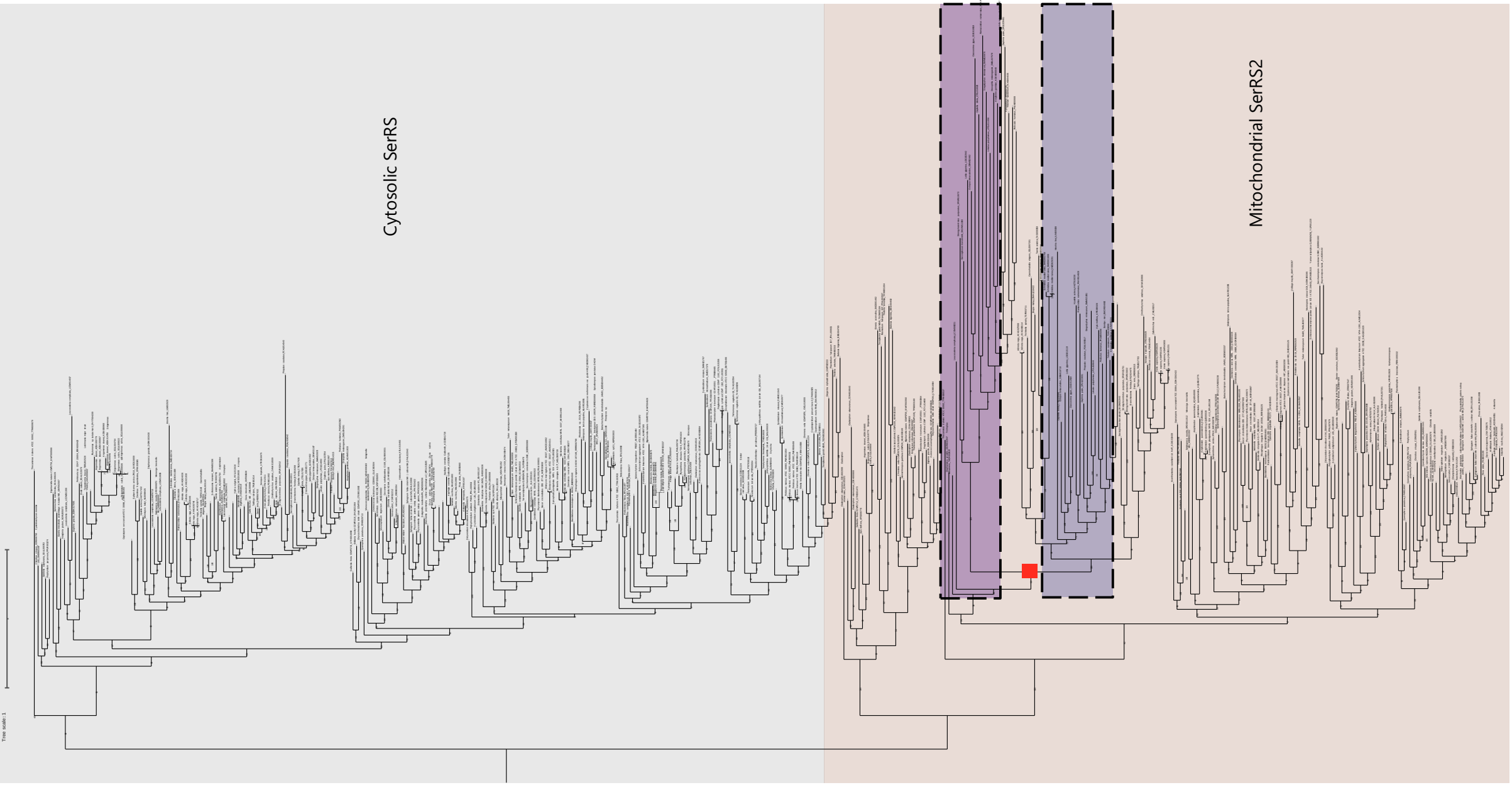
Supplementary figure 1. Phylogenetic analysis of metazoan SerRS, SerRS2, SLIMP, and SerRS2α sequences.

