**Table S1**.The genomic and transcriptomes information of the species used in this study

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Class** | **Subclass** | **Order** | **Family** | **Latin name** | **Data type** | **Accession** | **Contig N50** | **Source** |
| Aplacophora | Solenogastres | Pholidoskepia | Dondersiidae | *Helluoherpia aegiri* | Transcriptome | SRR6926336 | 1,657 | NCBI |
| Aplacophora | Solenogastres | *unclassified* | Gymnomeniidae | *Wirenia argentea* | Genome | GCA\_025802215.1 | 2,969 | NCBI |
| Aplacophora | Solenogastres | *unclassified* | Epimeniidae | *Epimenia babai* | Genome | GCA\_011762755.2 | 5,209 | NCBI |
| Polyplacophora | Neoloricata | Chitonida | Chitonidae | *Acanthopleura gemmata* | Transcriptome | SRR11674129 | 2.154 | NCBI |
| Polyplacophora | Neoloricata | Chitonida | Chitonidae | *A. granulata* | Genome | GCA\_016165875.1 | 1,098,986 | NCBI |
| Polyplacophora | Neoloricata | Chitonida | Chaetopleuridae | *Chaetopleura apiculata* | Transcriptome | SRR11674124 | 2,025 | NCBI |
| Polyplacophora | Neoloricata | Chitonida | Acanthochitonidae | *Cryptochiton stelleri* | Transcriptome | DRR144982 | 1,631 | NCBI |
| Polyplacophora | Neoloricata | Lepidopleurida | Leptochitonidae | *Leptochiton rugatus* | Transcriptome | SRR1611558 | 1,391 | NCBI |
| Monoplacophora | *unclassified* | Tryblidiida | Neopilinidae | *Laevipilina antarctica* | Transcriptome | SRR1505115 | 1,657 | NCBI |
| Cephalopoda | Natutilidea | Nautilida | Nautilidae | *Nautilus pompilius* | Genome | GCA\_018389105.1 | 1,094,646 | NCBI |
| Cephalopoda | Coleoidea | Myopsida | Loliginidae | *Architeuthis dux* | Genome | GCA\_006491835.1 | 5,397 | NCBI |
| Cephalopoda | Coleoidea | Myopsida | Loliginidae | *Doryteuthis pealeii* | Genome | GCA\_023376005.1 | 230,938 | NCBI |
| Cephalopoda | Coleoidea | Sepiida | Sepiolidae | *Euprymna scolopes* | Genome | GCA\_024364805.1 | 3,675 | NCBI |
| Cephalopoda | Coleoidea | Octopoda | Octopodidae | *Hapalochlaena maculosa* | Genome | GCA\_015501135.1 | 1,130 | NCBI |
| Cephalopoda | Coleoidea | Octopoda | Octopodidae | *Octopus bimaculoides* | Genome | GCA\_001194135.1 | 5,523 | NCBI |
| Cephalopoda | Coleoidea | Octopoda | Octopodidae | *O. sinensis* | Genome | GCA\_006345805.1 | 490,217 | NCBI |
| Cephalopoda | Coleoidea | Octopoda | Octopodidae | *O. vulgaris* | Genome | GCA\_003957725.1 | 3,040 | NCBI |
| Bivalvia | Protobranchia | Nuculida | Nuculidae | *Nucula tumidula* | Transcriptome | SRR5110533 | 1,489 | NCBI |
| Bivalvia | Autobranchia | Adapedonta | Solenidae | *Solen grandis* | Genome | GCA\_021229015.1 | 50,000 | NCBI |
| Bivalvia | Autobranchia | Arcoida | Arcidae | *Anadara kagoshimensis* | Genome | GCA\_021292105.1 | 1,935,399 | NCBI |
| Bivalvia | Autobranchia | Arcoida | Arcidae | *Scapharca broughtonii* | Genome | \* | 1,798,000 | MolluscDB |
| Bivalvia | Autobranchia | Arcoida | Arcidae | *Tegillarca granosa* | Genome | GCA\_013375625.1 | 605,873 | NCBI |
| Bivalvia | Autobranchia | Cardiida | Cardiidae | *Fragum fragum* | Genome | GCA\_946902895.1 | 2,298,020 | NCBI |
