

SEQUENCE LISTING

<110> Rehm, Bernd H.A.
Parlane, Natalie A.
Wedlock, David N.
Buddle, Bryce M.

<120> POLYMER PARTICLES AND USES THEREOF

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<150> US 61/229,318
<151> 2009-07-29

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<151> 2009-07-29

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<170> PatentIn version 3.5

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Asn Ser Pro Ala Leu Tyr Leu Asp Gly Leu Arg Ala Gln Asp Asp
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| aag Lys | tgg Trp | gag Glu | acc Thr 100 | ttc Phe | ctg Leu | acc Thr | agc Ser | gag Glu 105 | ctg Leu | ccg Pro | ggg Gly | tgg Trp | ctg Leu 110 | cag Gln | gcc Ala | 336 |
| aac Asn | agg Arg | cac His 115 | gtc Val | aag Lys | ccc Pro | acc Thr | gga Gly 120 | agc Ser | gcc Ala | gtc Val | gtc Val | ggg Gly 125 | ctt Leu | tgc Ser | atg Met | 384 |
| gct Ala | gct Ala 130 | tct Ser | tgc Ser | gcg Ala | ctg Leu | acg Thr 135 | ctg Leu | gcg Ala | atc Ile | tat Tyr | cac His 140 | ccc Pro | cag Gln | cag Gln | ttc Phe | 432 |
| gtc Val 145 | tac Tyr | gcg Ala | gga Gly | gcg Ala | atg Met 150 | tgc Ser | ggc Gly | ctg Leu | ttg Leu | gac Asp 155 | ccc Pro | tcc Ser | cag Gln | gcg Ala | atg Met 160 | 480 |
| ggg Gly | ccc Pro | acc Thr | ctg Leu | atc Ile 165 | ggc Gly | ctg Leu | gcg Ala | atg Met | ggg Gly 170 | gac Asp | gct Ala | ggc Gly | ggc Gly | tac Tyr 175 | aag Lys | 528 |
| gcc Ala | tcc Ser | gac Asp | atg Met 180 | tgg Trp | ggc Gly | ccg Pro | aag Lys | gag Glu 185 | gac Asp | ccg Pro | gcg Ala | tgg Trp | cag Gln 190 | cgc Arg | aac Asn | 576 |
| gac Asp | ccg Pro | ctg Leu 195 | ttg Leu | aac Asn | gtc Val | ggg Gly | aag Lys 200 | ctg Leu | atc Ile | gcc Ala | aac Asn | aac Asn 205 | acc Thr | cgc Arg | gtc Val | 624 |
| tgg Trp | gtg Val 210 | tac Tyr | tgc Cys | ggc Gly | aac Asn | ggc Gly 215 | aag Lys | ccg Pro | tgc Ser | gat Asp | ctg Leu 220 | ggg Gly | ggc Gly | aac Asn | aac Asn | 672 |
| ctg Leu 225 | ccg Pro | gcc Ala | aag Lys | ttc Phe | ctc Leu 230 | gag Glu | ggc Gly | ttc Phe | gtg Val | cgg Arg 235 | acc Thr | agc Ser | aac Asn | atc Ile | aag Lys 240 | 720 |
| ttc Phe | caa Gln | gac Asp | gcc Ala | tac Tyr 245 | aac Asn | gcc Ala | ggg Gly | ggc Gly | ggc Gly 250 | cac His | aac Asn | ggc Gly | gtg Val | ttc Phe 255 | gac Asp | 768 |
| ttc Phe | ccg Pro | gac Asp | agc Ser 260 | ggg Gly | acg Thr | cac His | agc Ser | tgg Trp 265 | gag Glu | tac Tyr | tgg Trp | ggg Gly | gcg Ala 270 | cag Gln | ctc Leu | 816 |
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| acc Thr | ggg Gly 290 | ccc Pro | gcg Ala | ccc Pro | cag Gln | ggc Gly 295 | gcc Ala | gga Gly | tcc Ser | aca Thr | gag Glu 300 | cag Gln | cag Gln | tgg Trp | aat Asn | 912 |
| ttc Phe 305 | gcg Ala | ggg Gly | atc Ile | gag Glu | gcc Ala 310 | gcg Ala | gca Ala | agc Ser | gca Ala | atc Ile 315 | cag Gln | ggg Gly | aat Asn | gtc Val | acc Thr 320 | 960 |
| tcc Ser | att Ile | cat His | tcc Ser | ctc Leu 325 | ctt Leu | gac Asp | gag Glu | ggg Gly | aag Lys 330 | cag Gln | tcc Ser | ctg Leu | acc Thr | aag Lys 335 | ctc Leu | 1008 |
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| ctg Leu | gcg Ala 370 | cgg Arg | acg Thr | atc Ile | agc Ser | gaa Glu 375 | gcc Ala | ggt Gly | cag Gln | gca Ala | atg Met 380 | gct Ala | tcg Ser | acc Thr | gaa Glu | 1152 |
| ggc Gly 385 | aac Asn | gtc Val | act Thr | ggg Gly | atg Met 390 | ttc Phe | gca Ala | act Thr | agt Ser | gcg Ala 395 | acc Thr | ggc Gly | aaa Lys | ggc Gly | gcg Ala 400 | 1200 |
| gca Ala | gct Ala | tcc Ser | acg Thr | cag Gln 405 | gaa Glu | ggc Gly | aag Lys | tcc Ser | caa Gln 410 | cca Pro | ttc Phe | aag Lys | gtc Val | acg Thr 415 | ccg Pro | 1248 |
| ggg Gly | cca Pro | ttc Phe | gat Asp 420 | cca Pro | gcc Ala | aca Thr | tgg Trp | ctg Leu 425 | gaa Glu | tgg Trp | tcc Ser | cgc Arg | cag Gln 430 | tgg Trp | cag Gln | 1296 |
| ggc Gly | act Thr | gaa Glu 435 | ggc Gly | aac Asn | ggc Gly | cac His | gcg Ala 440 | gcc Ala | gcg Ala | tcc Ser | ggc Gly | att Ile 445 | ccg Pro | ggc Gly | ctg Leu | 1344 |
| gat Asp | gcg Ala 450 | ctg Leu | gca Ala | ggc Gly | gtc Val | aag Lys 455 | atc Ile | gcg Ala | ccg Pro | gcg Ala | cag Gln 460 | ctg Leu | ggt Gly | gat Asp | atc Ile | 1392 |
| cag Gln 465 | cag Gln | cgc Arg | tac Tyr | atg Met | aag Lys 470 | gac Asp | ttc Phe | tca Ser | gcg Ala | ctg Leu 475 | tgg Trp | cag Gln | gcc Ala | atg Met | gcc Ala 480 | 1440 |
| gag Glu | ggc Gly | aag Lys | gcc Ala | gag Glu 485 | gcc Ala | acc Thr | ggt Gly | ccg Pro | ctg Leu 490 | cac His | gac Asp | cgg Arg | cgc Arg | ttc Phe 495 | gcc Ala | 1488 |
| ggc Gly | gac Asp | gca Ala | tgg Trp 500 | cgc Arg | acc Thr | aac Asn | ctc Leu | cca Pro 505 | tat Tyr | cgc Arg | ttc Phe | gct Ala | gcc Ala 510 | gcg Ala | ttc Phe | 1536 |
| tac Tyr | ctg Leu | ctc Leu 515 | aat Asn | gcg Ala | cgc Arg | gcc Ala | ttg Leu 520 | acc Thr | gag Glu | ctg Leu | gcc Ala | gat Asp 525 | gcc Ala | gtc Val | gag Glu | 1584 |
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| gtc Val 545 | gat Asp | gcg Ala | atg Met | tcg Ser | ccc Pro 550 | gcc Ala | aac Asn | ttc Phe | ctt Leu | gcc Ala 555 | acc Thr | aat Asn | ccc Pro | gag Glu | gcg Ala 560 | 1680 |
| cag Gln | cgc Arg | ctg Leu | ctg Leu | atc Ile 565 | gag Glu | tcg Ser | ggc Gly | ggc Gly | gaa Glu 570 | tcg Ser | ctg Leu | cgt Arg | gcc Ala | ggc Gly 575 | gtg Val | 1728 |
| cgc Arg | aac Asn | atg Met | atg Met 580 | gaa Glu | gac Asp | ctg Leu | aca Thr | cgc Arg 585 | ggc Gly | aag Lys | atc Ile | tcg Ser | cag Gln 590 | acc Thr | gac Asp | 1776 |
| gag Glu | agc Ser | gcg Ala 595 | ttt Phe | gag Glu | gtc Val | ggc Gly | cgc Arg 600 | aat Asn | gtc Val | gcg Ala | gtg Val | acc Thr 605 | gaa Glu | ggc Gly | gcc Ala | 1824 |
| gtg Val | gtc Val 610 | ttc Phe | gag Glu | aac Asn | gag Glu | tac Tyr 615 | ttc Phe | cag Gln | ctg Leu | ttg Leu | cag Gln 620 | tac Tyr | aag Lys | ccg Pro | ctg Leu | 1872 |

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| acc Thr 625 | gac Asp | aag Lys | gtg Val | cac His | gcg Ala 630 | cgc Arg | ccg Pro | ctg Leu | ctg Leu | atg Met 635 | gtg Val | ccg Pro | ccg Pro | tgc Cys | atc Ile 640 | 1920 |
| aac Asn | aag Lys | tac Tyr | tac Tyr | atc Ile 645 | ctg Leu | gac Asp | ctg Leu | cag Gln | ccg Pro 650 | gag Glu | agc Ser | tgc Ser | ctg Leu | gtg Val 655 | cgc Arg | 1968 |
| cat His | gtg Val | gtg Val | gag Glu 660 | cag Gln | gga Gly | cat His | acg Thr | gtg Val 665 | ttt Phe | ctg Leu | gtg Val | tgc Ser | tgg Trp 670 | cgc Arg | aat Asn | 2016 |
| ccg Pro | gac Asp | gcc Ala 675 | agc Ser | atg Met | gcc Ala | ggc Gly | agc Ser 680 | acc Thr | tgg Trp | gac Asp | gac Asp | tac Tyr 685 | atc Ile | gag Glu | cac His | 2064 |
| gcg Ala 690 | gcc Ala | atc Ile | cgc Arg | gcc Ala | atc Ile | gaa Glu 695 | gtc Val | gcg Ala | cgc Arg | gac Asp | atc Ile 700 | agc Ser | ggc Gly | cag Gln | gac Asp | 2112 |
| aag Lys 705 | atc Ile | aac Asn | gtg Val | ctc Leu | ggc Gly 710 | ttc Phe | tgc Cys | gtg Val | ggc Gly 715 | ggc Gly | acc Thr | att Ile | gtc Val | tgc Ser | acc Thr 720 | 2160 |
| gcg Ala | ctg Leu | gcg Ala | gtg Val | ctg Leu 725 | gcc Ala | gcg Ala | cgc Arg | ggc Gly | gag Glu 730 | cac His | ccg Pro | gcc Ala | gcc Ala | agc Ser 735 | gtc Val | 2208 |
| acg Thr | ctg Leu | ctg Leu | acc Thr 740 | acg Thr | ctg Leu | ctg Leu | gac Asp | ttt Phe 745 | gcc Ala | gac Asp | acg Thr | ggc Gly | atc Ile 750 | ctc Leu | gac Asp | 2256 |
| gtc Val | ttt Phe | gtc Val 755 | gac Asp | gag Glu | ggc Gly | cat His | gtg Val 760 | cag Gln | ttg Leu | cgc Arg | gag Glu | gcc Ala 765 | acg Thr | ctg Leu | ggc Gly | 2304 |
| ggc Gly 770 | ggc Gly | gcc Ala | ggc Gly | gcg Ala | ccg Pro | tgc Cys 775 | gcg Ala | ctg Leu | ctg Leu | cgc Arg | ggc Gly 780 | ctt Leu | gag Glu | ctg Leu | gcc Ala | 2352 |
| aat Asn 785 | acc Thr | ttc Phe | tgc Ser | ttc Phe | ttg Leu 790 | cgc Arg | ccg Pro | aac Asn | gac Asp | ctg Leu 795 | gtg Val | tgg Trp | aac Asn | tac Tyr | gtg Val 800 | 2400 |
| gtc Val | gac Asp | aac Asn | tac Tyr | ctg Leu 805 | aag Lys | ggc Gly | aac Asn | acg Thr | ccg Pro 810 | gtg Val | ccg Pro | ttc Phe | gac Asp | ctg Leu 815 | ctg Leu | 2448 |
| ttc Phe | tgg Trp | aac Asn | ggc Gly 820 | gac Asp | gcc Ala | acc Thr | aac Asn | ctg Leu 825 | ccg Pro | ggg Gly | ccg Pro | tgg Trp | tac Tyr 830 | tgc Cys | tgg Trp | 2496 |
| tac Tyr | ctg Leu | cgc Arg 835 | cac His | acc Thr | tac Tyr | ctg Leu | cag Gln 840 | aac Asn | gag Glu | ctc Leu | aag Lys | gta Val 845 | ccg Pro | ggc Gly | aag Lys | 2544 |
| ctg Leu 850 | acc Thr | gtg Val | tgc Cys | ggc Gly | gtg Val | ccg Pro 855 | gtg Val | gac Asp | ctg Leu | gcc Ala | agc Ser 860 | atc Ile | gac Asp | gtg Val | ccg Pro | 2592 |
| acc Thr 865 | tat Tyr | atc Ile | tac Tyr | ggc Gly | tgc Ser 870 | cgc Arg | gaa Glu | gac Asp | cat His | atc Ile 875 | gtg Val | ccg Pro | tgg Trp | acc Thr | gcg Ala 880 | 2640 |
| gcc Ala | tat Tyr | gcc Ala | tgc Ser | acc Thr 885 | gcg Ala | ctg Leu | ctg Leu | gcg Ala | aac Asn 890 | aag Lys | ctg Leu | cgc Arg | ttc Phe | gtg Val 895 | ctg Leu | 2688 |
| ggt Gly | gcg Ala | tgc Ser | ggc Gly | cat Thr | atc Thr | gcc Ala | ggt Gly | gtg Val | atc Thr | aac Lys | ccg Pro | ccg Pro | gcc Ala | aag Lys | aac Lys | 2736 |

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|------|
| Gly | Ala | Ser | Gly | His | Ile | Ala | Gly | Val | Ile | Asn | Pro | Pro | Ala | Lys | Asn | | |
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| aag | cgc | agc | cac | tgg | act | aac | gat | gcg | ctg | ccg | gag | tcg | ccg | cag | caa | | 2784 |
| Lys | Arg | Ser | His | Trp | Thr | Asn | Asp | Ala | Leu | Pro | Glu | Ser | Pro | Gln | Gln | | |
| | | 915 | | | | | 920 | | | | | 925 | | | | | |
| tgg | ctg | gcc | ggc | gcc | atc | gag | cat | cac | ggc | agc | tgg | tgg | ccg | gac | tgg | | 2832 |
| Trp | Leu | Ala | Gly | Ala | Ile | Glu | His | His | Gly | Ser | Trp | Trp | Pro | Asp | Trp | | |
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| acc | gca | tgg | ctg | gcc | ggg | cag | gcc | ggc | gcg | aaa | cgc | gcc | gcg | ccc | gcc | | 2880 |
| Thr | Ala | Trp | Leu | Ala | Gly | Gln | Ala | Gly | Ala | Lys | Arg | Ala | Ala | Pro | Ala | | |
| 945 | | | | | 950 | | | | | 955 | | | | | 960 | | |
| aac | tat | ggc | aat | gcg | cgc | tat | cgc | gca | atc | gaa | ccc | gcg | cct | ggg | cga | | 2928 |
| Asn | Tyr | Gly | Asn | Ala | Arg | Tyr | Arg | Ala | Ile | Glu | Pro | Ala | Pro | Gly | Arg | | |
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| tac | gtc | aaa | gcc | aag | gca | tga | | | | | | | | | | | 2949 |
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| Pro | Ser | Met | Gly | Arg | Asp | Ile | Lys | Val | Gln | Phe | Gln | Ser | Gly | Gly | Ala | | |
| | | | 20 | | | | | 25 | | | | | 30 | | | | |
| Asn | Ser | Pro | Ala | Leu | Tyr | Leu | Leu | Asp | Gly | Leu | Arg | Ala | Gln | Asp | Asp | | |
| | | 35 | | | | | 40 | | | | | 45 | | | | | |
| Phe | Ser | Gly | Trp | Asp | Ile | Asn | Thr | Pro | Ala | Phe | Glu | Trp | Tyr | Asp | Gln | | |
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| Ser | Gly | Leu | Ser | Val | Val | Met | Pro | Val | Gly | Gly | Gln | Ser | Ser | Phe | Tyr | | |
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| Ser | Asp | Trp | Tyr | Gln | Pro | Ala | Cys | Gly | Lys | Ala | Gly | Cys | Gln | Thr | Tyr | | |
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| Lys | Trp | Glu | Thr | Phe | Leu | Thr | Ser | Glu | Leu | Pro | Gly | Trp | Leu | Gln | Ala | | |
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| Asn | Arg | His | Val | Lys | Pro | Thr | Gly | Ser | Ala | Val | Val | Gly | Leu | Ser | Met | | |
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| Ala | Ala | Ser | Ser | Ala | Leu | Thr | Leu | Ala | Ile | Tyr | His | Pro | Gln | Gln | Phe | | |
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Val Tyr Ala Gly Ala Met Ser Gly Leu Leu Asp Pro Ser Gln Ala Met
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 Gly Pro Thr Leu Ile Gly Leu Ala Met Gly Asp Ala Gly Gly Tyr Lys
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 Ala Ser Asp Met Trp Gly Pro Lys Glu Asp Pro Ala Trp Gln Arg Asn
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 Asp Pro Leu Leu Asn Val Gly Lys Leu Ile Ala Asn Asn Thr Arg Val
 195 200 205
 Trp Val Tyr Cys Gly Asn Gly Lys Pro Ser Asp Leu Gly Gly Asn Asn
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 Leu Pro Ala Lys Phe Leu Glu Gly Phe Val Arg Thr Ser Asn Ile Lys
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 Phe Gln Asp Ala Tyr Asn Ala Gly Gly Gly His Asn Gly Val Phe Asp
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 Gln Lys Trp Asp Ala Thr Ala Thr Glu Leu Asn Asn Ala Leu Gln Asn
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 Leu Ala Arg Thr Ile Ser Glu Ala Gly Gln Ala Met Ala Ser Thr Glu
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 Gly Asn Val Thr Gly Met Phe Ala Thr Ser Ala Thr Gly Lys Gly Ala
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 Ala Ala Ser Thr Gln Glu Gly Lys Ser Gln Pro Phe Lys Val Thr Pro
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Gly Pro Phe Asp Pro Ala Thr Trp Leu Glu Trp Ser Arg Gln Trp Gln
420 425 430

Gly Thr Glu Gly Asn Gly His Ala Ala Ala Ser Gly Ile Pro Gly Leu
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Asp Ala Leu Ala Gly Val Lys Ile Ala Pro Ala Gln Leu Gly Asp Ile
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Gln Gln Arg Tyr Met Lys Asp Phe Ser Ala Leu Trp Gln Ala Met Ala
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Glu Gly Lys Ala Glu Ala Thr Gly Pro Leu His Asp Arg Arg Phe Ala
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Gly Asp Ala Trp Arg Thr Asn Leu Pro Tyr Arg Phe Ala Ala Ala Phe
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Tyr Leu Leu Asn Ala Arg Ala Leu Thr Glu Leu Ala Asp Ala Val Glu
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Ala Asp Ala Lys Thr Arg Gln Arg Ile Arg Phe Ala Ile Ser Gln Trp
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Val Asp Ala Met Ser Pro Ala Asn Phe Leu Ala Thr Asn Pro Glu Ala
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Gln Arg Leu Leu Ile Glu Ser Gly Gly Glu Ser Leu Arg Ala Gly Val
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Arg Asn Met Met Glu Asp Leu Thr Arg Gly Lys Ile Ser Gln Thr Asp
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Glu Ser Ala Phe Glu Val Gly Arg Asn Val Ala Val Thr Glu Gly Ala
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Val Val Phe Glu Asn Glu Tyr Phe Gln Leu Leu Gln Tyr Lys Pro Leu
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Thr Asp Lys Val His Ala Arg Pro Leu Leu Met Val Pro Pro Cys Ile
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Asn Lys Tyr Tyr Ile Leu Asp Leu Gln Pro Glu Ser Ser Leu Val Arg
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His Val Val Glu Gln Gly His Thr Val Phe Leu Val Ser Trp Arg Asn
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Pro Asp Ala Ser Met Ala Gly Ser Thr Trp Asp Asp Tyr Ile Glu His
675 680 685

Ala Ala Ile Arg Ala Ile Glu Val Ala Arg Asp Ile Ser Gly Gln Asp
Page 7

| 690 | 695 | 700 |
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| Lys 705 | Ile Asn Val Leu 710 | Gly Phe Cys Val Gly 715 |
| Thr Ile Val Ser Thr 720 | | |
| Ala Leu Ala Val 725 | Leu Ala Ala Arg Gly 730 | Glu His Pro Ala Ala Ser Val 735 |
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| Val Phe Val Asp Glu Gly His 755 | Val Gln Leu Arg Glu 760 | Ala Thr Leu Gly 765 |
| Gly Gly Ala Gly Ala Pro 770 | Cys Ala Leu Leu Arg 775 | Gly Leu Glu Leu Ala 780 |
| Asn Thr Phe Ser Phe 785 | Leu Arg Pro Asn Asp 790 | Leu Val Trp Asn Tyr Val 800 |
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| Gly Ala Ser 900 | Gly His Ile Ala Gly 905 | Val Ile Asn Pro Pro Ala Lys Asn 910 |
| Lys Arg Ser 915 | His Trp Thr Asn 920 | Asp Ala Leu Pro Glu Ser Pro Gln Gln 925 |
| Trp Leu Ala Gly Ala Ile 930 | Glu His His Gly Ser 935 | Trp Trp Pro Asp Trp 940 |
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Pro Ser Pro Ser Met Gly Arg Asp Ile Lys Val Gln Phe Gln Ser Gly
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Thr Tyr Lys Trp Glu Thr Phe Leu Thr Ser Glu Leu Pro Gly Trp Leu
95 100 105 110

