Contributions to Zoology

Polka-dotted treasures: Revising a clade of ascidian- and bivalve-associated shrimps (Caridea: Palaemonidae)

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Supplementary material

TABLE S1 List of specimens and material used in the analyses of the current study.

List of specimens and materials used in the analyses of the current study. Species and genera names, collection registration numbers (Coll. nr.), specimen localities, host associations, availability of gene sequences, and sources of previous literature of both the molecular (DNA) and morphological information are given. Museum abbreviations: RMNH.CRUS.D. – Naturalis Biodiversity Center, former Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands; SY-LH – Deep-sea biology laboratory of Institute of Deep-sea Science and Engineering, Chinese Academy of Sciences, Sanya, China; NTOU – National Taiwan Ocean University, Taiwan; MBM – Institute of Oceanology, Chinese Academy of Sciences, Qingdao, China; MNHN – Muséum National D'Histoire Naturelle, Paris, France; ZMA – Zoölogisch Museum Amsterdam (now part of the Naturalis collections, Leiden, NL); MTQ – Museum of Tropical Queensland, Townsville, Australia. Other abbreviations are part of non-registered voucher collections. GenBank accession numbers are given when available. Species which were only used in the morphological analyses are given a collection number, locality and host record based on the specimens in the Naturalis decapod collections (RMNH.CRUS.D.). If additional illustrations were used for the morphological dataset (e.g., due to the species not being present in the Naturalis collections), this is indicated with a separate record and one or more sources (Morph. Source(s)). Unknown host associations are indicated as a question mark (?), uncertain host associations are indicated with a genus or order name, and an asterisk (*). New sequences are indicated in bold. Superscript numbers [1] and [2] are discussed as notes below.

Species	Coll. nr.	Locality	Host Organism	COI	16S	DNA Source(s)	Morph. Source(s)
***Anchistus* Borradaile, 1898**							
A. australis Bruce, 1977	RMNH.CRUS.D.41436	Ambon, Indonesia	Bivalvia: *Tridacna squamosa* Lamarck, 1819				New illus.
A. australis Bruce, 1977	RMNH.CRUS.D.41438	Ambon, Indonesia	Bivalvia: *Tridacna* sp.*				New illus.
A. australis Bruce, 1977	RMNH.CRUS.D.53540	Ternate, Halmahera, Indonesia	Bivalvia: *Tridacna squamosa* Lamarck, 1819	JX185709		[1]	
A. australis Bruce, 1977	RMNH.CRUS.D.53859	Semporna area, Sabah, Malaysia	Bivalvia: *Tridacna squamosa* Lamarck, 1819	JX185708		[1]	
A. australis Bruce, 1977	SY-LH-008[1]	Sanya, Hainan, China	Bivalvia: *Tridacna squamosa* Lamarck, 1819	MN412556	MN412556	[2]	
A. australis Bruce, 1977	SY-LH-008[1]	Sanya, Hainan, China	Bivalvia: *Tridacna squamosa* Lamarck, 1819	NC046034	NC046034	[2]	
A. australis Bruce, 1977	[Additional illustrations]	-	-				[3, 4]
A. demani Kemp, 1922	RMNH.CRUS.D.41457	Ambon, Indonesia	Bivalvia: *Tridacna* sp.*				New illus.
A. demani Kemp, 1922	RMNH.CRUS.D.41480	Nocra Island, Eritrea	Bivalvia: *Tridacna* sp.*				New illus.
A. demani Kemp, 1922	RMNH.CRUS.D.48354	Cebu Strait, Indonesia	Bivalvia: *Hippopus hippopus* (L., 1758)		**OQ600396**		
A. demani Kemp, 1922	RMNH.CRUS.D.53938	Semporna area, Sabah, Malaysia	Bivalvia: *Hippopus hippopus* (L., 1758)	JX185707		[1]	
A. demani Kemp, 1922	MNHN-IU-2010-4969	Lavanono, Madagascar	?	KP759379	KP725496	[5]	
A. demani Kemp, 1922	[Additional illustrations]	-	-				[4, 6]
A. gravieri Kemp, 1922	RMNH.CRUS.D.58051	Nha Trang, Vietnam	?				New illus.
A. gravieri Kemp, 1922	[Additional illustrations]	-	-				[3, 6]
A. miersi (De Man, 1888)	RMNH.CRUS.D.41389	Ambon, Indonesia	Bivalvia: *Tridacna* sp.*				New illus.
A. miersi (De Man, 1888)	RMNH.CRUS.D.41390	Ambon, Indonesia	Bivalvia: *Tridacna* sp.*				New illus.
A. miersi (De Man, 1888)	RMNH.CRUS.D.53568	Tidore, Halmahera, Indonesia	Bivalvia: *Tridacna squamosa* cf.	JX185706		[1]	
A. miersi (De Man, 1888)	RMNH.CRUS.D.53798	Semporna area, Sabah, Malaysia	Bivalvia: *Tridacna* sp.*	JX185704		[1]	

