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John, O'Brien P
Kathleen, Oppen

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<130> CL5408 WO PCT

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 <212> PRT
 <213> Streptococcus salivarius

<400> 3

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		20						25					30		

Leu	Ser	Val	Thr	Thr	Ser	Ser	Val	Ser	Ala	Asp	Glu	Thr	Gln	Asp	Lys
		35					40					45			

Thr	Val	Thr	Gln	Ser	Asn	Ser	Gly	Thr	Thr	Ala	Ser	Leu	Val	Thr	Ser
	50					55					60				

Pro	Glu	Ala	Thr	Lys	Glu	Ala	Asp	Lys	Arg	Thr	Asn	Thr	Lys	Glu	Ala
65					70					75					80

Asp	Val	Leu	Thr	Pro	Ala	Lys	Glu	Thr	Asn	Ala	Val	Glu	Thr	Ala	Thr
				85					90					95	

Thr	Thr	Asn	Thr	Gln	Ala	Thr	Ala	Glu	Ala	Ala	Thr	Thr	Ala	Thr	Thr
			100					105					110		

Ala	Asp	Val	Ala	Val	Ala	Ala	Val	Pro	Asn	Lys	Glu	Ala	Val	Val	Thr
		115					120					125			

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

130

135

140

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

Lys Asn Ile Asp Gly Lys Tyr Tyr Tyr Val Asn Glu Asp Gly Ser His
 180 185 190

Lys Glu Asn Phe Ala Ile Thr Val Asn Gly Gln Leu Leu Tyr Phe Gly
 195 200 205

Lys Asp Gly Ala Leu Thr Ser Ser Ser Thr Tyr Ser Phe Thr Pro Gly
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Thr Thr Asn Ile Val Asp Gly Phe Ser Ile Asn Asn Arg Ala Tyr Asp
 225 230 235 240

Ser Ser Glu Ala Ser Phe Glu Leu Ile Asp Gly Tyr Leu Thr Ala Asp
 245 250 255

Ser Trp Tyr Arg Pro Ala Ser Ile Ile Lys Asp Gly Val Thr Trp Gln
 260 265 270

Ala Ser Thr Ala Glu Asp Phe Arg Pro Leu Leu Met Ala Trp Trp Pro
 275 280 285

Asn Val Asp Thr Gln Val Asn Tyr Leu Asn Tyr Met Ser Lys Val Phe
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Asn Leu Asp Ala Lys Tyr Ser Ser Thr Asp Lys Gln Glu Thr Leu Lys
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Val Ala Ala Lys Asp Ile Gln Ile Lys Ile Glu Gln Lys Ile Gln Ala
 325 330 335

Glu Lys Ser Thr Gln Trp Leu Arg Glu Thr Ile Ser Ala Phe Val Lys
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Thr Gln Pro Gln Trp Asn Lys Glu Thr Glu Asn Tyr Ser Lys Gly Gly
 355 360 365

Gly Glu Asp His Leu Gln Gly Gly Ala Leu Leu Tyr Val Asn Asp Ser
 370 375 380

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Arg Thr Pro Trp Ala Asn Ser Asp Tyr Arg Arg Leu Asn Arg Thr Ala
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 405 410 415
 Asp Pro Asn His Met Gly Gly Phe Asp Phe Leu Leu Ala Asn Asp Val
 420 425 430
 Asp Leu Ser Asn Pro Val Val Gln Ala Glu Gln Leu Asn Gln Ile His
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 Tyr Leu Met Asn Trp Gly Ser Ile Val Met Gly Asp Lys Asp Ala Asn
 450 455 460
 Phe Asp Gly Ile Arg Val Asp Ala Val Asp Asn Val Asp Ala Asp Met
 465 470 475 480
 Leu Gln Leu Tyr Thr Asn Tyr Phe Arg Glu Tyr Tyr Gly Val Asn Lys
 485 490 495
 Ser Glu Ala Asn Ala Leu Ala His Ile Ser Val Leu Glu Ala Trp Ser
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 Leu Asn Asp Asn His Tyr Asn Asp Lys Thr Asp Gly Ala Ala Leu Ala
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 Met Glu Asn Lys Gln Arg Leu Ala Leu Leu Phe Ser Leu Ala Lys Pro
 530 535 540
 Ile Lys Glu Arg Thr Pro Ala Val Ser Pro Leu Tyr Asn Asn Thr Phe
 545 550 555 560
 Asn Thr Thr Gln Arg Asp Glu Lys Thr Asp Trp Ile Asn Lys Asp Gly
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 Ser Lys Ala Tyr Asn Glu Asp Gly Thr Val Lys Gln Ser Thr Ile Gly
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 Lys Tyr Asn Glu Lys Tyr Gly Asp Ala Ser Gly Asn Tyr Val Phe Ile
 595 600 605
 Arg Ala His Asp Asn Asn Val Gln Asp Ile Ile Ala Glu Ile Ile Lys
 610 615 620
 Lys Glu Ile Asn Pro Lys Ser Asp Gly Phe Thr Ile Thr Asp Ala Glu
 625 630 635 640