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Gln Ala Asn Arg His Val Lys Pro Thr Gly Ser Ala Val Val Gly Leu
115 120 125

tct atg gct gct tca tca gct tta aca tta gct att tat cat cca caa 435
Ser Met Ala Ala Ser Ser Ala Leu Thr Leu Ala Ile Tyr His Pro Gln
130 135 140

caa ttt gtt tat gca ggt gct atg tca ggt tta tta gat cca tca caa 483
Gln Phe Val Tyr Ala Gly Ala Met Ser Gly Leu Leu Asp Pro Ser Gln

| | | | | | | | | | | | | | | | | | | | | |
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| tat Tyr 175 | aaa Lys | gct Ala | agt Ser | gat Asp | atg Met 180 | tgg Trp | gga Gly | cca Pro | aaa Lys | gaa Glu 185 | gat Asp | cca Pro | gca Ala | tgg Trp | caa Gln 190 | | 579 | | | |
| cgt Arg | aat Asn | gat Asp | cca Pro | tta Leu 195 | tta Leu | aat Asn | ggt Val | gga Gly | aaa Lys 200 | tta Leu | att Ile | gca Ala | aat Asn | aat Asn 205 | act Thr | | 627 | | | |
| cgt Arg | ggt Val | tgg Trp | ggt Val 210 | tat Tyr | tgt Cys | gga Gly | aat Asn | ggt Gly 215 | aaa Lys | cca Pro | tct Ser | gat Asp | tta Leu 220 | gga Gly | ggt Gly | | 675 | | | |
| aat Asn | aat Asn | tta Leu 225 | cca Pro | gca Ala | aaa Lys | ttt Phe | tta Leu 230 | gaa Glu | gga Gly | ttt Phe | ggt Val | cgt Arg 235 | aca Thr | tca Ser | aat Asn | | 723 | | | |
| att Ile | aaa Lys 240 | ttt Phe | caa Gln | gat Asp | gct Ala | tat Tyr 245 | aat Asn | gct Ala | ggt Gly | gga Gly | gga Gly 250 | cat His | aat Asn | ggt Gly | ggt Val | | 771 | | | |
| ttt Phe 255 | gat Asp | ttt Phe | cca Pro | gat Asp | tct Ser 260 | ggt Gly | aca Thr | cat His | tca Ser | tgg Trp 265 | gaa Glu | tat Tyr | tgg Trp | ggt Gly | gca Ala 270 | | 819 | | | |
| caa Gln | tta Leu | aat Asn | gct Ala | atg Met 275 | aaa Lys | cca Pro | gat Asp | tta Leu | caa Gln 280 | cgt Arg | gct Ala | tta Leu | ggt Gly | gct Ala 285 | act Thr | | 867 | | | |
| cct Pro | aat Asn | aca Thr | ggt Gly 290 | cca Pro | gct Ala | cct Pro | caa Gln | ggt Gly 295 | gca Ala | gga Gly | tca Ser | aca Thr | gaa Glu 300 | caa Gln | caa Gln | | 915 | | | |
| tgg Trp | aat Asn | ttt Phe 305 | gct Ala | gga Gly | att Ile | gaa Glu 310 | gct Ala | gca Ala | gct Ala | tct Ser | gct Ala | att Ile 315 | caa Gln | ggt Gly | aat Asn | | 963 | | | |
| ggt Val | aca Thr 320 | agt Ser | att Ile | cat His | tca Ser | tta Leu 325 | tta Leu | gat Asp | gaa Glu | gga Gly | aaa Lys 330 | caa Gln | tca Ser | tta Leu | aca Thr | | 1011 | | | |
| aaa Lys 335 | tta Leu | gct Ala | gca Ala | gct Ala | tgg Trp 340 | ggt Gly | ggt Gly | agt Ser | ggt Gly | tca Ser 345 | gaa Glu | gct Ala | tat Tyr | caa Gln | ggt Gly 350 | | 1059 | | | |
| ggt Val | caa Gln | caa Gln | aaa Lys | tgg Trp 355 | gat Asp | gca Ala | act Thr | gct Ala | act Thr 360 | gaa Glu | tta Leu | aat Asn | aat Asn | gct Ala 365 | tta Leu | | 1107 | | | |
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| Trp | Gln | Gly | Thr | Glu | Gly | Asn | Gly | His | Ala | Ala | Ala | Ser | Gly | Ile | Pro | |
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| Gly | Leu | Asp | Ala | Leu | Ala | Gly | Val | Lys | Ile | Ala | Pro | Ala | Gln | Leu | Gly | |
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| gat | att | caa | caa | cga | tat | atg | aaa | gat | ttt | tca | gct | ttg | tgg | caa | gca | 1443 |
| Asp | Ile | Gln | Gln | Arg | Tyr | Met | Lys | Asp | Phe | Ser | Ala | Leu | Trp | Gln | Ala | |
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| Met | Ala | Glu | Gly | Lys | Ala | Glu | Ala | Thr | Gly | Pro | Leu | His | Asp | Arg | Arg | |
| | 480 | | | | | 485 | | | | | 490 | | | | | |
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| Phe | Ala | Gly | Asp | Ala | Trp | Arg | Thr | Asn | Leu | Pro | Tyr | Arg | Phe | Ala | Ala | |
| 495 | | | | | 500 | | | | | 505 | | | | | 510 | |
| gct | ttt | tat | tta | tta | aat | gct | cgt | gct | tta | aca | gaa | ttg | gca | gat | gct | 1587 |
| Ala | Phe | Tyr | Leu | Leu | Asn | Ala | Arg | Ala | Leu | Thr | Glu | Leu | Ala | Asp | Ala | |
| | | | | 515 | | | | | 520 | | | | | 525 | | |
| gtg | gaa | gct | gat | gct | aaa | act | cgt | caa | cgt | att | aga | ttt | gca | att | agt | 1635 |
| Val | Glu | Ala | Asp | Ala | Lys | Thr | Arg | Gln | Arg | Ile | Arg | Phe | Ala | Ile | Ser | |
| | | | 530 | | | | | 535 | | | | | 540 | | | |
| caa | tgg | gtt | gat | gct | atg | agt | cct | gca | aat | ttc | ttg | gca | acc | aat | cct | 1683 |
| Gln | Trp | Val | Asp | Ala | Met | Ser | Pro | Ala | Asn | Phe | Leu | Ala | Thr | Asn | Pro | |
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| gaa | gca | caa | cga | tta | ctt | atc | gaa | tca | ggc | ggt | gaa | tca | ctt | cgt | gct | 1731 |
| Glu | Ala | Gln | Arg | Leu | Leu | Ile | Glu | Ser | Gly | Gly | Glu | Ser | Leu | Arg | Ala | |
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| ggt | gtt | aga | aat | atg | atg | gaa | gat | tta | act | cga | ggt | aaa | att | agt | caa | 1779 |
| Gly | Val | Arg | Asn | Met | Met | Glu | Asp | Leu | Thr | Arg | Gly | Lys | Ile | Ser | Gln | |
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| acc | gat | gaa | tca | gca | ttt | gaa | gtg | ggt | cga | aat | gta | gct | gtt | acg | gaa | 1827 |
| Thr | Asp | Glu | Ser | Ala | Phe | Glu | Val | Gly | Arg | Asn | Val | Ala | Val | Thr | Glu | |
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| ggt | gct | gtt | gtt | ttc | gaa | aat | gaa | tat | ttt | caa | ttg | tta | caa | tat | aaa | 1875 |
| Gly | Ala | Val | Val | Phe | Glu | Asn | Glu | Tyr | Phe | Gln | Leu | Leu | Gln | Tyr | Lys | |
| | | | 610 | | | | | 615 | | | | | 620 | | | |
| cct | tta | aca | gat | aaa | gtt | cat | gcc | cgt | cct | ttg | ctt | atg | gtt | cct | cct | 1923 |
| Pro | Leu | Thr | Asp | Lys | Val | His | Ala | Arg | Pro | Leu | Leu | Met | Val | Pro | Pro | |
| | | 625 | | | | | 630 | | | | | 635 | | | | |
| tgt | att | aat | aaa | tat | tac | att | ttg | gat | ctt | caa | cca | gaa | agc | tca | ctt | 1971 |
| Cys | Ile | Asn | Lys | Tyr | Tyr | Ile | Leu | Asp | Leu | Gln | Pro | Glu | Ser | Ser | Leu | |
| | 640 | | | | | 645 | | | | | 650 | | | | | |
| gtt | cga | cat | gtt | gtc | gaa | caa | ggt | cat | acc | gtc | ttt | ttg | gtt | agt | tgg | 2019 |
| Val | Arg | His | Val | Val | Glu | Gln | Gly | His | Thr | Val | Phe | Leu | Val | Ser | Trp | |
| 655 | | | | | 660 | | | | | 665 | | | | | 670 | |
| cga | aat | cct | gac | gct | agt | atg | gca | ggt | agt | acg | tgg | gat | gat | tat | att | 2067 |
| Arg | Asn | Pro | Asp | Ala | Ser | Met | Ala | Gly | Ser | Thr | Trp | Asp | Asp | Tyr | Ile | |
| | | | | 675 | | | | | 680 | | | | | 685 | | |
| gaa | cac | gct | gcc | att | cga | gca | att | gaa | gtt | gca | cga | gat | att | tct | ggt | 2115 |
| Glu | His | Ala | Ala | Ile | Arg | Ala | Ile | Glu | Val | Ala | Arg | Asp | Ile | Ser | Gly | |
| | | | 690 | | | | | 695 | | | | | 700 | | | |

| | | | | | | | | | | | | | | | | |
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| tct Ser | acg Thr 720 | gca Ala | tta Leu | gct Ala | gtc Val | ctt Leu 725 | gct Ala | gct Ala | cga Arg | gga Gly | gaa Glu 730 | cat His | cct Pro | gcc Ala | gct Ala | 2211 |
| tct Ser 735 | gtc Val | aca Thr | ttg Leu | ttg Leu | aca Thr 740 | aca Thr | tta Leu | tta Leu | gat Asp | ttt Phe 745 | gct Ala | gat Asp | act Thr | ggc Gly | att Ile 750 | 2259 |
| ctt Leu | gat Asp | gtg Val | ttt Phe | gtc Val 755 | gat Asp | gaa Glu | ggt Gly | cac His | gta Val 760 | caa Gln | tta Leu | aga Arg | gaa Glu | gca Ala 765 | acc Thr | 2307 |
| tta Leu | ggt Gly | gga Gly | gga Gly 770 | gct Ala | ggc Gly | gct Ala | cca Pro | tgt Cys 775 | gct Ala | ttg Leu | tta Leu | aga Arg | ggt Gly 780 | ttg Leu | gaa Glu | 2355 |
| ctt Leu | gct Ala | aat Asn 785 | aca Thr | ttt Phe | agc Ser | ttt Phe | ctt Leu 790 | cga Arg | cca Pro | aat Asn | gat Asp | ttg Leu 795 | gtc Val | tgg Trp | aac Asn | 2403 |
| tac Tyr | gtg Val 800 | gtt Val | gac Asp | aat Asn | tat Tyr | tta Leu 805 | aaa Lys | ggt Gly | aat Asn | acg Thr | cca Pro 810 | gtt Val | cct Pro | ttc Phe | gat Asp | 2451 |
| tta Leu 815 | ttg Leu | ttc Phe | tgg Trp | aac Asn | ggt Gly 820 | gat Asp | gca Ala | act Thr | aat Asn | tta Leu 825 | cca Pro | gga Gly | cct Pro | tgg Trp | tac Tyr 830 | 2499 |
| tgt Cys | tgg Trp | tat Tyr | tta Leu | aga Arg 835 | cac His | aca Thr | tat Tyr | tta Leu | caa Gln 840 | aat Asn | gaa Glu | ctt Leu | aaa Lys | gtc Val 845 | cca Pro | 2547 |
| gga Gly | aaa Lys | tta Leu | aca Thr 850 | gtc Val | tgt Cys | ggt Gly | gtt Val | cct Pro 855 | gta Val | gat Asp | tta Leu | gca Ala | tca Ser 860 | atc Ile | gac Asp | 2595 |
| gta Val | cct Pro | act Thr 865 | tat Tyr | att Ile | tat Tyr | ggt Gly | agt Ser 870 | cgt Arg | gaa Glu | gat Asp | cat His | att Ile 875 | gtg Val | cct Pro | tgg Trp | 2643 |
| aca Thr 880 | gca Ala | gca Ala | tat Tyr | gct Ala | tca Ser | aca Thr 885 | gca Ala | ctt Leu | ttg Leu | gcc Ala | aat Asn 890 | aaa Lys | tta Leu | cgt Arg | ttc Phe | 2691 |
| gtt Val 895 | ctt Leu | gga Gly | gct Ala | agt Ser | gga Gly 900 | cac His | att Ile | gct Ala | gga Gly | gtt Val 905 | att Ile | aat Asn | cct Pro | cca Pro | gct Ala 910 | 2739 |
| aaa Lys | aat Asn | aaa Lys | cgt Arg | tct Ser 915 | cat His | tgg Trp | aca Thr | aat Asn | gat Asp 920 | gct Ala | ttg Leu | cca Pro | gaa Glu | agt Ser 925 | cct Pro | 2787 |
| caa Gln | caa Gln | tgg Trp | tta Leu 930 | gcc Ala | gga Gly | gca Ala | atc Ile | gaa Glu 935 | cat His | cat His | ggt Gly | tca Ser | tgg Trp 940 | tgg Trp | cca Pro | 2835 |
| gat Asp | tgg Trp | act Thr 945 | gca Ala | tgg Trp | ttg Leu | gct Ala | ggt Gly 950 | caa Gln | gcc Ala | ggt Gly | gca Ala | aaa Lys 955 | cgt Arg | gca Ala | gca Ala | 2883 |
| cca Pro | gcc Ala 960 | aat Asn | tat Tyr | ggc Gly | aat Asn | gct Ala 965 | cga Arg | tat Tyr | aga Arg | gct Ala | att Ile 970 | gaa Glu | cct Pro | gca Ala | cca Pro | 2931 |
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Phe Ser Gly Trp Asp Ile Asn Thr Pro Ala Phe Glu Trp Tyr Asp Gln
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Ser Gly Leu Ser Val Val Met Pro Val Gly Gly Gln Ser Ser Phe Tyr
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Ser Asp Trp Tyr Gln Pro Ala Cys Gly Lys Ala Gly Cys Gln Thr Tyr
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Lys Trp Glu Thr Phe Leu Thr Ser Glu Leu Pro Gly Trp Leu Gln Ala
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Asn Arg His Val Lys Pro Thr Gly Ser Ala Val Val Gly Leu Ser Met
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Ala Ala Ser Ser Ala Leu Thr Leu Ala Ile Tyr His Pro Gln Gln Phe
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Val Tyr Ala Gly Ala Met Ser Gly Leu Leu Asp Pro Ser Gln Ala Met
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Gly Pro Thr Leu Ile Gly Leu Ala Met Gly Asp Ala Gly Gly Tyr Lys
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Ala Ser Asp Met Trp Gly Pro Lys Glu Asp Pro Ala Trp Gln Arg Asn
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Asp Pro Leu Leu Asn Val Gly Lys Leu Ile Ala Asn Asn Thr Arg Val
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Trp Val Tyr Cys Gly Asn Gly Lys Pro Ser Asp Leu Gly Gly Asn Asn
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Leu 225 Pro Ala Lys Phe 230 Leu Glu Gly Phe Val Arg 235 Thr Ser Asn Ile Lys 240
 Phe Gln Asp Ala Tyr 245 Asn Ala Gly Gly Gly 250 His Asn Gly Val Phe 255 Asp
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 Gln Lys Trp 355 Asp Ala Thr Ala Thr 360 Glu Leu Asn Asn Ala 365 Leu Gln Asn
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 Asp Ala 450 Leu Ala Gly Val Lys 455 Ile Ala Pro Ala Gln 460 Leu Gly Asp Ile
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 Glu Gly Lys Ala Glu 485 Ala Thr Gly Pro Leu 490 His Asp Arg Arg Phe 495 Ala

Gly Asp Ala Trp Arg Thr Asn Leu Pro Tyr Arg Phe Ala Ala Ala Phe
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Tyr Leu Leu Asn Ala Arg Ala Leu Thr Glu Leu Ala Asp Ala Val Glu
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Ala Asp Ala Lys Thr Arg Gln Arg Ile Arg Phe Ala Ile Ser Gln Trp
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Val Asp Ala Met Ser Pro Ala Asn Phe Leu Ala Thr Asn Pro Glu Ala
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Gln Arg Leu Leu Ile Glu Ser Gly Gly Glu Ser Leu Arg Ala Gly Val
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Arg Asn Met Met Glu Asp Leu Thr Arg Gly Lys Ile Ser Gln Thr Asp
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Glu Ser Ala Phe Glu Val Gly Arg Asn Val Ala Val Thr Glu Gly Ala
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Val Val Phe Glu Asn Glu Tyr Phe Gln Leu Leu Gln Tyr Lys Pro Leu
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Thr Asp Lys Val His Ala Arg Pro Leu Leu Met Val Pro Pro Cys Ile
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Asn Lys Tyr Tyr Ile Leu Asp Leu Gln Pro Glu Ser Ser Leu Val Arg
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His Val Val Glu Gln Gly His Thr Val Phe Leu Val Ser Trp Arg Asn
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Pro Asp Ala Ser Met Ala Gly Ser Thr Trp Asp Asp Tyr Ile Glu His
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Lys Ile Asn Val Leu Gly Phe Cys Val Gly Gly Thr Ile Val Ser Thr
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Ala Leu Ala Val Leu Ala Ala Arg Gly Glu His Pro Ala Ala Ser Val
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Thr Leu Leu Thr Thr Leu Leu Asp Phe Ala Asp Thr Gly Ile Leu Asp
740 745 750

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

Gly Gly Ala Gly Ala Pro Cys Ala Leu Leu Arg Gly Leu Glu Leu Ala
Page 15

770

775

780

Asn Thr Phe Ser Phe Leu Arg Pro Asn Asp Leu Val Trp Asn Tyr Val
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Val Asp Asn Tyr Leu Lys Gly Asn Thr Pro Val Pro Phe Asp Leu Leu
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Phe Trp Asn Gly Asp Ala Thr Asn Leu Pro Gly Pro Trp Tyr Cys Trp
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Tyr Leu Arg His Thr Tyr Leu Gln Asn Glu Leu Lys Val Pro Gly Lys
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Leu Thr Val Cys Gly Val Pro Val Asp Leu Ala Ser Ile Asp Val Pro
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Thr Tyr Ile Tyr Gly Ser Arg Glu Asp His Ile Val Pro Trp Thr Ala
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Ala Tyr Ala Ser Thr Ala Leu Leu Ala Asn Lys Leu Arg Phe Val Leu
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Gly Ala Ser Gly His Ile Ala Gly Val Ile Asn Pro Pro Ala Lys Asn
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Lys Arg Ser His Trp Thr Asn Asp Ala Leu Pro Glu Ser Pro Gln Gln
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Tyr Val Lys Ala Lys Ala
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attgtctcga ccgcgctggc ggtgctggcc gcgcgcggcg agcaccggc cgccagcgtc 1620
acgctgctga ccacgctgct ggactttgcc gacacgggca tcctcgacgt ctttgtcgac 1680
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tggaactacg tggtcgacaa ctacctgaag ggcaacacgc cggtgccgtt cgacctgctg 1860
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acctacctgc agaacgagct caaggtaccg ggcaagctga ccgtgtgcgg cgtgccgggtg 1980
gacctggcca gcatcgacgt gccgacctat atctacggct cgcgcgaaga ccatatcgtg 2040
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tggaactaac atgcgctgcc ggagtcgccg cagcaatggc tggccggcg catcgagcat 2220
cacggcagct ggtggccgga ctggaccgca tggctggccg ggcaggccgg cgcgaaacgc 2280
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tacgtcaaag ccaaggcatg a 2361

<210> 8
<211> 786
<212> PRT
<213> Artificial

<220>
<223> Hep C-PhaC fusion polypeptide encoded by pET-14b-HepC-PhaC
<400> 8

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

Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
35 40 45

Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
50 55 60

Ile Pro Lys Ala Arg Gln Pro Glu Gly Arg Ala Trp Ala Gln Pro Gly
65 70 75 80

Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Met Gly Trp Ala Gly Trp
85 90 95

Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro
100 105 110

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

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

Gly Ser Arg Glu Asp His Ile Val Pro Trp Thr Ala Ala Tyr Ala Ser
675 680 685

Thr Ala Leu Leu Ala Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly
690 695 700

His Ile Ala Gly Val Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser His
705 710 715 720

Trp Thr Asn Asp Ala Leu Pro Glu Ser Pro Gln Gln Trp Leu Ala Gly
725 730 735

Ala Ile Glu His His Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu
740 745 750

Ala Gly Gln Ala Gly Ala Lys Arg Ala Ala Pro Ala Asn Tyr Gly Asn
755 760 765

Ala Arg Tyr Arg Ala Ile Glu Pro Ala Pro Gly Arg Tyr Val Lys Ala
770 775 780

Lys Ala
785

<210> 9
<211> 2361
<212> DNA
<213> Artificial

<220>
<223> Synthetic construct pNZ-HepC-PhaCAB

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agaggacctt gattaggtgt tagagctaca cgtaaaacat cagaaagatc acaaccacgt 180
ggtcgtagac aaccaattcc taaagcaaga caaccagaag gtcgtgcttg ggcacaacct 240
ggatatcctt ggcctttata tggtaatgaa ggaatgggtt gggctggatg gttactttct 300
ccaagaggat ctgctcctag ttgggggtcca actgatactc gtagacgttc acgtaatcct 360
ggtaaagtta ttgatacact tacttgtgga tttgctgata ttatgggtta tattccatta 420
gttggagcac ctcttgagg tgctgcaaga gctcttgac atggagtctg tgtttttagaa 480
gatggtgtta attatgctac aggaaatctt ccagggtgtt ctttttctat ttttctttta 540
gctttacttt catgtttaac tattcctgct tctgcaacta gtggaggtgg aggtggagca 600
acaggaaaag gtgccgcagc ttcaacgcaa gaaggaaaat cacaaccatt taaagttacc 660
ccaggcccat ttgatccagc aacatgggtg gaatgggtcaa gacaatggca aggaactgaa 720
ggaaatggac atgctgctgc tagcgggtatt cctgggttag atgcacttgc tggagtcaaa 780

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attgctccag ctcaattagg tgatattcaa caacgatata tgaaagattt ttcagctttg      840
tggcaagcaa tggccgaagg aaaagctgaa gctacaggac cacttcatga tcgacgtttt      900
gcaggagatg cctggcgtag aaatttgcct tacagatttg cagctgcttt ttattttatta      960
aatgctcgtg ctttaacaga attggcagat gctgtggaag ctgatgctaa aactcgtcaa     1020
cgtattagat ttgcaattag tcaatggggt gatgctatga gtcctgcaaa tttcttggca     1080
accaatcctg aagcacaacg attacttatc gaatcaggcg gtgaatcact tcgtgctgggt     1140
gtagaaata tgatggaaga ttttaactcga ggtaaaatta gtcaaaccga tgaatcagca     1200
tttgaagtgg gtcgaaatgt agctgttacg gaagggtgctg ttgttttcga aaatgaatat     1260
tttcaattgt tacaatataa acctttaaca gataaagttc atgcccgctc tttgcttatg     1320
gttcctcctt gtattaataa atattacatt ttggatcttc aaccagaaag ctcacttggt     1380
cgacatgttg tcgaacaagg tcataccgtc tttttggtta gttggcgaaa tcctgacgct     1440
agtatggcag gtagtacgtg ggatgattat attgaacacg ctgccattcg agcaattgaa     1500
gttgcacgag atatttctgg tcaagacaaa attaatgtac ttggcttttg tgttggtggt     1560
acaattgttt ctacggcatt agctgtcctt gctgctcgag gagaacatcc tgccgcttct     1620
gtcacattgt tgacaacatt attagatttt gctgatactg gcattcttga tgtgtttgtc     1680
gatgaaggtc acgtacaatt aagagaagca accttaggtg gaggagctgg cgctccatgt     1740
gctttgttaa gaggtttgga acttgctaata acatttagct ttcttcgacc aaatgatttg     1800
gtctggaact acgtgggtga caattattta aaaggtaata cgccagttcc tttcgattta     1860
ttgttctgga acggtgatgc aactaattta ccaggacctt ggtactgttg gtatttaaga     1920
cacacatatt tacaaaatga acttaaagtc ccaggaaaat taacagtctg tgggtgttcct     1980
gtagatttag catcaatcga cgtacctact tatatttatg gtagtcgtga agatcatatt     2040
gtgccttgga cagcagcata tgcttcaaca gcacttttgg ccaataaatt acgtttcggt     2100
cttgagacta gtggacacat tgctggagtt attaatcctc cagctaaaaa taaacgttct     2160
cattggacaa atgatgcttt gccagaaagt cctcaacaat ggtagccgg agcaatcgaa     2220
catcatggtt catggtggcc agattggact gcatggttgg ctggtcaagc cggtgcaaaa     2280
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<210> 10
<211> 787
<212> PRT
<213> Artificial

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<220>
<223> HepC-PhaC fusion polypeptide encoded by pNZ-HepC-PhaCAB

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<400> 10

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

290

295

300

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

Gly Ala Pro Cys Ala Leu Leu Arg Gly Leu Glu Leu Ala Asn Thr Phe
580 585 590

Ser Phe Leu Arg Pro Asn Asp Leu Val Trp Asn Tyr Val Val Asp Asn
595 600 605

Tyr Leu Lys Gly Asn Thr Pro Val Pro Phe Asp Leu Leu Phe Trp Asn
610 615 620

Gly Asp Ala Thr Asn Leu Pro Gly Pro Trp Tyr Cys Trp Tyr Leu Arg
625 630 635 640

His Thr Tyr Leu Gln Asn Glu Leu Lys Val Pro Gly Lys Leu Thr Val
645 650 655

Cys Gly Val Pro Val Asp Leu Ala Ser Ile Asp Val Pro Thr Tyr Ile
660 665 670

Tyr Gly Ser Arg Glu Asp His Ile Val Pro Trp Thr Ala Ala Tyr Ala
675 680 685

Ser Thr Ala Leu Leu Ala Asn Lys Leu Arg Phe Val Leu Gly Ala Ser
690 695 700

Gly His Ile Ala Gly Val Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser
705 710 715 720

His Trp Thr Asn Asp Ala Leu Pro Glu Ser Pro Gln Gln Trp Leu Ala
725 730 735

Gly Ala Ile Glu His His Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp
740 745 750

