Table S1. Information of gene sequences of SDDV used in this study

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Isolate name | Host | Year | Geographical origin | Gene | Accession no. | Reference |
| TH4\_2017 | Asian seabass  (*Lates calcarifer*) | 2017 | Thailand | Uvr/REP helicase | PP855146 | This study |
| TH6\_2018 | Asian seabass  (*Lates calcarifer*) | 2018 | Thailand | Uvr/REP helicase | PP855147 | This study |
| SG12\_2019 | Asian seabass  (*Lates calcarifer*) | 2019 | Singapore | Uvr/REP helicase | PP855148 | This study |
|  |  |  | NIF-NLI interacting factor | PP855151 | This study |
| ML21\_2019 | Asian seabass  (*Lates calcarifer*) | 2019 | Malaysia | D5 family NTPase ATPase | PP855160 | This study |
|  |  |  | Flap endonuclease | PP855155 | This study |
|  |  |  | ATPase | PP855162 | This study |
|  |  |  | Myristylated membrane protein | PP855163 | This study |
|  |  |  | NIF-NLI interacting factor | PP855152 | This study |
|  |  |  | Uvr/REP helicase | PP855149 | This study |
| ML23\_2019 | Asian seabass  (*Lates calcarifer*) | 2019 | Malaysia | D5 family NTPase ATPase | PP855159 | This study |
|  |  |  | Flap endonuclease | PP855154 | This study |
|  |  |  | ATPase | PP855161 | This study |
|  |  |  | Myristylated membrane protein | PP855164 | This study |
|  |  |  | NIF-NLI interacting factor | PP855153 | This study |
|  |  |  | Uvr/REP helicase | PP855150 | This study |
|  |  |  | DNA polymerase | PP855156 | This study |
|  |  |  | RPO | PP855157 | This study |
|  |  |  | MCP | Under submission | This study |
| SDDV Fish-KU01 | Asian seabass  (*Lates calcarifer*) | 2018 | Thailand | MCP | MN541862 | [38] |
| SDDV\_2016 | Asian seabass  (*Lates calcarifer*) | 2016 | Thailand | MCP | MH152403 | [8] |
| SDDV\_2017 | Asian seabass  (*Lates calcarifer*) | 2017 | Thailand | MCP | MH152404 | [8] |
| SDDV\_2018 | Asian seabass  (*Lates calcarifer*) | 2018 | Thailand | MCP | MH152405 | [8] |
| SDDV SB1 | Asian seabass  (*Lates calcarifer*) | 2019 | Malaysia | MCP | MT012815 | [7] |
| SDDV SB2 | Asian seabass  (*Lates calcarifer*) | 2019 | Malaysia | MCP | MT012816 | [7] |
| SDDV SB3 | Asian seabass  (*Lates calcarifer*) | 2019 | Malaysia | MCP | MT012817 | [7] |

Table S2. BUSCO assessment results of recovered SDDV genomes in this study

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| BUSCO list | BUSCO search | | | | | | |
| SDDV TH2\_2016 | SDDV TH4\_2017 | SDDV TH6\_2018 | SDDV TH7\_2019 | SDDV SG12\_2019 | SDDV ML21\_2019 | SDDV ML23\_2019 |
| DNA polymerase | M | M | M | C | F | F | C |
| DNA-dependent RNA polymerase II alpha subunit (RPO) | M | F | M | C | F | F | C |
| DNA-dependent RNA polymerase II beta subunit (RPO2) | M | F | F | C | F | F | F |
| Putative D5 family NTPase ATPase | M | F | M | C | F | C | C |
| Putative NTPase | M | M | F | C | F | C | F |
| Flap endonuclease | M | F | M | C | C | C | C |
| ATPase | M | F | M | C | F | C | C |
| Myristylated membrane protein | M | M | M | C | F | C | C |
| NIF-NLI interacting factor | C | F | M | C | C | C | C |
| Uvr/REP helicase | M | C | C | C | C | C | C |
| Non-BUSCO list | Blastp search | | | | | | |
| MCP | NA | NA | NA | 1362 bp | NA | 516 bp | 1362 bp |

Table S3. Genome annotation of the SDDV TH7\_2019

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ORF | Position  (nt range) | | Product size | | Predicted function and conserved domain | Best BLAST hit | | |
| Start | end | nt (bp) | AA | Description | AA identity (%) | E-value |
| ORF001 | 31 | 1131 | 1101 | 377 | Putative ankyrin repeat protein (ANKYR) | ORF115R [SDDV C4575] | 100 | 0 |
