

20 40 60 80 100 120 140 160 180 200  
 proto Wuhan TACCTCCAGGATCAACAACCAACCACTTCGATCTCTGTAGATCTGTCTCTAAACGAACCTTAAATCTGTGGCTGCTCACTGGGCTGATCTTGTAGTCACTACGGAGTATAATTAATAAATAAATCTGCTGCTGCACGACGAGCAAGCTGCTGCTCTCTGACGGTCTACGGTCTGCTGCTT 200  
 Translation ORF/CDS ..... 158  
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 proto Gamma ..... 558  
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 proto Delta ..... 800  
 Translation ORF/CDS ..... 758  
 proto Alpha ..... 775  
 Translation ORF/CDS ..... 778  
 proto Beta ..... 758  
 Translation ORF/CDS ..... 774  
 proto Gamma ..... 758  
 Translation ORF/CDS ..... 762  
 proto Delta ..... 1000  
 Translation ORF/CDS ..... 958  
 proto Alpha ..... 975  
 Translation ORF/CDS ..... 978  
 proto Beta ..... 958  
 Translation ORF/CDS ..... 974  
 proto Gamma ..... 958  
 Translation ORF/CDS ..... 962  
 proto Delta ..... 1200  
 Translation ORF/CDS ..... 1158  
 proto Alpha ..... 1175  
 Translation ORF/CDS ..... 1178  
 proto Beta ..... 1158  
 Translation ORF/CDS ..... 1174  
 proto Gamma ..... 1158  
 Translation ORF/CDS ..... 1162  
 proto Delta ..... 1400  
 Translation ORF/CDS ..... 1358  
 proto Alpha ..... 1375  
 Translation ORF/CDS ..... 1378  
 proto Beta ..... 1358  
 Translation ORF/CDS ..... 1374  
 proto Gamma ..... 1358  
 Translation ORF/CDS ..... 1362  
 proto Delta ..... 1600  
 Translation ORF/CDS ..... 1558  
 proto Alpha ..... 1575  
 Translation ORF/CDS ..... 1578  
 proto Beta ..... 1558  
 Translation ORF/CDS ..... 1574  
 proto Gamma ..... 1558  
 Translation ORF/CDS ..... 1562  
 proto Delta ..... 1558  
 Translation ORF/CDS ..... 1562



3220 3240 3260 3280 3300 3320 3340 3360 3380 3400

proto Wuhan ATAGTCAACAACCTGGTTCACACAGCGCAGTGGACCAACACACACTACTTCAACAATGTTGAGGTCAACTCAATAGAGATGGAACTTACACAGCTTGCAGACTTGAAGTGAATGTTAGTGGTATTAAACACTGACGAATGTATACATATAAATGGACACATTGGCAAGAACT 3400  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3358  
proto Alpha  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3375  
proto Beta  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3378  
proto Gamma  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3358  
proto Delta  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3374  
proto Lambda  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3358  
proto MuGH  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3362  
proto Omicron  
Translation ORF/CDS D S Q Q T V G Q Q D G S E D N Q T T T I Q T I V E V Q P Q L E M E L T P V V Q T I E V N S F S G Y L K L T D N V Y I K N A D I V E E A

3420 3440 3460 3480 3500 3520 3540 3560 3580 3600

proto Wuhan AAAAGGTAAACCAACCTGCTTGAATCGACCAATGTTTACCTTAAACATGGAGAGCTGTTCCAGAGCTTAAATAGGCTACTAACATGCCATCGAAGTGAATCGATGATACATAGCTAATGACCACTAAAGTGGTGGTATGTTGTTTAAAGCGACACATCTGCTAAACACTGTTCTCA 3600  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3558  
proto Alpha  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3575  
proto Beta  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3578  
proto Gamma  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3578  
proto Delta  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3574  
proto Lambda  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3558  
proto MuGH  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3562  
proto Omicron  
Translation ORF/CDS K K V K P T V V V N A A N V Y L K H G G G V A G A L N K A T N N A M Q V E S D D Y I A T N G P L K V G G S C V L S G H N L A K H C L H

3800  
proto Wuhan TGTTCGGCCCAATCTTAAACAAGCTGAAGCACTCACTCTTAAGACTGCTTAAATAATTTTAAACAGCAACTTCTACTGGCACTATTATCACTGGTATTTTGGTGGACCTATACATCTTAAAGACTTCTTGAAGACTGTCGCACAACTGCTACTACTGCTGTTGATAAAATCTCT 3800  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3758  
proto Alpha  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3775  
proto Beta  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3778  
proto Gamma  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3758  
proto Delta  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3774  
proto Lambda  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3758  
proto MuGH  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3762  
proto Omicron  
Translation ORF/CDS V V G P N V N K G E D I Q L L K S A Y E N F N Q H E V L L A P L L S A G I F G A D P I H S L R V C V D T V R T N V Y L A V F D K N L

3820 3840 3860 3880 3900 3920 3940 3960 4000

proto Wuhan ATGCAACAACCTGTTTCAAGCTTTTGAAGTGAAGACTGAAACAAGCTGAAACAAGCTGCTGAGACTTCTAAAGAGCAACTTAACTGAAAGTAAAGCTTAACTGAAAGTAAAGCTTCAAGTGAACAGAAAACAAGACTGAAAGAAATCAAGACTGTTGTAAGAACTTGGGAAGAACTAACTGCTCTCA 4000  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E T K F L

3958  
proto Alpha  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E T K F L

3975  
proto Beta  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E T K F L

3978  
proto Gamma  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E T K F L

3958  
proto Delta  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E T K F L

3974  
proto Lambda  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E I K F L

3958  
proto MuGH  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E T K F L

3962  
proto Omicron  
Translation ORF/CDS Y D K L V S S F L E M K S E K Q V E Q K I A E I P K E E V K P F I T E S K P S V E Q R K Q D D K K I K A C V E E V T T T L E E T K F L

4020 4040 4060 4080 4100 4120 4140 4160 4180 4200

proto Wuhan ACAGAAAACCTGTTACTTTATTTGACATTAAGCAACTCTTCCAGACTGCTGTTGATGACACTGACACTCTTTTAAAGAAAAGTGGTCCATATATAGTGGTCACTGTTTCAAGAGGTTTAACTGCTGGTATACCTACTAAAGAGCTGGTGAACACTGAAATGCTGACGAAAG 4200  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K A G G T T E M L A K A

4158  
proto Alpha  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K A G G T T E M L A K A

4175  
proto Beta  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K A G G T T E M L A K A

4178  
proto Gamma  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K A G G T T E M L A K A

4158  
proto Delta  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K S G G T T E M L A K A