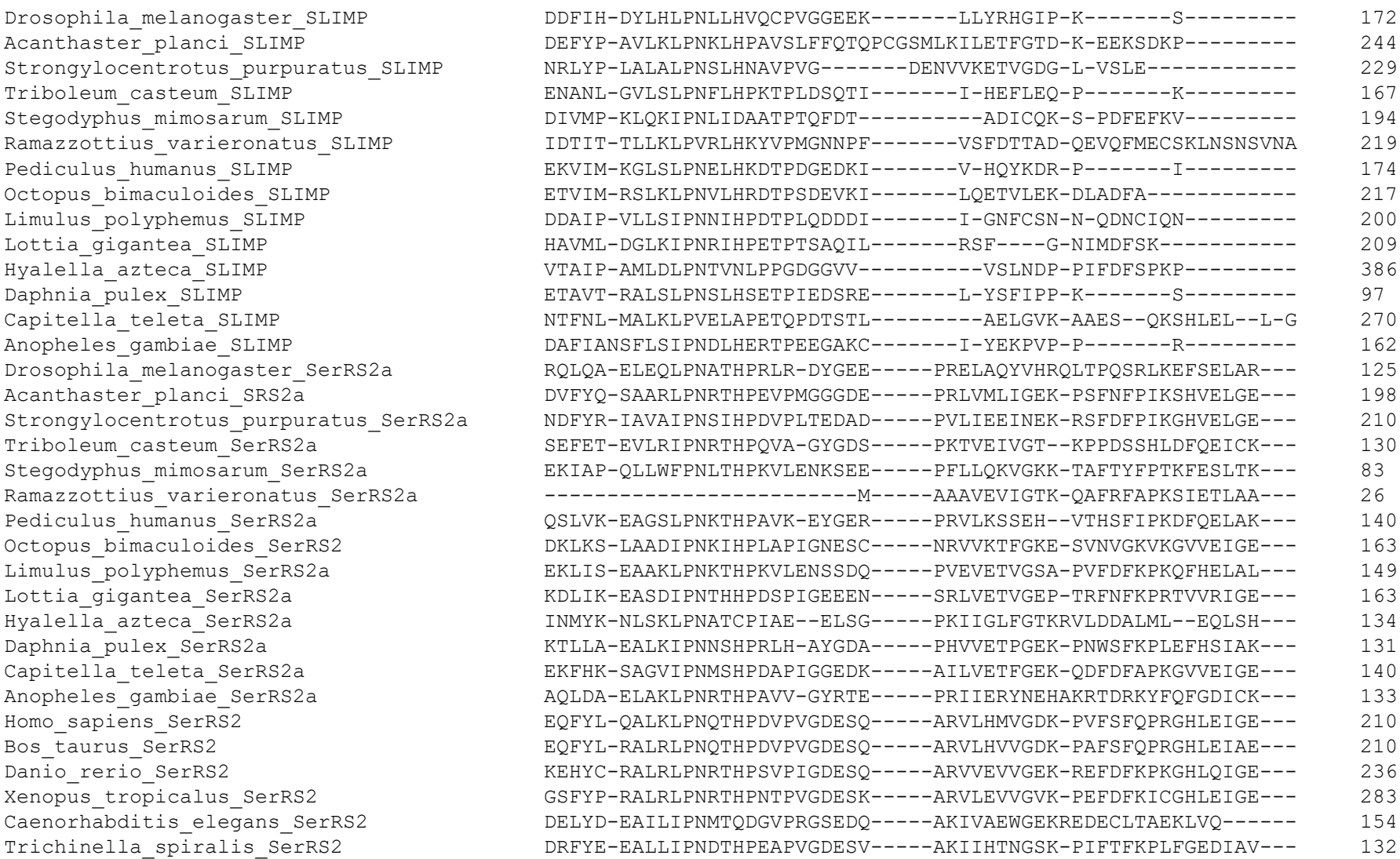


Supplementary Figure 2

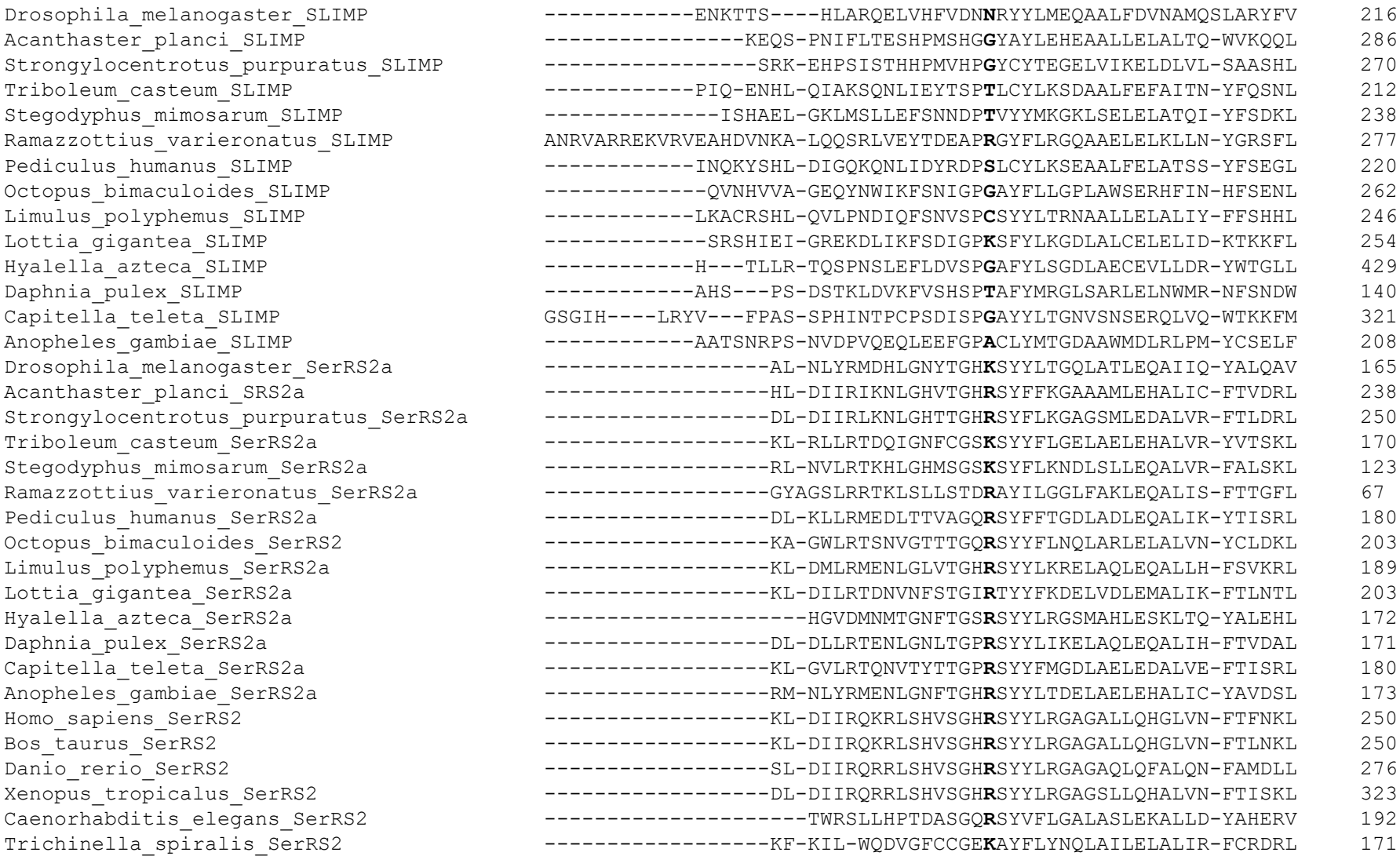
```
Drosophila_melanogaster_SLIMP              LSKVAEERERVTKRL----KELTKS---GSSAVQLEELKEHGKSLRNELKALKQTLYPIE     137
Acanthaster_planci_SLIMP                   KSCIEDRRSKVNEDI----KRLRKK---GGAKEQKDKLQQMGKSLREELRQINFSIASLS     196
Strongylocentrotus_purpuratus_SLIMP        KNQMERKKKALNTRA----KELSKQ---KGGSVTKEKVQLEGRKIREEVKSLNTSLNGLM     191
Triboleum_casteum_SLIMP                    KTVLEFTRSEIQNLI----NKLKQDGEE-KNQSDIEKLLLHIKVVKDDLKNVKEFTYGLE     133
Stegodyphus_mimosarum_SLIMP                YQEIVEKEEEYQKEL----ERLQSLDL--ET--EIKDITEKRIALSQNLRLEKEKLYDVE     156
Ramazzottius_varieronatus_SLIMP            RAELETRRKQSVENF-------------SKPSDVDEESKLKGRLLRGEIKQLNKDIAEIE     168
Pediculus_humanus_SLIMP                    KLQLEKRKTQIADNI----KDLKKIGNDGEAKQEMEKLKIEGRIVREDLKTLMKAFWEVE     140
Octopus_bimaculoides_SLIMP                 KKKLEEERKNIASMM----AALSKVKETEDVKRSKELLKSRGKSLRQLLKTLNADFNILE     178
Limulus_polyphemus_SLIMP                   LQELLRRKENISQKL----QELSKTNH--ITSEEKENWKVEGRKVREEIKHVTEKMWDYE     160
Lottia_gigantea_SLIMP                      KCDFESERKDIGKRVTELINLMKKSGENDNLVKSVDVLKSRGNKLKKLEKELSDRYFAIK     173
Hyalella_azteca_SLIMP                      IEELEKQADELTVTS----NEMK-----GKEDVKDDEVKVRISQLRSKTKILKARLNELE     347
Daphnia_pulex_SLIMP                        REDLETRRIEVTQLM----KQVASHTADTTRPNKIEEVKQEGIRLRTQLKELTKVWWDVE     63
Capitella_teleta_SLIMP                     KDLLEKQHKEISRGFAELVRAKK---NDDIAKEAKKELSEKGRELRPRLKAAITSYYEAE     226
Anopheles_gambiae_SLIMP                    KKEIEQYRVDLQKRI----Q----Q---SSSKEEQQQLKSRAVLARDDLKMLKEQSYKVA     127
Drosophila_melanogaster_SerRS2a            ------------------------------------------------------HKL     75
Acanthaster_planci_SRS2a                   LNDLQDEG-------------------------------SSPALANHLDLLKTQIRETE     148
Strongylocentrotus_purpuratus_SerRS2a      VHDVQLRLQTDIDK-----------------------GLNTKELESMLKEKKNQLDRAQ     160