| ORF002 | 1147 | 2568 | 1422 | 474 | Putative ankyrin repeat protein (ANKYR) | putative ankyrin repeat protein [SDDV TH2019] | 100 | 0 |
| ORF003 | 3259 | 2552 | 708 | 251 | Hypothetical protein | ORF133 [SDDV ZH-06/20] | 100 | 0 |
| ORF004 | 4170 | 3385 | 786 | 262 | Hypothetical protein | ORF118L [SDDV C4575] | 100 | 0 |
| ORF005 | 4197 | 4547 | 351 | 117 | Hypothetical protein | ORF119R [SDDV C4575] | 100 | 1e-83 |
| ORF006 | 5482 | 4544 | 939 | 313 | Hypothetical protein | ORF120L [SDDV C4575] | 100 | 0 |
| ORF007 | 7222 | 5528 | 1695 | 565 | Hypothetical protein | ORF121L [SDDV C4575] | 100 | 0 |
| ORF008a,b | 10409 | 7233 | 3177 | 1059 | DNA-dependent RNA polymerase II beta subunit (RPO2) | ORF122L [SDDV C4575] | 100 | 0 |
| ORF009 | 11119 | 10406 | 714 | 238 | Tumor necrosis factor receptor superfamily member 14 (TNFRSF14) | ORF123L [SDDV C4575] | 100 | 0 |
| ORF010 | 11188 | 12468 | 1281 | 427 | Putative ankyrin repeat protein (ANKYR) | ORF124R [SDDV C4575] | 100 | 0 |
| ORF011a | 13088 | 12465 | 624 | 208 | Putative deoxynucleoside kinase | ORF125L [SDDV C4575] | 99.52 | 9e-157 |
| ORF012a | 13099 | 13332 | 234 | 78 | Transcription factor S-II (TFIIS) | SDDV C4575 ORF126R | 100 | 7e-55 |
| ORF013 | 13447 | 15096 | 1650 | 550 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF014 | 15144 | 17087 | 1944 | 648 | Serine/threonine-protein phosphatase 6 regulatory ankyrin repeat subunit | Serine/threonine-protein phosphatase 6 regulatory ankyrin repeat subunit [SDDV TH2019] | 100 | 0 |
| ORF015 | 17103 | 18656 | 1554 | 518 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF016 | 18673 | 20049 | 1377 | 459 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF017 | 21062 | 20082 | 981 | 327 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF018 | 21140 | 22171 | 1032 | 344 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF019 | 23573 | 22161 | 1413 | 471 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF020 | 25157 | 23583 | 1575 | 525 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF021 | 25181 | 26281 | 1101 | 367 | Hypothetical protein | ORF002R [SDDV C4575] | 100 | 0 |
| ORF022 | 26432 | 26298 | 135 | 45 | Hypothetical protein | ORF114 [SDDV ZH-06/20] | 100 | 1e-28 |
| ORF023a | 26811 | 26449 | 363 | 121 | Ervl/Alr family protein | ORF003L [SDDV C4575] | 100 | 4e-90 |
| ORF024 | 28262 | 26817 | 1446 | 482 | Hypothetical protein | ORF004L [SDDV C4575] | 100 | 0 |
| ORF025 | 29907 | 28264 | 1644 | 548 | Hypothetical protein | ORF005L [SDDV C4575] | 100 | 0 |
| ORF026 | 30556 | 29861 | 696 | 232 | DNA-cytosine methylase | Putative DNA (cytosine-5)-methyltransferase [SDDV TH2019] | 100 | 3e-178 |
| ORF027 | 30605 | 30988 | 384 | 128 | Hypothetical protein | ORF008R | 100 | 5e-95 |
| ORF028 | 31306 | 30938 | 369 | 128 | Hypothetical protein | ORF009L | 100 | 3e-92 |
| ORF029 | 31397 | 31582 | 186 | 62 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 2e-40 |
| ORF030 | 31563 | 31916 | 354 | 118 | Hypothetical protein | ORF010R [SDDV C4575] | 100 | 2e-84 |
| ORF031 | 31929 | 32282 | 354 | 118 | Vascular endothelial growth factor like protein | ORF011R [SDDV C4575] | 100 | 7e-85 |
| ORF032 | 32288 | 32665 | 378 | 126 | C-terminal W2 domain of eukaryotic translation initiation factor 5 (eIF5) | ORF012R [SDDV C4575] | 100 | 2e-88 |
| ORF033 | 33307 | 32912 | 396 | 132 | Hypothetical protein | ORF013L [SDDV C4575] | 100 | 2e-97 |
| ORF034 | 33555 | 33349 | 207 | 69 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 9e-46 |