4174  
proto Lambda  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K A G G T T E M L A K A

4158  
proto MuGH  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K A G G T T E M L A K A

4162  
proto Omicron  
Translation ORF/CDS T E N L L L Y I D I N G N L H P D S A T L V S D I D I T F L K K D A P Y I V G D V V Q E G V L T A V V I P T K K A G G T T E M L A K A

4220 4240 4260 4280 4300 4320 4340 4360 4380 4400

proto Wuhan TTTGACCAACCAACCTGTTTCAAGCTTTTGAAGTGAAGACTGAAACAAGCTGAAACAAGCTGCTGAGACTTCTAAAGAGCAACTTAACTGAAAGTAAAGCTTCAAGTGAACAGAAAACAAGACTGAAAGAAATCAAGACTGTTGTAAGAACTTGGGAAGAACTAACTGCTCA 4400  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4358  
proto Alpha  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4375  
proto Beta  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4378  
proto Gamma  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4358  
proto Delta  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4374  
proto Lambda  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4358  
proto MuGH  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4362  
proto Omicron  
Translation ORF/CDS L R K V P T D N Y I T T Y P G Q G L N G Y T V E E A K T V L K K C K S A F Y I L P S I I S N E K Q E I L G T V S W N L R E M L A H A

4420 4440 4460 4480 4500 4520 4540 4560 4580 4600

proto Wuhan AAGAACAACCAACCTGTTTCAAGCTTTTGAAGTGAAGACTGAAACAAGCTGAAACAAGCTGCTGAGACTTCTAAAGAGCAACTTAACTGAAAGTAAAGCTTCAAGTGAACAGAAAACAAGACTGAAAGAAATCAAGACTGTTGTAAGAACTTGGGAAGAACTAACTGCTCA 4600  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4558  
proto Alpha  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4575  
proto Beta  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4578  
proto Gamma  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4558  
proto Delta  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4574  
proto Lambda  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4558  
proto MuGH  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4562  
proto Omicron  
Translation ORF/CDS E E T R K L M P V C V E T K A I V S T I Q R K Y K G I K I Q E G V V D Y G A R F Y F Y T S K T T V A S L I N T L N D L N E T L V T M P

4800  
proto Wuhan CTGCTCTTAAACACATGCTTAAAGCAAGCTGCTGGTATATACACTCTTAAAGTCCAGCTACTTCTTCTTCACTGATGCTTACACGGTAAAGTGTATCTTCTCTTCTTAAAGCACTGAAAGCAACTTAAAGCAACTGCTGCTGCTTCCGTAAGAACTGGCTCTCA 4800  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y

4758  
proto Alpha  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y

4775  
proto Beta  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y

4778  
proto Gamma  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y

4758  
proto Delta  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y

4774  
proto Lambda  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y

4758  
proto MuGH  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y

4762  
proto Omicron  
Translation ORF/CDS L G Y V T H G L N L E E A A R Y M R S L K V P A T V S V S S P D A V T A Y N G Y L T S S S K T P E E H F I E T I S L A G S Y K D W S Y



6,420 6,440 6,460 6,480 6,500 6,520 6,540 6,560 6,580 6,600

proto Wuhan  
Translation ORF/CDS CAAGTACTGGAAATCTACATACAGAAAGCCTTCTGACTGTAACTGCAAACTACCGAAGTCTGAGGACACTTAACTTAACCCAGCAAAATAGTCTTAAAAAATCAGACAAGGCTGGCCACACAGACTTAAGTGGCTGCTTATGACAACTTCTAGCTCTTACTTAAGAAKCTTAAGTACTAGACT 6600

proto Alpha  
Translation ORF/CDS EVVENPTTIQKDVLECNVKTTEEVVGDIIILKPAANNSLKITEEVGHTDLMMAAYVDNSSLTIKKNELSRV 6558

proto Beta  
Translation ORF/CDS EVVENPTTIQKDVLECNVKTTEEVVGDIIILKPAANNSLKITEEVGHTDLMMAAYVDNSSLTIKKNELSRV 6575

proto Gamma  
Translation ORF/CDS EVVENPTTIQKDVLECNVKTTEEVVGDIIILKPAANNSLKITEEVGHTDLMMAAYVDNSSLTIKKNELSRV 6578

proto Delta  
Translation ORF/CDS EVVENPTTIQKDVLECNVKTTEEVVGDIIILKPAANNSLKITEEVGHTDLMMAAYVDNSSLTIKKNELSRV 6558

proto Lambda  
Translation ORF/CDS EVVENPTTIQKDVLECNVKTTEEVVGDIIILKPAANNSLKITEEVGHTDLMMAAYVDNSSLTIKKNELSRV 6574

proto MuGH  
Translation ORF/CDS EVVENPTTIQKDVLECNVKTTEEVVGDIIILKPAANNSLKITEEVGHTDLMMAAYVDNSSLTIKKNELSRV 6558

proto Omicron  
Translation ORF/CDS EVVENPTTIQKDVLECNVKTTEEVVGDIIILKPAANNSLKITEEVGHTDLMMAAYVDNSSLTIKKNELSRV 6559

6,620 6,640 6,660 6,680 6,700 6,720 6,740 6,760 6,780 6,800

proto Wuhan  
Translation ORF/CDS ATTAGTCTTGAACCCCTGCTACTCATGCTTACCTGCTTAACTGCTCCCTGGGACTATGCTAACTAAGCTTCTTCAACAAGTCTTACTGACAACTAACACTAGTCTACAGGCTTTAAACCGTCTTGTACTAACTATATGCTCTTACTTATGCTACAATGCTACTTTTA 6800

proto Alpha  
Translation ORF/CDS LGLKTLATHGLAAAVNSVPPWDTIANYAKPFLNKVVSTTTNNIVTRCLNRRVCTNYMPYFFFTLLLQLCTF 6758

proto Beta  
Translation ORF/CDS LGLKTLATHGLAAAVNSVPPWDTIANYAKPFLNKVVSTTTNNIVTRCLNRRVCTNYMPYFFFTLLLQLCTF 6775

proto Gamma  
Translation ORF/CDS LGLKTLATHGLAAAVNSVPPWDTIANYAKPFLNKVVSTTTNNIVTRCLNRRVCTNYMPYFFFTLLLQLCTF 6778

proto Delta  
Translation ORF/CDS LGLKTLATHGLAAAVNSVPPWDTIANYAKPFLNKVVSTTTNNIVTRCLNRRVCTNYMPYFFFTLLLQLCTF 6758

proto Lambda  
Translation ORF/CDS LGLKTLATHGLAAAVNSVPPWDTIANYAKPFLNKVVSTTTNNIVTRCLNRRVCTNYMPYFFFTLLLQLCTF 6774

proto MuGH  
Translation ORF/CDS LGLKTLATHGLAAAVNSVPPWDTIANYAKPFLNKVVSTTTNNIVTRCLNRRVCTNYMPYFFFTLLLQLCTF 6758

proto Omicron  
Translation ORF/CDS LGLKTLATHGLAAAVNSVPPWDTIANYAKPFLNKVVSTTTNNIVTRCLNRRVCTNYMPYFFFTLLLQLCTF 6759

