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Immune Epitope Database and Analysis Resource Program

# 2019 Annual IEDB Compendium

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# Table of Contents

# Introduction

The Immune Epitope Database and Analysis Resource (IEDB) is a public repository of immune epitope data and is sponsored by the National Institute for Allergy and Infectious Diseases (NIAID). The IEDB development started in December 2003 and it became available to the public in a beta test phase on 15 February 2006. The IEDB primarily contains data related to antibody and T cell epitopes for humans, non-human primates, rodents, and other animal species. The IEDB also makes available a variety of analytical and epitope prediction tools and resources within its Analysis Resource.

This Compendium of the Immune Epitope Database and Analysis Resource, and consists of three sections. The first section contains a list of the antibody and T cell epitope information in the database as of 17 January 2020. The second section describes the features of the IEDB 3.10 website and the Analysis Resource 2.20. The third section lists the scientific publications in 2019 for which the IEDB played a contributory role.

Since the publication of last year's 2018 Annual Compendium, the quantity of data available in the IEDB continues to increase significantly. As of January 2020, the IEDB contains data for over 945,000 epitopes, 54,000 antigens, 2,150,000 assays, and 34,000 receptors from more than 20,700 references. The focus of the IEDB remains on peptidic and non-peptidic epitope data relating to infectious diseases, allergens, autoimmune diseases, and transplant/alloantigens; with exceptions in respect to cancer and HIV.

# 1 Antibody and T Cell Epitopes

Many new references and many new species were added to the IEDB in 2019, as demonstrated in Table 1.1. The table lists the number of distinct B cell and T cell epitopes in the database by source species at the end of 2018 and 2019. Of the 3,825 species/strains listed, 136 were added in 2019. It should be noted that the source organism is the species/strain from which the epitopes originate, and may not be from an infecting organism or vaccine target. The curation of MHC binding peptides, cross-reactive epitopes, and autoimmune epitopes has resulted in the appearance of human (Homo sapiens) and mouse (Mus musculus) epitopes on the list.

In the table below, the leftmost column labeled "New" indicates with an "X" if epitopes for the species/strain was added to the IEDB in 2019. A font color of red is used to highlight the information in the row. The Organism ID matches the NCBI taxonomy ID if it exists. Otherwise, it represents an IEDB-assigned identifier, which are eight-digit numbers starting with “1000”. These are easily distinguishable from the NCBI identifiers which are six digits or less. The columns labeled "B-18", "T-18", "B-19", and "T-19" indicate the cumulative number of distinct B cell and T cell epitopes in the database at the end of 2018 and 2019, respectively. The two rightmost columns display the differences in the B and T cell epitope counts from 2018 to 2019. The changes in B and T cell epitope counts are shown in red. In 2019, the number of B cell epitopes increased by 5,301 from 50,617 to 55,918 and the number of T cell epitopes increased by 80,160 from 461,348 to 541,508.

## Table 1.1 Summary of B and T cell epitopes contained in the IEDB

| ID | NEW 2019 | ORGANISM ID | SPECIES / STRAIN | B 18 | T 18 | B 19 | T 19 | DELTA B | DELTA T |
|---|---|---|---|---|---|---|---|---|---|
| 1 |  | 2 | Bacteria | 45 |  | 57 |  | 12 |  |
| 2 |  | 106 | Runella slithyformis |  | 1 |  | 1 |  |  |
| 3 |  | 108 | Spirosoma linguale | 1 |  | 1 |  |  |  |
| 4 |  | 139 | Borreliella burgdorferi | 78 | 43 | 78 | 45 |  | 2 |
| 6 |  | 158 | Treponema denticola |  | 1 |  | 1 |  |  |
| 7 |  | 160 | Treponema pallidum | 7 | 2 | 7 | 2 |  |  |
| 8 |  | 173 | Leptospira interrogans | 6 | 4 | 6 | 4 |  |  |
| 9 |  | 195 | Campylobacter coli |  | 2 |  | 2 |  |  |
| 10 |  | 197 | Campylobacter jejuni | 108 | 29 | 115 | 30 | 7 | 1 |
| 11 |  | 210 | Helicobacter pylori | 47 | 56 | 49 | 56 | 2 |  |
| 12 |  | 234 | Brucella |  | 28 |  | 28 |  |  |
| 13 |  | 235 | Brucella abortus | 7 | 39 | 7 | 39 |  |  |
| 14 |  | 236 | Brucella ovis |  | 3 |  | 3 |  |  |
| 15 |  | 263 | Francisella tularensis | 4 | 14 | 4 | 14 |  |  |
| 16 |  | 266 | Paracoccus denitrificans | 3 |  | 3 |  |  |  |
| 17 |  | 271 | Thermus aquaticus | 1 |  | 1 |  |  |  |
| 18 |  | 274 | Thermus thermophilus | 1 | 1 | 1 | 1 |  |  |
| 19 |  | 280 | Xanthobacter autotrophicus |  | 1 |  | 1 |  |  |
| 20 |  | 286 | Pseudomonas | 1 |  | 1 | 1 |  | 1 |
| 21 |  | 287 | Pseudomonas aeruginosa | 96 | 162 | 96 | 168 |  | 6 |
| 22 |  | 292 | Burkholderia cepacia | 3 | 2 | 3 | 2 |  |  |
| 23 |  | 294 | Pseudomonas fluorescens |  | 4 |  | 4 |  |  |
| 25 |  | 300 | Pseudomonas mendocina |  | 1 |  | 1 |  |  |
| 26 |  | 303 | Pseudomonas putida | 1 | 8 | 1 | 8 |  |  |
| 27 |  | 306 | Pseudomonas sp. |  | 1 |  | 1 |  |  |
| 28 |  | 312 | Pseudomonas sp. RS-16 | 1 |  | 1 |  |  |  |
| 30 |  | 319 | Pseudomonas savastanoi pv. phaseolicola | 1 |  | 1 |  |  |  |
| 31 |  | 354 | Azotobacter vinelandii |  | 2 |  | 2 |  |  |
| 32 |  | 358 | Agrobacterium tumefaciens | 1 | 2 | 1 | 2 |  |  |
| 33 |  | 382 | Sinorhizobium meliloti |  | 1 |  | 1 |  |  |
| 34 |  | 384 | Rhizobium leguminosarum |  | 1 |  | 1 |  |  |
| 35 |  | 446 | Legionella pneumophila | 1 | 1 | 1 | 1 |  |  |
| 36 |  | 470 | Acinetobacter baumannii | 2 | 1 | 2 | 1 |  |  |
| 37 |  | 471 | Acinetobacter calcoaceticus |  | 1 |  | 1 |  |  |
| 38 |  | 480 | Moraxella catarrhalis | 10 |  | 10 |  |  |  |
| 39 |  | 485 | Neisseria gonorrhoeae | 77 | 15 | 77 | 15 |  |  |
| 40 |  | 487 | Neisseria meningitidis | 88 | 23 | 91 | 23 | 3 |  |
| 41 |  | 491 | Neisseria meningitidis serogroup B | 46 | 1 | 46 | 1 |  |  |
| 42 |  | 511 | Alcaligenes faecalis | 3 | 2 | 3 | 2 |  |  |
| 43 |  | 520 | Bordetella pertussis | 338 | 218 | 338 | 218 |  |  |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 44 | | 543 | Enterobacteriaceae | 4 | | 4 | | | |
| 45 | | 544 | Citrobacter | 1 | | 1 | | | |
| 46 | | 546 | Citrobacter freundii | 1 | | 2 | | 1 | |
| 47 | | 548 | Klebsiella aerogenes | | 1 | | 1 | | |
| 48 | | 550 | Enterobacter cloacae | | 9 | | 9 | | |
| 49 | | 554 | Pectobacterium carotovorum | 2 | | 2 | | | |
| 50 | X | 556 | Dickeya chrysanthemi | | | 1 | | 1 | |
| 51 | | 562 | Escherichia coli | 257 | 150 | 275 | 182 | 18 | 32 |
| 52 | | 573 | Klebsiella pneumoniae | 29 | 9 | 29 | 9 | | |
| 53 | | 582 | Morganella morganii | 1 | | 1 | | | |
| 54 | | 583 | Proteus | 2 | | 2 | | | |
| 55 | | 584 | Proteus mirabilis | 7 | | 7 | | | |
| 57 | | 590 | Salmonella | 3 | | 3 | | | |
| 58 | | 596 | Salmonella enterica subsp. enterica serovar Muenchen | 1 | | 1 | | | |
| 59 | | 599 | Salmonella sp. | 1 | | 1 | | | |
| 60 | | 605 | Salmonella enterica subsp. enterica serovar Pullorum | | 1 | | 1 | | |
| 61 | | 611 | Salmonella enterica subsp. enterica serovar Heidelberg | 9 | | 9 | | | |
| 62 | | 615 | Serratia marcescens | 1 | 3 | 1 | 3 | | |
| 63 | | 621 | Shigella boydii | | 2 | | 2 | | |
| 64 | | 622 | Shigella dysenteriae | 6 | 2 | 6 | 2 | | |
| 65 | | 623 | Shigella flexneri | 77 | 11 | 77 | 11 | | |
| 66 | | 624 | Shigella sonnei | | 1 | | 1 | | |
| 67 | | 630 | Yersinia enterocolitica | 6 | 28 | 6 | 28 | | |
| 68 | | 632 | Yersinia pestis | 24 | 324 | 24 | 324 | | |
| 69 | | 633 | Yersinia pseudotuberculosis | | 2 | | 2 | | |
| 71 | | 644 | Aeromonas hydrophila | 9 | 3 | 9 | 3 | | |
| 72 | | 645 | Aeromonas salmonicida | 59 | | 59 | | | |
| 73 | | 659 | Photobacterium phosphoreum | | 1 | | 1 | | |
| 74 | | 666 | Vibrio cholerae | 38 | 91 | 38 | 91 | | |
| 75 | | 670 | Vibrio parahaemolyticus | | 57 | | 57 | | |
| 76 | | 671 | Vibrio proteolyticus | 1 | | 1 | | | |
| 77 | | 672 | Vibrio vulnificus | 1 | 66 | 1 | 66 | | |
| 78 | | 674 | Vibrio mimicus | 2 | | 2 | | | |
| 79 | | 686 | Vibrio cholerae O1 biovar El Tor | 3 | 1 | 3 | 1 | | |
| 80 | | 703 | Plesiomonas shigelloides | | 2 | | 2 | | |
| 81 | | 714 | Aggregatibacter actinomycetemcomitans | 1 | 4 | 1 | 4 | | |
| 82 | | 715 | Actinobacillus pleuropneumoniae | | 2 | | 2 | | |
| 83 | | 727 | Haemophilus influenzae | 30 | 68 | 31 | 68 | 1 | |
| 84 | | 730 | [Haemophilus] ducreyi | 3 | 2 | 3 | 2 | | |
| 85 | | 738 | Glaesserella parasuis | 1 | | 1 | | | |
| 86 | | 747 | Pasteurella multocida | 1 | 10 | 1 | 10 | | |
| 87 | | 769 | Anaplasma centrale | | 2 | | 2 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 88 | | 770 | Anaplasma marginale | 25 | 14 | 25 | 14 | | |
| 89 | | 777 | Coxiella burnetii | 2 | 201 | 2 | 311 | | 110 |
| 90 | | 779 | Ehrlichia ruminantium | 3 | | 3 | 23 | | 23 |
| 91 | | 781 | Rickettsia conorii | | 13 | | 13 | | |
| 92 | | 782 | Rickettsia prowazekii | | 23 | | 23 | | |
| 93 | | 783 | Rickettsia rickettsii | | 1 | | 1 | | |
| 94 | | 784 | Orientia tsutsugamushi | 87 | | 87 | | | |
| 95 | | 785 | Rickettsia typhi | | 3 | | 3 | | |
| 96 | | 787 | Rickettsia australis | | 1 | | 1 | | |
| 97 | | 788 | Rickettsia canadensis | | 1 | | 1 | | |
| 98 | | 813 | Chlamydia trachomatis | 178 | 69 | 208 | 69 | 30 | |
| 99 | | 817 | Bacteroides fragilis | | 3 | 27 | 3 | 27 | |
| 100 | | 837 | Porphyromonas gingivalis | 91 | 21 | 108 | 22 | 17 | 1 |
| 101 | | 920 | Acidithiobacillus ferrooxidans | | 1 | | 1 | | |
| 102 | | 944 | Ehrlichia canis | 7 | 1 | 7 | 1 | | |
| 103 | | 945 | Ehrlichia chaffeensis | 14 | 1 | 14 | 1 | | |
| 105 | | 948 | Anaplasma phagocytophilum | 33 | | 45 | | 12 | |
| 106 | | 955 | Wolbachia pipientis | 1 | | 1 | | | |
| 107 | | 1006 | Marivirga tractuosa | | 1 | | 1 | | |
| 108 | | 1018 | Capnocytophaga ochracea | | 1 | | 1 | | |
| 109 | | 1019 | Capnocytophaga sputigena | | 1 | | 1 | | |
| 110 | | 1022 | Beggiatoa alba | 1 | | 1 | | | |
| 111 | | 1063 | Rhodobacter sphaeroides | | 1 | | 1 | | |
| 112 | | 1076 | Rhodopseudomonas palustris | | 2 | | 2 | | |
| 113 | | 1224 | Proteobacteria | 3 | | 3 | | | |
| 114 | | 1245 | Leuconostoc mesenteroides | 1 | | 1 | | | |
| 115 | | 1254 | Pediococcus acidilactici | 1 | | 1 | | | |
| 116 | | 1260 | Finegoldia magna | | 1 | | 1 | | |
| 117 | | 1265 | Ruminococcus flavefaciens | | 1 | | 1 | | |
| 118 | | 1270 | Micrococcus luteus | 1 | | 1 | | | |
| 119 | | 1279 | Staphylococcus | 1 | | 1 | | | |
| 120 | | 1280 | Staphylococcus aureus | 134 | 46 | 135 | 47 | 1 | 1 |
| 122 | | 1292 | Staphylococcus warneri | 1 | | 1 | | | |
| 123 | | 1299 | Deinococcus radiodurans | 3 | | 3 | | | |
| 124 | | 1301 | Streptococcus | 5 | | 5 | | | |
| 125 | | 1303 | Streptococcus oralis | 12 | | 12 | | | |
| 127 | | 1305 | Streptococcus sanguinis | | 1 | | 1 | | |
| 128 | | 1307 | Streptococcus suis | 1 | | 1 | | | |
| 129 | | 1309 | Streptococcus mutans | 146 | 89 | 146 | 89 | | |
| 130 | | 1310 | Streptococcus sobrinus | 1 | | 1 | | | |
| 131 | | 1311 | Streptococcus agalactiae | 18 | | 18 | | | |
| 132 | | 1313 | Streptococcus pneumoniae | 90 | 8 | 90 | 28 | | 20 |
| 133 | | 1314 | Streptococcus pyogenes | 377 | 115 | 377 | 125 | | 10 |

|  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|
| 134 |  | 1317 | Streptococcus downei | 2 | 1 | 2 | 1 |  |  |
| 135 |  | 1319 | Streptococcus sp. 'group B' | 1 |  | 2 |  | 1 |  |
| 137 |  | 1324 | Streptococcus sp. G148 | 14 | 5 | 14 | 5 |  |  |
| 138 |  | 1334 | Streptococcus dysgalactiae | 3 | 6 | 3 | 6 |  |  |
| 139 |  | 1336 | Streptococcus equi | 22 | 14 | 22 | 14 |  |  |
| 140 |  | 1349 | Streptococcus uberis | 8 |  | 8 |  |  |  |
| 141 |  | 1351 | Enterococcus faecalis | 2 |  | 2 |  |  |  |
| 142 |  | 1352 | Enterococcus faecium | 6 |  | 6 |  |  |  |
| 143 |  | 1358 | Lactococcus lactis |  | 2 |  | 2 |  |  |
| 144 |  | 1390 | Bacillus amyloliquefaciens | 18 | 3 | 18 | 3 |  |  |
| 145 |  | 1392 | Bacillus anthracis | 399 | 209 | 402 | 209 | 3 |  |
| 146 |  | 1396 | Bacillus cereus | 1 | 8 | 1 | 8 |  |  |
| 147 |  | 1402 | Bacillus licheniformis |  | 10 |  | 10 |  |  |
| 148 |  | 1404 | Bacillus megaterium |  | 1 |  | 1 |  |  |
| 149 |  | 1405 | Bacillus mycoides |  | 1 |  | 1 |  |  |
| 151 |  | 1408 | Bacillus pumilus |  | 1 |  | 1 |  |  |
| 152 |  | 1422 | Geobacillus stearothermophilus | 2 | 1 | 2 | 1 |  |  |
| 153 |  | 1423 | Bacillus subtilis | 2 | 4 | 2 | 4 |  |  |
| 154 |  | 1428 | Bacillus thuringiensis | 7 | 7 | 7 | 7 |  |  |
| 155 |  | 1435 | Bacillus thuringiensis serovar san diego |  | 2 |  | 2 |  |  |
| 156 |  | 1467 | Bacillus lentus |  | 1 |  | 1 |  |  |
| 157 |  | 1491 | Clostridium botulinum | 196 | 112 | 196 | 112 |  |  |
| 158 |  | 1496 | Clostridioides difficile | 63 | 1 | 66 | 1 | 3 |  |
| 159 |  | 1502 | Clostridium perfringens | 41 | 1 | 41 | 1 |  |  |
| 160 |  | 1513 | Clostridium tetani | 79 | 272 | 79 | 275 |  | 3 |
| 161 |  | 1520 | Clostridium beijerinckii | 1 |  | 1 |  |  |  |
| 162 |  | 1585 | Lactobacillus delbrueckii subsp. bulgaricus | 1 |  | 1 |  |  |  |
| 163 |  | 1599 | Lactobacillus sakei |  | 1 |  | 1 |  |  |
| 164 |  | 1604 | Lactobacillus amylovorus |  | 1 |  | 1 |  |  |
| 165 | X | 1613 | Lactobacillus fermentum |  |  | 1 |  | 1 |  |
| 167 |  | 1638 | Listeria ivanovii | 1 | 1 | 1 | 1 |  |  |
| 168 |  | 1639 | Listeria monocytogenes | 22 | 99 | 22 | 100 |  | 1 |
| 169 |  | 1641 | Listeria grayi |  | 1 |  | 1 |  |  |
| 170 |  | 1642 | Listeria innocua | 2 | 3 | 2 | 3 |  |  |
| 171 |  | 1646 | Renibacterium salmoninarum | 12 |  | 12 |  |  |  |
| 172 |  | 1661 | Trueperella pyogenes | 7 |  | 7 |  |  |  |
| 173 | X | 1664 | Arthrobacter glacialis |  |  |  | 1 |  | 1 |
| 174 |  | 1681 | Bifidobacterium bifidum |  | 1 |  | 1 |  |  |
| 175 | X | 1716 | Corynebacterium |  |  |  | 1 |  | 1 |
| 176 |  | 1717 | Corynebacterium diphtheriae | 15 | 52 | 15 | 52 |  |  |
| 177 |  | 1718 | Corynebacterium glutamicum |  | 26 |  | 26 |  |  |
| 178 |  | 1747 | Cutibacterium acnes |  | 2 |  | 2 |  |  |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 179 | | 1752 | Propionibacterium freudenreichii subsp. shermanii | | 1 | | 1 | | |
| 180 | | 1763 | Mycobacterium | 29 | 20 | 29 | 21 | | 1 |
| 181 | | 1764 | Mycobacterium avium | 6 | 17 | 6 | 18 | | 1 |
| 182 | | 1765 | Mycobacterium tuberculosis variant bovis | 49 | 326 | 49 | 327 | | 1 |
| 183 | | 1766 | Mycolicibacterium fortuitum | | 1 | | 1 | | |
| 184 | | 1767 | Mycobacterium intracellulare | | 1 | | 1 | | |
| 185 | | 1768 | Mycobacterium kansasii | 9 | 13 | 9 | 13 | | |
| 186 | | 1769 | Mycobacterium leprae | 127 | 409 | 127 | 409 | | |
| 187 | | 1770 | Mycobacterium avium subsp. paratuberculosis | 105 | 15 | 105 | 15 | | |
| 188 | | 1771 | Mycolicibacterium phlei | | 1 | | 1 | | |
| 189 | | 1772 | Mycolicibacterium smegmatis | | 28 | | 28 | | |
| 190 | | 1773 | Mycobacterium tuberculosis | 642 | 2530 | 643 | 2577 | 1 | 47 |
| 191 | | 1774 | Mycobacteroides chelonae | 1 | | 1 | | | |
| 192 | | 1778 | Mycobacterium gordonae | 1 | | 1 | | | |
| 193 | | 1781 | Mycobacterium marinum | | 1 | | 1 | | |
| 194 | | 1783 | Mycobacterium scrofulaceum | 4 | | 4 | | | |
| 195 | | 1795 | Mycolicibacterium neoaurum | | 1 | | 1 | | |
| 196 | | 1804 | Mycolicibacterium gilvum | | 1 | | 1 | | |
| 197 | | 1809 | Mycobacterium ulcerans | | 10 | | 10 | | |
| 199 | | 1828 | Rhodococcus fascians | | 2 | | 2 | | |
| 200 | | 1830 | Rhodococcus ruber | | 1 | | 1 | | |
| 201 | | 1833 | Rhodococcus erythropolis | | 2 | | 2 | | |
| 202 | | 1836 | Saccharopolyspora erythraea | 1 | | 2 | | 1 | |
| 203 | | 1895 | Streptomyces avidinii | 1 | | 1 | | | |
| 204 | | 1902 | Streptomyces coelicolor | | 2 | | 2 | | |
| 205 | | 1916 | Streptomyces lividans | 10 | | 10 | | | |
| 206 | | 1946 | Streptomyces kasugaensis | | 1 | | 1 | | |
| 207 | | 2039 | Tropheryma whipplei | 1 | | 1 | | | |
| 208 | | 2097 | Mycoplasma genitalium | | 1 | | 1 | | |
| 209 | | 2099 | Mycoplasma hyopneumoniae | 2 | | 2 | | | |
| 210 | X | 2100 | Mycoplasma hyorhinis | | | 1 | | 1 | |
| 211 | | 2104 | Mycoplasma pneumoniae | 16 | 2 | 16 | 2 | | |
| 213 | | 2133 | Spiroplasma citri | | 1 | | 1 | | |
| 214 | | 2147 | Acholeplasma | 1 | | 1 | | | |
| 215 | | 2148 | Acholeplasma laidlawii | | 2 | | 2 | | |
| 216 | | 2190 | Methanocaldococcus jannaschii | | 1 | | 1 | | |
| 217 | | 2234 | Archaeoglobus fulgidus | 1 | 1 | 1 | 1 | | |
| 218 | | 2242 | Halobacterium salinarum | 1 | | 1 | | | |
| 219 | | 2287 | Saccharolobus solfataricus | 1 | | 1 | | | |
| 220 | X | 2336 | Thermotoga maritima | | | 2 | | 2 | |
| 221 | | 2439 | Plasmid ColB2 | 1 | | 1 | | | |
| 222 | | 2465 | Plasmid F | 1 | | 1 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 224 | X | 2736 | Verrucomicrobium spinosum | | | 1 | | 1 | |
| 225 | | 2759 | Eukaryota | 1 | | 1 | | | |
| 226 | | 2864 | Dinophyceae | 1 | | 1 | | | |
| 227 | | 2903 | Emiliania huxleyi | | 1 | | 1 | | |
| 228 | | 3039 | Euglena gracilis | 1 | | 1 | | | |
| 229 | | 3068 | Volvox carteri f. nagariensis | | 1 | | 1 | | |
| 230 | | 3318 | Pinaceae | 2 | | 2 | | | |
| 231 | | 3352 | Pinus taeda | 4 | | 4 | | | |
| 232 | | 3369 | Cryptomeria japonica | 45 | 300 | 45 | 300 | | |
| 233 | | 3469 | Papaver somniferum | 1 | | 1 | | | |
| 234 | | 3505 | Betula pendula | 85 | 335 | 85 | 337 | | 2 |
| 235 | | 3513 | Quercus alba | | 5 | | 5 | | |
| 236 | | 3517 | Alnus glutinosa | | 17 | | 17 | | |
| 237 | | 3562 | Spinacia oleracea | 4 | | 4 | | | |
| 239 | | 3617 | Fagopyrum esculentum | 40 | | 40 | | | |
| 240 | | 3645 | Bertholletia excelsa | 7 | 24 | 7 | 24 | | |
| 241 | | 3656 | Cucumis melo | 13 | | 13 | | | |
| 242 | | 3677 | Trichosanthes kirilowii | 4 | | 4 | | | |
| 243 | | 3702 | Arabidopsis thaliana | 3 | 10 | 6 | 10 | 3 | |
| 244 | | 3704 | Armoracia rusticana | 5 | | 5 | | | |
| 245 | | 3707 | Brassica juncea | 9 | | 9 | | | |
| 247 | | 3711 | Brassica rapa | 1 | | 1 | | | |
| 248 | | 3726 | Raphanus sativus | 1 | | 1 | | | |
| 249 | | 3728 | Sinapis alba | 2 | | 2 | | | |
| 250 | | 3750 | Malus domestica | 27 | 48 | 27 | 48 | | |
| 251 | | 3755 | Prunus dulcis | 19 | | 19 | | | |
| 252 | | 3758 | Prunus domestica | 4 | | 4 | | | |
| 253 | | 3760 | Prunus persica | 18 | 51 | 18 | 51 | | |
| 254 | | 3816 | Abrus precatorius | 1 | | 1 | | | |
| 255 | | 3818 | Arachis hypogaea | 461 | 263 | 478 | 263 | 17 | |
| 256 | | 3847 | Glycine max | 195 | 2 | 608 | 2 | 413 | |
| 257 | | 3864 | Lens culinaris | 19 | | 19 | | | |
| 258 | | 3885 | Phaseolus vulgaris | 10 | 3 | 10 | 3 | | |
| 260 | | 3972 | Viscum album | 17 | | 17 | | | |
| 261 | | 3981 | Hevea brasiliensis | 212 | 43 | 212 | 43 | | |
| 262 | | 3988 | Ricinus communis | 61 | 6 | 81 | 6 | 20 | |
| 263 | | 4012 | Rhus | | 1 | | 1 | | |
| 264 | | 4026 | Acer pseudoplatanus | 1 | | 1 | | | |
| 265 | | 4039 | Daucus carota | | 46 | | 46 | | |
| 266 | | 4045 | Apium graveolens | | 14 | | 14 | | |
| 267 | | 4081 | Solanum lycopersicum | 3 | | 3 | | | |
| 268 | | 4097 | Nicotiana tabacum | 5 | | 5 | | | |
| 269 | | 4100 | Nicotiana benthamiana | 5 | | 5 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 271 | | 4146 | Olea europaea | 70 | 19 | 70 | 19 | | |
| 272 | | 4163 | Digitalis | 1 | | 1 | | | |
| 273 | | 4182 | Sesamum indicum | 11 | | 11 | | | |
| 274 | | 4212 | Ambrosia artemisiifolia | 4 | 215 | 4 | 215 | | |
| 275 | | 4214 | Ambrosia trifida | | 10 | | 10 | | |
| 276 | | 4215 | Ambrosia artemisiifolia var. elatior | 9 | 12 | 9 | 12 | | |
| 277 | | 4220 | Artemisia vulgaris | 1 | 70 | 1 | 70 | | |
| 278 | | 4232 | Helianthus annuus | 18 | | 18 | | | |
| 279 | X | 4479 | Poaceae | | | 1 | | 1 | |
| 280 | | 4498 | Avena sativa | | 16 | | 16 | | |
| 281 | | 4509 | Dactylis glomerata | | 12 | | 12 | | |
| 282 | | 4513 | Hordeum vulgare | | 26 | | 26 | | |
| 283 | | 4522 | Lolium perenne | 44 | 123 | 44 | 123 | | |
| 284 | | 4530 | Oryza sativa | 2 | | 2 | | | |
| 285 | | 4545 | Poa pratensis | 34 | 35 | 34 | 35 | | |
| 286 | | 4550 | Secale cereale | 51 | 44 | 51 | 44 | | |
| 287 | | 4558 | Sorghum bicolor | | 1 | | 1 | | |
| 288 | | 4565 | Triticum aestivum | 649 | 583 | 650 | 586 | 1 | 3 |
| 289 | | 4567 | Triticum turgidum subsp. durum | | 1 | | 1 | | |
| 290 | | 4568 | Triticum monococcum | | 1 | | 1 | | |
| 292 | | 4577 | Zea mays | 3 | 1 | 3 | 1 | | |
| 293 | | 4606 | Festuca arundinacea | 1 | | 1 | | | |
| 294 | | 4615 | Ananas comosus | 3 | | 3 | | | |
| 295 | | 4641 | Musa acuminata | 50 | 1 | 50 | 1 | | |
| 296 | | 4751 | Fungi | 2 | | 4 | | 2 | |
| 297 | | 4754 | Pneumocystis carinii | 2 | 1 | 2 | 1 | | |
| 298 | | 4903 | Cyberlindnera jadinii | 12 | | 12 | | | |
| 299 | | 4932 | Saccharomyces cerevisiae | 29 | 14 | 29 | 14 | | |
| 300 | | 5039 | Blastomyces dermatitidis | | 1 | | 1 | | |
| 301 | X | 5052 | Aspergillus | | | 4 | | 4 | |
| 302 | X | 5059 | Aspergillus flavus | | | 6 | | 6 | |
| 303 | X | 5060 | Aspergillus giganteus | | | | 4 | | 4 |
| 304 | | 5061 | Aspergillus niger | | 1 | | 1 | | |
| 305 | | 5064 | Aspergillus restrictus | 1 | | 1 | | | |
| 306 | | 5067 | Aspergillus parasiticus | | 1 | | 1 | | |
| 307 | | 5076 | Penicillium chrysogenum | 45 | 19 | 45 | 19 | | |
| 308 | | 5077 | Penicillium citrinum | 13 | | 13 | | | |
| 309 | | 5141 | Neurospora crassa | 6 | 3 | 6 | 3 | | |
| 310 | | 5207 | Cryptococcus neoformans | 2 | 2 | 2 | 2 | | |
| 311 | | 5334 | Schizophyllum commune | 1 | 1 | 1 | 1 | | |
| 312 | | 5476 | Candida albicans | 108 | 80 | 111 | 80 | 3 | |
| 313 | | 5480 | Candida parapsilosis | 1 | | 1 | | | |
| 314 | | 5501 | Coccidioides immitis | | 1 | | 1 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 315 | | 5503 | Curvularia lunata | 20 | 10 | 20 | 10 | | |
| 316 | X | 5518 | Fusarium graminearum | | | 6 | | 6 | |
| 317 | | 5551 | Trichophyton rubrum | 2 | 27 | 2 | 27 | | |
| 318 | | 5554 | Cutaneotrichosporon cutaneum | 1 | | 1 | | | |
| 319 | | 5599 | Alternaria alternata | 5 | 36 | 6 | 36 | 1 | |
| 320 | | 5658 | Leishmania | 4 | | 4 | | | |
| 321 | | 5659 | Leishmania amazonensis | | 15 | | 15 | | |
| 322 | | 5660 | Leishmania braziliensis | 6 | | 6 | | | |
| 323 | | 5661 | Leishmania donovani | 25 | 84 | 25 | 96 | | 12 |
| 324 | | 5664 | Leishmania major | 25 | 184 | 30 | 184 | 5 | |
| 325 | | 5665 | Leishmania mexicana | 2 | 3 | 3 | 3 | 1 | |
| 326 | | 5667 | Leishmania aethiopica | 16 | | 16 | | | |
| 327 | | 5671 | Leishmania infantum | 102 | 9 | 108 | 9 | 6 | |
| 328 | | 5679 | Leishmania panamensis | 3 | 7 | 3 | 7 | | |
| 329 | | 5682 | Leishmania pifanoi | | 20 | | 20 | | |
| 330 | | 5691 | Trypanosoma brucei | 13 | 6 | 13 | 6 | | |
| 331 | | 5692 | Trypanosoma congolense | 1 | | 1 | | | |
| 332 | | 5693 | Trypanosoma cruzi | 161 | 454 | 164 | 454 | 3 | |
| 333 | | 5702 | Trypanosoma brucei brucei | 5 | | 5 | | | |
| 334 | | 5722 | Trichomonas vaginalis | 75 | 1 | 75 | 1 | | |
| 335 | | 5741 | Giardia intestinalis | 1 | 13 | 1 | 13 | | |
| 336 | | 5755 | Acanthamoeba castellanii | 14 | 3 | 14 | 3 | | |
| 337 | | 5759 | Entamoeba histolytica | 30 | 14 | 30 | 14 | | |
| 338 | | 5801 | Eimeria acervulina | 1 | | 1 | | | |
| 339 | | 5802 | Eimeria tenella | 6 | | 8 | | 2 | |
| 340 | | 5807 | Cryptosporidium parvum | 4 | 31 | 4 | 31 | | |
| 341 | | 5811 | Toxoplasma gondii | 83 | 103 | 85 | 103 | 2 | |
| 342 | | 5820 | Plasmodium | 3 | 4 | 3 | 4 | | |
| 343 | | 5821 | Plasmodium berghei | 14 | 50 | 20 | 50 | 6 | |
| 344 | | 5823 | Plasmodium berghei ANKA | 7 | 65 | 7 | 65 | | |
| 345 | | 5824 | Plasmodium brasilianum | 2 | | 2 | | | |
| 346 | | 5825 | Plasmodium chabaudi | 4 | 4 | 4 | 4 | | |
| 347 | | 5827 | Plasmodium cynomolgi | 2 | | 2 | | | |
| 349 | | 5833 | Plasmodium falciparum | 784 | 813 | 804 | 813 | 20 | |
| 350 | | 5834 | Plasmodium falciparum RO-33 | 8 | 1 | 8 | 1 | | |
| 351 | | 5835 | Plasmodium falciparum CAMP/Malaysia | 36 | 3 | 36 | 3 | | |
| 352 | | 5836 | Plasmodium falciparum CDC/Honduras | 18 | | 18 | | | |
| 353 | | 5837 | Plasmodium falciparum FC27/Papua New Guinea | 47 | 60 | 47 | 60 | | |
| 354 | | 5838 | Plasmodium falciparum FCR-3/Gambia | 94 | | 94 | | | |
| 355 | | 5839 | Plasmodium falciparum K1 | 18 | 19 | 18 | 19 | | |
| 356 | | 5840 | Plasmodium falciparum LE5 | | 2 | | 2 | | |
| 357 | | 5841 | Plasmodium falciparum Mad20/Papua New Guinea | 8 | 47 | 8 | 47 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 358 | | 5842 | Plasmodium falciparum NF7/Ghana | 4 | | 4 | | | |
| 359 | | 5843 | Plasmodium falciparum NF54 | 20 | 31 | 20 | 31 | | |
| 360 | | 5846 | Plasmodium falciparum T4/Thailand | 25 | 1 | 25 | 1 | | |
| 361 | | 5848 | Plasmodium falciparum isolate WELLCOME | 25 | 51 | 25 | 51 | | |
| 362 | | 5850 | Plasmodium knowlesi | 2 | 17 | 2 | 17 | | |
| 363 | | 5851 | Plasmodium knowlesi strain H | 41 | 10 | 41 | 10 | | |
| 364 | | 5852 | Plasmodium knowlesi strain Nuri | | 10 | | 10 | | |
| 365 | | 5855 | Plasmodium vivax | 138 | 176 | 369 | 176 | 231 | |
| 366 | | 5857 | Plasmodium fragile | | 5 | | 5 | | |
| 367 | | 5858 | Plasmodium malariae | 1 | | 1 | | | |
| 368 | | 5861 | Plasmodium yoelii | 17 | 39 | 17 | 39 | | |
| 369 | | 5865 | Babesia bovis | 3 | 8 | 5 | 8 | 2 | |
| 370 | | 5866 | Babesia bigemina | | 3 | | 3 | | |
| 371 | | 5868 | Babesia microti | 5 | | 5 | | | |
| 372 | | 5872 | Theileria equi | 8 | | 8 | | | |
| 373 | | 5874 | Theileria annulata | 1 | | 1 | | | |
| 374 | | 5875 | Theileria parva | 28 | 20 | 28 | 20 | | |
| 376 | | 6035 | Encephalitozoon cuniculi | | 5 | | 5 | | |
| 377 | | 6100 | Aequorea victoria | 3 | 5 | 4 | 5 | 1 | |
| 378 | | 6181 | Schistosoma | 3 | | 3 | | | |
| 379 | | 6182 | Schistosoma japonicum | 43 | 53 | 43 | 53 | | |
| 380 | | 6183 | Schistosoma mansoni | 99 | 52 | 102 | 52 | 3 | |
| 381 | | 6184 | Schistosoma bovis | 2 | | 2 | | | |
| 382 | | 6192 | Fasciola hepatica | 298 | 28 | 300 | 28 | 2 | |
| 383 | | 6203 | Taenia ovis | 8 | | 8 | | | |
| 384 | | 6204 | Taenia solium | 28 | 4 | 29 | 4 | 1 | |
| 385 | | 6206 | Taenia saginata | 13 | | 13 | | | |
| 386 | | 6207 | Taenia crassiceps | 11 | 1 | 11 | 1 | | |
| 387 | | 6210 | Echinococcus granulosus | 41 | 2 | 41 | 2 | | |
| 388 | | 6211 | Echinococcus multilocularis | 6 | | 6 | | | |
| 389 | | 6238 | Caenorhabditis briggsae | 1 | | 1 | | | |
| 390 | | 6239 | Caenorhabditis elegans | 2 | 10 | 2 | 10 | | |
| 392 | | 6253 | Ascaris suum | 1 | 1 | 1 | 1 | | |
| 393 | | 6265 | Toxocara canis | 3 | | 3 | | | |
| 394 | | 6269 | Anisakis simplex | 38 | 28 | 38 | 28 | | |
| 395 | | 6279 | Brugia malayi | 10 | 5 | 10 | 5 | | |
| 396 | | 6280 | Brugia pahangi | 1 | | 1 | | | |
| 397 | | 6282 | Onchocerca volvulus | 3310 | 39 | 4394 | 39 | 1084 | |
| 398 | | 6289 | Haemonchus contortus | 3 | | 3 | | | |
| 399 | | 6293 | Wuchereria bancrofti | 13 | 8 | 13 | 8 | | |
| 400 | | 6299 | Litomosoides carinii | 3 | | 3 | | | |
| 401 | | 6334 | Trichinella spiralis | 16 | 7 | 16 | 7 | | |
| 402 | | 6339 | Heligmosomoides polygyrus | 3 | | 3 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 403 | | 6421 | Hirudo medicinalis | | 3 | | 3 | | |
| 404 | | 6454 | Haliotis rufescens | 1 | | 1 | | | |
| 405 | | 6491 | Conus geographus | 30 | | 30 | | | |
| 406 | | 6492 | Conus magus | 2 | | 2 | | | |
| 407 | | 6493 | Conus striatus | 11 | | 11 | | | |
| 409 | | 6536 | Helix pomatia | 1 | | 1 | | | |
| 410 | | 6594 | Macrocallista nimbosa | 1 | | 1 | | | |
| 411 | | 6661 | Artemia franciscana | 2 | | 2 | | | |
| 412 | | 6687 | Penaeus monodon | 10 | 23 | 10 | 23 | | |
| 413 | | 6689 | Penaeus vannamei | 140 | | 140 | | | |
| 414 | | 6690 | Penaeus aztecus | 51 | 31 | 51 | 31 | | |
| 415 | | 6728 | Procambarus clarkii | 3 | | 3 | | | |
| 416 | | 6761 | Scylla serrata | 13 | | 13 | | | |
| 417 | | 6850 | Limulus polyphemus | | 1 | | 1 | | |
| 418 | | 6853 | Tachypleus tridentatus | 1 | | 1 | | | |
| 419 | | 6858 | Androctonus australis | 9 | | 9 | | | |
| 420 | | 6860 | Androctonus mauritanicus mauritanicus | 1 | | 1 | | | |
| 421 | | 6878 | Centruroides noxius | 10 | | 10 | | | |
| 422 | | 6887 | Tityus serrulatus | 92 | | 92 | | | |
| 423 | | 6925 | Latrodectus tredecimguttatus | | 1 | | 1 | | |
| 424 | | 6938 | Ornithodoros moubata | 20 | | 20 | | | |
| 425 | | 6941 | Rhipicephalus microplus | 1 | | 1 | | | |
| 426 | | 6945 | Ixodes scapularis | 11 | | 11 | | | |
| 427 | | 6953 | Dermatophagoides | | 578 | | 578 | | |
| 428 | | 6954 | Dermatophagoides farinae | 35 | 111 | 41 | 111 | 6 | |
| 429 | | 6956 | Dermatophagoides pteronyssinus | 109 | 300 | 133 | 300 | 24 | |
| 430 | | 6958 | Euroglyphus maynei | | 10 | | 10 | | |
| 431 | | 6973 | Blattella germanica | 23 | 501 | 23 | 501 | | |
| 432 | | 6978 | Periplaneta americana | 22 | 6 | 25 | 6 | 3 | |
| 433 | | 7088 | Lepidoptera | | 1 | | 1 | | |
| 434 | | 7108 | Spodoptera frugiperda | | 4 | | 4 | | |
| 435 | | 7130 | Manduca sexta | | 3 | | 3 | | |
| 436 | | 7137 | Galleria mellonella | 2 | | 2 | | | |
| 437 | | 7154 | Chironomus thummi | 2 | 3 | 2 | 3 | | |
| 438 | | 7155 | Chironomus thummi thummi | 58 | 27 | 58 | 27 | | |
| 439 | | 7160 | Aedes albopictus | 7 | | 7 | | | |
| 440 | | 7165 | Anopheles gambiae | 8 | 2 | 8 | 2 | | |
| 441 | | 7227 | Drosophila melanogaster | 10 | 17 | 11 | 17 | 1 | |
| 442 | | 7234 | Drosophila persimilis | 1 | | 1 | | | |
| 443 | | 7386 | Sarcophaga peregrina | | 1 | | 1 | | |
| 444 | | 7441 | Dolichovespula maculata | 11 | 20 | 11 | 20 | | |
| 445 | | 7444 | Vespa basalis | 1 | | 1 | | | |
| 446 | | 7453 | Vespula maculifrons | 1 | | 1 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 447 | | 7454 | Vespula vulgaris | 2 | 95 | 2 | 95 | | |
| 448 | | 7460 | Apis mellifera | 15 | 106 | 15 | 108 | | 2 |
| 449 | | 7469 | Apis mellifera ligustica | | 1 | | 1 | | |
| 450 | | 7515 | Ctenocephalides felis | | 2 | | 2 | | |
| 451 | | 7719 | Ciona intestinalis | 2 | | 2 | | | |
| 452 | | 7726 | Styela plicata | 6 | | 6 | | | |
| 453 | | 7742 | Vertebrata | 4 | | 4 | | | |
| 454 | | 7777 | Chondrichthyes | 1 | | 1 | | | |
| 455 | | 7787 | Tetronarce californica | 149 | 75 | 151 | 75 | 2 | |
| 456 | | 7788 | Torpedo marmorata | 3 | 3 | 3 | 3 | | |
| 457 | | 7955 | Danio rerio | 2 | 3 | 2 | 3 | | |
| 458 | | 7957 | Carassius auratus | 3 | 1 | 3 | 1 | | |
| 459 | | 7962 | Cyprinus carpio | 4 | 1 | 6 | 1 | 2 | |
| 460 | | 8005 | Electrophorus electricus | 4 | | 4 | | | |
| 461 | | 8018 | Oncorhynchus keta | | 6 | | 6 | | |
| 462 | | 8022 | Oncorhynchus mykiss | 1 | | 1 | | | |
| 463 | | 8030 | Salmo salar | 31 | | 35 | | 4 | |
| 464 | | 8049 | Gadus morhua | 43 | | 44 | | 1 | |
| 465 | | 8053 | Gadus morhua callarias | 10 | | 10 | | | |
| 466 | | 8090 | Oryzias latipes | 2 | 1 | 2 | 1 | | |
| 467 | | 8255 | Paralichthys olivaceus | 1 | | 1 | | | |
| 468 | X | 8342 | Anura | | | 1 | | 1 | |
| 469 | | 8355 | Xenopus laevis | 4 | 3 | 4 | 3 | | |
| 470 | | 8364 | Xenopus tropicalis | 2 | 2 | 2 | 2 | | |
| 471 | | 8554 | Heloderma suspectum | | 1 | | 1 | | |
| 472 | | 8613 | Bungarus fasciatus | 1 | | 1 | | | |
| 473 | | 8616 | Bungarus multicinctus | 17 | 3 | 17 | 3 | | |
| 474 | | 8620 | Dendroaspis polylepis polylepis | 22 | | 22 | | | |
| 475 | | 8654 | Naja nigricollis | 3 | 2 | 3 | 2 | | |
| 477 | | 8656 | Naja atra | 14 | | 14 | | | |
| 478 | | 8657 | Naja oxiana | 4 | | 4 | | | |
| 479 | | 8658 | Naja pallida | 1 | 1 | 1 | 1 | | |
| 480 | | 8663 | Notechis scutatus | 2 | | 2 | | | |
| 481 | | 8667 | Oxyuranus scutellatus scutellatus | 4 | | 4 | | | |
| 482 | | 8671 | Pseudechis porphyriacus | 3 | | 3 | | | |
| 483 | | 8704 | Vipera ammodytes | 1 | | 1 | | | |
| 484 | | 8722 | Bothrops asper | 1 | | 28 | | 27 | |
| 485 | X | 8724 | Bothrops jararaca | | | 5 | | 5 | |
| 486 | | 8725 | Bothrops atrox | 13 | | 13 | | | |
| 487 | | 8726 | Bothrops jararacussu | 13 | | 13 | | | |
| 488 | | 8732 | Crotalus durissus terrificus | 4 | | 4 | | | |
| 489 | | 8753 | Lachesis muta muta | 45 | | 45 | | | |
| 490 | | 8801 | Struthio camelus | 2 | | 2 | | | |

|  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|
| 491 |  | 8839 | Anas platyrhynchos | 2 |  | 2 |  |  |  |
| 492 |  | 8845 | Anser cygnoides | 2 |  | 2 |  |  |  |
| 493 |  | 8855 | Cairina moschata | 2 | 1 | 2 | 1 |  |  |
| 494 |  | 8932 | Columba livia |  | 10 |  | 10 |  |  |
| 495 |  | 8996 | Numida meleagris | 1 |  | 1 |  |  |  |
| 496 |  | 9014 | Colinus virginianus | 1 | 3 | 1 | 3 |  |  |
| 497 |  | 9031 | Gallus gallus | 338 | 346 | 340 | 371 | 2 | 25 |
| 498 |  | 9057 | Phasianus colchicus colchicus | 1 |  | 1 |  |  |  |
| 500 |  | 9103 | Meleagris gallopavo | 6 |  | 6 |  |  |  |
| 501 |  | 9258 | Ornithorhynchus anatinus |  | 1 |  | 1 |  |  |
| 502 |  | 9322 | Macropus sp. | 1 |  | 1 |  |  |  |
| 503 |  | 9337 | Trichosurus vulpecula | 45 |  | 45 |  |  |  |
| 504 |  | 9397 | Chiroptera | 1 |  | 1 |  |  |  |
| 506 |  | 9447 | Lemur catta | 1 |  | 1 |  |  |  |
| 507 |  | 9479 | Platyrrhini | 1 |  | 1 |  |  |  |
| 508 |  | 9483 | Callithrix jacchus | 1 | 4 | 1 | 4 |  |  |
| 509 |  | 9488 | Saguinus mystax | 1 |  | 1 |  |  |  |
| 510 |  | 9491 | Saguinus imperator | 1 |  | 1 |  |  |  |
| 511 |  | 9502 | Alouatta caraya | 1 |  | 1 |  |  |  |
| 512 |  | 9505 | Aotus trivirgatus | 1 |  | 1 |  |  |  |
| 513 |  | 9509 | Ateles geoffroyi |  | 1 |  | 1 |  |  |
| 514 |  | 9510 | Ateles paniscus | 1 |  | 1 |  |  |  |
| 515 |  | 9511 | Ateles sp. | 1 |  | 1 |  |  |  |
| 516 |  | 9515 | Sapajus apella | 1 |  | 1 |  |  |  |
| 517 |  | 9519 | Lagothrix lagotricha | 1 |  | 1 |  |  |  |
| 518 |  | 9521 | Saimiri sciureus | 1 |  | 1 |  |  |  |
| 519 |  | 9534 | Chlorocebus aethiops |  | 5 |  | 5 |  |  |
| 520 |  | 9538 | Erythrocebus patas |  | 1 |  | 1 |  |  |
| 521 |  | 9541 | Macaca fascicularis | 3 | 3 | 3 | 3 |  |  |
| 522 |  | 9544 | Macaca mulatta | 3 | 5 | 3 | 5 |  |  |
| 523 |  | 9548 | Macaca radiata | 14 | 1 | 14 | 1 |  |  |
| 524 |  | 9555 | Papio anubis | 1 |  | 1 |  |  |  |
| 525 |  | 9556 | Papio cynocephalus | 1 |  | 1 |  |  |  |
| 526 |  | 9580 | Hylobates lar |  | 1 |  | 1 |  |  |
| 527 |  | 9593 | Gorilla gorilla |  | 2 |  | 2 |  |  |
| 528 |  | 9595 | Gorilla gorilla gorilla |  | 6 |  | 6 |  |  |
| 529 |  | 9597 | Pan paniscus |  | 1 |  | 1 |  |  |
| 530 |  | 9598 | Pan troglodytes | 7 | 25 | 7 | 25 |  |  |
| 531 |  | 9600 | Pongo pygmaeus |  | 2 |  | 2 |  |  |
| 532 |  | 9601 | Pongo abelii |  | 2 |  | 2 |  |  |
| 533 |  | 9606 | Homo sapiens | 9022 | 298254 | 9639 | 368772 | 617 | 70518 |
| 534 |  | 9615 | Canis lupus familiaris | 17 | 1575 | 19 | 1937 | 2 | 362 |
| 535 |  | 9627 | Vulpes vulpes | 1 |  | 1 |  |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 536 | | 9666 | Mustela lutreola | 1 | | 1 | | | |
| 537 | | 9685 | Felis catus | 40 | 99 | 42 | 117 | 2 | 18 |
| 538 | | 9721 | Cetacea | 1 | | 1 | | | |
| 539 | | 9755 | Physeter catodon | 1 | 34 | 1 | 34 | | |
| 540 | | 9796 | Equus caballus | 54 | 55 | 54 | 57 | | 2 |
| 541 | | 9798 | Equus przewalskii | | 1 | | 1 | | |
| 542 | | 9823 | Sus scrofa | 115 | 53 | 121 | 55 | 6 | 2 |
| 543 | | 9825 | Sus scrofa domesticus | | 5 | | 5 | | |
| 544 | | 9844 | Lama glama | 1 | | 1 | | | |
| 545 | | 9860 | Cervus elaphus | 6 | | 6 | | | |
| 546 | | 9864 | Cervus canadensis nelsoni | 5 | | 5 | | | |
| 547 | | 9874 | Odocoileus virginianus | 2 | | 2 | | | |
| 548 | | 9913 | Bos taurus | 1320 | 843 | 1338 | 855 | 18 | 12 |
| 549 | | 9925 | Capra hircus | 11 | | 11 | | | |
| 550 | | 9940 | Ovis aries | 95 | 17 | 95 | 17 | | |
| 551 | | 9978 | Ochotona princeps | | 1 | | 1 | | |
| 552 | | 9986 | Oryctolagus cuniculus | 66 | 10 | 67 | 10 | 1 | |
| 553 | | 10029 | Cricetulus griseus | 9 | | 9 | | | |
| 554 | | 10036 | Mesocricetus auratus | 58 | | 58 | | | |
| 555 | X | 10042 | Peromyscus maniculatus | | | | 1 | | 1 |
| 556 | | 10090 | Mus musculus | 699 | 20365 | 716 | 22929 | 17 | 2564 |
| 557 | | 10092 | Mus musculus domesticus | | 12 | | 12 | | |
| 558 | | 10095 | Mus sp. | 1 | | 1 | | | |
| 559 | | 10114 | Rattus | 11 | | 11 | | | |
| 560 | | 10116 | Rattus norvegicus | 267 | 33167 | 279 | 33168 | 12 | 1 |
| 562 | | 10118 | Rattus sp. | | 1 | | 1 | | |
| 563 | | 10141 | Cavia porcellus | 37 | 79 | 37 | 87 | | 8 |
| 564 | | 10243 | Cowpox virus | | 25 | | 26 | | 1 |
| 565 | | 10244 | Monkeypox virus | 5 | 2 | 5 | 2 | | |
| 566 | | 10245 | Vaccinia virus | 11 | 547 | 11 | 610 | | 63 |
| 567 | | 10247 | Vaccinia virus WR 65-16 | | 4 | | 4 | | |
| 568 | | 10248 | Vaccinia virus LC16M8 | | 5 | | 5 | | |
| 569 | | 10249 | Vaccinia virus Copenhagen | 31 | 846 | 31 | 846 | | |
| 570 | | 10251 | Vaccinia virus IHD-J | 1 | | 1 | | | |
| 571 | | 10253 | Vaccinia virus Tian Tan | | 21 | | 21 | | |
| 572 | | 10254 | Vaccinia virus WR | 31 | 6689 | 31 | 6822 | | 133 |
| 573 | | 10255 | Variola virus | | 248 | | 248 | | |
| 574 | X | 10258 | Orf virus | | | 1 | | 1 | |
| 575 | | 10261 | Fowlpox virus | | 7 | | 7 | | |
| 576 | | 10263 | Fowlpox virus isolate HP-438/Munich | | 1 | | 1 | | |
| 577 | | 10273 | Myxoma virus | | 4 | | 4 | | |
| 578 | | 10276 | Swinepox virus | | 2 | | 2 | | |
| 579 | | 10292 | Herpesviridae | | 1 | | 1 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 580 | | 10298 | Human alphaherpesvirus 1 | 181 | 181 | 181 | 585 | | 404 |
| 581 | | 10299 | Human alphaherpesvirus 1 strain 17 | 44 | 46 | 44 | 46 | | |
| 582 | | 10301 | Human alphaherpesvirus 1 strain Angelotti | | 4 | | 4 | | |
| 583 | | 10303 | Human alphaherpesvirus 1 strain HFEM | 2 | | 2 | | | |
| 584 | | 10304 | Human alphaherpesvirus 1 strain F | 17 | 5 | 17 | 5 | | |
| 585 | | 10306 | Human alphaherpesvirus 1 strain KOS | 17 | 4 | 17 | 4 | | |
| 586 | | 10308 | Human alphaherpesvirus 1 strain Patton | 3 | | 3 | | | |
| 587 | | 10309 | Human alphaherpesvirus 1 strain SC16 | 5 | 2 | 5 | 2 | | |
| 588 | | 10310 | Human alphaherpesvirus 2 | 295 | 226 | 295 | 229 | | 3 |
| 589 | | 10312 | Human herpesvirus 2 strain 186 | 1 | 1 | 1 | 1 | | |
| 590 | | 10313 | Human herpesvirus 2 strain 333 | 2 | 5 | 2 | 5 | | |
| 591 | | 10315 | Human herpesvirus 2 strain HG52 | | 31 | | 32 | | 1 |
| 592 | | 10317 | Cercopithecine alphaherpesvirus 2 | | 1 | | 1 | | |
| 593 | | 10320 | Bovine alphaherpesvirus 1 | 5 | 40 | 6 | 40 | 1 | |
| 594 | | 10323 | Bovine herpesvirus type 1.1 (strain Cooper) | 9 | 17 | 9 | 17 | | |
| 595 | | 10324 | Bovine herpesvirus type 1.1 (strain P8-2) | 1 | | 1 | | | |
| 596 | | 10325 | Macacine alphaherpesvirus 1 | 1 | | 366 | | 365 | |
| 597 | | 10326 | Equid alphaherpesvirus 1 | 7 | 218 | 7 | 218 | | |
| 598 | | 10331 | Equid alphaherpesvirus 4 | 6 | | 6 | | | |
| 599 | | 10335 | Human alphaherpesvirus 3 | 10 | 127 | 10 | 132 | | 5 |
| 600 | | 10338 | Human herpesvirus 3 strain Dumas | | 29 | | 29 | | |
| 601 | | 10345 | Suid alphaherpesvirus 1 | 7 | 2 | 13 | 3 | 6 | 1 |
| 602 | | 10349 | Suid herpesvirus 1 (strain NIA-3) | 4 | | 4 | | | |
| 603 | | 10359 | Human betaherpesvirus 5 | 119 | 613 | 123 | 626 | 4 | 13 |
| 604 | | 10360 | Human herpesvirus 5 strain AD169 | 233 | 432 | 233 | 456 | | 24 |
| 605 | | 10363 | Human herpesvirus 5 strain Towne | 94 | 26 | 94 | 26 | | |
| 606 | | 10366 | Murid betaherpesvirus 1 | 2 | 64 | 2 | 64 | | |
| 607 | | 10367 | Murine cytomegalovirus (strain Smith) | | 32 | | 32 | | |
| 609 | | 10369 | Human herpesvirus 6 (strain GS) | 2 | | 2 | | | |
| 610 | | 10370 | Human herpesvirus 6 (strain Uganda-1102) | 2 | 4 | 2 | 4 | | |
| 611 | | 10372 | Human betaherpesvirus 7 | 2 | 4 | 2 | 4 | | |
| 612 | | 10373 | Macaca mulatta cytomegalovirus | | 76 | | 76 | | |
| 613 | | 10376 | Human gammaherpesvirus 4 | 2324 | 632 | 2362 | 659 | 38 | 27 |
| 614 | | 10377 | Human herpesvirus 4 strain B95-8 | 181 | 355 | 187 | 355 | 6 | |
| 615 | | 10378 | Human herpesvirus 4 strain RAJI | 1 | | 1 | | | |
| 616 | | 10381 | Saimiriine gammaherpesvirus 2 | | 3 | | 3 | | |
| 617 | | 10390 | Gallid alphaherpesvirus 2 | | 1 | | 1 | | |
| 618 | | 10407 | Hepatitis B virus | 267 | 645 | 277 | 712 | 10 | 67 |
| 619 | | 10408 | Hepatitis B virus subtype adw2 | 82 | 61 | 82 | 61 | | |
| 620 | | 10409 | Hepatitis B virus adr4 | | 13 | | 13 | | |
| 621 | | 10410 | Hepatitis B virus adw/991 | 2 | 2 | 2 | 2 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 622 |  | 10411 | Hepatitis B virus alpha1 |  | 24 |  | 24 |  |  |
| 623 |  | 10412 | Hepatitis B virus adw/Indonesia/PIDW420 |  | 3 |  | 3 |  |  |
| 624 |  | 10414 | Hepatitis B virus LSH/chimpanzee |  | 2 |  | 2 |  |  |
| 625 |  | 10415 | Hepatitis B virus adw/Okinawa/PODW282 |  | 5 |  | 5 |  |  |
| 626 |  | 10418 | Hepatitis B virus subtype ayw | 57 | 185 | 57 | 185 |  |  |
| 627 |  | 10419 | Hepatitis B virus subtype adyw | 4 | 45 | 4 | 45 |  |  |
| 628 |  | 10430 | Woodchuck hepatitis virus 1 | 3 |  | 3 |  |  |  |
| 629 |  | 10433 | Woodchuck hepatitis virus 8 |  | 34 |  | 34 |  |  |
| 630 |  | 10479 | Thermoproteus tenax virus 1 | 1 |  | 1 |  |  |  |
| 631 |  | 10497 | African swine fever virus | 5 |  | 5 | 26 |  | 26 |
| 632 |  | 10498 | African swine fever virus BA71V | 46 |  | 55 |  | 9 |  |
| 633 |  | 10515 | Human adenovirus 2 | 28 | 16 | 28 | 16 |  |  |
| 634 |  | 10519 | Human adenovirus 7 | 4 |  | 4 |  |  |  |
| 635 |  | 10521 | Human adenovirus 14 | 4 |  | 4 |  |  |  |
| 636 |  | 10524 | Human adenovirus 41 | 1 |  | 1 |  |  |  |
| 637 |  | 10529 | Human adenovirus 31 |  | 7 |  | 7 |  |  |
| 638 |  | 10530 | Murine adenovirus 1 | 1 | 2 | 1 | 2 |  |  |
| 639 |  | 10533 | Human adenovirus 1 |  | 1 |  | 1 |  |  |
| 640 |  | 10541 | Human adenovirus 11 |  | 12 |  | 12 |  |  |
| 641 |  | 10560 | Bovine papillomavirus type 2 | 15 |  | 15 |  |  |  |
| 642 |  | 10562 | Bovine papillomavirus type 4 | 10 | 3 | 10 | 3 |  |  |
| 643 |  | 10566 | Human papillomavirus | 3 | 1 | 3 | 1 |  |  |
| 644 |  | 10573 | Human papillomavirus type 13 | 1 | 1 | 1 | 1 |  |  |
| 646 |  | 10580 | Human papillomavirus type 11 | 9 | 43 | 9 | 43 |  |  |
| 647 |  | 10583 | Human papillomavirus type 1a | 8 | 15 | 8 | 15 |  |  |
| 648 |  | 10585 | Human papillomavirus type 31 | 13 | 7 | 13 | 7 |  |  |
| 649 |  | 10586 | Human papillomavirus type 33 | 6 | 9 | 6 | 9 |  |  |
| 650 |  | 10587 | Human papillomavirus type 35 | 1 | 1 | 1 | 1 |  |  |
| 651 |  | 10588 | Human papillomavirus type 39 | 1 | 1 | 1 | 1 |  |  |
| 652 |  | 10589 | Human papillomavirus type 41 |  | 1 |  | 1 |  |  |
| 653 |  | 10592 | Human papillomavirus type 44 |  | 1 |  | 1 |  |  |
| 654 |  | 10593 | Human papillomavirus type 45 | 2 | 9 | 2 | 9 |  |  |
| 655 |  | 10595 | Human papillomavirus type 51 | 1 | 1 | 1 | 1 |  |  |
| 656 |  | 10596 | Human papillomavirus type 56 | 1 | 5 | 1 | 5 |  |  |
| 657 |  | 10598 | Human papillomavirus type 58 | 49 | 34 | 49 | 34 |  |  |
| 658 |  | 10600 | Human papillomavirus type 6b | 11 | 29 | 11 | 29 |  |  |
| 659 |  | 10611 | Human papillomavirus type 30 | 1 |  | 1 |  |  |  |
| 660 |  | 10614 | Human papillomavirus 3 |  | 3 |  | 3 |  |  |
| 661 |  | 10615 | Human papillomavirus type 40 | 1 | 1 | 1 | 1 |  |  |
| 662 |  | 10617 | Human papillomavirus 4 |  | 4 |  | 4 |  |  |
| 663 |  | 10618 | Human papillomavirus type 52 | 1 | 36 | 1 | 36 |  |  |
| 664 |  | 10620 | Human papillomavirus type 7 | 1 | 3 | 1 | 3 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 665 | | 10623 | Kappapapillomavirus 2 | 5 | 7 | 5 | 7 | | |
| 666 | | 10631 | BK virus strain AS | | 1 | | 1 | | |
| 667 | | 10632 | JC polyomavirus | 9 | 78 | 9 | 78 | | |
| 668 | | 10636 | Murine polyomavirus strain A2 | | 3 | | 3 | | |
| 669 | | 10638 | Kilham polyomavirus | | 1 | | 1 | | |
| 670 | | 10665 | Escherichia virus T4 | 10 | 20 | 10 | 20 | | |
| 671 | X | 10678 | Escherichia virus P1 | | | | 6 | | 6 |
| 672 | X | 10703 | Corynephage beta | | | 2 | | 2 | |
| 673 | | 10710 | Escherichia virus Lambda | | 6 | | 6 | | |
| 674 | | 10754 | Salmonella virus P22 | 5 | | 5 | | | |
| 675 | | 10760 | Escherichia phage T7 | 1 | | 1 | | | |
| 676 | | 10783 | Aleutian mink disease parvovirus (STRAIN G) | 3 | | 3 | | | |
| 677 | | 10786 | Feline panleukopenia virus | | 4 | | 4 | | |
| 678 | | 10788 | Canine parvovirus | 23 | 20 | 23 | 20 | | |
| 679 | | 10790 | Canine parvovirus strain CPV-D CORNELL 320 | 1 | | 1 | | | |
| 680 | | 10791 | Canine parvovirus strain N | 47 | | 47 | | | |
| 681 | | 10793 | Mink enteritis virus strain Abashiri | 1 | | 1 | | | |
| 682 | | 10796 | Porcine parvovirus | 40 | | 40 | | | |
| 683 | | 10798 | Human parvovirus B19 | 93 | 44 | 94 | 44 | 1 | |
| 684 | | 10804 | Adeno-associated virus - 2 | 42 | 153 | 42 | 153 | | |
| 685 | | 10847 | Escherichia virus phiX174 | 1 | | 1 | | | |
| 686 | | 10863 | Enterobacteria phage f1 | 1 | 1 | 1 | 1 | | |
| 687 | | 10864 | Enterobacteria phage fd | 7 | 1 | 7 | 1 | | |
| 688 | | 10879 | Pseudomonas virus phi6 | 7 | | 7 | | | |
| 689 | | 10884 | Mammalian orthoreovirus 1 Lang | 3 | | 3 | | | |
| 690 | | 10886 | Mammalian orthoreovirus 3 Dearing | 1 | | 1 | | | |
| 691 | | 10891 | Reovirus sp. | | 2 | | 2 | | |
| 692 | | 10900 | Bluetongue virus (serotype 10 / American isolate) | 3 | | 3 | | | |
| 693 | | 10903 | Bluetongue virus 17 | 4 | | 4 | | | |
| 694 | | 10904 | Bluetongue virus (serotype 1 / isolate Australia) | 7 | | 7 | | | |
| 695 | | 10906 | Bluetongue virus 10 | 3 | | 3 | | | |
| 696 | | 10915 | Porcine rotavirus serotype 5/strain OSU | 1 | | 1 | | | |
| 697 | | 10917 | Porcine rotavirus strain Gottfried | 2 | | 2 | | | |
| 698 | | 10919 | Porcine rotavirus strain YM | 2 | 1 | 2 | 1 | | |
| 699 | | 10923 | Simian rotavirus A/SA11 | 8 | 5 | 8 | 5 | | |
| 700 | | 10927 | Bovine rotavirus | 9 | 1 | 9 | 1 | | |
| 701 | | 10933 | Bovine rotavirus strain RF | 12 | 7 | 12 | 7 | | |
| 702 | | 10934 | Bovine rotavirus strain UK/G6 | | 1 | | 1 | | |
| 703 | | 10941 | Human rotavirus A | 14 | 84 | 14 | 84 | | |
| 704 | | 10950 | Human rotavirus (SEROTYPE 2 / STRAIN DS1) | 1 | | 1 | | | |
| 705 | | 10952 | Human rotavirus strain KU | 9 | | 9 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 706 |  | 10957 | Human rotavirus strain P | 1 | 4 | 1 | 4 |  |  |
| 707 |  | 10958 | Human rotavirus strain RRV | 1 |  | 1 |  |  |  |
| 708 |  | 10960 | Human rotavirus G4 strain St. Thomas 3 | 6 |  | 6 |  |  |  |
| 709 |  | 10962 | Human rotavirus strain WA | 10 | 7 | 10 | 7 |  |  |
| 710 |  | 10995 | Infectious bursal disease virus | 12 |  | 12 |  |  |  |
| 711 |  | 10996 | Infectious bursal disease virus 52/70 |  | 10 |  | 10 |  |  |
| 712 |  | 10997 | Infectious bursal disease virus 002-73/AUS | 1 |  | 1 |  |  |  |
| 713 |  | 11002 | Infectious pancreatic necrosis virus | 1 |  | 1 |  |  |  |
| 714 |  | 11021 | Eastern equine encephalitis virus | 42 | 2 | 47 | 2 | 5 |  |
| 715 |  | 11022 | Eastern equine encephalitis virus (STRAIN VA33[TEN BROECK]) |  | 1 |  | 1 |  |  |
| 716 |  | 11029 | Ross River virus |  | 1 |  | 1 |  |  |
| 717 |  | 11032 | Ross river virus (STRAIN T48) | 3 |  | 3 |  |  |  |
| 718 |  | 11033 | Semliki Forest virus | 36 | 5 | 36 | 5 |  |  |
| 719 |  | 11034 | Sindbis virus | 26 |  | 26 |  |  |  |
| 720 |  | 11036 | Venezuelan equine encephalitis virus | 2 | 5 | 2 | 5 |  |  |
| 721 |  | 11037 | Venezuelan equine encephalitis virus (strain TC-83) | 25 |  | 25 |  |  |  |
| 722 |  | 11038 | Venezuelan equine encephalitis virus (strain Trinidad donkey) | 15 |  | 15 |  |  |  |
| 723 |  | 11039 | Western equine encephalitis virus |  | 1 |  | 1 |  |  |
| 724 |  | 11041 | Rubella virus | 81 | 100 | 81 | 100 |  |  |
| 725 |  | 11043 | Rubella virus strain M33 | 3 | 11 | 3 | 11 |  |  |
| 726 |  | 11044 | Rubella virus vaccine strain RA27/3 | 2 | 6 | 2 | 6 |  |  |
| 727 |  | 11045 | Rubella virus strain Therien | 20 | 35 | 20 | 35 |  |  |
| 728 |  | 11047 | Equine arteritis virus | 3 |  | 3 |  |  |  |
| 729 |  | 11048 | Lactate dehydrogenase-elevating virus | 14 |  | 14 |  |  |  |
| 730 |  | 11049 | Lelystad virus | 66 | 12 | 66 | 12 |  |  |
| 731 |  | 11053 | Dengue virus 1 | 51 | 559 | 90 | 625 | 39 | 66 |
| 732 |  | 11057 | Dengue virus 1 Thailand/AHF 82-80/1980 |  | 1 |  | 1 |  |  |
| 733 |  | 11059 | Dengue virus 1 Nauru/West Pac/1974 | 4 | 50 | 4 | 50 |  |  |
| 734 |  | 11060 | Dengue virus 2 | 184 | 713 | 191 | 739 | 7 | 26 |
| 735 |  | 11062 | Dengue virus 2 Malaysia M2 | 1 |  | 1 |  |  |  |
| 736 |  | 11064 | Dengue virus 2 Jamaica/1409/1983 | 264 | 1254 | 264 | 1254 |  |  |
| 737 |  | 11065 | Dengue virus 2 Thailand/NGS-C/1944 | 20 | 37 | 20 | 146 |  | 109 |
| 738 |  | 11066 | Dengue virus 2 Puerto Rico/PR159-S1/1969 | 32 | 21 | 32 | 21 |  |  |
| 739 |  | 11067 | Dengue virus 2 Tonga/EKB194/1974 |  | 3 |  | 3 |  |  |
| 740 |  | 11069 | Dengue virus 3 | 76 | 621 | 129 | 674 | 53 | 53 |
| 741 |  | 11070 | Dengue virus 4 | 80 | 429 | 83 | 461 | 3 | 32 |
| 742 |  | 11072 | Japanese encephalitis virus | 49 | 143 | 49 | 143 |  |  |
| 743 |  | 11073 | Japanese encephalitis virus strain SA-14 | 6 | 1 | 6 | 1 |  |  |
| 744 |  | 11075 | Japanese encephalitis virus strain JAOARS982 | 4 | 4 | 4 | 4 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 745 | | 11076 | Japanese encephalitis virus strain Nakayama | 2 | 2 | 2 | 2 | | |
| 746 | | 11077 | Kunjin virus | 12 | 1 | 12 | 1 | | |
| 747 | | 11078 | Kunjin virus (STRAIN MRM61C) | | 4 | | 4 | | |
| 748 | | 11079 | Murray Valley encephalitis virus | 21 | 9 | 21 | 9 | | |
| 749 | | 11080 | Saint Louis encephalitis virus | 9 | 1 | 9 | 1 | | |
| 750 | | 11081 | St. Louis encephalitis virus (strain MS1-7) | 7 | | 7 | | | |
| 751 | | 11082 | West Nile virus | 51 | 442 | 51 | 442 | | |
| 752 | | 11083 | Powassan virus | 1 | 3 | 1 | 3 | | |
| 753 | | 11084 | Tick-borne encephalitis virus | 14 | 137 | 18 | 146 | 4 | 9 |
| 754 | | 11085 | Langat virus | | 1 | | 1 | | |
| 755 | X | 11086 | Louping ill virus | | | 1 | | 1 | |
| 756 | | 11087 | Tick-borne encephalitis virus (STRAIN SOFJIN) | 6 | | 6 | | | |
| 757 | | 11089 | Yellow fever virus | | 1352 | | 1352 | | |
| 758 | | 11090 | Yellow fever virus 17D | | 364 | 2 | 364 | 2 | |
| 759 | | 11092 | Kumlinge virus | 26 | | 26 | | | |
| 760 | | 11096 | Classical swine fever virus | 15 | 4 | 15 | 4 | | |
| 761 | | 11098 | Classical swine fever virus - Brescia | 4 | | 4 | | | |
| 762 | | 11099 | Bovine viral diarrhea virus 1 | 1 | 12 | 1 | 12 | | |
| 763 | | 11100 | Bovine viral diarrhea virus 1-NADL | 4 | 3 | 4 | 3 | | |
| 764 | | 11103 | Hepacivirus C | 682 | 1129 | 693 | 1147 | 11 | 18 |
| 765 | | 11104 | Hepatitis C virus (isolate 1) | 37 | 256 | 37 | 256 | | |
| 766 | | 11105 | Hepatitis C virus (isolate BK) | 3 | 90 | 3 | 90 | | |
| 767 | | 11108 | Hepatitis C virus (isolate H) | 161 | 84 | 163 | 84 | 2 | |
| 768 | | 11110 | Hepatitis C virus HCT18 | 1 | | 1 | | | |
| 769 | | 11113 | Hepatitis C virus isolate HC-J6 | 8 | 3 | 8 | 3 | | |
| 770 | | 11115 | Hepatitis C virus isolate HC-J8 | 1 | 1 | 1 | 1 | | |
| 771 | | 11116 | Hepatitis C virus (isolate Japanese) | 6 | 19 | 6 | 19 | | |
| 772 | | 11120 | Infectious bronchitis virus | 10 | 5 | 10 | 5 | | |
| 773 | | 11127 | Avian infectious bronchitis virus (strain M41) | 4 | 3 | 4 | 3 | | |
| 774 | | 11128 | Bovine coronavirus | 7 | | 7 | | | |
| 775 | | 11137 | Human coronavirus 229E | | 2 | | 2 | | |
| 776 | | 11138 | Murine hepatitis virus | 3 | 31 | 3 | 31 | | |
| 777 | | 11142 | Murine hepatitis virus strain A59 | 26 | 4 | 26 | 4 | | |
| 778 | | 11144 | Murine hepatitis virus strain JHM | 25 | 21 | 25 | 21 | | |
| 779 | | 11149 | Transmissible gastroenteritis virus | 15 | 1 | 15 | 1 | | |
| 780 | | 11150 | Porcine transmissible gastroenteritis coronavirus strain FS772/70 | 2 | | 2 | | | |
| 781 | | 11151 | Porcine transmissible gastroenteritis coronavirus strain Purdue | 14 | | 14 | | | |
| 782 | | 11152 | Turkey coronavirus | 1 | | 1 | | | |
| 783 | | 11169 | Mumps virus strain Kilham | 1 | | 1 | | | |
| 784 | | 11173 | Mumps virus strain SBL-1 | 6 | | 6 | | | |
| 785 | | 11176 | Avian avulavirus 1 | 20 | 5 | 21 | 5 | 1 | |