| ORF035 | 34440 | 33562 | 879 | 293 | 2-cysteine adaptor domain | ORF014L [SDDV GF-MU1] | 100 | 0 |
| ORF036a | 35289 | 34468 | 822 | 274 | Putative serine/threonine-protein kinase | Putative serine/threonine-protein kinase [SDDV TH2019] | 100 | 0 |
| ORF037a | 35927 | 35295 | 633 | 211 | Protein family of unknown function (DUF5767) | ORF016L [SDDV C4575] | 99.52 | 9e-157 |
| ORF038 | 36230 | 35934 | 297 | 99 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 3e-70 |
| ORF039a | 37048 | 36209 | 840 | 280 | Poxvirus Late Transcription Factor VLTF3 like | ORF017L [SDDV C4575] | 100 | 0 |
| ORF040 | 39932 | 37053 | 2880 | 960 | Hypothetical protein | ORF018L [SDDV C4575] | 100 | 0 |
| ORF041 | 40609 | 40322 | 288 | 127 | Hypothetical protein | ORF019L [SDDV C4575] | 100 | 3e-92 |
| ORF042 | 41012 | 40641 | 372 | 124 | Hypothetical protein | ORF021L [SDDV C4575] | 100 | 9e-91 |
| ORF043 | 41400 | 41020 | 381 | 127 | Hypothetical protein | ORF022L [SDDV C4575] | 100 | 2e-90 |
| ORF044 | 41552 | 42112 | 561 | 187 | Hypothetical protein | ORF023R [SDDV C4575] | 100 | 1e-140 |
| ORF045a,b | 42149 | 42589 | 441 | 147 | Uvr/REP helicase | ORF024R [SDDV C4575] | 100 | 5e-109 |
| ORF046a | 42592 | 43365 | 774 | 258 | Ribonuclease III | ORF025R [SDDV C4575] | 100 | 0 |
| ORF047 | 43485 | 45377 | 1893 | 631 | Vesicle-fusing ATPase | Vesicle-fusing ATPase [SDDV TH2019] | 99.84 | 0 |
| ORF048 | 45834 | 45394 | 441 | 147 | SAP domain-containing protein | ORF027L [SDDV C4575] | 100 | 3e-106 |
| ORF049 | 45860 | 47536 | 1677 | 559 | Hypothetical protein | ORF028L [SDDV C4575] | 100 | 0 |
| ORF050 | 48045 | 47533 | 513 | 171 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 2e-126 |
| ORF051 | 49104 | 48058 | 1047 | 349 | Hypothetical protein | ORF030 [SDDV GF-MU1] | 100 | 0 |
| ORF052 | 49132 | 49311 | 180 | 60 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 3e-39 |
| ORF053 | 50283 | 49333 | 951 | 317 | Hypothetical protein | ORF031L [SDDV C4575] | 100 | 0 |
| ORF054 | 51416 | 50280 | 1137 | 379 | Hypothetical protein | ORF032L [SDDV C4575] | 100 | 0 |
| ORF055a | 52241 | 51432 | 810 | 270 | Protein family of unknown function (DUF5832) | ORF033L [SDDV C4575] | 100 | 0 |
| ORF056 | 52274 | 52966 | 693 | 231 | Protein family of unknown function (DUF2738) | ORF034R [SDDV C4575] | 100 | 5e-175 |
| ORF057a,b | 53732 | 52995 | 738 | 246 | ATPase | ORF035L [SDDV C4575] | 100 | 0 |
| ORF058a | 54782 | 53739 | 1044 | 348 | Immediate-early protein ICP-46 homolog | ORF036L [SDDV C4575] | 100 | 0 |
| ORF059a | 54868 | 57483 | 2616 | 872 | Putative kinase | ORF037R [SDDV C4575] | 100 | 0 |
| ORF060a | 57494 | 58012 | 519 | 173 | Hypothetical protein | ORF038R [SDDV C4575] | 100 | 3e-127 |
| ORF061a | 58795 | 58055 | 741 | 247 | Hypothetical protein | ORF039L [SDDV C4575] | 99.59 | 0 |
| ORF062a,b | 58805 | 61537 | 2733 | 911 | Putative D5 family NTPase ATPase (DNA primase) | putative helicase [SDDV TH2019] | 100 | 0 |
| ORF063 | 61893 | 61504 | 390 | 130 | Hypothetical protein | SDDV C4575 (ORF042L) | 99.22 | 2e-94 |
| ORF064 | 61918 | 62826 | 909 | 303 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF065 | 62901 | 63848 | 948 | 316 | Serine proteinase inhibitor 2 (SERP2) | SDDV C4575 (ORF045R) | 100 | 0 |
| ORF066 | 64415 | 63873 | 543 | 181 | Hypothetical protein | SDDV C4575 (ORF046L) | 100 | 4e-137 |
| ORF067 | 64440 | 65246 | 807 | 269 | Deoxyribonuclease-1 | SDDV C4575 (ORF047R) | 100 | 0 |
| ORF068 | 65240 | 66103 | 864 | 288 | Thymidylate synthase | thymidylate synthase [SDDV C4575] | 100 | 0 |
