

In Silico Analysis of SARS-CoV2 Spike Proteins of Different Field Variants

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Supplementary Figures

1. Envelope Protein



Figure S1. Schematic view of contigs of the envelope protein of 1. Alpha variant (B.1.1.7) (UDQ41840.1) and 2. Delta variant (B.1.617.21) (UDU36748.1) of SARs-CoV-2 with 3. reference strain (Wuhan) (YP_009724392.1).

2. Membrane Protein

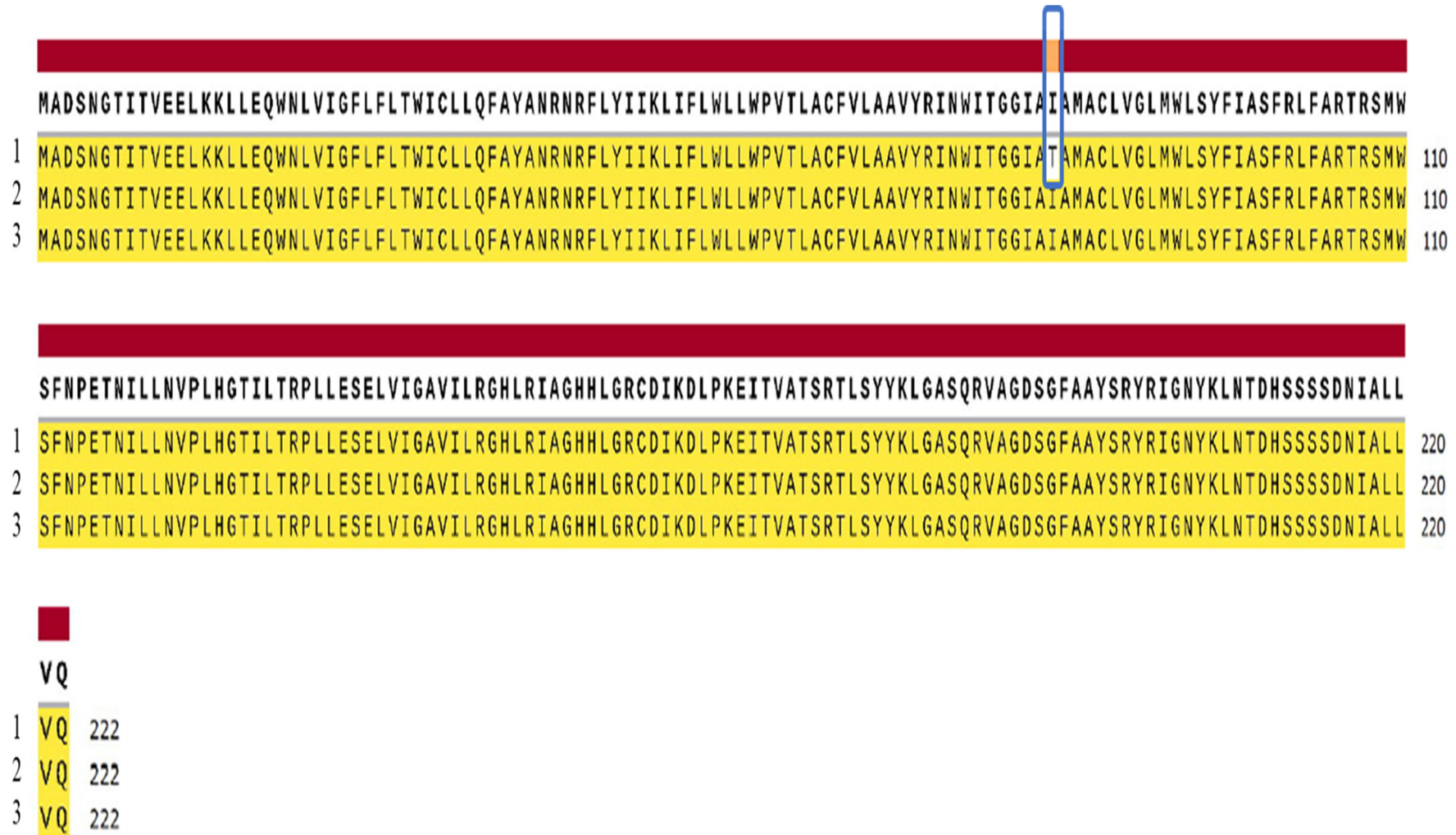


Figure S2. Schematic view of contigs of the membrane glycoprotein of 1. Alpha Variant (B.1.1.7) (UDQ41841.1) and 2. Delta Variant (B.1.617.21) (UDU36749.1) of SARs-CoV-2 with 3. reference strain (Wuhan) (YP_009724393.1).

3. Nucleocapsid Phosphoprotein



Figure S3. Schematic view of contigs of the Nucleocapsid phosphoprotein of 1. Alpha Variant (B.1.1.7) (UDQ41846.1) and 2. Delta Variant (B.1.617.21) (UDU36754.1) of SARs-CoV-2 with 3. reference strain (Wuhan) (YP_009724397.2).

4. ORF10 protein



Figure S4. Schematic view of contigs of the ORF10 protein of 1. Alpha Variant (B.1.1.7) (UDQ41847.1) and 2. Delta Variant (B.1.617.21) (UDU36755.1) of SARs-CoV-2 with 3. reference Strain (Wuhan) (YP_009725255.1).

5. ORF1a polyprotein

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1	MESLVPGFNEKTHVQLSLPVLQVRDVLVRGFGDSVEEVLSEARQHLDGTCGLVEVEKGVLPQLEQPYVFIKRS DARTAPHGHVMVELVAELEGIQYGRSGETLGVLPVH	110
2	MESLVPGFNEKTHVQLSLPVLQVRDVLVRGFGDSVEEVLSEARQHLDGTCGLVEVEKGVLPQLEQPYVFIKRS DARTAPHGHVMVELVAELEGIQYGRSGETLGVLPVH	110
3	MESLVPGFNEKTHVQLSLPVLQVRDVLVRGFGDSVEEVLSEARQHLDGTCGLVEVEKGVLPQLEQPYVFIKRS DARTAPHGHVMVELVAELEGIQYGRSGETLGVLPVH	110
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1 CPRHVICTSEDMLNPNYEDLLIRKSNHNFLVQAGNVQLRVIGHSMQNCVLKLKVDTANPKTPKYKFVRIQPGQTFSVLACYNGSPSGVYQCAMRPNFTIKGSFLNGSCGS 3410
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1 VGFNIDYDCVSFCYMHMELPTGVHAGTDLEGNFYGPFVDRQTAQAAGDTTITVNVLAWLYAAVINGDRWFLNRFTTTLNDFNLVAMKYNIEPLTQDHVDILGPLSAQT 3520
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GI AVLDMCASLKELLQNGMNGRTILGSALLEDEFTPFDDVVRQCSGVTFQSAVKRTIKGTHHWLLLTILTSLLVLVQSTQWSLFFFLYENAFLPFAMGIIAMSAFAMMFVK

1 GI AVLDMCASLKELLQNGMNGRTILGSALLEDEFTPFDDVVRQCSGVTFQSAVKRTIKGTHHWLLLTILTSLLVLVQSTQWSLFFFLYENAFLPFAMGIIAMSAFAMMFVK 3630
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3 HKHAFCLCLFLLPSLATVAYFNMVMPASWVMRIMTWLDMVDTSLSGFKLKDCVMYASAVVLLILMTARTVYDDGARRVWTL MNVLT LVYK VYYGNALDQAISMWALIISV 3740

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1 TSNYSGVVTTVMFLARGIVFMCVEYCPIFFITGNTLQCIMLVYCFLGYFCTCYFGLFCLLNRYFRLTLGVYDYL VSTQEFRYMNSQGLLPPKNSIDAFKLN IKLLGVGGK 3850
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3 PCIKVATVQSKMSDVKCTSVVLLSVLQQLRVESSSKLWAQCVQLHNDILLAKDTTEAFEKMSVLLSVLLSMQGAVDINKLCEEMLDNRATLQAIASEFSSLPSYAAFATA 3960

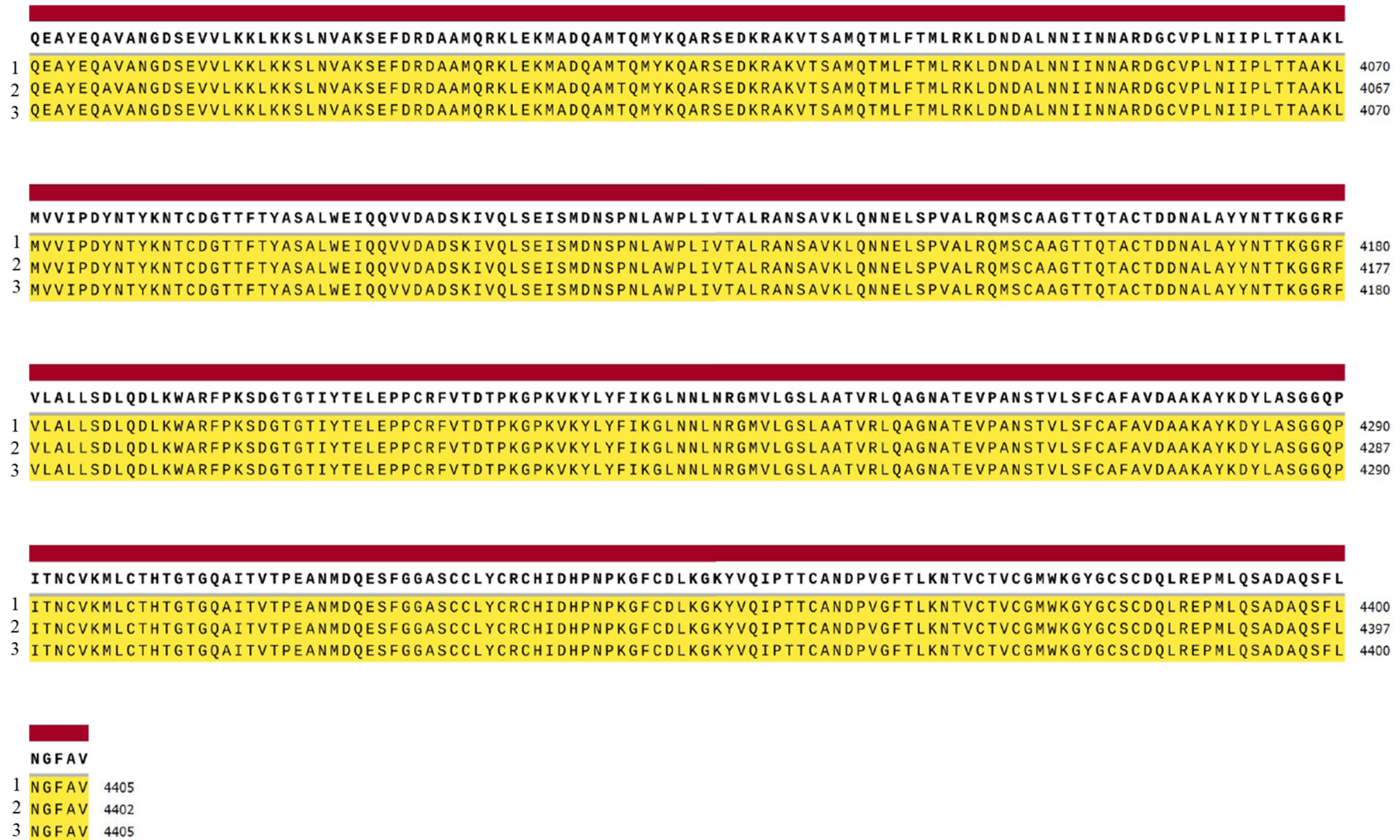


Figure S5. Schematic view of contigs of the ORF1a polypeptide of 1. Alpha Variant (B.1.1.7) (UDQ41837.1) and 2. Delta Variant (B.1.617.21) (UDU36745.1) of SARs-CoV-2 with 3. reference Strain (Wuhan) (YP_009725295.1).

6. ORF1ab polyprotein

MESLVPGFNEKTHVQLSLPVLQVRDVLVRGFGDSVEEVLSEARQHLKDGTCLVEVEKGVLPQLEQPYVFIKRS DARTAPHGHVMVELVAELEGIQYGRSGETLGVLVPH 110

1 MESLVPGFNEKTHVQLSLPVLQVRDVLVRGFGDSVEEVLSEARQHLKDGTCLVEVEKGVLPQLEQPYVFIKRS DARTAPHGHVMVELVAELEGIQYGRSGETLGVLVPH 110

2 MESLVPGFNEKTHVQLSLPVLQVRDVLVRGFGDSVEEVLSEARQHLKDGTCLVEVEKGVLPQLEQPYVFIKRS DARTAPHGHVMVELVAELEGIQYGRSGETLGVLVPH 110

3 MESLVPGFNEKTHVQLSLPVLQVRDVLVRGFGDSVEEVLSEARQHLKDGTCLVEVEKGVLPQLEQPYVFIKRS DARTAPHGHVMVELVAELEGIQYGRSGETLGVLVPH 110

VGEIPVAYRKVLLRKNGNKGAGGHSYGADLKSF DLGDELGTD PYEDFQENWNTKHSSGV TRELMRELNGGAYTRYVDN NFCGPDGYPLECIKDLLARAGKASCTLSEQLD 220

1 VGEIPVAYRKVLLRKNGNKGAGGHSYGADLKSF DLGDELGTD PYEDFQENWNTKHSSGV TRELMRELNGGAYTRYVDN NFCGPDGYPLECIKDLLARAGKASCTLSEQLD 220

2 VGEIPVAYRKVLLRKNGNKGAGGHSYGADLKSF DLGDELGTD PYEDFQENWNTKHSSGV TRELMRELNGGAYTRYVDN NFCGPDGYPLECIKDLLARAGKASCTLSEQLD 220

3 VGEIPVAYRKVLLRKNGNKGAGGHSYGADLKSF DLGDELGTD PYEDFQENWNTKHSSGV TRELMRELNGGAYTRYVDN NFCGPDGYPLECIKDLLARAGKASCTLSEQLD 220

FIDTKRGVYCCREHEHEIAWYTERSEKSYELQTPFEIKLAKKFDTFN GECPNFVFPLNSIIKTIQPRVEKKLDGFMGRIRSVYPVASPNECNQMCLSTLMKCDHCGETS 330

1 FIDTKRGVYCCREHEHEIAWYTERSEKSYELQTPFEIKLAKKFDTFN GECPNFVFPLNSIIKTIQPRVEKKLDGFMGRIRSVYPVASPNECNQMCLSTLMKCDHCGETS 330

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1 WQTGDFVKATCEFCGTENLTKEGATTCGYLPQNAVVKIYCPACHNSEVGPEHSLAEYHNESGLKTI LRKGGRTIAFGGCVFSYVGCHNKAYWVPRASANIGCNHTGVVG 440