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|---|---|---|---|---|---|---|---|---|---|
| 786 | | 11177 | Newcastle disease virus (STRAIN AUSTRALIA-VICTORIA/32) | 4 | | 4 | | | |
| 787 | | 11178 | Newcastle disease virus strain Beaudette C/45 | 12 | | 12 | | | |
| 788 | | 11180 | Newcastle disease virus strain D26/76 | 4 | | 4 | | | |
| 789 | | 11186 | Newcastle disease virus strain Queensland/66 | 4 | | 4 | | | |
| 790 | | 11191 | Murine respirovirus | 63 | 10 | 63 | 10 | | |
| 791 | | 11194 | Sendai virus (strain Enders) | 7 | 11 | 7 | 11 | | |
| 792 | | 11195 | Sendai virus (strain Fushimi) | | 1 | | 1 | | |
| 793 | | 11196 | Sendai virus (strain Harris) | 2 | | 2 | | | |
| 794 | | 11198 | Sendai virus (Z) | | 1 | | 2 | | 1 |
| 795 | | 11214 | Human parainfluenza virus 2 (strain Toshiba) | 3 | | 3 | | | |
| 796 | | 11215 | Bovine respirovirus 3 | 3 | 1 | 3 | 1 | | |
| 797 | | 11216 | Human respirovirus 3 | 2 | | 3 | | 1 | |
| 798 | | 11217 | Human parainfluenza 3 virus (strain NIH 47885) | 8 | | 8 | | | |
| 799 | | 11232 | Canine morbillivirus | 14 | 9 | 14 | 9 | | |
| 800 | | 11233 | Canine distemper virus strain Onderstepoort | 6 | 34 | 6 | 34 | | |
| 801 | | 11234 | Measles morbillivirus | 64 | 39 | 64 | 39 | | |
| 802 | | 11235 | Measles virus strain Edmonston | 167 | 210 | 167 | 210 | | |
| 803 | | 11236 | Measles virus strain Halle | | 34 | | 34 | | |
| 804 | | 11241 | Rinderpest morbillivirus | 2 | 3 | 2 | 3 | | |
| 805 | | 11243 | Rinderpest virus (strain L) | 6 | | 6 | | | |
| 806 | | 11246 | Bovine orthopneumovirus | 3 | 2 | 3 | 2 | | |
| 807 | | 11249 | Bovine respiratory syncytial virus (strain RB94) | 4 | | 4 | | | |
| 808 | | 11250 | Human orthopneumovirus | 34 | 206 | 35 | 207 | 1 | 1 |
| 809 | | 11251 | Human respiratory syncytial virus (subgroup B / strain 18537) | 2 | 1 | 2 | 1 | | |
| 810 | | 11252 | Human respiratory syncytial virus (strain RSB642) | 2 | | 2 | | | |
| 812 | | 11255 | Human respiratory syncytial virus (strain RSB6190) | 6 | | 6 | | | |
| 813 | | 11256 | Human respiratory syncytial virus (strain RSB6256) | 11 | | 11 | | | |
| 814 | | 11259 | Human respiratory syncytial virus A2 | 91 | 136 | 94 | 211 | 3 | 75 |
| 815 | | 11260 | Human respiratory syncytial virus A strain Long | 128 | 31 | 129 | 31 | 1 | |
| 816 | | 11263 | Murine orthopneumovirus | | 14 | | 14 | | |
| 817 | | 11269 | Marburg marburgvirus | 5 | 95 | 5 | 104 | | 9 |
| 818 | | 11276 | Vesicular stomatitis virus | | 10 | | 10 | | |
| 819 | | 11277 | Vesicular stomatitis Indiana virus | 9 | 7 | 9 | 7 | | |
| 820 | | 11278 | Vesicular stomatitis Indiana virus strain Glasgow | | 1 | | 1 | | |
| 821 | | 11279 | Vesicular stomatitis Indiana virus strain Mudd-Summers | 1 | | 1 | | | |
| 823 | | 11285 | Vesicular stomatitis Indiana virus strain San Juan | | 1 | | 1 | | |
| 824 | | 11288 | Viral hemorrhagic septicemia virus 07-71 | 12 | 1 | 12 | 1 | | |
| 825 | | 11290 | Infectious hematopoietic necrosis virus | 8 | | 8 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 826 |  | 11292 | Rabies lyssavirus | 13 | 26 | 14 | 26 | 1 |  |
| 827 |  | 11293 | Rabies virus AVO1 |  | 3 |  | 3 |  |  |
| 828 |  | 11294 | Rabies virus CVS-11 | 2 |  | 3 |  | 1 |  |
| 829 |  | 11295 | Rabies virus ERA | 10 | 27 | 10 | 27 |  |  |
| 830 |  | 11296 | Rabies virus HEP-FLURY | 7 | 1 | 7 | 1 |  |  |
| 831 |  | 11298 | Rabies virus Nishigahara RCEH | 1 |  | 1 |  |  |  |
| 832 |  | 11307 | Sonchus yellow net nucleorhabdovirus |  | 1 |  | 1 |  |  |
| 833 |  | 11318 | Dhori thogotovirus | 1 |  | 1 |  |  |  |
| 834 |  | 11320 | Influenza A virus | 74 | 533 | 74 | 592 |  | 59 |
| 836 |  | 11384 | Influenza A virus (A/chicken/FPV/Weybridge(H7N7)) |  | 2 |  | 2 |  |  |
| 837 |  | 11408 | Influenza A virus (STRAIN A/EQUINE/NEW MARKET/76) |  | 1 |  | 1 |  |  |
| 838 |  | 11448 | Influenza A virus (A/parrot/Ulster/73(H7N1)) |  | 1 |  | 1 |  |  |
| 839 |  | 11484 | Influenza A virus (A/whale/Maine/1/84(H13N9)) | 3 |  | 3 |  |  |  |
| 840 |  | 11520 | Influenza B virus | 4 | 6 | 4 | 452 |  | 446 |
| 841 |  | 11521 | Influenza B virus (B/Ann Arbor/1/1986) |  | 3 |  | 3 |  |  |
| 842 |  | 11532 | Influenza B virus (STRAIN B/HT/84) |  | 1 |  | 1 |  |  |
| 843 |  | 11541 | Influenza B virus (B/Oregon/5/80) | 16 |  | 16 |  |  |  |
| 844 |  | 11550 | Influenza B virus (B/Yamagata/1/73) |  | 3 |  | 3 |  |  |
| 845 |  | 11552 | Influenza C virus |  | 1 |  | 1 |  |  |
| 846 |  | 11553 | Influenza C virus (C/Ann Arbor/1/50) | 16 |  | 16 |  |  |  |
| 847 |  | 11577 | La Crosse virus | 2 | 1 | 2 | 1 |  |  |
| 848 |  | 11578 | La Crosse virus L74 |  | 2 |  | 2 |  |  |
| 849 |  | 11583 | HoJo virus |  | 1 |  | 1 |  |  |
| 850 |  | 11588 | Rift Valley fever virus | 5 | 27 | 13 | 27 | 8 |  |
| 851 |  | 11589 | Rift valley fever virus (STRAIN ZH-548 M12) |  | 2 |  | 2 |  |  |
| 852 |  | 11602 | Hantaan virus 76-118 | 14 | 132 | 14 | 132 |  |  |
| 853 |  | 11605 | Puumala virus Hallnas B1 |  | 1 |  | 1 |  |  |
| 854 |  | 11607 | Sapporo rat virus | 1 | 4 | 1 | 4 |  |  |
| 855 |  | 11610 | Seoul virus SR11 | 1 |  | 1 |  |  |  |
| 856 |  | 11618 | Arenavirus |  | 2 |  | 2 |  |  |
| 857 |  | 11620 | Lassa mammarenavirus | 13 | 670 | 15 | 706 | 2 | 36 |
| 858 |  | 11621 | Lassa virus GA391 |  | 54 |  | 55 |  | 1 |
| 859 |  | 11622 | Lassa virus Josiah | 10 | 409 | 10 | 409 |  |  |
| 860 |  | 11623 | Lymphocytic choriomeningitis mammarenavirus | 5 | 654 | 5 | 655 |  | 1 |
| 861 |  | 11624 | Lymphocytic choriomeningitis virus (strain Armstrong) |  | 1158 |  | 1158 |  |  |
| 862 |  | 11625 | Lymphocytic choriomeningitis virus (strain Pasteur) |  | 5 |  | 5 |  |  |
| 863 |  | 11626 | Lymphocytic choriomeningitis virus (strain Traub) |  | 3 |  | 3 |  |  |
| 864 |  | 11627 | Lymphocytic choriomeningitis virus (strain WE) |  | 69 |  | 74 |  | 5 |
| 865 |  | 11628 | Machupo mammarenavirus | 1 | 800 | 1 | 800 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 866 | | 11629 | Mopeia mammarenavirus | | 14 | | 14 | | |
| 867 | | 11631 | Tacaribe mammarenavirus | | 106 | | 106 | | |
| 868 | | 11636 | Reticuloendotheliosis virus | 2 | 5 | 2 | 5 | | |
| 869 | | 11660 | Caprine arthritis encephalitis virus | 14 | 1 | 14 | 1 | | |
| 870 | | 11661 | Caprine arthritis encephalitis virus strain Cork | 9 | | 9 | | | |
| 871 | | 11662 | Caprine arthritis encephalitis virus G63 | 6 | | 6 | | | |
| 872 | | 11665 | Equine infectious anemia virus | 93 | 112 | 93 | 112 | | |
| 873 | | 11670 | Equine infectious anemia virus (CLONE 1369) | | 1 | | 1 | | |
| 874 | | 11671 | Equine infectious anemia virus (STRAIN WSU5) | | 19 | | 19 | | |
| 875 | | 11673 | Feline immunodeficiency virus | | 30 | | 30 | | |
| 876 | | 11674 | Feline immunodeficiency virus (isolate Petaluma) | 2 | 4 | 2 | 4 | | |
| 877 | | 11675 | Feline immunodeficiency virus (isolate San Diego) | | 1 | | 1 | | |
| 878 | | 11676 | Human immunodeficiency virus 1 | 236 | 499 | 276 | 514 | 40 | 15 |
| 879 | | 11678 | Human immunodeficiency virus type 1 BH10 | 2 | 27 | 2 | 27 | | |
| 880 | | 11679 | Human immunodeficiency virus type 1 (CLONE 12) | | 7 | | 7 | | |
| 882 | | 11682 | Human immunodeficiency virus type 1 (BH5 ISOLATE) | | 1 | | 1 | | |
| 883 | | 11683 | Human immunodeficiency virus type 1 (Z2/CDC-Z34 ISOLATE) | | 1 | | 1 | | |
| 885 | | 11685 | HIV-1 M:B_ARV2/SF2 | 1 | 44 | 1 | 44 | | |
| 886 | | 11686 | Human immunodeficiency virus type 1 (BRU ISOLATE) | 1 | 4 | 1 | 4 | | |
| 887 | | 11687 | Human immunodeficiency virus type 1 (CDC-451 ISOLATE) | | 3 | | 3 | | |
| 888 | | 11688 | Human immunodeficiency virus type 1 (JRCSF ISOLATE) | 4 | 37 | 4 | 37 | | |
| 889 | | 11689 | Human immunodeficiency virus type 1 (ELI ISOLATE) | | 7 | | 7 | | |
| 890 | | 11690 | Human immunodeficiency virus type 1 (SF33 ISOLATE) | | 3 | | 3 | | |
| 891 | | 11691 | Human immunodeficiency virus type 1 (SF162 ISOLATE) | 2 | 1 | 2 | 1 | | |
| 892 | | 11694 | Human immunodeficiency virus type 1 (JH3 ISOLATE) | | 4 | | 4 | | |
| 893 | | 11695 | Human immunodeficiency virus type 1 (NDK ISOLATE) | | 8 | | 8 | | |
| 894 | | 11696 | HIV-1 M:B_MN | 11 | 27 | 11 | 27 | | |
| 895 | | 11697 | Human immunodeficiency virus type 1 (MAL ISOLATE) | | 8 | | 8 | | |
| 896 | | 11698 | Human immunodeficiency virus type 1 (NEW YORK-5 ISOLATE) | 2 | 2 | 2 | 2 | | |
| 897 | | 11699 | Human immunodeficiency virus type 1 (OYI ISOLATE) | | 3 | | 3 | | |
| 898 | | 11701 | Human immunodeficiency virus type 1 (RF/HAT ISOLATE) | 1 | 19 | 1 | 19 | | |
| 899 | | 11703 | Human immunodeficiency virus type 1 (STRAIN UGANDAN / ISOLATE U455) | | 15 | | 15 | | |
| 900 | | 11704 | Human immunodeficiency virus type 1 (MFA ISOLATE) | | 2 | | 2 | | |
| 901 | | 11705 | Human immunodeficiency virus type 1 (WMJ2 ISOLATE) | | 1 | | 1 | | |
| 902 | | 11706 | HIV-1 M:B_HXB2R | 13 | 17 | 15 | 17 | 2 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 903 | | 11708 | Human immunodeficiency virus type 1 (ZAIRE 6 ISOLATE) | | 1 | | 1 | | |
| 904 | | 11709 | Human immunodeficiency virus 2 | 1 | 8 | 1 | 8 | | |
| 905 | | 11711 | Simian immunodeficiency virus - mac | | 1 | | 1 | | |
| 906 | | 11713 | Human immunodeficiency virus type 2 (ISOLATE D194) | | 1 | | 1 | | |
| 907 | | 11714 | Human immunodeficiency virus type 2 (ISOLATE BEN) | | 12 | | 12 | | |
| 908 | | 11715 | Human immunodeficiency virus type 2 (ISOLATE CAM2) | | 2 | | 2 | | |
| 909 | | 11716 | Human immunodeficiency virus type 2 (ISOLATE D205,7) | | 2 | | 2 | | |
| 910 | | 11717 | Human immunodeficiency virus type 2 (ISOLATE GHANA-1) | | 7 | | 7 | | |
| 911 | | 11718 | Human immunodeficiency virus type 2 (ISOLATE SBLISY) | | 2 | | 2 | | |
| 912 | | 11720 | Human immunodeficiency virus type 2 (ISOLATE ROD) | | 2 | | 2 | | |
| 913 | | 11723 | Simian immunodeficiency virus | | 238 | | 239 | | 1 |
| 914 | | 11730 | Simian immunodeficiency virus (AGM3 ISOLATE) | | 1 | | 1 | | |
| 917 | | 11733 | Simian immunodeficiency virus (MM142-83 ISOLATE) | | 102 | | 102 | | |
| 918 | | 11734 | Simian immunodeficiency virus (MM251 ISOLATE) | | 1 | | 1 | | |
| 919 | | 11735 | Simian immunodeficiency virus - mac K6W | | 125 | | 125 | | |
| 920 | | 11736 | Simian immunodeficiency virus (K78 ISOLATE) | | 29 | | 29 | | |
| 921 | | 11737 | Simian immunodeficiency virus (F236/SMH4 ISOLATE) (SOOTY MANGABEY) | | 17 | | 17 | | |
| 922 | | 11738 | Simian immunodeficiency virus (PBJ/BC13 ISOLATE) (SOOTY MANGABEY) | | 2 | | 2 | | |
| 923 | | 11742 | Visna lentivirus (strain 1514) | 1 | | 1 | | | |
| 924 | | 11743 | Visna lentivirus (strain 1514 / clone LV1-1KS1) | 4 | | 4 | | | |
| 925 | | 11746 | Jaagsiekte sheep retrovirus | 1 | | 1 | | | |
| 926 | | 11757 | Mouse mammary tumor virus | | 12 | | 12 | | |
| 927 | | 11764 | Baboon endogenous virus strain M7 | 1 | | 1 | | | |
| 928 | | 11769 | Feline leukemia virus strain A/Glasgow-1 | 6 | | 6 | | | |
| 929 | | 11780 | Snyder-Theilen feline sarcoma virus | 1 | | 1 | | | |
| 930 | | 11786 | Murine leukemia virus | 1 | 23 | 1 | 23 | | |
| 931 | | 11790 | AKT8 murine leukemia virus | 1 | | 1 | | | |
| 932 | | 11791 | AKR (endogenous) murine leukemia virus | | 12 | | 13 | | 1 |
| 933 | | 11795 | Friend murine leukemia virus | 6 | 53 | 6 | 53 | | |
| 934 | | 11801 | Moloney murine leukemia virus | | 5 | | 5 | | |
| 935 | | 11812 | Murine sarcoma virus 3611 | 4 | | 4 | | | |
| 936 | | 11824 | Gardner-Arnstein feline leukemia oncovirus B | 13 | | 13 | | | |
| 937 | | 11827 | Human endogenous retrovirus | 1 | 1 | 1 | 1 | | |
| 938 | | 11861 | Avian erythroblastosis virus | 1 | | 1 | | | |
| 939 | | 11864 | Avian leukosis virus | 4 | | 4 | | | |
| 940 | | 11886 | Rous sarcoma virus | 4 | 4 | 4 | 4 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 941 | | 11901 | Bovine leukemia virus | 108 | 40 | 108 | 40 | | |
| 943 | | 11908 | Human T-cell leukemia virus type I | 236 | 280 | 236 | 280 | | |
| 944 | | 11909 | Human T-lymphotropic virus 2 | 63 | 2 | 63 | 2 | | |
| 945 | | 11926 | Human T-cell lymphotrophic virus type 1 (strain ATK) | 30 | 118 | 30 | 118 | | |
| 946 | | 11927 | Human T-cell lymphotrophic virus type 1 (Caribbean isolate) | | 6 | | 6 | | |
| 947 | | 11928 | Human T-cell lymphotrophic virus type 1 (isolate MT-2) | 1 | | 1 | | | |
| 948 | | 11942 | Simian retrovirus 1 | 1 | | 1 | | | |
| 949 | X | 11963 | Human spumaretrovirus | | | 1 | | 1 | |
| 950 | | 11966 | Aids-associated retrovirus | | 2 | | 2 | | |
| 951 | | 11976 | Rabbit hemorrhagic disease virus | 4 | | 4 | | | |
| 952 | | 11978 | Feline calicivirus | 4 | 1 | 4 | 1 | | |
| 953 | | 11980 | Feline calicivirus strain Japanese F4 | 6 | | 6 | | | |
| 954 | | 11981 | Feline calicivirus strain F9 | 2 | | 2 | | | |
| 955 | | 11983 | Norwalk virus | 4 | 1 | 4 | 1 | | |
| 956 | | 11984 | Southampton virus | 1 | | 1 | | | |
| 957 | | 12022 | Enterobacteria phage MS2 | 1 | | 1 | | | |
| 958 | | 12060 | Echovirus E9 | 1 | | 1 | | | |
| 959 | | 12063 | Human parechovirus 1 | 7 | | 7 | | | |
| 960 | | 12064 | Enterovirus E | 13 | | 17 | | 4 | |
| 961 | | 12065 | Bovine enterovirus strain VG-5-27 | 6 | | 6 | | | |
| 962 | | 12066 | Coxsackievirus | 1 | | 1 | | | |
| 963 | | 12067 | Coxsackievirus A9 | 30 | | 30 | | | |
| 964 | | 12071 | Coxsackievirus B1 | 12 | | 12 | | | |
| 965 | | 12072 | Coxsackievirus B3 | 7 | 15 | 7 | 15 | | |
| 966 | | 12073 | Coxsackievirus B4 | 17 | 51 | 17 | 51 | | |
| 967 | | 12075 | Swine vesicular disease virus | 1 | | 1 | | | |
| 968 | | 12076 | Swine vesicular disease virus (STRAIN H/3 '76) | 5 | | 5 | | | |
| 969 | | 12077 | Swine vesicular disease virus (STRAIN UKG/27/72) | 3 | | 3 | | | |
| 970 | | 12078 | Echovirus E11 | 1 | | 1 | | | |
| 971 | | 12080 | Human poliovirus 1 | 6 | 1 | 6 | 1 | | |
| 972 | | 12081 | Human poliovirus 1 Mahoney | 62 | 31 | 62 | 31 | | |
| 973 | | 12082 | Human poliovirus 1 strain Sabin | 7 | | 7 | | | |
| 974 | | 12086 | Human poliovirus 3 | 5 | 2 | 5 | 2 | | |
| 975 | | 12088 | Poliovirus type 3 (strains P3/LEON/37 AND P3/LEON 12A[1]B) | 4 | 15 | 4 | 15 | | |
| 976 | | 12092 | Hepatovirus A | 26 | 22 | 26 | 22 | | |
| 977 | | 12098 | Human hepatitis A virus Hu/Australia/HM175/1976 | 86 | 83 | 87 | 83 | 1 | |
| 978 | | 12104 | Encephalomyocarditis virus | | 1 | | 1 | | |
| 979 | | 12107 | Mengo virus | 5 | 13 | 5 | 13 | | |
| 980 | | 12110 | Foot-and-mouth disease virus | 25 | 5 | 30 | 5 | 5 | |
| 981 | | 12111 | Foot-and-mouth disease virus - type A | 3 | 6 | 3 | 6 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 982 | | 12112 | Foot-and-mouth disease virus (strain A10-61) | 8 | | 8 | | | |
| 983 | | 12113 | Foot-and-mouth disease virus (strain A5) | 3 | | 3 | | | |
| 984 | | 12114 | Foot-and-mouth disease virus (strain A12) | 21 | 1 | 21 | 1 | | |
| 985 | | 12115 | Foot-and-mouth disease virus (strain A24 Cruzeiro) | 17 | 32 | 17 | 32 | | |
| 986 | | 12116 | Foot-and-mouth disease virus - type C | 6 | 26 | 6 | 26 | | |
| 987 | | 12117 | Foot-and-mouth disease virus (strain C3 Indaial) | 2 | | 2 | | | |
| 988 | | 12118 | Foot-and-mouth disease virus - type O | 44 | 8 | 45 | 8 | 1 | |
| 989 | | 12120 | Foot-and-mouth disease virus (strain C1-Santa Pau) | 1 | | 1 | | | |
| 990 | | 12121 | Foot-and-mouth disease virus C1 | 1 | 4 | 1 | 4 | | |
| 991 | | 12123 | Foot-and-mouth disease virus - type SAT 3 | | 1 | | 1 | | |
| 992 | | 12124 | Theiler's encephalomyelitis virus | 1 | 18 | 1 | 18 | | |
| 993 | | 12125 | Theiler's encephalomyelitis virus (STRAIN BEAN 8386) | 16 | 52 | 16 | 52 | | |
| 994 | | 12126 | Theiler's encephalomyelitis virus (STRAIN DA) | 3 | 2 | 3 | 2 | | |
| 995 | | 12130 | Human rhinovirus A2 | 11 | | 11 | | | |
| 996 | | 12131 | Rhinovirus B14 | 15 | 1 | 15 | 1 | | |
| 997 | | 12132 | Human rhinovirus A89 | 3 | | 3 | | | |
| 998 | | 12134 | Human rhinovirus 1A | | 19 | | 19 | | |
| 999 | | 12146 | Tomato bushy stunt virus (STRAIN BS-3) | 3 | | 3 | | | |
| 1000 | | 12161 | Beet yellows virus | 5 | | 5 | | | |
| 1001 | | 12162 | Citrus tristeza virus | 8 | | 8 | | | |
| 1002 | | 12211 | Plum pox virus | 1 | | 1 | | | |
| 1003 | | 12213 | Plum pox virus isolate NAT | | 1 | | 1 | | |
| 1004 | | 12216 | Potato virus Y | 2 | | 2 | | | |
| 1005 | | 12219 | Potato virus Y strain N | 1 | | 1 | | | |
| 1006 | | 12220 | Potato virus Y strain O | 7 | | 7 | | | |
| 1007 | | 12232 | Zucchini yellow mosaic virus | 1 | | 1 | | | |
| 1008 | | 12242 | Tobacco mosaic virus | 36 | 13 | 142 | 13 | 106 | |
| 1009 | | 12243 | Tobacco mosaic virus (vulgare) | 1 | | 1 | | | |
| 1010 | | 12246 | Tobacco mosaic virus strain Dahlemense | 2 | | 2 | | | |
| 1011 | | 12260 | Bean pod mottle virus | 2 | | 2 | | | |
| 1012 | | 12264 | Cowpea mosaic virus | | 1 | | 1 | | |
| 1013 | | 12305 | Cucumber mosaic virus | 1 | | 1 | | | |
| 1014 | | 12455 | Borna disease virus | 8 | 4 | 8 | 4 | | |
| 1015 | | 12461 | Hepatitis E virus | 153 | 76 | 153 | 91 | | 15 |
| 1016 | | 12475 | Hepatitis delta virus | 56 | 19 | 56 | 66 | | 47 |
| 1017 | | 12509 | Human herpesvirus 4 type 2 | 2 | 10 | 2 | 10 | | |
| 1018 | | 12557 | Seoul virus 80-39 | | 3 | | 3 | | |
| 1019 | | 12618 | Chicken anemia virus | 3 | | 3 | | | |
| 1020 | | 12637 | Dengue virus | 51 | 553 | 52 | 588 | 1 | 35 |

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|---|---|---|---|---|---|---|---|---|---|
| 1021 | | 12639 | Duck hepatitis B virus | 262 | 20 | 262 | 20 | | |
| 1022 | | 12643 | Ectromelia virus | | 6 | | 45 | | 39 |
| 1023 | | 12663 | Feline coronavirus | | 1 | | 1 | | |
| 1024 | | 12701 | Human astrovirus 2 | 2 | | 2 | | | |
| 1025 | | 12750 | Visna/maedi virus EV1 | 1 | | 1 | | | |
| 1026 | | 12760 | Murine hepatitis virus strain 4 | | 5 | | 5 | | |
| 1027 | | 12814 | Respiratory syncytial virus | | 2 | 5 | 5 | 5 | 3 |
| 1028 | | 12870 | Variola major virus | | 17 | | 17 | | |
| 1029 | | 13101 | Juniperus ashei | 13 | | 13 | | | |
| 1030 | | 13187 | Parietaria officinalis | 2 | | 2 | | | |
| 1031 | | 13286 | Theromyzon tessulatum | 1 | | 1 | | | |
| 1032 | | 13373 | Burkholderia mallei | 1 | 49 | 3 | 49 | 2 | |
| 1033 | | 13415 | Chamaecyparis obtusa | 5 | 68 | 5 | 68 | | |
| 1034 | | 13451 | Corylus avellana | 27 | 57 | 27 | 57 | | |
| 1035 | | 13469 | Cupressus sempervirens | | 8 | | 8 | | |
| 1036 | | 13557 | Hapalemur griseus | | 1 | | 1 | | |
| 1037 | | 13616 | Monodelphis domestica | 1 | 4 | 1 | 4 | | |
| 1038 | | 13618 | Myrmecia pilosula | 2 | | 2 | | | |
| 1039 | X | 13677 | Scomber scombrus | | | 1 | | 1 | |
| 1040 | | 13687 | Sphingomonas | 1 | 4 | 1 | 4 | | |
| 1042 | | 15368 | Brachypodium distachyon | 1 | | 1 | | | |
| 1043 | | 15957 | Phleum pratense | 64 | 1158 | 64 | 1158 | | |
| 1044 | | 16719 | Juglans nigra | 1 | | 1 | | | |
| 1045 | | 27990 | Plasmodium vivax-like sp. | 3 | 1 | 3 | 1 | | |
| 1046 | | 28038 | Lactobacillus curvatus | | 1 | | 1 | | |
| 1047 | | 28080 | Campylobacter upsaliensis | 3 | | 3 | | | |
| 1048 | | 28108 | Alteromonas macleodii | | 1 | | 1 | | |
| 1049 | | 28130 | Prevotella disiens | | 1 | | 1 | | |
| 1050 | X | 28131 | Prevotella intermedia | | | | 2 | | 2 |
| 1052 | X | 28172 | Vibrio metschnikovii | | | 1 | | 1 | |
| 1053 | | 28227 | Mycoplasma penetrans | 40 | | 40 | | | |
| 1054 | | 28276 | Human adenovirus 15 | 1 | | 1 | | | |
| 1055 | | 28280 | Human adenovirus E4 | 1 | | 1 | | | |
| 1056 | | 28282 | Human adenovirus 12 | 11 | 3 | 11 | 3 | | |
| 1057 | | 28284 | Human adenovirus 40 | 2 | 1 | 2 | 1 | | |
| 1058 | | 28285 | Human adenovirus 5 | 26 | 185 | 27 | 186 | 1 | 1 |
| 1059 | | 28295 | Porcine epidemic diarrhea virus | 5 | | 13 | | 8 | |
| 1060 | | 28300 | Heron hepatitis B virus | | 1 | | 1 | | |
| 1061 | | 28314 | Aleutian mink disease virus | 10 | | 10 | | | |
| 1062 | | 28327 | Murine rotavirus | | 3 | | 3 | | |
| 1063 | | 28344 | Porcine reproductive and respiratory syndrome virus | 87 | 95 | 90 | 95 | 3 | |
| 1064 | | 28375 | Soil-borne wheat mosaic virus | 1 | | 1 | | | |
| 1065 | | 28448 | Komagataeibacter xylinus | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1066 | | 28450 | Burkholderia pseudomallei | 14 | 9 | 19 | 9 | 5 | |
| 1067 | | 28479 | Phalaris aquatica | | 12 | | 12 | | |
| 1068 | | 28869 | Ovine respiratory syncytial virus | 1 | | 1 | | | |
| 1069 | | 28871 | Taterapox virus | | 4 | | 4 | | |
| 1070 | | 28873 | Camelpox virus | | 2 | | 2 | | |
| 1071 | | 28875 | Rotavirus A | 1 | | 2 | | 1 | |
| 1072 | | 28901 | Salmonella enterica | | 141 | | 141 | | |
| 1073 | | 28903 | Mycoplasma bovis | 21 | | 21 | | | |
| 1074 | | 28909 | Cynodon dactylon | 27 | 48 | 27 | 48 | | |
| 1075 | X | 29159 | Crassostrea gigas | | | 7 | | 7 | |
| 1076 | | 29176 | Neospora caninum | 2 | 17 | 2 | 17 | | |
| 1077 | | 29271 | Dasheen mosaic virus | 1 | | 1 | | | |
| 1078 | | 29292 | Pyrococcus abyssi | | 1 | | 1 | | |
| 1079 | | 29320 | Paenarthrobacter nicotinovorans | 1 | | 1 | | | |
| 1080 | | 29339 | Bacillus thuringiensis serovar kurstaki | 3 | | 3 | | | |
| 1081 | | 29362 | Ruminiclostridium papyrosolvens | | 1 | | 1 | | |
| 1082 | | 29371 | Ruminiclostridium cellobioparum subsp. termitidis | 1 | | 1 | | | |
| 1083 | | 29388 | Staphylococcus capitis | 1 | | 1 | | | |
| 1084 | | 29430 | Acinetobacter haemolyticus | 1 | | 1 | | | |
| 1085 | | 29442 | Pseudomonas tolaasii | | 1 | | 1 | | |
| 1086 | | 29447 | Xanthomonas albilineans | | 1 | | 1 | | |
| 1087 | | 29459 | Brucella melitensis | 17 | 94 | 19 | 95 | 2 | 1 |
| 1088 | | 29461 | Brucella suis | 1 | 8 | 1 | 8 | | |
| 1089 | | 29477 | Salmonella enterica subsp. enterica serovar Essen | 1 | | 1 | | | |
| 1090 | | 29491 | Aeromonas salmonicida subsp. salmonicida | | 1 | | 1 | | |
| 1091 | | 29507 | Leptospira kirschneri | 1 | | 1 | | | |
| 1092 | | 29518 | Borreliella afzelii | 5 | 1 | 6 | 1 | 1 | |
| 1093 | | 29519 | Borreliella garinii | 6 | 29 | 6 | 29 | | |
| 1094 | | 29661 | Anthoxanthum odoratum | | 3 | | 3 | | |
| 1095 | | 29679 | Holcus lanatus | 14 | 3 | 14 | 3 | | |
| 1096 | | 29715 | Ambrosia psilostachya | | 10 | | 10 | | |
| 1097 | | 29760 | Vitis vinifera | 1 | | 1 | | | |
| 1098 | | 29780 | Mangifera indica | 1 | | 1 | | | |
| 1099 | X | 29916 | Fusarium sp. | | | 3 | | 3 | |
| 1100 | | 29918 | Cladosporium herbarum | | 18 | | 18 | | |
| 1101 | | 29960 | Penaeus indicus | 2 | | 2 | | | |
| 1102 | | 30069 | Anopheles stephensi | 1 | | 1 | | | |
| 1104 | | 30538 | Vicugna pacos | 1 | | 1 | | | |
| 1105 | | 31271 | Plasmodium chabaudi chabaudi | | 3 | | 3 | | |
| 1106 | | 31273 | Plasmodium vivax strain Belem | 6 | 31 | 6 | 31 | | |
| 1107 | | 31276 | Perkinsus marinus | | 1 | | 1 | | |
| 1108 | | 31285 | Trypanosoma brucei gambiense | 2 | | 2 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1109 | | 31286 | Trypanosoma brucei rhodesiense | 1 | 9 | 1 | 9 | | |
| 1110 | | 31330 | Ephydatia fluviatilis | | 1 | | 1 | | |
| 1111 | | 31512 | Hepatitis B virus adr/mutant | | 1 | | 1 | | |
| 1112 | | 31525 | Human herpesvirus 4 strain CAO | | 1 | | 1 | | |
| 1113 | | 31531 | Vaccinia virus L-IPV | | 8 | | 8 | | |
| 1114 | | 31545 | Human adenovirus D8 | 1 | 1 | 1 | 1 | | |
| 1115 | | 31552 | Human papillomavirus type 6 | 12 | 4 | 12 | 4 | | |
| 1116 | | 31560 | Infectious bursal disease virus E | 1 | | 1 | | | |
| 1117 | | 31569 | Human rotavirus (serotype 2 / strain RV-5) | 1 | | 1 | | | |
| 1118 | | 31604 | Small ruminant morbillivirus | 13 | 31 | 13 | 31 | | |
| 1119 | | 31608 | Simian virus 5 (isolate canine/CPI+) | 1 | | 1 | | | |
| 1120 | | 31611 | Bovine respiratory syncytial virus (strain 391-2) | 3 | | 3 | | | |
| 1121 | | 31615 | Tacaribe virus strain V5 | | 1 | | 1 | | |
| 1122 | | 31616 | Tacaribe virus strain V7 | | 1 | | 1 | | |
| 1123 | | 31621 | Four Corners hantavirus | 2 | 8 | 2 | 8 | | |
| 1124 | | 31631 | Human coronavirus OC43 | | 1 | | 1 | | |
| 1125 | | 31634 | Dengue virus 2 Thailand/16681/84 | 32 | 62 | 32 | 62 | | |
| 1126 | | 31635 | Dengue virus 2 16681-PDK53 | 4 | 32 | 4 | 80 | | 48 |
| 1127 | X | 31636 | Dengue virus 2 China/D2-04 | | | | 5 | | 5 |
| 1128 | X | 31637 | Dengue virus 2 Thailand/TH-36/1958 | | | | 4 | | 4 |
| 1129 | | 31641 | Yellow fever virus 1899/81 | | 36 | | 36 | | |
| 1130 | | 31644 | Hepatitis C virus HCV-KF | 1 | 1 | 1 | 1 | | |
| 1131 | | 31645 | Hepatitis C virus (isolate Taiwan) | 3 | 15 | 3 | 15 | | |
| 1132 | | 31646 | Hepatitis C virus subtype 1a | 202 | 399 | 206 | 399 | 4 | |
| 1133 | | 31647 | Hepatitis C virus subtype 1b | 608 | 293 | 608 | 293 | | |
| 1134 | | 31649 | Hepatitis C virus subtype 2a | 80 | 22 | 80 | 22 | | |
| 1135 | | 31650 | Hepatitis C virus subtype 2b | 103 | 4 | 103 | 4 | | |
| 1136 | | 31653 | Hepatitis C virus subtype 4a | 1 | 1 | 1 | 1 | | |
| 1137 | | 31654 | Hepatitis C virus subtype 5a | 1 | 1 | 1 | 1 | | |
| 1138 | | 31655 | Hepatitis C virus subtype 6a | | 1 | | 1 | | |
| 1139 | | 31678 | Human immunodeficiency virus type 1 (WMJ1 isolate) | | 16 | | 16 | | |
| 1141 | | 31682 | Simian immunodeficiency virus - mac1A11 | | 18 | | 18 | | |
| 1142 | | 31683 | Simian immunodeficiency virus - stm | | 7 | | 7 | | |
| 1143 | | 31684 | Simian immunodeficiency virus (isolate AGM / clone GRI-1) | | 2 | | 2 | | |
| 1145 | | 31704 | Coxsackievirus A16 | 4 | | 4 | | | |
| 1146 | | 31708 | Human rhinovirus A16 | | 30 | 9 | 30 | 9 | |
| 1147 | | 31715 | Bean-pod mottle virus (strain Kentucky G7) | 9 | 1 | 9 | 1 | | |
| 1148 | | 31721 | Beet necrotic yellow vein virus | 10 | | 10 | | | |
| 1149 | | 31767 | Hepatitis E virus (strain Burma) | 160 | | 160 | | | |
| 1150 | | 31768 | Hepatitis E virus (strain Mexico) | 31 | | 31 | | | |
| 1151 | | 32008 | Burkholderia | 1 | | 1 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1152 | | 32019 | Campylobacter fetus subsp. fetus | 3 | | 3 | | | |
| 1153 | | 32022 | Campylobacter jejuni subsp. jejuni | 2 | | 2 | | | |
| 1154 | | 32025 | Helicobacter hepaticus | | 1 | | 1 | | |
| 1155 | | 32049 | Synechococcus sp. PCC 7002 | | 1 | | 1 | | |
| 1156 | | 32201 | Carya illinoinensis | 19 | | 19 | | | |
| 1157 | | 32278 | Metapenaeus ensis | 1 | 6 | 1 | 6 | | |
| 1158 | | 32603 | Human betaherpesvirus 6A | 2 | 7 | 2 | 7 | | |
| 1159 | | 32604 | Human betaherpesvirus 6B | 2 | 1394 | 2 | 4483 | | 3089 |
| 1160 | | 32605 | Buffalopox virus | | 1 | | 1 | | |
| 1161 | | 32606 | Rabbitpox virus | | 2 | | 2 | | |
| 1162 | | 32614 | Convict Creek 107 virus | 1 | 3 | 1 | 3 | | |
| 1163 | X | 32630 | synthetic construct | | | | 1 | | 1 |
| 1164 | | 32644 | unidentified | | 22073 | | 22559 | | 486 |
| 1165 | X | 33090 | Viridiplantae | | | 1 | | 1 | |
| 1166 | | 33127 | Parietaria judaica | 65 | 2 | 65 | 2 | | |
| 1167 | | 33178 | Aspergillus terreus | 2 | | 2 | | | |
| 1168 | | 33703 | Suid herpesvirus 1 strain Kaplan | 4 | | 4 | | | |
| 1169 | | 33706 | Caviid betaherpesvirus 2 | 3 | 3 | 3 | 3 | | |
| 1170 | | 33708 | Murid gammaherpesvirus 4 | 1 | 53 | 1 | 53 | | |
| 1171 | | 33717 | Bluetongue virus (serotype 13 / isolate USA) | 2 | | 2 | | | |
| 1172 | | 33718 | Bluetongue virus (serotype 17 / isolate USA) | 4 | | 4 | | | |
| 1173 | | 33727 | Marburg virus - Musoke, Kenya, 1980 | 3 | 84 | 3 | 84 | | |
| 1174 | | 33728 | Lake Victoria marburgvirus - Popp | 2 | 15 | 3 | 15 | 1 | |
| 1175 | | 33734 | Feline infectious peritonitis virus (strain 79-1146) | 15 | 14 | 15 | 14 | | |
| 1176 | | 33741 | Dengue virus 1 Singapore/S275/1990 | | 245 | | 245 | | |
| 1177 | | 33745 | Hepatitis C virus genotype 4 | 1 | 10 | 1 | 10 | | |
| 1178 | | 33746 | Hepatitis C virus genotype 5 | | 2 | | 2 | | |
| 1179 | | 33747 | Simian T-lymphotropic virus 1 | | 14 | | 14 | | |
| 1180 | | 33758 | Echovirus | | 1 | | 1 | | |
| 1181 | | 33892 | Mycobacterium tuberculosis variant bovis BCG | 12 | 146 | 12 | 147 | | 1 |
| 1182 | | 33934 | Anoxybacillus flavithermus | | 1 | | 1 | | |
| 1184 | | 33990 | Rickettsia bellii | 1 | | 1 | | | |
| 1185 | | 34054 | Yersinia enterocolitica (type O:8) | | 1 | | 1 | | |
| 1186 | | 34245 | Zinnia elegans | | 1 | | 1 | | |
| 1187 | X | 34613 | Ixodes ricinus | | | 1 | | 1 | |
| 1188 | | 34631 | Rhipicephalus appendiculatus | 1 | | 1 | | | |
| 1189 | | 34632 | Rhipicephalus sanguineus | 1 | | 1 | | | |
| 1190 | | 34828 | Eulemur mongoz | 1 | | 1 | | | |
| 1191 | | 34862 | Otospermophilus beecheyi | | 1 | | 1 | | |
| 1192 | | 35241 | Lactococcus phage Tuc2009 | 1 | | 1 | | | |
| 1193 | | 35258 | Lambdapapillomavirus 2 | | 25 | | 25 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1194 | | 35269 | Woodchuck hepatitis virus | 4 | 6 | 4 | 6 | | |
| 1195 | | 35275 | Murine endogenous retrovirus | | 13 | | 13 | | |
| 1196 | | 35288 | Grapevine virus A | 12 | | 12 | | | |
| 1197 | | 35292 | Foot-and-mouth disease virus - type SAT 2 | 1 | 1 | 1 | 1 | | |
| 1198 | | 35297 | Striped jack nervous necrosis virus | 1 | | 1 | | | |
| 1199 | | 35305 | California encephalitis virus | | 1 | | 1 | | |
| 1200 | | 35327 | Bluetongue virus 1 | 4 | | 4 | | | |
| 1201 | | 35329 | Bluetongue virus 11 | 6 | | 6 | | | |
| 1202 | | 35330 | Bluetongue virus 13 | 1 | | 1 | | | |
| 1203 | | 35331 | Bluetongue virus 15 | 7 | | 7 | | | |
| 1204 | | 35336 | Rotavirus G4 | | 1 | | 1 | | |
| 1205 | | 35345 | Lactococcus phage TP901-1 | 3 | | 3 | | | |
| 1206 | | 35670 | Naja naja | 3 | | 3 | | | |
| 1207 | | 35725 | Macrophomina phaseolina | | 1 | | 1 | | |
| 1208 | | 35788 | Rickettsia africae | | 1 | | 1 | | |
| 1209 | | 35791 | Rickettsia massiliae | | 1 | | 1 | | |
| 1210 | | 35793 | Rickettsia sibirica | | 4 | | 4 | | |
| 1211 | | 35795 | Ehrlichia muris | 2 | 3 | 2 | 3 | | |
| 1212 | | 36329 | Plasmodium falciparum 3D7 | 225 | 270 | 1166 | 270 | 941 | |
| 1213 | | 36351 | Human herpesvirus 6 strain Z29 | 1 | 146 | 1 | 146 | | |
| 1214 | | 36352 | Human herpesvirus 4 type 1 | 4 | 14 | 4 | 14 | | |
| 1215 | | 36372 | Feline immunodeficiency virus (strain UK8) | | 1 | | 1 | | |
| 1216 | | 36374 | Visna/maedi virus EV1 KV1772 | 2 | | 2 | | | |
| 1217 | | 36375 | Human immunodeficiency virus type 1 (KB-1 isolate) | | 2 | | 2 | | |
| 1218 | | 36382 | Venezuelan equine encephalitis virus (strain 3880) | | 1 | | 1 | | |
| 1219 | | 36386 | Louping ill virus (strain 31) | 1 | | 1 | | | |
| 1220 | | 36409 | Rinderpest virus (strain RBOK) | 33 | 5 | 33 | 5 | | |
| 1221 | | 36412 | Human parainfluenza 1 virus (strains A1426 / 86-315 / 62M-753) | | 1 | | 1 | | |
| 1222 | | 36418 | Influenza A virus (A/chicken/Brescia/1902(H7N7)) | | 1 | | 1 | | |
| 1223 | | 36420 | H1N1 swine influenza virus | | 13 | | 13 | | |
| 1224 | | 36421 | African horse sickness virus 4 | 42 | 4 | 42 | 4 | | |
| 1225 | | 36439 | Bovine rotavirus strain NCDV/G6 | 1 | | 1 | | | |
| 1226 | | 36470 | Streptococcus sp. 'group A' | 21 | | 21 | | | |
| 1227 | | 36596 | Prunus armeniaca | 4 | | 4 | | | |
| 1228 | | 36809 | Mycobacteroides abscessus | | 19 | | 19 | | |
| 1229 | | 36826 | Clostridium botulinum A | 46 | | 46 | | | |
| 1230 | | 36827 | Clostridium botulinum B | 29 | | 29 | | | |
| 1231 | | 36829 | Clostridium botulinum D | 2 | | 2 | | | |
| 1232 | | 36830 | Clostridium botulinum E | 3 | 3 | 3 | 3 | | |
| 1233 | | 36831 | Clostridium botulinum F | 3 | | 3 | | | |
| 1234 | | 36855 | Brucella canis | | 4 | | 4 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1235 |  | 36911 | Clavispora lusitaniae | 1 |  | 1 |  |  |  |
| 1236 |  | 36936 | Lepidoglyphus destructor | 5 | 10 | 5 | 10 |  |  |
| 1238 |  | 37111 | Human papillomavirus 28 |  | 1 |  | 1 |  |  |
| 1239 |  | 37112 | Human papillomavirus 29 |  | 1 |  | 1 |  |  |
| 1240 |  | 37115 | Human papillomavirus type 59 | 2 | 1 | 2 | 1 |  |  |
| 1241 |  | 37120 | Human papillomavirus type 67 | 2 |  | 2 |  |  |  |
| 1242 |  | 37121 | Human papillomavirus type 69 |  | 1 |  | 1 |  |  |
| 1243 |  | 37124 | Chikungunya virus | 78 | 10 | 78 | 22 |  | 12 |
| 1244 |  | 37128 | Potato mop-top virus | 8 |  | 8 |  |  |  |
| 1245 |  | 37132 | Rabies virus Ontario fox | 3 |  | 3 |  |  |  |
| 1246 |  | 37137 | Simian rotavirus A/SA11-both | 20 | 2 | 20 | 2 |  |  |
| 1247 |  | 37207 | Rio Segundo hantavirus | 1 |  | 1 |  |  |  |
| 1248 |  | 37296 | Human gammaherpesvirus 8 | 26 | 488 | 26 | 488 |  |  |
| 1249 |  | 37325 | Muscovy duck parvovirus | 11 |  | 11 |  |  |  |
| 1250 |  | 37326 | Nocardia brasiliensis | 6 |  | 6 |  |  |  |
| 1251 |  | 37329 | Nocardia farcinica |  | 1 |  | 1 |  |  |
| 1252 |  | 37347 | Tupaia belangeri |  | 1 |  | 1 |  |  |
| 1253 |  | 37546 | Glossina morsitans morsitans | 2 |  | 2 |  |  |  |
| 1255 |  | 37762 | Escherichia coli B | 1 | 1 | 1 | 1 |  |  |
| 1256 |  | 38020 | marmosets | 3 |  | 3 |  |  |  |
| 1257 |  | 38033 | Chaetomium globosum | 1 |  | 1 |  |  |  |
| 1258 |  | 38171 | Avian reovirus strain S1133 | 5 |  | 6 |  | 1 |  |
| 1259 |  | 38251 | Goose parvovirus | 9 |  | 9 |  |  |  |
| 1260 |  | 38323 | Bartonella henselae | 1 |  | 1 |  |  |  |
| 1261 | X | 38347 | Leptospira interrogans serovar Hardjo-prajitno |  |  | 1 |  | 1 |  |
| 1262 |  | 38832 | Micromonas |  | 1 |  | 1 |  |  |
| 1263 |  | 38873 | Fraxinus excelsior |  | 3 |  | 3 |  |  |
| 1264 |  | 38973 | Influenza A virus (A/Memphis/4/1973(H3N2)) |  | 1 |  | 2 |  | 1 |
| 1265 |  | 39002 | Puumala virus sotkamo/v-2969/81 | 196 |  | 196 |  |  |  |
| 1266 |  | 39015 | Human T-cell lymphotropic virus type 1 (african isolate) |  | 2 |  | 2 |  |  |
| 1267 |  | 39054 | Enterovirus A71 | 111 | 1 | 128 | 1 | 17 |  |
| 1269 |  | 39113 | Hepatitis GB virus B |  | 4 |  | 4 |  |  |
| 1270 |  | 39152 | Methanococcus maripaludis | 1 |  | 1 |  |  |  |
| 1271 |  | 39414 | Plantago lanceolata |  | 2 |  | 2 |  |  |
| 1272 |  | 39442 | Mus musculus musculus |  | 1 |  | 1 |  |  |
| 1273 |  | 39457 | Human papillomavirus type 70 |  | 1 |  | 1 |  |  |
| 1275 |  | 39803 | Escherichia virus Qbeta |  | 2 |  | 2 |  |  |
| 1276 |  | 39947 | Oryza sativa Japonica Group | 5 | 1 | 5 | 1 |  |  |
| 1277 |  | 40051 | Bluetongue virus | 12 | 1 | 12 | 1 |  |  |
| 1278 |  | 40214 | Acinetobacter johnsonii |  | 1 |  | 1 |  |  |
| 1279 |  | 40271 | Hepatitis C virus genotype 2 | 41 | 6 | 42 | 6 | 1 |  |
| 1280 |  | 40674 | Mammalia | 6 |  | 6 | 2 |  | 2 |

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|---|---|---|---|---|---|---|---|---|---|
| 1281 | | 40697 | Blomia tropicalis | 19 | 6 | 19 | 6 | | |
| 1282 | | 41514 | Salmonella enterica subsp. arizonae serovar 62:z4,z23:- | | 4 | | 4 | | |
| 1283 | | 41856 | Hepatitis C virus genotype 1 | 4 | 177 | 4 | 177 | | |
| 1284 | | 41857 | Influenza A virus H3N2 | 2 | 50 | 3 | 50 | 1 | |
| 1285 | X | 41858 | Simian foamy virus-gorilla | | | 1 | | 1 | |
| 1286 | | 41953 | Pseudo-nitzschia | 1 | | 1 | | | |
| 1287 | | 42097 | Isla Vista hantavirus | 1 | 2 | 1 | 2 | | |
| 1288 | | 42182 | Hepatitis C virus genotype 6 | | 7 | | 7 | | |
| 1289 | | 42229 | Prunus avium | 3 | 1 | 3 | 1 | | |
| 1290 | | 42345 | Phoenix dactylifera | | 3 | | 3 | | |
| 1291 | | 42358 | Hantavirus Monongahela-3 | | 5 | | 5 | | |
| 1292 | | 42764 | Oliveros mammarenavirus | | 2 | | 2 | | |
| 1293 | X | 42769 | Coxsackievirus A10 | | | 3 | | 3 | |
| 1294 | | 42782 | Coxsackievirus A20 | 1 | | 1 | | | |
| 1295 | | 42789 | Enterovirus D68 | 1 | | 3 | | 2 | |
| 1296 | | 42792 | Hepatitis C virus subtype 3g | 1 | | 1 | | | |
| 1297 | | 42862 | Rickettsia felis | | 1 | | 1 | | |
| 1298 | | 42897 | Shigella flexneri 2a | 35 | | 35 | | | |
| 1299 | | 43304 | Mycolicibacterium peregrinum | 2 | | 2 | | | |
| 1300 | | 43765 | Corynebacterium amycolatum | | 1 | | 1 | | |
| 1301 | | 43767 | Rhodococcus hoagii | 18 | 3 | 18 | 3 | | |
| 1302 | | 43852 | Toxicodendron | 1 | 1 | 1 | 1 | | |
| 1303 | X | 43853 | Toxicodendron radicans | | | 1 | | 1 | |
| 1304 | | 44026 | Sepik virus | | 1 | | 1 | | |
| 1305 | | 44088 | Canarypox virus | | 8 | | 8 | | |
| 1306 | | 44104 | Vibrio cholerae 569B | 37 | | 37 | | | |
| 1307 | | 44271 | Leishmania chagasi | 3 | | 3 | | | |
| 1308 | | 44275 | Leptospira interrogans serovar Copenhageni | 2 | | 2 | | | |
| 1309 | | 44276 | Leptospira interrogans serovar Pomona | 2 | 3 | 2 | 3 | | |
| 1310 | | 44561 | Murine type C retrovirus | | 1 | | 1 | | |
| 1311 | | 44689 | Dictyostelium discoideum | 1 | 1 | 1 | 1 | | |
| 1312 | | 44755 | New York hantavirus | | 2 | | 2 | | |
| 1313 | | 45029 | Bluetongue virus 16 | 3 | | 3 | | | |
| 1314 | | 45201 | Mannheimia haemolytica serotype 1 | 82 | | 82 | | | |
| 1315 | | 45219 | Guanarito mammarenavirus | | 842 | | 842 | | |
| 1316 | | 45240 | Human papillomavirus type 68 | | 1 | | 1 | | |
| 1317 | | 45409 | Feline immunodeficiency virus (isolate wo) | 3 | | 3 | | | |
| 1318 | | 45410 | Hepatitis B virus adw4/Brazil/isolate w4b | | 12 | | 12 | | |
| 1319 | | 45455 | Macacine gammaherpesvirus 4 | | 27 | | 27 | | |
| 1320 | | 45582 | [Candida] saitoana | 1 | | 1 | | | |
| 1321 | | 45617 | Human endogenous retrovirus K | 14 | | 14 | | | |
| 1322 | | 45659 | Human adenovirus B3 | 29 | 2 | 29 | 2 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1324 |  | 46015 | Autographa californica nucleopolyhedrovirus |  | 1 |  | 1 |  |  |
| 1325 |  | 46221 | Porcine circovirus | 1 | 49 | 1 | 49 |  |  |
| 1326 |  | 46242 | Spodoptera litura nucleopolyhedrovirus |  | 2 |  | 2 |  |  |
| 1327 |  | 46245 | Drosophila pseudoobscura pseudoobscura | 1 |  | 1 |  |  |  |
| 1328 |  | 46290 | Foot-and-mouth disease virus C3 | 4 | 1 | 4 | 1 |  |  |
| 1329 |  | 46457 | Cycloclasticus oligotrophus |  | 1 |  | 1 |  |  |
| 1331 |  | 46506 | Bacteroides stercoris |  | 1 |  | 1 |  |  |
| 1332 |  | 46771 | Simian virus 12 | 1 |  | 1 |  |  |  |
| 1333 |  | 46835 | Fasciola gigantica | 3 |  | 3 |  |  |  |
| 1334 |  | 46919 | Whitewater Arroyo mammarenavirus |  | 349 |  | 349 |  |  |
| 1335 |  | 46920 | Rio Mamore hantavirus | 1 | 1 | 1 | 1 |  |  |
| 1336 |  | 46921 | Human adenovirus D13 | 1 |  | 1 |  |  |  |
| 1337 |  | 46941 | Human adenovirus 46 | 1 |  | 1 |  |  |  |
| 1340 |  | 47929 | Macacine betaherpesvirus 3 |  | 99 |  | 99 |  |  |
| 1341 |  | 48409 | Salmonella enterica subsp. enterica serovar Virchow |  | 1 |  | 1 |  |  |
| 1342 |  | 48483 | Reclinomonas americana |  | 1 |  | 1 |  |  |
| 1343 |  | 48935 | Novosphingobium aromaticivorans |  | 1 |  | 1 |  |  |
| 1344 |  | 49011 | Hesperocyparis arizonica | 2 | 6 | 2 | 6 |  |  |
| 1346 |  | 50557 | Insecta | 7 |  | 7 |  |  |  |
| 1347 |  | 51031 | Necator americanus | 17 |  | 17 |  |  |  |
| 1348 |  | 51033 | Human papillomavirus type 73 |  | 1 |  | 1 |  |  |
| 1349 |  | 51240 | Juglans regia | 34 | 19 | 34 | 19 |  |  |
| 1350 |  | 53179 | Porcine rubulavirus | 3 |  | 3 |  |  |  |
| 1351 |  | 53182 | Feline foamy virus | 7 |  | 7 |  |  |  |
| 1352 |  | 53258 | Variola minor virus |  | 93 |  | 93 |  |  |
| 1353 |  | 53751 | Echinacea purpurea | 1 |  | 1 |  |  |  |
| 1354 |  | 54290 | GB virus C | 16 |  | 16 |  |  |  |
| 1355 |  | 54315 | Bovine viral diarrhea virus 2 | 1 |  | 1 |  |  |  |
| 1356 |  | 54388 | Salmonella enterica subsp. enterica serovar Paratyphi A |  | 1 |  | 4 |  | 3 |
| 1357 |  | 54390 | Micrurus corallinus | 123 |  | 125 |  | 2 |  |
| 1358 |  | 55097 | Mobala mammarenavirus | 1 |  | 1 |  |  |  |
| 1360 |  | 55429 | Megathura crenulata | 1 |  | 1 |  |  |  |
| 1361 |  | 55513 | Pistacia vera |  | 6 |  | 6 |  |  |
| 1362 |  | 55532 | Influenza A virus (A/swine/Quebec/1192/1986(H1)) |  | 1 |  | 1 |  |  |
| 1363 |  | 55601 | Vibrio anguillarum | 1 |  | 1 |  |  |  |
| 1364 |  | 55635 | Inula helenium |  | 1 |  | 1 |  |  |
| 1365 |  | 55951 | Grapevine leafroll-associated virus 3 | 1 |  | 1 |  |  |  |
| 1366 |  | 56636 | Aeropyrum pernix | 3 | 2 | 3 | 2 |  |  |
| 1367 |  | 57068 | Acanthisitta chloris |  | 1 |  | 1 |  |  |
| 1368 |  | 57266 | Plasmodium falciparum 7G8 | 42 | 52 | 42 | 52 |  |  |
| 1369 |  | 57270 | Plasmodium falciparum Palo Alto/Uganda | 38 |  | 38 |  |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 1370 | | 57278 | Human herpesvirus 7 strain JI | | 1 | | 1 | | |
| 1372 | | 57372 | Mycoplasma suis | 3 | | 3 | | | |
| 1373 | | 57482 | European bat 1 lyssavirus | | 1 | | 1 | | |
| 1374 | | 57486 | Mus musculus molossinus | | 1 | | 1 | | |
| 1375 | | 57667 | Simian-Human immunodeficiency virus | 1 | | 1 | | | |
| 1376 | | 57678 | Leptospira interrogans serovar Lai | 10 | 10 | 10 | 10 | | |
| 1377 | | 58024 | Spermatophyta | 4 | 1 | 4 | 1 | | |
| 1378 | | 58216 | Loxosceles gaucho | 1 | | 1 | | | |
| 1379 | | 58217 | Loxosceles laeta | 2 | | 2 | | | |
| 1380 | | 58218 | Loxosceles intermedia | 83 | | 83 | | | |
| 1381 | | 59201 | Salmonella enterica subsp. enterica | | 18 | | 18 | | |
| 1382 | | 59202 | Salmonella enterica subsp. salamae | | 1 | | 1 | | |
| 1383 | | 59203 | Salmonella enterica subsp. arizonae | | 1 | | 1 | | |
| 1384 | | 59205 | Salmonella enterica subsp. houtenae | | 1 | | 1 | | |
| 1385 | | 59375 | Influenza A virus (A/South Carolina/1/1918(H1N1)) | 8 | 1 | 9 | 1 | 1 | |
| 1386 | | 59538 | Pantholops hodgsonii | | 1 | | 1 | | |
| 1387 | | 59729 | Taeniopygia guttata | | 1 | | 1 | | |
| 1388 | | 59799 | Angomonas deanei | | 2 | | 2 | | |
| 1389 | | 60189 | Rhipicephalus decoloratus | 5 | | 5 | | | |
| 1391 | | 60552 | Burkholderia vietnamiensis | | 2 | | 2 | | |
| 1392 | | 60876 | Pixuna virus | | 1 | | 1 | | |
| 1393 | | 60879 | Cabassou virus | | 1 | | 1 | | |
| 1394 | | 60893 | Desulfobacca acetoxidans | | 1 | | 1 | | |
| 1395 | | 61466 | Gnathostoma binucleatum | 10 | | 10 | | | |
| 1396 | | 61673 | Porcine endogenous retrovirus | 2 | 11 | 2 | 11 | | |
| 1397 | | 62319 | Halococcus saccharolyticus | | 1 | | 1 | | |
| 1398 | | 62330 | Fagopyrum tataricum | 5 | | 5 | | | |
| 1399 | | 62446 | Influenza A virus (A/Argentina/3779/94(H3N2)) | | 1 | | 1 | | |
| 1400 | | 62478 | Influenza A virus (A/Kitakyushu/93(H3N2)) | | 1 | | 1 | | |
| 1401 | | 62488 | Influenza A virus (A/Nanchang/58/1993(H3N2)) | | 1 | | 1 | | |
| 1402 | | 62496 | Influenza A virus (A/New_York/17/94(H3N2)) | | 1 | | 1 | | |
| 1403 | | 62503 | Influenza A virus (A/Ohio/3/95(H3N2)) | | 1 | | 1 | | |
| 1404 | | 62512 | Influenza A virus (A/Shangdong/5/94(H3N2)) | | 1 | | 1 | | |
| 1405 | | 62541 | Influenza A virus (A/Christchurch/2/1988(H3N2)) | | 1 | | 1 | | |
| 1406 | | 62549 | Influenza A virus (A/Fukuoka/C29/1985(H3N2)) | 5 | | 5 | | | |
| 1407 | | 62559 | Influenza A virus (A/Los Angeles/1987(H3N2)) | 5 | | 5 | | | |
| 1408 | | 62564 | Influenza A virus (A/New_York/15/94(H3N2)) | | 1 | | 1 | | |
| 1409 | | 62575 | Influenza A virus (A/Sichuan/2/1987(H3N2)) | | 5 | | 5 | | |
| 1410 | | 62596 | Influenza A virus (A/USSR/26/1985(H3N2)) | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1412 |  | 63106 | Influenza A virus (A/Wuhan/359/1995(H3N2)) | 5 |  | 5 |  |  |  |
| 1413 |  | 63221 | Homo sapiens neanderthalensis |  | 1 |  | 1 |  |  |
| 1414 |  | 63330 | Hendra henipavirus | 9 | 2 | 9 | 2 |  |  |
| 1415 |  | 63363 | Aquifex aeolicus | 2 | 3 | 2 | 3 |  |  |
| 1416 |  | 63421 | Swine hepatitis E virus | 10 |  | 10 |  |  |  |
| 1417 |  | 63673 | Turbo cornutus | 2 |  | 2 |  |  |  |
| 1418 |  | 63737 | Nostoc punctiforme PCC 73102 |  | 2 |  | 2 |  |  |
| 1419 |  | 63746 | Hepatitis C virus (isolate H77) | 150 | 208 | 165 | 208 | 15 |  |
| 1420 |  | 64284 | Saboya virus |  | 1 |  | 1 |  |  |
| 1421 |  | 64289 | Carey Island virus |  | 2 |  | 2 |  |  |
| 1422 |  | 64293 | Tembusu virus | 2 | 10 | 2 | 10 |  |  |
| 1423 |  | 64320 | Zika virus | 53 | 193 | 112 | 630 | 59 | 437 |
| 1424 |  | 64382 | Human Endogenous Retrovirus IDDMK1,2-22 | 3 |  | 3 |  |  |  |
| 1425 |  | 64495 | Rhizopus oryzae | 4 | 1 | 4 | 1 |  |  |
| 1426 |  | 65690 | AK7 murine leukemia virus |  | 1 |  | 1 |  |  |
| 1427 |  | 65699 | Neisseria meningitidis serogroup A | 5 |  | 5 |  |  |  |
| 1428 |  | 65743 | Blackcurrant reversion virus | 2 |  | 2 |  |  |  |
| 1429 |  | 66692 | Bacillus clausii KSM-K16 |  | 1 |  | 1 |  |  |
| 1430 | X | 67351 | Streptomyces californicus |  |  | 1 |  | 1 |  |
| 1431 |  | 68621 | Classical swine fever virus strain Riems |  | 5 |  | 5 |  |  |
| 1432 |  | 68887 | Torque teno virus | 5 | 94 | 5 | 94 |  |  |
| 1433 |  | 68909 | Deinococcus geothermalis | 1 |  | 1 |  |  |  |
| 1434 |  | 69008 | Juniperus oxycedrus |  | 3 |  | 3 |  |  |
| 1435 |  | 69153 | Human enterovirus 71 (strain BRCR) | 1 |  | 1 |  |  |  |
| 1436 |  | 69156 | Murine cytomegalovirus (strain K181) | 2 | 14 | 2 | 14 |  |  |
| 1437 |  | 69245 | Lechiguanas virus |  | 9 |  | 9 |  |  |
| 1439 |  | 69247 | Oran virus |  | 2 |  | 2 |  |  |
| 1440 |  | 69248 | Pergamino virus |  | 1 |  | 1 |  |  |
| 1441 |  | 70146 | Measles virus strain Edmonston-B | 2 | 78 | 2 | 78 |  |  |
| 1442 |  | 70149 | Measles virus strain Edmonston-Zagreb | 1 |  | 1 |  |  |  |
| 1443 |  | 70175 | Androctonus australis hector | 24 |  | 24 |  |  |  |
| 1444 |  | 70203 | Vibrio virus fs1 |  | 1 |  | 1 |  |  |
| 1445 |  | 70865 | Murine rotavirus EDIM |  | 27 |  | 27 |  |  |
| 1446 |  | 71238 | Pseudomonas sp. G-179 |  | 1 |  | 1 |  |  |
| 1447 |  | 71421 | Haemophilus influenzae Rd KW20 |  | 3 |  | 3 |  |  |
| 1450 |  | 72132 | Rotavirus G1 | 1 | 1 | 1 | 1 |  |  |
| 1451 |  | 72539 | Physalis mottle virus | 2 |  | 2 |  |  |  |
| 1452 |  | 72556 | Achromobacter piechaudii | 1 |  | 1 |  |  |  |
| 1453 |  | 72590 | Salmonella sp. 'group B' | 6 |  | 6 |  |  |  |
| 1454 |  | 72664 | Eutrema salsugineum | 2 |  | 2 |  |  |  |
| 1455 |  | 73036 | Rotavirus G3 |  | 1 |  | 1 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 1456 | | 73239 | Plasmodium yoelii yoelii | 22 | 42 | 22 | 42 | | |
| 1457 | | 73482 | Foot-and-mouth disease virus (strain O1) | 38 | 1 | 38 | 1 | | |
| 1458 | | 73484 | Human immunodeficiency virus type 2 (isolate KR) | | 3 | | 3 | | |
| 1459 | | 74138 | Pseudomonas sp. DJ-12 | | 1 | | 1 | | |
| 1460 | | 74537 | Vladivostok virus | 1 | | 1 | | | |
| 1462 | | 74722 | Stachybotrys chartarum | 11 | | 11 | | | |
| 1463 | | 74942 | Hantavirus CRF355 | | 1 | | 1 | | |
| 1465 | | 75922 | Mycolicibacterium tusciae | | 2 | | 2 | | |
| 1468 | | 76777 | Malassezia sympodialis | 1 | | 1 | | | |
| 1469 | | 76832 | Myroides odoratimimus | | 1 | | 1 | | |
| 1470 | | 76869 | Pseudomonas putida GB-1 | | 1 | | 1 | | |
| 1472 | | 77009 | Hordeum vulgare subsp. spontaneum | | 2 | | 2 | | |
| 1473 | X | 77095 | Prevotella bryantii | | | | 2 | | 2 |
| 1474 | X | 77153 | Muscovy duck reovirus | | | 1 | | 1 | |
| 1475 | X | 77643 | Mycobacterium tuberculosis complex | | | | 5 | | 5 |
| 1476 | | 78245 | Xanthobacter autotrophicus Py2 | | 1 | | 1 | | |
| 1477 | | 79692 | Human respiratory syncytial virus B1 | 1 | 25 | 1 | 25 | | |
| 1478 | | 79695 | Influenza A virus (A/Memphis/1/71H-A/Bellamy/42N) | | 1 | | 1 | | |
| 1479 | X | 79698 | Merluccius bilinearis | | | 1 | | 1 | |
| 1480 | | 79889 | Bovine herpesvirus type 1.1 | 2 | | 2 | | | |
| 1481 | | 79923 | Clonorchis sinensis | 2 | 1 | 2 | 1 | | |
| 1482 | | 80365 | Laminaria digitata | 2 | | 2 | | | |
| 1483 | | 80859 | Streptomyces ribosidificus | | 1 | | 1 | | |
| 1484 | | 80956 | Pomacentrus moluccensis | | 1 | | 1 | | |
| 1485 | | 81475 | Frateuria aurantia | 1 | | 1 | | | |
| 1486 | | 81847 | Trichophyton quinckeanum | 1 | | 1 | | | |
| 1487 | | 81985 | Capsella rubella | 1 | | 1 | | | |
| 1488 | X | 82070 | Drimia maritima | | | 1 | | 1 | |
| 1489 | | 82300 | Adeno-associated virus - 5 | 9 | | 9 | | | |
| 1490 | | 82372 | Influenza A virus (A/Sydney/05/97-like(H3N2)) | | 1 | | 1 | | |
| 1491 | | 82470 | Bovine viral diarrhea virus strain Oregon C24V | 5 | 3 | 5 | 3 | | |
| 1492 | | 82639 | Coxsackievirus B2 | 2 | | 2 | | | |
| 1493 | | 82659 | Sapporo virus-Manchester | | 1 | | 1 | | |
| 1494 | | 82823 | Bovine respiratory syncytial virus strain lelystad | 1 | | 1 | | | |
| 1495 | | 82824 | Bovine respiratory syncytial virus strain snook | 1 | 75 | 1 | 75 | | |
| 1496 | | 82830 | Epstein-barr virus strain ag876 | 14 | 1 | 16 | 1 | 2 | |
| 1497 | | 82831 | Equid herpesvirus type 2 strain 86/87 | 1 | | 1 | | | |
| 1499 | | 83192 | Topografov hantavirus | 1 | | 1 | | | |
| 1500 | | 83206 | Influenza A virus (A/swine/Scotland/410440/94(H1N2)) | | 5 | | 5 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1501 | | 83262 | Mycobacteroides immunogenum | | 5 | | 5 | | |
| 1502 | | 83331 | Mycobacterium tuberculosis CDC1551 | | 42 | | 42 | | |
| 1503 | | 83332 | Mycobacterium tuberculosis H37Rv | 62 | 964 | 62 | 973 | | 9 |
| 1504 | | 83333 | Escherichia coli K-12 | 28 | 19 | 33 | 19 | 5 | |
| 1505 | | 83334 | Escherichia coli O157:H7 | | 123 | 3 | 123 | 3 | |
| 1506 | | 83455 | Myxococcus stipitatus | | 1 | | 1 | | |
| 1507 | | 83554 | Chlamydia psittaci | 86 | 2 | 102 | 6 | 16 | 4 |
| 1508 | | 83555 | Chlamydia abortus | 12 | | 32 | | 20 | |
| 1509 | | 83556 | Chlamydia felis | 3 | | 12 | | 9 | |
| 1510 | | 83557 | Chlamydia caviae | 6 | | 14 | | 8 | |
| 1511 | | 83558 | Chlamydia pneumoniae | 84 | 24 | 110 | 24 | 26 | |
| 1512 | | 83559 | Chlamydia suis | 4 | | 19 | | 15 | |
| 1513 | | 83560 | Chlamydia muridarum | 12 | 3 | 17 | 3 | 5 | |
| 1514 | | 83810 | Thosea asigna virus | | 1 | | 1 | | |
| 1515 | | 85106 | Adeno-associated virus - 1 | | 11 | | 11 | | |
| 1516 | | 85223 | Laurus nobilis | | 1 | | 1 | | |
| 1517 | | 85552 | Scylla paramamosain | 7 | | 88 | | 81 | |
| 1518 | | 85569 | Salmonella enterica subsp. enterica serovar Typhimurium str. DT104 | 1 | | 1 | | | |
| 1519 | | 85698 | Achromobacter xylosoxidans | 1 | | 1 | | | |
| 1520 | | 85708 | Porcine circovirus 2 | 33 | 1 | 34 | 1 | 1 | |
| 1521 | | 85709 | Porcine circovirus type 2-B | 6 | | 6 | | | |
| 1522 | | 85777 | Agelas mauritiana | | 1 | | 1 | | |
| 1523 | | 85962 | Helicobacter pylori 26695 | 40 | 10 | 40 | 10 | | |
| 1524 | | 85963 | Helicobacter pylori J99 | | 53 | | 53 | | |
| 1525 | | 85991 | Chlamydia pecorum | 116 | | 142 | | 26 | |
| 1526 | | 86107 | Coxsackievirus A6 | 1 | | 1 | | | |
| 1527 | | 86600 | Discosoma sp. | | 1 | | 1 | | |
| 1528 | | 86782 | Amur virus | | 35 | | 35 | | |
| 1530 | | 87883 | Burkholderia multivorans | 1 | 2 | 1 | 2 | | |
| 1531 | | 88036 | Selaginella moellendorffii | | 1 | | 1 | | |
| 1532 | | 88085 | Lachesis stenophrys | 13 | | 13 | | | |
| 1533 | | 88086 | Protobothrops elegans | 7 | | 7 | | | |
| 1534 | | 88087 | Protobothrops flavoviridis | 3 | | 3 | | | |
| 1535 | | 88103 | Influenza A virus (A/Hong Kong/532/1997(H5N1)) | | 1 | | 1 | | |
| 1536 | | 88104 | Influenza A virus (A/Hong Kong/483/1997(H5N1)) | 3 | 10 | 3 | 10 | | |
| 1537 | | 88776 | Influenza A virus (A/Brevig Mission/1/1918(H1N1)) | | 1 | | 1 | | |
| 1538 | | 89169 | Influenza A virus (A/Chicken/Pennsylvania/13552-1/98 (H7N2NSB)) | 1 | | 1 | | | |
| 1539 | | 89172 | Influenza A virus (A/quail/Arkansas/16309-7/94 (H7N3NSA)) | 1 | | 1 | | | |
| 1541 | | 89462 | Bubalus bubalis | 7 | 1 | 7 | 1 | | |
| 1543 | | 90370 | Salmonella enterica subsp. enterica serovar Typhi | 15 | 111 | 15 | 112 | | 1 |