| ORF069 | 66151 | 66849 | 699 | 233 | Tumor necrosis factor receptor superfamily member 1B (TNFR2) | ORF049R [SDDV C4575] | 100 | 3e-172 |
| ORF070 | 66861 | 67634 | 774 | 258 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF071 | 67681 | 68310 | 630 | 210 | Hypothetical protein | ORF051R [SDDV C4575] | 100 | 2e-158 |
| ORF072a | 68344 | 69309 | 966 | 322 | Ribonucleotide reductase beta subunit | ORF052R [SDDV C4575] | 100 | 0 |
| ORF073 | 69375 | 70022 | 648 | 216 | Hypothetical protein | ORF054R [SDDV C4575] | 100 | 2e-161 |
| ORF074 | 70027 | 70941 | 915 | 305 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF075 | 71010 | 71834 | 825 | 275 | Serine/threonine-protein kinase/endoribonuclease | ORF056R [SDDV C4575] | 100 | 0 |
| ORF076 | 71863 | 72411 | 549 | 183 | Sar1 | ORF057R [SDDV C4575] | 100 | 1e-137 |
| ORF077 | 72422 | 72802 | 381 | 127 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 8e-83 |
| ORF078 | 72858 | 73424 | 567 | 189 | Hypothetical protein | ORF059R [SDDV C4575] | 100 | 1e-141 |
| ORF079a,b | 74878 | 73517 | 1362 | 454 | Major capsid protein (MCP) | ORF060L [SDDV C4575] | 100 | 0 |
| ORF080a,b | 76432 | 74882 | 1551 | 517 | Myristylated membrane protein | ORF061L [SDDV C4575] | 100 | 0 |
| ORF081 | 76494 | 77837 | 1344 | 488 | Hypothetical protein | ORF062L [SDDV C4575] | 100 | 0 |
| ORF082 | 78080 | 77865 | 216 | 72 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 2e-47 |
| ORF083 | 78112 | 78381 | 270 | 90 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 2e-63 |
| ORF084 | 78765 | 78388 | 378 | 126 | Hypothetical protein | ORF063L [SDDV C4575] | 100 | 3e-93 |
| ORF085 | 79029 | 78769 | 261 | 87 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 98.84 | 9e-58 |
| ORF086a | 79333 | 80955 | 1623 | 541 | Hypothetical protein | ORF065R [SDDV C4575] | 100 | 0 |
| ORF087 | 81273 | 80962 | 312 | 104 | Hypothetical protein | ORF066L [SDDV C4575] | 100 | 3e-77 |
| ORF088 | 81310 | 83214 | 1905 | 635 | ADP-ribose glycohydrolase | ADP-ribose glycohydrolase [SDDV TH2019] | 100 | 0 |
| ORF089 | 83220 | 84059 | 840 | 280 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 99.64 | 0 |
| ORF090 | 84699 | 84085 | 615 | 205 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 2e-153 |
| ORF091 | 85010 | 84714 | 297 | 99 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 7e-69 |
| ORF092 | 85044 | 85277 | 234 | 78 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 1e-53 |
| ORF093a,b | 85622 | 88528 | 2907 | 969 | DNA polymerase | DNA polymerase [SDDV TH2019] | 100 | 0 |
| ORF094 | 88531 | 89109 | 579 | 193 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 6e-144 |
| ORF095 | 89127 | 90200 | 1074 | 358 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 0 |
| ORF096a,b | 91141 | 90224 | 918 | 306 | Flap endonuclease | flap endonuclease [SDDV ZH-06/20] | 100 | 0 |
| ORF097 | 91225 | 91857 | 633 | 211 | Hypothetical protein | ORF037 [SDDV ZH-06/20] | 99.52 | 2e-158 |
| ORF098 | 91946 | 92608 | 663 | 221 | Hypothetical protein | ORF075R [SDDV C4575] | 100 | 3e-162 |
| ORF099a,b | 96210 | 92659 | 3552 | 1184 | DNA-dependent RNA polymerase II alpha subunit (RPO) | ORF076L [SDDV C4575] | 100 | 0 |
| ORF100 | 97063 | 96200 | 864 | 288 | Hypothetical protein | ORF078L [SDDV C4575] | 100 | 0 |
| ORF101 | 97083 | 97601 | 519 | 173 | Hypothetical protein | ORF079R [SDDV C4575] | 100 | 2e-130 |
| ORF102 | 97613 | 98110 | 498 | 166 | Hypothetical protein | ORF080R [SDDV C4575] | 100 | 3e-121 |
| ORF103 | 98100 | 98564 | 465 | 155 | DNA dependent RNA polymerase subunit H-like protein | ORF082R [SDDV C4575] | 100 | 5e-116 |
