gln Thr Thr Ala Glu Val Phe Ala Val Gln Tyr Pro Gly Arg
65 70 75 80

Gln Asp Arg Arg Arg Glu Thr Ser Pro Gly Asp Leu His Thr Leu Ala
85 90 95

Asp Gln Val His Gly Ala Leu Arg Asp Ser Leu Arg Gly His Arg Pro
100 105 110

Thr Val Phe Phe Gly His Ser Met Gly Ala Thr Leu Ala Phe Glu Val
115 120 125

Ala Arg Arg His Glu Ala Gln Gly Gly Arg Ile Ala His Leu Phe Ala
130 135 140

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

145 150 155 160

Leu Ser Asp Glu Gln Ile Val Glu Glu Leu Lys Leu Leu Ala Gly Thr
165 170 175

Asp Thr Ala Leu Leu Gly Asp Asp Glu Ile Leu Arg Met Ile Leu Pro
180 185 190

Ala Ile Arg Ser Asp Tyr Glu Ala Ile Glu Thr Tyr Arg Cys Thr Pro
195 200 205

Gly Ala Thr Val Ala Ala Pro Ile Thr Val Leu Thr Gly Asp Ser Asp
210 215 220

Pro Lys Thr Ser Arg Asp Glu Ala Glu Ser Trp Arg Asp His Thr Ser
225 230 235 240

Gly Pro Phe Asp Leu His Val Arg Pro Gly Gly His Phe Phe Leu Gly
245 250 255

Ser Asp Ala Pro Ala Ile Ile Ala Met Leu Arg Thr Val Leu Thr Ala
260 265 270

Ser Ser

<210> 17
<211> 946
<212> PRT
<213> Pseudonocardia autotrophica

<400> 17

Met Ser Asp Ala Thr Asp Arg Gly Val Arg Leu Val Gly Arg Gly Ser
1 5 10 15

Glu Ser Ala Trp Leu Ala Ser Ala Gly Ala Gly Ala Ala Ala Gly Ser
20 25 30

His Val Val Arg Leu Leu Val Gly Pro Pro Gly Ile Gly Lys Ser Val
35 40 45

Leu Leu Asp Gly Phe Cys Thr Glu Val Pro Ala Gly Val Arg Ala Ala
50 55 60

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

Arg Glu Leu Phe Gly Ala Leu Ala Gly Ala Gly Pro Val Asp Pro Ala
85 90 95

Leu Leu Glu Gly Gly Ala Arg Trp Ser Ala Pro Ala Leu Asp Glu Ala
100 105 110

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

Tyr Trp Leu Thr Val Asn His Thr Ala Arg Gly Pro Leu Val Leu Val
130 135 140

Val Asp Asp Leu Gln Trp Cys Asp Asp Ala Ser Leu Ala Phe Leu Gly
145 150 155 160

Phe Leu Leu Arg Arg Ser Glu Gly Leu Pro Leu Gly Val Val Leu Ala
165 170 175

Ser Arg Thr Asp Gly Ala Gly Ala Leu Pro Asp Arg Leu Ala Glu Ile
180 185 190

Arg Thr Gln Ala Gly Ala Ala Val Thr Glu Val Gly Pro Leu Asp Arg
195 200 205

Ser Gly Val Ala Arg Leu Ala Val Ala Arg Gly Ala Gly Thr Gly Ala

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

Pro Val Val Ala Ala Arg Pro Asp Asp Val Gly Ala Arg Thr Arg Leu
420 425 430

Ala Ala Ala Leu Ala Gln His Glu Pro Glu Arg Ala Val Ala Gln Leu
435 440 445

Arg Asp Ala Leu Asp Arg Ala Val Asp Leu Pro Ser Arg Ala Gln Ala
450 455 460

Ala Val Gln Leu Ala Met Thr Ser Leu Ala Val Gln Gln Ala Pro Arg
465 470 475 480

Ala Val Arg Val Leu Gln Asp Val Leu Asp Thr Met Asp Arg Glu Phe
485 490 495

Pro Ala Asp Pro Gly Pro Glu Ala Thr Glu Leu Arg Thr His Val Glu
500 505 510

Ala Ala Leu Leu Val Val Gly Leu Asp Glu Lys Lys Thr Val Ala Ala
515 520 525

Thr Ile Asp Arg Met Gly Arg Met Ala Arg Pro Ala Gly Arg Thr Pro
530 535 540

Ala Glu Arg Gln Lys Leu Ala Met Met Thr Val Thr Leu Ala Met Asp
545 550 555 560

Gly Asp Asp Ala Ala Ala Ala Val Asp Leu Ala Arg Arg Val Leu Leu
565 570 575

Val Asp Glu Ala Thr Leu Gly Gly Trp Ala Val Leu Ala Ser Ser Leu
580 585 590

Val Leu Arg Leu Ala Asp Glu Val Glu Glu Ser Thr Ala Val Leu Asp
595 600 605

Arg Leu Val Val Gln Ser Arg Glu Gln Ala Ser Ala Trp Thr Tyr Ser
610 615 620

Leu Ala Val Gly Thr Arg Ala Thr Asn His Val Val Val Gly Ser Leu
