

Table S1. Full name, abbreviation, and GenBank accession number of the 56 viruses used in the study.

| Genus                  | Virus name (Abbreviation)                                | Genome size(bp) | GC%   | Accession number |
|------------------------|--|-----------------|-------|------------------|
| <i>Ranavirus</i>       | <i>Rana grylio</i> iridovirus (RGV)                      | 105791          | 55.07 | JQ654586         |
|                        | Soft-shelled turtle iridovirus                           | 105890          | 55.06 | EU627010         |
|                        | <i>Rana nigromaculata</i> ranavirus                      | 104286          | 55.17 | MG791866         |
|                        | Frog virus 3 (FV3)                                       | 105903          | 55.05 | AY548484         |
|                        | Frog virus 3 strain Rana-Bra                             | 104744          | 54.94 | MT578298         |
|                        | Tiger frog virus   | 105057          | 55.01 | AF389451         |
|                        | Bohle iridovirus   | 103531          | 55.16 | KX185156         |
|                        | German gecko ranavirus                                   | 103681          | 55.06 | KP266742         |
|                        | Zoo ranavirus  | 103266          | 55.05 | MK227779         |
|                        | Tortoise ranavirus                                       | 103876          | 55.22 | KP266743         |
|                        | Common midwife toad virus-E (CMTV)                       | 106878          | 55.25 | JQ231222         |
|                        | Pike-perch iridovirus                                    | 108041          | 55.29 | KX574341         |
|                        | Pelophylax esculentus virus                              | 107469          | 55.18 | MF538627         |
|                        | Red-eared slider ranavirus                               | 106878          | 55.35 | MT452035         |
|                        | Common midwife toad virus isolate-Pe                     | 107054          | 55.24 | MF125269         |
|                        | Testudo hermanni ranavirus                               | 105811          | 55.36 | KP266741         |
|                        | <i>Rana catesbeiana</i> virus                            | 106890          | 54.98 | KX397571         |
|                        | <i>Andrias davidianus</i> ranavirus (ADRV)               | 106734          | 55.02 | KC865735         |
|                        | Chinese giant salamander iridovirus                      | 105375          | 55.22 | KF512820         |
|                        | Lumpfish ranavirus                                       | 115947          | 54.68 | MH665359         |
|                        | Cod iridovirus   | 114865          | 54.92 | KX574342         |
|                        | Ranavirus maximus  | 115510          | 54.94 | KX574343         |
|                        | Epizootic haematopoietic necrosis virus (EHNV)           | 125860          | 54.18 | MT510742         |
|                        | European catfish virus                                   | 127549          | 54.25 | KT989885         |
|                        | European sheatfish virus                                 | 127732          | 54.23 | JQ724856         |
|                        | <i>Ambystoma tigrinum</i> stebbensi virus (ATV)          | 106332          | 54.02 | AY150217         |
|                        | Short-finned eel ranavirus                               | 126965          | 54.71 | KX353311         |
|                        | Largemouth bass virus strain Alleghany (LMBV-A)          | 99827           | 51.93 | MK681855         |
|                        | Largemouth bass virus strain Pine (LMBV-P)               | 99290           | 51.91 | MK681856         |
|                        | Largemouth bass virus strain GDOU (LMBV-G)               | 99315           | 52.08 | MW630113         |
|                        | Mandarin fish ranavirus (MFRV)                           | 97946           | 52.10 | MG941005         |
|                        | <i>Micropterus salmoides</i> Ranavirus (MSRaV)           | 99171           | 52.09 | OQ267587         |
|                        | <i>Siniperca chuatsi</i> Ranavirus (SCRaV)               | 99405           | 52.09 | OQ267588         |
|                        | Grouper iridovirus                                       | 139793          | 48.60 | AY666015         |
|                        | Singapore grouper iridovirus (SGIV)                      | 140131          | 48.64 | NC_006549        |
| <i>Megalocytivirus</i> | European chub iridovirus                                 | 128216          | 38.40 | MK637631         |
|                        | Scale drop disease virus                                 | 131129          | 36.55 | MN562489         |
|                        | Turbot reddish body iridovirus                           | 110104          | 54.99 | GQ273492         |
|                        | Infectious spleen and kidney necrosis virus isolate EFIV | 111380          | 54.76 | MW273354         |
|                        | Infectious spleen and kidney necrosis virus              | 111362          | 54.78 | NC_003494        |
|                        | Large yellow croaker iridovirus                          | 112043          | 53.47 | MW139932         |
|                        | Rock bream iridovirus strain RBIV-KOR-TY1                | 112080          | 53.03 | AY532606         |
|                        | Rock bream iridovirus isolate RBIV-C1                    | 112333          | 53.00 | KC244182         |
|                        | Red seabream iridovirus                                  | 111557          | 53.03 | MT798582         |

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|--------------------------|---|--------|-------|-----------|
|                          | Giant sea perch iridovirus                    | 112565 | 53.02 | KT804738  |
|                          | Orange-spotted grouper iridovirus             | 112636 | 53.03 | AY894343  |
| <i>Lymphocystivirus</i>  | Lymphocystis disease virus 1                  | 102653 | 29.07 | NC_001824 |
|                          | Lymphocystis disease virus Sa                 | 208501 | 33.00 | NC_033423 |
|                          | Lymphocystis disease virus isolate China      | 186250 | 27.23 | AY380826  |
|                          | Lymphocystis disease virus 4                  | 211086 | 26.03 | MN803438  |
| <i>Decapodiridovirus</i> | <i>Cherax quadricarinatus</i> iridovirus      | 165695 | 34.57 | NC_040612 |
|                          | Shrimp hemocyte iridescent virus              | 165809 | 34.58 | MF599468  |
| <i>Chloriridovirus</i>   | <i>Aedes taeniorhynchus</i> iridescent virus  | 191100 | 47.89 | NC_008187 |
|                          | Invertebrate iridovirus 25                    | 204815 | 30.32 | HF920635  |
| <i>Iridovirus</i>        | <i>Armadillidium vulgare</i> iridescent virus | 220222 | 35.08 | NC_024451 |
|                          | Invertebrate iridescent virus 6               | 212482 | 28.62 | NC_003038 |