

1 10 20 30 40 50 60  
SARS-CoV-2 . MFVFLVLLPLVSSQCVN.LTTRTQLP PAYTN.SFTRGVYYPDKVFRSSVLSHTQDIFLPPFFSNVTWF  
SARSr-CoV\_RaTG13 . MFVFLVLLPLVSSQCVN.LTTRTQLP PAYTN.SSTRGVYYPDKVFRSSVLSHLLTQDIFLPPFFSNVTWF  
SARS-CoV\_Urbani . MFIFLLFLTLTSGSDLDRCTTFDDVQAPNYTQHTSSMRGVYYPDEIFRSDTLYLTQDIFLPPFYSNVTGF  
SARS-CoV\_CUHK-W1 . MFIFLLFLTLTSGSDLDRCTTFDDVQAPNYTQHTSSMRGVYYPDEIFRSDTLYLTQDIFLPPFYSNVTGF  
SARS-CoV\_GZ02 . MFIFLLFLTLTSGSDLDRCTTFDDVQAPNYTQHTSSMRGVYYPDEIFRSDTLYLTQDIFLPPFYSNVTGF  
SARS-CoV\_A031 . MFIFLLFLTLTSGSDLDRCTTFDDVQAPNYTQHTSSMRGVYYPDEIFRSDTLYLTQDIFLPPFYSNVTGF  
SARS-CoV\_A022 . MFIFLLFLTLTSGSDLDRCTTFDDVQAPNYTQHTSSMRGVYYPDEIFRSDTLYLTQDIFLPPFYSNVTGF  
WIV16 . MFIFLLFLTLTSGSDLDRCTTFDDVQAPNYTQHTSSMRGVYYPDEIFRSDTLYLTQDIFLPPFYSNVTGF  
WIV1 MKLLLVFATLVSSYTI EKCLDFDDRTFPANTQFLSSHrgvYYPDDIFRSNVLHLVQDHFLLPFD SNVTRF  
SARSr-CoV\_ZXC21 . . . . MLFLFLFLQFALVNSQC.DLTGRTP LNPNTN.SSRGVYYPDTIYRSDTLYLVSQGYFLPFD SNVSWY  
SARSr-CoV\_ZC45 . . . . MLFLFLFLQFALVNSQC.DLTGRTP LNPNTN.SSRGVYYPDTIYRSDTLYLVSQGYFLPFD SNVSWY  
SARSr-CoV\_Rp3 . MKILILAFSLAKAQEGCGIISRKPKPKMAQVSSRRGVYYPNDIFRSNVLHLTQDYFLPFD SNLTQY  
SARSr-CoV\_Rs672 . MKVLIIVLCLGLVTAQDGGCHISTKQPPLMDKFS.SSRGVYYPNDIFRSNVLHLTQDYFLPFDNTLTRY  
consensus>50 . mfifl.fltl.s...d.ctfdd...pnytq..Ss.RGVYYPDe!%RSdtL.ltQdlFLPFysNvt.%

70 80 90 100 110 120 130  
SARS-CoV-2 HAIHVSNGTNGTKRFDNPVLPFNDGVYFASTEKSNIRGWIFGTTLD SKTQSLLIVNNATNVV IKVCEFFQF  
SARSr-CoV\_RaTG13 HAIHVSNGTNGIKRFDNPVLPFNDGVYFASTEKSNIRGWIFGTTLD SKTQSLLIVNNATNVV IKVCEFFQF  
SARS-CoV\_Urbani HTIN.....HTFNDPVIPIFKDGIYFAATEKSNVVRGWVFGSTMNNKSQSVIIINNSTNVV IRACNFEL  
SARS-CoV\_CUHK-W1 HTIN.....HTFNDPVIPIFKDGIYFAATEKSNVVRGWVFGSTMNNKSQSVIIINNSTNVV IRACNFEL  
SARS-CoV\_GZ02 HTIN.....HTFNDPVIPIFKDGIYFAATEKSNVVRGWVFGSTMNNKSQSVIIINNSTNVV IRACNFEL  
SARS-CoV\_A031 HTIN.....HTFNDPVIPIFKDGIYFAATEKSNVVRGWVFGSTMNNKSQSVIIINNSTNVV IRACNFEL  
SARS-CoV\_A022 HTIN.....HTFNDPVIPIFKDGIYFAATEKSNVVRGWVFGSTMNNKSQSVIIINNSTNVV IRACNFEL  
WIV16 HTIN.....HRFNDPVIPIFKDGVYFAATEKSNVVRGWVFGSTMNNKSQSVIIINNSTNVV IRACNFEL  
WIV1 ITFG.....LNFDNPIPIFKDGIYFAATEKSNVIRGWVFGSTMNNKSQSVIIIMNNSTNLV IRACNFEL  
SARSr-CoV\_ZXC21 YSLTNNAA.TKR TDNPILD FKDGIYFAATEHSNIRGWIFGTTLDNTS QSLLIVNNATNVV IKV CNDFD  
SARSr-CoV\_ZC45 YSLTNNAA.TKR TDNPILD FKDGIYFAATEHSNIRGWIFGTTLDNTS QSLLIVNNATNVV IKV CNDFD  
SARSr-CoV\_Rp3 FSLNVDSDR.FTYFDNPIILDFGDGVYFAATEKSNVIRGWIFGTFDNTTQSAVIVNNSTHIIIRVCNFNL  
SARSr-CoV\_Rs672 LSFNMDSAT.KVYFDNPTLPFGDGIYFAATEKSNVVRGWVFGSTMNDNTTQSAIVNNSTHIIIRVCYFNL  
consensus>50 htin.....fdNPvipFKdG!YFAaTEkSN!!RGW!FGsTm#nksQSViIvNNsTnv!IraCnF#l