A. miersi (De Man, 1888)	RMNH.CRUS.D.53806	Semporna area, Sabah, Malaysia	Bivalvia: *Hippopus hippopus* (L., 1758)	JX185705		[1]	
A. miersi (De Man, 1888)	[Additional illustrations]	-	-				[6, 7]
***Dasella* Lebour, 1945**							
D. ansoni Bruce, 1983	[Additional illustrations]	-	-				[8]
D. brucei Berggren, 1990	[Additional illustrations]	-	-				[9, 10]
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.48249	Ambon, Indonesia	Tunicata: Ascidiacea*				New illus.
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.48251	Spermonde, Sulawesi, Indonesia	Tunicata: Ascidiacea*				New illus.
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.49846	Bali, Indonesia	Tunicata: Ascidiacea: *Herdmania momus* (Savigny, 1816)		KU170689	[11]	
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.53535	Ternate, Halmahera, Indonesia	Tunicata: Ascidiacea: *Herdmania momus* cf. (Savigny, 1816)	**OQ603086**			
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.53870	Semporna area, Sabah, Malaysia	Tunicata: Ascidiacea: *Herdmania momus* (Savigny, 1816)	**OQ603087**			
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.53924	Semporna area, Sabah, Malaysia	Tunicata: Ascidiacea: *Herdmania momus* (Savigny, 1816)	KU064966		[11]	
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.53967	Semporna area, Sabah, Malaysia	Tunicata: Ascidiacea: *Herdmania momus* (Savigny, 1816)	**OQ603088**			
D. herdmaniae (Lebour, 1938)	RMNH.CRUS.D.57964	Lembeh Strait, Indonesia	Tunicata: Ascidiacea: *Herdmania momus* (Savigny, 1816)	**OQ603089**	**OQ600397**		New illus.
D. herdmaniae (Lebour, 1938)	[Additional illustrations]	-	-				[12, 13]
***Ensiger* Borradaile, 1915**							
E. custoides (Bruce, 1977)	RMNH.CRUS.D.41440	Komodo, Indonesia	Bivalvia: *Pinna*/*Atrina* sp.*				New illus.
E. custoides (Bruce, 1977)	RMNH.CRUS.D.41444	Ambon, Indonesia	?				New illus.
E. custoides (Bruce, 1977)	RMNH.CRUS.D.49844	Bali, Indonesia	Bivalvia: *Atrina* sp.*		**OQ600398**		
E. custoides (Bruce, 1977)	RMNH.CRUS.D.53610	Halmahera, Indonesia	Bivalvia: *Atrina vexillum* (Born, 1778)	**OQ603090**			
E. custoides (Bruce, 1977)	RMNH.CRUS.D.53795	Semporna area, Sabah, Malaysia	Bivalvia: *Atrina vexillum* (Born, 1778)	JX185710		[1]	
E. custoides (Bruce, 1977)	RMNH.CRUS.D.53807	Semporna area, Sabah, Malaysia	Bivalvia: *Atrina vexillum* (Born, 1778)	**OQ603091**			
E. custoides (Bruce, 1977)	RMNH.CRUS.D.53810	Semporna area, Sabah, Malaysia	Bivalvia: *Atrina vexillum* (Born, 1778)	JX185712		[1]	
E. custoides (Bruce, 1977)	NTOU M01867	Okinawa, Japan	Bivalvia*	KU064954	KU064807	[11]	
E. custoides (Bruce, 1977)	MBM Llab001	Hainan, China	?		KF738359	[14]	
E. custoides (Bruce, 1977)	[Additional illustrations]	-	-				[3, 4]
E. custos (Forskål, 1775)	RMNH.CRUS.D.41445	Ambon, Indonesia	?				New illus.
E. custos (Forskål, 1775)	RMNH.CRUS.D.41446	Ambon, Indonesia	Bivalvia: *Pinna bicolor* (Gmelin, 1791)				New illus.
E. custos (Forskål, 1775)	RMNH.CRUS.D.41448	Ambon, Indonesia	Bivalvia: *Pinna* / *Atrina* sp.*				New illus.
E. custos (Forskål, 1775)	RMNH.CRUS.D.57963	Kepulauan Seribu, Indonesia	Bivalvia: *Pinna bicolor* (Gmelin, 1791)	**OQ603092**	**OQ600399**		
E. custos (Forskål, 1775)	MBM Llab002	Hainan, China	?		KF738360	[14]	
E. custos (Forskål, 1775)	A2005-D	Moreton Bay, Australia	Bivalvia*		KJ584120	[15]	
E. custos (Forskål, 1775)	[Additional illustrations]	-	-				[4, 6, 16]
***Neoanchistus* Bruce, 1975**							
N. cardiodytes Bruce, 1975	[Additional illustrations]	-	-				[17]

