Supplementary Information for the article

Trends of mutation accumulation across global SARS-CoV-2 genomes: Implications for the ecology and evolution of the novel coronavirus

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Running Title: Microevolution of SARS-CoV-2
Key words: SARS-CoV-2, COVID-19, genome-wide mutations, transition and transversion, microevolution, disinfectants as mutagens

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Table S1. Localization of all the 1797 transition mutations detected in the SARS-CoV-2 pan genome.
Table S2. Localization of all the 655 transversion mutations detected in the SARS-CoV-2 pan genome.

Supplementary Figure

Figure S1. Probable chemical reactions causing the transition mutation C→U.

References used in the the legend of Figure S1
Table S1. Localization of all the 1797 transition mutations detected in the SARS-CoV-2 pan genome.

| Genomic locus (nucleotide positions¹ between which the locus spans) | Nucleotide position¹ of the A→G mutation detected | Nucleotide position¹ of the G→A mutation detected | Nucleotide position¹ of the C→U mutation detected | Nucleotide position¹ of the U→C mutation detected |
|---------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| 5' UTR (1-265)                                             | 97                                             | 23                                             | 19                                             | 13                                             |
|                                                             | 187                                            | 101                                            | 21                                             | 141                                            |
|                                                             | 231                                            | 160                                            | 28                                             | 181                                            |
|                                                             |                                                | 198                                            | 36                                             | 221                                            |
| nsp1 (266-806)                                             | 270                                            | 271                                            | 292                                            | 327                                            |
|                                                             | 301                                            | 319                                            | 313                                            | 334                                            |
|                                                             | 361                                            | 354                                            | 337                                            | 400                                            |
|                                                             | 460                                            | 362                                            | 364                                            | 514                                            |
|                                                             | 570                                            | 374                                            | 506                                            | 565                                            |
|                                                             | 618                                            | 388                                            | 527                                            | 606                                            |
|                                                             | 761                                            | 491                                            | 541                                            | 658                                            |
|                                                             |                                                | 578                                            | 583                                            | 721                                            |
|                                                             |                                                | 598                                            | 601                                            | 771                                            |
|                                                             |                                                | 613                                            | 619                                            | 778                                            |
|                                                             |                                                | 614                                            | 643                                            |                                                |
|                                                             |                                                | 626                                            | 673                                            |                                                |
|                                                             |                                                | 680                                            | 679                                            |                                                |
|                                                             |                                                | 740                                            | 703                                            |                                                |
|                                                             |                                                |                                                | 784                                            |                                                |
|                                                             |                                                |                                                | 799                                            |                                                |
| nsp2 (807-2720)                                             | 895                                            | 840                                            | 823                                            | 833                                            |
|                                                             | 1015                                           | 922                                            | 829                                            | 1066                                           |
|                                                             | 1098                                           | 932                                            | 832                                            | 1117                                           |
|                                                             | 1262                                           | 957                                            | 835                                            | 1368                                           |
|                                                             | 1317                                           | 960                                            | 875                                            | 1372                                           |
|                                                             | 1399                                           | 1001                                           | 884                                            | 1570                                           |
|                                                             | 1430                                           | 1145                                           | 900                                            | 1592                                           |