140 150 160 170 180 190 200  
SARS-CoV-2 CNDPFLGVYYHKNKNSWMESEFRVYSSANCTFEYVSQPF LMDLEGKQGNFKN LREYVFKNI DG YFKIYS  
SARSr-CoV\_RaTG13 CNDPFLGVYYHKNKNSWMESEFRVYSSANCTFEYVSQPF LMDLEGKQGNFKN LREYVFKNI DG YFKIYS  
SARS-CoV\_Urbani CNDPFFAV...SKPMGTQTHMIFDNABNCTFEYISDAFSLDVSEKSGNFKHLREYVFKNKDGF LYVYK  
SARS-CoV\_CUHK-W1 CNDPFFAV...SKPMGTQTHMIFDNABNCTFEYISDAFSLDVSEKSGNFKHLREYVFKNKDGF LYVYK  
SARS-CoV\_GZ02 CNDPFFAV...SKPMGTQTHMIFDNABNCTFEYISDAFSLDVSEKSGNFKHLREYVFKNKDGF LYVYK  
SARS-CoV\_A031 CNDPFFV...SKPMGTQTHMIFDNABNCTFEYISDAFSLDVSEKSGNFKHLREYVFKNKDGF LYVYK  
SARS-CoV\_A022 CNDPFFV...SKPMGTQTHMIFDNABNCTFEYISDAFSLDVSEKSGNFKHLREYVFKNKDGF LYVYK  
WIV16 CNDPFFAV...SKPTGTQTHMIFDNABNCTFEYISDSFSLDVAEKSGNFKHLREYVFKNKDGF LYVYK  
WIV1 CNDPFFV...LKSNNTQIPSYIFNFA NCTFEYVSKDFNLDLGKPGNFKDLREYVFKNKDGF LHVYS  
SARSr-CoV\_ZXC21 CYDP.YLSGYHNNKTWSIREFAVYSSYANCTFEYVSKSFM LNISGNGGLFNTLREYVFRNV DGHFKIYS  
SARSr-CoV\_ZC45 CYDP.YLSGYHNNKTWSIREFAVYSSYANCTFEYVSKSFM LNISGNGGLFNTLREYVFRNV DGHFKIYS  
SARSr-CoV\_Rp3 CKEPMYTVSRGAQQSSW.....VYQSAFNCTYDRVEKSFQLDTAPKTGNFKDLREYVFKNRDGF LSVYQ  
SARSr-CoV\_Rs672 CKEPMYAISNEQHYKSW.....VYQNA NCTYDRVEQSFQLDTAPQTGNFKDLREYVFKNKDGF LSVYQ  
consensus>50 Cd#Pff.v...k...tq....!%dnafNCT%#y!sd.F.\$#vsek.GnFk.LRE%VFkNkDGfl.!Y.

