

Supplementary Material

Towards a systematic revision of the superfamily Cyrenoidea (Bivalvia: Imparidentia): species delimitation, multi-locus phylogeny and mitochondrial phylogenomics

Ruiwen Wu^{A,}, Lili Liu^A, Xiongjun Liu^B, Yingying Ye^C, Xiaoping Wu^D, Zhicai Xie^E, Zhenyuan Liu^E and Zhengfei Li^{E,*}*

^ASchool of Life Science, Shanxi Normal University, Taiyuan, 030031, PR China

^BSchool of Life Science, Jiaying University, Meizhou, 514015, PR China

^CNational Engineering Research Center for Marine Aquaculture, Zhejiang Ocean University, Zhoushan, 316022, PR China

^DSchool of Life Sciences, Nanchang University, Nanchang, 330031, PR China

^EInstitute of Hydrobiology, Chinese Academy of Sciences, Wuhan, 430072, PR China

*Correspondence to: Email: wurw@sxnu.edu.cn, rwwu@qq.com, lizhengfei@ihb.ac.cn

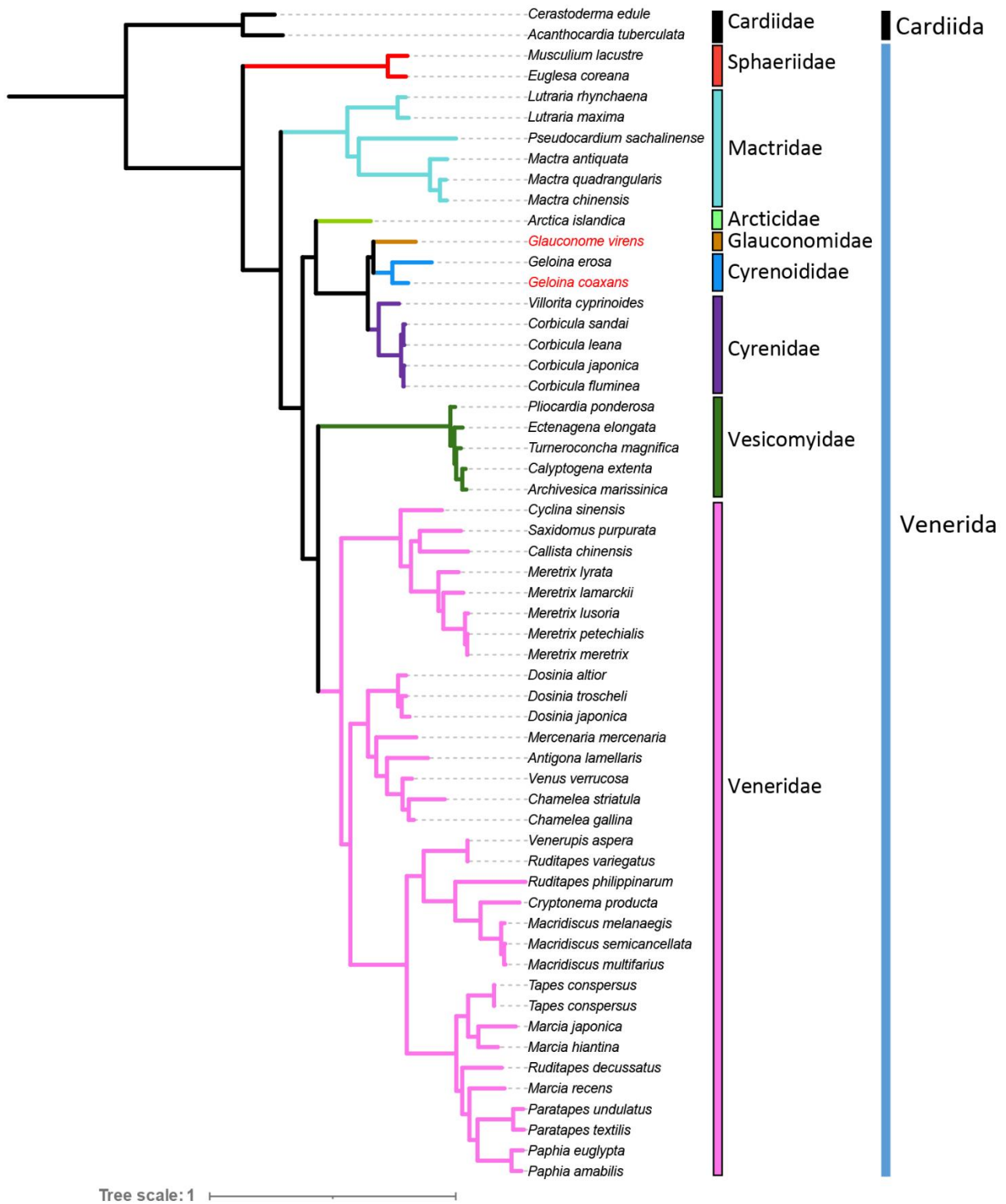


Fig. S1. Phylogenetic tree built by Bayesian Inference (BI) based on the AA dataset.