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|---|---|---|---|---|---|---|---|---|---|
| 1544 | | 90371 | Salmonella enterica subsp. enterica serovar Typhimurium | 16 | 76 | 16 | 76 | | |
| 1545 | | 91465 | Pseudomonas sp. MIS38 | | 1 | | 1 | | |
| 1546 | X | 92050 | Macruronus magellanicus | | | 2 | | 2 | |
| 1547 | | 92652 | Shrimp white spot syndrome virus | 3 | | 3 | | | |
| 1548 | | 93061 | Staphylococcus aureus subsp. aureus NCTC 8325 | 5 | 1 | 5 | 1 | | |
| 1549 | | 93062 | Staphylococcus aureus subsp. aureus COL | 17 | 1 | 17 | 1 | | |
| 1550 | | 93621 | Heteropneustes fossilis | | 1 | | 1 | | |
| 1551 | | 93678 | TTV-like mini virus | | 1 | | 1 | | |
| 1552 | | 93838 | Influenza A virus (A/goose/Guangdong/1/1996(H5N1)) | 1 | 9 | 1 | 9 | | |
| 1553 | | 94432 | Human rotavirus MP409 | 1 | 1 | 1 | 1 | | |
| 1554 | | 94966 | Bluetongue virus 12 | 15 | | 15 | | | |
| 1555 | | 94967 | Bluetongue virus 4 | 7 | | 7 | | | |
| 1557 | | 95486 | Burkholderia cenocepacia | 1 | 1 | 1 | 1 | | |
| 1558 | | 95602 | Eriocheir sinensis | 10 | | 10 | | | |
| 1559 | | 95888 | Influenza A virus (A/mallard duck/PA/10218/84(H5N2)) | 8 | | 8 | | | |
| 1563 | | 97348 | Influenza A virus (A/Chicken/Hong Kong/G23/97(H9N2)) | | 1 | | 1 | | |
| 1564 | | 97353 | Influenza A virus (A/Chicken/Hong Kong/739/94(H9N2)) | | 1 | | 1 | | |
| 1565 | | 97477 | Acetomicrobium mobile | | 1 | | 1 | | |
| 1566 | | 98360 | Salmonella enterica subsp. enterica serovar Dublin | | 2 | | 2 | | |
| 1567 | | 99287 | Salmonella enterica subsp. enterica serovar Typhimurium str. LT2 | | 77 | | 78 | | 1 |
| 1568 | | 99586 | Echis ocellatus | 5 | | 5 | | | |
| 1569 | | 99875 | Leishmania donovani donovani | 1 | | 1 | | | |
| 1570 | | 99883 | Tetraodon nigroviridis | | 2 | | 2 | | |
| 1571 | | 100226 | Streptomyces coelicolor A3(2) | 1 | 1 | 1 | 1 | | |
| 1572 | | 100835 | Influenza A virus (A/Chicken/Hong Kong/258/97 (H5N1)) | 1 | | 1 | | | |
| 1573 | | 101350 | Porcine rotavirus strain A253 | 2 | | 2 | | | |
| 1574 | | 102617 | Helicobacter pylori SS1 | 3 | 3 | 4 | 3 | 1 | |
| 1575 | | 102793 | H5N1 subtype | 27 | 36 | 27 | 36 | | |
| 1576 | | 102796 | H9N2 subtype | 1 | | 2 | | 1 | |
| 1577 | | 102862 | Proteus penneri | 1 | | 1 | | | |
| 1578 | | 103448 | Pleistophora sp. LS | | 1 | | 1 | | |
| 1579 | | 103903 | Coxsackievirus B3 (strain Nancy) | 13 | 30 | 13 | 30 | | |
| 1580 | | 103905 | Coxsackievirus B4 (strain E2) | 7 | 41 | 7 | 41 | | |
| 1581 | | 103906 | Coxsackievirus B4 (strain JVB / Benschoten / New York/51) | | 76 | | 76 | | |
| 1582 | | 103920 | Guinea pig cytomegalovirus (strain 22122 / ATCC VR682) (GPCMV) | 1 | | 1 | | | |
| 1583 | | 103929 | Rabies virus strain Pasteur vaccin | 2 | 1 | 2 | 1 | | |
| 1584 | | 103930 | Rhesus cytomegalovirus strain 68-1 | | 18 | | 18 | | |
| 1585 | | 104102 | Acetobacter tropicalis | | 1 | | 1 | | |
| 1586 | | 105751 | Aeromonas bestiarum | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1587 | | 106820 | Hepatitis B virus subtype adr | 23 | 25 | 23 | 25 | | |
| 1588 | | 106821 | Hepatitis B virus subtype adw | 17 | 75 | 17 | 76 | | 1 |
| 1589 | | 107404 | Influenza B virus (B/Beijing/184/93) | | 1 | | 1 | | |
| 1590 | | 107406 | Influenza B virus (B/Chiba/447/98) | | 1 | | 1 | | |
| 1591 | | 107493 | Influenza A virus (A/Cordoba/3278/96(H3N2)) | | 1 | | 1 | | |
| 1592 | | 107558 | Influenza A virus (A/France/75/97(H3N2)) | | 1 | | 1 | | |
| 1593 | | 107819 | Clostridium perfringens D | 44 | | 45 | | 1 | |
| 1594 | | 108098 | Human mastadenovirus B | 1 | | 1 | | | |
| 1595 | | 110195 | Foot-and-mouth disease virus - type Asia 1 | 10 | 3 | 10 | 3 | | |
| 1596 | | 112509 | Hordeum vulgare subsp. vulgare | | 18 | | 18 | | |
| 1597 | | 114727 | H1N1 subtype | 15 | 44 | 16 | 49 | 1 | 5 |
| 1598 | | 114729 | H2N2 subtype | | 1 | | 1 | | |
| 1599 | | 114742 | Pythium insidiosum | 2 | | 2 | | | |
| 1600 | | 115711 | Chlamydia pneumoniae AR39 | 1 | | 1 | | | |
| 1601 | | 115713 | Chlamydia pneumoniae CWL029 | | 48 | 34 | 48 | 34 | |
| 1602 | | 117125 | Cucumber mosaic virus (strain Pepo) | 1 | | 1 | | | |
| 1603 | X | 117187 | Fusarium verticillioides | | | 1 | | 1 | |
| 1604 | | 117204 | African horse sickness virus 3 | 21 | | 21 | | | |
| 1605 | | 119210 | H3N2 subtype | 5 | 23 | 6 | 23 | 1 | |
| 1606 | | 119211 | H3N8 subtype | 1 | | 1 | | | |
| 1607 | | 119218 | H7N7 subtype | | 1 | | 1 | | |
| 1608 | X | 119220 | H5N2 subtype | | | 1 | | 1 | |
| 1609 | | 119602 | Streptococcus dysgalactiae subsp. equisimilis | 21 | | 21 | | | |
| 1610 | | 119856 | Francisella tularensis subsp. tularensis | | 5 | | 5 | | |
| 1611 | | 119912 | Salmonella enterica subsp. enterica serovar Choleraesuis | | 3 | | 3 | | |
| 1612 | | 120505 | Baboon cytomegalovirus | | 1 | | 1 | | |
| 1613 | | 121224 | Pediculus humanus corporis | 2 | | 2 | | | |
| 1614 | | 121723 | Photobacterium sp. SKA34 | | 1 | | 1 | | |
| 1615 | | 121759 | Paracoccidioides brasiliensis | 4 | 16 | 4 | 16 | | |
| 1616 | | 121791 | Nipah henipavirus | 5 | | 5 | | | |
| 1617 | | 122291 | Kappapapillomavirus 1 | 2 | | 2 | | | |
| 1618 | | 122355 | Pseudomonas psychrophila | 1 | | 1 | | | |
| 1619 | | 122586 | Neisseria meningitidis MC58 | 17 | | 17 | | | |
| 1620 | | 122928 | Norovirus GI | 2 | | 2 | | | |
| 1621 | | 122929 | Norovirus GII | 2 | | 2 | | | |
| 1622 | | 126283 | Herpes simplex virus unknown type | | 1 | | 1 | | |
| 1623 | | 126793 | Plasmodium vivax Sal-1 | 17 | | 22 | | 5 | |
| 1624 | | 126794 | Vaccinia virus Ankara | | 127 | | 127 | | |
| 1625 | | 127906 | Vibrio cholerae O1 | 9 | | 9 | | | |
| 1626 | | 127999 | Tanacetum parthenium | | 1 | | 1 | | |
| 1627 | | 128947 | Ebola virus - Gabon (1994-1997) | | 18 | | 18 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1628 | | 128948 | Sudan virus - Boniface, Sudan,1976 | 2 | 1 | 2 | 1 | | |
| 1629 | | 128949 | Sudan ebolavirus - Maleo (1979) | | 30 | | 30 | | |
| 1630 | | 128951 | Ebola virus - Zaire (1995) | | 1 | | 3 | | 2 |
| 1631 | | 128952 | Ebola virus - Mayinga, Zaire, 1976 | 36 | 13 | 37 | 13 | 1 | |
| 1632 | | 128982 | Influenza A virus (A/Swine/Indiana/9K035/99 (H1N2)) | | 2 | | 2 | | |
| 1633 | | 128987 | Grass carp reovirus | | 1 | | 1 | | |
| 1634 | | 128999 | Tai Forest virus - Cote d'Ivoire, Cote d'Ivoire, 1994 | 1 | 3 | 1 | 3 | | |
| 1635 | | 129000 | Ebola virus - Eckron (Zaire, 1976) | | 12 | | 12 | | |
| 1636 | | 129003 | Reston ebolavirus - Reston | 2 | 27 | 2 | 27 | | |
| 1637 | | 129052 | Catelliglobosispora koreensis | | 1 | | 1 | | |
| 1638 | | 129138 | Pseudomonas amygdali pv. morsprunorum | 2 | | 2 | | | |
| 1639 | | 129727 | Bovine papular stomatitis virus | | 2 | | 2 | | |
| 1640 | | 129875 | Human mastadenovirus A | | 1 | | 1 | | |
| 1641 | | 129951 | Human mastadenovirus C | 1 | 3 | 1 | 3 | | |
| 1642 | | 130663 | Fowl aviadenovirus 4 | 3 | | 3 | | | |
| 1643 | | 130760 | Influenza A virus (A/Hong Kong/1073/99(H9N2)) | 1 | 25 | 1 | 25 | | |
| 1644 | | 130763 | Influenza A virus (A/Hong Kong/156/97(H5N1)) | 2 | 26 | 4 | 26 | 2 | |
| 1645 | | 132475 | Yaba-like disease virus | | 3 | | 3 | | |
| 1646 | | 132487 | Measles virus strain Schwarz | 1 | 1 | 1 | 1 | | |
| 1647 | | 132504 | Influenza A virus (A/X-31(H3N2)) | 77 | 189 | 78 | 189 | 1 | |
| 1649 | | 132783 | Influenza A virus (A/Netherlands/626/89 (H3N2)) | | 1 | | 1 | | |
| 1650 | | 132841 | Influenza A virus (A/Netherlands/785e/90 (H3N2)) | | 1 | | 1 | | |
| 1651 | | 132884 | Influenza A virus (A/Netherlands/458/98 (H3N2)) | | 1 | | 1 | | |
| 1652 | | 133704 | Porcine circovirus 1 | 5 | | 5 | | | |
| 1653 | | 134537 | Paraburkholderia fungorum | 1 | | 1 | | | |
| 1655 | | 135661 | Influenza A virus (A/environment/Hong Kong/437-10/99 (H5N1)) | | 1 | | 1 | | |
| 1656 | | 135720 | Neisseria meningitidis serogroup C | 3 | | 3 | | | |
| 1657 | | 136371 | Umbilicaria papulosa | 1 | | 1 | | | |
| 1658 | | 136474 | Influenza A virus (A/Swine/Colorado/23619/99(H3N2)) | | 1 | | 1 | | |
| 1659 | | 136966 | SEN virus | | 7 | | 7 | | |
| 1660 | | 137578 | Influenza A virus (A/England/939/69 x A/PR/8/34) | | 2 | | 2 | | |
| 1661 | | 137885 | Influenza A virus (A/parakeet/Chiba/1/97(H9N2)) | | 4 | | 4 | | |
| 1662 | | 137886 | Influenza A virus (A/parakeet/Narita/92A/98(H9N2)) | | 2 | | 2 | | |
| 1663 | | 138948 | Enterovirus A | 1 | | 1 | | | |
| 1664 | | 138950 | Enterovirus C | 6 | 3 | 6 | 3 | | |
| 1666 | X | 142786 | Norovirus | | | | 1 | | 1 |
| 1667 | | 142948 | Influenza A virus (A/ruddy turnstone/Delaware/67/1998(H12N4)) | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1668 | | 144549 | Mycolicibacterium fortuitum subsp. fortuitum | | 1 | | 1 | | |
| 1669 | | 145262 | Methanothermobacter thermautotrophicus | | 1 | | 1 | | |
| 1670 | | 145306 | Influenza A virus (A/swine/Hong Kong/10/98(H9N2)) | 5 | | 5 | | | |
| 1671 | | 145307 | Influenza A virus (A/swine/Hong Kong/9/98(H9N2)) | 2 | | 2 | | | |
| 1672 | | 147095 | Influenza A virus (A/Swine/Italy/25823/94(H3N2)) | | 2 | | 2 | | |
| 1673 | | 147272 | Paspalum notatum | | 16 | | 16 | | |
| 1674 | | 148360 | Watermelon mosaic virus 2 (isolate USA) | 2 | | 2 | | | |
| 1675 | | 148363 | Helicoverpa armigera nucleopolyhedrovirus G4 | 2 | | 2 | | | |
| 1676 | | 149539 | Salmonella enterica subsp. enterica serovar Enteritidis | 1 | 2 | 1 | 3 | | 1 |
| 1677 | | 150080 | Norovirus isolates | 1 | | 1 | | | |
| 1678 | | 150127 | Influenza B virus (B/Osaka/983/97-V3) | 1 | | 1 | | | |
| 1679 | | 150340 | Vibrio antiquarius | | 15 | | 15 | | |
| 1680 | | 150396 | Pseudomonas sp. MT-1 | | 1 | | 1 | | |
| 1681 | | 150846 | Enterovirus 5865/sin/000009 | 2 | | 2 | | | |
| 1682 | | 151250 | Kali turgidum | | 22 | 1 | 22 | 1 | |
| 1683 | | 152219 | Menangle virus | 2 | | 2 | | | |
| 1684 | | 152794 | Corynebacterium efficiens | | 5 | | 5 | | |
| 1685 | | 153969 | Influenza A virus (A/Hong Kong/497/97(H3N2)) | | 1 | | 1 | | |
| 1686 | | 154540 | Influenza A virus (A/Kayano/57(H2N2)) | | 1 | | 1 | | |
| 1687 | | 155017 | Anogeissus | 1 | | 1 | | | |
| 1688 | | 155091 | Secale cereale subsp. afghanicum | | 2 | | 2 | | |
| 1689 | | 155218 | Influenza A virus (A/Hong Kong/482/97(H5N1)) | 7 | 1 | 7 | 1 | | |
| 1690 | | 155220 | Influenza A virus (A/Hong Kong/542/97(H5N1)) | 1 | | 1 | | | |
| 1691 | | 155222 | Influenza A virus (A/Hong Kong/488/97(H5N1)) | | 1 | | 1 | | |
| 1692 | | 155225 | Influenza A virus (A/Hong Kong/507/97(H5N1)) | | 5 | | 5 | | |
| 1693 | | 155226 | Influenza A virus (A/Hong Kong/514/97(H5N1)) | | 1 | | 1 | | |
| 1694 | | 155227 | Influenza A virus (A/Hong Kong/516/97(H5N1)) | | 2 | | 2 | | |
| 1695 | | 155864 | Escherichia coli O157:H7 str. EDL933 | 4 | 32 | 4 | 32 | | |
| 1696 | | 155917 | Influenza A virus (A/NWS/33HA-A/tern/Australia/G70C/75NA(H1N9)) | 1 | | 1 | | | |
| 1697 | | 156230 | Karenia brevis | 1 | | 1 | | | |
| 1698 | | 156586 | Flavobacteria bacterium BBFL7 | | 1 | | 1 | | |
| 1700 | | 157703 | Murine polyomavirus strain A3 | | 4 | | 4 | | |
| 1701 | | 157914 | Ziziphus mauritiana | 4 | | 4 | | | |
| 1702 | | 158306 | Influenza A virus (A/swine/Cotes d'Armor/800/00(H1N2)) | | 1 | | 1 | | |
| 1703 | | 158465 | Human calicivirus Hu/NLV/GII/MD145-12/1987/US | 1 | | 1 | | | |
| 1704 | | 158474 | Bovine viral diarrhea virus strain Trangie Y546 | 1 | | 1 | | | |
| 1705 | | 158879 | Staphylococcus aureus subsp. aureus N315 | | 5 | | 5 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1706 | | 159091 | Pseudomonas sp. KIE171 | | 1 | | 1 | | |
| 1707 | | 159449 | Streptomyces scabrisporus | 1 | | 1 | | | |
| 1708 | | 159471 | Influenza A virus (A/eq/Sussex/89/(H3N8)) | 4 | | 4 | | | |
| 1709 | | 159479 | Saaremaa hantavirus | | 21 | | 21 | | |
| 1710 | | 160490 | Streptococcus pyogenes M1 GAS | 13 | 2 | 13 | 2 | | |
| 1711 | | 160491 | Streptococcus pyogenes str. Manfredo | 3 | 35 | 3 | 35 | | |
| 1712 | | 160753 | Simian immunodeficiency virus 17E-Fr | | 2 | | 2 | | |
| 1713 | | 161502 | Influenza A virus (A/swine/Italy/1509-6/97(H1N1)) | | 15 | | 15 | | |
| 1714 | | 161600 | Yellow grouper nervous necrosis virus | 1 | | 1 | | | |
| 1715 | | 161727 | Foot-and-mouth disease virus A10/Holland | 11 | 14 | 11 | 14 | | |
| 1716 | | 161934 | Beta vulgaris | 5 | | 5 | | | |
| 1717 | | 162145 | Human metapneumovirus | 8 | 130 | 8 | 130 | | |
| 1718 | | 162326 | Influenza A virus (A/Hong Kong/1143/99(H3N2)) | 1 | | 1 | | | |
| 1719 | | 163164 | Wolbachia endosymbiont of Drosophila melanogaster | | 1 | | 1 | | |
| 1720 | | 164326 | Influenza A virus (A/Hong Kong/1131/1998(H1N1)) | 1 | 1 | 1 | 1 | | |
| 1721 | | 164756 | Mycobacterium sp. MCS | | 73 | | 73 | | |
| 1722 | | 164757 | Mycobacterium sp. JLS | | 77 | | 77 | | |
| 1723 | | 165420 | Influenza A virus (A/Turkey/MO/24093/99(H1N2)) | | 4 | | 4 | | |
| 1724 | | 165512 | Influenza A virus (A/goose/Guangdong/3/1997(H5N1)) | 3 | 1 | 3 | 1 | | |
| 1726 | | 167758 | TTV-like virus DXL1 | | 10 | | 10 | | |
| 1727 | | 168278 | Influenza A virus (A/swine/Finistere/127/99(H3N2)) | | 4 | | 4 | | |
| 1728 | | 168807 | Escherichia coli O127:H6 | 1 | | 1 | | | |
| 1729 | | 169166 | Influenza A virus (A/swine/Italy/1521/98(H1N2)) | | 4 | | 4 | | |
| 1730 | | 169169 | Influenza A virus (A/swine/Cotes d'Armor/1482/1999(H1N1)) | | 1 | | 1 | | |
| 1731 | | 169173 | Choclo virus | | 3 | | 3 | | |
| 1733 | | 169963 | Listeria monocytogenes EGD-e | 5 | 64 | 5 | 64 | | |
| 1735 | | 170187 | Streptococcus pneumoniae TIGR4 | | 2 | | 2 | | |
| 1736 | | 170325 | Canid alphaherpesvirus 1 | | 1 | | 1 | | |
| 1737 | | 170342 | Influenza A virus (A/swine/Italy/1654-1/99(H1N2)) | | 1 | | 1 | | |
| 1738 | | 170500 | H1N9 subtype | 1 | | 1 | | | |
| 1739 | | 170525 | Measles virus genotype D4 | 1 | | 1 | | | |
| 1740 | | 170529 | Measles virus genotype D7 | 1 | | 1 | | | |
| 1741 | | 170955 | Amur virus Solovey/AP63/1999 | | 2 | | 2 | | |
| 1742 | | 171101 | Streptococcus pneumoniae R6 | 1 | 12 | 1 | 12 | | |
| 1743 | | 171264 | Measles virus genotype D3 | 1 | | 1 | | | |
| 1744 | | 171425 | Influenza B virus (B/Kobe/87/2001) | 1 | | 1 | | | |
| 1745 | X | 171631 | Fusarium oxysporum species complex | | | 8 | | 8 | |
| 1746 | | 171929 | Anacardium occidentale | 64 | 10 | 64 | 10 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1747 | | 172148 | Alkhumra hemorrhagic fever virus | | 4 | | 4 | | |
| 1748 | | 172149 | Influenza A virus (A/swine/Quebec/192/81(H1N1)) | 1 | | 1 | | | |
| 1749 | | 172851 | Avian hepatitis E virus | 20 | | 20 | | | |
| 1750 | | 173473 | Influenza A virus (A/swine/Hong Kong/2106/98(H9N2)) | | 2 | | 2 | | |
| 1751 | | 173477 | Influenza A virus (A/swine/Hong Kong/3297/98(H9N2)) | | 3 | | 3 | | |
| 1752 | | 176672 | Influenza A virus (A/Duck/Hong Kong/ww461/2000(H5N1)) | | 1 | | 1 | | |
| 1754 | | 177128 | Influenza A virus (A/SW/MN/12883/00(H1N2)) | | 2 | | 2 | | |
| 1755 | | 177131 | Influenza A virus (A/SW/KS/13481-T/00(H1N2)) | | 1 | | 1 | | |
| 1756 | | 177188 | Influenza A virus (A/SW/MN/3227/00(H1N2)) | | 1 | | 1 | | |
| 1757 | | 177416 | Francisella tularensis subsp. tularensis SCHU S4 | | 92 | | 92 | | |
| 1758 | | 178876 | Cryptococcus neoformans var. grubii | 1 | | 1 | | | |
| 1759 | | 180454 | Anopheles gambiae str. PEST | 6 | 2 | 6 | 2 | | |
| 1760 | | 180498 | Jatropha curcas | 6 | | 6 | | | |
| 1761 | | 182082 | Chlamydia pneumoniae TW-183 | 7 | | 7 | | | |
| 1762 | | 182781 | Influenza A virus (A/Goose/Hong Kong/385.3/2000(H5N1)) | | 1 | | 1 | | |
| 1763 | | 182785 | Mycobacterium tuberculosis subsp. tuberculosis | | 1 | | 1 | | |
| 1764 | | 183741 | Influenza A virus (A/Chicken/Shanghai/F/98(H9N2)) | 5 | | 5 | | | |
| 1765 | | 183764 | Influenza A virus (A/Puerto Rico/8/34/Mount Sinai(H1N1)) | 7 | 100 | 7 | 100 | | |
| 1766 | | 183778 | Influenza A virus (A/quail/Hong Kong/SF550/00(H6N1)) | | 2 | | 2 | | |
| 1767 | | 183783 | Influenza A virus (A/duck/Hong Kong/3096/99(H6N2)) | | 2 | | 2 | | |
| 1768 | | 184816 | Influenza B virus (B/Kadoma/122/99) | 2 | | 2 | | | |
| 1769 | | 184922 | Giardia lamblia ATCC 50803 | | 249 | | 249 | | |
| 1770 | | 185431 | Trypanosoma brucei brucei TREU927 | | 1 | | 1 | | |
| 1771 | | 185579 | Hepatitis E virus type 1 | 3 | | 3 | | | |
| 1772 | | 185580 | Hepatitis E virus type 4 | 1 | | 1 | | | |
| 1773 | | 185794 | Influenza A virus (A/mallard/NZ/1/97(H5N2)) | | 1 | | 1 | | |
| 1774 | | 185905 | Human rhinovirus A34 | | 54 | | 54 | | |
| 1775 | | 185907 | Human rhinovirus A39 | | 1 | | 1 | | |
| 1776 | | 185949 | Sphingomonas aurantiaca | | 1 | | 1 | | |
| 1777 | | 186460 | Influenza A virus (A/swine/New Jersey/11/1976(H1N1)) | 1 | | 1 | | | |
| 1778 | | 186536 | Ebolavirus | 61 | 1 | 61 | 1 | | |
| 1779 | | 186538 | Zaire ebolavirus | 99 | 886 | 124 | 897 | 25 | 11 |
| 1780 | | 186539 | Reston ebolavirus | 1 | 11 | 1 | 11 | | |
| 1781 | | 186540 | Sudan ebolavirus | 4 | 292 | 4 | 292 | | |
| 1782 | | 186541 | Tai Forest ebolavirus | | 1 | | 1 | | |
| 1783 | | 187164 | Influenza A virus (A/Swine/Minnesota/55551/2000(H1N2)) | | 1 | | 1 | | |
| 1784 | | 187410 | Yersinia pestis KIM10+ | | 11 | | 11 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1785 | | 187420 | Methanothermobacter thermautotrophicus str. Delta H | | 1 | | 1 | | |
| 1786 | | 188763 | Panine betaherpesvirus 2 | | 4 | | 4 | | |
| 1787 | | 189518 | Leptospira interrogans serovar Lai str. 56601 | 1 | | 1 | | | |
| 1788 | | 189918 | Mycobacterium sp. KMS | | 69 | | 69 | | |
| 1789 | | 191090 | Influenza A virus (A/Weiss/1943(H1N1)) | | 1 | | 1 | | |
| 1790 | | 191218 | Bacillus anthracis str. A2012 | | 29 | | 29 | | |
| 1791 | | 192087 | Pseudomonas syringae pv. atrofaciens | 4 | | 4 | | | |
| 1792 | | 192222 | Campylobacter jejuni subsp. jejuni NCTC 11168 = ATCC 700819 | 10 | 22 | 10 | 22 | | |
| 1793 | | 192535 | Influenza A virus (A/Saudi Arabia/7971/2000(H1N1)) | | 1 | | 1 | | |
| 1794 | | 192549 | Influenza A virus (A/Egypt/96/2002(H1N2)) | | 1 | | 1 | | |
| 1795 | | 192720 | Influenza A virus (A/Saudi Arabia/2581/2001(H1N2)) | | 1 | | 1 | | |
| 1796 | | 194601 | Vipera aspis aspis | 3 | | 3 | | | |
| 1797 | | 194958 | Porcine endogenous retrovirus A | 2 | | 2 | | | |
| 1798 | | 194959 | Porcine endogenous retrovirus B | 1 | | 1 | | | |
| 1799 | X | 195055 | Human parechovirus 3 | | | 1 | | 1 | |
| 1800 | | 195099 | Campylobacter jejuni RM1221 | | 13 | | 13 | | |
| 1801 | | 195102 | Clostridium perfringens str. 13 | | 1 | | 1 | | |
| 1802 | | 195700 | Avian rotavirus PO-13 | 6 | | 6 | | | |
| 1803 | | 196164 | Corynebacterium efficiens YS-314 | | 4 | | 4 | | |
| 1804 | | 196403 | Baboon endogenous virus | 1 | 1 | 1 | 1 | | |
| 1805 | | 196462 | Influenza A virus (A/chicken/California/1002a/00(H6N2)) | 1 | 1 | 1 | 1 | | |
| 1806 | | 196600 | Vibrio vulnificus YJ016 | | 75 | | 75 | | |
| 1807 | | 196620 | Staphylococcus aureus subsp. aureus MW2 | | 7 | | 7 | | |
| 1808 | | 196627 | Corynebacterium glutamicum ATCC 13032 | | 14 | | 14 | | |
| 1809 | | 197575 | Haemophilus aegyptius | 1 | | 1 | | | |
| 1810 | | 197579 | Influenza A virus (A/Chicken/Guangdong/11/97(H9N2)) | | 1 | | 1 | | |
| 1811 | | 197585 | Influenza A virus (A/chicken/Shandong/6/96(H9N2)) | 1 | | 1 | | | |
| 1812 | | 197589 | Influenza A virus (A/Quail/Shanghai/8/96(H9N2)) | | 1 | | 1 | | |
| 1813 | | 197780 | Bluetongue virus 8 | 2 | 21 | 2 | 21 | | |
| 1814 | | 198059 | Influenza A virus (A/England/627/01(H1N2)) | | 2 | | 2 | | |
| 1815 | | 198094 | Bacillus anthracis str. Ames | | 2 | | 2 | | |
| 1816 | | 198214 | Shigella flexneri 2a str. 301 | | 4 | | 4 | | |
| 1817 | | 198215 | Shigella flexneri 2a str. 2457T | | 2 | | 2 | | |
| 1818 | | 199306 | Coccidioides posadasii | | 9 | | 10 | | 1 |
| 1819 | | 199310 | Escherichia coli CFT073 | 1 | 2 | 1 | 2 | | |
| 1820 | | 199738 | uncultured Chlamydia sp. | 2 | | 2 | | | |
| 1821 | | 201444 | Aracatuba virus | | 5 | | 5 | | |
| 1822 | | 202812 | Adeno-associated virus - 7 | | 2 | | 2 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1823 | | 202813 | Adeno-associated virus - 8 | 17 | 14 | 17 | 14 | | |
| 1824 | | 202950 | Acinetobacter baylyi | | 2 | | 2 | | |
| 1825 | | 203119 | Hungateiclostridium thermocellum ATCC 27405 | | 1 | | 1 | | |
| 1826 | | 203124 | Trichodesmium erythraeum IMS101 | | 2 | | 2 | | |
| 1827 | | 203126 | Influenza A virus (A/Kamata/14/91(H3N2)) | 1 | | 1 | | | |
| 1828 | | 203129 | Influenza A virus (A/Aichi/2/1994(H3N2)) | | 1 | | 1 | | |
| 1829 | | 203172 | Camelpox virus CMS | | 28 | | 28 | | |
| 1830 | | 203173 | Camelpox virus M-96 | | 133 | | 133 | | |
| 1831 | | 203174 | Camelpox virus CP1 | | 1 | | 1 | | |
| 1833 | | 204428 | Chlamydiae | 16 | | 16 | | | |
| 1834 | | 204711 | Theilovirus | | 10 | | 10 | | |
| 1835 | | 204722 | Brucella suis 1330 | 1 | 29 | 1 | 29 | | |
| 1837 | | 205488 | Ebola virus sp. | | 2 | | 2 | | |
| 1838 | | 205913 | Bifidobacterium longum DJO10A | | 2 | | 2 | | |
| 1839 | | 205914 | Histophilus somni 129PT | | 2 | | 2 | | |
| 1840 | | 205920 | Ehrlichia chaffeensis str. Arkansas | 23 | | 23 | | | |
| 1841 | | 205946 | Influenza A virus (A/Chicken/Beijing/1/95(H9N2)) | | 1 | | 1 | | |
| 1843 | | 206203 | Influenza B virus (B/Hong Kong/330/2001) | | 23 | | 23 | | |
| 1844 | | 207401 | Influenza A virus (A/finch/Canada/NS1301/2001(H3N8)) | | 1 | | 1 | | |
| 1845 | | 208435 | Streptococcus agalactiae 2603V/R | 1 | 2 | 1 | 2 | | |
| 1846 | | 208726 | Human hepatitis A virus | 4 | 1 | 4 | 1 | | |
| 1847 | | 208893 | Human respiratory syncytial virus A | 30 | 4 | 30 | 4 | | |
| 1849 | | 208899 | Cupixi mammarenavirus | | 1 | | 1 | | |
| 1850 | | 208963 | Pseudomonas aeruginosa UCBPP-PA14 | | 23 | | 23 | | |
| 1851 | | 208964 | Pseudomonas aeruginosa PAO1 | 2 | 39 | 2 | 39 | | |
| 1852 | | 209261 | Salmonella enterica subsp. enterica serovar Typhi str. Ty2 | | 16 | | 16 | | |
| 1853 | | 209841 | Actinobacillus pleuropneumoniae serovar 7 | 1 | | 1 | | | |
| 1854 | | 209882 | Fusobacterium nucleatum subsp. vincentii ATCC 49256 | | 2 | | 2 | | |
| 1855 | | 210655 | Influenza A virus (A/Duck/Shantou/2144/00(H9N2)) | | 1 | | 1 | | |
| 1856 | | 210656 | Influenza A virus (A/Duck/Shantou/1881/00(H9N2)) | | 1 | | 1 | | |
| 1857 | | 210659 | Influenza A virus (A/Duck/Shantou/2088/01(H9N2)) | | 1 | | 1 | | |
| 1858 | | 210663 | Influenza A virus (A/Duck/Shantou/2134/00(H9N2)) | | 1 | | 1 | | |
| 1859 | | 211044 | Influenza A virus (A/Puerto Rico/8/1934(H1N1)) | 33 | 504 | 36 | 538 | 3 | 34 |
| 1860 | | 211110 | Streptococcus agalactiae NEM316 | | 1 | | 1 | | |
| 1861 | | 211882 | Leptospira interrogans serovar Australis | 2 | | 2 | | | |
| 1862 | | 212042 | Anaplasma phagocytophilum str. HZ | 21 | | 21 | | | |
| 1863 | | 212045 | Bacillus anthracis str. Western North America USA6153 | | 1 | | 1 | | |
| 1864 | X | 212361 | Anabaena aequalis | | | 1 | | 1 | |

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|---|---|---|---|---|---|---|---|---|---|
| 1865 | | 212717 | Clostridium tetani E88 | | 16 | | 16 | | |
| 1866 | | 214092 | Yersinia pestis CO92 | 39 | 22 | 39 | 22 | | |
| 1867 | X | 214675 | Leptospira interrogans serovar Manilae | | | 1 | | 1 | |
| 1868 | | 214697 | Musa acuminata AAA Group | 1 | | 1 | | | |
| 1870 | | 214856 | Alistipes finegoldii | | 1 | | 1 | | |
| 1871 | | 215862 | Influenza A virus (A/Chicken/Nanchang/2-220/2001(H3N6)) | | 1 | | 1 | | |
| 1873 | | 216466 | Streptococcus agalactiae serogroup V | 1 | | 1 | | | |
| 1874 | | 216495 | Streptococcus agalactiae serogroup III | 12 | | 12 | | | |
| 1875 | | 216592 | Escherichia coli 042 | 2 | | 2 | | | |
| 1876 | | 216594 | Mycobacterium marinum M | | 29 | | 29 | | |
| 1877 | | 216597 | Salmonella enterica subsp. enterica serovar Typhimurium str. SL1344 | | 2 | | 2 | | |
| 1878 | | 216600 | Streptococcus pneumoniae 23F | 6 | | 6 | | | |
| 1879 | | 216877 | Influenza A virus (A/quail/Hong Kong/FY298/00(H9N2)) | | 4 | | 4 | | |
| 1880 | | 216895 | Vibrio vulnificus CMCP6 | | 53 | | 53 | | |
| 1881 | | 217686 | Little cherry virus 1 | | 1 | | 1 | | |
| 1882 | | 217992 | Escherichia coli O6 | | 7 | | 7 | | |
| 1883 | X | 218497 | Chlamydia abortus S26/3 | | | 29 | | 29 | |
| 1884 | | 219334 | Lactobacillus casei subsp. casei ATCC 393 | 2 | | 2 | | | |
| 1885 | | 220341 | Salmonella enterica subsp. enterica serovar Typhi str. CT18 | | 92 | | 92 | | |
| 1886 | | 220837 | Cryptosporidium sp. MNJ-1 | | 1 | | 1 | | |
| 1887 | | 220977 | Influenza A virus (A/England/10/67(H2N2)) | | 1 | | 1 | | |
| 1888 | | 221012 | Influenza A virus (A/Rio/6/69(H3N2)) | | 1 | | 1 | | |
| 1889 | X | 221703 | Simian foamy virus Pongo pygmaeus pygmaeus | | | 2 | | 2 | |
| 1890 | | 221918 | Bovine viral diarrhea virus VEDEVAC | 6 | | 6 | | | |
| 1891 | | 221988 | [Mannheimia] succiniciproducens MBEL55E | | 2 | | 2 | | |
| 1892 | | 222523 | Bacillus cereus ATCC 10987 | | 1 | | 1 | | |
| 1893 | | 223337 | Tobacco leaf curl Zimbabwe virus | | 1 | | 1 | | |
| 1894 | | 223926 | Vibrio parahaemolyticus RIMD 2210633 | 2 | 17 | 2 | 17 | | |
| 1895 | | 223931 | Influenza A virus (A/Bangkok/10/1983(H1N1)) | | 1 | | 1 | | |
| 1897 | | 223935 | Influenza A virus (A/Okuda/1957(H2N2)) | 1 | 9 | 1 | 9 | | |
| 1898 | | 223947 | Influenza A virus (A/Hokkaido/20/89(H3N2)) | | 3 | | 3 | | |
| 1899 | | 223997 | Murine norovirus 1 | 4 | 1 | 4 | 1 | | |
| 1900 | | 224197 | Influenza C virus (C/Nara/1/85) | | 1 | | 1 | | |
| 1901 | | 224206 | Simian immunodeficiency virus - mon | | 1 | | 1 | | |
| 1902 | | 224308 | Bacillus subtilis subsp. subtilis str. 168 | | 1 | | 1 | | |
| 1903 | | 224324 | Aquifex aeolicus VF5 | 1 | 1 | 2 | 1 | 1 | |
| 1904 | | 224326 | Borreliella burgdorferi B31 | 107 | 10 | 113 | 10 | 6 | |

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|---|---|---|---|---|---|---|---|---|---|
| 1905 | | 224819 | Influenza A virus (A/Nagasaki/76/98(H3N2)) | | 1 | | 1 | | |
| 1906 | | 224914 | Brucella melitensis bv. 1 str. 16M | 6 | 14 | 6 | 14 | | |
| 1907 | | 224964 | Influenza B virus (B/Johannesburg/5/99) | 1 | | 1 | | | |
| 1908 | | 225071 | Influenza A virus (A/Tokyo/1566/98(H3N2)) | | 1 | | 1 | | |
| 1909 | X | 225085 | Influenza A virus (A/Aichi/2/68 (Ao)) | | | | 9 | | 9 |
| 1910 | | 225088 | Influenza A virus (A/Kitakyushu/159/93(H3N2)) | | 1 | | 1 | | |
| 1911 | | 225089 | Influenza A virus (A/equine/NewMarket/D64/79(H3N8)) | | 1 | | 1 | | |
| 1912 | | 226186 | Bacteroides thetaiotaomicron VPI-5482 | | 1 | | 1 | | |
| 1913 | | 226900 | Bacillus cereus ATCC 14579 | | 2 | | 2 | | |
| 1914 | | 227377 | Coxiella burnetii RSA 493 | | 13 | | 13 | | |
| 1915 | X | 227941 | Chlamydia caviae GPIC | | | 11 | | 11 | |
| 1916 | | 227984 | SARS coronavirus Tor2 | 171 | 2205 | 171 | 2205 | | |
| 1917 | | 228330 | SARS coronavirus Urbani | 26 | 52 | 26 | 52 | | |
| 1918 | | 228399 | Actinobacillus pleuropneumoniae serovar 1 str. 4074 | 2 | 1 | 2 | 1 | | |
| 1919 | | 228400 | Histophilus somni 2336 | 1 | | 1 | | | |
| 1921 | | 228407 | SARS coronavirus BJ01 | 64 | 28 | 64 | 28 | | |
| 1922 | | 228928 | Influenza A virus (A/Memphis/31/98(H3N2)) | 6 | | 6 | | | |
| 1923 | | 229032 | Porcine epidemic diarrhea virus CV777 | 5 | | 5 | | | |
| 1924 | | 229051 | Influenza A virus (A/81/HO) | | 6 | | 6 | | |
| 1925 | | 229992 | SARS coronavirus Frankfurt 1 | 5 | 26 | 5 | 26 | | |
| 1926 | | 231428 | Avian infectious bronchitis virus (strain Vic S) | 11 | 8 | 11 | 8 | | |
| 1927 | | 231455 | Dyella japonica | 1 | | 1 | | | |
| 1928 | | 231851 | Influenza A virus (A/Hong Kong/1774/99(H3N2)) | | 1 | | 1 | | |
| 1929 | | 233262 | Bovine enteric coronavirus (strain 98TXSF-110-ENT) | | 1 | | 1 | | |
| 1930 | | 233412 | [Haemophilus] ducreyi 35000HP | 1 | | 1 | | | |
| 1931 | | 233413 | Mycobacterium tuberculosis variant bovis AF2122/97 | | 54 | | 54 | | |
| 1932 | | 234267 | Candidatus Solibacter usitatus Ellin6076 | | 2 | | 2 | | |
| 1933 | | 234603 | Sapovirus Mc114 | | 1 | | 1 | | |
| 1934 | | 234826 | Anaplasma marginale str. St. Maries | 16 | 28 | 16 | 28 | | |
| 1935 | | 235279 | Helicobacter hepaticus ATCC 51449 | 2 | | 2 | | | |
| 1936 | | 235455 | Adeno-associated virus 9 | 10 | | 10 | | | |
| 1938 | | 237561 | Candida albicans SC5314 | | 3 | | 3 | | |
| 1939 | | 237609 | Pseudomonas alkylphenolica | | 1 | | 1 | | |
| 1940 | | 237631 | Ustilago maydis 521 | | 2 | | 2 | | |
| 1941 | | 237895 | Cryptosporidium hominis | | 3 | | 3 | | |
| 1943 | | 240426 | Squirrelpox virus | | 1 | | 1 | | |
| 1945 | | 242619 | Porphyromonas gingivalis W83 | 4 | | 4 | | | |
| 1946 | | 243160 | Burkholderia mallei ATCC 23344 | | 40 | | 40 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1947 | | 243161 | Chlamydia muridarum str. Nigg | | 42 | 11 | 42 | 11 | |
| 1948 | | 243164 | Dehalococcoides mccartyi 195 | | 1 | | 1 | | |
| 1949 | | 243230 | Deinococcus radiodurans R1 | 1 | | 2 | | 1 | |
| 1950 | | 243232 | Methanocaldococcus jannaschii DSM 2661 | 3 | 1 | 3 | 1 | | |
| 1951 | | 243243 | Mycobacterium avium 104 | | 43 | | 43 | | |
| 1952 | | 243273 | Mycoplasma genitalium G37 | 8 | 1 | 8 | 1 | | |
| 1953 | X | 243274 | Thermotoga maritima MSB8 | | | 1 | | 1 | |
| 1954 | | 243276 | Treponema pallidum subsp. pallidum str. Nichols | 283 | 9 | 283 | 9 | | |
| 1955 | | 243277 | Vibrio cholerae O1 biovar El Tor str. N16961 | 4 | 3 | 4 | 3 | | |
| 1956 | | 244320 | Escherichia coli O55:H7 | | 1 | | 1 | | |
| 1957 | | 244367 | Foot-and-mouth disease virus C-S8c1 | 15 | 17 | 15 | 17 | | |
| 1958 | | 246196 | Mycolicibacterium smegmatis MC2 155 | | 61 | | 61 | | |
| 1959 | | 246202 | Streptococcus sobrinus 6715 | 4 | 4 | 4 | 4 | | |
| 1960 | | 246437 | Tupaia chinensis | 1 | | 1 | | | |
| 1961 | | 246618 | Bifidobacterium thermacidophilum | 1 | | 1 | | | |
| 1962 | | 246878 | Canine parvovirus 2 | 3 | | 3 | | | |
| 1963 | | 249372 | Influenza A virus (A/duck/Hokkaido/13/00(H9N2)) | 2 | | 2 | | | |
| 1964 | | 251297 | Influenza A virus (A/Netherlands/127/03(H7N7)) | | 1 | | 1 | | |
| 1965 | | 253182 | Human Respiratory syncytial virus 9320 | 1 | | 1 | | | |
| 1966 | X | 253446 | Avian orthoreovirus strain 1017-1 | | | 1 | | 1 | |
| 1967 | | 253682 | Influenza A virus (A/swine/Hong Kong/5190/99(H3N2)) | | 3 | | 3 | | |
| 1968 | | 253686 | Influenza A virus (A/swine/Hong Kong/74/02(H3N2)) | | 1 | | 1 | | |
| 1969 | | 254252 | Lactococcus virus P2 | 2 | | 2 | | | |
| 1970 | | 254355 | Small ruminant lentivirus | 1 | | 1 | | | |
| 1971 | | 255681 | Influenza A virus (A/Yokohama/22/2002(H1N2)) | | 2 | | 2 | | |
| 1972 | | 255682 | Influenza A virus (A/Yokohama/47/2002(H1N2)) | | 1 | | 1 | | |
| 1973 | | 256045 | Influenza A virus (A/swine/Chiai/77-10/2001(H3N1)) | | 1 | | 1 | | |
| 1974 | | 256080 | Influenza B virus (B/Kobe/1/2003) | 1 | | 1 | | | |
| 1975 | | 257313 | Bordetella pertussis Tohama I | | 11 | | 11 | | |
| 1976 | | 257363 | Rickettsia typhi str. Wilmington | | 6 | | 6 | | |
| 1977 | | 260799 | Bacillus anthracis str. Sterne | 5 | 4 | 5 | 4 | | |
| 1978 | | 260806 | Influenza A virus (A/FPV/Dutch/1927(H7N7)) | 1 | | 1 | | | |
| 1979 | | 260965 | Cercopithecine herpesvirus 1 (strain E2490) | 18 | | 18 | | | |
| 1980 | | 261202 | Alto Paraguay hantavirus | | 3 | | 3 | | |
| 1981 | | 261204 | Itapua hantavirus | | 10 | | 10 | | |
| 1982 | | 261594 | Bacillus anthracis str. 'Ames Ancestor' | | 1 | | 1 | | |
| 1983 | | 261658 | Cavenderia fasciculata | | 1 | | 1 | | |
| 1984 | | 262307 | Measles virus genotype A | 4 | | 4 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 1985 | | 262316 | Mycobacterium avium subsp. paratuberculosis K-10 | 4 | 58 | 4 | 58 | | |
| 1986 | | 262698 | Brucella abortus bv. 1 str. 9-941 | | 1 | | 1 | | |
| 1987 | | 262722 | Mycoplasma hyopneumoniae 7448 | 1 | | 1 | | | |
| 1988 | X | 262724 | Thermus thermophilus HB27 | | | 1 | | 1 | |
| 1989 | | 262727 | Haemophilus influenzae R2846 | | 6 | | 6 | | |
| 1990 | | 262728 | Haemophilus influenzae R2866 | | 2 | | 2 | | |
| 1991 | | 263683 | Bovine herpesvirus 5 strain TX89 | 2 | | 2 | | | |
| 1992 | | 263815 | Pneumocystis murina | 3 | | 3 | | | |
| 1993 | X | 264202 | Chlamydia felis Fe/C-56 | | | 14 | | 14 | |
| 1994 | | 264510 | Influenza A virus (A/chicken/Thailand/LV1NF/2004(H5N1)) | | 1 | | 1 | | |
| 1996 | | 264635 | Acholeplasma granularum | 1 | | 1 | | | |
| 1997 | | 264730 | Pseudomonas savastanoi pv. phaseolicola 1448A | | 1 | | 1 | | |
| 1998 | | 264732 | Moorella thermoacetica ATCC 39073 | | 1 | | 1 | | |
| 1999 | | 265120 | Influenza A virus (A/turkey/Italy/214845/2002(H7N3)) | 1 | | 1 | | | |
| 2000 | | 265619 | Ornithodoros erraticus | 22 | | 22 | | | |
| 2001 | | 265669 | Listeria monocytogenes serotype 4b str. F2365 | | 7 | | 7 | | |
| 2002 | | 265872 | Cowpox virus (Brighton Red) | | 1 | | 1 | | |
| 2003 | | 266093 | Influenza A virus (A/chicken/Yamaguchi/7/2004(H5N1)) | 3 | | 3 | | | |
| 2004 | | 266264 | Cupriavidus metallidurans CH34 | | 3 | | 3 | | |
| 2005 | | 266779 | Chelativorans sp. BNC1 | | 4 | | 4 | | |
| 2006 | | 266827 | Influenza A virus (A/Thailand/1(KAN-1)/2004(H5N1)) | 4 | | 4 | | | |
| 2007 | | 266834 | Sinorhizobium meliloti 1021 | | 3 | | 3 | | |
| 2008 | | 266940 | Kineococcus radiotolerans SRS30216 = ATCC BAA-149 | | 2 | | 2 | | |
| 2009 | X | 267212 | Neisseria bacilliformis | | | 1 | | 1 | |
| 2010 | X | 267377 | Methanococcus maripaludis S2 | | | 1 | | 1 | |
| 2011 | | 267409 | Listeria monocytogenes serotype 1/2a str. F6854 | | 3 | | 3 | | |
| 2012 | | 267410 | Listeria monocytogenes serotype 4b str. H7858 | | 25 | | 25 | | |
| 2013 | | 267671 | Leptospira interrogans serovar Copenhageni str. Fiocruz L1-130 | 11 | | 11 | | | |
| 2014 | | 269482 | Burkholderia vietnamiensis G4 | | 9 | | 9 | | |
| 2015 | | 269484 | Ehrlichia canis str. Jake | 16 | | 16 | | | |
| 2016 | X | 269638 | Bovine enterovirus type 2 | | | 2 | | 2 | |
| 2017 | | 269798 | Cytophaga hutchinsonii ATCC 33406 | | 1 | | 1 | | |
| 2019 | | 269801 | Bacillus cereus G9241 | | 41 | | 41 | | |
| 2020 | | 270338 | Human poliovirus 3 strain Sabin | 80 | 1 | 80 | 1 | | |
| 2021 | | 270473 | Pneumonia virus of mice J3666 | | 10 | | 10 | | |
| 2022 | | 270478 | Zantedeschia mild mosaic virus | 1 | | 1 | | | |
| 2023 | | 270484 | Influenza A virus (A/tiger/Thailand/CU-LV/2004(H5N1)) | | 2 | | 2 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2024 | | 270490 | Influenza A virus (A/chicken/Nakorn-Patom/Thailand/CU-K3/2004(H5N1)) | | 1 | | 1 | | |
| 2025 | | 270510 | Influenza A virus (A/chicken/Vietnam/HD1/2004(H5N1)) | | 3 | | 3 | | |
| 2026 | | 270945 | Influenza A virus (A/Thailand/4(SP-528)/2004(H5N1)) | | 21 | | 21 | | |
| 2027 | | 271108 | Bombyx mori nucleopolyhedrovirus | 2 | | 2 | | | |
| 2028 | | 271848 | Burkholderia thailandensis E264 | | 2 | | 2 | | |
| 2029 | | 272560 | Burkholderia pseudomallei K96243 | 3 | 735 | 3 | 735 | | |
| 2030 | | 272561 | Chlamydia trachomatis D/UW-3/CX | 1 | 26 | 51 | 26 | 50 | |
| 2031 | | 272562 | Clostridium acetobutylicum ATCC 824 | | 1 | | 1 | | |
| 2032 | | 272564 | Desulfitobacterium hafniense DCB-2 | | 3 | | 3 | | |
| 2033 | | 272620 | Klebsiella pneumoniae subsp. pneumoniae MGH 78578 | 28 | | 28 | | | |
| 2035 | | 272624 | Legionella pneumophila subsp. pneumophila str. Philadelphia 1 | 1 | | 1 | | | |
| 2036 | | 272627 | Magnetospirillum magnetotacticum MS-1 | | 5 | | 5 | | |
| 2037 | | 272631 | Mycobacterium leprae TN | | 30 | | 30 | | |
| 2038 | | 272634 | Mycoplasma pneumoniae M129 | 9 | | 9 | | | |
| 2039 | | 272636 | Adeno-associated virus | | 18 | | 18 | | |
| 2040 | | 272831 | Neisseria meningitidis FAM18 | 1 | | 1 | | | |
| 2041 | | 272843 | Pasteurella multocida subsp. multocida str. Pm70 | | 5 | | 5 | | |
| 2042 | | 272943 | Rhodobacter sphaeroides 2.4.1 | | 1 | | 1 | | |
| 2043 | | 272944 | Rickettsia conorii str. Malish 7 | | 5 | | 5 | | |
| 2044 | | 272947 | Rickettsia prowazekii str. Madrid E | | 8 | | 8 | | |
| 2045 | | 272951 | Rickettsia sibirica 246 | | 27 | | 27 | | |
| 2046 | X | 272989 | Salmonella enterica subsp. enterica serovar Enteritidis str. LK5 | | | | 1 | | 1 |
| 2047 | | 273123 | Yersinia pseudotuberculosis IP 32953 | | 1 | | 1 | | |
| 2049 | | 274828 | Influenza A virus (A/duck/Fujian/13/2002(H5N1)) | | 1 | | 1 | | |
| 2050 | | 274829 | Influenza A virus (A/duck/Fujian/17/2001(H5N1)) | | 1 | | 1 | | |
| 2051 | | 278137 | Mycolicibacterium gilvum Spyr1 | | 53 | | 53 | | |
| 2052 | | 279150 | Classical swine fever virus 96TD | 2 | | 2 | | | |
| 2053 | X | 279329 | Influenza B virus (B/Shandong/7/97) | | | 1 | 1 | 1 | 1 |
| 2054 | | 279797 | Influenza A virus (A/egret/Hong Kong/757.3/2002(H5N1)) | | 3 | | 3 | | |
| 2056 | | 279889 | Triticum spelta var. arduini | | 3 | | 3 | | |
| 2057 | | 280240 | Nocardiopsis baichengensis | 1 | | 1 | | | |
| 2058 | | 280463 | Emiliania huxleyi CCMP1516 | | 1 | | 1 | | |
| 2060 | | 281310 | Haemophilus influenzae 86-028NP | 13 | | 13 | | | |
| 2061 | | 281689 | Desulfuromonas acetoxidans DSM 684 | | 1 | | 1 | | |
| 2062 | | 282124 | Influenza A virus (A/mallard/Alberta/127/00(H3N8)) | | 1 | | 1 | | |
| 2063 | | 282458 | Staphylococcus aureus subsp. aureus MRSA252 | 86 | | 86 | | | |
| 2064 | | 283166 | Bartonella henselae str. Houston-1 | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2065 | | 283643 | Cryptococcus neoformans var. neoformans B-3501A | 1 | 3 | 1 | 3 | | |
| 2066 | | 284168 | Influenza A virus (A/Ck/HK/2133.1/2003(H5N1)) | | 1 | | 1 | | |
| 2067 | | 284177 | Influenza A virus (A/Ck/HK/YU22/2002(H5N1)) | 1 | | 1 | | | |
| 2068 | | 284190 | Influenza A virus (A/Ck/Viet Nam/36/2004(H5N1)) | 1 | | 1 | | | |
| 2069 | | 284195 | Influenza A virus (A/Ck/YN/115/2004(H5N1)) | | 1 | | 1 | | |
| 2070 | | 284202 | Influenza A virus (A/Dk/ST/5048/2001(H3N8)) | 1 | | 1 | | | |
| 2071 | | 284218 | Influenza A virus (A/Viet Nam/1203/2004(H5N1)) | 73 | 134 | 74 | 134 | 1 | |
| 2072 | | 284672 | SARS coronavirus TJF | | 14 | | 14 | | |
| 2073 | | 284813 | Encephalitozoon cuniculi GB-M1 | | 28 | | 28 | | |
| 2074 | | 285006 | Saccharomyces cerevisiae RM11-1a | | 2 | | 2 | | |
| 2075 | | 286239 | Influenza A virus (A/red knot/Delaware/2561/1987(H10N5)) | | 1 | | 1 | | |
| 2076 | | 286542 | Soochong virus-2 | | 1 | | 1 | | |
| 2077 | | 286636 | Streptococcus pyogenes MGAS10394 | | 1 | | 1 | | |
| 2078 | | 286783 | Salmonella enterica subsp. enterica serovar Indiana | | 1 | | 1 | | |
| 2079 | | 287752 | Aurantimonas manganoxydans SI85-9A1 | | 1 | | 1 | | |
| 2080 | X | 288118 | Mandrillus leucophaeus foamy virus | | | 1 | | 1 | |
| 2082 | | 289338 | Influenza B virus (B/Nanchang/12/98) | | 1 | | 1 | | |
| 2083 | | 289365 | Human parvovirus 4 | | 3 | | 3 | | |
| 2085 | | 290512 | Prosthecochloris aestuarii DSM 271 | | 1 | | 1 | | |
| 2086 | | 291592 | Influenza A virus (A/crow/Kyoto/53/2004(H5N1)) | 1 | | 1 | | | |
| 2087 | | 292039 | Influenza A virus (A/chicken/HongKong/SF1/03(H9N2)) | 1 | | 1 | | | |
| 2088 | | 292045 | Influenza A virus (A/chicken/HongKong/YU427/03(H9N2)) | 1 | | 1 | | | |
| 2089 | | 292348 | Canine calicivirus (strain 48) | 2 | | 2 | | | |
| 2090 | | 292349 | Feline calicivirus (strain Urbana) | 1 | | 1 | | | |
| 2091 | | 292590 | Influenza A virus (A/swine/Ontario/42729A/01(H3N3)) | 1 | | 1 | | | |
| 2092 | | 292633 | Dragon grouper nervous necrosis virus | 20 | | 20 | | | |
| 2093 | | 293054 | Influenza A virus (A/turkey/Ontario/6213/66(H5N?)) | 1 | | 1 | | | |
| 2094 | | 293055 | Influenza A virus (A/mallard/Ohio/556/1987(H5N9)) | | 1 | | 1 | | |
| 2095 | | 293090 | Influenza A virus (A/Fujian/411/2002(H3N2)) | | 1 | | 1 | | |
| 2096 | | 293614 | Rickettsia akari str. Hartford | | 1 | | 1 | | |
| 2097 | | 294381 | Entamoeba histolytica HM-1:IMSS | | 103 | | 103 | | |
| 2098 | | 295027 | Human herpesvirus 5 strain Merlin | 2 | 3 | 2 | 3 | | |
| 2099 | | 295319 | Salmonella enterica subsp. enterica serovar Paratyphi A str. ATCC 9150 | | 3 | | 3 | | |
| 2100 | | 295358 | Mycoplasma hypopneumoniae 232 | 21 | | 21 | | | |
| 2101 | X | 298339 | Pan troglodytes foamy virus | | | 1 | | 1 | |
| 2102 | | 298653 | Frankia sp. EAN1pec | | 2 | | 2 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2103 | | 298713 | Influenza A virus (A/chicken/Korea/SNU0091/00(H9N2)) | | 1 | | 1 | | |
| 2104 | | 298716 | Influenza A virus (A/chicken/Korea/SNU1035C/00(H9N2)) | | 1 | | 1 | | |
| 2105 | | 299386 | Equine arteritis virus Bucyrus | 2 | | 2 | | | |
| 2106 | | 299390 | Influenza A virus (A/Viet Nam/HN/2004(H5N1)) | | 6 | | 6 | | |
| 2107 | | 299730 | Influenza A virus (A/chicken/Viet Nam/AG-010/2004(H5N1)) | | 1 | | 1 | | |
| 2109 | | 300015 | Lactate dehydrogenase elevating virus C | 1 | | 1 | | | |
| 2110 | | 300016 | Lactate dehydrogenase elevating virus Plagemann | 1 | | 1 | | | |
| 2111 | | 300180 | Mopeia Lassa virus reassortant 29 | | 4 | | 4 | | |
| 2112 | | 300267 | Shigella dysenteriae Sd197 | | 5 | | 5 | | |
| 2113 | | 300268 | Shigella boydii Sb227 | | 5 | | 5 | | |
| 2114 | | 300269 | Shigella sonnei Ss046 | | 9 | | 9 | | |
| 2115 | | 300559 | PRRSV VR2332 | 21 | 7 | 21 | 7 | | |
| 2116 | | 300563 | PRRSV HB-1(sh)/2002 | 1 | | 1 | | | |
| 2117 | | 300748 | Influenza A virus (A/swine/Korea/S190/2004(H9N2)) | | 3 | | 3 | | |
| 2118 | | 300749 | Influenza A virus (A/swine/Korea/S452/2004(H9N2)) | | 1 | | 1 | | |
| 2119 | | 300750 | Influenza A virus (A/chicken/Korea/S1/2003(H9N2)) | | 1 | | 1 | | |
| 2120 | | 300852 | Thermus thermophilus HB8 | | 1 | | 1 | | |
| 2121 | | 301448 | Streptococcus pyogenes serotype M3 | 1 | | 1 | | | |
| 2122 | | 301449 | Streptococcus pyogenes serotype M5 | 56 | 57 | 56 | 57 | | |
| 2123 | | 301450 | Streptococcus pyogenes serotype M6 | 9 | 7 | 9 | 7 | | |
| 2124 | | 301451 | Streptococcus pyogenes serotype M18 | 1 | | 1 | | | |
| 2125 | | 301452 | Streptococcus pyogenes serotype M49 | 1 | | 1 | | | |
| 2126 | | 301478 | Murray valley encephalitis virus (strain MVE-1-51) | 11 | 14 | 11 | 14 | | |
| 2127 | | 301964 | CY1014 virus | | 1 | | 1 | | |
| 2128 | | 302272 | Sendai virus (strain Ohita) | 1 | | 1 | | | |
| 2129 | | 303316 | Influenza A virus (A/Hatay/2004/(H5N1)) | 3 | | 3 | | | |
| 2130 | | 304883 | Influenza A virus (A/Belfast/53582/2004(H3N?)) | | 2 | | 2 | | |
| 2131 | | 304895 | Catenulispora acidiphila | | 1 | | 1 | | |
| 2132 | | 305674 | Deerpox virus W-848-83 | | 2 | | 2 | | |
| 2133 | | 306061 | Influenza A virus (A/swine/IDT/Bakum1832/2000(H1N2)) | | 1 | | 1 | | |
| 2134 | | 306254 | Campylobacter coli RM2228 | | 3 | | 3 | | |
| 2135 | | 306263 | Campylobacter lari RM2100 | | 1 | | 1 | | |
| 2136 | | 306264 | Campylobacter upsaliensis RM3195 | | 1 | | 1 | | |
| 2137 | | 306537 | Corynebacterium jeikeium K411 | | 1 | | 1 | | |
| 2138 | | 307044 | West Nile virus strain 385-99 | 22 | 12 | 22 | 12 | | |
| 2139 | X | 307685 | Merluccius australis polylepis | | | 1 | | 1 | |

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|---|---|---|---|---|---|---|---|---|---|
| 2140 | | 307819 | Influenza A virus (A/Jiangsu/38/2004(H3N2)) | | 1 | | 1 | | |
| 2141 | | 308061 | Hantavirus HPR/02-73 | | 1 | | 1 | | |
| 2142 | | 308159 | Araucaria virus | | 6 | | 6 | | |
| 2143 | | 310542 | Chimpanzee adenovirus | 2 | | 2 | | | |
| 2144 | | 311169 | Influenza A virus (A/duck/Korea/S10/03(H3N2)) | | 1 | | 1 | | |
| 2145 | | 311339 | Human herpesvirus 5 strain Toledo | 9 | | 9 | | | |
| 2146 | X | 311596 | Influenza A virus (A/New York/18/2003(H3N2)) | | | | 9 | | 9 |
| 2147 | | 311695 | Influenza A virus (A/New York/124/2001(H3N2)) | | 1 | | 1 | | |
| 2149 | | 311775 | Influenza A virus (A/New York/205/2001(H1N1)) | | 12 | | 12 | | |
| 2150 | | 313589 | Janibacter sp. HTCC2649 | | 1 | | 1 | | |
| 2151 | | 313596 | Robiginitalea biformata HTCC2501 | | 1 | | 1 | | |
| 2152 | | 313606 | Microscilla marina ATCC 23134 | | 1 | | 1 | | |
| 2153 | | 313627 | Bacillus sp. NRRL B-14911 | | 2 | | 2 | | |
| 2154 | | 314262 | Roseobacter sp. MED193 | | 1 | | 1 | | |
| 2155 | | 314275 | Alteromonas mediterranea | | 1 | | 1 | | |
| 2156 | | 314278 | Nitrococcus mobilis Nb-231 | | 1 | | 1 | | |
| 2157 | | 314283 | Reinekea blandensis MED297 | | 1 | | 1 | | |
| 2158 | | 314285 | Congregibacter litoralis KT71 | | 1 | | 1 | | |
| 2159 | | 314288 | Vibrio alginolyticus 12G01 | | 3 | | 3 | | |
| 2160 | | 314291 | Vibrio splendidus 12B01 | | 2 | | 2 | | |
| 2161 | | 314292 | Photobacterium angustum S14 | | 1 | | 1 | | |
| 2162 | | 315277 | Chlamydia trachomatis A/HAR-13 | 6 | 1 | 6 | 1 | | |
| 2163 | | 315456 | Rickettsia felis URRWXCal2 | | 7 | | 7 | | |
| 2164 | | 315730 | Bacillus mycoides KBAB4 | | 5 | | 5 | | |
| 2165 | | 315749 | Bacillus cytotoxicus NVH 391-98 | | 3 | | 3 | | |
| 2166 | | 316056 | Rhodopseudomonas palustris BisB18 | | 1 | | 1 | | |
| 2167 | | 316068 | Leadbetterella byssophila | | 1 | | 1 | | |
| 2168 | | 316287 | Ceratogyrus marshalli | 1 | | 1 | | | |
| 2169 | | 316385 | Escherichia coli str. K-12 substr. DH10B | | 3 | | 3 | | |
| 2170 | | 316401 | Escherichia coli ETEC H10407 | 64 | 31 | 64 | 31 | | |
| 2171 | | 316407 | Escherichia coli str. K-12 substr. W3110 | | 1 | | 1 | | |
| 2172 | | 317652 | Influenza A virus (A/Hong Kong/2/68(H3N2)) | | 4 | | 4 | | |
| 2173 | | 317655 | Sphingopyxis alaskensis RB2256 | | 1 | | 1 | | |
| 2174 | | 318586 | Paracoccus denitrificans PD1222 | | 2 | | 2 | | |
| 2175 | | 319224 | Shewanella putrefaciens CN-32 | | 1 | | 1 | | |
| 2176 | | 320306 | Influenza A virus (A/crested eagle/Belgium/01/2004(H5N1)) | 2 | | 2 | | | |
| 2177 | | 320372 | Burkholderia pseudomallei 1710b | | 4 | | 4 | | |
| 2178 | | 320373 | Burkholderia pseudomallei 668 | | 10 | | 10 | | |
| 2179 | | 320374 | Burkholderia pseudomallei S13 | | 2 | | 2 | | |
| 2180 | | 320388 | Burkholderia mallei SAVP1 | | 29 | | 29 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2181 | | 320390 | Burkholderia mallei GB8 horse 4 | | 1 | | 1 | | |
| 2182 | | 320483 | Anaplasma marginale str. Florida | 19 | 61 | 19 | 61 | | |
| 2183 | | 320667 | Trichosanthes dioica | 1 | | 1 | | | |
| 2184 | | 321314 | Salmonella enterica subsp. enterica serovar Choleraesuis str. SC-B67 | | 5 | | 5 | | |
| 2185 | | 322053 | Konjac mosaic virus | 1 | | 1 | | | |
| 2186 | | 322564 | Influenza A virus (A/tiger/Thailand/CU-T4/04(H5N1)) | | 5 | | 5 | | |
| 2187 | | 322566 | Influenza A virus (A/tiger/Thailand/CU-T6/04(H5N1)) | | 1 | | 1 | | |
| 2188 | | 322710 | Azotobacter vinelandii DJ | | 2 | | 2 | | |
| 2190 | | 325240 | Shewanella baltica OS155 | | 2 | | 2 | | |
| 2191 | | 327105 | HIV-1 O_ANT70 | 1 | | 1 | | | |
| 2192 | | 327205 | Influenza A virus (A/New York/348/2003(H1N1)) | | 149 | | 150 | | 1 |
| 2193 | | 327310 | Influenza A virus (A/Kinmen/645/04(H3N2)) | | 1 | | 1 | | |
| 2194 | | 327311 | Influenza A virus (A/Yilan/515/03(H3N2)) | | 1 | | 1 | | |
| 2195 | | 328670 | Banana streak GF virus | 4 | | 4 | | | |
| 2196 | | 328671 | Banana streak OL virus | 4 | | 4 | | | |
| 2198 | | 329389 | Hepatitis C virus (isolate Glasgow) | 3 | 4 | 3 | 4 | | |
| 2199 | | 329593 | Influenza A virus (A/chicken/Fujian/25/00(H9N2)) | | 6 | | 6 | | |
| 2200 | | 329854 | Bacteroides intestinalis | | 1 | | 1 | | |
| 2201 | | 330879 | Aspergillus fumigatus Af293 | | 18 | | 18 | | |
| 2202 | | 331111 | Escherichia coli O139:H28 str. E24377A | | 36 | | 36 | | |
| 2203 | | 331112 | Escherichia coli HS | | 14 | | 14 | | |
| 2204 | | 331271 | Burkholderia cenocepacia AU 1054 | | 7 | | 7 | | |
| 2205 | | 331272 | Burkholderia cenocepacia HI2424 | | 1 | | 1 | | |
| 2206 | | 331635 | Chlamydia pecorum E58 | 1 | | 29 | | 28 | |
| 2207 | | 331636 | Chlamydia psittaci 6BC | 1 | | 1 | | | |
| 2208 | | 331978 | Burkholderia pseudomallei Pasteur 52237 | | 1 | | 1 | | |
| 2209 | | 332193 | Vaccinia Virus Acambis 3000 MVA | | 20 | | 20 | | |
| 2211 | | 332747 | Influenza A virus (A/swine/Tennessee/25/1977(H1N1)) | 1 | | 1 | | | |
| 2212 | | 333278 | H7N9 subtype | 3 | 26 | 7 | 26 | 4 | |
| 2213 | | 333284 | Hepatitis C virus (isolate Con1) | 4 | 3 | 4 | 3 | | |
| 2214 | | 333367 | [Clostridium] asparagiforme | | 1 | | 1 | | |
| 2215 | | 333668 | Theileria parva strain Muguga | 14 | 19 | 14 | 19 | | |
| 2216 | | 333751 | Human papillomavirus type 2 | | 7 | | 7 | | |
| 2217 | | 333754 | Alphapapillomavirus 10 | 4 | | 4 | | | |
| 2218 | | 333760 | Human papillomavirus type 16 | 349 | 463 | 349 | 492 | | 29 |
| 2219 | | 333761 | Human papillomavirus type 18 | 26 | 104 | 26 | 104 | | |
| 2220 | | 333762 | Human papillomavirus type 26 | | 1 | | 1 | | |
| 2221 | | 333763 | Human papillomavirus type 32 | 1 | 1 | 1 | 1 | | |
| 2222 | | 333765 | Human papillomavirus type 53 | | 1 | | 1 | | |
| 2223 | | 333849 | Enterococcus faecium DO | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2224 | | 333923 | Human papillomavirus 5 | 1 | | 1 | | | |
| 2225 | X | 333990 | Carnobacterium sp. AT7 | | | 1 | | 1 | |
| 2226 | | 334203 | Mupapillomavirus 1 | 1 | 38 | 1 | 38 | | |
| 2227 | | 334380 | Orientia tsutsugamushi str. Ikeda | | 1 | | 1 | | |
| 2228 | | 334426 | Angiostrongylus costaricensis | 1 | 1 | 1 | 1 | | |
| 2230 | | 334590 | Influenza A virus (A/Moscow/343/2003(H3N2)) | | 1 | | 1 | | |
| 2231 | | 334802 | Burkholderia mallei FMH | | 1 | | 1 | | |
| 2232 | | 334803 | Burkholderia mallei JHU | | 2 | | 2 | | |
| 2233 | | 335333 | Influenza A virus (A/New York/384/2005(H3N2)) | | 64 | | 64 | | |
| 2234 | | 335337 | Influenza A virus (A/New York/388/2005(H3N2)) | | 14 | | 14 | | |
| 2235 | | 335358 | Influenza A virus (A/New York/232/2004(H3N2)) | | 110 | | 110 | | |
| 2236 | | 335812 | Influenza B virus (B/Shanghai/361/2002) | 1 | | 1 | | | |
| 2237 | | 336092 | Influenza A virus (A/black-headed goose/Qinghai/1/2005(H5N1)) | 2 | | 2 | | | |
| 2238 | | 336205 | Influenza A virus (A/swine/Bakum/5/95(H1N1)) | | 2 | | 2 | | |
| 2239 | | 336207 | Influenza A virus (A/swine/Bakum/1832/2000(H1N2)) | | 3 | | 3 | | |
| 2240 | | 336238 | Influenza A virus (A/Bar-headed Goose/Qinghai/61/05(H5N1)) | | 8 | | 8 | | |
| 2241 | | 336407 | Rickettsia bellii RML369-C | | 7 | | 7 | | |
| 2242 | | 336794 | Influenza A virus (A/equine/Massachussetts/213/2003(H3N8)) | | 1 | | 1 | | |
| 2243 | | 336800 | Influenza A virus (A/equine/New York/1/1999(H3N8)) | | 3 | | 3 | | |
| 2244 | | 336982 | Mycobacterium tuberculosis F11 | | 24 | | 24 | | |
| 2245 | | 337042 | Alphapapillomavirus 7 | 11 | | 11 | | | |
| 2246 | | 337043 | Alphapapillomavirus 4 | | 1 | | 1 | | |
| 2247 | | 337052 | Deltapapillomavirus 4 | 24 | | 24 | | | |
| 2248 | | 337090 | Chlorobium chlorochromatii | | 1 | | 1 | | |
| 2249 | X | 338079 | African green monkey simian foamy virus | | | 3 | | 3 | |
| 2250 | | 338188 | Bacteroides finegoldii | | 1 | | 1 | | |
| 2251 | X | 338478 | Macaque simian foamy virus | | | 1 | | 1 | |
| 2252 | | 338966 | Pelobacter propionicus DSM 2379 | | 3 | | 3 | | |
| 2253 | | 339670 | Burkholderia ambifaria AMMD | | 4 | | 4 | | |
| 2254 | | 339854 | Bacillus thuringiensis serovar israelensis ATCC 35646 | | 6 | | 6 | | |
| 2255 | | 340177 | Chlorobium chlorochromatii CaD3 | | 1 | | 1 | | |
| 2256 | | 340184 | Escherichia coli B7A | | 5 | | 5 | | |
| 2257 | | 340185 | Escherichia coli E22 | | 13 | | 13 | | |
| 2258 | | 340186 | Escherichia coli E110019 | | 2 | | 2 | | |
| 2259 | | 340197 | Escherichia coli F11 | | 12 | | 12 | | |
| 2261 | | 341663 | Aspergillus terreus NIH2624 | 2 | | 2 | | | |
| 2262 | | 341946 | Woodchuck hepatitis virus 2 | 4 | | 4 | | | |
| 2263 | | 341980 | Human herpesvirus 3 strain Oka vaccine | 3 | 62 | 3 | 62 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2264 | | 342023 | Streptococcus pyogenes serotype M12 | 3 | 1 | 3 | 1 | | |
| 2265 | | 342137 | Influenza A virus (A/chicken/CA/375TR/2002(H6N2)) | | 1 | | 1 | | |
| 2266 | | 342145 | Influenza A virus (A/turkey/MN/735/79(H6N2)) | | 2 | | 2 | | |
| 2267 | | 342207 | Influenza A virus (A/shorebird/Delaware/141/2002(H9N9)) | | 1 | | 1 | | |
| 2268 | | 342210 | Influenza A virus (A/shorebird/Delaware/275/2001(H9N7)) | | 1 | | 1 | | |
| 2269 | | 342221 | Influenza A virus (A/chicken/Korea/S4/2003(H9N2)) | | 1 | | 1 | | |
| 2270 | | 342396 | Influenza A virus (A/turkey/Canada-Ontario/NS-01839-1/05(H3)) | | 1 | | 1 | | |
| 2271 | | 342508 | Influenza A virus (A/New York/444/2001(H1N1)) | | 25 | | 25 | | |
| 2273 | | 342610 | Pseudoalteromonas atlantica T6c | | 1 | | 1 | | |
| 2274 | | 342613 | Streptococcus agalactiae 18RS21 | 2 | | 2 | | | |
| 2275 | | 342614 | Streptococcus agalactiae 515 | 1 | | 1 | | | |
| 2276 | | 342615 | Streptococcus agalactiae H36B | 1 | | 1 | | | |
| 2277 | | 342617 | Streptococcus agalactiae CJB111 | 2 | | 2 | | | |
| 2278 | | 343462 | Human adenovirus 11p | 7 | | 7 | | | |
| 2279 | | 343463 | Human adenovirus 11a | 1 | | 1 | | | |
| 2280 | | 344598 | Influenza A virus (A/whooper swan/Mongolia/6/05(H5N1)) | | 1 | | 1 | | |
| 2281 | | 344601 | Escherichia coli B171 | | 25 | | 25 | | |
| 2282 | | 344609 | Shigella boydii CDC 3083-94 | | 20 | | 20 | | |
| 2283 | | 344610 | Escherichia coli 53638 | | 1 | | 1 | | |
| 2284 | | 345072 | Vibrio cholerae MO10 | | 1 | | 1 | | |
| 2285 | | 345073 | Vibrio cholerae O395 | | 4 | | 4 | | |
| 2286 | | 345074 | Vibrio cholerae RC385 | | 2 | | 2 | | |
| 2287 | | 345075 | Vibrio cholerae V51 | | 3 | | 3 | | |
| 2288 | | 345076 | Vibrio cholerae V52 | | 32 | | 32 | | |
| 2290 | | 347257 | Mycoplasma agalactiae PG2 | 3 | | 3 | | | |
| 2291 | | 347495 | Bacillus cereus F837/76 | | 1 | | 1 | | |
| 2292 | | 347515 | Leishmania major strain Friedlin | 29 | 38 | 29 | 38 | | |
| 2293 | | 348776 | Mycobacterium tuberculosis C | | 177 | | 177 | | |
| 2294 | | 349101 | Rhodobacter sphaeroides ATCC 17029 | | 1 | | 1 | | |
| 2295 | | 349163 | Acidiphilium cryptum JF-5 | | 1 | | 1 | | |
| 2296 | | 349344 | Bat SARS CoV Rp3/2004 | | 1 | | 1 | | |
| 2297 | | 349746 | Yersinia pestis Angola | | 3 | | 3 | | |
| 2298 | | 349747 | Yersinia pseudotuberculosis IP 31758 | | 9 | | 9 | | |
| 2299 | | 349966 | Yersinia frederiksenii ATCC 33641 | | 2 | | 2 | | |
| 2300 | | 349967 | Yersinia mollaretii ATCC 43969 | | 3 | | 3 | | |
| 2301 | | 349968 | Yersinia bercovieri ATCC 43970 | | 5 | | 5 | | |
| 2302 | | 350054 | Mycolicibacterium gilvum PYR-GCK | | 64 | | 64 | | |
| 2303 | | 350058 | Mycolicibacterium vanbaalenii PYR-1 | | 55 | | 55 | | |
| 2304 | | 350702 | Burkholderia cenocepacia PC184 | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2305 | | 350703 | Pseudomonas aeruginosa 2192 | | 2 | | 2 | | |
| 2306 | | 350704 | Pseudomonas aeruginosa C3719 | | 2 | | 2 | | |
| 2307 | | 351071 | Newcastle disease virus AF2240 | 1 | | 1 | | | |
| 2308 | | 351073 | Mammalian orthoreovirus | | 1 | | 1 | | |
| 2309 | | 351277 | Influenza A virus (A/Nanchang/0058/1994(H3N2)) | | 1 | | 1 | | |
| 2310 | | 351581 | Francisella tularensis subsp. holarctica FSC200 | | 1 | | 1 | | |
| 2311 | | 351607 | Acidothermus cellulolyticus 11B | | 2 | | 2 | | |
| 2312 | | 351627 | Caldicellulosiruptor saccharolyticus DSM 8903 | | 1 | | 1 | | |
| 2313 | | 351745 | Shewanella sp. W3-18-1 | | 1 | | 1 | | |
| 2314 | | 351746 | Pseudomonas putida F1 | | 6 | | 6 | | |
| 2315 | | 352034 | Influenza A virus (A/duck/Potsdam/1402-6/1986(H5N2)) | 1 | | 1 | | | |
| 2316 | | 352348 | Influenza A virus (A/chicken/Hong Kong/17/1977(H6N1)) | | 1 | | 1 | | |
| 2317 | | 352520 | Influenza A virus (A/mallard/Alberta/35/1976(H1N1)) | 1 | 6 | 1 | 6 | | |
| 2318 | | 352561 | Influenza A virus (A/duck/Australia/341/1983(H15N8)) | | 1 | | 1 | | |
| 2319 | | 352564 | Influenza A virus (A/mallard/Astrakhan/263/1982(H14N5)) | 1 | | 1 | | | |
| 2320 | | 352764 | Influenza A virus (A/mallard/Alberta/202/1996(H2N5)) | 1 | | 1 | | | |
| 2321 | | 352914 | Plasmodium yoelii yoelii 17XNL | 6 | 3 | 6 | 3 | | |
| 2322 | | 352963 | Influenza A virus (A/California/7/2004(H3N2)) | | 1 | | 1 | | |
| 2323 | | 353152 | Cryptosporidium parvum Iowa II | | 84 | | 84 | | |
| 2324 | | 353153 | Trypanosoma cruzi strain CL Brener | 2058 | 10 | 2059 | 10 | 1 | |
| 2325 | | 353154 | Theileria annulata strain Ankara | | 4 | | 4 | | |
| 2326 | | 353253 | Influenza A virus (A/duck/Novosibirsk/56/2005(H5N1)) | 6 | 2 | 6 | 2 | | |
| 2327 | | 353466 | Influenza A virus (A/Canterbury/236/2005(H3N2)) | | 1 | | 1 | | |
| 2328 | | 354228 | Influenza A virus (A/Gf/HK/SSP607/2003(H9N2)) | | 1 | | 1 | | |
| 2329 | | 354235 | Influenza A virus (A/Ck/HK/CSW161/2003(H9N2)) | | 1 | | 1 | | |
| 2330 | | 354242 | Campylobacter jejuni subsp. jejuni 81-176 | | 4 | | 4 | | |
| 2331 | | 355315 | Streptococcus agalactiae serogroup Ia | 1 | | 1 | | | |
| 2333 | | 356114 | Hepatitis C virus genotype 3 | 121 | 17 | 121 | 20 | | 3 |
| 2334 | | 356386 | Hepatitis C virus (isolate India) | | 1 | | 1 | | |
| 2335 | | 356391 | Hepatitis C virus (isolate 6a33) | | 11 | | 11 | | |
| 2336 | | 356410 | Hepatitis C virus (isolate HC-G9) | 1 | 1 | 1 | 1 | | |
| 2337 | | 356411 | Hepatitis C virus JFH-1 | 8 | 5 | 8 | 5 | | |
| 2338 | | 356413 | Hepatitis C virus (isolate BEBE1) | | 14 | | 14 | | |
| 2339 | | 356415 | Hepatitis C virus (isolate NZL1) | 1 | 3 | 1 | 3 | | |
| 2340 | | 356416 | Hepatitis C virus (isolate HCV-K3a/650) | | 21 | | 21 | | |
| 2341 | | 356417 | Hepatitis C virus (isolate JK049) | | 6 | | 6 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2342 | | 356418 | Hepatitis C virus ED43 | | 1 | 3 | 1 | 3 | |
| 2343 | | 356419 | Hepatitis C virus (isolate EUH1480) | | 5 | | 5 | | |
| 2344 | | 356421 | Hepatitis C virus (isolate Th580) | | 7 | | 7 | | |
| 2345 | | 356424 | Hepatitis C virus (isolate VN004) | | 1 | | 1 | | |
| 2346 | | 356426 | Hepatitis C virus subtype 3a | 12 | 105 | 12 | 105 | | |
| 2347 | | 357205 | Influenza A virus (A/chicken/Hong Kong/3123.1/2002(H5N1)) | | 1 | | 1 | | |
| 2348 | | 357208 | Influenza A virus (A/Vietnam/CL26/2004(H5N1)) | | 79 | | 79 | | |
| 2349 | | 357210 | Influenza A virus (A/Vietnam/CL100/2004(H5N1)) | 1 | | 1 | | | |
| 2350 | | 357244 | Orientia tsutsugamushi str. Boryong | 2 | 2 | 2 | 2 | | |
| 2351 | | 357348 | Burkholderia pseudomallei 1106a | | 2 | | 2 | | |
| 2352 | | 357355 | Hepatitis C virus (isolate Tr Kj) | | 3 | | 3 | | |
| 2353 | | 358708 | Shigella dysenteriae 1012 | | 1 | | 1 | | |
| 2354 | | 358709 | Escherichia coli 101-1 | | 5 | | 5 | | |
| 2355 | | 358769 | Classical swine fever virus - Alfort/187 | 70 | | 70 | | | |
| 2356 | | 358805 | Classical swine fever virus - Alfort/Tuebingen | 5 | | 5 | | | |
| 2357 | | 358812 | Classical swine fever virus - C | 2 | | 2 | | | |
| 2358 | | 359391 | Brucella abortus 2308 | | 31 | | 31 | | |
| 2359 | X | 359787 | Staphylococcus aureus subsp. aureus JH1 | | | 1 | 1 | 1 | 1 |
| 2360 | | 359921 | Influenza A virus (A/Australian shelduck/Western Australia/1756/1983(H15N2)) | 1 | | 1 | | | |
| 2361 | | 360095 | Bartonella bacilliformis KC583 | | 1 | | 1 | | |
| 2362 | | 360102 | Yersinia pestis Antiqua | | 36 | | 36 | | |
| 2363 | | 360112 | Campylobacter jejuni subsp. jejuni HB93-13 | | 2 | | 2 | | |
| 2364 | | 360115 | Coxiella burnetii RSA 331 | | 8 | | 8 | | |
| 2365 | | 360116 | Coxiella burnetii 'MSU Goat Q177' | | 7 | | 7 | | |
| 2366 | | 360117 | Coxiella burnetii Q321 | | 14 | | 14 | | |
| 2367 | | 360118 | Burkholderia pseudomallei 406e | | 2 | | 2 | | |
| 2368 | | 360549 | Themiste hennahi | 1 | | 1 | | | |
| 2369 | | 360910 | Bordetella avium 197N | | 1 | | 1 | | |
| 2370 | | 362242 | Mycobacterium ulcerans Agy99 | | 16 | | 16 | | |
| 2371 | | 362651 | Human immunodeficiency virus type 1 (isolate YU2) | 16 | 21 | 16 | 21 | | |
| 2372 | | 362663 | Escherichia coli 536 | | 65 | | 65 | | |
| 2373 | | 363020 | Avian leukosis virus HPRS103 | 1 | | 1 | | | |
| 2374 | | 364106 | Escherichia coli UTI89 | | 2 | | 2 | | |
| 2375 | | 364132 | Influenza A virus (A/New York/504/1998(H3N2)) | | 1 | | 1 | | |
| 2376 | | 365044 | Polaromonas naphthalenivorans CJ2 | | 2 | | 2 | | |
| 2378 | | 365078 | Influenza A virus (A/duck/Guangxi/1586/2004(H5N1)) | | 1 | | 1 | | |
| 2379 | | 365080 | Influenza A virus (A/duck/Guangxi/1793/2004(H5N1)) | | 1 | | 1 | | |
| 2380 | | 365129 | Influenza A virus (A/chicken/Vietnam/DT171/2004(H5N1)) | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2382 | | 366394 | Sinorhizobium medicae WSM419 | | 1 | | 1 | | |
| 2384 | | 367120 | Influenza A virus (A/Fort Monmouth/1/1947(H1N1)) | 1 | | 1 | | | |
| 2385 | | 367400 | Neembucu hantavirus | | 5 | | 5 | | |
| 2386 | X | 367737 | Arcobacter butzleri RM4018 | | | 1 | | 1 | |
| 2387 | | 367830 | Staphylococcus aureus subsp. aureus USA300 | 1 | | 1 | | | |
| 2388 | | 368445 | Crocodilepox virus | | 2 | | 2 | | |
| 2389 | | 370127 | Influenza A virus (A/Victoria/1968(H3N2)) | | 1 | | 1 | | |
| 2390 | | 370128 | Influenza A virus (A/Northern Territory/60/1968(H3N2)) | | 3 | | 3 | | |
| 2391 | | 370354 | Entamoeba dispar SAW760 | | 19 | | 19 | | |
| 2392 | | 370810 | Influenza A virus (A/Anhui/1/2005(H5N1)) | 6 | | 7 | | 1 | |
| 2393 | | 370811 | Influenza A virus (A/Anhui/2/2005(H5N1)) | 1 | | 1 | | | |
| 2394 | | 370813 | Influenza A virus (A/duck/IT/701/2005(H10N7)) | | 1 | | 1 | | |
| 2395 | | 370830 | Hantaan virus Q32 | | 4 | | 4 | | |
| 2396 | | 371082 | Influenza A virus (A/Taiwan/2/2006(H1N1)) | | 7 | | 7 | | |
| 2397 | | 371094 | Chikungunya virus strain S27-African prototype | 24 | | 24 | | | |
| 2398 | | 371214 | Influenza A virus (A/chicken/Taiwan/0329/01(H6N1)) | 5 | | 5 | | | |
| 2399 | | 373098 | Gambierdiscus toxicus | 6 | | 6 | | | |
| 2401 | | 373153 | Streptococcus pneumoniae D39 | | 61 | | 61 | | |
| 2402 | | 373384 | Shigella flexneri 5 str. 8401 | | 23 | | 23 | | |
| 2403 | | 373665 | Yersinia pestis biovar Orientalis str. IP275 | | 1 | | 1 | | |
| 2404 | | 374405 | Influenza C virus (C/Yamagata/15/2004) | 2 | | 2 | | | |
| 2405 | | 374507 | Human rotavirus G9 isolate F45 | 7 | | 7 | | | |
| 2406 | | 374927 | Haemophilus influenzae 22.1-21 | | 3 | | 3 | | |
| 2407 | | 374928 | Haemophilus influenzae PittAA | | 2 | | 2 | | |
| 2408 | | 374931 | Haemophilus influenzae PittGG | | 1 | | 1 | | |
| 2409 | | 374932 | Haemophilus influenzae PittHH | 1 | | 1 | | | |
| 2410 | | 374933 | Haemophilus influenzae PittII | | 3 | | 3 | | |
| 2411 | | 375177 | Haemophilus influenzae 3655 | | 1 | 6 | 1 | 6 | |
| 2412 | | 375432 | Haemophilus influenzae R3021 | | 2 | | 2 | | |
| 2413 | | 375450 | Yersinia pestis FV-1 | | 2 | | 2 | | |
| 2414 | | 376619 | Francisella tularensis subsp. holarctica LVS | 10 | 291 | 10 | 291 | | |
| 2415 | | 376721 | Influenza A virus (A/chicken/Kurgan/05/2005(H5N1)) | 1 | | 1 | | | |
| 2416 | | 377628 | Yersinia pestis Nepal516 | | 135 | | 135 | | |
| 2417 | | 378131 | Influenza A virus (A/Memphis/13/1978(H1N1)) | | 1 | | 1 | | |
| 2418 | | 378139 | Influenza A virus (A/Memphis/1/1978(H1N1)) | | 7 | | 7 | | |
| 2419 | | 378809 | Ravn virus - Ravn, Kenya, 1987 | 2 | 32 | 2 | 32 | | |
| 2420 | | 378830 | Lake Victoria marburgvirus - Angola2005 | 6 | 18 | 6 | 18 | | |
| 2422 | | 380210 | Influenza A virus (A/England/333/1980(H1N1)) | 1 | 1 | 1 | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2423 | | 380213 | Influenza A virus (A/Taiwan/1/1986(H1N1)) | | 1 | | 1 | | |
| 2424 | | 380217 | Influenza A virus (A/swine/Hong Kong/4/1976(H3N2)) | | 1 | | 1 | | |
| 2425 | | 380282 | Influenza A virus (A/Fort Monmouth/1/1947-mouse adapted(H1N1)) | | 47 | | 47 | | |
| 2426 | | 380284 | Influenza A virus (A/England/268/1996(H7N7)) | 1 | 1 | 1 | 1 | | |
| 2427 | | 380285 | Influenza A virus (A/turkey/Ireland/1378/1983(H5N8)) | | 1 | | 1 | | |
| 2428 | | 380299 | Influenza A virus (A/turkey/Wisconsin/1968(H5N9)) | | 1 | | 1 | | |
| 2429 | | 380301 | Influenza A virus (A/turkey/Ontario/7732/1966(H5N9)) | 5 | 8 | 5 | 8 | | |
| 2430 | | 380330 | Influenza A virus (A/goose/Hong Kong/8/1976(H1N1)) | | 2 | | 2 | | |
| 2431 | | 380332 | Influenza A virus (A/swine/Hong Kong/273/1994(H1N1)) | | 1 | | 1 | | |
| 2432 | | 380337 | Influenza A virus (A/equine/Prague/1/1956(H7N7)) | | 1 | | 1 | | |
| 2433 | | 380339 | Influenza A virus (A/equine/Tennessee/5/1986(H3N8)) | | 1 | | 1 | | |
| 2434 | | 380340 | Influenza A virus (A/equine/London/1416/1973(H7N7)) | 1 | 1 | 1 | 1 | | |
| 2435 | | 380342 | Influenza A virus (A/swine/Iowa/15/1930(H1N1)) | 1 | | 1 | | | |
| 2436 | | 380343 | Influenza A virus (A/ruddy turnstone/New Jersey/47/1985(H4N6)) | | 2 | | 2 | | |
| 2437 | | 380346 | Influenza A virus (A/Wisconsin/3523/1988(H1N1)) | 2 | | 2 | | | |
| 2439 | | 380836 | Influenza A virus (A/chicken/Vietnam/5/2003(H5N1)) | | 1 | | 1 | | |
| 2440 | | 380842 | Influenza A virus (A/duck/Vietnam/15/2003(H5N1)) | | 3 | | 3 | | |
| 2441 | | 380905 | Influenza A virus (A/X-47(H3N2)) | 3 | 2 | 3 | 2 | | |
| 2442 | | 380950 | Influenza A virus (A/Beijing/32/1992(H3N2)) | | 54 | | 54 | | |
| 2443 | | 380951 | Influenza A virus (A/Hebei/19/1995(H3N2)) | 1 | | 1 | | | |
| 2444 | | 380960 | Influenza A virus (A/Tokyo/3/1967(H2N2)) | 2 | | 2 | | | |
| 2445 | | 380964 | Influenza A virus (A/Texas/36/1991(H1N1)) | | 1 | | 1 | | |
| 2446 | | 380978 | Influenza A virus (A/Wisconsin/4755/1994(H1N1)) | | 5 | | 5 | | |
| 2447 | | 380979 | Influenza A virus (A/Wisconsin/4754/1994(H1N1)) | | 1 | | 1 | | |
| 2448 | | 380982 | Influenza A virus (A/WSN(H1N1)) | | 1 | | 1 | | |
| 2449 | | 380984 | Influenza A virus (A/Leningrad/134/17/1957(H2N2)) | | 2 | | 2 | | |
| 2450 | | 380985 | Influenza A virus (A/Chile/1/1983(H1N1)) | | 4 | | 4 | | |
| 2451 | | 381512 | Influenza A virus (A/New Caledonia/20/1999(H1N1)) | 39 | 236 | 39 | 243 | | 7 |
| 2452 | | 381513 | Influenza A virus (A/Panama/2007/1999(H3N2)) | 10 | 14 | 10 | 14 | | |
| 2453 | | 381516 | Influenza A virus (A/USSR/90/1977(H1N1)) | 12 | | 12 | | | |
| 2454 | | 381517 | Influenza A virus (A/Udorn/307/1972(H3N2)) | | 5 | | 5 | | |
| 2455 | | 381518 | Influenza A virus (A/Wilson-Smith/1933(H1N1)) | 1 | 149 | 1 | 150 | | 1 |