210 220 230 240 250 260 270  
SARS-CoV-2 KHTPINLVRDLPQGFSALEPLVDLP IGINITRFQTL LALHRSYLTIPGDSSSGWTAGAAAYVGYLQPRTF  
SARSr-CoV\_RaTG13 KHTPINLVRDLPQGFSALEPLVDLP IGINITRFQTL LALHRSYLTIPGDSSSGWTAGAAAYVGYLQPRTF  
SARS-CoV\_Urbani GYQPIDVVRDLP SGFNTLKP IFKLPLGINTNFRA ILTAFSP.....AQDWTGTSAAAYFVGYLKPPTTF  
SARS-CoV\_CUHK-W1 GYQPIDVVRDLP SGFNTLKP IFKLPLGINTNFRA ILTAFSP.....AQDWTGTSAAAYFVGYLKPPTTF  
SARS-CoV\_GZ02 GYQPIDVVRDLP SGFNTLKP IFKLPLGINTNFRA ILTAFSP.....AQDWTGTSAAAYFVGYLKPPTTF  
SARS-CoV\_A031 GYQPIDVVRDLP SGFNTLKP IFKLPLGINTNFRA ILTAFSP.....AQDWTGTSAAAYFVGYLKPPTTF  
SARS-CoV\_A022 GYQPIDVVRDLP SGFNTLKP IFKLPLGINTNFRA ILTAFSP.....AQDWTGTSAAAYFVGYLKPPTTF  
WIV16 GYQPIDVVRDLP SGFNTLKP IFKLPLGINTNFRA ILTAFSP.....AQDWTGTSAAAYFVGYLKPPTTF  
WIV1 GYQPIISAASGLPTGFNALKP IFKLPLGINTNFRA LLTAFPP.....RPDYWTGTSAAAYFVGYLKPPTTF  
SARSr-CoV\_ZXC21 KFTPVNLRNGLPTGLSVLQPLVELPVSINITKFRLLTIHRG...DPMNNGWTAFSAAYFVGYLKPPTTF  
SARSr-CoV\_ZC45 KFTPVNLRNGLPTGLSVLQPLVELPVSINITKFRLLTIHRG...DPMNNGWTAFSAAYFVGYLKPPTTF  
SARSr-CoV\_Rp3 TYTAVNLPRGLPTGFSVLRPILKLPFGINTSYRVMAMFS.....QTTSNFLPESAAAYVGNLKYTTTF  
SARSr-CoV\_Rs672 AYSPIDIPRGLPTGFSVLRPILKLPISINITSFKVVMMSFS.....RTTSNFLPEVAAAYVGNLKYTTTF  
consensus>50 gyqp!dvvrldLP.Gfn.LkPifkLPLgInITn%r.i\$taf.p.....qd.wgtsaAAY%VGYLkptTF

280 290 300 310 320 330 340

SARS-CoV-2 L L K Y N E N G T I T D A V D C A L D P L S E T K C T L K S F T V E K G I Y Q T S N F R V Q P T E S I V R F P N I T N L C P F G E V F N A T  
SARSr-CoV\_RaTG13 L L K Y N E N G T I T D A V D C A L D P L S E T K C T L K S F T V E K G I Y Q T S N F R V Q P T D S I V R F P N I T N L C P F G E V F N A T  
SARS-CoV\_Urbani M L K Y D E N G T I T D A V D C S Q N P L A E L K C S V K S F E I D K G I Y Q T S N F R V V P S G D V V R F P N I T N L C P F G E V F N A T  
SARS-CoV\_CUHK-W1 M L K Y D E N G T I T D A V D C S Q N P L A E L K C S V K S F E I D K G I Y Q T S N F R V V P S G D V V R F P N I T N L C P F G E V F N A T  
SARS-CoV\_GZ02 M L K Y D E N G T I T D A V D C S Q N P L A E L K C S V K S F E I D K G I Y Q T S N F R V V P S R D V V R F P N I T N L C P F G E V F N A T  
SARS-CoV\_A031 M L K Y D E N G T I T D A V D C S Q N P L A E L K C S V K S F E I D K G I Y Q T S N F R V V P S G D V V R F P N I T N L C P F G E V F N A T  
SARS-CoV\_A022 M L K Y D E N G T I T D A V D C S Q N P L A E L K C S V K S F E I D K G I Y Q T S N F R V V P S G D V V R F P N I T N L C P F G E V F N A T  
WIV16 M L K Y D E N G T I T D A V D C S Q N P L A E L K C S V K S F E I D K G I Y Q T S N F R V A P S K E V V R F P N I T N L C P F G E V F N A T  
WIV1 M L K Y D E N G T I T D A V D C S Q N P L A E L K C S V K S F E I D K G I Y Q T S N F R V A P S K E V V R F P N I T N L C P F G E V F N A T  
SARSr-CoV\_ZXC21 M L K Y N E N G T I T D A V D C A L D P L S E T K C T L K S L S V Q K G I Y Q T S N F R V Q P T Q S I V R F P N I T N V C P F H K V F N A T  
SARSr-CoV\_ZC45 M L K Y N E N G T I T D A V D C A L D P L S E T K C T L K S L T V Q K G I Y Q T S N F R V Q P T Q S V V R F P N I T N V C P F H K V F N A T  
SARSr-CoV\_Rp3 M L S F N E N G T I T N A I D C A Q N P L A E L K C T I K N F N V S K G I Y Q T S N F R V S P T Q E V I R F P N I T N R C P F D K V F N A T  
SARSr-CoV\_Rs672 M L N F N E N G T I T D A I D C A Q N P L S E L K C T I K N F N V S K G I Y Q T S N F R V S P T H E V I R F P N I T N R C P F D K V F N A S  
consensus>50 \$Lk%#ENGTIT#A!DCsq#PLaELKCSvKsfe!dKGIYQTSNFRV.Ps.d!RFPNITNLCPFgeVFNA