Table S1. Sequences from mtDNA dataset used for molecular analyses and corresponding GenBank numbers.

Order	Superfamily	Family	Species	GenBank numbers
Venerida	Arcticoidea	Arctidae	<i>Arctica islandica</i>	KF363951
	Cyrenoidea	Cyrenidae	<i>Corbicula fluminea</i>	MK587518
	Cyrenoidea	Cyrenidae	<i>Corbicula japonica</i>	MW646293
	Cyrenoidea	Cyrenidae	<i>Corbicula leana</i>	MW646295
	Cyrenoidea	Cyrenidae	<i>Corbicula sandai</i>	NC_061685
	Cyrenoidea	Cyrenidae	<i>Villorita cyprinoides</i>	MK481950
	Cyrenoidea	Cyrenoididae	<i>Geloina erosa</i>	MN849878
	Cyrenoidea	Cyrenoididae	<i>Geloina coaxans</i>	OQ595195
	Cyrenoidea	Glauconomidae	<i>Glauconome virens</i>	OQ595194
	Glossoidea	Vesicomidae	<i>Archivesica marissinica</i>	MK948426
	Glossoidea	Vesicomidae	<i>Calyptogena extenta</i>	MF981085
	Glossoidea	Vesicomidae	<i>Turneroconcha magnifica</i> “ <i>Calyptogena magnifica</i> ”	KR862368
	Glossoidea	Vesicomidae	<i>Ectenagena elongata</i>	MH290879
	Glossoidea	Vesicomidae	<i>Pliocardia ponderosa</i>	MF981084
	Mactroidea	Mactridae	<i>Lutraria maxima</i>	MF784266
	Mactroidea	Mactridae	<i>Lutraria rhynchaena</i>	NC_023384
	Mactroidea	Mactridae	<i>Mactra antiquata</i>	JN692486
	Mactroidea	Mactridae	<i>Mactra chinensis</i>	KJ754823
	Mactroidea	Mactridae	<i>Mactra quadrangularis</i>	MW691169
	Mactroidea	Mactridae	<i>Pseudocardium sachalinense</i>	MG431821
	Sphaerioidea	Sphaeriidae	<i>Euglesa coreana</i>	OM216845
	Sphaerioidea	Sphaeriidae	<i>Musculium lacustre</i>	OM279805
	Veneroidea	Veneridae	<i>Callista chinensis</i>	MT742541
	Veneroidea	Veneridae	<i>Chamelea gallina</i>	MW662591
	Veneroidea	Veneridae	<i>Chamelea striatula</i>	MW662611
	Veneroidea	Veneridae	<i>Cryptonema producta</i>	OM214563
	Veneroidea	Veneridae	<i>Cyclina sinensis</i>	KU097333
	Veneroidea	Veneridae	<i>Dosinia altior</i>	MG543473
	Veneroidea	Veneridae	<i>Dosinia japonica</i>	MF401432
	Veneroidea	Veneridae	<i>Dosinia troscheli</i>	MG543474
	Veneroidea	Veneridae	<i>Macridiscus melanaegis</i>	MK394098
	Veneroidea	Veneridae	<i>Macridiscus multifarius</i>	MK394099
	Veneroidea	Veneridae	<i>Macridiscus semicancellata</i>	MN639354
Veneroidea	Veneridae	<i>Mercenaria mercenaria</i>	MN233789	
Veneroidea	Veneridae	<i>Meretrix lamarckii</i>	GU071281	
Veneroidea	Veneridae	<i>Meretrix lusoria</i>	GQ903339	
Veneroidea	Veneridae	<i>Meretrix lyrata</i>	KC832317	