2 WQTGDFVKATCEFCGTENLTKEGATTCGYLPQNAVVKIYCPACHNSEVGPEHSLAEYHNESGLKTI LRKGGRTIAFGGCVFSYVGCHNKAYWVPRASANIGCNHTGVVG 440

3 WQTGDFVKATCEFCGTENLTKEGATTCGYLPQNAVVKIYCPACHNSEVGPEHSLAEYHNESGLKTI LRKGGRTIAFGGCVFSYVGCHNKAYWVPRASANIGCNHTGVVG 440

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1 EGSEGLNDNLLEILQKEKVNINIVGDFKLNEEIAIILASFSASTSAFVETVKGLDYKAFKQIVESCGNFKVTKGKAKKGAWNIGEQKSILSPYAFASEAARVVRSIFSR 550
2 EGSEGLNDNLLEILQKEKVNINIVGDFKLNEEIAIILASFSASTSAFVETVKGLDYKAFKQIVESCGNFKVTKGKAKKGAWNIGEQKSILSPYAFASEAARVVRSIFSR 550
3 EGSEGLNDNLLEILQKEKVNINIVGDFKLNEEIAIILASFSASTSAFVETVKGLDYKAFKQIVESCGNFKVTKGKAKKGAWNIGEQKSILSPYAFASEAARVVRSIFSR 550

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1 TLETAQNSVRVLQKAAITILDGISQYSLRLIDAMMFTSDLATNNLVVMAYITGGVVQLTSQWLTNIFGTVYEKLKPVLDWLEEKFKEGVEFLRDGWEIVKFISTCACEIV 660
2 TLETAQNSVRVLQKAAITILDGISQYSLRLIDAMMFTSDLATNNLVVMAYITGGVVQLTSQWLTNIFGTVYEKLKPVLDWLEEKFKEGVEFLRDGWEIVKFISTCACEIV 660
3 TLETAQNSVRVLQKAAITILDGISQYSLRLIDAMMFTSDLATNNLVVMAYITGGVVQLTSQWLTNIFGTVYEKLKPVLDWLEEKFKEGVEFLRDGWEIVKFISTCACEIV 660

GGQIVTCAKEIKESVQTFFKLVNKFLALCADSIIIGGAKLKALNLGETFVTHSKGLYRKC VKSREETGLLMPLKAPKEIIFLEGETLPTEVLTEEVVLKTGDLQPLEQPT

1 GGQIVTCAKEIKESVQTFFKLVNKFLALCADSIIIGGAKLKALNLGETFVTHSKGLYRKC VKSREETGLLMPLKAPKEIIFLEGETLPTEVLTEEVVLKTGDLQPLEQPT 770
2 GGQIVTCAKEIKESVQTFFKLVNKFLALCADSIIIGGAKLKALNLGETFVTHSKGLYRKC VKSREETGLLMPLKAPKEIIFLEGETLPTEVLTEEVVLKTGDLQPLEQPT 770
3 GGQIVTCAKEIKESVQTFFKLVNKFLALCADSIIIGGAKLKALNLGETFVTHSKGLYRKC VKSREETGLLMPLKAPKEIIFLEGETLPTEVLTEEVVLKTGDLQPLEQPT 770

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1 NTVKS VGKFCLEASFNYLKSPNFSKLINIIWFLLLSVCLGSLIYSTAALGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSIPCSVCLSGLD SLD TYPSLETIQIT 2310

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3 NTVKS VGKFCLEASFNYLKSPNFSKLINIIWFLLLSVCLGSLIYSTAALGVLM SNLGMPSYCTGYREGYLNSTNVTIATYCTGSIPCSVCLSGLD SLD TYPSLETIQIT 2310

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1 ISSFKWDLTAFGLVAEWFLAYILFTRFFYVLGLAATMQLFFSYFAVHFISNSWLMWLIINLVQMAPISAMVRMYIFFASFYYVWKS YVHVVDGCNSSTCMMCYKRNRATR 2420

2 ISSFKWDLTAFGLVAEWFLAYILFTRFFYVLGLAATMQLFFSYFAVHFISNSWLMWLIINLVQMAPISAMVRMYIFFASFYYVWKS YVHVVDGCNSSTCMMCYKRNRATR 2420

3 ISSFKWDLTAFGLVAEWFLAYILFTRFFYVLGLAATMQLFFSYFAVHFISNSWLMWLIINLVQMAPISAMVRMYIFFASFYYVWKS YVHVVDGCNSSTCMMCYKRNRATR 2420

VECTTIVNGVRRSFYVYANGGKGFCCLHNWNCVNCDTFCAGSTFISDEVARDLSLQFKRPINPTDQSSYIVDSVTVKNGSIHLYFDKAGQKTYERHSLSHFVNLDNLRAN

1 VECTTIVNGVRRSFYVYANGGKGFCCLHNWNCVNCDTFCAGSTFISDEVARDLSLQFKRPINPTDQSSYIVDSVTVKNGSIHLYFDKAGQKTYERHSLSHFVNLDNLRAN 2530

2 VECTTIVNGVRRSFYVYANGGKGFCCLHNWNCVNCDTFCAGSTFISDEVARDLSLQFKRPINPTDQSSYIVDSVTVKNGSIHLYFDKAGQKTYERHSLSHFVNLDNLRAN 2530

3 VECTTIVNGVRRSFYVYANGGKGFCCLHNWNCVNCDTFCAGSTFISDEVARDLSLQFKRPINPTDQSSYIVDSVTVKNGSIHLYFDKAGQKTYERHSLSHFVNLDNLRAN 2530

NTKGSLPINVIVFDGKSKCEESSAKSASVYYSQLMCQPILLDDQALVSDVGDSA EVAVKMF DAYVNTFSSTFNVPMEK LKTLVATAEAE LAKNVSLDNVLSTFISAARQG

1 NTKGSLPINVIVFDGKSKCEESSAKSASVYYSQLMCQPILLDDQALVSDVGDSA EVAVKMF DAYVNTFSSTFNVPMEK LKTLVATAEAE LAKNVSLDNVLSTFISAARQG 2640

2 NTKGSLPINVIVFDGKSKCEESSAKSASVYYSQLMCQPILLDDQALVSDVGDSA EVAVKMF DAYVNTFSSTFNVPMEK LKTLVATAEAE LAKNVSLDNVLSTFISAARQG 2640

3 NTKGSLPINVIVFDGKSKCEESSAKSASVYYSQLMCQPILLDDQALVSDVGDSA EVAVKMF DAYVNTFSSTFNVPMEK LKTLVATAEAE LAKNVSLDNVLSTFISAARQG 2640

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1 FVDSDEVTKDVVECLKLSHQSDIEVTGDSNNYMLTYNKVENMTPRDLGACIDCSARHINAQVAKSHNIALIWNVKDFMSLSEQLRKQIRSAAKNNLPFKLTCATTRQV 2750
2 FVDSDEVTKDVVECLKLSHQSDIEVTGDSNNYMLTYNKVENMTPRDLGACIDCSARHINAQVAKSHNIALIWNVKDFMSLSEQLRKQIRSAAKNNLPFKLTCATTRQV 2750
3 FVDSDEVTKDVVECLKLSHQSDIEVTGDSNNYMLTYNKVENMTPRDLGACIDCSARHINAQVAKSHNIALIWNVKDFMSLSEQLRKQIRSAAKNNLPFKLTCATTRQV 2750

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1 VNVVTTKIALKGGKIVNNWLKQLIKVTLVFLFVAAIFYLITPVHVMSKHTDFSSEIIGYKAIDGGVTRDIASDTCTCFANKHADFDTWFSQRGGSYTNDKACPLIAAVITR 2860
2 VNVVTTKIALKGGKIVNNWLKQLIKVTLVFLFVAAIFYLITPVHVMSKHTDFSSEIIGYKAIDGGVTRDIASDTCTCFANKHADFDTWFSQRGGSYTNDKACPLIAAVITR 2860
3 VNVVTTKIALKGGKIVNNWLKQLIKVTLVFLFVAAIFYLITPVHVMSKHTDFSSEIIGYKAIDGGVTRDIASDTCTCFANKHADFDTWFSQRGGSYTNDKACPLIAAVITR 2860

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1 EVGFVVPGLPGTILRTTNGDFLHFLPRVFSAVGNICYTPSKLIEYTDFAVSACVLAAECTIFKDASGKVPYCYDTNVLEGSVAYESLRPDTRYVLMDGSIQFPNTYLE 2970
2 EVGFVVPGLPGTILRTTNGDFLHFLPRVFSAVGNICYTPSKLIEYTDFAVSACVLAAECTIFKDASGKVPYCYDTNVLEGSVAYESLRPDTRYVLMDGSIQFPNTYLE 2970
3 EVGFVVPGLPGTILRTTNGDFLHFLPRVFSAVGNICYTPSKLIEYTDFAVSACVLAAECTIFKDASGKVPYCYDTNVLEGSVAYESLRPDTRYVLMDGSIQFPNTYLE 2970

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1 GSRVVVTTFDSEYCRHGTCESEAGVCVSTSGRWVLNNDYYRSLPGVFCGVDAVNLLTNMFTPLIQPIGALDISASIVAGGIVAIVVTCLAYYFMRFRRAFGEYSHVVAF 3080
2 GSRVVVTTFDSEYCRHGTCESEAGVCVSTSGRWVLNNDYYRSLPGVFCGVDAVNLLTNMFTPLIQPIGALDISASIVAGGIVAIVVTCLAYYFMRFRRAFGEYSHVVAF 3080
3 GSRVVVTTFDSEYCRHGTCESEAGVCVSTSGRWVLNNDYYRSLPGVFCGVDAVNLLTNMFTPLIQPIGALDISASIVAGGIVAIVVTCLAYYFMRFRRAFGEYSHVVAF 3080

NTLLFLMSFTVLCCLTPVYSFLPGVYSVIYLYLTFYLTNDVSFLAHIQWMVMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVSFSTFEEAALCTFLLNKEMY

1	NTLLFLMSFTVLCCLTPVYSFLPGVYSVIYLYLTFYLTNDVSFLAHIQWMVMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVSFSTFEEAALCTFLLNKEMY	3190
2	NTLLFLMSFTVLCCLTPVYSFLPGVYSVIYLYLTFYLTNDVSFLAHIQWMVMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVSFSTFEEAALCTFLLNKEMY	3190
3	NTLLFLMSFTVLCCLTPVYSFLPGVYSVIYLYLTFYLTNDVSFLAHIQWMVMFTPLVPFWITIAIYIICISTKHFYWFFSNYLKRRVVFNGVSFSTFEEAALCTFLLNKEMY	3190

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1	LKLRSDVLLPLTQYNRYLALYNKYKYFSGAMDTSYREAAACCHLAKALNDFSNSGSDVLYQPPQTSITSAVLQSGFRKMAFPSGKVEGCMVQVTCGTTTLNGLWLDVVY	3300
2	LKLRSDVLLPLTQYNRYLALYNKYKYFSGAMDTSYREAAACCHLAKALNDFSNSGSDVLYQPPQTSITSAVLQSGFRKMAFPSGKVEGCMVQVTCGTTTLNGLWLDVVY	3300
3	LKLRSDVLLPLTQYNRYLALYNKYKYFSGAMDTSYREAAACCHLAKALNDFSNSGSDVLYQPPQTSITSAVLQSGFRKMAFPSGKVEGCMVQVTCGTTTLNGLWLDVVY	3300

CPRHVICTSEDMLNPNYEDLLIRKSNHNFLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTFSVLACYNGSPSGVYQCAMRPNFTIKGSFLNGSCGS

1	CPRHVICTSEDMLNPNYEDLLIRKSNHNFLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTFSVLACYNGSPSGVYQCAMRPNFTIKGSFLNGSCGS	3410
2	CPRHVICTSEDMLNPNYEDLLIRKSNHNFLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTFSVLACYNGSPSGVYQCAMRPNFTIKGSFLNGSCGS	3410
3	CPRHVICTSEDMLNPNYEDLLIRKSNHNFLVQAGNVQLRVIGHSMQNCVLKLVDTANPKTPKYKFVRIQPGQTFSVLACYNGSPSGVYQCAMRPNFTIKGSFLNGSCGS	3410

VGFNIDYDCVSFCYMHMELPTGVHAGTDLEGNFYGPFVDRQTAQAAGDTTITVNVLAWLYAAVINGDRWFLNRFTTTLNDFNLVAMKYNYEPLTQDHVDILGPLSAQT

1	VGFNIDYDCVSFCYMHMELPTGVHAGTDLEGNFYGPFVDRQTAQAAGDTTITVNVLAWLYAAVINGDRWFLNRFTTTLNDFNLVAMKYNYEPLTQDHVDILGPLSAQT	3520
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3	VGFNIDYDCVSFCYMHMELPTGVHAGTDLEGNFYGPFVDRQTAQAAGDTTITVNVLAWLYAAVINGDRWFLNRFTTTLNDFNLVAMKYNYEPLTQDHVDILGPLSAQT	3520

GI AVLDMCASLKELLQNGMNGRTILGSALLEDEFTPFDVVRQCSGVTFQSAVKRTIKGTHHWLLLTILTSLLVLVQSTQWSLFFFLYENAFLPFAMGIIAMSAFAMMFVK

GI AVLDMCASLKELLQNGMNGRTILGSALLEDEFTPFDVVRQCSGVTFQSAVKRTIKGTQHWLLLTILTSLLVLVQSTQWSLFFFLYENAFLPFAMGIIAMSAFAMMFVK 3630

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HKHAFCLCLFLLPSLATVAYFNMVMPASWVMRIMTWLDMVDTSLSGFKLKDCVMYASAVVLLILMTARTVYDDGARRVWTL MNVLT LVYKVYYGNALDQAISMWALIISV

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HKHAFCLCLFLLPSLATVAYFNMVMPASWVMRIMTWLDMVDTSLSGFKLKDCVMYASAVVLLILMTARTVYDDGARRVWTL MNVLT LVYKVYYGNALDQAISMWALIISV 3740

TSNYSGVVTTVMFLARGIVFMCVEYCPPIFFITGNTLQCI MLVYCF LGYFCTCYFGLFCLLNRYFRLTLGVYDYL VSTQEF RYMNSQGLLPPKNSIDAFKLN IKLLGVGGK

TSNYSGVVTTVMFLARGIVFMCVEYCPPIFFITGNTLQCI MLVYCF LGYFCTCYFGLFCLLNRYFRLTLGVYDYL VSTQEF RYMNSQGLLPPKNSIDAFKLN IKLLGVGGK 3850

TSNYSGVVTTVMFLARGIVFMCVEYCPPIFFITGNTLQCI MLVYCF LGYFCTCYFGLFCLLNRYFRLTLGVYDYL VSTQEF RYMNSQGLLPPKNSIDAFKLN IKLLGVGGK 3847