| Bivalvia | Autobranchia | Cardiida | Psammobiidae | *Gari tellinella* | Genome | GCA\_922989275.2 | 19,181,371 | NCBI |
| Bivalvia | Autobranchia | Cardiida | Cardiidae | *Hippopus hippopus* | Genome | GCA\_946811185.1 | 4,905,753 | NCBI |
| Bivalvia | Autobranchia | Cardiida | Solecurtidae | *Sinonovacula constricta* | Genome | GCA\_009762815.1 | 679,505 | NCBI |
| Bivalvia | Autobranchia | Cardiida | Solecurtidae | *Sinonovacula constricta* | Genome | GCA\_007844125.1 | 976,936 | NCBI |
| Bivalvia | Autobranchia | Cardiida | Cardiidae | *Tridacna crocea* | Genome | GCA\_943736015.1 | 32,149,973 | NCBI |
| Bivalvia | Autobranchia | Cardiida | Cardiidae | *T. gigas* | Genome | GCA\_945859735.2 | 469,269 | NCBI |
| Bivalvia | Autobranchia | Myida | Dreissenidae | *Dreissena rostriformis* | Genome | GCA\_007657795.1 | 45,905 | NCBI |
| Bivalvia | Autobranchia | Myida | Myidae | *Mya arenaria* | Genome | GCA\_922144925.1 | 10,552 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *Bathymodiolus azoricus* | Transcriptome | ERR3600985 | 1,515 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *B. platifrons* | Genome | GCA\_002080005.1 | 12,602 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *Limnoperna fortunei* | Genome | GCA\_944474755.1 | 1,498,882 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *Modiolus philippinarum* | Genome | GCA\_002080025.1 | 18,389 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *Mytilus californianus* | Genome | GCA\_021869535.1 | 16,323,199 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *M. coruscus* | Genome | GCA\_017311375.1 | 1,481,111 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *M. edulis* | Genome | GCA\_019925275.1 | 490,737 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *M. galloprovincialis* | Genome | GCA\_025277285.1 | 26,323 | NCBI |
| Bivalvia | Autobranchia | Mytilida | Mytilidae | *Perna viridis* | Genome | GCA\_018327765.1 | 70,096 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *Crassostrea angulata* | Genome | GCA\_025612915.1 | 10,870,631 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *C. ariakensis* | Genome | GCA\_020458035.1 | 5,932,265 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *C. gigas* | Genome | GCA\_902806645.1 | 1,564,469 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *C. hongkongensis* | Genome | GCA\_015776775.1 | 2,576,225 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *C. virginica* | Genome | GCA\_002022765.4 | 1,971,208 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *Magallana hongkongensis* | Genome | GCA\_016163765.1 | 17,202 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *Ostrea denselamellosa* | Genome | GCA\_024699665.1 | 13,952,798 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *O. edulis* | Genome | GCA\_023158985.1 | 1,809,825 | NCBI |
| Bivalvia | Autobranchia | Ostreida | Ostreidae | *Saccostrea glomerata* | Genome | GCA\_003671525.1 | 39,540 | NCBI |
| Bivalvia | Autobranchia | Pectinida | Pectinidae | *Argopecten irradians irradians* | Genome | GCA\_004382745.1 | 78,654 | NCBI |