6,820 6,840 6,860 6,880 6,900 6,920 6,940 6,960 6,980 7,000

proto Wuhan  
Translation ORF/CDS CTCAGAATCAAACTAGAAATTAAGCATCTGCGGCTACTATAGCAAGAATCTTAAAGCTTCGCTAAATTTCTCAGCGCTCATTAATTTATTTGAGCTCAATAATTAATAATTTGGTCTTACTTAACTGTTGGCTAGCTTTAACTCTCAACCGCTCT 7000

proto Alpha  
Translation ORF/CDS TRSTNSRIKASMPPTTIAKNTVKS V G K F C L E A S F N Y L K S P N F S K L I N I I W F L L L S V C L G S L I Y S T A A 6958

proto Beta  
Translation ORF/CDS TRSTNSRIKASMPPTTIAKNTVKS V G K F C L E A S F N Y L K S P N F S K L I N I I W F L L L S V C L G S L I Y S T A A 6975

proto Gamma  
Translation ORF/CDS TRSTNSRIKASMPPTTIAKNTVKS V G K F C L E A S F N Y L K S P N F S K L I N I I W F L L L S V C L G S L I Y S T A A 6978

proto Delta  
Translation ORF/CDS TRSTNSRIKASMPPTTIAKNTVKS V G K F C L E A S F N Y L K S P N F S K L I N I I W F L L L S V C L G S L I Y S T A A 6958

proto Lambda  
Translation ORF/CDS TRSTNSRIKASMPPTTIAKNTVKS V G K F C L E A S F N Y L K S P N F S K L I N I I W F L L L S V C L G S L I Y S T A A 6974

proto MuGH  
Translation ORF/CDS TRSTNSRIKASMPPTTIAKNTVKS V G K F C L E A S F N Y L K S P N F S K L I N I I W F L L L S V C L G S L I Y S T A A 6958

proto Omicron  
Translation ORF/CDS TRSTNSRIKASMPPTTIAKNTVKS V G K F C L E A S F N Y L K S P N F S K L I N I I W F L L L S V C L G S L I Y S T A A 6959

7,020 7,040 7,060 7,080 7,100 7,120 7,140 7,160 7,180 7,200

proto Wuhan  
Translation ORF/CDS TTAGCTGTTTAAATGCTAATTAGGACTGCTTCTTACTGCTGCTTACAGAGAGGCTATTGCACTCTACTAATCTGCAACTACTGCTTGGCACTACTGCTGCTTCTATACCTCTGATGCTTCTTCTAGCTGGTGTAGATTCTTACAGAACTTACCTCTTGTAGAACCTATACAAATACCAATTCATCTTTAATG 7200

proto Alpha  
Translation ORF/CDS LGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSI PC SV CLSGLD SLD T Y P S L E T I Q I T I S S F K W 7158

proto Beta  
Translation ORF/CDS LGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSI PC SV CLSGLD SLD T Y P S L E T I Q I T I S S F K W 7175

proto Gamma  
Translation ORF/CDS LGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSI PC SV CLSGLD SLD T Y P S L E T I Q I T I S S F K W 7178

proto Delta  
Translation ORF/CDS LGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSI PC SV CLSGLD SLD T Y P S L E T I Q I T I S S F K W 7158

proto Lambda  
Translation ORF/CDS LGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSI PC SV CLSGLD SLD T Y P S L E T I Q I T I S S F K W 7174

proto MuGH  
Translation ORF/CDS LGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSI PC SV CLSGLD SLD T Y P S L E T I Q I T I S S F K W 7158

proto Omicron  
Translation ORF/CDS LGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSI PC SV CLSGLD SLD T Y P S L E T I Q I T I S S F K W 7159

7,220 7,240 7,260 7,280 7,300 7,320 7,340 7,360 7,380 7,400

proto Wuhan  
Translation ORF/CDS GGATTTAAGCTTTGGCTTACTGCGAGAGTGTTTGGCATATCTTTCTCACTAGTTTCTGATCTAGTGGTGGCGCAATCAATGATTTTTCAGCTATTTCGAGTACATTTATTAAGTAATCTTGGCTTATGGTAAATTAATCTTGCACAAGCCGCCATTCAGCTATGTAGAA 7400

proto Alpha  
Translation ORF/CDS DLTAFLGLVAEWF LAY I L F T R F F Y V L G L A A I M Q L F F S Y F A V H F I S N S W L M W L I I N L V Q M A P I S A M V R 7358

proto Beta  
Translation ORF/CDS DLTAFLGLVAEWF LAY I L F T R F F Y V L G L A A I M Q L F F S Y F A V H F I S N S W L M W L I I N L V Q M A P I S A M V R 7375

proto Gamma  
Translation ORF/CDS DLTAFLGLVAEWF LAY I L F T R F F Y V L G L A A I M Q L F F S Y F A V H F I S N S W L M W L I I N L V Q M A P I S A M V R 7378

proto Delta  
Translation ORF/CDS DLTAFLGLVAEWF LAY I L F T R F F Y V L G L A A I M Q L F F S Y F A V H F I S N S W L M W L I I N L V Q M A P I S A M V R 7358

proto Lambda  
Translation ORF/CDS DLTAFLGLVAEWF LAY I L F T R F F Y V L G L A A I M Q L F F S Y F A V H F I S N S W L M W L I I N L V Q M A P I S A M V R 7374

proto MuGH  
Translation ORF/CDS DLTAFLGLVAEWF LAY I L F T R F F Y V L G L A A I M Q L F F S Y F A V H F I S N S W L M W L I I N L V Q M A P I S A M V R 7358

proto Omicron  
Translation ORF/CDS DLTAFLGLVAEWF LAY I L F T R F F Y V L G L A A I M Q L F F S Y F A V H F I S N S W L M W L I I N L V Q M A P I S A M V R 7359