| ORF104 | 98571 | 99683 | 1113 | 371 | Transmembrane amino acid transporter protein | ORF082R [SDDV C4575] | 100 | 0 |
| ORF105 | 100734 | 99652 | 1083 | 361 | Hypothetical protein | ORF083L [SDDV C4575] | 99.72 | 0 |
| ORF106 | 100773 | 101687 | 915 | 305 | Ankyrin repeat-containing protein | ORF084R [SDDV C4575] | 100 | 0 |
| ORF107 | 102677 | 101859 | 819 | 273 | Rnase H | Rnase H [SDDV C4575] | 100 | 0 |
| ORF108 | 102861 | 103463 | 603 | 201 | Hypothetical protein | ORF086R [SDDV C4575] | 100 | 2e-150 |
| ORF109 | 103804 | 103511 | 294 | 152 | Hypothetical protein | ORF025 [SDDV ZH-06/20] | 99.34 | 3e-111 |
| ORF110 | 105469 | 103967 | 1503 | 501 | mRNA-capping enzyme | mRNA-capping enzyme [SDDV TH2019] | 100 | 0 |
| ORF111 | 106035 | 105472 | 564 | 188 | Thymidylate kinase | Thymidylate kinase [SDDV TH2019] | 100 | 8e-142 |
| ORF112 | 106470 | 106048 | 423 | 141 | Macro domain-containing protein | ORF090L [SDDV C4575] | 100 | 1e-105 |
| ORF113a | 109419 | 106495 | 2925 | 975 | Protein family of unknown function (DUF5757) | Putative structural protein [SDDV TH2019] | 100 | 0 |
| ORF114 | 109447 | 109941 | 495 | 165 | Hypothetical protein | ORF092R [SDDV C4575] | 100 | 6e-120 |
| ORF115 | 109949 | 110461 | 513 | 171 | Hypothetical protein | ORF093R [SDDV C4575] | 100 | 5e-126 |
| ORF116 | 111670 | 110489 | 1182 | 394 | Hypothetical protein | ORF094R [SDDV C4575] | 100 | 0 |
| ORF117 | 112442 | 111732 | 711 | 237 | Golgi antiapoptotic protein (L6) | Protein lifeguard [SDDV TH2019] | 100 | 1e-173 |
| ORF118 | 112725 | 112480 | 246 | 82 | Hypothetical protein | ORF096 [SDDV GF-MU1] | 100 | 4e-57 |
| ORF119 | 113940 | 112936 | 1005 | 335 | Serine proteinase inhibitor 1 (SPI-1) | ORF097L [SDDV C4575] | 100 | 0 |
| ORF120 | 114370 | 113912 | 459 | 153 | Hypothetical protein | ORF098L [SDDV C4575] | 100 | 7e-113 |
| ORF121a,b | 114932 | 114375 | 558 | 186 | NIF-NLI interacting factor | ORF099L [SDDV C4575] | 100 | 2e-138 |
| ORF122 | 115261 | 114938 | 324 | 108 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 2e-78 |
| ORF123 | 116087 | 115617 | 471 | 157 | RING finger | ORF103L [SDDV C4575] | 100 | 1e-107 |
| ORF124a,b | 118852 | 116141 | 2712 | 904 | Putative NTPase | ORF104L [SDDV C4575] | 100 | 0 |
| ORF125 | 124541 | 118869 | 5673 | 1891 | Poxvirus B22R protein C-terminal | ORF105L [SDDV C4575] | 100 | 0 |
| ORF126 | 126056 | 124593 | 1464 | 488 | Hypothetical protein | ORF107L [SDDV C4575] | 100 | 0 |
| ORF127 | 126120 | 127463 | 1344 | 448 | Ankyrin repeat-containing protein | ORF108R [SDDV C4575] | 100 | 0 |
| ORF128 | 127996 | 127448 | 549 | 183 | Hypothetical protein | ORF109L [SDDV C4575] | 100 | 2e-138 |
| ORF129 | 128060 | 128467 | 408 | 136 | Protein family of unknown function (DUF5850) | ORF110R [SDDV C4575] | 100 | 1e-95 |
| ORF130 | 128515 | 129063 | 549 | 183 | Hypothetical protein | hypothetical protein [SDDV TH2019] | 100 | 2e-135 |
| ORF131a | 129047 | 129991 | 945 | 315 | Hypothetical protein | ORF112L [SDDV C4575] | 100 | 0 |
| ORF132 | 129995 | 131041 | 1047 | 349 | Nucleoside sugar epimerase | nucleotide-sugar epimerase [SDDV C4575] | 99.71 | 0 |
| ORF133 | 131128 | 131595 | 468 | 156 | Ankyrin repeat-containing protein | ORF114R [SDDV C4575] | 100 | 1e-113 |
| ORF134 | 131666 | 131758 | 92 | 31 | Hypothetical protein | ORF115R [SDDV C4575] | 100 | 3e-15 |

a iridovirus core genes, b gene defined by BUSCO

Table S4. Gene-to-gene comparison of ORFs of the SDDV TH7\_2019 against previously published SDDV genomes. Data are shown in number ORFs within the ranges of amino acid similarity.