625 630 635 640

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

Glu Ala Trp Arg Gly Asn Thr Val Val Pro Thr Ile Ala Leu Ala Asn
660 665 670

Val Arg Gln Gln Gln Gly Asp Pro Glu Ala Ala Leu Glu Leu Leu Asp
675 680 685

Gly Ile Val Arg Pro Arg Leu Glu Asp Phe Ala Trp Glu Tyr His Asp
690 695 700

Tyr Leu Met Ala Arg Ala Gly Ala Thr Ala Asp Val Gly Asp Val Asp
705 710 715 720

Arg Ala Leu Ser Thr Tyr Arg Arg Cys Gly Asp Ser Leu Asp Ala Ala
725 730 735

Gly Ile Ala Asn Pro Val Leu Ala Pro Trp Trp Val His Ala Ala Val
740 745 750

Leu Leu Ala Asp Thr Gly Arg Ala His Glu Ala His Gly Ile Val Glu
755 760 765

Gly Gly Ala Glu Arg Ala Ala Arg Trp Gly Thr Gly Arg Gly Arg Gly
770 775 780

Leu Ala Leu Leu Ala Arg Gly Val Val Thr Ala Gly Pro Arg Gly Glu
785 790 795 800

Asp Met Leu Arg Glu Ala Val Glu Val Leu Glu Gly Ser Pro Ala Arg
805 810 815

Thr Glu Leu Ile Leu Ala His His Leu Leu Gly Arg Ala Met Leu Val
820 825 830

Ser Asp His Ala Glu Asp Ala Arg Glu Gln Leu Arg Arg Ala Ala Thr
835 840 845

Leu Ala Ala Arg Cys Gly Ala Leu Arg Ala Ala Arg Val Ala Arg Glu
850 855 860

Leu Leu Val Gln Ala Gly Gly Arg Met Arg Pro Pro Thr Gly Ser Pro
865 870 875 880

Leu Asp Pro Leu Thr Gly Ala Glu Arg Arg Val Val Ala Leu Ala Ala
885 890 895

Glu Gly Ala Arg Asn Arg Glu Ile Ala Glu Ala Leu Phe Val Thr Leu
900 905 910

Arg Thr Val Glu Val His Leu Thr Ser Ala Phe Arg Lys Leu Gly Val
915 920 925

Thr Asp Arg Ala Ala Leu Ala Gly Ile Val Asp Ala Ala Arg Val Arg
930 935 940

Ser Ala
945

<210> 18
<211> 765
<212> PRT
<213> Pseudonocardia autotrophica

<400> 18

Met Leu Arg Glu Arg Asp Ala Ala Cys Ala Glu Leu Asp Arg Ala Leu
1 5 10 15

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

Pro Gly Thr Gly Arg Ser Ala Leu Leu Arg Arg Ala Ser Gly Arg Ala
35 40 45

Ala Asp Arg Ala Val Arg Val Leu Ser Ala Arg Ala Val Pro Thr Glu
50 55 60

Thr Gly Cys Pro Leu Ala Thr Gly His Gly Leu Val Glu Arg Leu Gly
65 70 75 80

Pro Val Pro Ala Pro Pro Arg Ser Gly Pro Val Gly Ala Asp Val Leu
85 90 95

His Glu Trp Cys Arg Ala Val Leu Asp Leu Ala Arg Thr Gly Pro Val
100 105 110

Leu Leu Val Val Asp Asp Leu His Trp Ala Asp Glu Asp Thr Gly Gln
115 120 125

Trp Leu Gln Met Leu Leu Arg Arg Arg Arg Glu Ala Pro Val Gly Leu
130 135 140

Leu Val Ala Leu Asn Gly Thr His Asp Gly Leu Gly Trp Ala Val Ser
145 150 155 160

Pro Thr Gly Pro Ser Asp Val Val Leu Arg Thr Gly Pro Leu Ser Leu
165 170 175

Gly Ala Val Arg Glu Val Val Thr Ala Glu Tyr Pro Thr Pro Pro Asp
180 185 190

Arg Ala Phe Thr Val Leu Ala Arg Arg Cys Thr Gly Gly Asn Pro Ala
195 200 205

Val Leu Arg Ala Thr Leu Ala Gly Leu Asp Arg Ala Val Pro Pro Thr
210 215 220

Ala Ala Ala Val Pro Glu Leu Val Arg Arg Ala Ala Thr Ala Arg Arg
225 230 235 240

Asp His Val Ala Arg Val Leu Asp Gly Leu Pro Pro Ala Leu Val Glu
245 250 255

Ala Leu Arg Ala Ala Ala Val Cys Gly Ser Glu Leu Gln Pro Val Arg
260 265 270

His Arg Val Gly Gly Pro Val Ala Ser Thr Gly Ala Gly Ala Arg Ala
275 280 285

Ala Leu Ala Ala Thr Gly Leu Val Arg Gly Thr Asp His Ala Leu Pro
290 295 300

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

His Arg Arg Ala Leu Phe Gly Ser Ala Ala Gly Leu Ala Ala Arg Ala
325 330 335

