

Spidroins and Silk Fibers of Aquatic Spiders

Sandra M. Correa-Garhwal, Thomas H. Clarke III, Marc Janssen, Luc Crevecoeur, Bryce N. McQuillan, Angela H. Simpson, Cor J. Vink, Cheryl Y. Hayashi

Supplementary Text

Supplementary Results and Discussion

Aciniform spidroins have mostly been described from orb-web and cob-web weaving spiders, and are considered the main components of aciniform silk¹⁻⁴. Aciniform silk is used for web construction, web decoration, and wrapping of prey. Similar to aciniform spidroins from other species³⁻⁶, the AcSp protein sequences from our three focal species have long repeats (ranging from 173-206 aa; Supplementary Fig. S1). *Badumna longinqua* and *Argyroneta aquatica* each have at least two AcSp variants, which we named variants A and B (AcSp_vA and AcSp_vB). The *B. longinqua* AcSp variants have different repeat units, sharing only 41% sequence similarity at the amino acid level, suggesting that there are at least two AcSp loci in the *B. longinqua* genome. For the *A. aquatica* AcSp variants, only one transcript contained a complete repeat unit (*A. aquatica* AcSp_N_vB; Supplementary Fig. S1B). However, comparison of the available repetitive regions of *A. aquatica* AcSp variants shows few similarities with only 25% sequence identity (over 80 aa), also suggesting that *A. aquatica* has two AcSp loci. This finding is consistent with previously published *A. aquatica* silk sequences, where at least two AcSp transcripts were reported⁷.

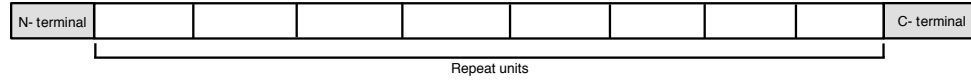
Female spiders protect their eggs by wrapping them in silk. The silken egg cases are mainly composed of tubuliform silk⁸⁻¹⁰. Each of our focal species contained transcripts that were long enough to have more than one complete repeat unit of TuSp (Supplementary Figure S1C). The TuSp repeat units were very similar across species, with 190 aa in *A. aquatica*, 194 aa in *B. longinqua*, and 196 aa in *Desis marina*. Repeat units from all three species are comparable in length to the 180–184 aa TuSp1 repeat units from the cob-web weaving *Latrodectus hesperus*¹¹ and the orb-web weaving spiders *Argiope bruennichi*¹² and *Argiope argentata*¹³. Not only are the TuSp repeat units conserved in length across species, they have conserved amino acid sequence motifs. The amino acid sequence motifs poly-serine, poly-alanine, and glycine-X (where X could be A, I, L, Q, S, T, V, or Y), are common in our focal species. Unlike the single, long poly-alanine motifs found in each MaSp1 repeat unit^{14,15}, poly-alanine motifs in TuSp are no more than four residues long and are dispersed across the sequence (Supplementary Figure S1C). The *A. aquatica* TuSp repeat also shares a five threonine (boxed, Supplementary Figure S1C) stretch with the TuSp repeats of the orb-web weaving spiders *Argiope aurantia*, *Nephila clavipes*, and *Araneus gemmoides*¹⁶, the cob-web weaving spider *L. hesperus*¹¹, and the velvet spider *Stegodyphus mimosarum*.

References

1. Hayashi, C. Y., Blackledge, T. A. & Lewis, R. V. Molecular and Mechanical Characterization of Aciniform Silk: Uniformity of Iterated Sequence Modules in a Novel Member of the Spider Silk Fibroin Gene Family. *Mol. Biol. Evol.* **21**, 1950–1959 (2004).
2. Vasanthavada, K. *et al.* Aciniform spidroin, a constituent of egg case sacs and wrapping silk fibers from the black widow spider *Latrodectus hesperus*. *J. Biol. Chem.* **282**, 35088–35097 (2007).
3. Ayoub, N. A., Garb, J. E., Kuelbs, A. & Hayashi, C. Y. Ancient properties of spider silks revealed by the complete gene sequence of the prey-wrapping silk protein (AcSp1). *Mol. Biol. Evol.* **30**, 589–601 (2013).
4. Chaw, R. C. *et al.* Intragenic homogenization and multiple copies of prey-wrapping silk genes in *Argiope* garden spiders. *BMC Evol. Biol.* **14**, 31 (2014).
5. Correa-Garhwal, S. M. *et al.* Silk genes and silk gene expression in the spider *Tengella perfuga* (Zoropsidae), including a potential cribellar spidroin (CrSp). *PLOS ONE* **13**, e0203563 (2018).
6. Correa-Garhwal, S. M. *et al.* Semi-aquatic spider silks: transcripts, proteins, and silk fibres of the fishing spider, *Dolomedes triton* (Pisauridae). *Insect Mol. Biol.* 1–17 doi:10.1111/imb.12527
7. Strickland, M., Tudorica, V., Řezáč, M., Thomas, N. R. & Goodacre, S. L. Conservation of a pH-sensitive structure in the C-terminal region of spider silk extends across the entire silk gene family. *Heredity* 1 (2018). doi:10.1038/s41437-018-0050-9
8. Hu, X. *et al.* Spider egg case core fibers: trimeric complexes assembled from TuSp1, ECP-1, and ECP-2. *Biochemistry* **45**, 3506–3516 (2006).
9. Hu, X. *et al.* Egg Case Protein-1 a new class of silk proteins with fibroin-like properties from the spider *Latrodectus Hesperus*. *J. Biol. Chem.* **280**, 21220–21230 (2005).
10. Casem, M. L., Collin, M. A., Ayoub, N. A. & Hayashi, C. Y. Silk gene transcripts in the developing tubuliform glands of the Western black widow, *Latrodectus hesperus*. *J. Arachnol.* **38**, 99–103 (2010).
11. Hu, X. *et al.* Araneoid egg case silk: a fibroin with novel ensemble repeat units from the black widow spider, *Latrodectus hesperus*. *Biochemistry* **44**, 10020–10027 (2005).
12. Zhao, A.-C. *et al.* Novel molecular and mechanical properties of egg case silk from wasp spider, *Argiope bruennichi*. *Biochemistry* **45**, 3348–3356 (2006).
13. Chaw, R. C., Collin, M., Wimmer, M., Helmrick, K.-L. & Hayashi, C. Y. Egg case silk gene sequences from *Argiope* spiders: evidence for multiple loci and a loss of function between paralogs. *G3 GenesGenomesGenetics* **8**, 231–238 (2017).
14. Ayoub, N. A., Garb, J. E., Tinghitella, R. M., Collin, M. A. & Hayashi, C. Y. Blueprint for a high-performance biomaterial: full-length spider dragline silk genes. *PloS One* **2**, e514 (2007).
15. Hinman, M. B. & Lewis, R. V. Isolation of a clone encoding a second dragline silk fibroin. *Nephila clavipes* dragline silk is a two-protein fiber. *J. Biol. Chem.* **267**, 19320–19324 (1992).
16. Tian, M. & Lewis, R. V. Molecular characterization and evolutionary study of spider tubuliform (eggcase) silk protein. *Biochemistry* **44**, 8006–8012 (2005).

Supplementary Figures

A. Spidroin regions



B. AcSp complete repeat unit

A. aqu_AcSp_vB 1 QNTLSSKTLKGVDSGVSAISQSLSKSGILGLGAGASTRSTYQAIAKSIIVSGGLASSGILNADNASDLGADLVSGFLQASAGVAAQFGIRISQSDVAADISTVTNSLR
B. lon_AcSp_vA 1 QSTLSSVL-GVDSISVNIANDLQSNILNLGAGADTSSYAMAVAKSTVSGGLASSGLINSNNASDGVKFAAGLQAAQIAAQFGIRISQNVSSDISSITNLR
B. lon_AcSp_vB 1 STTLSSI--GVSSSVSSITSNLQSGLYSSGSSLSASIIANPLASRVVSGLSSAGVLTFGNASGLISSFTNGFLQASASVATQFGITVSAS-----
D. mar_AcSp 1 QAMARA--SVDVRVSSGIVNRVQNAFMQMGSSATASSYAQTIASLVVRGLSSAGILTASNGYGMTGIASGFVTSASSFASQYGTAAASKSASAA-----

A. aqu_AcSp_vB 106 ASTSGTTTSSASASADAQSSFD--FGASAGLDFGAGVDFGAQAGYGAAPGYGLGAGCAPAGDMSDVVNNLASALARNTFKSIFRAGVSSQVAVRIASSI--
B. lon_AcSp_vA 105 --TSSTQTSTSVTSSSTSLNQIS--AGLGASLDLGLAGLVNVSPP---SSPGYGAPGASGATPSGDLGIVNNLASALASASTFQSIIFRAGVSSQIAARIATSAV--
B. lon_AcSp_vB 90 -STSSASTSLISTSSAGSSFDQARLSTLLSSPAGA-----SATGSGFFGGYGSL-SGFPSSIIINDLTNSLLGSGTFNSIFGGGISSQIAVQIAVSGV--
D. mar_AcSp 93 -STSASSST-SSTSSAASS---SAAQAASSYGAAM-----SAAQALSASTASSFVGSYVSYLLQSEYTRIFGSGISGQVASRVAASALA

C. TuSp complete repeat unit

A. aqu_TuSp 1 FSQASAAASLSSAFSSAFASASSAAAAGSIAYNLALQTANALGISNAVGIASAVSQAVSAGVAGASSFAYASAVSNAAQFLAAQGLSQANASALASSFA
B. lon_TuSp 1 FSQSSASSLSSAFASAFSSASSASAVGTGVYQLALQTANTLGISNPAALAGAVQAVSSVGVGASPFAYASAIASNAVQQLSQGLSQANASALASSFA
D. mar_TuSp 1 FAQASASSLATSSAFAKAFASASSASAAGSLGYQMAFQVGNLTGISNAAFAEAIQAVSSVGVGASAYAYASAIANTAGOFFFTQGVLSQNTYSALASSFS

Threonine-rich

A. aqu_TuSp 103 SAFASAAASASASAAASDSAQSAASAAAFSAASAFSA-----ASQAA---SQAGSYSTTTTSGSQAAASQAAASAAQAAASQSSSYASASASA
B. lon_TuSp 103 SAFASAAASASASAAASAAQSAASAAAFSAASAFSAASAAASRAASQAA---SQAGAFSRTTSTSTAESGSG---AASQAAASQAASSSYAASASAS
D. mar_TuSp 103 SAFASAAASASASASAGAY--SASADQSAASAAAFSAASAAASRAASQAAASQAGAGYSRSTTVSGSQAGSG---AASMAASRAASSSYAASASASA

D. PySp complete repeat unit

A. aqu_PySp_N 1 QAAAYADTSSK-TLNQDSSNSDLASSQTNSAQVSSSDSQSLASSSSSRVSDIQSIQSSVSLSLIGSGVL
B. lon_PySp 1 QTSQASAAASAVSNAAASSSALSSSQTNASQVSSSSAQSLASSSSSRVSDIQSIQSSVSSSLIGSGVL

A. aqu_PySp_N 69 SVISSGILSNSDVSSAVIQGLVNSGVQYSIAQSIIVSQYLSSVSAGSSQQTVAQSIAAAVSQSLSSSNAV
B. lon_PySp 70 SGITSGILSNSDVSSAVIQGLVNSGVQYSIAQRVVVSQYLSSVSAGSSQQTVAQSIAAAVSQSLSSSNAV

A. aqu_PySp_N 138 SAGQEQTISSQISSISTNMNMISQRARPAPVPQPR-----PAPRQPIVSPRAAPAPLEPLASIS
B. lon_PySp 139 SAGQEQTISSQISSISTNLENIISQRARPAPVPQPRPAPRPIAPAPRQPIVSPRAAPAPLEPLASIS

Proline-rich

Figure S1. Exemplar repeat units for aciniform, tubuliform, and pyriform spidroins. Schematic organization of a spidroin primary structure showing the tandemly arrayed repeat units (A). Multiple alignments comparing single repeat units of aciniform spidroins (AcSp; B), tubuliform spidroins (TuSp; C), and pyriform spidroins (PySp; D) of *Argyroneta aquatica*, *Badumna longinqua*, and *Desis marina*. Sequence names highlighted as in Figure 2 and abbreviated as in Supplementary Table S1. Amino acids conserved > 50% across all sequences are highlighted in grey. Gaps inserted into the alignment are indicated by dashes and missing sequence by periods. Amino acid positions for each sequence are numbered on the left. Proline and threonine-rich regions shown in red boxes.