|                                                             | 1515                                           | 1148                                           | 936                                            | 1623                                           |
|                                                             | 1547                                           | 1319                                           | 958                                            | 1918                                           |
|                                                             | 1622                                           | 1401                                           | 1059                                           | 2149                                           |
|                                                             | 1646                                           | 1440                                           | 1063                                           | 2244                                           |
|                                                             | 1691                                           | 1467                                           | 1076                                           | 2266                                           |
|                                                             | 1815                                           | 1478                                           | 1102                                           | 2277                                           |
|                                                             | 1817                                           | 1548                                           | 1150                                           | 2446                                           |
|                                                             | 2018                                           | 1595                                           | 1191                                           | 2551                                           |
|                                                             | 2104                                           | 1598                                           | 1218                                           | 2561                                           |
|                                                             | 2160                                           | 1658                                           | 1221                                           |                                                |
|                                                             | 2165                                           | 1681                                           | 1225                                           |                                                |
|                                                             | 2480                                           | 1685                                           | 1238                                           |                                                |
|                                                             | 2550                                           | 1697                                           | 1267                                           |                                                |
|                                                             | 2590                                           | 1719                                           | 1288                                           |                                                |
| nsp3 (2720-8555) | 2863 | 2808 | 2836 | 2851 |
|------------------|------|------|------|------|
|                  | 3010 | 2840 | 2862 | 2884 |
|                  | 3046 | 2875 | 2910 | 2992 |
|                  | 3094 | 2891 | 2937 | 3011 |
|                  | 3138 | 2945 | 2939 | 3144 |
| 9244 | 9116 | 8937 | 9172 |
| 9274 | 9136 | 8950 | 9511 |
| 9307 | 9176 | 8956 | 9660 |
| 9433 |      | 8980 | 9706 |
| 9514 |      | 9039 | 9708 |
| 9698 |      | 9113 | 9976 |
| 9707 |      | 9159 |      |
| 9749 |      | 9166 |      |
| 9793 |      | 9170 |      |
| 9830 |      | 9180 |      |
| 9838 |      | 9223 |      |
| 9848 |      | 9246 |      |
|      |      | 9319 |      |
|      |      | 9360 |      |
|      |      | 9430 |      |
|      |      | 9438 |      |
|      |      | 9443 |      |
|      |      | 9474 |      |
|      |      | 9491 |      |
|      |      | 9521 |      |
|      |      | 9561 |      |
|      |      | 9565 |      |
|      |      | 9598 |      |
|      |      | 9724 |      |
|      |      | 9733 |      |
|      |      | 9803 |      |
|      |      | 9857 |      |
|      |      | 9866 |      |
|      |      | 9891 |      |
|      |      | 9924 |      |
|      |      | 9943 |      |
|      |      | 9951 |      |
|      |      | 9962 |      |
|      |      | 9967 |      |
|      |      | 9979 |      |
|      |      | 9996 |      |
|      |      | 10015 |    |
|      |      | 10029 |    |
|      |      | 10036 |    |
| 10236 | 10097 | 10138 | 10129 |
| 10248 | 10265 | 10156 | 10216 |
| 10317 | 10368 | 10188 | 10480 |
| 10323 | 10617 | 10202 | 10524 |
| 10329 | 10631 | 10207 | 10561 |
| 10434 |      | 10232 | 10756 |
| 10479 |      | 10277 | 10771 |
| 10579 |      | 10279 | 10933 |
| 10622 |      | 10296 | 10960 |
| 10761 |      | 10319 |      |
| 10829 |      | 10335 |      |
| 10948 |      | 10369 |      |
|      |      | 10377 |      |
|      |      | 10416 |      |
|      |      | 10440 |      |
|      |      | 10448 |      |
|      |      | 10456 |      |
|      |      | 10507 |      |
|      |      | 10525 |      |
|      |      | 10572 |      |
|      |      | 10582 |      |
|      |      | 10623 |      |
|      |      | 10626 |      |
|      |      | 10632 |      |
|      |      | 10712 |      |
|      |      |      |      |
|-------|-------|-------|-------|
|       |       |       |       |
| 11101 | 11161 | 10989 | 11107 |
| 11217 | 11291 | 11003 | 11121 |
| 11268 | 11306 | 11008 | 11182 |
| 11425 | 11327 | 11020 | 11264 |
| 11537 | 11375 | 11036 | 11320 |
| 11585 | 11410 | 11074 | 11526 |
| 11595 | 11534 | 11109 | 11538 |
| 11782 | 11557 | 11195 | 11635 |
| 11830 | 11807 | 11200 | 11638 |
|        |       | 11224 | 11798 |
|        |       | 11289 |       |
|        |       | 11379 |       |
|        |       | 11455 |       |
|        |       | 11620 |       |
|        |       | 11653 |       |
|        |       | 11674 |       |
|        |       | 11704 |       |
|        |       | 11747 |       |
|        |       | 11750 |       |
|        |       | 11752 |       |
|        |       | 11758 |       |
|        |       | 11824 |       |
|        |       | 11832 |       |
|        |       | 11835 |       |
| 11957 | 11937 | 11916 | 11879 |
| 12004 | 12071 | 11919 | 11959 |
| 12077 |       | 11941 | 11974 |
| 12082 |       | 11956 | 12037 |
|        |       | 12025 | 12045 |
|        |       | 12073 |       |
| 12103 | 12111 | 12100 | 12112 |
| 12286 | 12149 | 12102 | 12629 |
| 12507 | 12167 | 12115 |       |
| 12557 | 12274 | 12119 |       |
| 12631 | 12378 | 12132 |       |
|        | 12600 | 12153 |       |
|        | 12613 | 12213 |       |
|        |       | 12242 |       |
|        |       | 12357 |       |
|        |       | 12400 |       |
|        |       | 12403 |       |
|        |       | 12415 |       |
|        |       | 12439 |       |
|        |       | 12488 |       |
|        |       | 12513 |       |
|        |       | 12525 |       |
|        |       | 12534 |       |
|        |       | 12616 |       |
|        |       | 12651 |       |
|        |       | 12664 |       |
| 12787 | 12758 | 12710 | 12757 |
| 12820 | 12795 | 12729 | 13006 |
|        | 12797 | 12754 |       |
|        | 12806 | 12778 |       |
|        |       | 12781 |       |
|        |       | 12789 |       |
|        |       | 12809 |       |
|        |       | 12854 |       |