Gly Leu Pro Glu Glu Arg Ile Ala Arg Ala Leu Leu Asp Ala Pro Ala
340 345 350

Leu Gly Glu Pro Trp Ala Ala Glu Leu Leu His Arg Val Ala Val Arg
355 360 365

His Arg Ala Glu Asp Arg Pro Ala Asp Ala Ala Ala Ala Glu Arg
370 375 380

Ala Leu Gln Glu Pro Leu Pro Asp Pro Leu Arg Gly Ala Leu Leu Val
385 390 395 400

Glu Leu Ala Leu Ser Arg Ser His Thr Ala Pro Gly Thr Ala Ala Arg
405 410 415

Val Leu Ser Arg Ile Thr Leu Asp Thr Asp Pro Ala Ala Ser Arg Tyr
420 425 430

Gly Ala Arg Ala Val Asp Leu Leu Leu Ser Ala Gly Glu Val Gly Ala
435 440 445

Ala Arg Gln Ala Leu Asp Ile Ala Val Arg Arg Cys Pro Glu Asp Ala
450 455 460

Pro Ala Arg Ala Asp Leu Leu Ser Leu Ser Arg Leu Thr Asp Glu Leu
465 470 475 480

Gly Phe Asp Arg Arg Thr Val Leu His Gly Pro Val Ala Thr Ala Ala
485 490 495

Ala Gly Ser Asp Asp Asp Gly Pro Val Ala Arg Gly Thr Thr Ala Trp
500 505 510

Ser Leu Val Leu Arg Gly Arg Asp Arg Asp Arg Ala Thr Arg Leu Ala
515 520 525

Arg Ala Thr Leu Thr Gly Pro Ser Gly Val Leu Pro Ala Ile Pro Gln
530 535 540

Val Val Ala Ala Leu Thr Leu Asp Ala Val Gly Cys Ala Asp Glu Ala
545 550 555 560

Gly Glu Ala Met His His Leu Leu Leu Glu Ile Thr Arg Glu Arg Pro
565 570 575

Val Pro Pro Ala Val Leu Ala Val Ser Ala Leu Val Glu Leu Arg Thr
580 585 590

Gly Asp Leu Asp Gly Ala Arg Arg Asp Leu Arg Ala Ala Ala Val Ala
595 600 605

Pro Val Ser Ser Asp Gly Pro Asp Pro Leu Ala Gly Ala Ala Arg Val
610 615 620

Leu Val His Leu Ala Glu Pro Asp Val Glu Ala Ala Asp Ala Ala Ala
625 630 635 640

Phe Ala Asp Leu Ala Ala Gly Gly Val Arg Pro Gly Ala Ala Leu Leu
645 650 655

Glu Tyr Ala Arg Gly Arg Val Arg Ser Val Gln Gly Arg His Arg Asp
660 665 670

Ala Val Glu His Tyr Met Gly Cys Gly Arg Leu Leu Leu Asp Arg Gly
675 680 685

Arg Val Asn Pro Val Leu Ala Pro Trp Arg Ser Ala Ala Ala Thr Ser
690 695 700

Leu Leu Ala Cys Gly Ser Pro Ala Ala Ala Arg Arg Leu Ala Ala Asp
705 710 715 720

Glu Leu Arg Leu Ala Leu Arg Trp Gly Ala Pro Ala Pro Val Ala Ala
725 730 735

Ala Glu Ala Val Leu Ala Gly Leu Asp Ala Glu Pro Thr Ala Val Gly
740 745 750

Glu Pro Leu Gly Asp Gly Val Ala Arg Ala Ala Arg Pro
755 760 765

<210> 19
 <211> 925
 <212> PRT
 <213> *Pseudonocardia autotrophica*

<400> 19

Met Arg Asp Ala Val Thr Arg Ala Ala Asp Gly Ser Gly Ala Ala Val
 1 5 10 15

Val Val Gly Gly Gly Val Gly Ser Gly Arg Thr Ala Leu Leu Asp Ala
 20 25 30

Val Gly Val Ala Ala Gly Arg Ala Gly Leu Thr Val Leu Arg Ala Ala
 35 40 45

Ser Ala Leu Val Glu Arg Asp Phe Glu Phe Gly Val Pro Arg Gln Leu
 50 55 60

Phe Asp Pro Leu Leu Ala Ala Ala Gly Ala Asp Ala Arg Thr Arg Trp
 65 70 75 80

Leu Ala Ala Ser Arg Pro Arg Leu Pro Ala Ala Leu Ala Ala Glu Pro
 85 90 95

Leu Asp Pro Ala Glu Thr His Glu Glu Gln Asp Arg Val Arg Glu Leu
 100 105 110

Gln Ala Leu Leu Ala Thr Val Gly Ala Glu Arg Pro Val Leu Val Leu
 115 120 125

Val Asp Asp Leu Gln Trp Ala Asp Thr Ala Ser Leu Arg Trp Leu Asn
 130 135 140

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

Thr Leu His Gly Asp Pro Gly Ala Gly Arg Pro Pro Val Arg Gly Leu

165

170

175

Ala Gly Ser Ala Val Pro Leu Arg Ser Arg Pro Leu Gly Pro Ala Ala
180 185 190

Val Arg Gly Met Val Ala Gly Arg Phe Gly Arg Ala Gly Asp Pro Glu
195 200 205

Phe Leu Gln Val Cys Glu Glu Val Ser Gly Gly Val Pro Ser Val Leu