Leu Ala Gly Gln Ala Gly Ala Lys Arg Ala Ala Pro Ala Asn Tyr Gly
755 760 765

Asn Ala Arg Tyr Arg Ala Ile Glu Pro Ala Pro Gly Arg Tyr Val Lys
770 775 780

Ala Lys Ala
785

<210> 11
<211> 2775
<212> DNA
<213> Artificial

<220>
<223> Synthetic construct - pET-14b-PhaC-HA1 of H3-PhaC

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60

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| gtgccgaacg | gtaccattgt | taaaaccatc | acgaacgatc | agattgaagt | gaccaatgcg | 120 |
| acggaactgg | ttcagagctc | tagtaccggt | gaaatctgcg | atagcccgca | tcagattctg | 180 |
| gatggcgaaa | attgtacgct | gatcgatgcc | ctgctgggcg | atccgcagtg | cgatggtttt | 240 |
| cagaacaaaa | aatgggatct | gttcgtggaa | cgctctaaag | catacagtaa | ctgttaccgg | 300 |
| tatgatgtgc | cggattacgc | cagcctgcgt | tctctggttg | caagctctgg | caccctggaa | 360 |
| tttaacaatg | aaagcttcaa | ctggaccggc | gttacgcaga | atggtacgag | tagcgcgtgc | 420 |
| attcgtcgca | gtaacaatag | ctttttctct | cgtctgaact | ggctgacca | cctgaaatct | 480 |
| aaatatccgg | ccctgaatgt | gacgatgccg | aacaacgaaa | aattcgataa | actgtacatc | 540 |
| tggggcgttc | atcaccggg | taccgataac | gatcagattt | ttccgtatgc | ccaggcaagc | 600 |
| ggtcgcatca | ccgtgagcac | gaaacgttct | cagcagaccg | ttattccgaa | catcggtctt | 660 |
| cgtccgcgcg | tgcgtaatat | tccgagtcgc | attagcatct | actggaccat | cgtaaaccg | 720 |
| ggcgatattc | tgctgatcaa | cagcacgggc | aatctgattg | caccgcgcg | ttattttaaa | 780 |
| atccgttctg | gcaaacttag | tattatgcgt | agtgatgcgc | cgatcggtaa | atgcaatagc | 840 |
| gaatgtatca | ccccgaacgg | ctctattccg | aatgataaac | cgttccagaa | cgtgaatcgc | 900 |
| attacgtatg | gtgcctgccc | gcgttacgtt | aaacagaaca | ccctgaaact | ggcaacgggc | 960 |
| atgcgcaatg | tgccggaaaa | acagaccggt | acgggtggcg | gtggcggtgc | gaccggcaaa | 1020 |
| ggcgcggcag | cttcacgca | ggaaggcaag | tccaaccat | tcaaggtcac | gccggggcca | 1080 |
| ttcgatccag | ccacatgggt | ggaatgggtc | cgccagtggc | agggcactga | aggcaacggc | 1140 |
| cacgcggccg | cgtccggcat | tccgggcctg | gatgcgctgg | caggcgtcaa | gatcgcgccg | 1200 |
| gcgcagctgg | gtgatatcca | gcagcgctac | atgaaggact | tctcagcgct | gtggcaggcc | 1260 |
| atggccgagg | gcaaggccga | ggccaccggt | ccgctgcacg | accggcgctt | cgccggcgac | 1320 |
| gcatggcgca | ccaacctccc | atatcgcttc | gctgccgcgt | tctacctgct | caatgcgcgc | 1380 |
| gccttgaccg | agctggccga | tgccgtcgag | gccgatgcc | agaccgcga | gcgcatccgc | 1440 |
| ttcgcatct | cgcaatgggt | cgatgcgatg | tcgcccgcga | acttccttgc | caccaatccc | 1500 |
| gaggcgagc | gcctgctgat | cgagtcgggc | ggcgaatcgc | tgctgcccgg | cgtgcgcaac | 1560 |
| atgatggaag | acctgacacg | cggcaagatc | tcgcagaccg | acgagagcgc | gtttgaggtc | 1620 |
| ggccgcaatg | tcgcgggtgac | cgaaggcgcc | gtggtcttcg | agaacgagta | cttcagctg | 1680 |
| ttgcagtaca | agccgctgac | cgacaagggt | cacgcgcgcc | cgctgctgat | ggtgccgccg | 1740 |
| tgcatcaaca | agtactacat | cctggacctg | cagccggaga | gctcgctggg | gcgccatgtg | 1800 |
| gtggagcagg | gacatacggg | gtttctggtg | tcgtggcgca | atccggacgc | cagcatggcc | 1860 |
| ggcagcacct | gggacgacta | catcgagcac | gcggccatcc | gcgccatcga | agtcgcgcgc | 1920 |
| gacatcagcg | gccaggacaa | gatcaacgtg | ctcggcttct | gcgtgggccc | caccattgtc | 1980 |
| tcgaccgcgc | tggcgggtgct | ggccgcgcgc | ggcgagcacc | cggccgccag | cgtcacgctg | 2040 |
| ctgaccacgc | tgctggactt | tgccgacacg | ggcatcctcg | acgtctttgt | cgacgagggc | 2100 |
| catgtgcagt | tgcgcgaggc | cacgctgggc | ggcgccgccg | gcgcgccgtg | cgcgctgctg | 2160 |

cgcggccttg agctggccaa taccttctcg ttcttgccg cgaacgacct ggtgtggaac 2220
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 <211> 924
 <212> PRT
 <213> Artificial

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<220>
 <221> Protein
 <222> (1)..(924)
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<400> 12

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

Thr Gly Glu Ile Cys Asp Ser Pro His Gln Ile Leu Asp Gly Glu Asn
50 55 60

Cys Thr Leu Ile Asp Ala Leu Leu Gly Asp Pro Gln Cys Asp Gly Phe
65 70 75 80

Gln Asn Lys Lys Trp Asp Leu Phe Val Glu Arg Ser Lys Ala Tyr Ser
85 90 95

Asn Cys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Ser Leu Arg Ser Leu
100 105 110

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

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

His Pro Ala Ala Ser Val Thr Leu Leu Thr Thr Leu Leu Asp Phe Ala
 675 680 685
 Asp Thr Gly Ile Leu Asp Val Phe Val Asp Glu Gly His Val Gln Leu
 690 695 700
 Arg Glu Ala Thr Leu Gly Gly Gly Ala Gly Ala Pro Cys Ala Leu Leu
 705 710 715 720
 Arg Gly Leu Glu Leu Ala Asn Thr Phe Ser Phe Leu Arg Pro Asn Asp
 725 730 735
 Leu Val Trp Asn Tyr Val Val Asp Asn Tyr Leu Lys Gly Asn Thr Pro
 740 745 750
 Val Pro Phe Asp Leu Leu Phe Trp Asn Gly Asp Ala Thr Asn Leu Pro
 755 760 765
 Gly Pro Trp Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn Glu
 770 775 780
 Leu Lys Val Pro Gly Lys Leu Thr Val Cys Gly Val Pro Val Asp Leu
 785 790 795 800
 Ala Ser Ile Asp Val Pro Thr Tyr Ile Tyr Gly Ser Arg Glu Asp His
 805 810 815
 Ile Val Pro Trp Thr Ala Ala Tyr Ala Ser Thr Ala Leu Leu Ala Asn
 820 825 830
 Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala Gly Val Ile
 835 840 845
 Asn Pro Pro Ala Lys Asn Lys Arg Ser His Trp Thr Asn Asp Ala Leu
 850 855 860
 Pro Glu Ser Pro Gln Gln Trp Leu Ala Gly Ala Ile Glu His His Gly
 865 870 875 880
 Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu Ala Gly Gln Ala Gly Ala
 885 890 895
 Lys Arg Ala Ala Pro Ala Asn Tyr Gly Asn Ala Arg Tyr Arg Ala Ile
 900 905 910
 Glu Pro Ala Pro Gly Arg Tyr Val Lys Ala Lys Ala
 915 920

<210> 13
 <211> 43
 <212> DNA

<213> Artificial
 <220>
 <223> Primer - synthesised in the laboratory
 <400> 13
 agatactagt atgcagaaac tgccgggtaa cgataatagt acc 43

<210> 14
 <211> 40
 <212> DNA
 <213> Artificial
 <220>
 <223> Primer - synthesised in the laboratory
 <400> 14
 gatgcgtacg ggtctgtttt tccggcacat tgcgcatgcc 40

<210> 15
 <211> 40
 <212> DNA
 <213> Artificial
 <220>
 <223> Primer - synthesised in the laboratory
 <400> 15
 agatctcgag cagaaactgc cgggtaacga taatagtacc 40

<210> 16
 <211> 43
 <212> DNA
 <213> Artificial
 <220>
 <223> Primer - synthesised in the laboratory
 <400> 16
 gatgggatcc tcaggtctgt ttttccggca cattgcgcat gcc 43

<210> 17
 <211> 3195
 <212> DNA
 <213> Artificial
 <220>
 <223> Synthetic construct - pET-14b-NA-PhaC
 <400> 17
 atgaatccaa atcaaaagat aataacgatt ggctctgttt ctctcaccat ttccacaata 60
 tgcttcttca tgcaaattgc catcttgata actactgtaa cattgcattt caagcaatat 120
 gaattcaact ccccccaaa caaccaagtg atgctgtgtg aaccaacaat aatagaaaga 180
 aacataacag agatagtgtg tctgaccaac accaccatag agaaggaaat atgccccaaa 240
 ctagcagaat acagaaattg gtcaaagccg caatgtgaca ttacaggatt tgcacctttt 300
 tctaaggaca attcgattag gctttccgct ggtggggaca tctgggtgac aagagaacct 360
 tatgtgtcat gcgatcctga caagtgttat caatttgccc ttggacaggg aacaacacta 420
 aacaacgtgc attcaaatga cacagtacgt gataggacct cttatcggac cctattgatg 480

| | | | | | | |
|------------|-------------|------------|------------|------------|------------|------|
| aatgagttag | gtgttccttt | tcctctgggg | accaagcaag | tgtgcatagc | atggtccagc | 540 |
| tcaagttgtc | acgatggaaa | agcatggctg | catgtttgta | taacggggga | tgataaaaat | 600 |
| gcaactgcta | gcttcattta | caatgggagg | cttgtagata | gtattgtttc | atggtccaaa | 660 |
| gaaatcctca | ggaccagga | gtcagaatgc | gtttgtatca | atggaacttg | tacagtagta | 720 |
| atgactgatg | ggagtgcctc | aggaaaagct | gataactaaa | tactattcat | tgaggagggg | 780 |
| aaaatcgctc | atactagcac | attgtcagga | agtgtcagc | atgtcgagga | gtgctcctgc | 840 |
| tatcctcgat | atcctggtgt | cagatgtgtc | tgcagagaca | actggaaagg | ctccaatagg | 900 |
| cccatcgtag | atataaacat | aaaggatcat | agcactgttt | ccagttatgt | gtgttcagga | 960 |
| cttggtggag | acacaccag | aaaaaacgac | agctccagca | gtagccattg | tttagatcct | 1020 |
| aacaatgaag | aagggtgtca | tggagtgaag | ggctgggcct | ttgatgatgg | aaatgacgtg | 1080 |
| tggatgggaa | gaacgatcag | cgagaagtcg | cgcttagggg | atgaaacctt | caaagtcatt | 1140 |
| gaaggctggg | ccaaccctaa | gtccaaattg | cagataaata | ggcaagtcac | agttgacaga | 1200 |
| ggtaataggt | ccggttattc | tgggtatttc | tctgttgaag | gcaaaagctg | catcaatcgg | 1260 |
| tgcttttatg | tggagtgtat | aaggggaaga | aaagaggaaa | ctgaagtctt | gtggacctca | 1320 |
| aacagtattg | ttgtgttttg | tggcacctca | ggtacatatg | gaacaggctc | atggcctgat | 1380 |
| ggggcggaca | tcaatctcat | gcctatacgt | acgggtggcg | gtggcgggtg | gaccggcaaa | 1440 |
| ggcgcggcag | cttcacgca | ggaaggcaag | tccaaccat | tcaaggtcac | gccggggcca | 1500 |
| ttcgatccag | ccacatggct | ggaatgggtc | cgccagtggc | agggcactga | aggcaacggc | 1560 |
| cacgcggccg | cgtccggcat | tccgggcctg | gatgcgctgg | caggcgtaaa | gatcgcgccg | 1620 |
| gcgcagctgg | gtgatatcca | gcagcgctac | atgaaggact | tctcagcgct | gtggcaggcc | 1680 |
| atggccgagg | gcaaggccga | ggccaccggg | ccgctgcacg | accggcgctt | cgccggcgac | 1740 |
| gcatggcgca | ccaacctccc | atatcgcttc | gctgccgcgt | tctacctgct | caatgcgcgc | 1800 |
| gccttgaccg | agctggccga | tgccgtcgag | gccgatgcca | agaccgcga | gcgcatccgc | 1860 |
| ttcgcgatct | cgcaatgggt | cgatgcgatg | tcgcccgcga | acttccttgc | caccaatccc | 1920 |
| gaggcgagc | gcctgctgat | cgagtcgggc | ggcgaatcgc | tgctgtccgg | cgtgcgcaac | 1980 |
| atgatggaag | acctgacacg | cggcaagatc | tcgcagaccg | acgagagcgc | gtttgaggtc | 2040 |
| ggccgcaatg | tcgcggtgac | cgaaggcgcc | gtggtcttcg | agaacgagta | cttcagctg | 2100 |
| ttgcagtaca | agccgctgac | cgacaagggt | cacgcgcgcc | cgctgctgat | ggtgccgccg | 2160 |
| tgcatcaaca | agtactacat | cctggacctg | cagccggaga | gctcgctggg | gcgccatgtg | 2220 |
| gtggagcagg | gacatacggg | gtttctggtg | tcgtggcgca | atccggacgc | cagcatggcc | 2280 |
| ggcagcacct | gggacgacta | catcgagcac | gcggccatcc | gcgccatcga | agtcgcgcgc | 2340 |
| gacatcagcg | gccaggacaa | gatcaacgtg | ctcggcttct | gcgtggggcg | caccattgtc | 2400 |
| tcgaccgcgc | tggcgggtgct | ggccgcgcgc | ggcgagcacc | cggccgccag | cgtcacgctg | 2460 |
| ctgaccacgc | tgctggactt | tgccgacacg | ggcatcctcg | acgtctttgt | cgacgagggc | 2520 |

catgtgcagt tgcgcgaggc cacgctgggc ggcggcgccg gcgcgccgtg cgcgctgctg 2580
cgcggccttg agctggccaa taccttctcg ttcttgccg cgaacgacct ggtgtggaac 2640
tacgtggctg acaactacct gaagggcaac acgccggtgc cgttcgacct gctgttcttg 2700
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accgcggcct atgcctcgac cgcgctgctg gcgaacaagc tgcgcttcgt gctgggtgcg 2940
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aacgatgcgc tgccggagtc gccgcagcaa tggctggccg gcgccatcga gcatcacggc 3060
agctggtggc cggactggac cgcattgctg gccgggcagg ccggcgcgaa acgcgccgcg 3120
cccgccaact atggcaatgc gcgctatcgc gcaatcgaac ccgcgcctgg gcgatacgtc 3180
aaagccaagg catga 3195

<210> 18
<211> 1064
<212> PRT
<213> Artificial

<220>
<223> NA-PhaC fusion polypeptide encoded by pET-14b-NA-PhaC

<400> 18

Met Asn Pro Asn Gln Lys Ile Ile Thr Ile Gly Ser Val Ser Leu Thr
1 5 10 15

Ile Ser Thr Ile Cys Phe Phe Met Gln Ile Ala Ile Leu Ile Thr Thr
20 25 30

Val Thr Leu His Phe Lys Gln Tyr Glu Phe Asn Ser Pro Pro Asn Asn
35 40 45

Gln Val Met Leu Cys Glu Pro Thr Ile Ile Glu Arg Asn Ile Thr Glu
50 55 60

Ile Val Tyr Leu Thr Asn Thr Thr Ile Glu Lys Glu Ile Cys Pro Lys
65 70 75 80

Leu Ala Glu Tyr Arg Asn Trp Ser Lys Pro Gln Cys Asp Ile Thr Gly
85 90 95

Phe Ala Pro Phe Ser Lys Asp Asn Ser Ile Arg Leu Ser Ala Gly Gly
100 105 110

Asp Ile Trp Val Thr Arg Glu Pro Tyr Val Ser Cys Asp Pro Asp Lys
115 120 125

Cys Tyr Gln Phe Ala Leu Gly Gln Gly Thr Thr Leu Asn Asn Val His
130 135 140

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

Cys Ile Asn Arg Cys Phe Tyr Val Glu Leu Ile Arg Gly Arg Lys Glu
 420 425 430

Glu Thr Glu Val Leu Trp Thr Ser Asn Ser Ile Val Val Phe Cys Gly
 435 440 445

Thr Ser Gly Thr Tyr Gly Thr Gly Ser Trp Pro Asp Gly Ala Asp Ile
 450 455 460

Asn Leu Met Pro Ile Arg Thr Gly Gly Gly Gly Gly Ala Thr Gly Lys
 465 470 475 480

Gly Ala Ala Ala Ser Thr Gln Glu Gly Lys Ser Gln Pro Phe Lys Val
 485 490 495

Thr Pro Gly Pro Phe Asp Pro Ala Thr Trp Leu Glu Trp Ser Arg Gln
 500 505 510

Trp Gln Gly Thr Glu Gly Asn Gly His Ala Ala Ala Ser Gly Ile Pro
 515 520 525

Gly Leu Asp Ala Leu Ala Gly Val Lys Ile Ala Pro Ala Gln Leu Gly
 530 535 540

Asp Ile Gln Gln Arg Tyr Met Lys Asp Phe Ser Ala Leu Trp Gln Ala
 545 550 555 560

Met Ala Glu Gly Lys Ala Glu Ala Thr Gly Pro Leu His Asp Arg Arg
 565 570 575

Phe Ala Gly Asp Ala Trp Arg Thr Asn Leu Pro Tyr Arg Phe Ala Ala
 580 585 590

Ala Phe Tyr Leu Leu Asn Ala Arg Ala Leu Thr Glu Leu Ala Asp Ala
 595 600 605

Val Glu Ala Asp Ala Lys Thr Arg Gln Arg Ile Arg Phe Ala Ile Ser
 610 615 620

Gln Trp Val Asp Ala Met Ser Pro Ala Asn Phe Leu Ala Thr Asn Pro
 625 630 635 640

Glu Ala Gln Arg Leu Leu Ile Glu Ser Gly Gly Glu Ser Leu Arg Ala
 645 650 655

Gly Val Arg Asn Met Met Glu Asp Leu Thr Arg Gly Lys Ile Ser Gln
 660 665 670

Thr Asp Glu Ser Ala Phe Glu Val Gly Arg Asn Val Ala Val Thr Glu
 675 680 685

Gly Ala Val Val Phe Glu Asn Glu Tyr Phe Gln Leu Leu Gln Tyr Lys
690 695 700

Pro Leu Thr Asp Lys Val His Ala Arg Pro Leu Leu Met Val Pro Pro
705 710 715 720

Cys Ile Asn Lys Tyr Tyr Ile Leu Asp Leu Gln Pro Glu Ser Ser Leu
725 730 735

Val Arg His Val Val Glu Gln Gly His Thr Val Phe Leu Val Ser Trp
740 745 750

Arg Asn Pro Asp Ala Ser Met Ala Gly Ser Thr Trp Asp Asp Tyr Ile
755 760 765

Glu His Ala Ala Ile Arg Ala Ile Glu Val Ala Arg Asp Ile Ser Gly
770 775 780

Gln Asp Lys Ile Asn Val Leu Gly Phe Cys Val Gly Gly Thr Ile Val
785 790 795 800

Ser Thr Ala Leu Ala Val Leu Ala Ala Arg Gly Glu His Pro Ala Ala
805 810 815

Ser Val Thr Leu Leu Thr Thr Leu Leu Asp Phe Ala Asp Thr Gly Ile
820 825 830

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

Leu Gly Gly Gly Ala Gly Ala Pro Cys Ala Leu Leu Arg Gly Leu Glu
850 855 860

Leu Ala Asn Thr Phe Ser Phe Leu Arg Pro Asn Asp Leu Val Trp Asn
865 870 875 880

Tyr Val Val Asp Asn Tyr Leu Lys Gly Asn Thr Pro Val Pro Phe Asp
885 890 895

Leu Leu Phe Trp Asn Gly Asp Ala Thr Asn Leu Pro Gly Pro Trp Tyr
900 905 910

Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn Glu Leu Lys Val Pro
915 920 925

Gly Lys Leu Thr Val Cys Gly Val Pro Val Asp Leu Ala Ser Ile Asp
930 935 940

Val Pro Thr Tyr Ile Tyr Gly Ser Arg Glu Asp His Ile Val Pro Trp
945 950 955 960

Thr Ala Ala Tyr Ala Ser Thr Ala Leu Leu Ala Asn Lys Leu Arg Phe

965

970

975

Val Leu Gly Ala Ser Gly His Ile Ala Gly Val Ile Asn Pro Pro Ala
 980 985 990

Lys Asn Lys Arg Ser His Trp Thr Asn Asp Ala Leu Pro Glu Ser Pro
 995 1000 1005

Gln Gln Trp Leu Ala Gly Ala Ile Glu His His Gly Ser Trp Trp
 1010 1015 1020

Pro Asp Trp Thr Ala Trp Leu Ala Gly Gln Ala Gly Ala Lys Arg
 1025 1030 1035

Ala Ala Pro Ala Asn Tyr Gly Asn Ala Arg Tyr Arg Ala Ile Glu
 1040 1045 1050

Pro Ala Pro Gly Arg Tyr Val Lys Ala Lys Ala
 1055 1060

<210> 19
 <211> 3228
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic construct - pET-14b-PhaC-linker-NA

<400> 19
 atggcgaccg gcaaaggcgc ggcagcttcc acgcaggaag gcaagtccca accattcaag 60
 gtcacgccgg ggccattcga tccagccaca tggctggaat ggtcccgcga gtggcagggc 120
 actgaaggca acggccacgc ggccgcgtcc ggcattccgg gcctggatgc gctggcagggc 180
 gtcaagatcg cgccggcgca gctgggtgat atccagcagc gctacatgaa ggactttctca 240
 gcgctgtggc aggccatggc cgagggcaag gccgaggcca ccggtccgct gcacgaccgg 300
 cgcttcgccg gcgacgcatg gcgcaccaac ctcccatatc gcttcgctgc cgcgtttctac 360
 ctgctcaatg cgcgcgcctt gaccgagctg gccgatgccg tcgaggccga tgccaagacc 420
 cgccagcgca tccgcttcgc gatctcgcaa tgggtcgatg cgatgtcgcc cgccaacttc 480
 cttgccacca atcccagggc gcagcgcctg ctgatcgagt cgggcggcga atcgctgcgt 540
 gccggcgtgc gcaacatgat ggaagacctg acacgcggca agatctcgca gaccgacgag 600
 agcgcgtttg aggtcggccg caatgtcgcg gtgaccgaag gcgccgtggg cttcgagaac 660
 gagtacttcc agctgttgca gtacaagccg ctgaccgaca aggtgcacgc gcgcccgtg 720
 ctgatgggtg cgccgtgcat caacaagtac tacatcctgg acctgcagcc ggagagctcg 780
 ctggtgcgcc atgtgggtgga gcagggacat acggtgtttc tgggtgtcgtg gcgcaatccg 840
 gacgccagca tggccggcag cacctgggac gactacatcg agcacgcggc catccgcgcc 900
 atcgaagtcg cgcgcgacat cagcggccag gacaagatca acgtgctcgg cttctgcgtg 960
 ggcggcacca ttgtctcgac cgcgctggcg gtgctggccg cgcgcggcga gcacccggcc 1020

| | | | | | | |
|------------|------------|-------------|------------|-------------|-------------|------|
| gccagcgtca | cgctgctgac | cacgctgctg | gactttgccg | acacgggcat | cctcgacgtc | 1080 |
| tttgtcgacg | agggccatgt | gcagttgcgc | gaggccacgc | tgggcggcgg | cgccggcgcg | 1140 |
| ccgtgcgcgc | tgctgcgcgg | ccttgagctg | gccaatacct | tctcgttctt | gcgcccgaac | 1200 |
| gacctggtgt | ggaactacgt | ggtcgacaac | tacctgaagg | gcaacacgcc | ggtgccgttc | 1260 |
| gacctgctgt | tctggaacgg | cgacgccacc | aacctgccgg | ggccgtggta | ctgctggtac | 1320 |
| ctgcgccaca | cctacctgca | gaacgagctc | aaggtaccgg | gcaagctgac | cgtgtgcggc | 1380 |
| gtgccggtgg | acctggccag | catcgacgtg | ccgacctata | tctacggctc | gcgcgaagac | 1440 |
| catatcgtgc | cgtggaccgc | ggcctatgcc | tcgaccgcgc | tgctggcgaa | caagctgcgc | 1500 |
| ttcgtgctgg | gtgcgtcggg | ccatatcgcc | ggtgtgatca | acccgccggc | caagaacaag | 1560 |
| cgcagccact | ggactaacga | tgcgctgccg | gagtcgccgc | agcaatggct | ggccggcgcc | 1620 |
| atcgagcatc | acggcagctg | gtggccggac | tggaccgcac | ggctggccgg | gcaggccggc | 1680 |
| gcgaaacgcg | ccgcgcccgc | caactatggc | aatgcgcgct | atcgcgcaat | cgaaccgcgc | 1740 |
| cctgggcgat | acgtcaaagc | caaggcacat | atggtgctgg | cgggtggcgat | tgataaacgc | 1800 |
| ggaggcggtg | gaggcctcga | gaatccaaat | caaaagataa | taacgattgg | ctctgtttct | 1860 |
| ctcaccattt | ccacaatatg | cttcttcatg | caaattgcc | tcttgataac | tactgtaaca | 1920 |
| ttgcatttca | agcaatatga | attcaactcc | ccccaaaca | accaagtgat | gctgtgtgaa | 1980 |
| ccaacaataa | tagaaagaaa | cataacagag | atagtgtatc | tgaccaacac | caccatagag | 2040 |
| aaggaaatat | gccccaaact | agcagaatac | agaaattggt | caaagccgca | atgtgacatt | 2100 |
| acaggatttg | cacctttttc | taaggacaat | tcgattaggc | tttccgctgg | tggggacatc | 2160 |
| tgggtgacaa | gagaacctta | tgtgtcatgc | gatcctgaca | agtgttatca | atttgccctt | 2220 |
| ggacagggaa | caacactaaa | caacgtgcat | tcaaatgaca | cagtacgtga | taggaccctt | 2280 |
| tatcggaccc | tattgatgaa | tgagttaggt | gttccttttc | atctggggac | caagcaagtg | 2340 |
| tgcatagcat | ggtccagctc | aagttgtcac | gatggaaaag | catggctgca | tgtttgtata | 2400 |
| acgggggatg | ataaaaatgc | aactgctagc | ttcatttaca | atgggaggct | tgtagatagt | 2460 |
| attgtttcat | ggtccaaaga | aatcctcagg | accaggagt | cagaatgcgt | ttgtatcaat | 2520 |
| ggaacttgta | cagtagtaat | gactgatggg | agtgtttcag | gaaaagctga | tactaaaata | 2580 |
| ctattcattg | aggaggggaa | aatcgttcat | actagcacat | tgtcaggaag | tgctcagcat | 2640 |
| gtcgaggagt | gctcctgcta | tcctcgatat | cctggtgtca | gatgtgtctg | cagagacaac | 2700 |
| tggaaaggct | ccaataggcc | catcgtagat | ataaacataa | aggatcatag | cactgtttcc | 2760 |
| agttatgtgt | gttcaggact | tgttggagac | acaccagaa | aaaacgacag | ctccagcagt | 2820 |
| agccattgtt | tggatcctaa | caatgaagaa | ggtggtcatg | gagtgaaggg | ctgggccttt | 2880 |
| gatgatggaa | atgacgtgtg | gatgggaaga | acgatcagcg | agaagtcgcg | cttaggggtat | 2940 |
| gaaaccttca | aagtcattga | aggctggtcc | aaccctaagt | ccaaattgca | gataaatagg | 3000 |
| caagtcatag | ttgacagagg | taatagggtcc | ggttattctg | gtattttctc | tgttgaaggc | 3060 |

aaaagctgca tcaatcggtg cttttatgtg gagttgataa ggggaagaaa agaggaaact 3120
gaagtcttgt ggacctcaaa cagtattgtt gtgttttgtg gcacctcagg tacatatgga 3180
acaggctcat ggcctgatgg ggcggacatc aatctcatgc ctatataa 3228