| Bivalvia | Autobranchia | Pectinida | Pectinidae | *A. irradians concentricus* | Genome | GCA\_004382765.1 | 63,725 | NCBI |
| Bivalvia | Autobranchia | Pectinida | Pectinidae | *A. purpuratus* | Genome | \* | 80,000 | MolluscDB |
| Bivalvia | Autobranchia | Pectinida | Pectinidae | *Chlamys farreri* | Genome | \* | 22,000 | MolluscDB |
| Bivalvia | Autobranchia | Pectinida | Pectinidae | *Mizuhopecten yessoensis* | Genome | GCA\_002113885.1 | 65,014 | NCBI |
| Bivalvia | Autobranchia | Pectinida | Pectinidae | *Patinopecten yessoensis* | Genome | \* | 3,800 | MolluscDB |
| Bivalvia | Autobranchia | Pectinida | Pectinidae | *Pecten maximus* | Genome | GCA\_902652985.1 | 1,258,799 | NCBI |
| Bivalvia | Autobranchia | Pterioida | Pteriidae | *Pinctada fucata martensii* | Genome | \* | 21,000 | MolluscDB |
| Bivalvia | Autobranchia | Pterioida | Pteriidae | *P. fucata* | Genome | \* | 21,000 | MolluscDB |
| Bivalvia | Autobranchia | Pterioida | Pteriidae | *P. imbricata* | Genome | GCA\_002216045.1 | 21,518 | NCBI |
| Bivalvia | Autobranchia | Unionida | Margaritiferidae | *Margaritifera margaritifera* | Genome | GCA\_015947965.1 | 16,891 | NCBI |
| Bivalvia | Autobranchia | Unionida | Unionidae | *Megalonaias nervosa* | Genome | GCA\_016617855.1 | 50,186 | NCBI |
| Bivalvia | Autobranchia | Unionida | Unionidae | *Potamilus streckersoni* | Genome | GCA\_016746295.1 | 2,032,685 | NCBI |
| Bivalvia | Autobranchia | Unionida | Unionidae | *Venustaconcha ellipsiformis* | Genome | GCA\_003401595.1 | 2,813 | NCBI |
| Bivalvia | Autobranchia | Venerida | Vesicomyidae | *Archivesica marissinica* | Genome | GCA\_014843695.1 | 79,144 | NCBI |
| Bivalvia | Autobranchia | Venerida | Vesicomyidae | *A. packardana* | Transcriptome | SRR8820490 | 1,157 | NCBI |
| Bivalvia | Autobranchia | Venerida | Cyrenidae | *Corbicula fluminea* | Transcriptome | SRR6169119 | 1,527 | NCBI |
| Bivalvia | Autobranchia | Venerida | Veneridae | *Cyclina sinensis* | Genome | GCA\_012932295.1 | 2,587,078 | NCBI |
| Bivalvia | Autobranchia | Venerida | Mactridae | *Lutraria rhynchaena* | Genome | GCA\_008271625.1 | 2,143,760 | NCBI |
| Bivalvia | Autobranchia | Venerida | Mactridae | *Mactra quadrangularis* | Genome | GCA\_025267735.1 | 7,487,386 | NCBI |
| Bivalvia | Autobranchia | Venerida | Veneridae | *Mercenaria mercenaria* | Genome | GCA\_014805675.1 | 1,779,571 | NCBI |
| Bivalvia | Autobranchia | Venerida | Veneridae | *Ruditapes philippinarum* | Genome | GCA\_009026015.1 | 29,238 | NCBI |
| Bivalvia | Autobranchia | Venerida | Veneridae | *Saxidomus purpurata* | Genome | GCA\_022818135.1 | 511,514 | NCBI |
| Bivalvia | Autobranchia | Venerida | Mactridae | *Spisula solida* | Genome | GCA\_947247005.1 | 15,021,671 | NCBI |
| Scaphopoda | *unclassified* | Dentaliida | Dentaliidae | *Graptacme eborea* | Transcriptome | SRR2057020 | 1,060 | NCBI |
| Gastropoda | Caenogastropoda | Architaenioglossa | Ampullariidae | *Lanistes nyassanus* | Genome | GCA\_004794575.1 | 25,785 | NCBI |
| Gastropoda | Caenogastropoda | Architaenioglossa | Ampullariidae | *Marisa cornuarietis* | Genome | GCA\_004794655.1 | 4,359,112 | NCBI |