350 360 370 380 390 400 410

SARS-CoV-2 R F A S V Y A W N R K R I S N C V A D Y S V L Y N S T S F S T F K C Y G V S P T K L N D L C F T N V Y A D S F V I R G D E V R Q I A P G Q T  
SARSr-CoV\_RaTG13 T F A S V Y A W N R K R I S N C V A D Y S V L Y N S T S F S T F K C Y G V S P T K L N D L C F T N V Y A D S F V I T G D E V R Q I A P G Q T  
SARS-CoV\_Urbani K F P S V Y A W E R K K I S N C V A D Y S V L Y N S T S F S T F K C Y G V S A T K L N D L C F S N V Y A D S F V V K G D D V R Q I A P G Q T  
SARS-CoV\_CUHK-W1 K F P S V Y A W E R K K I S N C V A D Y S V L Y N S T S F S T F K C Y G V S A T K L N D L C F S N V Y A D S F V V K G D D V R Q I A P G Q T  
SARS-CoV\_GZ02 K F P S V Y A W E R K K I S N C V A D Y S V L Y N S T S F S T F K C Y G V S A T K L N D L C F S N V Y A D S F V V K G D D V R Q I A P G Q T  
SARS-CoV\_A031 K F P S V Y A W E R K K I S N C V A D Y S V L Y N S T S F S T F K C Y G V S A T K L N D L C F S N V Y A D S F V V K G D D V R Q I A P G Q T  
SARS-CoV\_A022 K F P S V Y A W E R K K I S N C V A D Y S V L Y N S T S F S T F K C Y G V S A T K L N D L C F S N V Y A D S F V V K G D D V R Q I A P G Q T  
WIV16 T F P S V Y A W E R K K I S N C V A D Y S V L Y N S T S F S T F K C Y G V S A T K L N D L C F S N V Y A D S F V V K G D D V R Q I A P G Q T  
WIV1 T F P S V Y A W E R K K I S N C V A D Y S V L Y N S T S F S T F K C Y G V S A T K L N D L C F S N V Y A D S F V V K G D D V R Q I A P G Q T  
SARSr-CoV\_ZXC21 R F P S V Y A W E R T K I S D C I A D Y T V F Y N S T S F S T F K C Y G V S P S K L I D L C F T S V Y A D T F L I R F S E V R Q V A P G Q T  
SARSr-CoV\_ZC45 R F P S V Y A W E R T K I S D C I A D Y T V F Y N S T S F S T F K C Y G V S P S K L I D L C F T S V Y A D T F L I R F S E V R Q V A P G Q T  
SARSr-CoV\_Rp3 R F P N V Y A W E R T K I S D C V A D Y T V L Y N S T S F S T F K C Y G V S P S K L I D L C F T S V Y A D T F L I R S S E V R Q V A P G E T  
SARSr-CoV\_Rs672 R F P N V Y A W E R T K I S D C V A D Y T V L Y N S T S F S T F K C Y G V S P S K L I D L C F T S V Y A D T F L I R S S E V R Q V A P G E T  
consensus>50 .FpsVYAW#RkrIS#C!ADYsVLYNStsFSTFKCYGVSatKLnDLCFsnVYADsFv!kgd#VRQ!APG#T