TSNYSGVVTTVMFLARGIVFMCVEYCPPIFFITGNTLQCI MLVYCF LGYFCTCYFGLFCLLNRYFRLTLGVYDYL VSTQEF RYMNSQGLLPPKNSIDAFKLN IKLLGVGGK 3850

PCIKVATVQSKMSDVKCTSVVLLSVLQQLRVESSSKLWAQCVQLHNDILLAKDTTEAFEKMSVLLSVLLSMQGAVDINKLCEEMLDNRATLQAIASEFSSLPSYAAFATA

PCIKVATVQSKMSDVKCTSVVLLSVLQQLRVESSSKLWAQCVQLHNDILLAKDTTEAFEKMSVLLSVLLSMQGAVDINKLCEEMLDNRATLQAIASEFSSLPSYAAFATA 3960

PCIKVATVQSKMSDVKCTSVVLLSVLQQLRVESSSKLWAQCVQLHNDILLAKDTTEAFEKMSVLLSVLLSMQGAVDINKLCEEMLDNRATLQAIASEFSSLPSYAAFATA 3957

PCIKVATVQSKMSDVKCTSVVLLSVLQQLRVESSSKLWAQCVQLHNDILLAKDTTEAFEKMSVLLSVLLSMQGAVDINKLCEEMLDNRATLQAIASEFSSLPSYAAFATA 3960

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1	QEAYEQAVANGDSEVVLKKLKKSLNVAKSEFDRDAAMQRKLEKMAHQAMTQMYKQARSEDKRAKVTSAMQTMFTMLRKLDNDALNNIINNARDGCVPLNIPLTTAAKL	4070
2	QEAYEQAVANGDSEVVLKKLKKSLNVAKSEFDRDAAMQRKLEKMAHQAMTQMYKQARSEDKRAKVTSAMQTMFTMLRKLDNDALNNIINNARDGCVPLNIPLTTAAKL	4067
3	QEAYEQAVANGDSEVVLKKLKKSLNVAKSEFDRDAAMQRKLEKMAHQAMTQMYKQARSEDKRAKVTSAMQTMFTMLRKLDNDALNNIINNARDGCVPLNIPLTTAAKL	4070

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1	MVVIPDYNTYKNTCDGTTFTYASALWEIQVVDADSKIVQLSEISMDNSPNLAWPLIVTALRANSVAVKLQNNELSPVALRQMSCAAGTTQTACTDDNALAYYNTTKGGRF	4180
2	MVVIPDYNTYKNTCDGTTFTYASALWEIQVVDADSKIVQLSEISMDNSPNLAWPLIVTALRANSVAVKLQNNELSPVALRQMSCAAGTTQTACTDDNALAYYNTTKGGRF	4177
3	MVVIPDYNTYKNTCDGTTFTYASALWEIQVVDADSKIVQLSEISMDNSPNLAWPLIVTALRANSVAVKLQNNELSPVALRQMSCAAGTTQTACTDDNALAYYNTTKGGRF	4180

VLALLSDLQDLKWARFPKSDGTGTIYTELEPPCRFVTDTPKGPVKYLYFIKGLNNLNRGMVLGSLAATVRLQAGNATEVPANSTVLSFCAFAVDAAKAYKDYLASGGQP

1	VLALLSDLQDLKWARFPKSDGTGTIYTELEPPCRFVTDTPKGPVKYLYFIKGLNNLNRGMVLGSLAATVRLQAGNATEVPANSTVLSFCAFAVDAAKAYKDYLASGGQP	4290
2	VLALLSDLQDLKWARFPKSDGTGTIYTELEPPCRFVTDTPKGPVKYLYFIKGLNNLNRGMVLGSLAATVRLQAGNATEVPANSTVLSFCAFAVDAAKAYKDYLASGGQP	4287
3	VLALLSDLQDLKWARFPKSDGTGTIYTELEPPCRFVTDTPKGPVKYLYFIKGLNNLNRGMVLGSLAATVRLQAGNATEVPANSTVLSFCAFAVDAAKAYKDYLASGGQP	4290

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1	ITNCVKMLCTHTGTGQAITVTPEANMDQESFGGASCCLYCRCHIDHPNPKGFCDLKGKYVQIPTTCANDPVGFLLKNTVCTVCGMWKGYGCSCDQLREPMLQSADAQSFL	4400
2	ITNCVKMLCTHTGTGQAITVTPEANMDQESFGGASCCLYCRCHIDHPNPKGFCDLKGKYVQIPTTCANDPVGFLLKNTVCTVCGMWKGYGCSCDQLREPMLQSADAQSFL	4397
3	ITNCVKMLCTHTGTGQAITVTPEANMDQESFGGASCCLYCRCHIDHPNPKGFCDLKGKYVQIPTTCANDPVGFLLKNTVCTVCGMWKGYGCSCDQLREPMLQSADAQSFL	4400

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1 NRVCGVSAARLTPCGTGTSTDVVYRAFDIYNDKVAGFAKFLKTNCCRFQEKDEDDNLIDSYFVVKRHTFSNYQHEETIYNLLKDCPAVAKHDFKFRIDGDMVPHISRQR 4510
2 NRVCGVSAARLTPCGTGTSTDVVYRAFDIYNDKVAGFAKFLKTNCCRFQEKDEDDNLIDSYFVVKRHTFSNYQHEETIYNLLKDCPAVAKHDFKFRIDGDMVPHISRQR 4507
3 NRVCGVSAARLTPCGTGTSTDVVYRAFDIYNDKVAGFAKFLKTNCCRFQEKDEDDNLIDSYFVVKRHTFSNYQHEETIYNLLKDCPAVAKHDFKFRIDGDMVPHISRQR 4510

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1 LTKYTMADLVYALRHFDEGNCDTLKEILVTYNCCDDYFNKKDWYDFVENPDILRVYANLGERVRQALLKTVQFCDAMRNAGIVGVLTLDNQDLNGNWYDFGDFIQTTPG 4620
2 LTKYTMADLVYALRHFDEGNCDTLKEILVTYNCCDDYFNKKDWYDFVENPDILRVYANLGERVRQALLKTVQFCDAMRNAGIVGVLTLDNQDLNGNWYDFGDFIQTTPG 4617
3 LTKYTMADLVYALRHFDEGNCDTLKEILVTYNCCDDYFNKKDWYDFVENPDILRVYANLGERVRQALLKTVQFCDAMRNAGIVGVLTLDNQDLNGNWYDFGDFIQTTPG 4620

SGVPVVD SYYSLLMPILTLTRALTAESHVDTDLTKPYIKWDLKDYDFTEERLKLFD RYFKYWDQTYHPNCVNCLDDRCILHCANFNVLFSTVFPLTSFGPLVRKIFVDGV

1 SGVPVVD SYYSLLMPILTLTRALTAESHVDTDLTKPYIKWDLKDYDFTEERLKLFD RYFKYWDQTYHPNCVNCLDDRCILHCANFNVLFSTVFPLTSFGPLVRKIFVDGV 4730
2 SGVPVVD SYYSLLMPILTLTRALTAESHVDTDLTKPYIKWDLKDYDFTEERLKLFD RYFKYWDQTYHPNCVNCLDDRCILHCANFNVLFSTVFPLTSFGPLVRKIFVDGV 4727
3 SGVPVVD SYYSLLMPILTLTRALTAESHVDTDLTKPYIKWDLKDYDFTEERLKLFD RYFKYWDQTYHPNCVNCLDDRCILHCANFNVLFSTVFPLTSFGPLVRKIFVDGV 4730

PFV VSTGYHFRELGVVHNQDVNLHSSRLSFKELLVYAADPAMHAASGNLLLDKRTTCFSVAALTNNVAFQTVKPGNFNKDFYDFAVSKGFFKEGSSVELKHFFFAQDGNA

1 PFV VSTGYHFRELGVVHNQDVNLHSSRLSFKELLVYAADPAMHAASGNLLLDKRTTCFSVAALTNNVAFQTVKPGNFNKDFYDFAVSKGFFKEGSSVELKHFFFAQDGNA 4840
2 PFV VSTGYHFRELGVVHNQDVNLHSSRLSFKELLVYAADPAMHAASGNLLLDKRTTCFSVAALTNNVAFQTVKPGNFNKDFYDFAVSKGFFKEGSSVELKHFFFAQDGNA 4837
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1	AISDYDYYRYNLPTMCDIRQLLFVVEVVDKYFDCYDGGCINANQVIVNNLDKSAGFPFNKGKARLYYDSMSYEDQDALFAYTKRNVIPITITQMNLYAISAKNRARTVA	4950
2	AISDYDYYRYNLPTMCDIRQLLFVVEVVDKYFDCYDGGCINANQVIVNNLDKSAGFPFNKGKARLYYDSMSYEDQDALFAYTKRNVIPITITQMNLYAISAKNRARTVA	4947
3	AISDYDYYRYNLPTMCDIRQLLFVVEVVDKYFDCYDGGCINANQVIVNNLDKSAGFPFNKGKARLYYDSMSYEDQDALFAYTKRNVIPITITQMNLYAISAKNRARTVA	4950

GVSICSTMTNRQFHQKLLKSIAATRGATVVIGTSKFYGGWHNMLKTVYSDVENPHLMGWDYPKCDRAMPNMLRIMASLVLARKHTTCCSLSHRFYRLANCAQVLSEMVM

1	GVSICSTMTNRQFHQKLLKSIAATRGATVVIGTSKFYGGWHNMLKTVYSDVENPHLMGWDYPKCDRAMPNMLRIMASLVLARKHTTCCSLSHRFYRLANCAQVLSEMVM	5060
2	GVSICSTMTNRQFHQKLLKSIAATRGATVVIGTSKFYGGWHNMLKTVYSDVENPHLMGWDYPKCDRAMPNMLRIMASLVLARKHTTCCSLSHRFYRLANCAQVLSEMVM	5057
3	GVSICSTMTNRQFHQKLLKSIAATRGATVVIGTSKFYGGWHNMLKTVYSDVENPHLMGWDYPKCDRAMPNMLRIMASLVLARKHTTCCSLSHRFYRLANCAQVLSEMVM	5060

CGGSLYVKPGGTSSGDATTAYANSVFNICQAVTANVNALLSTDGNKIADKYVRNLQHRLYECLYRNRDVTDFVNEFYAYLRKHFSMMILSDDAVVCFNSTYASQGLVAS

1	CGGSLYVKPGGTSSGDATTAYANSVFNICQAVTANVNALLSTDGNKIADKYVRNLQHRLYECLYRNRDVTDFVNEFYAYLRKHFSMMILSDDAVVCFNSTYASQGLVAS	5170
2	CGGSLYVKPGGTSSGDATTAYANSVFNICQAVTANVNALLSTDGNKIADKYVRNLQHRLYECLYRNRDVTDFVNEFYAYLRKHFSMMILSDDAVVCFNSTYASQGLVAS	5167
3	CGGSLYVKPGGTSSGDATTAYANSVFNICQAVTANVNALLSTDGNKIADKYVRNLQHRLYECLYRNRDVTDFVNEFYAYLRKHFSMMILSDDAVVCFNSTYASQGLVAS	5170

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2	IKNFKSVLYYQNNVMSEAKWTETDLTKGPHEFCSQHTMLVKQGDDYVYLPYPDPSRILGAGCFVDDIVKTDGTLMIERFVSLAIDAYPLTKHPNQEYADVFLYLQYI	5277
3	IKNFKSVLYYQNNVMSEAKWTETDLTKGPHEFCSQHTMLVKQGDDYVYLPYPDPSRILGAGCFVDDIVKTDGTLMIERFVSLAIDAYPLTKHPNQEYADVFLYLQYI	5280

RKLHDELTGHMLDMYSVMLTNDNTSRYWEPEFYEAMYPHTVLQAVGACVLCNSQTSLRGACIRRPFLCCKCCYDHVISTSHKLVL SVN PYVCNAPGCDVTDVTQLYLG

1	RKLHDELTGHMLDMYSVMLTNDNTSRYWEPEFYEAMYPHTVLQAVGACVLCNSQTSLRGACIRRPFLCCKCCYDHVISTSHKLVL SVN PYVCNAPGCDVTDVTQLYLG	5390
2	RKLHDELTGHMLDMYSVMLTNDNTSRYWEPEFYEAMYPHTVLQAVGACVLCNSQTSLRGACIRRPFLCCKCCYDHVISTSHKLVL SVN PYVCNAPGCDVTDVTQLYLG	5387
3	RKLHDELTGHMLDMYSVMLTNDNTSRYWEPEFYEAMYPHTVLQAVGACVLCNSQTSLRGACIRRPFLCCKCCYDHVISTSHKLVL SVN PYVCNAPGCDVTDVTQLYLG	5390

GMSYYCKSHKPPISFPLCANGQVFGLYKNTCVGSDNVTD FNAIATCDWTNAGDYILANTCTERLKLFAAETLKATEETFKLSYGIATVREVLS DRELHLSWEVGKPRPPL

1	GMSYYCKSHKPPISFPLCANGQVFGLYKNTCVGSDNVTD FNAIATCDWTNAGDYILANTCTERLKLFAAETLKATEETFKLSYGIATVREVLS DRELHLSWEVGKPRPPL	5500
2	GMSYYCKSHKPPISFPLCANGQVFGLYKNTCVGSDNVTD FNAIATCDWTNAGDYILANTCTERLKLFAAETLKATEETFKLSYGIATVREVLS DRELHLSWEVGKPRPPL	5497
3	GMSYYCKSHKPPISFPLCANGQVFGLYKNTCVGSDNVTD FNAIATCDWTNAGDYILANTCTERLKLFAAETLKATEETFKLSYGIATVREVLS DRELHLSWEVGKPRPPL	5500

NRNYVFTGYRVTKNSKVQIGEYTFEKG DYGD AVVYRGTTTYKLNVDYFVLTSHTVMPLSAPTLVPQEHYVRITGLYPTLNISDEFSSNVANYQKVGMQKYSTLQGPPGT

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2	NRNYVFTGYRVTKNSKVQIGEYTFEKG DYGD AVVYRGTTTYKLNVDYFVLTSHTVMPLSAPTLVPQEHYVRITGLYPTLNISDEFSSNVANYQKVGMQKYSTLQGPPGT	5607
3	NRNYVFTGYRVTKNSKVQIGEYTFEKG DYGD AVVYRGTTTYKLNVDYFVLTSHTVMPLSAPTLVPQEHYVRITGLYPTLNISDEFSSNVANYQKVGMQKYSTLQGPPGT	5610