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| 2456 |  | 381666 | Cupriavidus necator H16 |  | 1 |  | 1 |  |  |
| 2457 |  | 382781 | Influenza A virus (A/Singapore/1/1957(H2N2)) | 1 | 32 | 1 | 32 |  |  |
| 2458 |  | 382813 | Influenza A virus (A/Japan/305+/1957(H2N2)) | 2 |  | 2 |  |  |  |
| 2459 |  | 382825 | Influenza A virus (A/Philippines/2/1982(H3N2)) | 1 | 1 | 1 | 1 |  |  |
| 2460 |  | 382828 | Influenza A virus (A/RI/5-/1957(H2N2)) |  | 1 |  | 1 |  |  |
| 2461 |  | 382832 | Influenza A virus (A/VM113-V1(H1N1)) | 1 |  | 1 |  |  |  |
| 2462 |  | 382835 | Influenza A virus (A/WSN/1933(H1N1)) | 7 | 3 | 13 | 3 | 6 |  |
| 2463 |  | 382842 | Influenza A virus (A/swine/29/1937(H1N1)) |  | 2 |  | 2 |  |  |
| 2464 |  | 382848 | Influenza A virus (A/swine/Hong Kong/126/1982(H3N2)) |  | 1 |  | 1 |  |  |
| 2465 |  | 383028 | Influenza A virus (A/New York/687/1995(H3N2)) | 1 |  | 1 |  |  |  |
| 2466 |  | 383121 | Influenza A virus (A/Waikato/7/2000(H3N2)) |  | 2 |  | 2 |  |  |
| 2467 |  | 383152 | Influenza A virus (A/Wellington/22/2001(H3N2)) |  | 1 |  | 1 |  |  |
| 2468 |  | 383231 | Influenza A virus (A/Wellington/8/2004(H3N2)) |  | 2 |  | 2 |  |  |
| 2469 |  | 383281 | Influenza A virus (A/Otago/5/2005(H1N1)) |  | 1 |  | 1 |  |  |
| 2470 |  | 383379 | Toxoplasma gondii RH | 27 | 23 | 27 | 23 |  |  |
| 2471 |  | 383531 | Influenza A virus (A/swine/Italy/2/1979(H1N1)) |  | 4 |  | 4 |  |  |
| 2472 |  | 383537 | Influenza A virus (A/swine/Iowa/1946(H1N1)) |  | 1 |  | 1 |  |  |
| 2473 |  | 383550 | Influenza A virus (A/duck/England/1/1956(H11N6)) |  | 2 |  | 2 |  |  |
| 2475 |  | 383561 | Influenza A virus (A/swine/Italy/1850/1977(H3N2)) |  | 1 |  | 1 |  |  |
| 2476 |  | 383566 | Influenza A virus (A/swine/Italy/425/1976(H1N1)) |  | 1 |  | 1 |  |  |
| 2477 |  | 383568 | Influenza A virus (A/Shanghai/11/1987(H3N2)) |  | 1 |  | 1 |  |  |
| 2478 |  | 383571 | Influenza A virus (A/Memphis/6/1986(H3N2)) | 4 | 1 | 4 | 1 |  |  |
| 2479 |  | 383574 | Influenza A virus (A/Memphis/2/1985(H3N2)) | 1 |  | 1 |  |  |  |
| 2480 |  | 383577 | Influenza A virus (A/Memphis/1/1990(H3N2)) |  | 1 |  | 1 |  |  |
| 2481 |  | 383578 | Influenza A virus (A/Memphis/4/1980(H3N2)) |  | 1 |  | 1 |  |  |
| 2482 |  | 383586 | Influenza A virus (A/Memphis/1/1971(H3N2)) | 19 | 11 | 19 | 11 |  |  |
| 2483 |  | 383602 | Influenza A virus (A/Anas acuta/Primorje/695/1976(H2N3)) |  | 17 |  | 17 |  |  |
| 2484 |  | 383603 | Influenza A virus (A/turkey/Minnesota/833/1980(H4N2)) |  | 1 |  | 1 |  |  |
| 2486 |  | 384483 | Influenza A virus (A/swine/Hong Kong/127/1982(H3N2)) |  | 1 |  | 1 |  |  |
| 2487 |  | 384484 | Influenza A virus (A/swine/Hong Kong/81/1978(H3N2)) |  | 12 |  | 12 |  |  |
| 2488 |  | 384487 | Influenza A virus (A/Swine/Indiana/1726/1988(H1N1)) |  | 2 |  | 2 |  |  |
| 2489 |  | 384493 | Influenza A virus (A/seal/Mass/1/1980(H7N7)) | 1 | 1 | 1 | 1 |  |  |
| 2490 |  | 384495 | Influenza A virus (A/Kiev/59/1979(H1N1)) |  | 5 |  | 5 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 2491 |  | 384498 | Influenza A virus (A/Ann Arbor/6/1960(H2N2)) |  | 270 |  | 270 |  |  |
| 2492 |  | 384499 | Influenza A virus (A/gull/Maryland/704/1977(H13N6)) |  | 1 |  | 1 |  |  |
| 2493 |  | 384500 | Influenza A virus (A/Beijing/11/1956(H1N1)) |  | 30 |  | 30 |  |  |
| 2495 |  | 384505 | Influenza A virus (A/nt/60/1968(H3N2)) |  | 69 | 1 | 69 | 1 |  |
| 2496 |  | 384509 | Influenza A virus (A/tern/Australia/G70C/1975(H11N9)) | 9 |  | 9 |  |  |  |
| 2497 |  | 384510 | Influenza A virus (A/tern/South Africa/1961(H5N3)) | 1 |  | 1 |  |  |  |
| 2498 |  | 384527 | Influenza A virus (A/Cameron/1946(H1N1)) |  | 1 |  | 1 |  |  |
| 2499 |  | 384676 | Pseudomonas entomophila L48 |  | 1 |  | 1 |  |  |
| 2500 |  | 384946 | Influenza A virus (A/duck/Hungary/1/1970(H6N2)) |  | 1 |  | 1 |  |  |
| 2501 |  | 385576 | Influenza A virus (A/Alaska/6/1977(H3N2)) |  | 2 |  | 2 |  |  |
| 2502 |  | 385580 | Influenza A virus (A/duck/Ukraine/1/1963(H3N8)) | 3 |  | 3 |  |  |  |
| 2503 |  | 385583 | Influenza A virus (A/Denver/1957(H1N1)) |  | 2 |  | 2 |  |  |
| 2504 |  | 385585 | Influenza A virus (A/equine/Jilin/1/1989(H3N8)) | 1 |  | 1 |  |  |  |
| 2505 |  | 385586 | Influenza A virus (A/chicken/Pennsylvania/1/1983(H5N2)) |  | 1 |  | 1 |  |  |
| 2506 |  | 385587 | Influenza A virus (A/budgerigar/Hokkaido/1/1977(H4N6)) |  | 10 |  | 10 |  |  |
| 2507 |  | 385599 | Influenza A virus (A/udorn/1972(H3N2)) |  | 1 |  | 1 |  |  |
| 2508 |  | 385600 | Influenza A virus (A/Puerto Rico/8/1934(Cambridge)(H1N1)) | 1 |  | 1 |  |  |  |
| 2509 |  | 385605 | Influenza A virus (A/equine/Kentucky/2/1986(H3N8)) |  | 3 |  | 3 |  |  |
| 2510 |  | 385616 | Influenza A virus (A/ruddy turnstone/NJ/60/1985(N9)) |  | 1 |  | 1 |  |  |
| 2511 |  | 385617 | Influenza A virus (A/chicken/Pennsylvania/1370/1983(H5N2)) | 1 |  | 1 |  |  |  |
| 2512 |  | 385624 | Influenza A virus (A/Port Chalmers/1/1973(H3N2)) | 7 | 1 | 7 | 1 |  |  |
| 2513 |  | 385630 | Influenza A virus (A/Bangkok/1/1979(H3N2)) | 1 | 7 | 1 | 7 |  |  |
| 2514 |  | 385640 | Influenza A virus (A/Memphis/102/1972(H3N2)) |  | 8 |  | 8 |  |  |
| 2515 |  | 385644 | Influenza A virus (A/swine/Ukkel/1/1984(H3N2)) |  | 1 |  | 1 |  |  |
| 2516 |  | 386032 | Reston ebolavirus - Reston (1989) |  | 4 |  | 4 |  |  |
| 2517 |  | 386033 | Sudan ebolavirus - Uganda (2000) | 1 | 6 | 1 | 6 |  |  |
| 2518 |  | 386043 | Listeria welshimeri serovar 6b str. SLCC5334 |  | 3 |  | 3 |  |  |
| 2519 |  | 386056 | Paraburkholderia ferrariae |  | 1 |  | 1 |  |  |
| 2520 |  | 386415 | Clostridium novyi NT |  | 2 |  | 2 |  |  |
| 2521 |  | 386585 | Escherichia coli O157:H7 str. Sakai |  | 17 |  | 17 |  |  |
| 2522 |  | 386656 | Yersinia pestis Pestoides F |  | 2 |  | 2 |  |  |
| 2523 |  | 387093 | Sulfurovum sp. NBC37-1 |  | 1 |  | 1 |  |  |
| 2524 |  | 387139 | Influenza A virus (A/Aichi/2/1968(H3N2)) | 10 | 11 | 12 | 11 | 2 |  |
| 2525 |  | 387147 | Influenza A virus (A/England/878/1969(H3N2)) | 1 | 2 | 1 | 2 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 2526 | | 387156 | Influenza A virus (A/Harbin/1/1988(H1N2)) | | 17 | | 17 | | |
| 2527 | | 387161 | Influenza A virus (A/Japan/305/1957(H2N2)) | 4 | 29 | 4 | 29 | | |
| 2528 | | 387191 | Influenza A virus (A/camel/Mongolia/1982(H1N1)) | | 8 | | 8 | | |
| 2529 | | 387203 | Influenza A virus (A/duck/Bavaria/2/1977(H1N1)) | | 1 | | 1 | | |
| 2530 | | 387207 | Influenza A virus (A/duck/Hokkaido/8/1980(H3N8)) | | 6 | | 6 | | |
| 2532 | | 387213 | Influenza A virus (A/equine/Alaska/1/1991(H3N8)) | | 1 | | 1 | | |
| 2533 | | 387223 | Influenza A virus (A/equine/Miami/1963(H3N8)) | 5 | | 5 | | | |
| 2534 | | 387239 | Influenza A virus (A/gull/Delaware/475/1986(H2N2)) | | 1 | | 1 | | |
| 2535 | | 387243 | Influenza A virus (A/herring gull/DE/677/1988(H2N8)) | | 1 | | 1 | | |
| 2536 | | 388041 | Influenza A virus (A/bar-headed goose/Qinghai/1A/2005(H5N1)) | 1 | | 1 | | | |
| 2537 | | 388272 | Pseudomonas aeruginosa PACS2 | | 12 | | 12 | | |
| 2538 | | 388634 | Bombyx mandarina nuclear polyhedrosis virus | | 1 | | 1 | | |
| 2539 | | 388799 | HIV-1 group O | 1 | | 1 | | | |
| 2540 | | 389259 | Influenza A virus (A/Nagasaki/N03/2005(H3N2)) | | 1 | | 1 | | |
| 2541 | | 390236 | Borreliella afzelii PKo | 2 | | 2 | | | |
| 2542 | | 391646 | Hepatitis B virus ayw3 | 1 | | 1 | | | |
| 2543 | | 391647 | Hepatitis B virus ayw2 | 8 | | 8 | | | |
| 2544 | | 391650 | Hepatitis B virus ayw4 | 1 | | 1 | | | |
| 2545 | | 391896 | Rickettsia bellii OSU 85-389 | | 3 | | 3 | | |
| 2546 | | 392021 | Rickettsia rickettsii str. 'Sheila Smith' | 1 | 9 | 1 | 9 | | |
| 2547 | | 392734 | Terriglobus roseus | | 1 | | 1 | | |
| 2548 | | 392809 | Influenza A virus (A/Victoria/3/1975(H3N2)) | 45 | 9 | 45 | 9 | | |
| 2549 | | 392810 | Influenza A virus (A/chicken/Rostock/8/1934(H7N1)) | 2 | 4 | 2 | 4 | | |
| 2550 | | 392811 | Influenza A virus (A/Udorn/8/1972(H3N2)) | 1 | | 1 | | | |
| 2551 | | 393011 | Francisella tularensis subsp. holarctica OSU18 | | 6 | | 6 | | |
| 2552 | | 393115 | Francisella tularensis subsp. tularensis FSC198 | | 85 | | 85 | | |
| 2553 | | 393117 | Listeria monocytogenes FSL J1-194 | | 2 | | 2 | | |
| 2554 | | 393124 | Listeria monocytogenes FSL N3-165 | | 2 | | 2 | | |
| 2555 | | 393125 | Listeria monocytogenes FSL R2-503 | | 1 | | 1 | | |
| 2556 | | 393126 | Listeria monocytogenes FSL R2-561 | | 1 | | 1 | | |
| 2557 | | 393128 | Listeria monocytogenes F6900 | | 1 | | 1 | | |
| 2558 | | 393130 | Listeria monocytogenes J0161 | | 6 | | 6 | | |
| 2559 | | 393133 | Listeria monocytogenes 10403S | | 4 | | 4 | | |
| 2560 | | 393305 | Yersinia enterocolitica subsp. enterocolitica 8081 | | 16 | | 16 | | |
| 2562 | | 393548 | Influenza A virus (A/chicken/Tula/Russia/Oct-5/2005(H5N1)) | | 1 | | 1 | | |
| 2563 | | 393557 | Influenza A virus (A/Leningrad/1954/1(H1N1)) | | 8 | | 8 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2564 | | 393697 | Influenza A virus (A/Liaoning/25/2000(H1N1)) | | 1 | | 1 | | |
| 2565 | | 393902 | Influenza A virus (A/Wisconsin/67/2005(H3N2)) | 1 | 5 | 1 | 5 | | |
| 2566 | | 395095 | Mycobacterium tuberculosis str. Haarlem | | 127 | | 127 | | |
| 2567 | | 395494 | Gallionella capsiferriformans ES-2 | | 1 | | 1 | | |
| 2568 | | 395841 | Influenza A virus (A/duck/Hokkaido/1130/01(H1N1)) | | 1 | | 1 | | |
| 2569 | | 395842 | Influenza A virus (A/tern/Australia/1/04(H2N5)) | | 1 | | 1 | | |
| 2570 | | 397342 | Horsepox virus | | 6 | | 6 | | |
| 2572 | | 398031 | Toxoplasma gondii type III | | 1 | | 1 | | |
| 2573 | | 398812 | TGEV virulent Purdue | 4 | | 4 | | | |
| 2575 | | 399741 | Serratia proteamaculans 568 | | 1 | | 1 | | |
| 2576 | | 400331 | Influenza A virus (A/New South Wales/15/1999(H3N2)) | | 1 | | 1 | | |
| 2577 | | 400667 | Acinetobacter baumannii ATCC 17978 | 10 | 13 | 10 | 13 | | |
| 2578 | | 400788 | Influenza A virus (A/Indonesia/5/2005(H5N1)) | 1 | 3 | 1 | 3 | | |
| 2579 | | 400810 | Influenza A virus (A/Indonesia/CDC594/2006(H5N1)) | 1 | | 1 | | | |
| 2580 | | 400828 | Influenza A virus (A/Indonesia/CDC669/2006(H5N1)) | 5 | | 5 | | | |
| 2581 | | 400830 | Influenza A virus (A/Indonesia/CDC699/2006(H5N1)) | 2 | | 2 | | | |
| 2583 | | 401650 | Listeria monocytogenes HPB2262 | | 3 | | 3 | | |
| 2584 | | 401671 | HIV-1 M:B_89.6 | | 1 | | 1 | | |
| 2585 | | 402194 | Influenza A virus (A/Istanbul/CTF/10/2004(H3N2)) | | 1 | | 1 | | |
| 2586 | | 402464 | Influenza A virus (A/gray teal/Australia/2/1979(H4N4)) | | 1 | | 1 | | |
| 2587 | | 402489 | Influenza A virus (A/turkey/Minnesota/1200/1980(H7N3)) | | 1 | | 1 | | |
| 2588 | | 402518 | Influenza A virus (A/Canada/rv504/2004(H7N3)) | 1 | | 1 | | | |
| 2589 | | 402527 | Influenza A virus (A/chicken/Scotland/1959(H5N1)) | | 1 | | 1 | | |
| 2590 | | 402938 | Influenza A virus (A/Michigan/2/2003(H1N2)) | 1 | | 1 | | | |
| 2591 | | 404137 | Influenza A virus (A/chicken/Beijing/nl/2002(H9N2)) | | 1 | | 1 | | |
| 2593 | | 404150 | Influenza A virus (A/chicken/Hubei/wk/1997(H5N1)) | | 2 | | 2 | | |
| 2595 | | 404155 | Influenza A virus (A/chicken/Hunan/fg/2004(H5N1)) | | 2 | | 2 | | |
| 2596 | | 404163 | Influenza A virus (A/chicken/Jilin/hg/2002(H5N1)) | | 1 | | 1 | | |
| 2597 | | 404330 | Streptococcus pyogenes serotype M2 | 2 | | 2 | | | |
| 2598 | | 404331 | Streptococcus pyogenes serotype M4 | 2 | | 2 | | | |
| 2599 | | 404408 | Influenza A virus (A/chicken/Shanxi/2/2006(H5N1)) | 1 | | 1 | | | |
| 2600 | | 404573 | Influenza A virus (A/chicken/Netherlands/03010132/03(H7N7)) | 1 | | 1 | | | |
| 2601 | | 404974 | Vibrio cholerae AM-19226 | | 1 | | 1 | | |
| 2602 | | 405050 | Influenza A virus (A/tern/Australia/1402/2004(H2N5)) | | 1 | | 1 | | |
| 2603 | | 405531 | Bacillus cereus G9842 | | 3 | | 3 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2604 |  | 405532 | Bacillus cereus B4264 |  | 1 |  | 1 |  |  |
| 2605 |  | 405533 | Bacillus cereus AH1134 |  | 3 |  | 3 |  |  |
| 2606 |  | 405536 | Bacillus anthracis str. Tsiankovskii-I |  | 1 |  | 1 |  |  |
| 2607 |  | 405917 | Bacillus cereus W |  | 1 |  | 1 |  |  |
| 2608 |  | 405955 | Escherichia coli APEC O1 |  | 8 |  | 8 |  |  |
| 2609 |  | 406269 | West Nile virus strain PTRoxo |  | 12 |  | 12 |  |  |
| 2610 |  | 407134 | Yellow fever virus strain Ghana/Asibi/1927 |  | 5 |  | 5 |  |  |
| 2611 |  | 407141 | Yellow fever virus isolate Ethiopia/Couma/1961 |  | 2 |  | 2 |  |  |
| 2612 |  | 407148 | Campylobacter jejuni subsp. jejuni 81116 |  | 14 |  | 14 |  |  |
| 2613 |  | 407418 | Influenza A virus (A/chicken/Guiyang/2147/2005(H5N1)) |  | 1 |  | 1 |  |  |
| 2614 |  | 408599 | Human rotavirus G9P[8] | 1 |  | 1 |  |  |  |
| 2615 |  | 408685 | Dengue virus 1 Brazil/97-11/1997 |  | 1058 |  | 1058 |  |  |
| 2616 |  | 408686 | Dengue virus 4 Philippines/H241/1956 | 4 | 947 | 4 | 947 |  |  |
| 2617 |  | 408687 | Dengue virus 4 Singapore/8976/1995 |  | 5 |  | 5 |  |  |
| 2618 |  | 408688 | Dengue virus 4 Thailand/0348/1991 |  | 15 |  | 15 |  |  |
| 2619 |  | 408689 | Dengue virus 4 Thailand/0476/1997 |  | 3 |  | 3 |  |  |
| 2620 |  | 408690 | Dengue virus 3 China/80-2/1980 |  | 84 |  | 84 |  |  |
| 2621 |  | 408691 | Dengue virus 3 Martinique/1243/1999 |  | 889 |  | 889 |  |  |
| 2622 |  | 408692 | Dengue virus 3 Sri Lanka/1266/2000 |  | 66 |  | 66 |  |  |
| 2623 |  | 408693 | Dengue virus 3 Singapore/8120/1995 |  | 69 |  | 69 |  |  |
| 2624 |  | 408694 | Dengue virus 2 Peru/IQT2913/1996 |  | 87 |  | 87 |  |  |
| 2625 |  | 408870 | Dengue virus 3 Philippines/H87/1956 | 8 | 13 | 8 | 13 |  |  |
| 2626 |  | 408871 | Dengue virus 4 Dominica/814669/1981 | 1 | 256 | 1 | 256 |  |  |
| 2627 |  | 410069 | Streptococcus pyogenes serotype M80 | 1 |  | 1 |  |  |  |
| 2628 |  | 410072 | Coprococcus comes | 1 |  | 1 |  |  |  |
| 2629 |  | 410078 | Human respiratory syncytial virus S2 | 1 |  | 1 |  |  |  |
| 2630 |  | 410289 | Mycobacterium tuberculosis variant bovis BCG str. Pasteur 1173P2 | 1 | 229 | 1 | 229 |  |  |
| 2631 |  | 411157 | Influenza A virus (A/Thailand/271/2005(H1N1)) | 1 |  | 1 |  |  |  |
| 2632 |  | 411167 | Influenza A virus (A/Queensland/11/2001(H3N2)) |  | 1 |  | 1 |  |  |
| 2633 |  | 411662 | Influenza A virus (A/Hanoi/TN405/2005(H3N2)) |  | 1 |  | 1 |  |  |
| 2634 |  | 412022 | Burkholderia mallei NCTC 10229 |  | 9 |  | 9 |  |  |
| 2635 |  | 412419 | Borrelia duttonii Ly | 12 |  | 12 |  |  |  |
| 2636 |  | 412420 | Yersinia pestis CA88-4125 |  | 21 |  | 21 |  |  |
| 2637 |  | 412614 | Vibrio cholerae 2740-80 |  | 44 |  | 44 |  |  |
| 2638 |  | 412694 | Bacillus thuringiensis str. Al Hakam |  | 8 |  | 8 |  |  |
| 2639 |  | 412883 | Vibrio cholerae MZO-3 |  | 1 |  | 1 |  |  |
| 2640 |  | 412966 | Vibrio cholerae 1587 |  | 3 |  | 3 |  |  |
| 2641 |  | 412967 | Vibrio cholerae MAK 757 |  | 9 |  | 9 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 2642 | X | 413502 | Cronobacter turicensis | | | 1 | | 1 | |
| 2643 | | 413999 | Clostridium botulinum A str. ATCC 3502 | | 3 | | 3 | | |
| 2644 | | 414044 | Influenza A virus (A/Thailand/1(KAN-1A)/2004(H5N1)) | 1 | | 1 | | | |
| 2645 | | 415166 | Influenza A virus(A/swine/Henan/2/2004(H9N2)) | | 2 | | 2 | | |
| 2646 | | 415167 | Influenza A virus(A/swine/Henan/3/2004(H9N2)) | | 1 | | 1 | | |
| 2647 | | 415169 | Influenza A virus(A/swine/Henan/5/2004(H9N2)) | | 1 | | 1 | | |
| 2648 | | 415172 | Influenza A virus(A/swine/Henan/8/2004(H9N2)) | | 2 | | 2 | | |
| 2649 | | 415176 | Influenza A virus(A/swine/Shandong/fNY/2003(H9N2)) | | 3 | | 3 | | |
| 2650 | | 415177 | Influenza A virus(A/swine/Shandong/fZC/2003(H9N2)) | | 7 | | 7 | | |
| 2651 | | 416035 | Norovirus Hu/GII.4/DenHaag89/2006/NL | 1 | | 1 | | | |
| 2652 | | 416276 | Rickettsia massiliae MTU5 | | 2 | | 2 | | |
| 2653 | | 416674 | Influenza B virus (B/Yamagata/16/1988) | 4 | | 4 | 1 | | 1 |
| 2654 | | 416730 | Influenza A virus (A/Memphis/10/1996(H1N1)) | | 1 | | 1 | | |
| 2655 | | 417398 | Vibrio cholerae MZO-2 | | 2 | | 2 | | |
| 2656 | | 417399 | Vibrio cholerae NCTC 8457 | | 1 | | 1 | | |
| 2657 | | 417400 | Vibrio cholerae B33 | | 5 | | 5 | | |
| 2658 | | 417758 | Influenza A virus (A/quail/Shantou/1475/2004(H9N2)) | 1 | | 1 | | | |
| 2659 | | 418136 | Francisella tularensis subsp. tularensis WY96-3418 | | 2 | | 2 | | |
| 2660 | | 418868 | Influenza A virus (A/Egypt/14724-NAMRU3/2006(H5N1)) | 1 | | 1 | | | |
| 2661 | | 419109 | Vibrio parahaemolyticus AQ3810 | | 38 | | 38 | | |
| 2662 | | 419947 | Mycobacterium tuberculosis H37Ra | | 130 | | 130 | | |
| 2663 | | 420174 | Hepatitis C virus isolate HC-J4 | 23 | 160 | 23 | 163 | | 3 |
| 2664 | | 420245 | Leishmania braziliensis MHOM/BR/75/M2904 | 14 | 8 | 14 | 8 | | |
| 2665 | | 420246 | Geobacillus thermodenitrificans NG80-2 | 1 | | 2 | | 1 | |
| 2666 | | 420521 | Expression vector pNIC-NHT-CF | 1 | | 1 | | | |
| 2667 | | 420662 | Methylibium petroleiphilum PM1 | | 1 | | 1 | | |
| 2668 | | 421472 | Influenza A virus (A/Indonesia/CDC1032N/2007(H5N1)) | 1 | | 1 | | | |
| 2669 | | 421877 | Hepatitis C virus isolate HC-J1 | 3 | 26 | 3 | 26 | | |
| 2670 | | 421901 | Influenza A virus (A/Egypt/0636-NAMRU3/2007(H5N1)) | 2 | 1 | 2 | 1 | | |
| 2671 | | 423368 | Salmonella enterica subsp. enterica serovar Newport str. SL254 | | 1 | | 1 | | |
| 2672 | | 424717 | Shigella flexneri 3a | 4 | | 4 | | | |
| 2673 | | 424718 | Shigella flexneri 5a | 2 | | 2 | | | |
| 2674 | | 424720 | Shigella flexneri Y | 8 | | 8 | | | |
| 2675 | | 425067 | Burkholderia pseudomallei 305 | | 2 | | 2 | | |
| 2676 | | 425088 | Tanganya virus | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2677 | | 425551 | Influenza A virus (A/AA/Huston/1945(H1N1)) | 1 | | 1 | | | |
| 2678 | | 425557 | Influenza A virus (A/California/10/1978(H1N1)) | | 1 | | 1 | | |
| 2679 | | 426430 | Staphylococcus aureus subsp. aureus str. Newman | 7 | | 7 | | | |
| 2680 | | 426738 | Influenza A virus (A/swine/Miyagi/5/2003(H1N2)) | | 2 | | 2 | | |
| 2681 | | 427773 | Influenza A virus (A/Thailand/SP83/2004(H5N1)) | 1 | | 1 | | | |
| 2682 | | 427826 | Influenza B virus (B/Hong Kong/8/1973) | | 1 | | 1 | | |
| 2683 | | 427890 | Influenza A virus (A/Viet Nam/JP4207/2005(H5N1)) | 1 | | 1 | | | |
| 2685 | | 430066 | Brucella abortus S19 | | 15 | | 15 | | |
| 2686 | | 430417 | Influenza A virus (A/Wyoming/3e5/2003(H3)) | 1 | | 1 | | | |
| 2687 | | 430511 | Juquitiba virus | | 2 | | 2 | | |
| 2688 | | 430557 | Francisella tularensis subsp. tularensis FSC033 | | 27 | | 27 | | |
| 2689 | | 431944 | Magnetospirillum gryphiswaldense MSR-1 | | 1 | | 1 | | |
| 2690 | | 431947 | Porphyromonas gingivalis ATCC 33277 | 20 | 4 | 20 | 4 | | |
| 2691 | | 432070 | Influenza A virus (A/Hong Kong/213/2003(H5N1)) | 1 | 4 | 1 | 4 | | |
| 2692 | | 432094 | Influenza A virus (A/Wyoming/3/2003-X-147(H3N2)) | | 1 | | 1 | | |
| 2693 | | 432359 | Toxoplasma gondii VEG | 14 | | 14 | | | |
| 2694 | | 434922 | Coxiella burnetii Dugway 5J108-111 | | 8 | | 8 | | |
| 2695 | | 434923 | Coxiella burnetii CbuG_Q212 | | 1 | | 1 | | |
| 2696 | | 434924 | Coxiella burnetii CbuK_Q154 | | 1 | | 1 | | |
| 2697 | | 435258 | Leishmania infantum JPCM5 | 28 | 5 | 28 | 15 | | 10 |
| 2698 | | 435359 | Influenza A virus (A/chicken/Hebei/706/2005(H5N1)) | | 2 | | 2 | | |
| 2699 | | 436004 | Influenza A virus (A/kunke/1/71(H3N2)) | | 1 | | 1 | | |
| 2700 | X | 439184 | Escherichia coli RS218 | | | 1 | | 1 | |
| 2701 | | 439235 | Desulfatibacillum alkenivorans AK-01 | | 1 | | 1 | | |
| 2702 | | 439843 | Salmonella enterica subsp. enterica serovar Schwarzengrund str. CVM19633 | | 1 | | 1 | | |
| 2703 | | 439847 | Salmonella enterica subsp. enterica serovar Saintpaul str. SARA29 | | 1 | | 1 | | |
| 2704 | | 440534 | Salmonella enterica subsp. enterica serovar 4,[5],12:i:- str. CVM23701 | | 1 | | 1 | | |
| 2705 | | 441158 | Burkholderia pseudomallei 9 | | 1 | | 1 | | |
| 2706 | | 441159 | Burkholderia pseudomallei 91 | | 2 | | 2 | | |
| 2707 | | 441160 | Burkholderia pseudomallei 14 | | 1 | | 1 | | |
| 2708 | | 441769 | Bacillus coahuilensis m4-4 | | 1 | | 1 | | |
| 2709 | | 441771 | Clostridium botulinum A str. Hall | 44 | | 45 | | 1 | |
| 2710 | | 441962 | Influenza A virus (A/duck/Mongolia/47/2001(H7N1)) | | 3 | | 3 | | |
| 2711 | X | 443149 | Mycobacterium tuberculosis CCDC5079 | | | | 3 | | 3 |
| 2712 | | 444178 | Brucella ovis ATCC 25840 | | 8 | | 8 | | |
| 2713 | | 444185 | Simian rotavirus A strain RRV | 10 | 1 | 10 | 1 | | |
| 2714 | | 444186 | Simian rotavirus A strain TUCH | | 5 | | 5 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2715 | | 444318 | Influenza A virus (A/Texas/1/1977(H3N2)) | 1 | 15 | 1 | 15 | | |
| 2716 | | 444793 | Influenza A virus (A/Auckland/590/2000(H1N1)) | | 1 | | 1 | | |
| 2717 | X | 444922 | Psychromonas ossibalaenae | | | | 1 | | 1 |
| 2718 | | 445335 | Clostridium botulinum NCTC 2916 | | 2 | | 2 | | |
| 2719 | | 445338 | Clostridium botulinum str. Iwanei E | 6 | | 6 | | | |
| 2720 | | 445983 | Borreliella burgdorferi 156a | 1 | | 1 | | | |
| 2721 | | 445985 | Borreliella burgdorferi ZS7 | 3 | 45 | 3 | 45 | | |
| 2722 | | 446023 | Influenza A virus (A/Hong Kong/68(H3N2)) | 1 | | 1 | | | |
| 2724 | | 447095 | Blastomyces dermatitidis ATCC 26199 | | 1 | | 1 | | |
| 2725 | | 447133 | Influenza A virus (A/chicken/Japan/1925(H7N7)) | 1 | | 1 | | | |
| 2726 | | 447188 | Influenza A virus (A/duck/Tasmania/277/2007(H7N2)) | 1 | | 1 | | | |
| 2727 | | 448058 | Influenza A virus (A/swine/Guangdong/01/2005(H3N2)) | | 1 | | 1 | | |
| 2728 | | 449278 | West Nile virus SPU116/89 | | 1 | | 1 | | |
| 2729 | | 449656 | Influenza A virus (A/chicken/Taiwan/2838V/00(H6N1)) | 15 | | 15 | | | |
| 2731 | | 451707 | Bacillus cereus NVH0597-99 | | 7 | | 7 | | |
| 2732 | | 451708 | Bacillus cereus H3081.97 | | 12 | | 12 | | |
| 2733 | | 451709 | Bacillus cereus 03BB108 | | 8 | | 8 | | |
| 2734 | | 451804 | Aspergillus fumigatus A1163 | | 13 | | 13 | | |
| 2735 | | 452646 | Neovison vison | | 1 | | 1 | | |
| 2736 | | 452652 | Kitasatospora setae KM-6054 | | 1 | | 1 | | |
| 2737 | | 452659 | Rickettsia rickettsii str. Iowa | | 1 | | 1 | | |
| 2738 | | 453057 | Influenza A virus (A/Indonesia/CDC540/2006(H5N1)) | 1 | | 1 | | | |
| 2739 | | 453927 | Juniperus formosana | 1 | | 1 | | | |
| 2741 | | 458234 | Francisella tularensis subsp. holarctica FTNF002-00 | | 1 | | 1 | | |
| 2742 | | 458678 | Hantaanvirus CGRn93P8 | | 2 | | 2 | | |
| 2743 | | 461739 | Influenza B virus (B/Florida/4/2006) | 1 | | 1 | | | |
| 2744 | | 461772 | Influenza A virus (A/Wisconsin/43/2006(H3N2)) | 1 | | 1 | | | |
| 2745 | | 462695 | Influenza A virus (A/Hiroshima/52/2005(H3)) | 2 | | 2 | | | |
| 2746 | | 463722 | Murine norovirus GV/CR6/2005/USA | | 1 | | 1 | | |
| 2747 | | 464314 | Influenza A virus (A/Anhui/T2/2006(H5N1)) | 1 | | 1 | | | |
| 2748 | | 464417 | Influenza B virus (B/Malaysia/2506/2004) | 1 | | 1 | | | |
| 2749 | | 464622 | Influenza A virus (A/Solomon Islands/3/2006 (Egg passage)(H1N1)) | 1 | | 1 | | | |
| 2750 | | 464623 | Influenza A virus (A/Solomon Islands/3/2006(H1N1)) | 12 | | 14 | | 2 | |
| 2751 | | 465541 | Streptomyces sp. Mg1 | | 1 | | 1 | | |
| 2752 | | 467144 | Modified Vaccinia Ankara virus | | 22 | | 23 | | 1 |
| 2753 | | 468968 | Influenza A virus (A/Indonesia/560H/2006(H5N1)) | 1 | | 1 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2754 | | 470137 | Brucella suis ATCC 23445 | 1 | 5 | 1 | 5 | | |
| 2755 | | 471223 | Geobacillus sp. WCH70 | | 2 | | 2 | | |
| 2756 | | 471721 | HIV-1 CRF01_AE | 1 | | 1 | | | |
| 2757 | | 472511 | Influenza A virus (A/Indonesia/TLL007/2006(H5N1)) | 1 | | 1 | | | |
| 2758 | | 475478 | Influenza A virus (A/equine/New Market/1/1979(H3N8)) | 1 | | 1 | | | |
| 2759 | | 475493 | Influenza A virus (A/equine/California/8560/2002(H3N8)) | | 2 | | 2 | | |
| 2760 | X | 476176 | Moraea pallida | | | 1 | | 1 | |
| 2761 | | 476294 | Influenza A virus (A/Brisbane/10/2007(H3N2)) | 5 | | 5 | | | |
| 2762 | | 476303 | Influenza A virus (A/California/04/2007(H1N1)) | | 1 | | 1 | | |
| 2763 | | 478005 | Escherichia coli O157:H7 str. EC4486 | | 1 | | 1 | | |
| 2764 | | 478006 | Escherichia coli O157:H7 str. EC4501 | | 2 | | 2 | | |
| 2765 | | 478008 | Escherichia coli O157:H7 str. EC869 | | 13 | | 13 | | |
| 2766 | X | 479022 | Influenza A virus (A/chicken/Korea/IS/2006(H5N1)) | | | 1 | | 1 | |
| 2767 | | 480019 | Influenza A virus (A/Moscow/10/1999(H3N2)) | | 2 | | 2 | | |
| 2768 | | 480024 | Influenza A virus (A/Wyoming/03/2003(H3N2)) | | 8 | | 8 | | |
| 2769 | | 481805 | Escherichia coli ATCC 8739 | | 1 | | 1 | | |
| 2770 | | 482134 | Hepatitis B virus adw/Japan/Nishioka/1983 | | 1 | | 1 | | |
| 2771 | | 482628 | Campylobacter jejuni subsp. jejuni BH-01-0142 | | 1 | | 1 | | |
| 2772 | | 482957 | Burkholderia lata | | 2 | | 2 | | |
| 2773 | | 483179 | Brucella canis ATCC 23365 | | 9 | | 9 | | |
| 2774 | | 484021 | Klebsiella pneumoniae subsp. pneumoniae NTUH-K2044 | | 1 | | 1 | | |
| 2775 | | 486280 | Torque teno virus VT416 | | 3 | | 3 | | |
| 2776 | | 486619 | Bacillus anthracis str. A0193 | | 3 | | 3 | | |
| 2777 | | 486620 | Bacillus anthracis str. A0465 | | 5 | | 5 | | |
| 2778 | | 486621 | Bacillus anthracis str. A0442 | | 1 | | 1 | | |
| 2779 | | 486623 | Bacillus anthracis str. A0389 | | 5 | | 5 | | |
| 2780 | | 486624 | Bacillus anthracis str. A0488 | | 91 | | 91 | | |
| 2781 | | 487067 | Torque teno virus Human/Ghana/GH1/1996 | | 3 | | 3 | | |
| 2782 | | 487521 | Mycobacterium intracellulare ATCC 13950 | 1 | | 1 | | | |
| 2783 | | 488233 | Influenza A virus (A/Iran/1/1957(H2N2)) | | 1 | | 1 | | |
| 2784 | | 488241 | Influenza A virus (A/Korea/426/1968(H2N2)) | | 2 | | 2 | | |
| 2785 | | 489455 | HBV genotype A | 1 | | 1 | | | |
| 2786 | | 489460 | HBV genotype B | 1 | | 1 | 5 | | 5 |
| 2787 | | 489466 | HBV genotype C | 10 | 11 | 10 | 21 | | 10 |
| 2788 | | 489469 | Hepatitis B virus ayw/China/Tibet127/2002 | 1 | | 1 | | | |
| 2789 | | 489483 | HBV genotype D | 1 | 3 | 1 | 3 | | |
| 2790 | | 489821 | Norovirus GII.4 | 2 | 11 | 2 | 11 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2791 | | 489822 | Norovirus Hu/Houston/TCH186/2002/US | 2 | | 2 | | | |
| 2792 | | 490039 | Norovirus GII.2 | 1 | | 1 | | | |
| 2793 | | 490041 | Norovirus GII.3 | 1 | | 1 | | | |
| 2794 | | 490133 | Hepatitis B virus ayw/France/Tiollais/1979 | | 4 | | 4 | | |
| 2795 | | 493803 | Merkel cell polyomavirus | 2 | 2 | 2 | 12 | | 10 |
| 2796 | | 496036 | Influenza A virus (A/duck/Vietnam/37/2007(H5N1)) | | 1 | | 1 | | |
| 2797 | | 497976 | Salmonella enterica subsp. enterica serovar Typhi str. E00-7866 | | 1 | | 1 | | |
| 2798 | | 497977 | Salmonella enterica subsp. enterica serovar Typhi str. 404ty | | 1 | | 1 | | |
| 2799 | | 499191 | Norovirus GII.1 | 1 | | 1 | | | |
| 2800 | | 499286 | Influenza A virus (A/Hong Kong/CUHK13527/2003(H3N2)) | | 2 | | 2 | | |
| 2801 | | 502057 | Vaccinia virus GLV-1h68 | | 2 | | 2 | | |
| 2802 | | 502780 | Paracoccidioides brasiliensis Pb18 | 1 | 1 | 1 | 1 | | |
| 2803 | | 502790 | Aeromonas diversa | | 1 | | 1 | | |
| 2804 | | 503386 | Influenza B virus (B/Kobe/3/2004) | 1 | | 1 | | | |
| 2805 | | 504660 | Influenza B virus (B/Kobe/67/2005) | 1 | | 1 | | | |
| 2806 | | 504662 | Influenza B virus (B/Kobe/39/2005) | 1 | | 1 | | | |
| 2807 | | 504664 | Influenza B virus (B/Kobe/113/2005) | 1 | | 1 | | | |
| 2808 | | 504666 | Influenza B virus (B/Kobe/115/2005-T1) | 1 | | 1 | | | |
| 2809 | | 504697 | Influenza A virus (A/Cygnus olor/Czech Republic/10732/07(H5N1)) | | 1 | | 1 | | |
| 2810 | | 504904 | Influenza A virus (A/Brisbane/59/2007(H1N1)) | 26 | 13 | 26 | 14 | | 1 |
| 2811 | | 504910 | Influenza A virus (A/Wellington/75/2006(H1N1)) | | 1 | | 1 | | |
| 2812 | | 505184 | HIV-1 M:A | 9 | 1 | 9 | 1 | | |
| 2813 | | 505185 | HIV-1 M:B | 8 | 1 | 8 | 25 | | 24 |
| 2814 | | 505186 | HIV-1 M:C | 10 | | 11 | | 1 | |
| 2815 | | 505228 | HIV-1 M:G | 4 | | 4 | | | |
| 2816 | | 506282 | Influenza A virus (A/unknown/New York/11646-5/2005(H7N2)) | 1 | | 1 | | | |
| 2817 | | 506350 | Influenza A virus (A/Hong Kong/1/1968(H3N2)) | 18 | 3 | 22 | 3 | 4 | |
| 2819 | X | 506380 | Influenza A virus (A/Hong Kong/1-4-MA21-1/1968(H3N2)) | | | 1 | | 1 | |
| 2820 | | 507601 | Toxoplasma gondii GT1 | | 205 | | 205 | | |
| 2821 | | 508767 | Clostridium botulinum E3 str. Alaska E43 | | 1 | | 1 | | |
| 2822 | | 508771 | Toxoplasma gondii ME49 | 21 | 89 | 21 | 89 | | |
| 2823 | | 508775 | Norovirus GII.9 | 1 | 1 | 1 | 1 | | |
| 2824 | | 509173 | Acinetobacter baumannii AYE | | 1 | | 1 | | |
| 2825 | X | 509628 | Hepatitis E virus type 3 | | | | 1 | | 1 |
| 2826 | | 510222 | Influenza A virus (A/duck/Vietnam/NCVD-9/2007(H5N1)) | 1 | | 1 | | | |
| 2827 | X | 510670 | Hepatitis delta virus dTk6 | | | | 1 | | 1 |
| 2828 | | 511145 | Escherichia coli str. K-12 substr. MG1655 | | 31 | | 31 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2829 |  | 511839 | Influenza A virus (A/turkey/England/N28/1973(H5N2)) | 1 |  | 1 |  |  |  |
| 2831 |  | 514193 | Influenza A virus (A/CHU/2-524/2005(H3N2)) |  | 2 |  | 2 |  |  |
| 2832 |  | 515581 | Influenza A virus (A/swine/Ohio/24366/2007(H1N1)) |  | 2 |  | 2 |  |  |
| 2834 |  | 515817 | Amphioctopus fangsiao | 1 |  | 1 |  |  |  |
| 2835 |  | 518922 | Influenza A virus (A/Beijing/262/1995(H1N1)) | 1 |  | 1 |  |  |  |
| 2836 |  | 518968 | Influenza A virus (A/X-31B(Puerto Rico/8/1934-Aichi/2/1968)(H3N2)) | 1 |  | 1 |  |  |  |
| 2837 |  | 518987 | Influenza B virus (B/Lee/1940) | 5 | 3 | 5 | 3 |  |  |
| 2838 | X | 519082 | Influenza A virus (A/New York/107/2003(H7N2)) |  |  | 1 |  | 1 |  |
| 2840 |  | 520450 | Brucella abortus bv. 2 str. 86/8/59 |  | 1 |  | 1 |  |  |
| 2841 |  | 520464 | Brucella melitensis bv. 1 str. Rev.1 | 1 |  | 1 |  |  |  |
| 2842 |  | 520963 | Norovirus GII.11 | 1 |  | 1 |  |  |  |
| 2843 |  | 520964 | Norovirus GII.18 | 1 |  | 1 |  |  |  |
| 2844 |  | 521004 | Haemophilus influenzae 6P18H1 |  | 1 |  | 1 |  |  |
| 2845 |  | 521005 | Haemophilus influenzae 7P49H1 |  | 1 |  | 1 |  |  |
| 2846 |  | 521007 | Borreliella burgdorferi N40 | 4 | 3 | 4 | 3 |  |  |
| 2847 |  | 522740 | Influenza A virus (A/swine/Hannover/1/1981(H1N1)) |  | 12 |  | 12 |  |  |
| 2848 |  | 524364 | Norovirus Hu/1968/US | 3 | 1 | 6 | 1 | 3 |  |
| 2849 |  | 525281 | Escherichia coli 83972 |  | 3 |  | 3 |  |  |
| 2850 |  | 525368 | Mycobacterium parascrofulaceum ATCC BAA-614 |  | 35 |  | 35 |  |  |
| 2851 |  | 525374 | Staphylococcus epidermidis BCM-HMP0060 |  | 1 |  | 1 |  |  |
| 2852 |  | 526974 | Bacillus cereus BDRD-ST24 |  | 1 |  | 1 |  |  |
| 2853 |  | 526977 | Bacillus cereus ATCC 4342 |  | 1 |  | 1 |  |  |
| 2855 |  | 527024 | Bacillus thuringiensis serovar tochigiensis BGSC 4Y1 |  | 1 |  | 1 |  |  |
| 2856 |  | 527026 | Bacillus thuringiensis serovar sotto str. T04001 |  | 1 |  | 1 |  |  |
| 2858 |  | 528354 | Neisseria gonorrhoeae MS11 | 8 |  | 8 |  |  |  |
| 2859 |  | 529058 | Influenza A virus (A/Uruguay/716/2007(H3N2)) | 1 |  | 1 |  |  |  |
| 2860 |  | 529507 | Proteus mirabilis HI4320 | 1 |  | 1 |  |  |  |
| 2861 |  | 533026 | Influenza A virus (A/turkey/Ohio/313053/2004(H3N2)) | 1 | 2 | 1 | 2 |  |  |
| 2862 |  | 535026 | Bacillus subtilis subsp. subtilis NCIB 3610 = ATCC 6051 |  | 1 |  | 1 |  |  |
| 2863 |  | 535852 | Influenza A virus (A/California/06/2008(H1N1)) |  | 1 |  | 1 |  |  |
| 2864 |  | 538555 | Influenza A virus (A/swine/Korea/Hongsong2/2004(H1N2)) |  | 2 |  | 2 |  |  |
| 2865 |  | 543153 | Mycobacterium phage Predator |  | 1 |  | 1 |  |  |
| 2866 |  | 543824 | Synechocystis aquatilis |  | 2 |  | 2 |  |  |
| 2867 |  | 546980 | Norovirus Hu/GII-4/Saga1/2006/JP | 1 |  | 1 |  |  |  |
| 2868 |  | 548470 | Staphylococcus aureus subsp. aureus MN8 | 11 |  | 11 |  |  |  |
| 2869 |  | 549169 | Pseudogulbenkiania ferrooxidans |  | 1 |  | 1 |  |  |
| 2870 |  | 552536 | Listeria monocytogenes HCC23 |  | 2 |  | 2 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 2871 | | 553345 | Influenza A virus (A/Aichi/72/2007(H3N2)) | 1 | | 1 | | | |
| 2872 | | 553583 | Staphylococcus aureus A9635 | 1 | | 1 | | | |
| 2873 | | 554290 | Salmonella enterica subsp. enterica serovar Paratyphi A str. AKU_12601 | | 3 | | 3 | | |
| 2874 | X | 556277 | Influenza A virus (A/swine/Guangdong/02/2005(H3N2)) | | | 1 | | 1 | |
| 2875 | | 557433 | Lactobacillus reuteri JCM 1112 | 3 | | 3 | | | |
| 2876 | | 557599 | Mycobacterium kansasii ATCC 12478 | 1 | | 1 | | | |
| 2877 | | 558177 | Influenza A virus (A/mallard/Bavaria/10/2007(H5N1)) | | 1 | | 1 | | |
| 2878 | | 559292 | Saccharomyces cerevisiae S288C | 16 | 1 | 16 | 2 | | 1 |
| 2879 | | 560463 | Influenza A virus (A/Taiwan/VGHYM0325-06/2002(H3N2)) | | 1 | | 1 | | |
| 2882 | | 562988 | Influenza A virus (A/Egypt/2289-NAMRU3/2008(H5N1)) | 1 | | 1 | | | |
| 2883 | | 562992 | Influenza A virus (A/Egypt/3300-NAMRU3/2008(H5N1)) | 1 | | 1 | | | |
| 2884 | | 563041 | Helicobacter pylori G27 | 2 | | 2 | | | |
| 2885 | | 563773 | Vibrio parahaemolyticus AN-5034 | | 4 | | 4 | | |
| 2886 | | 565995 | Bundibugyo ebolavirus | 14 | | 15 | | 1 | |
| 2888 | | 566466 | gamma proteobacterium NOR5-3 | | 1 | | 1 | | |
| 2889 | | 567106 | Campylobacter jejuni subsp. jejuni IA3902 | | 1 | | 1 | | |
| 2890 | | 568206 | Bacillus anthracis str. CDC 684 | | 3 | | 3 | | |
| 2891 | | 568819 | Listeria monocytogenes serotype 4b str. CLIP 80459 | | 6 | | 6 | | |
| 2892 | | 571800 | Psychrobacter sp. G | 1 | | 1 | | | |
| 2893 | | 572264 | Bacillus cereus 03BB102 | | 2 | | 2 | | |
| 2894 | | 572307 | Neospora caninum Liverpool | | 1 | | 1 | | |
| 2895 | X | 573729 | Thermothelomyces thermophilus ATCC 42464 | | | 1 | | 1 | |
| 2896 | | 573797 | Influenza A virus (A/England/654/2007(H1N1)) | | 1 | | 1 | | |
| 2897 | | 573977 | Human bocavirus 2 | 4 | | 4 | | | |
| 2898 | | 574556 | Anaplasma centrale str. Israel | | 2 | | 2 | | |
| 2899 | | 575590 | Bacteroidetes oral taxon 274 str. F0058 | 1 | | 1 | | | |
| 2900 | | 575591 | Brucella abortus NCTC 8038 | | 1 | | 1 | | |
| 2901 | | 575788 | Vibrio tasmaniensis LGP32 | | 1 | | 1 | | |
| 2903 | | 577543 | Influenza A virus (A/Xinjiang/1/2006(H5N1)) | 4 | | 4 | | | |
| 2904 | | 578079 | Influenza A virus (A/ferret/Maryland/P10-UMD/2008(H9N2)) | | 1 | | 1 | | |
| 2905 | | 580047 | Chlamydia trachomatis A2497 | 1 | | 3 | | 2 | |
| 2906 | | 585034 | Escherichia coli IAI1 | 3 | | 3 | | | |
| 2907 | | 585544 | Bacteroides sp. D22 | 1 | | 1 | | | |
| 2908 | X | 586029 | Fowl adenovirus 8b | | | 2 | | 2 | |
| 2909 | | 587200 | Variola virus human/India/Ind3/1967 | | 4 | | 4 | | |
| 2910 | | 587884 | Influenza A virus (A/Sydney/5/1997(H3N2)) | 7 | | 7 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2911 |  | 588533 | Norovirus Hu/GII/GZ-1/2008/CHN | 1 |  | 1 |  |  |  |
| 2912 |  | 591020 | Shigella flexneri 2002017 |  | 1 |  | 1 |  |  |
| 2913 |  | 592021 | Bacillus anthracis str. A0248 |  | 1 |  | 1 |  |  |
| 2914 |  | 592313 | Vibrio cholerae 12129(1) |  | 1 |  | 1 |  |  |
| 2915 | X | 595609 | Recombinant Hepatitis C virus HK6a/JFH-1 |  |  | 3 |  | 3 |  |
| 2916 |  | 598745 | Giardia intestinalis ATCC 50581 |  | 7 |  | 7 |  |  |
| 2917 |  | 604436 | Influenza B virus (B/Brisbane/60/2008) | 2 |  | 8 |  | 6 |  |
| 2918 |  | 614035 | Influenza A virus (A/swine/Belgium/1/1998(H1N1)) | 1 |  | 1 |  |  |  |
| 2919 |  | 616922 | Influenza A virus (A/chicken/Anhui/1/1998(H9N2)) |  | 1 |  | 1 |  |  |
| 2920 |  | 617102 | Yellow fever virus 17D/Tiantan | 4 | 5 | 4 | 5 |  |  |
| 2921 |  | 619693 | Prevotella sp. oral taxon 472 str. F0295 | 1 |  | 1 |  |  |  |
| 2922 |  | 627442 | SARS coronavirus P2 | 1 |  | 1 |  |  |  |
| 2923 |  | 627611 | Vibrio parahaemolyticus K5030 |  | 22 |  | 22 |  |  |
| 2924 |  | 630277 | Tarsius lariang |  | 1 |  | 1 |  |  |
| 2925 |  | 632134 | Influenza A virus (A/chicken/Pakistan/UDL-01/2008(H9N2)) | 7 |  | 7 |  |  |  |
| 2926 |  | 633557 | Infectious bronchitis virus CK/CH/LHLJ/04V | 1 |  | 1 |  |  |  |
| 2927 |  | 634464 | Chlamydia trachomatis Sweden2 | 1 |  | 1 |  |  |  |
| 2928 |  | 637383 | Helicobacter pylori NCTC 11639 |  | 8 |  | 8 |  |  |
| 2929 |  | 638313 | Human bocavirus 3 | 6 |  | 6 |  |  |  |
| 2930 |  | 641140 | Brucella abortus str. 2308 A |  | 1 |  | 1 |  |  |
| 2931 |  | 641501 | Influenza A virus (A/California/04/2009(H1N1)) | 74 | 127 | 74 | 128 |  | 1 |
| 2932 |  | 641809 | Influenza A virus (A/California/07/2009(H1N1)) | 30 | 14 | 35 | 50 | 5 | 36 |
| 2933 |  | 641812 | Influenza A virus (A/Texas/05/2009(H1N1)) | 1 |  | 1 |  |  |  |
| 2934 |  | 642261 | Influenza A virus (A/California/08/2009(H1N1)) | 8 |  | 8 |  |  |  |
| 2935 |  | 642794 | Influenza A virus (A/Auckland/1/2009(H1N1)) |  | 1 |  | 1 |  |  |
| 2936 |  | 643212 | Influenza A virus (A/Netherlands/602/2009(H1N1)) | 2 | 14 | 2 | 14 |  |  |
| 2937 |  | 643680 | Saccharomyces cerevisiae EC1118 |  | 1 |  | 1 |  |  |
| 2938 |  | 644289 | Influenza A virus (A/Korea/01/2009(H1N1)) | 3 |  | 4 |  | 1 |  |
| 2939 |  | 644788 | Influenza A virus (A/Vietnam/1194/2004(H5N1)) | 14 | 9 | 14 | 9 |  |  |
| 2940 |  | 645463 | Clostridioides difficile R20291 | 1 |  | 1 |  |  |  |
| 2941 |  | 645724 | Influenza A virus (A/Hong Kong/01/2009(H1N1)) | 3 |  | 3 |  |  |  |
| 2942 |  | 645771 | Influenza A virus (A/Catalonia/63/2009(H1N1)) |  | 1 |  | 1 |  |  |
| 2943 |  | 647096 | Influenza A virus (A/Beijing/01/2009(H1N1)) |  | 27 |  | 35 |  | 8 |
| 2944 |  | 647514 | Norovirus GI.1 | 1 |  | 1 |  |  |  |
| 2945 |  | 647515 | Norovirus GI.2 | 1 |  | 1 |  |  |  |
| 2946 |  | 647516 | Norovirus GI.3 |  | 1 |  | 1 |  |  |
| 2947 |  | 647519 | Norovirus GI.5 | 1 |  | 1 |  |  |  |
| 2948 |  | 647521 | Norovirus GI.7 | 1 |  | 1 |  |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 2949 | | 647923 | Influenza A virus (A/reassortant/NYMC X-179A(California/07/2009 x NYMC X-157)(H1N1)) | 16 | | 16 | | | |
| 2950 | | 648194 | Neisseria meningitidis serogroup Y | 3 | | 3 | | | |
| 2951 | | 648856 | Influenza A virus (A/Beijing/501/2009(H1N1)) | 1 | | 1 | | | |
| 2952 | | 650131 | Equine rhinitis B virus 1 strain P1436/71 | 6 | | 6 | | | |
| 2953 | | 652616 | Mycobacterium tuberculosis str. Erdman = ATCC 35801 | 15 | 19 | 15 | 19 | | |
| 2954 | | 654811 | Influenza A virus (A/Perth/16/2009(H3N2)) | 3 | | 3 | | | |
| 2955 | | 655288 | Influenza A virus (A/mallard/Quebec/10969/2006(H2N3)) | | 1 | | 1 | | |
| 2956 | | 655827 | Metarhizium acridum CQMa 102 | 1 | | 1 | | | |
| 2957 | | 655863 | Grosmannia clavigera kw1407 | | 1 | | 1 | | |
| 2958 | | 657165 | Influenza A virus (A/Hong Kong/213/03) | 2 | 2 | 2 | 2 | | |
| 2959 | | 658578 | Influenza A virus (A/duck/Beijing/MG0617/2005(H9N2)) | | 1 | | 1 | | |
| 2960 | | 658655 | Lachnospiraceae bacterium 1_4_56FAA | | 1 | | 1 | | |
| 2961 | | 658858 | Giardia lamblia P15 | | 1 | | 1 | | |
| 2962 | | 661367 | Legionella longbeachae NSW150 | | 1 | | 1 | | |
| 2964 | | 667015 | Bacteroides salanitronis DSM 18170 | | 1 | | 1 | | |
| 2965 | | 672161 | Chlamydia trachomatis B/TZ1A828/OT | 3 | | 3 | | | |
| 2966 | | 673446 | Influenza A virus (A/reassortant/NYMC X-181(California/07/2009 x NYMC X-157)(H1N1)) | 1 | | 1 | | | |
| 2967 | | 679206 | Escherichia coli MS 119-7 | | 1 | | 1 | | |
| 2968 | | 679716 | Trypanosoma brucei gambiense DAL972 | | 1 | | 1 | | |
| 2969 | | 680689 | Influenza A virus (A/England/AV877/1996(H7N7)) | | 1 | | 1 | | |
| 2970 | | 680690 | Influenza A virus (A/Hong Kong/1074/1999(H9N2)) | 2 | 1 | 2 | 1 | | |
| 2971 | | 680692 | Influenza A virus (A/Hong Kong/485/1997(H5N1)) | 1 | 1 | 1 | 1 | | |
| 2972 | | 680693 | Influenza A virus (A/Netherlands/219/2003(H7N7)) | 1 | | 1 | | | |
| 2973 | | 680729 | Influenza A virus (A/chicken/Italy/1067/1999(H7N1)) | | 17 | | 20 | | 3 |
| 2974 | | 680739 | Influenza A virus (A/chicken/Mexico/37821-771/1996(H5N2)) | | 1 | | 1 | | |
| 2975 | | 680767 | Influenza A virus (A/duck/Hong Kong/140/1998(H5N1)) | | 1 | | 1 | | |
| 2976 | | 680785 | Influenza A virus (A/environment/Hong Kong/156/1997(H5N1)) | 1 | | 1 | | | |
| 2977 | | 680789 | Influenza A virus (A/environment/Viet Nam/1203/2004(H5N1)) | 1 | | 1 | | | |
| 2978 | | 680799 | Influenza A virus (A/goose/Hong Kong/437-6/1999(H5N1)) | | 1 | | 1 | | |
| 2979 | | 680803 | Influenza A virus (A/goose/Hong Kong/739.2/2002(H5N1)) | | 1 | | 1 | | |
| 2981 | | 682728 | Influenza A virus (A/Quebec/144147/2009(H1N1)) | 10 | | 10 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 2982 | X | 683780 | Influenza A virus (A/wild bird/Korea/A81/2009(H5N2)) | | | 1 | | 1 | |
| 2983 | | 687340 | Torque teno virus 1 | | 3 | | 3 | | |
| 2984 | | 687341 | Torque teno virus 2 | | 4 | | 4 | | |
| 2985 | | 687342 | Torque teno virus 3 | | 4 | | 4 | | |
| 2986 | | 687343 | Torque teno virus 4 | | 6 | | 6 | | |
| 2987 | | 687345 | Torque teno virus 6 | | 2 | | 2 | | |
| 2988 | | 687346 | Torque teno virus 7 | | 3 | | 3 | | |
| 2989 | | 687347 | Torque teno virus 8 | | 6 | | 6 | | |
| 2990 | | 687350 | Torque teno virus 11 | | 1 | | 1 | | |
| 2991 | | 687353 | Torque teno virus 14 | | 5 | | 5 | | |
| 2992 | | 687354 | Torque teno virus 15 | | 3 | | 3 | | |
| 2993 | | 687355 | Torque teno virus 16 | | 4 | | 4 | | |
| 2994 | | 687358 | Torque teno virus 19 | | 5 | | 5 | | |
| 2995 | | 687359 | Torque teno virus 20 | | 2 | | 2 | | |
| 2996 | | 687360 | Torque teno virus 21 | | 2 | | 2 | | |
| 2997 | | 687362 | Torque teno virus 23 | | 2 | | 2 | | |
| 2998 | | 687363 | Torque teno virus 24 | | 3 | | 3 | | |
| 2999 | | 687364 | Torque teno virus 25 | | 3 | | 3 | | |
| 3000 | | 687365 | Torque teno virus 26 | | 5 | | 5 | | |
| 3001 | | 687366 | Torque teno virus 27 | | 5 | | 5 | | |
| 3002 | | 687367 | Torque teno virus 28 | | 3 | | 3 | | |
| 3003 | | 687368 | Torque teno virus 29 | | 4 | | 4 | | |
| 3004 | | 687369 | Torque teno mini virus 1 | | 1 | | 1 | | |
| 3005 | | 687371 | Torque teno mini virus 3 | | 2 | | 2 | | |
| 3006 | | 687375 | Torque teno mini virus 7 | | 2 | | 2 | | |
| 3007 | | 687376 | Torque teno mini virus 8 | | 2 | | 2 | | |
| 3008 | | 687382 | Torque teno tamarin virus | | 2 | | 2 | | |
| 3009 | | 687383 | Torque teno douroucouli virus | | 5 | | 5 | | |
| 3010 | | 687384 | Torque teno felis virus | | 1 | | 1 | | |
| 3011 | | 687385 | Torque teno canis virus | | 1 | | 1 | | |
| 3012 | | 687386 | Torque teno sus virus 1a | 12 | 1 | 12 | 1 | | |
| 3013 | | 689403 | Human bocavirus 1 | 8 | | 8 | | | |
| 3016 | | 694009 | Severe acute respiratory syndrome-related coronavirus | 170 | 502 | 171 | 505 | 1 | 3 |
| 3017 | | 696871 | Vaccinia virus Western Reserve | | 4 | | 31 | | 27 |
| 3018 | | 697610 | Influenza A virus (A/India/GWMH05/2009(H1N1)) | | 1 | | 1 | | |
| 3019 | | 703352 | Brucella melitensis M5-90 | 5 | 26 | 5 | 26 | | |
| 3021 | | 714978 | Human adenovirus 55 | 4 | | 4 | | | |
| 3022 | | 715091 | Influenza A virus (A/Roma/ISS1941/2009(H1N1)) | | 1 | | 1 | | |
| 3023 | | 715494 | Influenza A virus (A/Hong Kong/33982/2009(H9N2)) | | 3 | | 3 | | |
| 3024 | | 722438 | Mycoplasma pneumoniae FH | 3 | | 3 | | | |
| 3025 | | 742305 | Influenza A virus (A/slaty-backed gull/Japan/6KS0185/2006(H4N8)) | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3026 | | 742503 | Tokudaia muenninki | | 1 | | 1 | | |
| 3027 | | 743722 | Sphingobacterium sp. 21 | 1 | | 1 | | | |
| 3028 | | 743973 | Taylorella equigenitalis ATCC 35865 | 1 | | 1 | | | |
| 3029 | | 744533 | Naegleria gruberi strain NEG-M | 1 | | 1 | | | |
| 3030 | | 746128 | Aspergillus fumigatus | 126 | 86 | 127 | 87 | 1 | 1 |
| 3031 | | 747305 | Norovirus GII.10 | 7 | | 7 | | | |
| 3032 | | 754027 | Treponema phagedenis F0421 | | 1 | | 1 | | |
| 3033 | | 754366 | Influenza A virus (A/Ontario/309862/2009(H1N1)) | 1 | | 1 | | | |
| 3034 | | 754503 | Mycoplasma hyopneumoniae 7422 | 1 | | 1 | | | |
| 3035 | | 759272 | Chaetomium thermophilum var. thermophilum DSM 1495 | 1 | | 1 | | | |
| 3036 | X | 759363 | Chlamydia trachomatis D-EC | | | 3 | | 3 | |
| 3037 | X | 760591 | Influenza A virus (A/Egypt/N03072/2010(H5N1)) | | | 1 | | 1 | |
| 3038 | | 761193 | Runella slithyformis DSM 19594 | | 1 | | 1 | | |
| 3039 | | 761251 | Influenza A virus (A/Mexico City/WR1704T/2009(H1N1)) | | 1 | | 1 | | |
| 3040 | | 762378 | Influenza A virus (A/bar-headed goose/Qinghai/3/2005(H5N1)) | | 1 | | 1 | | |
| 3042 | | 763552 | Mus musculus papillomavirus type 1 | | 4 | | 4 | | |
| 3043 | | 768646 | Influenza A virus (A/chicken/Uchal/8293/2006(H9N2)) | | 1 | | 1 | | |
| 3044 | | 768647 | Influenza A virus (A/chicken/Uchal/8286/2006(H9N2)) | | 1 | | 1 | | |
| 3045 | | 857099 | Streptococcus mutans OMZ175 | 2 | 1 | 2 | 1 | | |
| 3046 | | 857571 | Moraxella catarrhalis O35E | 27 | | 27 | | | |
| 3047 | X | 862909 | Trichodysplasia spinulosa-associated polyomavirus | | | 2 | | 2 | |
| 3050 | | 868597 | Stenotrophomonas maltophilia JV3 | 1 | | 1 | | | |
| 3051 | | 870484 | Nonlabens agnitus | | 1 | | 1 | | |
| 3052 | | 871575 | Ogataea parapolymorpha DL-1 | | 1 | | 1 | | |
| 3053 | | 875328 | Mycolicibacter sinensis | | 10 | | 10 | | |
| 3055 | | 885311 | Entamoeba histolytica KU27 | | 1 | | 1 | | |
| 3056 | | 887118 | Influenza A virus (A/Mexico/UASLP-012/2008(H3N2)) | | 1 | | 1 | | |
| 3057 | | 908203 | Influenza A virus (A/Thailand/CU-H126/2009(H1N1)) | | 1 | | 1 | | |
| 3058 | | 909420 | Neisseria meningitidis H44/76 | 2 | | 2 | | | |
| 3059 | | 913028 | Yersinia enterocolitica W22703 | | 1 | | 1 | | |
| 3060 | X | 914129 | Streptococcus pneumoniae 2061376 | | | | 1 | | 1 |
| 3061 | | 915014 | Influenza A virus (A/swine/Heilongjiang/44/2009(H1N1)) | 1 | | 1 | | | |
| 3062 | | 928301 | Fowlpox virus strain NVSL | | 3 | | 3 | | |
| 3063 | | 928313 | Tacaribe virus strain Franze-Fernandez | | 6 | | 6 | | |
| 3064 | | 929439 | Leishmania mexicana MHOM/GT/2001/U1103 | | 1 | | 1 | | |
| 3065 | | 932622 | Influenza A virus (A/chicken/Huadong/4/2008(H5N1)) | 1 | | 1 | | | |
| 3066 | | 935198 | Clostridium botulinum B str. Eklund 17B (NRP) | | 1 | | 1 | | |
| 3067 | | 936115 | Influenza A virus (A/Netherlands/18/1994(H3N2)) | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3068 | | 940614 | Granulicella mallensis | | 1 | | 1 | | |
| 3069 | | 947939 | Influenza A virus (A/aquatic bird/Korea/w44/2005(H7N3)) | | 1 | | 1 | | |
| 3070 | | 981087 | Leishmania donovani BPK282A1 | | 9 | | 9 | | |
| 3071 | | 986174 | Influenza A virus (A/swine/Korea/4382/2009(H1N2)) | | 1 | | 1 | | |
| 3072 | | 991335 | Influenza A virus (A/swine/Hong Kong/71/2009(H1N1)) | | 1 | | 1 | | |
| 3073 | | 992121 | Helicobacter pylori Hp M5 | 1 | | 1 | | | |
| 3074 | | 996581 | Influenza A virus (A/chicken/Shanghai/Q0808-1/2008(H9N2)) | | 1 | | 1 | | |
| 3075 | | 1003835 | Severe fever with thrombocytopenia virus | 1 | | 1 | | | |
| 3076 | | 1004253 | Cyberlindnera mrakii | 1 | 1 | 1 | 1 | | |
| 3077 | | 1005048 | Collimonas fungivorans Ter331 | | 2 | | 2 | | |
| 3078 | | 1005962 | Ogataea parapolymorpha | | 1 | | 1 | | |
| 3079 | X | 1006061 | Duck hepatitis A virus 1 | | | 1 | | 1 | |
| 3080 | | 1006581 | Mycoplasma gallisepticum S6 | 1 | | 1 | | | |
| 3081 | | 1009714 | Pseudomonas aeruginosa PAK | 7 | 3 | 7 | 3 | | |
| 3082 | | 1016852 | Banana streak CA virus | 5 | | 5 | | | |
| 3083 | | 1016853 | Banana streak IM virus | 10 | | 10 | | | |
| 3084 | | 1016998 | Salmonella enterica subsp. enterica serovar Paratyphi B str. SPB7 | | 11 | | 11 | | |
| 3085 | | 1035514 | Plasmodium vivax North Korean | 1 | | 1 | | | |
| 3086 | | 1041522 | Mycobacterium colombiense CECT 3035 | | 20 | | 20 | | |
| 3087 | | 1041990 | Influenza A virus (A/Guangdong/15/2007(H3N2)) | 3 | | 3 | | | |
| 3088 | | 1045775 | Paenibacillus catalpae | 1 | | 1 | | | |
| 3089 | | 1050221 | Chlamydia psittaci NJ1 | 10 | | 10 | | | |
| 3090 | | 1053141 | Recombinant Hepatitis C virus J6/JFH1-J6 | 2 | | 2 | | | |
| 3091 | X | 1055687 | Trypanosoma vivax Y486 | | | 1 | | 1 | |
| 3092 | | 1068705 | Influenza A virus (A/swine/Guangdong/221/2009(H1N1)) | | 1 | | 1 | | |
| 3093 | | 1077587 | Influenza B virus (B/Victoria/2/1987) | 2 | 4 | 2 | 4 | | |
| 3094 | | 1081253 | Influenza A virus (A/Indiana/08/2011(H3N2)) | | 6 | | 6 | | |
| 3095 | | 1082519 | Influenza A virus (A/chicken/Taixing/10/2010(H9N2)) | 2 | | 2 | | | |
| 3096 | | 1086859 | Influenza A virus (A/Bilthoven/4791/1981(H3N2)) | | 3 | | 3 | | |
| 3097 | | 1091045 | Cutibacterium acnes subsp. defendens ATCC 11828 | 5 | | 5 | | | |
| 3098 | | 1093545 | Influenza A virus (A/shorebird/Delaware Bay/277/2000(H9N7)) | | 1 | | 1 | | |
| 3099 | X | 1112244 | Chlamydia psittaci 06-1683 | | | 3 | | 3 | |
| 3100 | | 1112253 | Chlamydia psittaci 02DC14 | 1 | | 1 | | | |
| 3101 | X | 1112254 | Chlamydia psittaci 02DC15 | | | 19 | | 19 | |
| 3102 | | 1112258 | Chlamydia psittaci 02DC22 | 1 | | 2 | | 1 | |
| 3103 | | 1112262 | Chlamydia psittaci 03DC29 | 1 | | 1 | | | |
| 3104 | X | 1112269 | Chlamydia psittaci 09DC78 | | | 1 | | 1 | |

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|---|---|---|---|---|---|---|---|---|---|
| 3105 | | 1117322 | Glaesserella parasuis str. Nagasaki | 1 | | 1 | | | |
| 3106 | | 1122279 | Influenza A virus (A/equine/Guangxi/3/2011(H9N2)) | | 1 | | 1 | | |
| 3107 | | 1125722 | Porphyromonas gingivalis W50 | | 36 | | 36 | | |
| 3108 | | 1126212 | Macrophomina phaseolina MS6 | | 1 | | 1 | | |
| 3109 | X | 1129345 | Influenza A virus (A/little yellow-shouldered bat/Guatemala/153/2009(H17N10)) | | | | 3 | | 3 |
| 3111 | | 1133363 | Schmallenberg virus | 6 | | 6 | | | |
| 3112 | | 1133968 | Babesia microti strain RI | 3 | | 3 | | | |
| 3113 | | 1144025 | Influenza A virus (A/Shandong/9/1993(H3N2)) | 13 | | 13 | | | |
| 3114 | | 1146883 | Blastococcus saxobsidens DD2 | | 1 | | 1 | | |
| 3115 | | 1156983 | Norovirus Hu/GII.4/Minerva/CS1258/2006/USA | 1 | | 1 | | | |
| 3116 | | 1163697 | Influenza A virus (A/Oklahoma/309/2006(H3N2)) | 4 | 3 | 4 | 3 | | |
| 3117 | | 1169127 | Clostridioides difficile genomovar ribotype_087 | 1 | | 1 | | | |
| 3119 | | 1171336 | Influenza A virus (A/swine/Nebraska/A01116984/2011(H3N2)) | | 1 | | 1 | | |
| 3120 | | 1172206 | Neisseria meningitidis NMB | 1 | | 1 | | | |
| 3121 | | 1176042 | Influenza A virus (A/swine/Italy/1513-1/1998(H1N1)) | | 1 | | 1 | | |
| 3122 | | 1178016 | Encephalitozoon romaleae SJ-2008 | | 1 | | 1 | | |
| 3123 | X | 1182143 | Norovirus Hu/GII.4/Farmington Hills/2004/USA | | | 2 | | 2 | |
| 3124 | | 1182144 | Norovirus Hu/GII.4/Minerva/2006/USA | 2 | | 2 | | | |
| 3125 | | 1184252 | Streptococcus suis S735 | 2 | | 2 | | | |
| 3126 | | 1186058 | Trichosporon asahii var. asahii CBS 2479 | | 1 | | 1 | | |
| 3127 | | 1197131 | Escherichia coli F576 | 1 | | 1 | | | |
| 3128 | | 1198627 | Mycobacteroides abscessus subsp. massiliense str. GO 06 | | 1 | | 1 | | |
| 3129 | | 1198676 | Streptococcus mutans GS-5 | | 14 | | 14 | | |
| 3130 | | 1207470 | Streptococcus pyogenes M1 476 | 1 | | 1 | | | |
| 3131 | | 1209523 | Toxoplasma gondii type II | | 2 | | 2 | | |
| 3132 | | 1209525 | Toxoplasma gondii type I | | 2 | | 2 | | |
| 3133 | | 1214154 | Streptococcus suis 2651 | 1 | | 1 | | | |
| 3134 | | 1214159 | Streptococcus suis 13730 | 2 | | 2 | | | |
| 3135 | | 1214225 | Acidocella sp. MX-AZ02 | 1 | | 1 | | | |
| 3136 | | 1218488 | Torque teno sus virus k2 | 11 | | 11 | | | |
| 3137 | | 1219377 | Human rhinovirus C3 | | 52 | | 52 | | |
| 3138 | | 1225860 | Porcine torque teno virus 1 | 2 | | 2 | | | |
| 3139 | | 1229831 | Chlamydia avium 10DC88 | 2 | | 2 | | | |
| 3142 | | 1235996 | Human betacoronavirus 2c EMC/2012 | 7 | | 7 | 12 | | 12 |
| 3143 | | 1236978 | Staphylococcus epidermidis JCM 2414 | 1 | | 1 | | | |
| 3144 | | 1239567 | Mamastrovirus 3 | 2 | | 2 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3145 | | 1241973 | Norovirus Hu/GII.4/Sydney/NSW0514/2012/AU | 3 | | 4 | | 1 | |
| 3146 | | 1263102 | Prevotella copri CAG:164 | | 1 | | 1 | | |
| 3147 | | 1263720 | Betacoronavirus England 1 | 9 | | 10 | | 1 | |
| 3148 | | 1268303 | Rhodococcus sp. AW25M09 | 1 | 1 | 1 | 1 | | |
| 3149 | | 1268360 | Influenza A virus (A/Victoria/361/2011(H3N2)) | 5 | | 5 | | | |
| 3150 | | 1278073 | Myxococcus stipitatus DSM 14675 | | 1 | | 1 | | |
| 3151 | X | 1285028 | Influenza A virus (A/American black duck/New Brunswick/00464/2010(H4N6)) | | | 1 | | 1 | |
| 3152 | | 1285600 | Nile crocodilepox virus | | 2 | | 2 | | |
| 3153 | | 1285902 | Artificial vector pGEX-2T | 1 | | 1 | | | |
| 3154 | | 1286616 | Norovirus Hu/GII.3/693/425/2008/AU | 6 | | 6 | | | |
| 3155 | | 1286635 | Desulfotignum phosphitoxidans DSM 13687 | | 1 | | 1 | | |
| 3156 | | 1288825 | Shigella flexneri 2b | 2 | | 2 | | | |
| 3157 | | 1289562 | Influenza A virus (A/swine/Spain/SF11131/2007(H1N1)) | | 3 | | 3 | | |
| 3158 | X | 1291361 | Leptospira interrogans serovar Naam str. Naam | | | 1 | | 1 | |
| 3161 | X | 1303514 | Diaporthe toxica | | | 1 | | 1 | |
| 3162 | | 1310532 | Influenza A virus (A/chicken/West Java/Sbg-29/2007(H5N1)) | 7 | | 7 | | | |
| 3163 | | 1318439 | Influenza A virus (A/Washington/05/2011(H1N1)) | 1 | | 1 | | | |
| 3164 | X | 1318464 | Bovine Schmallenberg virus BH80/Germany/2011 | | | 2 | | 2 | |
| 3165 | | 1321009 | Influenza A virus (A/Texas/50/2012(H3N2)) | 1 | | 2 | | 1 | |
| 3167 | X | 1330520 | Enterovirus F | | | 1 | | 1 | |
| 3168 | | 1332244 | Influenza A virus (A/Shanghai/02/2013(H7N9)) | 9 | | 11 | | 2 | |
| 3169 | | 1335626 | Middle East respiratory syndrome-related coronavirus | 6 | 12 | 11 | 21 | 5 | 9 |
| 3170 | | 1337063 | Puumala virus bank vole/CG1820/Russia/1984 | | 1 | | 1 | | |
| 3171 | | 1337393 | Helicobacter pylori PZ5056 | 1 | | 1 | | | |
| 3172 | | 1342397 | Influenza A virus (A/chicken/Hong Kong/TP38/2003(H9N2)) | | 3 | | 3 | | |
| 3173 | | 1342434 | Influenza A virus (A/turkey/Minnesota/511/1978(H9N2)) | | 1 | | 1 | | |
| 3174 | | 1345266 | HIV-1 M:CRF01_AE | 1 | | 1 | | | |
| 3175 | | 1346336 | Influenza A virus (A/Fort Monmouth/1-JY2/1947(H1N1)) | | 1 | | 1 | | |
| 3176 | | 1352357 | Helicobacter pylori SouthAfrica50 | 1 | | 1 | | | |
| 3177 | | 1355477 | Bradyrhizobium diazoefficiens | | 1 | | 1 | | |
| 3178 | | 1380386 | Mycobacterium sp. URHB0044 | | 1 | | 1 | | |
| 3179 | | 1389959 | Mycobacterium tuberculosis variant bovis AN5 | 9 | 28 | 9 | 28 | | |
| 3180 | | 1391655 | Influenza A virus (A/Aichi/2-1/1968(H3N2)) | 1 | | 1 | | | |
| 3181 | X | 1391998 | Mycobacterium avium subsp. paratuberculosis 08-8281 | | | 1 | | 1 | |
| 3182 | | 1392869 | Escherichia coli K1 | | 1 | | 1 | | |