<210> 20
<211> 1075
<212> PRT
<213> Artificial

<220>
<223> PhaC-linker-NA fusion polypeptide encoded by
pET-14b-PhaC-linker-NA

<400> 20

Met Ala Thr Gly Lys Gly Ala Ala Ala Ser Thr Gln Glu Gly Lys Ser
1 5 10 15

Gln Pro Phe Lys Val Thr Pro Gly Pro Phe Asp Pro Ala Thr Trp Leu
20 25 30

Glu Trp Ser Arg Gln Trp Gln Gly Thr Glu Gly Asn Gly His Ala Ala
35 40 45

Ala Ser Gly Ile Pro Gly Leu Asp Ala Leu Ala Gly Val Lys Ile Ala
50 55 60

Pro Ala Gln Leu Gly Asp Ile Gln Gln Arg Tyr Met Lys Asp Phe Ser
65 70 75 80

Ala Leu Trp Gln Ala Met Ala Glu Gly Lys Ala Glu Ala Thr Gly Pro
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Leu His Asp Arg Arg Phe Ala Gly Asp Ala Trp Arg Thr Asn Leu Pro
100 105 110

Tyr Arg Phe Ala Ala Ala Phe Tyr Leu Leu Asn Ala Arg Ala Leu Thr
115 120 125

Glu Leu Ala Asp Ala Val Glu Ala Asp Ala Lys Thr Arg Gln Arg Ile
130 135 140

Arg Phe Ala Ile Ser Gln Trp Val Asp Ala Met Ser Pro Ala Asn Phe
145 150 155 160

Leu Ala Thr Asn Pro Glu Ala Gln Arg Leu Leu Ile Glu Ser Gly Gly
165 170 175

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

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

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

His Ile Val Pro Trp Thr Ala Ala Tyr Ala Ser Thr Ala Leu Leu Ala
485 490 495

Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala Gly Val
500 505 510

Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser His Trp Thr Asn Asp Ala
515 520 525

Leu Pro Glu Ser Pro Gln Gln Trp Leu Ala Gly Ala Ile Glu His His
530 535 540

Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu Ala Gly Gln Ala Gly
545 550 555 560

Ala Lys Arg Ala Ala Pro Ala Asn Tyr Gly Asn Ala Arg Tyr Arg Ala
565 570 575

Ile Glu Pro Ala Pro Gly Arg Tyr Val Lys Ala Lys Ala His Met Val
580 585 590

Leu Ala Val Ala Ile Asp Lys Arg Gly Gly Gly Gly Gly Leu Glu Asn
595 600 605

Pro Asn Gln Lys Ile Ile Thr Ile Gly Ser Val Ser Leu Thr Ile Ser
610 615 620

Thr Ile Cys Phe Phe Met Gln Ile Ala Ile Leu Ile Thr Thr Val Thr
625 630 635 640

Leu His Phe Lys Gln Tyr Glu Phe Asn Ser Pro Pro Asn Asn Gln Val
645 650 655

Met Leu Cys Glu Pro Thr Ile Ile Glu Arg Asn Ile Thr Glu Ile Val
660 665 670

Tyr Leu Thr Asn Thr Thr Ile Glu Lys Glu Ile Cys Pro Lys Leu Ala
675 680 685

Glu Tyr Arg Asn Trp Ser Lys Pro Gln Cys Asp Ile Thr Gly Phe Ala
690 695 700

Pro Phe Ser Lys Asp Asn Ser Ile Arg Leu Ser Ala Gly Gly Asp Ile
705 710 715 720

Trp Val Thr Arg Glu Pro Tyr Val Ser Cys Asp Pro Asp Lys Cys Tyr
725 730 735

Gln Phe Ala Leu Gly Gln Gly Thr Thr Leu Asn Asn Val His Ser Asn
740 745 750

Asp Thr Val Arg Asp Arg Thr Pro Tyr Arg Thr Leu Leu Met Asn Glu
Page 41

| 755 | | | | | 760 | | | | | 765 | | | | | |
|-----|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|
| Leu | Gly | Val | Pro | Phe | His | Leu | Gly | Thr | Lys | Gln | Val | Cys | Ile | Ala | Trp |
| 770 | | | | | | 775 | | | | | 780 | | | | |
| Ser | Ser | Ser | Ser | Cys | His | Asp | Gly | Lys | Ala | Trp | Leu | His | Val | Cys | Ile |
| 785 | | | | | 790 | | | | | 795 | | | | | 800 |
| Thr | Gly | Asp | Asp | Lys | Asn | Ala | Thr | Ala | Ser | Phe | Ile | Tyr | Asn | Gly | Arg |
| | | | | 805 | | | | | 810 | | | | | 815 | |
| Leu | Val | Asp | Ser | Ile | Val | Ser | Trp | Ser | Lys | Glu | Ile | Leu | Arg | Thr | Gln |
| | | | 820 | | | | | 825 | | | | | 830 | | |
| Glu | Ser | Glu | Cys | Val | Cys | Ile | Asn | Gly | Thr | Cys | Thr | Val | Val | Met | Thr |
| | | 835 | | | | | 840 | | | | | 845 | | | |
| Asp | Gly | Ser | Ala | Ser | Gly | Lys | Ala | Asp | Thr | Lys | Ile | Leu | Phe | Ile | Glu |
| | 850 | | | | | | 855 | | | | | 860 | | | |
| Glu | Gly | Lys | Ile | Val | His | Thr | Ser | Thr | Leu | Ser | Gly | Ser | Ala | Gln | His |
| 865 | | | | | 870 | | | | | 875 | | | | | 880 |
| Val | Glu | Glu | Cys | Ser | Cys | Tyr | Pro | Arg | Tyr | Pro | Gly | Val | Arg | Cys | Val |
| | | | | 885 | | | | | 890 | | | | | 895 | |
| Cys | Arg | Asp | Asn | Trp | Lys | Gly | Ser | Asn | Arg | Pro | Ile | Val | Asp | Ile | Asn |
| | | | 900 | | | | | 905 | | | | | 910 | | |
| Ile | Lys | Asp | His | Ser | Thr | Val | Ser | Ser | Tyr | Val | Cys | Ser | Gly | Leu | Val |
| | | 915 | | | | | 920 | | | | | 925 | | | |
| Gly | Asp | Thr | Pro | Arg | Lys | Asn | Asp | Ser | Ser | Ser | Ser | Ser | His | Cys | Leu |
| | 930 | | | | | | 935 | | | | | 940 | | | |
| Asp | Pro | Asn | Asn | Glu | Glu | Gly | Gly | His | Gly | Val | Lys | Gly | Trp | Ala | Phe |
| 945 | | | | | 950 | | | | | 955 | | | | | 960 |
| Asp | Asp | Gly | Asn | Asp | Val | Trp | Met | Gly | Arg | Thr | Ile | Ser | Glu | Lys | Ser |
| | | | | 965 | | | | | 970 | | | | | 975 | |
| Arg | Leu | Gly | Tyr | Glu | Thr | Phe | Lys | Val | Ile | Glu | Gly | Trp | Ser | Asn | Pro |
| | | | 980 | | | | | 985 | | | | | 990 | | |
| Lys | Ser | Lys | Leu | Gln | Ile | Asn | Arg | Gln | Val | Ile | Val | Asp | Arg | Gly | Asn |
| | | 995 | | | | | 1000 | | | | | 1005 | | | |
| Arg | Ser | Gly | Tyr | Ser | Gly | Ile | Phe | Ser | Val | Glu | Gly | Lys | Ser | Cys | |
| | 1010 | | | | | | 1015 | | | | | 1020 | | | |
| Ile | Asn | Arg | Cys | Phe | Tyr | Val | Glu | Leu | Ile | Arg | Gly | Arg | Lys | Glu | |
| | 1025 | | | | | | 1030 | | | | | 1035 | | | |

Glu Thr Glu Val Leu Trp Thr Ser Asn Ser Ile Val Val Phe Cys
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Gly Thr Ser Gly Thr Tyr Gly Thr Gly Ser Trp Pro Asp Gly Ala
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Asp Ile Asn Leu Met Pro Ile
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 <213> Artificial

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Ala Gly Lys Asn Thr Asp Leu Glu Ala Leu Met Glu Trp Leu Lys Thr
 35 40 45

Arg Pro Ile Leu Ser Pro Leu Thr Lys Gly Ile Leu Gly Phe Val Phe
 50 55 60

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

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

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 Leu Pro₃₇₀ Tyr Arg Phe Ala Ala₃₇₅ Ala Phe Tyr Leu Leu₃₈₀ Asn Ala Arg Ala
 Leu₃₈₅ Thr Glu Leu Ala Asp₃₉₀ Ala Val Glu Ala Asp₃₉₅ Ala Lys Thr Arg Gln₄₀₀
 Arg Ile Arg Phe Ala₄₀₅ Ile Ser Gln Trp Val₄₁₀ Asp Ala Met Ser Pro₄₁₅ Ala
 Asn Phe Leu Ala₄₂₀ Thr Asn Pro Glu Ala₄₂₅ Gln Arg Leu Leu Ile₄₃₀ Glu Ser
 Gly Gly Glu₄₃₅ Ser Leu Arg Ala Gly₄₄₀ Val Arg Asn Met Met₄₄₅ Glu Asp Leu
 Thr Arg₄₅₀ Gly Lys Ile Ser Gln₄₅₅ Thr Asp Glu Ser Ala₄₆₀ Phe Glu Val Gly
 Arg₄₆₅ Asn Val Ala Val Thr₄₇₀ Glu Gly Ala Val Val₄₇₅ Phe Glu Asn Glu Tyr₄₈₀
 Phe Gln Leu Leu Gln₄₈₅ Tyr Lys Pro Leu Thr₄₉₀ Asp Lys Val His Ala₄₉₅ Arg
 Pro Leu Leu Met₅₀₀ Val Pro Pro Cys Ile₅₀₅ Asn Lys Tyr Tyr Ile₅₁₀ Leu Asp
 Leu Gln Pro₅₁₅ Glu Ser Ser Leu Val₅₂₀ Arg His Val Val₅₂₅ Glu Gln Gly His
 Thr Val₅₃₀ Phe Leu Val Ser Trp₅₃₅ Arg Asn Pro Asp Ala₅₄₀ Ser Met Ala Gly
 Ser₅₄₅ Thr Trp Asp Asp Tyr₅₅₀ Ile Glu His Ala Ala₅₅₅ Ile Arg Ala Ile Glu₅₆₀
 Val Ala Arg Asp Ile₅₆₅ Ser Gly Gln Asp Lys₅₇₀ Ile Asn Val Leu Gly₅₇₅ Phe
 Cys Val Gly Gly₅₈₀ Thr Ile Val Ser Thr₅₈₅ Ala Leu Ala Val Leu₅₉₀ Ala Ala
 Arg Gly Glu₅₉₅ His Pro Ala Ala Ser₆₀₀ Val Thr Leu Leu Thr₆₀₅ Thr Leu Leu
 Asp Phe₆₁₀ Ala Asp Thr Gly Ile₆₁₅ Leu Asp Val Phe Val₆₂₀ Asp Glu Gly His

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

Ala Leu Leu Arg Gly Leu Glu Leu Ala Asn Thr Phe Ser Phe Leu Arg
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Pro Asn Asp Leu Val Trp Asn Tyr Val Val Asp Asn Tyr Leu Lys Gly
660 665 670

Asn Thr Pro Val Pro Phe Asp Leu Leu Phe Trp Asn Gly Asp Ala Thr
675 680 685

Asn Leu Pro Gly Pro Trp Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu
690 695 700

Gln Asn Glu Leu Lys Val Pro Gly Lys Leu Thr Val Cys Gly Val Pro
705 710 715 720

Val Asp Leu Ala Ser Ile Asp Val Pro Thr Tyr Ile Tyr Gly Ser Arg
725 730 735

Glu Asp His Ile Val Pro Trp Thr Ala Ala Tyr Ala Ser Thr Ala Leu
740 745 750

Leu Ala Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala
755 760 765

Gly Val Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser His Trp Thr Asn
770 775 780

Asp Ala Leu Pro Glu Ser Pro Gln Gln Trp Leu Ala Gly Ala Ile Glu
785 790 795 800

His His Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu Ala Gly Gln
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| | |
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| gcgctgtggc aggccatggc cgagggcaag gccgaggcca ccggtccgct gcacgaccgg | 300 |
| cgcttcgccg gcgacgcatg gcgcaccaac ctcccatatc gcttcgctgc cgcgttctac | 360 |
| ctgctcaatg cgcgcgctt gaccgagctg gccgatgccg tcgaggccga tgccaagacc | 420 |
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| gccggcgtgc gcaacatgat ggaagacctg acacgcggca agatctcgca gaccgacgag | 600 |
| agcgcgtttg aggtcggccg caatgtcgcg gtgaccgaag gcgccgtggt cttcgagaac | 660 |
| gagtacttcc agctgttgca gtacaagccg ctgaccgaca aggtgcacgc gcgcccgtg | 720 |
| ctgatggtgc cgccgtgcat caacaagtac tacatcctgg acctgcagcc ggagagctcg | 780 |
| ctggtgcgcc atgtggtgga gcagggacat acggtgtttc tgggtgtcgtg gcgcaatccg | 840 |
| gacgccagca tggccggcag cacctgggac gactacatcg agcacgcggc catccgcgcc | 900 |
| atcgaagtcg cgcgcgacat cagcggccag gacaagatca acgtgctcgg cttctgcgtg | 960 |
| ggcggcacca ttgtctcgac cgcgctggcg gtgctggccg cgcgcggcga gcacccggcc | 1020 |
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| catatcgtgc cgtggaccgc ggcctatgcc tcgaccgcgc tgctggcgaa caagctgcgc | 1500 |
| ttcgtgctgg gtgcgtcggg ccatatcgcc ggtgtgatca acccgccggc caagaacaag | 1560 |
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| aaaaacacag atcttgaggc tctcatggaa tggctaaaga caagaccaat tctgtcacct | 1980 |
| ctgactaagg ggattttggg gtttgtgttc acgctcaccg tgcccagtga gcgaggactg | 2040 |
| cagcgtagac gctttgtcca aaatgccctc aatgggaatg gagatccaaa taacatggac | 2100 |
| aaagcagtta aactgtatag gaaacttaag agggagataa cgttccatgg ggccaaagaa | 2160 |
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35 40 45

Ala Ser Gly Ile Pro Gly Leu Asp Ala Leu Ala Gly Val Lys Ile Ala
50 55 60

Pro Ala Gln Leu Gly Asp Ile Gln Gln Arg Tyr Met Lys Asp Phe Ser
65 70 75 80

Ala Leu Trp Gln Ala Met Ala Glu Gly Lys Ala Glu Ala Thr Gly Pro
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Leu His Asp Arg Arg Phe Ala Gly Asp Ala Trp Arg Thr Asn Leu Pro
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Tyr Arg Phe Ala Ala Ala Phe Tyr Leu Leu Asn Ala Arg Ala Leu Thr
115 120 125

Glu Leu Ala Asp Ala Val Glu Ala Asp Ala Lys Thr Arg Gln Arg Ile
130 135 140

Arg Phe Ala Ile Ser Gln Trp Val Asp Ala Met Ser Pro Ala Asn Phe
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Leu Ala Thr Asn Pro Glu Ala Gln Arg Leu Leu Ile Glu Ser Gly Gly
165 170 175

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

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

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210 215 220

Leu Leu Gln Tyr Lys Pro Leu Thr Asp Lys Val His Ala Arg Pro Leu
225 230 235 240

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245 250 255

Pro Glu Ser Ser Leu Val Arg His Val Val Glu Gln Gly His Thr Val
260 265 270

Phe Leu Val Ser Trp Arg Asn Pro Asp Ala Ser Met Ala Gly Ser Thr
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Trp Asp Asp Tyr Ile Glu His Ala Ala Ile Arg Ala Ile Glu Val Ala
290 295 300

Arg Asp Ile Ser Gly Gln Asp Lys Ile Asn Val Leu Gly Phe Cys Val
305 310 315 320

Gly Gly Thr Ile Val Ser Thr Ala Leu Ala Val Leu Ala Ala Arg Gly
325 330 335

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

Leu Arg Glu Ala Thr Leu Gly Gly Gly Ala Gly Ala Pro Cys Ala Leu
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Leu Arg Gly Leu Glu Leu Ala Asn Thr Phe Ser Phe Leu Arg Pro Asn
385 390 395 400

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

Pro Gly Pro Trp Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn
435 440 445

Glu Leu Lys Val Pro Gly Lys Leu Thr Val Cys Gly Val Pro Val Asp
Page 50

| 450 | 455 | 460 |
|---------|---|---|
| Leu 465 | Ala Ser Ile Asp Val 470 | Pro Thr Tyr Ile Tyr 475 Gly Ser Arg Glu Asp 480 |
| His | Ile Val Pro Trp 485 Thr Ala Ala Tyr Ala 490 Ser Thr Ala Leu 495 Ala | |
| Asn | Lys Leu Arg 500 Phe Val Leu Gly Ala 505 Ser Gly His Ile Ala 510 Gly Val | |
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| Leu | Pro 530 Glu Ser Pro Gln Gln 535 Trp Leu Ala Gly Ala 540 Ile Glu His His | |
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| Leu | Ala Val 595 Ala Ile Asp Lys Arg 600 Gly Gly Gly Gly Gly 605 Leu Glu Ser | |
| Leu | Leu 610 Thr Glu Val Glu Thr 615 Tyr Val Leu Ser Ile 620 Val Pro Ser Gly | |
| Pro 625 | Leu Lys Ala Glu Ile 630 Ala Gln Arg Leu Glu 635 Asp Val Phe Ala Gly 640 | |
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| Ile | Leu Ser Pro 660 Leu Thr Lys Gly Ile 665 Leu Gly Phe Val Phe 670 Thr Leu | |
| Thr | Val Pro 675 Ser Glu Arg Gly Leu 680 Gln Arg Arg Arg Phe 685 Val Gln Asn | |
| Ala | Leu 690 Asn Gly Asn Gly Asp 695 Pro Asn Asn Met Asp 700 Lys Ala Val Lys | |
| Leu 705 | Tyr Arg Lys Leu Lys 710 Arg Glu Ile Thr Phe 715 His Gly Ala Lys Glu 720 | |
| Ile | Ala Leu Ser Tyr 725 Ser Ala Gly Ala Leu 730 Ala Ser Cys Met Gly 735 Leu | |

Ile Tyr Asn Arg Met Gly Ala Val Thr Thr Glu Val Ala Phe Gly Leu
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Val Cys Ala Thr Cys Glu Gln Ile Ala Asp Ser Gln His Arg Ser His
755 760 765

Arg Gln Met Val Ala Thr Thr Asn Pro Leu Ile Lys His Glu Asn Arg
770 775 780

Met Val Leu Ala Ser Thr Thr Ala Lys Ala Met Glu Gln Met Ala Gly
785 790 795 800

Ser Ser Glu Gln Ala Ala Glu Ala Met Glu Ile Ala Ser Gln Ala Arg
805 810 815

Gln Met Val Gln Ala Met Arg Ala Ile Gly Thr His Pro Ser Ser Ser
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Thr Gly Leu Arg Asp Asp Leu Leu Glu Asn Leu Gln Thr Tyr Gln Lys
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| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
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| Ile | Ser | Thr | Ile | Cys | Phe | Phe | Met | Gln | Ile | Ala | Ile | Leu | Ile | Thr | Thr |
| | | | 20 | | | | | 25 | | | | | 30 | | |

| | | | | | | | | | | | | | | | |
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| Val | Thr | Leu | His | Phe | Lys | Gln | Tyr | Glu | Phe | Asn | Ser | Pro | Pro | Asn | Asn |
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Leu Ala Glu Tyr Arg₈₅ Asn Trp Ser Lys₉₀ Pro Gln Cys Asp Ile₉₅ Thr Gly
 Phe Ala Pro Phe₁₀₀ Ser Lys Asp Asn₁₀₅ Ser Ile Arg Leu Ser Ala₁₁₀ Gly Gly
 Asp Ile Trp₁₁₅ Val Thr Arg Glu₁₂₀ Tyr Val Ser Cys Asp₁₂₅ Pro Asp Lys
 Cys Tyr₁₃₀ Gln Phe Ala Leu Gly₁₃₅ Gln Gly Thr Thr Leu₁₄₀ Asn Asn Val His
 Ser₁₄₅ Asn Asp Thr Val Arg₁₅₀ Asp Arg Thr Pro Tyr₁₅₅ Arg Thr Leu Leu Met₁₆₀
 Asn Glu Leu Gly Val₁₆₅ Pro Phe His Leu Gly₁₇₀ Thr Lys Gln Val Cys₁₇₅ Ile
 Ala Trp Ser Ser₁₈₀ Ser Ser Cys His Asp₁₈₅ Gly Lys Ala Trp Leu₁₉₀ His Val
 Cys Ile Thr₁₉₅ Gly Asp Asp Lys Asn₂₀₀ Ala Thr Ala Ser Phe₂₀₅ Ile Tyr Asn
 Gly Arg₂₁₀ Leu Val Asp Ser Ile₂₁₅ Val Ser Trp Ser Lys₂₂₀ Glu Ile Leu Arg
 Thr₂₂₅ Gln Glu Ser Glu Cys₂₃₀ Val Cys Ile Asn Gly₂₃₅ Thr Cys Thr Val Val₂₄₀
 Met Thr Asp Gly Ser₂₄₅ Ala Ser Gly Lys Ala₂₅₀ Asp Thr Lys Ile Leu₂₅₅ Phe
 Ile Glu Glu Gly₂₆₀ Lys Ile Val His Thr₂₆₅ Ser Thr Leu Ser Gly₂₇₀ Ser Ala
 Gln His Val₂₇₅ Glu Glu Cys Ser Cys₂₈₀ Tyr Pro Arg Tyr Pro₂₈₅ Gly Val Arg
 Cys Val₂₉₀ Cys Arg Asp Asn Trp₂₉₅ Lys Gly Ser Asn Arg₃₀₀ Pro Ile Val Asp
 Ile₃₀₅ Asn Ile Lys Asp His₃₁₀ Ser Thr Val Ser Ser₃₁₅ Tyr Val Cys Ser Gly₃₂₀
 Leu Val Gly Asp Thr₃₂₅ Pro Arg Lys Asn Asp₃₃₀ Ser Ser Ser Ser Ser₃₃₅ His
 Cys Leu Asp Pro₃₄₀ Asn Asn Glu Glu Gly₃₄₅ Gly His Gly Val Lys₃₅₀ Gly Trp