7,420 7,440 7,460 7,480 7,500 7,520 7,540 7,560 7,580 7,600

proto Wuhan  
Translation ORF/CDS TGCACTCTCTTCCGACTTATATATGATGCAAGAACTGATGCGCTGCTAGACGCTGTAATCCACCACTTATGATGCTTCAACAAGCTATAGACAGCAAGCAAGCTGCAATGCACTATGTTAGTGGTGTAGAAAGTCTTTATGCTTGTAGAAAGCTCTTTATGCTTGTAGAAAGCTGGCGAACTCACAACT 7600

proto Alpha  
Translation ORF/CDS M Y I F F A S F Y Y V W K S Y V H V V D G C N S S T C M M C Y K R N R A T R V E C T T I V N G V R R S F Y V Y A N G G K G F C K L H N 7558

proto Beta  
Translation ORF/CDS M Y I F F A S F Y Y V W K S Y V H V V D G C N S S T C M M C Y K R N R A T R V E C T T I V N G V R R S F Y V Y A N G G K G F C K L H N 7575

proto Gamma  
Translation ORF/CDS M Y I F F A S F Y Y V W K S Y V H V V D G C N S S T C M M C Y K R N R A T R V E C T T I V N G V R R S F Y V Y A N G G K G F C K L H N 7578

proto Delta  
Translation ORF/CDS M Y I F F A S F Y Y V W K S Y V H V V D G C N S S T C M M C Y K R N R A T R V E C T T I V N G V R R S F Y V Y A N G G K G F C K L H N 7558

proto Lambda  
Translation ORF/CDS M Y I F F A S F Y Y V W K S Y V H V V D G C N S S T C M M C Y K R N R A T R V E C T T I V N G V R R S F Y V Y A N G G K G F C K L H N 7574

proto MuGH  
Translation ORF/CDS M Y I F F A S F Y Y V W K S Y V H V V D G C N S S T C M M C Y K R N R A T R V E C T T I V N G V R R S F Y V Y A N G G K G F C K L H N 7558

proto Omicron  
Translation ORF/CDS M Y I F F A S F Y Y V W K S Y V H V V D G C N S S T C M M C Y K R N R A T R V E C T T I V N G V R R S F Y V Y A N G G K G F C K L H N 7559

7,620 7,640 7,660 7,680 7,700 7,720 7,740 7,760 7,780 7,800

proto Wuhan  
Translation ORF/CDS TCGAATCTGTTAATGCTATCTGCTGCTGCTAGTACTATTTAGTGTAGAACTGGCGAGAGCTGCTCACTACAGTTTAAAGACCAATTAATCTCATCGCCACTCTTCTTACACTGTTTACAGTGAAGAACTGCTCCATCTTACTTGTATGAAGCTGCTGAAAGACTTATGAAGACA 7800

proto Alpha  
Translation ORF/CDS W N C V N C D T F C A G S T F F I S D E V A R D L S L Q F K R P I N P T D Q S S Y I V D S V T V K N G S I H L Y F D K A G Q K T Y E R H 7758

proto Beta  
Translation ORF/CDS W N C V N C D T F C A G S T F F I S D E V A R D L S L Q F K R P I N P T D Q S S Y I V D S V T V K N G S I H L Y F D K A G Q K T Y E R H 7775

proto Gamma  
Translation ORF/CDS W N C V N C D T F C A G S T F F I S D E V A R D L S L Q F K R P I N P T D Q S S Y I V D S V T V K N G S I H L Y F D K A G Q K T Y E R H 7778

proto Delta  
Translation ORF/CDS W N C V N C D T F C A G S T F F I S D E V A R D L S L Q F K R P I N P T D Q S S Y I V D S V T V K N G S I H L Y F D K A G Q K T Y E R H 7758

proto Lambda  
Translation ORF/CDS W N C V N C D T F C A G S T F F I S D E V A R D L S L Q F K R P I N P T D Q S S Y I V D S V T V K N G S I H L Y F D K A G Q K T Y E R H 7774

proto MuGH  
Translation ORF/CDS W N C V N C D T F C A G S T F F I S D E V A R D L S L Q F K R P I N P T D Q S S Y I V D S V T V K N G S I H L Y F D K A G Q K T Y E R H 7758

proto Omicron  
Translation ORF/CDS W N C V N C D T F C A G S T F F I S D E V A R D L S L Q F K R P I N P T D Q S S Y I V D S V T V K N G S I H L Y F D K A G Q K T Y E R H 7759

7,820 7,840 7,860 7,880 7,900 7,920 7,940 7,960 7,980 8,000

proto Wuhan  
Translation ORF/CDS TTCTCTCTCAATTTTCTAGACAACCTCAGACTAAACACTAAAGCTTACTGCTAATTAATGTTATGTTTTCAGTAACTCAAAATCTGAGCAACTCTGCAAAATCAGGCTCTTCTTACTACACTGCTTCTGCTCAACTACTGCTTACTAGTAGAGCACTACTGCTGATGTTGGTGA 8000

proto Alpha  
Translation ORF/CDS S L S H F V N L D N L R A N N T K G S L P I N V I V F D G K S K C E E S S A K S A S V Y Y S Q L M C Q P I L L L D Q A L V S D V G D 7958

proto Beta  
Translation ORF/CDS S L S H F V N L D N L R A N N T K G S L P I N V I V F D G K S K C E E S S A K S A S V Y Y S Q L M C Q P I L L L D Q A L V S D V G D 7975

proto Gamma  
Translation ORF/CDS S L S H F V N L D N L R A N N T K G S L P I N V I V F D G K S K C E E S S A K S A S V Y Y S Q L M C Q P I L L L D Q A L V S D V G D 7978

proto Delta  
Translation ORF/CDS S L S H F V N L D N L R A N N T K G S L P I N V I V F D G K S K C E E S S A K S A S V Y Y S Q L M C Q P I L L L D Q A L V S D V G D 7958

proto Lambda  
Translation ORF/CDS S L S H F V N L D N L R A N N T K G S L P I N V I V F D G K S K C E E S S A K S A S V Y Y S Q L M C Q P I L L L D Q A L V S D V G D 7974

proto MuGH  
Translation ORF/CDS S L S H F V N L D N L R A N N T K G S L P I N V I V F D G K S K C E E S S A K S A S V Y Y S Q L M C Q P I L L L D Q A L V S D V G D 7958

proto Omicron  
Translation ORF/CDS S L S H F V N L D N L R A N N T K G S L P I N V I V F D G K S K C E E S S A K S A S V Y Y S Q L M C Q P I L L L D Q A L V S D V G D 7959