Figure S2. Comparison of repeats from transcript sequences towards the beginning or end of the same spidroin. Sequence names highlighted as in Figure 2 and abbreviated as in Supplementary Tables S1 and S5. Abundant amino acids highlighted: alanine (red), serine (purple), glycine (green), and glutamine (blue). Cladograms reflect the relationships in Figures 2-3 for N- and C-terminal regions, respectively

<i>B. lon_CrSp</i>	1	AVGSHLYETLLSNPRFVSSFGLFSLAKARVFLSALASRMHSFPQFSSLRVQDLVKRYLDALETITLGSSVSLYAQTIS
<i>S. mim_CrSp</i>	1	AFGSHLYGTLLVNPRFSTLFGSEFSLKVRPFLFALASHIHFSQFSSISANDLFERYIEVVNALPLGSSVQAYALALS
<i>T. per_CrSp</i>	1	AFGSHLYGTLLVNPRFVTVFGSDFSLERSRLFLSVLSSRIHSFPQFSSIPVQYLLNRYTDVVASIPFGSSEQIYARRIA
<i>B. lon_CrSp</i>	80	QVTASFLEKSNLLSWQLISDKYEATSEAVESIIETTPLTEKSLSTGLPSVEDSAATTAATAVFSPSVLHVLSTAE
<i>S. mim_CrSp</i>	80	QATAELLYENNLLSWDALAKEDAEAGAG-EAQATVSSSTLVS-----SSTVESAAAETAASAILSPSVLSILSSSE
<i>T. per_CrSp</i>	80	QETASVLYKNNLLSWQILASEDAVDKAA-EDAGAVLSQEASLSDQSISLSSSTEDVAASMAASAVLSPSVLETLLATAE

Figure S3. Cribellar spidroin (CrSp) repeat unit. Identified CrSp motif of *Badumna longinqua* (green) aligned to *Tengella perfuga* (*T.per_CrSp*), and *Stegodyphus mimosarum* (*S.mim_Sp1*; GenBank: KFM60634.1). Names abbreviated as in Tables S1 and S4. Amino acids conserved 100% across all sequences are shaded in grey. Abundant amino acids in silks are highlighted: alanine (red), serine (purple), glycine (green), leucine (orange), and glutamine (blue). Gaps inserted into the alignment are indicated by dashes. Amino acid positions for each sequence are numbered on the left.

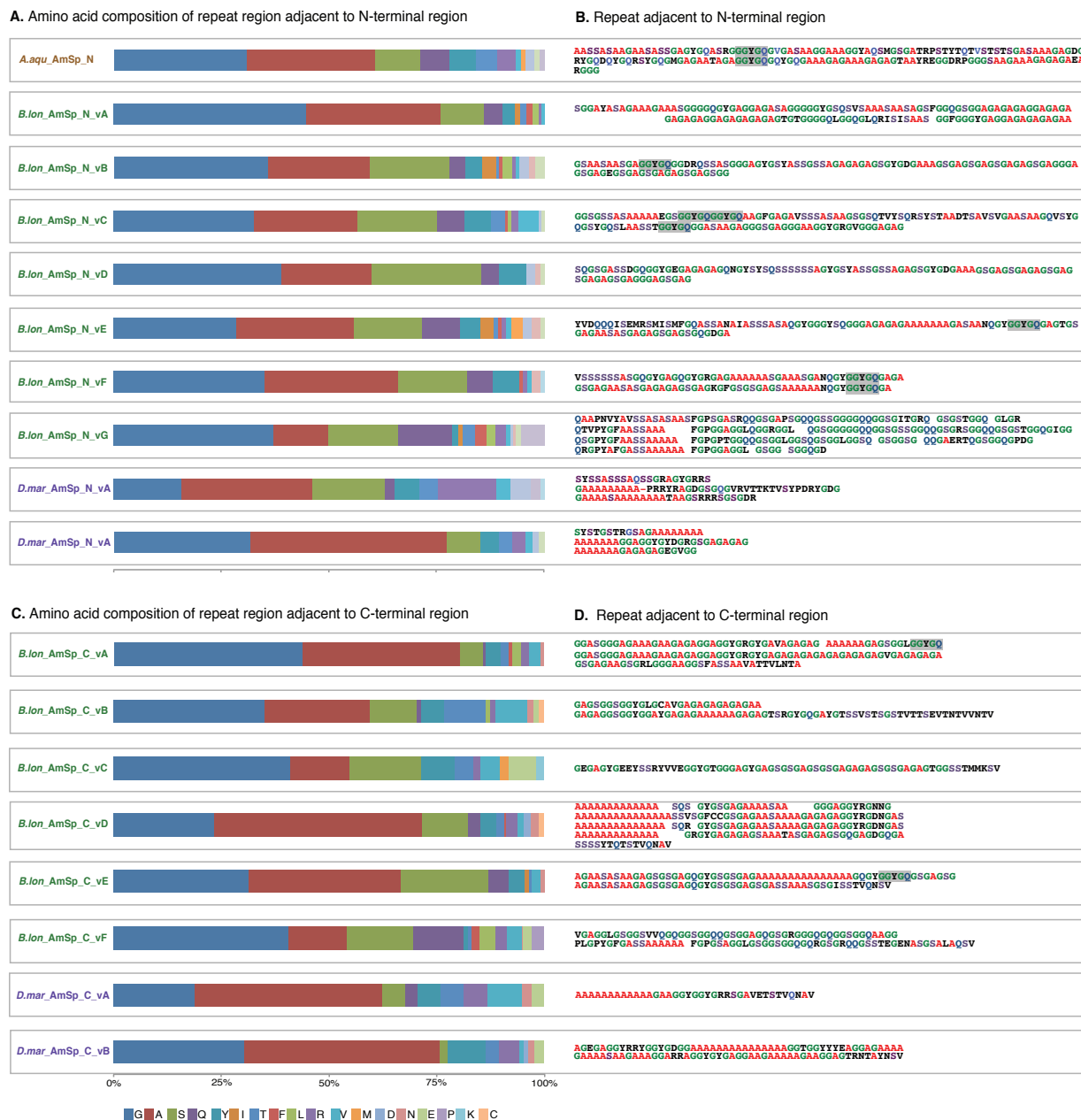


Figure S4. Repetitive regions of Ampullate Spidroin (AmSp) sequences. Amino acid composition of AmSp repetitive regions (A and C) adjacent to the N-terminal (B) or C-terminal (D) regions of *Argyroneta aquatica*, *Badumna longinqua*, and *Desis marina*. Sequence names abbreviated as in Supplementary Table S1 and highlighted as in Figure 2. Amino acids abundant in AmSp sequences are highlighted as in Figure S2. The amino acid motif GYGQ, which is found in several sequences, is highlighted by grey shading.

```

B. lon_Sp_N_vB 1 NALINDESFNSAIQTGISSTSIASAIAGSVASAEFSAVGYSALVKAYLQAI SDEKEGATVSDYARGIAAATTSVLNAGIFAAGIDLEHITAAGAIASGIHSTSGIQAVSDSHVTPGDASNV
S. mim_Sp2b 1 NALINDSGFQSAFSGTVSTNIIINAFATAIAGSVASAEFSVGYSSLVKAYLQALSSEKDGATIEDYARAIAATATSNVLEQNGIFSEGIVASGHITAAVNATSGISSTH----ITESAVTTTSVGSQ

B. lon_Sp_N_vB 128 LTAAVTTATVDGSSPVSHIPAYTALTGTPAISTISFARQIYAALLADPOFGLSFQOPISLERIRLHLTAIATSITSIPQYSLIDTNDLLNSYLDSSIIGIPPGSSTFVYAQAIARVTAAVLFKHDLITW
S. mim_Sp2b 124 TTVSSDAGTSSG---VGHIPAYTAPAGTPAVAINFARQIYISLLADPSFSSVFQAPISLDRVKIYLAALAKFTVAIPRYSIVSADELVNGYLGTTIIGIPPGSASSIYAQAIARITADTFYKNGLLSL

B. lon_Sp_N_vB 255 ESVNTGLPEVQNAIQSALVSDTTSSSENDVESSIDTRATSKDLTLVTTGLKGEAGTGDLVQTLTTPETAPSQIKEPSVLEIRDQYVAPEGTPAVSVAFAKKIYAALLSDNRFITAFESPLSIPRARI
S. mim_Sp2b 248 DTVNAESGIIQNAVQNAL-----RSAALESSAITSGTEQTSADQKPISEHTIDD-----HPYIAPEGTPAVSVAFAKRIYLALATDKRFVAAFTFPLSLTRARI

B. lon_Sp_N_vB 382 YLSAIAENLCALPRFNTINDEELVEGYVEAIISSVPSEADVSIYAQEIATDFALVLFENNLLTWQAVTAGSSALSTAITDALSTAAERDSSIISSSPSIQIPSSDDDDINITTGTEQISERDGTLSRVY
S. mim_Sp2b 342 YLSALAKSLCALPRYNTISDEELVEGYIEAISAQVQAPNPFLYAQEIATVTALIFYENNLLTWQALTAGSAALQGAIQSALNAAEEDTLAFSAT-----VAQTSTTQISSESQTSAVSDSTTLTAY

B. lon_Sp_N_vB 509 SPFSGTTPVARTFGKQIYGYLTENARFSSVFGKEFSLQNARLFLTALATSISSLPFFSSVTVSELVGKYIQAISAVPLGSDFYAYAQVIAEATSEILLSRKLTLQVVSALSSSIQAAVGSALES
S. mim_Sp2b 464 NPFVGSSTPVARNFGRLIYNSLLADEKFSSVFGIGNSFVNIRLFLTTLATSISSFQFSSVTVSELVGKYIQAITPIPGSDIHQYAQAIAQATAEIMSSRKLTLQGVVLTALSSSLESAISSALES

```

Figure S5. Pairwise alignment of *Badumna longinqua* Sp_N_vB (green) and *Stegodyphus mimosarum* (Sp2b, GenBank: KK117516.1) repetitive region. Names abbreviated as in Tables S1 and S5. Amino acids conserved 100% across all sequences are shaded in gray. Gaps inserted into the alignment are indicated by dashes. Amino acid positions for each sequence are numbered on the left.

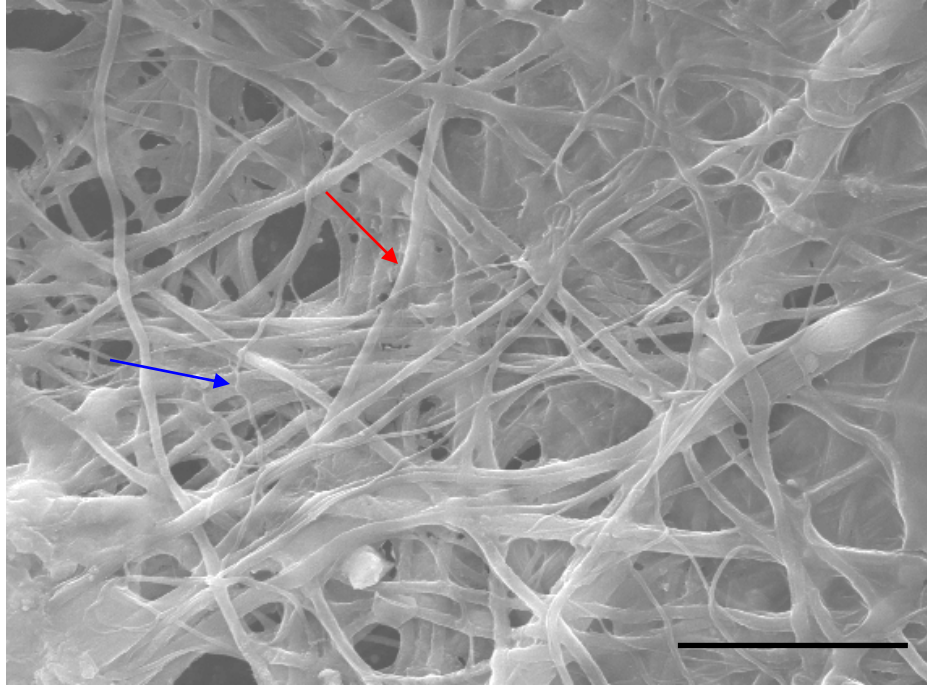


Figure S6. Scanning electron micrograph of *Argyroneta aquatica* diving bell. Large diameter fibers are indicated by a red arrow and smaller diameter fibers by a blue arrow. Scale bar 5 μm .