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| 3184 | X | 1395982 | Influenza A virus (A/tree sparrow/Shanghai/01/2013(H7N9)) |  |  | 1 |  | 1 |  |
| 3185 |  | 1398154 | Sporothrix brasiliensis 5110 |  | 4 |  | 4 |  |  |
| 3186 |  | 1399582 | Duck Tembusu virus | 7 |  | 7 |  |  |  |
| 3187 |  | 1401444 | Avian leukosis virus ev/J | 5 |  | 5 |  |  |  |
| 3188 |  | 1403335 | Porphyromonas gingivalis 381 | 71 | 55 | 71 | 55 |  |  |
| 3189 |  | 1403514 | Influenza A virus (A/chicken/Jiangsu/x1/2004(H9N2)) | 7 |  | 7 |  |  |  |
| 3190 |  | 1405296 | Chlamydia suis MD56 | 1 |  | 1 |  |  |  |
| 3191 | X | 1406148 | Norovirus Hu/GII.3/Jingzhou/2013402/CHN |  |  | 2 |  | 2 |  |
| 3192 |  | 1408475 | Taylorella asinigenitalis ATCC 700933 | 1 |  | 1 |  |  |  |
| 3193 |  | 1413188 | Influenza A virus (A/Anhui/PA-1/2013(H7N9)) | 1 | 3 | 1 | 3 |  |  |
| 3194 |  | 1416333 | Trypanosoma cruzi Dm28c | 2 |  | 2 |  |  |  |
| 3195 |  | 1420840 | Influenza A virus (A/Luxembourg/46/2009(H1N1)) |  | 1 |  | 1 |  |  |
| 3196 |  | 1427371 | Chlamydia pecorum VR629 | 5 |  | 5 |  |  |  |
| 3197 | X | 1432052 | Eisenbergiella tayi |  |  |  | 3 |  | 3 |
| 3198 |  | 1432555 | Escherichia coli ISC7 |  | 1 |  | 1 |  |  |
| 3199 |  | 1440122 | Murid herpesvirus 68 |  | 2 |  | 2 |  |  |
| 3200 |  | 1447813 | Influenza A virus (A/Shanghai/5190T/2013(H7N9)) |  | 6 |  | 6 |  |  |
| 3201 |  | 1451093 | Influenza A virus (A/chicken/Taiwan/67/2013(H6N1)) |  | 5 |  | 5 |  |  |
| 3202 |  | 1457141 | Chlamydia avium | 1 |  | 1 |  |  |  |
| 3203 |  | 1457153 | Chlamydia gallinacea | 3 |  | 3 |  |  |  |
| 3204 |  | 1458279 | Staphylococcus aureus USA300-ISMMS1 | 1 |  | 1 |  |  |  |
| 3205 |  | 1463841 | Streptomyces sp. NRRL F-2580 |  | 1 |  | 1 |  |  |
| 3206 |  | 1464048 | Micromonospora parva |  | 1 |  | 1 |  |  |
| 3207 |  | 1470614 | Influenza A virus (A/swine/Thailand/CU-S3673N/2012(H3N2)) |  | 1 |  | 1 |  |  |
| 3208 |  | 1476909 | Banana streak MY virus | 39 |  | 39 |  |  |  |
| 3209 |  | 1481964 | Influenza A virus (A/Anhui/1-DEWH730/2013(H7N9)) | 1 | 35 | 1 | 35 |  |  |
| 3210 | X | 1481966 | Influenza A virus (A/Anhui/1-JCVI1_RG2/2013(H7N9)) |  |  | 3 |  | 3 |  |
| 3211 |  | 1498499 | Legionella norrlandica |  | 1 |  | 1 |  |  |
| 3212 |  | 1507381 | Influenza A virus (A/Minnesota/11/2010(H3N2)) | 11 |  | 19 |  | 8 |  |
| 3215 | X | 1566298 | Paraiso Escondido virus |  |  |  | 1 |  | 1 |
| 3216 | X | 1570291 | Ebola virus |  |  | 3 |  | 3 |  |
| 3217 |  | 1581419 | Amblyomma sculptum | 1 |  | 1 |  |  |  |
| 3218 |  | 1634342 | Norovirus Hu/GII/JP/2015/GII.P17_GII.17/Kawasaki308 | 1 |  | 1 |  |  |  |
| 3219 |  | 1663864 | Influenza A virus (A/Anhui/1-YK_RG134/2013(H7N9)) |  | 1 |  | 1 |  |  |
| 3220 |  | 1663934 | Influenza A virus (A/Anhui/1-YK_RG64/2013(H7N9)) |  | 2 |  | 2 |  |  |
| 3221 |  | 1663996 | Influenza A virus (A/Anhui/1-YK_RG01/2013(H7N9)) | 1 |  | 1 |  |  |  |
| 3222 |  | 1665645 | Norovirus GI/Hu/NL/2012/GI.6/Groningen |  | 1 |  | 1 |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 3223 |  | 1671798 | Human papillomavirus type 54 |  | 1 |  | 1 |  |  |
| 3224 |  | 1727172 | Influenza A virus (A/duck/Bavaria/1/1977(H1N1)) |  | 2 |  | 2 |  |  |
| 3225 | X | 1763596 | Guertu virus |  |  | 32 |  | 32 |  |
| 3226 |  | 1835656 | Rotavirus A RVA/Cow-tc/USA/B223/1983/G10P[11] | 2 |  | 2 |  |  |  |
| 3227 | X | 1855372 | bacterium JGI 053 |  |  |  | 1 |  | 1 |
| 3228 | X | 1885248 | Variegated squirrel bornavirus 1 |  |  |  | 1 |  | 1 |
| 3229 |  | 1891187 | Zaire ebolavirus Makona |  | 34 |  | 57 |  | 23 |
| 3230 |  | 1891729 | Mesocricetus auratus polyomavirus 1 | 11 |  | 11 |  |  |  |
| 3231 |  | 1891730 | Mus musculus polyomavirus 1 | 4 | 30 | 4 | 30 |  |  |
| 3232 |  | 1891762 | Human polyomavirus 1 | 3 | 52 | 4 | 52 | 1 |  |
| 3233 |  | 1891767 | Macaca mulatta polyomavirus 1 | 16 | 42 | 16 | 42 |  |  |
| 3234 |  | 1898104 | Bacteroidetes bacterium |  | 1 |  | 1 |  |  |
| 3235 | X | 1898203 | Lachnospiraceae bacterium |  |  |  | 1 |  | 1 |
| 3236 |  | 1933300 | Watermelon silver mottle tospovirus | 3 |  | 3 |  |  |  |
| 3237 | X | 1972699 | Norovirus Hu/GII.3/3-34/2015/HNZZ/CHN |  |  | 11 |  | 11 |  |
| 3238 |  | 1979160 | Human rubulavirus 2 | 10 |  | 10 |  |  |  |
| 3239 |  | 1979162 | Mammalian rubulavirus 5 | 1 | 1 | 1 | 1 |  |  |
| 3240 |  | 1979165 | Mumps rubulavirus | 3 |  | 3 | 1 |  | 1 |
| 3241 |  | 1980442 | Orthohantavirus |  | 15 |  | 15 |  |  |
| 3242 |  | 1980456 | Andes orthohantavirus | 2 | 77 | 2 | 77 |  |  |
| 3243 |  | 1980459 | Bayou orthohantavirus | 1 |  | 1 |  |  |  |
| 3244 |  | 1980463 | Cano Delgadito orthohantavirus |  | 1 |  | 1 |  |  |
| 3245 |  | 1980467 | Dobrava-Belgrade orthohantavirus |  | 25 |  | 25 |  |  |
| 3246 |  | 1980468 | El Moro Canyon orthohantavirus |  | 2 |  | 2 |  |  |
| 3247 |  | 1980471 | Hantaan orthohantavirus | 2 | 60 | 2 | 60 |  |  |
| 3248 |  | 1980475 | Khabarovsk orthohantavirus |  | 1 |  | 1 |  |  |
| 3249 |  | 1980476 | Laguna Negra orthohantavirus |  | 12 |  | 12 |  |  |
| 3250 |  | 1980481 | Montano orthohantavirus | 3 |  | 3 |  |  |  |
| 3251 |  | 1980485 | Prospect Hill orthohantavirus | 1 | 2 | 1 | 2 |  |  |
| 3252 |  | 1980486 | Puumala orthohantavirus | 32 | 20 | 32 | 20 |  |  |
| 3253 |  | 1980489 | Sangassou orthohantavirus |  | 6 |  | 6 |  |  |
| 3254 |  | 1980490 | Seoul orthohantavirus |  | 5 |  | 5 |  |  |
| 3255 |  | 1980491 | Sin Nombre orthohantavirus | 1 | 35 | 1 | 35 |  |  |
| 3256 |  | 1980494 | Tula orthohantavirus | 1 | 14 | 1 | 14 |  |  |
| 3257 |  | 1980519 | Crimean-Congo hemorrhagic fever orthonairovirus | 82 | 18 | 82 | 18 |  |  |
| 3259 | X | 2029108 | Bacillus sp. UMB0899 |  |  | 1 |  | 1 |  |
| 3260 |  | 2043570 | Zika virus ZIKV/H. sapiens/FrenchPolynesia/10087PF/2013 |  | 54 | 6 | 54 | 6 |  |
| 3262 |  | 2070132 | Influenza A virus (A/chicken/Jiangsu/W1-8/2015(H7N9)) | 6 |  | 6 |  |  |  |
| 3263 | X | 2115988 | Swine acute diarrhea syndrome related coronavirus |  |  | 1 |  | 1 |  |
| 3264 |  | 2116544 | Synechococcus lacustris | 1 |  | 1 |  |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 3265 | | 2169971 | Visna-maedi virus | 5 | 7 | 5 | 7 | | |
| 3266 | | 2169986 | Barley yellow dwarf virus PAV | 1 | | 1 | | | |
| 3267 | | 2169991 | Argentinian mammarenavirus | 8 | 873 | 8 | 873 | | |
| 3268 | | 2169992 | Brazilian mammarenavirus | | 879 | | 879 | | |
| 3269 | | 2169993 | Cali mammarenavirus | | 11 | | 11 | | |
| 3270 | | 2169994 | Paraguayan mammarenavirus | | 1 | | 1 | | |
| 3271 | | 2169996 | Serra do Navio mammarenavirus | | 3 | | 3 | | |
| 3272 | X | 2170197 | Guenon simian foamy virus | | | 1 | | 1 | |
| 3273 | X | 2170200 | Spider monkey simian foamy virus | | | 1 | | 1 | |
| 3274 | X | 2170201 | Squirrel monkey simian foamy virus | | | 1 | | 1 | |
| 3275 | X | 2170206 | Yellow-breasted capuchin simian foamy virus | | | 1 | | 1 | |
| 3276 | X | 2316109 | Zika virus ZIKV/Human/Cambodia/FSS13025/2010 | | | | 2 | | 2 |
| 3277 | X | 2487134 | Clostridium sp. E02 | | | | 1 | | 1 |
| 3278 | | 2678873 | Trimerodytes annularis | 1 | | 1 | | | |
| 3279 | | 10000000 | Mus musculus BALB/c | | 3 | | 3 | | |
| 3280 | | 10000055 | Mus musculus DBA/2 | 1 | | 1 | | | |
| 3281 | | 10000067 | Mus musculus C57BL/6 | | 6005 | | 6005 | | |
| 3282 | | 10000187 | Sus scrofa Landrace X Large White | 1 | | 1 | | | |
| 3283 | | 10000291 | Bacillus anthracis str. Sterne 34F2 | 1 | | 1 | | | |
| 3284 | | 10000293 | Clostridium botulinum A 1 | 1 | | 1 | | | |
| 3285 | | 10000294 | Clostridium botulinum A 2 | 2 | | 2 | | | |
| 3286 | | 10000295 | Clostridium botulinum B 111 | 2 | | 2 | | | |
| 3287 | | 10000296 | Clostridium botulinum D 1873 | 2 | | 2 | | | |
| 3288 | | 10000297 | Clostridium botulinum C 92-13 | 5 | | 5 | | | |
| 3289 | | 10000299 | Clostridium botulinum E Beluga | 2 | | 2 | | | |
| 3290 | | 10000301 | Clostridium botulinum A str. Hall hyper | 3 | | 3 | | | |
| 3291 | | 10000302 | Clostridium botulinum A Kyoto-F | 1 | | 1 | | | |
| 3292 | | 10000303 | Clostridium botulinum B Lammana | 1 | | 1 | | | |
| 3293 | | 10000304 | Clostridium botulinum F NCTC 10281 | 1 | | 1 | | | |
| 3294 | | 10000305 | Clostridium botulinum B Okra | 3 | | 3 | | | |
| 3295 | | 10000306 | Clostridium botulinum C Stockholm | 2 | | 2 | | | |
| 3296 | | 10000307 | Clostridium difficile BART'S W1 | 1 | | 1 | | | |
| 3297 | | 10000308 | Listeria monocytogenes ATCC 35967 | | 1 | | 1 | | |
| 3298 | | 10000309 | Listeria monocytogenes ATCC 43251 | | 3 | | 3 | | |
| 3299 | | 10000313 | Mycobacterium avium serovar 1 | 1 | | 1 | | | |
| 3300 | | 10000314 | Mycobacterium avium serovar 2 | 1 | | 1 | | | |
| 3301 | | 10000316 | Mycobacterium avium serovar 25 | 1 | | 1 | | | |
| 3302 | | 10000317 | Mycobacterium avium serovar 26 | 1 | | 1 | | | |
| 3303 | | 10000318 | Mycobacterium avium serovar 4 | 2 | | 2 | | | |
| 3304 | | 10000319 | Mycobacterium avium serovar 8 | 1 | 1 | 1 | 1 | | |
| 3305 | | 10000320 | Mycobacterium avium serovar 9 | 1 | | 1 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3306 | | 10000323 | Mycobacterium bovis T/91/1378 | | 6 | | 6 | | |
| 3307 | | 10000328 | Mycobacterium avium subsp. paratuberculosis Strain Ben | | 1 | | 1 | | |
| 3308 | | 10000329 | Mycobacterium tuberculosis 103 | 1 | | 1 | | | |
| 3309 | | 10000331 | Mycobacterium gastri W471 | 1 | | 1 | | | |
| 3310 | | 10000335 | Candida albicans A-9 (serotype B) | 1 | | 1 | | | |
| 3311 | | 10000337 | Candida albicans KIT 1113 | 1 | | 1 | | | |
| 3312 | | 10000339 | Candida albicans serotype A | 1 | | 1 | | | |
| 3313 | | 10000341 | Leishmania donovani donovani 1S2D | 1 | | 1 | | | |
| 3314 | | 10000345 | Leishmania infantum LEM 75 | 14 | | 14 | | | |
| 3315 | | 10000348 | Trypanosoma cruzi G | 1 | | 1 | | | |
| 3316 | | 10000351 | Trypanosoma cruzi Y | 1 | | 1 | | | |
| 3317 | | 10000352 | Entamoeba histolytica YS-27 | 1 | | 1 | | | |
| 3318 | | 10000353 | Toxoplasma gondii 76K | 5 | 5 | 5 | 5 | | |
| 3319 | | 10000354 | Toxoplasma gondii BK | 1 | 1 | 1 | 1 | | |
| 3320 | | 10000355 | Toxoplasma gondii Prugniaud | | 1 | | 1 | | |
| 3321 | | 10000356 | Plasmodium berghei NK65 | 2 | 2 | 2 | 2 | | |
| 3322 | | 10000357 | Plasmodium chabaudi adami DS | 2 | 37 | 2 | 37 | | |
| 3323 | | 10000358 | Plasmodium falciparum 366 | | 1 | | 1 | | |
| 3327 | | 10000363 | Plasmodium falciparum Brazil-608 | 1 | 1 | 1 | 1 | | |
| 3328 | | 10000366 | Plasmodium falciparum FCB-2 | 1 | | 1 | | | |
| 3329 | | 10000369 | Plasmodium falciparum FVO | | 5 | | 5 | | |
| 3330 | | 10000370 | Plasmodium falciparum GAM5 | | 1 | | 1 | | |
| 3331 | | 10000371 | Plasmodium falciparum Indochina I/CDC | 32 | | 32 | | | |
| 3332 | | 10000373 | Plasmodium falciparum ItG2G1 | | 1 | | 1 | | |
| 3333 | | 10000375 | Plasmodium falciparum RO71 | 1 | 1 | 1 | 1 | | |
| 3334 | | 10000376 | Plasmodium falciparum UF-5 | 2 | | 2 | | | |
| 3335 | | 10000378 | Plasmodium vivax NK | | 2 | | 2 | | |
| 3336 | | 10000381 | Plasmodium yoelii yoelii YM | 1 | 5 | 1 | 5 | | |
| 3337 | | 10000382 | Babesia bovis Mexico | 1 | 4 | 1 | 4 | | |
| 3338 | | 10000383 | Babesia bovis Mexico Mo7 | 1 | 33 | 1 | 33 | | |
| 3339 | | 10000385 | Schistosoma mansoni Puerto Rico | 20 | 7 | 20 | 7 | | |
| 3340 | | 10000386 | Monkeypox virus USA_2003_039 | | 1 | | 1 | | |
| 3341 | | 10000388 | Vaccinia virus NYCBH - Dryvax | | 29 | | 29 | | |
| 3342 | | 10000390 | Variola major virus India-1967 | | 1 | | 1 | | |
| 3343 | | 10000391 | Equid herpesvirus 2 ER32 | 1 | | 1 | | | |
| 3344 | | 10000394 | Human herpesvirus 1 103/65 | 1 | | 1 | | | |
| 3345 | | 10000396 | Human herpesvirus 1 McIntyre | | 1 | | 1 | | |
| 3346 | | 10000398 | Human herpesvirus 1 NS | 1 | | 1 | | | |
| 3347 | | 10000404 | Bovine herpesvirus 1 Lam | 1 | | 1 | | | |
| 3348 | | 10000405 | Equid herpesvirus 4 TH20 | 2 | | 2 | | | |
| 3349 | | 10000406 | Human herpesvirus 3 H-551 | 26 | 15 | 26 | 15 | | |
| 3350 | | 10000408 | Human herpesvirus 5 TB40 | | 1 | | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3351 | | 10000411 | Murid herpesvirus 1 deltaMS94.5 | | 2 | | 2 | | |
| 3352 | | 10000412 | Murid herpesvirus 1 Isolate G4 | | 1 | | 1 | | |
| 3353 | | 10000413 | Murid herpesvirus 1 Isolate K6 | | 1 | | 1 | | |
| 3355 | | 10000420 | Human herpesvirus 4 BL74 | | 1 | | 1 | | |
| 3356 | | 10000421 | Human herpesvirus 4 CKL | | 10 | | 10 | | |
| 3357 | | 10000424 | Human herpesvirus 4 GD1 | 4 | 1 | 4 | 1 | | |
| 3358 | | 10000427 | Human herpesvirus 4 type A | | 5 | | 5 | | |
| 3360 | | 10000435 | Hepatitis B virus genotype D | | 6 | | 6 | | |
| 3361 | | 10000436 | Hepatitis B virus subtype AY | 7 | | 7 | | | |
| 3362 | | 10000437 | Hepatitis B virus subtype AYR | | 1 | | 1 | | |
| 3363 | | 10000438 | Human parvovirus B19 genotype 1 | 1 | | 1 | | | |
| 3364 | | 10000439 | Eastern equine encephalitis virus SV | 8 | | 8 | | | |
| 3365 | | 10000440 | Dengue virus type 1 Hawaii | 29 | 22 | 29 | 22 | | |
| 3366 | | 10000442 | Dengue virus type 3 CH53489 | | 7 | | 7 | | |
| 3367 | | 10000444 | Japanese encephalitis virus CH2195LA | 1 | | 1 | | | |
| 3368 | | 10000445 | Japanese encephalitis virus JaOH0566 | 1 | | 1 | | | |
| 3369 | | 10000447 | West Nile virus 3000.0259 | 2 | | 2 | | | |
| 3370 | | 10000449 | Tick-borne encephalitis virus (WESTERN SUBTYPE) - Neudoerfl | 10 | | 10 | | | |
| 3371 | | 10000451 | Classical swine fever virus Shimen | 16 | | 16 | | | |
| 3372 | | 10000453 | Hepatitis C virus subtype 1a (isolate Gla) | 5 | | 5 | | | |
| 3373 | | 10000455 | Hepatitis C virus subtype 1a 1/910 | | 18 | | 18 | | |
| 3374 | | 10000456 | Hepatitis C virus subtype 1b AD78 | 71 | | 71 | | | |
| 3375 | | 10000457 | Hepatitis C virus subtype 1a Chiron Corp. | 1 | 1 | 1 | 1 | | |
| 3377 | | 10000460 | Hepatitis C virus subtype 1b JK1 | 13 | | 13 | | | |
| 3378 | | 10000462 | Measles virus CAM/RB | | 1 | | 1 | | |
| 3379 | | 10000463 | Phocine distemper virus 2558/Han 88 | 5 | | 5 | | | |
| 3380 | | 10000465 | Rinderpest virus LATC | 2 | | 2 | | | |
| 3381 | | 10000467 | Rabies virus CVS | 14 | | 14 | | | |
| 3382 | | 10000470 | Rabies virus Flury LEP | | 1 | | 1 | | |
| 3383 | | 10000471 | Rabies virus RC-HL | 4 | | 4 | | | |
| 3384 | | 10000472 | Bovine ephemeral fever virus BB7721 | 2 | | 2 | | | |
| 3385 | | 10000474 | Influenza A virus H3N2 (A/Resvir-9 (H3N2)) | | 10 | | 10 | | |
| 3386 | | 10000477 | H1N1 subtype Influenza A virus (A/Netherlands/306/00 (H1N1)) | | 1 | | 1 | | |
| 3387 | | 10000482 | Rift Valley fever virus ZH501 | 2 | | 2 | | | |
| 3388 | | 10000483 | Puumala virus CG18-20 | 4 | | 4 | | | |
| 3389 | | 10000484 | Puumala virus Kazan | 26 | 7 | 26 | 7 | | |
| 3390 | | 10000485 | Puumala virus (STRAIN HALLNAS B1) Vranica/Hallnas | 4 | | 4 | | | |
| 3391 | | 10000487 | Lymphocytic choriomeningitis virus (strain Armstrong) (clone 4) | 1 | | 1 | | | |
| 3392 | | 10000488 | Lymphocytic choriomeningitis virus (strain Armstrong) (clone 53b) | | 61 | | 61 | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3393 | | 10000490 | Lymphocytic choriomeningitis virus A22.2b | | 1 | | 1 | | |
| 3394 | | 10000491 | Lymphocytic choriomeningitis virus Docile | | 2 | | 2 | | |
| 3395 | | 10000494 | Lymphocytic choriomeningitis virus (strain WE) variant 8.7 | | 1 | | 1 | | |
| 3396 | | 10000495 | Lymphocytic choriomeningitis virus (strain WE) WE CL1.2 | | 1 | | 1 | | |
| 3397 | | 10000496 | Lymphocytic choriomeningitis virus (strain Armstrong) (clone 3) | | 1 | | 1 | | |
| 3398 | | 10000497 | Lymphocytic choriomeningitis virus (strain Armstrong) (clone 5) | 1 | | 1 | | | |
| 3399 | | 10000499 | Equine infectious anemia virus PV | | 2 | | 2 | | |
| 3400 | | 10000500 | Human immunodeficiency virus 1 IIIB | 1 | 2 | 1 | 2 | | |
| 3401 | | 10000501 | Simian immunodeficiency virus - mac  - mac 239 | | 474 | 1 | 474 | 1 | |
| 3402 | | 10000502 | Simian immunodeficiency virus - mac  - mac 32H | | 9 | | 9 | | |
| 3403 | | 10000503 | Simian immunodeficiency virus - mac  - mac BK28 | | 4 | | 4 | | |
| 3404 | | 10000504 | Simian immunodeficiency virus - mac  - mac F965 | | 2 | | 2 | | |
| 3406 | | 10000506 | Simian immunodeficiency virus - sm - sm PT573 | | 3 | | 3 | | |
| 3407 | | 10000507 | Rabbit hemorrhagic disease virus Olot/89 | 1 | | 1 | | | |
| 3408 | | 10000513 | Foot-and-mouth disease virus (strain O1) (O1 Kaufbeuren) | 43 | 8 | 43 | 8 | | |
| 3409 | | 10000514 | Foot-and-mouth disease virus (strain O1) (O1BFS 1860) | 9 | | 9 | | | |
| 3410 | | 10000515 | Foot-and-mouth disease virus (strain O1) (O1BFS) | 5 | | 5 | | | |
| 3411 | | 10000516 | Foot-and-mouth disease virus (strain O1) (O1 Campos) | 18 | 19 | 18 | 19 | | |
| 3412 | | 10000518 | Borna disease virus Giessen strain He/80 | 6 | | 6 | | | |
| 3413 | | 10000519 | Hepatitis E virus China Xinjiang | 1 | | 1 | | | |
| 3414 | | 10000520 | Hepatitis E virus SAR-55 | 2 | 6 | 2 | 6 | | |
| 3415 | | 10000523 | Hepatitis delta virus TW2667 | | 5 | | 5 | | |
| 3416 | | 10000524 | Equid herpesvirus 2 691 | 1 | | 1 | | | |
| 3417 | | 10000525 | Equid herpesvirus 2 16V | 1 | | 1 | | | |
| 3418 | | 10000526 | Equid herpesvirus 2 5FN | 1 | | 1 | | | |
| 3419 | | 10000527 | Equid herpesvirus 2 FIN60 | 1 | | 1 | | | |
| 3420 | | 10000528 | Porcine respiratory and reproductive syndrome virus BJ-4 | 1 | | 1 | | | |
| 3421 | | 10000529 | Porcine respiratory and reproductive syndrome virus CH-1a | 7 | 1 | 7 | 1 | | |
| 3422 | | 10000530 | Borrelia garinii IP90 | 3 | | 3 | | | |
| 3423 | | 10000535 | Human herpesvirus 6B HST | 1 | | 1 | | | |
| 3424 | | 10000536 | Murid herpesvirus 4 G2.4 | | 3 | | 3 | | |
| 3425 | | 10000537 | Murid herpesvirus 4 WUMS | | 19 | | 19 | | |
| 3426 | | 10000542 | Streptococcus pyogenes serotype M3 D58 | 4 | | 4 | | | |
| 3427 | | 10000544 | Sin Nombre virus NM H10 | 4 | | 4 | | | |
| 3428 | | 10000547 | Human enterovirus 71 Subgenogroup B5 | 12 | | 12 | | | |
| 3429 | | 10000548 | Human enterovirus 71 Subgenogroup C2 | 19 | | 19 | | | |
| 3430 | | 10000549 | Human enterovirus 71 Subgenogroup C4 | 11 | | 11 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3431 | | 10000550 | Influenza A virus H3N2 (A/Netherlands/9/03 (H3N2)) | | 1 | | 1 | | |
| 3432 | | 10000553 | Andes virus CHI-7913 | 53 | | 53 | | | |
| 3433 | | 10000554 | Salmonella enterica subsp. enterica serovar Minnesota R595 | 2 | | 2 | | | |
| 3434 | | 10000555 | Plasmodium yoelii yoelii 265BY | | 1 | | 1 | | |
| 3435 | | 10000556 | Foot-and-mouth disease virus (strain O1) Kaufbeuren | 44 | 12 | 44 | 12 | | |
| 3436 | | 10000559 | Chlamydophila abortus B-577 | 11 | | 11 | | | |
| 3437 | | 10000560 | Norovirus genogroup 3 Bo/Jena/1980/DE | 1 | | 1 | | | |
| 3438 | | 10000566 | Paracoccidioides brasiliensis B339 | | 8 | | 8 | | |
| 3439 | | 10000567 | Vibrio cholerae O1 serotype Inaba | 1 | | 1 | | | |
| 3440 | | 10000568 | Vibrio cholerae O1 serotype Ogawa | 6 | | 6 | | | |
| 3441 | | 10000571 | Cowpox virus (Brighton Red) White-pock | | 1 | | 1 | | |
| 3442 | | 10000662 | Rattus norvegicus Lewis | | 1 | | 1 | | |
| 3443 | | 10000675 | Borrelia burgdorferi CA12 | | 6 | | 6 | | |
| 3444 | | 10000679 | Campylobacter jejuni subsp. jejuni 16971.94GSH (O:41) | 2 | | 2 | | | |
| 3445 | | 10000718 | Helicobacter pylori J223 | 2 | | 2 | | | |
| 3446 | | 10000720 | Helicobacter pylori UA948 | 2 | | 2 | | | |
| 3447 | | 10000721 | Helicobacter pylori UA955 | 1 | | 1 | | | |
| 3448 | | 10000723 | Pseudomonas aeruginosa Immunotype 4 | 4 | | 4 | | | |
| 3449 | | 10000727 | Escherichia coli 180/C3 | 1 | | 1 | | | |
| 3450 | | 10000728 | Escherichia coli B B/r CM6 | | 1 | | 1 | | |
| 3451 | | 10000733 | Escherichia coli O5:K4:H4 | 1 | | 1 | | | |
| 3452 | | 10000734 | Escherichia coli O65:K-:H- | 1 | | 1 | | | |
| 3453 | | 10000738 | Salmonella typhimurium PL5 (O9,12) | 1 | | 1 | | | |
| 3454 | | 10000739 | Salmonella typhi 620Ty | 1 | | 1 | | | |
| 3455 | | 10000740 | Salmonella typhi Ty21a | | 6 | | 6 | | |
| 3456 | | 10000742 | Salmonella typhimurium SH 4809 | 4 | | 4 | | | |
| 3457 | | 10000743 | Salmonella typhimurium SL3261 | | 4 | | 4 | | |
| 3458 | | 10000748 | Shigella dysenteriae serotype 1 | 3 | | 3 | | | |
| 3459 | | 10000749 | Shigella dysenteriae serotype 1 114Sd | 1 | | 1 | | | |
| 3460 | | 10000752 | Shigella flexneri 5b | 1 | | 1 | | | |
| 3461 | | 10000754 | Shigella flexneri X | 1 | | 1 | | | |
| 3462 | | 10000756 | Yersinia pestis KIM 5 | 21 | | 21 | | | |
| 3463 | | 10000757 | Yersinia pestis 195/P | 5 | | 5 | | | |
| 3464 | | 10000759 | Pasteurella multocida X-73 | 2 | | 2 | | | |
| 3465 | | 10000760 | Anaplasma marginale South Idaho | | 2 | | 2 | | |
| 3466 | | 10000761 | Orientia tsutsugamushi Karp | 1 | | 1 | | | |
| 3467 | | 10000763 | Chlamydia trachomatis Serovar C | 16 | 1 | 16 | 1 | | |
| 3468 | | 10000764 | Chlamydia trachomatis Serovar E | 19 | 2 | 19 | 2 | | |
| 3469 | | 10000765 | Chlamydia trachomatis Serovar H | 7 | | 7 | | | |
| 3470 | | 10000766 | Chlamydia trachomatis Serovar I | 10 | | 10 | | | |
| 3471 | | 10000767 | Chlamydia trachomatis serovar K | 14 | | 14 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3472 | | 10000768 | Chlamydia trachomatis Serovar L2 | 15 | 12 | 15 | 12 | | |
| 3473 | | 10000769 | Chlamydia trachomatis Serovar L3 | 2 | | 2 | | | |
| 3474 | | 10000773 | Streptococcus mutans MT 8148 | 40 | 12 | 40 | 12 | | |
| 3475 | | 10000775 | Streptococcus pyogenes 156 | 1 | | 1 | | | |
| 3476 | | 10000776 | Streptococcus pyogenes 88/25 | 1 | | 1 | | | |
| 3477 | | 10000777 | Streptococcus pyogenes 88/30 | 1 | | 1 | | | |
| 3478 | | 10000778 | Streptococcus pyogenes 88/544 | 1 | | 1 | | | |
| 3479 | | 10000779 | Streptococcus pyogenes 90/85 | 1 | | 1 | | | |
| 3480 | | 10000780 | Streptococcus pyogenes serotype M12 A374 | 1 | | 1 | | | |
| 3481 | | 10000781 | Streptococcus pyogenes BSA10 | 3 | | 3 | | | |
| 3482 | | 10000782 | Streptococcus pyogenes NS1 | 1 | | 1 | | | |
| 3483 | | 10000783 | Streptococcus pyogenes NS14 | 1 | | 1 | | | |
| 3484 | | 10000784 | Streptococcus pyogenes NS27 | 1 | | 1 | | | |
| 3485 | | 10000785 | Streptococcus pyogenes NS5 | 1 | | 1 | | | |
| 3486 | | 10000786 | Streptococcus pyogenes serotype M11 | 2 | | 2 | | | |
| 3487 | | 10000787 | Streptococcus pyogenes serotype M13 | 1 | | 1 | | | |
| 3488 | | 10000788 | Streptococcus pyogenes serotype M22 | 1 | | 1 | | | |
| 3489 | | 10000789 | Streptococcus pyogenes serotype M24 | 6 | 2 | 6 | 2 | | |
| 3490 | | 10000790 | Streptococcus pyogenes serotype M30 | 1 | | 1 | | | |
| 3491 | | 10000791 | Streptococcus pyogenes serotype M41 | 1 | | 1 | | | |
| 3492 | | 10000792 | Streptococcus pyogenes serotype M52 | 1 | | 1 | | | |
| 3493 | | 10000793 | Streptococcus pyogenes serotype M54 | 1 | | 1 | | | |
| 3494 | | 10000794 | Streptococcus pyogenes serotype M55 | 1 | | 1 | | | |
| 3495 | | 10000795 | Streptococcus pyogenes serotype M57 | 1 | | 1 | | | |
| 3496 | | 10000796 | Streptococcus pyogenes serotype M60 | 1 | | 1 | | | |
| 3497 | | 10000797 | Streptococcus pyogenes serotype M75 | 1 | | 1 | | | |
| 3498 | | 10000798 | Streptococcus pyogenes serotype M8 | 1 | | 1 | | | |
| 3499 | | 10000801 | Foot-and-mouth disease virus - type O (O/SKR/2002) | 1 | | 1 | | | |
| 3500 | | 10000802 | Taenia crassiceps Strain ORF | 3 | 3 | 3 | 3 | | |
| 3501 | | 10000804 | Chlamydia trachomatis Serovar B | 47 | 5 | 47 | 5 | | |
| 3502 | | 10000806 | Foot-and-mouth disease virus (strain O1) (O1 Manisa) | 5 | | 6 | 1 | 1 | 1 |
| 3503 | | 10000807 | Haemophilus influenzae NTHi UC19 | 2 | 2 | 2 | 2 | | |
| 3504 | | 10000809 | Swine vesicular disease virus ITL/1/66 | 1 | | 1 | | | |
| 3505 | | 10000814 | Leptospira interrogans serovar Lai str. HY-1 | 1 | | 1 | | | |
| 3506 | | 10000815 | Pseudomonas aeruginosa PAO | 2 | 2 | 2 | 2 | | |
| 3507 | | 10000816 | Plasmodium falciparum T9/96 | 1 | 1 | 1 | 1 | | |
| 3508 | | 10000817 | Pseudomonas aeruginosa KB7 | 2 | | 2 | | | |
| 3509 | | 10000818 | Pseudomonas aeruginosa P1 | 1 | | 1 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3510 | | 10000820 | Foot-and-mouth disease virus (strain O1) (O/Taiwan/1/97) | 1 | | 1 | | | |
| 3511 | | 10000822 | Pseudomonas aeruginosa Immunotype 3 | 1 | | 1 | | | |
| 3512 | | 10000824 | Streptococcus pyogenes serotype M6 strain D471 | 4 | | 4 | | | |
| 3513 | | 10000825 | Infectious bronchitis virus Avian strain D207 | 11 | | 11 | | | |
| 3514 | | 10000828 | Ajellomyces dermatitidis ATCC 60636 | | 2 | | 2 | | |
| 3515 | | 10000829 | Norovirus genogroup 2 Mexico type strain 36 | 3 | | 3 | | | |
| 3516 | | 10000832 | Norovirus genogroup 2 Camberwell 1890 | 1 | | 1 | | | |
| 3517 | | 10000833 | Haemophilus influenzae NTHi 1128 | 6 | | 6 | | | |
| 3518 | | 10000835 | Equine rhinitis A virus 393/76 | 4 | | 4 | | | |
| 3519 | | 10000836 | Foot-and-mouth disease virus C1 CS8 | 22 | 24 | 22 | 24 | | |
| 3520 | | 10000840 | Foot-and-mouth disease virus C1 Brescia It/64 | 2 | | 2 | | | |
| 3521 | | 10000842 | Swine vesicular disease virus NET/1/92 | 1 | | 1 | | | |
| 3522 | | 10000843 | Neisseria meningitidis serogroup B H44/76 | 74 | 22 | 74 | 22 | | |
| 3523 | | 10000845 | Chlamydia trachomatis Serovar F | 3 | | 3 | | | |
| 3524 | | 10000848 | Theileria sergenti Type B1 | | 1 | | 1 | | |
| 3525 | | 10000849 | Theileria sergenti Type B2 | | 2 | | 2 | | |
| 3526 | | 10000850 | Theileria sergenti Type C | | 5 | | 5 | | |
| 3527 | | 10000851 | Theileria sergenti Type I | | 1 | | 1 | | |
| 3528 | | 10000852 | Chlamydophila pneumoniae Kajaani 6 | | 7 | | 7 | | |
| 3529 | | 10000853 | Chlamydia trachomatis Serovar L1 | 21 | 3 | 21 | 3 | | |
| 3530 | | 10000855 | Theiler's murine encephalomyelitis virus (strain BeAn 8386) (variant M2) | | 1 | | 1 | | |
| 3531 | | 10000856 | Foot-and-mouth disease virus - type O isolate O/UKG/35/2001 | | 14 | | 14 | | |
| 3533 | | 10000858 | Chlamydia trachomatis B/Jali-20/OT | 2 | | 2 | | | |
| 3534 | | 10000859 | Porcine respiratory and reproductive syndrome virus JA142 | 1 | | 1 | | | |
| 3535 | | 10000860 | Haemophilus influenzae Serotype B | 18 | 9 | 18 | 9 | | |
| 3536 | | 10000861 | Haemophilus influenzae Variant d1 | 18 | | 18 | | | |
| 3537 | | 10000862 | Plasmodium vivax VK247 | 1 | | 1 | | | |
| 3538 | | 10000863 | Neisseria gonorrhoeae 4505 | 1 | | 1 | | | |
| 3539 | | 10000864 | Porcine respiratory and reproductive syndrome virus MD-001 | 2 | | 2 | | | |
| 3540 | | 10000865 | Influenza A virus H3N2 (A/Kiev/301/94) | 3 | | 3 | | | |
| 3541 | | 10000888 | Porcine respiratory and reproductive syndrome virus Olot/91 | 3 | 5 | 3 | 5 | | |
| 3542 | | 10000890 | Porcine respiratory and reproductive syndrome virus SD92-23983 | | 33 | | 33 | | |
| 3543 | | 10000960 | Human respiratory syncytial virus A Mon/3/88 | 6 | | 6 | | | |
| 3544 | | 10000961 | Dengue virus type 1 strain 16007 | 15 | | 15 | | | |
| 3545 | | 10000964 | Foot-and-mouth disease virus (strain O1) (O1 Brugge) | 2 | | 2 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3546 | | 10000965 | Dengue virus type 1 FGA/89 | 4 | | 4 | | | |
| 3547 | | 10000968 | Hepatitis C virus subtype 1b isolate BE-11 | 3 | | 3 | | | |
| 3548 | | 10000969 | Porcine respiratory and reproductive syndrome virus 111/92 | 9 | | 9 | | | |
| 3549 | | 10000971 | West Nile virus NY-99 | 15 | 21 | 15 | 21 | | |
| 3550 | | 10000972 | Neisseria meningitidis serogroup B Strain B16.B6 | 1 | | 1 | | | |
| 3551 | | 10000979 | Neisseria meningitidis serogroup B Strain 8047 | 4 | | 4 | | | |
| 3552 | | 10000980 | Arcanobacterium pyogenes Strain 42 | 4 | | 4 | | | |
| 3553 | | 10000986 | Foot-and-mouth disease virus C1 CS30 | 1 | | 1 | | | |
| 3554 | | 10000987 | Human rhinovirus 2 Vienna | 5 | | 5 | | | |
| 3555 | | 10000989 | Foot-and-mouth disease virus - type A (strain A22) | 8 | 6 | 8 | 6 | | |
| 3556 | | 10000991 | Foot-and-mouth disease virus - type A (strain A22 Iraq) | 5 | 1 | 5 | 1 | | |
| 3557 | | 10000992 | Foot-and-mouth disease virus - type SAT 1 (Strain Bot 1/68) | 1 | | 1 | | | |
| 3558 | | 10000993 | Foot-and-mouth disease virus - type SAT 2 (Strain Ken 3/57) | 1 | | 1 | | | |
| 3559 | | 10000994 | Foot-and-mouth disease virus - type SAT 3 (Strain Bec 1/65) | 1 | | 1 | | | |
| 3560 | | 10000995 | Foot-and-mouth disease virus - type Asia 1 Pakistan | 1 | | 1 | | | |
| 3561 | | 10001000 | Foot-and-mouth disease virus - type SAT 2 (strain Rho 1/48) | 4 | | 4 | | | |
| 3562 | | 10001002 | Swine vesicular disease virus SPA/1/93 | 16 | | 16 | | | |
| 3563 | | 10001003 | Neisseria meningitidis serogroup B CU385 | 2 | | 2 | | | |
| 3564 | | 10001004 | Human T-cell lymphotrophic virus type 1 (Caribbean isolate) (Strain HS35) | 1 | | 1 | | | |
| 3565 | | 10001006 | Proteus mirabilis CFT322 | 1 | | 1 | | | |
| 3566 | | 10001008 | Chlamydia trachomatis Serovar J | 6 | | 6 | | | |
| 3567 | | 10001019 | Mus musculus B10.D2 | | 1 | | 1 | | |
| 3568 | | 10001020 | Peste-des-petits-ruminants virus (strain Nigeria 75/1) | | 1 | | 1 | | |
| 3569 | | 10001021 | Treponema pallidum subsp. pallidum (strain Chicago) | 19 | | 19 | | | |
| 3570 | | 10001025 | Classical swine fever virus Glentorf | | 26 | | 26 | | |
| 3571 | | 10001027 | Vaccinia virus Connaught | 1 | | 1 | | | |
| 3572 | | 10001028 | Human poliovirus 2 (strain MEF-1) | 1 | | 1 | | | |
| 3573 | | 10001032 | Newcastle disease virus (strain La Sota) | 1 | | 17 | | 16 | |
| 3574 | | 10001039 | Foot-and-mouth disease virus C3 (strain Resendne-Br/55) | 1 | | 1 | | | |
| 3575 | | 10001040 | Human poliovirus 2 (strain Sabin) | 2 | 7 | 2 | 7 | | |
| 3576 | | 10001042 | Haemophilus influenzae NTHi 1479 | 12 | 4 | 12 | 4 | | |
| 3577 | | 10001044 | Neisseria meningitidis serogroup C MC51 | 1 | | 1 | | | |
| 3578 | | 10001047 | West Nile virus strain 2741 | 32 | | 32 | | | |
| 3579 | | 10001049 | Neisseria meningitidis serogroup B Strain S3446 | 1 | | 1 | | | |
| 3580 | | 10001050 | Neisseria meningitidis serogroup B Strain 7967 | 1 | | 1 | | | |
| 3581 | | 10001051 | Neisseria meningitidis serogroup A Strain 8659 | 1 | | 1 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3582 | | 10001053 | Haemophilus influenzae MinnA | 9 | | 9 | | | |
| 3583 | | 10001055 | Haemophilus influenzae 6U | 2 | | 2 | | | |
| 3584 | | 10001056 | Haemophilus influenzae ATCC 9795 | 2 | | 2 | | | |
| 3585 | | 10001057 | Pseudomonas aeruginosa CD4 | 1 | | 1 | | | |
| 3586 | | 10001058 | Pseudomonas aeruginosa K122-4 | 1 | | 1 | | | |
| 3587 | | 10001077 | Neisseria gonorrhoeae SU89 | 1 | | 1 | | | |
| 3588 | | 10001078 | Neisseria gonorrhoeae SU96 | 3 | | 3 | | | |
| 3589 | | 10001081 | Porphyromonas gingivalis HG66 | 2 | | 2 | | | |
| 3590 | | 10001085 | Chlamydia trachomatis Serovar D | 3 | | 3 | | | |
| 3591 | | 10001091 | Borrelia burgdorferi BEP4 | 1 | | 1 | | | |
| 3592 | | 10001097 | Sus scrofa Yorkshire | 1 | | 1 | | | |
| 3593 | | 10001100 | Plum pox virus (strain W) | 6 | | 6 | | | |
| 3594 | | 10001102 | Foot-and-mouth disease virus (strain O1) O/UKG/11/2001 | 1 | 1 | 1 | 1 | | |
| 3595 | | 10001116 | Norovirus genogroup 1 isolates 96-908 | 4 | | 4 | | | |
| 3596 | | 10001118 | Foot-and-mouth disease virus - type O (strain HKN/14/82) | 2 | | 2 | | | |
| 3597 | | 10001120 | Cryptococcus neoformans var. neoformans Serotype D | 1 | | 1 | | | |
| 3598 | | 10001121 | Chlamydia trachomatis Serovar Da | 1 | | 1 | | | |
| 3599 | | 10001130 | Feline leukemia virus subtype A | 2 | | 2 | | | |
| 3600 | | 10001132 | Cryptococcus neoformans var. neoformans Serotype A | 1 | | 1 | | | |
| 3601 | | 10001133 | Rattus norvegicus DA | | 3 | | 3 | | |
| 3602 | | 10001138 | Newcastle disease virus (strain Eaves) | 1 | | 1 | | | |
| 3603 | | 10001140 | Newcastle disease virus (strain WA2116) | 1 | | 1 | | | |
| 3604 | | 10001141 | Chlamydia trachomatis Serovar A | 22 | 8 | 22 | 8 | | |
| 3605 | | 10001145 | Escherichia coli 1471 | 2 | | 2 | | | |
| 3606 | | 10001149 | Haemophilus influenzae Subtype 1H | 23 | | 23 | | | |
| 3607 | | 10001150 | Haemophilus influenzae Strain Eagan | 58 | | 58 | | | |
| 3608 | | 10001154 | Transmissible gastroenteritis virus MAD88 | 8 | 1 | 8 | 1 | | |
| 3609 | | 10001155 | Haemophilus influenzae strain 1479 | 2 | | 2 | | | |
| 3610 | | 10001156 | Hepatitis B virus subtype AD | 3 | 2 | 3 | 2 | | |
| 3611 | | 10001157 | H3N2 subtype Influenza A virus (A/Hong Kong(H3N2)) | | 15 | | 15 | | |
| 3612 | | 10001161 | Neisseria meningitidis serogroup B Strain 2996 | 1 | | 1 | | | |
| 3613 | | 10001162 | Neisseria meningitidis serogroup B Strain M1239 | 4 | | 4 | | | |
| 3614 | | 10001207 | Murine leukemia virus LP-BM5 | | 1 | | 1 | | |
| 3615 | | 10001209 | Tobacco mosaic virus (strain PM5) | 1 | | 1 | | | |
| 3616 | | 10001210 | Tobacco mosaic virus (strain Ni568) | 1 | | 1 | | | |
| 3617 | | 10001213 | Human coxsackievirus B3 (strain RK) | 1 | | 1 | | | |
| 3618 | | 10001215 | Human rotavirus G9 WI61 | 1 | | 1 | | | |
| 3619 | | 10001216 | Rotavirus G3 strain RV-3 | 1 | | 1 | | | |
| 3620 | | 10001223 | Porphyromonas gingivalis OMZ 409 | 23 | | 23 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3621 |  | 10001225 | H1N1 subtype Influenza A/Oklahoma/7485/01 |  | 5 |  | 5 |  |  |
| 3622 |  | 10001238 | Puumala virus (strain Umea/hu) | 1 |  | 1 |  |  |  |
| 3623 |  | 10001239 | Porcine circovirus strain ISU31 | 7 |  | 7 |  |  |  |
| 3624 |  | 10001243 | Theileria parva strain Marikebuni |  | 1 |  | 1 |  |  |
| 3625 |  | 10001307 | Small ruminant lentivirus strain It-561 | 1 |  | 1 |  |  |  |
| 3626 |  | 10001308 | Small ruminant lentivirus strain It-Pi1 | 1 |  | 1 |  |  |  |
| 3627 |  | 10001315 | H1N1 swine influenza virus (A/swine/Korea/S10/2004(H1N1)) |  | 3 |  | 3 |  |  |
| 3628 |  | 10001316 | H1N1 swine influenza virus (A/swine/Korea/S175/2004(H1N1)) |  | 1 |  | 1 |  |  |
| 3629 |  | 10001317 | H9N2 subtype Influenza A virus (A/swine/Korea/S81/2004(H9N2)) |  | 1 |  | 1 |  |  |
| 3630 |  | 10001318 | H9N2 subtype Influenza A virus (A/swine/Korea/S83/2004(H9N2)) |  | 2 |  | 2 |  |  |
| 3631 |  | 10001335 | Japanese encephalitis virus Vellore P20778 | 1 | 1 | 1 | 1 |  |  |
| 3632 |  | 10001392 | Human adenovirus B strain Harbin04B | 5 |  | 5 |  |  |  |
| 3633 |  | 10001396 | Murine cytomegalovirus (strain Smith) MW97.01 |  | 5 |  | 5 |  |  |
| 3634 |  | 10001412 | Rattus norvegicus Wistar-Furth |  | 11 |  | 11 |  |  |
| 3635 |  | 10001424 | Brucella abortus W99 | 1 |  | 1 |  |  |  |
| 3636 |  | 10001431 | Infectious bronchitis virus CK/CH/LDL/97I | 1 |  | 1 |  |  |  |
| 3637 |  | 10001439 | Streptococcus sanguinis strain BD113-20 |  | 6 |  | 6 |  |  |
| 3638 |  | 10001456 | Human respiratory syncytial virus A strain RGH | 1 |  | 1 |  |  |  |
| 3639 |  | 10001459 | Babesia bovis Argentina R1A | 4 |  | 4 |  |  |  |
| 3640 |  | 10001484 | Norovirus genogroup 1 GI.12 | 1 |  | 1 |  |  |  |
| 3641 |  | 10001485 | Norovirus genogroup 3 GIII.1 | 1 |  | 1 |  |  |  |
| 3642 |  | 10001489 | Proteus vulgaris Strain 5/43 | 1 |  | 1 |  |  |  |
| 3643 |  | 10001490 | Proteus mirabilis O24 | 1 |  | 1 |  |  |  |
| 3644 |  | 10001491 | Proteus mirabilis O29 | 1 |  | 1 |  |  |  |
| 3645 |  | 10001492 | Salmonella enterica subsp. enterica serovar Enteritidis SH1262 | 3 |  | 3 |  |  |  |
| 3647 |  | 10001498 | Proteus mirabilis O23 | 1 |  | 1 |  |  |  |
| 3648 |  | 10001499 | Proteus mirabilis O6 | 1 |  | 1 |  |  |  |
| 3649 |  | 10001500 | Proteus mirabilis O43 | 1 |  | 1 |  |  |  |
| 3650 |  | 10001501 | Proteus penneri ATCC 33519 | 1 |  | 1 |  |  |  |
| 3651 |  | 10001502 | Escherichia coli J-5 | 1 |  | 1 |  |  |  |
| 3652 |  | 10001503 | Acinetobacter lwoffii F78 | 1 |  | 1 |  |  |  |
| 3653 |  | 10001504 | Yokenella regensburgei PCM 2476 | 1 |  | 1 |  |  |  |
| 3654 |  | 10001505 | Yokenella regensburgei PCM 2477 | 1 |  | 1 |  |  |  |
| 3655 |  | 10001511 | Salmonella 'group A' | 2 |  | 2 |  |  |  |
| 3656 |  | 10001514 | Providencia stuartii O33 | 1 |  | 1 |  |  |  |
| 3657 |  | 10001519 | Pseudomonas aeruginosa serotype O11 | 1 |  | 1 |  |  |  |
| 3658 |  | 10001520 | Haemophilus influenzae strain RM7004 | 1 |  | 1 |  |  |  |
| 3659 |  | 10001523 | Haemophilus influenzae strain I-69 Rd-/b+ | 4 |  | 4 |  |  |  |

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|---|---|---|---|---|---|---|---|---|---|
| 3660 | | 10001524 | Neisseria meningitidis strain 3006 | 1 | | 1 | | | |
| 3661 | | 10001526 | Salmonella thompson C1 strain IS40 | 1 | | 1 | | | |
| 3662 | | 10001528 | Escherichia coli F515 | 1 | | 1 | | | |
| 3663 | | 10001530 | Acinetobacter haemolyticus strain 57 | 1 | | 1 | | | |
| 3664 | | 10001531 | Acinetobacter haemolyticus strain 61 | 1 | | 1 | | | |
| 3665 | | 10001556 | Moraxella catarrhalis 26404 | 1 | | 1 | | | |
| 3666 | | 10001558 | Neisseria gonorrhoeae 15253 | 1 | | 1 | | | |
| 3667 | | 10001560 | Neisseria meningitidis M982B | 2 | | 5 | | 3 | |
| 3668 | | 10001569 | Salmonella enterica subsp. enterica serovar Gallinarum/pullorum str. 11 | 1 | | 1 | | | |
| 3669 | | 10001570 | Salmonella enterica subsp. enterica serovar Gallinarum/pullorum str. 77 | 1 | | 1 | | | |
| 3670 | | 10001573 | Anatid herpesvirus 1 Clone-03 | 1 | | 1 | | | |
| 3671 | | 10001578 | Classical swine fever virus LPC/AHRI | 4 | | 4 | | | |
| 3672 | | 10001581 | Proteus penneri 8 (O67) | 1 | | 1 | | | |
| 3673 | | 10001582 | Dengue virus 1 Mochizuki | 4 | | 4 | | | |
| 3674 | | 10001583 | Dengue virus 2 New Guinea C | 1 | 4 | 1 | 38 | | 34 |
| 3675 | | 10001586 | Porcine reproductive and respiratory syndrome virus 07V063 | 3 | | 3 | | | |
| 3676 | | 10001587 | Porcine reproductive and respiratory syndrome virus 08V204 | 2 | | 2 | | | |
| 3677 | | 10001588 | Providencia stuartii O4 | 1 | | 1 | | | |
| 3679 | | 10001606 | Norovirus genogroup 2 Hu/NoV/Farmington Hills/2002/USA | 1 | 2 | 1 | 2 | | |
| 3680 | | 10001614 | Junin virus strain MC2 | | 1 | | 1 | | |
| 3681 | | 10001615 | Machupo virus strain Carvallo | | 1 | | 1 | | |
| 3682 | | 10001616 | Guanarito virus strain INH-95551 | | 1 | | 1 | | |
| 3683 | | 10001617 | Whitewater Arroyo virus strain AV9310135 | | 1 | | 1 | | |
| 3684 | | 10001618 | Pichinde virus strain Munchique | | 1 | | 1 | | |
| 3685 | | 10001619 | Dengue virus 3 strain 16652 | 16 | | 16 | | | |
| 3686 | | 10001624 | Feline infectious peritonitis virus (strain KU-2) | 22 | 43 | 22 | 43 | | |
| 3687 | | 10001627 | Human herpesvirus 5 (strain RV798) | | 6 | | 6 | | |
| 3688 | | 10001628 | Aggregatibacter actinomycetemcomitans serotype b str. Y4 | 1 | | 1 | | | |
| 3689 | | 10001633 | Escherichia coli 055:B5 | 3 | | 3 | | | |
| 3690 | | 10001635 | Dengue virus 2 PL046 | | 7 | | 7 | | |
| 3691 | | 10001636 | Dengue virus 2 S221 | | 42 | | 42 | | |
| 3692 | | 10001638 | Streptococcus pneumoniae type 27 | 2 | | 2 | | | |
| 3693 | | 10001641 | Streptococcus dysgalactiae subsp. equisimilis D181 | 1 | | 1 | | | |
| 3694 | | 10001642 | Foot-and-mouth disease virus - type O Wuppertal/FRG/82 | | 1 | | 1 | | |
| 3695 | | 10001644 | Streptococcus pneumoniae CCUG 1378 | 1 | | 1 | | | |
| 3696 | | 10001645 | Streptococcus pneumoniae CSR-SCS-2 | 1 | | 1 | | | |
| 3697 | | 10001646 | Streptococcus pneumoniae type 37 | 2 | | 2 | | | |
| 3698 | | 10001648 | Japanese encephalitis virus strain SA-14 -14-2 | 2 | | 2 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3699 | | 10001649 | West Nile virus strain 956 | 1 | | 1 | | | |
| 3700 | | 10001651 | Streptococcus pneumoniae type 14 | 19 | | 19 | | | |
| 3701 | | 10001652 | Candida albicans NIH B-792 (serotype B) | 1 | | 1 | | | |
| 3702 | | 10001659 | Escherichia coli O125 | 1 | | 1 | | | |
| 3703 | | 10001662 | Staphylococcus aureus Cowan 1 | 2 | | 2 | | | |
| 3704 | | 10001663 | Streptococcus anginosus K214-2K | 4 | | 4 | | | |
| 3705 | | 10001667 | Helicobacter pylori 487 | 1 | | 1 | | | |
| 3706 | | 10001676 | Streptococcus dysgalactiae subsp. equisimilis ATCC 12388 | 2 | | 2 | | | |
| 3707 | | 10001686 | Streptococcus pneumoniae type 6A | 2 | | 2 | | | |
| 3708 | | 10001687 | Streptococcus pneumoniae type 6B | 5 | | 5 | | | |
| 3709 | | 10001688 | Pseudomonas syringae pv. atrofaciens str. IMV 7836 | 1 | | 1 | | | |
| 3710 | | 10001689 | Pseudomonas syringae pv. atrofaciens str. IMV K-1025 | 1 | | 1 | | | |
| 3711 | | 10001690 | Pseudomonas syringae pv. atrofaciens str. IMV 4394 | 1 | | 1 | | | |
| 3712 | | 10001693 | Pseudomonas syringae pv. tagetis str. ICMP 6370 | 1 | | 1 | | | |
| 3713 | | 10001697 | Pseudomonas syringae pv. phaseolicola str. IMV 120a | 1 | | 1 | | | |
| 3714 | | 10001698 | Pseudomonas syringae pv. morsprunorum str. GSPB 883 | 1 | | 1 | | | |
| 3715 | | 10001700 | Pseudomonas syringae pv. morsprunorum str. CFBP 1650 | 1 | | 1 | | | |
| 3716 | | 10001705 | Dengue virus 2 strain 43 | 1 | | 2 | | 1 | |
| 3717 | | 10001713 | Neisseria meningitidis serogroup W-135 | 1 | | 1 | | | |
| 3718 | | 10001722 | Salmonella 'group D' | 3 | | 3 | | | |
| 3719 | | 10001730 | Streptococcus pneumoniae type 6C | 1 | | 1 | | | |
| 3720 | | 10001731 | Streptococcus pneumoniae type 2 | 8 | | 8 | | | |
| 3722 | | 10001740 | Candida glabrata IFO 0622 | 1 | | 1 | | | |
| 3723 | | 10001747 | Candida parapsilosis M1015 | 1 | | 1 | | | |
| 3724 | | 10001761 | BK polyomavirus strain Dunlop | | 1 | | 1 | | |
| 3725 | | 10001762 | JC polyomavirus strain MAD1 | | 1 | | 1 | | |
| 3726 | | 10001763 | Simian virus 40 strain 776 | | 1 | | 1 | | |
| 3727 | | 10001764 | Classical swine fever virus Margarita (AJ704817) | 4 | 1 | 4 | 1 | | |
| 3728 | | 10001768 | Dengue virus 2 S-16803 | 1 | | 1 | | | |
| 3729 | | 10001771 | Porcine reproductive and respiratory syndrome virus HuN4-F112 | 4 | 1 | 4 | 1 | | |
| 3730 | | 10001783 | Neisseria meningitidis serogroup C strain C11 | 1 | 1 | 1 | 1 | | |
| 3731 | | 10001792 | Streptococcus pneumoniae type 3 | 6 | | 6 | | | |
| 3732 | | 10001794 | Helicobacter pylori B128 Gerbil-adapted variant 7.13 | 1 | | 1 | | | |
| 3734 | | 10001797 | Neisseria meningitidis serogroup C strain MC19 | 1 | | 1 | | | |
| 3735 | | 10001798 | Porcine transmissible gastroenteritis coronavirus strain Pur46-MAD | 4 | | 4 | | | |
| 3736 | | 10001800 | Porcine reproductive and respiratory syndrome virus HuN4 | 1 | 4 | 4 | 4 | 3 | |
| 3737 | | 10001801 | Streptococcus pneumoniae type 8 | 10 | | 10 | | | |
| 3738 | | 10001831 | Moraxella catarrhalis serotype B | 1 | | 1 | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 3740 | | 10001835 | Proteus penneri 7 (O61) | 2 | | 2 | | | |
| 3741 | | 10001836 | Proteus penneri 14 (O59) | 2 | | 2 | | | |
| 3742 | | 10001837 | Proteus penneri 15 (O52) | 2 | | 2 | | | |
| 3743 | | 10001847 | Clostridium difficile BI / NAP1/ 027 | 1 | | 1 | | | |
| 3744 | | 10001849 | Moraxella catarrhalis serotype A | 3 | | 3 | | | |
| 3745 | | 10001851 | Moraxella catarrhalis serotype C | 1 | | 1 | | | |
| 3746 | | 10001860 | Neisseria meningitidis serogroup X | 3 | | 3 | | | |
| 3747 | | 10001879 | West Nile virus strain 68856 | 2 | | 2 | | | |
| 3748 | | 10001881 | Porcine circovirus 2 -A | 3 | | 3 | | | |
| 3750 | | 10001886 | Brucella ovis 020 | 2 | | 2 | | | |
| 3751 | | 10001887 | Brucella ovis Reo 198 | 1 | | 1 | | | |
| 3752 | | 10001888 | Brucella ovis 63/290 | 1 | | 1 | | | |
| 3754 | | 10001895 | Yersinia pseudotuberculosis str. 32777 | | 1 | | 1 | | |
| 3755 | | 10001900 | Streptococcus agalactiae serogroup III M781 | 1 | 1 | 1 | 1 | | |
| 3756 | | 10001902 | Human enterovirus 71 NUH0083/SIN/08 | 4 | | 4 | | | |
| 3757 | | 10001913 | Lactobacillus johnsonii JCM 1022 | 3 | | 3 | | | |
| 3758 | | 10001918 | Muscovy duck reovirus S12 | 2 | | 4 | | 2 | |
| 3759 | | 10001929 | Equine rhinitis B virus 2 strain 313/75 | 5 | | 5 | | | |
| 3760 | | 10001930 | Equine rhinitis B virus 3 isolate 2225AS | 5 | | 5 | | | |
| 3761 | | 10001934 | Chikungunya virus Singapore/11/2008 | 3 | | 3 | | | |
| 3762 | | 10001943 | Dengue virus 4 Burma/63632/1976 | 3 | | 3 | | | |
| 3763 | | 10001944 | Dengue virus 3 Thailand/PaH881/1988 | 2 | | 2 | | | |
| 3764 | | 10001945 | Dengue virus 1 PVP159 | 2 | | 2 | | | |
| 3765 | | 10001946 | Foot-and-mouth disease virus - type Asia 1 YS/CHA/05 | 4 | | 4 | | | |
| 3766 | | 10001964 | Porcine circovirus 1 strain 1/G | 7 | | 7 | | | |
| 3767 | | 10001965 | Avian leukosis virus strain NX0101 | 1 | | 1 | | | |
| 3768 | | 10001967 | Avian leukosis virus isolate CAUHM01 | 1 | | 1 | | | |
| 3769 | | 10001973 | Vaccinia virus Acambis 2000 | 8 | | 8 | | | |
| 3770 | | 10001975 | Streptococcus salivarius JCM 5707 | 1 | | 1 | | | |
| 3771 | | 10001997 | Chikungunya virus strain LR2006_OPY1 IMT/Reunion Island/2006 | 1 | | 1 | | | |
| 3772 | | 10001999 | Reticuloendotheliosis virus strain HLJ07I | 1 | | 1 | | | |
| 3773 | | 10002000 | Porcine epidemic diarrhea virus CH/SHH/06 | 1 | | 1 | | | |
| 3774 | | 10002003 | Campylobacter jejuni subsp. jejuni serotype HS:15 | 1 | | 1 | | | |
| 3775 | | 10002006 | Bluetongue virus 16 BN96/16 | 2 | | 2 | | | |
| 3776 | | 10002007 | Plasmodium falciparum isolate UAS22 | 4 | | 4 | | | |
| 3777 | | 10002008 | Plasmodium falciparum isolate UAS31 | 1 | | 1 | | | |
| 3778 | | 10002009 | Plasmodium falciparum isolate UAS29 | 2 | | 2 | | | |
| 3779 | | 10002010 | Dengue virus 2 D2/SG/05K4155DK1/2005 | | 49 | | 49 | | |

|  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|
| 3780 |  | 10002011 | Plasmodium falciparum R29/IT4 | 1 |  | 1 |  |  |  |
| 3781 |  | 10002015 | Human coxsackievirus A16 shzh05-1 | 92 |  | 92 |  |  |  |
| 3782 |  | 10002018 | Bovine coronavirus Kakegawa | 1 |  | 1 |  |  |  |
| 3783 |  | 10002020 | Foot-and-mouth disease virus - type Asia 1 Nepal 29/97 | 4 |  | 4 |  |  |  |
| 3784 |  | 10002022 | Escherichia coli O6 O6:K15:H31 |  | 1 |  | 1 |  |  |
| 3785 |  | 10002026 | Murine norovirus 1 Mu/NoV/GV/MNV1/2002/USA |  | 1 |  | 1 |  |  |
| 3786 |  | 10002027 | Bluetongue virus 16 Kumamoto/1985 | 2 |  | 2 |  |  |  |
| 3787 |  | 10002028 | Bluetongue virus 16 Beatrice Hill/1987 | 2 |  | 2 |  |  |  |
| 3788 |  | 10002034 | Fish | 4 |  | 4 |  |  |  |
| 3789 |  | 10002052 | Toxoplasma gondii Gansu Jingtai | 27 |  | 27 |  |  |  |
| 3790 |  | 10002056 | Enterovirus A71 TW/2086/98 | 1 |  | 1 |  |  |  |
| 3791 |  | 10002069 | Bordetella pertussis 509 |  | 7 |  | 7 |  |  |
| 3792 |  | 10002079 | Clostridium difficile VPI 10463 | 2 |  | 2 |  |  |  |
| 3793 |  | 10002082 | Rhesus rotavirus MMU 18006 |  | 3 |  | 3 |  |  |
| 3794 |  | 10002089 | Porcine reproductive and respiratory syndrome virus SY0608 | 17 |  | 17 |  |  |  |
| 3795 |  | 10002090 | Influenza A virus (A/swine/Denmark/101310-1/2011(H1N1)) |  | 7 |  | 7 |  |  |
| 3796 |  | 10002111 | Dengue virus 4 TVP-376 | 1 |  | 1 |  |  |  |
| 3797 |  | 10002112 | Dengue virus 4 1036 | 1 |  | 1 |  |  |  |
| 3798 |  | 10002121 | Staphylococcus aureus Reynolds | 2 |  | 2 |  |  |  |
| 3799 |  | 10002122 | Staphylococcus aureus Becker | 2 |  | 2 |  |  |  |
| 3800 |  | 10002123 | Peste-des-petits-ruminants virus China/Tibet/Geg/07-30 | 53 |  | 53 |  |  |  |
| 3801 |  | 10002127 | Escherichia coli O86:B7 | 1 |  | 1 |  |  |  |
| 3802 |  | 10002129 | Staphylococcus aureus RN4850 | 1 |  | 1 |  |  |  |
| 3803 |  | 10002132 | Duck hepatitis A virus 1 HP-1 | 2 |  | 2 |  |  |  |
| 3805 |  | 10002148 | Dengue virus 4 Mexico/BC287/1997 | 1 |  | 1 |  |  |  |
| 3806 |  | 10002151 | Duck hepatitis A virus 1 LY0801 | 1 |  | 1 |  |  |  |
| 3807 |  | 10002152 | Duck hepatitis A virus 3 SD1201 | 1 |  | 1 |  |  |  |
| 3808 |  | 10002161 | Streptococcus pneumoniae type 1 | 5 |  | 5 |  |  |  |
| 3809 |  | 10002165 | Avian infectious bronchitis virus (strain CHINA/Sczy3/09) | 2 |  | 2 |  |  |  |
| 3810 |  | 10002169 | Avian infectious bronchitis virus (strain Holte) |  | 2 |  | 2 |  |  |
| 3812 |  | 10002183 | ZIKV/H. sapiens/French Polynesia/PF13/2013 | 4 |  | 4 |  |  |  |
| 3813 | X | 10002188 | ZIKV/H. sapiens/PRI/PRVABC59/2015 |  |  |  | 5 |  | 5 |
| 3814 |  | 10002190 | ZIKV/H. sapiens/Uganda/MR-766/1947 | 4 |  | 4 |  |  |  |
| 3815 |  | 10002192 | Streptococcus suis 1178027 | 2 |  | 2 |  |  |  |
| 3817 |  | 10002196 | Hepatitis E virus type 4 JAK-Sai | 1 |  | 1 |  |  |  |
| 3818 |  | 10002197 | Chikungunya virus MY/08/065 | 15 |  | 15 |  |  |  |
| 3820 |  | 10002238 | Influenza A virus (A/swan/Poland/305-135V08/2006(H5N1)) | 1 |  | 1 |  |  |  |
| 3821 |  | 10002272 | Streptococcus pneumoniae 7F | 5 |  | 5 |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|
| 3822 |  | 10002273 | Influenza A virus (A/Hong Kong/4801/2014(H3N2)) |  | 1 |  | 1 |  |  |
| 3823 | X | 10002285 | Yellow fever virus CNYF01/2016 |  |  | 1 |  | 1 |  |
| 3824 | X | 10002287 | Salmonella enterica subsp. enterica serovar Typhi str. Quailes |  |  |  | 1 |  | 1 |
| 3825 |  | 10002289 | Enterobacteria phage PRD1 | 2 |  | 2 |  |  |  |
|  |  |  | **Total** | 50617 | 461348 | 55918 | 541508 | 5301 | 80160 |

# 2 Website Features

In 2019, the IEDB adopted an agile, continuous deployment methodology, whereby weekly, iterative updates were deployed to the IEDB external website (3.10). Changes of note include:

- Updated finders to have close and expand/shrink tree buttons
- Updated Banner Messages to "Upcoming Events" to allow displaying a calendar of events for the year
- Updated Allele Finder to use full display names for the search results tables, so users can more clearly identify search hits
- Redesigned CSV Export delivery by providing a new download page that allows the export to run in the background window, making the export file link available for 24 hours
- Revised CSV Export design to retrieve data in segments, allowing epitope/assay exports to function on very large sets of data
- Updated Assay Details pages to move carrier information into comments fields
- Upgraded external build and searches to support new standard finder design for Disease Finder
- Removed/consolidated fields from Details pages that were previously removed from curation since the fields were rarely used

In addition to feature updates and improvements, many outstanding bugs and defects were also addressed throughout the contract year.

In addition, there were two major releases (Releases 2.21 and 2.22) of the Analysis Resource since the 2018 Annual Compendium plus numerous smaller updates made throughout the year. Changes of note include:

- Launch of new structure tool - Structural Complexes of Epitope Receptor (SCEptRe)
- Incorporation of new structure tool - Docktope
- Performance enhancements for CD4episcore
- Performance enhancements for the Deimmunization tool
- Improved sequence format detection for MHC I binding, MHC II binding, Deimmunization and Tepitool
- NetMHCpan 4.0 EL mode has been added to the class I binding predictor (web, API, standalone), as well as an option in MHCNP
- Class II binding predictor now allows prediction for various lengths (11-30)
- NetMHCIIpan 3.2 and NetMHCII 2.3 have been added to the class II binding predictor (web, API, standalone)
- DNA fasta sequences input detection and reminder on web page and standalone tool
- Additional input validation added to APIs
- Optimization of automated benchmark dataset downloads
- Stability improvements and performance enhancements throughout

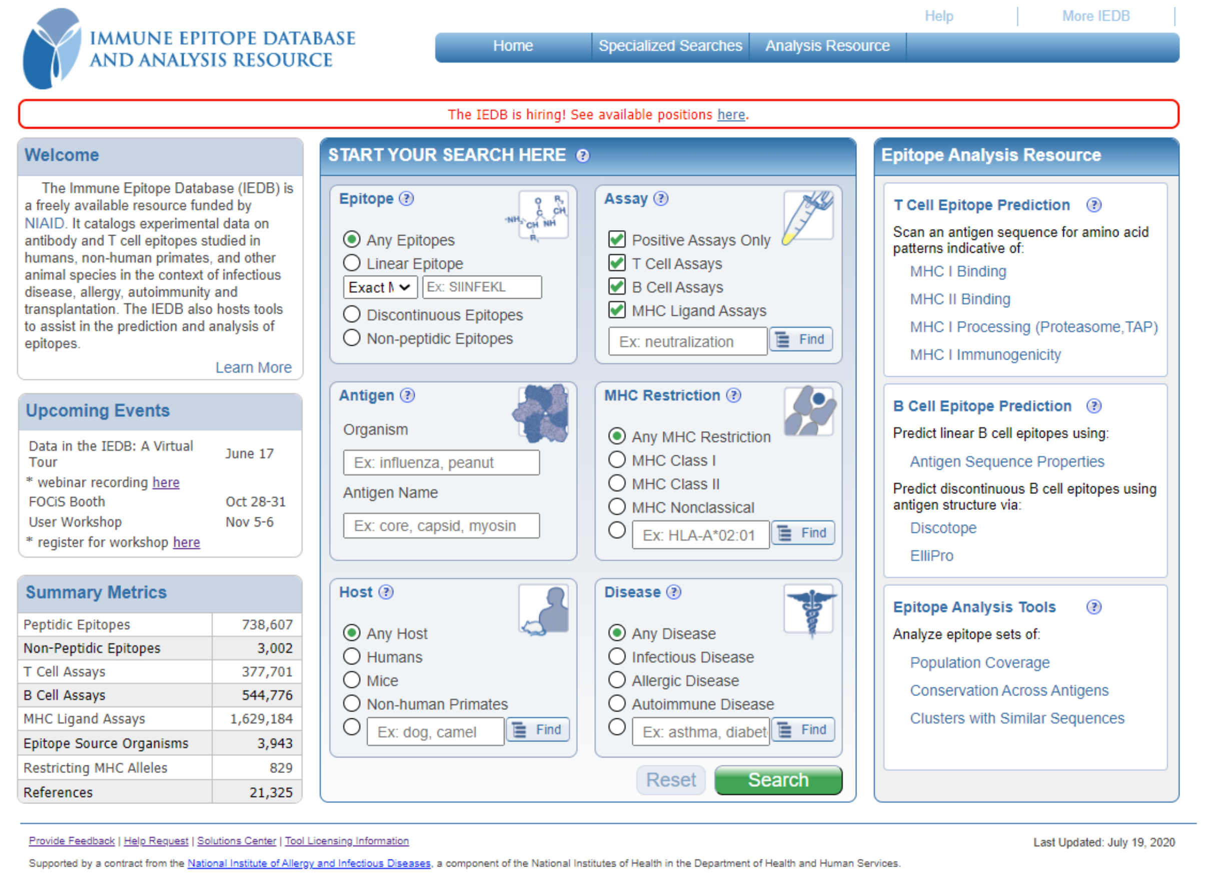
The IEDB website functionality can be divided into five categories– Home Page (Section 2.1), Specialized Searches (Section 2.2.2), Analysis Resource (Section 2.3), Help (Section 2.4), and More IEDB (Section 2.5), which largely correspond to the pull-down menus at the top of the home page. The subsections that follow describe the website features within these categories.

The reader will find it helpful to keep in mind how data are stored in the IEDB. Each item contained in the IEDB consists of a reference (article or submission) containing information about one or more epitopes and associated binding or response information. The same epitope can exist in multiple references.

## 2.1 *Home Page*

The IEDB Home Page (www.iedb.org) is the default screen displayed when users enter the IEDB system. Besides providing a general description of the IEDB project, the home page displays system level status and notification of scheduled updates or maintenance. As one can see in Figure 2.1, the page is divided into three columns that contain introductory information, Summary Metrics of the data, a basic data search capability, and links to the epitope prediction and analysis tools in the Analysis Resource. As users browse the IEDB system, they can return to the home page anytime by clicking *Home* on the far left of the main menu bar or by clicking on the IEDB logo in the upper left-hand corner of the page.

The top box in the left column contains a welcome statement that briefly describes the content of the database. It also has a "Learn More" link that brings the user to a web page containing more information about the support and user help features available, about the data itself, and about the IEDB program. This page is described in detail in Section 2.6. The Summary Metrics are displayed in the bottom box of this column. These numbers are intended to be a gauge of the volume of data available in the system. The Summary Metrics provide the number of epitopes (peptidic and non-peptidic), assays (T cell, B cell, and MHC ligand assays), epitope source organisms, restricting MHC alleles, and references. A middle box may appear (as shown in Figure 2.1) when there are special messages to convey to users. The text will appear in red. The middle column contains the initial search interface that is described in detail in Section 2.2.1. This section includes several finders on the search interface, thus enabling more complete queries without the need for further filtering of the results. The rightmost column has links to the most frequently used tools in the Analysis Resource.



The IEDB is hiring! See available positions here.

**Welcome**

The Immune Epitope Database (IEDB) is a freely available resource funded by NIAID. It catalogs experimental data on antibody and T cell epitopes studied in humans, non-human primates, and other animal species in the context of infectious disease, allergy, autoimmunity and transplantation. The IEDB also hosts tools to assist in the prediction and analysis of epitopes.

**Upcoming Events**

| | |
|---|---|
| Data in the IEDB: A Virtual Tour | June 17 |
| * webinar recording here | |
| FOCiS Booth | Oct 28-31 |
| User Workshop | Nov 5-6 |
| * register for workshop here | |

**Summary Metrics**

| | |
|---|---|
| Peptidic Epitopes | 738,607 |
| Non-Peptidic Epitopes | 3,002 |
| T Cell Assays | 377,701 |
| B Cell Assays | 544,776 |
| MHC Ligand Assays | 1,629,184 |
| Epitope Source Organisms | 3,943 |
| Restricting MHC Alleles | 829 |
| References | 21,325 |

**Epitope**

- ● Any Epitopes
- ○ Linear Epitope
- Exact M | Ex: SIINFEKL
- ○ Discontinuous Epitopes
- ○ Non-peptidic Epitopes

**Assay**

- ☑ Positive Assays Only
- ☑ T Cell Assays
- ☑ B Cell Assays
- ☑ MHC Ligand Assays
- Ex: neutralization

**Antigen**

Organism: Ex: influenza, peanut

Antigen Name: Ex: core, capsid, myosin

**MHC Restriction**

- ● Any MHC Restriction
- ○ MHC Class I
- ○ MHC Class II
- ○ MHC Nonclassical
- ○ Ex: HLA-A*02:01

**Host**

- ● Any Host
- ○ Humans
- ○ Mice
- ○ Non-human Primates
- ○ Ex: dog, camel

**Disease**

- ● Any Disease
- ○ Infectious Disease
- ○ Allergic Disease
- ○ Autoimmune Disease
- ○ Ex: asthma, diabet

**Epitope Analysis Resource**

**T Cell Epitope Prediction**

Scan an antigen sequence for amino acid patterns indicative of:

- MHC I Binding
- MHC II Binding
- MHC I Processing (Proteasome,TAP)
- MHC I Immunogenicity

**B Cell Epitope Prediction**

Predict linear B cell epitopes using:

- Antigen Sequence Properties

Predict discontinuous B cell epitopes using antigen structure via:

- Discotope
- ElliPro

**Epitope Analysis Tools**

Analyze epitope sets of:

- Population Coverage
- Conservation Across Antigens
- Clusters with Similar Sequences

Provide Feedback | Help Request | Solutions Center | Tool Licensing Information

Last Updated: July 19, 2020

Supported by a contract from the National Institute of Allergy and Infectious Diseases, a component of the National Institutes of Health in the Department of Health and Human Services.