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

Leu Ile Tyr Glu Gly Phe Ser Asn Phe Gln Thr Ile Pro Asp Gly Ser
 900 905 910
 Asp Pro Ser Val Tyr Thr Asn Arg Lys Ile Ala Glu Asn Val Asp Leu
 915 920 925
 Phe Lys Ser Trp Gly Val Thr Ser Phe Glu Met Ala Pro Gln Phe Val
 930 935 940
 Ser Ala Asp Asp Gly Thr Phe Leu Asp Ser Val Ile Gln Asn Gly Tyr
 945 950 955 960
 Ala Phe Ala Asp Arg Tyr Asp Leu Ala Met Ser Lys Asn Asn Lys Tyr
 965 970 975
 Gly Ser Lys Glu Asp Leu Arg Asp Ala Leu Lys Ala Leu His Lys Ala
 980 985 990
 Gly Ile Gln Ala Ile Ala Asp Trp Val Pro Asp Gln Ile Tyr Gln Leu
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 Pro Gly Lys Glu Val Val Thr Ala Thr Arg Thr Asp Gly Ala Gly
 1010 1015 1020
 Arg Lys Ile Ala Asp Ala Ile Ile Asp His Ser Leu Tyr Val Ala
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 Asn Ser Lys Ser Ser Gly Lys Asp Tyr Gln Ala Lys Tyr Gly Gly
 1040 1045 1050
 Glu Phe Leu Ala Glu Leu Lys Ala Lys Tyr Pro Glu Met Phe Lys
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 Val Asn Met Ile Ser Thr Gly Lys Pro Ile Asp Asp Ser Val Lys
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 Leu Lys Gln Trp Lys Ala Glu Tyr Phe Asn Gly Thr Asn Val Leu
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 Glu Arg Gly Val Gly Tyr Val Leu Ser Asp Glu Ala Thr Gly Lys
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 Tyr Phe Thr Val Thr Lys Glu Gly Asn Phe Ile Pro Leu Gln Leu
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 Thr Gly Lys Glu Lys Val Ile Thr Gly Phe Ser Ser Asp Gly Lys

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Tyr	Arg	Phe	Leu	Pro	Asn	Gly	Ile	Met	Leu	Ser	Asn	Ala	Phe	Tyr	
1190						1195					1200				
Ile	Asp	Ala	Asn	Gly	Asn	Thr	Tyr	Leu	Tyr	Asn	Ser	Lys	Gly	Gln	
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Met	Tyr	Lys	Gly	Gly	Tyr	Thr	Lys	Phe	Asp	Val	Ser	Glu	Thr	Asp	
1220						1225					1230				
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Gly	Asn	Val	Trp	Tyr	Tyr	Ala	Gly	Ala	Asn	Gly	Lys	Thr	Val	Thr
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Tyr	Ser	Lys	Tyr	Asn	Ala	Ser	Thr	Gly	Glu	Arg	Leu	Thr	Asn	Glu
1415						1420					1425			
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1460						1465					1470			
Ala	Gly	Asn	Gly	Arg	Ile	Ser	Tyr	Tyr	Tyr	Gly	Asp	Ser	Gly	Lys
1475						1480					1485			
Arg	Ala	Val	Ser	Thr	Trp	Ile	Glu	Ile	Gln	Pro	Gly	Val	Tyr	Val
1490						1495					1500			
Tyr	Phe	Asp	Lys	Asn	Gly	Leu	Ala	Tyr	Pro	Pro	Arg	Val	Leu	Asn
1505						1510					1515			