9,620 9,640 9,660 9,680 9,700 9,720 9,740 9,760 9,780 9,800
proto Wuhan Translation ORF/CDS TACTAATGATGTTCTTTTACACATATTCACTGGATGTTGTTCACACCTTACTACCTTCGTGATACAACTCTTATACATTTGTATTCCACAAAGCATCTTACTGGTCTTTAGTAATCACTAAAGACAGCTGAGTCTTTAATGCTGTTACCTTTTGAAGAGCTCGCTGCACCT 9800
TNDVSFLAHIQWVVMMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVVSFSTFEAAALCT
9758
proto Alpha Translation ORF/CDS TNDVSFLAHIQWVVMMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVVSFSTFEAAALCT
9775
proto Beta Translation ORF/CDS TNDVSFLAHIQWVVMMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVVSFSTFEAAALCT
9778
proto Gamma Translation ORF/CDS TNDVSFLAHIQWVVMMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVVSFSTFEAAALCT
9758
proto Delta Translation ORF/CDS TNDVSFLAHIQWVVMMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVVSFSTFEAAALCT
9774
proto Lambda Translation ORF/CDS TNDVSFLAHIQWVVMMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVVSFSTFEAAALCT
9758
proto MuGH Translation ORF/CDS TNDVSFLAHIQWVVMMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVVSFSTFEAAALCT
9759
9,820 9,840 9,860 9,880 9,900 9,920 9,940 9,960 9,980 10,000
proto Wuhan Translation ORF/CDS TTTTGTAAATAAGAAGTGTACTAAAGTGGCTAGTGTGCTTACCTACCGAATAAATAGTACTAGCTTTTAAATAAGACAGTATTTAGTGAGCAATGGATGACAACTAGCTACAGAAAGCTGCTTGTGTCTGCGAAGGCTCTCAATGACTCAGTAACCTCAGTTCGTTGATCTCT 10000
FLLNKEMYLKLRSDVLLPLLTQYNRYLALYNYKYKVFSGAMD TTSYREAAACCHLAKALNDFFSNVSGSDVL
9958
proto Alpha Translation ORF/CDS FLLNKEMYLKLRSVLLPLLTQYNRYLALYNYKYKVFSGAMD TTSYREAAACCHLAKALNDFFSNVSGSDVL
9975
proto Beta Translation ORF/CDS FLLNKEMYLKLRSVLLPLLTQYNRYLALYNYKYKVFSGAMD TTSYREAAACCHLAKALNDFFSNVSGSDVL
9978
proto Gamma Translation ORF/CDS FLLNKEMYLKLRSVLLPLLTQYNRYLALYNYKYKVFSGAMD TTSYREAAACCHLAKALNDFFSNVSGSDVL
9958
proto Delta Translation ORF/CDS FLLNKEMYLKLRSVLLPLLTQYNRYLALYNYKYKVFSGAMD TTSYREAAACCHLAKALNDFFSNVSGSDVL
9974
proto Lambda Translation ORF/CDS FLLNKEMYLKLRSVLLPLLTQYNRYLALYNYKYKVFSGAMD TTSYREAAACCHLAKALNDFFSNVSGSDVL
9958
proto MuGH Translation ORF/CDS FLLNKEMYLKLRSVLLPLLTQYNRYLALYNYKYKVFSGAMD TTSYREAAACCHLAKALNDFFSNVSGSDVL
9959
9,020 9,040 9,060 9,080 9,100 9,120 9,140 9,160 9,180 9,200
proto Wuhan Translation ORF/CDS TACCACCAACAACCTCTACCTACCTCTTTCCAGAGCTTTAGAAAATGGTCCCTCTCTGTAAGTTCAGCGTTGTGTGACAACTAGTCTGGTACAACTACCTAACGCTCTTGGCTGTAGCAGTCTTACTCTCAAGACATGTATCTGCACTCTGAACACTCTTAACTAACTAA 10200
YQPPQTSITSAVLQSGFRKMAFFPSGKVEGCMVQVTCGTTTLNGLWLDVVYCPRHVIC TSEDMLNPN
10158
proto Alpha Translation ORF/CDS YQPPQTSITSAVLQSGFRKMAFFPSGKVEGCMVQVTCGTTTLNGLWLDVVYCPRHVIC TSEDMLNPN
10175
proto Beta Translation ORF/CDS YQPPQTSITSAVLQSGFRKMAFFPSGKVEGCMVQVTCGTTTLNGLWLDVVYCPRHVIC TSEDMLNPN
10178
proto Gamma Translation ORF/CDS YQPPQTSITSAVLQSGFRKMAFFPSGKVEGCMVQVTCGTTTLNGLWLDVVYCPRHVIC TSEDMLNPN
10158
proto Delta Translation ORF/CDS YQPPQTSITSAVLQSGFRKMAFFPSGKVEGCMVQVTCGTTTLNGLWLDVVYCPRHVIC TSEDMLNPN
10174
proto Lambda Translation ORF/CDS YQPPQTSITSAVLQSGFRKMAFFPSGKVEGCMVQVTCGTTTLNGLWLDVVYCPRHVIC TSEDMLNPN
10158
proto MuGH Translation ORF/CDS YQPPQTSITSAVLQSGFRKMAFFPSGKVEGCMVQVTCGTTTLNGLWLDVVYCPRHVIC TSEDMLNPN
10159
9,220 9,240 9,260 9,280 9,300 9,320 9,340 9,360 9,380 9,400
proto Wuhan Translation ORF/CDS TTTAAGAACTACTCATTGAAGTAACTAAATTTCTGGTACAGGCTGGTAACTTCACCTCAGGTTATTGACATTCATGCAAAATGGTGTACTAAGCTAAGGTTGATACAGCAATCTAAGACACTAAGTAAAGTTTGGCTCCTCAACGAGACAGACTTTTCAGTCTAGCTGTTAACTAAT 10400
YEDLLIRKSNHNFVLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTF S V L A C Y N
10358
proto Alpha Translation ORF/CDS YEDLLIRKSNHNFVLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTF S V L A C Y N
10375
proto Beta Translation ORF/CDS YEDLLIRKSNHNFVLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTF S V L A C Y N
10378
proto Gamma Translation ORF/CDS YEDLLIRKSNHNFVLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTF S V L A C Y N
10358
proto Delta Translation ORF/CDS YEDLLIRKSNHNFVLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTF S V L A C Y N
10374
proto Lambda Translation ORF/CDS YEDLLIRKSNHNFVLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTF S V L A C Y N
10358
proto MuGH Translation ORF/CDS YEDLLIRKSNHNFVLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTF S V L A C Y N
10359
9,420 9,440 9,460 9,480 9,500 9,520 9,540 9,560 9,580 9,600