Triboleum_casteum_SerRS2a                  ---------------------------------------------------DKLYNATK     82
Stegodyphus_mimosarum_SerRS2a              --D-----------------------------------------------IEKCQILK     33
Ramazzottius_varieronatus_SerRS2a          ------------------------------------------------------------     0
Pediculus_humanus_SerRS2a                  ---------------------------------------------------GKRETLW     92
Octopus_bimaculoides_SerRS2                ---------------------------------------------------MKKQGLI     113
Limulus_polyphemus_SerRS2a                 --E----------------------------------------------ETERALLE     99
Lottia_gigantea_SerRS2a                    --A----------------------------------------------SHK-DRIW     113
Hyalella_azteca_SerRS2a                    ------------------------------------------------SLNSVTSEDEL     87
Daphnia_pulex_SerRS2a                      ---------------------------------------------------SADQMELK     82
Capitella_teleta_SerRS2a                   SDR----------------------------------------------SEEFMSLQ     90
Anopheles_gambiae_SerRS2a                  ---------------------------------------------------ESERGTLQ     83
Homo_sapiens_SerRS2                        IRSLEEEKAAVTEAVRALLANQDSGEV--QQDPKYQGLRARGREIRKELVHLYPREAQLE     160
Bos_taurus_SerRS2                          IRSLEEEKEAVTEAVRALVVNQDNSQV--QQDPQYQSLRARGREIRKQLTLLYPKEAQLE     160
Danio_rerio_SerRS2                         ISHLEGRKQVVSSTVRELVGKHDKSTL--SSLEEYGHAREEGRAIREKLNQLYLQEKELE     186
Xenopus_tropicalus_SerRS2                  IKTLEEEKSAIAKEVKHMVISEEKQNL--QTNPRYALIRKRGKDIRLELSTLYKEESNLE     233
Caenorhabditis_elegans_SerRS2              GEK-----Q-------------------------------------TNGAVSEQKYKQLW     106
Trichinella_spiralis_SerRS2                KNP-----------------------------------------TMTMNELTSMW     82
```

Full-length sequence alignment of SerRS2, SLIMP, and SerRS2α metazoan sequences (labeled accordingly).