GKSHFAIGLALYYPSARIVYTACSHA AVDALCEKALKYLPIDKCSRIIPARARVECFDKFKVNSTLEQYVFCTVNALPETTADIVVFDEISMATNYDLSVVNARLRAKHY

1	GKSHFAIGLALYYPSARIVYTACSHA AVDALCEKALKYLPIDKCSRIIPARARVECFDKFKVNSTLEQYVFCTVNALPETTADIVVFDEISMATNYDLSVVNARLRAKHY	5720
2	GKSHFAIGLALYYPSARIVYTACSHA AVDALCEKALKYLPIDKCSRIIPARARVECFDKFKVNSTLEQYVFCTVNALPETTADIVVFDEISMATNYDLSVVNARLRAKHY	5717
3	GKSHFAIGLALYYPSARIVYTACSHA AVDALCEKALKYLPIDKCSRIIPARARVECFDKFKVNSTLEQYVFCTVNALPETTADIVVFDEISMATNYDLSVVNARLRAKHY	5720

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1	VYIGDPAQLPAPRTLLTKGTLEPEYFNSVCRLMKTIGPDMFLGTCRRCPAEIVDTVSA LVYDNKLKAHKDKSAQCFKMFYKGVITHDVSSAINRPQIGVVREFLTRNPAW	5830
2	VYIGDPAQLPAPRTLLTKGTLEPEYFNSVCRLMKTIGPDMFLGTCRRCPAEIVDTVSA LVYDNKLKAHKDKSAQCFKMFYKGVITHDVSSAINRPQIGVVREFLTRNPAW	5827
3	VYIGDPAQLPAPRTLLTKGTLEPEYFNSVCRLMKTIGPDMFLGTCRRCPAEIVDTVSA LVYDNKLKAHKDKSAQCFKMFYKGVITHDVSSAINRPQIGVVREFLTRNPAW	5830

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1	RKAVFISPYNSQNAVASKILGLPTQTV DSSQGSEYDYVIFTQTTETAHSCNVNRFNVAITRAKVGILCIMS DRDLYDKLQFTSLEIPRRNVATLQAENV TGLFKDCSKVI	5940
2	RKAVFISPYNSQNAVASKILGLPTQTV DSSQGSEYDYVIFTQTTETAHSCNVNRFNVAITRAKVGILCIMS DRDLYDKLQFTSLEIPRRNVATLQAENV TGLFKDCSKVI	5937
3	RKAVFISPYNSQNAVASKILGLPTQTV DSSQGSEYDYVIFTQTTETAHSCNVNRFNVAITRAKVGILCIMS DRDLYDKLQFTSLEIPRRNVATLQAENV TGLFKDCSKVI	5940

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1	TGLHPTQAPTHLSVDTKFKTEGLCVDIPGIPKDMTYRRLISMMGFKMNYQVNGYPNMFITREEAIRHVRAWIGFDVEGCHATREAVGTNLPLQLGFSTGVNLVAVPTGYV	6050
2	TGLHPTQAPTHLSVDTKFKTEGLCVDIPGIPKDMTYRRLISMMGFKMNYQVNGYPNMFITREEAIRHVRAWIGFDVEGCHATREAVGTNLPLQLGFSTGVNLVAVPTGYV	6047
3	TGLHPTQAPTHLSVDTKFKTEGLCVDIPGIPKDMTYRRLISMMGFKMNYQVNGYPNMFITREEAIRHVRAWIGFDVEGCHATREAVGTNLPLQLGFSTGVNLVAVPTGYV	6050

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1	DTPNNTDFSRVSAKPPPGDQFKHLIPLMYKGLPWNVVRIKIVQMLS DTLKNLS DRVV FVLWAHGFELTSMKYFVKIGPERTCCLCDRRATCFSTASDTYACWHHSIGFDY	6160
2	DTPNNTDFSRVSAKPPPGDQFKHLIPLMYKGLPWNVVRIKIVQMLS DTLKNLS DRVV FVLWAHGFELTSMKYFVKIGPERTCCLCDRRATCFSTASDTYACWHHSIGFDY	6157
3	DTPNNTDFSRVSAKPPPGDQFKHLIPLMYKGLPWNVVRIKIVQMLS DTLKNLS DRVV FVLWAHGFELTSMKYFVKIGPERTCCLCDRRATCFSTASDTYACWHHSIGFDY	6160

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1 VYNPFMIDVQQWGFTGNLQSNHDLYCQVHGNAHVASCDAIMTRCLAVHECFVKRVDWTIEYPIIGDELKINAACRKVQHMVVKAALLADKFPVLHDIGNPKAIKCVPQAD 6270
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1 VEWKFYDAQPCSDKAYKIEELFYSYATHSDKFTDGVCLFWNCNVD RYPANSIVCRFDTRVLSNLNLP GCDGGS LYVNKHAFHTPAFDKSAFVNLKQLPFFYYSDSPCESH 6380
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1 DVELFENKTTLPVNVAFELWAKRNIKPVEVKILNNLGVDIAANTVIWDYKRDAPAHISTIGVCSMTDIAKKPTETICAPLTVFFDGRVDGQVDLFRNARNGVLITEGSV 6600
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1 KGLQPSVGPKQASLNGVTLXXXXXXXXXXXXXXXXXXXXVQQLPETYFTQSRNXXXXXXXXSQXXXXXELAMDEFIERYKLEGYAFEHIVYGDFSHSQLGGHLHLLIGLAKRF 6710

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1 RESPFELEDFIPMDSTVKNYFITDAQTGSSKVCVCSVIDLLDDFVEIISQDLSVVSKVVKVTIDYTEISFMLWCKDGHVETFYPKLQSSQAWQPGVAMPNLYKMQRMLL 6820

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3 KESPFELEDFIPMDSTVKNYFITDAQTGSSKVCVCSVIDLLDDFVEIISQDLSVVSKVVKVTIDYTEISFMLWCKDGHVETFYPKLQSSQAWQPGVAMPNLYKMQRMLL 6820

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1 EKCDLQNYGDSATLPKGIMMNVAKYTQLCQYLNTLT LAVPYNMRVIHFGAGSDKGVAPGTAVLRQWLPTGTLLVDSLND FVSDADSTLIGDCATVHTANKWDLIISDMY 6930

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3 EKCDLQNYGDSATLPKGIMMNVAKYTQLCQYLNTLT LAVPYNMRVIHFGAGSDKGVAPGTAVLRQWLPTGTLLVDSLND FVSDADSTLIGDCATVHTANKWDLIISDMY 6930

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1 DPKTKNVTKENDSKEGFFTYICGFIQQKLALGGSVAIKITEHSWNADLYKLMGHFAWWTAFVTNVNASSSEAF LIGCN YLGKPREQIDGYVMHANYIFWRNTNPIQLSSY 7040

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Figure S6. Schematic view of contigs of the ORF1ab polyprotein of 1. Alpha Variant (B.1.1.7) (UDQ41836.1) and 2. Delta Variant (B.1.617.21) (UDU36744.1) of SARs-CoV-2 with 3. reference Strain (Wuhan) (YP_009724389.1).

7. ORF3a protein

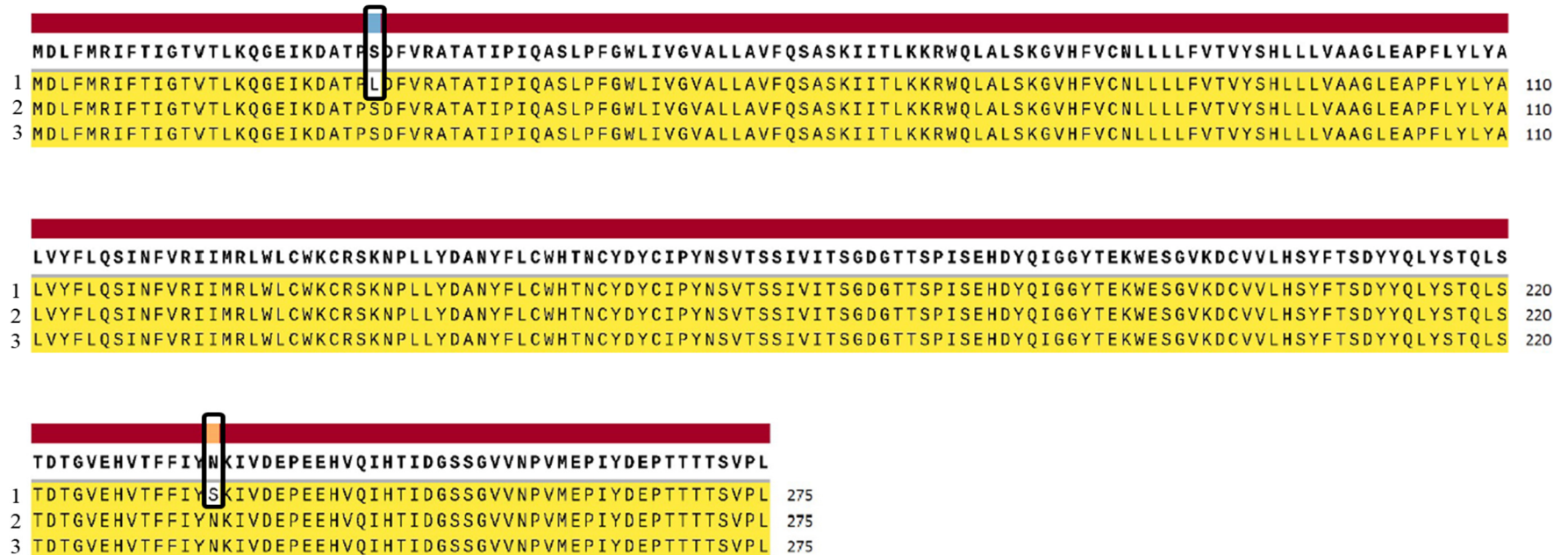


Figure S7. Schematic view of contigs of the ORF3a protein of 1. Alpha Variant (B.1.1.7) (UDQ41839.1) and 2. Delta Variant (B.1.617.21) (UDU36747.1) of SARs-CoV-2 with 3. reference Strain (Wuhan) (YP_009724391.1).

8. ORF6 protein



Figure S8. Schematic view of contigs of the ORF6 protein of 1. Alpha Variant (B.1.1.7) (UDQ41842.1) and 2. Delta Variant (B.1.617.21) (UDU36750.1) of SARs-CoV-2 with 3. reference Strain (Wuhan) (YP_009724394.1).

9. ORF7a protein

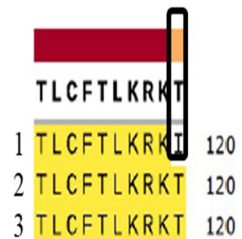


Figure S9. Schematic view of contigs of the ORF7a protein of 1. Alpha Variant (B.1.1.7) (UDQ41843.1) and 2. Delta Variant (B.1.617.21) (UDU36751.1) of SARs-CoV-2 with 3. reference Strain (Wuhan) (YP_009724395.1).

10. ORF7b protein



Figure S10. Schematic view of contigs of the ORF7b protein of 1. Alpha Variant (B.1.1.7) (UDQ41844.1) and 2. Delta Variant (B.1.617.21) (UDU36752.1) of SARs-CoV-2 with 3. reference Strain (Wuhan) (YP_009725318.1).

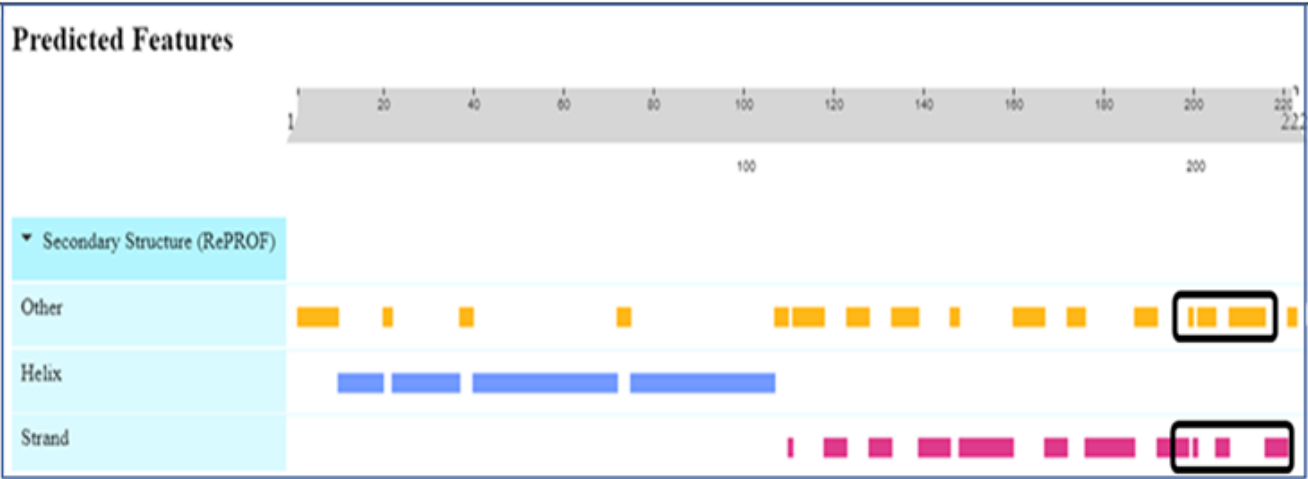
11. ORF8 protein



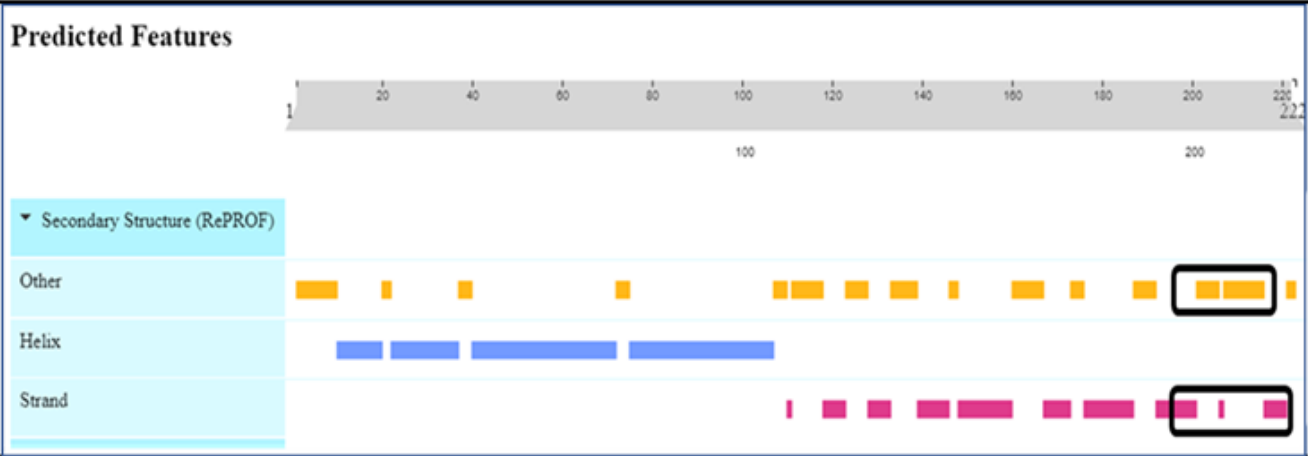
Figure S11. Schematic view of contigs of the ORF8 protein of 1. Delta Variant (B.1.617.21) (UDU36753.1) of SARs-CoV-2 with 2. reference Strain (Wuhan) (YP_009724396.1).