|  |  |  |  |
| --- | --- | --- | --- |
| AA similarity (%) | Number of ORFs | | |
| SDDV TH\_2019 | SDDV  ZH-06/20 | SDDV C4575 |
| 100% | 115 | 98 | 96 |
| <100% - 95% | 7 | 23 | 14 |
| <95% - 90% | 5 | 3 | 5 |
| <90% - 85% | 1 | 1 | 2 |
| <85% - 80% | 2 | 3 | 3 |
| <80% - 75% | 0 | 1 | 1 |
| <75% - 70% | 0 | 0 | 0 |
| <70% | 3 | 4 | 8 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Consensus pattern | Size (bp) | Locationa | SDDV TH2019 | | SDDV TH7\_2019 | | SDDV C4575 | | SDDV ZH-06/20 | |
|  |  |  | Percent match | Copy number | Percent match | Copy number | Percent match | Copy number | Percent match | Copy number |
| GATCTAGCAGGTACAGGTGGAGACAAGGAAG | 31 | ORF036 | 84 | 2.4 | 84 | 2.4 | 84 | 2.4 | 84 | 2.4 |
| GGCGTAGGTTTG | 12 | ORF051 | 95 | 2.9 | 95 | 2.9 | 97 | 3.9 | 97 | 4.9 |
| GATGATTCTGAGTGGGATACAATCAACGAAGAATCATCA | 39 | ORF064 | 92 | 2.3 | 92 | 2.3 | 92 | 2.3 | 92 | 2.3 |
| TTTAAAACATTGATAATTG | 19 | ORF076-077 | 90 | 2.1 | 90 | 2.1 | 90 | 2.1 | 92 | 2.1 |
| AACATCCGTGGCAAACGTTTGAAGGACAAG | 30 | ORF077 | 76 | 3.5 | 76 | 3.5 | 73 | 5.5 | 73 | 5.5 |
| AACATCCGTGGCAAA | 15 | ORF077 | 75 | 3 | 75 | 3 | 65 | 7 | 65 | 7 |
| TTGGCAAAAACATCCGTGGCAAACGTTTGAAGGACAAGAACATCCGTGGCAAAAACACAT | 60 | ORF077 | 100 | 1.9 | 100 | 1.9 | 100 | 2.9 | 100 | 2.9 |
| ATGTCGTCGCATATGACACGGTAGCGGACGACGAAGCT | 38 | ORF088 | 88 | 7.1 | 88 | 7.1 | 87 | 6.1 | 86 | 6.1 |
| TCGCATATGACACGGTAGCGGACGACGAAGCTATGTCAGTAGGCGTATGACACAGTAGCAGACGACGAAGCTATGTCGATCGCATACGACACAGTAGCGGACGACGAAGCTATCTCGA | 118 | ORF088 | 88 | 2.4 | 88 | 2.4 | - | - | - | - |
| GGAGAAGCGCGTCGACGAGGAGACGCACGTCGT | 33 | non-coding region | 89 | 2.2 | 89 | 2.2 | 89 | 2.2 | 89 | 2.2 |
| ATGTTTGAACTACTA | 15 | ORF126 | 90 | 2.4 | 90 | 2.4 | 90 | 2.4 | 90 | 2.4 |
| GGCGTAGGAGTCGGCGTAGGTTTG | 24 | ORF051 | - | - | - | - | 84 | 2.3 | 84 | 2.3 |
| TATGACACGGTAGCAGACGACGAAGCTATGTCAGTCGCGTATGACACAGTAGCAGACGACGAAGCTATGTCGATCGCATACGACACAGTAGCGGACGACGAAGCTATGTCTGTTGCG | 117 | ORF088 | - | - | - | - | 92 | 2 | 92 | 2 |

Table S5. Tandem repeats in SDDV genomes

a Location based on SDDV TH7\_2019

Table S6 Gene presence and absence of SDDV genomes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Gene | Annotation | No. of isolates found | SDDV C4575 | SDDV TH7\_2019 | SDDV TH2019 | SDDV ZH-06/20 |
| UNH60791.1 | Serine/threonine-protein phosphatase 6 regulatory ankyrin repeat subunit | 4 | 1 | 1 | 1 | 1 |
| QLI60755.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37447.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37477.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60710.1 | putative kinase | 4 | 1 | 1 | 1 | 1 |
| AKU37446.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60773.1 | Eukaryotic translation initiation factor | 4 | 1 | 1 | 1 | 1 |
| UNH60701.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37534.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60721.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60758.1 | putative ribonuclease | 4 | 1 | 1 | 1 | 1 |
| QLI60720.1 | Tumor necrosis factor receptor superfamily member | 4 | 1 | 1 | 1 | 1 |
| AKU37449.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60654.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60671.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37460.1 | Serine proteinase inhibitor | 4 | 1 | 1 | 1 | 1 |
| UNH60799.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37461.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60725.1 | putative myristoylated protein | 4 | 1 | 1 | 1 | 1 |
| UNH60683.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60753.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60670.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| MCP | Major capsid protein | 4 | 1 | 1 | 1 | 1 |
| QLI60711.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37451.1 | ORF\_036L | 4 | 1 | 1 | 1 | 1 |
| UNH60704.1 | DNA-directed RNA polymerase II subunit | 4 | 1 | 1 | 1 | 1 |
| UNH60754.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60734.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37430.1 | putative serine/threonine-protein kinase | 4 | 1 | 1 | 1 | 1 |
| UNH60731.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60783.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60671.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60780.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37483.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60749.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60657.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60670.1 | 3 beta-hydroxysteroid dehydrogenase | 4 | 1 | 1 | 1 | 1 |