Ala Phe Asp₃₅₅ Asp Gly Asn Asp Val₃₆₀ Trp Met Gly Arg Thr₃₆₅ Ile Ser Glu
 Lys Ser₃₇₀ Arg Leu Gly Tyr Glu₃₇₅ Thr Phe Lys Val Ile₃₈₀ Glu Gly Trp Ser
 Asn₃₈₅ Pro Lys Ser Lys Leu₃₉₀ Gln Ile Asn Arg Gln₃₉₅ Val Ile Val Asp Arg₄₀₀
 Gly Asn Arg Ser Gly₄₀₅ Tyr Ser Gly Ile Phe₄₁₀ Ser Val Glu Gly Lys₄₁₅ Ser
 Cys Ile Asn Arg₄₂₀ Cys Phe Tyr Val Glu₄₂₅ Leu Ile Arg Gly Arg₄₃₀ Lys Glu
 Glu Thr Glu₄₃₅ Val Leu Trp Thr Ser₄₄₀ Asn Ser Ile Val Val₄₄₅ Phe Cys Gly
 Thr Ser₄₅₀ Gly Thr Tyr Gly Thr₄₅₅ Gly Ser Trp Pro Asp₄₆₀ Gly Ala Asp Ile
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 Gln Trp Gln₅₁₅ Gly Thr Glu Gly Asn₅₂₀ Gly His Ala Ala Ala₅₂₅ Ser Gly Ile
 Pro Gly₅₃₀ Leu Asp Ala Leu Ala₅₃₅ Gly Val Lys Ile Ala₅₄₀ Pro Ala Gln Leu
 Gly₅₄₅ Asp Ile Gln Gln Arg₅₅₀ Tyr Met Lys Asp Phe₅₅₅ Ser Ala Leu Trp Gln₅₆₀
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 Ala Ala Phe₅₉₅ Tyr Leu Leu Asn Ala₆₀₀ Arg Ala Leu Thr Glu₆₀₅ Leu Ala Asp
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 675 680 685
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 690 695 700
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| Phe | Val | Leu | Gly | Ala | Ser | Gly | His | Ile | Ala | Gly | Val | Ile | Asn | Pro | Pro |
| | | | 980 | | | | | 985 | | | | | 990 | | |
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| | | 995 | | | | | 1000 | | | | | 1005 | | | |
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| Trp | Pro | Asp | Trp | Thr | Ala | Trp | Leu | Ala | Gly | Gln | Ala | Gly | Ala | Lys | |
| | 1025 | | | | | 1030 | | | | | 1035 | | | | |
| Arg | Ala | Ala | Pro | Ala | Asn | Tyr | Gly | Asn | Ala | Arg | Tyr | Arg | Ala | Ile | |
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| Glu | Pro | Ala | Pro | Gly | Arg | Tyr | Val | Lys | Ala | Lys | Ala | His | Met | Val | |
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| Leu | Ala | Val | Ala | Ile | Asp | Lys | Arg | Gly | Gly | Gly | Gly | Gly | Leu | Glu | |
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His His Ala Val Pro Asn Gly Thr Ile Val Lys Thr Ile Thr Asn Asp
35 40 45

Gln Ile Glu Val Thr Asn Ala Thr Glu Leu Val Gln Ser Ser Ser Thr
50 55 60

Gly Glu Ile Cys Asp Ser Pro His Gln Ile Leu Asp Gly Glu Asn Cys
65 70 75 80

Thr Leu Ile Asp Ala Leu Leu Gly Asp Pro Gln Cys Asp Gly Phe Gln

85

90

95

Asn Lys Lys Trp₁₀₀ Asp Leu Phe Val Glu₁₀₅ Arg Ser Lys Ala Tyr₁₁₀ Ser Asn
 Cys Tyr Pro₁₁₅ Tyr Asp Val Pro Asp₁₂₀ Tyr Ala Ser Leu Arg₁₂₅ Ser Leu Val
 Ala Ser₁₃₀ Ser Gly Thr Leu Glu₁₃₅ Phe Asn Asn Glu₁₄₀ Ser Phe Asn Trp Thr
 Gly₁₄₅ Val Thr Gln Asn Gly₁₅₀ Thr Ser Ser Ala Cys₁₅₅ Ile Arg Arg Ser Asn₁₆₀
 Asn Ser Phe Phe Ser₁₆₅ Arg Leu Asn Trp Leu₁₇₀ Thr His Leu Lys Phe₁₇₅ Lys
 Tyr Pro Ala Leu₁₈₀ Asn Val Thr Met Pro₁₈₅ Asn Asn Glu Lys Phe₁₉₀ Asp Lys
 Leu Tyr Ile₁₉₅ Trp Gly Val His His₂₀₀ Pro Gly Thr Asp Asn₂₀₅ Asp Gln Ile
 Phe Pro₂₁₀ Tyr Ala Gln Ala Ser₂₁₅ Gly Arg Ile Thr Val₂₂₀ Ser Thr Lys Arg
 Ser₂₂₅ Gln Gln Thr Val Ile₂₃₀ Pro Asn Ile Gly Ser₂₃₅ Arg Pro Arg Val Arg₂₄₀
 Asn Ile Pro Ser Arg₂₄₅ Ile Ser Ile Tyr Trp₂₅₀ Thr Ile Val Lys Pro₂₅₅ Gly
 Asp Ile Leu Leu₂₆₀ Ile Asn Ser Thr Gly₂₆₅ Asn Leu Ile Ala Pro₂₇₀ Arg Gly
 Tyr Phe Lys₂₇₅ Ile Arg Ser Gly Lys₂₈₀ Ser Ser Ile Met Arg₂₈₅ Ser Asp Ala
 Pro Ile₂₉₀ Gly Lys Cys Asn Ser₂₉₅ Glu Cys Ile Thr Pro₃₀₀ Asn Gly Ser Ile
 Pro₃₀₅ Asn Asp Lys Pro Phe₃₁₀ Gln Asn Val Asn Arg₃₁₅ Ile Thr Tyr Gly Ala₃₂₀
 Cys Pro Arg Tyr Val₃₂₅ Lys Gln Asn Thr Leu₃₃₀ Lys Leu Ala Thr Gly₃₃₅ Met
 Arg Asn Val Pro₃₄₀ Glu Lys Gln Thr Arg₃₄₅ Gly Ile Phe Gly Ala₃₅₀ Ile Ala
 Gly Phe Ile₃₅₅ Glu Asn Gly Trp Glu₃₆₀ Gly Met Val Asp Gly₃₆₅ Trp Tyr Gly

Phe Arg His Gln Asn Ser Glu Gly Ile Gly Gln Ala Ala Asp Leu Lys
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Ser Thr Gln Ala Ala Ile Asp Gln Ile Asn Gly Lys Leu Asn Arg Leu
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Ile Gly Lys Thr Asn Glu Lys Phe His Gln Ile Glu Lys Glu Phe Ser
 405 410 415

Glu Val Glu Gly Arg Ile Gln Asp Leu Glu Lys Tyr Val Glu Asp Thr
 420 425 430

Lys Ile Asp Leu Trp Ser Tyr Asn Ala Glu Leu Leu Val Ala Leu Glu
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Asn Gln His Thr Ile Asp Leu Thr Asp Ser Glu Met Asn Lys Leu Phe
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Glu Lys Thr Lys Lys Gln Leu Arg Glu Asn Ala Glu Asp Met Gly Asn
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Gly Cys Phe Lys Ile Tyr His Lys Cys Asp Asn Ala Cys Ile Gly Ser
 485 490 495

Ile Arg Asn Gly Thr Tyr Asp His Asp Val Tyr Arg Asp Glu Ala Leu
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Asn Asn Arg Phe Gln Ile Lys Gly Val Glu Leu Lys Ser Gly Tyr Lys
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Asp Trp Ile Leu Trp Ile Ser Phe Ala Ile Ser Cys Phe Leu Leu Cys
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Val Ala Leu Leu Gly Phe Ile Met Trp Ala Cys Gln Lys Gly Asn Ile
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Arg Cys Asn Ile Cys Ile Arg Thr Gly Gly Gly Gly Gly Ala Thr Gly
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Lys Gly Ala Ala Ala Ser Thr Gln Glu Gly Lys Ser Gln Pro Phe Lys
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Val Thr Pro Gly Pro Phe Asp Pro Ala Thr Trp Leu Glu Trp Ser Arg
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Gln Trp Gln Gly Thr Glu Gly Asn Gly His Ala Ala Ala Ser Gly Ile
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Pro Gly Leu Asp Ala Leu Ala Gly Val Lys Ile Ala Pro Ala Gln Leu
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 Ala Met Ala Glu Gly Lys Ala Glu Ala Thr Gly Pro Leu His Asp Arg
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 Pro Glu Ala Gln Arg Leu Leu Ile Glu Ser Gly Gly Glu Ser Leu Arg
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 850 855 860
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| | | | | | | |
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| caacgcatat agcgctagca gcacgccata gtgactggcg atgctgtcgg aatggacgat | 8400 |
| atcccgcaag agggccggca gtaccggcat aaccaagcct atgcctacag catccagggt | 8460 |
| gacggtgccg aggatgacga tgagcgcatt gttagatttc atacacggtg cctgactgcg | 8520 |
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| Met | Lys | Leu | Asn | Lys | Ile | Thr | Leu | Gly | Ile | Leu | Ser | Leu | Ser | Ile | Ala |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Thr | Thr | Phe | Ala | Thr | Asp | Val | Asn | Asn | Ser | Lys | Pro | Asn | Asp | Tyr |
| | | | 20 | | | | | 25 | | | | | 30 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Thr | Leu | Val | Lys | Ile | Lys | Gln | Lys | Leu | Phe | Asn | Asn | Ala | Asn | Thr |
| | | 35 | | | | | 40 | | | | | 45 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Lys | Thr | Thr | Thr | Pro | Ile | Lys | His | Val | Val | Ile | Ile | Phe | Gln | Glu |
| | 50 | | | | | 55 | | | | | 60 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Asn | Ser | Phe | Asp | Arg | Tyr | Phe | Gly | Met | Tyr | Pro | Asn | Ala | Lys | Asn |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Glu | Gly | Glu | Pro | Lys | Phe | Val | Ala | Lys | Glu | Asn | Thr | Pro | Asn | Val |
| | | | | 85 | | | | | 90 | | | | | 95 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Gly | Leu | Thr | Lys | Gln | Leu | Leu | Glu | Asn | Asn | Pro | Asn | Thr | Lys | Asn |
| | | | 100 | | | | | 105 | | | | | 110 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Tyr | Arg | Leu | Asp | Arg | Asn | Phe | Gln | Pro | Cys | Ser | Gln | Asn | His | Glu |
| | | 115 | | | | | 120 | | | | | 125 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Tyr | His | Gln | Glu | Ile | Ser | Ser | Phe | Asn | Gly | Gly | Leu | Met | Asn | Lys | Phe |
| | 130 | | | | | 135 | | | | | 140 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Glu | His | Gly | Gly | His | Asp | Asn | Asp | Thr | Tyr | Lys | Gln | Asn | Cys | Asp |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

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

Gly Pro Arg Leu Pro Met Leu Val Ile Ser Pro Tyr Thr Lys Ala Asn
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 Tyr Ile Asp His Ser Leu Leu Asn Gln Ala Ser Val Leu Lys Phe Ile
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 Glu Tyr Asn Trp Gly Ile Gly Ser Val Ser Lys Tyr Ser Asn Asp Lys
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 Tyr Ser Asn Asn Ile Leu Asn Met Phe Asp Phe Asn Lys Lys Gln Lys
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 Thr Pro Lys Leu Ile Leu Asp Pro Lys Thr Gly Leu Val Val Asp Lys
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 Ser Gln Pro Phe Lys Val Thr Pro Gly Pro Phe Asp Pro Ala Thr Trp
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 Ala Ala Ser Gly Ile Pro Gly Leu Asp Ala Leu Ala Gly Val Lys Ile
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 Ser Ala Leu Trp Gln Ala Met Ala Glu Gly Lys Ala Glu Ala Thr Gly
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 Pro Leu His Asp Arg Arg Phe Ala Gly Asp Ala Trp Arg Thr Asn Leu
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 Pro Tyr Arg Phe Ala Ala Ala Phe Tyr Leu Leu Asn Ala Arg Ala Leu
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 Ile Arg Phe Ala Ile Ser Gln Trp Val Asp Ala Met Ser Pro Ala Asn
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 Phe Leu Ala Thr Asn Pro Glu Ala Gln Arg Leu Leu Ile Glu Ser Gly
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 Gly Glu Ser Leu Arg Ala Gly Val Arg Asn Met Met Glu Asp Leu Thr
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Arg Gly Lys Ile Ser Gln Thr Asp Glu Ser Ala Phe Glu Val Gly Arg
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 Asn Val Ala Val Thr Glu Gly Ala Val Val Phe Glu Asn Glu Tyr Phe
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 Leu Leu Met Val Pro Pro Cys Ile Asn Lys Tyr Tyr Ile Leu Asp Leu
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 Gln Pro Glu Ser Ser Leu Val Arg His Val Val Glu Gln Gly His Thr
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 Val Phe Leu Val Ser Trp Arg Asn Pro Asp Ala Ser Met Ala Gly Ser
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 Thr Trp Asp Asp Tyr Ile Glu His Ala Ala Ile Arg Ala Ile Glu Val
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 Ala Arg Asp Ile Ser Gly Gln Asp Lys Ile Asn Val Leu Gly Phe Cys
 820 825 830
 Val Gly Gly Thr Ile Val Ser Thr Ala Leu Ala Val Leu Ala Ala Arg
 835 840 845
 Gly Glu His Pro Ala Ala Ser Val Thr Leu Leu Thr Thr Leu Leu Asp
 850 855 860
 Phe Ala Asp Thr Gly Ile Leu Asp Val Phe Val Asp Glu Gly His Val
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 Gln Leu Arg Glu Ala Thr Leu Gly Gly Gly Ala Gly Ala Pro Cys Ala
 885 890 895
 Leu Leu Arg Gly Leu Glu Leu Ala Asn Thr Phe Ser Phe Leu Arg Pro
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 Asn Asp Leu Val Trp Asn Tyr Val Val Asp Asn Tyr Leu Lys Gly Asn
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 Thr Pro Val Pro Phe Asp Leu Leu Phe Trp Asn Gly Asp Ala Thr Asn
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 945 950 955 960
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Asp Leu Ala Ser Ile Asp Val Pro Thr Tyr Ile Tyr Gly Ser Arg Glu
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Asp His Ile Val Pro Trp Thr Ala Ala Tyr Ala Ser Thr Ala Leu Leu
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Ala Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala
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Gly Val Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser His Trp Thr
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Ile Glu His His Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu
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Ala Gly Gln Ala Gly Ala Lys Arg Ala Ala Pro Ala Asn Tyr Gly
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Asn Ala Arg Tyr Arg Ala Ile Glu Pro Ala Pro Gly Arg Tyr Val
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Lys Ala Lys Ala His Met Val Leu Ala Val Ala Ile Asp Lys Arg
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Gly Gly Gly Gly Gly Leu Glu Met Ile Met Ser Glu Met Ile Thr
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Arg Gln Gln Val Thr Ser Gly Glu Thr Ile His Val Arg Thr Asp
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 1160 1165 1170

Ala Ile Glu Gly Gly Glu Asp Val Thr Lys Ala Asp Ser Ala Thr
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Asn Pro Thr Ile Ser Ile Thr Leu Gly Val Leu Ile Lys Ser Asn
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Val Arg Thr Lys Ile Glu Glu Lys Val Ser Ser Ile Leu Gln Ala
 1220 1225 1230

Ser Ala Thr Asp Met Lys Ile Lys Leu Gly Asn Ser Asn Lys Lys

| | | | | |
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| Ser Ile Glu Pro Thr Glu Leu | Met Gly Val Ser Lys | Asp Gly Met | | |
| 1280 | 1285 | 1290 | | |
| Ser Tyr His Ile Ile Ser Ile | Asp Gly Leu Thr Thr | Ser Gln Gly | | |
| 1295 | 1300 | 1305 | | |
| Ser Leu Pro Val Cys Cys Ala | Ala Ser Thr Asp Lys | Gly Val Ala | | |
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 Tyr Arg Phe Ala Ala Ala Phe Tyr Leu Leu Asn Ala Arg Ala Leu Thr
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 Arg Phe Ala Ile Ser Gln Trp Val Asp Ala Met Ser Pro Ala Asn Phe
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 Glu Ser Leu Arg Ala Gly Val Arg Asn Met Met Glu Asp Leu Thr Arg
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 Gly Lys Ile Ser Gln Thr Asp Glu Ser Ala Phe Glu Val Gly Arg Asn
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515

520

525

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<220>
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pET-14b-PorA-PhaC-PorB

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

Ile Ser Asp Phe Gly Ser Phe Ile Gly Phe Lys Gly Ser Glu Asp Leu
50 55 60

Gly Asp Gly Leu Lys Ala Val Trp Gln Leu Glu Gln Asp Val Ser Val

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

Asn Thr Gly Ile Gly Asn Tyr Thr Gln Ile Asn Ala Ala Ser Ile Gly
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Leu Arg His Lys Phe Ala Thr Gly Lys Gly Ala Ala Ala Ser Thr Gln
 370 375 380

Glu Gly Lys Ser Gln Pro Phe Lys Val Thr Pro Gly Pro Phe Asp Pro
 385 390 395 400

Ala Thr Trp Leu Glu Trp Ser Arg Gln Trp Gln Gly Thr Glu Gly Asn
 405 410 415

Gly His Ala Ala Ala Ser Gly Ile Pro Gly Leu Asp Ala Leu Ala Gly
 420 425 430

Val Lys Ile Ala Pro Ala Gln Leu Gly Asp Ile Gln Gln Arg Tyr Met
 435 440 445

Lys Asp Phe Ser Ala Leu Trp Gln Ala Met Ala Glu Gly Lys Ala Glu
 450 455 460

Ala Thr Gly Pro Leu His Asp Arg Arg Phe Ala Gly Asp Ala Trp Arg
 465 470 475 480

Thr Asn Leu Pro Tyr Arg Phe Ala Ala Ala Phe Tyr Leu Leu Asn Ala
 485 490 495

Arg Ala Leu Thr Glu Leu Ala Asp Ala Val Glu Ala Asp Ala Lys Thr
 500 505 510

Arg Gln Arg Ile Arg Phe Ala Ile Ser Gln Trp Val Asp Ala Met Ser
 515 520 525

Pro Ala Asn Phe Leu Ala Thr Asn Pro Glu Ala Gln Arg Leu Leu Ile
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Glu Ser Gly Gly Glu Ser Leu Arg Ala Gly Val Arg Asn Met Met Glu
 545 550 555 560

Asp Leu Thr Arg Gly Lys Ile Ser Gln Thr Asp Glu Ser Ala Phe Glu
 565 570 575

Val Gly Arg Asn Val Ala Val Thr Glu Gly Ala Val Val Phe Glu Asn
 580 585 590

Glu Tyr Phe Gln Leu Leu Gln Tyr Lys Pro Leu Thr Asp Lys Val His
 595 600 605

Ala Arg Pro Leu Leu Met Val Pro Pro Cys Ile Asn Lys Tyr Tyr Ile
 610 615 620

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

Thr Asn Asp Ala Leu Pro Glu Ser Pro Gln Gln Trp Leu Ala Gly Ala
 900 905 910

Ile Glu His His Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu Ala
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Gly Gln Ala Gly Ala Lys Arg Ala Ala Pro Ala Asn Tyr Gly Asn Ala
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Arg Tyr Arg Ala Ile Glu Pro Ala Pro Gly Arg Tyr Val Lys Ala Lys
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Ala His Met Val Leu Ala Val Ala Ile Asp Lys Arg Gly Gly Gly Gly
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Gly Leu Glu Asp Val Thr Leu Tyr Gly Thr Ile Lys Ala Gly Val Glu
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Thr Ser Arg Ser Val Ala His Asn Gly Ala Gln Ala Ala Ser Val Glu
 995 1000 1005

Thr Gly Thr Gly Ile Val Asp Leu Gly Ser Lys Ile Gly Phe Lys
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Gly Gln Glu Asp Leu Gly Asn Gly Leu Lys Ala Ile Trp Gln Val
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Glu Gln Lys Ala Ser Ile Ala Gly Thr Asp Ser Gly Trp Gly Asn
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Arg Gln Ser Phe Ile Gly Leu Lys Gly Gly Phe Gly Lys Leu Arg
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Val Gly Arg Leu Asn Ser Val Leu Lys Asp Thr Gly Asp Ile Asn
 1070 1075 1080

Pro Trp Asp Ser Lys Ser Asp Tyr Leu Gly Val Asn Lys Ile Ala
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Glu Pro Glu Ala Arg Leu Ile Ser Val Arg Tyr Asp Ser Pro Glu
 1100 1105 1110

Phe Ala Gly Leu Ser Gly Ser Val Gln Tyr Ala Leu Asn Asp Asn
 1115 1120 1125

Ala Gly Arg His Asn Ser Glu Ser Tyr His Ala Gly Phe Asn Tyr
 1130 1135 1140

Lys Asn Gly Gly Phe Phe Val Gln Tyr Gly Gly Ala Tyr Lys Arg
 1145 1150 1155

His His Gln Val Gln Glu Asn Val Asn Ile Glu Lys Tyr Gln Ile

| | | | | |
|---|------|------|------|------|
| 1160 | | 1165 | | 1170 |
| His Arg Leu Val Ser Gly Tyr Asp Asn Asp Ala Leu Tyr Ala Ser | 1175 | 1180 | 1185 | |
| Val Ala Val Gln Gln Gln Asp Ala Lys Leu Ala Leu Pro Asn Asp | 1190 | 1195 | 1200 | |
| Asn Ser His Asn Ser Gln Thr Glu Val Ala Ala Thr Leu Ala Tyr | 1205 | 1210 | 1215 | |
| Arg Phe Gly Asn Val Thr Pro Arg Val Ser Tyr Ala His Gly Phe | 1220 | 1225 | 1230 | |
| Lys Gly Ser Phe Asp Asp Ala Asp Leu Ser Asn Asp Tyr Asp Gln | 1235 | 1240 | 1245 | |
| Val Val Val Gly Ala Glu Tyr Asp Phe Ser Lys Arg Thr Ser Ala | 1250 | 1255 | 1260 | |
| Leu Val Ser Ala Gly Trp Leu Gln Glu Gly Lys Gly Glu Asn Lys | 1265 | 1270 | 1275 | |
| Phe Val Ser Thr Ala Gly Gly Val Gly Leu Arg His Lys Phe | 1280 | 1285 | 1290 | |