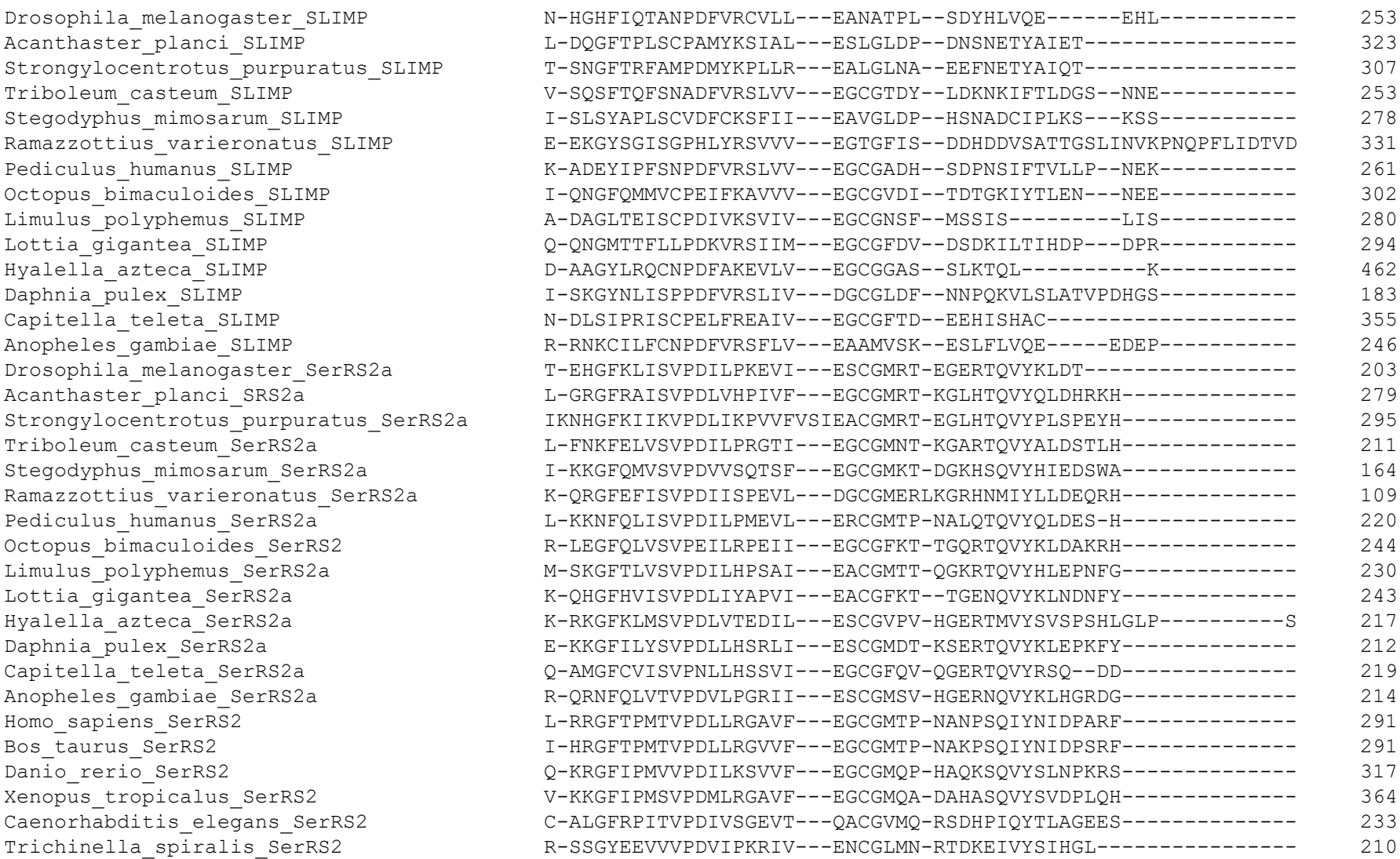
Supplementary Figure 2



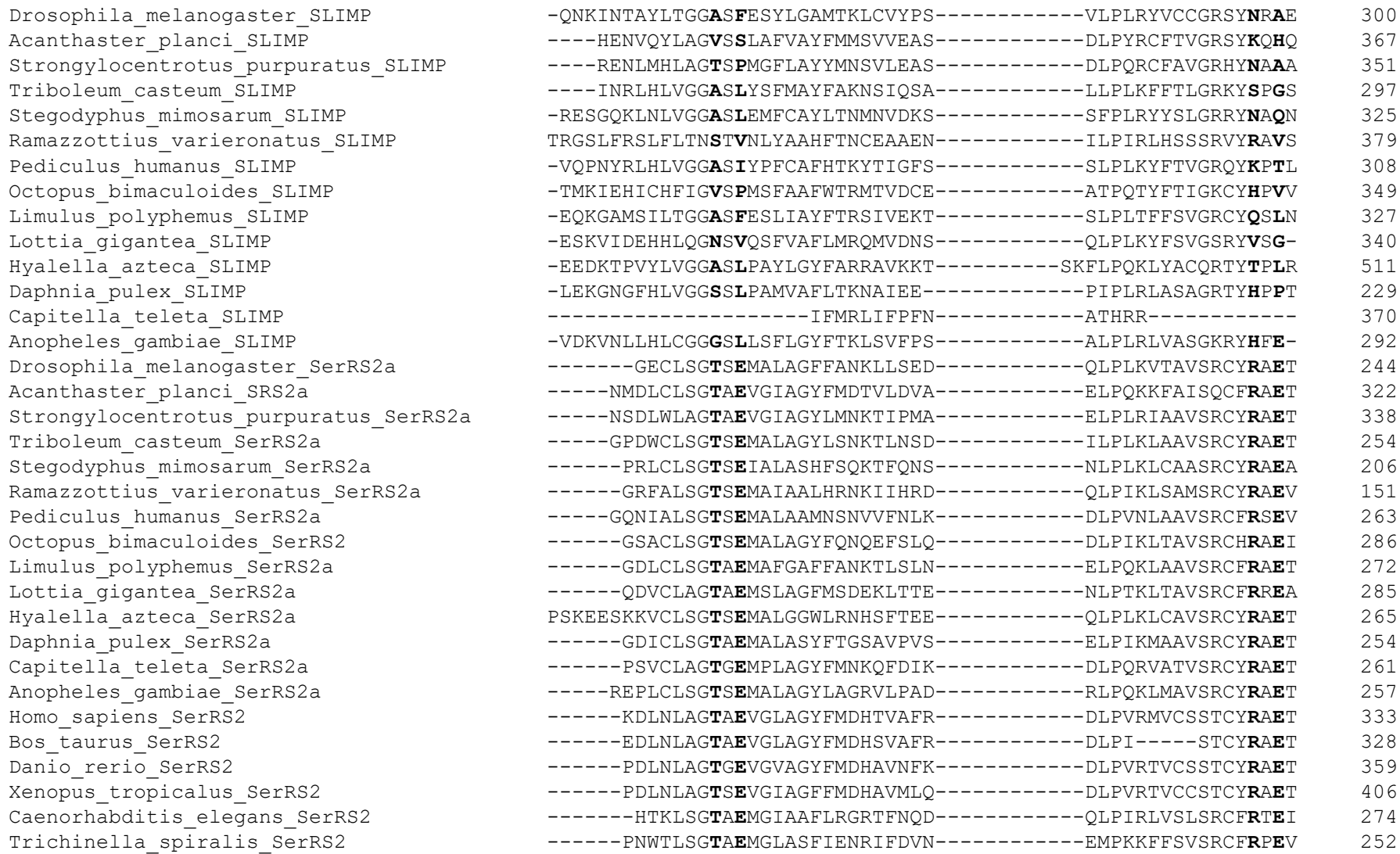
Supplementary Figure 2



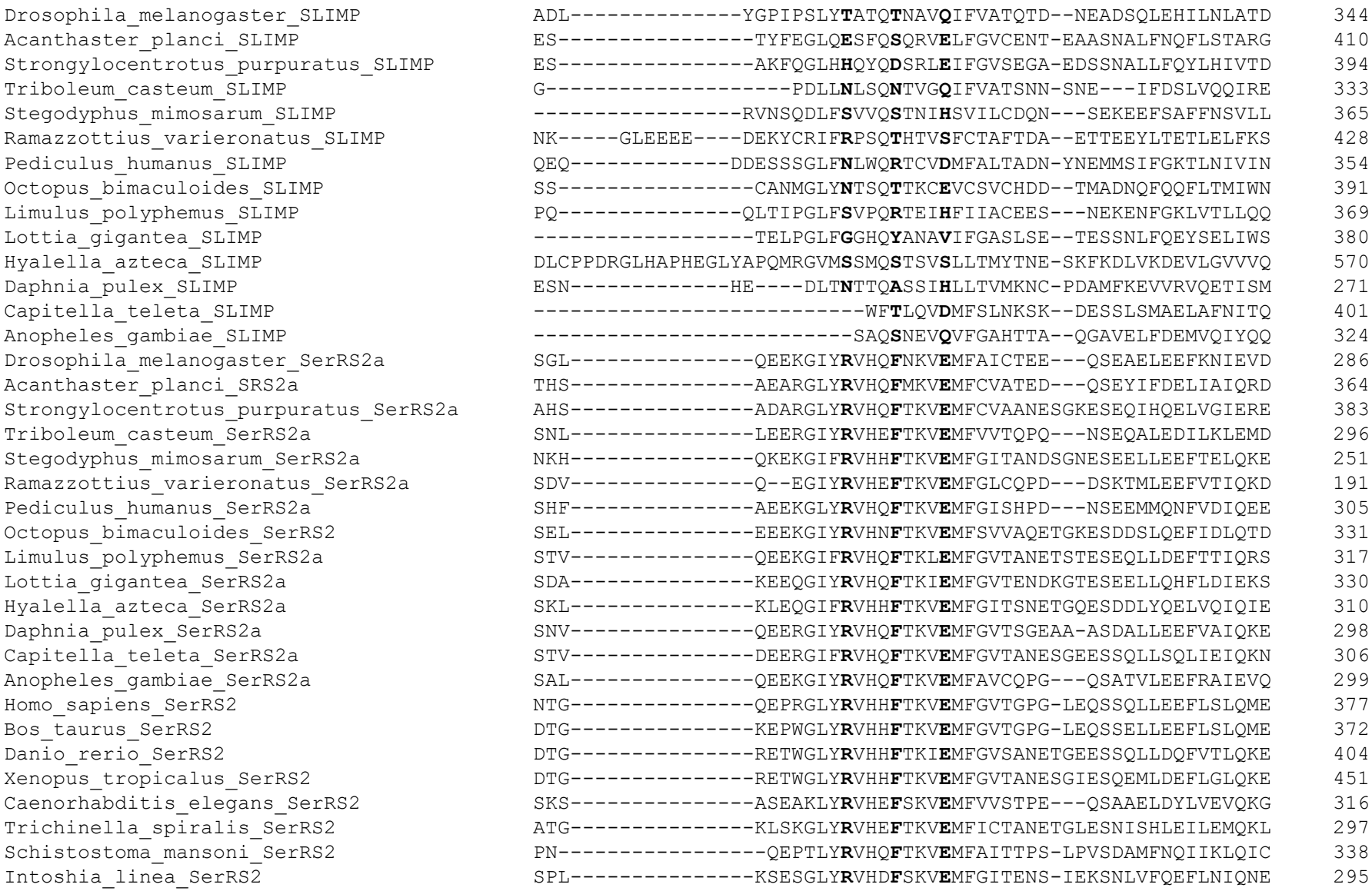
Supplementary Figure 2



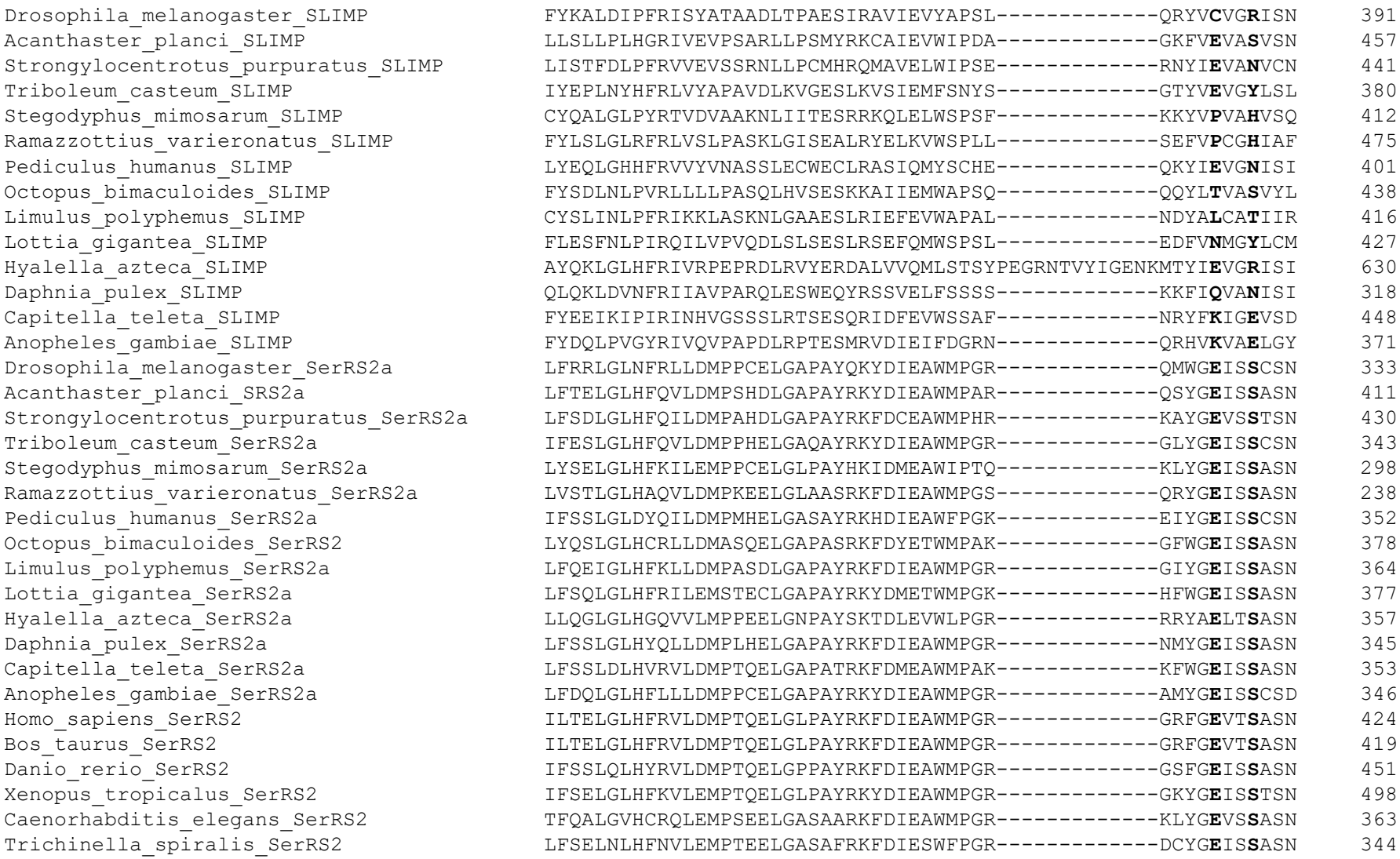
Supplementary Figure 2



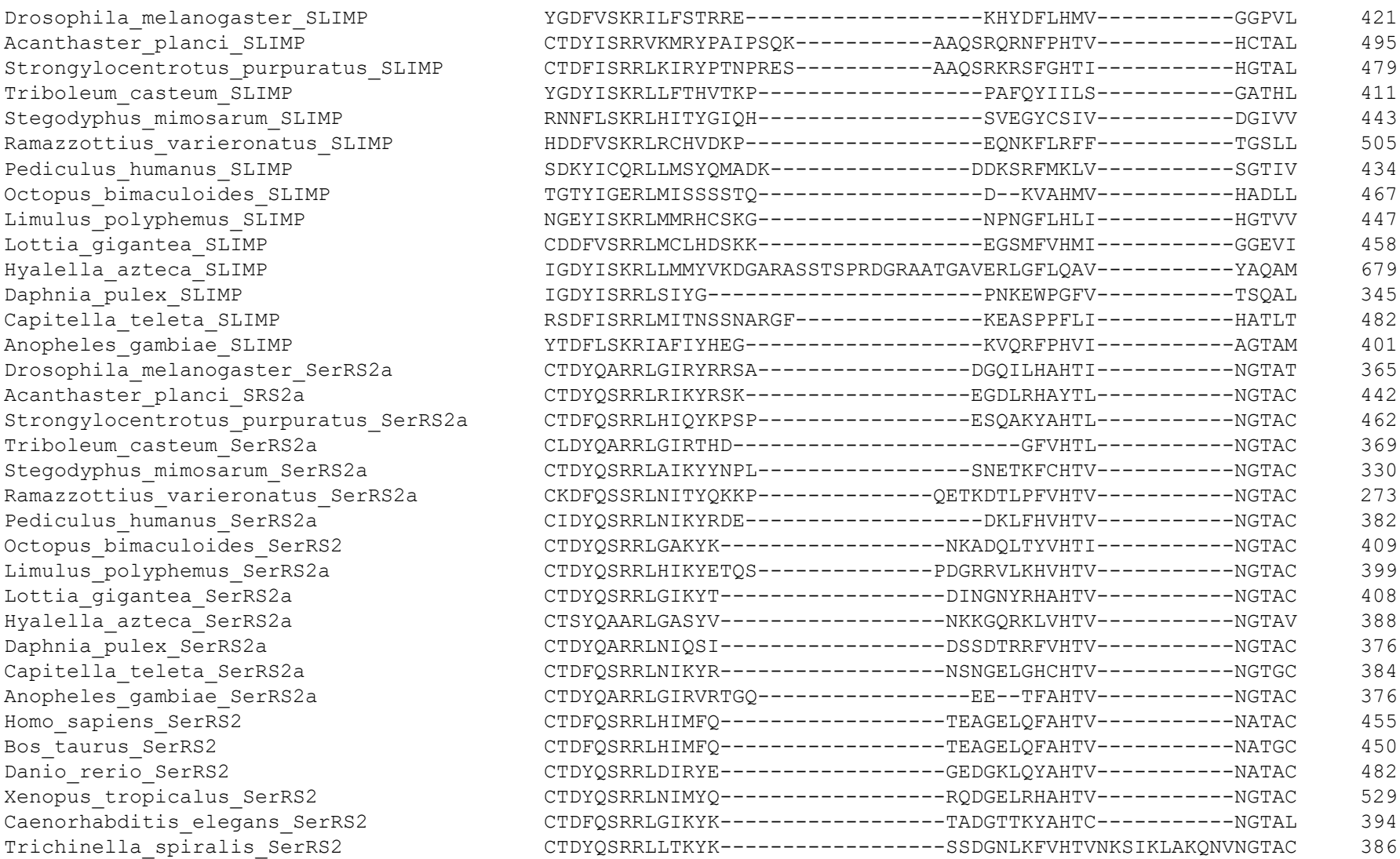
Supplementary Figure 2



Supplementary Figure 2



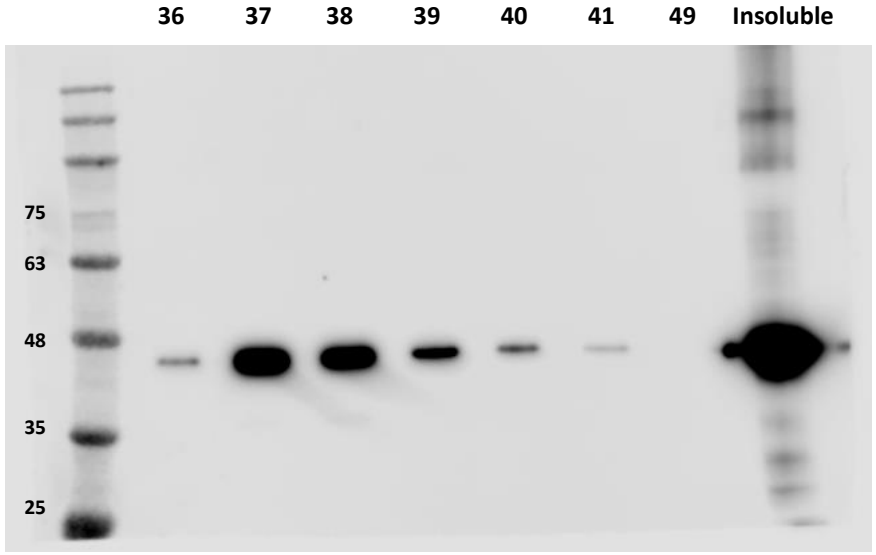
Supplementary Figure 2



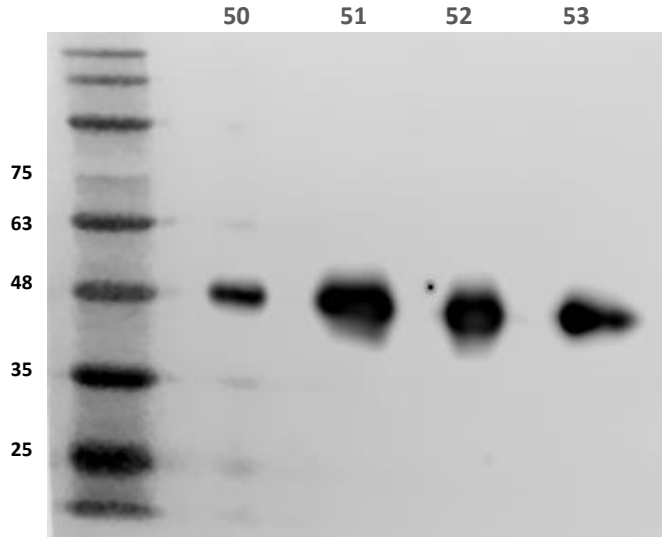
Supplementary Figure 2

```
Drosophila_melanogaster_SLIMP              YTSRLIAALVEHGVRLE----------DCKLLGSISQKPVHQQD-LQQ----------F     459
Acanthaster_planci_SLIMP                   DTSVILAALLPSVHQQL-PEV--LK---------PY----LPQAIPK-------------     526
Strongylocentrotus_purpuratus_SLIMP        KTSVLLSAMLDYGALDL-KEA--KS-----------------------------------     501
Triboleum_casteum_SLIMP                    KSP--PNCSTSRLPQTA-PIY--NI--RHPVVLQAHVREPMTRITPLQN-----ATYAYL     459