Order	Superfamily	Family	Species	GenBank numbers
	Veneroidea	Veneridae	<i>Meretrix meretrix</i>	GQ463598
	Veneroidea	Veneridae	<i>Meretrix petechialis</i>	EU145977
	Veneroidea	Veneridae	<i>Paphia amabilis</i>	JF969276
	Veneroidea	Veneridae	<i>Paphia euglypta</i>	GU269271
	Veneroidea	Veneridae	<i>Paratapes textilis</i>	JF969277
	Veneroidea	Veneridae	<i>Paratapes undulatus</i>	JF969278
	Veneroidea	Veneridae	<i>Ruditapes decussatus</i>	KP089983
	Veneroidea	Veneridae	<i>Ruditapes philippinarum</i>	AB065374
	Veneroidea	Veneridae	<i>Ruditapes variegatus</i>	MZ675530
	Veneroidea	Veneridae	<i>Saxidomus purpurata</i>	KP419933
	Veneroidea	Veneridae	<i>Tapes conspersus</i>	OM214568
	Veneroidea	Veneridae	<i>Tapes conspersus</i> " <i>Tapes dorsatus</i> "	OM677698
	Veneroidea	Veneridae	<i>Venerupis aspera</i>	MN635724
	Veneroidea	Veneridae	<i>Venus verrucosa</i>	MW662590
	Veneroidea	Veneridae	<i>Antigona lamellaris</i>	MT254059
	Veneroidea	Veneridae	<i>Marcia hiantina</i>	OM214564
	Veneroidea	Veneridae	<i>Marcia japonica</i>	OM214565
	Veneroidea	Veneridae	<i>Marcia recens</i>	OM214566
Cardiida		Cardiidae	<i>Acanthocardia tuberculata</i>	NC_008452
		Cardiidae	<i>Cerastoderma edule</i>	NC_035728

Table S2. Partitioning strategies from PartitionFinder and ModelFinder for the three-gene dataset.

Partitionfinder		
Subset	Best Model	Partition names
1	GTR+I+G	16S_mafft_gb, COI_NT_removed_chars_gb_codon1
2	GTR+G	28S_mafft_gb
3	GTR+G	COI_NT_removed_chars_gb_codon2
4	HKY+G	COI_NT_removed_chars_gb_codon3
ModelFinder		
Subset	Best Model	Partition names
1	TVM+F+I+G4	16S_mafft_gb,
2	TIM3+F+G4	28S_mafft_gb,
3	TN+F+G4	COI_NT_removed_chars_gb_codon1,
4	TVM+F+G4	COI_NT_removed_chars_gb_codon2,
5	HKY+F+G4	COI_NT_removed_chars_gb_codon3;

Table S3. Partitioning strategies from ModelFinder for the whole mt genome dataset.

PartitionFinder for AA dataset		
Sub set	Best Model	Partition names
1	WAG+I+G	cox2_AA_removed_chars_gb, atp6_AA_removed_chars_gb
2	CPREV+I+G	cox3_AA_removed_chars_gb, cox1_AA_removed_chars_gb
3	WAG+G	cytb_AA_removed_chars_gb
4	WAG+I+G	nad1_AA_removed_chars_gb, nad3_AA_removed_chars_gb, nad5_AA_removed_chars_gb, nad4_AA_removed_chars_gb
5	WAG+I+G	nad2_AA_removed_chars_gb, nad4L_AA_removed_chars_gb, nad6_AA_removed_chars_gb
PartitionFinder for NT dataset		
1	GTR+I+G	cox3_NT_removed_chars_gb_codon1, atp6_NT_removed_chars_gb_codon1
2	GTR+I+G	cox3_NT_removed_chars_gb_codon2, atp6_NT_removed_chars_gb_codon2
3	GTR+G	nad3_NT_removed_chars_gb_codon3, atp6_NT_removed_chars_gb_codon3
4	GTR+I+G	cox1_NT_removed_chars_gb_codon1
5	GTR+I+G	cox1_NT_removed_chars_gb_codon2, nad1_NT_removed_chars_gb_codon2
6	GTR+I+G	cox1_NT_removed_chars_gb_codon3, nad1_NT_removed_chars_gb_codon3, cytb_NT_removed_chars_gb_codon3
7	GTR+I+G	cox2_NT_removed_chars_gb_codon1, cox2_NT_removed_chars_gb_codon2
8	GTR+G	nad5_NT_removed_chars_gb_codon3, nad2_NT_removed_chars_gb_codon3, nad4_NT_removed_chars_gb_codon3, nad4L_NT_removed_chars_gb_codon3, nad6_NT_removed_chars_gb_codon3, cox2_NT_removed_chars_gb_codon3, cox3_NT_removed_chars_gb_codon3
9	GTR+I+G	cytb_NT_removed_chars_gb_codon2, cytb_NT_removed_chars_gb_codon1
10	GTR+I+G	nad2_NT_removed_chars_gb_codon1, nad6_NT_removed_chars_gb_codon1, nad4L_NT_removed_chars_gb_codon1, nad3_NT_removed_chars_gb_codon1, nad1_NT_removed_chars_gb_codon1, nad4_NT_removed_chars_gb_codon1, nad5_NT_removed_chars_gb_codon1
11	GTR+I+G	nad4L_NT_removed_chars_gb_codon2, nad5_NT_removed_chars_gb_codon2, nad3_NT_removed_chars_gb_codon2, nad6_NT_removed_chars_gb_codon2, nad4_NT_removed_chars_gb_codon2, nad2_NT_removed_chars_gb_codon2