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| caccgtcacc ctggatgctg taggcatagg cttggttatg ccggtactgc cgggcctctt | 180 |
| gcgggatatc gtccattccg acagcatcgc cagtcactat ggcgtgctgc tagcgctata | 240 |
| tgcgttgatg caatttctat gcgcacccgt tctcggagca ctgtccgacc gctttggccg | 300 |
| ccgcccagtc ctgctcgctt cgctacttgg agccactatc gactacgca tcatggcgac | 360 |
| cacacccgtc ctgtggatat ccggatatag ttctctcttt cagcaaaaaa cccctcaaga | 420 |
| cccgtttaga ggccccaagg ggttatgcta gttattgctc agcgggtggca gcagccaact | 480 |
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| tggttcagca gggtatccgc ttccacatac cagttccatt cgccatagcg ggtgttgccg | 660 |
| cgatagttcg cgcccagggt cagcatatga tggcccgggg tcggggtttc atagcgcgcc | 720 |
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| | | | | | | |
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| ctcgctttca | gatgaaagcc | caggcgcgcc | gccggcacgc | gcgggcggtt | ctgatcatcc | 840 |
| tgcgcaataa | acgggcggtt | gccatacgca | tcttcgcggc | ccggcaggct | cggcaggttt | 900 |
| ttcaggcggc | cgcgcacata | atcgccgctc | acgccaatgc | gatagcgcg | ggtcggttta | 960 |
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| ttcatttcgc | tatcatcttc | aatgcttttc | gggcccggc | catcgttcag | ggtctgcgca | 1080 |
| taaatatagt | tgccaaagcg | gttgcgatac | agcgccagg | tatactgcca | gcgatcgctt | 1140 |
| tcatagccca | gcgccagttc | aatgttggtg | ctgcgttctt | tgttcagatg | tttggtgccc | 1200 |
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| ttataatagt | tttcgcgatc | aatcagcgct | ttatcatact | gaatgctcgc | tttctgtttt | 1440 |
| tccacgcgca | cgccgccttc | cagggtaaag | ttatcccagt | tcgcctgttc | cacgcaaaaa | 1500 |
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| tccaccgcat | cgcccgtttt | ttcatcatgg | cgataatcgt | tcgggttcag | atgcacgcgc | 1740 |
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| cgcatatcaa | tccacgggag | gccgctatgg | gtatgcgcat | gcgcgttatc | atcatcatga | 1860 |
| aagccgcagc | tcaggcccg | gttatcataa | tcaatatctt | cttcggtcag | cagatgcgga | 1920 |
| tacagctgca | gatagcgttt | gttaatcagg | cttttctgcc | aaataatatc | cgcatggcaa | 1980 |
| tcatcatatt | catggctatg | cgccggcagg | ccatactgat | cgcggcgatc | gctatacgcc | 2040 |
| acgccaataa | agcctttttc | gcccaccag | ctcaggccaa | tgctgccggt | ctggctatcc | 2100 |
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| ccgccgccat | actggctcgc | atgaatgcc | ggcacgccat | ccagcgcata | gcccaggttc | 2580 |
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| agcaggccgc | tggtcgcgcg | cgggcggtt | ttgccacca | cgctcacggt | ttccagatcc | 2700 |
| acgctctgtt | cggtttcatg | ctcgaggcct | ccaccgcctc | cgcgtttatc | aatcgccacc | 2760 |
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| catgcggtcc | agtccggcca | ccagctgccg | tgatgctcga | tggcgccggc | cagccattgc | 2940 |
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| cccttcaggt | agttgtcgac | cacgtagttc | cacaccaggt | cgttcgggcg | caagaacgag | 3360 |
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| | | | | | | |
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 pET-14b-FetA-PhaC-ZnuD

<400> 38

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 35 40 45
 Glu Pro Ser Ile Asp Phe Gly Gly Gly Asn Gly Thr Ser Gln Phe Leu
 50 55 60
 Thr Leu Arg Gly Met Gly Gln Asn Ser Val Asp Ile Lys Val Asp Asn
 65 70 75 80
 Ala Tyr Ser Asp Ser Gln Ile Leu Tyr His Gln Gly Arg Phe Ile Val
 85 90 95
 Asp Pro Ala Leu Val Lys Val Val Ser Val Gln Lys Gly Ala Gly Ser
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 Ala Ser Ala Gly Ile Gly Ala Thr Asn Gly Ala Ile Ile Ala Lys Thr
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 Val Asp Ala Gln Asp Leu Leu Lys Gly Leu Asp Lys Asn Trp Gly Val
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 Arg Leu Asn Ser Gly Phe Ala Ser Asn Glu Gly Val Ser Tyr Gly Ala
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 Ser Val Phe Gly Lys Glu Gly Asn Phe Asp Gly Leu Phe Ser Tyr Asn
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 Arg Asn Asn Glu Lys Asp Tyr Glu Ala Gly Lys Gly Phe Arg Asn Asn
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 Phe Asn Gly Gly Lys Thr Val Pro Tyr Ser Ala Leu Asp Lys Arg Ser
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 Tyr Leu Ala Lys Ile Gly Thr Ser Phe Gly Asp Gly Asp His Arg Ile
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 Val Leu Ser His Met Lys Asp Gln His Arg Gly Ile Arg Thr Val Arg
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 Glu Glu Phe Thr Val Gly Gly Asp Lys Glu Arg Ile Ser Met Glu Arg
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 260 265 270
 Tyr Thr Gly Lys Asn Leu Gly Phe Val Glu Lys Leu Asp Ala Asn Ala
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| | | | | |
|-------------------------|---------------------|---------------------|---------------------|-----|
| 275 | | 280 | | 285 |
| Tyr Val | Leu Glu Lys Lys | Arg Tyr Ser Ala Asp | Asp Lys Gly Ser Gly | |
| 290 | | 295 | 300 | |
| Tyr Ala Gly Asn Val | Glu Gly Pro Asn His | Thr Arg Ile Thr Thr | His | |
| 305 | 310 | 315 | 320 | |
| Gly Ala Asn Phe | Asn Phe Asp Ser Arg | Leu Ala Glu Gln Thr | Leu Leu | |
| | 325 | 330 | 335 | |
| Lys Tyr Gly Ile | Asn Tyr Arg His | Gln Glu Ile Lys Pro | Gln Ala Phe | |
| | 340 | 345 | 350 | |
| Leu Asn Gly | Glu Phe Lys Ile | Lys Asp Lys Ser Gly | Ala Thr Gln Ala | |
| | 355 | 360 | 365 | |
| Glu Lys Gln Lys Asn Arg | Asp Asp Glu Asn Ile | Val Lys Ala Tyr Arg | | |
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| Leu Thr Asn Pro Thr | Lys Thr Asp Thr Gly | Ala Tyr Ile Glu Ala | Ile | |
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| | 420 | 425 | 430 | |
| Asn Pro Ser | Phe Gly Val Ile | Trp Gln Pro His Glu | Tyr Trp Ser Phe | |
| | 435 | 440 | 445 | |
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| | 450 | 455 | 460 | |
| Leu Gln Thr His Gly | Lys Arg Gly Ile Ile | Ser Ile Ala Asp Gly | Thr | |
| 465 | 470 | 475 | 480 | |
| Lys Ala Glu Arg | Ala Arg Asn Thr Glu | Ile Gly Phe Asn Tyr | Asn Asp | |
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| Gly Thr Phe | Ala Ala Asn Gly Ser | Tyr Phe Trp Gln Thr | Ile Lys Asp | |
| | 500 | 505 | 510 | |
| Ala Leu Ala | Asn Pro Gln Asn | Arg His Asp Ser Val | Ala Val Arg Glu | |
| | 515 | 520 | 525 | |
| Ala Val Asn Ala Gly Tyr | Ile Lys Asn His Gly | Tyr Glu Leu Gly Ala | | |
| | 530 | 535 | 540 | |
| Ser Tyr Arg Thr Gly | Gly Leu Thr Ala Lys | Val Gly Val Ser His | Ser | |
| 545 | 550 | 555 | 560 | |

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 Pro Glu Phe Gly₅₈₀ Ala Gln Val Gly Arg₅₈₅ Thr Trp Thr Ala Ser₅₉₀ Leu Ala
 Tyr Arg Phe₅₉₅ Lys Asn Pro Asn Leu₆₀₀ Glu Ile Gly Trp Arg₆₀₅ Gly Arg Tyr
 Val₆₁₀ Gln Lys Ala Val Gly Ser₆₁₅ Ile Leu Val Ala Gly₆₂₀ Gln Lys Asp Arg
 Gln₆₂₅ Gly Asn Leu Glu Asn₆₃₀ Val Val Arg Lys Gly₆₃₅ Phe Gly Val Asn Asp₆₄₀
 Val Phe Ala Asn Trp₆₄₅ Lys Pro Leu Gly Lys₆₅₀ Asp Thr Leu Asn Val₆₅₅ Asn
 Leu Ser Val₆₆₀ Asn Asn Val Phe Asn Thr₆₆₅ Phe Tyr Tyr Pro His₆₇₀ Ser Gln
 Arg Trp Thr₆₇₅ Asn Thr Leu Pro Gly₆₈₀ Val Gly Arg Asp Val₆₈₅ Arg Leu Gly
 Val₆₉₀ Asn Tyr Lys Phe Ala Thr₆₉₅ Gly Lys Gly Ala Ala₇₀₀ Ala Ser Thr Gln
 Glu₇₀₅ Gly Lys Ser Gln Pro₇₁₀ Phe Lys Val Thr Pro₇₁₅ Gly Pro Phe Asp Pro₇₂₀
 Ala Thr Trp Leu Glu₇₂₅ Trp Ser Arg Gln Trp₇₃₀ Gln Gly Thr Glu Gly₇₃₅ Asn
 Gly His Ala Ala₇₄₀ Ala Ser Gly Ile Pro₇₄₅ Gly Leu Asp Ala Leu₇₅₀ Ala Gly
 Val Lys Ile₇₅₅ Ala Pro Ala Gln Leu₇₆₀ Gly Asp Ile Gln Gln₇₆₅ Arg Tyr Met
 Lys Asp₇₇₀ Phe Ser Ala Leu Trp₇₇₅ Gln Ala Met Ala Glu₇₈₀ Gly Lys Ala Glu
 Ala₇₈₅ Thr Gly Pro Leu His₇₉₀ Asp Arg Arg Phe Ala₇₉₅ Gly Asp Ala Trp Arg₈₀₀
 Thr Asn Leu Pro Tyr₈₀₅ Arg Phe Ala Ala₈₁₀ Ala Phe Tyr Leu Leu Asn₈₁₅ Ala
 Arg Ala Leu Thr₈₂₀ Glu Leu Ala Asp Ala₈₂₅ Val Glu Ala Asp Ala₈₃₀ Lys Thr

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 Asp Leu Thr Arg Gly Lys Ile Ser Gln Thr Asp Glu Ser Ala Phe Glu
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 Val Gly Arg Asn Val Ala Val Thr Glu Gly Ala Val Val Phe Glu Asn
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 Ile Glu Val Ala Arg Asp Ile Ser Gly Gln Asp Lys Ile Asn Val Leu
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| | | | | | | | | | | | | | | |
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| Leu | Leu | Phe | Trp | Asn | Gly | Asp | Ala | Thr | Asn | Leu | Pro | Gly | Pro | Trp |
| | 1115 | | | | | 1120 | | | | | 1125 | | | |
| Tyr | Cys | Trp | Tyr | Leu | Arg | His | Thr | Tyr | Leu | Gln | Asn | Glu | Leu | Lys |
| | 1130 | | | | | 1135 | | | | | 1140 | | | |
| Val | Pro | Gly | Lys | Leu | Thr | Val | Cys | Gly | Val | Pro | Val | Asp | Leu | Ala |
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| Ser | Ile | Asp | Val | Pro | Thr | Tyr | Ile | Tyr | Gly | Ser | Arg | Glu | Asp | His |
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| | 1205 | | | | | 1210 | | | | | 1215 | | | |
| Asp | Ala | Leu | Pro | Glu | Ser | Pro | Gln | Gln | Trp | Leu | Ala | Gly | Ala | Ile |
| | 1220 | | | | | 1225 | | | | | 1230 | | | |
| Glu | His | His | Gly | Ser | Trp | Trp | Pro | Asp | Trp | Thr | Ala | Trp | Leu | Ala |
| | 1235 | | | | | 1240 | | | | | 1245 | | | |
| Gly | Gln | Ala | Gly | Ala | Lys | Arg | Ala | Ala | Pro | Ala | Asn | Tyr | Gly | Asn |
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| Ala | Arg | Tyr | Arg | Ala | Ile | Glu | Pro | Ala | Pro | Gly | Arg | Tyr | Val | Lys |
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| Gly | Gly | His | Glu | Thr | Glu | Gln | Ser | Val | Asp | Leu | Glu | Thr | Val | Ser |
| | 1295 | | | | | 1300 | | | | | 1305 | | | |
| Val | Val | Gly | Lys | Ser | Arg | Pro | Arg | Ala | Thr | Ser | Gly | Leu | Leu | His |
| | 1310 | | | | | 1315 | | | | | 1320 | | | |
| Thr | Ser | Thr | Ala | Ser | Asp | Lys | Ile | Ile | Ser | Gly | Asp | Thr | Leu | Arg |
| | 1325 | | | | | 1330 | | | | | 1335 | | | |
| Gln | Lys | Ala | Val | Asn | Leu | Gly | Asp | Ala | Leu | Asp | Gly | Val | Pro | Gly |
| | 1340 | | | | | 1345 | | | | | 1350 | | | |
| Ile | His | Ala | Ser | Gln | Tyr | Gly | Gly | Gly | Ala | Ser | Ala | Pro | Val | Ile |

| 1355 | | | | | | 1360 | | | | | | 1365 | | | |
|------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|-----|-----|--|
| Arg | Gly | Gln | Thr | Gly | Arg | Arg | Ile | Lys | Val | Leu | Asn | His | His | Gly | |
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| Glu | Thr | Gly | Asp | Met | Ala | Asp | Phe | Ser | Pro | Asp | His | Ala | Ile | Met | |
| | 1385 | | | | | 1390 | | | | | 1395 | | | | |
| Val | Asp | Thr | Ala | Leu | Ser | Gln | Gln | Val | Glu | Ile | Leu | Arg | Gly | Pro | |
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| Val | Thr | Leu | Leu | Tyr | Ser | Ser | Gly | Asn | Val | Ala | Gly | Leu | Val | Asp | |
| | 1415 | | | | | 1420 | | | | | 1425 | | | | |
| Val | Ala | Asp | Gly | Lys | Ile | Pro | Glu | Lys | Met | Pro | Glu | Asn | Gly | Val | |
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| | 1475 | | | | | 1480 | | | | | 1485 | | | | |
| Pro | Arg | Tyr | Arg | Asn | Leu | Lys | Arg | Leu | Pro | Asp | Ser | His | Ala | Asp | |
| | 1490 | | | | | 1495 | | | | | 1500 | | | | |
| Ser | Gln | Thr | Gly | Ser | Ile | Gly | Leu | Ser | Trp | Val | Gly | Glu | Lys | Gly | |
| | 1505 | | | | | 1510 | | | | | 1515 | | | | |
| Phe | Ile | Gly | Val | Ala | Tyr | Ser | Asp | Arg | Arg | Asp | Gln | Tyr | Gly | Leu | |
| | 1520 | | | | | 1525 | | | | | 1530 | | | | |
| Pro | Ala | His | Ser | His | Glu | Tyr | Asp | Asp | Cys | His | Ala | Asp | Ile | Ile | |
| | 1535 | | | | | 1540 | | | | | 1545 | | | | |
| Trp | Gln | Lys | Ser | Leu | Ile | Asn | Lys | Arg | Tyr | Leu | Gln | Leu | Tyr | Pro | |
| | 1550 | | | | | 1555 | | | | | 1560 | | | | |
| His | Leu | Leu | Thr | Glu | Glu | Asp | Ile | Asp | Tyr | Asp | Asn | Pro | Gly | Leu | |
| | 1565 | | | | | 1570 | | | | | 1575 | | | | |
| Ser | Cys | Gly | Phe | His | Asp | Asp | Asp | Asn | Ala | His | Ala | His | Thr | His | |
| | 1580 | | | | | 1585 | | | | | 1590 | | | | |
| Ser | Gly | Arg | Pro | Trp | Ile | Asp | Leu | Arg | Asn | Lys | Arg | Tyr | Glu | Leu | |
| | 1595 | | | | | 1600 | | | | | 1605 | | | | |
| Arg | Ala | Glu | Trp | Lys | Gln | Pro | Phe | Pro | Gly | Phe | Glu | Ala | Leu | Arg | |
| | 1610 | | | | | 1615 | | | | | 1620 | | | | |

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| Val | His 1625 | Leu | Asn | Arg | Asn | Asp 1630 | Tyr | Arg | His | Asp | Glu 1635 | Lys | Ala | Gly |
| Asp | Ala 1640 | Val | Glu | Asn | Phe | Phe 1645 | Asn | Asn | Gln | Thr | Gln 1650 | Asn | Ala | Arg |
| Ile | Glu 1655 | Leu | Arg | His | Gln | Pro 1660 | Ile | Gly | Arg | Leu | Lys 1665 | Gly | Ser | Trp |
| Gly | Val 1670 | Gln | Tyr | Leu | Gln | Gln 1675 | Lys | Ser | Ser | Ala | Leu 1680 | Ser | Ala | Ile |
| Ser | Glu 1685 | Ala | Val | Lys | Gln | Pro 1690 | Met | Leu | Leu | Asp | Asn 1695 | Lys | Val | Gln |
| His | Tyr 1700 | Ser | Phe | Phe | Gly | Val 1705 | Glu | Gln | Ala | Asn | Trp 1710 | Asp | Asn | Phe |
| Thr | Leu 1715 | Glu | Gly | Gly | Val | Arg 1720 | Val | Glu | Lys | Gln | Lys 1725 | Ala | Ser | Ile |
| Gln | Tyr 1730 | Asp | Lys | Ala | Leu | Ile 1735 | Asp | Arg | Glu | Asn | Tyr 1740 | Tyr | Asn | His |
| Pro | Leu 1745 | Pro | Asp | Leu | Gly | Ala 1750 | His | Arg | Gln | Thr | Ala 1755 | Arg | Ser | Phe |
| Ala | Leu 1760 | Ser | Gly | Asn | Trp | Tyr 1765 | Phe | Thr | Pro | Gln | His 1770 | Lys | Leu | Ser |
| Leu | Thr 1775 | Ala | Ser | His | Gln | Glu 1780 | Arg | Leu | Pro | Ser | Thr 1785 | Gln | Glu | Leu |
| Tyr | Ala 1790 | His | Gly | Lys | His | Val 1795 | Ala | Thr | Asn | Thr | Phe 1800 | Glu | Val | Gly |
| Asn | Lys 1805 | His | Leu | Asn | Lys | Glu 1810 | Arg | Ser | Asn | Asn | Ile 1815 | Glu | Leu | Ala |
| Leu | Gly 1820 | Tyr | Glu | Gly | Asp | Arg 1825 | Trp | Gln | Tyr | Asn | Leu 1830 | Ala | Leu | Tyr |
| Arg | Asn 1835 | Arg | Phe | Gly | Asn | Tyr 1840 | Ile | Tyr | Ala | Gln | Thr 1845 | Leu | Asn | Asp |
| Gly | Arg 1850 | Gly | Pro | Lys | Ser | Ile 1855 | Glu | Asp | Asp | Ser | Glu 1860 | Met | Lys | Leu |
| Val | Arg 1865 | Tyr | Asn | Gln | Ser | Gly 1870 | Ala | Asp | Phe | Tyr | Gly 1875 | Ala | Glu | Gly |

Glu Ile Tyr Phe Lys Pro Thr Pro Arg Tyr Arg Ile Gly Val Ser
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 Gly Asp Tyr Val Arg Gly Arg Leu Lys Asn Leu Pro Ser Leu Pro
 1895 1900 1905
 Gly Arg Glu Asp Ala Tyr Gly Asn Arg Pro Phe Ile Ala Gln Asp
 1910 1915 1920
 Asp Gln Asn Ala Pro Arg Val Pro Ala Ala Arg Leu Gly Phe His
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 Leu Lys Ala Ser Leu Thr Asp Arg Ile Asp Ala Asn Leu Asp Tyr
 1940 1945 1950
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 1955 1960 1965
 Thr Pro Gly His His Met Leu Asn Leu Gly Ala Asn Tyr Arg Arg
 1970 1975 1980
 Asn Thr Arg Tyr Gly Glu Trp Asn Trp Tyr Val Lys Ala Asp Asn
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 2015 2020 2025

Phe

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Ala Ser Gly Ile Pro Gly Leu Asp Ala Leu Ala Gly Val Lys Ile Ala
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Ala Leu Trp Gln Ala Met Ala Glu Gly Lys Ala Glu Ala Thr Gly Pro
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Leu His Asp Arg Arg Phe Ala Gly Asp Ala Trp Arg Thr Asn Leu Pro
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Tyr Arg Phe Ala Ala Ala Phe Tyr Leu Leu Asn Ala Arg Ala Leu Thr
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Glu Leu Ala Asp Ala Val Glu Ala Asp Ala Lys Thr Arg Gln Arg Ile
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Arg Phe Ala Ile Ser Gln Trp Val Asp Ala Met Ser Pro Ala Asn Phe
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Leu Ala Thr Asn Pro Glu Ala Gln Arg Leu Leu Ile Glu Ser Gly Gly
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Glu Ser Leu Arg Ala Gly Val Arg Asn Met Met Glu Asp Leu Thr Arg
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Gly Lys Ile Ser Gln Thr Asp Glu Ser Ala Phe Glu Val Gly Arg Asn
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Leu Met Val Pro Pro Cys Ile Asn Lys Tyr Tyr Ile Leu Asp Leu Gln
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Pro Glu Ser Ser Leu Val Arg His Val Val Glu Gln Gly His Thr Val
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Phe Leu Val Ser Trp Arg Asn Pro Asp Ala Ser Met Ala Gly Ser Thr
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Gly Gly Thr Ile Val Ser Thr Ala Leu Ala Val Leu Ala Ala Arg Gly
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Glu His Pro Ala Ala Ser Val Thr Leu Leu Thr Thr Leu Leu Asp Phe
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Ala Asp Thr Gly Ile Leu Asp Val Phe Val Asp Glu Gly His Val Gln
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Leu Arg Glu Ala Thr Leu Gly Gly Gly Ala Gly Ala Pro Cys Ala Leu
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Leu Arg Gly Leu Glu Leu Ala Asn Thr Phe Ser Phe Leu Arg Pro Asn
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Pro Val Pro Phe Asp Leu Leu Phe Trp Asn Gly Asp Ala Thr Asn Leu
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Pro Gly Pro Trp Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn
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Glu Leu Lys Val Pro Gly Lys Leu Thr Val Cys Gly Val Pro Val Asp
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Leu Ala Ser Ile Asp Val Pro Thr Tyr Ile Tyr Gly Ser Arg Glu Asp
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Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala Gly Val
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Ser Gln Asn Lys Lys Glu Val Ile Ser Ser Asp Asn Leu Gln Leu Pro
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Glu Leu Lys Gln Lys Ser Ser Asn Thr Ser Ala Gly Pro Thr Val Pro

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| Asn | Ile | His 835 | Glu | Lys | Lys | Gly | Leu 840 | Thr | Lys | Tyr | Lys | Ser 845 | Ser | Pro | Glu | | | |
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| Gly 865 | Arg | Ile | Asp | Lys | Asn 870 | Val | Ser | Pro | Glu | Ala 875 | Arg | His | Pro | Leu | Val 880 | | | |
| Ala | Ala | Tyr | Pro | Ile 885 | Val | His | Val | Asp | Met 890 | Glu | Asn | Ile | Ile | Leu 895 | Ser | | | |
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| Ile | Ser | Lys 915 | Asn | Thr | Ser | Thr | Ser 920 | Arg | Thr | His | Thr | Ser 925 | Glu | Val | His | | | |
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| Asn | Leu 1040 | Ala | Pro | Ile | Ala | Leu 1045 | Asn | Ala | Gln | Asp | Asp 1050 | Phe | Ser | Ser | | | | |
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| | | | | | | | | | | | | | | |
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| Ser | Asn 1100 | Trp | Ser | Glu | Val | Leu 1105 | Pro | Gln | Ile | Gln | Glu 1110 | Thr | Thr | Ala |
| Arg | Ile 1115 | Ile | Phe | Asn | Gly | Lys 1120 | Asp | Leu | Asn | Leu | Val 1125 | Glu | Arg | Arg |
| Ile | Ala 1130 | Ala | Val | Asn | Pro | Ser 1135 | Asp | Pro | Leu | Glu | Thr 1140 | Thr | Lys | Pro |
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| Glu | Pro 1160 | Asn | Gly | Asn | Leu | Gln 1165 | Tyr | Gln | Gly | Lys | Asp 1170 | Ile | Thr | Glu |
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| Arg | Phe 1220 | His | Tyr | Asp | Arg | Asn 1225 | Asn | Ile | Ala | Val | Gly 1230 | Ala | Asp | Glu |
| Ser | Val 1235 | Val | Lys | Glu | Ala | His 1240 | Arg | Glu | Val | Ile | Asn 1245 | Ser | Ser | Thr |
| Glu | Gly 1250 | Leu | Leu | Leu | Asn | Ile 1255 | Asp | Lys | Asp | Ile | Arg 1260 | Lys | Ile | Leu |
| Ser | Gly 1265 | Tyr | Ile | Val | Glu | Ile 1270 | Glu | Asp | Thr | Glu | Gly 1275 | Leu | Lys | Glu |
| Val | Ile 1280 | Asn | Asp | Arg | Tyr | Asp 1285 | Met | Leu | Asn | Ile | Ser 1290 | Ser | Leu | Arg |
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| Leu | Pro 1310 | Leu | Tyr | Ile | Ser | Asn 1315 | Pro | Asn | Tyr | Lys | Val 1320 | Asn | Val | Tyr |