| QLI60737.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60709.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37542.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60741.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37487.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37454.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60678.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37455.1 | putative helicase | 4 | 1 | 1 | 1 | 1 |
| AKU37485.1 | DNA polymerase | 4 | 1 | 1 | 1 | 1 |
| UNH60760.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37498.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60686.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37471.1 | Serine/threonine-protein kinase/endoribonuclease | 4 | 1 | 1 | 1 | 1 |
| RPO2 | DNA-directed RNA polymerase II subunit | 4 | 1 | 1 | 1 | 1 |
| UNH60762.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37428.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37431.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37433.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60692.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37441.1 | Vesicle-fusing ATPase | 4 | 1 | 1 | 1 | 1 |
| UNH60755.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37530.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37462.1 | Deoxyribonuclease-1 | 4 | 1 | 1 | 1 | 1 |
| AKU37463.1 | Thymidylate synthase | 4 | 1 | 1 | 1 | 1 |
| UNH60735.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60738.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60739.1 | ADP-ribose glycohydrolase | 4 | 1 | 1 | 1 | 1 |
| QLI60741.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37489.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60752.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60692.1 | Thymidylate kinase | 4 | 1 | 1 | 1 | 1 |
| AKU37506.1 | putative structural protein | 4 | 1 | 1 | 1 | 1 |
| AKU37421.1 | putative DNA (cytosine-5)-methyltransferase | 4 | 1 | 1 | 1 | 1 |
| AKU37510.1 | Protein lifeguard | 4 | 1 | 1 | 1 | 1 |
| UNH60685.1 | mRNA decay activator protein | 4 | 1 | 1 | 1 | 1 |
| QLI60771.1 | Serine proteinase inhibitor | 4 | 1 | 1 | 1 | 1 |
| QLI60774.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60679.1 | putative RING finger protein | 4 | 1 | 1 | 1 | 1 |
| UNH60677.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37524.1 | putative E3 ubiquitin-protein ligase makorin-1 | 4 | 1 | 1 | 1 | 1 |
| AKU37525.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37531.1 | putative ankyrin repeat protein | 4 | 1 | 1 | 1 | 1 |
| AKU37532.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60793.1 | DNA-directed RNA polymerase III subunit | 4 | 1 | 1 | 1 | 1 |
| QLI60702.1 | putative membrane protein | 4 | 1 | 1 | 1 | 1 |
| AKU37490.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60707.1 | Flap endonuclease | 4 | 1 | 1 | 1 | 1 |
| QLI60766.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37418.1 | putative FAD-linked sulfhydryl oxidase | 4 | 1 | 1 | 1 | 1 |
| QLI60779.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37439.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37508.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60732.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37539.1 | putative ankyrin repeat protein | 4 | 1 | 1 | 1 | 1 |
| UNH60733.1 | Ribonucleoside-diphosphate reductase subunit | 4 | 1 | 1 | 1 | 1 |
| AKU37503.1 | mRNA-capping enzyme | 4 | 1 | 1 | 1 | 1 |
| UNH60775.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60756.1 | putative SAP domain-containing protein | 4 | 1 | 1 | 1 | 1 |
| UNH60774.1 | Vascular endothelial growth factor A | 4 | 1 | 1 | 1 | 1 |
| AKU37419.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| UNH60696.1 | Ribonuclease | 4 | 1 | 1 | 1 | 1 |
| AKU37514.1 | putative CTD phosphatase-like protein | 4 | 1 | 1 | 1 | 1 |
| UNH60747.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37432.1 | putative transcription factor | 4 | 1 | 1 | 1 | 1 |
| QLI60768.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37505.1 | ADP-ribose glycohydrolase | 4 | 1 | 1 | 1 | 1 |
| QLI60661.1 | putative deoxynucleoside kinase | 4 | 1 | 1 | 1 | 1 |
| UNH60761.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37519.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37474.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60758.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60780.1 | Serine/threonine-protein phosphatase 6 regulatory ankyrin repeat subunit B | 4 | 1 | 1 | 1 | 1 |