**nsp6**
(10974-11843)

**nsp7**
(11844-12092)

**nsp8**
(12093-12686)

**nsp9**
(12687-13025)
| nsp10  
| (13026-13442) | 13198 | NIL | 13072 | 13090 |
| | 13318 | NIL | 13083 | 13180 |
| | | | 13115 | 13210 |
| | | | 13138 | 13438 |
| | | | 13170 | 13225 |
| | | | 13252 | 13297 |
| | | | 13329 | 13384 |
| nsp11  
| (13443-13481) | NIL | NIL | NIL | NIL |
| | 13522 | 13723 | 13487 | 13572 |
| | 13712 | 13975 | 13511 | 13845 |
| | 13748 | 14118 | 13515 | 13914 |
| | 13755 | 14126 | 13517 | 13929 |
| | 13768 | 14274 | 13536 | 13932 |
| | 13859 | 14712 | 13554 | 14073 |
| | 13962 | 15260 | 13608 | 14104 |
| | 14224 | 15414 | 13620 | 14151 |
| | 14604 | 15594 | 13665 | 14259 |
| | 14673 | 15760 | 13721 | 14313 |
| | 14747 | 16068 | 13730 | 14438 |
| | 14774 | 16078 | 13740 | 14492 |
| | 14836 | 16221 | 13862 | 14501 |
| | 14856 | 16240 | 13994 | 14568 |
| | 14882 | 16245 | 14177 | 14679 |
| | 14912 | | 14178 | 15166 |
| | 15205 | | 14183 | 15264 |
| | 15477 | | 14184 | 15597 |
| | 15593 | | 14235 | 15607 |
| | 15972 | | 14262 | 15648 |
| | 16060 | | 14267 | 15849 |
| | 16095 | | 14322 | 15888 |
| | | | 14340 | 15922 |
| | | | 14408 | 16047 |
| | | | 14422 | 16077 |
| | | | 14554 | 16242 |
| | | | 14599 | 16299 |
| | | | 14649 | |
| | | | 14657 | |
| | | | 14676 | |
| | | | 14697 | |
| | | | 14724 | |
| | | | 14786 | |
| | | | 14805 | |
| | | | 14877 | |
| | | | 14925 | |
| | | | 14932 | |
| | | | 14937 | |
| | | | 14980 | |
| | | | 15024 | |
| | | | 15101 | |
| | | | 15154 | |
| | | | 15216 | |
| | | | 15222 | |
| nsp13 (16329-18041) |  |  | 
|----------------------|----------------|----------------|
| 16467                | 16381          | 16329          |
| 16474                | 17049          | 16375          |
| 16628                | 17058          | 16386          |
| 16841                | 17149          | 16428          |
| 16942                | 17158          | 16457          |
| 16947                | 17632          | 16466          |
| 17287                | 17964          | 16468          |
| 17289                | 17988          | 16568          |
| 17344                |                | 16575          |
| 17376                |                | 16616          |
| 17423                |                | 16658          |
| 17482                |                | 16679          |
| 17542                |                | 16694          |
| 17615                |                | 16716          |
| 17622                |                | 16726          |
| 17631                |                | 16750          |
| 17858                |                | 16830          |
| 17884                |                | 16848          |
| 17961                |                | 16859          |
| 17993                |                | 16869          |
| 18015                |                | 16877          |
|                      |                | 16887          |
|                      |                | 16915          |
|                      |                | 17000          |
|                      |                | 17004          |
|                      |                | 17104          |
|                      |                | 17118          |
|                      |                | 17125          |
|                      |                | 17135          |
|                      |                | 17249          |
|                      |                | 17274          |
|                      |                | 17326          |
|                      |                | 17372          |
|                      |                | 17373          |
|                      |                | 17397          |
|     |     |     |
|-----|-----|-----|
| 17402 | 17440 | 17470 |
| 17474 | 17518 | 17550 |
| 17569 | 17639 | 17649 |
| 17690 | 17747 | 17766 |
| 17802 | 17825 | 17850 |
| 17894 | 17898 | 17934 |
| 17985 | 18029 | 18057 |
| 18060 | 18115 | 18126 |
| 18129 | 18131 | 18134 |
| 18167 | 18176 | 18180 |
| 18246 | 18252 | 18255 |
| 18264 | 18268 | 18271 |
| 18377 | 18401 | 18405 |
| 18431 | 18441 | 18452 |
| 18508 | 18519 | 18521 |
| 18568 | 18603 | 18605 |
| 18647 | 18736 | 18834 |
| 18654 | 18857 | 18885 |
| 18680 | 18888 | 18927 |
| 18681 | 18928 | 18941 |
| 18744 | 18998 | 19017 |
| 18778 | 19018 | 19102 |
| 18795 | 19065 | 19118 |
| 18796 | 19164 | 19169 |
| 18814 | 19170 | 19220 |
| 18828 | 19263 | 19264 |