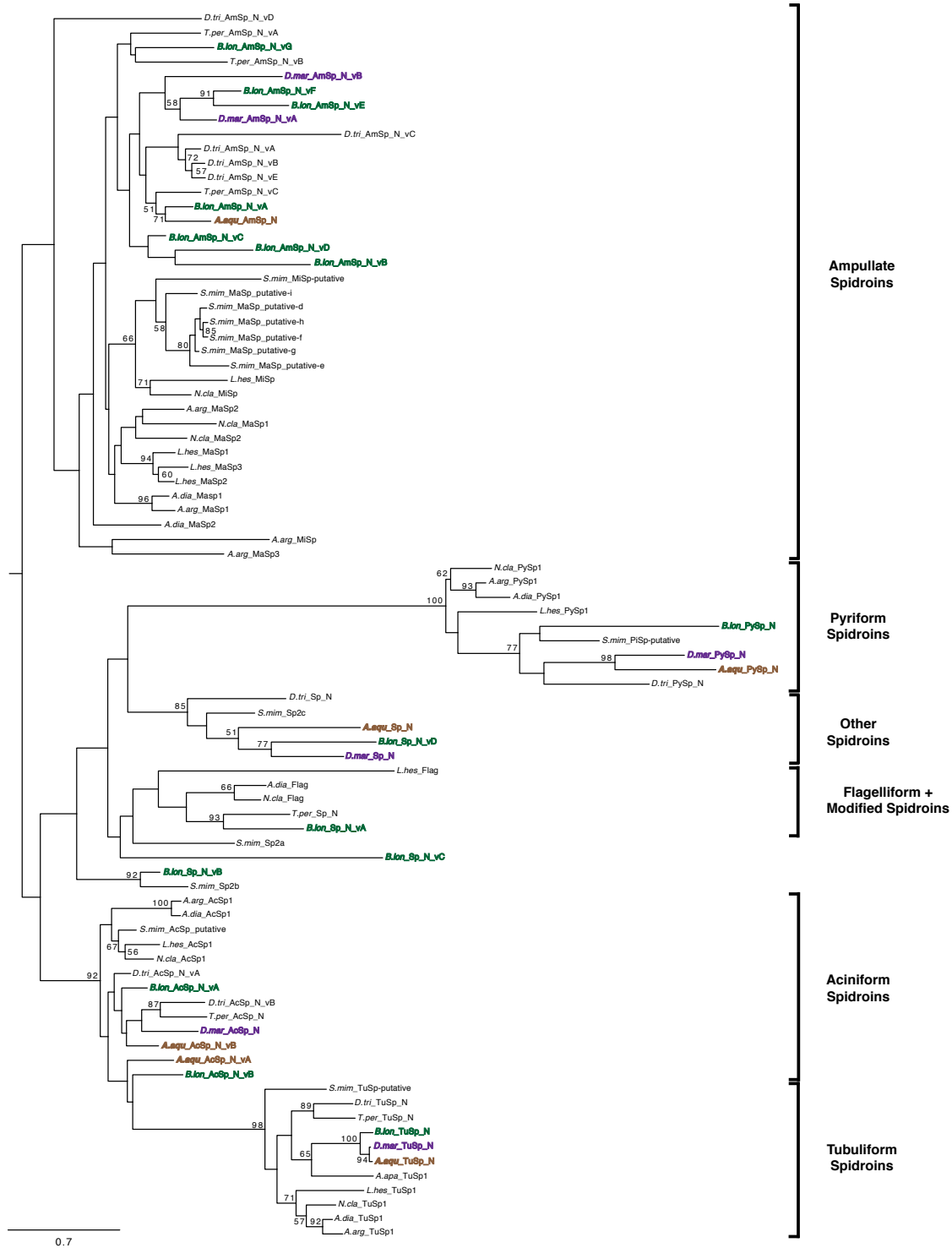


Figure S7. Complete maximum likelihood tree of spidroin N-terminal regions. *Argyroneta aquatica*, *Badumna longinqua*, and *Desis marina* spidroin paralogs highlighted in brown, green, and purple respectively. Tree rooted with the California trapdoor spider *Bothriocyrtum californicum* fibroin 1 (not shown). Names abbreviated as in Tables S1 and S5. Bootstrap percentages >50% are shown. Scale bar represents substitutions per site.

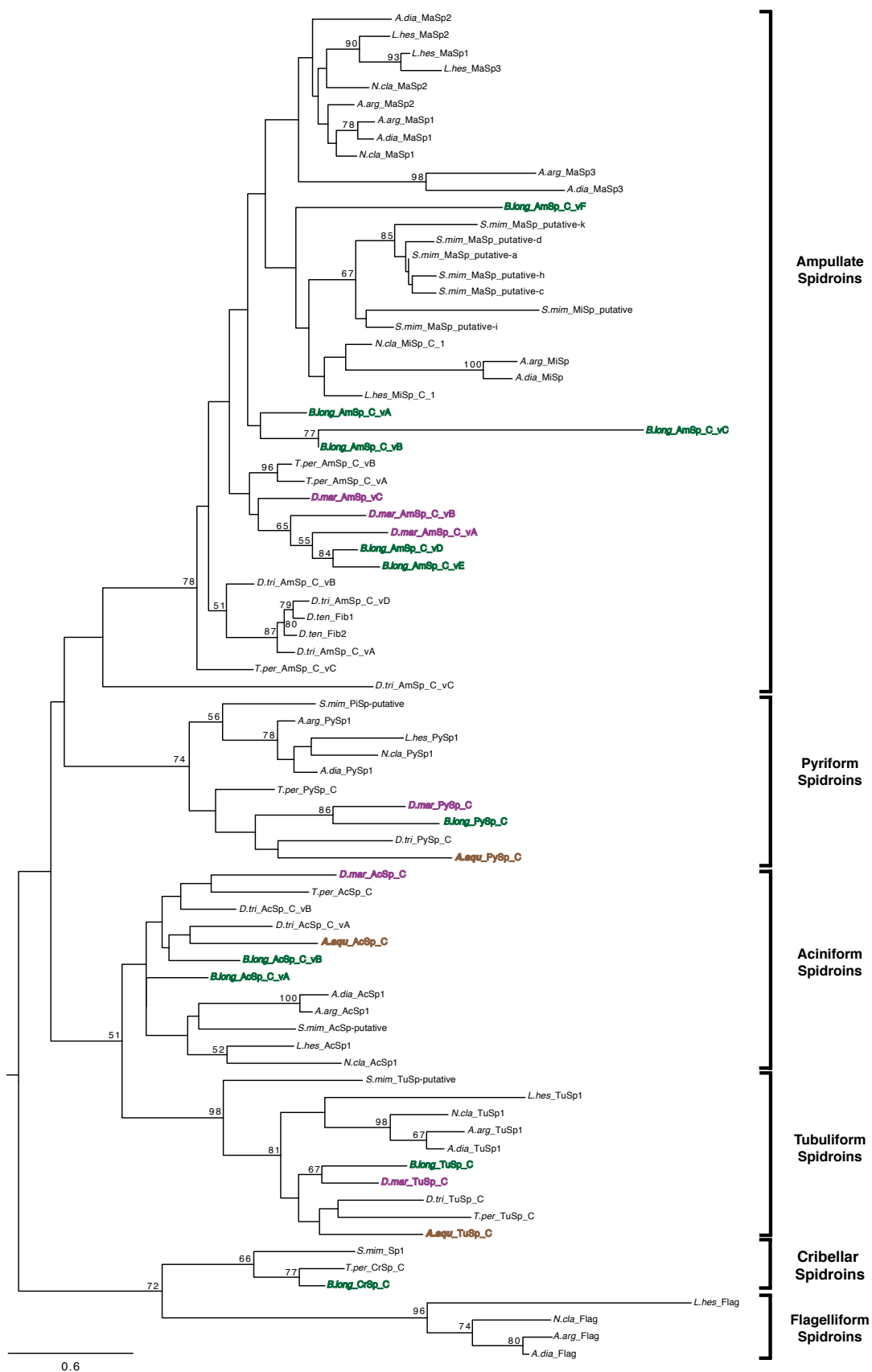


Figure S8. Complete maximum likelihood tree of spidroin C-terminal regions. *Argyroneta aquatica*, *Badumna longinqua*, and *Desis marina* spidroin paralogs highlighted in brown, green, and purple respectively. Tree rooted with the California trapdoor spider *Bothriocyrtum californicum* fibroin 1 (not shown). Names abbreviated as in Tables S1 and S5. Bootstrap percentages >50% are shown. Scale bar represents substitutions per site.

Supplementary Tables

Table S1. Spidroins from this study for *Argyroneta aquatica*, *Badumna longinqua*, and *Desis marina*.

