

# Genome-wide analysis of Indian SARS-CoV-2 Genomes for the Identification of Genetic Mutation and SNP

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## Abstract

The wave of COVID-19 is a big threat to the human population. Presently, the world is going through different phases of lock down in order to stop this wave of pandemic; India being no exception. We have also started the lock down on 23rd March, 2020. In this current situation, apart from social distancing only a vaccine can be the proper solution to serve the population of human being. Thus it is important for all the nations to perform the genome-wide analysis in order to identify the genetic variation in Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) so that proper vaccine can be designed. This fast motivated us to analyze publicly available 566 Indian complete or near complete SARS-CoV-2 genomes to find the mutation points as substitution, deletion and insertion. In this regard, we have performed the multiple sequence alignment in presence of reference sequence from NCBI. After the alignment, a consensus sequence is build to analyze each genome in order to identify the mutation points. As a consequence, we have found 933 substitutions, 2449 deletions and 2 insertions, in total 3384 unique mutation points, in 566 genomes across 29.9K bp. Further, it has been classified into three groups as 100 clusters of mutations (mostly deletions), 1609 point mutations as substitution, deletion and insertion and 64 SNPs. These outcomes are visualized using BioCircos and bar plots as well as plotting entropy value of each genomic location. Moreover, phylogenetic analysis has also been performed to see the evolution of SARS-CoV-2 virus in India. It also shows the wide variation in tree which indeed vivid in genomic analysis. Finally, these SNPs can be the useful target for virus classification, designing and defining the effective dose of vaccine for the heterogeneous population.

**Keywords:** Multiple Sequence Alignment, Point mutation, SNPs, SARS-CoV-2

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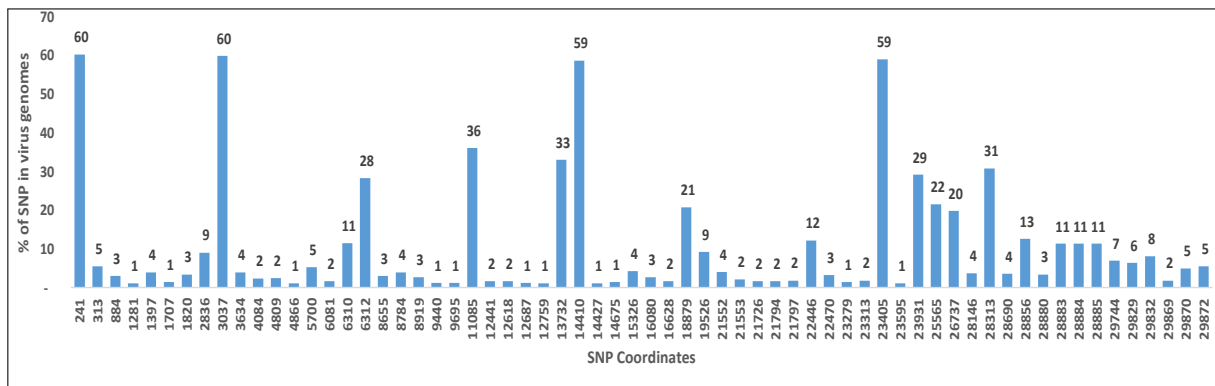


Figure S1: Percentage of SNPs in Indian SARS-CoV-2 genome population

| Original Genome ID  | Shorter Genome ID                            | Length of the Genome |
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| NC-045512.2/SARS-2/Wuhan-Hu-1/CompleteGenome                      | NC-045512.2/SARS-2/Wuhan-Hu-1/CompleteGenome | 29903                |
| hCoV-19/India/NCDC-02322/2020—EPI_ISL_435082—2020-03-29           | hCoV-19/India/ISL-435082/29-03-2020          | 29700                |
| hCoV-19/India/MaxCov0037_CSIR-IGIB/2020—EPI_ISL_459939—2020-05-11 | hCoV-19/India/ISL-459939/11-05-2020          | 29702                |
| hCoV-19/India/GBRC59/2020—EPI_ISL_447034—2020-05-03               | hCoV-19/India/ISL-447034/03-05-2020          | 29720                |
| hCoV-19/India/GBRC5/2020—EPI_ISL_435052—2020-04-13                | hCoV-19/India/ISL-435052/13-04-2020          | 29724                |
| hCoV-19/India/NIV-6964/2020—EPI_ISL_454546—2020-04-03             | hCoV-19/India/ISL-454546/03-04-2020          | 29735                |
| hCoV-19/India/NIV-1738/2020—EPI_ISL_454525—2020-03-12             | hCoV-19/India/ISL-454525/12-03-2020          | 29735                |
| hCoV-19/India/GBRC57/2020—EPI_ISL_447032—2020-05-03               | hCoV-19/India/ISL-447032/03-05-2020          | 29747                |
| hCoV-19/India/GBRC78a/2020—EPI_ISL_447536—2020-05-05              | hCoV-19/India/ISL-447536/05-05-2020          | 29748                |
| hCoV-19/India/GBRC78b/2020—EPI_ISL_447537—2020-05-05              | hCoV-19/India/ISL-447537/05-05-2020          | 29748                |
| hCoV-19/India/NCDC-02250/2020—EPI_ISL_435074—2020-03-28           | hCoV-19/India/ISL-435074/28-03-2020          | 29749                |
| hCoV-19/India/NCDC-02242/2020—EPI_ISL_435083—2020-03-28           | hCoV-19/India/ISL-435083/28-03-2020          | 29751                |
| hCoV-19/India/NIV-6311/2020—EPI_ISL_452206—2020-03-30             | hCoV-19/India/ISL-452206/30-03-2020          | 29758                |
| hCoV-19/India/MaxCov0035_CSIR-IGIB/2020—EPI_ISL_459937—2020-05-10 | hCoV-19/India/ISL-459937/10-05-2020          | 29752                |
| hCoV-19/India/GBRC9/2020—EPI_ISL_435056—2020-04-21                | hCoV-19/India/ISL-435056/21-04-2020          | 29759                |
| hCoV-19/India/MaxCov0012_CSIR-IGIB/2020—EPI_ISL_459914—2020-05-01 | hCoV-19/India/ISL-459914/01-05-2020          | 29757                |
| hCoV-19/India/NIV-QA-708/2020—EPI_ISL_454564—2020-04-04           | hCoV-19/India/ISL-454564/04-04-2020          | 29766                |
| hCoV-19/India/NIV-QC-801/2020—EPI_ISL_454570—2020-04-26           | hCoV-19/India/ISL-454570/26-04-2020          | 29766                |
| hCoV-19/India/GBRC54/2020—EPI_ISL_444485—2020-05-04               | hCoV-19/India/ISL-444485/04-05-2020          | 29768                |
| hCoV-19/India/GBRC79a/2020—EPI_ISL_447538—2020-05-05              | hCoV-19/India/ISL-447538/05-05-2020          | 29770                |
| hCoV-19/India/GBRC79b/2020—EPI_ISL_447539—2020-05-05              | hCoV-19/India/ISL-447539/05-05-2020          | 29770                |
| hCoV-19/India/GBRC148a/2020—EPI_ISL_458109—2020-05-17             | hCoV-19/India/ISL-458109/17-05-2020          | 29770                |
| hCoV-19/India/GBRC148b/2020—EPI_ISL_458110—2020-05-17             | hCoV-19/India/ISL-458110/17-05-2020          | 29770                |
| hCoV-19/India/GBRC18/2020—EPI_ISL_437447—2020-04-26               | hCoV-19/India/ISL-437447/26-04-2020          | 29771                |
| hCoV-19/India/GBRC96/2020—EPI_ISL_450784—2020-05-09               | hCoV-19/India/ISL-450784/09-05-2020          | 29772                |
| hCoV-19/India/NIV-5104/2020—EPI_ISL_454537—2020-03-26             | hCoV-19/India/ISL-454537/26-03-2020          | 29773                |
| hCoV-19/India/NIV-6423/2020—EPI_ISL_454543—2020-03-31             | hCoV-19/India/ISL-454543/31-03-2020          | 29774                |
| hCoV-19/India/NIV-QC-798/2020—EPI_ISL_454568—2020-04-25           | hCoV-19/India/ISL-454568/25-04-2020          | 29776                |
| hCoV-19/India/NIV-12058/2020—EPI_ISL_454524—2020-04-20            | hCoV-19/India/ISL-454524/20-04-2020          | 29776                |
| hCoV-19/India/NCDC-2517/2020—EPI_ISL_436418—2020-03-31            | hCoV-19/India/ISL-436418/31-03-2020          | 29770                |
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| hCoV-19/India/NIV-4379/2020—EPI_ISL_454532—2020-03-23             | hCoV-19/India/ISL-454532/23-03-2020          | 29778                |
| hCoV-19/India/THSTI-BAL_914/2020—EPI_ISL_454866—2020-04-16        | hCoV-19/India/ISL-454866/16-04-2020          | 29778                |
| hCoV-19/India/THSTI-BAL_231/2020—EPI_ISL_454862—2020-04-11        | hCoV-19/India/ISL-454862/11-04-2020          | 29779                |

| Original Genome ID  | Shorter Genome ID                   | Length of the Genome |
|---|-------------------------------------|----------------------|
| hCoV-19/India/THSTI-BAL_918/2020—EPI_ISL_454867—2020-04-16        | hCoV-19/India/ISL-454867/16-04-2020 | 29780                |
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| hCoV-19/India/NIV-4438/2020—EPI_ISL_454533—2020-03-23             | hCoV-19/India/ISL-454533/23-03-2020 | 29783                |
| hCoV-19/India/GBRC47/2020—EPI_ISL_444478—2020-04-30               | hCoV-19/India/ISL-444478/30-04-2020 | 29784                |
| hCoV-19/India/GBRC2/2020—EPI_ISL_435049—2020-04-13                | hCoV-19/India/ISL-435049/13-04-2020 | 29785                |
| hCoV-19/India/NIV-4130/2020—EPI_ISL_454529—2020-03-21             | hCoV-19/India/ISL-454529/21-03-2020 | 29785                |
| hCoV-19/India/NIV-701_3/2020—EPI_ISL_454560—2020-04-06            | hCoV-19/India/ISL-454560/06-04-2020 | 29786                |
| hCoV-19/India/GBRC66/2020—EPI_ISL_447042—2020-05-03               | hCoV-19/India/ISL-447042/03-05-2020 | 29787                |
| hCoV-19/India/GBRC21/2020—EPI_ISL_437450—2020-04-26               | hCoV-19/India/ISL-437450/26-04-2020 | 29787                |
| hCoV-19/India/NIV-5102/2020—EPI_ISL_454536—2020-03-26             | hCoV-19/India/ISL-454536/26-03-2020 | 29787                |
| hCoV-19/India/NIV-4369/2020—EPI_ISL_454531—2020-03-22             | hCoV-19/India/ISL-454531/22-03-2020 | 29787                |
| hCoV-19/India/NIV-3472/2020—EPI_ISL_454528—2020-03-17             | hCoV-19/India/ISL-454528/17-03-2020 | 29788                |
| hCoV-19/India/NIV-4271/2020—EPI_ISL_454530—2020-03-22             | hCoV-19/India/ISL-454530/22-03-2020 | 29788                |
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| hCoV-19/India/NIV-1804/2020—EPI_ISL_454526—2020-03-13             | hCoV-19/India/ISL-454526/13-03-2020 | 29798                |
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| hCoV-19/India/NIHSAD-0905-216/2020—EPI_ISL_452794—2020-05-08      | hCoV-19/India/ISL-452794/08-05-2020 | 29797                |
| hCoV-19/India/CCMB_L1025/2020—EPI_ISL_458049—2020-05-11           | hCoV-19/India/ISL-458049/11-05-2020 | 29783                |
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| hCoV-19/India/GBRC6/2020—EPI_ISL_435053—2020-04-07                | hCoV-19/India/ISL-435053/07-04-2020 | 29800                |
| hCoV-19/India/GBRC8/2020—EPI_ISL_435055—2020-04-22                | hCoV-19/India/ISL-435055/22-04-2020 | 29800                |
| hCoV-19/India/CCMB_C10/2020—EPI_ISL_458036—2020-04-29             | hCoV-19/India/ISL-458036/29-04-2020 | 29794                |
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| hCoV-19/India/NIV-QC-800/2020—EPI_ISL_452217—2020-04-26           | hCoV-19/India/ISL-452217/26-04-2020 | 29804                |
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| hCoV-19/India/NIV-6315/2020—EPI_ISL_454542—2020-03-30             | hCoV-19/India/ISL-454542/30-03-2020 | 29804                |
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| hCoV-19/India/NIV-7558/2020—EPI_ISL_454549—2020-04-05             | hCoV-19/India/ISL-454549/05-04-2020 | 29804                |
| hCoV-19/India/NIV-QC-795/2020—EPI_ISL_454566—2020-04-21           | hCoV-19/India/ISL-454566/21-04-2020 | 29804                |
| hCoV-19/India/NIV-10380/2020—EPI_ISL_452192—2020-04-16            | hCoV-19/India/ISL-452192/16-04-2020 | 29805                |
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| Original Genome ID                                      | Shorter Genome ID                   | Length of the Genome |
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| hCoV-19/India/NIV-11687/2020—EPI_ISL_452197—2020-04-19  | hCoV-19/India/ISL-452197/19-04-2020 | 29805                |
| hCoV-19/India/NIV-11855/2020—EPI_ISL_452198—2020-04-20  | hCoV-19/India/ISL-452198/20-04-2020 | 29805                |
| hCoV-19/India/NIV-12067/2020—EPI_ISL_452201—2020-04-20  | hCoV-19/India/ISL-452201/20-04-2020 | 29805                |
| hCoV-19/India/NIV-2810/2020—EPI_ISL_452202—2020-03-16   | hCoV-19/India/ISL-452202/16-03-2020 | 29805                |
| hCoV-19/India/NIV-4367/2020—EPI_ISL_452203—2020-03-22   | hCoV-19/India/ISL-452203/22-03-2020 | 29805                |
| hCoV-19/India/NIV-5119/2020—EPI_ISL_452205—2020-03-26   | hCoV-19/India/ISL-452205/26-03-2020 | 29805                |
| hCoV-19/India/NIV-7439/2020—EPI_ISL_452207—2020-04-05   | hCoV-19/India/ISL-452207/05-04-2020 | 29805                |
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| hCoV-19/India/NIV-7786/2020—EPI_ISL_452209—2020-04-06   | hCoV-19/India/ISL-452209/06-04-2020 | 29805                |
| hCoV-19/India/NIV-7830/2020—EPI_ISL_452210—2020-04-06   | hCoV-19/India/ISL-452210/06-04-2020 | 29805                |
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| hCoV-19/India/NIV-9768/2020—EPI_ISL_452212—2020-04-15   | hCoV-19/India/ISL-452212/15-04-2020 | 29805                |
| hCoV-19/India/NIV-981/2020—EPI_ISL_452213—2020-03-10    | hCoV-19/India/ISL-452213/10-03-2020 | 29805                |
| hCoV-19/India/NIV-QA-709/2020—EPI_ISL_452214—2020-04-07 | hCoV-19/India/ISL-452214/07-04-2020 | 29805                |
| hCoV-19/India/NIV-QC-797/2020—EPI_ISL_452215—2020-04-22 | hCoV-19/India/ISL-452215/22-04-2020 | 29805                |
| hCoV-19/India/CCMB_L1022/2020—EPI_ISL_458047—2020-05-11 | hCoV-19/India/ISL-458047/11-05-2020 | 29794                |
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| hCoV-19/India/RMRC24/2020—EPI_ISL_455775—2020-04-04     | hCoV-19/India/ISL-455775/04-04-2020 | 29811                |
| hCoV-19/India/CCMB_L1082/2020—EPI_ISL_458055—2020-05-13 | hCoV-19/India/ISL-458055/13-05-2020 | 29803                |
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| hCoV-19/India/NCDC-3195/2020—EPI_ISL_436430—2020-04-05  | hCoV-19/India/ISL-436430/05-04-2020 | 29810                |
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| hCoV-19/India/CCMB_C13/2020—EPI_ISL_458035—2020-04-29   | hCoV-19/India/ISL-458035/29-04-2020 | 29815                |
| hCoV-19/India/GBRC117/2020—EPI_ISL_451162—2020-05-03    | hCoV-19/India/ISL-451162/03-05-2020 | 29818                |
| hCoV-19/India/GBRC102/2020—EPI_ISL_450791—2020-04-27    | hCoV-19/India/ISL-450791/27-04-2020 | 29818                |
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| hCoV-19/India/GBRC151b/2020—EPI_ISL_461479—2020-05-02             | hCoV-19/India/ISL-461479/02-05-2020 | 29829                |
| hCoV-19/India/GBRC152/2020—EPI_ISL_461480—2020-05-02              | hCoV-19/India/ISL-461480/02-05-2020 | 29829                |
| hCoV-19/India/GBRC158/2020—EPI_ISL_461488—2020-05-27              | hCoV-19/India/ISL-461488/27-05-2020 | 29829                |
| hCoV-19/India/GBRC159a/2020—EPI_ISL_461489—2020-05-27             | hCoV-19/India/ISL-461489/27-05-2020 | 29829                |
| hCoV-19/India/GBRC159b/2020—EPI_ISL_461490—2020-05-27             | hCoV-19/India/ISL-461490/27-05-2020 | 29829                |
| hCoV-19/India/GBRC164/2020—EPI_ISL_461499—2020-05-27              | hCoV-19/India/ISL-461499/27-05-2020 | 29829                |