*nsp14*

(18042-19622)
| nsp15 (19623-20660) |   |   | 19269 | 19325 | 19366 | 19488 | 19524 | 19547 | 19554 | 19610 |
|-------------------|---|---|-------|-------|-------|-------|-------|-------|-------|-------|
| 19722             | 19711 |   | 19718 | 19700 |
| 19818             | 19800 |   | 19763 | 19839 |
| 19883             | 19847 |   | 19813 | 20063 |
| 20268             | 19962 |   | 19836 | 20151 |
| 20553             | 20005 | 20131 | 19854 | 20253 |
|                   | 20580 |   | 19862 | 20256 |
|                   |       |   | 19881 | 20281 |
|                   |       |   | 19952 | 20401 |
|                   |       |   | 19961 | 20466 |
|                   |       |   | 20016 | 20537 |
|                   |       |   | 20030 |       |
|                   |       |   | 20051 |       |
|                   |       |   | 20081 |       |
|                   |       |   | 20148 |       |
|                   |       |   | 20178 |       |
|                   |       |   | 20204 |       |
|                   |       |   | 20233 |       |
|                   |       |   | 20270 |       |
|                   |       |   | 20316 |       |
|                   |       |   | 20320 |       |
|                   |       |   | 20402 |       |
|                   |       |   | 20480 |       |
|                   |       |   | 20483 |       |
|                   |       |   | 20555 |       |
|                   |       |   | 20611 |       |
|                   |       |   | 20646 |       |
| nsp16 (20661-21554)|   |   | 20667 | 20679 |
|                   | 20670 |   | 20677 | 20891 |
|                   | 20752 |   | 20692 | 21126 |
|                   | 20887 |   | 20703 | 21144 |
|                   | 20890 |   | 20719 | 21147 |
|                   | 21316 |   | 20762 | 21458 |
|                   |       |   | 20801 | 21467 |
|                   |       |   | 20823 |       |
|                   |       |   | 20844 |       |
|                   |       |   | 20930 |       |
|                   |       |   | 20936 |       |
|                   |       |   | 21005 |       |
|                   |       |   | 21058 |       |
|                   |       |   | 21077 |       |
|                   |       |   | 21114 |       |
|                   |       |   | 21139 |       |
|                   |       |   | 21306 |       |
|                   |       |   | 21364 |       |
|                   |       |   | 21365 |       |
|                   |       |   | 21386 |       |
|                   |       |   | 21410 |       |
|                   |       |   | 21513 |       |
|                   |       |   | 21552 |       |
| geneS (21563-25384)|   |   | 21562 | 21616 |
|                   | 21796 |   | 21575 | 21656 |
|                   | 21893 |   | 21588 | 21656 |
|                   | 22201 |   | 21595 | 21790 |
|                   | 22005 |   | 21614 | 21797 |
|                   | 22225 |   | 21627 | 21838 |
|                   | 22344 |   | 21636 | 21890 |
|                   | 22346 |   | 21642 | 21931 |
|                   | 22604 |   | 21646 | 21995 |
| 22320 | 22988 | 21648 | 22078 |
| 22374 | 23426 | 21691 | 22207 |
| 22455 | 23607 | 21707 | 22318 |
| 22525 | 23876 | 21711 | 22516 |
| 22798 | 24047 | 21721 | 22741 |
| 23083 | 24075 | 21736 | 22939 |
| 23147 | 24145 | 21742 | 22965 |
| 23235 | 25252 | 21757 | 23010 |
| 23403 | 25340 | 21767 | 23018 |
| 23440 | 21774 | 23042 | |
| 23796 | 21781 | 23284 | |
| 23947 | 21789 | 23287 | |
| 23989 | 21805 | 23427 | |
| 24014 | 21811 | 23482 | |
| 24121 | 21846 | 23599 | |
| 24123 | 21910 | 23677 | |
| 24325 | 21911 | 23822 | |
| 24367 | 21914 | 24022 | |
| 24520 | 21998 | 24152 | |
| 24862 | 22120 | 24364 | |
| 24877 | 22281 | 24628 | |
| 25050 | 22323 | 24749 | |
| 25060 | 22326 | 24832 | |
| 25104 | 22432 | 24887 | |
|        | 22444 | 24929 | |
|        | 22450 | 24948 | |
|        | 22480 | 24979 | |
|        | 22530 | 24982 | |
|        | 22624 | 25036 | |
|        | 22735 |       |   |
|        | 22858 |       |   |
|        | 23185 |       |   |
|        | 23206 |       |   |
|        | 23230 |       |   |
|        | 23244 |       |   |
|        | 23271 |       |   |
|        | 23277 |       |   |
|        | 23393 |       |   |
|        | 23423 |       |   |
|        | 23439 |       |   |
|        | 23453 |       |   |
|        | 23502 |       |   |
|        | 23520 |       |   |
|        | 23525 |       |   |
|        | 23551 |       |   |
|        | 23557 |       |   |
|        | 23575 |       |   |
|        | 23577 |       |   |
|        | 23589 |       |   |
|        | 23606 |       |   |
|        | 23635 |       |   |
|        | 23638 |       |   |
|        | 23673 |       |   |
|        | 23707 |       |   |
|        | 23731 |       |   |
|        | 23758 |       |   |
|        | 23785 |       |   |
|        | 23865 |       |   |
|        | 23929 |       |   |
|        | 23934 |       |   |
|        | 23996 |       |   |
|        | 24023 |       |   |
|        | 24034 |       |   |
|        | 24042 |       |   |
|                  |                  |                  |                  |
|------------------|------------------|------------------|------------------|
| **orf3a**        |                  |                  |                  |
| (25393-26220)    |                  |                  |                  |