Spidroin Name ^a	Top BLASTx hit Accession	Top BLAST hit Description	E-value
<i>A. aqu_AcSp_C</i>	gi 587655300 gb AHK09813.1	Aciniform spidroin 1 [<i>Argiope argentata</i>]	5E-04
<i>A. aqu_PySp_C</i>	gi 257124471 gb ACV41934.1	Pyriform spidroin [<i>Latrodectus hesperus</i>]	9E-05
<i>A. aqu_TuSp_C</i>	tr A6YP77 A6YP77_9ARAC	Fibroin 1 [<i>Hypochilus thorelli</i>]	1E-10
<i>A. aqu_AcSp_N_vA</i>	gi 587655228 gb AHK09777.1	Aciniform spidroin 1 N-terminal region variant 2, partial [<i>Argiope trifasciata</i>]	1E-45
<i>A. aqu_AcSp_N_vB</i>	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	1E-49
<i>A. aqu_AmSp_N</i>	gi 193506893 gb ACF19412.1	Tubuliform spidroin 1, partial [<i>Agelenopsis aperta</i>]	9E-25
<i>A. aqu_PySp_N</i>	gi 675382271 KFM75168.1	Hypothetical protein X975_11824, partial [<i>Stegodyphus mimosarum</i>]	2E-18
<i>A. aqu_Sp_N</i>	gi 675382271 KFM70693.1	Hypothetical protein X975_03452, partial [<i>Stegodyphus mimosarum</i>]	9E-16
<i>A. aqu_TuSp_N</i>	gi 303307781 gb ADM14330.1	Egg case silk protein 1 [<i>Argiope bruennichi</i>]	5E-32
<i>B. lon_AcSp_C_vA</i>	gi 422900764 gb AFX83559.1	Aciniform spidroin 1, partial [<i>Latrodectus hesperus</i>]	6E-31
<i>B. lon_AcSp_C_vB</i>	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	2E-20
<i>B. lon_AmSp_C_vA</i>	gi 38197757 gb AAR13813.1	Major ampullate spidroin-2, partial [<i>Argiope amoena</i>]	8E-10
<i>B. lon_AmSp_C_vB</i>	gi 55274114 gb AAV48937.1	Dragline silk spidroin 1, partial [<i>Psecchus sinensis</i>]	0.081
<i>B. lon_AmSp_C_vC</i>	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	2E-20
<i>B. lon_AmSp_C_vD</i>	gi 38197749 gb AAR13809.1	Major ampullate spidroin-2, partial [<i>Argiope amoena</i>]	0.076
<i>B. lon_AmSp_C_vE</i>	gi 55274104 gb AAV48932.1	Dragline silk spidroin 1, partial [<i>Cyrtophora moluccensis</i>]	5E-05
<i>B. lon_AmSp_C_vF</i>	gi 55274094 gb AAV48927.1	Dragline silk spidroin 1, partial [<i>Nephila pilipes</i>]	3E-07
<i>B. lon_CrSp_C</i>	gi 392997864 gb AFM97615.1	Fibroin 1, partial [<i>Hypochilus thorelli</i>]	0.019
<i>B. lon_PySp_C</i>	gi 675382271 KFM75168.1	Hypothetical protein X975_11824, partial [<i>Stegodyphus mimosarum</i>]	6E-07
<i>B. lon_TuSp_C</i>	gi 303307770 gb ADM14323.1	Tubuliform spidroin 1, partial [<i>Agelenopsis aperta</i>]	7E-04
<i>B. lon_AcSp_N_vA</i>	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	1E-42
<i>B. lon_AcSp_N_vB</i>	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	2E-41
<i>B. lon_AmSp_N_vA</i>	gi 115635734 emb CAJ90517.1	Major ampullate spidroin 1 precursor, partial [<i>Euprosthenops australis</i>]	3E-30
<i>B. lon_AmSp_N_vB</i>	gi 87133239 gb ABD24294.1	Major ampullate spidroin 1, partial [<i>Latrodectus hesperus</i>]	8E-14
<i>B. lon_AmSp_N_vC</i>	gi 115635734 emb CAJ90517.1	Major ampullate spidroin 1 precursor, partial [<i>Euprosthenops australis</i>]	5E-15
<i>B. lon_AmSp_N_vD</i>	gi 193506893 gb ACF19412.1	Major ampullate spidroin 1B precursor, partial [<i>Nephila clavipes</i>]	9E-27
<i>B. lon_AmSp_N_vE</i>	gi 115635734 emb CAJ90517.1	Major ampullate spidroin 1 precursor, partial [<i>Euprosthenops australis</i>]	1E-26
<i>B. lon_AmSp_N_vF</i>	gi 193506893 gb ACF19412.1	Major ampullate spidroin 1B precursor, partial [<i>Nephila clavipes</i>]	6E-31
<i>B. lon_AmSp_N_vG</i>	gi 193506893 gb ACF19412.1	Major ampullate spidroin 1B precursor, partial [<i>Nephila clavipes</i>]	2E-49
<i>B. lon_Sp_N_vA</i>	gi 587655204 gb AHK09765.1	Aciniform spidroin 1 N-terminal region variant 3, partial [<i>Argiope argentata</i>]	8E-15
<i>B. lon_PySp_N</i>	gi 675382271 gb KFM75168.1	Hypothetical protein X975_11824 [<i>Stegodyphus mimosarum</i>]	8E-22
<i>B. lon_Sp_N_vC</i>	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	2e-23
<i>B. lon_Sp_N_vB</i>	gi 303307752 gb ADM14314.1	Major ampullate spidroin 1, partial [<i>Kukulcania hibernalis</i>]	2e-10
<i>B. lon_Sp_N_vD</i>	gi 303307750 gb ADM14313.1	Fibroin 1, partial [<i>Bothriocyrtum californicum</i>]	2e-11
<i>B. lon_TuSp_N</i>	gi 303307781 gb ADM14330.1	Tubuliform spidroin 1, partial [<i>Agelenopsis aperta</i>]	1E-16
<i>D. mar_AcSp_C</i>	gi 587655300 gb AHK09813.1	Aciniform spidroin 1 [<i>Argiope argentata</i>]	2E-08
<i>D. mar_AmSp_C_vA</i>	gi 32815671 gb AAP88232.1	Major ampullate spidroin-1, partial [<i>Argiope amoena</i>]	9E-12
<i>D. mar_AmSp_C_vB</i>	gi 32815671 gb AAP88232.1	Major ampullate spidroin-1, partial [<i>Argiope amoena</i>]	2E-14

<i>D. mar_PySp_C</i>	gi 675382271 gb KFM75168.1	Hypothetical protein X975_11824 [<i>Stegodyphus mimosarum</i>]	1E-50
<i>D. mar_TuSp_C</i>	gi 303307770 gb ADM14323.1	Tubuliform spidroin 1, partial [<i>Agelenopsis aperta</i>]	7E-17
<i>D. mar_Sp_C</i>	gi 1263285 gb AAC47009.1	Fibroin-2, partial [<i>Araneus diadematus</i>]	3E-20
<i>D. mar_AcSp_N</i>	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	2E-47
<i>D. mar_AmSp_N_vA</i>	gi 193506891 gb ACF19411.1	Major ampullate spidroin 1A precursor, partial [<i>Nephila clavipes</i>]	2E-35
<i>D. mar_AmSp_N_vB</i>	gi 303307772 gb ADM14324.1	Major ampullate spidroin, partial [<i>Agelenopsis aperta</i>]	1E-21
<i>D. mar_PySp_N</i>	gi 675382271 gb KFM75168.1	Hypothetical protein X975_11824 [<i>Stegodyphus mimosarum</i>]	4E-19
<i>D. mar_Sp_N</i>	gi 164709230 gb ABY67420.1	Major ampullate spidroin 1 locus 3, partial [<i>Latrodectus geometricus</i>]	1E-04
<i>D. mar_TuSp_N</i>	gi 303307781 gb ADM14330.1	Tubuliform spidroin 1, partial [<i>Agelenopsis aperta</i>]	2E-17

^a N or C in spidroin names indicate whether a contig contains the N- or C- terminal region coding sequence. Variant name (e.g. _vA) does not indicate association of N- term transcripts with C-terminal transcripts.

Table S2. Proteins identified in *Argyroneta aquatica* diving bell.

Identified Protein	Top BLAST Hit Accession	Top BLAST Hit Description	E-value
<i>A. aqu</i> _AcSp_N_vA	gi 193506893 gb ACF19412.1	Tubuliform spidroin 1, partial [<i>Agelenopsis aperta</i>]	9.0E-25
<i>A. aqu</i> _PySp_C	gi 257124471 gb ACV41934.1	Pyriform spidroin [<i>Latrodectus hesperus</i>]	9.0E-05
<i>A. aqu</i> _Sp_N	gi 422900780 gb AFX83566.1	Aciniform spidroin 1, partial [<i>Latrodectus geometricus</i>]	2.0e-23
DN13205_c0_g1_i1-1	gi 33667938 gb AAQ24546.1	Blo t 9 allergen [<i>Blomia tropicalis</i>]	2.0E-09
253304_1	gi 40548521 gb AAR87381.1	Tropomyosin [<i>Neoscona nautica</i>]	2.0E-149
50840_1	gi 318087320 gb ADV40252.1	Hypothetical protein, partial [<i>Latrodectus hesperus</i>]	8.0E-07
DN141454_c0_g2_i1-1	gi 506965343 gb AGM32062.1	Hypothetical protein [<i>Coptotermes formosanus</i>]	6.4E-02
242175_1	gi 523712986 gb AGQ56699.1	Vitellogenin 2 [<i>Neoseiulus cucumeris</i>]	2.0E-14
DN139557_c0_g2_i1-1	gi 1009581138 ref XP_015921887.1	Apolipophorins-like [<i>Parasteatoda tepidariorum</i>]	5.0E-37
31706_7562	gi 2073373 dbj BAA19844.1	Alpha-2-macroglobulin [<i>Limulus sp.</i>]	0.0E+00
318196_1	gi 344178917 dbj BAK64111.1	Alpha-2 macroglobulin [<i>Hasarius adansoni</i>]	2.0E-49
332195_1	gi 671759229 gb AII98023.1	BLTX669 [<i>Nephila pilipes</i>]	6.0E-10
DN138176_c0_g2_i2-1	gi 332027696 gb EGI67764.1	Tubulin alpha-1 chain [<i>Acromyrmex echinator</i>]	0.0E+00
DN126632_c0_g5_i1-1	gi 405952567 gb EKC20363.1	Hypothetical protein CGI_10006238 [<i>Crassostrea gigas</i>]	1.0E-35
370852_1	gi 556102150 gb ESO90802.1	Hypothetical protein LOTGIDRAFT_233588 [<i>Lottia gigantea</i>]	3.0E-05
26982_11	gi 431921509 gb ELK18875.1	Heat shock cognate 71 protein [<i>Pteropus alecto</i>]	4.4E+00
DN76940_c0_g1_i1-1	gi 492904312 ref WP_006034718.1	Elongation factor Tu [<i>Rickettsiella grylli</i>]	2.0E-94
DN75073_c0_g1_i1-1	gi 492904817 ref WP_006035223.1	Thioredoxin [<i>Rickettsiella grylli</i>]	7.0E-52
DN104795_c0_g1_i1-1	gi 499265039 ref WP_010962432.1	MULTISPECIES: ATP synthase subunit beta [<i>Wolbachia</i>]	0.0E+00
21585_7	gi 170063054 ref XP_001866937.1	Scavenger receptor cysteine-rich protein [<i>Culex quinquefasciatus</i>]	5.0E-67
265412_1	gi 241575657 ref XP_002403224.1	Trichohyalin, putative [<i>Ixodes scapularis</i>]	9.0E-106
345535_1	gi 241744740 ref XP_002405466.1	Alkyl hydroperoxide reductase, thiol specific antioxidant, putative [<i>Ixodes scapularis</i>]	5.0E-112
DN131058_c3_g1_i1-1	gi 241999408 ref XP_002434347.1	Glyceraldehyde 3-phosphate dehydrogenase, putative [<i>Ixodes scapularis</i>]	0.0E+00
DN143327_c0_g2_i1-1	gi 291225136 ref XP_002732558.1	Probable serine/threonine-protein kinase kinX [<i>Saccoglossus kowalevskii</i>]	1.0E-03
DN120520_c0_g2_i1-1	gi 291241282 ref XP_002740542.1	Apolipoprotein D-like [<i>Saccoglossus kowalevskii</i>]	1.0E-45
322416_3	gi 302783030 ref XP_002973288.1	Hypothetical protein SELMODRAFT_232026 [<i>Selaginella moellendorffii</i>]	1.0E-20
31706_6984	gi 339261586 ref XP_003367832.1	Putative trypsin Inhibitor like cysteine rich domain protein, partial [<i>Trichinella spiralis</i>]	1.0E-03

281967_1	gi 391326419 ref XP_003737714.1 	PREDICTED: glutamate dehydrogenase, mitochondrial [<i>Galendromus occidentalis</i>]	0.0E+00
DN32275_c0_g2_i1-1	gi 391341738 ref XP_003745184.1 	PREDICTED: synaptotagmin-15-like [<i>Metaseiulus occidentalis</i>]	1.0E-45
358067_1	gi 391342852 ref XP_003745729.1 	PREDICTED: glucose dehydrogenase [FAD, quinone] [<i>Galendromus occidentalis</i>]	4.0E-143
31706_8269	gi 391342852 ref XP_003745729.1 	PREDICTED: glucose dehydrogenase [FAD, quinone] [<i>Galendromus occidentalis</i>]	3.0E-145
282009_1	gi 391342852 ref XP_003745729.1 	PREDICTED: glucose dehydrogenase [FAD, quinone] [<i>Galendromus occidentalis</i>]	7.0E-138
DN137736_c0_g1_i1-1	gi 499048261 ref XP_004574680.1 	Polyserase-2-like [<i>Maylandia zebra</i>]	1.0E-30
280834_1	gi 556948298 ref XP_005987015.1 	PREDICTED: low choriolytic enzyme-like isoform X2 [<i>Latimeria chalumnae</i>]	1.0E-39
DN143934_c0_g2_i2-1	gi 594066187 ref XP_006057071.1 	PREDICTED: apolipoprotein L3-like [<i>Bubalus bubalis</i>]	4.0E-03
DN133244_c0_g1_i2-1	gi 573910962 ref XP_006643199.1 	PREDICTED: transmembrane protease serine 9-like [<i>Lepisosteus oculatus</i>]	1.0E-43
31706_1002	--	--	--
DN119698_c1_g1_i1-1	--	--	--
DN134830_c112_g2_i2-1	--	--	--
DN197674_c0_g1_i1-1	--	--	--
DN21975_c0_g1_i1-1	--	--	--
44288_1	--	--	--
DN152011_c3_g1_i1-1	--	--	--
DN152897_c7_g1_i1-1	--	--	--
365077_1	--	--	--
DN150297_c1_g5_i1-1	--	--	--
DN17735_c0_g1_i1-1	--	--	--
DN129222_c0_g1_i1-1	--	--	--

Table S3. Summary of *de novo* transcriptome assemblies.