420 430 440 450 460 470 480

SARS-CoV-2 G K I A D Y N Y K L P D D F T G C V I A W N S N N L D S K V G G N Y N Y L Y R L F R K S N L K P F E R D I S T E I Y Q A G S T P C N G V E G  
SARSr-CoV\_RaTG13 G K I A D Y N Y K L P D D F T G C V I A W N S K H I D A K E G G N F N Y L Y R L F R K A N L K P F E R D I S T E I Y Q A G S K P C N G Q T G  
SARS-CoV\_Urbani G V I A D Y N Y K L P D D F M G C V L A W N T R N I D A T S T G N Y N Y K Y R Y L R H G K L R P F E R D I S N V P F S P D G K P C T . P P A  
SARS-CoV\_CUHK-W1 G V I A D Y N Y K L P D D F M G C V L A W N T R N I D A T S T G N Y N Y K Y R Y L R H G K L R P F E R D I S N V P F S P D G K P C T . P P A  
SARS-CoV\_GZ02 G V I A D Y N Y K L P D D F M G C V L A W N T R N I D A T S T G N Y N Y K Y R Y L R H G K L R P F E R D I S N V P F S P D G K P C T . P P A  
SARS-CoV\_A031 G V I A D Y N Y K L P D D F M G C V L A W N T R N I D A T S T G N Y N Y K Y R Y L R H G K L R P F E R D I S N V P F S P D G K P C T . P P A  
SARS-CoV\_A022 G V I A D Y N Y K L P D D F M G C V L A W N T R N I D A T S T G N Y N Y K Y R Y L R H G K L R P F E R D I S N V P F S P D G K P C T . P P A  
WIV16 G V I A D Y N Y K L P D D F T G C V L A W N T R N I D A T Q T G N Y N Y K Y R S L R H G K L R P F E R D I S N V P F S P D G K P C T . P P A  
WIV1 G V I A D Y N Y K L P D D F T G C V L A W N T R N I D A T Q T G N Y N Y K Y R S L R H G K L R P F E R D I S N V P F S P D G K P C T . P P A  
SARSr-CoV\_ZXC21 G V I A D Y N Y K L P D D F T G C V I A W N T A K Q D T G . . . . H Y F Y R S H R S T K L K P F E R D L S S D E . . . . .  
SARSr-CoV\_ZC45 G V I A D Y N Y K L P D D F T G C V I A W N T A K Q D V G . . . . N Y F Y R S H R S T K L K P F E R D L S S D E . . . . .  
SARSr-CoV\_Rp3 G V I A D Y N Y K L P D D F T G C V I A W N T A K Q D Q G . . . . Q Y Y Y R S H R K T K L K P F E R D L S S D E . . . . .  
SARSr-CoV\_Rs672 G V I A D Y N Y K L P D D F T G C V I A W N T A K Q D Q G . . . . Q Y Y Y R S S R K T K L K P F E R D L S S D E . . . . .  
consensus>50 GvIADYNYKLPDDFtGCVlAWNtrniDat.tgnyNyKyr.lRhgkLrPFERDisnvpfs.dgkpct.ppa

490 500 510 520 530 540 550

SARS-CoV-2 F N C Y W P L Q S Y G F Y P T N G V G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T N L V K N Q C V N F N F N G L T G T G V L T P S  
SARSr-CoV\_RaTG13 L N C Y W P L Y R Y G F Y P T D G V G H Q P Y R V V V L S F E L L N A P A T V C G P K L S T N L V K N Q C V N F N F N G L T G T G V L T P S  
SARS-CoV\_Urbani L N C Y W P L N D Y G F Y T T T G I G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T D L I K N Q C V N F N F N G L T G T G V L T P S  
SARS-CoV\_CUHK-W1 L N C Y W P L N D Y G F Y T T T G I G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T D L I K N Q C V N F N F N G L T G T G V L T P S  
SARS-CoV\_GZ02 L N C Y W P L N D Y G F Y T T T G I G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T D L I K N Q C V N F N F N G L T G T G V L T P S  
SARS-CoV\_A031 P N C Y W P L R G Y G F Y T T S G I G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T D L I K N Q C V N F N F N G L T G T G V L T P S  
SARS-CoV\_A022 P N C Y W P L R G Y G F Y T T S G I G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T D L I K N Q C V N F N F N G L T G T G V L T P S  
WIV16 F N C Y W P L N D Y G F Y I T N G I G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T D L I K N Q C V N F N F N G L T G T G V L T P S  
WIV1 F N C Y W P L N D Y G F Y I T N G I G Y Q P Y R V V V L S F E L L N A P A T V C G P K L S T D L I K N Q C V N F N F N G L T G T G V L T P S  
SARSr-CoV\_ZXC21 . N G V R T L S T Y D F N P N V P L E Y Q A T R V V V L S F E L L N A P A T V C G P K L S T Q L V K N Q C V N F N F N G L K G T G V L T D S  
SARSr-CoV\_ZC45 . N G V R T L S T Y D F N P N V P L E Y Q A T R V V V L S F E L L N A P A T V C G P K L S T Q L V K N Q C V N F N F N G L K G T G V L T D S  
SARSr-CoV\_Rp3 . N G V R T L S T Y D F Y P S V P V A Y Q A T R V V V L S F E L L N A P A T V C G P K L S T Q L V K N Q C V N F N F N G L K G T G V L T E S  
SARSr-CoV\_Rs672 . N G V R T L S T Y D F Y P N V P I E Y Q A T R V V V L S F E L L N A P A T V C G P K L S T G L V K N Q C V N F N F N G L K G T G V L T D S  
consensus>50 .Ncywpl..YgFy.t.gigyQpyRVVVLSELLnAPATVCGPKlSTdL!KNqCVNFNFNGLtGTGVLTPS