proto Wuhan Translation ORF/CDS GTTACCACCTGGTGTTCACAATGCTGTAGGCGCAATTTCACTAAATTAAGGTTTCTTCCTTCAAGTTCATGTTGATGTTTAAACAGATATGACTGTCTCTTTTGTACATGCACCATGCAATTACCAACTGGAGTATGCTGGCAGACAGCTAGAAGTAAGTCTTATGACCTTTGTT 10600
GSPSGVYQCAMRPNFTTIKGSFLNGSCG SVGFNIDYDCV SFCYMHMMELPTGVHAGTDLEGNFYGFV
10558
proto Alpha Translation ORF/CDS GSPSGVYQCAMRPNFTTIKGSFLNGSCG SVGFNIDYDCV SFCYMHMMELPTGVHAGTDLEGNFYGFV
10575
proto Beta Translation ORF/CDS GSPSGVYQCAMRPNFTTIKGSFLNGSCG SVGFNIDYDCV SFCYMHMMELPTGVHAGTDLEGNFYGFV
10578
proto Gamma Translation ORF/CDS GSPSGVYQCAMRPNFTTIKGSFLNGSCG SVGFNIDYDCV SFCYMHMMELPTGVHAGTDLEGNFYGFV
10558
proto Delta Translation ORF/CDS GSPSGVYQCAMRPNFTTIKGSFLNGSCG SVGFNIDYDCV SFCYMHMMELPTGVHAGTDLEGNFYGFV
10574
proto Lambda Translation ORF/CDS GSPSGVYQCAMRPNFTTIKGSFLNGSCG SVGFNIDYDCV SFCYMHMMELPTGVHAGTDLEGNFYGFV
10558
proto MuGH Translation ORF/CDS GSPSGVYQCAMRPNFTTIKGSFLNGSCG SVGFNIDYDCV SFCYMHMMELPTGVHAGTDLEGNFYGFV
10559
9,620 9,640 9,660 9,680 9,700 9,720 9,740 9,760 9,780 9,800
proto Wuhan Translation ORF/CDS CACAGCACAACAGGCAAGCTGGTACGGCAACTATTACAGTAACTGTTTACTTCTGCTTACCTGCTGTTTAAATGAAGAGCAAGTGGTGTCTCAATGATTTACACAACTTAAAGCTTAAAGCTGCTGAGTCAAGTACATTTAAGCTCTCAACCTCAACAGCAAGACTGGTCACTACGACCTCT 10800
DRQTAQAAGTDTTTITVNVLAWLVA A V I N G D R W F L N R F T T T L N D F N L V A M K Y N Y E P L T Q D H V D I L G P L
10758
proto Alpha Translation ORF/CDS DRQTAQAAGTDTTTITVNVLAWLVA A V I N G D R W F L N R F T T T L N D F N L V A M K Y N Y E P L T Q D H V D I L G P L
10775
proto Beta Translation ORF/CDS DRQTAQAAGTDTTTITVNVLAWLVA A V I N G D R W F L N R F T T T L N D F N L V A M K Y N Y E P L T Q D H V D I L G P L
10778
proto Gamma Translation ORF/CDS DRQTAQAAGTDTTTITVNVLAWLVA A V I N G D R W F L N R F T T T L N D F N L V A M K Y N Y E P L T Q D H V D I L G P L
10758
proto Delta Translation ORF/CDS DRQTAQAAGTDTTTITVNVLAWLVA A V I N G D R W F L N R F T T T L N D F N L V A M K Y N Y E P L T Q D H V D I L G P L
10774
proto Lambda Translation ORF/CDS DRQTAQAAGTDTTTITVNVLAWLVA A V I N G D R W F L N R F T T T L N D F N L V A M K Y N Y E P L T Q D H V D I L G P L
10758
proto MuGH Translation ORF/CDS DRQTAQAAGTDTTTITVNVLAWLVA A V I N G D R W F L N R F T T T L N D F N L V A M K Y N Y E P L T Q D H V D I L G P L
10759
9,820 9,840 9,860 9,880 9,900 9,920 9,940 9,960 9,980 10,000
proto Wuhan Translation ORF/CDS TTTGCTCAAATGGAATTCGGTCTTAAAGTCTCAATAAAGAACTTACGAAATGGTGAAGTCACTACATATTGGATGCTTTATAGAAGTGAAATACACTTTTGTGATGTTAGACAATGCTCAGGTTCTACTTCCAAGTCTCAAGGCTGAAAAGACAACTAAGGCTACACCACTGGT 11000
SAQTGIAVLDMCASLKE LLQNGMNGRTILGSALLEDEFTFPFDVVVRQC SGVTFQSAVKRTIKGTHHW
10958
proto Alpha Translation ORF/CDS SAQTGIAVLDMCASLKE LLQNGMNGRTILGSALLEDEFTFPFDVVVRQC SGVTFQSAVKRTIKGTHHW
10975
proto Beta Translation ORF/CDS SAQTGIAVLDMCASLKE LLQNGMNGRTILGSALLEDEFTFPFDVVVRQC SGVTFQSAVKRTIKGTHHW
10978
proto Gamma Translation ORF/CDS SAQTGIAVLDMCASLKE LLQNGMNGRTILGSALLEDEFTFPFDVVVRQC SGVTFQSAVKRTIKGTHHW
10958
proto Delta Translation ORF/CDS SAQTGIAVLDMCASLKE LLQNGMNGRTILGSALLEDEFTFPFDVVVRQC SGVTFQSAVKRTIKGTHHW
10974
proto Lambda Translation ORF/CDS SAQTGIAVLDMCASLKE LLQNGMNGRTILGSALLEDEFTFPFDVVVRQC SGVTFQSAVKRTIKGTHHW
10958
proto MuGH Translation ORF/CDS SAQTGIAVLDMCASLKE LLQNGMNGRTILGSALLEDEFTFPFDVVVRQC SGVTFQSAVKRTIKGTHHW
10959
9,020 9,040 9,060 9,080 9,100 9,120 9,140 9,160 9,180 9,200
proto Wuhan Translation ORF/CDS TGTACTCACAAATTTGACTTCACTTTAGTTCAGTACTCACTCAAGTCAAGTCTTTGCTTTTGTATGAAAGTCCCTTTTAACTTTGCTATGCTGTTTCTTTCACAACTGTTTCTGAACAACTCAAGTCTGCTTTTCTTTTGTACTCTCTCCACTGCTAGCTCTTAT 11200
LLTILTSLLLV LVQSTQW S L F F FLYENAFLFPFAMGIIAMSAFAMMFVKHKHAF LCLFLLP S L A T V A Y
11158
proto Alpha Translation ORF/CDS LLTILTSLLLV LVQSTQW S L F F FLYENAFLFPFAMGIIAMSAFAMMFVKHKHAF LCLFLLP S L A T V A Y
11175
proto Beta Translation ORF/CDS LLTILTSLLLV LVQSTQW S L F F FLYENAFLFPFAMGIIAMSAFAMMFVKHKHAF LCLFLLP S L A T V A Y
11178
proto Gamma Translation ORF/CDS LLTILTSLLLV LVQSTQW S L F F FLYENAFLFPFAMGIIAMSAFAMMFVKHKHAF LCLFLLP S L A T V A Y
11158
proto Delta Translation ORF/CDS LLTILTSLLLV LVQSTQW S L F F FLYENAFLFPFAMGIIAMSAFAMMFVKHKHAF LCLFLLP S L A T V A Y
11174
proto Lambda Translation ORF/CDS LLTILTSLLLV LVQSTQW S L F F FLYENAFLFPFAMGIIAMSAFAMMFVKHKHAF LCLFLLP S L A T V A Y
11158
proto MuGH Translation ORF/CDS LLTILTSLLLV LVQSTQW S L F F FLYENAFLFPFAMGIIAMSAFAMMFVKHKHAF LCLFLLP S L A T V A Y
11159