	<i>Argyroneta aquatica</i>	<i>Badumna longinqua</i>	<i>Desis marina</i>
No. Raw Paired Reads	57,211,947	12,104,773	112,108,725
No. Cleaned Paired Reads	52,277,995	7,805,324	99,597,666
No. Contigs	343,077	49,520	402,833
Total Length (bp)	209,100,116	21,859,077	263,857,902
N50 (bp)	805	471	892
BUSCO	91	66	97.5

Table S4. Sequences used in Blastx searches to identify spider silk sequences

Protein Name	Accession ID	Description	Organism
Aciniform Spidroin	GGRN01042810.1	D.tri_AcSp_C_vA	<i>Dolomedes triton</i>
Aciniform Spidroin	GGRN01034313.1	D.tri_AcSp_C_vB_contig	<i>Dolomedes triton</i>
Aciniform Spidroin	GGRN01039088.1	D.tri_AcSp_N_vA_contig	<i>Dolomedes triton</i>
Aciniform Spidroin	GGRN01024633.1	D.tri_AcSp_N_vB_contig	<i>Dolomedes triton</i>
Aciniform Spidroin	GGOF01004031.1	T.per_AcSp_C_contig	<i>Tengella perfuga</i>
Aciniform Spidroin	GGOF01043170.1	T.per_AcSp_N_contig	<i>Tengella perfuga</i>
Aciniform Spidroin 1	ADM35668.1	aciniform spidroin 1 [Araneus ventricosus]	<i>Araneus ventricosus</i>
Aciniform Spidroin 1	ADM35669.1	aciniform spidroin 1 [Argiope amoena]	<i>Argiope amoena</i>
Aciniform Spidroin 1	AAR83925.1	aciniform spidroin 1 [Argiope trifasciata]	<i>Argiope trifasciata</i>
Aciniform Spidroin 1	AFX83557.1	aciniform spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	AFX83566.1	aciniform spidroin 1, partial [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Aciniform Spidroin 1	AFX83567.1	aciniform spidroin 1, partial [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Aciniform Spidroin 1	AFX83568.1	aciniform spidroin 1, partial [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Aciniform Spidroin 1	AFX83558.1	aciniform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	AFX83559.1	aciniform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	AFX83560.1	aciniform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	AFX83561.1	aciniform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	AFX83562.1	aciniform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	AFX83563.1	aciniform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	AFX83565.1	aciniform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin 1	ADG57593.1	aciniform-like protein [Parawixia bistriata]	<i>Parawixia bistriata</i>
Aciniform Spidroin 1	ABD61598.1	AcSp1 [Uloborus diversus]	<i>Uloborus diversus</i>
Aciniform Spidroin 1 -Like	ABW24499.1	aciniform spidroin 1-like, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aciniform Spidroin -Putative	AZAQ0111412.1	S.m. AcSp-putative	<i>Stegodyphus mimosarum</i>
Aggregate Gland Silk Factor 1	AFP57565.1	aggregate gland silk factor 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aggregate Gland Silk Factor 2	AFP57562.1	aggregate gland silk factor 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aggregate Gland Silk Factor 2-Like	AFP57559.1	aggregate spider glue 2-like protein, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aggregate Spidroin-1	AMK48679.1	aggregate spidroin 1, partial [Steatoda grossa]	<i>Steatoda grossa</i>
Aggregate Spidroin-1	AMK48678.1	aggregate spidroin 1, partial [Parasteatoda tepidariorum]	<i>Parasteatoda tepidariorum</i>
Aggregate Spidroin-1	AMK48675.1	aggregate spidroin 1, partial [Argiope argentata]	<i>Argiope argentata</i>
Aggregate Spidroin-1	AMK48674.1	aggregate spidroin 1, partial [Araneus diadematus]	<i>Araneus diadematus</i>

Aggregate Spidroin-1	AMK48677.1	aggregate spidroin 1, partial [Nephila clavipes]	<i>Nephila clavipes</i>
Aggregate Spidroin-1	AMK48676.1	aggregate spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Ampullate Spidroin	GGOF01047967.1	Tpercomp47195 c1-1 Amp N vA	<i>Tengella perfuga</i>
Ampullate Spidroin	GGOF01046653.1	Tpercomp55599 c0-1 Amp N vB	<i>Tengella perfuga</i>
Ampullate Spidroin	GGOF01039047.1	Tpercomp55839 c1-1 Amp N vC	<i>Tengella perfuga</i>
Ampullate Spidroin	GGOF01123749.1	T.per Amp C vA contig	<i>Tengella perfuga</i>
Ampullate Spidroin	GGOF01084018.1	T.per Amp C vB contig	<i>Tengella perfuga</i>
Ampullate Spidroin	GGOF01083989.1	T.per Amp C vC contig	<i>Tengella perfuga</i>
Ampullate Spidroin	GGRN01028718.1	D.tri Amp C vA contig	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01042502.1	D.tri Amp vB contig	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01017618.1	12534_1_Amp_C_vC	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01023437.1	3010_1_Amp_C_vD	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01022108.1	D.tri Amp N vA contig	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01004068.1	DolMalecomp6778 c4-1 Amp N vB	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01039044.1	196_1_Amp_N_vC	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01040476.1	8251_1_Amp_N_vD	<i>Dolomedes triton</i>
Ampullate Spidroin	GGRN01013787.1	DolFecom3105 c0-1 Amp N vE	<i>Dolomedes triton</i>
Aqueous Glue Droplet Peptide-1	ABO09798.1	aqueous glue droplet peptide [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Aqueous Glue Droplet Peptide-2	ABO09799.1	aqueous glue droplet peptide [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Cribellar Spidroin	GGOF01121319.1	T.per CrSp C contig	<i>Tengella perfuga</i>
Dragline Silk Fibroin 1	P46802.1	Dragline silk fibroin 1 [Araneus bicentenarius]	<i>Araneus bicentenarius</i>
Dragline Silk Fibroin 1	AAV48932.1	dragline silk spidroin 1 [Cyrtophora moluccensis]	<i>Cyrtophora moluccensis</i>
Dragline Silk Fibroin 1	AAV48934.1	dragline silk spidroin 1 [Cyrtophora moluccensis]	<i>Cyrtophora moluccensis</i>
Dragline Silk Fibroin 1	AAV48935.1	dragline silk spidroin 1 [Cyrtophora moluccensis]	<i>Cyrtophora moluccensis</i>
Dragline Silk Fibroin 1	AAV48951.1	dragline silk spidroin 1 [Cyrtophora moluccensis]	<i>Cyrtophora moluccensis</i>
Dragline Silk Fibroin 1	AAV48940.1	dragline silk spidroin 1 [Macrothele holsti]	<i>Macrothele holsti</i>
Dragline Silk Fibroin 1	AAV48920.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48921.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48922.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48925.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48926.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48927.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48928.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48941.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48942.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>

Dragline Silk Fibroin 1	AAV48943.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48944.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48945.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48947.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48948.1	dragline silk spidroin 1 [Nephila pilipes]	<i>Nephila pilipes</i>
Dragline Silk Fibroin 1	AAV48929.1	dragline silk spidroin 1 [Octonoba varians]	<i>Octonoba varians</i>
Dragline Silk Fibroin 1	AAV48938.1	dragline silk spidroin 1 [Psechrus sinensis]	<i>Psechrus sinensis</i>
Dragline Silk Fibroin 1	AAV48939.1	dragline silk spidroin 1, partial [Psechrus sinensis]	<i>Psechrus sinensis</i>
Dragline Silk Fibroin 1	P19837.3	RecName: Full=Spidroin-1; AltName: Full=Dragline silk fibroin 1, partial [Nephila clavipes]	<i>Nephila clavipes</i>
Dragline Silk Fibroin 2	P46804.1	RecName: Full=Spidroin-2; AltName: Full=Dragline silk fibroin 2, partial [Nephila clavipes]	<i>Nephila clavipes</i>
Dragline Silk Protein	AAL32375.1	dragline silk protein [Nephila clavipes]	<i>Nephila clavipes</i>
Dragline Silk Protein Spidroin 1	AAC04504.1	dragline silk protein spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Dragline Silk Protein Spidroin 2	AAL32472.1	dragline silk protein spidroin 2 [Nephila clavata]	<i>Nephila clavata</i>
Egg Case Fibroin	AAZ15706.1	egg case fibroin [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Egg Case Fibroin	ADV40181.1	egg case fibroin [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Egg Case Fibroin-Like Protein 1	AFM97608.1	egg case protein-like protein 1 [Liphistius malayanus]	<i>Liphistius malayanus</i>
Egg Case Fibroin-Like Protein 2	AFM97609.1	egg case protein-like protein 2 [Liphistius malayanus]	<i>Liphistius malayanus</i>
Egg Case Fibroin-Like Protein 3	AFM97610.1	egg case protein-like protein 3 [Liphistius malayanus]	<i>Liphistius malayanus</i>
Egg Case Fibroin-Like Protein 4	AFM97611.1	egg case protein-like protein 4 [Liphistius malayanus]	<i>Liphistius malayanus</i>
Egg Case Fibroin-Like Protein 5	AFM97612.1	egg case protein-like protein 5, partial [Liphistius malayanus]	<i>Liphistius malayanus</i>
Egg Case Fibroin-Like Protein 6	AFM97613.1	egg case protein-like protein 6 [Liphistius malayanus]	<i>Liphistius malayanus</i>
Egg Case Silk Protein 1	BAE86855.1	egg case silk protein 1 [Argiope bruennichi]	<i>Argiope bruennichi</i>
Egg Case Silk Protein 1	AAX92677.1	egg case silk protein-1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Egg Case Silk Protein 2	BAE86856.1	egg case silk protein 2 [Argiope bruennichi]	<i>Argiope bruennichi</i>
Egg Case Silk Protein 2	ABC68105.1	egg case silk protein 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Fibroin 1	ABW80563.1	fibroin 1 [Aptostichus sp. AS217]	<i>Aptostichus sp. AS217</i>
Fibroin 1	ABW80565.1	fibroin 1 [Bothriocyrtum californicum]	<i>Bothriocyrtum californicum</i>
Fibroin 1	ADM14313.1	fibroin 1 [Bothriocyrtum californicum]	<i>Bothriocyrtum californicum</i>
Fibroin 1	AAK30598.1	fibroin 1 [Dolomedes tenebrosus]	<i>Dolomedes tenebrosus</i>
Fibroin 1	AAK30600.1	fibroin 1 [Euagrus chisoseus]	<i>Euagrus chisoseus</i>
Fibroin 1	ABW80568.1	fibroin 1 [Euagrus chisoseus]	<i>Euagrus chisoseus</i>
Fibroin 1	AAK30610.1	fibroin 1 [Plectreuryx tristis]	<i>Plectreuryx tristis</i>
Fibroin 1	ABW80562.1	fibroin 1, partial [Aliatypus gulosus]	<i>Aliatypus gulosus</i>
Fibroin 1	AFM97617.1	fibroin 1, partial [Aphonopelma seemanni]	<i>Aphonopelma seemanni</i>