|                  |                  |                  |                  |
|------------------|------------------|------------------|------------------|
| 25449            | 25492            | 25549            | 25614            |
| 25616            | 25744            | 25752            | 25803            |
| 25759            | 25847            | 25853            | 25854            |
| 25853            | 26019            | 26045            | 26055            |
| 26055            | 26183            | 26183            | 26183            |
| 25452            | 25466            | 25473            | 25496            |
| 25469            | 25487            | 25518            | 25518            |
| 25513            | 25516            | 25521            | 25528            |
| 25521            | 25551            | 25551            | 25551            |
| 26104            | 26152            | 26172            | 26172            |
| 25835            | 25850            | 25850            | 25850            |
| 25978            | 26104            | 26104            | 26104            |
| 26152            | 26172            | 26172            | 26172            |
| 25551            | 25551            | 25551            | 25551            |
| 25835            | 25850            | 25850            | 25850            |
| 25978            | 26104            | 26104            | 26104            |
| 26152            | 26172            | 26172            | 26172            |
| 25551            | 25551            | 25551            | 25551            |
| 25835            | 25850            | 25850            | 25850            |
| 25978            | 26104            | 26104            | 26104            |
| 26152            | 26172            | 26172            | 26172            |
| 25551            | 25551            | 25551            | 25551            |
| Gene   | Start Position | End Position | Start Position | End Position |
|--------|----------------|--------------|----------------|--------------|
| geneE  | 26530          | 26704        | 26527          | 26609        |
|        | 26864          |              | 26534          | 26729        |
|        |                |              | 26601          | 26861        |
|        |                |              | 26606          | 27056        |
| geneM  | 27200          | NIL          | 27208          | 27272        |
|        | 27302          |              | 27213          | 27285        |
|        | 27359          |              | 27263          | 27299        |
| orf6   | 27397          | 27604        | 27416          | 27408        |
|        | 27398          |              | 27434          | 27546        |
|        | 27421          |              | 27476          | 27560        |
|        | 27515          |              | 27498          | 27722        |
|        | 27525          |              | 27500          |              |
|        | 27669          |              | 27527          |              |
|        |                |              | 27549          |              |
|        |                |              | 27559          |              |
|                     | 27821 | 27916 | 27964 | 27895 |
|---------------------|-------|-------|-------|-------|
| orfB (27894-28259)  | 27860 | 28202 | 27998 | 28061 |
|                     | 27924 | 28212 | 27999 | 28144 |
|                     | 28210 |       | 28005 | 28151 |
|                     | 28222 |       | 28093 | 28199 |
|                     | 28259 |       | 28099 |       |

|                     | 28283 | 28314 | 28311 | 28297 |
|                     | 28338 | 28321 | 28332 | 28360 |
|                     | 28390 | 28376 | 28391 | 28393 |
|                     | 28811 | 28396 | 28409 | 28450 |
|                     | 28848 | 28631 | 28432 | 28648 |
|                     | 28858 | 28798 | 28472 | 28688 |
|                     | 28885 | 28878 | 28519 | 28693 |
|                     | 29012 | 28881 | 28528 | 28723 |
|                     | 29292 | 28916 | 28603 | 28759 |
|                     | 29403 | 28931 | 28606 | 28835 |