Table with columns for coordinates (14,420 to 14,800) and rows for protein variants (proto Wuhan, Alpha, Beta, Gamma, Delta, Lambda, MuH, Omicron) and their translations (ORF/CDS). The table contains amino acid sequences for each variant, with some positions highlighted in green and red.







20,820 20,840 20,860 20,880 20,900 20,920 20,940 20,960 20,980 21,000

proto Wuhan  
Translation ORF/CD5 AATATTTAAACACATTAAGCTTACCTTACCTATAATAGAGGTTATACATTTGGTGGCTGTCATGAAAGAGTTCACACAGGTCACGCTGTTTAAAGACAGGTCCTGCTGAGCTTACAGCTTAAAGCTTGTCTGATGAGAGCTCAACTTGTATGGTATTGCTCAACTGTA 21000  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V

proto Alpha  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 20949  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 20966  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 20969  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 20958  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 20965  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 20958  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 20950  
Translation ORF/CD5 Q Y L N T L T L L A V P Y N M R V I H F G A G S D K G V A P G T A V L R Q W L P T G T L L V D S D L N D F V S D A D S T L I G D C A T V 21000

21,020 21,040 21,060 21,080 21,100 21,120 21,140 21,160 21,180 21,200

proto Wuhan  
Translation ORF/CD5 CATAACCTATAAATGGGCTCTCATTACTGATGATCAGACCTAAGCTAAAATGTTACAAAAGAAAGTCTAAAGAGGGTGTTCCTACTTACATTTTACAGAAAAGGCTAGCTTGGAGGTCCTGGTAAAGTAAGACAGCAAGTCTTGAAGTGTACTTAAAGCTCAGGG 21200  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21149  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21166  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21169  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21158  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21165  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21155  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21150  
Translation ORF/CD5 H T A N K W D L I I S D M Y D P K T K N V T K E N D S K E G F F T Y I C G F I Q Q K L A L G G S V A I K I T E H S W N A D L Y K L M G 21150

21,220 21,240 21,260 21,280 21,300 21,320 21,340 21,360 21,380 21,400

proto Wuhan  
Translation ORF/CD5 ACCTTGGCTGCGACAGCTTGTACTAATGATGATCGCTCATCTGAACGATTTAAATGGATGATTAATCTGGCAACACCGGCAAAATAGATGTTATGATGATGCAAAATACATTTTGGAGGTAACAACTCAATCACTGTCTCTCTATTTTGAACGACTGAATTTCCC 21400  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21349  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21366  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21369  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21358  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21365  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21358  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21350  
Translation ORF/CD5 H F A W W T A F V T N V N A S S E A F L I G C N Y L G K P R E Q I D G Y V M H A N Y I F W R N T N P I Q L S S Y S L F D M S K F P 21350

21,420 21,440 21,460 21,480 21,500 21,520 21,540 21,560 21,580 21,600

proto Wuhan  
Translation ORF/CD5 TTAATTAAGGGTACTGCTTATGCTTTTAAAGAAGGCAAACTCAATGATGATTTATCTCTCTTAAAGAGGTCAGCTATAATAGAGAAACCAAGAGCTGTTTACTGACTGATGCTGTTTAAACAACTAAAGCAAACTGTTGTTTCTGTTTATGGCACTACTCTCTGAGTGTGTA 21600  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N 21549  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N 21566  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N 21569  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N 21558  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N 21555  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N 21550  
Translation ORF/CD5 L K L R G T A V M S L K E G Q I N D M I L S L L S K G R L I I R E N N R V I S S D V L V N N \* M F V F L V L L P L V S S Q C V N 21550

21,620 21,640 21,660 21,680 21,700 21,720 21,740 21,760 21,780 21,800

proto Wuhan  
Translation ORF/CD5 TCTTACACGAAGTCAATACCCTGCATACACTATTTTACACAGTGGTGTATTTACCTCGAAGAGTTCAGACTCAGTTCATCTTCACTCAACTCAGGACTGTTCTTACCTTCTTCCCAATGTACTTGGTCCATGATACATGCTCTGGCAGCAAGTACTACTAGAGCTTGC 21800  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21743  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21766  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21769  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21758  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21765  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21758  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21744  
Translation ORF/CD5 L T T R T Q L P P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H A I H V S G T N G T K R F D N P V 21744

21,820 21,840 21,860 21,880 21,900 21,920 21,940 21,960 21,980 22,000

proto Wuhan  
Translation ORF/CD5 TACCATTGAATGGTGTATTTTCTCCACTGAGAAGCTCAACATAAAGAGCTGGATTTGGTACTTACTAGATCGAAGCAGCCCTACTTGTGTAACAGCTCAATGTTGTATAAAGCTGTGAAGTTCATTTAAAGATATTTAAAGTCAACCCCTTAAATTTAGTGGCTGA 21900  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21937  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21963  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21966  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21955  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21962  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21958  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21932  
Translation ORF/CD5 L P F N D G V Y F A S T E K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F Q F C N D P F L G V Y Y H K N N 21932

22,020 22,040 22,060 22,080 22,100 22,120 22,140 22,160 22,180 22,200

proto Wuhan  
Translation ORF/CD5 AAAAGTGGATGGAAGTGAAGTCAAGTCTTACTGAGCAATGCACTTGAATGCTCTCAGCTTCTCTTGAAGCAAGGAGTAACTCAAAGTCTAGGAACTTGGTTTAAGAATATGATGTTTAAATATATTCAAGCAACCCCTTAAATTTAGTGGCTGA 22100  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D 22134  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D 22160  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D 22163  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D 22146  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D 22159  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D 22155  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R D 22129  
Translation ORF/CD5 K S W M E S E F R V Y S S A N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N I D G Y F K I Y S K H T P I N L V R E P 22129