Membrane Protein

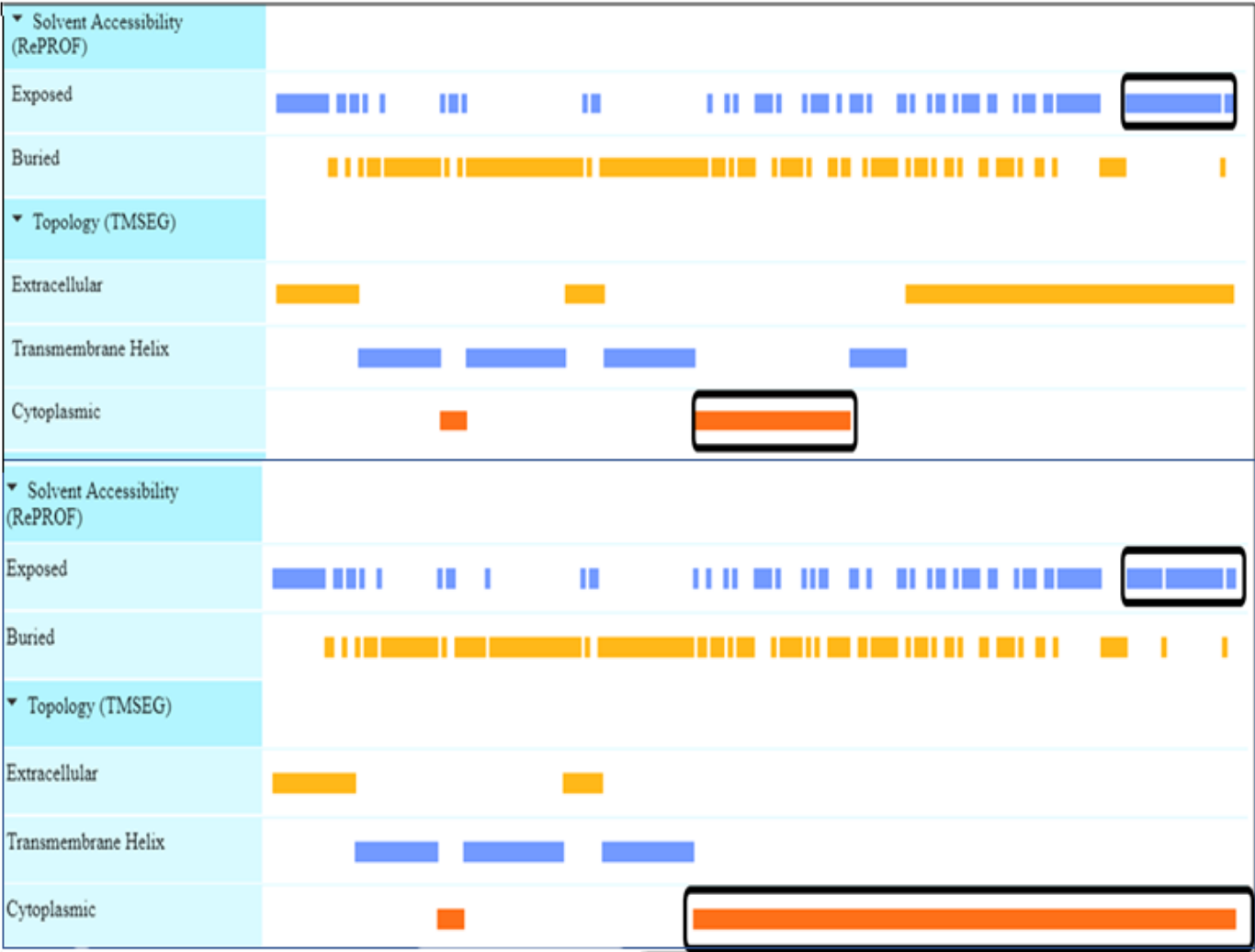
Alpha (B.1.617.21)
UDU36749.1



Wuhan
YP_009724393.1



Alpha (B.1.617.21)
UDU36749.1



Wuhan
YP_009724393.1

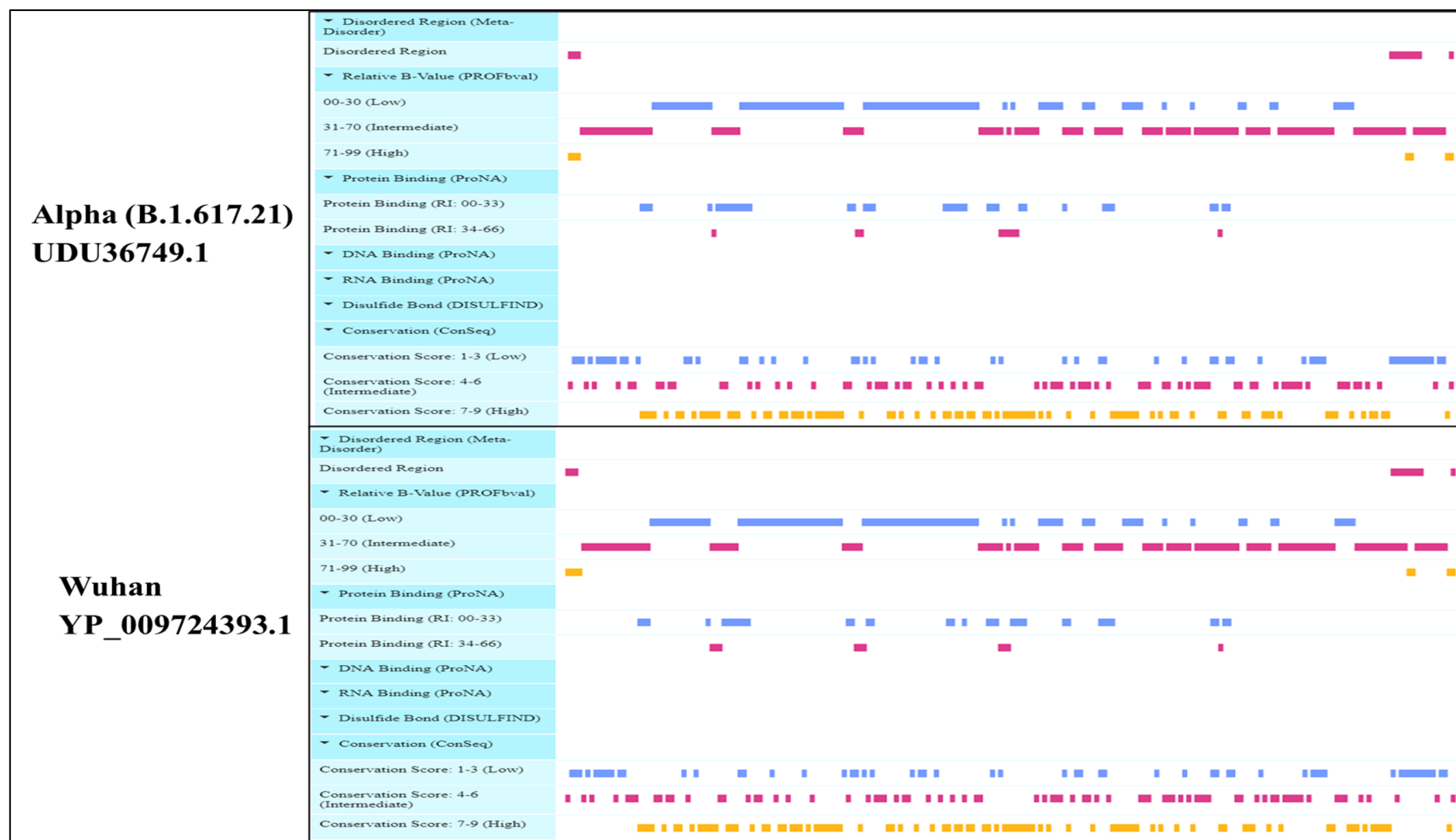
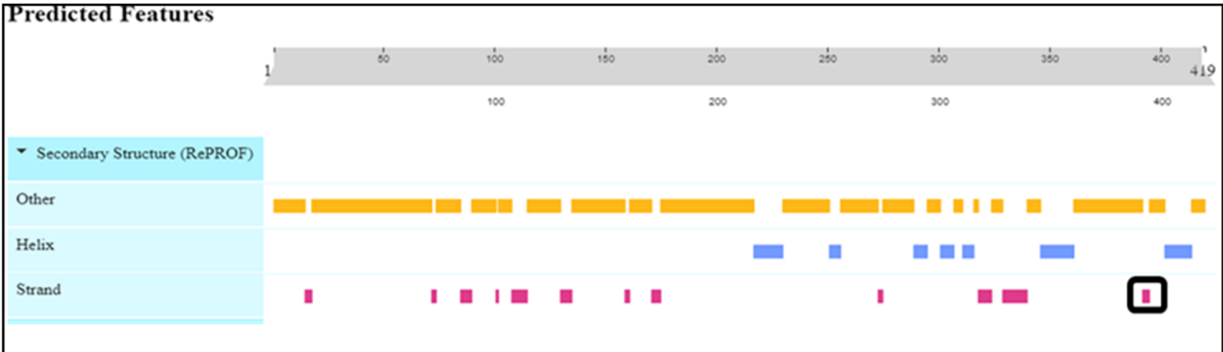


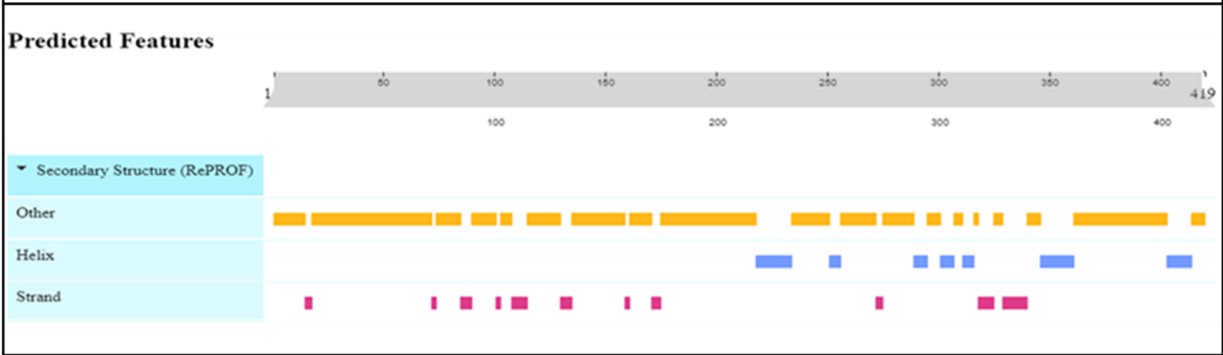
Figure S12. Viewer lays out predicted features of protein structural and functional features of Membrane Glycoproteins.