|                     |       |       |       |       |
|                     | 29239 | 28629 | 28861 |       |
|                     | 29260 | 28651 | 28924 |       |
|                     | 29291 | 28657 | 28930 |       |
|                     | 29374 | 28697 | 29026 |       |
|                     | 29383 | 28708 | 29029 |       |
|                     | 29422 | 28720 | 29148 |       |
|                     | 29440 | 28826 | 29308 |       |
|                     | 29473 | 28830 | 29410 |       |
|                     | 29527 | 28836 | 29452 |       |

|                     |       |       |       |       |
|                     | 28849 |       |       |       |
|                     | 28854 |       |       |       |
|                     | 28863 |       |       |       |
|                     | 28866 |       |       |       |
|                     | 28873 |       |       |       |
|                     | 28887 |       |       |       |
|                     | 28915 |       |       |       |
|                     | 28948 |       |       |       |
|                     | 28961 |       |       |       |
|                     | 28977 |       |       |       |
|                     | 29013 |       |       |       |
|                     | 29077 |       |       |       |
|                     | 29085 |       |       |       |
|                     | 29095 |       |       |       |
|                     | 29119 |       |       |       |
|                     | 29144 |       |       |       |
|                     | 29167 |       |       |       |
|                     | 29177 |       |       |       |
|                     | 29199 |       |       |       |
|                     | 29218 |       |       |       |
|                     | 29230 |       |       |       |
|                     | 29250 |       |       |       |
|                     | 29253 |       |       |       |
|                     | 29272 |       |       |       |
|                  | NIL  | 29573 | 29563 | NIL  |
|------------------|------|-------|-------|------|
| **orf10**        | NIL  | 29573 | 29563 | NIL  |
| (29558-29674)    |      |       |       |      |
| **3' UTR**       | 29695| 29742 | 29708 | 29685|
| (29675-29903)    | 29700| 29747 | 29724 | 29710|
|                  | 29861| 29732 | 29750 | 29758|
|                  | 29868| 29733 | 29754 | 29793|
|                  |      | 29738 | 29762 | 29821|
|                  |      | 29739 | 29769 |      |
|                  |      | 29743 | 29774 |      |
|                  |      | 29750 | 29837 |      |
|                  |      | 29754 | 29838 |      |

1. All nucleotide positions are designated based on the 5' to 3' sequence of the 29,903 nucleotide RNA-genome (MN908947.3) of the reference strain from Wuhan, China.
Table S2. Localization of all the 655 transversion mutations detected in the SARS-CoV-2 pan genome.

| Genomic locus (nucleotide positions\(^1\) between which the locus spans) | Nucleotide position\(^1\) of the U\(\rightarrow\)A mutation detected | Nucleotide position\(^1\) of the U\(\rightarrow\)G mutation detected | Nucleotide position\(^1\) of the C\(\rightarrow\)A mutation detected | Nucleotide position\(^1\) of the C\(\rightarrow\)G mutation detected | Nucleotide position\(^1\) of the A\(\rightarrow\)U mutation detected | Nucleotide position\(^1\) of the A\(\rightarrow\)C mutation detected | Nucleotide position\(^1\) of the G\(\rightarrow\)U mutation detected | Nucleotide position\(^1\) of the G\(\rightarrow\)C mutation detected |
|--------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| 5' UTR (1-265)           | 77                                               | 104                                             | 153                                              | NIL                                              | 37                                               | 75                                               | 84                                               | 186                                              |
|                          | 96/5'UTR 1                                      | 490                                             | 274                                              | NIL                                              | 195                                              | 77                                               | 74                                               | NIL                                              |
| nsp1 (266-806)           | 956                                              | 1978                                            | 1211                                             | NIL                                              | 1223                                             | 652                                              | 691                                              | 696                                              |
|                          | 490                                              | 274                                             | 379                                              | NIL                                              | 652                                              | 691                                              | 332                                              | 370                                              |
| nsp2 (807-2720)          | 2737                                             | 3331                                            | 6779                                             | 3178                                             | 3141                                             | 3177                                             | 3373                                             | 3698                                             |
|                          | 4011                                             | 5485                                            | 6905                                             | 5485                                             | 3177                                             | 3373                                             | 3698                                             | 4155                                             |
|                          | 4155                                             | 4230                                            | 5694                                             | 5694                                             | 4230                                            | 5694                                             | 5700                                             | 6016                                             |
|                          | 6016                                             | 6312                                            | 7728                                             | 6312                                             | 7728                                            | 6312                                             | 7728                                            | 7844                                             |
|                          | 7844                                             | 8318                                            | 5240                                             | 8318                                             | 5240                                             | 8318                                             | 5240                                             | 8318                                             |
| nsp3 (2720-8555)         | 8967                                             | 9477                                            | 8665                                             | 9477                                             | 8665                                             | 9477                                             | 9634                                             | 9477                                             |
|                          | 8665                                             | 9370                                            | 9935                                             | 9370                                             | 9935                                             | 9370                                             | 9935                                             | 9935                                             |
|                          | 9935                                             | 105                                             | 199                                              | 105                                              | 199                                              | 105                                              | 199                                              | 105                                              |
|                          | 204                                              | 210                                              | 219                                              | 252                                              | 210                                              | 219                                              | 252                                              | 252                                              |
| nsp4 (8556-10055)        | 8600                                             | 8633                                            | 8949                                             | 8600                                             | 8633                                            | 8949                                             | 8600                                             | 8633                                             |
|                          | 8600                                             | 8633                                            | 8949                                             | 8600                                             | 8633                                            | 8949                                             | 8600                                             | 8633                                             |