22,220 22,240 22,260 22,280 22,300 22,320 22,340 22,360 22,380 22,400

proto Wuhan  
Translation ORF/CD5 -----CTCCCTCAGGCTTTTGGCGTTAAGCACTTCTGACTAGTATGCAATAGTATTAACACTCAGTACTTCAACTTCTGCTTACAGTAAAGTATTTACTCTGCTGCTTCTTCAAGTGGACCTGGTCTGACCTATTTCTGCTCAACTAGCCTTTCTATTAATAATAT 22300  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y 22328  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y 22345  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y 22357  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y 22340  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y 22332  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y 22349  
Translation ORF/CD5 L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y 22329  
Translation ORF/CD5 A C A A C A L E D L P Q G F S A L E P L V D L P I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A A Y Y V G Y L Q P R T F L L K Y











	28,820	28,840	28,860	28,880	28,900	28,920	28,940	28,960	28,980	29,000
proto Wuhan	GGAGCAGAGCGGGAGTCAAGCTCTCTGCTTCCTACAGTCCGCAACAGTTCAGAAATCACTCCAGGCAGCAGTGGGAACTCTCTCTAGAAATGGCGGCTGGCAATGGCGGCTGGTCTGCTGCTTGGCTGCTGACAGATGAAACAGCTTGAGAGCAAAATCTGCTGAAAGGCCAACACAA									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto Alpha	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto Beta	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto Gamma	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto Delta	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto Lambda	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto MuGH	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto Omicron	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
Translation ORF/CDS	G S R G G S Q A S S R S S S R S R N S S R N S T P G S S R G T S P A R M A G N G G D A A L A L L L L D R L N Q L E S K M S G K G Q Q Q									
proto Wuhan	28,920	28,940	28,960	28,980	29,000	29,020	29,040	29,060	29,080	29,100
Translation ORF/CDS	CAAGGCCAACTGCTCACTAAGAAATCTGCTGAGGCTCTAAGAGGCTCGGCAAAAGCTCCACTAAGACTACAACTGTAACCAAGCTTGGCGAGCCTGGCCAGCAAAACCAAGAAATTTGGGGACAGCAAACTAATCAGACAAAGCACTGATACAAACATTTGGCCAAATTCACAAATTTGCACAAATTTGC									
proto Alpha	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
Translation ORF/CDS	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
proto Beta	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
Translation ORF/CDS	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
proto Gamma	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
Translation ORF/CDS	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
proto Delta	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
Translation ORF/CDS	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
proto Lambda	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
Translation ORF/CDS	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
proto MuGH	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
Translation ORF/CDS	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
proto Omicron	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
Translation ORF/CDS	Q G Q T V T K K S A A E A S K K P R Q K R T A T K A Y N V T Q A F G R R G P E Q T Q G N F G D Q E L I R Q G T D Y K H W P Q I A Q F A									
proto Wuhan	29,120	29,140	29,160	29,180	29,200	29,220	29,240	29,260	29,280	29,300
Translation ORF/CDS	CCCGAGCCTCACGCTTTCGGAATTCGGCATTGGATGAGTCCACCTTCGGGAAGCTGGTTCACCTACACAGTGGCACTCAAAATGGTGAACAATCCAAATTCAAAGTCAACTTTTCTGAAATAGCATATGACGCATACAAATCCCAACAGAGCCTAAAGGACAAAGACAA									
proto Alpha	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
Translation ORF/CDS	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
proto Beta	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
Translation ORF/CDS	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
proto Gamma	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
Translation ORF/CDS	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
proto Delta	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
Translation ORF/CDS	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
proto Lambda	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
Translation ORF/CDS	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
proto MuGH	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
Translation ORF/CDS	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
proto Omicron	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
Translation ORF/CDS	P S A S A F F G M S R I G M E V T P S G T W L T Y T G A I K L D D K D P N F K D Q V I L L N K H I D A Y K T F P P T E P K K D K K K									
proto Wuhan	29,320	29,340	29,360	29,380	29,400	29,420	29,440	29,460	29,480	29,500
Translation ORF/CDS	AGCGTGAACCTCAAGCTTACCGCAGAGCAGAGAAACAGCAAACTGACTCTCTCTGCTGAGCAGTGGTGGATGATTCTCCAAACAATGCAACAATCCATGAGCAGGCTCACTCACTCAGGCTAACTCGCAGACACCAAGGAGAGGCTATATAAAGCTTTTCGGTTTACGATA									
proto Alpha	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
Translation ORF/CDS	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
proto Beta	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
Translation ORF/CDS	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
proto Gamma	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
Translation ORF/CDS	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
proto Delta	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
Translation ORF/CDS	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
proto Lambda	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
Translation ORF/CDS	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
proto MuGH	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
Translation ORF/CDS	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
proto Omicron	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
Translation ORF/CDS	K A D E T Q A L P Q R Q K K Q Q T V T L L P A A D L D D F S K Q L Q Q S M S S A D S T Q A									
proto Wuhan	29,520	29,540	29,560	29,580	29,600	29,620	29,640	29,660	29,680	29,700
Translation ORF/CDS	TATAGTCACTCTTGTGAGAAATGATCTCGTAACTACTAGCAGAAAGTAGATGTTAACTTAACTCACATAGCAATCTTTAATCAGTGTGAACATTAGGAGGACTGAAAGAGCCACCACTTTCCAGGAGCCAGCGGAGTACGATGACAGTGAACAATGCTAGGGAGAGCTCTATATGGA									
proto Alpha	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
Translation ORF/CDS	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
proto Beta	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
Translation ORF/CDS	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
proto Gamma	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
Translation ORF/CDS	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
proto Delta	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
Translation ORF/CDS	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
proto Lambda	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
Translation ORF/CDS	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
proto MuGH	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
Translation ORF/CDS	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
proto Omicron	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
Translation ORF/CDS	Y S L L L C R M N S R N Y I A Q V D V V N F N L T									
proto Wuhan	29,720	29,740	29,760	29,780	29,800	29,820	29,840	29,860	29,880	29,900
Translation ORF/CDS	AGAGCCCTAATGCTAAATTAATTTAGTGTCTCCCACTGATGTTAATGACTCTTAGGAGCATGACAAAAAAAAAAAAAAAAAA 29878									
proto Alpha	29763									
Translation ORF/CDS	29763									
proto Beta	29782									
Translation ORF/CDS	29782									
proto Gamma	29788									
Translation ORF/CDS	29788									
proto Delta	29769									
Translation ORF/CDS	29769									
proto Lambda	29769									
Translation ORF/CDS	29769									
proto MuGH	29781									
Translation ORF/CDS	29781									
proto Omicron	29756									
Translation ORF/CDS	29756									