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| acgagctcaa | ggtaccgggc | aagctgaccg | tgtgcggcgt | gccggtggac | ctggccagca | 6960 |
| tcgacgtgcc | gacctatatc | tacggctcgc | gcgaagacca | tatcgtgccg | tggaaccgcg | 7020 |
| cctatgcctc | gaccgcgctg | ctggcgaaca | agctgcgctt | cgtgctgggt | gcgtcggggc | 7080 |
| atatcgccgg | tgtgatcaac | ccgccggcca | agaacaagcg | cagccactgg | actaacgatg | 7140 |
| cgctgccgga | gtcgccgcag | caatggctgg | ccggcgccat | cgagcatcac | ggcagctggt | 7200 |
| ggccggactg | gaccgcatgg | ctggccgggc | aggccggcgc | gaaacgcgcc | gcgcccgcga | 7260 |
| actatggcaa | tgcgcgctat | cgcgcaatcg | aaccgcgcgc | tgggcgatac | gtcaaagcca | 7320 |
| aggcacatat | ggtgctggcg | gtggcgattg | ataaacgcgg | aggcgggtgga | ggcctcgaga | 7380 |
| gcgtggcgct | ggcgccgcac | gtgggcctgg | gcctggaaac | ccgcaccgaa | acctggatga | 7440 |
| gcagcgaagg | cgcggtgaaa | cagattcaga | aagtggaaac | ctgggcgctg | cgccatccgg | 7500 |
| gctttaccgt | gattgcgctg | tttctggcgc | atgcgattgg | caccagcatt | accagaaaag | 7560 |
| gcattatatt | tattctgctg | atgctggtga | ccccgagcat | ggcgtaagga | tccggctgct | 7620 |

| | |
|---|------|
| aacaaagccc gaaaggaagc tgagttggct gctgccaccg ctgagcaata actagcataa | 7680 |
| ccccttgggg cctctaaacg ggtcttgagg ggttttttgc tgaaaggagg aactatatcc | 7740 |
| ggatatccac aggacgggtg tggtcgccat gatcgcgtag tcgatatgtg ctccaagtag | 7800 |
| cgaagcgagc aggactgggc ggcggccaaa gcggtcggac agtgctccga gaacgggtgc | 7860 |
| gcatagaaat tgcataacg catatagcgc tagcagcacg ccatagtacg tggcgatgct | 7920 |
| gtcggaatgg acgatatccc gcaagaggcc cggcagtacc ggcataacca agcctatgcc | 7980 |
| tacagcatcc aggggtgacg tgccgaggat gacgatgagc gcattgttag atttcataca | 8040 |
| cggtgcctga ctgcgttagc aatttaactg tgataaacta cgcattaaa gcttatcgat | 8100 |
| gataagctgt caaacatgag aa | 8122 |

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 <212> PRT
 <213> Artificial

<220>
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<400> 42

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Arg | Cys | Val | Gly | Ile | Gly | Asn | Arg | Asp | Phe | Val | Glu | Gly | Leu | Ser |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Ala | Thr | Trp | Val | Asp | Val | Val | Leu | Glu | His | Gly | Ser | Cys | Val | Thr |
| | | | 20 | | | | | 25 | | | | | 30 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Met | Ala | Lys | Asp | Lys | Pro | Thr | Leu | Asp | Ile | Glu | Leu | Leu | Lys | Thr |
| | | 35 | | | | | 40 | | | | | 45 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Glu | Val | Thr | Asn | Pro | Ala | Val | Leu | Arg | Lys | Leu | Cys | Ile | Glu | Ala | Lys |
| | 50 | | | | | 55 | | | | | 60 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Ser | Asn | Thr | Thr | Thr | Asp | Ser | Arg | Cys | Pro | Thr | Gln | Gly | Glu | Ala |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Leu | Val | Glu | Glu | Gln | Asp | Thr | Asn | Phe | Val | Cys | Arg | Arg | Thr | Phe |
| | | | 85 | | | | | | 90 | | | | | 95 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Asp | Arg | Gly | Trp | Gly | Asn | Gly | Cys | Gly | Leu | Phe | Gly | Lys | Gly | Ser |
| | | | 100 | | | | | 105 | | | | | 110 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Ile | Thr | Cys | Ala | Lys | Phe | Lys | Cys | Val | Thr | Lys | Leu | Glu | Gly | Lys |
| | | 115 | | | | | 120 | | | | | 125 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Val | Gln | Tyr | Glu | Asn | Leu | Lys | Tyr | Ser | Val | Ile | Val | Thr | Val | His |
| | 130 | | | | | 135 | | | | | 140 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Gly | Asp | Gln | His | Gln | Val | Gly | Asn | Glu | Thr | Thr | Glu | His | Gly | Thr |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |

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

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

Leu Leu Gln Tyr Lys₇₂₅ Pro Leu Thr Asp Lys₇₃₀ Val His Ala Arg Pro₇₃₅ Leu
 Leu Met Val Pro₇₄₀ Pro Cys Ile Asn Lys₇₄₅ Tyr Tyr Ile Leu Asp₇₅₀ Leu Gln
 Pro Glu Ser₇₅₅ Ser Leu Val Arg His₇₆₀ Val Val Glu Gln Gly₇₆₅ His Thr Val
 Phe Leu₇₇₀ Val Ser Trp Arg Asn₇₇₅ Pro Asp Ala Ser Met₇₈₀ Ala Gly Ser Thr
 Trp₇₈₅ Asp Asp Tyr Ile Glu₇₉₀ His Ala Ala Ile Arg₇₉₅ Ala Ile Glu Val Ala₈₀₀
 Arg Asp Ile Ser Gly₈₀₅ Gln Asp Lys Ile Asn₈₁₀ Val Leu Gly Phe Cys₈₁₅ Val
 Gly Gly Thr Ile₈₂₀ Val Ser Thr Ala Leu₈₂₅ Ala Val Leu Ala Ala Arg Gly
 Glu His Pro₈₃₅ Ala Ala Ser Val Thr₈₄₀ Leu Leu Thr Thr Leu₈₄₅ Leu Asp Phe
 Ala Asp₈₅₀ Thr Gly Ile Leu Asp₈₅₅ Val Phe Val Asp Glu₈₆₀ Gly His Val Gln
 Leu₈₆₅ Arg Glu Ala Thr Leu₈₇₀ Gly Gly Gly Ala Gly₈₇₅ Ala Pro Cys Ala Leu₈₈₀
 Leu Arg Gly Leu₈₈₅ Glu Leu Ala Asn Thr Phe₈₉₀ Ser Phe Leu Arg Pro₈₉₅ Asn
 Asp Leu Val Trp₉₀₀ Asn Tyr Val Val Asp₉₀₅ Asn Tyr Leu Lys Gly₉₁₀ Asn Thr
 Pro Val Pro₉₁₅ Phe Asp Leu Leu Phe₉₂₀ Trp Asn Gly Asp Ala₉₂₅ Thr Asn Leu
 Pro Gly₉₃₀ Pro Trp Tyr Cys Trp₉₃₅ Tyr Leu Arg His Thr₉₄₀ Tyr Leu Gln Asn
 Glu₉₄₅ Leu Lys Val Pro Gly₉₅₀ Lys Leu Thr Val Cys₉₅₅ Gly Val Pro Val Asp₉₆₀
 Leu Ala Ser Ile Asp₉₆₅ Val Pro Thr Tyr Ile₉₇₀ Tyr Gly Ser Arg Glu₉₇₅ Asp
 His Ile Val Pro₉₈₀ Trp Thr Ala Ala Tyr₉₈₅ Ala Ser Thr Ala Leu₉₉₀ Leu Ala

Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala Gly Val
 995 1000 1005
 Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser His Trp Thr Asn Asp
 1010 1015 1020
 Ala Leu Pro Glu Ser Pro Gln Gln Trp Leu Ala Gly Ala Ile Glu
 1025 1030 1035
 His His Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu Ala Gly
 1040 1045 1050
 Gln Ala Gly Ala Lys Arg Ala Ala Pro Ala Asn Tyr Gly Asn Ala
 1055 1060 1065
 Arg Tyr Arg Ala Ile Glu Pro Ala Pro Gly Arg Tyr Val Lys Ala
 1070 1075 1080
 Lys Ala His Met Val Leu Ala Val Ala Ile Asp Lys Arg Gly Gly
 1085 1090 1095
 Gly Gly Gly Leu Glu Ser Val Ala Leu Ala Pro His Val Gly Leu
 1100 1105 1110
 Gly Leu Glu Thr Arg Thr Glu Thr Trp Met Ser Ser Glu Gly Ala
 1115 1120 1125
 Trp Lys Gln Ile Gln Lys Val Glu Thr Trp Ala Leu Arg His Pro
 1130 1135 1140
 Gly Phe Thr Val Ile Ala Leu Phe Leu Ala His Ala Ile Gly Thr
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 Ser Ile Thr Gln Lys Gly Ile Ile Phe Ile Leu Leu Met Leu Val
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 Thr Pro Ser Met Ala
 1175

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 tttatttttc taaatacatt caaatatgta tccgctcatg agacaataac cctgataaat 180
 gcttcaataa tattgaaaaa ggaagagtat gagtattcaa catttcctgt tcgcccttat 240

| | | | | | | |
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| aaaagatgct | gaagatcagt | tgggtgcacg | agtgggttac | atcgaactgg | atctcaacag | 360 |
| cggtaagatc | cttgagagtt | ttcgccccga | agaacgtttt | ccaatgatga | gcacttttaa | 420 |
| agttctgcta | tgtggcgcg | tattatcccc | tgttgacgcc | gggcaagagc | aactcggtcg | 480 |
| ccgcatacac | tattctcaga | atgacttggt | tgagtactca | ccagtcacag | aaaagcatct | 540 |
| tacggatggc | atgacagtaa | gagaattatg | cagtgtgtcc | ataaccatga | gtgataacac | 600 |
| tgcgccaac | ttactttcta | caacgatcgg | aggaccgaag | gagctaaccg | cttttttgca | 660 |
| caacatgggg | gatcatgtaa | ctcgccttga | tcgttgggaa | ccggagctga | atgaagccat | 720 |
| accaaacgac | gagcgtgaca | ccacgatgcc | tgcagcaatg | gcaacaacgt | tgcgcaaact | 780 |
| attaactggc | gaactactta | ctctagcttc | ccggcaacaa | ttaatagact | ggatggaggc | 840 |
| ggataaagtt | gcaggaccac | ttctgcgctc | ggcccttcg | gctggctggt | ttattgctga | 900 |
| taaatctgga | gccggtgagc | gtgggtctcg | cggtatcatt | gcagcactgg | ggccagatgg | 960 |
| taagccctcc | cgtatcgtag | ttatctacac | gacggggagt | caggcaacta | tggatgaacg | 1020 |
| aaatagacag | atcgctgaga | taggtgcctc | actgattaag | cattggtaac | tgtcagacca | 1080 |
| agtttactca | tatatacttt | agattgattt | aaaacttcat | ttttaattta | aaaggatcta | 1140 |
| ggtgaagatc | ctttttgata | atctcatgac | caaaatccct | taacgtgagt | tttcgttcca | 1200 |
| ctgagcgtca | gaccccgtag | aaaagatcaa | aggatcttct | tgagatcctt | tttttctgcy | 1260 |
| cgtaatctgc | tgcttgcaaa | caaaaaaacc | accgctacca | gcygtggttt | gtttgccgga | 1320 |
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| ctcgtcaggg | gggcggagcc | tatggaaaaa | cgccagcaac | gcggcctttt | tacggttcct | 1860 |
| ggccttttgc | tggccttttg | ctcacatgtt | ctttcctgcy | ttatcccctg | attctgtgga | 1920 |
| taaccgtatt | accgcctttg | agtgagctga | taccgctcgc | cgcagccgaa | cgaccgagcg | 1980 |
| cagcgagtca | gtgagcgagg | aagcggaaga | gcgcctgatg | cggatatttt | tccttacgca | 2040 |
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| gcatagttaa | gccagtatac | actccgctat | cgctacgtga | ctgggtcatg | gctgcgcccc | 2160 |
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| | | | | | | |
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| ttctgataaa | gcggggccatg | ttaagggcgg | ttttttcctg | tttggtcact | gatgcctccg | 2460 |
| tgtaaggggg | atttctgttc | atgggggtaa | tgataccgat | gaaacgagag | aggatgctca | 2520 |
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| aactgattaa | aaccgaagcg | aaacagccgg | cgaccctgcg | caaataattgc | attgaagcga | 4260 |
| aactgaccaa | caccaccacc | gaaagccgct | gcccgaacca | gggcgaaccg | agcctgaacg | 4320 |
| aagaacagga | taaacgcttt | gtgtgcaaac | atagcatggg | ggatcgcggc | tggggcaacg | 4380 |

| | | | | | | |
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| ttaccccgcg | gagcagcatt | accgaagcgg | aactgaccgg | ctatggcacc | gtgaccatgg | 4620 |
| aatgcagccc | gcgcaccggc | ctggatttta | acgaaatggt | gctgctgcag | atggaaaaca | 4680 |
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 35 40 45
 Glu Ala Lys Gln Pro Ala Thr Leu Arg Lys Tyr Cys Ile Glu Ala Lys
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 Leu Thr Asn Thr Thr Thr Glu Ser Arg Cys Pro Thr Gln Gly Glu Pro
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 Ser Leu Asn Glu Glu Gln Asp Lys Arg Phe Val Cys Lys His Ser Met
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 Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Gly
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 Ile Val Thr Cys Ala Met Phe Arg Cys Lys Lys Asn Met Glu Gly Lys
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 Val Val Gln Pro Glu Asn Leu Glu Tyr Thr Ile Val Ile Thr Pro His
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 Ser Gly Glu Glu His Ala Val Gly Asn Asp Thr Gly Lys His Gly Lys
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 Glu Ile Lys Ile Thr Pro Gln Ser Ser Ile Thr Glu Ala Glu Leu Thr
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 Gly Tyr Gly Thr Val Thr Met Glu Cys Ser Pro Arg Thr Gly Leu Asp
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 Phe Asn Glu Met Val Leu Leu Gln Met Glu Asn Lys Ala Trp Leu Val
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 His Arg Gln Trp Phe Leu Asp Leu Pro Leu Pro Trp Leu Pro Gly Ala
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 Asp Thr Gln Gly Ser Asn Trp Ile Gln Lys Glu Thr Leu Val Thr Phe
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 Lys Asn Pro His Ala Lys Lys Gln Asp Val Val Val Leu Gly Ser Gln
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 Glu Gly Ala Met His Thr Ala Leu Thr Gly Ala Thr Glu Ile Gln Met
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| Lys | Phe | Lys | Val | Val | Lys | Glu | Ile | Ala | Glu | Thr | Gln | His | Gly | Thr | Ile |
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| Val | Ile | Arg | Val | Gln | Tyr | Glu | Gly | Asp | Gly | Ser | Pro | Cys | Lys | Ile | Pro |
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| Phe | Glu | Ile | Met | Asp | Leu | Glu | Lys | Arg | His | Val | Leu | Gly | Arg | Leu | Ile |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Thr | Val | Asn | Pro | Ile | Val | Thr | Glu | Lys | Asp | Ser | Pro | Val | Asn | Ile | Glu |
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| Ala | Glu | Pro | Pro | Phe | Gly | Asp | Ser | Tyr | Ile | Ile | Ile | Gly | Val | Glu | Pro |
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| Gly | Gln | Leu | Lys | Leu | Asn | Trp | Phe | Lys | Lys | Gly | Ser | Ser | Ile | Gly | Gln |
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| Met | Phe | Glu | Thr | Thr | Met | Arg | Gly | Ala | Lys | Arg | Met | Ala | Ile | Leu | Gly |
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| Asp | Thr | Ala | Trp | Asp | Phe | Gly | Ser | Leu | Gly | Gly | Val | Phe | Thr | Ser | Ile |
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| Gly | Lys | Ala | Leu | His | Gln | Val | Phe | Gly | Ala | Ile | Tyr | Gly | Ala | Ala | Phe |
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| Ser | Gly | Val | Ser | Trp | Thr | Met | Lys | Ile | Leu | Ile | Gly | Val | Ile | Ile | Thr |
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| Trp | Ile | Gly | Met | Asn | Ser | Arg | Ser | Thr | Ser | Leu | Ser | Val | Thr | Leu | Val |
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| Leu | Val | Gly | Ile | Val | Thr | Leu | Tyr | Leu | Gly | Val | Met | Val | Gln | Ala | Thr |
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| Ser | Ala | Thr | Gly | Lys | Gly | Ala | Ala | Ala | Ser | Thr | Gln | Glu | Gly | Lys | Ser |
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| Gln | Pro | Phe | Lys | Val | Thr | Pro | Gly | Pro | Phe | Asp | Pro | Ala | Thr | Trp | Leu |
| | | 515 | | | | | 520 | | | | | 525 | | | |
| Glu | Trp | Ser | Arg | Gln | Trp | Gln | Gly | Thr | Glu | Gly | Asn | Gly | His | Ala | Ala |
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| Ala | Ser | Gly | Ile | Pro | Gly | Leu | Asp | Ala | Leu | Ala | Gly | Val | Lys | Ile | Ala |
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 Ala Leu Trp Gln₅₈₀ Ala Met Ala Glu Gly₅₈₅ Lys Ala Glu Ala Thr₅₉₀ Gly Pro
 Leu His Asp₅₉₅ Arg Arg Phe Ala Gly₆₀₀ Asp Ala Trp Arg Thr₆₀₅ Asn Leu Pro
 Tyr Arg₆₁₀ Phe Ala Ala Ala Phe₆₁₅ Tyr Leu Leu Asn Ala₆₂₀ Arg Ala Leu Thr
 Glu₆₂₅ Leu Ala Asp Ala Val₆₃₀ Glu Ala Asp Ala Lys₆₃₅ Thr Arg Gln Arg Ile₆₄₀
 Arg Phe Ala Ile Ser₆₄₅ Gln Trp Val Asp Ala₆₅₀ Met Ser Pro Ala Asn₆₅₅ Phe
 Leu Ala Thr Asn₆₆₀ Pro Glu Ala Gln Arg₆₆₅ Leu Leu Ile Glu Ser₆₇₀ Gly Gly
 Glu Ser Leu₆₇₅ Arg Ala Gly Val Arg₆₈₀ Asn Met Met Glu Asp₆₈₅ Leu Thr Arg
 Gly Lys₆₉₀ Ile Ser Gln Thr Asp₆₉₅ Glu Ser Ala Phe Glu₇₀₀ Val Gly Arg Asn
 Val₇₀₅ Ala Val Thr Glu Gly₇₁₀ Ala Val Val Phe Glu₇₁₅ Asn Glu Tyr Phe Gln₇₂₀
 Leu Leu Gln Tyr Lys₇₂₅ Pro Leu Thr Asp Lys₇₃₀ Val His Ala Arg Pro₇₃₅ Leu
 Leu Met Val Pro₇₄₀ Pro Cys Ile Asn Lys₇₄₅ Tyr Tyr Ile Leu Asp₇₅₀ Leu Gln
 Pro Glu Ser₇₅₅ Ser Leu Val Arg His₇₆₀ Val Val Glu Gln Gly₇₆₅ His Thr Val
 Phe Leu Val Ser Trp Arg Asn₇₇₅ Pro Asp Ala Ser Met₇₈₀ Ala Gly Ser Thr
 Trp₇₈₅ Asp Asp Tyr Ile Glu₇₉₀ His Ala Ala Ile Arg₇₉₅ Ala Ile Glu Val Ala₈₀₀
 Arg Asp Ile Ser Gly₈₀₅ Gln Asp Lys Ile Asn₈₁₀ Val Leu Gly Phe Cys₈₁₅ Val
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Leu Arg Gly Leu Glu Leu Ala Asn Thr Phe Ser Phe Leu Arg Pro Asn
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Pro Val Pro Phe Asp Leu Leu Phe Trp Asn Gly Asp Ala Thr Asn Leu
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Pro Gly Pro Trp Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn
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Glu Leu Lys Val Pro Gly Lys Leu Thr Val Cys Gly Val Pro Val Asp
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Leu Ala Ser Ile Asp Val Pro Thr Tyr Ile Tyr Gly Ser Arg Glu Asp
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His Ile Val Pro Trp Thr Ala Ala Tyr Ala Ser Thr Ala Leu Leu Ala
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Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala Gly Val
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Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser His Trp Thr Asn Asp
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His His Gly Ser Trp Trp Pro Asp Trp Thr Ala Trp Leu Ala Gly
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Lys Ala His Met Val Leu Ala Val Ala Ile Asp Lys Arg Gly Gly
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Glu Ala Thr Gln Leu Ala Thr Leu Arg Lys Leu Cys Ile Glu Gly Lys
50 55 60

Ile Thr Asn Ile Thr Thr Asp Ser Arg Cys Pro Thr Gln Gly Glu Ala
65 70 75 80

Val Leu Pro Glu Glu Gln Asp Gln Asn Tyr Val Cys Lys His Thr Tyr
85 90 95

Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Ser
100 105 110

Leu Val Thr Cys Ala Lys Phe Gln Cys Leu Glu Pro Ile Glu Gly Lys

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| Thr | Gly | Asp | Gln | His | Gln | Val | Gly | Asn | Glu | Thr | Gln | Gly | Val | Thr | Ala |
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| Glu | Ile | Thr | Pro | Gln | Ala | Ser | Thr | Thr | Glu | Ala | Ile | Leu | Pro | Glu | Tyr |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Gly | Thr | Leu | Gly | Leu | Glu | Cys | Ser | Pro | Arg | Thr | Gly | Leu | Asp | Phe | Asn |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Glu | Met | Ile | Leu | Leu | Thr | Met | Lys | Asn | Lys | Ala | Trp | Met | Val | His | Arg |
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| Glu | Thr | Pro | Thr | Trp | Asn | Arg | Lys | Glu | Leu | Leu | Val | Thr | Phe | Lys | Asn |
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| Ala | His | Ala | Lys | Lys | Gln | Glu | Val | Val | Val | Leu | Gly | Ser | Gln | Glu | Gly |
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| Ala | Met | His | Thr | Ala | Leu | Thr | Gly | Ala | Thr | Glu | Ile | Gln | Asn | Ser | Gly |
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| Gly | Thr | Ser | Ile | Phe | Ala | Gly | His | Leu | Lys | Cys | Arg | Leu | Lys | Met | Asp |
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| Lys | Leu | Glu | Leu | Lys | Gly | Met | Ser | Tyr | Ala | Met | Cys | Thr | Asn | Thr | Phe |
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| Val | Leu | Lys | Lys | Glu | Val | Ser | Glu | Thr | Gln | His | Gly | Thr | Ile | Leu | Ile |
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| Lys | Val | Glu | Tyr | Lys | Gly | Glu | Asp | Ala | Pro | Cys | Lys | Ile | Pro | Phe | Ser |
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| Pro | Pro | Phe | Gly | Glu | Ser | Asn | Ile | Val | Ile | Gly | Ile | Gly | Asp | Asn | Ala |
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| Leu | Lys | Ile | Asn | Trp | Tyr | Lys | Lys | Gly | Ser | Ser | Ile | Gly | Lys | Met | Phe |
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 Ala Trp Asp Phe Gly Ser Val Gly Gly Val Leu Asn Ser Leu Gly Lys
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 Val Ser Trp Val Met Lys Ile Gly Ile Gly Val Leu Leu Thr Trp Ile
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 Gly Leu Asn Ser Lys Asn Thr Ser Met Ser Phe Ser Cys Ile Ala Ile
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 Gly Ile Ile Thr Leu Tyr Leu Gly Ala Val Val Gln Ala Thr Ser Ala
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 Phe Lys Val Thr Pro Gly Pro Phe Asp Pro Ala Thr Trp Leu Glu Trp
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Leu Arg Ala Gly Val Arg Asn Met Met Glu Asp Leu Thr Arg Gly Lys
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 Ile Ser Gln Thr Asp Glu Ser Ala Phe Glu Val Gly Arg Asn Val Ala
 690 695 700
 Val Thr Glu Gly Ala Val Val Phe Glu Asn Glu Tyr Phe Gln Leu Leu
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Lys Val Pro Gly Lys Leu Thr Val Cys Gly Val Pro Val Asp Leu Ala
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 Ser Ile Asp Val Pro Thr Tyr Ile Tyr Gly Ser Arg Glu Asp His Ile
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35 40 45