**Figure 2.1** IEDB 3.10 Home page

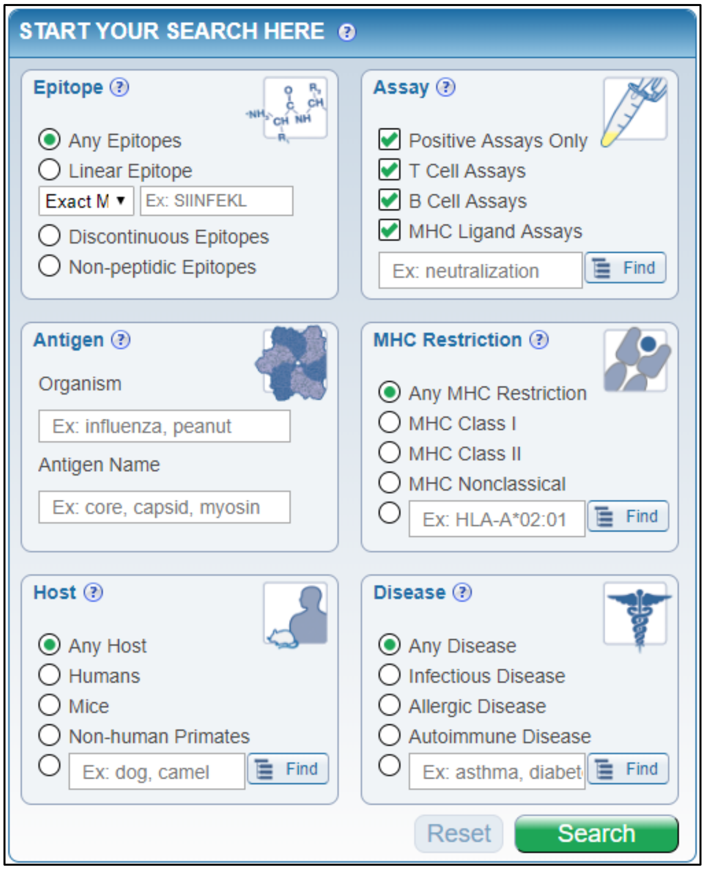
## *2.2 Query*

There are several ways users can find information in the IEDB. A simplified search that is especially designed for the needs of most immunologists appears on the home page. This document will refer to this particular query as the Simple Search or Home Page Search. A family of advanced query-by-example searches can be accessed on the Search pull-down menu and consist of “Epitope Details”, “T Cell Assay Details”, “B Cell Assay Details”, “MHC Assay Details”, “Identifier Search”, and “Browse by 3D Structure”. This group of queries are referred to as Specialized Searches. All of these methods return results in a common format, as described in Section 2.2.3. These methods are elaborated in the subsections below.

### 2.2.1 Perform a Home Page Search

The home page search feature available in the center of the home page (Figure 2.2) is designed to simplify the search process for many commonly asked queries by immunologists. It is the most frequently used query mode. The approach it takes is analogous to many travel and shopping websites. IEDB users can start their search by specifying a number of fundamental and common search parameters on the home page. On the subsequent results page, users can then apply additional and more specific filters. The epitope structure choices include linear epitopes, discontinuous epitopes, and non-peptidic epitopes. For the linear epitope search, the user can prescribe the type of search desired - an exact match to the entered sequence, a substring search (described below), or a homologous peptide sequence at identity levels of 70%, 80%, or 90% as determined by BLAST. The IEDB categorizes all assays as T cell, B cell, or MHC ligand. The MHC ligand includes binding and elution assays. Users can also select the MHC restriction for non-B cell searches. Finally, users can select the host species and the disease.

The results of the query are displayed in five tabs – Epitopes, Antigens, Assays, Receptors, and References. The Epitopes tab lists the epitope description, such as the amino acid sequence for linear epitopes, its associated antigen and source organism, the number of references in which it appears, and the number of assays in which it is used. The Antigen tab lists the antigen, its source organism, and the number of related epitopes, assays, and references. The Assays tab contains three tabs, one each for T cell, B cell, and MHC ligand assays. The Receptors tab details the receptor types alongside the sequences of each chain component, and is divided into two separate tabs for T Cell Receptors (TCRs) and B Cell Receptors (BCRs). The References tab lists the IEDB-specific reference identifier, the authors, title, abstract, and year of publication or submission. A user can cross-query specific criteria from any of these five tabs; for example, filtering on a specific assay would refresh the results to display data across all tabs which is only relevant to that assay. Additionally, a user can click on the IEDB-specific identifier link to drill down to get additional information about the epitope, assay, receptor or reference.



Epitope
● Any Epitopes
○ Linear Epitope
Exact M ▾ Ex: SIINFEKL
○ Discontinuous Epitopes
○ Non-peptidic Epitopes

Assay
☑ Positive Assays Only
☑ T Cell Assays
☑ B Cell Assays
☑ MHC Ligand Assays
Ex: neutralization

Antigen
Organism
Ex: influenza, peanut
Antigen Name
Ex: core, capsid, myosin

MHC Restriction
● Any MHC Restriction
○ MHC Class I
○ MHC Class II
○ MHC Nonclassical
○ Ex: HLA-A*02:01

Host
● Any Host
○ Humans
○ Mice
○ Non-human Primates
○ Ex: dog, camel

Disease
● Any Disease
○ Infectious Disease
○ Allergic Disease
○ Autoimmune Disease
○ Ex: asthma, diabet

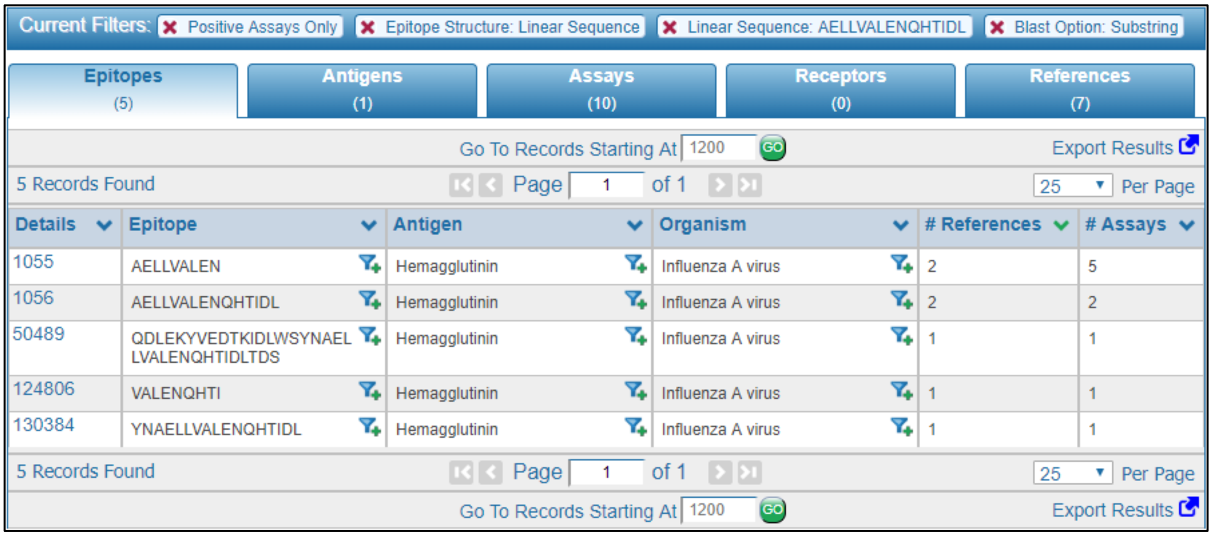
**Figure 2.2** Home page simple search

Once the initial results are generated, the user can filter the results using additional filtering criteria. Autocomplete fields and associated hierarchical tree views reveal the available parameter choices. In this way, users can narrow their query to specific non-peptidic epitopes, assay types, MHC alleles, hosts, or diseases. Users can also specify article type (journal article and/or submission), the author, title, PubMed ID, and year. All filters that are applied are displayed at the top of the page. Results on most pages can be downloaded as comma separated value (CSV) files that can be read using a text editor or spreadsheet application. Users also have the ability to map positive and negative results to reference proteomes as a means of visualizing immunogenic regions using the Immunome Browser (Section 2.2.3.2).

An autocomplete feature is available for many of the fields on the left-hand side of the results page that contain additional filter criteria. This includes the non-peptidic epitope field in the Epitope box, the organism and antigen name fields in the Antigen box, the T cell, B cell, and MHC ligand assay fields in the Assay box, the specific MHC restriction field in the MHC Restriction box, the specific host field in the Host box, and the specific disease field in the Disease box. For example, as one types “hep” in the organism field in the Antigen box, several choices start to appear in a list below the text field, including “hepatitis C virus”. The user can click on a selection from the list or can continue typing to further narrow down choices. Likewise, a user may type “human” or “homo” to select “homo sapiens” in the Organism field. The list of matches includes scientific names and synonyms. These actions enable users to quickly specify their search parameters without using the finders. Use of the autocomplete circumvents the need to directly use the finders.

If the user decides not to use the autocomplete feature for a search field, they will need to use the finders. The epitope source can be prescribed for the source organism and source antigen by using the organism finder (Section 2.2.4.5) and molecule finder (Section 2.2.4.4), respectively. The user can decide whether to include B cell responses, T cell responses, and/or MHC ligand results in the search (at least one must be checked). The host organism, the MHC restriction, and the MHC class can also be specified with the help of the organism finder and the allele finder (Section 2.2.4.1). The fields using finders will allow multiple selections as search criteria. In these cases, the selections are treated as a set. Records will be considered a match if they include at least one of the selected values in the set. The search is executed by clicking the Search button and the query results can be viewed on the updated results page described in Section 2.2.3.

In addition to finding peptides in the database that contain the specified amino acid sequence, the substring search also finds epitopes within the input sequence itself. For example, when the sequence AELLVALENQHTIDL is submitted for a substring search, the query results, shown in Figure 2.3, yields five peptide sequences. Three of them (the second, third, and fifth) contain the input sequence. The two others (the first and fourth) are substrings of the input sequence that are also epitopes contained in the IEDB.


Current Filters: ✖ Positive Assays Only ✖ Epitope Structure: Linear Sequence ✖ Linear Sequence: AELLVALENQHTIDL ✖ Blast Option: Substring

| Details | Epitope | Antigen | Organism | # References | # Assays |
|---|---|---|---|---|---|
| 1055 | AELLVALEN | Hemagglutinin | Influenza A virus | 2 | 5 |
| 1056 | AELLVALENQHTIDL | Hemagglutinin | Influenza A virus | 2 | 2 |
| 50489 | QDLEKYVEDTKIDLWSYNAELLVALENQHTIDLTDS | Hemagglutinin | Influenza A virus | 1 | 1 |
| 124806 | VALENQHTI | Hemagglutinin | Influenza A virus | 1 | 1 |
| 130384 | YNAELLVALENQHTIDL | Hemagglutinin | Influenza A virus | 1 | 1 |

**Figure 2.3** Query results for a substring search performed on the input sequence AELLVALENQHTIDL

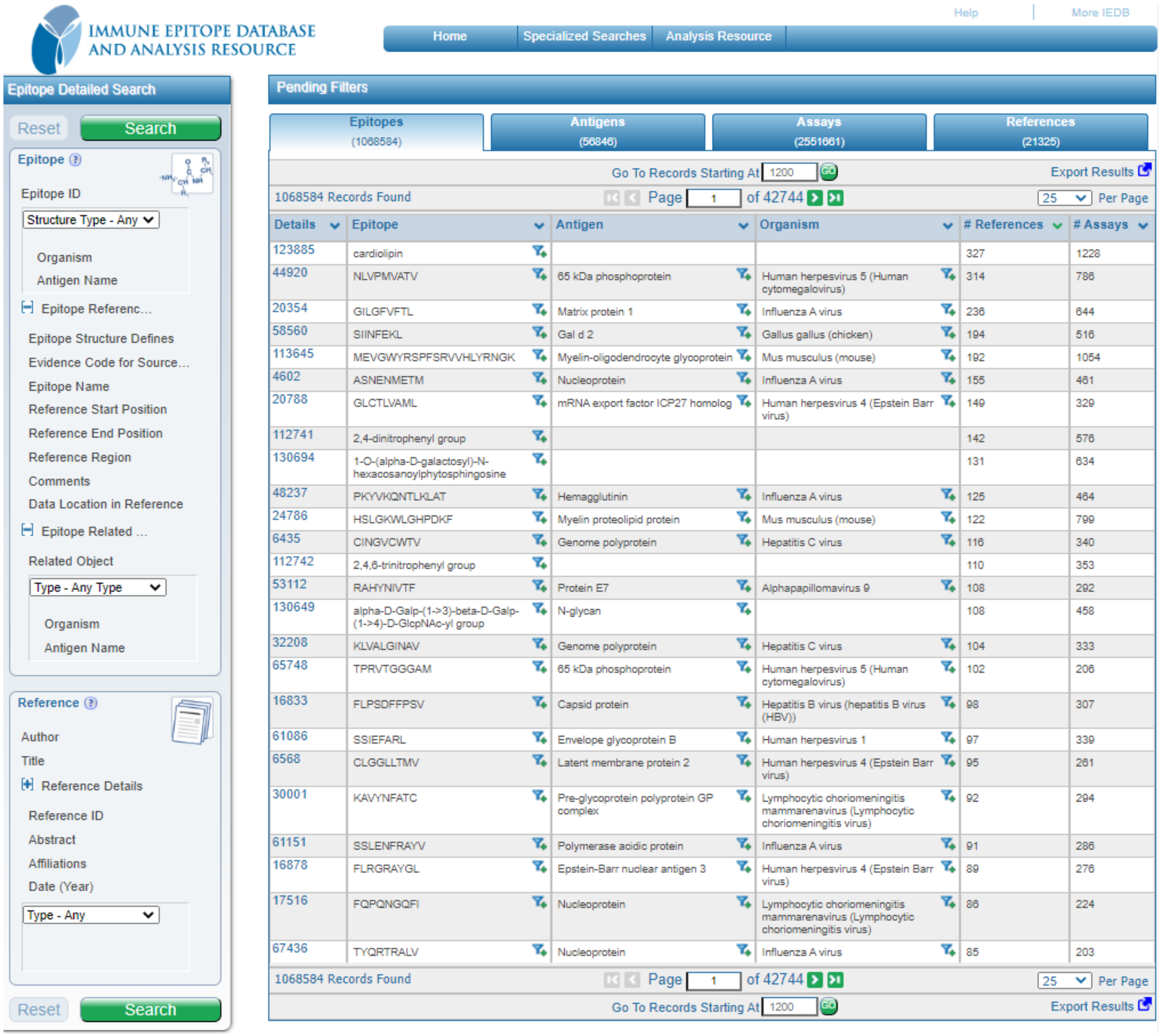
## 2.2.2 Specialized Searches

The Specialized queries are based on a standard Query by Example (QBE) approach, which is a method of forming queries where a user can enter conditions for each data field they want included in the query. The Specialized queries allow users to define example criteria for each field in the system. As there are over 300 fields, the Specialized Search queries are both powerful and comprehensive.

The fully expanded input screen for the Epitope Details Search is shown in Figure 2.4. The user can specify criteria in the left-hand panels for Epitope and Reference. These sections expand to the right to expose more detailed criteria for the search, including autocomplete fields and finders. An example of the expanded Epitope box is found in Figure 2.5. Users can specify search criteria for the epitope, such as epitope type (e.g. peptide from protein, carbohydrate), source molecule and organism, and various reference details. Further explanation of the search terms can be found in the Curation Manual. Using the bottom Reference section, the user can search on several reference criteria, such as author name, article title, the IEDB Reference ID, keywords in the reference abstract, year, author affiliation, and reference type. References are either published literature articles that have been curated by the IEDB curation staff or data submitted directly by researchers.

Auto-complete functionality is available for all the finder fields, as exemplified by the Simple Search and denoted by the greyed text that provide example inputs. The "?" provides a brief explanation and a "Learn More" link that connects to the appropriate help page in the IEDB Solutions Center. Finders are described in further detail in Section 2.2.4.

Figure 2.5 shows the fields when "Structure Type - Any" is selected in the Epitope filter. The fields for the other epitope type selections are shown in Figure 2.6 (linear epitopes), Figure 2.7 (Discontinuous epitopes), Figure 2.8 (Discontinuous peptides on Multichain), and Figure 2.9 (Non-peptidic epitopes).

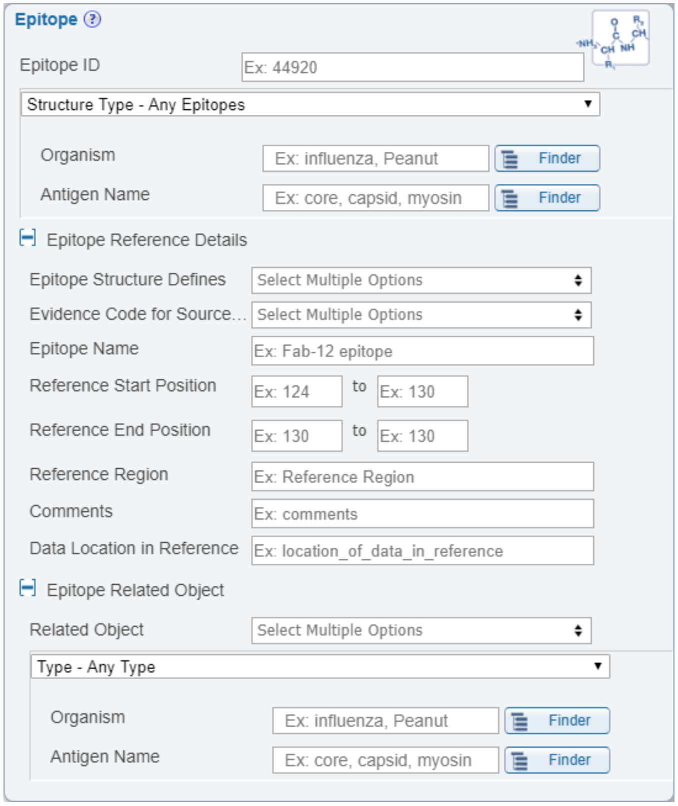


1068584 Records Found

| Details | Epitope | Antigen | Organism | # References | # Assays |
|---|---|---|---|---|---|
| 123885 | cardiolipin | | | 327 | 1228 |
| 44920 | NLVPMVATV | 65 kDa phosphoprotein | Human herpesvirus 5 (Human cytomegalovirus) | 314 | 786 |
| 20354 | GILGFVFTL | Matrix protein 1 | Influenza A virus | 236 | 644 |
| 58560 | SIINFEKL | Gal d 2 | Gallus gallus (chicken) | 194 | 516 |
| 113645 | MEVGWYRSPFSRVVHLYRNGK | Myelin-oligodendrocyte glycoprotein | Mus musculus (mouse) | 192 | 1054 |
| 4602 | ASNENMETM | Nucleoprotein | Influenza A virus | 155 | 461 |
| 20788 | GLCTLVAML | mRNA export factor ICP27 homolog | Human herpesvirus 4 (Epstein Barr virus) | 149 | 329 |
| 112741 | 2,4-dinitrophenyl group | | | 142 | 576 |
| 130694 | 1-O-(alpha-D-galactosyl)-N-hexacosanoylphytosphingosine | | | 131 | 634 |
| 48237 | PKYVKQNTLKLAT | Hemagglutinin | Influenza A virus | 125 | 464 |
| 24786 | HSLGKWLGHPDKF | Myelin proteolipid protein | Mus musculus (mouse) | 122 | 799 |
| 6435 | CINGVCWTV | Genome polyprotein | Hepatitis C virus | 116 | 340 |
| 112742 | 2,4,6-trinitrophenyl group | | | 110 | 353 |
| 53112 | RAHYNIVTF | Protein E7 | Alphapapillomavirus 9 | 108 | 292 |
| 130649 | alpha-D-Galp-(1->3)-beta-D-Galp-(1->4)-D-GlcpNAc-yl group | N-glycan | | 108 | 458 |
| 32208 | KLVALGINAV | Genome polyprotein | Hepatitis C virus | 104 | 333 |
| 65748 | TPRVTGGGAM | 65 kDa phosphoprotein | Human herpesvirus 5 (Human cytomegalovirus) | 102 | 206 |
| 16833 | FLPSDFFPSV | Capsid protein | Hepatitis B virus (hepatitis B virus (HBV)) | 98 | 307 |
| 61086 | SSIEFARL | Envelope glycoprotein B | Human herpesvirus 1 | 97 | 339 |
| 6568 | CLGGLLTMV | Latent membrane protein 2 | Human herpesvirus 4 (Epstein Barr virus) | 95 | 261 |
| 30001 | KAVYNFATC | Pre-glycoprotein polyprotein GP complex | Lymphocytic choriomeningitis mammarenavirus (Lymphocytic choriomeningitis virus) | 92 | 294 |
| 61151 | SSLENFRAYV | Polymerase acidic protein | Influenza A virus | 91 | 286 |
| 16878 | FLRGRAYGL | Epstein-Barr nuclear antigen 3 | Human herpesvirus 4 (Epstein Barr virus) | 89 | 276 |
| 17516 | FQPQNGQFI | Nucleoprotein | Lymphocytic choriomeningitis mammarenavirus (Lymphocytic choriomeningitis virus) | 88 | 224 |
| 67436 | TYQRTRALV | Nucleoprotein | Influenza A virus | 85 | 203 |

1068584 Records Found

**Figure 2.4** Epitope Specialized Search input screen



**Epitope** ?

Epitope ID: Ex: 44920

Structure Type - Any Epitopes ▾

Organism: Ex: influenza, Peanut [Finder]

Antigen Name: Ex: core, capsid, myosin [Finder]

⊟ Epitope Reference Details

Epitope Structure Defines: Select Multiple Options

Evidence Code for Source…: Select Multiple Options

Epitope Name: Ex: Fab-12 epitope

Reference Start Position: Ex: 124 to Ex: 130

Reference End Position: Ex: 130 to Ex: 130

Reference Region: Ex: Reference Region

Comments: Ex: comments

Data Location in Reference: Ex: location_of_data_in_reference

⊟ Epitope Related Object

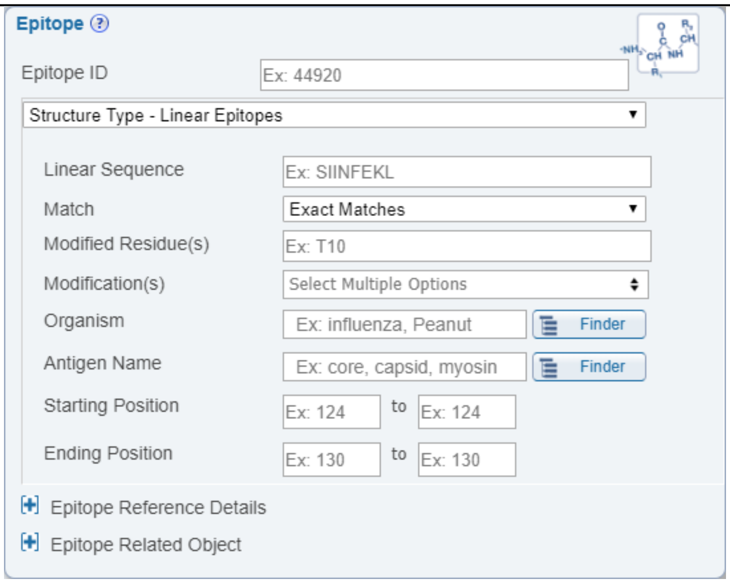
Related Object: Select Multiple Options

Type - Any Type ▾

Organism: Ex: influenza, Peanut [Finder]

Antigen Name: Ex: core, capsid, myosin [Finder]

**Figure 2.5** Epitope panel on the Specialized Search page expanded to show input fields



**Epitope** ?

Epitope ID: Ex: 44920

Structure Type - Linear Epitopes ▾

Linear Sequence: Ex: SIINFEKL

Match: Exact Matches ▾

Modified Residue(s): Ex: T10

Modification(s): Select Multiple Options

Organism: Ex: influenza, Peanut [Finder]

Antigen Name: Ex: core, capsid, myosin [Finder]

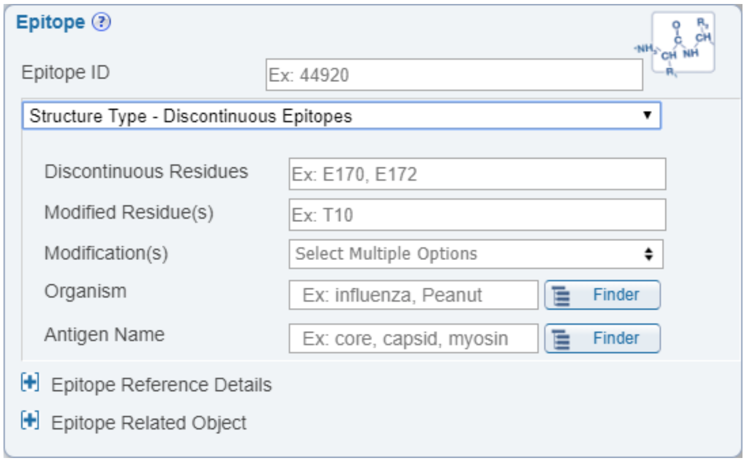
Starting Position: Ex: 124 to Ex: 124

Ending Position: Ex: 130 to Ex: 130

⊞ Epitope Reference Details

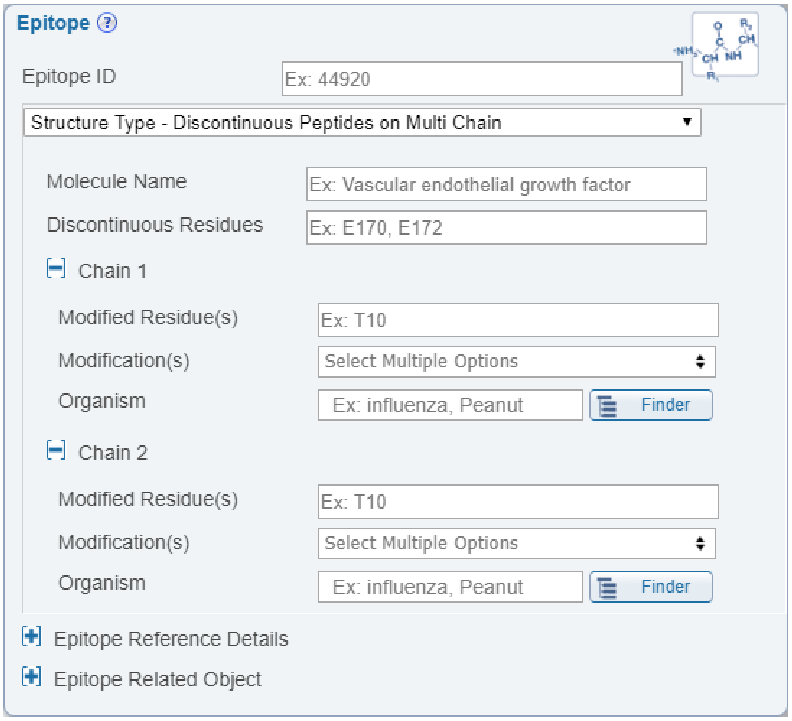
⊞ Epitope Related Object

**Figure 2.6** Epitope query fields in the Advanced Search for Linear peptide epitopes



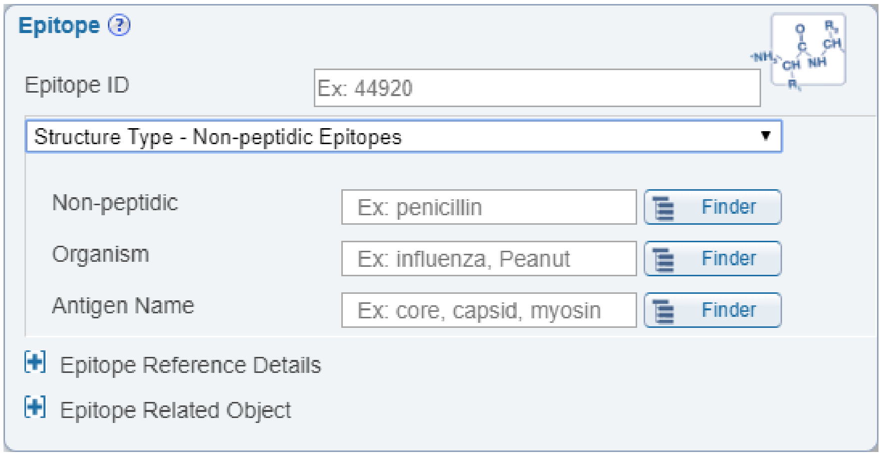
Structure Type - Discontinuous Epitopes

**Figure 2.7** Epitope query fields in the Advanced Search for Discontinuous peptide epitopes



Structure Type - Discontinuous Peptides on Multi Chain

**Figure 2.8** Epitope query fields in the Advanced Search for Discontinuous peptide on multi-chain epitopes



Epitope ID: Ex: 44920

Structure Type - Non-peptidic Epitopes

Non-peptidic: Ex: penicillin

Organism: Ex: influenza, Peanut

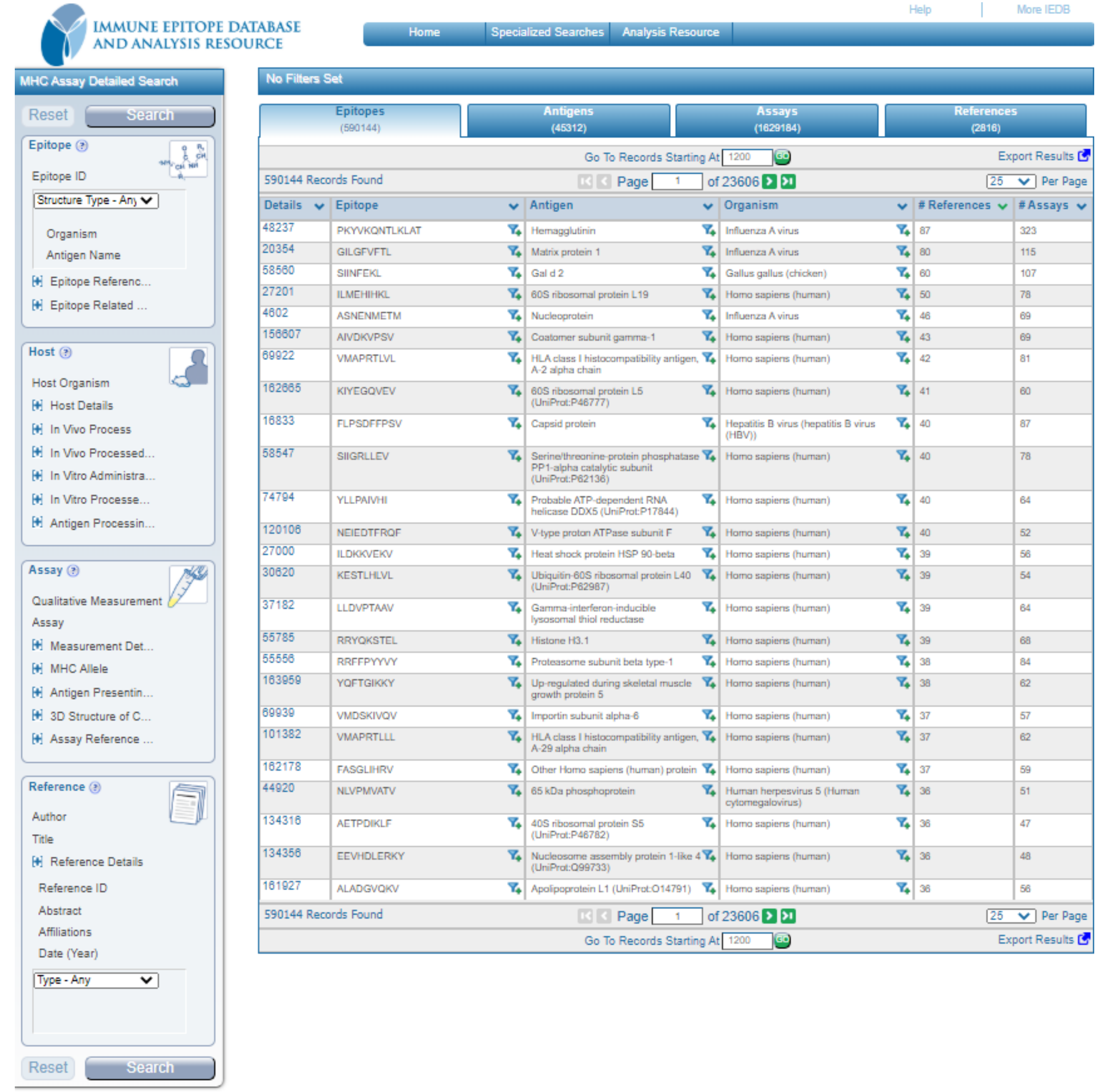
Antigen Name: Ex: core, capsid, myosin

Epitope Reference Details

Epitope Related Object

**Figure 2.9** Epitope query fields in the Advanced Search for Non-peptidic epitopes

There are five other Specialized Search queries that can be used to select search criteria for references, epitopes, and assays. These are T Cell Assay Details, B Cell Assay Details, MHC Assay Details, Identifier Search, and Browse by 3D Structure. As an example, the MHC Assay Detailed Search page is shown in Figure 2.10. As is the case for all three assay search pages, the Epitope and Reference criteria fields are listed first and last, respectively, with the other relevant filter criteria specific for each assay type listed between them.



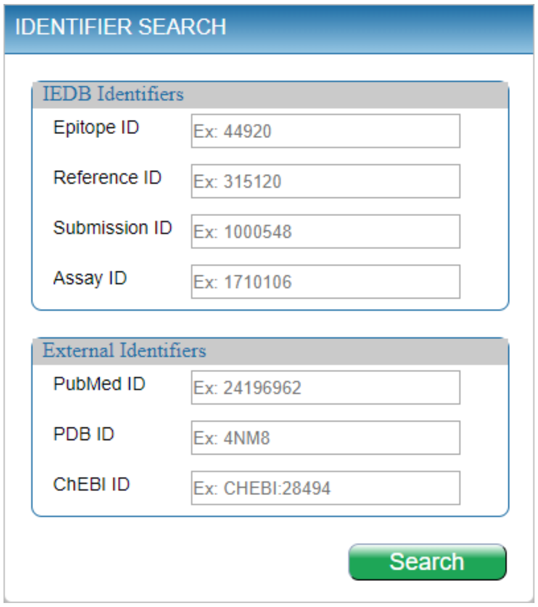
| Details | Epitope | Antigen | Organism | # References | # Assays |
|---|---|---|---|---|---|
| 48237 | PKYVKQNTLKLAT | Hemagglutinin | Influenza A virus | 87 | 323 |
| 20354 | GILGFVFTL | Matrix protein 1 | Influenza A virus | 80 | 115 |
| 58560 | SIINFEKL | Gal d 2 | Gallus gallus (chicken) | 60 | 107 |
| 27201 | ILMEHIHKL | 60S ribosomal protein L19 | Homo sapiens (human) | 50 | 78 |
| 4602 | ASNENMETM | Nucleoprotein | Influenza A virus | 46 | 69 |
| 156607 | AIVDKVPSV | Coatomer subunit gamma-1 | Homo sapiens (human) | 43 | 69 |
| 69922 | VMAPRTLVL | HLA class I histocompatibility antigen, A-2 alpha chain | Homo sapiens (human) | 42 | 81 |
| 162665 | KIYEGQVEV | 60S ribosomal protein L5 (UniProt:P46777) | Homo sapiens (human) | 41 | 60 |
| 16833 | FLPSDFFPSV | Capsid protein | Hepatitis B virus (hepatitis B virus (HBV)) | 40 | 87 |
| 58547 | SIIGRLLEV | Serine/threonine-protein phosphatase PP1-alpha catalytic subunit (UniProt:P62136) | Homo sapiens (human) | 40 | 78 |
| 74794 | YLLPAIVHI | Probable ATP-dependent RNA helicase DDX5 (UniProt:P17844) | Homo sapiens (human) | 40 | 64 |
| 120106 | NEIEDTFRQF | V-type proton ATPase subunit F | Homo sapiens (human) | 40 | 52 |
| 27000 | ILDKKVEKV | Heat shock protein HSP 90-beta | Homo sapiens (human) | 39 | 56 |
| 30620 | KESTLHLVL | Ubiquitin-60S ribosomal protein L40 (UniProt:P62987) | Homo sapiens (human) | 39 | 54 |
| 37182 | LLDVPTAAV | Gamma-interferon-inducible lysosomal thiol reductase | Homo sapiens (human) | 39 | 64 |
| 55785 | RRYQKSTEL | Histone H3.1 | Homo sapiens (human) | 39 | 68 |
| 55556 | RRFFPYYVY | Proteasome subunit beta type-1 | Homo sapiens (human) | 38 | 84 |
| 163959 | YQFTGIKKY | Up-regulated during skeletal muscle growth protein 5 | Homo sapiens (human) | 38 | 62 |
| 69939 | VMDSKIVQV | Importin subunit alpha-6 | Homo sapiens (human) | 37 | 57 |
| 101382 | VMAPRTLLL | HLA class I histocompatibility antigen, A-29 alpha chain | Homo sapiens (human) | 37 | 62 |
| 162178 | FASGLIHRV | Other Homo sapiens (human) protein | Homo sapiens (human) | 37 | 59 |
| 44920 | NLVPMVATV | 65 kDa phosphoprotein | Human herpesvirus 5 (Human cytomegalovirus) | 36 | 51 |
| 134316 | AETPDIKLF | 40S ribosomal protein S5 (UniProt:P46782) | Homo sapiens (human) | 36 | 47 |
| 134356 | EEVHDLERKY | Nucleosome assembly protein 1-like 4 (UniProt:Q99733) | Homo sapiens (human) | 36 | 48 |
| 161927 | ALADGVQKV | Apolipoprotein L1 (UniProt:O14791) | Homo sapiens (human) | 36 | 56 |

**Figure 2.10** MHC Assay Detailed Search web page

The B cell response assay category captures B cell-mediated immunity information and describes antibody responses related to the epitope/antigen. In a B cell response, B lymphocytes (a type of white blood cell) produce proteins called antibodies that bind to antigens. Antibodies are present on the surface on B lymphocytes and are also secreted. Once an antibody binds an antigen, the bound antigen molecule can be engulfed by phagocytes and broken into fragments.

The T Cell Response assay category captures T cell-mediated immunity information where the MHC molecule/antigen complex is recognized by T cells in the context of presentation by an antigen presenting cell.

The MHC Ligand assay category combines assays that were previously in the MHC Binding and MHC Ligand Elution assay categories. As such, the MHC Ligand category captures details relating to the in vitro interaction of the epitope with specific MHC molecules along with available Epitope-MHC complex structure details, that is the epitope's binding capacity to the MHC molecule. It also captures data related to epitopes that are naturally processed and presented on the surface of an antigen presenting cell. The MHC Ligand Elution subcategory differs from the MHC Binding subcategory in that for the former, antigen bound to the MHC molecule on the cell surface has been taken up and processed internally for presentation by the antigen presenting cell, whilst for the latter, antigen in solution is bound to MHC molecules on the surface of the antigen presenting cells.



IDENTIFIER SEARCH

IEDB Identifiers

| | |
|---|---|
| Epitope ID | Ex: 44920 |
| Reference ID | Ex: 315120 |
| Submission ID | Ex: 1000548 |
| Assay ID | Ex: 1710106 |

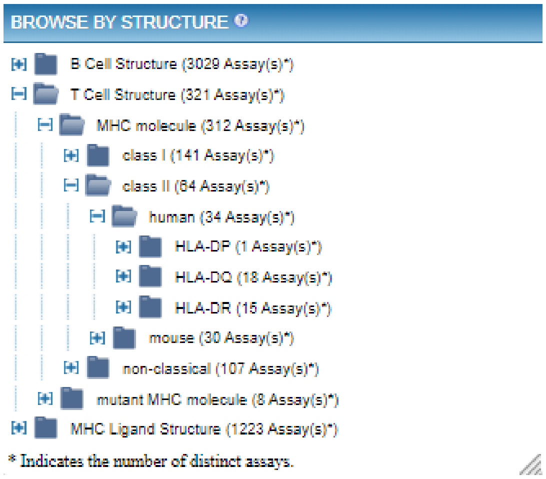
External Identifiers

| | |
|---|---|
| PubMed ID | Ex: 24196962 |
| PDB ID | Ex: 4NM8 |
| ChEBI ID | Ex: CHEBI:28494 |

**Figure 2.11** Identifier Search input screen

The Identifier Search input screen is shown in Figure 2.11. If users know the epitope, reference, submission, or assay identifier they are seeking, they can enter that information into one of the four IEDB Identifiers fields.

The Browse by 3D Structure selection screen in shown in Figure 2.12. Users can select 3D structure of interest to them based on available structures within the database.



BROWSE BY STRUCTURE

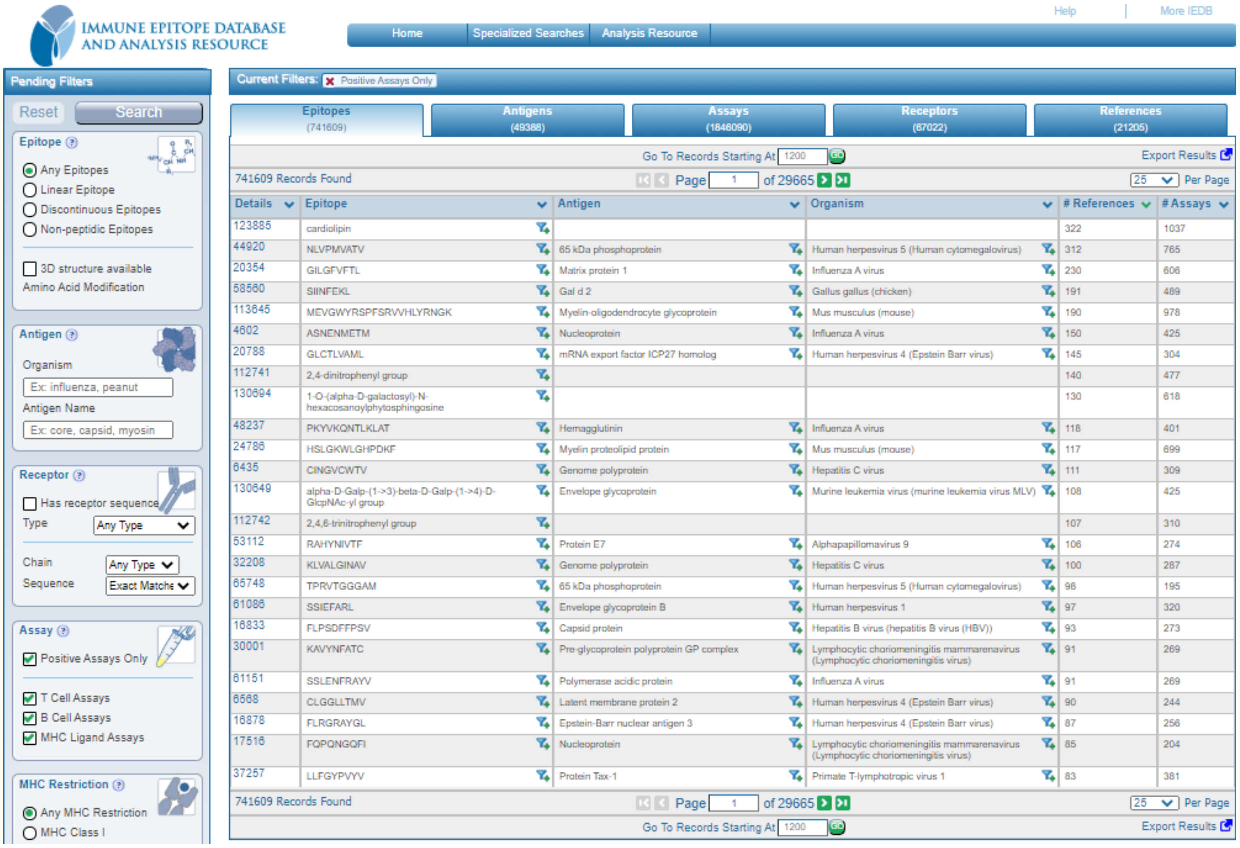
- B Cell Structure (3029 Assay(s)*)
- T Cell Structure (321 Assay(s)*)
  - MHC molecule (312 Assay(s)*)
    - class I (141 Assay(s)*)
    - class II (64 Assay(s)*)
      - human (34 Assay(s)*)
        - HLA-DP (1 Assay(s)*)
        - HLA-DQ (18 Assay(s)*)
        - HLA-DR (15 Assay(s)*)
      - mouse (30 Assay(s)*)
    - non-classical (107 Assay(s)*)
  - mutant MHC molecule (8 Assay(s)*)
- MHC Ligand Structure (1223 Assay(s)*)

* Indicates the number of distinct assays.

**Figure 2.12** Browse by 3D Structure search

### 2.2.3 Search Results Page

The results of a search or query appear on the Results page. An example is shown in Figure 2.12. The search criteria are listed in the Current Filters section above the results table. There are five tabs for the results. Figure 2.12 displays the Epitopes tab. Results are initially sorted by the number of assays, but the user can click on the column header to change the sort order. A second click will reverse the sort order of the selected column. The table includes the epitope structure description, the corresponding antigen, source organism, the number of references in which the epitope appears, and the number of assays (positive and negative) that reside in the database. Clicking on the Epitope ID number in the far-left column will take the user to a Distinct Epitope Detail page, as seen in Figure 2.13. The bottom section of the figure contains links to relevant tools in the Analysis Resource. Links can also appear to the Bioinformatics Resource Centers (BRC), such as the Influenza Research Database (IRD). The user can also refine the search results by clicking on the filter icon in the epitope, antigen, and organism fields.



Current Filters: ☒ Positive Assays Only

Epitope
● Any Epitopes
○ Linear Epitope
○ Discontinuous Epitopes
○ Non-peptidic Epitopes
☐ 3D structure available
Amino Acid Modification

Antigen
Organism: Ex: influenza, peanut
Antigen Name: Ex: core, capsid, myosin

Receptor
☐ Has receptor sequence
Type: Any Type
Chain: Any Type
Sequence: Exact Matche

Assay
☑ Positive Assays Only
☑ T Cell Assays
☑ B Cell Assays
☑ MHC Ligand Assays

MHC Restriction
● Any MHC Restriction
○ MHC Class I

Go To Records Starting At 1200

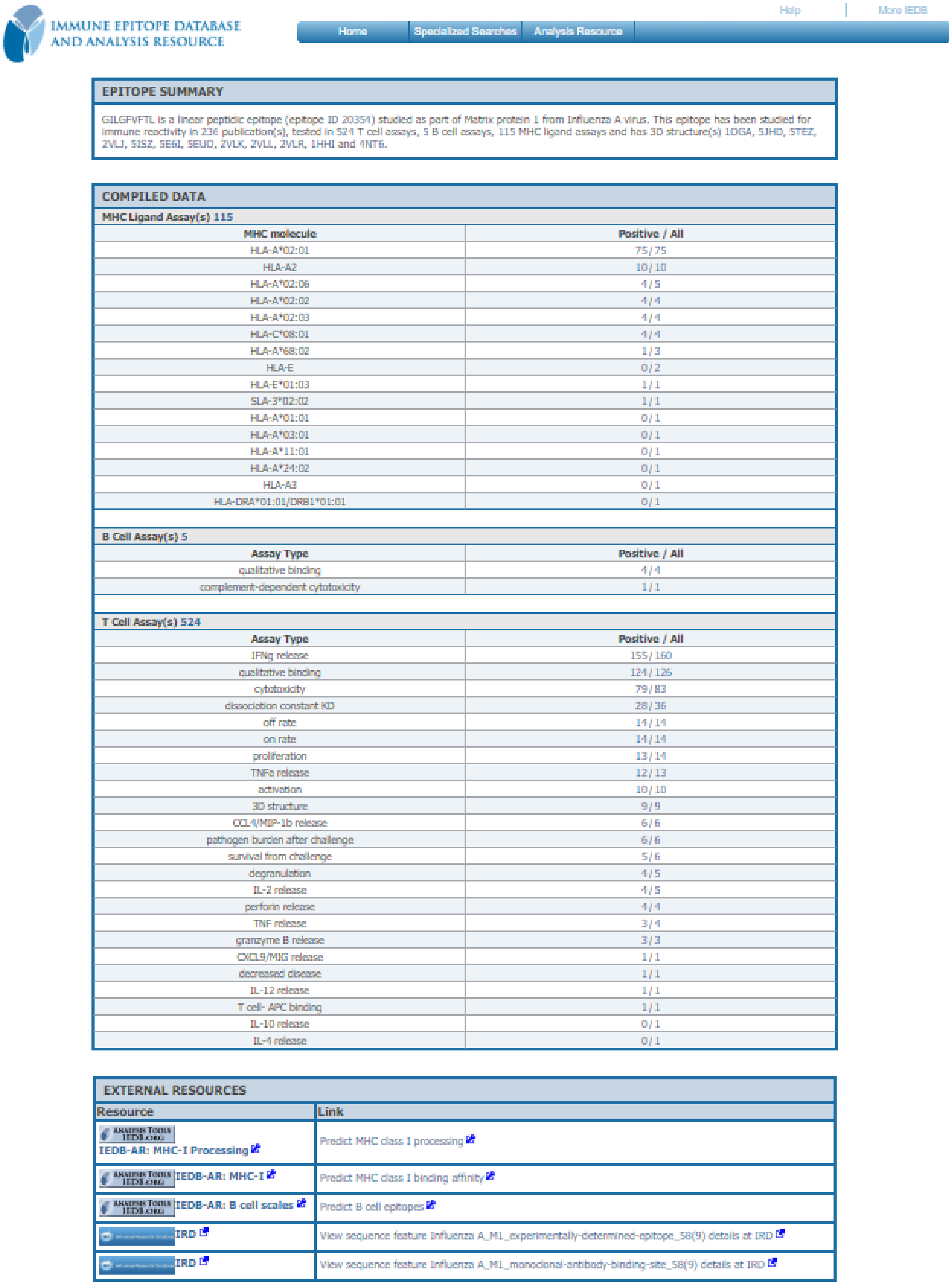
741609 Records Found — Page 1 of 29665 — 25 Per Page

| Details | Epitope | Antigen | Organism | # References | # Assays |
|---|---|---|---|---|---|
| 123885 | cardiolipin | | | 322 | 1037 |
| 44920 | NLVPMVATV | 65 kDa phosphoprotein | Human herpesvirus 5 (Human cytomegalovirus) | 312 | 765 |
| 20354 | GILGFVFTL | Matrix protein 1 | Influenza A virus | 230 | 606 |
| 58560 | SIINFEKL | Gal d 2 | Gallus gallus (chicken) | 191 | 489 |
| 113645 | MEVGWYRSPFSRVVHLYRNGK | Myelin-oligodendrocyte glycoprotein | Mus musculus (mouse) | 190 | 978 |
| 4602 | ASNENMETM | Nucleoprotein | Influenza A virus | 150 | 425 |
| 20788 | GLCTLVAML | mRNA export factor ICP27 homolog | Human herpesvirus 4 (Epstein Barr virus) | 145 | 304 |
| 112741 | 2,4-dinitrophenyl group | | | 140 | 477 |
| 130694 | 1-O-(alpha-D-galactosyl)-N-hexacosanoylphytosphingosine | | | 130 | 618 |
| 48237 | PKYVKQNTLKLAT | Hemagglutinin | Influenza A virus | 118 | 401 |
| 24786 | HSLGKWLGHPDKF | Myelin proteolipid protein | Mus musculus (mouse) | 117 | 699 |
| 6435 | CINGVCWTV | Genome polyprotein | Hepatitis C virus | 111 | 309 |
| 130649 | alpha-D-Galp-(1->3)-beta-D-Galp-(1->4)-D-GlcpNAc-yl group | Envelope glycoprotein | Murine leukemia virus (murine leukemia virus MLV) | 108 | 425 |
| 112742 | 2,4,6-trinitrophenyl group | | | 107 | 310 |
| 53112 | RAHYNIVTF | Protein E7 | Alphapapillomavirus 9 | 106 | 274 |
| 32208 | KLVALGINAV | Genome polyprotein | Hepatitis C virus | 100 | 287 |
| 65748 | TPRVTGGGAM | 65 kDa phosphoprotein | Human herpesvirus 5 (Human cytomegalovirus) | 98 | 195 |
| 61086 | SSIEFARL | Envelope glycoprotein B | Human herpesvirus 1 | 97 | 320 |
| 16833 | FLPSDFFPSV | Capsid protein | Hepatitis B virus (hepatitis B virus (HBV)) | 93 | 273 |
| 30001 | KAVYNFATC | Pre-glycoprotein polyprotein GP complex | Lymphocytic choriomeningitis mammarenavirus (Lymphocytic choriomeningitis virus) | 91 | 269 |
| 61151 | SSLENFRAYV | Polymerase acidic protein | Influenza A virus | 91 | 269 |
| 6568 | CLGGLLTMV | Latent membrane protein 2 | Human herpesvirus 4 (Epstein Barr virus) | 90 | 244 |
| 16878 | FLRGRAYGL | Epstein-Barr nuclear antigen 3 | Human herpesvirus 4 (Epstein Barr virus) | 87 | 256 |
| 17516 | FQPQNGQFI | Nucleoprotein | Lymphocytic choriomeningitis mammarenavirus (Lymphocytic choriomeningitis virus) | 85 | 204 |
| 37257 | LLFGYPVYV | Protein Tax-1 | Primate T-lymphotropic virus 1 | 83 | 381 |

741609 Records Found — Page 1 of 29665 — 25 Per Page

Go To Records Starting At 1200

**Figure 2.13** The Epitope tab of the search results page



**EPITOPE SUMMARY**

GILGFVFTL is a linear peptidic epitope (epitope ID 20354) studied as part of Matrix protein 1 from Influenza A virus. This epitope has been studied for immune reactivity in 236 publication(s), tested in 524 T cell assays, 5 B cell assays, 115 MHC ligand assays and has 3D structure(s) 1OGA, 5JHD, 5TEZ, 2VLJ, 5ISZ, 5E6I, 5EUO, 2VLK, 2VLL, 2VLR, 1HHI and 4NT6.

**COMPILED DATA**

**MHC Ligand Assay(s) 115**

| MHC molecule | Positive / All |
|---|---|
| HLA-A*02:01 | 75 / 75 |
| HLA-A2 | 10 / 10 |
| HLA-A*02:06 | 4 / 5 |
| HLA-A*02:02 | 4 / 4 |
| HLA-A*02:03 | 4 / 4 |
| HLA-C*08:01 | 4 / 4 |
| HLA-A*68:02 | 1 / 3 |
| HLA-E | 0 / 2 |
| HLA-E*01:03 | 1 / 1 |
| SLA-3*02:02 | 1 / 1 |
| HLA-A*01:01 | 0 / 1 |
| HLA-A*03:01 | 0 / 1 |
| HLA-A*11:01 | 0 / 1 |
| HLA-A*24:02 | 0 / 1 |
| HLA-A3 | 0 / 1 |
| HLA-DRA*01:01/DRB1*01:01 | 0 / 1 |

**B Cell Assay(s) 5**

| Assay Type | Positive / All |
|---|---|
| qualitative binding | 4 / 4 |
| complement-dependent cytotoxicity | 1 / 1 |

**T Cell Assay(s) 524**

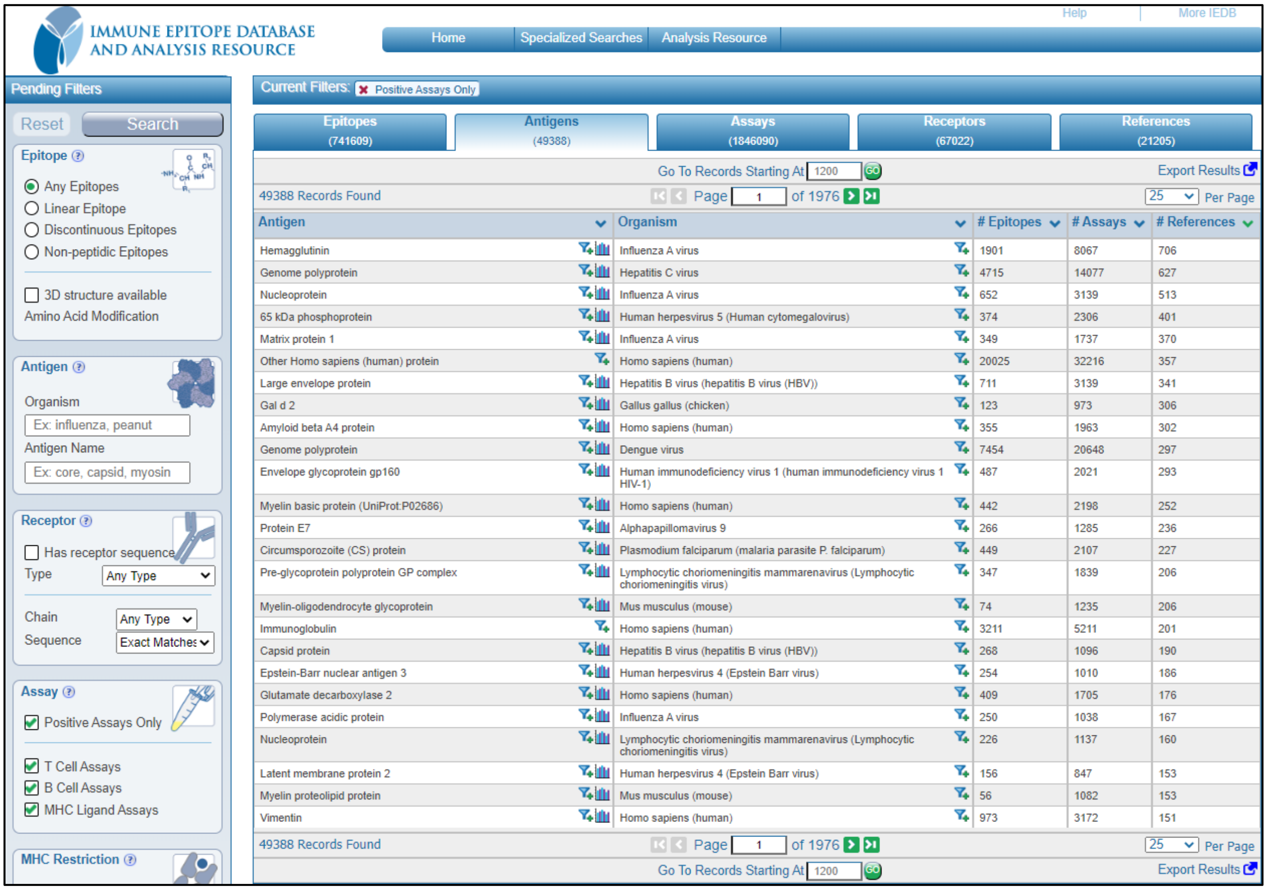
| Assay Type | Positive / All |
|---|---|
| IFNg release | 155 / 160 |
| qualitative binding | 124 / 126 |
| cytotoxicity | 79 / 83 |
| dissociation constant KD | 28 / 36 |
| off rate | 14 / 14 |
| on rate | 14 / 14 |
| proliferation | 13 / 14 |
| TNFa release | 12 / 13 |
| activation | 10 / 10 |
| 3D structure | 9 / 9 |
| CCL4/MIP-1b release | 6 / 6 |
| pathogen burden after challenge | 6 / 6 |
| survival from challenge | 5 / 6 |
| degranulation | 4 / 5 |
| IL-2 release | 4 / 5 |
| perforin release | 4 / 4 |
| TNF release | 3 / 4 |
| granzyme B release | 3 / 3 |
| CXCL9/MIG release | 1 / 1 |
| decreased disease | 1 / 1 |
| IL-12 release | 1 / 1 |
| T cell- APC binding | 1 / 1 |
| IL-10 release | 0 / 1 |
| IL-4 release | 0 / 1 |

**EXTERNAL RESOURCES**

| Resource | Link |
|---|---|
| IEDB-AR: MHC-I Processing | Predict MHC class I processing |
| IEDB-AR: MHC-I | Predict MHC class I binding affinity |
| IEDB-AR: B cell scales | Predict B cell epitopes |
| IRD | View sequence feature Influenza A_M1_experimentally-determined-epitope_58(9) details at IRD |
| IRD | View sequence feature Influenza A_M1_monoclonal-antibody-binding-site_58(9) details at IRD |

**Figure 2.14** An example of the epitope detail page

The second tab on the results page is the Antigens tab (Figure 2.14). Results are initially sorted by the number of assays, but the user can click on the column header to change the sort order. The table includes the antigen name, the corresponding source organism, the number of associated antigen epitopes in the IEDB, and the number of assays (positive and negative) that reside in the database. The user can explore the data related to a particular antigen by clicking on the funnel icon in the righthand side of the Antigen column. The data in the other three tabs will change accordingly as seen in Figure 2.15.



Current Filters: Positive Assays Only

Epitope
● Any Epitopes
○ Linear Epitope
○ Discontinuous Epitopes
○ Non-peptidic Epitopes
☐ 3D structure available
Amino Acid Modification

Antigen
Organism: Ex: influenza, peanut
Antigen Name: Ex: core, capsid, myosin

Receptor
☐ Has receptor sequence
Type: Any Type
Chain: Any Type
Sequence: Exact Matches

Assay
☑ Positive Assays Only
☑ T Cell Assays
☑ B Cell Assays
☑ MHC Ligand Assays

Go To Records Starting At 1200

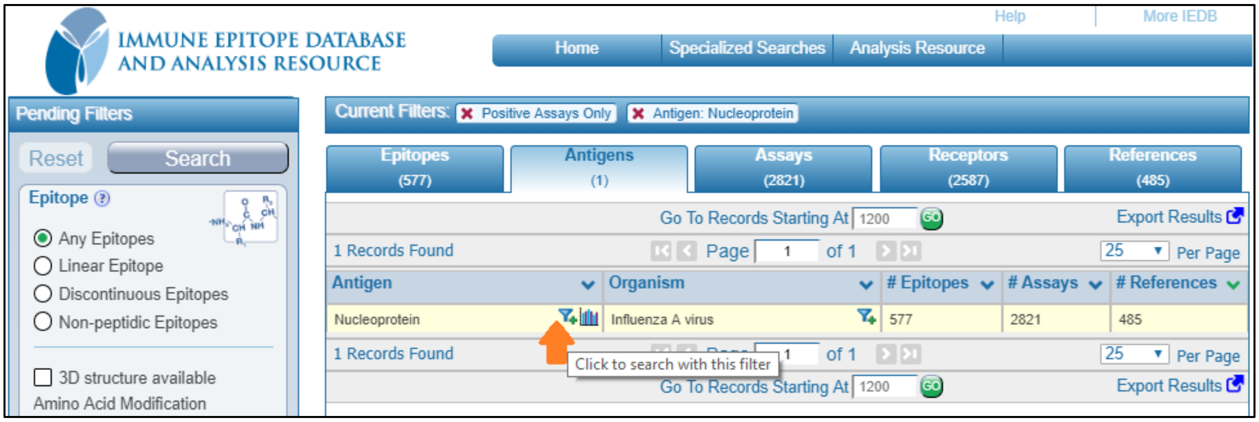
49388 Records Found · Page 1 of 1976 · 25 Per Page

| Antigen | Organism | # Epitopes | # Assays | # References |
|---|---|---|---|---|
| Hemagglutinin | Influenza A virus | 1901 | 8067 | 706 |
| Genome polyprotein | Hepatitis C virus | 4715 | 14077 | 627 |
| Nucleoprotein | Influenza A virus | 652 | 3139 | 513 |
| 65 kDa phosphoprotein | Human herpesvirus 5 (Human cytomegalovirus) | 374 | 2306 | 401 |
| Matrix protein 1 | Influenza A virus | 349 | 1737 | 370 |
| Other Homo sapiens (human) protein | Homo sapiens (human) | 20025 | 32216 | 357 |
| Large envelope protein | Hepatitis B virus (hepatitis B virus (HBV)) | 711 | 3139 | 341 |
| Gal d 2 | Gallus gallus (chicken) | 123 | 973 | 306 |
| Amyloid beta A4 protein | Homo sapiens (human) | 355 | 1963 | 302 |
| Genome polyprotein | Dengue virus | 7454 | 20648 | 297 |
| Envelope glycoprotein gp160 | Human immunodeficiency virus 1 (human immunodeficiency virus 1 HIV-1) | 487 | 2021 | 293 |
| Myelin basic protein (UniProt:P02686) | Homo sapiens (human) | 442 | 2198 | 252 |
| Protein E7 | Alphapapillomavirus 9 | 266 | 1285 | 236 |
| Circumsporozoite (CS) protein | Plasmodium falciparum (malaria parasite P. falciparum) | 449 | 2107 | 227 |
| Pre-glycoprotein polyprotein GP complex | Lymphocytic choriomeningitis mammarenavirus (Lymphocytic choriomeningitis virus) | 347 | 1839 | 206 |
| Myelin-oligodendrocyte glycoprotein | Mus musculus (mouse) | 74 | 1235 | 206 |
| Immunoglobulin | Homo sapiens (human) | 3211 | 5211 | 201 |
| Capsid protein | Hepatitis B virus (hepatitis B virus (HBV)) | 268 | 1096 | 190 |
| Epstein-Barr nuclear antigen 3 | Human herpesvirus 4 (Epstein Barr virus) | 254 | 1010 | 186 |
| Glutamate decarboxylase 2 | Homo sapiens (human) | 409 | 1705 | 176 |
| Polymerase acidic protein | Influenza A virus | 250 | 1038 | 167 |
| Nucleoprotein | Lymphocytic choriomeningitis mammarenavirus (Lymphocytic choriomeningitis virus) | 226 | 1137 | 160 |
| Latent membrane protein 2 | Human herpesvirus 4 (Epstein Barr virus) | 156 | 847 | 153 |
| Myelin proteolipid protein | Mus musculus (mouse) | 56 | 1082 | 153 |
| Vimentin | Homo sapiens (human) | 973 | 3172 | 151 |

49388 Records Found · Page 1 of 1976 · 25 Per Page

Go To Records Starting At 1200

**Figure 2.15** The Antigens tab of the search results page



Current Filters: Positive Assays Only · Antigen: Nucleoprotein

Epitope
● Any Epitopes
○ Linear Epitope
○ Discontinuous Epitopes
○ Non-peptidic Epitopes
☐ 3D structure available
Amino Acid Modification

Go To Records Starting At 1200

1 Records Found · Page 1 of 1 · 25 Per Page

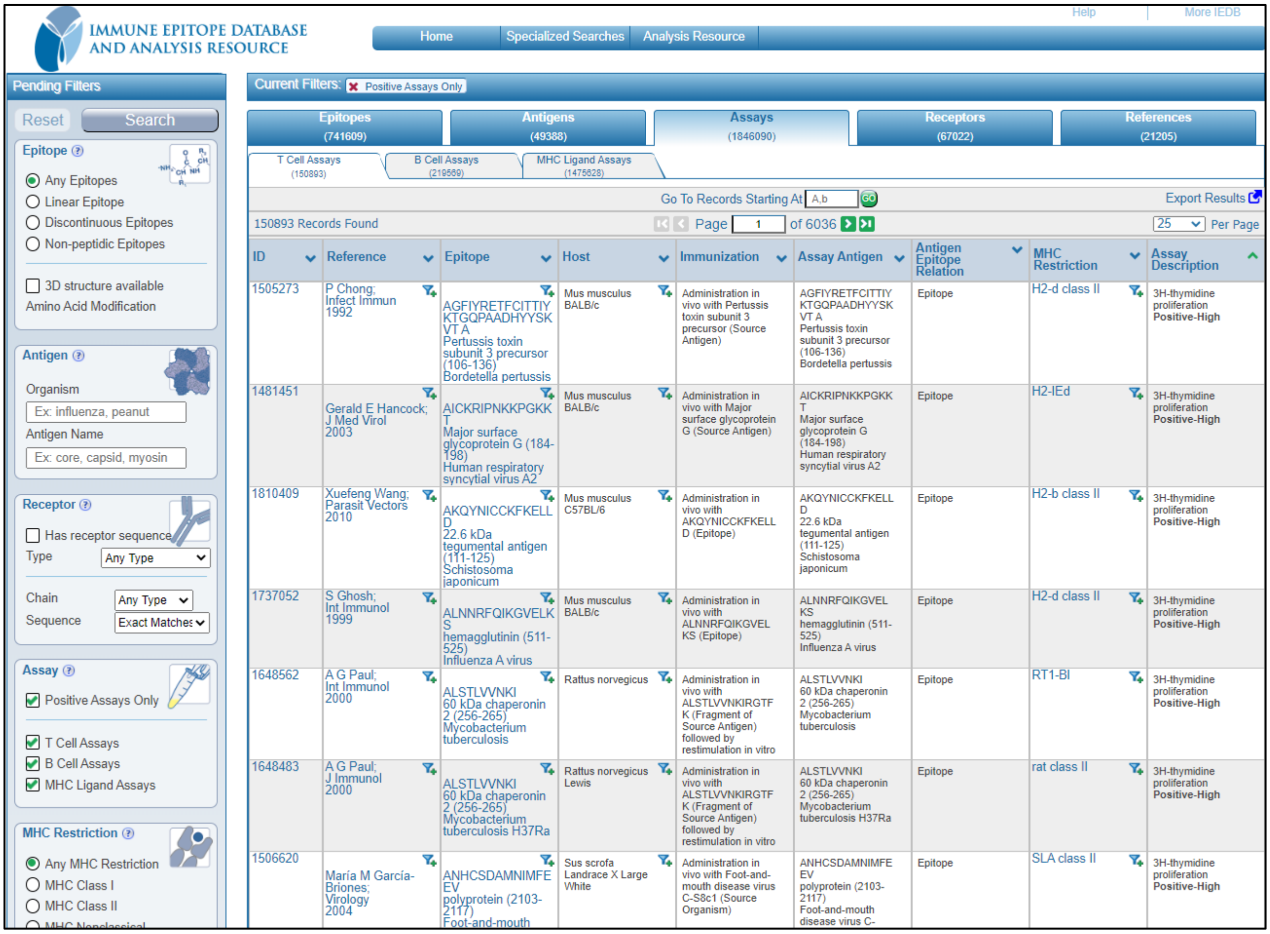
| Antigen | Organism | # Epitopes | # Assays | # References |
|---|---|---|---|---|
| Nucleoprotein | Influenza A virus | 577 | 2821 | 485 |

1 Records Found · 25 Per Page

Go To Records Starting At 1200

**Figure 2.16** The Results filtered by the Nucleoprotein of the Influenza A virus. This was achieved by clicking on the filter icon in the antigen column. The content of the other tabs contain data specific to this antigen.

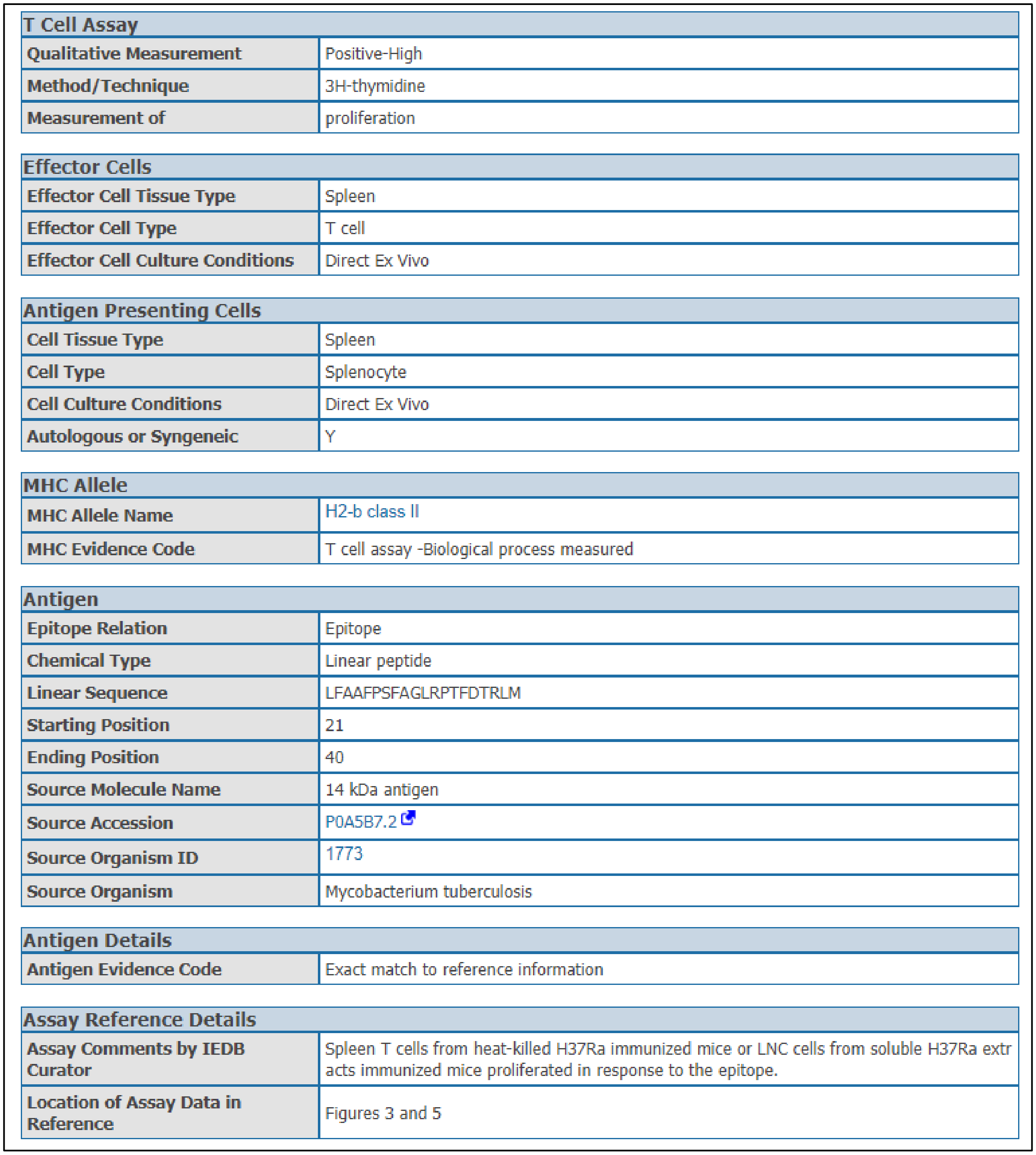
The third tab on the results page is the Assays tab (Figure 2.16). Results are initially sorted by the Assay Description, but the user can click on the column header to change the sort order. The table contains three additional tabs, one each for the three assay categories – T cell, B cell, and MHC Ligand. The table for the T cell assays includes the assay ID, the reference, epitope, host organism, immunization, assay antigen, antigen epitope relation, MHC restriction, and assay description. The content of the B cell assay tab is the same except it omits the MHC restriction column. The MHC ligand assay tab contains fields for assay ID, reference, epitope, antigen processing, MHC restriction, assay description, and quantitative measure. Clicking on the Assay ID in the far-left lane will take the user to an Assay Detail page. An example is given in Figure 2.17. The actual page contains additional fields below what is shown in the figure, including sections for Epitope Reference Details, Immunization, Host Details, 1st In Vivo Process, Administration Details, 1st Immunogen, Immunogen Details, Immunization Comments, T Cell Assay, Effector Cells, Antigen Presenting Cells, MHC Allele, Antigen, Antigen Details, and Assay Reference Details. The user can also refine the results further by clicking on the filter icon that is available in several of the fields, such as reference, epitope, and host.



150893 Records Found

| ID | Reference | Epitope | Host | Immunization | Assay Antigen | Antigen Epitope Relation | MHC Restriction | Assay Description |
|---|---|---|---|---|---|---|---|---|
| 1505273 | P Chong;<br>Infect Immun<br>1992 | AGFIYRETFCITTIYKTGQPAADHYYSKVT A<br>Pertussis toxin subunit 3 precursor (106-136)<br>Bordetella pertussis | Mus musculus BALB/c | Administration in vivo with Pertussis toxin subunit 3 precursor (Source Antigen) | AGFIYRETFCITTIYKTGQPAADHYYSKVT A<br>Pertussis toxin subunit 3 precursor (106-136)<br>Bordetella pertussis | Epitope | H2-d class II | 3H-thymidine proliferation<br>**Positive-High** |
| 1481451 | Gerald E Hancock;<br>J Med Virol<br>2003 | AICKRIPNKKPGKKT<br>Major surface glycoprotein G (184-198)<br>Human respiratory syncytial virus A2 | Mus musculus BALB/c | Administration in vivo with Major surface glycoprotein G (Source Antigen) | AICKRIPNKKPGKKT<br>Major surface glycoprotein G (184-198)<br>Human respiratory syncytial virus A2 | Epitope | H2-IEd | 3H-thymidine proliferation<br>**Positive-High** |
| 1810409 | Xuefeng Wang;<br>Parasit Vectors<br>2010 | AKQYNICCKFKELLD<br>22.6 kDa tegumental antigen (111-125)<br>Schistosoma japonicum | Mus musculus C57BL/6 | Administration in vivo with AKQYNICCKFKELLD (Epitope) | AKQYNICCKFKELLD<br>22.6 kDa tegumental antigen (111-125)<br>Schistosoma japonicum | Epitope | H2-b class II | 3H-thymidine proliferation<br>**Positive-High** |
| 1737052 | S Ghosh;<br>Int Immunol<br>1999 | ALNNRFQIKGVELKS<br>hemagglutinin (511-525)<br>Influenza A virus | Mus musculus BALB/c | Administration in vivo with ALNNRFQIKGVELKS (Epitope) | ALNNRFQIKGVELKS<br>hemagglutinin (511-525)<br>Influenza A virus | Epitope | H2-d class II | 3H-thymidine proliferation<br>**Positive-High** |
| 1648562 | A G Paul;<br>Int Immunol<br>2000 | ALSTLVVNKI<br>60 kDa chaperonin 2 (256-265)<br>Mycobacterium tuberculosis | Rattus norvegicus | Administration in vivo with ALSTLVVNKIRGTFK (Fragment of Source Antigen) followed by restimulation in vitro | ALSTLVVNKI<br>60 kDa chaperonin 2 (256-265)<br>Mycobacterium tuberculosis | Epitope | RT1-Bl | 3H-thymidine proliferation<br>**Positive-High** |
| 1648483 | A G Paul;<br>J Immunol<br>2000 | ALSTLVVNKI<br>60 kDa chaperonin 2 (256-265)<br>Mycobacterium tuberculosis H37Ra | Rattus norvegicus Lewis | Administration in vivo with ALSTLVVNKIRGTFK (Fragment of Source Antigen) followed by restimulation in vitro | ALSTLVVNKI<br>60 kDa chaperonin 2 (256-265)<br>Mycobacterium tuberculosis H37Ra | Epitope | rat class II | 3H-thymidine proliferation<br>**Positive-High** |
| 1506620 | María M García-Briones;<br>Virology<br>2004 | ANHCSDAMNIMFEEV<br>polyprotein (2103-2117)<br>Foot-and-mouth | Sus scrofa Landrace X Large White | Administration in vivo with Foot-and-mouth disease virus C-S8c1 (Source Organism) | ANHCSDAMNIMFEEV<br>polyprotein (2103-2117)<br>Foot-and-mouth disease virus C- | Epitope | SLA class II | 3H-thymidine proliferation<br>**Positive-High** |

**Figure 2.17** The Assays tab of the search results page. The page contains three additional tabs for T Cell, B Cell, and MHC Ligand Assays



| T Cell Assay | |
|---|---|
| **Qualitative Measurement** | Positive-High |
| **Method/Technique** | 3H-thymidine |
| **Measurement of** | proliferation |

| Effector Cells | |
|---|---|
| **Effector Cell Tissue Type** | Spleen |
| **Effector Cell Type** | T cell |
| **Effector Cell Culture Conditions** | Direct Ex Vivo |

| Antigen Presenting Cells | |
|---|---|
| **Cell Tissue Type** | Spleen |
| **Cell Type** | Splenocyte |
| **Cell Culture Conditions** | Direct Ex Vivo |
| **Autologous or Syngeneic** | Y |

| MHC Allele | |
|---|---|
| **MHC Allele Name** | H2-b class II |
| **MHC Evidence Code** | T cell assay -Biological process measured |

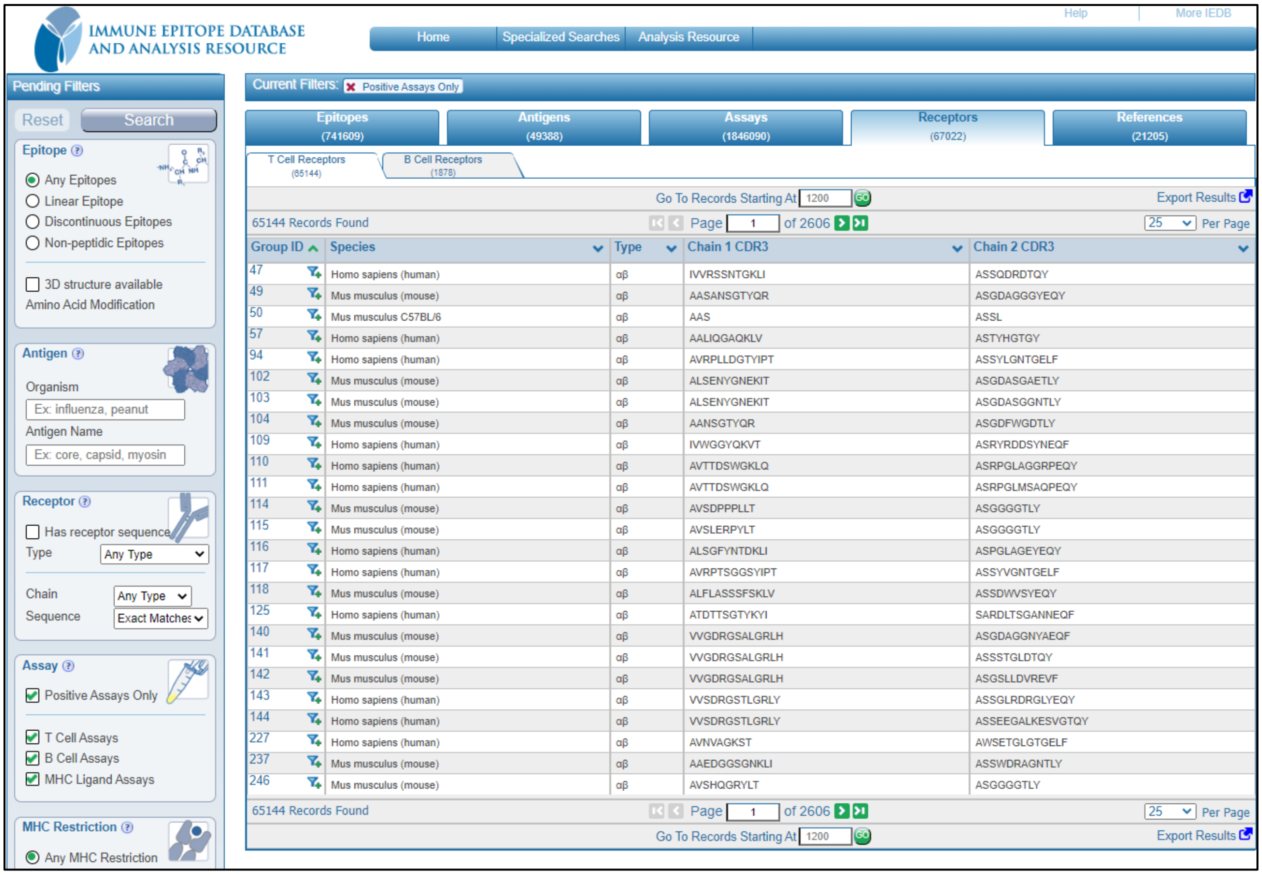
| Antigen | |
|---|---|
| **Epitope Relation** | Epitope |
| **Chemical Type** | Linear peptide |
| **Linear Sequence** | LFAAFPSFAGLRPTFDTRLM |
| **Starting Position** | 21 |
| **Ending Position** | 40 |
| **Source Molecule Name** | 14 kDa antigen |
| **Source Accession** | P0A5B7.2 |
| **Source Organism ID** | 1773 |
| **Source Organism** | Mycobacterium tuberculosis |

| Antigen Details | |
|---|---|
| **Antigen Evidence Code** | Exact match to reference information |

| Assay Reference Details | |
|---|---|
| **Assay Comments by IEDB Curator** | Spleen T cells from heat-killed H37Ra immunized mice or LNC cells from soluble H37Ra extracts immunized mice proliferated in response to the epitope. |
| **Location of Assay Data in Reference** | Figures 3 and 5 |

**Figure 2.18** The top three sections of a sample T cell assay detail page.

The fourth tab on the results page is the Receptors tab (Figure 2.19). The Receptors tab indicates the distinct receptor group, the species, and the receptor types alongside the sequences of each chain component. The display is subdivided into two separate tabs for TCRs and BCRs. Clicking on the Group ID links brings the user to a receptor specific details page.