| Gastropoda | Caenogastropoda | Architaenioglossa | Ampullariidae | *Pomacea canaliculata* | Genome | GCA\_003073045.1 | 1,072,857 | NCBI |
| Gastropoda | Caenogastropoda | Architaenioglossa | Ampullariidae | *P. maculata* | Genome | GCA\_004794325.1 | 75,997 | NCBI |
| Gastropoda | Caenogastropoda | Haliotidae | Batillariidae | *Batillaria attramentaria* | Genome | GCA\_018292915.1 | 1,290,776 | NCBI |
| Gastropoda | Caenogastropoda | Neogastropoda | Buccinidae | *Babylonia areolata* | Genome | GCA\_011634625.1 | 5,933 | NCBI |
| Gastropoda | Caenogastropoda | Neogastropoda | Conidae | *Conus betulinus* | Genome | GCA\_016801955.1 | 182,638 | NCBI |
| Gastropoda | Caenogastropoda | Neogastropoda | Conidae | *C. consors* | Transcriptome | SRR1958824 | 1.542 | NCBI |
| Gastropoda | Caenogastropoda | Neogastropoda | Conidae | *C. ventricosus* | Genome | GCA\_018398815.1 | 114,325 | NCBI |
| Gastropoda | Caenogastropoda | *unclassified* | Provannidae | *Alviniconcha marisindica* | Genome | GCA\_018857735.1 | 727,552 | NCBI |
| Gastropoda | Caenogastropoda | Neogastropoda | Raphitomidae | *Phymorhynchus buccinoides* | Genome | GCA\_017654935.1 | 336,037 | NCBI |
| Gastropoda | Caenogastropoda | Littorinimorpha | Strombidae | *Aliger gigas* | Transcriptome | SRR8490883 | 1,113 | NCBI |
| Gastropoda | Heterobranchia | Stylommatophora | Achatinidae | *Achatina immaculata* | Genome | GCA\_009760885.1 | 3,802,429 | NCBI |
| Gastropoda | Heterobranchia | Aplysiida | Aplysiidae | *Aplysia californica* | Genome | GCA\_000002075.2 | 16,681 | NCBI |
| Gastropoda | Heterobranchia | Nudibranchia | Chromodorididae | *Mexichromis festiva* | Transcriptome | SRR12422334 | 1,032 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Lymnaeidae | *Ampullaceana balthica* | Genome | GCA\_944989445.1 | 435,188 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Lymnaeidae | *Lymnaea stagnalis* | Genome | GCA\_900036025.1 | 34,753 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Lymnaeidae | *Radix auricularia* | Genome | GCA\_002072015.1 | 24,354 | NCBI |
| Gastropoda | Heterobranchia | Nudibranchia | Myrrhinidae | *Hermissenda crassicornis* | Transcriptome | SRR1950939 | 1,445 | NCBI |
| Gastropoda | Heterobranchia | Systellommatophora | Onchidiidae | *Onchidium reevesii* | Transcriptome | SRR6118637 | 2,148 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Physidae | *Physella acuta* | Genome | GCA\_004329575.1 | 1,333 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Plakobranchidae | *Elysia chlorotica* | Genome | GCA\_003991915.1 | 30,474 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Plakobranchidae | *E. marginata* | Genome | GCA\_019649035.1 | 6,205 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Plakobranchidae | *Plakobranchus ocellatus* | Genome | GCA\_019648995.1 | 5,479 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Planorbidae | *Biomphalaria glabrata* | Genome | GCA\_000457365.1 | 7,298 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Planorbidae | *B. straminea* | Genome | GCA\_021533235.1 | 9,530 | NCBI |