| Original Genome ID                                      | Shorter Genome ID                   | Length of the Genome |
|---|-------------------------------------|----------------------|
| hCoV-19/India/GBRC156/2020—EPI_ISL_461485—2020-05-27    | hCoV-19/India/ISL-461485/27-05-2020 | 29831                |
| hCoV-19/India/GBRC166a/2020—EPI_ISL_461501—2020-05-27   | hCoV-19/India/ISL-461501/27-05-2020 | 29831                |
| hCoV-19/India/GBRC166b/2020—EPI_ISL_461502—2020-05-27   | hCoV-19/India/ISL-461502/27-05-2020 | 29831                |
| hCoV-19/India/GBRC162a/2020—EPI_ISL_461495—2020-05-27   | hCoV-19/India/ISL-461495/27-05-2020 | 29832                |
| hCoV-19/India/GBRC162b/2020—EPI_ISL_461496—2020-05-27   | hCoV-19/India/ISL-461496/27-05-2020 | 29832                |
| hCoV-19/India/GBRC165/2020—EPI_ISL_461500—2020-05-27    | hCoV-19/India/ISL-461500/27-05-2020 | 29835                |
| hCoV-19/India/GBRC167a/2020—EPI_ISL_461503—2020-05-27   | hCoV-19/India/ISL-461503/27-05-2020 | 29835                |
| hCoV-19/India/GBRC167b/2020—EPI_ISL_461504—2020-05-27   | hCoV-19/India/ISL-461504/27-05-2020 | 29835                |
| hCoV-19/India/GBRC168a/2020—EPI_ISL_461505—2020-05-27   | hCoV-19/India/ISL-461505/27-05-2020 | 29835                |
| hCoV-19/India/GBRC168b/2020—EPI_ISL_461506—2020-05-27   | hCoV-19/India/ISL-461506/27-05-2020 | 29835                |
| hCoV-19/India/ILSCV15547/2020—EPI_ISL_463036—2020-05-11 | hCoV-19/India/ISL-463036/11-05-2020 | 29837                |
| hCoV-19/India/GBRC160a/2020—EPI_ISL_461491—2020-05-27   | hCoV-19/India/ISL-461491/27-05-2020 | 29837                |
| hCoV-19/India/GBRC160b/2020—EPI_ISL_461492—2020-05-27   | hCoV-19/India/ISL-461492/27-05-2020 | 29837                |
| hCoV-19/India/GBRC154/2020—EPI_ISL_461483—2020-05-27    | hCoV-19/India/ISL-461483/27-05-2020 | 29838                |
| hCoV-19/India/GBRC161a/2020—EPI_ISL_461493—2020-05-27   | hCoV-19/India/ISL-461493/27-05-2020 | 29843                |
| hCoV-19/India/GBRC161b/2020—EPI_ISL_461494—2020-05-27   | hCoV-19/India/ISL-461494/27-05-2020 | 29843                |
| hCoV-19/India/GBRC163a/2020—EPI_ISL_461497—2020-05-27   | hCoV-19/India/ISL-461497/27-05-2020 | 29847                |
| hCoV-19/India/GBRC163b/2020—EPI_ISL_461498—2020-05-27   | hCoV-19/India/ISL-461498/27-05-2020 | 29847                |
| hCoV-19/India/GBRC157a/2020—EPI_ISL_461486—2020-05-27   | hCoV-19/India/ISL-461486/27-05-2020 | 29852                |
| hCoV-19/India/GBRC157b/2020—EPI_ISL_461487—2020-05-27   | hCoV-19/India/ISL-461487/27-05-2020 | 29852                |
| hCoV-19/India/GBRC155/2020—EPI_ISL_461484—2020-05-27    | hCoV-19/India/ISL-461484/27-05-2020 | 29853                |
| hCoV-19/India/GBRC153a/2020—EPI_ISL_461481—2020-04-27   | hCoV-19/India/ISL-461481/27-04-2020 | 29855                |
| hCoV-19/India/GBRC153b/2020—EPI_ISL_461482—2020-04-27   | hCoV-19/India/ISL-461482/27-04-2020 | 29855                |

Table S1: Original and Shorter genome IDs with length of SARS-CoV-2 genomes

| Start Coordinate of Mutation | End Coordinate of Mutation | Cluster Size of Mutation | Avg. occurrence of Mutation in Genomes | Type of Mutation | Avg. Entropy of Cluster of Mutation | Mapped with Coding Region  |
|------------------------------|----------------------------|--------------------------|--|------------------|-------------------------------------|----------------------------|
| 2                            | 83                         | 82                       | 147                                    | Deletion         | 0.275781951                         | 5'-UTR (Non-coding Region) |
| 2                            | 4                          | 3                        | 2                                      | Substitution     | 0.40952                             | 5'-UTR (Non-coding Region) |
| 12                           | 16                         | 5                        | 1                                      | Substitution     | 0.594238                            | 5'-UTR (Non-coding Region) |
| 75                           | 78                         | 4                        | 2                                      | Substitution     | 0.0947625                           | 5'-UTR (Non-coding Region) |
| 505                          | 510                        | 6                        | 2                                      | Deletion         | 0.02719                             | ORF1ab                     |
| 518                          | 520                        | 3                        | 1                                      | Substitution     | 0.01294                             | ORF1ab                     |
| 669                          | 671                        | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                     |
| 1584                         | 1586                       | 3                        | 1                                      | Substitution     | 0.01294                             | ORF1ab                     |
| 1588                         | 1590                       | 3                        | 1                                      | Substitution     | 0.01644                             | ORF1ab                     |
| 1687                         | 1708                       | 22                       | 4                                      | Deletion         | 0.043014545                         | ORF1ab                     |
| 2089                         | 2092                       | 4                        | 3                                      | Deletion         | 0.036245                            | ORF1ab                     |
| 2356                         | 2370                       | 15                       | 1                                      | Deletion         | 0.014502667                         | ORF1ab                     |
| 2862                         | 2873                       | 12                       | 1                                      | Deletion         | 0.013815                            | ORF1ab                     |
| 3276                         | 3278                       | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                     |
| 3722                         | 3733                       | 12                       | 2                                      | Deletion         | 0.0198625                           | ORF1ab                     |
| 3752                         | 3754                       | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                     |
| 3827                         | 3877                       | 51                       | 1                                      | Deletion         | 0.015007843                         | ORF1ab                     |
| 3970                         | 3973                       | 4                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                     |
| 3976                         | 3979                       | 4                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                     |
| 3989                         | 4011                       | 23                       | 2                                      | Deletion         | 0.027747391                         | ORF1ab                     |
| 5297                         | 5306                       | 10                       | 1                                      | Deletion         | 0.014235                            | ORF1ab                     |

| Start Coordinate of Mutation | End Coordinate of Mutation | Cluster Size of Mutation | Avg. occurrence of Mutation in Genomes | Type of Mutation | Avg. Entropy of Cluster of Mutation | Mapped with Coding Region |
|------------------------------|----------------------------|--------------------------|--|------------------|-------------------------------------|---------------------------|
| 5560                         | 5576                       | 17                       | 2                                      | Deletion         | 0.023527647                         | ORF1ab                    |
| 5829                         | 5841                       | 13                       | 1                                      | Deletion         | 0.016170769                         | ORF1ab                    |
| 5911                         | 5913                       | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 6308                         | 6310                       | 3                        | 23                                     | Substitution     | 0.14885                             | ORF1ab                    |
| 6310                         | 6312                       | 3                        | 9                                      | Deletion         | 0.385446667                         | ORF1ab                    |
| 6508                         | 6554                       | 47                       | 1                                      | Deletion         | 0.016129362                         | ORF1ab                    |
| 6601                         | 6603                       | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 6637                         | 6640                       | 4                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 6840                         | 6877                       | 38                       | 3                                      | Deletion         | 0.036317895                         | ORF1ab                    |
| 6943                         | 6945                       | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 7020                         | 7049                       | 30                       | 1                                      | Deletion         | 0.015121333                         | ORF1ab                    |
| 7279                         | 7334                       | 56                       | 3                                      | Deletion         | 0.034108929                         | ORF1ab                    |
| 8169                         | 8190                       | 22                       | 1                                      | Deletion         | 0.016237727                         | ORF1ab                    |
| 8345                         | 8445                       | 101                      | 1                                      | Deletion         | 0.014666931                         | ORF1ab                    |
| 9317                         | 9345                       | 29                       | 1                                      | Deletion         | 0.01491931                          | ORF1ab                    |
| 9409                         | 9421                       | 13                       | 1                                      | Deletion         | 0.013747692                         | ORF1ab                    |
| 9683                         | 9695                       | 13                       | 1                                      | Deletion         | 0.018861538                         | ORF1ab                    |
| 11124                        | 11139                      | 16                       | 2                                      | Deletion         | 0.024133125                         | ORF1ab                    |
| 11569                        | 11571                      | 3                        | 1                                      | Deletion         | 0.01644                             | ORF1ab                    |
| 12260                        | 12262                      | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 12360                        | 12364                      | 5                        | 1                                      | Substitution     | 0.01294                             | ORF1ab                    |
| 12763                        | 12777                      | 15                       | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 13794                        | 13796                      | 3                        | 2                                      | Substitution     | 0.020756667                         | ORF1ab                    |
| 13797                        | 13813                      | 17                       | 2                                      | Deletion         | 0.020351765                         | ORF1ab                    |
| 14490                        | 14504                      | 15                       | 2                                      | Deletion         | 0.026854667                         | ORF1ab                    |
| 14751                        | 14758                      | 8                        | 2                                      | Deletion         | 0.01980875                          | ORF1ab                    |
| 15598                        | 15609                      | 12                       | 2                                      | Deletion         | 0.02344                             | ORF1ab                    |
| 16213                        | 16215                      | 3                        | 1                                      | Deletion         | 0.020753333                         | ORF1ab                    |
| 17358                        | 17360                      | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 17764                        | 17769                      | 6                        | 2                                      | Deletion         | 0.023846667                         | ORF1ab                    |
| 18130                        | 18153                      | 24                       | 2                                      | Deletion         | 0.0257525                           | ORF1ab                    |
| 19306                        | 19354                      | 49                       | 1                                      | Deletion         | 0.014570612                         | ORF1ab                    |
| 19389                        | 19424                      | 36                       | 1                                      | Deletion         | 0.015743056                         | ORF1ab                    |
| 19432                        | 19434                      | 3                        | 2                                      | Deletion         | 0.02632                             | ORF1ab                    |
| 19456                        | 19458                      | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 19497                        | 19550                      | 54                       | 2                                      | Deletion         | 0.026757778                         | ORF1ab                    |
| 20088                        | 20103                      | 16                       | 1                                      | Deletion         | 0.018284375                         | ORF1ab                    |
| 20321                        | 20324                      | 4                        | 1                                      | Substitution     | 0.01294                             | ORF1ab                    |
| 20894                        | 20898                      | 5                        | 2                                      | Deletion         | 0.028126                            | ORF1ab                    |
| 20962                        | 20968                      | 7                        | 1                                      | Deletion         | 0.019288571                         | ORF1ab                    |
| 21017                        | 21021                      | 5                        | 1                                      | Deletion         | 0.01763                             | ORF1ab                    |
| 21171                        | 21208                      | 38                       | 1                                      | Deletion         | 0.014849737                         | ORF1ab                    |
| 21288                        | 21290                      | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 21396                        | 21398                      | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 21459                        | 21502                      | 44                       | 2                                      | Deletion         | 0.019661136                         | ORF1ab                    |
| 21509                        | 21511                      | 3                        | 1                                      | Deletion         | 0.01294                             | ORF1ab                    |
| 21547                        | 21603                      | 57                       | 3                                      | Deletion         | 0.036725263                         | ORF1ab                    |
| 21996                        | 21998                      | 3                        | 1                                      | Deletion         | 0.01644                             | Spike                     |
| 22655                        | 22660                      | 6                        | 1                                      | Deletion         | 0.01294                             | Spike                     |
| 23403                        | 23405                      | 3                        | 112                                    | Substitution     | 0.24856                             | Spike                     |

| Start Coordinate of Mutation | End Coordinate of Mutation | Cluster Size of Mutation | Avg. occurrence of Mutation in Genomes | Type of Mutation | Avg. Entropy of Cluster of Mutation | Mapped with Coding Region  |
|------------------------------|----------------------------|--------------------------|--|------------------|-------------------------------------|----------------------------|
| 23917                        | 23933                      | 17                       | 3                                      | Deletion         | 0.062954118                         | Spike                      |
| 23966                        | 24018                      | 53                       | 3                                      | Deletion         | 0.036207925                         | Spike                      |
| 25677                        | 25679                      | 3                        | 2                                      | Deletion         | 0.01994                             | ORF3a                      |
| 26160                        | 26163                      | 4                        | 1                                      | Deletion         | 0.01294                             | ORF3a                      |
| 26337                        | 26340                      | 4                        | 2                                      | Substitution     | 0.0336925                           | Envelope                   |
| 26340                        | 26399                      | 60                       | 6                                      | Deletion         | 0.054097833                         | Envelope                   |
| 27382                        | 27385                      | 4                        | 1                                      | Deletion         | 0.01294                             | ORF6                       |
| 27536                        | 27539                      | 4                        | 1                                      | Deletion         | 0.0246625                           | ORF7a                      |
| 27541                        | 27682                      | 142                      | 2                                      | Deletion         | 0.028414507                         | ORF7a                      |
| 27603                        | 27608                      | 6                        | 1                                      | Substitution     | 0.029793333                         | ORF7a                      |
| 27686                        | 27689                      | 4                        | 2                                      | Substitution     | 0.019415                            | ORF7a                      |
| 27697                        | 27743                      | 47                       | 2                                      | Deletion         | 0.027526383                         | ORF7a                      |
| 27741                        | 27743                      | 3                        | 1                                      | Substitution     | 0.037193333                         | ORF7a                      |
| 27753                        | 27756                      | 4                        | 1                                      | Substitution     | 0.01294                             | ORF7a                      |
| 27758                        | 27763                      | 6                        | 1                                      | Deletion         | 0.01294                             | ORF7b                      |
| 27774                        | 27782                      | 9                        | 1                                      | Deletion         | 0.015544444                         | ORF7b                      |
| 28270                        | 28274                      | 5                        | 3                                      | Deletion         | 0.035052                            | Not Present                |
| 28877                        | 28887                      | 11                       | 2                                      | Deletion         | 0.129616364                         | Nucleocapsid               |
| 28883                        | 28885                      | 3                        | 64                                     | Substitution     | 0.38174                             | Nucleocapsid               |
| 29386                        | 29388                      | 3                        | 1                                      | Substitution     | 0.01294                             | Nucleocapsid               |
| 29469                        | 29495                      | 27                       | 2                                      | Deletion         | 0.027851852                         | Nucleocapsid               |
| 29698                        | 29716                      | 19                       | 3                                      | Deletion         | 0.028396316                         | 3'-UTR (Non-coding Region) |
| 29742                        | 29904                      | 163                      | 142                                    | Deletion         | 0.240619571                         | 3'-UTR (Non-coding Region) |
| 29779                        | 29781                      | 3                        | 1                                      | Substitution     | 0.05775                             | 3'-UTR (Non-coding Region) |
| 29785                        | 29791                      | 7                        | 1                                      | Substitution     | 0.056127143                         | 3'-UTR (Non-coding Region) |
| 29795                        | 29797                      | 3                        | 1                                      | Substitution     | 0.06343                             | 3'-UTR (Non-coding Region) |
| 29802                        | 29806                      | 5                        | 1                                      | Substitution     | 0.092584                            | 3'-UTR (Non-coding Region) |
| 29864                        | 29866                      | 3                        | 2                                      | Substitution     | 0.703953333                         | 3'-UTR (Non-coding Region) |
| 29868                        | 29872                      | 5                        | 15                                     | Substitution     | 0.69455                             | 3'-UTR (Non-coding Region) |