Thr Ala Lys Glu Val Ala Leu Leu Arg Thr Tyr Cys Ile Glu Ala Ser
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Ile Ser Asn Ile Thr Thr Ala Thr Arg Cys Pro Thr Gln Gly Glu Pro
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Tyr Leu Lys Glu Glu Gln Asp Gln Gln Tyr Ile Cys Arg Arg Asp Val
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Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Gly
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Val Val Thr Cys Ala Lys Phe Ser Cys Ser Gly Lys Ile Thr Gly Asn
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Leu Val Gln Ile Glu Asn Leu Glu Tyr Thr Val Val Val Thr Val His
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Asn Gly Asp Thr His Ala Val Gly Asn Asp Thr Ser Asn His Gly Val
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Asp Tyr Gly Glu Leu Thr Leu Asp Cys Glu Pro Arg Ser Gly Ile Asp
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Phe Asn Glu Met Ile Leu Met Lys Met Lys Lys Lys Thr Trp Leu Val
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His Lys Gln Trp Phe Leu Asp Leu Pro Leu Pro Trp Thr Ala Gly Ala
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Asp Thr Ser Glu Val His Trp Asn Tyr Lys Glu Arg Met Val Thr Phe
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Lys Val Pro His Ala Lys Arg Gln Asp Val Thr Val Leu Gly Ser Gln
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 Glu Gly Ala Met His Ser Ala Leu Ala Gly Ala Thr Glu Val Asp Ser
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 Gly Asp Gly Asn His Met Phe Ala Gly His Leu Lys Cys Lys Val Arg
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 Met Glu Lys Leu Arg Ile Lys Gly Met Ser Tyr Thr Met Cys Ser Gly
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 Lys Phe Ser Ile Asp Lys Glu Met Ala Glu Thr Gln His Gly Thr Thr
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 Ala Val Gly Gly Ile Thr Leu Phe Leu Gly Phe Thr Val Gln Ala Thr
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 Ser Ala Thr Gly Lys Gly Ala Ala Ala Ser Thr Gln Glu Gly Lys Ser
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Gln Pro Phe Lys Val Thr Pro Gly Pro Phe Asp Pro Ala Thr Trp Leu
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Glu Trp Ser Arg Gln Trp Gln Gly Thr Glu Gly Asn Gly His Ala Ala
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Pro Ala Gln Leu Gly Asp Ile Gln Gln Arg Tyr Met Lys Asp Phe Ser
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Leu His Asp Arg Arg Phe Ala Gly Asp Ala Trp Arg Thr Asn Leu Pro
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Tyr Arg Phe Ala Ala Ala Phe Tyr Leu Leu Asn Ala Arg Ala Leu Thr
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Glu Ser Leu Arg Ala Gly Val Arg Asn Met Met Glu Asp Leu Thr Arg
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Gly Lys Ile Ser Gln Thr Asp Glu Ser Ala Phe Glu Val Gly Arg Asn
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Val Ala Val Thr Glu Gly Ala Val Val Phe Glu Asn Glu Tyr Phe Gln
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Leu Leu Gln Tyr Lys Pro Leu Thr Asp Lys Val His Ala Arg Pro Leu
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Leu Met Val Pro Pro Cys Ile Asn Lys Tyr Tyr Ile Leu Asp Leu Gln
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Pro Glu Ser Ser Leu Val Arg His Val Val Glu Gln Gly His Thr Val
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Phe Leu Val Ser Trp Arg Asn Pro Asp Ala Ser Met Ala Gly Ser Thr
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Trp Asp Asp Tyr Ile Glu His Ala Ala Ile Arg Ala Ile Glu Val Ala
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 Arg Asp Ile Ser Gly Gln Asp Lys Ile Asn Val Leu Gly Phe Cys Val
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 Ala Asp Thr Gly Ile Leu Asp Val Phe Val Asp Glu Gly His Val Gln
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 Asp Leu Val Trp Asn Tyr Val Val Asp Asn Tyr Leu Lys Gly Asn Thr
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 Pro Gly Pro Trp Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn
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 995 1000 1005
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| Arg Tyr | Arg Ala Ile Glu | Pro Ala Pro Gly Arg | Tyr Val Lys Ala | |
| 1070 | | 1075 | 1080 | |
| Lys Ala | His Met Val Leu | Ala Val Ala Ile Asp | Lys Arg Gly Gly | |
| 1085 | | 1090 | 1095 | |
| Gly Gly | Gly Leu Glu Ser | Val Ala Leu Thr Pro | His Ser Gly Met | |
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| Gly Leu | Glu Thr Arg Ala | Glu Thr Trp Met Ser | Ser Glu Gly Ala | |
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| Trp Lys | His Ala Gln Arg | Val Glu Ser Trp Ile | Leu Arg Asn Pro | |
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| Gly Phe | Ala Leu Leu Ala | Gly Phe Met Ala Tyr | Met Ile Gly Gln | |
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| Thr Gly | Ile Gln Arg Thr | Val Phe Phe Val Leu | Met Met Leu Val | |
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<400> 50

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Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
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Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
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Ser Ala Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
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Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
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Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
115 120 125

Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
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Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
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Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
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Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
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Asn Glu Thr Ile Tyr Thr Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
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Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
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Glu Leu Ser Phe Thr Val Val Ser Asn Gly Ala Lys Asn Ile Ser Gly
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| Val | His | Ser 355 | Gln | Gly | Arg | Glu | Ala 360 | Ala | Val | Ser | His | Leu 365 | Thr | Thr Leu |
| Ala | Thr 370 | Ile | Ser | Thr | Ser | Pro 375 | Gln | Ser | Leu | Thr | Thr 380 | Lys | Pro | Gly Pro |
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| His 465 | His | Gln | Asp | Thr | Gly 470 | Glu | Glu | Ser | Ala | Ser 475 | Ser | Gly | Lys | Leu Gly 480 |
| Leu | Ile | Thr | Asn | Thr 485 | Ile | Ala | Gly | Val | Ala 490 | Gly | Leu | Ile | Thr | Gly Gly 495 |
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Gln Ile Ile His Asp Phe Val Asp Lys Thr Leu Pro Asp Gln Gly Asp
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Asn Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala Gly Ile
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Gln Glu Gly Lys Ser Gln Pro Phe Lys Val Thr Pro Gly Pro Phe Asp
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Asn Gly His Ala Ala Ala Ser Gly Ile Pro Gly Leu Asp Ala Leu Ala
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Thr Arg Gln Arg Ile Arg Phe Ala Ile Ser Gln Trp Val Asp Ala Met
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Ser Pro Ala Asn Phe Leu Ala Thr Asn Pro Glu Ala Gln Arg Leu Leu
 835 840 845

Ile Glu Ser Gly Gly Glu Ser Leu Arg Ala Gly Val Arg Asn Met Met
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Glu Asp Leu Thr Arg Gly Lys Ile Ser Gln Thr Asp Glu Ser Ala Phe
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Glu Val Gly Arg Asn Val Ala Val Thr Glu Gly Ala Val Val Phe Glu
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Asn Glu Tyr Phe Gln Leu Leu Gln Tyr Lys Pro Leu Thr Asp Lys Val
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His Ala Arg Pro Leu Leu Met Val Pro Pro Cys Ile Asn Lys Tyr Tyr
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Ile Leu Asp Leu Gln Pro Glu Ser Ser Leu Val Arg His Val Val Glu
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Gln Gly His Thr Val Phe Leu Val Ser Trp Arg Asn Pro Asp Ala Ser
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Met Ala Gly Ser Thr Trp Asp Asp Tyr Ile Glu His Ala Ala Ile Arg
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Ala Ile Glu Val Ala Arg Asp Ile Ser Gly Gln Asp Lys Ile Asn Val
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Leu Gly Phe Cys Val Gly Gly Thr Ile Val Ser Thr Ala Leu Ala Val
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Leu Ala Ala Arg Gly Glu His Pro Ala Ala Ser Val Thr Leu Leu
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Val Asp Glu Gly His Val Gln Leu Arg Glu Ala Thr Leu Gly Gly
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Asn Thr Phe Ser Phe Leu Arg Pro Asn Asp Leu Val Trp Asn Tyr
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Val Val Asp Asn Tyr Leu Lys Gly Asn Thr Pro Val Pro Phe Asp
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Leu Leu Phe Trp Asn Gly Asp Ala Thr Asn Leu Pro Gly Pro Trp
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Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn Glu Leu Lys
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| | | | | | | | | | | | | | | |
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| Ser | Ile | Asp | Val | Pro | Thr | Tyr | Ile | Tyr | Gly | Ser | Arg | Glu | Asp | His |
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| Asn | Lys | Leu | Arg | Phe | Val | Leu | Gly | Ala | Ser | Gly | His | Ile | Ala | Gly |
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| Val | Ile | Asn | Pro | Pro | Ala | Lys | Asn | Lys | Arg | Ser | His | Trp | Thr | Asn |
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| Asp | Ala | Leu | Pro | Glu | Ser | Pro | Gln | Gln | Trp | Leu | Ala | Gly | Ala | Ile |
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| Glu | His | His | Gly | Ser | Trp | Trp | Pro | Asp | Trp | Thr | Ala | Trp | Leu | Ala |
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| Gly | Gln | Ala | Gly | Ala | Lys | Arg | Ala | Ala | Pro | Ala | Asn | Tyr | Gly | Asn |
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| Phe | Leu | Tyr | Asp | Arg | Leu | Ala | Ser | Thr | Val | Ile | Tyr | Arg | Gly | Val | |
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| Tyr | Thr | Glu | Asn | Thr | Ser | Ser | Tyr | Tyr | Ala | Thr | Ser | Tyr | Leu | Glu | |
| | 1490 | | | | | 1495 | | | | | 1500 | | | | |
| Tyr | Glu | Ile | Glu | Asn | Phe | Gly | Ala | Gln | His | Ser | Thr | Thr | Leu | Phe | |
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| Lys | Ile | Asp | Asn | Asn | Thr | Phe | Val | Arg | Leu | Asp | Arg | Pro | His | Thr | |
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| Lys | Asn | Leu | Ser | Glu | Gln | Leu | Arg | Gly | Glu | Glu | Leu | Ser | Phe | Glu | |
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| Ala | Leu | Ser | Leu | Asn | Glu | Thr | Glu | Asp | Asp | Asp | Ala | Ala | Ser | Ser | |
| | 1595 | | | | | 1600 | | | | | 1605 | | | | |
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| | | | | | | | | | | | | | | |
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| Thr | Ile | Gly | Ile | Arg | Pro | Ser | Ser | Ser | Gln | Ile | Pro | Ser | Ser | Ser |
| | 1685 | | | | | 1690 | | | | | 1695 | | | |
| Pro | Thr | Thr | Ala | Pro | Ser | Pro | Glu | Ala | Gln | Thr | Pro | Thr | Thr | His |
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| Thr | Ser | Gly | Pro | Ser | Val | Met | Ala | Thr | Glu | Glu | Pro | Thr | Thr | Pro |
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| Pro | Gly | Ser | Ser | Pro | Gly | Pro | Thr | Thr | Glu | Ala | Pro | Thr | Leu | Thr |
| | 1730 | | | | | 1735 | | | | | 1740 | | | |
| Thr | Pro | Glu | Asn | Ile | Thr | Thr | Ala | Val | Lys | Thr | Val | Leu | Pro | Gln |
| | 1745 | | | | | 1750 | | | | | 1755 | | | |
| Glu | Ser | Thr | Ser | Asn | Gly | Leu | Ile | Thr | Ser | Thr | Val | Thr | Gly | Ile |
| | 1760 | | | | | 1765 | | | | | 1770 | | | |
| Leu | Gly | Ser | Leu | Gly | Leu | Arg | Lys | Arg | Ser | Arg | Arg | Gln | Thr | Asn |
| | 1775 | | | | | 1780 | | | | | 1785 | | | |
| Thr | Lys | Ala | Thr | Gly | Lys | Cys | Asn | Pro | Asn | Leu | His | Tyr | Trp | Thr |
| | 1790 | | | | | 1795 | | | | | 1800 | | | |
| Ala | Gln | Glu | Gln | His | Asn | Ala | Ala | Gly | Ile | Ala | Trp | Ile | Pro | Tyr |
| | 1805 | | | | | 1810 | | | | | 1815 | | | |
| Phe | Gly | Pro | Gly | Ala | Glu | Gly | Ile | Tyr | Thr | Glu | Gly | Leu | Met | His |
| | 1820 | | | | | 1825 | | | | | 1830 | | | |
| Asn | Gln | Asn | Ala | Leu | Val | Cys | Gly | Leu | Arg | Gln | Leu | Ala | Asn | Glu |
| | 1835 | | | | | 1840 | | | | | 1845 | | | |
| Thr | Thr | Gln | Ala | Leu | Gln | Leu | Phe | Leu | Arg | Ala | Thr | Thr | Glu | Leu |
| | 1850 | | | | | 1855 | | | | | 1860 | | | |
| Arg | Thr | Tyr | Thr | Ile | Leu | Asn | Arg | Lys | Ala | Ile | Asp | Phe | Leu | Leu |
| | 1865 | | | | | 1870 | | | | | 1875 | | | |
| Arg | Arg | Trp | Gly | Gly | Thr | Cys | Arg | Ile | Leu | Gly | Pro | Asp | Cys | Cys |
| | 1880 | | | | | 1885 | | | | | 1890 | | | |
| Ile | Glu | Pro | His | Asp | Trp | Thr | Lys | Asn | Ile | Thr | Asp | Lys | Ile | Asn |
| | 1895 | | | | | 1900 | | | | | 1905 | | | |

Gln Ile Ile His Asp Phe Ile Asp Asn Pro Leu Pro Asn Gln Asp
1910 1915 1920

Asn Asp Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala
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Cys Val Cys Lys Leu Leu Cys
1955 1960

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

Asp Gln Leu Val Cys Lys Asp His Leu Ala Ser Thr Asp Gln Leu Lys
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Ser Val Gly Leu Asn Leu Glu Gly Ser Gly Val Ser Thr Asp Ile Pro
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Ser Ala Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
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Val Ser Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
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Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Pro Pro Pro Asp Gly
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 Val Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Ala Gln Gly Thr
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 Gly Pro Cys Pro Gly Asp Tyr Ala Phe His Lys Asp Gly Ala Phe Phe
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 Phe Val Arg Leu Asp Arg Pro His Thr Pro Gln Phe Leu Phe Gln Leu
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 Leu Ile Trp Thr Leu Asp Ala Asn Ile Asn Ala Asp Ile Gly Glu Trp
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 Ala Phe Trp Glu Asn Lys Lys Asn Leu Ser Glu Gln Leu Arg Gly Glu
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 Glu Gly Arg Arg Val Gly Val Asn Thr Gln Glu Thr Ile Thr Glu Thr
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 Pro Ser Val 435 Met Ala Thr Glu Glu 440 Pro Thr Thr Pro 445 Pro Gly Ser Ser
 Pro Gly 450 Pro Thr Thr Glu Ala 455 Pro Thr Leu Thr Thr 460 Pro Glu Asn Ile
 Thr 465 Thr Ala Val Lys Thr 470 Val Leu Pro Gln Glu 475 Ser Thr Ser Asn Gly 480
 Leu Ile Thr Ser Thr 485 Val Thr Gly Ile Leu 490 Gly Ser Leu Gly Leu 495 Arg
 Lys Arg Ser Arg 500 Arg Gln Thr Asn Thr 505 Lys Ala Thr Gly Lys 510 Cys Asn
 Pro Asn Leu 515 His Tyr Trp Thr Ala 520 Gln Glu Gln His Asn 525 Ala Ala Gly
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Gly Ile Thr Gly Ile Ile Ile Ala Ile Ile Ala Leu Leu Cys Val Cys
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 Lys Leu Leu Cys Thr Ser Ala Thr Gly Lys Gly Ala Ala Ala Ser Thr
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 Gln Glu Gly Lys Ser Gln Pro Phe Lys Val Thr Pro Gly Pro Phe Asp
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 Pro Ala Thr Trp Leu Glu Trp Ser Arg Gln Trp Gln Gly Thr Glu Gly
 705 710 715 720
 Asn Gly His Ala Ala Ala Ser Gly Ile Pro Gly Leu Asp Ala Leu Ala
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 Gly Val Lys Ile Ala Pro Ala Gln Leu Gly Asp Ile Gln Gln Arg Tyr
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 Met Lys Asp Phe Ser Ala Leu Trp Gln Ala Met Ala Glu Gly Lys Ala
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 Glu Ala Thr Gly Pro Leu His Asp Arg Arg Phe Ala Gly Asp Ala Trp
 770 775 780
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 Ala Arg Ala Leu Thr Glu Leu Ala Asp Ala Val Glu Ala Asp Ala Lys
 805 810 815
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 865 870 875 880
 Glu Val Gly Arg Asn Val Ala Val Thr Glu Gly Ala Val Val Phe Glu
 885 890 895
 Asn Glu Tyr Phe Gln Leu Leu Gln Tyr Lys Pro Leu Thr Asp Lys Val
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 His Ala Arg Pro Leu Leu Met Val Pro Pro Cys Ile Asn Lys Tyr Tyr
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 Ile Leu Asp Leu Gln Pro Glu Ser Ser Leu Val Arg His Val Val Glu
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930

935

940

Gln Gly His Thr Val Phe Leu Val Ser Trp Arg Asn Pro Asp Ala Ser
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 980 985 990

Leu Gly Phe Cys Val Gly Gly Thr Ile Val Ser Thr Ala Leu Ala Val
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Leu Ala Ala Arg Gly Glu His Pro Ala Ala Ser Val Thr Leu Leu
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Thr Thr Leu Leu Asp Phe Ala Asp Thr Gly Ile Leu Asp Val Phe
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Val Asp Glu Gly His Val Gln Leu Arg Glu Ala Thr Leu Gly Gly
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Asn Thr Phe Ser Phe Leu Arg Pro Asn Asp Leu Val Trp Asn Tyr
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Val Val Asp Asn Tyr Leu Lys Gly Asn Thr Pro Val Pro Phe Asp
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Leu Leu Phe Trp Asn Gly Asp Ala Thr Asn Leu Pro Gly Pro Trp
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Tyr Cys Trp Tyr Leu Arg His Thr Tyr Leu Gln Asn Glu Leu Lys
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Val Pro Gly Lys Leu Thr Val Cys Gly Val Pro Val Asp Leu Ala
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Ile Val Pro Trp Thr Ala Ala Tyr Ala Ser Thr Ala Leu Leu Ala
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Asn Lys Leu Arg Phe Val Leu Gly Ala Ser Gly His Ile Ala Gly
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Val Ile Asn Pro Pro Ala Lys Asn Lys Arg Ser His Trp Thr Asn
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| Glu | His 1220 | His | Gly | Ser | Trp | Trp 1225 | Pro | Asp | Trp | Thr | Ala 1230 | Trp | Leu | Ala |
| Gly | Gln 1235 | Ala | Gly | Ala | Lys | Arg 1240 | Ala | Ala | Pro | Ala | Asn 1245 | Tyr | Gly | Asn |
| Ala | Arg 1250 | Tyr | Arg | Ala | Ile | Glu 1255 | Pro | Ala | Pro | Gly | Arg 1260 | Tyr | Val | Lys |
| Ala | Lys 1265 | Ala | His | Met | Val | Leu 1270 | Ala | Val | Ala | Ile | Asp 1275 | Lys | Arg | Gly |
| Gly | Gly 1280 | Gly | Gly | Leu | Glu | Met 1285 | Gly | Val | Thr | Gly | Ile 1290 | Leu | Gln | Leu |
| Pro | Arg 1295 | Asp | Arg | Phe | Lys | Arg 1300 | Thr | Ser | Phe | Phe | Leu 1305 | Trp | Val | Ile |
| Ile | Leu 1310 | Phe | Gln | Arg | Thr | Phe 1315 | Ser | Ile | Pro | Leu | Gly 1320 | Val | Ile | His |
| Asn | Ser 1325 | Thr | Leu | Gln | Val | Ser 1330 | Asp | Val | Asp | Lys | Leu 1335 | Val | Cys | Arg |
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| Leu | Glu 1355 | Gly | Asn | Gly | Val | Ala 1360 | Thr | Asp | Val | Pro | Ser 1365 | Ala | Thr | Lys |
| Arg | Trp 1370 | Gly | Phe | Arg | Ser | Gly 1375 | Val | Pro | Pro | Lys | Val 1380 | Val | Asn | Tyr |
| Glu | Ala 1385 | Gly | Glu | Trp | Ala | Glu 1390 | Asn | Cys | Tyr | Asn | Leu 1395 | Glu | Ile | Lys |
| Lys | Pro 1400 | Asp | Gly | Ser | Glu | Cys 1405 | Leu | Pro | Ala | Ala | Pro 1410 | Asp | Gly | Ile |
| Arg | Gly 1415 | Phe | Pro | Arg | Cys | Arg 1420 | Tyr | Val | His | Lys | Val 1425 | Ser | Gly | Thr |
| Gly | Pro 1430 | Cys | Ala | Gly | Asp | Phe 1435 | Ala | Phe | His | Lys | Glu 1440 | Gly | Ala | Phe |
| Phe | Leu 1445 | Tyr | Asp | Arg | Leu | Ala 1450 | Ser | Thr | Val | Ile | Tyr 1455 | Arg | Gly | Thr |

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|-----|-------------|-----|-----|-----|-------------|-----|-----|-----|-----|-------------|-----|-----|-----|
| Thr | Phe 1460 | Ala | Glu | Gly | Val 1465 | Ala | Phe | Leu | Ile | Leu 1470 | Pro | Gln | Ala |
| Lys | Lys 1475 | Asp | Phe | Phe | Ser 1480 | His | Pro | Leu | Arg | Glu 1485 | Pro | Val | Asn |
| Ala | Thr 1490 | Glu | Asp | Pro | Ser 1495 | Gly | Tyr | Tyr | Ser | Thr 1500 | Thr | Ile | Arg |
| Tyr | Gln 1505 | Ala | Thr | Gly | Phe 1510 | Thr | Asn | Glu | Thr | Glu 1515 | Tyr | Leu | Phe |
| Glu | Val 1520 | Asp | Asn | Leu | Thr 1525 | Val | Gln | Leu | Glu | Ser 1530 | Arg | Phe | Thr |
| Pro | Gln 1535 | Phe | Leu | Leu | Gln 1540 | Asn | Glu | Thr | Ile | Tyr 1545 | Thr | Ser | Gly |
| Lys | Arg 1550 | Ser | Asn | Thr | Thr 1555 | Lys | Leu | Ile | Trp | Lys 1560 | Val | Asn | Pro |
| Glu | Ile 1565 | Asp | Thr | Thr | Ile 1570 | Glu | Trp | Ala | Phe | Trp 1575 | Glu | Thr | Lys |
| Lys | Asn 1580 | Leu | Thr | Arg | Lys 1585 | Arg | Ser | Glu | Glu | Leu 1590 | Ser | Phe | Thr |
| Val | Val 1595 | Ser | Asn | Gly | Ala 1600 | Asn | Ile | Ser | Gly | Gln 1605 | Ser | Pro | Ala |
| Arg | Thr 1610 | Ser | Ser | Asp | Pro 1615 | Thr | Asn | Thr | Thr | Thr 1620 | Glu | Asp | His |
| Lys | Ile 1625 | Met | Ala | Ser | Glu 1630 | Asn | Ser | Ser | Ala | Met 1635 | Val | Gln | Val |
| Ser | Gln 1640 | Gly | Arg | Glu | Ala 1645 | Val | Ser | His | Leu | Thr 1650 | Thr | Leu | Ala |
| Thr | Ile 1655 | Ser | Thr | Ser | Pro 1660 | Ser | Leu | Thr | Thr | Lys 1665 | Pro | Gly | Pro |
| Asp | Asn 1670 | Ser | Thr | His | Asn 1675 | Pro | Val | Tyr | Lys | Leu 1680 | Asp | Ile | Ser |
| Glu | Ala 1685 | Thr | Gln | Val | Glu 1690 | His | His | Arg | Arg | Thr 1695 | Asp | Asn | Asp |
| Ser | Thr 1700 | Ala | Ser | Asp | Thr 1705 | Ser | Ala | Thr | Thr | Ala 1710 | Ala | Gly | Pro |

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 Thr Gln Asp Glu Gly Ala Ala Ile Gly Leu Ala Trp Ile Pro Tyr
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 Phe Gly Pro Ala Ala Glu Gly Ile Tyr Ile Glu Gly Leu Met His
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 1880 1885 1890
 Ile Glu Pro His Asp Trp Thr Lys Asn Ile Thr Asp Lys Ile Asp
 1895 1900 1905
 Gln Ile Ile His Asp Phe Val Asp Lys Thr Leu Pro Asp Gln Gly
 1910 1915 1920
 Asp Asn Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala
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Val Ala Val Thr Glu Gly Ala Val Val Phe Glu Asn Glu Tyr Phe Gln
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Val Pro Ile Ser Ser Val Ala Ser Leu Asn Asp Leu Thr Pro Val Gly
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Arg Leu Val Thr Val Asn Pro Phe Val Ser Val Ala Thr Ala Asn Ala
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Lys Val Leu Ile Glu Leu Glu Pro Pro Phe Gly Asp Ser Tyr Ile Val
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Val Gly Arg Gly Glu Gln Gln Ile Asn His His Trp His Lys Ser Gly
995 1000 1005

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Gly Gly Ala Phe Arg Ser Leu Phe Gly Gly Met Ser Trp Ile Thr
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Gln Gly Leu Leu Gly Ala Leu Leu Leu Trp Met Gly Ile Asn Ala
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