| AKU37501.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| AKU37538.1 | Tumor necrosis factor receptor superfamily | 4 | 1 | 1 | 1 | 1 |
| UNH60699.1 | Sodium-coupled neutral amino acid transporter | 4 | 1 | 1 | 1 | 1 |
| UNH60778.1 | hypothetical protein | 4 | 1 | 1 | 1 | 1 |
| QLI60727.1 | GTP-binding protein | 4 | 1 | 1 | 1 | 1 |
| QLI60666.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60787.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| QLI60672.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60720.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60712.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60694.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| QLI60714.1 | hypothetical protein | 3 | 1 | 1 | 1 | 0 |
| QLI60775.1 | Tripartite motif-containing protein | 3 | 1 | 0 | 1 | 1 |
| QLI60665.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60788.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60786.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| QLI60679.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60770.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60766.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60752.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60723.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| QLI60734.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| UNH60713.1 | hypothetical protein | 3 | 0 | 1 | 1 | 1 |
| AKU37529.1 | hypothetical protein | 2 | 1 | 1 | 0 | 0 |
| QLI60728.1 | hypothetical protein | 2 | 0 | 1 | 1 | 0 |
| UNH60728.1 | hypothetical protein | 2 | 1 | 0 | 0 | 1 |
| AKU37479.1 | RING E3 ubiquitin ligase | 2 | 1 | 0 | 0 | 1 |
| UNH60772.1 | hypothetical protein | 2 | 0 | 0 | 1 | 1 |
| UNH60711.1 | hypothetical protein | 2 | 0 | 0 | 1 | 1 |
| AKU37544.1 | ORF\_129R | 1 | 1 | 0 | 0 | 0 |
| AKU37422.1 | ORF\_007L | 1 | 1 | 0 | 0 | 0 |
| AKU37435.1 | ORF\_020R | 1 | 1 | 0 | 0 | 0 |
| AKU37456.1 | ORF\_041L | 1 | 1 | 0 | 0 | 0 |
| AKU37459.1 | ORF\_044R | 1 | 1 | 0 | 0 | 0 |
| AKU37468.1 | ORF\_053L | 1 | 1 | 0 | 0 | 0 |
| AKU37492.1 | ORF\_077R | 1 | 1 | 0 | 0 | 0 |
| AKU37516.1 | ORF\_101R | 1 | 1 | 0 | 0 | 0 |
| AKU37521.1 | ORF\_106L | 1 | 1 | 0 | 0 | 0 |
| AKU37502.1 | ORF\_087L | 1 | 1 | 0 | 0 | 0 |

Table S7. Summary of single nucleotide polymorphisms (SNPs) in SDDV core genes

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Nucleotide (NT) and amino acid (AA) substitutions | | | | | | | | | | | | | | | | | | |
|  | Thailand | | | | | |  | Singapore | | | |  | Malaysia | | | |  | China | |
|  | TH4\_2107 | | TH6\_2018 | | TH7\_2019 | |  | C4575 | | SG12\_2019 | |  | ML21\_2019 | | ML23\_2019 | |  | ZH-06/20 | |
| Gene | NT | AA | NT | AA | NT | AA |  | NT | AA | NT | AA |  | NT | AA | NT | AA |  | NT | AA |
| DNA polymerase | n/a | n/a | n/a | n/a | - | - |  | 415C>G | Leu139Vala | n/a | n/a |  | n/a | n/a | 415C>G | Leu139Vala |  | 415C>G | Leu139Vala |
|  | n/a | n/a | n/a | n/a | - | - |  | 1770G>A | Arg590Argb | n/a | n/a |  | n/a | n/a | 1770G>A | Arg590Argb |  | 1770G>A | Arg590Argb |
| RPO | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | n/a | n/a | - | - |  | 2433G>A | Glu811Glub |
|  | n/a | n/a | n/a | n/a | - | - |  | 2451T>C | Ala817Alab | n/a | n/a |  | n/a | n/a | 2451T>C | Ala817Alab |  | 2451T>C | Ala817Alab |
| RPO2 | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | n/a | n/a | n/a | n/a |  | 1395T>A | Ala465Alab |
| D5 family NTPase ATPase | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | - | - | n/a | n/a |  | 1243G>T | Ala415Sera |
| NTPase | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | 1990C>A | Pro664Thra | n/a | n/a |  | - | - |
|  | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | 2703T>G | Ile901Meta | n/a | n/a |  | - | - |
| Flap endonuclease | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | 404C>G | Pro135Arga | 404C>G | Pro135Arga |  | - | - |
| ATPase | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | - | - | - | - |  | - | - |
| Myristylated membrane protein | n/a | n/a | n/a | n/a | - | - |  | - | - | n/a | n/a |  | - | - | - | - |  | 1368G>A | Pro456Prob |
| NIF-NLI interacting factor | n/a | n/a | n/a | n/a | - | - |  | - | - | - | - |  | 385A>C | Lys129Glna | - | - |  | - | - |
| Uvr/REP helicase | - | - | 87G>C | Gln29Hisa | - | - |  | - | - | - | - |  | - | - | - | - |  | - | - |
|  | 325C>T | Arg109Cysa | - | - | - | - |  | - | - | - | - |  | - | - | - | - |  | - | - |

Dash represents no SNPs found. n/a: not applicable, a nonsynonymous variant, b synonymous variant