Table S2: Mutation as Cluster in Indian SARS-CoV-2 Genomes

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region  |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|----------------------------|
| 7                      | 2                                 | Substitution     | G>A,G>C              | R>K,R>T              | 0.48558 | 5'-UTR (Non-coding Region) |
| 9                      | 2                                 | Substitution     | T>G                  | V>G                  | 0.50961 | 5'-UTR (Non-coding Region) |
| 10                     | 1                                 | Substitution     | T>G                  | F>C                  | 0.51441 | 5'-UTR (Non-coding Region) |
| 22                     | 2                                 | Substitution     | A>T                  | Q>L                  | 0.67516 | 5'-UTR (Non-coding Region) |
| 23                     | 1                                 | Substitution     | G>A                  | R>K                  | 0.67312 | 5'-UTR (Non-coding Region) |
| 27                     | 1                                 | Substitution     | A>C                  | N>T                  | 0.67312 | 5'-UTR (Non-coding Region) |
| 55                     | 2                                 | Substitution     | A>C                  | *>S                  | 0.03638 | 5'-UTR (Non-coding Region) |
| 56                     | 2                                 | Substitution     | G>T                  | R>L                  | 0.03638 | 5'-UTR (Non-coding Region) |
| 72                     | 2                                 | Substitution     | G>A                  | R>-                  | 0.04687 | 5'-UTR (Non-coding Region) |
| 92                     | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 94                     | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | 5'-UTR (Non-coding Region) |
| 106                    | 5                                 | Substitution     | C>T                  | A>V                  | 0.0505  | 5'-UTR (Non-coding Region) |
| 109                    | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 110                    | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | 5'-UTR (Non-coding Region) |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region  |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|----------------------------|
| 126                    | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 140                    | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 167                    | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 184                    | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 187                    | 1                                 | Substitution     | A>G                  | Q>R                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 199                    | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 203                    | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 204                    | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 218                    | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | 5'-UTR (Non-coding Region) |
| 219                    | 4                                 | Substitution     | G>T                  | R>L                  | 0.04198 | 5'-UTR (Non-coding Region) |
| 222                    | 1                                 | Deletion         | C>-                  | S>-                  | 0.03638 | 5'-UTR (Non-coding Region) |
| 222                    | 2                                 | Substitution     | C>T                  | S>L                  | 0.03638 | 5'-UTR (Non-coding Region) |
| 227                    | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 241                    | 4                                 | Deletion         | C>-                  | S>-                  | 0.70789 | 5'-UTR (Non-coding Region) |
| 241                    | 341                               | Substitution     | C>T                  | S>L                  | 0.70789 | 5'-UTR (Non-coding Region) |
| 253                    | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | 5'-UTR (Non-coding Region) |
| 264                    | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | 5'-UTR (Non-coding Region) |
| 270                    | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                     |
| 292                    | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                     |
| 299                    | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                     |
| 313                    | 4                                 | Deletion         | C>-                  | S>-                  | 0.25363 | ORF1ab                     |
| 313                    | 31                                | Substitution     | C>T                  | S>L                  | 0.25363 | ORF1ab                     |
| 335                    | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                     |
| 337                    | 1                                 | Deletion         | C>-                  | A>-                  | 0.02589 | ORF1ab                     |
| 337                    | 1                                 | Substitution     | C>T                  | A>V                  | 0.02589 | ORF1ab                     |
| 347                    | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                     |
| 351                    | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                     |
| 374                    | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                     |
| 377                    | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | ORF1ab                     |
| 388                    | 1                                 | Substitution     | G>A                  | R>K                  | 0.01294 | ORF1ab                     |
| 454                    | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                     |
| 458                    | 2                                 | Deletion         | G>-                  | *>-                  | 0.02344 | ORF1ab                     |
| 490                    | 1                                 | Substitution     | T>C                  | M>T                  | 0.01294 | ORF1ab                     |
| 493                    | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                     |
| 494                    | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                     |
| 496                    | 1                                 | Substitution     | A>C                  | E>A                  | 0.01294 | ORF1ab                     |
| 499                    | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                     |
| 500                    | 1                                 | Substitution     | G>T                  | C>L                  | 0.01294 | ORF1ab                     |
| 503                    | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                     |
| 504                    | 1                                 | Substitution     | C>G                  | P>-                  | 0.01294 | ORF1ab                     |
| 506                    | 2                                 | Substitution     | C>T                  | S>L                  | 0.04687 | ORF1ab                     |
| 516                    | 1                                 | Substitution     | T>G                  | V>G                  | 0.01294 | ORF1ab                     |
| 536                    | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                     |
| 538                    | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                     |
| 560                    | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                     |
| 583                    | 1                                 | Deletion         | C>-                  | S>-                  | 0.02589 | ORF1ab                     |
| 583                    | 1                                 | Substitution     | C>T                  | S>F                  | 0.02589 | ORF1ab                     |
| 589                    | 1                                 | Substitution     | C>A                  | S>Y                  | 0.01294 | ORF1ab                     |
| 635                    | 2                                 | Substitution     | C>T                  | S>L                  | 0.02344 | ORF1ab                     |
| 643                    | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                     |



| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 658                    | 4                                 | Deletion         | T>-                  | L>-                  | 0.04198 | ORF1ab                    |
| 697                    | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 706                    | 1                                 | Substitution     | C>A                  | T>K                  | 0.01294 | ORF1ab                    |
| 744                    | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 761                    | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 771                    | 3                                 | Substitution     | T>C                  | V>A                  | 0.03301 | ORF1ab                    |
| 784                    | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 832                    | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 835                    | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 840                    | 1                                 | Substitution     | G>A                  | G>D                  | 0.01294 | ORF1ab                    |
| 843                    | 5                                 | Deletion         | C>-                  | P>-                  | 0.0505  | ORF1ab                    |
| 851                    | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |
| 875                    | 3                                 | Substitution     | C>T                  | P>L                  | 0.03301 | ORF1ab                    |
| 884                    | 1                                 | Deletion         | C>-                  | T>-                  | 0.14757 | ORF1ab                    |
| 884                    | 17                                | Substitution     | C>T                  | T>M                  | 0.14757 | ORF1ab                    |
| 1059                   | 5                                 | Substitution     | C>T                  | T>I                  | 0.0505  | ORF1ab                    |
| 1060                   | 2                                 | Deletion         | C>-                  | P>-                  | 0.02344 | ORF1ab                    |
| 1063                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 1080                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 1093                   | 3                                 | Deletion         | C>-                  | P>-                  | 0.03301 | ORF1ab                    |
| 1094                   | 3                                 | Substitution     | T>C                  | L>P                  | 0.03301 | ORF1ab                    |
| 1102                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 1191                   | 3                                 | Substitution     | C>T                  | P>L                  | 0.03301 | ORF1ab                    |
| 1204                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 1218                   | 4                                 | Substitution     | C>T                  | S>L                  | 0.04198 | ORF1ab                    |
| 1267                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 1278                   | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF1ab                    |
| 1281                   | 6                                 | Substitution     | C>T                  | A>V                  | 0.05866 | ORF1ab                    |
| 1282                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 1348                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 1353                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 1381                   | 1                                 | Substitution     | A>G                  | H>R                  | 0.01294 | ORF1ab                    |
| 1397                   | 22                                | Substitution     | G>A                  | S>N                  | 0.16411 | ORF1ab                    |
| 1414                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 1419                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 1420                   | 2                                 | Deletion         | C>-                  | P>-                  | 0.02344 | ORF1ab                    |
| 1440                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 1457                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 1458                   | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | ORF1ab                    |
| 1462                   | 1                                 | Substitution     | G>T                  | R>M                  | 0.01294 | ORF1ab                    |
| 1480                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 1498                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 1519                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 1541                   | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                    |
| 1562                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 1572                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 1579                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 1592                   | 2                                 | Substitution     | T>C                  | F>S                  | 0.02344 | ORF1ab                    |
| 1594                   | 2                                 | Deletion         | C>-                  | P>-                  | 0.02344 | ORF1ab                    |
| 1599                   | 2                                 | Substitution     | G>T                  | G>V                  | 0.02344 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 1601                   | 1                                 | Substitution     | C>A                  | S>Y                  | 0.01294 | ORF1ab                    |
| 1633                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 1639                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 1691                   | 1                                 | Substitution     | A>G                  | Y>C                  | 0.04595 | ORF1ab                    |
| 1694                   | 1                                 | Substitution     | T>C                  | F>S                  | 0.04595 | ORF1ab                    |
| 1707                   | 8                                 | Substitution     | C>T                  | S>F                  | 0.2701  | ORF1ab                    |
| 1710                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 1717                   | 1                                 | Substitution     | A>G                  | Q>R                  | 0.01294 | ORF1ab                    |
| 1723                   | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |
| 1756                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 1804                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 1805                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 1807                   | 1                                 | Substitution     | A>G                  | E>G                  | 0.01294 | ORF1ab                    |
| 1812                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 1819                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 1820                   | 19                                | Substitution     | G>A                  | R>K                  | 0.14674 | ORF1ab                    |
| 1846                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.04595 | ORF1ab                    |
| 1846                   | 3                                 | Substitution     | A>T                  | N>I                  | 0.04595 | ORF1ab                    |
| 1852                   | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | ORF1ab                    |
| 1858                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 1887                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 1909                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 1912                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 1938                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 1950                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 1967                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 1971                   | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 1982                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 1987                   | 2                                 | Deletion         | A>-                  | H>-                  | 0.02344 | ORF1ab                    |
| 2004                   | 1                                 | Substitution     | T>G                  | L>R                  | 0.01294 | ORF1ab                    |
| 2012                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 2026                   | 3                                 | Deletion         | A>-                  | H>-                  | 0.03301 | ORF1ab                    |
| 2040                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 2043                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 2047                   | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 2074                   | 1                                 | Substitution     | T>G                  | V>G                  | 0.01294 | ORF1ab                    |
| 2076                   | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | ORF1ab                    |
| 2077                   | 1                                 | Substitution     | T>G                  | V>-                  | 0.01294 | ORF1ab                    |
| 2078                   | 2                                 | Deletion         | G>-                  | C>-                  | 0.02344 | ORF1ab                    |
| 2081                   | 4                                 | Deletion         | G>-                  | C>-                  | 0.04198 | ORF1ab                    |
| 2088                   | 3                                 | Substitution     | T>G                  | L>*                  | 0.03301 | ORF1ab                    |
| 2089                   | 3                                 | Substitution     | G>A                  | *>-                  | 0.04595 | ORF1ab                    |
| 2094                   | 3                                 | Substitution     | C>T                  | S>L                  | 0.03301 | ORF1ab                    |
| 2111                   | 1                                 | Substitution     | A>T                  | H>L                  | 0.01294 | ORF1ab                    |
| 2127                   | 1                                 | Substitution     | A>C                  | Y>S                  | 0.01294 | ORF1ab                    |
| 2134                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 2141                   | 1                                 | Substitution     | C>A                  | T>N                  | 0.01294 | ORF1ab                    |
| 2143                   | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | ORF1ab                    |
| 2161                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 2164                   | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 2174                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 2176                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 2199                   | 3                                 | Deletion         | G>-                  | G>-                  | 0.03301 | ORF1ab                    |
| 2200                   | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 2223                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 2236                   | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 2249                   | 1                                 | Substitution     | G>A                  | W>*                  | 0.01294 | ORF1ab                    |
| 2277                   | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF1ab                    |
| 2309                   | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 2322                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 2368                   | 2                                 | Substitution     | A>T                  | K>M                  | 0.03638 | ORF1ab                    |
| 2388                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 2393                   | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 2436                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 2476                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 2480                   | 1                                 | Substitution     | A>G                  | N>S                  | 0.01294 | ORF1ab                    |
| 2485                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 2518                   | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 2526                   | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 2558                   | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | ORF1ab                    |
| 2593                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 2595                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 2604                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 2616                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 2632                   | 3                                 | Substitution     | G>T                  | C>F                  | 0.03301 | ORF1ab                    |
| 2634                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 2636                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 2638                   | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 2653                   | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 2664                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 2687                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 2691                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 2697                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 2701                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 2707                   | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 2713                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 2730                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 2778                   | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 2785                   | 2                                 | Deletion         | T>-                  | I>-                  | 0.02344 | ORF1ab                    |
| 2821                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 2836                   | 51                                | Substitution     | C>T                  | A>V                  | 0.30242 | ORF1ab                    |
| 2879                   | 1                                 | Substitution     | G>A                  | R>H                  | 0.01294 | ORF1ab                    |
| 2891                   | 3                                 | Deletion         | G>-                  | G>-                  | 0.03301 | ORF1ab                    |
| 2909                   | 2                                 | Deletion         | A>-                  | N>-                  | 0.02344 | ORF1ab                    |
| 2910                   | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | ORF1ab                    |
| 2933                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 2934                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 2956                   | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 2961                   | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 3037                   | 3                                 | Deletion         | C>-                  | S>-                  | 0.70203 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 3037                   | 339                               | Substitution     | C>T                  | S>F                  | 0.70203 | ORF1ab                    |
| 3039                   | 3                                 | Substitution     | A>G                  | Y>C                  | 0.03301 | ORF1ab                    |
| 3048                   | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 3054                   | 2                                 | Substitution     | A>G                  | D>G                  | 0.02344 | ORF1ab                    |
| 3084                   | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 3176                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 3190                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 3231                   | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | ORF1ab                    |
| 3240                   | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 3243                   | 2                                 | Deletion         | G>-                  | G>-                  | 0.03638 | ORF1ab                    |
| 3243                   | 1                                 | Substitution     | G>T                  | G>V                  | 0.03638 | ORF1ab                    |
| 3255                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 3263                   | 2                                 | Deletion         | A>-                  | N>-                  | 0.02344 | ORF1ab                    |
| 3275                   | 1                                 | Substitution     | A>C                  | N>-                  | 0.01294 | ORF1ab                    |
| 3350                   | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 3351                   | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 3372                   | 1                                 | Substitution     | A>G                  | D>G                  | 0.01294 | ORF1ab                    |
| 3390                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 3406                   | 1                                 | Substitution     | A>G                  | K>-                  | 0.01294 | ORF1ab                    |
| 3407                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 3408                   | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 3417                   | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | ORF1ab                    |
| 3426                   | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | ORF1ab                    |
| 3429                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 3467                   | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | ORF1ab                    |
| 3472                   | 4                                 | Substitution     | A>G                  | E>G                  | 0.04198 | ORF1ab                    |
| 3514                   | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 3517                   | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF1ab                    |
| 3533                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 3552                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 3556                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 3564                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 3581                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 3604                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 3606                   | 2                                 | Deletion         | G>-                  | C>-                  | 0.02344 | ORF1ab                    |
| 3627                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 3634                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.17699 | ORF1ab                    |
| 3634                   | 22                                | Substitution     | C>T                  | T>I                  | 0.17699 | ORF1ab                    |
| 3637                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 3638                   | 1                                 | Substitution     | G>A                  | R>K                  | 0.01294 | ORF1ab                    |
| 3639                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 3668                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 3671                   | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 3684                   | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 3686                   | 2                                 | Substitution     | C>T                  | A>V                  | 0.02344 | ORF1ab                    |
| 3687                   | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 3737                   | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | ORF1ab                    |
| 3768                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.02589 | ORF1ab                    |
| 3768                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.02589 | ORF1ab                    |
| 3784                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 3817                   | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | ORF1ab                    |
| 3831                   | 1                                 | Substitution     | G>C                  | S>T                  | 0.02589 | ORF1ab                    |
| 3874                   | 1                                 | Substitution     | C>T                  | S>L                  | 0.02589 | ORF1ab                    |
| 3881                   | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 3903                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 3946                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 3955                   | 1                                 | Substitution     | G>A                  | R>K                  | 0.01294 | ORF1ab                    |
| 3983                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 3994                   | 1                                 | Substitution     | G>T                  | W>L                  | 0.03638 | ORF1ab                    |
| 4067                   | 2                                 | Substitution     | G>A                  | C>Y                  | 0.02344 | ORF1ab                    |
| 4084                   | 13                                | Substitution     | C>T                  | T>I                  | 0.10922 | ORF1ab                    |
| 4158                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 4182                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 4216                   | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 4246                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 4255                   | 4                                 | Substitution     | G>T,G>A              | R>L,R>Q              | 0.04595 | ORF1ab                    |
| 4257                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 4263                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 4268                   | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF1ab                    |
| 4272                   | 1                                 | Substitution     | G>A                  | G>D                  | 0.01294 | ORF1ab                    |
| 4300                   | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 4345                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 4354                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.05491 | ORF1ab                    |
| 4354                   | 4                                 | Substitution     | G>A                  | R>K                  | 0.05491 | ORF1ab                    |
| 4372                   | 5                                 | Substitution     | A>G                  | E>G                  | 0.0505  | ORF1ab                    |
| 4373                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 4444                   | 4                                 | Substitution     | G>T                  | W>L                  | 0.04198 | ORF1ab                    |
| 4496                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 4543                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 4544                   | 1                                 | Substitution     | A>G                  | Q>R                  | 0.01294 | ORF1ab                    |
| 4545                   | 1                                 | Substitution     | G>T                  | S>-                  | 0.01294 | ORF1ab                    |
| 4546                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 4547                   | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 4559                   | 1                                 | Deletion         | G>-                  | S>-                  | 0.02589 | ORF1ab                    |
| 4559                   | 1                                 | Substitution     | G>T                  | S>I                  | 0.02589 | ORF1ab                    |
| 4582                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 4638                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 4660                   | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF1ab                    |
| 4679                   | 3                                 | Substitution     | C>T                  | A>V                  | 0.03301 | ORF1ab                    |
| 4764                   | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 4803                   | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 4809                   | 14                                | Substitution     | C>T                  | S>F                  | 0.11577 | ORF1ab                    |
| 4866                   | 6                                 | Substitution     | G>T                  | S>I                  | 0.05866 | ORF1ab                    |
| 4893                   | 3                                 | Substitution     | C>A,C>T              | T>K,T>I              | 0.03638 | ORF1ab                    |
| 4901                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 4903                   | 1                                 | Substitution     | A>G                  | *>W                  | 0.01294 | ORF1ab                    |
| 4904                   | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | ORF1ab                    |
| 4931                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 4935                   | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | ORF1ab                    |
| 4942                   | 5                                 | Deletion         | T>-                  | F>-                  | 0.0505  | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 5008                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 5018                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 5029                   | 2                                 | Substitution     | G>T                  | *>L                  | 0.02344 | ORF1ab                    |
| 5062                   | 3                                 | Substitution     | G>A                  | W>*                  | 0.03301 | ORF1ab                    |
| 5080                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 5081                   | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 5114                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 5151                   | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 5184                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 5194                   | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | ORF1ab                    |
| 5210                   | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 5219                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 5289                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 5301                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.02589 | ORF1ab                    |
| 5368                   | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 5424                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 5462                   | 1                                 | Substitution     | A>G                  | E>G                  | 0.01294 | ORF1ab                    |
| 5572                   | 3                                 | Substitution     | G>T                  | C>F                  | 0.05643 | ORF1ab                    |
| 5593                   | 1                                 | Substitution     | T>C                  | M>T                  | 0.01294 | ORF1ab                    |
| 5608                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 5657                   | 2                                 | Deletion         | G>-                  | S>-                  | 0.03638 | ORF1ab                    |
| 5657                   | 1                                 | Substitution     | G>T                  | S>I                  | 0.03638 | ORF1ab                    |
| 5700                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.21984 | ORF1ab                    |
| 5700                   | 30                                | Substitution     | C>A                  | A>D                  | 0.21984 | ORF1ab                    |
| 5730                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 5736                   | 6                                 | Deletion         | C>-                  | A>-                  | 0.05866 | ORF1ab                    |
| 5743                   | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 5744                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 5791                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 5821                   | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | ORF1ab                    |
| 5825                   | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | ORF1ab                    |
| 5826                   | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | ORF1ab                    |
| 5846                   | 1                                 | Substitution     | G>A                  | R>K                  | 0.01294 | ORF1ab                    |
| 5877                   | 1                                 | Substitution     | A>C                  | N>T                  | 0.01294 | ORF1ab                    |
| 5961                   | 3                                 | Deletion         | A>-                  | Y>-                  | 0.03301 | ORF1ab                    |
| 5988                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 5999                   | 2                                 | Deletion         | A>-                  | N>-                  | 0.02344 | ORF1ab                    |
| 6030                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 6031                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 6040                   | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 6078                   | 7                                 | Deletion         | C>-                  | A>-                  | 0.06652 | ORF1ab                    |
| 6081                   | 4                                 | Deletion         | A>-                  | D>-                  | 0.12338 | ORF1ab                    |
| 6081                   | 9                                 | Substitution     | A>G                  | D>G                  | 0.12338 | ORF1ab                    |
| 6109                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 6122                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 6133                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 6145                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 6183                   | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF1ab                    |
| 6190                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 6197                   | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 6204                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 6220                   | 1                                 | Substitution     | G>A                  | C>Y                  | 0.01294 | ORF1ab                    |
| 6249                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 6312                   | 160                               | Substitution     | C>A                  | T>K                  | 0.73568 | ORF1ab                    |
| 6315                   | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | ORF1ab                    |
| 6316                   | 11                                | Deletion         | A>-                  | ->-                  | 0.0957  | ORF1ab                    |
| 6317                   | 2                                 | Insertion        | ->A                  | ->N                  | 0.02344 | ORF1ab                    |
| 6351                   | 1                                 | Substitution     | A>G                  | E>G                  | 0.01294 | ORF1ab                    |
| 6370                   | 1                                 | Substitution     | G>A                  | G>E                  | 0.01294 | ORF1ab                    |
| 6403                   | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | ORF1ab                    |
| 6439                   | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 6440                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 6441                   | 1                                 | Substitution     | A>G                  | E>-                  | 0.01294 | ORF1ab                    |
| 6458                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 6467                   | 4                                 | Substitution     | A>G                  | K>R                  | 0.04198 | ORF1ab                    |
| 6468                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 6502                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 6532                   | 1                                 | Substitution     | A>C                  | E>A                  | 0.02589 | ORF1ab                    |
| 6542                   | 2                                 | Substitution     | C>T                  | T>I                  | 0.03638 | ORF1ab                    |
| 6544                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.02589 | ORF1ab                    |
| 6574                   | 2                                 | Deletion         | C>-                  | S>-                  | 0.06539 | ORF1ab                    |
| 6574                   | 4                                 | Substitution     | C>T                  | S>F                  | 0.06539 | ORF1ab                    |
| 6595                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 6598                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 6617                   | 2                                 | Substitution     | A>G                  | *>W                  | 0.02344 | ORF1ab                    |
| 6647                   | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 6652                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 6688                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 6696                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 6702                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 6703                   | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |
| 6704                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 6705                   | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 6749                   | 1                                 | Substitution     | A>G                  | *>*                  | 0.01294 | ORF1ab                    |
| 6882                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 6886                   | 3                                 | Deletion         | G>-                  | G>-                  | 0.03301 | ORF1ab                    |
| 6897                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 6900                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 6925                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 6926                   | 1                                 | Substitution     | A>T                  | H>L                  | 0.01294 | ORF1ab                    |
| 6937                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 6962                   | 2                                 | Deletion         | G>-                  | G>-                  | 0.02344 | ORF1ab                    |
| 6976                   | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 6990                   | 2                                 | Substitution     | T>C                  | F>S                  | 0.02344 | ORF1ab                    |
| 7004                   | 1                                 | Substitution     | A>G                  | Q>R                  | 0.01294 | ORF1ab                    |
| 7011                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 7012                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 7023                   | 1                                 | Substitution     | T>C                  | F>S                  | 0.02589 | ORF1ab                    |
| 7044                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.02589 | ORF1ab                    |
| 7063                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 7087                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 7120                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 7165                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 7171                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 7174                   | 1                                 | Substitution     | C>A                  | S>Y                  | 0.01294 | ORF1ab                    |
| 7211                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 7215                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 7216                   | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 7233                   | 1                                 | Substitution     | T>G                  | L>R                  | 0.01294 | ORF1ab                    |
| 7259                   | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 7320                   | 2                                 | Substitution     | A>G                  | Q>R                  | 0.07391 | ORF1ab                    |
| 7377                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 7393                   | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | ORF1ab                    |
| 7402                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 7421                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 7452                   | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | ORF1ab                    |
| 7458                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 7474                   | 3                                 | Deletion         | G>-                  | G>-                  | 0.03301 | ORF1ab                    |
| 7554                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 7574                   | 2                                 | Deletion         | C>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 7586                   | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 7601                   | 2                                 | Deletion         | C>-                  | A>-                  | 0.04687 | ORF1ab                    |
| 7601                   | 2                                 | Substitution     | C>T                  | A>V                  | 0.04687 | ORF1ab                    |
| 7622                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.02589 | ORF1ab                    |
| 7622                   | 1                                 | Substitution     | T>C                  | V>A                  | 0.02589 | ORF1ab                    |
| 7676                   | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | ORF1ab                    |
| 7701                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 7705                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 7707                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 7733                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 7739                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 7800                   | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 7809                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 7824                   | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 7830                   | 1                                 | Insertion        | ->T                  | ->L                  | 0.01294 | ORF1ab                    |
| 7913                   | 1                                 | Substitution     | G>A                  | C>Y                  | 0.01294 | ORF1ab                    |
| 7926                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 7947                   | 3                                 | Substitution     | C>T                  | T>I                  | 0.03301 | ORF1ab                    |
| 8018                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 8025                   | 53                                | Deletion         | T>-                  | L>-                  | 0.3105  | ORF1ab                    |
| 8028                   | 10                                | Deletion         | A>-                  | Q>-                  | 0.08869 | ORF1ab                    |
| 8045                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 8075                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 8082                   | 2                                 | Substitution     | A>T                  | Q>L                  | 0.02344 | ORF1ab                    |
| 8104                   | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 8110                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 8139                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 8141                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 8148                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 8166                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |



| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 8169                   | 2                                 | Substitution     | T>C                  | F>-                  | 0.03638 | ORF1ab                    |
| 8193                   | 1                                 | Substitution     | T>G                  | L>W                  | 0.01294 | ORF1ab                    |
| 8235                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 8249                   | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 8298                   | 2                                 | Substitution     | T>C                  | I>T                  | 0.02344 | ORF1ab                    |
| 8331                   | 1                                 | Substitution     | T>A                  | L>*                  | 0.01294 | ORF1ab                    |
| 8338                   | 1                                 | Substitution     | T>A                  | L>*                  | 0.01294 | ORF1ab                    |
| 8349                   | 1                                 | Substitution     | T>A                  | V>E                  | 0.02589 | ORF1ab                    |
| 8370                   | 1                                 | Substitution     | G>A                  | R>H                  | 0.02589 | ORF1ab                    |
| 8373                   | 1                                 | Substitution     | G>T                  | R>M                  | 0.02589 | ORF1ab                    |
| 8448                   | 4                                 | Deletion         | A>-                  | N>-                  | 0.04198 | ORF1ab                    |
| 8462                   | 2                                 | Substitution     | C>A                  | A>D                  | 0.02344 | ORF1ab                    |
| 8465                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 8474                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 8483                   | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 8499                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 8537                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 8540                   | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 8545                   | 8                                 | Deletion         | C>-                  | T>-                  | 0.07413 | ORF1ab                    |
| 8560                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 8573                   | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | ORF1ab                    |
| 8582                   | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 8589                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 8597                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 8601                   | 2                                 | Deletion         | T>-                  | L>-                  | 0.02344 | ORF1ab                    |
| 8623                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 8639                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 8655                   | 17                                | Substitution     | G>T                  | C>F                  | 0.13468 | ORF1ab                    |
| 8663                   | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 8664                   | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 8685                   | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 8743                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 8744                   | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 8758                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 8784                   | 22                                | Substitution     | C>T                  | A>V                  | 0.16411 | ORF1ab                    |
| 8786                   | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 8832                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 8840                   | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 8846                   | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | ORF1ab                    |
| 8859                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 8876                   | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 8893                   | 1                                 | Substitution     | A>T                  | H>L                  | 0.01294 | ORF1ab                    |
| 8915                   | 1                                 | Deletion         | A>-                  | H>-                  | 0.02589 | ORF1ab                    |
| 8915                   | 1                                 | Substitution     | A>T                  | H>L                  | 0.02589 | ORF1ab                    |
| 8919                   | 2                                 | Deletion         | C>-                  | S>-                  | 0.14554 | ORF1ab                    |
| 8919                   | 15                                | Substitution     | C>T                  | S>F                  | 0.14554 | ORF1ab                    |
| 8952                   | 2                                 | Substitution     | C>T                  | S>F                  | 0.02344 | ORF1ab                    |
| 9028                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 9041                   | 10                                | Deletion         | C>-                  | A>-                  | 0.10161 | ORF1ab                    |
| 9041                   | 1                                 | Substitution     | C>A                  | A>D                  | 0.10161 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 9103                   | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 9165                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 9212                   | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 9228                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 9248                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 9320                   | 1                                 | Substitution     | T>A                  | F>Y                  | 0.02589 | ORF1ab                    |
| 9322                   | 1                                 | Substitution     | T>A                  | L>Q                  | 0.02589 | ORF1ab                    |
| 9359                   | 1                                 | Substitution     | T>A                  | F>Y                  | 0.01294 | ORF1ab                    |
| 9386                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 9391                   | 3                                 | Deletion         | G>-                  | G>-                  | 0.06599 | ORF1ab                    |
| 9391                   | 3                                 | Substitution     | G>A                  | G>E                  | 0.06599 | ORF1ab                    |
| 9399                   | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 9432                   | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 9439                   | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 9440                   | 7                                 | Substitution     | C>T                  | T>I                  | 0.06652 | ORF1ab                    |
| 9472                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 9473                   | 1                                 | Deletion         | G>-                  | R>-                  | 0.03638 | ORF1ab                    |
| 9473                   | 2                                 | Substitution     | G>A                  | R>K                  | 0.03638 | ORF1ab                    |
| 9474                   | 2                                 | Substitution     | A>G                  | E>-                  | 0.02344 | ORF1ab                    |
| 9475                   | 2                                 | Deletion         | G>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 9476                   | 2                                 | Deletion         | C>-                  | A>-                  | 0.02344 | ORF1ab                    |
| 9477                   | 2                                 | Substitution     | T>C                  | L>-                  | 0.02344 | ORF1ab                    |
| 9479                   | 1                                 | Substitution     | T>A                  | F>Y                  | 0.01294 | ORF1ab                    |
| 9481                   | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | ORF1ab                    |
| 9482                   | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 9516                   | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | ORF1ab                    |
| 9519                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 9528                   | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 9563                   | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 9630                   | 2                                 | Substitution     | T>C                  | L>P                  | 0.02344 | ORF1ab                    |
| 9650                   | 1                                 | Substitution     | G>A                  | W>*                  | 0.01294 | ORF1ab                    |
| 9654                   | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | ORF1ab                    |
| 9658                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.02589 | ORF1ab                    |
| 9658                   | 1                                 | Substitution     | A>G                  | Y>C                  | 0.02589 | ORF1ab                    |
| 9665                   | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 9695                   | 7                                 | Substitution     | C>T                  | A>V                  | 0.08992 | ORF1ab                    |
| 9745                   | 1                                 | Substitution     | T>C                  | L>S                  | 0.01294 | ORF1ab                    |
| 9801                   | 1                                 | Deletion         | T>-                  | L>-                  | 0.02589 | ORF1ab                    |
| 9801                   | 1                                 | Substitution     | T>C                  | L>P                  | 0.02589 | ORF1ab                    |
| 9804                   | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | ORF1ab                    |
| 9859                   | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 9861                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 9905                   | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 9914                   | 2                                 | Deletion         | A>-                  | Y>-                  | 0.02344 | ORF1ab                    |
| 9935                   | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 9941                   | 2                                 | Deletion         | G>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 9944                   | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 9956                   | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 9993                   | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 10006                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 10034                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 10039                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 10041                  | 2                                 | Deletion         | C>-                  | P>-                  | 0.03638 | ORF1ab                    |
| 10041                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.03638 | ORF1ab                    |
| 10048                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 10072                  | 3                                 | Deletion         | A>-                  | N>-                  | 0.03301 | ORF1ab                    |
| 10076                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 10079                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 10093                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 10140                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                    |
| 10187                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 10279                  | 3                                 | Substitution     | C>T                  | T>I                  | 0.03301 | ORF1ab                    |
| 10297                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 10300                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 10319                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 10323                  | 1                                 | Substitution     | T>C                  | L>S                  | 0.01294 | ORF1ab                    |
| 10333                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 10341                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF1ab                    |
| 10371                  | 2                                 | Substitution     | C>T                  | A>V                  | 0.02344 | ORF1ab                    |
| 10403                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 10423                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF1ab                    |
| 10436                  | 1                                 | Substitution     | A>G                  | Q>R                  | 0.01294 | ORF1ab                    |
| 10437                  | 2                                 | Deletion         | A>-                  | N>-                  | 0.02344 | ORF1ab                    |
| 10450                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.02589 | ORF1ab                    |
| 10450                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.02589 | ORF1ab                    |
| 10462                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 10480                  | 5                                 | Substitution     | A>C                  | *>S                  | 0.0505  | ORF1ab                    |
| 10481                  | 5                                 | Substitution     | A>T                  | N>L                  | 0.0505  | ORF1ab                    |
| 10540                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 10547                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 10584                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 10587                  | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 10590                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 10624                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.02589 | ORF1ab                    |
| 10624                  | 1                                 | Substitution     | A>G                  | N>S                  | 0.02589 | ORF1ab                    |
| 10669                  | 1                                 | Substitution     | T>C                  | F>S                  | 0.01294 | ORF1ab                    |
| 10704                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 10758                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |
| 10773                  | 2                                 | Substitution     | T>C                  | M>T                  | 0.02344 | ORF1ab                    |
| 10779                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 10817                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.03638 | ORF1ab                    |
| 10817                  | 2                                 | Substitution     | C>T                  | S>F                  | 0.03638 | ORF1ab                    |
| 10863                  | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | ORF1ab                    |
| 10890                  | 1                                 | Substitution     | A>G                  | D>G                  | 0.01294 | ORF1ab                    |
| 10904                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 10938                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 10949                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 10950                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 10961                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 10967                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 10980                  | 1                                 | Substitution     | A>G                  | Q>R                  | 0.01294 | ORF1ab                    |
| 11005                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 11076                  | 2                                 | Substitution     | C>T                  | S>F                  | 0.02344 | ORF1ab                    |
| 11085                  | 9                                 | Deletion         | G>-                  | C>-                  | 0.74748 | ORF1ab                    |
| 11085                  | 204                               | Substitution     | G>T,G>A              | C>F,C>- ,C>Y         | 0.74748 | ORF1ab                    |
| 11086                  | 15                                | Deletion         | T>-                  | V>-                  | 0.12219 | ORF1ab                    |
| 11093                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 11105                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 11109                  | 1                                 | Substitution     | T>C                  | L>S                  | 0.01294 | ORF1ab                    |
| 11125                  | 1                                 | Substitution     | G>A                  | C>-                  | 0.02589 | ORF1ab                    |
| 11146                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 11169                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 11202                  | 4                                 | Substitution     | C>T                  | P>L                  | 0.04198 | ORF1ab                    |
| 11224                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 11226                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 11228                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 11266                  | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 11269                  | 2                                 | Deletion         | G>-                  | G>-                  | 0.02344 | ORF1ab                    |
| 11308                  | 3                                 | Substitution     | G>A                  | R>K                  | 0.03301 | ORF1ab                    |
| 11337                  | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | ORF1ab                    |
| 11398                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 11407                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 11427                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 11458                  | 1                                 | Substitution     | A>T                  | H>L                  | 0.01294 | ORF1ab                    |
| 11459                  | 2                                 | Substitution     | T>C                  | I>T                  | 0.02344 | ORF1ab                    |
| 11492                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 11508                  | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 11517                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 11520                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.02589 | ORF1ab                    |
| 11520                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.02589 | ORF1ab                    |
| 11574                  | 2                                 | Substitution     | C>T                  | S>F                  | 0.02344 | ORF1ab                    |
| 11622                  | 5                                 | Substitution     | C>T                  | S>F                  | 0.0505  | ORF1ab                    |
| 11651                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 11666                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 11667                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 11671                  | 2                                 | Deletion         | C>-                  | P>-                  | 0.02344 | ORF1ab                    |
| 11728                  | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 11738                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 11744                  | 1                                 | Substitution     | A>G                  | Q>R                  | 0.01294 | ORF1ab                    |
| 11745                  | 1                                 | Substitution     | G>T                  | R>M                  | 0.01294 | ORF1ab                    |
| 11749                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 11771                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF1ab                    |
| 11781                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 11810                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 11824                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 11835                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 11838                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 11864                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 12005                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 12051                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 12078                  | 4                                 | Substitution     | C>T                  | T>I                  | 0.04198 | ORF1ab                    |
| 12104                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 12115                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 12151                  | 1                                 | Substitution     | G>A                  | R>K                  | 0.01294 | ORF1ab                    |
| 12244                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 12259                  | 1                                 | Substitution     | C>A                  | A>-                  | 0.01294 | ORF1ab                    |
| 12314                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.02589 | ORF1ab                    |
| 12314                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.02589 | ORF1ab                    |
| 12317                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 12329                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 12342                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 12354                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 12357                  | 2                                 | Deletion         | G>-                  | R>-                  | 0.02344 | ORF1ab                    |
| 12368                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 12370                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 12371                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 12383                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 12422                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 12441                  | 9                                 | Substitution     | C>T                  | P>L                  | 0.08151 | ORF1ab                    |
| 12473                  | 1                                 | Substitution     | A>C                  | K>T                  | 0.01294 | ORF1ab                    |
| 12509                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF1ab                    |
| 12543                  | 1                                 | Substitution     | A>G                  | H>R                  | 0.01294 | ORF1ab                    |
| 12562                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 12618                  | 9                                 | Substitution     | C>T                  | T>I                  | 0.08151 | ORF1ab                    |
| 12687                  | 21                                | Deletion         | G>-                  | R>-                  | 0.22446 | ORF1ab                    |
| 12687                  | 7                                 | Substitution     | G>T                  | R>I                  | 0.22446 | ORF1ab                    |
| 12697                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 12708                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 12712                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 12759                  | 6                                 | Substitution     | T>C                  | L>P                  | 0.05866 | ORF1ab                    |
| 12808                  | 1                                 | Substitution     | G>A                  | C>Y                  | 0.01294 | ORF1ab                    |
| 12861                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 12862                  | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 12932                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 12939                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 12972                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 12991                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.02589 | ORF1ab                    |
| 12991                  | 1                                 | Substitution     | G>A                  | G>D                  | 0.02589 | ORF1ab                    |
| 13013                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 13040                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 13079                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 13085                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 13092                  | 1                                 | Substitution     | T>C                  | M>T                  | 0.01294 | ORF1ab                    |
| 13117                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 13290                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 13392                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 13398                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 13404                  | 7                                 | Deletion         | T>-                  | M>-                  | 0.06652 | ORF1ab                    |
| 13410                  | 3                                 | Deletion         | T>-                  | V>-                  | 0.03301 | ORF1ab                    |
| 13454                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 13460                  | 3                                 | Substitution     | C>T                  | S>L                  | 0.03301 | ORF1ab                    |
| 13478                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 13533                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 13538                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 13544                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |
| 13550                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 13551                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 13565                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 13566                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 13587                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.06343 | ORF1ab                    |
| 13587                  | 5                                 | Substitution     | C>T                  | P>L                  | 0.06343 | ORF1ab                    |
| 13619                  | 2                                 | Substitution     | G>T                  | R>M                  | 0.02344 | ORF1ab                    |
| 13641                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.02589 | ORF1ab                    |
| 13641                  | 1                                 | Substitution     | G>A                  | *>*                  | 0.02589 | ORF1ab                    |
| 13652                  | 8                                 | Deletion         | T>-                  | L>-                  | 0.07413 | ORF1ab                    |
| 13655                  | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 13713                  | 1                                 | Substitution     | A>G                  | *>*                  | 0.01294 | ORF1ab                    |
| 13715                  | 1                                 | Substitution     | G>T                  | R>M                  | 0.01294 | ORF1ab                    |
| 13725                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 13726                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 13732                  | 2                                 | Deletion         | C>-                  | A>-                  | 0.65607 | ORF1ab                    |
| 13732                  | 187                               | Substitution     | C>T                  | A>V,A>-              | 0.65607 | ORF1ab                    |
| 13733                  | 3                                 | Deletion         | T>-                  | L>-                  | 0.03301 | ORF1ab                    |
| 13760                  | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 13792                  | 1                                 | Substitution     | A>T                  | Q>L                  | 0.01294 | ORF1ab                    |
| 13855                  | 2                                 | Deletion         | A>-                  | N>-                  | 0.02344 | ORF1ab                    |
| 13861                  | 2                                 | Substitution     | A>G                  | D>G                  | 0.02344 | ORF1ab                    |
| 13864                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.02589 | ORF1ab                    |
| 13864                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.02589 | ORF1ab                    |
| 13894                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 13916                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF1ab                    |
| 13923                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 13960                  | 1                                 | Substitution     | G>A                  | R>H                  | 0.01294 | ORF1ab                    |
| 13996                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 14007                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 14030                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 14043                  | 1                                 | Substitution     | A>C                  | Y>S                  | 0.01294 | ORF1ab                    |
| 14076                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 14132                  | 2                                 | Substitution     | A>G                  | E>G                  | 0.02344 | ORF1ab                    |
| 14183                  | 2                                 | Substitution     | G>A                  | *>*                  | 0.02344 | ORF1ab                    |
| 14200                  | 1                                 | Substitution     | C>G                  | A>G                  | 0.01294 | ORF1ab                    |
| 14209                  | 3                                 | Deletion         | A>-                  | H>-                  | 0.03301 | ORF1ab                    |
| 14276                  | 2                                 | Substitution     | G>C                  | R>T                  | 0.02344 | ORF1ab                    |
| 14292                  | 1                                 | Substitution     | G>T                  | *>L                  | 0.01294 | ORF1ab                    |
| 14320                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 14394                  | 1                                 | Substitution     | T>A                  | L>H                  | 0.01294 | ORF1ab                    |
| 14410                  | 6                                 | Deletion         | C>-                  | P>-                  | 0.7277  | ORF1ab                    |
| 14410                  | 332                               | Substitution     | C>T                  | P>L                  | 0.7277  | ORF1ab                    |
| 14427                  | 6                                 | Substitution     | C>A                  | T>N                  | 0.05866 | ORF1ab                    |
| 14439                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 14458                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 14503                  | 1                                 | Substitution     | T>C                  | V>A                  | 0.03638 | ORF1ab                    |
| 14605                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 14606                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 14631                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 14641                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 14659                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 14668                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 14675                  | 8                                 | Substitution     | A>G                  | N>S                  | 0.07413 | ORF1ab                    |
| 14681                  | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 14748                  | 1                                 | Substitution     | G>T                  | *>F                  | 0.01294 | ORF1ab                    |
| 14749                  | 1                                 | Substitution     | A>T                  | E>L                  | 0.01294 | ORF1ab                    |
| 14751                  | 1                                 | Substitution     | T>C                  | I>-                  | 0.02589 | ORF1ab                    |
| 14807                  | 3                                 | Substitution     | C>T                  | T>I                  | 0.03301 | ORF1ab                    |
| 14826                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 14836                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 14887                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 14899                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 14924                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 14927                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 14934                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 14942                  | 2                                 | Deletion         | A>-                  | N>-                  | 0.02344 | ORF1ab                    |
| 14956                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 14962                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 14966                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 14976                  | 2                                 | Deletion         | G>-                  | G>-                  | 0.02344 | ORF1ab                    |
| 14992                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 15046                  | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 15047                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 15050                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 15066                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 15074                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 15134                  | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 15137                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 15148                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 15180                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 15182                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 15211                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 15270                  | 1                                 | Substitution     | G>A                  | R>K                  | 0.01294 | ORF1ab                    |
| 15274                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 15275                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 15309                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 15326                  | 24                                | Substitution     | C>T                  | T>I                  | 0.17527 | ORF1ab                    |
| 15373                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                    |
| 15420                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 15438                  | 29                                | Deletion         | A>-                  | N>-                  | 0.20188 | ORF1ab                    |
| 15446                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 15453                  | 5                                 | Substitution     | G>A                  | R>Q                  | 0.0505  | ORF1ab                    |
| 15479                  | 1                                 | Substitution     | A>G                  | E>G                  | 0.01294 | ORF1ab                    |
| 15493                  | 1                                 | Substitution     | A>G                  | D>G                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 15511                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 15653                  | 1                                 | Substitution     | T>C                  | L>S                  | 0.01294 | ORF1ab                    |
| 15656                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 15710                  | 2                                 | Substitution     | G>T                  | *>L                  | 0.02344 | ORF1ab                    |
| 15722                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                    |
| 15740                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 15745                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 15768                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 15823                  | 1                                 | Substitution     | T>G                  | M>R                  | 0.01294 | ORF1ab                    |
| 15842                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 15960                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 16019                  | 3                                 | Substitution     | C>T                  | S>L                  | 0.03301 | ORF1ab                    |
| 16063                  | 1                                 | Substitution     | A>G                  | N>S                  | 0.01294 | ORF1ab                    |
| 16080                  | 15                                | Substitution     | G>A                  | C>Y                  | 0.12219 | ORF1ab                    |
| 16180                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 16199                  | 2                                 | Deletion         | G>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 16213                  | 1                                 | Substitution     | T>G                  | M>-                  | 0.03638 | ORF1ab                    |
| 16223                  | 1                                 | Substitution     | G>A                  | R>H                  | 0.01294 | ORF1ab                    |
| 16234                  | 2                                 | Deletion         | T>-                  | L>-                  | 0.02344 | ORF1ab                    |
| 16275                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 16283                  | 4                                 | Deletion         | A>-                  | D>-                  | 0.04198 | ORF1ab                    |
| 16350                  | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 16357                  | 2                                 | Substitution     | A>G                  | K>R                  | 0.02344 | ORF1ab                    |
| 16361                  | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 16364                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 16370                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 16379                  | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | ORF1ab                    |
| 16387                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 16395                  | 2                                 | Substitution     | C>T                  | S>F                  | 0.02344 | ORF1ab                    |
| 16412                  | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 16435                  | 1                                 | Substitution     | G>A                  | G>E                  | 0.01294 | ORF1ab                    |
| 16436                  | 1                                 | Substitution     | A>G                  | E>R                  | 0.01294 | ORF1ab                    |
| 16438                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 16439                  | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 16492                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 16508                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 16577                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 16628                  | 9                                 | Substitution     | C>T                  | S>L                  | 0.08151 | ORF1ab                    |
| 16642                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 16706                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 16744                  | 1                                 | Substitution     | T>C                  | V>A                  | 0.01294 | ORF1ab                    |
| 16750                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF1ab                    |
| 16825                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 16838                  | 2                                 | Deletion         | T>-                  | L>-                  | 0.02344 | ORF1ab                    |
| 16840                  | 1                                 | Substitution     | A>C                  | E>A                  | 0.01294 | ORF1ab                    |
| 16854                  | 2                                 | Substitution     | G>T                  | W>L                  | 0.02344 | ORF1ab                    |
| 16855                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | ORF1ab                    |
| 16866                  | 1                                 | Substitution     | G>A                  | C>Y                  | 0.01294 | ORF1ab                    |
| 16879                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 16889                  | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | ORF1ab                    |



| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 16917                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 16919                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 16977                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 16995                  | 5                                 | Substitution     | T>C                  | I>T                  | 0.0505  | ORF1ab                    |
| 17006                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF1ab                    |
| 17124                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 17137                  | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | ORF1ab                    |
| 17362                  | 1                                 | Substitution     | A>T                  | E>V                  | 0.01294 | ORF1ab                    |
| 17365                  | 1                                 | Substitution     | T>A                  | I>N                  | 0.01294 | ORF1ab                    |
| 17375                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 17405                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 17417                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |
| 17442                  | 5                                 | Substitution     | C>T                  | P>L                  | 0.0505  | ORF1ab                    |
| 17458                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 17504                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 17556                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 17575                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 17576                  | 1                                 | Substitution     | T>A                  | L>Q                  | 0.01294 | ORF1ab                    |
| 17591                  | 1                                 | Substitution     | T>A                  | L>Q                  | 0.01294 | ORF1ab                    |
| 17594                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 17658                  | 1                                 | Substitution     | A>G                  | N>S                  | 0.01294 | ORF1ab                    |
| 17724                  | 2                                 | Substitution     | G>T                  | G>V                  | 0.02344 | ORF1ab                    |
| 17749                  | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | ORF1ab                    |
| 17756                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | ORF1ab                    |
| 17768                  | 2                                 | Substitution     | C>T                  | S>- ,S>F             | 0.03638 | ORF1ab                    |
| 17790                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 17792                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 17811                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 17852                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 17860                  | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | ORF1ab                    |
| 17887                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 17894                  | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 17945                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 17946                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 17961                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.02589 | ORF1ab                    |
| 17961                  | 1                                 | Substitution     | A>G                  | H>R                  | 0.02589 | ORF1ab                    |
| 17966                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 17986                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 18001                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 18009                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 18034                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 18042                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 18054                  | 3                                 | Substitution     | A>G                  | N>S                  | 0.03301 | ORF1ab                    |
| 18062                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 18120                  | 1                                 | Substitution     | C>A                  | P>H                  | 0.01294 | ORF1ab                    |
| 18131                  | 3                                 | Substitution     | C>T                  | T>I                  | 0.05643 | ORF1ab                    |
| 18136                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.03638 | ORF1ab                    |
| 18178                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 18179                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 18188                  | 1                                 | Substitution     | G>T                  | *>L                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 18199                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 18335                  | 2                                 | Deletion         | A>-                  | E>-                  | 0.02344 | ORF1ab                    |
| 18370                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 18379                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 18382                  | 2                                 | Substitution     | G>T                  | G>V                  | 0.02344 | ORF1ab                    |
| 18397                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF1ab                    |
| 18443                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF1ab                    |
| 18459                  | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | ORF1ab                    |
| 18488                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.05643 | ORF1ab                    |
| 18488                  | 3                                 | Substitution     | C>T                  | S>L                  | 0.05643 | ORF1ab                    |
| 18510                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 18513                  | 2                                 | Substitution     | C>T                  | S>F                  | 0.02344 | ORF1ab                    |
| 18557                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 18575                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF1ab                    |
| 18578                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 18678                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 18684                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 18693                  | 5                                 | Deletion         | T>-                  | F>-                  | 0.0505  | ORF1ab                    |
| 18767                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 18805                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 18879                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.52162 | ORF1ab                    |
| 18879                  | 117                               | Substitution     | C>T                  | S>F                  | 0.52162 | ORF1ab                    |
| 18890                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | ORF1ab                    |
| 18913                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 18917                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 19019                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 19049                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 19088                  | 3                                 | Substitution     | G>T                  | S>I                  | 0.03301 | ORF1ab                    |
| 19136                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 19184                  | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | ORF1ab                    |
| 19196                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 19217                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF1ab                    |
| 19266                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 19301                  | 7                                 | Deletion         | T>-                  | M>-                  | 0.07944 | ORF1ab                    |
| 19301                  | 1                                 | Substitution     | T>G                  | M>R                  | 0.07944 | ORF1ab                    |
| 19319                  | 1                                 | Substitution     | C>A                  | S>Y                  | 0.02589 | ORF1ab                    |
| 19342                  | 1                                 | Substitution     | G>A                  | S>N                  | 0.03638 | ORF1ab                    |
| 19346                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.03638 | ORF1ab                    |
| 19356                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 19357                  | 2                                 | Deletion         | T>-                  | L>-                  | 0.02344 | ORF1ab                    |
| 19361                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 19375                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 19376                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 19384                  | 1                                 | Substitution     | C>A                  | S>Y                  | 0.01294 | ORF1ab                    |
| 19418                  | 1                                 | Substitution     | A>G                  | *>W                  | 0.02589 | ORF1ab                    |
| 19419                  | 2                                 | Substitution     | G>T                  | S>I                  | 0.03638 | ORF1ab                    |
| 19424                  | 1                                 | Substitution     | A>G                  | Q>R                  | 0.02589 | ORF1ab                    |
| 19442                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 19448                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 19452                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 19461                  | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | ORF1ab                    |
| 19464                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 19470                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 19471                  | 1                                 | Substitution     | G>A                  | C>Y                  | 0.01294 | ORF1ab                    |
| 19485                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 19486                  | 16                                | Deletion         | C>-                  | A>-                  | 0.12849 | ORF1ab                    |
| 19526                  | 52                                | Substitution     | C>T                  | S>L                  | 0.39346 | ORF1ab                    |
| 19601                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 19622                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 19660                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 19672                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 19681                  | 6                                 | Deletion         | G>-                  | G>-                  | 0.10056 | ORF1ab                    |
| 19681                  | 4                                 | Substitution     | G>T                  | G>V                  | 0.10056 | ORF1ab                    |
| 19686                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 19705                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 19709                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 19723                  | 2                                 | Substitution     | A>C                  | K>T                  | 0.02344 | ORF1ab                    |
| 19724                  | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | ORF1ab                    |
| 19737                  | 1                                 | Substitution     | G>T                  | *>L                  | 0.01294 | ORF1ab                    |
| 19743                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 19818                  | 3                                 | Substitution     | G>T                  | S>I                  | 0.03301 | ORF1ab                    |
| 19840                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 19863                  | 1                                 | Substitution     | G>A                  | C>Y                  | 0.01294 | ORF1ab                    |
| 19874                  | 3                                 | Substitution     | G>T                  | *>L                  | 0.03301 | ORF1ab                    |
| 19883                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 19938                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 19946                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 19954                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF1ab                    |
| 19962                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 19964                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 19969                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 19985                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.03638 | ORF1ab                    |
| 19985                  | 2                                 | Substitution     | C>T                  | S>F                  | 0.03638 | ORF1ab                    |
| 19991                  | 3                                 | Deletion         | T>-                  | L>-                  | 0.03301 | ORF1ab                    |
| 19996                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 20000                  | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 20008                  | 2                                 | Substitution     | G>A                  | G>D                  | 0.02344 | ORF1ab                    |
| 20038                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 20057                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 20065                  | 4                                 | Substitution     | T>C                  | V>A                  | 0.04198 | ORF1ab                    |
| 20069                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 20078                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 20083                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 20089                  | 2                                 | Substitution     | G>C                  | G>A                  | 0.03638 | ORF1ab                    |
| 20104                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF1ab                    |
| 20114                  | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | ORF1ab                    |
| 20119                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 20132                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 20133                  | 1                                 | Substitution     | G>A                  | S>N                  | 0.01294 | ORF1ab                    |
| 20136                  | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 20144                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | ORF1ab                    |
| 20146                  | 1                                 | Deletion         | A>-                  | Q>-                  | 0.01294 | ORF1ab                    |
| 20150                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 20153                  | 3                                 | Substitution     | T>C                  | I>T                  | 0.03301 | ORF1ab                    |
| 20162                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 20183                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 20184                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 20214                  | 1                                 | Deletion         | A>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 20242                  | 2                                 | Deletion         | G>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 20257                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 20261                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 20265                  | 2                                 | Deletion         | G>-                  | R>-                  | 0.02344 | ORF1ab                    |
| 20270                  | 1                                 | Substitution     | A>G                  | *>W                  | 0.01294 | ORF1ab                    |
| 20274                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 20277                  | 2                                 | Deletion         | G>-                  | G>-                  | 0.02344 | ORF1ab                    |
| 20289                  | 3                                 | Deletion         | G>-                  | *>-                  | 0.03301 | ORF1ab                    |
| 20291                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 20319                  | 1                                 | Substitution     | G>A                  | R>Q                  | 0.01294 | ORF1ab                    |
| 20325                  | 2                                 | Deletion         | A>-                  | Y>-                  | 0.02344 | ORF1ab                    |
| 20334                  | 1                                 | Deletion         | G>-                  | W>-                  | 0.01294 | ORF1ab                    |
| 20335                  | 2                                 | Deletion         | G>-                  | G>-                  | 0.02344 | ORF1ab                    |
| 20344                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 20347                  | 2                                 | Deletion         | A>-                  | H>-                  | 0.02344 | ORF1ab                    |
| 20357                  | 2                                 | Substitution     | A>G                  | *>W                  | 0.02344 | ORF1ab                    |
| 20359                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 20376                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 20380                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 20414                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 20431                  | 8                                 | Deletion         | C>-                  | P>-                  | 0.08705 | ORF1ab                    |
| 20431                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.08705 | ORF1ab                    |
| 20432                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 20435                  | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | ORF1ab                    |
| 20452                  | 2                                 | Deletion         | A>-                  | N>-                  | 0.02344 | ORF1ab                    |
| 20455                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 20482                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 20496                  | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 20499                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |
| 20579                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 20679                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 20711                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF1ab                    |
| 20775                  | 2                                 | Substitution     | G>T                  | R>M                  | 0.02344 | ORF1ab                    |
| 20832                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 20897                  | 1                                 | Substitution     | A>G                  | H>-                  | 0.03638 | ORF1ab                    |
| 20898                  | 1                                 | Substitution     | C>G                  | T>S                  | 0.02589 | ORF1ab                    |
| 20937                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF1ab                    |
| 20950                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 20956                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |
| 20964                  | 1                                 | Substitution     | G>A                  | *>-                  | 0.03638 | ORF1ab                    |
| 20969                  | 1                                 | Substitution     | T>C                  | L>-                  | 0.01294 | ORF1ab                    |
| 20983                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 20993                  | 2                                 | Substitution     | G>C,G>T              | *>S,*>L              | 0.02589 | ORF1ab                    |
| 21006                  | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | ORF1ab                    |
| 21013                  | 1                                 | Substitution     | T>A                  | V>E                  | 0.01294 | ORF1ab                    |
| 21015                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF1ab                    |
| 21020                  | 1                                 | Substitution     | A>G                  | Q>R                  | 0.02589 | ORF1ab                    |
| 21109                  | 3                                 | Deletion         | T>-                  | F>-                  | 0.03301 | ORF1ab                    |
| 21139                  | 4                                 | Substitution     | A>G                  | K>R                  | 0.04198 | ORF1ab                    |
| 21162                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 21250                  | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF1ab                    |
| 21251                  | 4                                 | Deletion         | G>-                  | *>-                  | 0.04198 | ORF1ab                    |
| 21256                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 21267                  | 1                                 | Substitution     | G>A                  | *>*                  | 0.01294 | ORF1ab                    |
| 21269                  | 1                                 | Substitution     | A>G                  | K>-                  | 0.01294 | ORF1ab                    |
| 21270                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 21271                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 21279                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 21283                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 21285                  | 1                                 | Deletion         | T>-                  | M>-                  | 0.01294 | ORF1ab                    |
| 21309                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF1ab                    |
| 21320                  | 1                                 | Deletion         | T>-                  | M>-                  | 0.01294 | ORF1ab                    |
| 21322                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF1ab                    |
| 21324                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 21329                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 21337                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | ORF1ab                    |
| 21351                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 21353                  | 4                                 | Deletion         | G>-                  | G>-                  | 0.04198 | ORF1ab                    |
| 21364                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 21365                  | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF1ab                    |
| 21366                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF1ab                    |
| 21367                  | 2                                 | Deletion         | C>-                  | P>-                  | 0.03638 | ORF1ab                    |
| 21367                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.03638 | ORF1ab                    |
| 21372                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.02344 | ORF1ab                    |
| 21377                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 21401                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF1ab                    |
| 21419                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 21423                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF1ab                    |
| 21427                  | 4                                 | Deletion         | G>-                  | G>-                  | 0.04198 | ORF1ab                    |
| 21452                  | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | ORF1ab                    |
| 21460                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.02589 | ORF1ab                    |
| 21461                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.03638 | ORF1ab                    |
| 21476                  | 1                                 | Substitution     | A>T                  | Y>F                  | 0.03638 | ORF1ab                    |
| 21489                  | 1                                 | Substitution     | A>T                  | *>-                  | 0.02589 | ORF1ab                    |
| 21492                  | 1                                 | Substitution     | G>A                  | R>K                  | 0.02589 | ORF1ab                    |
| 21506                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF1ab                    |
| 21513                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF1ab                    |
| 21514                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF1ab                    |
| 21518                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | ORF1ab                    |
| 21520                  | 3                                 | Deletion         | G>-                  | R>-                  | 0.03301 | ORF1ab                    |
| 21525                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF1ab                    |
| 21531                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF1ab                    |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 21532                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 21543                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF1ab                    |
| 21544                  | 1                                 | Substitution     | T>A                  | L>Q                  | 0.01294 | ORF1ab                    |
| 21545                  | 1                                 | Substitution     | T>A                  | L>K                  | 0.01294 | ORF1ab                    |
| 21552                  | 23                                | Substitution     | A>C                  | Q>P,Q>-              | 0.32658 | ORF1ab                    |
| 21553                  | 12                                | Substitution     | A>T,A>C              | N>I,N>L,N>-          | 0.33415 | ORF1ab                    |
| 21570                  | 1                                 | Substitution     | T>A                  | L>*                  | 0.03638 | Spike                     |
| 21577                  | 3                                 | Substitution     | C>T                  | S>F                  | 0.05643 | Spike                     |
| 21602                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.02589 | Spike                     |
| 21629                  | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | Spike                     |
| 21630                  | 2                                 | Substitution     | T>G                  | L>R                  | 0.02344 | Spike                     |
| 21641                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | Spike                     |
| 21646                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | Spike                     |
| 21648                  | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | Spike                     |
| 21660                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Spike                     |
| 21709                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Spike                     |
| 21726                  | 9                                 | Substitution     | G>T                  | C>F                  | 0.08151 | Spike                     |
| 21729                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Spike                     |
| 21794                  | 3                                 | Deletion         | A>-                  | K>-                  | 0.11444 | Spike                     |
| 21794                  | 9                                 | Substitution     | A>T                  | K>M                  | 0.11444 | Spike                     |
| 21797                  | 10                                | Substitution     | G>T                  | R>M                  | 0.08869 | Spike                     |
| 21802                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | Spike                     |
| 21809                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | Spike                     |
| 21810                  | 1                                 | Substitution     | T>G                  | L>W                  | 0.01294 | Spike                     |
| 21822                  | 12                                | Deletion         | T>-                  | L>-                  | 0.10254 | Spike                     |
| 21836                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | Spike                     |
| 21877                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | Spike                     |
| 21892                  | 2                                 | Substitution     | T>C                  | F>S                  | 0.02344 | Spike                     |
| 21936                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Spike                     |
| 22006                  | 1                                 | Substitution     | A>T                  | K>I                  | 0.01294 | Spike                     |
| 22032                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | Spike                     |
| 22049                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | Spike                     |
| 22051                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | Spike                     |
| 22058                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 22083                  | 1                                 | Deletion         | G>-                  | S>-                  | 0.02589 | Spike                     |
| 22083                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.02589 | Spike                     |
| 22095                  | 2                                 | Substitution     | G>T                  | W>L                  | 0.02344 | Spike                     |
| 22104                  | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | Spike                     |
| 22110                  | 3                                 | Deletion         | A>-                  | N>-                  | 0.03301 | Spike                     |
| 22118                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 22122                  | 3                                 | Deletion         | C>-                  | S>-                  | 0.03301 | Spike                     |
| 22214                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | Spike                     |
| 22228                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Spike                     |
| 22291                  | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | Spike                     |
| 22301                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | Spike                     |
| 22328                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | Spike                     |
| 22345                  | 4                                 | Substitution     | G>A                  | W>*                  | 0.04198 | Spike                     |
| 22349                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Spike                     |
| 22352                  | 3                                 | Deletion         | C>-                  | A>-                  | 0.03301 | Spike                     |
| 22353                  | 2                                 | Deletion         | A>-                  | Q>-                  | 0.02344 | Spike                     |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 22355                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Spike                     |
| 22376                  | 2                                 | Substitution     | A>G                  | Q>R                  | 0.02344 | Spike                     |
| 22377                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 22386                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | Spike                     |
| 22446                  | 69                                | Substitution     | C>T                  | T>I                  | 0.37028 | Spike                     |
| 22460                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Spike                     |
| 22470                  | 18                                | Substitution     | G>T                  | R>L                  | 0.14076 | Spike                     |
| 22485                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | Spike                     |
| 22494                  | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | Spike                     |
| 22511                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Spike                     |
| 22512                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Spike                     |
| 22518                  | 23                                | Deletion         | T>-                  | L>-                  | 0.16973 | Spike                     |
| 22532                  | 3                                 | Substitution     | C>T                  | T>I                  | 0.03301 | Spike                     |
| 22556                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 22653                  | 1                                 | Substitution     | T>A                  | L>Q                  | 0.01294 | Spike                     |
| 22654                  | 1                                 | Substitution     | G>A                  | *>-                  | 0.01294 | Spike                     |
| 22665                  | 2                                 | Substitution     | C>A                  | S>Y                  | 0.02344 | Spike                     |
| 22683                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | Spike                     |
| 22727                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 22757                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | Spike                     |
| 22768                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 22787                  | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | Spike                     |
| 22794                  | 1                                 | Substitution     | C>A                  | S>*                  | 0.01294 | Spike                     |
| 22857                  | 1                                 | Substitution     | C>A                  | A>D                  | 0.01294 | Spike                     |
| 22860                  | 1                                 | Substitution     | C>A                  | A>E                  | 0.01294 | Spike                     |
| 22863                  | 1                                 | Substitution     | T>A                  | L>*                  | 0.01294 | Spike                     |
| 22865                  | 1                                 | Substitution     | T>A                  | I>K                  | 0.01294 | Spike                     |
| 22947                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Spike                     |
| 22975                  | 1                                 | Substitution     | G>C                  | *>S                  | 0.01294 | Spike                     |
| 23014                  | 1                                 | Substitution     | G>C                  | *>S                  | 0.01294 | Spike                     |
| 23085                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | Spike                     |
| 23118                  | 4                                 | Deletion         | A>-                  | Y>-                  | 0.05491 | Spike                     |
| 23118                  | 1                                 | Substitution     | A>T                  | Y>F                  | 0.05491 | Spike                     |
| 23120                  | 4                                 | Deletion         | A>-                  | H>-                  | 0.04198 | Spike                     |
| 23122                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.06343 | Spike                     |
| 23122                  | 5                                 | Substitution     | G>T                  | C>F                  | 0.06343 | Spike                     |
| 23124                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.01294 | Spike                     |
| 23220                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Spike                     |
| 23222                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | Spike                     |
| 23238                  | 2                                 | Substitution     | G>T                  | S>I                  | 0.02344 | Spike                     |
| 23279                  | 8                                 | Substitution     | C>T                  | T>I                  | 0.07413 | Spike                     |
| 23284                  | 2                                 | Substitution     | G>C,G>T              | *>S,*>L              | 0.02589 | Spike                     |
| 23313                  | 10                                | Substitution     | G>T                  | R>I                  | 0.08869 | Spike                     |
| 23369                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Spike                     |
| 23405                  | 5                                 | Deletion         | A>-                  | D>-                  | 0.7198  | Spike                     |
| 23428                  | 1                                 | Substitution     | G>A                  | C>Y                  | 0.01294 | Spike                     |
| 23595                  | 6                                 | Substitution     | G>T,G>C              | R>I,R>T              | 0.06343 | Spike                     |
| 23610                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | Spike                     |
| 23632                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Spike                     |
| 23637                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | Spike                     |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 23640                  | 4                                 | Substitution     | C>T                  | S>L                  | 0.04198 | Spike                     |
| 23680                  | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | Spike                     |
| 23681                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Spike                     |
| 23703                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | Spike                     |
| 23709                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.02589 | Spike                     |
| 23709                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.02589 | Spike                     |
| 23732                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Spike                     |
| 23817                  | 3                                 | Substitution     | T>C                  | I>T                  | 0.03301 | Spike                     |
| 23823                  | 2                                 | Substitution     | G>A                  | C>Y                  | 0.02344 | Spike                     |
| 23856                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Spike                     |
| 23857                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | Spike                     |
| 23870                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.02589 | Spike                     |
| 23870                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.02589 | Spike                     |
| 23876                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Spike                     |
| 23886                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | Spike                     |
| 23887                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | Spike                     |
| 23931                  | 165                               | Substitution     | C>T                  | T>I                  | 0.68561 | Spike                     |
| 23954                  | 2                                 | Deletion         | T>-                  | F>-                  | 0.03638 | Spike                     |
| 23954                  | 1                                 | Substitution     | T>G                  | F>C                  | 0.03638 | Spike                     |
| 23956                  | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | Spike                     |
| 23958                  | 1                                 | Substitution     | T>G                  | V>G                  | 0.01294 | Spike                     |
| 23959                  | 1                                 | Substitution     | G>T                  | W>V                  | 0.01294 | Spike                     |
| 23961                  | 1                                 | Substitution     | T>G                  | V>G                  | 0.01294 | Spike                     |
| 23989                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.04595 | Spike                     |
| 24024                  | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | Spike                     |
| 24044                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Spike                     |
| 24059                  | 4                                 | Deletion         | G>-                  | G>-                  | 0.04198 | Spike                     |
| 24132                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | Spike                     |
| 24135                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | Spike                     |
| 24199                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | Spike                     |
| 24228                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Spike                     |
| 24239                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | Spike                     |
| 24279                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Spike                     |
| 24280                  | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | Spike                     |
| 24283                  | 1                                 | Substitution     | A>T                  | *>L                  | 0.01294 | Spike                     |
| 24327                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 24330                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | Spike                     |
| 24353                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | Spike                     |
| 24369                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | Spike                     |
| 24372                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | Spike                     |
| 24382                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | Spike                     |
| 24391                  | 40                                | Deletion         | A>-                  | K>-                  | 0.25505 | Spike                     |
| 24392                  | 40                                | Deletion         | G>-                  | S>-                  | 0.25505 | Spike                     |
| 24401                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Spike                     |
| 24474                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Spike                     |
| 24481                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 24504                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | Spike                     |
| 24522                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | Spike                     |
| 24625                  | 21                                | Deletion         | T>-                  | F>-                  | 0.15841 | Spike                     |
| 24626                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | Spike                     |



| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 24644                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Spike                     |
| 24679                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | Spike                     |
| 24759                  | 1                                 | Substitution     | G>T                  | *>L                  | 0.01294 | Spike                     |
| 24766                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | Spike                     |
| 24793                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 24794                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | Spike                     |
| 24796                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | Spike                     |
| 24813                  | 2                                 | Substitution     | T>A                  | M>K                  | 0.02344 | Spike                     |
| 24822                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | Spike                     |
| 24874                  | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | Spike                     |
| 24892                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Spike                     |
| 24906                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | Spike                     |
| 24911                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | Spike                     |
| 24935                  | 2                                 | Substitution     | G>T                  | G>V                  | 0.02344 | Spike                     |
| 24966                  | 1                                 | Deletion         | C>-                  | T>-                  | 0.01294 | Spike                     |
| 24983                  | 3                                 | Deletion         | C>-                  | P>-                  | 0.03301 | Spike                     |
| 24984                  | 3                                 | Deletion         | T>-                  | L>-                  | 0.03301 | Spike                     |
| 25021                  | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | Spike                     |
| 25039                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.02344 | Spike                     |
| 25051                  | 2                                 | Deletion         | G>-                  | R>-                  | 0.03638 | Spike                     |
| 25051                  | 1                                 | Substitution     | G>T                  | R>I                  | 0.03638 | Spike                     |
| 25100                  | 2                                 | Substitution     | T>A                  | I>N                  | 0.02344 | Spike                     |
| 25106                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | Spike                     |
| 25107                  | 2                                 | Deletion         | A>-                  | K>-                  | 0.02344 | Spike                     |
| 25124                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 25164                  | 1                                 | Substitution     | C>A                  | S>*                  | 0.01294 | Spike                     |
| 25165                  | 2                                 | Deletion         | C>-                  | P>-                  | 0.03638 | Spike                     |
| 25165                  | 1                                 | Substitution     | C>A                  | P>K                  | 0.03638 | Spike                     |
| 25184                  | 1                                 | Deletion         | A>-                  | E>-                  | 0.01294 | Spike                     |
| 25206                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Spike                     |
| 25237                  | 1                                 | Deletion         | A>-                  | D>-                  | 0.01294 | Spike                     |
| 25254                  | 1                                 | Substitution     | G>T                  | *>L                  | 0.01294 | Spike                     |
| 25292                  | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | Spike                     |
| 25316                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.06343 | Spike                     |
| 25316                  | 5                                 | Substitution     | G>T                  | G>V                  | 0.06343 | Spike                     |
| 25320                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | Spike                     |
| 25329                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Spike                     |
| 25345                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Spike                     |
| 25346                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Spike                     |
| 25352                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | Spike                     |
| 25356                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.02589 | Spike                     |
| 25356                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.02589 | Spike                     |
| 25383                  | 8                                 | Deletion         | A>-                  | H>-                  | 0.08705 | Spike                     |
| 25383                  | 1                                 | Substitution     | A>C                  | H>P                  | 0.08705 | Spike                     |
| 25415                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF3a                     |
| 25431                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF3a                     |
| 25441                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | ORF3a                     |
| 25447                  | 2                                 | Substitution     | G>T                  | G>V                  | 0.02344 | ORF3a                     |
| 25463                  | 5                                 | Substitution     | T>C                  | L>P                  | 0.0505  | ORF3a                     |
| 25478                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF3a                     |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 25483                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.02589 | ORF3a                     |
| 25483                  | 1                                 | Substitution     | G>A                  | R>H                  | 0.02589 | ORF3a                     |
| 25496                  | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | ORF3a                     |
| 25498                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF3a                     |
| 25502                  | 1                                 | Substitution     | G>A                  | R>Q                  | 0.01294 | ORF3a                     |
| 25515                  | 3                                 | Substitution     | C>T                  | T>I                  | 0.03301 | ORF3a                     |
| 25530                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.06343 | ORF3a                     |
| 25530                  | 5                                 | Substitution     | C>T                  | A>V                  | 0.06343 | ORF3a                     |
| 25551                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF3a                     |
| 25565                  | 122                               | Substitution     | G>T                  | R>I                  | 0.52072 | ORF3a                     |
| 25578                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF3a                     |
| 25579                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.01294 | ORF3a                     |
| 25598                  | 3                                 | Substitution     | A>G                  | D>G                  | 0.03301 | ORF3a                     |
| 25614                  | 1                                 | Substitution     | T>G                  | L>R                  | 0.01294 | ORF3a                     |
| 25615                  | 3                                 | Substitution     | C>T                  | S>F                  | 0.03301 | ORF3a                     |
| 25623                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF3a                     |
| 25636                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF3a                     |
| 25643                  | 1                                 | Substitution     | G>C                  | C>S                  | 0.01294 | ORF3a                     |
| 25644                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF3a                     |
| 25649                  | 2                                 | Substitution     | G>T                  | C>F                  | 0.02344 | ORF3a                     |
| 25651                  | 1                                 | Substitution     | T>G                  | L>W                  | 0.01294 | ORF3a                     |
| 25672                  | 1                                 | Substitution     | A>C                  | H>P                  | 0.01294 | ORF3a                     |
| 25693                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.02589 | ORF3a                     |
| 25693                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.02589 | ORF3a                     |
| 25705                  | 2                                 | Deletion         | C>-                  | P>-                  | 0.02344 | ORF3a                     |
| 25709                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | ORF3a                     |
| 25716                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF3a                     |
| 25720                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | ORF3a                     |
| 25723                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.02589 | ORF3a                     |
| 25723                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.02589 | ORF3a                     |
| 25724                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF3a                     |
| 25726                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF3a                     |
| 25728                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF3a                     |
| 25738                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF3a                     |
| 25739                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.01294 | ORF3a                     |
| 25745                  | 1                                 | Deletion         | T>-                  | V>-                  | 0.01294 | ORF3a                     |
| 25754                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF3a                     |
| 25762                  | 2                                 | Deletion         | T>-                  | I>-                  | 0.02344 | ORF3a                     |
| 25787                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | ORF3a                     |
| 25795                  | 1                                 | Substitution     | G>A                  | R>H                  | 0.01294 | ORF3a                     |
| 25804                  | 5                                 | Deletion         | A>-                  | N>-                  | 0.0505  | ORF3a                     |
| 25807                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF3a                     |
| 25821                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF3a                     |
| 25857                  | 2                                 | Substitution     | G>T                  | R>L                  | 0.02344 | ORF3a                     |
| 25860                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | ORF3a                     |
| 25893                  | 4                                 | Deletion         | A>-                  | N>-                  | 0.04198 | ORF3a                     |
| 25902                  | 2                                 | Deletion         | A>-                  | Y>-                  | 0.02344 | ORF3a                     |
| 25906                  | 3                                 | Substitution     | C>T                  | S>L                  | 0.03301 | ORF3a                     |
| 25909                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF3a                     |
| 25918                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF3a                     |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 25963                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF3a                     |
| 25981                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | ORF3a                     |
| 25982                  | 1                                 | Substitution     | A>C                  | E>A                  | 0.01294 | ORF3a                     |
| 25985                  | 1                                 | Substitution     | A>G                  | *>*                  | 0.01294 | ORF3a                     |
| 26118                  | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | ORF3a                     |
| 26146                  | 2                                 | Substitution     | G>T                  | G>V                  | 0.02344 | ORF3a                     |
| 26157                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | ORF3a                     |
| 26228                  | 2                                 | Substitution     | A>G                  | K>R                  | 0.02344 | Not Present               |
| 26247                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | Envelope                  |
| 26321                  | 1                                 | Substitution     | A>G                  | Y>C                  | 0.01294 | Envelope                  |
| 26324                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Envelope                  |
| 26331                  | 1                                 | Substitution     | G>A                  | S>K                  | 0.01294 | Envelope                  |
| 26332                  | 2                                 | Substitution     | T>G                  | V>S,V>G              | 0.02344 | Envelope                  |
| 26334                  | 2                                 | Substitution     | A>T                  | Y>F,Y>L              | 0.02344 | Envelope                  |
| 26335                  | 1                                 | Substitution     | C>G                  | T>*                  | 0.01294 | Envelope                  |
| 26352                  | 2                                 | Substitution     | G>A                  | C>-                  | 0.09752 | Envelope                  |
| 26363                  | 1                                 | Substitution     | G>A                  | C>-                  | 0.06343 | Envelope                  |
| 26371                  | 2                                 | Substitution     | A>G                  | Y>-                  | 0.03638 | Envelope                  |
| 26372                  | 2                                 | Substitution     | C>T                  | T>- ,T>I             | 0.04687 | Envelope                  |
| 26377                  | 2                                 | Substitution     | G>A                  | C>- ,C>*             | 0.03638 | Envelope                  |
| 26378                  | 2                                 | Substitution     | C>A                  | A>K                  | 0.03638 | Envelope                  |
| 26405                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Envelope                  |
| 26415                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Envelope                  |
| 26437                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Envelope                  |
| 26439                  | 1                                 | Substitution     | C>A                  | S>Y                  | 0.01294 | Envelope                  |
| 26449                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Envelope                  |
| 26458                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | Envelope                  |
| 26463                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | Envelope                  |
| 26471                  | 1                                 | Substitution     | C>A                  | S>Y                  | 0.01294 | Envelope                  |
| 26508                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Not Present               |
| 26516                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Not Present               |
| 26517                  | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | Not Present               |
| 26532                  | 3                                 | Substitution     | A>G                  | D>G                  | 0.03301 | Membrane                  |
| 26609                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | Membrane                  |
| 26683                  | 2                                 | Substitution     | C>T                  | S>F                  | 0.02344 | Membrane                  |
| 26692                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | Membrane                  |
| 26710                  | 2                                 | Deletion         | A>-                  | *>-                  | 0.02344 | Membrane                  |
| 26711                  | 28                                | Deletion         | G>-                  | S>-                  | 0.19669 | Membrane                  |
| 26726                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | Membrane                  |
| 26729                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | Membrane                  |
| 26732                  | 5                                 | Substitution     | G>T                  | C>F                  | 0.0505  | Membrane                  |
| 26737                  | 112                               | Substitution     | C>T                  | T>I                  | 0.49696 | Membrane                  |
| 26775                  | 1                                 | Substitution     | T>C                  | M>T                  | 0.01294 | Membrane                  |
| 26897                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | Membrane                  |
| 26902                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Membrane                  |
| 26964                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Membrane                  |
| 26975                  | 1                                 | Deletion         | A>-                  | Y>-                  | 0.01294 | Membrane                  |
| 27105                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Membrane                  |
| 27112                  | 5                                 | Substitution     | C>T                  | T>I                  | 0.0505  | Membrane                  |
| 27193                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.03638 | Not Present               |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 27193                  | 2                                 | Substitution     | A>G                  | K>R                  | 0.03638 | Not Present               |
| 27209                  | 1                                 | Substitution     | T>C                  | F>S                  | 0.01294 | ORF6                      |
| 27210                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | ORF6                      |
| 27215                  | 4                                 | Substitution     | C>T                  | S>L                  | 0.04198 | ORF6                      |
| 27228                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF6                      |
| 27275                  | 1                                 | Substitution     | T>C                  | F>S                  | 0.01294 | ORF6                      |
| 27360                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.02589 | ORF6                      |
| 27360                  | 1                                 | Substitution     | G>T                  | R>I                  | 0.02589 | ORF6                      |
| 27381                  | 1                                 | Substitution     | A>T                  | D>-                  | 0.01294 | ORF6                      |
| 27386                  | 5                                 | Substitution     | T>C                  | I>T                  | 0.0505  | ORF6                      |
| 27391                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | Not Present               |
| 27529                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF7a                     |
| 27536                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.02589 | ORF7a                     |
| 27538                  | 2                                 | Substitution     | C>T                  | P>- ,P>L             | 0.03638 | ORF7a                     |
| 27557                  | 1                                 | Substitution     | T>A                  | L>*                  | 0.03638 | ORF7a                     |
| 27579                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.02589 | ORF7a                     |
| 27599                  | 1                                 | Substitution     | T>A                  | L>Q                  | 0.02589 | ORF7a                     |
| 27614                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.03638 | ORF7a                     |
| 27615                  | 5                                 | Substitution     | G>T                  | R>L                  | 0.07391 | ORF7a                     |
| 27620                  | 1                                 | Substitution     | T>C                  | I>T                  | 0.03638 | ORF7a                     |
| 27630                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.04595 | ORF7a                     |
| 27632                  | 1                                 | Substitution     | C>A                  | P>Q                  | 0.03638 | ORF7a                     |
| 27635                  | 1                                 | Substitution     | A>C                  | D>A                  | 0.03638 | ORF7a                     |
| 27648                  | 1                                 | Substitution     | A>C                  | *>S                  | 0.05491 | ORF7a                     |
| 27675                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.05491 | ORF7a                     |
| 27682                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.02589 | ORF7a                     |
| 27684                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.02589 | ORF7a                     |
| 27684                  | 1                                 | Substitution     | T>A                  | L>*                  | 0.02589 | ORF7a                     |
| 27691                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | ORF7a                     |
| 27693                  | 1                                 | Substitution     | A>G                  | N>R                  | 0.01294 | ORF7a                     |
| 27694                  | 1                                 | Substitution     | T>A                  | I>D                  | 0.01294 | ORF7a                     |
| 27696                  | 1                                 | Substitution     | T>C                  | F>-                  | 0.01294 | ORF7a                     |
| 27704                  | 1                                 | Substitution     | T>A                  | L>-                  | 0.02589 | ORF7a                     |
| 27708                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.02589 | ORF7a                     |
| 27710                  | 1                                 | Substitution     | G>A                  | R>H                  | 0.02589 | ORF7a                     |
| 27711                  | 1                                 | Substitution     | G>C                  | G>T                  | 0.03638 | ORF7a                     |
| 27713                  | 1                                 | Substitution     | A>T                  | Q>L                  | 0.03638 | ORF7a                     |
| 27715                  | 1                                 | Substitution     | T>A                  | I>K                  | 0.03638 | ORF7a                     |
| 27717                  | 1                                 | Substitution     | G>C                  | S>T                  | 0.03638 | ORF7a                     |
| 27722                  | 1                                 | Substitution     | T>C                  | L>S                  | 0.03638 | ORF7a                     |
| 27746                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.01294 | ORF7a                     |
| 27748                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | ORF7a                     |
| 27749                  | 1                                 | Substitution     | A>G                  | E>G                  | 0.01294 | ORF7a                     |
| 27766                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | ORF7b                     |
| 27770                  | 2                                 | Deletion         | T>-                  | F>-                  | 0.02344 | ORF7b                     |
| 27771                  | 1                                 | Substitution     | C>A                  | S>Y                  | 0.01294 | ORF7b                     |
| 27772                  | 1                                 | Substitution     | A>C                  | H>T                  | 0.01294 | ORF7b                     |
| 27774                  | 1                                 | Substitution     | T>C                  | L>-                  | 0.03638 | ORF7b                     |
| 27784                  | 3                                 | Deletion         | C>-                  | S>-                  | 0.04595 | ORF7b                     |
| 27784                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.04595 | ORF7b                     |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 27785                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | ORF7b                     |
| 27786                  | 2                                 | Deletion         | A>-                  | Y>-                  | 0.02344 | ORF7b                     |
| 27787                  | 1                                 | Deletion         | T>-                  | I>-                  | 0.01294 | ORF7b                     |
| 27849                  | 2                                 | Deletion         | C>-                  | S>-                  | 0.03638 | ORF7b                     |
| 27849                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.03638 | ORF7b                     |
| 27851                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF7b                     |
| 27872                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | ORF7b                     |
| 27876                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | ORF7b                     |
| 27891                  | 2                                 | Substitution     | C>T                  | T>M                  | 0.02344 | Not Present               |
| 27918                  | 1                                 | Substitution     | G>A                  | G>E                  | 0.01294 | ORF8                      |
| 27989                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | ORF8                      |
| 28001                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.01294 | ORF8                      |
| 28047                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF8                      |
| 28079                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.04595 | ORF8                      |
| 28079                  | 3                                 | Substitution     | G>T                  | R>L                  | 0.04595 | ORF8                      |
| 28085                  | 3                                 | Substitution     | G>T                  | *>L                  | 0.03301 | ORF8                      |
| 28092                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | ORF8                      |
| 28095                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | ORF8                      |
| 28117                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | ORF8                      |
| 28146                  | 21                                | Substitution     | T>C                  | L>S                  | 0.15841 | ORF8                      |
| 28176                  | 1                                 | Substitution     | A>T                  | K>I                  | 0.01294 | ORF8                      |
| 28223                  | 4                                 | Substitution     | G>T                  | R>I                  | 0.04198 | ORF8                      |
| 28255                  | 4                                 | Substitution     | C>T,C>A              | S>L,S>Y              | 0.04595 | ORF8                      |
| 28256                  | 1                                 | Deletion         | A>-                  | H>-                  | 0.03638 | ORF8                      |
| 28256                  | 2                                 | Substitution     | A>C                  | H>P,H>T              | 0.03638 | ORF8                      |
| 28270                  | 2                                 | Substitution     | A>C                  | N>-                  | 0.03638 | Not Present               |
| 28291                  | 2                                 | Substitution     | C>A                  | T>N                  | 0.02344 | Nucleocapsid              |
| 28313                  | 10                                | Deletion         | C>-                  | P>-                  | 0.69874 | Nucleocapsid              |
| 28313                  | 174                               | Substitution     | C>T                  | P>L                  | 0.69874 | Nucleocapsid              |
| 28314                  | 2                                 | Substitution     | C>T                  | P>F                  | 0.02344 | Nucleocapsid              |
| 28328                  | 2                                 | Substitution     | G>T                  | G>V                  | 0.02344 | Nucleocapsid              |
| 28364                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | Nucleocapsid              |
| 28373                  | 2                                 | Substitution     | G>T                  | S>I                  | 0.02344 | Nucleocapsid              |
| 28385                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | Nucleocapsid              |
| 28392                  | 1                                 | Substitution     | A>G                  | N>S                  | 0.01294 | Nucleocapsid              |
| 28398                  | 2                                 | Substitution     | G>A                  | G>D                  | 0.02344 | Nucleocapsid              |
| 28434                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | Nucleocapsid              |
| 28462                  | 1                                 | Substitution     | G>A                  | R>K                  | 0.01294 | Nucleocapsid              |
| 28467                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Nucleocapsid              |
| 28493                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | Nucleocapsid              |
| 28551                  | 1                                 | Substitution     | A>C                  | D>A                  | 0.01294 | Nucleocapsid              |
| 28552                  | 1                                 | Substitution     | C>A                  | T>Q                  | 0.01294 | Nucleocapsid              |
| 28605                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | Nucleocapsid              |
| 28623                  | 1                                 | Substitution     | G>T                  | G>V                  | 0.01294 | Nucleocapsid              |
| 28633                  | 1                                 | Substitution     | G>A                  | W>*                  | 0.01294 | Nucleocapsid              |
| 28659                  | 1                                 | Substitution     | C>T                  | T>M                  | 0.01294 | Nucleocapsid              |
| 28678                  | 4                                 | Deletion         | A>-                  | N>-                  | 0.04198 | Nucleocapsid              |
| 28690                  | 20                                | Substitution     | T>C                  | L>P                  | 0.15262 | Nucleocapsid              |
| 28691                  | 3                                 | Deletion         | T>-                  | L>-                  | 0.03301 | Nucleocapsid              |
| 28692                  | 1                                 | Substitution     | G>T                  | *>L                  | 0.01294 | Nucleocapsid              |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|---------------------------|
| 28704                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.01294 | Nucleocapsid              |
| 28705                  | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | Nucleocapsid              |
| 28715                  | 2                                 | Deletion         | G>-                  | G>-                  | 0.02344 | Nucleocapsid              |
| 28722                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | Nucleocapsid              |
| 28729                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | Nucleocapsid              |
| 28741                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | Nucleocapsid              |
| 28754                  | 1                                 | Substitution     | A>C                  | Q>P                  | 0.01294 | Nucleocapsid              |
| 28763                  | 1                                 | Substitution     | A>T                  | Q>L                  | 0.01294 | Nucleocapsid              |
| 28788                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Nucleocapsid              |
| 28797                  | 3                                 | Substitution     | A>G                  | K>R                  | 0.03301 | Nucleocapsid              |
| 28798                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | Nucleocapsid              |
| 28799                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Nucleocapsid              |
| 28816                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Nucleocapsid              |
| 28828                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Nucleocapsid              |
| 28831                  | 1                                 | Deletion         | T>-                  | F>-                  | 0.01294 | Nucleocapsid              |
| 28847                  | 2                                 | Substitution     | G>T                  | R>L                  | 0.02344 | Nucleocapsid              |
| 28853                  | 1                                 | Substitution     | G>T                  | S>I                  | 0.01294 | Nucleocapsid              |
| 28856                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.38991 | Nucleocapsid              |
| 28856                  | 71                                | Substitution     | C>T                  | S>L                  | 0.38991 | Nucleocapsid              |
| 28865                  | 1                                 | Substitution     | C>T                  | S>L                  | 0.01294 | Nucleocapsid              |
| 28879                  | 1                                 | Substitution     | A>T                  | Q>L                  | 0.02589 | Nucleocapsid              |
| 28880                  | 19                                | Substitution     | G>A,G>C              | S>N,S>S              | 0.16653 | Nucleocapsid              |
| 28915                  | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | Nucleocapsid              |
| 28919                  | 3                                 | Deletion         | G>-                  | G>-                  | 0.03301 | Nucleocapsid              |
| 28925                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Nucleocapsid              |
| 28950                  | 4                                 | Substitution     | C>T                  | T>I                  | 0.04198 | Nucleocapsid              |
| 28955                  | 1                                 | Deletion         | T>-                  | L>-                  | 0.01294 | Nucleocapsid              |
| 28966                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | Nucleocapsid              |
| 28975                  | 1                                 | Deletion         | A>-                  | N>-                  | 0.01294 | Nucleocapsid              |
| 28977                  | 1                                 | Deletion         | G>-                  | C>-                  | 0.02589 | Nucleocapsid              |
| 28977                  | 1                                 | Substitution     | G>C                  | C>S                  | 0.02589 | Nucleocapsid              |
| 28981                  | 1                                 | Substitution     | G>T                  | W>L                  | 0.01294 | Nucleocapsid              |
| 28988                  | 1                                 | Deletion         | G>-                  | G>-                  | 0.01294 | Nucleocapsid              |
| 29019                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | Nucleocapsid              |
| 29110                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | Nucleocapsid              |
| 29173                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Nucleocapsid              |
| 29179                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | Nucleocapsid              |
| 29190                  | 2                                 | Substitution     | A>T                  | H>L                  | 0.02344 | Nucleocapsid              |
| 29199                  | 2                                 | Substitution     | C>T                  | P>L                  | 0.02344 | Nucleocapsid              |
| 29220                  | 1                                 | Deletion         | C>-                  | S>-                  | 0.01294 | Nucleocapsid              |
| 29238                  | 2                                 | Substitution     | C>T                  | A>V                  | 0.02344 | Nucleocapsid              |
| 29256                  | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | Nucleocapsid              |
| 29274                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Nucleocapsid              |
| 29298                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Nucleocapsid              |
| 29305                  | 1                                 | Substitution     | C>T                  | S>F                  | 0.01294 | Nucleocapsid              |
| 29317                  | 1                                 | Substitution     | G>T                  | R>I                  | 0.01294 | Nucleocapsid              |
| 29350                  | 1                                 | Substitution     | G>T                  | R>L                  | 0.01294 | Nucleocapsid              |
| 29360                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | Nucleocapsid              |
| 29384                  | 3                                 | Deletion         | A>-                  | K>-                  | 0.04595 | Nucleocapsid              |
| 29384                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.04595 | Nucleocapsid              |