Nucleocapsid phosphoprotein

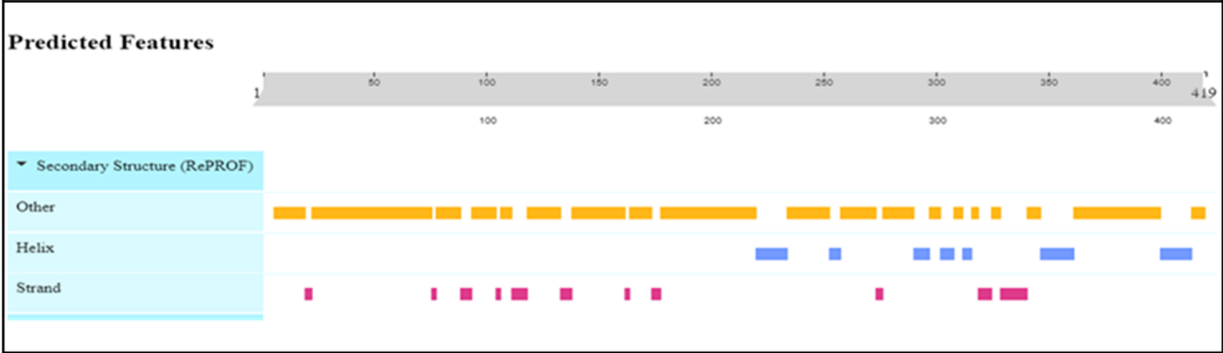
Alpha (B.1.617.21)
UDU36754.1



Delta (B.1.1.7)
UDQ41846.1



Wuhan
YP_009724397.2



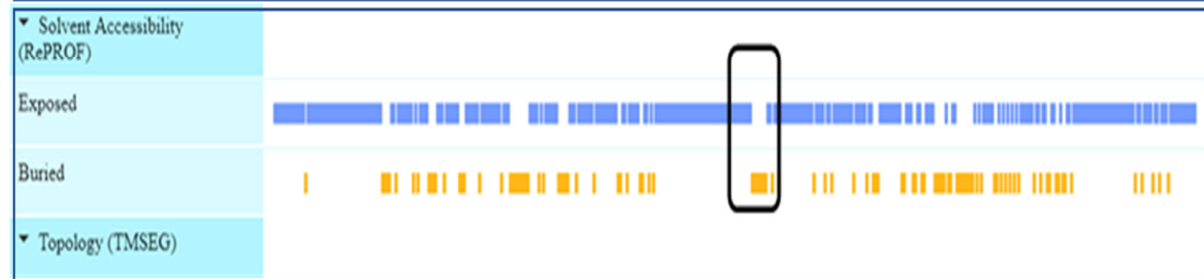
Alpha (B.1.617.21)
UDU36754.1



Delta (B.1.1.7)
UDQ41846.1



Wuhan
YP_009724397.2



Alpha (B.1.617.21)
UDU36754.1



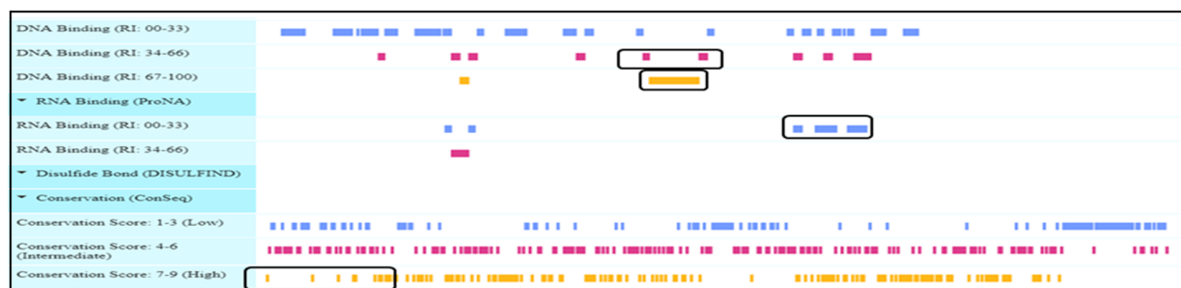
Delta (B.1.1.7)
UDQ41846.1



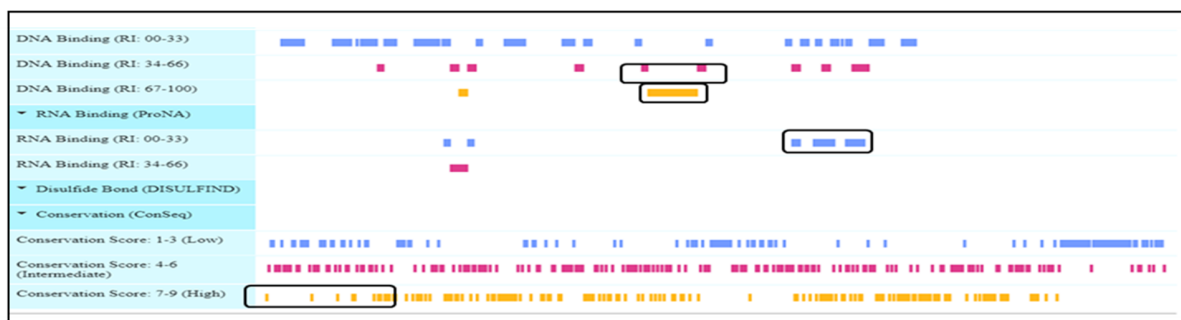
Wuhan
YP_009724397.2



Alpha (B.1.617.21)
UDU36754.1



Delta (B.1.1.7)
UDQ41846.1



Wuhan
YP_009724397.2

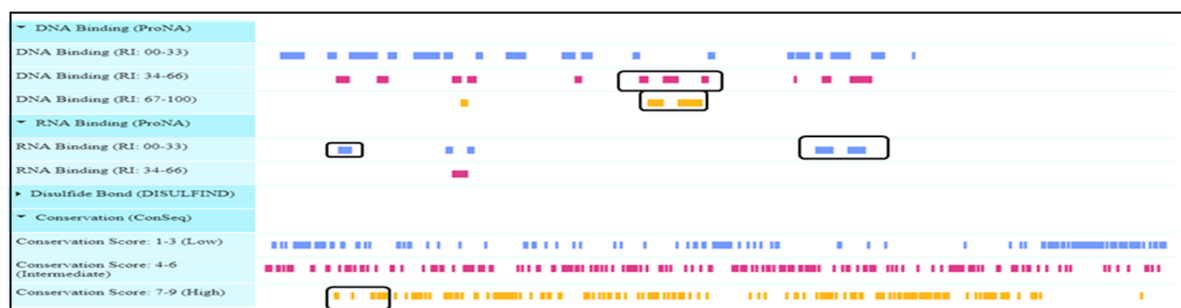
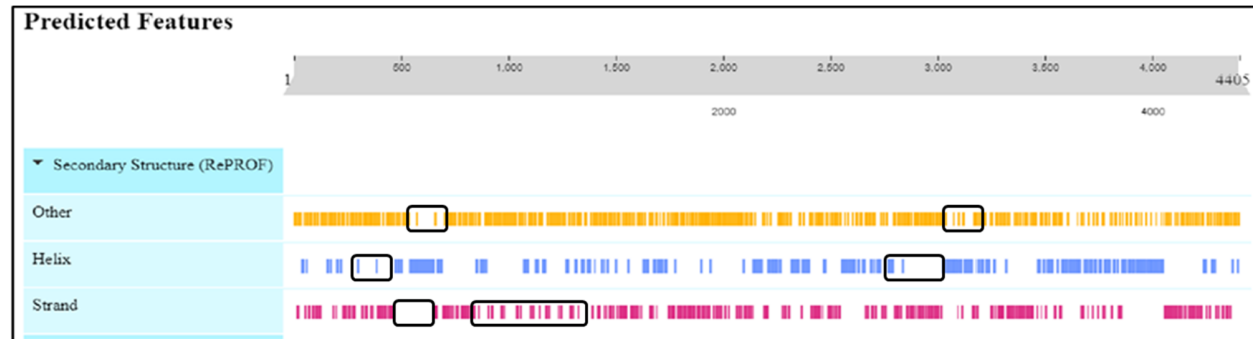


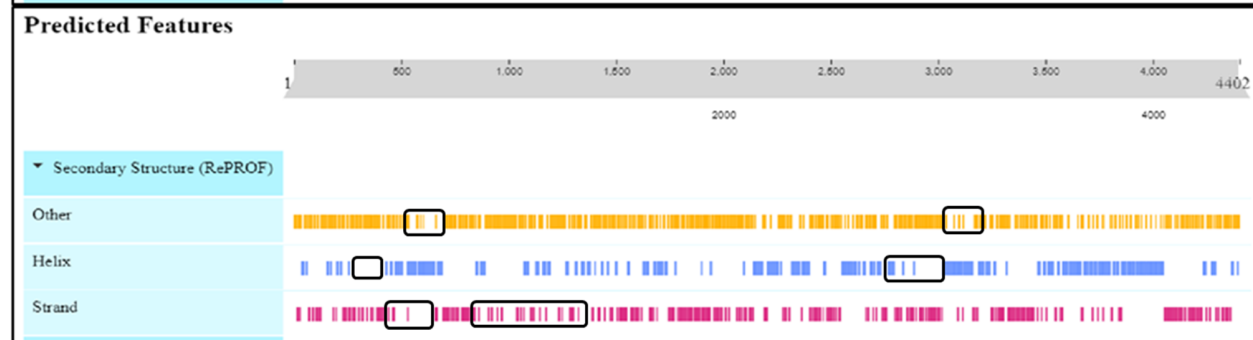
Figure S13. Viewer lays out predicted features of protein structural and functional features of Nucleocapsid phosphoprotein.