| Gastropoda | Heterobranchia | *unclassified* | Planorbidae | *Bulinus truncatus* | Genome | GCA\_021962125.1 | 234,305 | NCBI |
| Gastropoda | Neomphalina | *unclassified* | Peltospiridae | *Chrysomallon squamiferum* | Genome | GCA\_012295275.1 | 1,883,489 | NCBI |
| Gastropoda | Neomphalina | *unclassified* | Peltospiridae | *Gigantopelta aegis* | Genome | GCA\_016097555.1 | 461,769 | NCBI |
| Gastropoda | Neritimorpha | Cycloneritida | Neritidae | *Nerita melanotragus* | Transcriptome | SRR1920139 | 1,174 | NCBI |
| Gastropoda | Patellogastropoda | *unclassified* | Lottiidae | *Lottia gigantea* | Genome | GCA\_000327385.1 | 96,027 | NCBI |
| Gastropoda | Patellogastropoda | *unclassified* | Nacellidae | *Cellana rota* | Transcriptome | SRR3928170 | 2.694 | NCBI |
| Gastropoda | Patellogastropoda | *unclassified* | Patellidae | *Patella pellucida* | Genome | GCA\_917208275.1 | 3,173,890 | NCBI |
| Gastropoda | Patellogastropoda | *unclassified* | Patellidae | *P. vulgata* | Genome | GCA\_932274485.1 | 18,376,887 | NCBI |
| Gastropoda | Vetigastropoda | Lepetellida | Haliotidae | *Haliotis cracherodii* | Genome | GCA\_022045235.1 | 17,462,865 | NCBI |
| Gastropoda | Vetigastropoda | Lepetellida | Haliotidae | *H. discus hannai* | Genome | \* | 14,000 | MolluscDB |
| Gastropoda | Vetigastropoda | Lepetellida | Haliotidae | *H. rufescens* | Genome | GCA\_023055435.1 | 8,868,657 | NCBI |
| Gastropoda | Vetigastropoda | Lepetellida | Haliotidae | *H. rubra* | Genome | GCF\_003918875.1 | 1,177,711 | NCBI |
| Gastropoda | Vetigastropoda | Trochida | Trochidae | *Gibbula magus* | Genome | GCA\_936450465.1 | 3,416,053 | NCBI |
| Gastropoda | Vetigastropoda | Trochida | Trochidae | *Phorcus lineatus* | Genome | GCA\_921293015.1 | 4,940,451 | NCBI |
| Gastropoda | Vetigastropoda | Trochida | Trochidae | *Steromphala cineraria* | Genome | GCA\_916613615.1 | 6,200,493 | NCBI |
| **Outgroup** |  |  |  |  |  |  |  |  |
| [Lingulata](https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?mode=Undef&id=115361&lvl=3&keep=1&srchmode=1&unlock" \o "class) | *unclassified* | [Lingulida](https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?mode=Undef&id=7570&lvl=3&keep=1&srchmode=1&unlock" \o "order) | [Lingulida](https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?mode=Undef&id=7570&lvl=3&keep=1&srchmode=1&unlock" \o "order)e | *Lingula anatina* | Genome | GCA\_001039355.2 | 460,090 | NCBI |

\* *Scapharca broughtonii* http://mgbase.qnlm.ac/downloadData/download?path=Scapharca\_broughtonii.genomic.fa

*A. purpuratus* http://mgbase.qnlm.ac/downloadData/download?path=Argopecten\_purpuratus.genomic.fa

*Chlamys farreri* http://mgbase.qnlm.ac/downloadData/download?path=Chlamys\_farreri.genomic.fa

*Patinopecten yessoensis* http://mgbase.qnlm.ac/downloadData/download?path=Patinopecten\_yessoensis.genomic.fa

*Pinctada fucata martensii* <http://mgbase.qnlm.ac/downloadData/download?path=Pinctada_fucata_martensii.genomic.fa>

*P. fucata* <http://mgbase.qnlm.ac/downloadData/download?path=Pinctada_fucata.genomic.fa>

*H. discus hannai* http://mgbase.qnlm.ac/downloadData/download?path=Haliotis\_discus\_hannai.genomic.fa