\(^1\) Numbers in parentheses represent the nucleotide positions.
| nsp5  | NIL    | NIL    | 10301  | NIL    | 10081  | 10624  | 9190   | 9479   | 9802   | 10523  | 10670  |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 10056-10973 |       |        |        |        |        |        |        |        |        |        |        |
| nsp6  | 11191  | 11233  | NIL    | NIL    | 11742  | NIL    | 11042  | 11222  | 11335  | 11376  | 11417  |
| 10974-11843 |       |        |        |        |        |        |        |        |        |        |        |
| nsp7  | NIL    | NIL    | NIL    | NIL    | NIL    | NIL    | 12052  | 12041  | 12079  |        |        |
| 11844-12092 |       |        |        |        |        |        |        |        |        |        |        |
| nsp8  | NIL    | NIL    | NIL    | NIL    | 12148  | 12471  | 12131  | 12361  | 12491  | 12514  | 12660  | 12685  |
| 12093-12686 |       |        |        |        |        |        |        |        |        |        |        |
| nsp9  | 12910  | 12897  | NIL    | NIL    | NIL    | NIL    | 12704  | 12773  | 12793  |        |        |
| 12687-13025 |       |        |        |        |        |        |        |        |        |        |        |
| nsp10 | NIL    | NIL    | 13130  | NIL    | 13265  | 13419  | 13118  | 13201  | 13348  |        |        |
| 13026-13442 |       |        |        |        |        |        |        |        |        |        |        |
| nsp11 | NIL    | NIL    | NIL    | NIL    | NIL    | NIL    | 13459  |        |        |        |        |
| 13443-13481 |       |        |        |        |        |        |        |        |        |        |        |
| nsp12 | 14429  | 13954  | 14006  | NIL    | 13693  | 14041  | 13571  | 13617  | 13627  | 13771  | 14028  | 14290  | 14393  | 14500  | 14528  | 14718  | 15193  | 15380  | 15444  | 15672  | 15732  | 15906  | 15910  | 15919  | 15982  | 16075  | 16158  | 14277  | 16325  |
| 13482-16328 |       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| nsp13 | 17506  | 16456  | 16410  | 17010  | 17059  | 17141  | 17410  | 17634  | 16487  | 17399  | 16377  | 16396  | 16535  | 16647  | 16700  | 16795  | 16852  | 16883  | 16885  | 16897  | 16912  | 16957  | 16975  | 17019  | 17079  | 17122  | 17193  | 17269  | 17278  | 17280  | 17302  | 17338  | 17427  | 17509  | 17562  | 17679  | 17686  | 17808  | 17814  | 17944  |
|    | nsp14  |    |    | nsp15  |    |    | nsp16  |    |    | geneS  |    |
|----|--------|----|----|--------|----|----|--------|----|----|--------|----|
|    |        | 1869 | 18975 | 19015 | 19035 | 19452 |        | 18632 | 19026 | 19225 | 18086 | 18171 | NIL | 18163 | 18600 | 19175 | 18105 | 18106 | 18149 | 18186 | 18255 | 18281 | 18318 | 18325 | 18380 | 18583 | 18589 | 18653 | 18756 | 18762 | 18898 | 18907 | 18973 | 18985 | 19009 | 19072 | 19086 | 19254 | 19340 | 19414 | 19417 | 19481 | 19518 | 19542 | 19563 | 18984 |
|    |        | 18632 | NIL | 20031 | NIL | 19632 | NIL | 19963 | NIL | 20718 | 20931 | 21004 | 21123 | 21204 | 21225 | 21334 | 21404 | 21643 | 21600 | 21604 | 21641 | 21777 | 21795 | 21800 | 21824 | 21830 | 21850 | 21850 | 21821 | 21974 | 22226 | 22973 | 23587 | 23755 | 25064 | 25145 | 25244 | 25273 | 25300 | 25337 |