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region  |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|----------------------------|
| 29393                  | 1                                 | Deletion         | A>-                  | K>-                  | 0.02589 | Nucleocapsid               |
| 29393                  | 1                                 | Substitution     | A>G                  | K>-                  | 0.02589 | Nucleocapsid               |
| 29394                  | 2                                 | Deletion         | G>-                  | R>-                  | 0.02344 | Nucleocapsid               |
| 29423                  | 2                                 | Deletion         | C>-                  | P>-                  | 0.03638 | Nucleocapsid               |
| 29423                  | 1                                 | Substitution     | C>T                  | P>L                  | 0.03638 | Nucleocapsid               |
| 29424                  | 1                                 | Deletion         | G>-                  | R>-                  | 0.01294 | Nucleocapsid               |
| 29453                  | 2                                 | Substitution     | C>T                  | T>I                  | 0.02344 | Nucleocapsid               |
| 29462                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | Nucleocapsid               |
| 29465                  | 1                                 | Deletion         | C>-                  | A>-                  | 0.01294 | Nucleocapsid               |
| 29476                  | 3                                 | Substitution     | G>T                  | G>V                  | 0.05643 | Nucleocapsid               |
| 29518                  | 1                                 | Deletion         | G>-                  | *>-                  | 0.01294 | Nucleocapsid               |
| 29526                  | 1                                 | Substitution     | T>C                  | L>P                  | 0.01294 | Nucleocapsid               |
| 29542                  | 1                                 | Substitution     | G>T                  | C>F                  | 0.01294 | Not Present                |
| 29545                  | 5                                 | Substitution     | G>T                  | R>I                  | 0.0505  | Not Present                |
| 29557                  | 3                                 | Substitution     | C>T                  | A>V                  | 0.03301 | Not Present                |
| 29559                  | 3                                 | Substitution     | G>T                  | R>I                  | 0.03301 | ORF10                      |
| 29616                  | 1                                 | Substitution     | C>T                  | A>V                  | 0.01294 | ORF10                      |
| 29624                  | 1                                 | Substitution     | A>T                  | N>I                  | 0.01294 | ORF10                      |
| 29693                  | 1                                 | Substitution     | T>G                  | V>G                  | 0.01294 | 3'-UTR (Non-coding Region) |
| 29695                  | 1                                 | Substitution     | T>G                  | V>G                  | 0.01294 | 3'-UTR (Non-coding Region) |
| 29697                  | 1                                 | Substitution     | A>G                  | N>-                  | 0.01294 | 3'-UTR (Non-coding Region) |
| 29724                  | 3                                 | Substitution     | C>T                  | P>L                  | 0.03301 | 3'-UTR (Non-coding Region) |
| 29734                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.01294 | 3'-UTR (Non-coding Region) |
| 29735                  | 1                                 | Deletion         | C>-                  | P>-                  | 0.01294 | 3'-UTR (Non-coding Region) |
| 29736                  | 5                                 | Substitution     | G>T,G>C              | R>L,R>P              | 0.05491 | 3'-UTR (Non-coding Region) |
| 29744                  | 39                                | Substitution     | G>T,G>A              | R>L,R>H              | 0.32078 | 3'-UTR (Non-coding Region) |
| 29745                  | 2                                 | Substitution     | C>T                  | A>V                  | 0.03638 | 3'-UTR (Non-coding Region) |
| 29747                  | 1                                 | Substitution     | G>A                  | G>E                  | 0.03638 | 3'-UTR (Non-coding Region) |
| 29771                  | 1                                 | Substitution     | C>T                  | T>I                  | 0.05491 | 3'-UTR (Non-coding Region) |
| 29776                  | 4                                 | Substitution     | C>A,C>T              | A>E,A>V              | 0.08788 | 3'-UTR (Non-coding Region) |
| 29777                  | 1                                 | Substitution     | T>A                  | L>K                  | 0.05491 | 3'-UTR (Non-coding Region) |
| 29783                  | 1                                 | Substitution     | G>A                  | R>K                  | 0.05491 | 3'-UTR (Non-coding Region) |
| 29793                  | 1                                 | Substitution     | T>A                  | I>K                  | 0.06343 | 3'-UTR (Non-coding Region) |
| 29800                  | 1                                 | Substitution     | G>A                  | R>K                  | 0.06343 | 3'-UTR (Non-coding Region) |
| 29809                  | 1                                 | Substitution     | T>A                  | M>K                  | 0.09443 | 3'-UTR (Non-coding Region) |
| 29810                  | 1                                 | Substitution     | G>A                  | C>-                  | 0.09443 | 3'-UTR (Non-coding Region) |
| 29829                  | 36                                | Substitution     | A>T                  | *>L                  | 0.36309 | 3'-UTR (Non-coding Region) |
| 29831                  | 2                                 | Substitution     | T>A                  | V>D                  | 0.15801 | 3'-UTR (Non-coding Region) |
| 29832                  | 46                                | Substitution     | G>T,G>C              | C>-                  | 0.45629 | 3'-UTR (Non-coding Region) |
| 29876                  | 2                                 | Substitution     | A>G                  | K>R                  | 0.43615 | 3'-UTR (Non-coding Region) |
| 29881                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.383   | 3'-UTR (Non-coding Region) |
| 29885                  | 1                                 | Substitution     | A>T                  | K>I                  | 0.37242 | 3'-UTR (Non-coding Region) |
| 29887                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.37242 | 3'-UTR (Non-coding Region) |
| 29893                  | 1                                 | Substitution     | A>G                  | K>R                  | 0.36522 | 3'-UTR (Non-coding Region) |
| 29903                  | 1                                 | Substitution     | A>T                  | K>I                  | 0.27239 | 3'-UTR (Non-coding Region) |