210 215 220

Arg Ala Val Leu Asp Glu Val Val Ala Ala Gly Gly Gly Pro Val Ala
225 230 235 240

Ala Cys Ile Pro Ala Val Arg Ser Ala Arg Pro Ala Gly Leu Arg Glu
245 250 255

Arg Phe Ala Arg Cys Leu Arg Ala Gln Asp Asp Ala Ala Arg Arg Tyr
260 265 270

Leu Gly Ala Leu Ala Val Leu Gly Pro Ala Ala Asp Pro Ala Val Val
275 280 285

Ala Arg Leu Ala Glu Leu Asp Pro His Gly Leu Arg Ala Val Gln Gly
290 295 300

Gln Leu Thr Glu Gln Gly Leu Leu Thr Asp Asp His Thr Gly Phe Thr
305 310 315 320

His Pro Leu Val Arg Asp Val Ala Ala Asp Pro Ala Glu Arg Glu Arg
325 330 335

Leu His Leu Arg Ala Ala Arg Leu Leu His Glu Thr Gly His His Ala
340 345 350

Gln Glu Val Ala Ala His Leu Leu Ala Val Ala Ala Pro Leu Asp Gly

355 Trp Ala Val Glu Val Leu Arg Ala Ala Ala His Gln Thr Thr Thr Ala
 370 375 380
 Leu Arg Pro Asp Thr Ala Asp Asp His Asp Asp Asp Pro Val Ala Val
 385 390 395 400
 Arg Tyr Leu Arg Arg Ala Leu Leu Asp Ser Asp Val Arg Gly His Glu
 405 410 415
 Arg Gly Ala Leu Leu Val Glu Leu Ala Ala Ala Glu Arg Phe Thr Glu
 420 425 430
 Pro Gly Thr Ala Val Arg His Val Ser Gln Ala Leu Pro Leu Leu Ala
 435 440 445
 Ser Pro Gln Asp Arg Ala Val Ala Leu Thr Leu Ile Asp Pro Ser Thr
 450 455 460
 Val Arg Glu Val Pro Ala Arg Val Gln Glu Ala Val Arg Ala Ala Asp
 465 470 475 480
 Ala Gly Thr Asp Pro Val Val Asp Asp Glu Cys Thr Val Ala Val Arg
 485 490 495
 Ile Arg Ala Arg Ala Arg Arg Leu Asp Glu Gln His Pro Glu Gly Leu
 500 505 510
 Ala Arg Ser Cys Ala Leu Leu Arg Glu Val Val Ala Ala Pro Asp Glu
 515 520 525
 His Leu Ser Thr Ala Ala Gly Arg Glu Leu Val Gly Val Leu Leu His
 530 535 540
 Ala Ala Ala Leu Thr Gly Gly Val Pro Ala Ala Asp Val Ala His Leu

545											550											555											560
Gly	Glu	Arg	Leu	Leu	Arg	Ile	Thr	Pro	Ala	Arg	Glu	Val	Arg	Pro	Pro																		
				565					570					575																			
His	Gly	Ile	Pro	Pro	Gly	Asp	Gly	Pro	Arg	Gly	Leu	Leu	Val	Leu	Ala																		
				580					585					590																			
Leu	Val	Ala	Ala	Asp	Arg	Pro	Arg	Pro	Leu	Glu	Asp	Trp	Leu	Val	Pro																		
				595					600					605																			
Asp	Pro	Thr	Ser	Pro	Ala	Ala	Ala	Thr	Ala	Asp	Glu	Leu	Ala	Leu	Val																		
				610					615					620																			
Leu	Leu	Ala	Arg	Gly	Arg	Pro	Ala	Ala	Ala	Ala	Ala	Leu	Pro	Gly	Gly																		
				625					630					635																			
Val	Leu	Arg	Glu	Arg	Gly	Val	Pro	Ala	Ser	Ala	Ala	Phe	His	Thr	Ala																		
				645					650					655																			
Leu	Ile	Ala	Ala	Ala	Ile	Glu	Ala	Arg	Ala	Pro	Ala	Leu	Gly	Pro	Glu																		
				660					665					670																			
Pro	Ala	Gly	Arg	Pro	Pro	Gly	Gly	Gly	Leu	Val	Ala	His	Ala	Thr	His																		
				675					680					685																			
Gln	Leu	Val	Arg	Ala	Ala	Gly	Ala	Leu	Arg	Ala	Gly	Arg	Gln	Asp	Leu																		
				690					695					700																			
Ala	Leu	Glu	Cys	Leu	Leu	Asp	Cys	Gly	Arg	His	Leu	Glu	His	Leu	Gly																		
				705					710					715																			
Trp	Ser	Asn	Pro	Ala	Leu	Phe	Pro	Trp	Arg	Ser	Trp	Ala	Ala	Arg	Leu																		
				725					730					735																			
Leu	Arg	Arg	Arg	Gly	Ala	Thr	Gly	Ala	Ala	Leu	Glu	Trp	Ala	Asp	Glu																		
				740					745					750																			