Fibroin 1	AFM97622.1	fibroin 1, partial [Atypoides riversi]	<i>Atypoides riversi</i>
Fibroin 1	AFM97625.1	fibroin 1, partial [Hexura picea]	<i>Hexura picea</i>
Fibroin 1	AFM97615.1	fibroin 1, partial [Hypochilus thorelli]	<i>Hypochilus thorelli</i>
Fibroin 1	AFM97627.1	fibroin 1, partial [Megahexura fulva]	<i>Megahexura fulva</i>
Fibroin 1	AFM97620.1	fibroin 1, partial [Poecilotheria regalis]	<i>Poecilotheria regalis</i>
Fibroin 1	AIU80193.1	fibroin 1, partial [Scytodes thoracica]	<i>Scytodes thoracica</i>
Fibroin 1a	ABD61591.1	fibroin 1a [Deinopis spinosa]	<i>Deinopis spinosa</i>
Fibroin 1b	ABD61592.1	fibroin 1b [Deinopis spinosa]	<i>Deinopis spinosa</i>
Fibroin 2	ABW80564.1	fibroin 2 [Aptostichus sp. AS220]	<i>Aptostichus sp. AS220</i>
Fibroin 2	ABD61588.1	fibroin 2 [Deinopis spinosa]	<i>Deinopis spinosa</i>
Fibroin 2	AAK30599.1	fibroin 2 [Dolomedes tenebrosus]	<i>Dolomedes tenebrosus</i>
Fibroin 2	AAK30611.1	fibroin 2 [Plectreurys tristis]	<i>Plectreurys tristis</i>
Fibroin 2	AFM97618.1	fibroin 2, partial [Aphonopelma seemanni]	<i>Aphonopelma seemanni</i>
Fibroin 2	AFM97623.1	fibroin 2, partial [Atypoides riversi]	<i>Atypoides riversi</i>
Fibroin 2	AFM97616.1	fibroin 2, partial [Hypochilus thorelli]	<i>Hypochilus thorelli</i>
Fibroin 2	AFM97621.1	fibroin 2, partial [Poecilotheria regalis]	<i>Poecilotheria regalis</i>
Fibroin 2	AIU80194.1	fibroin 2, partial [Scytodes thoracica]	<i>Scytodes thoracica</i>
Fibroin 3	AFM97619.1	fibroin 3, partial [Aphonopelma seemanni]	<i>Aphonopelma seemanni</i>
Fibroin 4	AAK30613.1	fibroin 4 [Plectreurys tristis]	<i>Plectreurys tristis</i>
Fibroin-1	AAC47008.1	fibroin-1, partial [Araneus diadematus]	<i>Araneus diadematus</i>
Fibroin-2	AAC47009.1	fibroin-2, partial [Araneus diadematus]	<i>Araneus diadematus</i>
Fibroin-3	AAC47010.1	fibroin-3, partial [Araneus diadematus]	<i>Araneus diadematus</i>
Fibroin-4	AAC47011.1	fibroin-4, partial [Araneus diadematus]	<i>Araneus diadematus</i>
Flagelliform Silk Protein	ABD61590.1	Flag [Deinopis spinosa]	<i>Deinopis spinosa</i>
Flagelliform Silk Protein	AAK30594.1	flagelliform silk protein [Argiope trifasciata]	<i>Argiope trifasciata</i>
Flagelliform Silk Protein	AAC38847.1	flagelliform silk protein [Nephila clavipes]	<i>Nephila clavipes</i>
Flagelliform Silk Protein	AAF36092.1	flagelliform silk protein, partial [Nephila inaurata madagascariensis]	<i>Nephila inaurata madagascariensis</i>
Flagelliform Silk Protein-1	AAT36347.1	flagelliform silk protein-1 [Araneus ventricosus]	<i>Araneus ventricosus</i>
Flagelliform Silk Protein-Like	ABR37273.1	flagelliform spidroin-like protein, partial [Nephilengys cruentata]	<i>Nephilengys cruentata</i>
Major Ampullate Gland Dragline Silk Protein 2	AAN85281.1	major ampullate gland dragline silk protein-2 [Araneus ventricosus]	<i>Araneus ventricosus</i>
Major Ampullate Silk Protein-Putative-a	AZAQ01054438.1	S.m.MaSp-putative-a	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-b	AZAQ01171519.1	S.m.MaSp-putative-b	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-c	AZAQ01121857.1	S.m.MaSp-putative-c	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-d	AZAQ01026555.1	S.m.MaSp-putative-d	<i>Stegodyphus mimosarum</i>

Major Ampullate Silk Protein-Putative-e	AZAQ01086913.1	S.m.MaSp-putative-e	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-f	AZAQ01026550.1	S.m.MaSp-putative-f	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-g	AZAQ01005949.1	S.m.MaSp-putative-g	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-h	AZAQ01026555.1	S.m.MaSp-putative-h	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-i	AZAQ01107911.1	S.m.MaSp-putative-i	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-j	AZAQ01107913.1	S.m.MaSp-putative-j	<i>Stegodyphus mimosarum</i>
Major Ampullate Silk Protein-Putative-k	AZAQ01108596.1	S.m.MaSp-putative-k	<i>Stegodyphus mimosarum</i>
Major Ampullate Spidroin	AAT08436.1	major ampullate spidroin [Agelenopsis aperta]	<i>Agelenopsis aperta</i>
Major Ampullate Spidroin	ADM14324.1	major ampullate spidroin [Agelenopsis aperta]	<i>Agelenopsis aperta</i>
Major Ampullate Spidroin	ADM14325.1	major ampullate spidroin [Agelenopsis aperta]	<i>Agelenopsis aperta</i>
Major Ampullate Spidroin	ADM14315.1	major ampullate spidroin [Diguettia canities]	<i>Diguettia canities</i>
Major Ampullate Spidroin	ADM14316.1	major ampullate spidroin [Diguettia canities]	<i>Diguettia canities</i>
Major Ampullate Spidroin 1	ADO78764.1	major ampullate spidroin 1, partial [Latrodectus mactans]	<i>Latrodectus mactans</i>
Major Ampullate Spidroin 1	ABR68856.1	major ampullate spidroin 1 [Latrodectus hesperus].	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1	ABR68857.1	major ampullate spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1	ABC72644.1	major ampullate fibroin 1 [Nephila antipodiana]	<i>Nephila antipodiana</i>
Major Ampullate Spidroin 1	AFN54362.1	major ampullate silk protein 1, partial [Argiope bruennichi]	<i>Argiope bruennichi</i>
Major Ampullate Spidroin 1	AAK30591.1	major ampullate spidroin 1 [Argiope aurantia]	<i>Argiope aurantia</i>
Major Ampullate Spidroin 1	CAJ00428.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32251.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32252.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32253.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32254.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32255.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32256.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32257.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32258.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32259.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32260.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32261.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32262.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32263.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32264.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32265.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>

Major Ampullate Spidroin 1	CAM32267.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32268.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32269.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32270.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	CAM32271.1	major ampullate spidroin 1 [Euprostenops australis]	<i>Euprostenops australis</i>
Major Ampullate Spidroin 1	AAT08433.1	major ampullate spidroin 1 [Kukulcania hibernalis]	<i>Kukulcania hibernalis</i>
Major Ampullate Spidroin 1	ADM14314.1	major ampullate spidroin 1 [Kukulcania hibernalis]	<i>Kukulcania hibernalis</i>
Major Ampullate Spidroin 1	AAY28935.1	major ampullate spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1	ABD66602.1	major ampullate spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1	ABR68856.1	major ampullate spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1	ABR68857.1	major ampullate spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1	AAT75308.1	major ampullate spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1	AAT75309.1	major ampullate spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1	AAT75310.1	major ampullate spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1	AAT75311.1	major ampullate spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1	AAT75312.1	major ampullate spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1	ACC77633.1	major ampullate spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1	AAK30606.1	major ampullate spidroin 1 [Nephila inaurata madagascariensis]	<i>Nephila inaurata madagascariensis</i>
Major Ampullate Spidroin 1	AAK30608.1	major ampullate spidroin 1 [Nephila senegalensis]	<i>Nephila senegalensis</i>
Major Ampullate Spidroin 1	AAK30614.1	major ampullate spidroin 1 [Tetragnatha kauaiensis]	<i>Tetragnatha kauaiensis</i>
Major Ampullate Spidroin 1	AAK30615.1	major ampullate spidroin 1 [Tetragnatha versicolor]	<i>Tetragnatha versicolor</i>
Major Ampullate Spidroin 1	AEV46833.2	major ampullate spidroin 1 silk protein, partial [Araneus ventricosus]	<i>Araneus ventricosus</i>
Major Ampullate Spidroin 1	AAP88232.1	major ampullate spidroin-1 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 1	ABD61596.1	MaSp1 [Uloborus diversus]	<i>Uloborus diversus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67402.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67403.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67412.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67413.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67414.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67415.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67418.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>

Major Ampullate Spidroin 1, Locus 1	ABY67421.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 1	ABY67423.1	major ampullate spidroin 1 locus 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 2	ABY67406.1	major ampullate spidroin 1 locus 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 2	ABY67407.1	major ampullate spidroin 1 locus 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 2	ABY67410.1	major ampullate spidroin 1 locus 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 2	ABY67411.1	major ampullate spidroin 1 locus 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 2	ABY67422.1	major ampullate spidroin 1 locus 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 2	ABY67424.1	major ampullate spidroin 1 locus 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 2	ABY67425.1	major ampullate spidroin 1 locus 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 3	ABY67420.1	major ampullate spidroin 1 locus 3 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 1, Locus 3	ABY67400.1	major ampullate spidroin 1 locus 3 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 3	ABY67401.1	major ampullate spidroin 1 locus 3 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 3	ABY67404.1	major ampullate spidroin 1 locus 3 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 3	ABY67405.1	major ampullate spidroin 1 locus 3 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Locus 3	ABY67419.1	major ampullate spidroin 1 locus 3 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1, Precursor	CAJ90517.1	major ampullate spidroin 1 precursor [Euprosthenops australis]	<i>Euprosthenops australis</i>
Major Ampullate Spidroin 1, Variant 1, Locus 1	ABY67426.1	major ampullate spidroin 1 variant 1 locus 1 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 1, Variant 1, Locus 2	ABY67428.1	major ampullate spidroin 1 variant 1 locus 2 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 1, Variant 2, Locus 1	ABY67427.1	major ampullate spidroin 1 variant 2 locus 1 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 1, Variant 2, Locus 2	ABY67429.1	major ampullate spidroin 1 variant 2 locus 2, [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 1A, Precursor	ACF19411.1	major ampullate spidroin 1A precursor [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1B, Precursor	ACF19412.1	major ampullate spidroin 1B precursor [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 1-Like	AAZ15320.1	major ampullate spidroin 1-like, partial [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 1-Like	AAZ15321.1	major ampullate spidroin 1-like, partial [Latrodectus geometricus]	<i>Latrodectus geometricus</i>