Table S3: Point Mutation in Indian SARS-CoV-2 Genomes

| Coordinate of Mutation | Occurrence of Mutation in Genomes | Type of Mutation | Change in Nucleotide | Change in Amino Acid | Entropy | Mapped with Coding Region  |
|------------------------|-----------------------------------|------------------|----------------------|----------------------|---------|----------------------------|
| 241                    | 341                               | Substitution     | C>T                  | S>L                  | 0.70789 | 5'-UTR (Non-coding Region) |
| 313                    | 31                                | Substitution     | C>T                  | S>L                  | 0.25363 | ORF1ab                     |
| 884                    | 17                                | Substitution     | C>T                  | T>M                  | 0.14757 | ORF1ab                     |
| 1281                   | 6                                 | Substitution     | C>T                  | A>V                  | 0.05866 | ORF1ab                     |
| 1397                   | 22                                | Substitution     | G>A                  | S>N                  | 0.16411 | ORF1ab                     |
| 1707                   | 8                                 | Substitution     | C>T                  | S>F                  | 0.2701  | ORF1ab                     |
| 1820                   | 19                                | Substitution     | G>A                  | R>K                  | 0.14674 | ORF1ab                     |
| 2836                   | 51                                | Substitution     | C>T                  | A>V                  | 0.30242 | ORF1ab                     |
| 3037                   | 339                               | Substitution     | C>T                  | S>F                  | 0.70203 | ORF1ab                     |
| 3634                   | 22                                | Substitution     | C>T                  | T>I                  | 0.17699 | ORF1ab                     |
| 4084                   | 13                                | Substitution     | C>T                  | T>I                  | 0.10922 | ORF1ab                     |
| 4809                   | 14                                | Substitution     | C>T                  | S>F                  | 0.11577 | ORF1ab                     |
| 4866                   | 6                                 | Substitution     | G>T                  | S>I                  | 0.05866 | ORF1ab                     |
| 5700                   | 30                                | Substitution     | C>A                  | A>D                  | 0.21984 | ORF1ab                     |
| 6081                   | 9                                 | Substitution     | A>G                  | D>G                  | 0.12338 | ORF1ab                     |
| 6310                   | 65                                | Substitution     | C>A                  | A>E, A>K             | 0.39722 | ORF1ab                     |
| 6312                   | 160                               | Substitution     | C>A                  | T>K                  | 0.73568 | ORF1ab                     |
| 8655                   | 17                                | Substitution     | G>T                  | C>F                  | 0.13468 | ORF1ab                     |
| 8784                   | 22                                | Substitution     | C>T                  | A>V                  | 0.16411 | ORF1ab                     |
| 8919                   | 15                                | Substitution     | C>T                  | S>F                  | 0.14554 | ORF1ab                     |
| 9440                   | 7                                 | Substitution     | C>T                  | T>I                  | 0.06652 | ORF1ab                     |
| 9695                   | 7                                 | Substitution     | C>T                  | A>V                  | 0.08992 | ORF1ab                     |
| 11085                  | 204                               | Substitution     | G>T, G>A             | C>F, C>-, C>Y        | 0.74748 | ORF1ab                     |
| 12441                  | 9                                 | Substitution     | C>T                  | P>L                  | 0.08151 | ORF1ab                     |
| 12618                  | 9                                 | Substitution     | C>T                  | T>I                  | 0.08151 | ORF1ab                     |
| 12687                  | 7                                 | Substitution     | G>T                  | R>I                  | 0.22446 | ORF1ab                     |
| 12759                  | 6                                 | Substitution     | T>C                  | L>P                  | 0.05866 | ORF1ab                     |
| 13732                  | 187                               | Substitution     | C>T                  | A>V, A>-             | 0.65607 | ORF1ab                     |
| 14410                  | 332                               | Substitution     | C>T                  | P>L                  | 0.7277  | ORF1ab                     |
| 14427                  | 6                                 | Substitution     | C>A                  | T>N                  | 0.05866 | ORF1ab                     |
| 14675                  | 8                                 | Substitution     | A>G                  | N>S                  | 0.07413 | ORF1ab                     |
| 15326                  | 24                                | Substitution     | C>T                  | T>I                  | 0.17527 | ORF1ab                     |
| 16080                  | 15                                | Substitution     | G>A                  | C>Y                  | 0.12219 | ORF1ab                     |
| 16628                  | 9                                 | Substitution     | C>T                  | S>L                  | 0.08151 | ORF1ab                     |
| 18879                  | 117                               | Substitution     | C>T                  | S>F                  | 0.52162 | ORF1ab                     |
| 19526                  | 52                                | Substitution     | C>T                  | S>L                  | 0.39346 | ORF1ab                     |
| 21552                  | 23                                | Substitution     | A>C                  | Q>P,Q>-              | 0.32658 | ORF1ab                     |
| 21553                  | 12                                | Substitution     | A>T,A>C              | N>I,N>L,N>-          | 0.33415 | ORF1ab                     |
| 21726                  | 9                                 | Substitution     | G>T                  | C>F                  | 0.08151 | Spike                      |
| 21794                  | 9                                 | Substitution     | A>T                  | K>M                  | 0.11444 | Spike                      |
| 21797                  | 10                                | Substitution     | G>T                  | R>M                  | 0.08869 | Spike                      |
| 22446                  | 69                                | Substitution     | C>T                  | T>I                  | 0.37028 | Spike                      |
| 22470                  | 18                                | Substitution     | G>T                  | R>L                  | 0.14076 | Spike                      |
| 23279                  | 8                                 | Substitution     | C>T                  | T>I                  | 0.07413 | Spike                      |
| 23313                  | 10                                | Substitution     | G>T                  | R>I                  | 0.08869 | Spike                      |
| 23405                  | 334                               | Substitution     | A>G                  | D>G                  | 0.7198  | Spike                      |
| 23595                  | 6                                 | Substitution     | G>T, G>C             | R>I, R>T             | 0.06343 | Spike                      |
| 23931                  | 165                               | Substitution     | C>T                  | T>I                  | 0.68561 | Spike                      |
| 25565                  | 122                               | Substitution     | G>T                  | R>I                  | 0.52072 | ORF3a                      |
| 26737                  | 112                               | Substitution     | C>T                  | T>I                  | 0.49696 | Membrane                   |
| 28146                  | 21                                | Substitution     | T>C                  | L>S                  | 0.15841 | ORF8                       |
| 28313                  | 174                               | Substitution     | C>T                  | P>L                  | 0.69874 | Nucleocapsid               |
| 28690                  | 20                                | Substitution     | T>C                  | L>P                  | 0.15262 | Nucleocapsid               |
| 28856                  | 71                                | Substitution     | C>T                  | S>L                  | 0.38991 | Nucleocapsid               |
| 28880                  | 19                                | Substitution     | G>A, G>C             | S>N, S>S             | 0.16653 | Nucleocapsid               |
| 28883                  | 64                                | Substitution     | G>A                  | R>K                  | 0.3755  | Nucleocapsid               |
| 28884                  | 64                                | Substitution     | G>A                  | G>N                  | 0.38486 | Nucleocapsid               |
| 28885                  | 64                                | Substitution     | G>C                  | G>T                  | 0.38486 | Nucleocapsid               |
| 29744                  | 39                                | Substitution     | G>T, G>A             | R>L, R>H             | 0.32078 | 3'-UTR (Non-coding Region) |
| 29829                  | 36                                | Substitution     | A>T                  | *>L                  | 0.36309 | 3'-UTR (Non-coding Region) |
| 29832                  | 46                                | Substitution     | G>T, G>C             | C>-                  | 0.45629 | 3'-UTR (Non-coding Region) |
| 29869                  | 10                                | Substitution     | T>A                  | M>K, M>- , M>Q, M>N  | 0.6916  | 3'-UTR (Non-coding Region) |
| 29870                  | 28                                | Substitution     | G>A, G>C             | *>K, *>Y, *>*, *>T   | 0.74695 | 3'-UTR (Non-coding Region) |
| 29872                  | 31                                | Substitution     | C>A                  | T>K, T>Q             | 0.70809 | 3'-UTR (Non-coding Region) |

Table S4: Mutation as SNPs in more than 1% of population of Indian SARS-CoV-2 genomes