|    |        | 19632 | 20315 | NIL | 20031 | 20371 | NIL | 19645 | 19656 | 19684 | 19825 | 19872 | 19999 | 20002 | 20014 | 20060 | 20062 | 20134 | 20433 | 20477 | 20578 | 20980 | 20991 | 21255 | 21563 | 21644 | 21628 | 22088 | 22783 | 23119 | 23557 | 24811 | 24565 | 23604 | 24096 | 21568 | 21584 | 22033 | 22197 | 22204 | 22222 | 22284 | 22524 | 22672 | 23235 | 23261 | 23268 | 23661 | 23698 | 24070 | 24218 | 24312 | 24566 | 24894 | 24894 | 24894 | 24894 |
|    |        | 19632 | 20315 | 20031 | 20371 | 21146 | 21357 | 21404 | 21643 | 21600 | 21604 | 21641 | 21777 | 21795 | 21800 | 21824 | 21830 | 21850 | 21850 | 21821 | 21974 | 22226 | 22973 | 23587 | 23755 | 25064 | 25145 | 25244 | 25273 | 25300 | 25337 | 21568 | 21584 | 22033 | 22197 | 22204 | 22222 | 22284 | 22524 | 22672 | 23235 | 23261 | 23268 | 23661 | 23698 | 24070 | 24218 | 24312 | 24566 | 24894 | 24894 | 24894 | 24894 |
|    |        | 19632 | 20315 | 20031 | 20371 | 21146 | 21357 | 21404 | 21643 | 21600 | 21604 | 21641 | 21777 | 21795 | 21800 | 21824 | 21830 | 21850 | 21850 | 21821 | 21974 | 22226 | 22973 | 23587 | 23755 | 25064 | 25145 | 25244 | 25273 | 25300 | 25337 | 21568 | 21584 | 22033 | 22197 | 22204 | 22222 | 22284 | 22524 | 22672 | 23235 | 23261 | 23268 | 23661 | 23698 | 24070 | 24218 | 24312 | 24566 | 24894 | 24894 | 24894 | 24894 |
| Gene  | Start (bp) | End (bp) | Description | Start (bp) | End (bp) | Description | Start (bp) | End (bp) | Description |
|-------|------------|----------|-------------|------------|----------|-------------|------------|----------|-------------|
| orf3a | 25393      | 26220    | NIL         | 25554      | 25566    | 25418       | 25606      | 25575    | 25429       |
| orf6  | 27202      | 27387    | NIL         | 27228      | NIL      | NIL         | 27217      | 27225    | 27225       |
| orf7a | 27394      | 27759    | NIL         | 27698      | NIL      | NIL         | 27420      | 27506    | 27420       |
| Gene     | Start (nt) | End (nt) | orf8  (27894-28259) | 27647 | 27670 | 27703 | 28001 | 28028 | 28044 | 28079 | 28083 | 28086 | 28089 | 28191 | 28221 | 28233 |
|----------|------------|----------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| orf8     | 28340      | 28738    | 28963               | 29470 | 29515 | 29036 | 29696 | 29896 | 29903 | 20514 | 29188 | 29301 | 28366 | 28692 | 28254 | 28289 |
| geneN    | 29867      | 29511    | 29867               | 29870 | 29663 | 29847 | 29866 | 29896 | 29903 | 29909 | 29910 | 29904 | 29908 | 29960 | 29979 | 29980 |

1 All nucleotide positions are designated based on the 5' to 3' sequence of the 29,903 nucleotide RNA-genome (MN908947.3) of the reference strain from Wuhan, China.
Figure S1. Probable chemical reactions that may lead to C→U transition (besides base changes due to replication errors). If the RNA within the virus is subjected to heat treatment (incubated for some time at 95°C) then sulfonated by sodium sulfite (sulfite, including sodium sulfite and sodium metabisulfite are used as disinfectant, antioxidant and preservative agent), at pH 7 and 65°C, the next step of hydrolytic deamination can occur at high pH and room temperature. In the final step, alkali desulfonation (alkaline brines and marinades are frequently employed in Chinese cuisines to alter the texture of meat or seafood) can take place to obtain uracil (for details see Hyatsu, 2008).

References used in the the legend of Figure S1
Hayatsu, H., 2008. Discovery of bisulfite-mediated cytosine conversion to uracil, the key reaction for DNA methylation analysis- A personal account. Proc. Jpn. Acad. Ser. B Phys. Biol. Sci. 84: 321-330. DOI: 10.2183/pjab/84.321.