	560	570	580	590	600	610	620
SARS-CoV-2	NKKFLP	FQQFGR	DIAD	TTDA	VRDP	QTL	ILDIT
SARs-CoV_RaTG13	NKKFLP	FQQFGR	DIAD	TTDA	VRDP	QTL	ILDIT
SARS-CoV_Urbani	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
SARS-CoV_CUHK-W1	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
SARS-CoV_GZ02	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
SARS-CoV_A031	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
SARS-CoV_A022	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
WIV16	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
WIV1	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
SARs-CoV_ZXC21	SKRFQP	FQQFGR	DVSD	FTDS	VRDP	KTSE	ILDIS
SARs-CoV_ZC45	SKRFQS	FQQFGK	DASD	FTDS	VRDP	QTL	ILDIT
SARs-CoV_Rp3	SKRFQS	FQQFGR	DVSD	FTDS	VRDP	QTL	ILDIT
SARs-CoV_Rs672	SKRFQS	FQQFGR	DVSD	FTDS	VRDP	QTL	ILDIT
consensus>50	sKrFqpFQQFGRDVsDfTdsVRDPkTs#ILDISPCSFGGVSVITPGTNaSs#VAVLYQDVNCT#VptaIh						

	630	640	650	660	670	680	690
SARS-CoV-2	ADQLTPT	WRVYST	GSNV	FQTR	AGCLIG	AEHVNN	SYECDI
SARs-CoV_RaTG13	ADQLTPT	WRVYST	GSNV	FQTR	AGCLIG	AEHVNN	SYECDI
SARS-CoV_Urbani	ADQLTP	PAWRIY	STGNN	VFQT	AGCLIG	AEHVNT	SYECDI
SARS-CoV_CUHK-W1	ADQLTP	PAWRIY	STGNN	VFQT	AGCLIG	AEHVNT	SYECDI
SARS-CoV_GZ02	ADQLTP	PAWRIY	STGNN	VFQT	AGCLIG	AEHVNT	SYECDI
SARS-CoV_A031	AEQLTP	PAWRIY	STGNN	VFQT	AGCLIG	AEHVNT	SYECDI
SARS-CoV_A022	AEQLTP	PAWRIY	STGNN	VFQT	AGCLIG	AEHVNT	SYECDI
WIV16	ADQLTP	SWRVY	STGNN	VFQT	AGCLIG	AEHVNT	SYECDI
WIV1	ADQLTP	SWRVH	STGNN	VFQT	AGCLIG	AEHVNT	SYECDI
SARs-CoV_ZXC21	ADQLTP	PAWRIY	ATGTS	VFQT	AGCLIG	AEHVNT	SYECDI
SARs-CoV_ZC45	ADQLTP	PAWRIY	ATGTS	VFQT	AGCLIG	AEHVNT	SYECDI
SARs-CoV_Rp3	ADQLTP	PAWRVY	STGNT	VFQT	AGCLIG	AEHVNT	SYECDI
SARs-CoV_Rs672	ADQLTP	PAWRVY	STGNT	VFQT	AGCLIG	AEHVNT	SYECDI
consensus>50	A#QLTPAWR!ystGnnVFQTqAGCLIGAEHV#tSYECDIPIGAGICASYhTvs.l...RstsqksI!AY						

	700	710	720	730	740	750	760
SARS-CoV-2	TMSLGA	ENSVAY	SNNSIA	IPTNFT	ISVTTE	ILPVSM	TKTSVDC
SARs-CoV_RaTG13	TMSLGA	ENSVAY	SNNSIA	IPTNFT	ISVTTE	ILPVSM	TKTSVDC
SARS-CoV_Urbani	TMSLGAD	SSIAYS	SNNTIA	IPTNFS	SISITTE	VMPVSM	AKTSVDC
SARS-CoV_CUHK-W1	TMSLGAD	SSIAYS	SNNTIA	IPTNFS	SISITTE	VMPVSM	AKTSVDC
SARS-CoV_GZ02	TMSLGAD	SSIAYS	SNNTIA	IPTNFS	SISITTE	VMPVSM	AKTSVDC
SARS-CoV_A031	TMSLGAD	SSIAYS	SNNTIA	IPTNFS	SISITTE	VMPVSM	AKTSVDC
SARS-CoV_A022	TMSLGAD	SSIAYS	SNNTIA	IPTNFS	SISITTE	VMPVSM	AKTSVDC
WIV16	TMSLGAD	SSIAYS	SNNTIA	IPTNFS	SISITTE	VMPVSM	AKTSVDC
WIV1	TMSLGAD	SSIAYS	SNNTIA	IPTNFS	SISITTE	VMPVSM	AKTSVDC
SARs-CoV_ZXC21	TMSLGA	ENSVAY	SNNSIA	IPTNFT	ISVTTE	ILPVSM	TKTSVDC
SARs-CoV_ZC45	TMSLGA	ENSVAY	SNNSIA	IPTNFT	ISVTTE	ILPVSM	TKTSVDC
SARs-CoV_Rp3	TMSLGA	ENSVAY	SNNSIA	IPTNFT	ISVTTE	ILPVSM	TKTSVDC
SARs-CoV_Rs672	TMSLGA	ENSVAY	SNNSIA	IPTNFT	ISVTTE	ILPVSM	TKTSVDC
consensus>50	TMSLGA#sS!AYsNNTIAIPTNFSIS!TTE!\$PVSMAkTSVDCnMYICGDStECaNLLLQYGSFctQLNR						