Stegodyphus_mimosarum_SLIMP                NIPVLIACIMENFQTKN-YGF--EI--PP--VLKEIMDNLYA------------------     478
Ramazzottius_varieronatus_SLIMP            DLTPFVACCIDGSEGGI-FEH--IRRNPACVL---------------------------     534
Pediculus_humanus_SLIMP                    DVPKLLGCLIEEQEDED-KKF--PI--PDFLVI---------------------------     462
Octopus_bimaculoides_SLIMP                 DVSRMLAFLIEHGKIGE-NEL--LQ--LP-----RLKLDAIPELIP--------------     503
Limulus_polyphemus_SLIMP                   SIPTLIAAIIENCQTSD-CSF--VV--PK--VLQSYMLS----------------------     479
Lottia_gigantea_SLIMP                      NITNLLALMLEYDLP-------------------LISNK----------------------     478
Hyalella_azteca_SLIMP                      DVTRVLAVAVENLQDAQ-GEA--NL--GK--LIDKLSS----------------------     710
Daphnia_pulex_SLIMP                        SVPKLLYCYLKN-----------------------------------------------     357
Capitella_teleta_SLIMP                     SIQPLLAAILENSQSKD-GRI--CL--PG-----VY------------------------     508
Anopheles_gambiae_SLIMP                    SSLELIKLLLGNGITMQ-----------DLPMLNTLENE---------------------     429
Drosophila_melanogaster_SerRS2a            AIPRLLIALLESYQKED-G-I--EI--PA--VLRPFMDNQELITRNKRI-----PETKLV     412
Acanthaster_planci_SRS2a                   AVPRVLLTLLECNQERD-GSV--SI--PK--ALQPYMNGKTVITKPPGG------FLHHT     489
Strongylocentrotus_purpuratus_SerRS2a      AVPRLIIAILENNQQRD-GSI--TI--PE--PLQPYMDGMREITRPASG------KLHFT     509
Triboleum_casteum_SerRS2a                  AVPRLLIALVEMGQRKN-GTV--GL--PE--VLWPYMGGKQLIGKQKSV-----PDLRLI     417
Stegodyphus_mimosarum_SerRS2a              AIPRLLMTIFENFQNLD-GSI--TV--PA--PLQKYMGKDVI-KEKFS-----E-KI--L     374
Ramazzottius_varieronatus_SerRS2a          AVPRMIIAILEQNQLSN-GII--TI--PE--VLRRYFDNAVTLSKPTGA----T-GLYWR     321