Major Ampullate Spidroin 1-Like	AAK30595.1	major ampullate spidroin 1, partial [Argiope trifasciata]	<i>Argiope trifasciata</i>
Major Ampullate Spidroin 1-Like	AAK30602.1	major ampullate spidroin 1, partial [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 1-Like	ABD24294.1	major ampullate spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 1-Like	ADE74592.1	major ampullate spidroin 1, partial [Peucetia viridans]	<i>Peucetia viridans</i>
Major Ampullate Spidroin 1-Like	ADG57596.1	MaSp1-like protein [Parawixia bistriata]	<i>Parawixia bistriata</i>
Major Ampullate Spidroin 2	AFN54363.1	major ampullate silk protein 2 [Argiope bruennichi]	<i>Argiope bruennichi</i>
Major Ampullate Spidroin 2	AAK30592.1	major ampullate spidroin 2 [Argiope aurantia]	<i>Argiope aurantia</i>
Major Ampullate Spidroin 2	AAK30596.1	major ampullate spidroin 2 [Argiope trifasciata]	<i>Argiope trifasciata</i>
Major Ampullate Spidroin 2	ADM14319.1	major ampullate spidroin 2 [Deinopis spinosa]	<i>Deinopis spinosa</i>
Major Ampullate Spidroin 2	CAM32249.1	major ampullate spidroin 2 [Euprosthenops australis]	<i>Euprosthenops australis</i>
Major Ampullate Spidroin 2	CAM32272.1	major ampullate spidroin 2 [Euprosthenops australis]	<i>Euprosthenops australis</i>
Major Ampullate Spidroin 2	AAK30601.1	major ampullate spidroin 2 [Gasteracantha cancriformis]	<i>Gasteracantha cancriformis</i>
Major Ampullate Spidroin 2	AAK30603.1	major ampullate spidroin 2 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 2	AAK30604.1	major ampullate spidroin 2 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 2	ABY67417.1	major ampullate spidroin 2 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin 2	AAY28936.1	major ampullate spidroin 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	ABD66603.1	major ampullate spidroin 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	ABR68855.1	major ampullate spidroin 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	ABR68858.1	major ampullate spidroin 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	ABY67408.1	major ampullate spidroin 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	ABY67409.1	major ampullate spidroin 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	ABY67416.1	major ampullate spidroin 2 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	AAT75313.1	major ampullate spidroin 2 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 2	AAT75314.1	major ampullate spidroin 2 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 2	AAT75315.1	major ampullate spidroin 2 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 2	AAT75316.1	major ampullate spidroin 2 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 2	AAT75317.1	major ampullate spidroin 2 [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 2	AAK30607.1	major ampullate spidroin 2 [Nephila inaurata madagascariensis]	<i>Nephila inaurata madagascariensis</i>
Major Ampullate Spidroin 2	AAK30609.1	major ampullate spidroin 2 [Nephila senegalensis]	<i>Nephila senegalensis</i>
Major Ampullate Spidroin 2	ACF19413.1	major ampullate spidroin 2 precursor [Nephila clavipes]	<i>Nephila clavipes</i>
Major Ampullate Spidroin 2	AAZ15371.1	major ampullate spidroin 2, partial [Argiope trifasciata]	<i>Argiope trifasciata</i>

Major Ampullate Spidroin 2	AAZ15372.1	major ampullate spidroin 2, partial [Argiope trifasciata]	<i>Argiope trifasciata</i>
Major Ampullate Spidroin 2	ABD24295.1	major ampullate spidroin 2, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Major Ampullate Spidroin 2	AAR13808.1	major ampullate spidroin-2 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 2	AAR13809.1	major ampullate spidroin-2 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 2	AAR13810.1	major ampullate spidroin-2 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 2	AAR13811.1	major ampullate spidroin-2 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 2	AAR13812.1	major ampullate spidroin-2 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 2	AAR13813.1	major ampullate spidroin-2 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 2	AAR13814.1	major ampullate spidroin-2 [Argiope amoena]	<i>Argiope amoena</i>
Major Ampullate Spidroin 2	ABD61599.1	MaSp2 [Uloborus diversus]	<i>Uloborus diversus</i>
Major Ampullate Spidroin 2	ABD61600.1	MaSp2 [Uloborus diversus]	<i>Uloborus diversus</i>
Major Ampullate Spidroin 2-1	AAT08434.1	major ampullate spidroin 2-1 [Kukulcania hibernalis]	<i>Kukulcania hibernalis</i>
Major Ampullate Spidroin 2-2	AAT08435.1	major ampullate spidroin 2-2 [Kukulcania hibernalis]	<i>Kukulcania hibernalis</i>
Major Ampullate Spidroin 2a	ABD61593.1	MaSp2a [Deinopis spinosa]	<i>Deinopis spinosa</i>
Major Ampullate Spidroin 2b	ABD61594.1	MaSp2b [Deinopis spinosa]	<i>Deinopis spinosa</i>
Major Ampullate Spidroin 2-Like	AAZ15322.1	major ampullate spidroin 2-like [Nephila inaurata madagascariensis]	<i>Nephila inaurata madagascariensis</i>
Major Ampullate Spidroin 2-Like	AAK30597.1	major ampullate spidroin 2-like protein [Argiope trifasciata]	<i>Argiope trifasciata</i>
Major Ampullate Spidroin 2-Like	AAK30605.1	major ampullate spidroin 2-like protein [Nephila inaurata madagascariensis]	<i>Nephila inaurata madagascariensis</i>
Major Ampullate Spidroin 2-Like	ADG57597.1	MaSp2-like protein, partial [Parawixia bistrata]	<i>Parawixia bistrata</i>
Major Ampullate Spidroin 3	AAT08432.1	major ampullate spidroin 3 [Kukulcania hibernalis]	<i>Kukulcania hibernalis</i>
Major Ampullate Spidroin-Like	CAM32250.1	major ampullate spidroin-like [Euprosthenops australis]	<i>Euprosthenops australis</i>
Major Ampullate Spidroin-Like	ADM14317.1	major ampullate spidroin-like protein [Diguettia canities]	<i>Diguettia canities</i>
Major Ampullate Spidroin-Like	ADM14318.1	major ampullate spidroin-like protein [Diguettia canities]	<i>Diguettia canities</i>
Major Ampullate Spidroin-Like	AAV91960.1	major ampullate spidroin-like protein [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Major Ampullate Spidroin-Like	ABR37275.1	major ampullate spidroin-like protein [Nephilengys cruentata]	<i>Nephilengys cruentata</i>
Minor Ampullate Silk Protein	AAC14590.1	minor ampullate silk protein [Nephila clavipes]	<i>Nephila clavipes</i>
Minor Ampullate Silk Protein	AF027736.1	minor ampullate silk protein [Nephila clavipes]	<i>Nephila clavipes</i>
Minor Ampullate Silk Protein	AFV31615.1	minor ampullate spidroin [Araneus ventricosus]	<i>Araneus ventricosus</i>
Minor Ampullate Silk Protein	ADM14321.1	minor ampullate spidroin [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Minor Ampullate Silk Protein	ADM14322.1	minor ampullate spidroin [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Minor Ampullate Silk Protein	ADM14320.1	minor ampullate spidroin [Metepeira grandiosa]	<i>Metepeira grandiosa</i>

Minor Ampullate Silk Protein	ADM14328.1	minor ampullate spidroin [Metespira grandiosa]	<i>Metespira grandiosa</i>
Minor Ampullate Silk Protein	ADM14329.1	minor ampullate spidroin [Metespira grandiosa]	<i>Metespira grandiosa</i>
Minor Ampullate Silk Protein	ADM14326.1	minor ampullate spidroin [Uloborus diversus]	<i>Uloborus diversus</i>
Minor Ampullate Silk Protein	ADM14327.1	minor ampullate spidroin [Uloborus diversus]	<i>Uloborus diversus</i>
Minor Ampullate Silk Protein	AFV31613.1	minor ampullate spidroin, partial [Araneus ventricosus]	<i>Araneus ventricosus</i>
Minor Ampullate Silk Protein	AFV31614.1	minor ampullate spidroin, partial [Araneus ventricosus]	<i>Araneus ventricosus</i>
Minor Ampullate Silk Protein	AFM29835.1	minor ampullate spidroin, partial [Argiope argentata]	<i>Argiope argentata</i>
Minor Ampullate Silk Protein	AFM29836.1	minor ampullate spidroin, partial [Argiope argentata]	<i>Argiope argentata</i>
Minor Ampullate Silk Protein	ABD61589.1	MiSp [Deinopis spinosa]	<i>Deinopis spinosa</i>
Minor Ampullate Silk Protein	ABD61597.1	MiSp [Uloborus diversus]	<i>Uloborus diversus</i>
Minor Ampullate Silk Protein 1-Like	ACB29694.1	minor ampullate spidroin 1-like protein [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Minor Ampullate Silk Protein-Like	ABR37276.1	minor ampullate spidroin-like protein [Nephilengys cruentata]	<i>Nephilengys cruentata</i>
Minor Ampullate Silk Protein-Like	ABR37277.1	minor ampullate spidroin-like protein [Nephilengys cruentata]	<i>Nephilengys cruentata</i>
Minor Ampullate Silk Protein-Like	ABR37278.1	minor ampullate spidroin-like protein, partial [Nephilengys cruentata]	<i>Nephilengys cruentata</i>
Minor Ampullate Silk Protein-Like	ADG57595.1	MiSp-like protein [Parawixia bistriata]	<i>Parawixia bistriata</i>
Minor Ampullate Silk Protein-Putative	AZAQ01030745.1	S.m. _3 MiSp-putative	<i>Stegodyphus mimosarum</i>
Minor Ampullate Spidroin 1	ABC72645.1	minor ampullate fibroin 1 [Nephila antipodiana]	<i>Nephila antipodiana</i>
Minor Ampullate Spidroin 1	AAC14589.1	minor ampullate silk protein MiSp1 [Nephila clavipes]	<i>Nephila clavipes</i>
Minor Ampullate Spidroin 1	AF027735.1	minor ampullate silk protein MiSp1 [Nephila clavipes]	<i>Nephila clavipes</i>
Minor Ampullate Spidroin 2	AF027737.1	minor ampullate silk protein MiSp2 [Nephila clavipes]	<i>Nephila clavipes</i>
Piriform Spidroin	AEP25627.1	piriform spidroin [Araneus gemmoides]	<i>Araneus gemmoides</i>
Piriform Spidroin	ADN39425.1	piriform spidroin [Argiope trifasciata]	<i>Argiope trifasciata</i>
Piriform Spidroin	ADN39427.1	piriform spidroin [Nephila clavipes]	<i>Nephila clavipes</i>
Piriform Spidroin	ADN39426.1	piriform spidroin, partial [Nephila clavipes]	<i>Nephila clavipes</i>
Piriform Spidroin-Like	ADK56477.1	piriform-like spidroin [Nephilengys cruentata]	<i>Nephilengys cruentata</i>
Piriform Spidroin-Putative	AZAQ01087893.1	S.m. _2 PiSp-putative	<i>Stegodyphus mimosarum</i>
Pyriform Spidroin	GGOF01074945.1	T.per_PySp_C contig	<i>Tengella perfuga</i>
Pyriform Spidroin	GGRN01023505.1	8234_1_PySp_C	<i>Dolomedes triton</i>
Pyriform Spidroin	GGRN01007173.1	8231_1_D.tri_PySp_N	<i>Dolomedes triton</i>
Pyriform Spidroin 1	ACV41934.1	pyriform spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Pyriform Spidroin 1	ADV40087.1	pyriform spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Pyriform Spidroin 2	ADK92884.1	pyriform spidroin 2, partial [Nephila clavipes]	<i>Nephila clavipes</i>