Glu Leu Ala Leu Ala Arg Ala Trp Gly Ala Pro Ala Ala Leu Gly Arg
755 760 765

Ala Leu Arg Val Arg Gly Ser Leu Val Gly Gly Ala Ala Gly Ala Thr
770 775 780

Gln Leu Arg Glu Ala Val Glu Val Leu Arg Asp Ser Ala Asp Thr Ala
785 790 795 800

Ala Leu Gly Arg Ala Glu Ile Val Leu Gly Arg His Leu Ala Gly Thr
805 810 815

Gly Ala Pro Glu Gly Glu Ala Leu Leu Arg Arg Gly Leu Arg Arg Leu
820 825 830

Glu Glu Ala Gly Ala Gly Asp Pro Asp Thr Ala Thr Pro Val Pro Thr
835 840 845

Val Glu Pro Ala Ala Gly Thr Gly Asp Asp Gly Glu Glu Ser Pro Ala
850 855 860

Trp Arg Val Val Asp Ala Leu Thr Asp Ala Glu Arg Gln Val Val Asp
865 870 875 880

Arg Val Val Gly Gly Ala Thr Asn Lys Met Ile Ala Glu Glu Leu Gly
885 890 895

Val Ser Arg Arg Ala Val Glu Lys Arg Leu Thr Ser Ala Tyr Arg Lys
900 905 910

Leu Gly Val Ser Gly Arg Ser Ala Leu Arg Gly Ala Asp
915 920 925

<210> 20
<211> 526
<212> PRT

<213> Pseudonocardia autotrophica

<400> 20

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

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

Thr Ala Ala Thr Glu Gln Gln His Ala Arg Gly Lys Leu Thr Val His
35 40 45

Glu Arg Leu Ala Met Leu Leu Asp Glu Gly Ser Phe Arg Glu Ile Glu
50 55 60

Gln Phe Arg Arg His Arg Ala Thr Gly Phe Gly Leu Glu Asp Arg Arg
65 70 75 80

Pro His Thr Asp Gly Val Val Thr Gly Trp Gly Thr Ile Asp Gly Arg
85 90 95

Thr Val Phe Val Tyr Ala His Asp Phe Arg Ile Phe Gly Gly Ser Leu
100 105 110

Gly Glu Ala His Ala Thr Lys Ile His Lys Val Met Asp Leu Ala Glu
115 120 125

Ser Ala Gly Ala Pro Leu Ile Ser Leu Ser Asp Gly Ala Gly Ala Arg
130 135 140

Ile Gln Glu Gly Val Thr Ala Leu Ala Gly Tyr Gly Gly Ile Phe Arg
145 150 155 160

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

Gly Pro Cys Ala Gly Gly Ala Thr Tyr Ser Pro Ala Leu Thr Asp Tyr
180 185 190

Val Phe Met Val Arg Asp Ile Ala Gln Met Tyr Ile Thr Gly Pro Asp
195 200 205

Val Val Ser Ala Val Thr Gly Glu Glu Ile Thr His Glu Glu Leu Gly
210 215 220

Gly Ala Glu Val His Ala Thr Glu Ser Gly Ala Gly Ala Phe Val Tyr
225 230 235 240

Asp Asp Glu Glu Ser Cys Phe Ala Asp Val Arg His Leu Val Ser Leu
245 250 255

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

Pro Pro Asp Arg Ala Thr Pro Ser Leu Leu Asp Ile Val Pro Ala Asp
275 280 285

Thr Thr Arg Ala Tyr Asp Met Arg Asp Val Ile Ala Glu Val Val Asp
290 295 300

Asp Gly Asp Leu Phe Glu Val His Ala Asn Trp Ala Thr Asn Ile Val
305 310 315 320

Cys Gly Leu Ala Arg Leu Asp Gly His Thr Val Gly Ile Val Ala Asn
325 330 335

Gln Pro Ala Ser Leu Ala Gly Val Leu Asp Ile His Ala Ser Glu Lys
340 345 350

Ala Ala Arg Phe Val Ser Thr Cys Asp Ser Phe Ser Ile Pro Leu Val
355 360 365

Thr Leu Val Asp Val Pro Gly Phe Leu Pro Gly Gly Asp Gln Glu Arg
370 375 380

Gly Gly Ile Ile Arg His Gly Ala Lys Leu Leu Tyr Ala Tyr Cys Ala
385 390 395 400

Ala Thr Val Pro Arg Val Gln Leu Ile Leu Arg Lys Ala Tyr Gly Gly
405 410 415

Ala Tyr Ile Val Met Asp Ser Arg Ser Ile Gly Ala Asp Leu Ser Leu
420 425 430

Ala Trp Pro Thr Asn Glu Ile Ala Val Met Gly Ala Glu Ala Ala Ala
435 440 445

Asn Val Val Phe Arg Arg Glu Ile Ala Ala Ala Pro Asp Pro Glu Ile
450 455 460

Ala Arg Ala Gln Arg Ile Lys Gln Tyr Arg Asn Asp Leu Met His Pro
465 470 475 480

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

Asp Thr Arg Ala Val Leu Val Asp Ala Leu Ser Met Leu Arg Ala Lys
500 505 510

Arg Ala Glu Leu Pro Val Arg Lys His Gly Asn Pro Pro Thr