Pediculus_humanus_SerRS2a                  AIPRMLMALFETHQQQN-GNI--LL--PK--PLRPFLNGKEVIQVQNSI-----PKLISR     430
Octopus_bimaculoides_SerRS2                AVPRLVMAIIENNQLPN-GSV--LL--PQ--VLHPYFQGSLLTVEPK-------SLNHWK     455
Limulus_polyphemus_SerRS2a                 AIPRMLIAILENFQTKD-GDI--RI--PD--PLIPHMRGLAVIKNRRTK----D-KIYWT     447
Lottia_gigantea_SerRS2a                    AIPRMIMAILEQFQTKD-WNV--NI--PE--VLQPYMNNKTQLTGPQNK----H-PTKWI     456
Hyalella_azteca_SerRS2a                    AVPRCIIALCETHQEAT-GRRALQL--PA--FLGLAPAHPQQFQPNETSVDTGHEHNAFL     443
Daphnia_pulex_SerRS2a                      AVPRTLIALLETHQQSN-GEV--II--PA--VLQPYLNGMQRLRNPTQP----F-KMKWI     424
Capitella_teleta_SerRS2a                   AVPRVLMSLIENNQQSD-GTV--VI--PT--ALRSFMAGQQLISASEDV----LPNTHWI     433
Anopheles_gambiae_SerRS2a                  AIPRMLIALLENFQNED-YTI--TV--PE--VLRRYMGGKQLLRRRKVL-----PELKLT     424