Silk Gland Protein 1	AAR21194.1	silk gland protein 1 [Argiope amoena]	<i>Argiope amoena</i>
Spidroin	GGOF01078382.1	Tpercomp24302_c0-1_Sp_N	<i>Tengella perfuga</i>
Spidroin	GGRN01011518.1	7528 1 Sp N	<i>Dolomedes triton</i>
Spidroin 1	AZAQ01020238.1	S.m.Sp1	<i>Stegodyphus mimosarum</i>
Spidroin 1	AAC38957.1	spidroin 1 [Nephila clavipes]	<i>Nephila clavipes</i>
Spidroin 1a	ACF71407.1	spidroin 1a [Avicularia juruensis]	<i>Avicularia juruensis</i>
Spidroin 1b	ACF71408.1	spidroin 1b, partial [Avicularia juruensis]	<i>Avicularia juruensis</i>
Spidroin 1c	ACF71409.1	spidroin 1c [Avicularia juruensis]	<i>Avicularia juruensis</i>
Spidroin 2	ACF71410.1	spidroin 2 [Avicularia juruensis]	<i>Avicularia juruensis</i>
Spidroin 2	AAC04503.1	spidroin 2, partial [Araneus bicentenarius]	<i>Araneus bicentenarius</i>
Spidroin 2a	AZAQ01082375.1	S.m.Sp2a	<i>Stegodyphus mimosarum</i>
Spidroin 2b	AZAQ01067030.1	S.m.Sp2b	<i>Stegodyphus mimosarum</i>
Spidroin 2c	AZAQ01099004.1	S.m.Sp2c	<i>Stegodyphus mimosarum</i>
Tubuliform Spidroin	AAX45292.1	tubuliform spidroin [Argiope aurantia]	<i>Argiope aurantia</i>
Tubuliform Spidroin	AAX45293.1	tubuliform spidroin, partial [Araneus gemmoides]	<i>Araneus gemmoides</i>
Tubuliform Spidroin	AAX45294.1	tubuliform spidroin, partial [Araneus gemmoides]	<i>Araneus gemmoides</i>
Tubuliform Spidroin	AAX45291.1	tubuliform spidroin, partial [Argiope aurantia]	<i>Argiope aurantia</i>
Tubuliform Spidroin	AAX45295.1	tubuliform spidroin, partial [Nephila clavipes]	<i>Nephila clavipes</i>
Tubuliform Spidroin-1	ADM14323.1	tubuliform spidroin 1 [Agelenopsis aperta]	<i>Agelenopsis aperta</i>
Tubuliform Spidroin-1	ADM14330.1	tubuliform spidroin 1 [Agelenopsis aperta]	<i>Agelenopsis aperta</i>
Tubuliform Spidroin-1	ADM14331.1	tubuliform spidroin 1 [Agelenopsis aperta]	<i>Agelenopsis aperta</i>
Tubuliform Spidroin-1	AAY28932.1	tubuliform spidroin 1 [Argiope argentata]	<i>Argiope argentata</i>
Tubuliform Spidroin-1	AAY28945.1	tubuliform spidroin 1 [Argiope argentata]	<i>Argiope argentata</i>
Tubuliform Spidroin-1	AAY28952.1	tubuliform spidroin 1 [Argiope argentata]	<i>Argiope argentata</i>
Tubuliform Spidroin-1	ADM14332.1	tubuliform spidroin 1 [Argiope argentata]	<i>Argiope argentata</i>
Tubuliform Spidroin-1	ADM14333.1	tubuliform spidroin 1 [Argiope argentata]	<i>Argiope argentata</i>
Tubuliform Spidroin-1	AAY28942.1	tubuliform spidroin 1 [Argiope aurantia]	<i>Argiope aurantia</i>
Tubuliform Spidroin-1	AAY28953.1	tubuliform spidroin 1 [Argiope aurantia]	<i>Argiope aurantia</i>
Tubuliform Spidroin-1	AAY28944.1	tubuliform spidroin 1 [Cyrtophora moluccensis]	<i>Cyrtophora moluccensis</i>
Tubuliform Spidroin-1	AAY28934.1	tubuliform spidroin 1 [Deinopis spinosa]	<i>Deinopis spinosa</i>
Tubuliform Spidroin-1	AAY28943.1	tubuliform spidroin 1 [Gea heptagon]	<i>Gea heptagon</i>
Tubuliform Spidroin-1	AAY28954.1	tubuliform spidroin 1 [Gea heptagon]	<i>Gea heptagon</i>
Tubuliform Spidroin-1	AAY28940.1	tubuliform spidroin 1 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Tubuliform Spidroin-1	AAY28950.1	tubuliform spidroin 1 [Latrodectus geometricus]	<i>Latrodectus geometricus</i>
Tubuliform Spidroin-1	AAY28941.1	tubuliform spidroin 1 [Latrodectus hasseltii]	<i>Latrodectus hasseltii</i>

Tubuliform Spidroin-1	AAZ28949.1	tubuliform spidroin 1 [Latrodectus hasseltii]	<i>Latrodectus hasseltii</i>
Tubuliform Spidroin-1	AAZ28931.1	tubuliform spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Tubuliform Spidroin-1	AAZ28937.1	tubuliform spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Tubuliform Spidroin-1	AAZ28947.1	tubuliform spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Tubuliform Spidroin-1	ADV40185.1	tubuliform spidroin 1 [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Tubuliform Spidroin-1	AAZ28938.1	tubuliform spidroin 1 [Latrodectus mactans]	<i>Latrodectus mactans</i>
Tubuliform Spidroin-1	AAZ28946.1	tubuliform spidroin 1 [Latrodectus mactans]	<i>Latrodectus mactans</i>
Tubuliform Spidroin-1	AAZ28939.1	tubuliform spidroin 1 [Latrodectus tredecimguttatus]	<i>Latrodectus tredecimguttatus</i>
Tubuliform Spidroin-1	AAZ28948.1	tubuliform spidroin 1 [Latrodectus tredecimguttatus]	<i>Latrodectus tredecimguttatus</i>
Tubuliform Spidroin-1	AAZ28951.1	tubuliform spidroin 1 [Steatoda grossa]	<i>Steatoda grossa</i>
Tubuliform Spidroin-1	AAZ28933.1	tubuliform spidroin 1 [Uloborus diversus]	<i>Uloborus diversus</i>
Tubuliform Spidroin-1	AFA43480.1	tubuliform spidroin 1, partial [Argiope amoena]	<i>Argiope amoena</i>
Tubuliform Spidroin-1	ABD24296.1	tubuliform spidroin 1, partial [Latrodectus hesperus]	<i>Latrodectus hesperus</i>
Tubuliform Spidroin-1	AAZ90151.1	TuSp1 [Nephila antipodiana]	<i>Nephila antipodiana</i>
Tubuliform Spidroin-Like	ABR37274.1	tubuliform spidroin-like protein [Nephilengys cruentata]	<i>Nephilengys cruentata</i>
Tubuliform Spidroin-Putative	AZAQ01117603.1	S.m. 4 TuSp-putative Tubuliform spidroin putative	<i>Stegodyphus mimosarum</i>
Tubulliform Spidroin	GGOF01102549.1	T.per_TuSp_C_contig	<i>Tengella perfuga</i>
Tubulliform Spidroin	GGOF01015106.1	Tpercomp127803_c1-1_TuSp_N	<i>Tengella perfuga</i>
Tubulliform Spidroin	GGRN01041094.1	D.tri_TuSp_C_contig	<i>Dolomedes triton</i>
Tubulliform Spidroin	GGRN01011637.1	5425_1_D.tri_TuSp_N	<i>Dolomedes triton</i>

Table S5. Spidroin sequences included in phylogenetic analyses

Spidroin Name	Species	N-terminal region GenBank Accession	C-terminal region GenBank Accession
<i>A.ape</i> MaSp	<i>Agelenopsis aperta</i>	HM752573	<u>AAT08436</u>
<i>A.ape</i> TuSp1	<i>Agelenopsis aperta</i>	HM752576	--
<i>A.arg</i> AcSp	<i>Argiope argentata</i>	AHK09813	AHK09813
<i>A.arg</i> Flag	<i>Argiope argentata</i>	--	MF955778
<i>A.arg</i> MaSp1	<i>Argiope argentata</i>	AWK58623	AWK58705
<i>A.arg</i> MaSp2	<i>Argiope argentata</i>	AWK58645	AWK58747
<i>A.arg</i> MaSp3	<i>Argiope argentata</i>	AWK58729	AWK58636
<i>A.arg</i> MiSp	<i>Argiope argentata</i>	AWK58671	AWK58662
<i>A.arg</i> PySp1	<i>Argiope argentata</i>	AQR58363	AQR58363
<i>A.arg</i> TuSp1	<i>Argiope argentata</i>	ATW75951	ATW75951
<i>A.dia</i> AcSp	<i>Araneus diadematus</i>	AWK58687	AWK58698
<i>A.dia</i> Flag	<i>Araneus diadematus</i>	AWK58733	AWK58723
<i>A.dia</i> Masp1	<i>Araneus diadematus</i>	AWK58624	AWK58706
<i>A.dia</i> MaSp2	<i>Araneus diadematus</i>	AWK58648	AWK58752
<i>A.dia</i> MaSp3	<i>Araneus diadematus</i>	--	AWK58637
<i>A.dia</i> MiSp	<i>Araneus diadematus</i>	--	AWK58663
<i>A.dia</i> PySp1	<i>Araneus diadematus</i>	AWK58658	AWK58716
<i>A.dia</i> TuSp1	<i>Araneus diadematus</i>	AWK58641	AWK58742
<i>B.cal</i> fibroin1	<i>Bothriocyrtum californicum</i>	HM752562	EU117162
<i>D.ten</i> fib1	<i>Dolomedes tenebrosus</i>	--	AF350269
<i>D.ten</i> fib2	<i>Dolomedes tenebrosus</i>	--	AF350270
<i>L.hes</i> AcSp1	<i>Latrodectus hesperus</i>	AFX83557	AFX83557
<i>L.hes</i> Flag	<i>Latrodectus hesperus</i>	AWK58736	AWK58725
<i>L.hes</i> MaSp1	<i>Latrodectus hesperus</i>	F595246	F595246
<i>L.hes</i> MaSp2	<i>Latrodectus hesperus</i>	F595245	F595245
<i>L.hes</i> MaSp3	<i>Latrodectus hesperus</i>	AWK58730	AWK58638
<i>L.hes</i> MiSp	<i>Latrodectus hesperus</i>	ARA91152	ARA91152
<i>L.hes</i> PySp1	<i>Latrodectus hesperus</i>	AWK58659	AWK58717
<i>L.hes</i> TuSp1	<i>Latrodectus hesperus</i>	AWK58642	AWK58744
<i>N.cla</i> AcSp1	<i>Nephila clavipes</i>	AWK58691	AWK58702
<i>N.cla</i> Flag	<i>Nephila clavipes</i>	AWK58737	AWK58726
<i>N.cla</i> MaSp1	<i>Nephila clavipes</i>	AWK58628	AWK58709
<i>N.cla</i> MaSp2	<i>Nephila clavipes</i>	AWK58653	AWK58758
<i>N.cla</i> MiSp	<i>Nephila clavipes</i>	AWK58679	AWK58667
<i>N.cla</i> PySp1	<i>Nephila clavipes</i>	AWK58660	AWK58718
<i>N.cla</i> TuSp1	<i>Nephila clavipes</i>	AWK58643	AWK58745
<i>N.cla</i> TuSp1	<i>Nephila clavipes</i>	AWK58643	AWK58745
<i>S.mim</i> AcSp-putative	<i>Stegodyphus mimosarum</i>	KFM79920	KFM79920
<i>S.mim</i> MaSp-putative-a	<i>Stegodyphus mimosarum</i>	--	KFM83271
<i>S.mim</i> MaSp-putative-c	<i>Stegodyphus mimosarum</i>	--	JT038023
<i>S.mim</i> MaSp-putative-d	<i>Stegodyphus mimosarum</i>	KFM59474	KFM59474
<i>S.mim</i> MaSp-putative-e	<i>Stegodyphus mimosarum</i>	KFM74936	--
<i>S.mim</i> MaSp-putative-f	<i>Stegodyphus mimosarum</i>	KFM61798	--
<i>S.mim</i> MaSp-putative-g	<i>Stegodyphus mimosarum</i>	KFM57717	--
<i>S.mim</i> MaSp-putative-h	<i>Stegodyphus mimosarum</i>	KFM61802	KFM61800
<i>S.mim</i> MaSp-putative-i	<i>Stegodyphus mimosarum</i>	KFM79313	KFM79313
<i>S.mim</i> Misp-putative	<i>Stegodyphus mimosarum</i>	KFM62627	KFM62627
<i>S.mim</i> PiSp-putative	<i>Stegodyphus mimosarum</i>	KFM75168	KFM68615
<i>S.mim</i> Sp1	<i>Stegodyphus mimosarum</i>	--	KFM60634
<i>S.mim</i> Sp2a	<i>Stegodyphus mimosarum</i>	KFM73910	--
<i>S.mim</i> Sp2b	<i>Stegodyphus mimosarum</i>	KFM70693	--
<i>S.mim</i> TuSp-putative	<i>Stegodyphus mimosarum</i>	KFM79920	KFM79920