515 520 525

<210> 21
<211> 213
<212> PRT
<213> Pseudonocardia autotrophica

<400> 21

Met Arg Val Leu Pro Tyr Asp Gly Asp Thr Thr Glu Arg Ile Ser Gln
1 5 10 15

Glu Ser Thr Ser Ala Cys Met Val Ser Leu Asp Arg Gly Leu Arg Val
20 25 30

Val Ala Ala Asn Gln Glu Met Phe Arg Arg Met Cys Asp Ile Gly Ser
35 40 45

Gly Asp Val Cys Gly Ser Ala Phe Cys Asp Leu Leu Asp Gly Ser Ile
50 55 60

Arg Thr Arg Val Arg His Gln Met Glu Arg Leu Leu Asp Gly Gln Gln
65 70 75 80

Pro Arg Phe Gln Glu Arg Ser Val Ala Ile Ala Gly Ala Gly Ser Ser
85 90 95

Leu Arg Gly Asp Leu Met Ala Thr Ala Ile Ala Arg Asn Ala Gly Arg
100 105 110

Val Glu Gly Val Val Val Val Leu Arg Thr Gly Asp Ala Glu Pro Ser
115 120 125

Thr Ala Trp Ser Gly Pro Arg Arg Ile Leu Ser Asp Met Asp Ala Lys
130 135 140

Ile Leu Glu Gly Val Ala Ser Gly Ala Ser Thr Val Gln Leu Ala Ser
145 150 155 160

Thr Leu Phe Leu Ser Arg Gly Gly Val Glu Tyr His Val Thr Ala Leu
165 170 175

Leu Arg Lys Met Arg Val Lys Asn Arg Pro Ala Leu Ile Ser Lys Ala
180 185 190

Tyr Ser Met Gly Phe Phe Glu Leu Gly Ser Trp Pro Pro Gln Val Val
195 200 205

Pro Asp His Val Lys
210

<210> 22
<211> 138
<212> PRT
<213> Pseudonocardia autotrophica

<400> 22

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

Thr Ile Gly Asp Gly Gln His Glu Arg Ile Met Ser Gly Met Arg Arg
20 25 30

Thr Gly Asp Val Ala Gly Pro Gly Leu Val Gly Arg Ala Arg Pro Thr
35 40 45

Pro Arg Gly Ile Asp Val Glu Pro Val Pro Gly Leu Thr Val Arg Val
50 55 60

Leu Asp Thr Gly Trp Met Glu Leu Gly His Pro Ser Arg Cys Asp Arg
65 70 75 80

Leu Leu Cys Asp Glu Val Gly Thr Ala Met Trp Leu Ala Leu Cys Arg
85 90 95

Thr Ala Trp Asn Leu Gly Asp Ala Ala Ala His Leu Ala Asp Leu Trp
100 105 110

Asp Thr Asp Pro Trp Ala Met Arg Asp Met Met Asp Asp Trp Leu Asp
115 120 125

Asp Leu Arg Glu Ala Gly Leu Val Arg Tyr
130 135

<210> 23
<211> 963
<212> PRT
<213> *Pseudonocardia autotrophica*

<400> 23

Met Ala Cys Thr Ser Val Gly Arg Arg Ser Tyr Glu Cys Arg Gly Pro
1 5 10 15

Thr Leu Gly Ser Arg Pro Ser Gly Gly Pro Arg Gly Ala Pro Arg Ala
20 25 30

Arg Arg Pro Thr Ala Gly Pro Ser Leu Met Pro Arg Pro Val Leu Leu
35 40 45

Gly Arg Ala Gly Asp Leu Ala Glu Val Asp Gly Ala Leu Ala Arg Ala
50 55 60

Val Gly Gly Thr Ala Ser Leu Leu Val Phe Thr Gly Pro Ile Gly Ile
65 70 75 80

Gly Arg Thr Ala Leu Leu Glu Glu Cys Ala Arg Arg Gly Ala Ala Arg
85 90 95

Gly Met Gln Val Ala Arg Ala Gly Gly Thr Asp Glu Glu Gly Gly Ile
100 105 110

Pro Leu Gly Thr Ala Arg Glu Leu Leu Ala Ala Cys Gly Gly Pro Gly
115 120 125

Pro Ser Pro Pro Cys Gly Glu Pro Asp Gly Asp Asp Thr Gly Ala Leu
130 135 140

Ser Ala Ala Leu Ala Gly Arg Ala Ala Val Gly Pro Val Leu Leu Leu
145 150 155 160

Val Asp Asp Ala Ala Arg Cys Asp Ala Arg Ser Leu Arg Trp Leu Ala
165 170 175

Arg Leu Cys Cys Pro Arg Ala Cys Leu Arg Val Ala Val Val Leu Thr
180 185 190

Val Leu Asp Gly Asp Ala Gly His Asp Gly Gly Thr Arg His Gly Gly
195 200 205

Ala Thr Gly Gly Leu Pro Thr Glu Leu Ala Ala Val Ala Asp Ala Val
210 215 220

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

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

Ala Ala Thr Glu Gly Asn Pro Leu His Leu Thr Cys Val Leu Glu Glu
260 265 270

Leu Ala Ala Arg Pro Gln Cys Thr Thr Glu Pro Pro Ala Arg Arg Val
275 280 285

Ala Gly Ala Ala Pro Ala Arg Leu Arg Asp Arg Phe Ala His Ala Val
290 295 300

Arg Arg Leu Pro Ala Thr Glu Arg Arg Tyr Leu Ala Ala Val Ala Val