Homo_sapiens_SerRS2                        AVPRLLIALLESNQQKD-GSV--LV--PP--ALQSYLGTDRITAPTHV-------PLQYI     501
Bos_taurus_SerRS2                          AVPRLLIALLESYQQKD-GSV--LV--PP--ALQPYLGTDRITTPTHV-------PLQYI     496
Danio_rerio_SerRS2                         AIPRTIIAILETYQTKK-GTV--QV--PE--VLQQYIGMEVIEKPKYT-------PIKYI     528
Xenopus_tropicalus_SerRS2                  AVPRLLIAILESNQRKD-GAV--LI--PE--VLQPYMGTDVIEKPRYI-------PARYI     575
Caenorhabditis_elegans_SerRS2              ASTRALISVLETFQNDKKGLG--EL--PE--PLRKRVKQRGS-------------PLRFQ     435
Trichinella_spiralis_SerRS2                ALSRTLIAMLEQFQCKN-RQV--NI--PK--FLLDYVNVEMKRQYAERK------PLSLL     433
```

Supplementary Figure 3



*Dm*ΔSLIMP (45.5 KDa)



*Dm*SerRS2α (46.5 KDa)

Western blot analyses of purified 6His-tagged *Dm*ΔSLIMP and *Dm*SerRS2α using an Anti-His antibody.
These proteins were used to attempt the reconstitution of the *Dm*SerRS2α/ *Dm*ΔSLIMP complex.