1. ORF1a Polypeptide

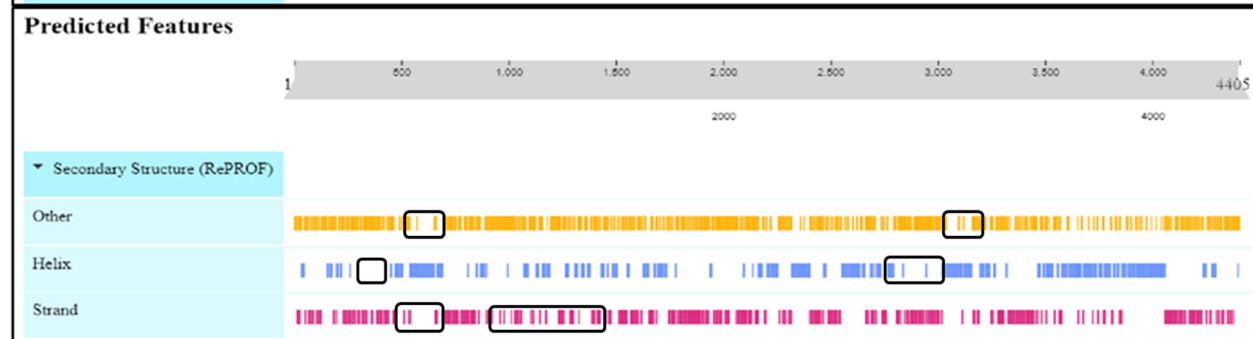
Alpha
B.1.617.21
UDU36745.1



Delta
B.1.1.7
UDQ41837.1



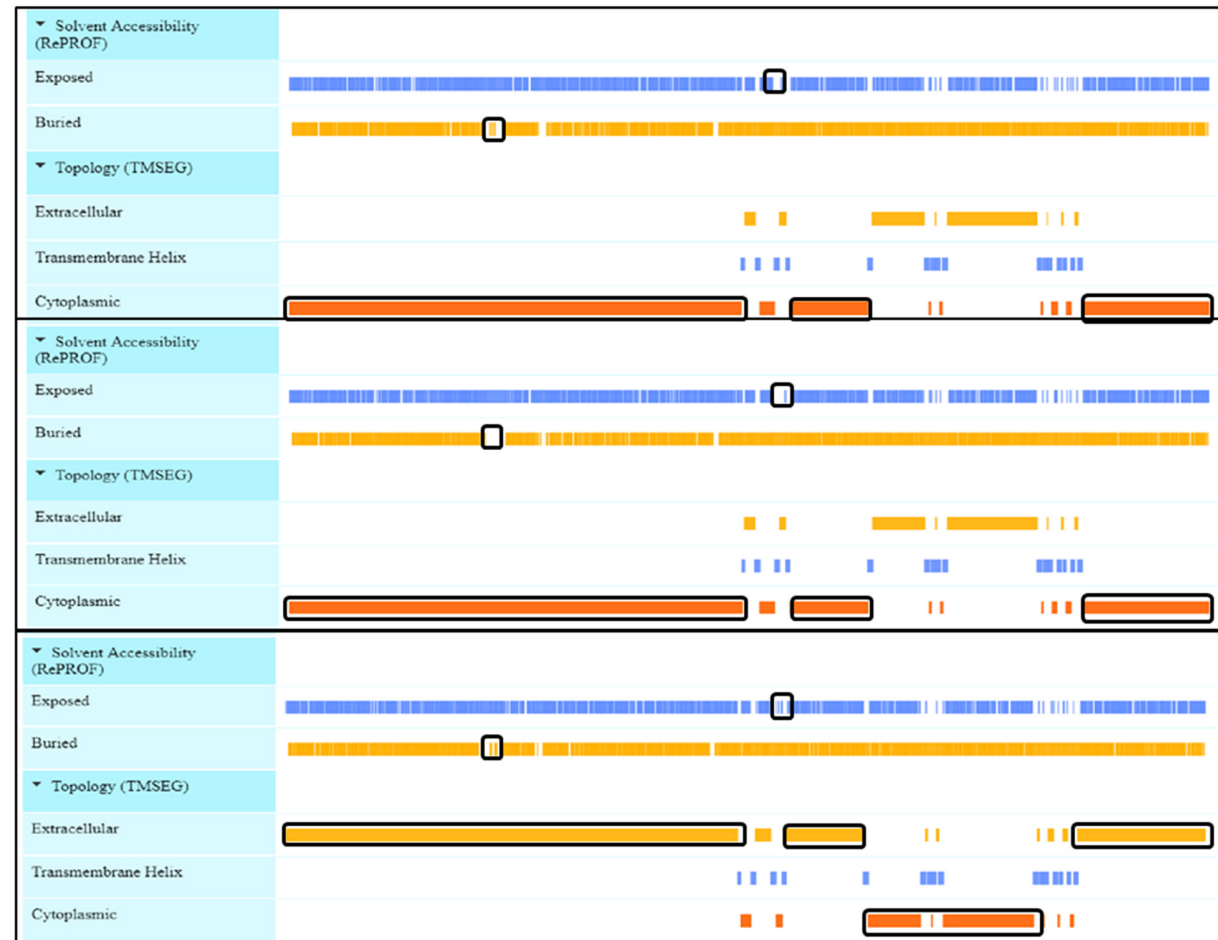
Wuhan
YP_009725295.1



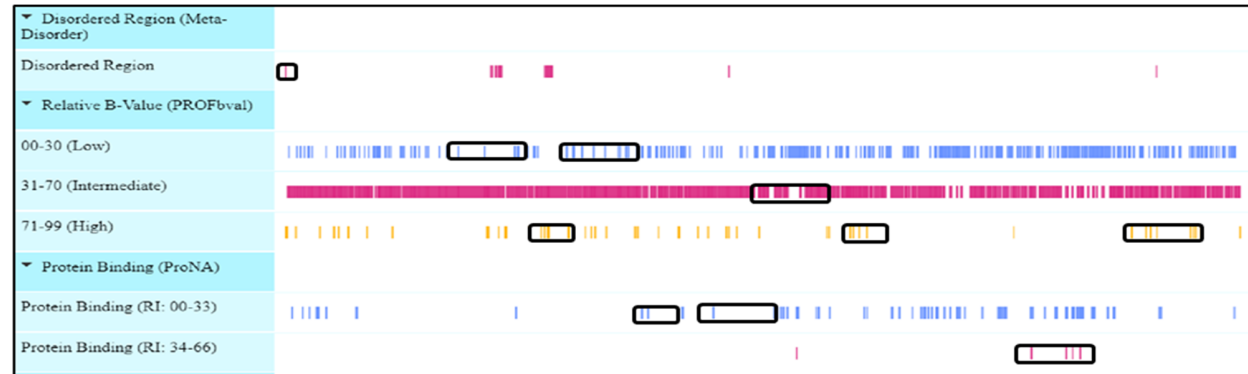
Alpha
B.1.617.21
UDU36745.1

Delta
B.1.1.7
UDQ41837.1

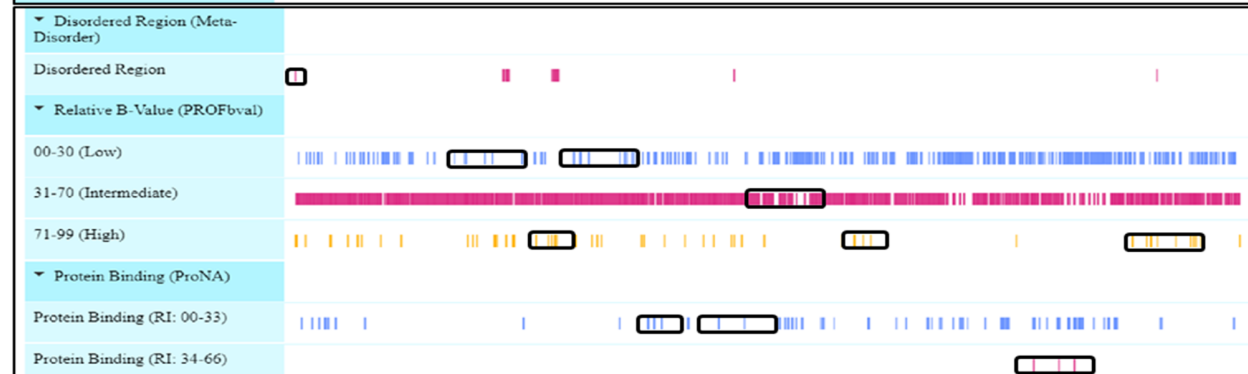
Wuhan
YP_009725295.1



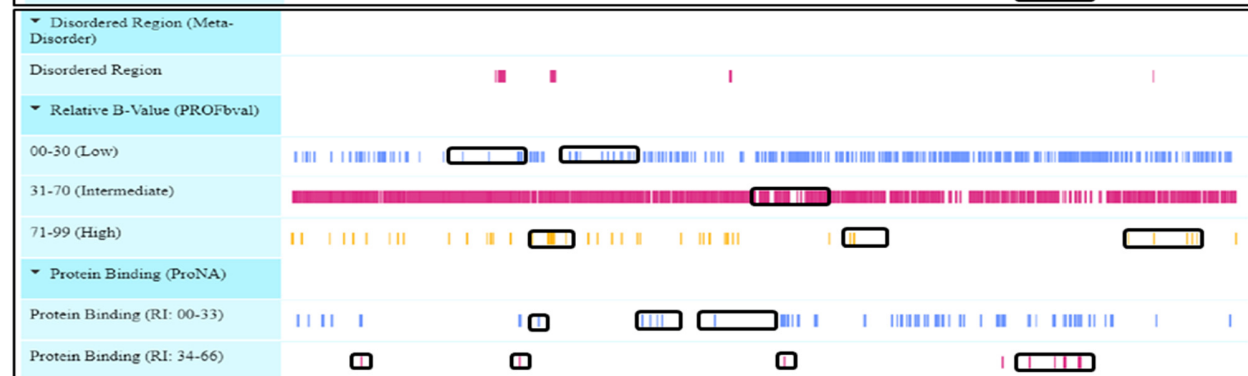
Alpha
B.1.617.21
UDU36745.1



Delta
B.1.1.7
UDQ41837.1



Wuhan
YP_009725295.1



Alpha
B.1.617.21
UDU36745.1

Delta
B.1.1.7
UDQ41837.1

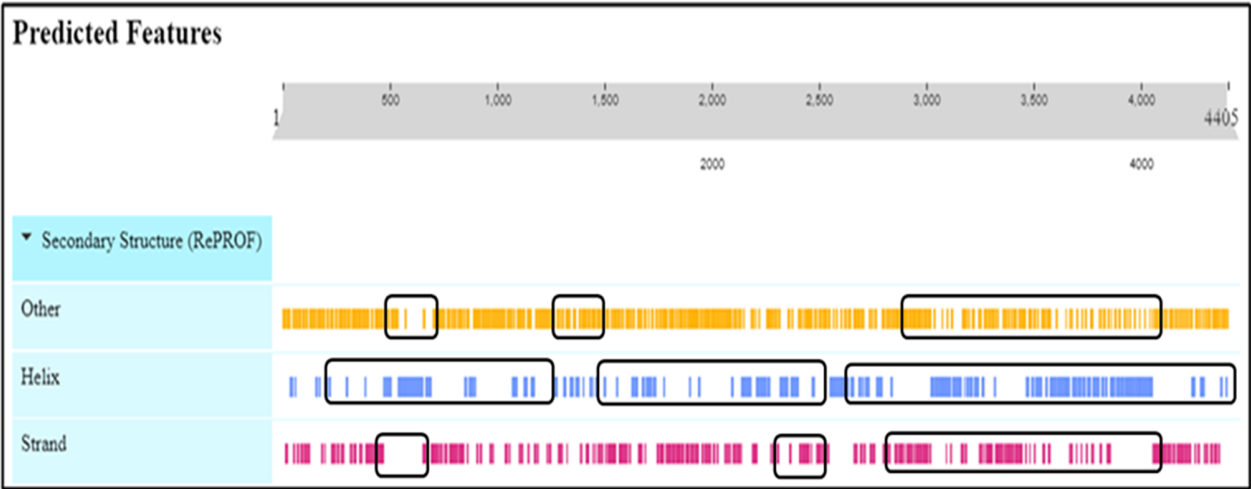
Wuhan
YP_009725295.1



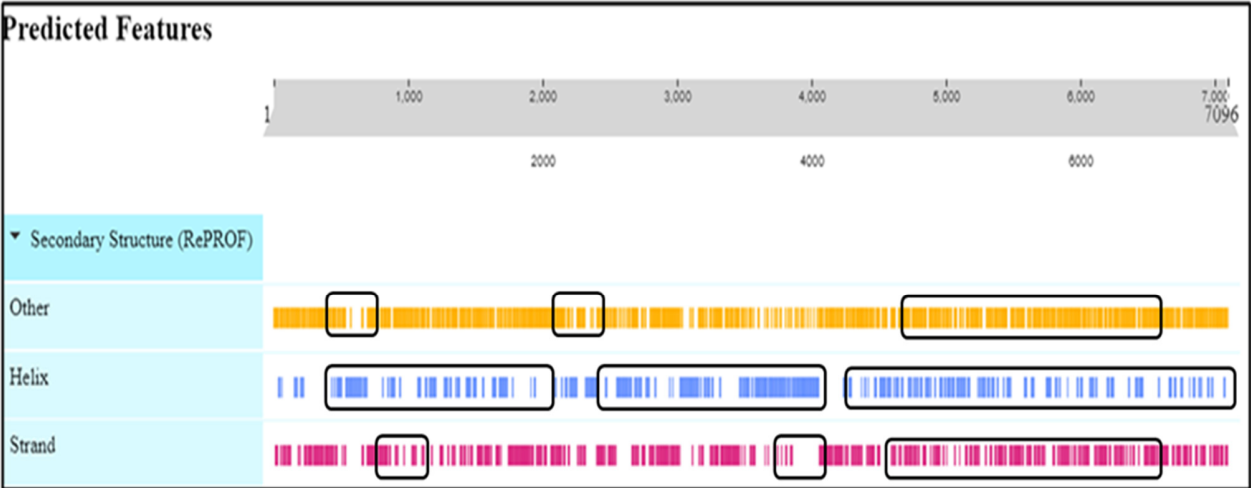
Figure S14. Viewer lays out predicted features of protein structural and functional features of ORF1a Polyprotein.

ORF1ab Polyprotein

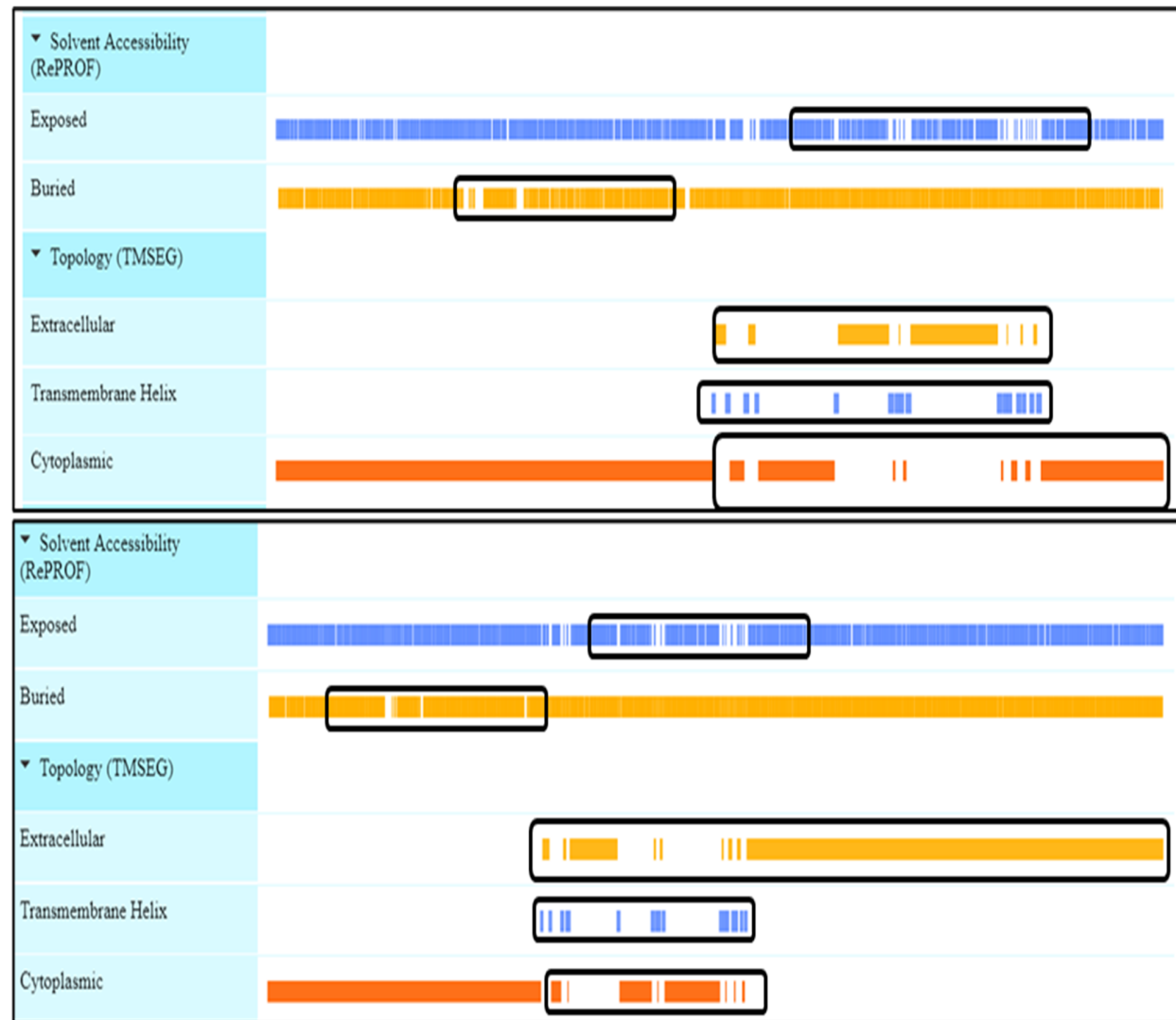
Delta
B.1.1.7
UDQ41836.1



Wuhan
YP_009724389.1



Delta
B.1.1.7
UDQ41836.1



Wuhan
YP_009724389.1

Delta
B.1.1.7
UDQ41836.1



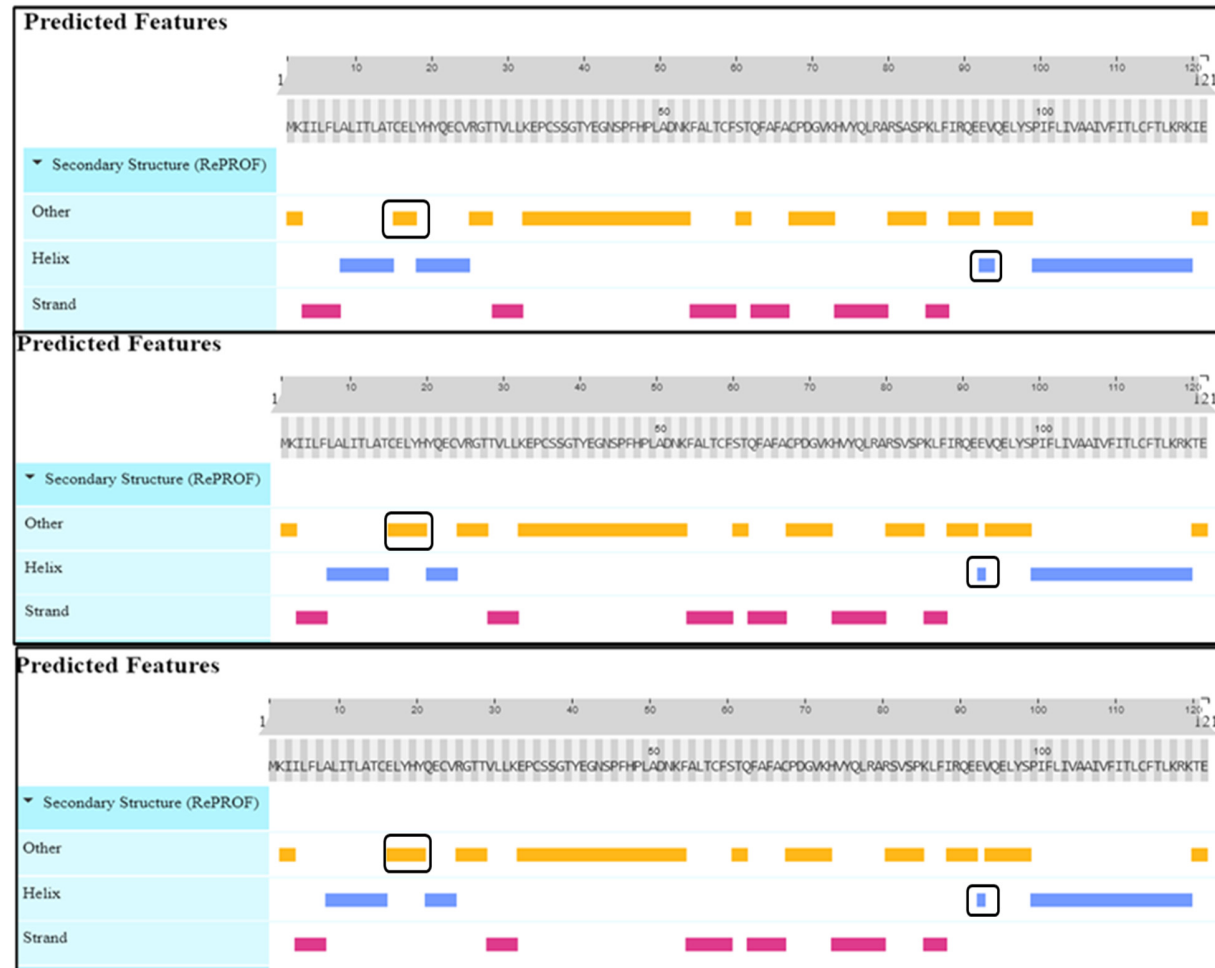
Figure S15. Viewer lays out predicted features of protein structural and functional features of ORF1ab Polyprotein.