	770	780	790	800	810	820	830
SARS-CoV-2	ALTGIA	AVEQDK	NTOEV	FAQVKQ	IYKTPP	IKDF	GGFNFS
SARs-CoV_RaTG13	ALTGIA	AVEQDK	NTOEV	FAQVKQ	IYKTPP	IKDF	GGFNFS
SARS-CoV_Urbani	ALSGIA	AAEQDR	NTR	EVFAQVKQ	MYKTP	TLKY	FGGFNFS
SARS-CoV_CUHK-W1	ALSGIA	AAEQDR	NTR	EVFAQVKQ	MYKTP	TLKY	FGGFNFS
SARS-CoV_GZ02	ALSGIA	AAEQDR	NTR	EVFAQVKQ	MYKTP	TLKY	FGGFNFS
SARS-CoV_A031	ALSGIA	AAEQDR	NTR	EVFAQVKQ	MYKTP	TLKY	FGGFNFS
SARS-CoV_A022	ALSGIA	AAEQDR	NTR	EVFAQVKQ	MYKTP	TLKY	FGGFNFS
WIV16	ALSGIA	AVEQDR	NTR	EVFAQVKQ	MYKTP	TLKY	FGGFNFS
WIV1	ALSGIA	AVEQDR	NTR	EVFAQVKQ	MYKTP	TLKY	FGGFNFS
SARs-CoV_ZXC21	ALSGIA	AVEQDK	NTOEV	FAQVKQ	IYKTPP	IKDF	GGFNFS
SARs-CoV_ZC45	ALSGIA	AVEQDK	NTOEV	FAQVKQ	IYKTPP	IKDF	GGFNFS
SARs-CoV_Rp3	ALSGIA	AVEQDK	NTOEV	FAQVKQ	IYKTPP	IKDF	GGFNFS
SARs-CoV_Rs672	ALSGIA	AVEQDK	NTOEV	FAQVKQ	IYKTPP	IKDF	GGFNFS
consensus>50	ALsG!AVEQDRnTrEVfAqVKQmYKTPtIKDFGGFNFSQILPDPkKPtKRSFIEDLLFNKVTLDAGFMk						



840 850 860 870 880 890 900  
SARS-CoV-2 QYGDCLGDIAARDLICAQKFNGLTVLPPLLTDEMIAQYTSALLAGTITSGWTFGAGAAALQIPFAMQMAYR  
SARSr-CoV\_RaTG13 QYGDCLGDIAARDLICAQKFNGLTVLPPLLTDEMIAQYTSALLAGTITSGWTFGAGAAALQIPFAMQMAYR  
SARS-CoV\_Urbani QYGECLGDINARDLICAQKFNGLTVLPPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
SARS-CoV\_CUHK-w1 QYGECLGDINARDLICAQKFNGLTVLPPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
SARS-CoV\_GZ02 QYGECLGDINARDLICAQKFNGLTVLPPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
SARS-CoV\_A031 QYQCLGDINARDLICAQKFNGLTVLPPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
SARS-CoV\_A022 QYGECLGDINARDLICAQKFNGLTVLPPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
WIV16 QYGECLGDINARDLICAQKFNGLTVLPPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
WIV1 QYGECLGDINARDLICAQKFNGLTVLPPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
SARSr-CoV\_ZXC21 QYGDCLGDISARDLICAQKFNGLTVLPPLLTDEMIAAYTAALISGTATAGWTFGAGAAALQIPFAMQMAYR  
SARSr-CoV\_ZC45 QYGECLGDISARDLICAQKFNGLTVLPPLLTDEMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
SARSr-CoV\_Rp3 QYGECLGDISARDLICAQKFNGLTVLPPLLTDEMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
SARSr-CoV\_Rs672 QYGECLGDISARDLICAQKFNGLTVLPPLLTDEMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMAYR  
consensus>50 QYG#CLGDInARDLICAQKFNGLTVLPPLLT#MIAAYTaALVsGTaTaGWTFGAGaALQIPFAMQMAYR

910 920 930 940 950 960 970  
SARS-CoV-2 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARSr-CoV\_RaTG13 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARS-CoV\_Urbani FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARS-CoV\_CUHK-w1 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARS-CoV\_GZ02 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARS-CoV\_A031 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARS-CoV\_A022 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
WIV16 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
WIV1 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARSr-CoV\_ZXC21 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARSr-CoV\_ZC45 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARSr-CoV\_Rp3 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
SARSr-CoV\_Rs672 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS  
consensus>50 FNGIGVTQNVLYENQKLIANQFNKAI SGIQD SLSS TASALGKLQDVVNQNAQALNTLVKQLSSNFGAISS