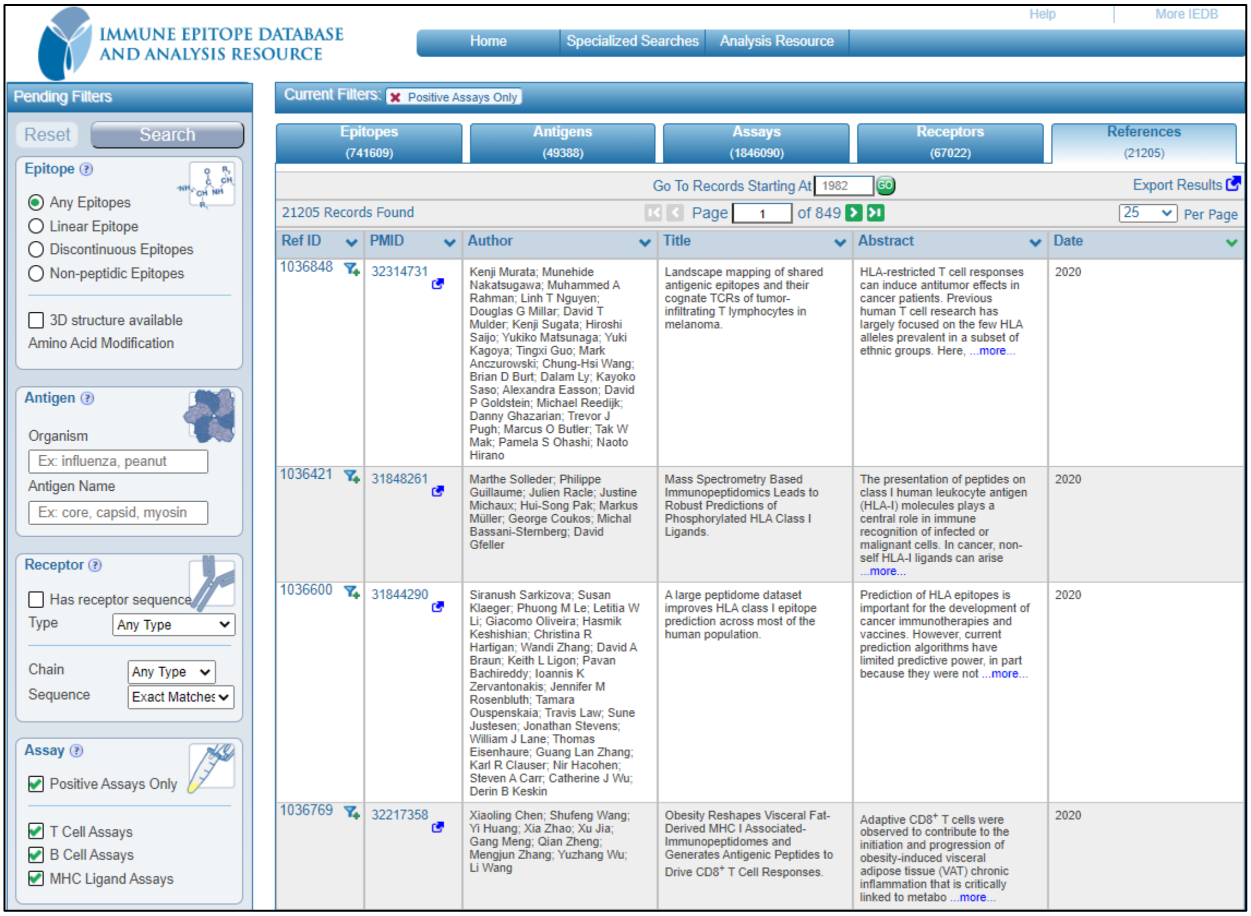
65144 Records Found

| Group ID | Species | Type | Chain 1 CDR3 | Chain 2 CDR3 |
|---|---|---|---|---|
| 47 | Homo sapiens (human) | αβ | IVVRSSNTGKLI | ASSQDRDTQY |
| 49 | Mus musculus (mouse) | αβ | AASANSGTYQR | ASGDAGGGYEQY |
| 50 | Mus musculus C57BL/6 | αβ | AAS | ASSL |
| 57 | Homo sapiens (human) | αβ | AALIQGAQKLV | ASTYHGTGY |
| 94 | Homo sapiens (human) | αβ | AVRPLLDGTYIPT | ASSYLGNTGELF |
| 102 | Mus musculus (mouse) | αβ | ALSENYGNEKIT | ASGDASGAETLY |
| 103 | Mus musculus (mouse) | αβ | ALSENYGNEKIT | ASGDASGGNTLY |
| 104 | Mus musculus (mouse) | αβ | AANSGTYQR | ASGDFWGDTLY |
| 109 | Homo sapiens (human) | αβ | IVWGGYQKVT | ASRYRDDSYNEQF |
| 110 | Homo sapiens (human) | αβ | AVTTDSWGKLQ | ASRPGLAGGRPEQY |
| 111 | Homo sapiens (human) | αβ | AVTTDSWGKLQ | ASRPGLMSAQPEQY |
| 114 | Mus musculus (mouse) | αβ | AVSDPPPLLT | ASGGGGTLY |
| 115 | Mus musculus (mouse) | αβ | AVSLERPYLT | ASGGGGTLY |
| 116 | Homo sapiens (human) | αβ | ALSGFYNTDKLI | ASPGLAGEYEQY |
| 117 | Homo sapiens (human) | αβ | AVRPTSGGSYIPT | ASSYVGNTGELF |
| 118 | Mus musculus (mouse) | αβ | ALFLASSSFSKLV | ASSDWVSYEQY |
| 125 | Homo sapiens (human) | αβ | ATDTTSGTYKYI | SARDLTSGANNEQF |
| 140 | Mus musculus (mouse) | αβ | VVGDRGSALGRLH | ASGDAGGNYAEQF |
| 141 | Mus musculus (mouse) | αβ | VVGDRGSALGRLH | ASSSTGLDTQY |
| 142 | Mus musculus (mouse) | αβ | VVGDRGSALGRLH | ASGSLLDVREVF |
| 143 | Homo sapiens (human) | αβ | VVSDRGSTLGRLY | ASSGLRDRGLYEQY |
| 144 | Homo sapiens (human) | αβ | VVSDRGSTLGRLY | ASSEEGALKESVGTQY |
| 227 | Homo sapiens (human) | αβ | AVNVAGKST | AWSETGLGTGELF |
| 237 | Mus musculus (mouse) | αβ | AAEDGGSGNKLI | ASSWDRAGNTLY |
| 246 | Mus musculus (mouse) | αβ | AVSHQGRYLT | ASGGGGTLY |

65144 Records Found

**Figure 2.19** The Receptors tab of the search results page

The fifth tab on the results page is the References tab (Figure 2.20). Results are initially sorted by the year of publication or submission, the most recent references first. Again, the user can click on the column header to change the sort order. The table includes the IEDB-assigned reference ID, the PubMed ID, authors, article title, abstract, and the date. For journal articles, the information is downloaded directly from PubMed. Clicking on the Ref ID in the far-left lane will take the user to a Reference Detail page. An example is given in Figure 2.21.



Current Filters: ✖ Positive Assays Only

● Any Epitopes
○ Linear Epitope
○ Discontinuous Epitopes
○ Non-peptidic Epitopes

☐ 3D structure available
Amino Acid Modification

Organism: Ex: influenza, peanut
Antigen Name: Ex: core, capsid, myosin

☐ Has receptor sequence
Type: Any Type
Chain: Any Type
Sequence: Exact Matches

☑ Positive Assays Only

☑ T Cell Assays
☑ B Cell Assays
☑ MHC Ligand Assays

Go To Records Starting At 1982

21205 Records Found

Page 1 of 849

25 Per Page

| Ref ID | PMID | Author | Title | Abstract | Date |
|---|---|---|---|---|---|
| 1036848 | 32314731 | Kenji Murata; Munehide Nakatsugawa; Muhammed A Rahman; Linh T Nguyen; Douglas G Millar; David T Mulder; Kenji Sugata; Hiroshi Saijo; Yukiko Matsunaga; Yuki Kagoya; Tingxi Guo; Mark Anczurowski; Chung-Hsi Wang; Brian D Burt; Dalam Ly; Kayoko Saso; Alexandra Easson; David P Goldstein; Michael Reedijk; Danny Ghazarian; Trevor J Pugh; Marcus O Butler; Tak W Mak; Pamela S Ohashi; Naoto Hirano | Landscape mapping of shared antigenic epitopes and their cognate TCRs of tumor-infiltrating T lymphocytes in melanoma. | HLA-restricted T cell responses can induce antitumor effects in cancer patients. Previous human T cell research has largely focused on the few HLA alleles prevalent in a subset of ethnic groups. Here, ...more... | 2020 |
| 1036421 | 31848261 | Marthe Solleder; Philippe Guillaume; Julien Racle; Justine Michaux; Hui-Song Pak; Markus Müller; George Coukos; Michal Bassani-Sternberg; David Gfeller | Mass Spectrometry Based Immunopeptidomics Leads to Robust Predictions of Phosphorylated HLA Class I Ligands. | The presentation of peptides on class I human leukocyte antigen (HLA-I) molecules plays a central role in immune recognition of infected or malignant cells. In cancer, non-self HLA-I ligands can arise ...more... | 2020 |
| 1036600 | 31844290 | Siranush Sarkizova; Susan Klaeger; Phuong M Le; Letitia W Li; Giacomo Oliveira; Hasmik Keshishian; Christina R Hartigan; Wandi Zhang; David A Braun; Keith L Ligon; Pavan Bachireddy; Ioannis K Zervantonakis; Jennifer M Rosenbluth; Tamara Ouspenskaia; Travis Law; Sune Justesen; Jonathan Stevens; William J Lane; Thomas Eisenhaure; Guang Lan Zhang; Karl R Clauser; Nir Hacohen; Steven A Carr; Catherine J Wu; Derin B Keskin | A large peptidome dataset improves HLA class I epitope prediction across most of the human population. | Prediction of HLA epitopes is important for the development of cancer immunotherapies and vaccines. However, current prediction algorithms have limited predictive power, in part because they were not ...more... | 2020 |
| 1036769 | 32217358 | Xiaoling Chen; Shufeng Wang; Yi Huang; Xia Zhao; Xu Jia; Gang Meng; Qian Zheng; Mengjun Zhang; Yuzhang Wu; Li Wang | Obesity Reshapes Visceral Fat-Derived MHC I Associated-Immunopeptidomes and Generates Antigenic Peptides to Drive CD8$^+$ T Cell Responses. | Adaptive CD8$^+$ T cells were observed to contribute to the initiation and progression of obesity-induced visceral adipose tissue (VAT) chronic inflammation that is critically linked to metabo ...more... | 2020 |

**Figure 2.20** The References tab of the search results page

| Reference | |
|---|---|
| **Article Authors** | Shira Yair-Sabag; Valentina Tedeschi; Carolina Vitulano; Eilon Barnea; Fabian Glaser; Dganit Melamed Kadosh; Joel D Taurog; Maria Teresa Fiorillo; Rosa Sorrentino; Arie Admon |
| **Article Title** | The Peptide Repertoire of HLA-B27 may include Ligands with Lysine at P2 Anchor Position. |

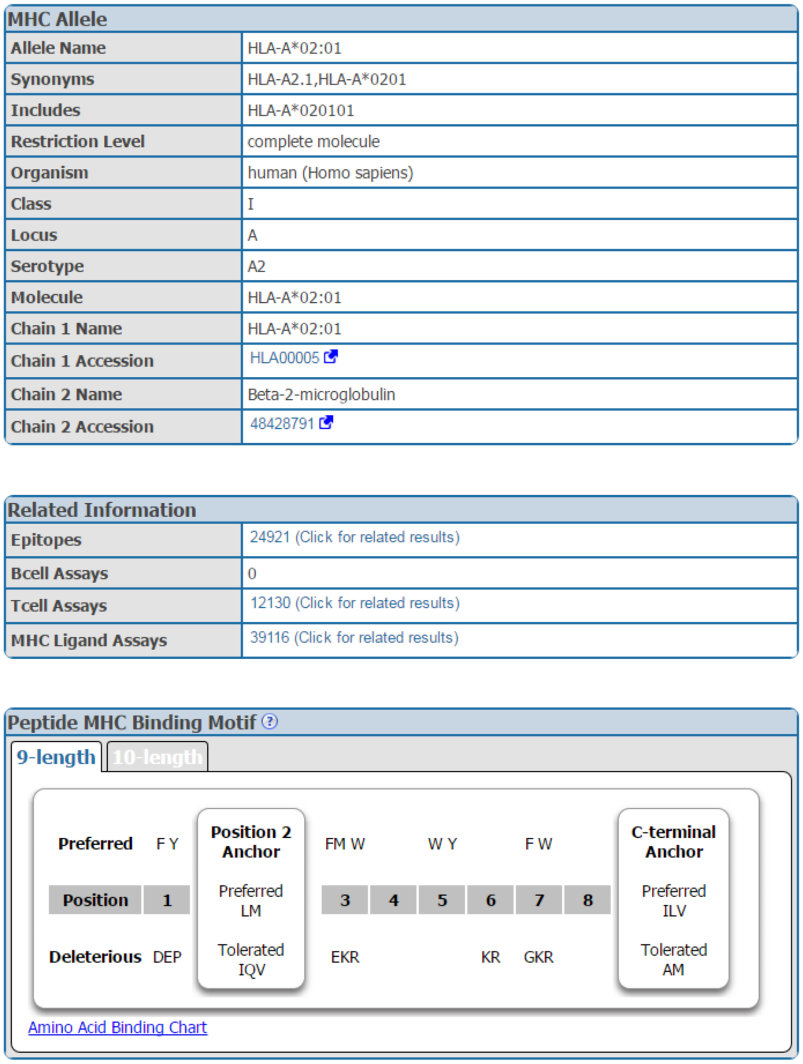
| Reference Detail | |
|---|---|
| **Reference ID** | 1033511 |
| **Abstract** | The HLA-B*27 peptidome has drawn significant attention due to the genetic association between some of the HLA-B*27 alleles and the inflammatory rheumatic disease ankylosing spondylitis (AS), for which a comprehensive biological explanation is still lacking. This study aims to expand the known limits of the HLA-B*27 peptidome to facilitate selection and testing of new peptides, possibly involved in the disease. The HLA peptidomes of HeLa and C1R cell lines stably transfected with the AS-associated HLA-B*27:05 allele, the nonassociated HLA-B*27:09 allele, or their cysteine 67 to serine mutants (C67S), are analyzed on a very large scale. In addition, the peptidomes of HLA-B*27:05 and HLA-B*27:05-C67S are analyzed from the spleens of rats transgenic for these alleles. The results indicate that C67S mutation increases the percentage of peptides with glutamine or lysine at their P2 position (P2-Lys), in both HLA-B*27:05 and HLA-B*27:09. Furthermore, a small fraction of HLA-B*27 peptides contains lysine at their second position (P2), in addition to the more commonly found peptides with arginine (P2-Arg) or the less common glutamine (P2-Gln) located at this anchor position. Overall these data indicate that peptides with P2-Lys should be considered as real ligands of HLA-B*27 molecules and taken into account while looking for putative peptides implicated in the AS. |
| **Affiliations** | Department of Biology, Technion-Israel Institute of Technology, Haifa, Israel; Department of Biology and Biotechnology "C. Darwin", Sapienza University of Rome, Rome, Italy; Bioinformatics Knowledge Unit, The Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering, Technion-Israel Institute of Technology, Haifa, Israel; Department of Internal Medicine, University of Texas Southwestern Medical Center, Dallas, USA. |
| **Date** | 2018 |
| **Reference Type** | Literature |
| **PubMed ID** | 29393594 |
| **Journal** | Proteomics |
| **Journal Volume** | 18 |
| **Article Pages** | e1700249 |
| **Journal ISSN** | 1615-9861 |
| **Curation Last Updated** | 2019-01-03 23:39:42 |

| Related Information | |
|---|---|
| **Epitopes** | 34798 (Click for related results) |
| **Bcell Assays** | 0 |
| **Tcell Assays** | 0 |
| **MHC Ligand Assays** | 42431 (Click for related results) |

**Figure 2.21** An example of the Reference detail page

### 2.2.3.1 Peptide MHC Binding Motif Displays

A display of peptide MHC binding motif diagrams and amino acid binding charts for a subset of MHC allele records appears on the MHC Allele Details page. Clicking on the allele name in the MHC Restriction column on the Assays tab for T Cells and MHC Ligand will bring the user to an MHC Allele Details page (Figure 2.22). As can be seen by the tabs in the binding motif display, the Peptide MHC Binding Motif diagrams on MHC Allele Information pages support diagrams for multiple lengths.



| MHC Allele | |
|---|---|
| **Allele Name** | HLA-A*02:01 |
| **Synonyms** | HLA-A2.1,HLA-A*0201 |
| **Includes** | HLA-A*020101 |
| **Restriction Level** | complete molecule |
| **Organism** | human (Homo sapiens) |
| **Class** | I |
| **Locus** | A |
| **Serotype** | A2 |
| **Molecule** | HLA-A*02:01 |
| **Chain 1 Name** | HLA-A*02:01 |
| **Chain 1 Accession** | HLA00005 |
| **Chain 2 Name** | Beta-2-microglobulin |
| **Chain 2 Accession** | 48428791 |

| Related Information | |
|---|---|
| **Epitopes** | 24921 (Click for related results) |
| **Bcell Assays** | 0 |
| **Tcell Assays** | 12130 (Click for related results) |
| **MHC Ligand Assays** | 39116 (Click for related results) |

Peptide MHC Binding Motif

9-length | 10-length

| **Position** | **1** | **Position 2 Anchor** | **3** | **4** | **5** | **6** | **7** | **8** | **C-terminal Anchor** |
|---|---|---|---|---|---|---|---|---|---|
| **Preferred** | F Y | Preferred<br>LM | FM W | | W Y | | F W | | Preferred<br>ILV |
| **Deleterious** | DEP | Tolerated<br>IQV | EKR | | | KR | GKR | | Tolerated<br>AM |

Amino Acid Binding Chart

**Figure 2.22** Sample MHC Allele Details page with Peptide MHC Binding Motif diagram for HLA-A*02:01. Note the link to the corresponding Amino Acid Binding Chart on the bottom left of the diagram

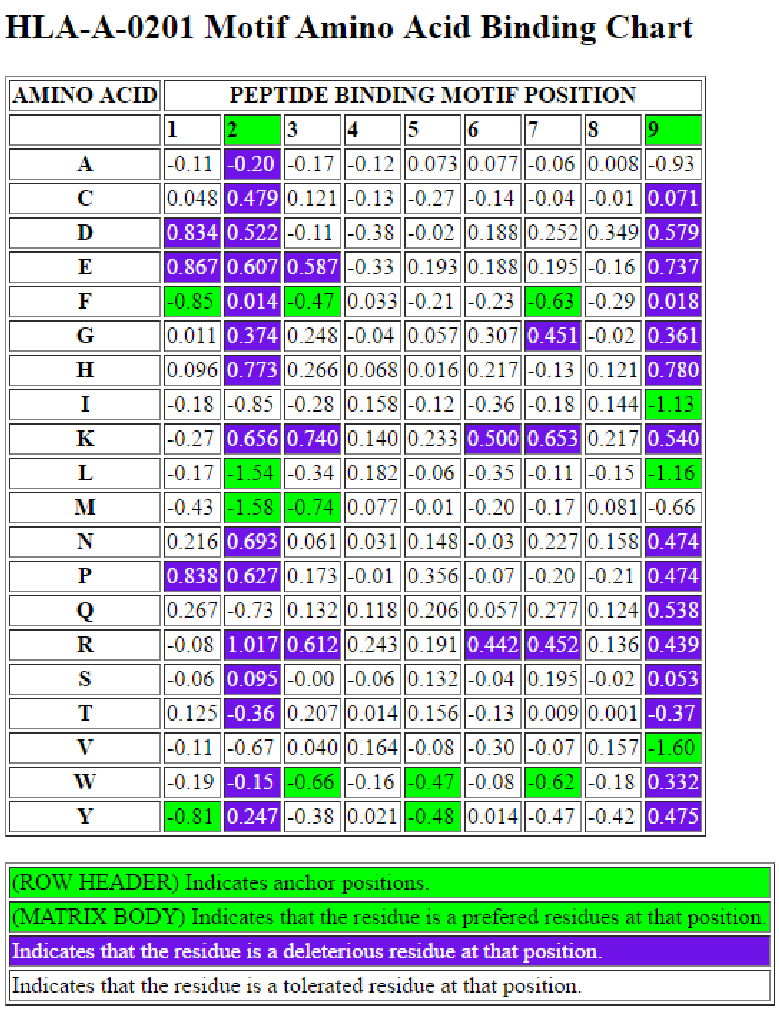
The Peptide MHC Binding Motif diagram summarizes the results of the amino acid binding for each position, which is shown in Figure 2.23. The amino acids are color-coded for each position, where green indicates the residue is preferred for binding, purple indicates it is deleterious for binding, and white indicates the residue is tolerated at that position. The motif diagram shows which residues are preferred and tolerated at the anchor positions, and which residues are preferred and deleterious at the non-anchor positions.

The residue preference is calculated from the SMM prediction matrix, which is described in Section 2.3.1.1. The following steps are taken in determining the residue preference at each position:

For anchor position:

1. determine the best value of this position from corresponding column of the SMM matrix
2. if a residue's value in this column of the SMM matrix is within 3-fold of the best value, designate this residue as preferred

3. if a residue's value in this column of the SMM matrix is within 10-fold of the best value, designate this residue as tolerated
4. The remaining residues are designated as deleterious



## HLA-A-0201 Motif Amino Acid Binding Chart

| AMINO ACID | PEPTIDE BINDING MOTIF POSITION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **A** | -0.11 | -0.20 | -0.17 | -0.12 | 0.073 | 0.077 | -0.06 | 0.008 | -0.93 |
| **C** | 0.048 | 0.479 | 0.121 | -0.13 | -0.27 | -0.14 | -0.04 | -0.01 | 0.071 |
| **D** | 0.834 | 0.522 | -0.11 | -0.38 | -0.02 | 0.188 | 0.252 | 0.349 | 0.579 |
| **E** | 0.867 | 0.607 | 0.587 | -0.33 | 0.193 | 0.188 | 0.195 | -0.16 | 0.737 |
| **F** | -0.85 | 0.014 | -0.47 | 0.033 | -0.21 | -0.23 | -0.63 | -0.29 | 0.018 |
| **G** | 0.011 | 0.374 | 0.248 | -0.04 | 0.057 | 0.307 | 0.451 | -0.02 | 0.361 |
| **H** | 0.096 | 0.773 | 0.266 | 0.068 | 0.016 | 0.217 | -0.13 | 0.121 | 0.780 |
| **I** | -0.18 | -0.85 | -0.28 | 0.158 | -0.12 | -0.36 | -0.18 | 0.144 | -1.13 |
| **K** | -0.27 | 0.656 | 0.740 | 0.140 | 0.233 | 0.500 | 0.653 | 0.217 | 0.540 |
| **L** | -0.17 | -1.54 | -0.34 | 0.182 | -0.06 | -0.35 | -0.11 | -0.15 | -1.16 |
| **M** | -0.43 | -1.58 | -0.74 | 0.077 | -0.01 | -0.20 | -0.17 | 0.081 | -0.66 |
| **N** | 0.216 | 0.693 | 0.061 | 0.031 | 0.148 | -0.03 | 0.227 | 0.158 | 0.474 |
| **P** | 0.838 | 0.627 | 0.173 | -0.01 | 0.356 | -0.07 | -0.20 | -0.21 | 0.474 |
| **Q** | 0.267 | -0.73 | 0.132 | 0.118 | 0.206 | 0.057 | 0.277 | 0.124 | 0.538 |
| **R** | -0.08 | 1.017 | 0.612 | 0.243 | 0.191 | 0.442 | 0.452 | 0.136 | 0.439 |
| **S** | -0.06 | 0.095 | -0.00 | -0.06 | 0.132 | -0.04 | 0.195 | -0.02 | 0.053 |
| **T** | 0.125 | -0.36 | 0.207 | 0.014 | 0.156 | -0.13 | 0.009 | 0.001 | -0.37 |
| **V** | -0.11 | -0.67 | 0.040 | 0.164 | -0.08 | -0.30 | -0.07 | 0.157 | -1.60 |
| **W** | -0.19 | -0.15 | -0.66 | -0.16 | -0.47 | -0.08 | -0.62 | -0.18 | 0.332 |
| **Y** | -0.81 | 0.247 | -0.38 | 0.021 | -0.48 | 0.014 | -0.47 | -0.42 | 0.475 |

(ROW HEADER) Indicates anchor positions.

(MATRIX BODY) Indicates that the residue is a prefered residues at that position.

Indicates that the residue is a deleterious residue at that position.

Indicates that the residue is a tolerated residue at that position.

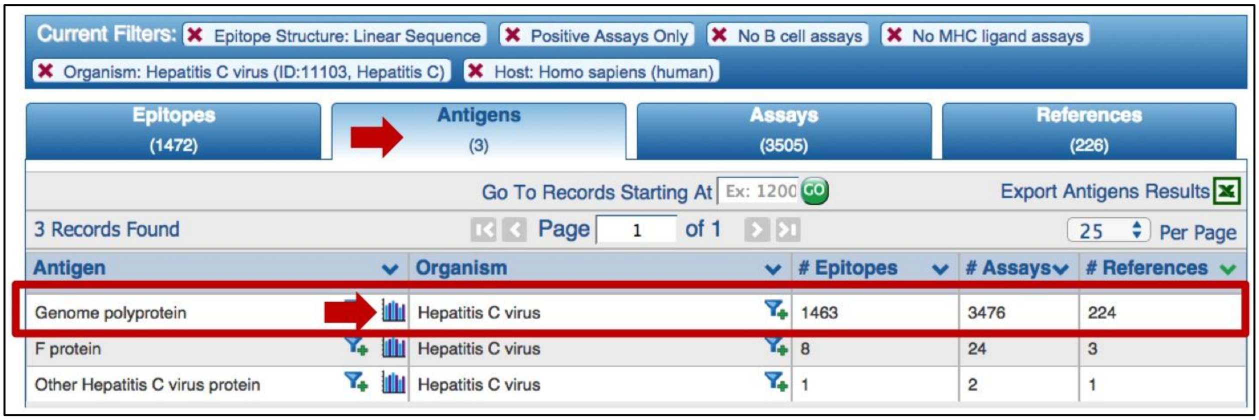
**Figure 2.23** Amino acid binding matrix for MHC allele HLA-A*02:01

For non-anchor position:

1. determine the median value of this position from corresponding column of the SMM matrix
2. if a residue's value in this column of the SMM matrix is within 3-fold of the median value, designate this residue as tolerated
3. if a residue's value in this column of the SMM matrix is above 3-fold of the median value, designate this residue as preferred
4. if a residue's value in this column of the SMM matrix is below 3-fold of the median value, designate this residue as deleterious

### 2.2.3.2 Immunome Browser

The Immunome Browser is a feature integrated into the IEDB to more efficiently display large sets of immune epitope data. The purpose of the tool is to allow users to explore how often each protein region has been studied in immune assays and in how many assays the immune response was positive or negative. The Immunome Browser "maps" query results from the IEDB onto a reference proteome. A reference proteome is used because (1) epitopes reported in IEDB were identified for different strains and protein isoforms – mapping to the reference protein allows to visualize and study such epitopes as they would have the same antigen; (2) different mutant variants of the same epitope were tested and reported; and (3) immune response varies among studies and assays due to heterogeneity of samples and complexity of immune response. The Immunome Browser presents the mapped data along with calculated 'epitope prominence scores' that rank known epitopes based on how frequently subjects responded to each epitope, allowing identification of immunodominance. Both linear and discontinuous linear peptide epitopes with T cell or B cell responses are supported for viewing using the Immunome Browser. It is accessible via the Immunome Browser icon on the Antigen tab on the results page, as seen in Figure 2.24.

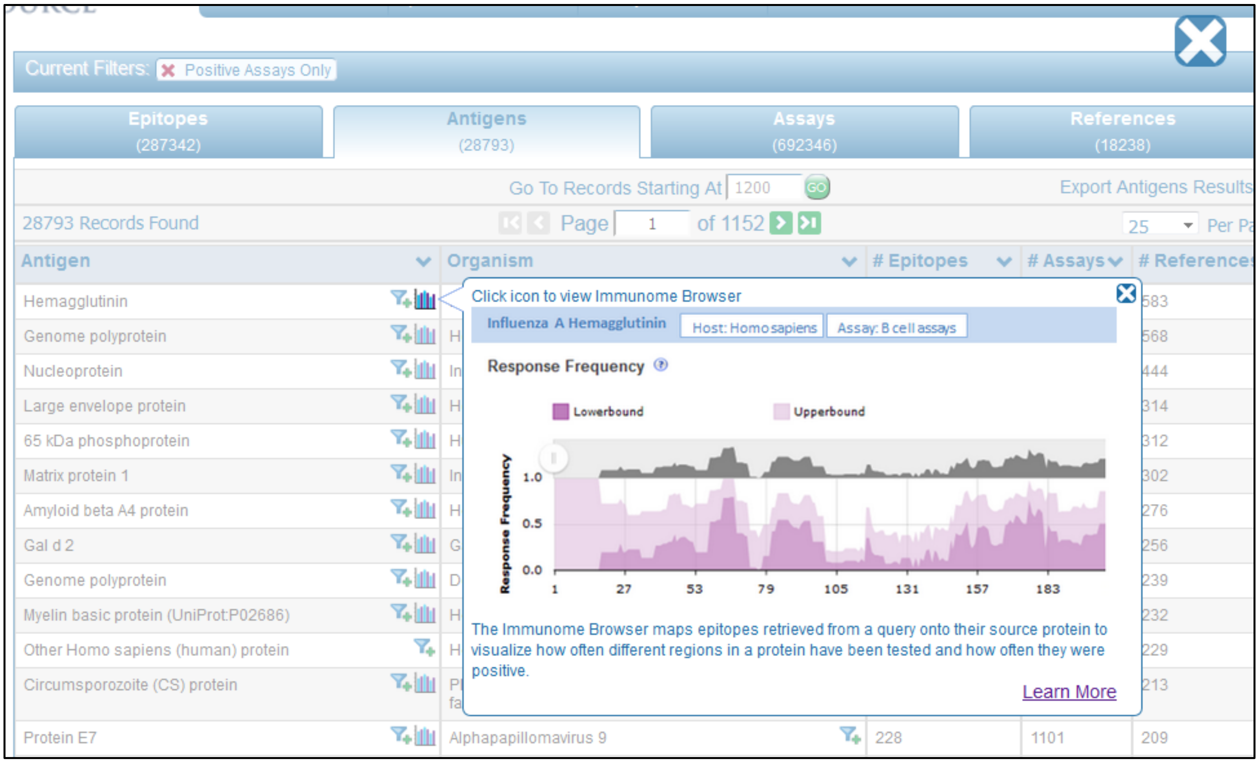


Current Filters: ✖ Epitope Structure: Linear Sequence ✖ Positive Assays Only ✖ No B cell assays ✖ No MHC ligand assays ✖ Organism: Hepatitis C virus (ID:11103, Hepatitis C) ✖ Host: Homo sapiens (human)

| Antigen | Organism | # Epitopes | # Assays | # References |
|---|---|---|---|---|
| Genome polyprotein | Hepatitis C virus | 1463 | 3476 | 224 |
| F protein | Hepatitis C virus | 8 | 24 | 3 |
| Other Hepatitis C virus protein | Hepatitis C virus | 1 | 2 | 1 |

**Figure 2.24** The Immunome Browser is accessed by clicking on the icon shown on the Antigen tab on the results page of a query

In order to make the Immunome Browser capability more prominent, a pop-up window was added that appears the first time a user goes to the Antigen tab after making a search, as seen in Figure 2.25. It can be easily dismissed by clicking on the large X in the upper right-hand corner or clicking anywhere else on the window.



28793 Records Found

| Antigen | Organism | # Epitopes | # Assays | # Reference |
|---|---|---|---|---|
| Hemagglutinin | | | | 583 |
| Genome polyprotein | H | | | 568 |
| Nucleoprotein | In | | | 444 |
| Large envelope protein | H | | | 314 |
| 65 kDa phosphoprotein | H | | | 312 |
| Matrix protein 1 | In | | | 302 |
| Amyloid beta A4 protein | H | | | 276 |
| Gal d 2 | G | | | 256 |
| Genome polyprotein | D | | | 239 |
| Myelin basic protein (UniProt:P02686) | H | | | 232 |
| Other Homo sapiens (human) protein | H | | | 229 |
| Circumsporozoite (CS) protein | Pl fa | | | 213 |
| Protein E7 | Alphapapillomavirus 9 | 228 | 1101 | 209 |

Click icon to view Immunome Browser

Influenza A Hemagglutinin | Host: Homo sapiens | Assay: B cell assays

Response Frequency

The Immunome Browser maps epitopes retrieved from a query onto their source protein to visualize how often different regions in a protein have been tested and how often they were positive.

Learn More

**Figure 2.25** A pop-up window appears each time the user clicks on the Antigen tab on the Results page. It highlights the Immunome Browser icon and briefly explains the Immunome Browser's functionality.

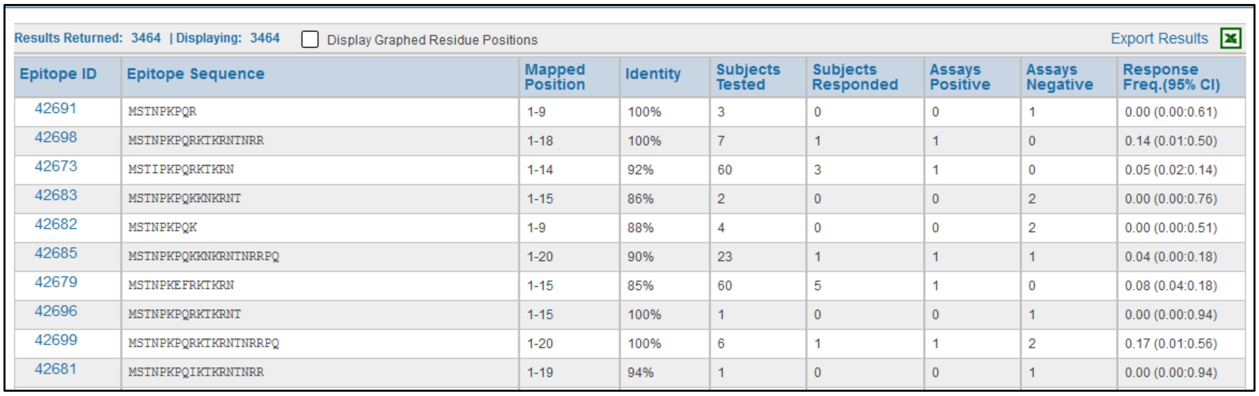
In the Immunome Browser, each selected antigen is considered to be a target protein, and the tool by default maps and visualizes all epitopes in the query result that are from the source antigen, which is the target protein or any of its taxonomic child. The mapping is done using the alignment between the source antigen and the target protein, and matching the epitope positions in the source antigen with the residue positions in the target protein. By default, epitopes that were tested as negative for the correspondent query will be mapped as well, even if the user queried only for positive assays. Also, the epitopes that failed to satisfy the default mapping criteria won't be mapped and visualized. The Immunome Browser output for query criteria of T cell assays, linear epitopes, Hepatitis C virus, and human host is shown in Figure 2.26.

Pending Filters: Positive Assays Only | Epitope Structure: Linear Sequence | Organism: Hepatitis C virus (ID:11103, Hepatitis C) | No B cell assays | No MHC ligand assays | Host: Homo sapiens (human)

Residue Position Start 1 End 3011

**Figure 2.26** Immunome Browser graphical output displaying assay results mapped onto a reference proteome by residue position

Two graphs are generated in the Immunome Browser. The upper plot titled "Response Frequency" renders the lower (dark color) and upper (light color) bounds of the 95% confidence interval (CI) of the response frequency (RF) for each position target protein position, averaged over all epitopes mapped to that position. RF is calculated as the number of positively responded subjects (or individuals in this case) relative to the total number of those tested summed up by mapped epitopes. The graph, however, displays only the upper and lower bounds of the 95% confidence interval (CI) for the RF score and not the RF score itself. The lower plot, titled "Epitope Assay Counts," indicates the number of positive and negative assays for each residue position.



Results Returned: 3464 | Displaying: 3464 ☐ Display Graphed Residue Positions

| Epitope ID | Epitope Sequence | Mapped Position | Identity | Subjects Tested | Subjects Responded | Assays Positive | Assays Negative | Response Freq.(95% CI) |
|---|---|---|---|---|---|---|---|---|
| 42691 | MSTNPKPQR | 1-9 | 100% | 3 | 0 | 0 | 1 | 0.00 (0.00:0.61) |
| 42698 | MSTNPKPQRKTKRNTNRR | 1-18 | 100% | 7 | 1 | 1 | 0 | 0.14 (0.01:0.50) |
| 42673 | MSTIPKPQRKTKRN | 1-14 | 92% | 60 | 3 | 1 | 0 | 0.05 (0.02:0.14) |
| 42683 | MSTNPKPQKKNKRNT | 1-15 | 86% | 2 | 0 | 0 | 2 | 0.00 (0.00:0.76) |
| 42682 | MSTNPKPQK | 1-9 | 88% | 4 | 0 | 0 | 2 | 0.00 (0.00:0.51) |
| 42685 | MSTNPKPQKKNKRNTNRRPQ | 1-20 | 90% | 23 | 1 | 1 | 1 | 0.04 (0.00:0.18) |
| 42679 | MSTNPKEFRKTKRN | 1-15 | 85% | 60 | 5 | 1 | 0 | 0.08 (0.04:0.18) |
| 42696 | MSTNPKPQRKTKRNT | 1-15 | 100% | 1 | 0 | 0 | 1 | 0.00 (0.00:0.94) |
| 42699 | MSTNPKPQRKTKRNTNRRPQ | 1-20 | 100% | 6 | 1 | 1 | 2 | 0.17 (0.01:0.56) |
| 42681 | MSTNPKPQIKTKRNTNRR | 1-19 | 94% | 1 | 0 | 0 | 1 | 0.00 (0.00:0.94) |

**Figure 2.27** Immunome Browser tabular output.

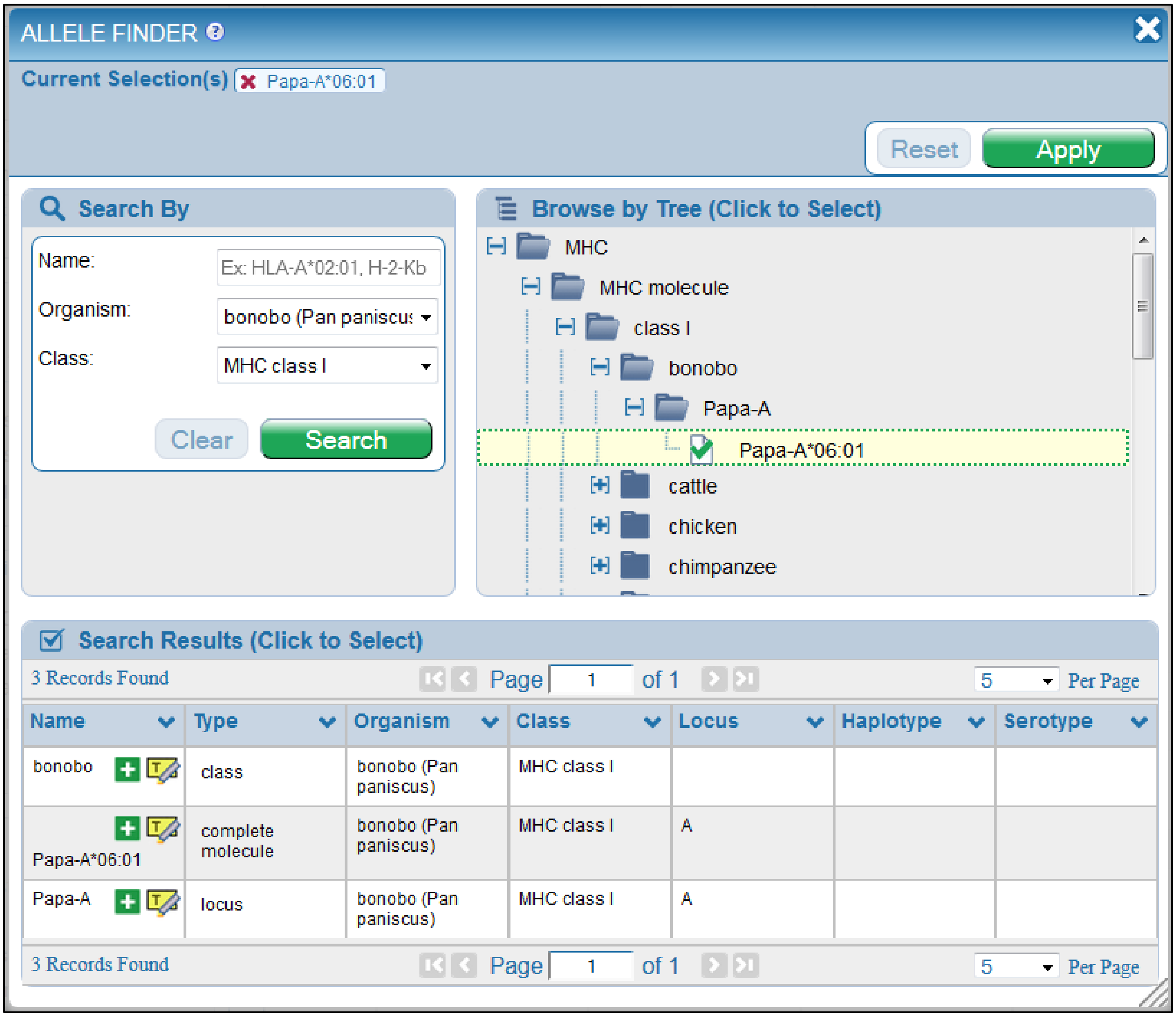
In addition to the plots, a table is generated that displays the epitope ID, sequence, position, and identity, as well as the number of subjects tested, the number who responded, and number of positive and negative assays, and the response frequency (Figure 2.27). The user can interactively zoom in and out on the plots to a specific protein region and, if the check box for the table to correspond the plots is selected, the table is automatically updated to show only epitope from the selected region. Alternatively, the user can specify the residue start and end positions at the bottom of plots and click Update Display.

## 2.2.4 Finders Overview

Several finders (Allele, Assay, Disease, Molecule, Geolocation, and Organism) are available to help facilitate selections and control vocabulary usage, thus improving query results. At times the potential list of selections can be quite extensive, and the finders help users make selections from large lists. The finders can be utilized when performing all queries. Multiple selections can be made when utilizing finders during a query.

### 2.2.4.1 Allele Finder

The MHC Allele Finder facilitates the selection of one or more MHC alleles. The finder consists of four sections as shown in Figure 2.28. The top section lists the alleles that the user selects. The selections can be removed by clicking on the red X of an allele name or by clicking on the Reset button to delete all selected alleles. When the user has completed the selection process, the user needs to click the green Apply button. The middle left section of the finder contains the “Search By” panel. Users can search by allele name, source organism, and/or class (I, II, or non-classical). After the user supplies their search criteria and clicks the Search button, the system will filter the list of MHC alleles using the organism, class, and allele provided. The allele finder uses wild card characters by default on both ends of criteria entered into the allele field. The system then returns in the bottom “Search Results” panel a list of any alleles that contain the value in the name field and match the class selected. Users can click on the green “+” icon to select an allele. Users can also click on the yellow highlighter icon to highlight the allele in the allele tree in the middle right section of the finder. Alternatively, a user can browse the hierarchical allele tree. Clicking on a node in this tree will add the allele to the Current Selections section of the finder.



Current Selection(s) ✖ Papa-A*06:01

Name: Ex: HLA-A*02:01, H-2-Kb
Organism: bonobo (Pan paniscus
Class: MHC class I

- MHC
  - MHC molecule
    - class I
      - bonobo
        - Papa-A
          - ✓ Papa-A*06:01
      - cattle
      - chicken
      - chimpanzee

3 Records Found   Page 1 of 1   5 Per Page

| Name | Type | Organism | Class | Locus | Haplotype | Serotype |
|---|---|---|---|---|---|---|
| bonobo | class | bonobo (Pan paniscus) | MHC class I | | | |
| Papa-A*06:01 | complete molecule | bonobo (Pan paniscus) | MHC class I | A | | |
| Papa-A | locus | bonobo (Pan paniscus) | MHC class I | A | | |

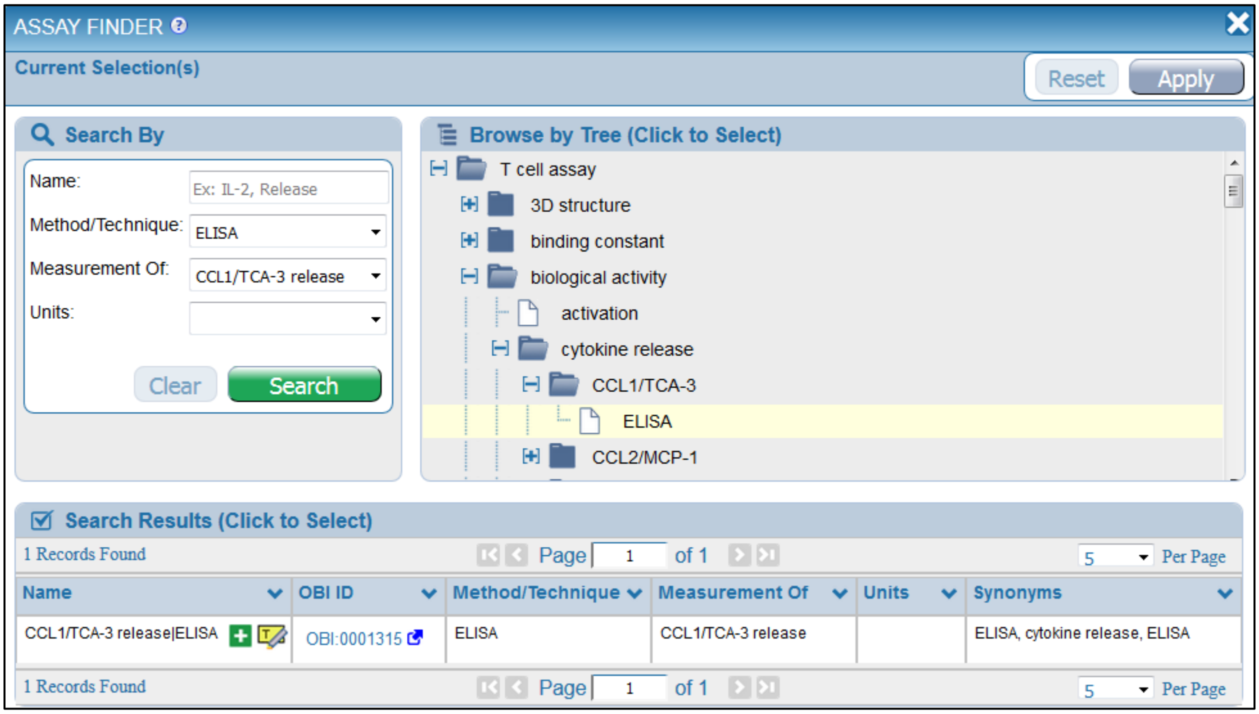
3 Records Found   Page 1 of 1   5 Per Page

**Figure 2.28** Allele Finder. Alleles are displayed in a tree structure and users can search by allele name, source organism, and MHC class (I, II, or non-classical)

### 2.2.4.2 Assay Finder

The IEDB contains experimental data characterizing antibody and T cell epitopes studied in humans, non-human primates, and other animal species. Search results may easily be narrowed to include only the specific assay categories of T Cell Assays, B Cell Assays, and MHC Ligand Assays. Additionally, one may further narrow search results to very specific experimental methods using the Assay Finder.

The Assay Finder is used to facilitate the selection of one or more assay types and lists all assay types in the selected assay category. The Assay Finder for T Cell, B cell, and MHC Ligand assays can be found in the Assay section on the home page search interface, the left-hand side of the Results page, and on their respective Specialized Search pages. These versions of the Assay Finder organize and display assays in a tree structure, as seen in Figure 2.29 for the T Cell assays. Users can also search for assays by their method/technique and by the characters within the assay's name. The figure shows the results for ELISA type assays for "CCL1/TCA-3 release". Users can click on the green "+" icon to select an assay. Users can also click on the yellow highlighter icon to highlight the assay in the assay tree in the middle right section of the finder, as is shown in the figure. Alternatively, a user can browse the hierarchical assay tree. Clicking on a node in this tree will add the assay to the Current Selections section of the finder.



Name: Ex: IL-2, Release
Method/Technique: ELISA
Measurement Of: CCL1/TCA-3 release
Units:

| Name | OBI ID | Method/Technique | Measurement Of | Units | Synonyms |
|---|---|---|---|---|---|
| CCL1/TCA-3 release\|ELISA | OBI:0001315 | ELISA | CCL1/TCA-3 release | | ELISA, cytokine release, ELISA |

**Figure 2.29** Assay Finder on the T Cell Advanced Search page. Assays are displayed in a tree structure and users can find displays by their method/technique and by the characters with which the assay name starts

### 2.2.4.3 Disease Finder

This query feature allows users to select a disease association based on the host disease state or status as captured in curation. Diseases are organized into a browsable tree structure. Upon the selection of host disease state/status, the system provides the user with a hierarchical *Disease Tree* that organizes the data at the highest level according to the five disease categories (Allergy, Autoimmunity, Infectious Disease, Additional Diseases by category, and Transplant-related Disease and Allo-reactivity) and then by the anatomical location of the disease (e.g. respiratory tract, gastrointestinal tract). In this way the user can either type in the disease name or synonym of interest, or navigate the Disease Tree by disease manifestation and physical location to see what is available. A node for healthy subjects is also included. The Disease Finder is fully functional for only Autoimmunity. The finder will be revised with an updated disease ontology and hierarchical tree during 2017 based on the Disease Ontology that will make it functional for the other disease categories. Infectious disease searches are best accommodated using the Organism Finder to specify the antigen.

Figure 2.30 shows the Disease Tree with diabetes highlighted. DOID refers to the Disease Ontology identifier. The DTREE designates an IEDB-specific identifier that will be updated later with a DOID number when the Disease Ontology incorporates the terms.

Current Selection(s) diabetes mellitus

Disease Name: diabetes

Disease ID: Ex: 9415

ID Source:

4 Records Found Page 1 of 1 5 Per Page

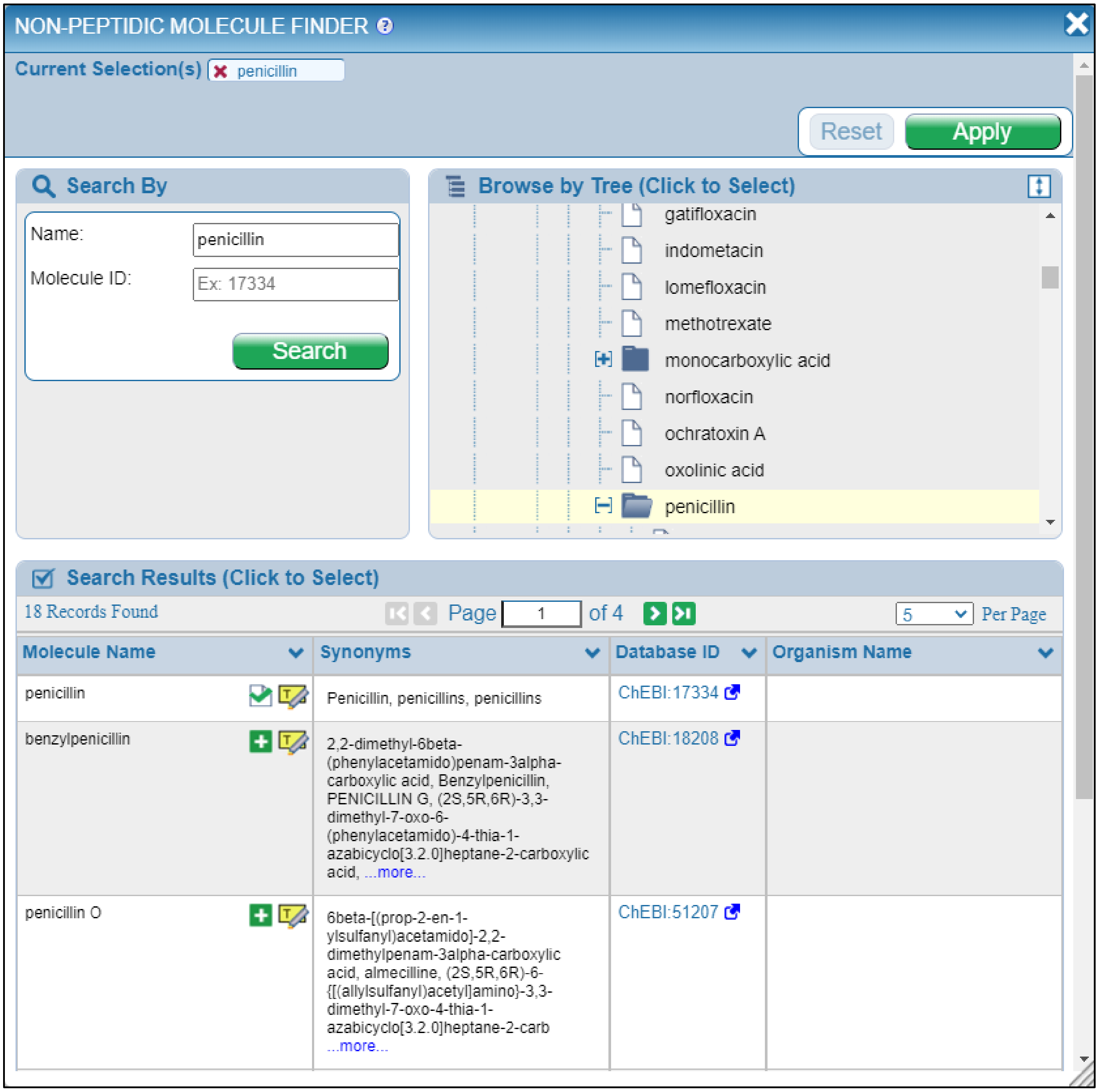
| Disease Name | Synonyms | Disease ID |
|---|---|---|
| diabetes mellitus | | DOID [DOID:9351] |
| prediabetes syndrome | prediabetic state, Prediabetes | DOID [DOID:11716] |
| type 1 diabetes mellitus | type I diabetes mellitus, insulin-dependent diabetes mellitus, IDDM | DOID [DOID:9744] |
| type 2 diabetes mellitus | type 2 diabetes, non-insulin-dependent diabetes mellitus, type II diabetes mellitus, NIDDM | DOID [DOID:9352] |

4 Records Found Page 1 of 1 5 Per Page

**Figure 2.30** The disease finder is particularly helpful in specifying epitopes related to autoimmune diseases. In the example shown, diabetes is highlighted and selected.

### 2.2.4.4 Molecule Finder

The Molecule Finder is used to facilitate the selection of source antigens, immunogens, and epitopes. There are two versions of the Molecule Finder – one specifically for non-peptidic molecules found in the Epitope box in the results page, and another that includes peptidic and non-peptidic branches, found in the Antigen box in the results page. The former contains the structures curated by the Chemical Entities of Biological Interest (ChEBI) database. An example of the non-peptidic finder is shown in Figure 2.31.



Current Selection(s) penicillin

Name: penicillin

Molecule ID: Ex: 17334

18 Records Found

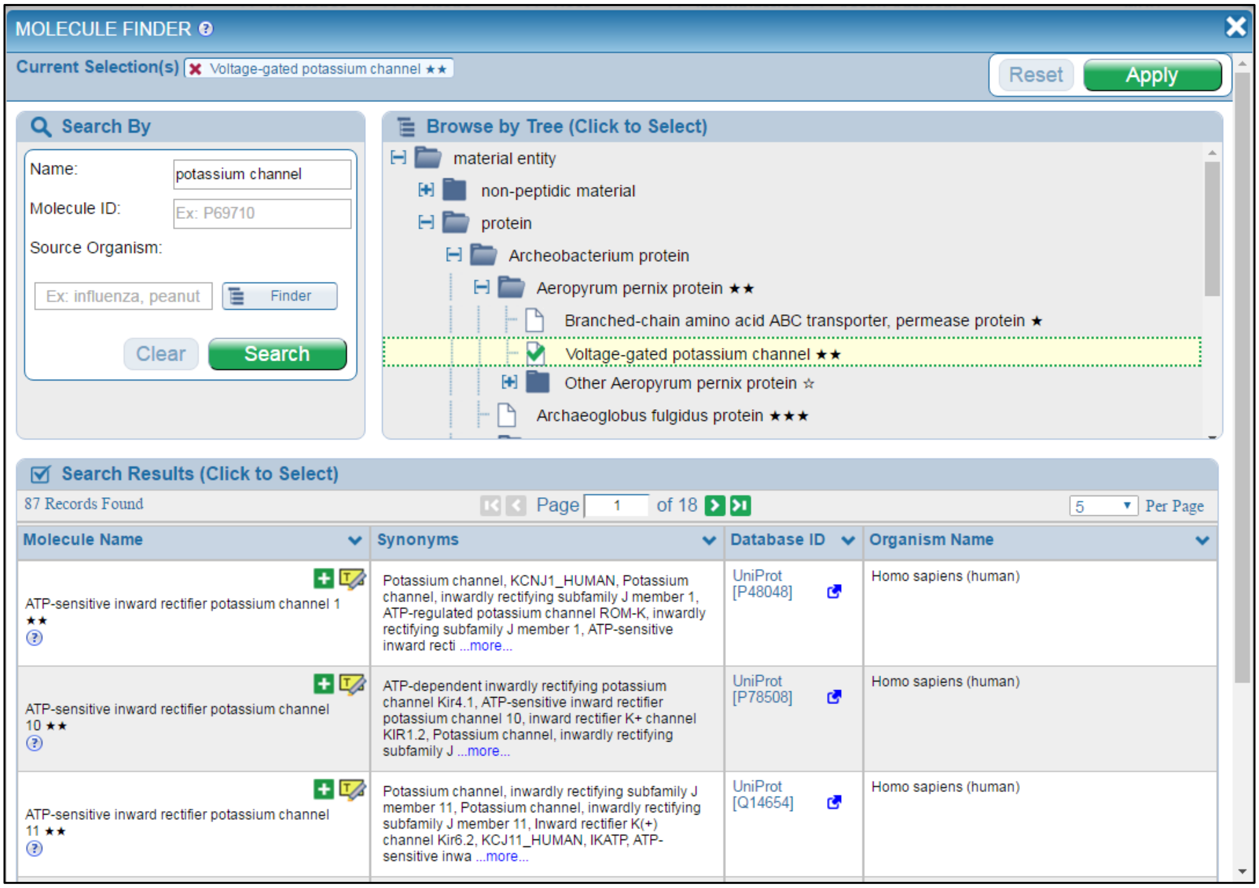
Page 1 of 4

5 Per Page

| Molecule Name | Synonyms | Database ID | Organism Name |
|---|---|---|---|
| penicillin | Penicillin, penicillins, penicillins | ChEBI:17334 | |
| benzylpenicillin | 2,2-dimethyl-6beta-(phenylacetamido)penam-3alpha-carboxylic acid, Benzylpenicillin, PENICILLIN G, (2S,5R,6R)-3,3-dimethyl-7-oxo-6-(phenylacetamido)-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid, ...more... | ChEBI:18208 | |
| penicillin O | 6beta-[(prop-2-en-1-ylsulfanyl)acetamido]-2,2-dimethylpenam-3alpha-carboxylic acid, almecilline, (2S,5R,6R)-6-{[(allylsulfanyl)acetyl]amino}-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carb ...more... | ChEBI:51207 | |

**Figure 2.31** The non-peptidic version of the Molecule Finder. This finder is accessed in the Epitope filter on the search results page.

With regard to the protein or peptidic branch of the Molecule Finder, individual GenPept proteins utilized by IEDB data are assigned to parent proteins from reference proteomes by sequence homology. These reference proteomes are graded by a star system described below that reflects the quality and completeness of each. An example of the star system and the protein tree can be seen in Figure 2.32.



Current Selection(s) Voltage-gated potassium channel ★★

Name: potassium channel
Molecule ID: Ex: P69710
Source Organism: Ex: influenza, peanut

- material entity
  - non-peptidic material
  - protein
    - Archeobacterium protein
      - Aeropyrum pernix protein ★★
        - Branched-chain amino acid ABC transporter, permease protein ★
        - ☑ Voltage-gated potassium channel ★★
        - Other Aeropyrum pernix protein ☆
      - Archaeoglobus fulgidus protein ★★★

87 Records Found Page 1 of 18 5 Per Page

| Molecule Name | Synonyms | Database ID | Organism Name |
|---|---|---|---|
| ATP-sensitive inward rectifier potassium channel 1 ★★ | Potassium channel, KCNJ1_HUMAN, Potassium channel, inwardly rectifying subfamily J member 1, ATP-regulated potassium channel ROM-K, inwardly rectifying subfamily J member 1, ATP-sensitive inward recti ...more... | UniProt [P48048] | Homo sapiens (human) |
| ATP-sensitive inward rectifier potassium channel 10 ★★ | ATP-dependent inwardly rectifying potassium channel Kir4.1, ATP-sensitive inward rectifier potassium channel 10, inward rectifier K+ channel KIR1.2, Potassium channel, inwardly rectifying subfamily J ...more... | UniProt [P78508] | Homo sapiens (human) |
| ATP-sensitive inward rectifier potassium channel 11 ★★ | Potassium channel, inwardly rectifying subfamily J member 11, Potassium channel, inwardly rectifying subfamily J member 11, Inward rectifier K(+) channel Kir6.2, KCJ11_HUMAN, IKATP, ATP-sensitive inwa ...more... | UniProt [Q14654] | Homo sapiens (human) |

**Figure 2.32** An example of the protein branch of the Molecule Finder

### Proteomes

★★★ For some well-studied species UniProt provides reference proteomes that contain a full set of all proteins expressed by the species. For some bacterial species having inconsistent protein expression, additional proteins have been added to the reference proteome to create metaproteomes. These reference proteomes or metaproteomes are designated by **three stars**.

★★ For other species that have been completely sequenced, UniProt provides complete proteomes. In addition, for some species expressing allergens, formal nomenclature designated by the International Union of Immunological Societies (IUIS) exists to describe these allergens. Complete proteomes that are not considered reference proteomes, or ones that contain formal IUIS allergen nomenclature for a subset of proteins, are designated by **two stars**.

★ For some species, a proteome does not currently exist in UniProt, but GenBank provides a set of proteins representative of the species. These GenBank proteomes are designated by a **single star**.

☆ For species that have no proteome in UniProt or GenBank, and no IUIS nomenclature, UniProt may still contain some records that can be used as parents. This case is designated with an **unfilled star**.

**No Star**. Species having no proteome in either UniProt or GenBank are designated by **no stars**.

**Proteins**

Within each species' proteome, individual, "parent" proteins serve to group multiple distinct GenPept sequences. These GenPept entries are the "children" for each proteome protein in the Molecule Tree. This allows users to search IEDB data by selecting the parent protein from the reference proteome, rather than having to select each individual GenPept entry. The "parent" proteins within each proteome also use stars to denote the quality of information provided by each.

★★ UniProt reviewed proteins or proteins having official IUIS allergen nomenclature have **two stars**.

★ UniProt unreviewed proteins or proteins from GenBank have a **single star**.

☆ Nodes of the protein branch of the molecule tree containing GenPept and IEDB internal protein accessions having no homology to any protein within a reference proteome are designated with an **unfilled star**.

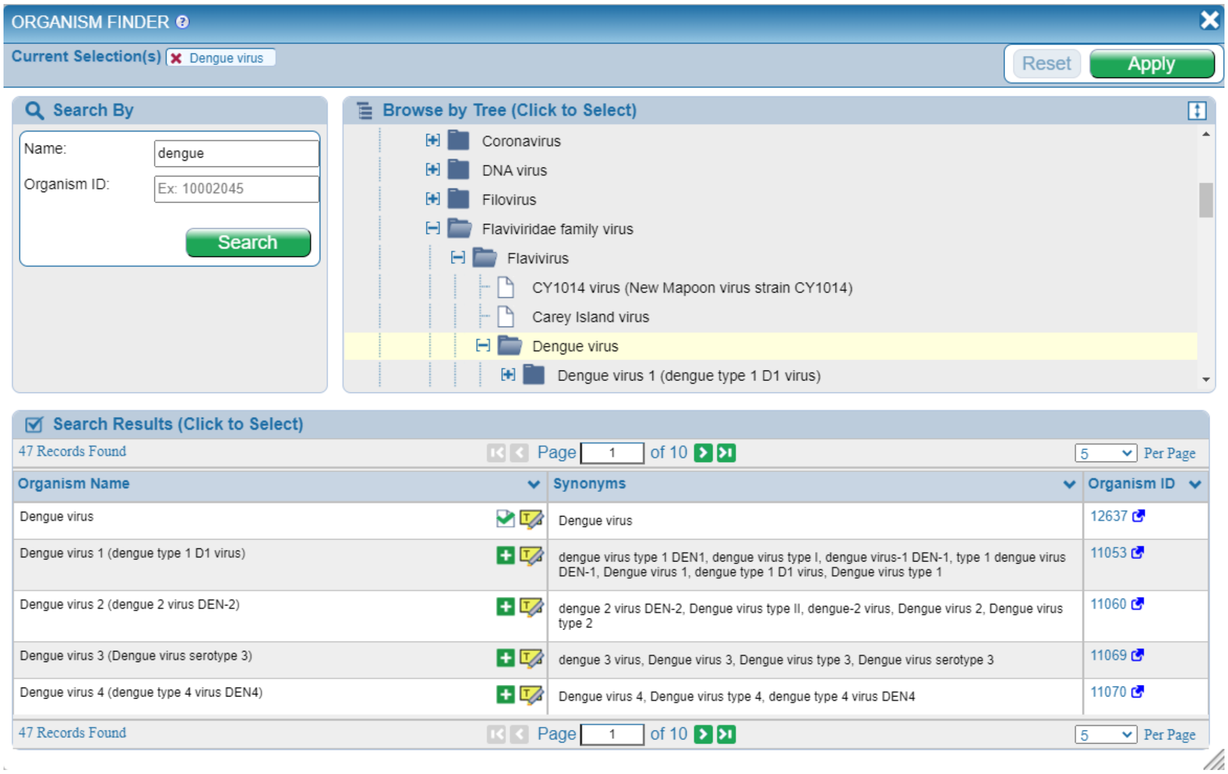
Organizational nodes, utilized by the Molecule tree to clarify the relationship between groups of similar proteins have **no stars**. An example of these nodes is "Immunoglobulin" used to group all immunoglobulin proteins from a single species.

As one can see in Figure 2.32, a user can search the molecule tree by entering text, including synonyms, in the Name field in the upper left-hand corner of the finder. The user can also specify the source organism of the molecule of interest using the autocomplete field or the organism finder. For example, this can facilitate the specification of a hemagglutinin is a particular strain of Influenza.

### 2.2.4.5 Organism Finder

The organism finder is used to facilitate the selection of a species or strain from the NCBI Taxonomy Database. The Organism finder allows the user to find species using their name, synonyms, or taxonomy identifier (assigned by NCBI). When the user performs a search, the system will display a tree structure. The user can search for a name or Organism ID in the "Search By" panel in the upper left-hand portion of the Finder. In the example shown in

Figure 2.33, a search for "dengue" is performed, which results in 47 items being found. The user can select one or more of the items by clicking on the green "+" icon or clicking a branch in the tree. The user can also choose to highlight the item in the tree, as shown in the figure, by clicking the corresponding yellow highlighter icon. Synonyms for a selection are listed next to the organism name column in the search results table. When the Organism Finder is adjacent to a Host Organism field, only the source organisms for which data exist in the IEDB are displayed in the tree structure.



Current Selection(s) Dengue virus

Name: dengue

Organism ID: Ex: 10002045

- Coronavirus
- DNA virus
- Filovirus
- Flaviviridae family virus
  - Flavivirus
    - CY1014 virus (New Mapoon virus strain CY1014)
    - Carey Island virus
    - Dengue virus
      - Dengue virus 1 (dengue type 1 D1 virus)

47 Records Found Page 1 of 10 5 Per Page

| Organism Name | Synonyms | Organism ID |
|---|---|---|
| Dengue virus | Dengue virus | 12637 |
| Dengue virus 1 (dengue type 1 D1 virus) | dengue virus type 1 DEN1, dengue virus type I, dengue virus-1 DEN-1, type 1 dengue virus DEN-1, Dengue virus 1, dengue type 1 D1 virus, Dengue virus type 1 | 11053 |
| Dengue virus 2 (dengue 2 virus DEN-2) | dengue 2 virus DEN-2, Dengue virus type II, dengue-2 virus, Dengue virus 2, Dengue virus type 2 | 11060 |
| Dengue virus 3 (Dengue virus serotype 3) | dengue 3 virus, Dengue virus 3, Dengue virus type 3, Dengue virus serotype 3 | 11069 |
| Dengue virus 4 (dengue type 4 virus DEN4) | Dengue virus 4, Dengue virus type 4, dengue type 4 virus DEN4 | 11070 |

47 Records Found Page 1 of 10 5 Per Page

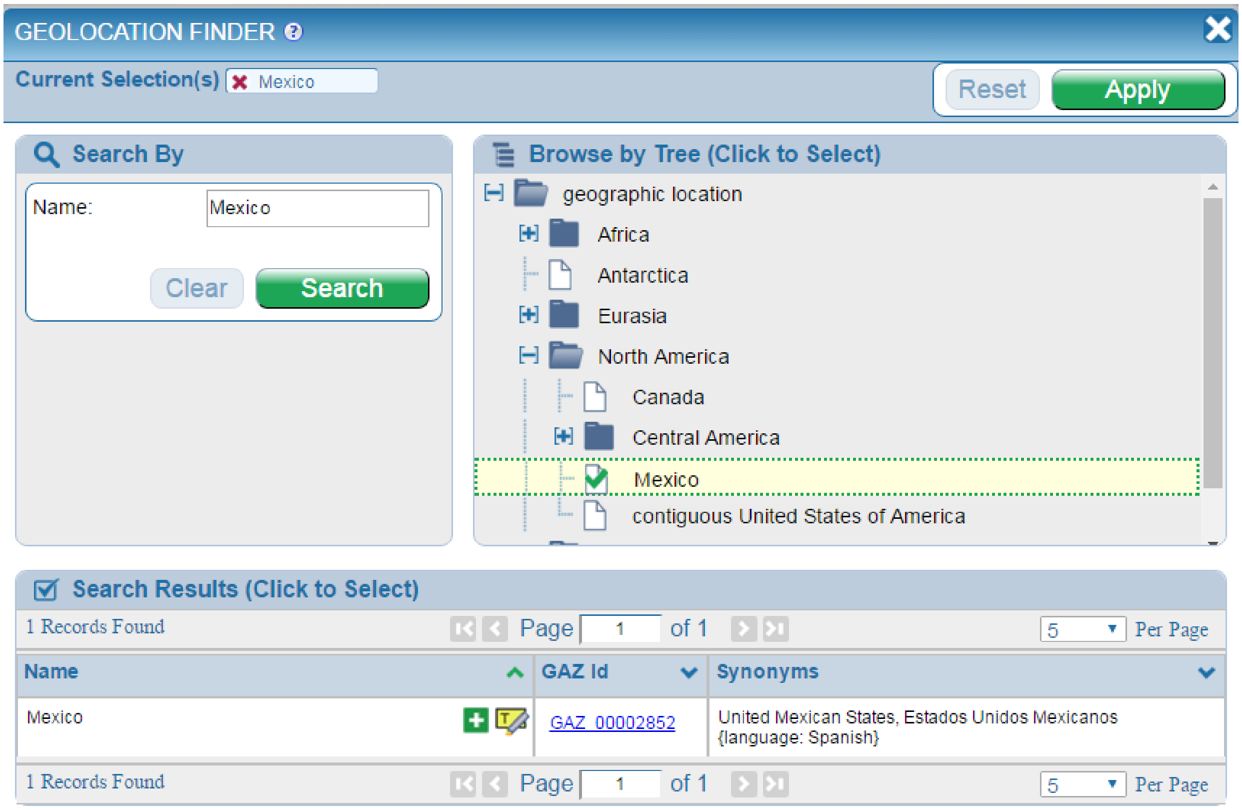
**Figure 2.33** Organism Finder showing a search for dengue with dengue highlighted in the tree

### 2.2.4.6 Geolocation Finder

This feature combines the locations where study subjects were studied and the external ontology known as Gazetteer (http://bioportal.bioontology.org/ontologies/1397). It can be found on the B Cell Search, T Cell Search, and MHC Ligand Specialized search pages under the Host Details subsection within the Immunization section. Gazetteer represents geographic locations in a formal ontological hierarchy. The IEDB's Geographic Location Finder was created by taking the geographic locations mentioned in the manuscripts containing data curated by the IEDB and presenting them in the formal ontological hierarchy of Gazetteer. Thus, every geographic location in the Finder links out to a GAZ ID, where additional information provided by Gazetteer such as definitions and synonyms can be found.

To use the Finder, simply navigate the tree by clicking open the continent of choice to find the country(ies) where study subjects were exposed to the immunogen tested in the immune epitope assays. Alternatively, one may use the "Search By" feature and type free text to search the tree. The Search By feature accepts synonyms as search criteria. Its use is shown in Figure 2.34 for the term “Mexico”.

It must be noted that curators only capture geographic location information when authors explicitly state that subjects were recruited in a specific country. The location of authors' affiliations is not used to populate this field.



Current Selection(s): Mexico

Name: Mexico

- geographic location
  - Africa
  - Antarctica
  - Eurasia
  - North America
    - Canada
    - Central America
    - ☑ Mexico
    - contiguous United States of America

1 Records Found

| Name | GAZ Id | Synonyms |
|---|---|---|
| Mexico | GAZ_00002852 | United Mexican States, Estados Unidos Mexicanos {language: Spanish} |

1 Records Found

**Figure 2.34** Geolocation finder. This example shows the tree structure by continent, region, and country. A search was made for Mexico within the tree using the Search By box on the left, which produced one result. This was then highlighted in the tree, as shown. Clicking on “Mexico” in the tree populated the Current Selection field in the upper left corner of the finder.

## *2.3 Tools*

The Analysis Resource pull-down menu at www.iedb.org accesses the IEDB Analysis Resource and has five items – Analysis Resource Overview, T Cell Epitope Prediction, B Cell Epitope Prediction, Epitope Analysis Tools, and Tool Licensing Information. The purpose of the Analysis Resource of the IEDB is to provide computational tools that enhance the value of the IEDB database to the user. Providing access to tools in one centralized location helps make users aware of available solutions to their problems. All of the information contained within the Analysis Resource, including analysis tools and algorithms developed by the IEDB staff, are freely available to the scientific community. For commercial entities that wish to access the tools in-house, licensing information for the tools can be accessed from the pull-down menu. The Analysis Resource can also be accessed via the rightmost panel on the IEDB home page, although only the most frequently used tools are listed.

The tools provided in the analysis resource fall into two categories – prediction tools and analysis tools. Prediction tools extrapolate beyond data held in the database. They can be used to predict epitopes in protein sequences or predict properties of known epitopes, such as their MHC binding affinity. Analysis tools help extract and interpret data contained in the database.

For prediction tools, it is important to differentiate between the **tool** making predictions, and the **method** used to generate that tool, given a set of training data. For example, the artificial neural network (ANN) method or approach, when trained on a particular data set, will yield a prediction tool. As the ANN method is trained on different data sets, different corresponding prediction tools will result. In this way, the ANN method can be used to develop an MHC class I prediction tool and a separate MHC class II prediction tool. These tools can be refined as more data are available for training. One benefit of the IEDB is that it allows implementing methods to automatically generate new prediction tools as the database grows.

The AR Labs concept was introduced in early 2016. Tools under AR Labs are experimental and are considered to be beta versions, not quite ready for production yet. They are intended for further research, updates and testing. This means they are functional, but the team is still actively developing on improving them and more substantial changes are expected in upcoming releases.

The next subsections will describe each prediction and analytical tool in more detail.

### 2.3.1 T Cell and B Cell Prediction Tools

Prediction tools can be subdivided into categories by what they predict. The current tools fall into the subcategories listed below:

- T cell epitopes – MHC class I and II binding prediction
- T cell epitopes – Processing prediction
- T cell epitopes – Immunogenicity prediction
- B cell epitope prediction
- Structure tools

#### 2.3.1.1 T Cell Epitopes - MHC binding prediction

The Analysis Resource provides tools for predicting peptide binding to MHC class I and II molecules. For class I binding predictions, users can select predictions performed with tools derived from ten different methods – IEDB Recommended, artificial neural network (ANN), stabilized matrix method (SMM), SMM with a peptide:MHC binding energy covariance matrix (SMMPMBEC), Scoring matrices derived from combinatorial peptide libraries (Comblib_Sidney2008), Consensus, NetMHCpan, PickPocket, NetMHCcons, and NetMHCstabpan. The Consensus method is derived from the ANN, SMM, and CombLib methods. For class II binding predictions, users can select IEDB Recommended, the Combinatorial Library method, the NN_align, the SMM_align method, a method devised by Sturniolo et al. and used in TEPITOPE, NetMHCIIpan, and a consensus method derived from the NN-align, SMM_align, Sturniolo methods, and the Combinatorial Library. Tutorials and example data are available for both the class I and II tools.