2. ORF7a protein

Alpha

B.1.617.21

UDU36751.1



Delta

B.1.1.7

UDQ41843.1

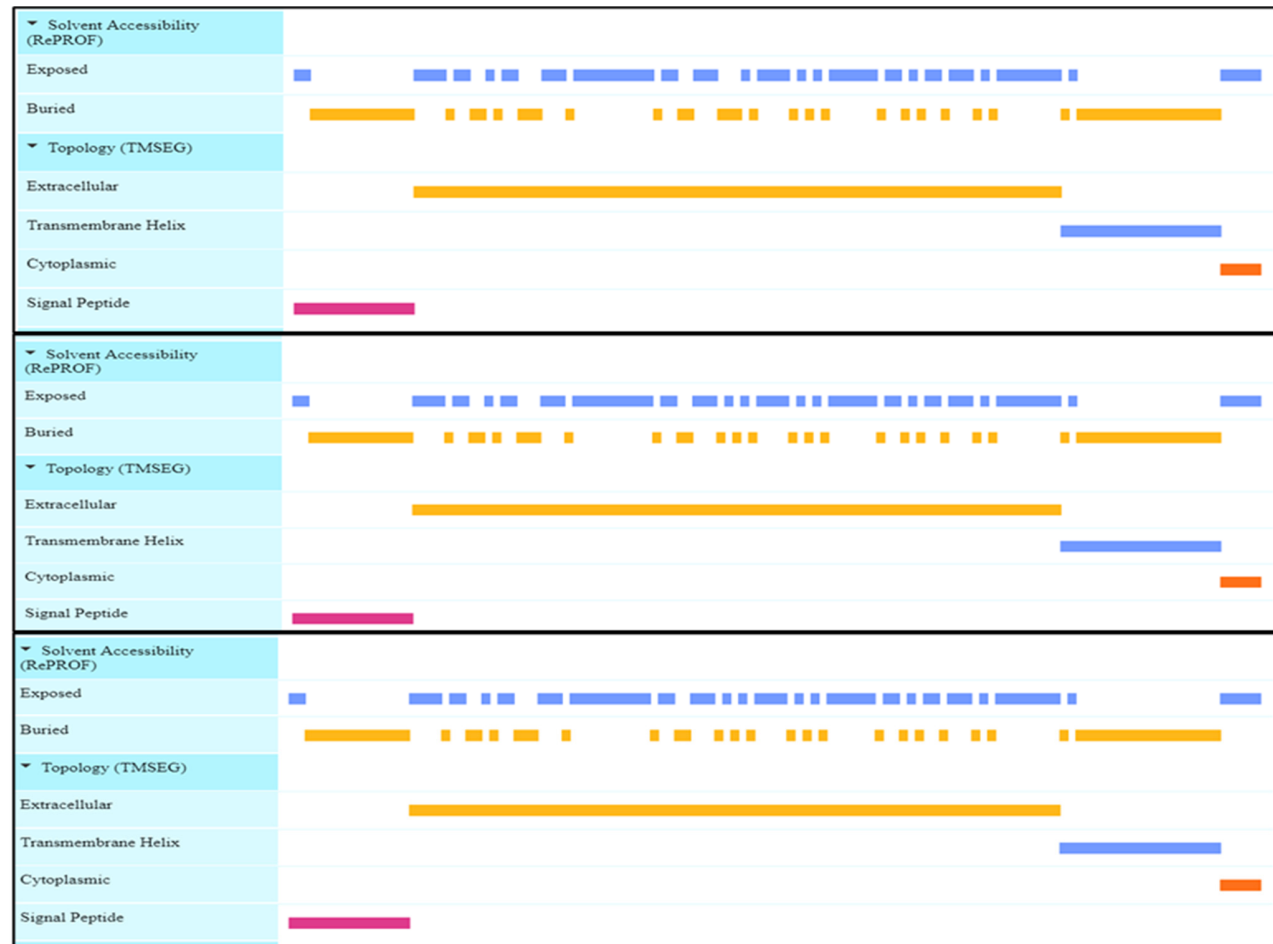
Wuhan

YP_009724395.1

Alpha
B.1.617.21
UDU36751.1

Delta
B.1.1.7
UDQ41843.1

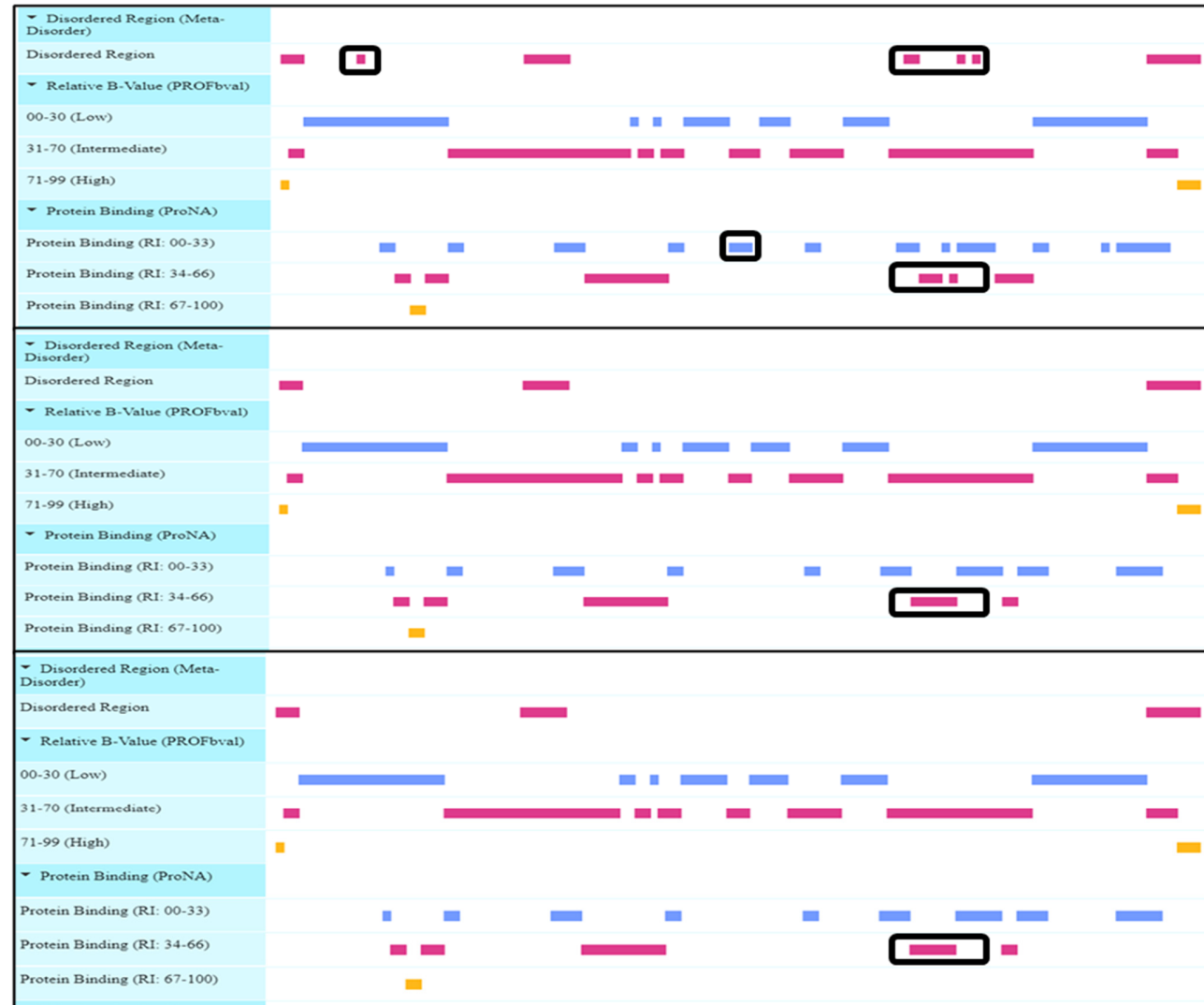
Wuhan
YP_009724395.1



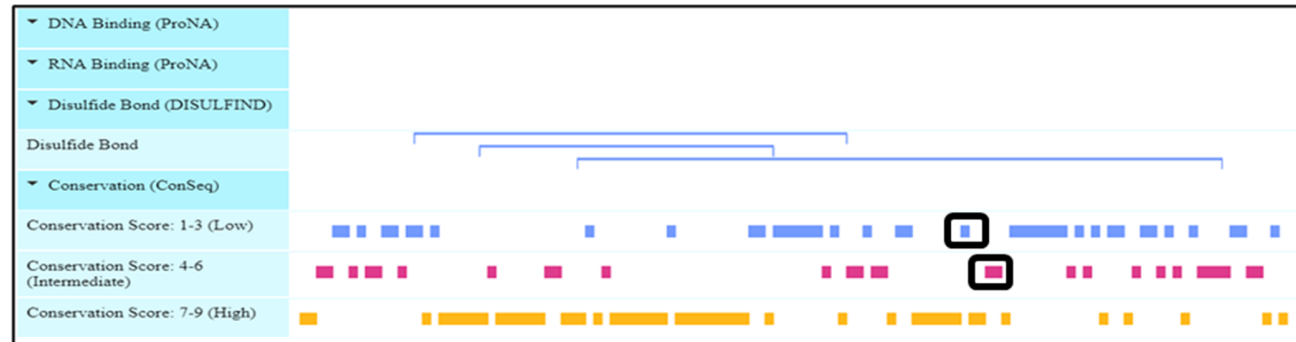
Alpha
B.1.617.21
UDU36751.1

Delta
B.1.1.7
UDQ41843.1

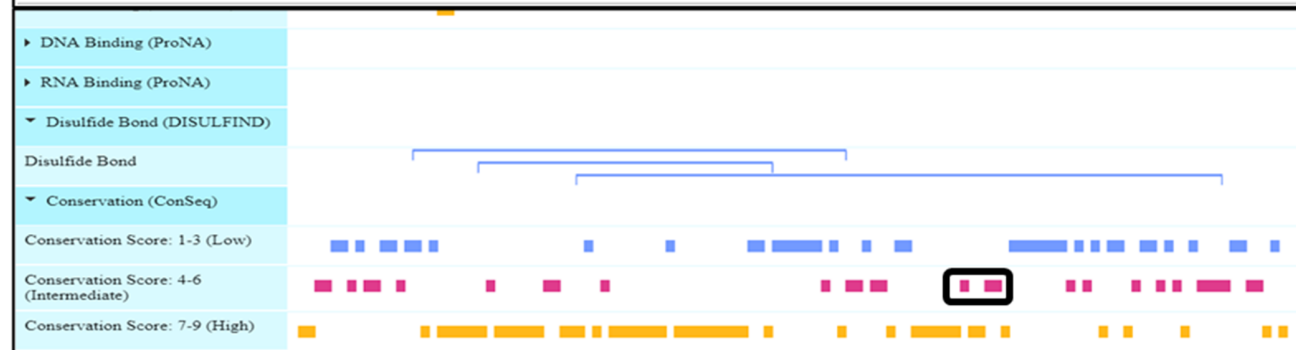
Wuhan
YP_009724395.1



Alpha
B.1.617.21
UDU36751.1



Delta
B.1.1.7
UDQ41843.1



Wuhan
YP_009724395.1

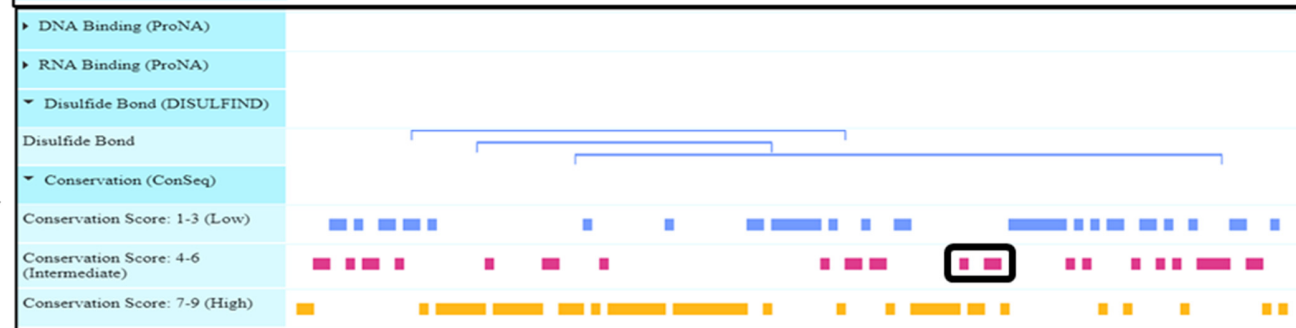


Figure S16. Viewer lays out predicted features of protein structural and functional features of ORF7a protein.

Supplementary Tables

Table S1: Mutation of amino acids in Alpha & Delta Variant of SARs-CoV-2 from Pakistan with reference strain (hCoV-19/Wuhan/WIV04/2019).

Alpha		Delta	
Mutation	Count	Mutation	Count
Envelope			
		E_V62F	1
Membrane			
		M_I82T	8
Nucleocapsid phosphoprotein			
N_D3L	5	N_A90S	1
N_G204R	5	N_D377Y	8
N_Q389H	1	N_D63G	8
N_R203K	5	N_G215C	4
N_S235F	5	N_H300Y	1
		N_R203M	8
		N_R385K	1
NS3			
NS3_K16N	1	NS3_A23V	1
		NS3_G49V	1
		NS3_I118T	1
		NS3_I62F	1
		NS3_K16T	1
		NS3_L65I	1
		NS3_L73I	1
		NS3_Q116H	1
		NS3_S26L	8
		NS3_T221K	1
		NS3_Y211H	1
NS7a			
		NS7a_L116F	2
		NS7a_T120I	8
		NS7a_V82A	8
NS7b			
		NS7b_T40I	4
NS8			
NS8_R52I	5	NS8_Q27stop	5

NS8_V62L	1		
NS8_Y73C	5		
NSP12			
NSP12_P323L	5	NSP12_G228S	
		NSP12_G671S	
		NSP12_P323L	
		NSP12_Q357H	
		NSP12_V111L	
NSP13			
		NSP13_M576I	
		NSP13_P77L	
		NSP13_R392C	
		NSP13_S350L	
NSP14			
		NSP14_A394V	
		NSP14_D144Y	
		NSP14_M72I	
		NSP14_P46L	
		NSP14_T113I	
NSP15			
		NSP15_G229C	
		NSP15_H234Y	
		NSP15_V66L	
NSP16			
		NSP16_K160R	
		NSP16_M270I	
NSP2			
NSP2_E345K	1	NSP2_A386S	
NSP2_L550F	1	NSP2_P129L	
		NSP2_Y16H	
NSP3			
NSP3_A1321V	1	NSP3_A416V	1
NSP3_A1819V	1	NSP3_A488S	4
NSP3_A1941V	1	NSP3_H1274Y	1
NSP3_A890D	5	NSP3_K1693N	1
NSP3_I1412T	5	NSP3_P1228L	4
NSP3_P153L	1	NSP3_P1469S	4
NSP3_R586C	1	NSP3_P822L	4

NSP3_T183I	5	NSP3_S1285F	1
NSP3_T423I	1	NSP3_S1370F	1
NSP3_T779I	1	NSP3_S1424F	1
		NSP3_V245F	
NSP4			
		NSP4_A446V	4
		NSP4_T492I	4
		NSP4_V167L	4
NSP5			
		NSP5_V86L	1
NSP6			
NSP6_F108del	5	NSP6_T181I	2
NSP6_G107del	5	NSP6_T77A	4
NSP6_S106del	5	NSP6_V149A	4
Spike			
Spike_A570D	5	Spike_A1078V	1
Spike_A67S	1	Spike_A222V	2
Spike_A688V	1	Spike_C1250W	1
Spike_D1118H	5	Spike_D138Y	1
Spike_D614G	5	Spike_D215H	1
Spike_H69del	5	Spike_D574Y	1
Spike_N501Y	5	Spike_D614G	8
Spike_P681H	5	Spike_D950N	6
Spike_S982A	5	Spike_E156G	8
Spike_S98F	1	Spike_E484Q	1
Spike_T716I	5	Spike_F157del	8
Spike_V70del	5	Spike_G142D	6
Spike_S98F	1	Spike_I850L	1
Spike_Y144del	5	Spike_L1141W	1
		Spike_L452R	8
		Spike_P681R	8
		Spike_Q613H	1
		Spike_R158del	8
		Spike_T19R	8
		Spike_T478K	8
		Spike_T95I	4
		Spike_V483A	1