305 310 315 320

Ala Gly Glu Lys Ala Asp Asp Val Met Leu Ala Arg Leu Ala Glu Leu
325 330 335

Asp Ala Thr Asp Leu Ala Val Ala Gly Ala Val Thr Arg Ser Met Gly

340 345 350

Leu Thr Gly Pro Glu Gly His Arg Leu Arg His Gly Leu Val Gly Ala
355 360 365

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

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

Ala Ala His Leu Leu Thr Ala Gly Gly Ala Ala Pro Ala Trp Thr Val
405 410 415

Glu Ala Leu Arg Asp Ala Ala Gly Thr Ala Val Arg Arg Gly Glu Ser
420 425 430

Trp Thr Ala Val Arg Tyr Leu Arg His Ala Leu Leu Ala Gly Pro Asp
435 440 445

Glu Pro Gly Arg Ala Ala Val Leu Leu Asp Leu Ala Gly Leu Glu Arg
450 455 460

Ser Arg Asp Thr Gly Leu Ala Leu Arg Arg Ile Val Gln Ala Val Pro
465 470 475 480

Leu Leu Gly Ser Leu Arg Glu Arg Ala Ala Ala Leu Cys Arg Val Thr
485 490 495

Pro Leu Ala Leu Glu Gly Ala Ala Pro Pro Val Ile Ala Leu Leu Arg
500 505 510

Gly Val Ala Glu Glu Leu Gly Arg Tyr Gly Gly Thr Gly Asp Thr Glu
515 520 525

Thr Arg Glu Leu Ala Leu Arg Val Glu Ala Arg Leu His Tyr Val Asp

530

535

540

Lys His Thr Arg Ala Gly Leu Ser Ala Ala Ala Ala Arg Leu Asp Glu
545 550 555 560

Leu Glu Ala Leu Pro Asp Gly Leu Pro Ile Arg Thr Pro Gly Glu Arg
565 570 575

Glu Leu Ala Cys Val Leu Leu His Ser Ala Ala Val Gly Gly His Arg
580 585 590

Pro Ala Ser Val Val Ala Ala Ala Cys Arg Ala Val Leu Ala Arg Glu
595 600 605

Pro Ala Ser Ser Asp His Val His Ser Thr Val Gly Met Leu Val Thr
610 615 620

Cys Leu Cys Met Ala Asp Ala Val Glu Asp Leu Pro Ser Trp Leu Ser
625 630 635 640

Val Ala Leu Glu Gln Ala Arg Ala Glu Arg Ala Pro Val Val Glu Ala
645 650 655

Val Leu His Ala Glu Leu Ala Ala Val Leu Val Cys Ser Gly Arg Val
660 665 670

Glu Glu Ala Ala Glu Gln Val Arg Ser Ala Val Glu Leu Val Asp Glu
675 680 685

Leu Ala Asp Asp Ser Leu Leu Pro Gly Thr Val Leu Ala Pro Val Leu
690 695 700

Thr Ala Val Pro His Gly Pro Gly Ala Asp Arg Val Leu Ala Arg Tyr
705 710 715 720

Gly Ala Thr Pro Ser Val Pro Pro Gly Phe Gly Ala Cys Leu Gln Met
725 730 735

Leu Arg Ala Arg Val Ala Ala Glu Ala Gly Asp Ala Glu Thr Ala Leu
740 745 750

Glu Tyr Cys Leu Asp Ala Gly Arg Arg Phe Asp Gln Ala Gly Trp Thr
755 760 765

Ala Thr Pro Val Pro Trp Arg Pro Trp Ala Val Glu Ile Leu Ala Glu
770 775 780

Arg Gly Arg Arg Ala Glu Ala Arg Ala Leu Ala Glu Gln Glu Leu Ala
785 790 795 800

Arg Ala Arg Arg Trp Gly Ala Pro Ala Gln Leu Gly Arg Ala Leu Arg
805 810 815

Met Leu Gly Gln Leu Gly Gly Thr Asp Arg Gly Ala Glu Leu Leu Glu
820 825 830

Gln Ala Thr Ile Val Leu Arg Thr Ser Gly Asp Arg Ser Glu Ala Glu
835 840 845

Arg Ala Thr Arg Ala Leu Thr Ala His Arg Ala Pro Pro Gly Pro Gly
850 855 860

Asp Leu Pro Pro Arg Thr Gly Asp Pro Ala Gly Pro Pro Pro Arg Leu
865 870 875 880

His Asp Thr Val Gly Thr Pro Val Pro Gly His Arg Pro Thr Ser Arg
885 890 895

Ala Ser Ala Ala Leu Thr Arg Ser Glu Glu Arg Val Ala Thr Arg Ala
900 905 910

Ser Arg Gly Leu Thr Asn His Glu Ile Ala Ala Asp Leu Ala Val Ser
915 920 925

Val Arg Ala Val Glu Lys His Leu Thr Gly Val Tyr Arg Lys Leu Gly
930 935 940

Val Pro Gly Arg Ala Ala Leu Arg Gln Leu Arg Glu Ser Gly Ser Asp
945 950 955 960

Arg Ile Ala

<210> 24

<211> 684

<212> PRT

<213> Pseudonocardia autotrophica

<400> 24

Met Ala Ala Met Leu Arg His Glu Pro Pro Gly Val Val Glu Leu Ala
1 5 10 15

Arg Ala Val Ala Val Leu Glu Pro Asp Ala Asp Ala Gly Thr Arg Ala