ModelFinder for AA dataset

1	mtInv+F+I+G4	atp6_AA_removed_chars_gb,
2	mtZOA+I+G4	cox1_AA_removed_chars_gb,
3	mtInv+F+I+G4	cox2_AA_removed_chars_gb,
4	mtInv+F+I+G4	cox3_AA_removed_chars_gb,
5	mtInv+F+G4	cytb_AA_removed_chars_gb,
6	mtZOA+F+I+G4	nad1_AA_removed_chars_gb,
7	mtZOA+F+G4	nad2_AA_removed_chars_gb,
8	mtMet+F+G4	nad3_AA_removed_chars_gb,
9	mtInv+F+G4	nad4L_AA_removed_chars_gb,
10	mtZOA+F+I+G4	nad4_AA_removed_chars_gb,
11	mtMet+F+I+G4	nad5_AA_removed_chars_gb,
12	mtZOA+F+G4	nad6_AA_removed_chars_gb;

PartitionFinder for NT dataset

1	TIM2+F+I+G4	atp6_NT_removed_chars_gb_codon1,
2	TVM+F+G4	atp6_NT_removed_chars_gb_codon2,
3	TIM2+F+ASC+G4	atp6_NT_removed_chars_gb_codon3,
4	TIM2+F+I+G4	cox1_NT_removed_chars_gb_codon1,
5	TVM+F+I+G4	cox1_NT_removed_chars_gb_codon2,
6	TIM2+F+G4	cox1_NT_removed_chars_gb_codon3,
7	TIM2+F+I+G4	cox2_NT_removed_chars_gb_codon1,
8	TVM+F+I+G4	cox2_NT_removed_chars_gb_codon2,
9	TN+F+ASC+G4	cox2_NT_removed_chars_gb_codon3,
10	TIM2+F+I+G4	cox3_NT_removed_chars_gb_codon1,
11	TVM+F+I+G4	cox3_NT_removed_chars_gb_codon2,
12	HKY+F+ASC+G4	cox3_NT_removed_chars_gb_codon3,
13	TIM2+F+I+G4	cytb_NT_removed_chars_gb_codon1,
14	GTR+F+G4	cytb_NT_removed_chars_gb_codon2,
15	HKY+F+ASC+G4	cytb_NT_removed_chars_gb_codon3,
16	TIM2+F+I+G4	nad1_NT_removed_chars_gb_codon1,
17	TVM+F+G4	nad1_NT_removed_chars_gb_codon2,
18	TN+F+ASC+G4	nad1_NT_removed_chars_gb_codon3,
19	TIM2+F+I+G4	nad2_NT_removed_chars_gb_codon1,
20	TVM+F+I+G4	nad2_NT_removed_chars_gb_codon2,
21	TIM3+F+ASC+G4	nad2_NT_removed_chars_gb_codon3,
22	TIM2+F+I+G4	nad3_NT_removed_chars_gb_codon1,
23	TVM+F+G4	nad3_NT_removed_chars_gb_codon2,
24	TN+F+ASC+G4	nad3_NT_removed_chars_gb_codon3,
25	TIM2+F+I+G4	nad4L_NT_removed_chars_gb_codon1,
26	TVM+F+G4	nad4L_NT_removed_chars_gb_codon2,
27	TPM3+F+ASC+G4	nad4L_NT_removed_chars_gb_codon3,
28	TIM2+F+I+G4	nad4_NT_removed_chars_gb_codon1,
29	TVM+F+I+G4	nad4_NT_removed_chars_gb_codon2,
30	TN+F+ASC+G4	nad4_NT_removed_chars_gb_codon3,
31	TIM2+F+I+G4	nad5_NT_removed_chars_gb_codon1,
32	GTR+F+I+G4	nad5_NT_removed_chars_gb_codon2,
33	K3Pu+F+ASC+G4	nad5_NT_removed_chars_gb_codon3,
34	TIM2+F+I+G4	nad6_NT_removed_chars_gb_codon1,
35	TVM+F+G4	nad6_NT_removed_chars_gb_codon2,
36	K3Pu+F+ASC+G4	nad6_NT_removed_chars_gb_codon3;