980 990 1000 1010 1020 1030 1040  
SARS-CoV-2 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARSr-CoV\_RaTG13 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARS-CoV\_Urbani VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARS-CoV\_CUHK-w1 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARS-CoV\_GZ02 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARS-CoV\_A031 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARS-CoV\_A022 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
WIV16 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
WIV1 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARSr-CoV\_ZXC21 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARSr-CoV\_ZC45 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARSr-CoV\_Rp3 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
SARSr-CoV\_Rs672 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK  
consensus>50 VLNDILSRLDKVEAEVQIDRLITGRQLQSLQTYVTTQQLIRAAEIRASANLAATKMSECVLIGQSKRVDFCGK

1050 1060 1070 1080 1090 1100 1110  
SARS-CoV-2 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARSr-CoV\_RaTG13 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARS-CoV\_Urbani GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARS-CoV\_CUHK-w1 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARS-CoV\_GZ02 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARS-CoV\_A031 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARS-CoV\_A022 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
WIV16 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
WIV1 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARSr-CoV\_ZXC21 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARSr-CoV\_ZC45 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARSr-CoV\_Rp3 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
SARSr-CoV\_Rs672 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII  
consensus>50 GYHLSMFPQSAAPHGVVFLHVTYVPSQERNFETTAPAICHEGKAYFPREGVVFVNGTWSWFTQRNFFYEPQII

	1120	1130	1140	1150	1160	1170	1180
SARS-CoV-2	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARSr-CoV_RaTG13	TTDNTFVSGS	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARS-CoV_Urbani	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARS-CoV_CUHK-w1	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARS-CoV_GZ02	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARS-CoV_A031	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARS-CoV_A022	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
WIV16	TTDNTFVSGS	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
WIV1	TTDNTFVSGS	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARSr-CoV_ZXC21	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARSr-CoV_ZC45	TTDNTFVSGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARSr-CoV_Rp3	TTDNTFVAGS	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
SARSr-CoV_Rs672	TTDNTFVAGN	CDVVIGI	VNNTVYDPLQPELDSFKEELD	KYFKNHTSPD	V	DLGDISGINASVVNIQ	KEIDR
consensus>50	TTDNTFVsGn	CDVVIGI	!NNTVYDPLQPELDSFKEELD	KYFKNHTSPD!	DLGDISGINASVVNIQ	keEIDR	

	1190	1200	1210	1220	1230	1240	1250
SARS-CoV-2	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARSr-CoV_RaTG13	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARS-CoV_Urbani	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARS-CoV_CUHK-w1	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARS-CoV_GZ02	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARS-CoV_A031	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARS-CoV_A022	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
WIV16	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
WIV1	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARSr-CoV_ZXC21	LNEVAKNLNESLIDLQELGKYE	HYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGF	CCK
SARSr-CoV_ZC45	LNEVARNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARSr-CoV_Rp3	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
SARSr-CoV_Rs672	LNEVAKNLNESLIDLQELGKYE	QYIKWPWY	WVWLGFIAGLIAI	VMVTIMLCCMTSCCSCLKG	C	CSCGS	CCK
consensus>50	LNEVAKNLNESLIDLQELGKYE	qYIKWPWY!	WLGFIAGLIAI!	MvT	TI\$	LCCMTSCCSCLKG	aCSCGS

	1260	1270
SARS-CoV-2	FDEDDSEPVLKGVKLHYT	
SARSr-CoV_RaTG13	FDEDDSEPVLKGVKLHYT	
SARS-CoV_Urbani	FDEDDSEPVLKGVKLHYT	
SARS-CoV_CUHK-w1	FDEDDSEPVLKGVKLHYT	
SARS-CoV_GZ02	FDEDDSEPVLKGVKLHYT	
SARS-CoV_A031	FDEDDSEPVLKGVKLHYT	
SARS-CoV_A022	FDEDDSEPVLKGVKLHYT	
WIV16	FDEDDSEPVLKGVKLHYT	
WIV1	FDEDDSEPVLKGVKLHYT	
SARSr-CoV_ZXC21	FDEDDSEPVLKGVKLHYT	
SARSr-CoV_ZC45	FDEDDSEPVLKGVKLHYT	
SARSr-CoV_Rp3	FDEDDSEPVLKGVKLHYT	
SARSr-CoV_Rs672	FDEDDSEPVLKGVKLHYT	
consensus>50	FDEDDSEPVLKGVKLHYT	