20 25 30

Arg Val Ala Gly Leu Asp Asp Val Ala Ala Ala His Ala Ala Glu Arg
35 40 45

Leu Val Glu Leu Gly Val Leu Asp Gly His Arg Cys Gly His Asp Pro
50 55 60

Ala Arg Thr Ala Val Leu Glu Ala Ala Gly Ala Asp Arg Cys Arg Arg
65 70 75 80

Leu His Ala Arg Ala Ala Arg Val Leu Asp Ser Glu Gly Ala Pro Leu
85 90 95

Asp Arg Val Ala Asp His His Leu Ala Ala Gly Pro Pro Arg Asp Gly
100 105 110

Gly Val Val Glu Leu Leu His Val Ala Ala Ala Arg Ala Glu Gln Arg
115 120 125

Gly Asp Arg Val Arg Ala Arg Arg Leu Leu Glu His Thr Leu Thr Gly
130 135 140

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

Val Glu Arg Val Ala Ala Pro Ala Thr Ala Arg Gly His Leu Val Glu
165 170 175

Ala Leu Ser Leu Leu Pro Cys Ala Arg Glu Arg Ala Glu Leu Leu Ala
180 185 190

Arg Thr Val Ala Arg Ser Pro Gly Gly Ala Val Asp Leu Ala Pro Leu
195 200 205

Leu Glu Asp Val Leu Arg Asp Leu Ala Asp Ala Gly Thr Gly Thr Ser
210 215 220

Gly Gln Asp Arg Glu Leu Arg Gln Arg Leu Glu Ala Leu Val Leu His
225 230 235 240

Ala Ala Cys Glu Asp Pro Ser Gly Ala Ala Arg Val Trp Glu Trp Val
245 250 255

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

Leu Arg Ser Ala His Leu Leu Phe Ser Ala Leu Ala Leu His Thr Asp
275 280 285

Ala Ala Thr Ala Ala Ala Arg Thr Ala Glu Ala Met Pro Ala Asp Leu
290 295 300

Glu Asp Asp Ala Tyr Leu His Pro Met Gln Val Ala Ala Leu Gly Leu
305 310 315 320

Leu Cys Trp Ala Glu Ala Thr Thr Gly Leu Asp Gly Val Arg Arg Arg
325 330 335

Thr Leu Asp Ala Ala His Arg Thr His Arg Thr Asp Val Glu Ala Phe
340 345 350

Leu Arg Gly Val Asp Ala Met Leu Leu Leu Arg Arg Gly Gln Val Pro
355 360 365

Ala Ala Leu Ala Ala Ala Arg Ala Ser Leu Asp Val Leu Thr Gly Ala
370 375 380

Thr Arg Leu Met Val Leu Arg Ala Ala Thr Leu Ala Leu Val Glu Leu
385 390 395 400

Gly Arg Thr Ala Glu Ala Glu Arg Leu Leu Ala Pro Val Asp Asp Arg
405 410 415

Ser Ser Ala Asp Arg Thr Trp Arg Trp Asn Tyr Leu Leu Asp Ala Arg
420 425 430

Ala Ala Val Leu Ala Ala Thr Gly Arg Thr Arg Glu Ala Leu Ala Leu
435 440 445

Thr Leu Glu Cys Gly His Arg Leu Met Ala Val Gly Ile Val Asn Pro
450 455 460

Val Val Leu Asp Trp Arg Arg Arg Ala Val Glu Leu His His Glu Leu
465 470 475 480

Gly Glu His Glu Ala Ala Thr Ala Ala Ala Glu Glu Tyr Val Thr Leu
485 490 495

Cys Arg Leu Trp Gly Pro Glu Gly Tyr Gly Gly Ala Ala Leu Arg Val
500 505 510

Leu Gly Leu Val Gln Gly Gly Glu Arg Gly Leu Ala Thr Leu His Ser
515 520 525

Ala Arg Ala Glu Leu Gly Ala Ser Pro Leu Ala Leu Asp Arg Ala Arg
530 535 540

Cys Thr Val Asp Leu Gly Ala Arg Met Arg Ala His Gly Ala Ala Gly
545 550 555 560

Glu Ala Arg Ala Leu Leu Arg His Gly Leu Glu Leu Ala Val Asp Cys
565 570 575

Gly Ala Pro Ile Leu Ala Ala Arg Ala Arg Thr Glu Leu Ala Ala Ala
580 585 590

Gly Gly Arg Pro Arg Arg Gly Gly Ser Ser Ser Leu Thr Pro Ala Glu
595 600 605

Leu Gly Val Ala Arg Leu Ala Ala Gly Gly Ala Thr Asn Arg Asp Ile
610 615 620

Ala Ala Val Leu Gly Thr Ser Gln Arg Ala Val Glu Gly His Leu Thr
625 630 635 640

Arg Val Tyr Arg Lys Leu Glu Ile Asp Gly Arg Glu Gly Leu Ala Ser
645 650 655

Ala Pro Gly Leu Arg Val Gly Thr Cys Arg Pro Gly Gly Gln Gly Asp
660 665 670

Val Asp Ala Pro Thr Arg Ala Val Ala Pro Arg Pro
675 680

<210> 25
 <211> 23
 <212> DNA
 <213> artificial-CYP forward primer

<400> 25
 tggatcggcg acgaccgsvy cgt 23

<210> 26
 <211> 23
 <212> DNA
 <213> artificial-CYP reverse primer

<400> 26
 ccgwasagsa yscgctcgta ctt 23