A RESTful interface is available for the MHC class I and class II prediction tools. This allows users to perform predictions on the IEDB server in batch mode without having to install any software on their own systems. Additionally, users will always be assured that they are using the latest version of the tools. More information is available in Section 2.3.5. These tools are also available in standalone form on the Download tab and can be downloaded at http://tools.iedb.org/main/download/.

##### *2.3.1.1.1 Peptide Binding to MHC Class I Molecules*

Users can select from ten different methods for predicting class I epitopes – ANN, SMM, SMMPMBEC, Comblib_Sidney2008, Consensus, NetMHCpan, NetMHCcons, PickPocket, NetMHCstabpan, and IEDB recommended, which are described further below. A check box can be used to show only frequently occurring alleles. This allows the selection of only those alleles that occur in at least 1% of the human population or allele frequency of 1% or higher. However, un-checking the check-box will allow selection of all the alleles and corresponding peptide lengths for a particular species. Users can also upload an allele file instead of entering allele on the page one at a time.

**Artificial Neural Network**
Artificial neural networks (ANN) are computer algorithms modeled after the brain. They consist of many simple processing units which are wired together in a communication network. Each unit is a simplified model of a neuron which sends off a new signal if it receives a sufficiently strong input signal from the other units to which it is connected. The strength of these connections can be varied in order for the network to perform a desired pattern of node signal activity, which is learned from a set of input training data.

ANNs have been trained for 81 different Human MHC alleles including HLA-A, -B, -C and -E. Furthermore, predictions for 41 animal (Monkey, Cattle, Pig, and Mouse) alleles are available. The current version of ANN is based on NetMHC 4.0. The method is described in Nielsen et al. (Protein Science, 2003) and Andreatta and Nielsen (Bionformatics, 2016).

**Stabilized Matrix Method (SMM)**
The Stabilized Matrix Method (SMM) described by Peters and Sette (BMC Bioinformatics, 2005) can be applied to calculate matrices from quantitative affinity data of peptides binding to MHC molecules. The advantage of this method is that it suppresses the noise present in the training data, caused by the inevitable experimental error as well as the limited number of data points.

**Stabilized matrix Method with a Peptide:MHC Binding Energy Covariance matrix (SMMPMBEC)**
SMMPMBEC is an improved version of SMM. It is different from SMM in that it addresses sparseness of peptide sequence coverage that is often found in binding data sets by using Peptide:MHC Binding Energy Covariance (PMBEC). The PMBEC matrix was derived from experimentally determined binding affinity measurements using combinatorial peptide libraries. SMMPMBEC is described in Kim et al. BMC Bioinformatics 2009.

**Scoring matrices derived from combinatorial peptide libraries (Comblib_Sidney2008)**
Comblib_Sidney2008 refers to a set of predictors (i.e. scoring matrices) that were derived from binding affinity measurements of combinatorial peptide libraries against a panel of MHC alleles. This work is

described in Sidney et al. (Immunome Res. 2008). This class of predictors is unique in that average binding energy contribution of a given residue at a position is directly measured, without worrying about limited peptide sequence coverage.

### Consensus

The Consensus predictor was motivated by an idea that predictions made by consulting "consensus" of individual predictions from multiple predictors may result in improved performance over that of any individual ones. For MHC-I, a work describing an early implementation can be found in Moutaftsi et al. (Nat Biotech 2006). The methods used for Consensus are ANN, SMM, and CombLib_Sidney2008. The Consensus method uses as many of these three component methods as possible, depending on their applicability for the chosen allele and length.

### NetMHCpan

NetMHCpan version 4.0 predicts binding of peptides to any MHC class I molecule of known sequence using artificial neural networks (ANNs). The method is trained on binding affinity and eluted ligand data leveraging the information from both data types as described in Jurtz et al. (J Immunol, 2017). To train this method, data on all class I MHC ligand elution assays available in IEDB database were collected including the ligand sequence, details of the source protein, position of the ligand in the source protein and the restricting allele of the ligand. There were 160,527 distinct assays in total and the length of the ligands ranged from 4–37. All lengths with a count of ligands at least 0.5% of total ligands were selected for further analysis which included lengths 8–15 and comprised of 99% of the assay entries. After refinement described in Jurtz et al. (J Immunol, 2017), the final training data set had 85,217 entries in total with ligand length ranging from 8 to 15. The ligands originated from 14,797 source antigens and were restricted by 55 unique HLA molecules. Random artificial negatives were generated for each MHC molecule covered by eluted ligand data by sampling randomly 10*N peptides of each length 8–15 amino acids from the antigen source protein sequences, where N is the number of 9mer ligands for the given MHC molecule.

### PickPocket

PickPocket predicts binding of peptides to any known MHC molecule using position specific weight matrices. The method is trained on more than 150,000 quantitative binding data covering more than 150 different MHC molecules. Predictions can be made for HLA-A, B, C, E and G alleles, as well as for non-human primates, mouse, cattle, and pig. Version 1.1 has been retrained on extensive data sets, including 10 prevalent HLA-C and 7 prevalent BoLA MHC-I molecules. The matrices of pocket-library are generated using the SMM_pmbec method described in Kim et al. (BMC Bioinformatics, 2009). Predictions can be made for 8 – 12mer peptides. All non-9mer predictions are made using approximations. The prediction values are given in nM IC50 values. The algorithm is described in Zhang et al. (Bioinformatics, 2009).

### NetMHCcons

NetMHCcons predicts binding of peptides to any known MHC class I molecule. This is a consensus method for MHC class I predictions integrating three state-of-the-art methods, NetMHC, NetMHCpan, and PickPocket, to give the most accurate predictions. NetMHC is an artificial neural network-based (ANN) allele-specific method which has been trained using 94 MHC class I alleles. Version 3.4 is used as part of NetMHCcons-1.1. NetMHCpan is a pan-specific ANN method trained on more than 115,000 quantitative binding data covering more than 120 different MHC molecules. Version 2.8 is used as part of NetMHCcons-1.1. PickPocket Version 1.1 is described above. NetMHCcons can generate predictions for peptides of 8 – 15 residues in length. The prediction values are given in nM IC50 values. The method is described in detail in Karosiene et al. (Immunogenetics, 2012).

### NetMHCstabpan

NetMHCstabpan was introduced in 2016. It predicts binding stability of peptides to any known MHC molecule using artificial neural networks (ANNs). The method is trained on more than 25,000 quantitative stability data covering 75 different HLA molecules. The user can upload full length MHC protein sequences, and have the server predict MHC restricted peptides from any given protein of interest. Predictions can be made for 8-14 mer peptides, although all non 9mer predictions are made using approximations. Most HLA molecules have a strong preference for binding 9mers. The prediction values are given in half life time in hours values and as %-Rank to a set of 200,000 random natural peptides. The method is described in Rasmussen et al. (Journal of Immunology, 2016).

**IEDB Recommended**

IEDB recommended is the default prediction method selection. It considers all alleles and their corresponding peptide lengths for a particular species. For each allele-length combination, consensus method is used, which includes ANN, SMM, and CombLib. If none of these methods are available for the allele, NetMHCpan is used.

#### *2.3.1.1.2 Peptide Binding to MHC Class II Molecules*

Users can select from seven different methods for predicting class II epitopes – IEDB recommended, SMM-align, Sturniolo, Combinatorial Library, Consensus, NN-align, and NetMHCIIpan. By default, the overall best method (IEDB recommended) is selected. However, not all methods can currently make predictions for all alleles, so only the alleles available will be displayed. The seven methods are described further below.

**SMM-align**

The MHC class II binding groove is open at both ends making the correct alignment of a peptide in the binding groove a crucial part of identifying the core of an MHC class II binding motif. The stabilization matrix alignment method, SMM-align, allows for direct prediction of peptide:MHC binding affinities. The method uses amino terminal peptide flanking residues (PFR) to get a consistent gain in predictive performance by favoring binding registers with a minimum PFR length of two amino acids. The method predicts quantitative peptide:MHC binding affinity values. The method has been trained and evaluated on a data set that covers the nine HLA-DR supertypes suggested and three mouse H2-IA allele. The method is described by Nielsen et al. (BMC Bioinformatics, 2007).

**Sturniolo**

This matrix-based approach is used in the TEPITOPE class II epitope prediction program. It is described in Sturniolo et al. (Nat. Biotechnol., 1999).

**Combinatorial Library**

The positional scanning combinatorial libraries approach utilized a pool of random peptide libraries to systematically measure the contribution to MHC binding from each amino acid at each of the nine positions at the binding peptide. Each pool in the library contains 9-mer peptides with one fixed residue at a single position. With each of the 20 naturally occurring residues represented at each position along the 9-mer backbone, the entire library consisted of 180 peptide mixtures. Competitive binding assays were then carried out to determine the IC50 values for each pool. IC50 values for each mixture were standardized as a ratio to the geometric mean IC50 value of the entire set of 180 mixtures, and then normalized at each position so that the value associated with the optimal value at each position corresponds to 1. For each position, an average (geometric) relative binding affinity (ARB) was calculated, and then the ratio of the ARB for the entire library to the ARB for each position was derived. The final results are a set of 9 by 20 scoring matrices which could predict the binding of novel peptides to MHC molecules.

The methodology is the same as that used for the MHC class I combinatorial library tool as described in Sidney et al. Immunome Res. 2008. A description of the ARB method is contained in Bui et al., Immunogenetics, 2005.

**Consensus**
The consensus method was developed by the IEDB team by exploiting features of three aforementioned methods. The Consensus method uses NN-align, SMM-align, and the combinatorial peptide scanning library. When the scanning library is not available for an allele, the Sturniolo method is used instead. A paper describing the original method was published by Wang et al. (PLoS Comput Biol, 2008), and a subsequent paper was published by Wang et al. (BMC Bioinformatics, 2010). The datasets used in assessing the performance of the NN-align, SMM-align, and Sturniolo methods and in developing the Consensus method, as described in Wang et al. (2010), can be found at http://tools.iedb.org/main/datasets/.

**NN-align**
NN-align is an artificial neural network-based alignment algorithm for MHC class II peptide binding prediction. It simultaneously identifies the MHC class II binding core and binding affinity. The method is trained using an algorithm that corrects bias in the training data caused by redundancy in binding core representation. Prediction accuracy has been shown to improve significantly when information about the residues flanking the peptide-binding core is considered. A 2009 paper in BMC Bioinformatics by Nielsen and Lund describes the method in detail (PMID: 19765293).

**NetMHCIIpan**
NetMHCIIpan predicts binding of peptides for all three human MHC class II isotypes- HLA-DR, HLA-DP, and HLA-DQ, in addition to mouse H-2-I molecules. A paper describing the method was published by Nielsen et al. in PLoS Computational Biology, 2008, and a paper describing the latest version 3.1 was published by Andreatta et al. in Immunogenetics, 2015.

**IEDB Recommended**
IEDB recommended is the default prediction method selection. It considers all alleles and their corresponding peptide lengths for a particular species. For each allele-length combination, consensus method is used, as described above. If none of these methods are available for the allele, NetMHCIIpan is used.

#### *2.3.1.1.3 Tepitool*

The tool is designed as a wizard for the prediction of T cell epitope candidates from a given set of amino acid sequences, based on predicted peptide binding to MHC class I and class II molecules, where the user is led through a series of well-defined steps to complete the task. In contrast to the independent methods described above, Tepitool guides the user step-by-step as a client-side web form that takes user input data that is in turn processed at the server-side when the user submits the entire form. All fields except sequences and alleles are filled with default recommended settings for prediction and selection of optimum peptides. The input parameters can be adjusted as per the user's specific needs, and the user can go back to previous steps to change the selection before final submission of the job. The TepiTool has six steps:

(i) Provide sequence data.
(ii) Select the host species and MHC allele class.
(iii) Select the alleles for binding prediction.
(iv) Select peptides to be included in prediction.
(v) Select preferred methods for binding prediction and peptide selection and cutoff values.
(vi) Review selections, enter job details and submit data.

The tool is described in Paul et al. (Curr. Protoc. Immunol., 2016).

### 2.3.1.2 T Cell Epitopes – MHC Processing Prediction

#### *2.3.1.2.1 Proteasomal cleavage/TAP transport/MHC class I combined predictor*

For the prediction of antigen processing through the MHC class I antigen presentation pathway, we incorporated predictions of proteasomal cleavage and TAP transport similar to the MHCPathway website described in (Tenzer et al, CMLS, 2005). The predictions are based on in vitro experiments characterizing the sequence specificity of proteasomal cleavage and TAP transport. The goal of the prediction is to identify MHC-I ligands (peptides that are naturally processed from their source proteins and presented by MHC class I molecules).

The proteasomal cleavage predictions evaluate how efficiently a peptide or its N-terminally prolonged precursors can be liberated from its source protein. The TAP transport predictions evaluate how efficiently a peptide or its N-terminal prolonged precursors are transported into the ER by TAP (Peters et al., Immunol, 2003). When this information is taken together and combined with MHC class I binding predictions, the tool yields a prediction of the efficiency with which a peptide is presented on the cell surface. The methods available are ANN, SMM, SMMPMBEC, Comblib_Sidney2008, NetMHCpan, PickPocket, NetMHCcons, and IEDB Recommended, which are described in Section 2.3.1.1.1.

A check box can be used to show only frequently occurring alleles. This allows the selection of only those alleles that occur in at least 1% of the human population or allele frequency of 1% or higher. However, un-checking the check-box will allow selection of all the alleles and corresponding peptide lengths for a particular species. Users can also upload an allele file instead of entering allele on the page one at a time.

#### *2.3.1.2.2 Neural network-based prediction of proteasomal cleavage sites (NetChop) and T cell epitopes (NetCTL/NetCTLpan)*

NetChop produces neural network predictions for cleavage sites of the human proteasome (Kesmir et al., 2002). NetChop considers the characteristics of the structurally modified proteasomes found in cells stimulated by gamma-interferon under physiological conditions. The NetChop algorithm was trained on in vitro data and MHC Class I ligand data. The use of this training set, combined with the artificial neural network methodology, makes the prediction of cleavage sites more accurate. NetChop has been trained only on human data, but since the proteasome structure is quite conserved, the algorithm developers believe that the tool is capable of making reliable predictions for at least the other mammalian proteasomes.

NetCTL predicts CTL epitopes in protein sequences integrating prediction of peptide MHC binding, proteasomal C terminal cleavage and TAP transport efficiency. The method is described in detail in Larsen et al. (Eur J Immunol., 2005). NetCTLpan is an update to the original NetCTL server that allows for prediction of CTL epitope with restriction to any MHC molecules of known protein sequence (Stranzl et al., Immunogenetics, 2010). This tool is also available in a standalone form on the Download tab and can be downloaded at http://tools.iedb.org/main/download/.

##### *2.3.1.2.3 MHC-NP: Prediction of peptides naturally processed by the MHC*

MHC-NP is a tool for predicting peptides naturally processed by the MHC pathway and was introduced to the Analysis Resource in 2013. MHC-NP employs data obtained from MHC elution experiments in order to assess the probability that a given peptide is naturally processed and binds to a given MHC molecule. This tool was the winner of the 2nd Machine Learning Competition in Immunology, where it yielded state-of-the-art accuracy for the prediction of peptides eluted from human HLA-A*02:01, HLA-B*07:02, HLA-B*35:01, HLA-B*44:03, HLA-B*53:01, HLA-B*57:01 and mouse H2-D(b) and H2-K(b) MHC molecules. The method is described in Giguère et al. (J Immunol Methods, 2013). Because the tool was developed by researchers external to the IEDB team, it is not included in the virtual machine image.

##### *2.3.1.2.4 MHC-II-NP: Prediction of peptides naturally processed by the MHC*

Although algorithms for the prediction of peptide binding affinity to MHC II molecules exist, there is a lack of methods that predict the ligands resulting from natural antigen processing. To address this gap MHC-II-NP was developed.

The training ligand dataset, obtained through IEDB database query, contained more than 14,000 naturally processed ligands identified by MS of peptides eluted from MHC class II-expressing cells (from approximately 2,600 unique protein sequences). Analysis into sequence signatures which liberate peptides from their source antigens revealed preferred amino acids surrounding both N- and C- ligand terminuses. These cleavage motifs were used to develop this method for predicting naturally processed MHC II ligands as described in Paul et al. (Front. Immunol., 2018).

#### 2.3.1.3 T Cell Class I pMHC Immunogenicity Predictor

An MHC class I immunogenicity tool was introduced in 2013. T-cells have to recognize peptides presented on MHC molecules to be activated and elicit their effector functions. Several studies have demonstrated that some peptides are more immunogenic than others and therefore more likely to be T-cell epitopes. This tool is based on an analysis of a large set of data describing the immunogenicity of peptides presented on various MHC-I molecules.

Two main conclusions could be drawn from this analysis. First, in line with previous observations, the developers showed that positions P4-6 of a presented peptide are more important for immunogenicity. Second, some amino acids, especially those with large and aromatic side chains, are associated with immunogenicity. This information was combined into a simple model that was used to demonstrate that immunogenicity is, to a certain extent, predictable. This model was validated with data from two independent epitope discovery studies. This model indicated that T-cells are equipped to better recognize viral than human (self) peptides. The method is described in Calis et al. (PLoS Comput Biol., 2013). This tool is also available in a standalone form on the Download tab and can be downloaded at http://tools.iedb.org/main/download/.

#### 2.3.1.4 Deimmunization

The deimmunization tool is attempt to identify immunodominant regions in a given therapeutically important protein, and suggest amino-acid substitutions that create non-immunogenic versions of the proteins. Therefore, we have opted for a two steps process; 1) In the first step, the deimmunization tool will list all the immunogenic regions or peptides based on selected threshold. These peptides will be generated from the protein with 15mer window size and 10mer overlap. 2) In the second step, the user can select one or more peptides listed in the results and final result window will display the non-immunogenic substitution of each selected peptides. The default threshold is 8.5 (which is difference in the median of percentile rank from 26 reference alleles set for MHC class II). In the final result window, the tools will also take care of the fact that non-immunogenic substitution in the immunogenic peptides, should not create new immunogenic site in the neighboring peptides. Therefore, the result window will also display the effect of substitution on the neighboring peptides.

This tool is described in Dhanda et al. (Immunology, 2018).

#### 2.3.1.5 CD4 T cell immunogenicity

The server is developed to predict the allele independent CD4 T cell immunogenicity at population level, overcoming complications related to the high level of variability of HLA molecules, potential other factors beyond HLA as well as a frequent lack of HLA typing data. With this tool, users can predict the T cell immunogenicity using 7-allele method (Paul et. al. 2015), immunogenicity method and combined method (IEDB recommended). The combined method predicts the final score that combines the predictions from 7-allele method and immunogenicity method.

This tool is described in Dhanda et al. (Front Immunol, 2018).

### 2.3.2 B Cell Epitope Prediction

#### 2.3.2.1 Prediction of linear epitopes from protein sequence

Six different tools are provided that predict antibody epitope candidates from amino acid sequences. Five are based on amino acid property scales and a sixth method uses a Hidden Markov Model. Parameters such as hydrophilicity, flexibility, accessibility, and antigenic propensity of polypeptides chains have been correlated with the location of continuous epitopes in a few well-characterized proteins. Based on these observations, amino acid property scales have been developed to predict antigenic determinants. Each scale consists of 20 values assigned to each of the amino acid residues on the basis of their relative propensity to possess the property described by the scale. The following amino acid property scales have been selected and implemented based on their popularity and coverage of different categories.

- Secondary structure - Chou and Fasman beta turn prediction
- Surface exposure - Emini surface accessibility prediction
- Flexibility - Karplus and Schulz flexibility prediction
- Antigenicity - Kolaskar and Tongaonkar antigenicity prediction
- Hydrophobicity/hydrophilicity - Parker hydrophilicity prediction

BepiPred combines the predictions of a hidden Markov model and the propensity scale of Parker et al. (Biochemistry, 1986). It is described in Larsen et al. (Immunome Research, 2006). The linear B cell epitope predictor is also available as a standalone tool. In 2017, BepiPred 2.0 was developed and published (Nucleic Acids Res, 2017), PMID: 28472356. BepiPred-2.0 uses structural predictions, such as surface accessibility and secondary structure as part of the feature space. Using a Random Forest machine-learning algorithm trained on structural epitopes obtained from 160 3D-structures, they improved the performance significantly compared to the prior version and other state-of-the-art prediction tools.

#### 2.3.2.2 DiscoTope - Prediction of epitopes from protein structure

DiscoTope was augmented in 2013 to include version 2.0 as well as version 1.1. DiscoTope is designed specifically to predict discontinuous epitopes. It uses protein three-dimensional structural data in addition sequence data. The method is based on amino acid statistics, spatial information, and surface accessibility in a compiled data set of discontinuous epitopes determined by X-ray crystallography of antibody/antigen protein complexes. DiscoTope 2.0 works with a novel definition of the spatial neighborhood used to sum propensity scores and half-sphere exposure as a surface measure. The results are more accurate than version 1.1 but involve more complex calculations that increase run times by a factor of approximately 30.

DiscoTope 1.1 is described in Haste Andersen et al. (Protein Sci., 2006), and DiscoTope 2.0 is described in Kringelum et al. (PLoS Comp. Bio, 2012).

#### 2.3.2.3 ElliPro - Epitope prediction based upon structural protrusion

ElliPro predicts linear and discontinuous antibody epitopes based on a protein antigen's 3D structure. ElliPro accepts either a protein structure (preferred) or a protein sequence as an input. If a protein sequence is used, ElliPro will predict its 3D structure by homology modeling. Its use if described in the Tutorial tab of the ElliPro section of the Analysis Resource. The method is described in Julia Ponomarenko et al. (BMC Bioinformatics, 2008). It is also available as a standalone tool.

#### 2.3.2.4 Methods for modeling and docking of antibody and protein 3D structures

This web page provides information on methods for modeling and docking of antibody and protein 3D structures. The methods are available as web servers and are hosted outside the IEDB except one method, LYRA, described above. One of the approaches at B-cell epitope prediction involves antibody-antigen docking, or 3D modeling of an antibody-antigen complex, for known 3D structures of both antibody and antigen. When the structures of either antibody or protein or both are unknown (that is, not available in PDB) but sequences are known, the user can attempt to obtain the 3D structural models of the antibody and the antigen, following the chart displayed on the web page and using the described web servers. Links are provided to these servers for the user’s convenience.

### 2.3.3 Structure Tools

#### 2.3.3.1 LYmphocyte Receptor Automated modeling (LYRA)

The LYRA web server implements a complete and automated method for building of B- and T-cell receptor structural models starting from their amino acid sequence alone. The webserver is freely available and easy to use for non-specialists. Upon submission, LYRA automatically generates alignments using ad hoc profiles, predicts the structural class of each hypervariable loop, selects the best templates in an automatic fashion, and provides within minutes a complete 3D model that can be downloaded or inspected online. Experienced users can manually select or exclude template structures according to case specific information. LYRA is based on the canonical structure method, that in the last 30 years has been successfully used to generate antibody models of high accuracy, and in our benchmarks this approach proves to achieve similarly good results on TCR modeling, with a benchmarked average RMSD accuracy of 1.29 and 1.48 Å for B- and T-cell receptors, respectively. The tool is described in detail by Klausen et al. (Nucleic Acids Research, 2015).

#### 2.3.3.2 Structural Complexes of Epitope Receptor (SCEptRe)

SCEptRe provides weekly updated, non-redundant, user customized benchmark datasets with information on the immune receptor features for receptor-specific epitope predictions. This tool extracts weekly updated 3D complexes of antibody-antigen, TCR-pMHC and MHC-ligand from the Immune Epitope Database (IEDB) and clusters them based on antigens, receptors and epitopes to generate benchmark datasets. Users can customize structural quality and clustering parameters (e.g., resolution, R free factors, antigen or epitope sequence identity) to generate these datasets based on their need. The tool is described in detail by Mahajan et al. (BMC Bioinformatics, 2019).

#### 2.3.3.3 Docktope

Docktope is a web-based tool, based on the D1-EM-D2 approach, intended to allow the pMHC-I modeling. Some applications allowed from the pMHC-I construction include the study of the pMHC-I tridimensional structure, epitope-MHC-I interaction patterns, cross-reactivity assessment and molecular dynamics studies. The tool allows the user to construct pMHC-I structures for the following alleles: HLA-A*02:01 (9-mer epitopes), HLA-B*27:05 (9-mer epitopes), H2-Db (9-mer/10-mer epitopes) and H2-Kb (8-mer epitopes). The tool is described in detail by Rigo et al. (Scientific Reports, 2015).

### 2.3.4 Epitope Analysis Tools

#### 2.3.4.1 Population Coverage

T cells recognize a complex between a specific MHC type and a particular pathogen-derived epitope and thus a given epitope will elicit a response only in individuals that express an MHC molecule capable of binding that particular epitope. MHC molecules are extremely polymorphic (over a thousand different variants are known in humans). Therefore, selecting multiple peptides with different MHC binding specificities will afford increased coverage of the patient population targeted as vaccine recipients. The issue of population coverage in relation to MHC polymorphism is further complicated by the fact that different MHC types are expressed at dramatically different frequencies in different ethnicities. Thus, without careful consideration, a vaccine with ethnically biased population coverage could result. To address this issue, the actual/predicted binding capacity of potential epitopes to as many different MHC molecules possible (and when available, also restriction data of T cell responses recognizing the epitope) can be used to project the population coverage in different ethnicities of different vaccine candidates or epitope sets. Accordingly, epitope-based vaccines or diagnostics can be designed to maximize population coverage, while minimizing complexity (that is, the number of different epitopes included in the diagnostic or vaccine), and also minimizing the variability of coverage obtained or projected in different ethnic groups.

An important consideration in the process of epitope selection is that the patient population coverage afforded by a given set is not simply corresponding to the sum of the coverage of its individual components. Thus, to calculate the coverage afforded by a given mixture of epitopes, a more comprehensive approach and a suitable algorithm has been developed for this specific purpose (Bui et al. BMC Bioinformatics 2006). This method calculates the fraction of individuals predicted to respond to a given epitope set on the basis of HLA genotypic frequencies, assuming non-linkage disequilibrium between HLA loci, and on the basis of MHC binding and/or T cell restriction data. The algorithm is briefly explained here. First, genotypic frequencies of various MHC are tabulated. Each time a peptide binds to a given MHC, a “hit” is recorded for that MHC. The process is repeated for all peptides. Then the hits for MHC are tallied. Next, the frequency of each possible diploid MHC combination (phenotype) is calculated. For *n* MHC types, this corresponds to an *n* x *n* tabulation of the frequency at which each specific pair of MHCs will be found in the population from which the MHC frequencies are derived. A similar table is generated to contain the number of hits per each of the MHC combinations by adding the number of hits associated with each of the two alleles of MHC in the combination (a simple exception is the case of homozygous combinations, where the number of hits is simply the number of hits of the given MHC). From these two tables, a frequency distribution is assembled, tabulating the genotypic frequency of all MHC combinations associated with a certain number of hits. The result of the analysis is displayed as a frequency distribution histogram and a cumulative frequency plot.

HLA allele genotypic frequencies were obtained from Allele Frequency Net Database (http://www.allelefrequencies.net/). At present, Allele Frequency Net Database (Gonzalez-Galarza FF et al., Nucleic Acids Res. 2015) provides allele frequencies for 115 countries and 20 different ethnicities grouped into 16 different geographical areas. In addition, the program also accepts custom populations with allele frequencies defined by users. Multiple population coverages can be simultaneously calculated and an average population coverage is generated. Since MHC class I and MHC class II restricted T cell epitopes elicit immune responses from two different T cell populations (CTL and HTL, respectively), the program provides three calculation options to accommodate different coverage modes: (1) class I separate, (2) class II separate, and (3) class I and class II combined. For each population coverage, the tool computes the following: (1) projected population coverage, (2) average number of epitope hits / HLA combinations recognized by the population, and (3) minimum number of epitope hits / HLA combinations recognized by 90% of the population (PC90).

#### 2.3.4.2 Epitope Conservancy

In a diagnostic or epitope-based vaccine setting, focusing on conserved epitopes allows for targeting responses around pathogen variability, whether it exists prior to infection, or develops in the natural course of disease. The use of conserved epitopes would be expected to focus the immune response on sequences crucial for retaining biological function of the pathogen proteins, and thus with intrinsically lower variability, even under immune pressure. The epitope conservancy analysis tools implemented here aims to address the issue of variability (or conservation) of epitopes, and to assist in the selection of epitopes with the desired pattern of conservation. The algorithm has been implemented to calculate the degree of conservancy of an epitope within a given protein sequence set at different degree of identities. The degree of conservation is defined as the number of protein sequences that contain the epitope at a given identity level, divided by the total number of protein sequences found in the dataset analyzed (Bui et al. BMC Bioinformatics 2007).

Users can now also indicate whether they want duplicated protein sequences removed from the results set by checking a box in the "Specify calculation options" section of the input page. Previously redundant results were removed. For users wanting to study different populations, keeping redundant sequences can be very informative.

#### 2.3.4.3 Epitope Cluster Analysis

Version 2.0 of the Epitope Cluster Analysis tool (Dhanda et al., Immunology. 2018) was released in 2018. This new version expanded tool functionality to include graphical representation, to provide connectivity within a cluster, to generate epitope clusters based on representative or consensus sequences, and to calculate overhang sequence identity. The base functionality of the tool remained the same.

The tool groups epitopes into clusters based on sequence identity. A cluster is defined as a group of sequences that has a sequence similarity greater than the minimum sequence identity threshold specified. Epitope sequences can be either directly entered in the text area or uploaded from a file. Two acceptable sequence formats are PLAIN and FASTA. The user can select the sequence identity threshold at which they want to calculate epitope clusters. Clusters are displayed in a table format where clusters are indicated by table rows which have the same color.

#### 2.3.4.4 Computational Methods for Mapping Mimotopes to Protein Antigens

A web page devised by Dr. Julia Ponomarenko was added to the Analysis Tools section in 2014 that provides guidelines for mapping mimotopes to protein antigens. Mimotopes are molecules, often peptides, which are recognized by antibodies or T cells that were primed to recognize a different epitope. For antibody epitope mapping, peptide mimotopes can be selected from a combinatorial library (usually peptides from a specific protein antigen) on binding to a specific monoclonal antibody with high affinity. They are commonly obtained using phage display. Experimental data on mimotopes can be found in the IEDB, MimoDB (http://immunet.cn/mimodb/index.html), and journal publications. Mimotopes can mimic essential features of genuine epitopes and therefore their mapping to the antigen is a logical and essential step of the mimotope analysis. This web page provides information on available methods for mimotope mapping, how to search the IEDB for mimotopes, and an example of a mimotope dataset and the results of its mapping, using the available web servers hosted outside the IEDB.

Methods available as web servers and operational as of July 2014 (they all require the user submitting an antigen protein 3D structure, providing either PDB ID of the structure or the pdb file) are as follows:

- **MIMOX** (http://immunet.cn/mimox/)
- **Pepitope server** (http://pepitope.tau.ac.il/) provides three algorithms: Mapitope, PepSurf, or combined
- **EpiSearch** (http://curie.utmb.edu/episearch.html)

The web page also lists other published methods that are unavailable as web servers. They include the following:

- **PepMapper** (http://www.ncbi.nlm.nih.gov/pubmed/22701536) (2012) - provided URL didn't respond
- **MimoPro** (http://www.ncbi.nlm.nih.gov/pubmed/21609501) (2011) - provided URL didn't respond
- **Pep-3D-Search** (http://www.ncbi.nlm.nih.gov/pubmed/19087303) (2008) - available for download at http://kyc.nenu.edu.cn/Pep3DSearch/
- **MEPS** (http://www.ncbi.nlm.nih.gov/pubmed/17430573) (2007)
- **MIMOP** (http://www.ncbi.nlm.nih.gov/pubmed/16434442) (2006)
- **3D-Epitope-Explorer (3DEX)** (http://www.ncbi.nlm.nih.gov/pubmed/15834923) (2005) - available for download at http://www.schreiber-abc.com/3dex/
- **Enshell-Seijffers et al.** (http://www.ncbi.nlm.nih.gov/pubmed/14596802) (2003)
- **FINDMAP** (http://www.ncbi.nlm.nih.gov/pubmed/12935344) (2003)
- **SiteLight** (http://www.ncbi.nlm.nih.gov/pubmed/12824481) (2003)

The webpage also contains instructions on how to search for mimotopes in the IEDB.

#### 2.3.4.5 Restrictor Analysis Tool for Epitopes (RATE)

RATE is an automated method that can infer HLA restriction for a set of given epitopes from large datasets of T cell responses in HLA typed subjects. The tool takes two data files, one containing the alleles expressed by the subjects and the other containing the response of the peptides in the subjects. The tool calculates the odds ratio and estimates its significance using Fisher's exact test. It also calculates a parameter called relative frequency similar to odds ratio. The tool was developed with a focus on class II alleles but can also be applied to class I alleles. A description of the tool can be found in Paul et al. (Journal of Immunology, 2015).

In 2017, RATE was validated using experimentally defined restriction data from a set of 191 tuberculosis-derived epitopes and 63 healthy individuals with MTB infection from the Western Cape Region of South Africa. Additionally, the parameters used by the RATE tool to infer restriction were optimized. New HLA restrictions were identified using the optimized RATE tool. A description of this study can be found in Paul et al. (BMC Immunol, 2017).

#### 2.3.4.6 ImmunomeBrowser

This tool aggregates all data relevant to the user query and allows one to visualize the known immune response to a specific antigen, as well as illustrating knowledge gaps in a reference protein. It provides the immune reactivity in terms of response frequency (RF) and the number of subjects tested/responded and/or number of independent assays performed along the length of reference protein. The tool was originally implemented in the results page of the database section of the IEDB. To further extend the usability to predicted epitopes and propriety epitopes or non-IEDB data, a stand-alone version of the tool was developed in 2018 (Dhanda et. al., Bioinformatics 2018). The standalone version maps user provided peptide sets and associated response data to a user-provided protein reference sequence. This now allows the user to analyze and visualize immunodominant regions within their own dataset. The results are presented both as a user interactive JavaScript based web interface and a tabular format in a selected reference sequence.

### 2.3.5 IEDB Analysis Resource Labs

The AR Labs concept was introduced in early 2016. Tools designated as within AR Labs are experimental and are considered to be beta versions, not quite ready for production yet. They are intended for further research, updates and testing. This means they are functional, but the team is still actively developing on improving them and more substantial changes are expected in upcoming releases. Therefore, users are asked not to expect the same level of stability for these tools as for other tools in the IEDB analysis resource. Users are welcome to send bug reports and suggestions for improvements for these tools via the help desk.

Of the tools described above, 8 tools are currently available under the Labs designation:

| **Prediction LABS Tools** | **Analysis LABS Tools** |
|---|---|
| MHCII-NP | RATE |
| Deimmunization | ImmunomeBrowser |
| CD4 T Cell Immunogenicity | |
| LYRA | |
| SCEptRe | |
| Docktope | |

### 2.3.6 Benchmark References and Data Sets

The "Datasets" tab contains data sets and references related to benchmarking results of the IEDB's epitope prediction tools. There are three accordion sliders that can be expanded to reveal details. The three are for MHC class I binding prediction, MHC class II binding prediction, and B cell epitope prediction. In each case, the journal article title, authors, journal name, and year are listed along with a description of the data set, the date of its generation, details on the data set generation, the data format, and where the data set is available.

For the MHC class I binding predictions, the references are:

- Jurtz V, Paul S, Andreatta M, Marcatili P, Peters B, Nielsen M. NetMHCpan-4.0: Improved Peptide-MHC Class I Interaction Predictions Integrating Eluted Ligand and Peptide Binding Affinity Data. J Immunol. 2017 Nov 1;199(9):3360-3368. doi: 10.4049/jimmunol.1700893. Epub 2017 Oct 4. PMID: 28978689; PMCID: PMC5679736.
- Trolle T, Metushi IG, Greenbaum JA, Kim Y, Sidney J, Lund O, Sette A, Peters B, Nielsen M. Automated benchmarking of peptide-MHC class I binding predictions. Bioinformatics. 2015 Jul 1;31(13):2174-81. doi: 10.1093/bioinformatics/btv123. Epub 2015 Feb 25. PMID: 25717196; PMCID: PMC4481849
- Kim Y, Sidney J, Buus S, Sette A, Nielsen M, Peters B. Dataset size and composition impact the reliability of performance benchmarks for peptide-MHC binding predictions. BMC Bioinformatics. 2014 Jul 14;15:241. doi: 10.1186/1471-2105-15-241. PMID: 25017736; PMCID: PMC4111843.
- Kim Y, Sidney J, Pinilla C, Sette A, Peters B. Derivation of an amino acid similarity matrix for peptide: MHC binding and its application as a Bayesian prior. BMC Bioinformatics. 2009 Nov 30;10:394. PMID: 19948066.
- Peters B, Bui HH, Frankild S, Nielson M, Lundegaard C, Kostem E, Basch D, Lamberth K, Harndahl M, Fleri W, Wilson SS, Sidney J, Lund O, Buus S, Sette A., A community resource benchmarking predictions of peptide binding to MHC-I molecules, PLoS Comput Biol. 2006 Jun 9;2(6):e65. Epub 2006 Jun 9. PMID: 16789818

For the MHC class II binding predictions, the references are:

- Andreatta M, Trolle T, Yan Z, Greenbaum JA, Peters B, Nielsen M. An automated benchmarking platform for MHC class II binding prediction methods. Bioinformatics. 2018 May 1;34(9):1522-1528. doi: 10.1093/bioinformatics/btx820. PMID: 29281002; PMCID: PMC5925780.
- Wang P, Sidney J, Kim Y, Sette A, Lund O, Nielsen M, Peters B. Peptide binding predictions for HLA DR, DP and DQ molecules. BMC Bioinformatics. 2010 Nov 22;11:568. PMID: 21092157; PMCID: PMC2998531.
- Wang, P., J. Sidney, C. Dow, B. Mothe, A. Sette, B. Peters. (2008). A Systematic Assessment of MHC Class II Peptide Binding Predictions and Evaluation of a Consensus Approach. PLoS Computational Biology 4(4). PMID: 18389056

For the B cell predictions, the references are:

- Kringelum JV, Nielsen M, Padkjær SB, Lund O. Structural analysis of B-cell epitopes in antibody:protein complexes. Mol Immunol. 2013 Jan;53(1-2):24-34. doi: 10.1016/j.molimm.2012.06.001. Epub 2012 Jul 10. PMID: 22784991; PMCID: PMC3461403
- Kringelum JV, Lundegaard C, Lund O, Nielsen M. Reliable B cell epitope predictions: impacts of method development and improved benchmarking. PLoS Comput Biol. 2012;8(12):e1002829. doi: 10.1371/journal.pcbi.1002829. Epub 2012 Dec 27. PMID: 23300419; PMCID: PMC3531324.
- Rubinstein ND, Mayrose I, Martz E, Pupko T. Epitopia: a web-server for predicting B-cell epitopes. BMC Bioinformatics. 2009 Sep 14;10:287. doi: 10.1186/1471-2105-10-287. PMID: 19751513; PMCID: PMC2751785.
- Liang S, Zheng D, Standley DM, Yao B, Zacharias M, Zhang C. EPSVR and EPMeta: prediction of antigenic epitopes using support vector regression and multiple server results. BMC Bioinformatics. 2010 Jul 16;11:381. doi: 10.1186/1471-2105-11-381. PMID: 20637083; PMCID: PMC2910724.
- Ponomarenko JV, Bourne PE., Antibody-protein interactions: benchmark datasets and prediction tools evaluation. BMC Struct Biol. 2007 Oct 2;7(1):64. PMID: 17910770

### 2.3.7 Other Ways to Access Tools

There are several ways that users can access many of the tools in the Analysis Resource in addition to using the tools directly on the Analysis Resource website. On the Analysis Resource home page (http://tools.iedb.org), there are tabs for Tools-API and Download. The former takes the user to information about the RESTful interface. The RESTful (Representational State Transfer) web service is available for the MHC class I and II binding predictions, MHC class I processing predictions, and MHC-NP for T cell epitopes, and linear epitope prediction methods for B cells. The service sends POST request to the tool's server, and relies on user supplied parameters. The Tools-API web page contains examples for accessing the service using the 'curl' program, although any program that sends POST requests to the server will work just as well (including a web browser). This feature allows users to perform predictions on the IEDB server in batch mode without having to install any software on their own systems. Additionally, users will always be assured that they are using the latest version of the tools.

The Download tab takes the user to the IEDB Tools Download web page. For users from non-commercial organizations with batch processing needs, the MHC class I and II binding prediction tools, linear B cell epitope prediction tool, ElliPro, the epitope cluster analysis tool, the MHC class I immunogencity tool, and proteasomal cleavage prediction tool (added in 2016) are available as standalone scripts for download. These command line tools are kept in sync with the web tools and should therefore produce the same results as clicking through the web interface. They are freely available to non-profit/academic users through an open source license.

For commercial users that would like to run the analysis resource locally, licenses for a virtual machine image file or standalone downloads are available upon request for a modest annual fee. For the virtual machine, all tools are included except MHC-NP which was not developed by the IEDB team. The virtual machine image is kept in sync with the current version of the IEDB Analysis Resource and is updated approximately every six months. Commercial licenses are also available. Requests for either license can be sent to license@iedb.org.

## *2.4 Help Overview*

The Help pull-down menu contains items that aid the user to understand and utilize the features of the website. Users can access relevant documentation, request help, and provide feedback.

### 2.4.1 Support

The IEDB Solutions Center is the primary resource for information on using the website's features. The user can submit help requests, check on the status of requests, browse and search the knowledge base and forums, and link to help documentation, such as the Curation Manual. In order to submit a help request via the Solutions Center, users must provide an email address, a subject line, and a description of the issue password. The Solutions Center can also be accessed by a link at the bottom of each web page.

The Solutions Center has extensive documentation organized in forums that address a variety of topics, including the epitope analysis and prediction tools, submitting data to the IEDB, querying the database, and general announcements and updates. The Solutions Center is also the repository for the Annual Compendia, the list of papers published by the IEDB team, release notes for the main website and the Analysis Resource, and the News and Noteworthy forum. In addition, written and video tutorials, including the presentations from the annual IEDB User Workshops can be found there.

### 2.4.2 Help Request

Users can submit help requests in two ways. At the bottom of most pages is a "Help request" link. This will initiate a submission to the IEDB Solutions Center. The second method also utilizes the IEDB Solutions Center. The top menu bar on the IEDB Solutions Center web page has a "Help Request" link. Selecting this link brings the user to a "Submit a request" web page. The user must fill in their email address, the subject line, and a description of the help request. All help requests are forwarded to the same help desk.

Help requests should consist of problems that users have with the application, such as a certain function of the system not working. Questions on how to use features of the application should be covered in the online help available in the Solutions Center. After submitting a help request, a confirmation e-mail will be sent to the user's e-mail address, which will include the help request number. When the help request issue has been resolved, an e-mail will be sent to notify the user that the help request has been satisfied.

Help requests are generally responded to within one business day and solved within five business days. Requests that are actually bug reports by users are answered initially to inform the requestor that their issue is being forwarded to the appropriate developers and they will be notified when a fix is released. Requests involving the curation or re-curation of articles will typically take longer to resolve.

### 2.4.3 Provide Feedback

All users are able to submit feedback, which will transmit an email message to the IEDB team. Feedback is intended for questions, input, and suggestions, such as new features they would like to see added in the future. Feedback helps the IEDB team update the system to provide users with the best possible experience. If users need help using the system or handling an unexpected result, a Help Request is more appropriate. The feedback feature can be accessed with the Support pull-down menu and the "Provide Feedback" at the bottom of each web page. Both initiate a submission to the IEDB Solutions Center.

### 2.4.4 Video Tutorials

There is a link to the IEDB video tutorials under the Help menu at the top of each web page. This link takes the user to the "How-to Videos" article in the Solutions Center in the Tutorials and Reference Materials folder. Most of the videos are edited versions of live presentations made at the annual IEDB User Workshops. The videos from the 2019 event are currently posted for user viewing. An overview of the resource and information regarding the data structure and curation are presented first. The next category addresses the query and reporting features. Videos for all the tools in the Analysis Resource are listed next. Videos for the legacy website have been removed because the legacy site has been retired and can no longer be accessed by users.

## *2.5 More IEDB*

The "More IEDB" pull-down menu contains links to other relevant information that may be of interest to users. Its component links are described below.

### 2.5.1 Database Export

The contents of the Immune Epitope Database are exported weekly to files in XML format. The database export page (Figure 2.35) contains a complete database export in XML format along with exports of the various records that are referenced in the complete database export. The complete dataset export is provided as a ZIP archive (iedb_export.zip) containing one XML file for each reference contained in the database. The export also contains ZIP archives of XML files that provide users with the full record for the various identifiers that are referenced in the full database export, such as the IEDB source organism accession identifier list, the MHC allele name list, and the organism list. The supporting XML files only contain full records when the record is not otherwise available from the original source.

The database export page also provides the relevant XML Schema Definition (XSD) files for each of the XML files provided. The XSD file(s) for a particular XML file are located in the IEDB Schema box in the export table. In the case of the complete database export, multiple schemas are provided, with the primary schema being listed first, followed by any supporting schemas.

In addition to the XML export, the contents of the IEDB are exported weekly as a MySQL Structure Query Language (SQL) database. The database export page contains the complete database export in two formats, a single SQL script (iedb_public.sql.gz), and a TAR archive of MyISAM binary tables (iedb_public.tar.gz). Both export formats are generated from a 5.5.52-MariaDB database server. The database export page also provides an entity-relationship diagram (ERD) for the MySQL database.

Archives of the data as they appeared in IEDB 1.0, 2.0, 2.1, and 2.3 are available by clicking on the *Archived Versions*. For each version, there is a compressed file that contains an XML for each reference. The corresponding XSD files are also available for download.

Select compilations of data are available for download from the Database Export web page in CSV format in the section titled CSV Metric Exports. Users can download these files to conveniently obtain all the information in the IEDB for specific categories. Files are available for all epitopes, antigens, T cell assays, B cell assays, MHC ligand assays, and references. In addition, an export for antibody and T cell receptors was added in 2016. In addition to the files available on the Database Export web page, comma separated values (CSV) file exports are available on-demand from all list pages and list tabs throughout the site.

### 2.5.2 Meta-Analyses

The IEDB team has conducted a variety of analyses that examine data in the IEDB for several disease conditions and have been published in scientific journals. Over 20 papers have been published covering topics ranging from allergies, diabetes, and multiple sclerosis, to influenza, tuberculosis, malaria. When a user selects this menu item, they are directed to the Meta-analyses folder in the Knowledgebase and Forums section of the IEDB Solutions Center. The forum is updated as new meta-analyses are published. Users who subscribe to the folder will be automatically informed when content is added.

### 2.5.3 Citing the IEDB

Data and tools within the IEDB are presented as a public resource. Users are requested to consider citing the IEDB when they present information obtained from the IEDB or use tools contained in the Analysis Resource. It is expected that the authors of an entry as well as the IEDB are properly cited whenever their work is referred to:

1. The IEDB website should be cited using the URL: http://www.iedb.org

2. The journal reference for the IEDB was updated in 2018; and should be cited as:

   Vita R, Mahajan S, Overton JA, Dhanda SK, Martini S, Cantrell JR, Wheeler DK, Sette A, Peters B. The Immune Epitope Database (IEDB): 2018 update. Nucleic Acids Res. 2018 Oct 24. doi: 10.1093/nar/gky1006. [Epub ahead of print] PubMed PMID: 30357391.

### 2.5.4 Release Notes

Release notes are provided whenever a new release of the main website or the Analysis Resource is deployed to the public. When a user selects this menu item, they are directed to the Release Notes folder in the Knowledgebase and Forums section of the IEDB Solutions Center. The forum is updated as new releases are deployed. Users who subscribe to the folder will be automatically informed when content is added.

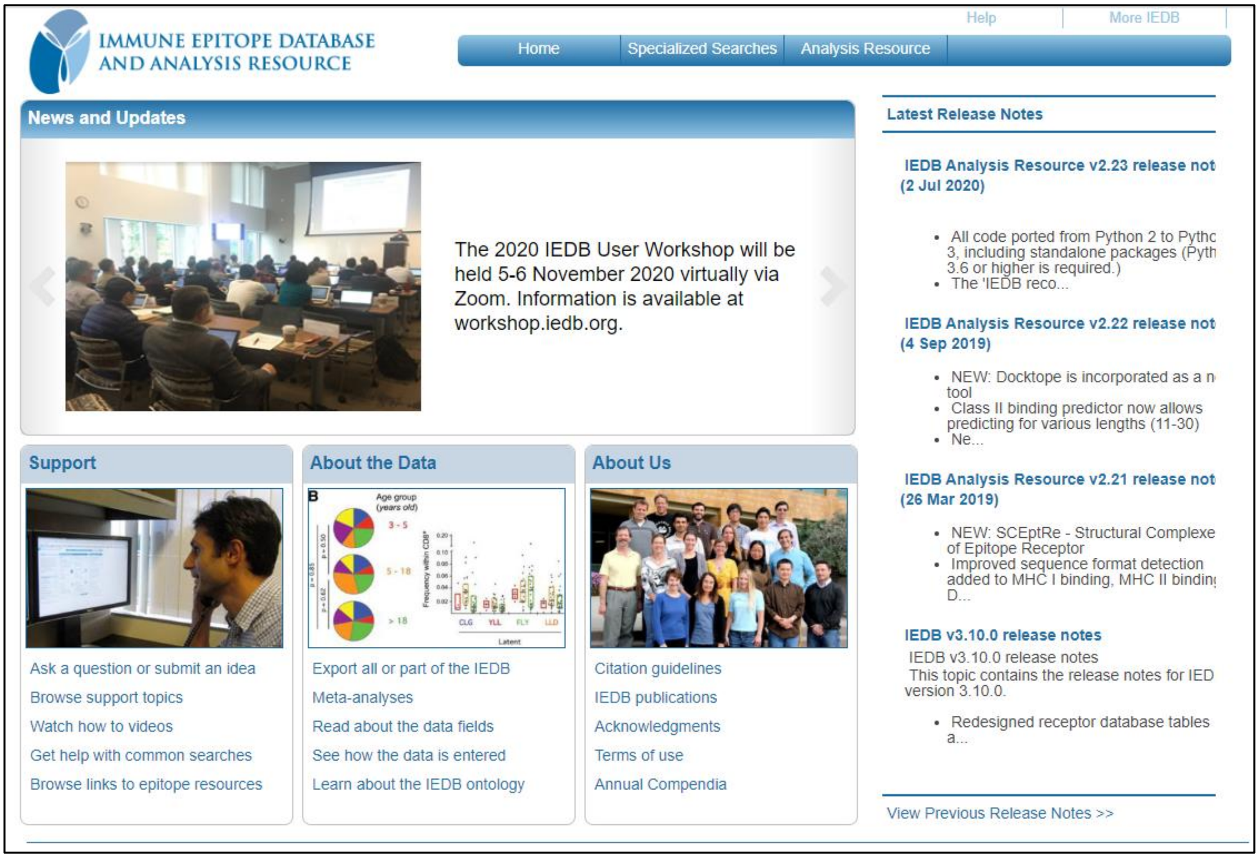
### 2.5.5 Links to External Sources

The IEDB system provides a list of links to external resources solely for the convenience of Immune Epitope Database visitors. The Immune Epitope Database has no interest in, responsibility for, or control over the linked-site. The Immune Epitope Database makes no promises or warranties of any kind, express or implied, including those of fitness for any particular purpose, as to the content of the linked-site. To view the links available, select the Links menu item. The hyperlinks on the links page are grouped by category:

- Public Databases, Prediction Algorithms, and Other Tools
- Antibody Related Links
- Bioinformatics Resource Centers
- MHC and TCR Related Links
- Protein Related Links
- Laboratory Resources
- Biodefense Resources

## 2.6 *Learn More*

The Learn More web page can be accessed from the link at the bottom of the Welcome box in the upper left-hand corner of the IEDB home page. The Learn More page has five major sections, as seen in Figure 2.36. The upper left section has a carousel of content from the New and Noteworthy forum in the Solutions Center. A graphic is usually included in the forum article that is displayed in the left-hand portion of the section. Below this section are three other sections titled Support, About the Data, and About Us. The Support section has links to submit a help request or feedback. The right-hand panel of the page lists the release notes for the most recent versions of the main website and the Analysis Resource.



The 2020 IEDB User Workshop will be held 5-6 November 2020 virtually via Zoom. Information is available at workshop.iedb.org.

Ask a question or submit an idea
Browse support topics
Watch how to videos
Get help with common searches
Browse links to epitope resources

Export all or part of the IEDB
Meta-analyses
Read about the data fields
See how the data is entered
Learn about the IEDB ontology

Citation guidelines
IEDB publications
Acknowledgments
Terms of use
Annual Compendia

IEDB Analysis Resource v2.23 release not
(2 Jul 2020)

- All code ported from Python 2 to Pythc 3, including standalone packages (Pyth 3.6 or higher is required.)
- The 'IEDB reco...

IEDB Analysis Resource v2.22 release not
(4 Sep 2019)

- NEW: Docktope is incorporated as a n tool
- Class II binding predictor now allows predicting for various lengths (11-30)
- Ne...

IEDB Analysis Resource v2.21 release not
(26 Mar 2019)

- NEW: SCEptRe - Structural Complexe of Epitope Receptor
- Improved sequence format detection added to MHC I binding, MHC II bindin D...

IEDB v3.10.0 release notes
IEDB v3.10.0 release notes
This topic contains the release notes for IED version 3.10.0.

- Redesigned receptor database tables a...

View Previous Release Notes >>

**Figure 2.35** The Learn More page, accessed from the Welcome message in the upper left corner of the IEDB home page

### 2.6.1 Support

Each link is briefly described below.

**Ask a question or submit an idea**
This link allows the user to submit a help request or suggestion via the IEDB Solutions Center. The user must specify their email address, the subject of their request, and description of the problem or suggestion. Users can also attach relevant files.

**Browse support topics**
The IEDB Solutions Center home page has a variety of user help, including several resources for getting started with the IEDB, recent Release Notes, and timely articles.

**Get help with common searches**
There is a category in the Solutions Center that contains a list of common queries and questions. These queries have been designed to parallel the IEDB meta-analysis efforts. Meta-analyses are performed at intervals to query the database for all data relating to subjects of interest (ex. Influenza, Malaria, Tuberculosis). These queries represent a simplified version of such analysis.

**Browse links to epitope resources**
The IEDB system provides a list of links to external resources solely for the convenience of Immune Epitope Database visitors as described in Section 2.5.5.

### 2.6.2 About the Data

Each link is briefly described below.

**Export all or part of the IEDB**
Clicking on this link will bring the user to the Database Export page that is described in Section 2.5.1.

**Meta-analyses**
The meta-analyses conducted by the IEDB team are described in Section 2.5.2.

**Read about the data fields**
This link gives the user access to a subset of the Curation Manual hosted in a Wiki that describes and defines the various data fields. Using the Find function of their web browser, users can search for the data field name of interest in order to gain a fuller understanding of the field definition and the possible values.

**See how the data is entered**
Users can access the full IEDB Curation Manual. The rules for curating all data fields are described in this Wiki.

**Learn about the IEDB ontology**
Selecting IEDB Ontology takes the user to http://ontology.iedb.org, the home page for the Ontology of Immune Epitopes (ONTIE). The IEDB ontology is available to download in a format that can be viewed with the Protégé OWL editor. The file ONTIE.owl contains the classes and relations used in the IEDB export. IEDB-export.owl is the ONTIE-annotated export of the IEDB T cell epitope data. Smaller versions of the file are available for download. The ONTIE home page also lists related ontologies that are used in constructing ONTIE.

### 2.6.3 About Us

**Citation Guidelines**
This link brings the user to the “Citing the IEDB” web page described in Section 2.5.3.

**IEDB Publications**
A list of publications relevant to the IEDB can be found on the Publications page. They have been grouped into four categories – General IEDB, Epitope Meta-analyses, Analysis Resource, and Curation. This list is updated with each new release of the main website. A list of IEDB related publications can also be found in the Publications folder in the IEDB Solutions Center.

**Acknowledgements**
A host of talented individuals have worked hard to make the Immune Epitope Database a reality. A roster of the current team members can be viewed on this page.

**Terms of Use**

The Terms of Use page is a collection of statements that outline the conditions related to using the IEDB system. The Terms of use includes our privacy notice, copyright information, and various disclaimers. The IEDB privacy policy describes what user information is collected, the circumstances for collecting it, and how it is used. Personal information about users is not collected unless the users choose to provide it.

**Annual Compendia**

An archive of the IEDB Annual Compendia can be found at this link to the IEDB Solutions Center. The list includes all Annual Compendia going back to 2005.

# 3 Scientific Publications

This section lists the scientific publications for which the IEDB played a contributory role. The first section lists publications authored by the IEDB contractor team over the past 17 years. The second section lists references that cited the IEDB. This list was compiled by using Google Scholar and the ISI Web of Knowledge to find citations for each one of the IEDB team authored papers.

## *3.1 IEDB Sponsored Publications*

Scientific articles written by the IEDB team members that are relevant to the IEDB are listed below (organized by year of publication) through 2019. This publication list was re-evaluated in December 2019 to ensure that the list was accurate and up to date. As a result of this review, the publication list now contains 158 IEDB sponsored publications (including book chapters) between program inception in 2003 and 31 December 2019.

| Year | Type | Paper | PMID | Journal |
|---|---|---|---|---|
| **2019** | General | Comprehensive Review of Human Plasmodium falciparum-Specific CD8+ T Cell Epitopes | 30949162 | Frontiers in Immunology |
| | | Human T Cell Response to Dengue Virus Infection | 31552052 | Frontiers in Immunology |
| | | A survey of known immune epitopes in the enteroviruses associated with acute flaccid myelitis | 31451291 | Human Immunology |
| | | Benchmark datasets of immune receptor-epitope structural complexes | 31601176 | BMC Bioinformatics |
| | | The Immune Epitope Database and Analysis Resource program 2003-2019 reflections and outlook | 31761977 | Immunogenetics |
| | Tools | Antibody specific B-cell epitope predictions: leveraging information from antibody-antigen protein complexes | 30863406 | Frontiers in Immunology |
| | | Immune Epitope Database - Analysis Resource (IEDB-AR) in 2019 | 31114900 | Nucleic Acids Research |
| | | TCRpMHCmodels: Structural modelling of TCR-pMHC class I complexes. | 31601838 | Scientific Reports |
| | | Book Chapter: Prediction of B and T cell epitopes in proteins | N/A | Immunotechnology and Its Applications |
| | | NNAlign_MA; MHC Peptidome Deconvolution for Accurate MHC Binding Motif Characterization and Improved T-cell Epitope Predictions | 31578220 | Molecular & Cellular Proteomics |
| **2018** | General | Investigation of outbreak-specific nonsynonymous mutations on Ebolavirus GP in the context of known immune reactivity | 30581874 | Journal of Immunology Research |
| | | FAIR principles and the IEDB: Short-term improvements and a Long-term vision of OBO-Foundry mediated machine-actionable interoperability | 29688354 | Database |
| | | A Review on T Cell Epitopes Identified Using Prediction and Cell-Mediated Immune Models for Mycobacterium tuberculosis and Bordetella pertussis | 30555469 | Frontiers in Immunology |
| | | Identification of Errors in the IEDB Using Ontologies | 29688357 | Database |

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|---|---|---|---|---|
| | | Epitope Specific Antibodies and T Cell Receptors in the Immune Epitope Database | 30515166 | Frontiers in Immunology |
| | | The Immune Epitope Database (IEDB): 2018 update | 30357391 | Nucleic Acids Research |
| | Tools | An automated benchmarking platform for MHC class II binding prediction methods | 29281002 | Bioinformatics |
| | | Bioinformatics Tools for the Prediction of T-Cell Epitopes. | 29714025 | Methods Mol Biol |
| | | Development of a novel clustering tool for linear peptide sequences | 30014462 | Immunology |
| | | Predicting HLA CD4 immunogenicity in human populations | 29963059 | Frontiers in Immunology |
| | | Footprints of antigen processing boost MHC class II natural ligand binding predictions | 30446001 | Genome Medicine |
| | | Computational Tools for the Identification and Interpretation of Sequence Motifs in Immunopeptidomes | 29327813 | Proteomics |
| | | ImmunomeBrowser: A tool to aggregate and visualize complex and heterogeneous epitopes in reference protein | 29878047 | Bioinformatics |
| | | Improved methods for predicting peptide binding affinity to MHC class II molecules | 29315598 | Immunology |
| | | Determination of a Predictive Cleavage Motif for Eluted Major Histocompatibility Complex Class II Ligands | 30127785 | Frontiers in Immunology |
| | | Microbiota epitope similarity either dampens or enhances the immunogenicity of disease-associated antigenic epitopes | 29734356 | PLoS One |
| **2017** | General | Deciphering the MHC-associated peptidome: a review of naturally processed ligand data | 28756714 | Expert Rev Proteomics |
| | | Unconventional peptide Presentation by Major Histocompatibility Complex (MHC) Class I Allele HLA-A*02:01: Breaking Confinement | 28179428 | J Biol Chem |
| | | The Immune Epitope Database: How Data Are Entered and Retrieved | 28634590 | J Immunol Res |
| | | Better living through ontologies at the Immune Epitope Database | 28365732 | Database (Oxford) |
| | | The SysteMHC Atlas project | 28985418 | Nucleic Acids Res |
| | | The Immune Epitope Database and Analysis Resource in Epitope Discovery and Synthetic Vaccine Design | 28352270 | Front Immunol |
| | Tools | Experimental validation of the RATE tool for inferring HLA restrictions of T cell epitopes | 28681704 | BMC Immunology |
| | | Citrullination only infrequently impacts peptide binding to HLA class II MHC | 28481943 | PLoS One |
| | | Machine learning reveals a non-canonical mode of peptide binding to MHC class II molecules | 28542831 | Immunology |
| | | NNAlign: a platform to construct and evaluate artificial neural network models of receptor-ligand interactions | 28407117 | Nucleic Acids Res |
| | | BepiPred-2.0: improving sequence-based B-cell epitope predictions using conformational epitopes | 28472356 | Nucleic Acids Res |
| | | GibbsCluster: unsupervised clustering and alignment of peptide sequences | 28407089 | Nucleic Acids Res |

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|---|---|---|---|---|
| | | An introduction to Deep learning on biological sequence data - Examples and solutions | 28961695 | Bioinformatics |
| | | Development of a strategy and computational application to select candidate protein analogues with reduced HLA binding and immunogenicity | 28833085 | Immunology |
| | | NetMHCpan 4.0: Improved peptide-MHC class I interaction predictions integrating eluted ligand and peptide binding affinity data | 28978689 | J Immunol |
| **2016** | General | Ebola: an analysis of immunity at the molecular level | N/A | IEEE Xplore Digital Library |
| | | Identifying candidate targets of immune responses in Zika virus based on homology to epitopes in other Flavivirus species | 28018746 | PLoS Curr |
| | | Immune Epitope Database and Analysis Resource (IEDB) | N/A | Encyclopedia of Bioimmunology |
| | | An Ontology for Major Histocompatibility Restriction | 26759709 | J Biomed Semantics |
| | | The Ontology for Biomedical Investigations | 27128319 | PLoS One |
| | | Reproducibility and Conflicts in Immune Epitope Data | 26678806 | Immunology |
| | Tools | The Length Distribution of Class I-Restricted T Cell Epitopes Is Determined by Both Peptide Supply and MHC Allele-Specific Binding Preference | 26783342 | J Immunol |
| | | NetMHCpan-3.0; improved prediction of binding to MHC class I molecules integrating information from multiple receptor and peptide length data sets | 27029192 | Genome Med |
| | | T-cell recognition is shaped by epitope sequence conservation in the host proteome and microbiome | 26789414 | Immunology |
| | | TepiTool: A pipeline for computational prediction of T cell epitope candidates | 27479659 | Current Protocols in Immunology |
| | | Toxoplasma gondii peptide ligands open the gate of the HLA class I binding groove | 26824387 | Elife |
| | | Gapped sequence alignment using artificial neural networks: application to the MHC class I system | 26515819 | Bioinformatics |
| | | Pan-Specific Prediction of Peptide-MHC Class I Complex Stability, a Correlate of T Cell Immunogenicity | 27402703 | J Immunol |
| **2015** | General | Analysis of Human RSV immunity at the molecular level: learning from the past and present | 26001197 | PLoS One |
| | | The Use of the Immune Epitope Database (IEDB) to Study Autoimmune Epitope Data related to Alopecia Areata | 26551944 | Journal of Investigative Dermatology |
| | | The immune epitope database (IEDB) 3.0 | 25300482 | Nucleic Acids Res |
| | | Consequences of periodic α-to-β(3) residue replacement for immunological recognition of peptide epitopes | 25559929 | ACS Chem Biol |
| | Tools | Automated benchmarking of peptide-MHC class I binding predictions | 25717196 | Bioinformatics |
| | | Development and validation of a broad scheme for prediction of HLA class II restricted T cell epitopes | 25862607 | J Immunol Methods |
| | | Automatic generation of validated specific epitope sets | 26568965 | J Immunol Res |

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|---|---|---|---|---|
| | | Antibody specific epitope prediction - emergence of a new paradigm | 25837466 | Curr Opin Virol |
| | | A population response analysis approach to assign class II HLA-epitope restrictions | 25948811 | J Immunol |
| | | LYRA, a webserver for lymphocyte receptor structural modeling | 26007650 | Nucleic Acids Res |
| | | Accurate pan-specific prediction of peptide-MHC class II binding affinity with improved binding core identification | 26416257 | Immunogenetics |
| **2014** | General | Substantial gaps in knowledge of Bordetella pertussis antibody and T cell epitopes relevant for natural immunity and vaccine efficacy | 24530743 | Human Immunology |
| | | Conservancy of mAb epitopes in Ebolavirus glycoproteins of previous and 2014 outbreaks | 25642381 | PLoS Curr |
| | | A molecular view of multiple sclerosis and experimental autoimmune encephalitis: What can we learn from the epitope data? | 24365494 | J Neuroimmunol |
| | Tools | Dataset size and composition impact the reliability of performance benchmarks for peptide-MHC binding predictions | 25017736 | BMC Bioinformatics |
| | | NetTepi: an integrated method for the prediction of T-cell epitopes | 24863339 | Immunogenetics |
| | | NetMHCstab - predicting stability of peptide:MHC-I complexes; impacts for CTL epitope discovery | 23927693 | Immunology |
| | | Characterization of binding specificities of bovine leucocyte class I molecules: impacts for rational epitope discovery | 25186069 | Immunogenetics |
| **2013** | General | Navigating diabetes-related immune epitope data: resources and tools provided by the Immune Epitope Database (IEDB) | 25140192 | Immunome Res |
| | | Query Enhancement through the Practical Application of Ontology: The IEDB and OBI | 23734660 | J Biomed Semantics |
| | | Positional Bias of MHC Class I Restricted T-Cell Epitopes in Viral Antigens is likely due to a Bias in Conservation | 23357871 | PLoS Comput Biol |
| | Tools | Evaluating the immunogenicity of protein drugs by applying in vitro MHC binding data and the immune epitope database and analysis resource | 24222776 | Clin Dev Immunol |
| | | Properties of MHC class I presented peptides that enhance immunogenicity | 24204222 | PLoS Comp Biol |
| | | NetMHCIIpan-3.0, a common pan-specific MHC class II prediction method including all three human MHC class II isotypes, HLA-DR, HLA-DP and HLA-DQ | 23900783 | Immunogenetics |
| | | SigniSite: Identification of residue-level genotype-phenotype correlations in protein multiple sequence alignments | 23761454 | Nucleic Acids Res |
| | | Evaluation of peptide selection approaches for epitope-based vaccine design | 24461003 | Tissue Antigens |
| | | HLA Class I Alleles Are Associated with Peptide-Binding Repertoires of Different Size, Affinity, and Immunogenicity | 24190657 | J Immunol |

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| | | Structural analysis of B-cell epitopes in antibody:protein complexes | 22784991 | Mol Immunol |
| **2012** | General | A meta-analysis of the existing knowledge of immunoreactivity against hepatitis C virus (HCV) | 22675428 | PLoS One |
| | | The immune epitope database: a historical retrospective of the first decade | 22681406 | Immunology |
| | | Strategies to query and display allergy-derived epitope data from the Immune Epitope Database (IEDB) | 23172234 | Int Arch Allergy Immunol |
| | | A Comparison of Epitope Repertoires Associated with Myasthenia Gravis in Humans and Nonhuman Hosts | 23243503 | Autoimmune Dis |
| | Tools | Immune epitope database analysis resource | 22610854 | Nucleic Acids Res |
| | | Predictions versus high-throughput experiments in T-cell epitope discovery: competition or synergy? | 22149708 | Expert Rev Vaccines |
| | | NetMHCcons: a consensus method for the major histocompatibility complex class I predictions. | 22009319 | Immunogenetics |
| **2011** | General | Cost sensitive hierarchical document classification to triage PubMed abstracts for manual curation | 22182279 | BMC Bioinformatics |
| | | A Model for Collaborative Curation, The IEDB and ChEBI Curation of Non-peptidic Epitopes | 21897450 | Immunome Res |
| | | IEDB-3D: structural data within the immune epitope database | 21030437 | Nucleic Acids Res |
| | Tools | Applications for T-cell epitope queries and tools in the Immune Epitope Database and Analysis Resource | 21047510 | J Immunol Methods |
| | | Prediction of epitopes using neural network based methods | 21047511 | J Immunol Methods |
| | | A computational pipeline to generate MHC binding motifs | 28747991 | Immunome Res |
| **2010** | General | Towards defining molecular determinants recognized by adaptive immunity in allergic disease: an inventory of the available data | 21403821 | J Allergy (Cairo) |
| | | OBI consortium. Modeling biomedical experimental processes with OBI | 20626927 | J Biomed Semantics |
| | | Design and utilization of epitope-based databases and predictive tools | 20213141 | Immunogenetics |
| | | Meta-analysis of all immune epitope data in the Flavivirus genus: inventory of current immune epitope data status in the context of virus immunity and immunopathology | 20565291 | Viral Immunol |
| | | The Immune Epitope Database 2.0 | 19906713 | Nucleic Acids Res |
| | | Molecular determinants of T cell epitope recognition to the common Timothy grass allergen | 20554959 | J Immunol |
| | | Divergent motifs but overlapping binding repertoires of six HLA-DQ molecules frequently expressed in the worldwide human population. | 20810981 | J Immunol |
| | | Five HLA-DP molecules frequently expressed in the worldwide human population share a common HLA supertypic binding specificity | 20139279 | J Immunol |
| | | Uncovering the interplay between CD8, CD4 and antibody responses to complex pathogens. | 20143946 | Future Microbiol |

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| | Tools | MHC class II epitope predictive algorithms | 20408898 | Immunology |
| | | Peptide binding predictions for HLA DR, DP and DQ molecules | 21092157 | BMC Bioinformatics |
| | | Limitations of Ab initio predictions of peptide binding to MHC class II molecules | 20174654 | PLoS One |
| | | NetCTLpan: pan-specific MHC class I pathway epitope predictions | 20379710 | Immunogenetics |
| | | The MHC motif viewer: a visualization tool for MHC binding motifs. | 20143317 | Curr Protoc Immunol |
| **2009** | General | Classification of the universe of immune epitope literature: representation and knowledge gaps | 19774228 | PLoS One |
| | | Pre-existing immunity against swine-origin H1N1 influenza viruses in the general human population | 19918065 | Proc Natl Acad Sci |
| | | Meta-analysis of immune epitope data for all Plasmodia: overview and applications for malarial immunobiology and vaccine-related issues | 19149776 | Parasite Immunol |
| | | Two MHC class I molecules associated with elite control of immunodeficiency virus replication, Mamu-B*08 and HLA-B*2705, bind peptides with sequence similarity. | 19494300 | J Immunol |
| | | Diverse recognition of conserved orthopoxvirus CD8+ T cell epitopes in vaccinated rhesus macaques. | 19531389 | Vaccine |
| | | Definition of epitopes and antigens recognized by vaccinia specific immune responses: their conservation in variola virus sequences, and use as a model system to study complex pathogens | 20006135 | Vaccine |
| | Tools | NetMHCpan, a method for MHC class I binding prediction beyond humans | 19002680 | Immunogenetics |
| | | Derivation of an amino acid similarity matrix for peptide: MHC binding and its application as a Bayesian prior | 19948066 | BMC Bioinformatics |
| | | The PickPocket method for predicting binding specificities for receptors based on receptor pocket similarities: Application to MHC-peptide binding | 19297351 | Bioinformatics |
| | | Pan-specific MHC class I predictors: a benchmark of HLA class I pan-specific prediction methods | 18996943 | Bioinformatics |
| **2008** | General | The Curation Guidelines of the Immune Epitope Database and Analysis Resource | 18688821 | Cytometry A |
| | | Analysis of epitope information related to Bacillus anthracis and Clostridium botulinum | 18251694 | Expert Rev Vaccines |
| | | Quantitative peptide binding motifs for 19 human and mouse MHC class I molecules derived using positional scanning combinatorial peptide libraries | 18221540 | Immunome Res |
| | | HLA class I supertypes: a revised and updated classification | 18211710 | BMC Immunol |
| | | Immunodominant epitopes in herpes simplex virus type 2 glycoprotein D are recognized by CD4 lymphocytes from both HSV-1 and HSV-2 seropositive subjects | 18941251 | J Immunol |
| | Tools | NetMHC-3.0: accurate web accessible predictions of human, mouse and monkey MHC class I affinities for peptides of length 8-11 | 18463140 | Nucleic Acids Res |

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| | | Quantitative Predictions of Peptide Binding to Any HLA-DR Molecule of Known Sequence: NetMHCIIpan | 18604266 | PLoS Computational Biology |
| | | B-cell epitope prediction | | Structural Bioinformatics |
| | | ElliPro: a new structure-based tool for the prediction of antibody epitopes | 19055730 | BMC Bioinformatics |
| | | A Systematic Assessment of MHC Class II Peptide Binding Predictions and Evaluation of a Consensus Approach | 18389056 | PLoS Computational Biology |
| | | Immune epitope database analysis resource (IEDB-AR) | 18515843 | Nucleic Acids Res |
| **2007** | General | An analysis of the epitope knowledge related to Mycobacteria | 18081934 | Immunome Res |
| | | Ab and T cell epitopes of influenza A virus, knowledge and opportunities | 17200302 | Proc Natl Acad Sci |
| | | Meeting Report: NIH Workshop on the Tuberculosis Immune Epitope Database | 18068490 | Tuberculosis (Edinb) |
| | | Integrating epitope data into the emerging web of biomedical knowledge resources | 17479127 | Nat Rev Immunol |
| | | Immune epitope mapping in the post-genomic era: lessons for vaccine development | 17113275 | Curr Opin Immunol |
| | | Automating document classification for the Immune Epitope Database | 17655769 | BMC Bioinformatics |
| | | Characterization of the peptide-binding specificity of the chimpanzee class I alleles A 0301 and A 0401 using a combinatorial peptide library | 17701407 | Immunogenetics |
| | Tools | Antibody-protein interactions: benchmark datasets and prediction tools evaluation. | 17910770 | BMC Struct Biol |
| | | EpitopeViewer: a Java application for the visualization and analysis of immune epitopes in the Immune Epitope Database and Analysis Resource (IEDB) | 17313688 | Immunome Res |
| | | Development of an epitope conservancy analysis tool to facilitate the design of epitope-based diagnostics and vaccines | 17897458 | BMC Bioinformatics |
| | | Towards a consensus on datasets and evaluation metrics for developing B-cell epitope prediction tools | 17205610 | J Mol Recognit |
| | | Modeling the adaptive immune system: predictions and simulations | 18045832 | Bioinformatics |
| | | NetMHCpan, a method for quantitative predictions of peptide binding to any HLA-A and -B locus protein of known sequence | 17726526 | PLoS One |
| **2006** | General | The biocurator: connecting and enhancing scientific data | 17069454 | PLoS Comput Biol |
| | | The Immune Epitope Database and Analysis Resource | N/A | Conference Proceedings |
| | | Curation of complex, context-dependent immunological data | 16836764 | BMC Bioinformatics |
| | Tools | Predicting population coverage of T-cell epitope-based diagnostics and vaccines | 16545123 | BMC Bioinformatics |
| | | A community resource benchmarking predictions of peptide binding to MHC-I molecules | 16789818 | PLoS Comput Biol |
| **2005** | General | The design and implementation of the immune epitope database and analysis resource | 15895191 | Immunogenetics |

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| | | The Immune Epitope Database and Analysis Resource: From Vision to Blueprint | 15760272 | PLoS Biology |
| | | An ontology for immune epitopes: application to the design of a broad scope database of immune reactivities | 16305755 | Immunome Res |
| | | A Roadmap for the Immunomics of Category A–C Pathogens | 15773067 | Immunity |
| | | Characterization of the peptide-binding specificity of Mamu-A*11 results in the identification of SIV-derived epitopes and interspecies cross-reactivity | 15747117 | Immunogenetics |
| | Tools | Generating quantitative models describing the sequence specificity of biological processes with the stabilized matrix method | 15927070 | BMC Bioinformatics |
| | | A computational resource for the prediction of peptide binding to Indian rhesus macaque MHC class I molecules. | 16137805 | Vaccine |
| **2004** | General | The immune epitope database and analysis resource: from vision to blueprint | 16312048 | Genome Inform |
| | | Identification of seventeen new simian immunodeficiency virus-derived CD8+ T cell epitopes restricted by the high frequency molecule, Mamu-A*02, and potential escape from CTL recognition | 15470050 | J Immunol |
| **2003** | General | In silico prediction of peptides binding to multiple HLA-DR molecules accurately identifies immunodominant epitopes from gp43 of Paracoccidioides brasiliensis frequently recognized in primary peripheral blood mononuclear cell responses from sensitized individuals | 15208742 | Mol Med |

## *3.2 Publications Citing the IEDB in 2019*

In 2019, the IEDB or Analysis Resource received a total of 2,676 individual citations (2,079 total citations for IEDB publications and 597 additional inline citations). This represents an increase of 461 citations over 2,215 from the previous year (2018). The citation list includes 1,520 references that formally cited one or more of the 154 papers written by the IEDB team over the past seventeen years, and an additional 597 references that cited the IEDB in-text but did not cite a specific reference. This represents an increase of 197 references from the 1,323 references that cited the IEDB in 2018. Of note, this total may increase over time since these databases may not include references published late in 2019.

The formal citation list was compiled by using Google Scholar and the ISI Web of Knowledge to find citations for each one of the 154 papers and excludes self-citations. In contrast, often scientific reports quote the IEDB not as a formal citation, but by simply stating in the text that the IEDB was used or listing the website address. Here we developed and implemented a plan to address in-text citations (informal mentions of the IEDB, rather than a direct citation). For this purpose, we utilized Publish or Perish, a software program that retrieves citations from Crossref, Google Scholar, Microsoft Academic, Scopus, and Web of Science, and returns output that can easily be converted to an excel file. The tool can capture citations that the document specialist's citation analysis, which includes Google Scholar and Web or Science, may have missed, and can capture references that cite the IEDB in text but do not cite a specific IEDB-related publication.

The papers have been categorized by the type of IEDB paper they cited – General IEDB (G) or Analysis Resource (AR). By reference, the General IEDB (G) papers received 529 citations in 2019 and the Analysis Resource (AR) papers received 1,550 citations. However, without redundancy, 923 unique references formally cited the IEDB and Analysis Resource, and a further 597 references informally cited the resource.

All papers listed below denote their category or categories with these abbreviations since a paper can cite several IEDB papers that belong in different categories. For example, a paper that cites an analysis resource paper may also cite the primary IEDB Nucleic Acids Res (2014) paper, and thus is listed under General IEDB and has an [AR, G] to indicate the Analysis Resource citation. Any paper that has “General” as one of its categories has been listed in the General category below.

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**2.** Abdolvahab, M.H., Venselaar, H., Fazeli, A., Arab, S.S., and Behmanesh, M. (2019). "Point Mutation Approach to Reduce Antigenicity of Interferon Beta." International Journal of Peptide Research and Therapeutics 1-9. **[G, AR]**

**3.** Abdul-Jalil, A.A. and Khalaf, S.N. (2019). "Protein Kinases A (PknA), a Good Target for Vaccine Design against Tuberculosis." Indian Journal of Public Health Research & Development 10(6): 668-673. **[G]**

**4.** Abdulla, F., Adhikari, U.K., and Uddin, M.K. (2019). "Exploring T & B-cell epitopes and designing multi-epitope subunit vaccine targeting integration step of HIV-1 lifecycle using immunoinformatics approach." Microbial Pathogenesis 137 **[AR]**

**5.** Abdulla, F., Nain, Z., Hossain, M.M., Sayed, S.B., Khan, M.S.A., and Adhikari, U.K. (2019). "Computational Approach for Screening the Whole Proteome of Hantavirus and Designing a Multi-Epitope Subunit Vaccine." bioRxiv 832980- **[AR]**

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**8.** Admon, A. (2019). "ERAP1 shapes just part of the immunopeptidome." Human Immunology 80(5): 296-301. **[G, AR]**

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