N. nasalis Holthuis, 1986	RMNH.CRUS.D.36608	Dhofar, Oman	Bivalvia: *Mimachlamys townsendi* (Sowerby III, 1895)				[18] New illus.
N. nasalis Holthuis, 1986	[Additional illustrations]	-	-				[18]
***Paranchistus* Holthuis, 1952**							
P. armatus H. Milne Edwards, 1837	RMNH.CRUS.D.46092	Kei Islands, Tanimbar, Indonesia	Bivalvia: *Tridacna gigas* (L., 1758)		**OQ600400**		New illus.
P. armatus H. Milne Edwards, 1837	[Additional illustrations]	-	-				[19]
***Polkacaris* gen. nov.**							
P. liui (Li, Bruce & Manning, 2004)	[Additional illustrations]	-	-				[20]
P. nobilii (Holthuis, 1952)	ZMA_102.828	Persian Gulf, Iran	Bivalvia: *Spondylus gaederopus* L., 1758				New illus.
P. nobilii (Holthuis, 1952)	[Additional illustrations]	-	-				[16]
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.48261	Ambon, Indonesia	Bivalvia: *Pteria* sp.*				New illus.
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.48262	Ambon, Indonesia	Bivalvia: *Pteria* sp.*				New illus.
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.48263	Ambon, Indonesia	Bivalvia: *Pteria* sp.*				New illus.
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.48266	Ambon, Indonesia	Bivalvia: *Vulsella vulsella* (L., 1758)				New illus.
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.49845	Bali, Indonesia	Bivalvia: *Pteria* sp.*		**OQ600401**		
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.53612	Ternate, Halmahera, Indonesia	Bivalvia: *Pteria penguin* (Röding, 1798)	**OQ603093**			
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.53787	Semporna area, Sabah, Malaysia	Bivalvia: *Spondylus* sp.*	**OQ603094**	**OQ600402**		
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.53797	Semporna area, Sabah, Malaysia	Bivalvia: *Pteria penguin* (Röding, 1798)	**OQ603095**			
P. pycnodontae (Bruce, 1978)	RMNH.CRUS.D.53926	Semporna area, Sabah, Malaysia	Bivalvia: *Pteria penguin* (Röding, 1798)	**OQ603096**			
P. pycnodontae (Bruce, 1978)	MTQ W-33124	Lizard Island, Australia	Bivalvia*	KU064985	KU064831	[11]	
P. pycnodontae (Bruce, 1978)	[Additional illustrations]	-	-				[4]
P. spondylis (Suzuki, 1971)	[Additional illustrations]	-	-				[21, 20]
***Tympanicheles* gen. nov.**							
T. ornatus (Holthuis, 1952)	RMNH.CRUS.D.41491	Nocra Island, Eritrea	?				New illus.
T. ornatus (Holthuis, 1952)	RMNH.CRUS.D.41497	Nocra Island, Eritrea	Bivalvia: *Atrina* sp.*				New illus.
T. ornatus (Holthuis, 1952)	MNHN-IU-2010-4971	Baie des Galion, Tôlanaro, Madagascar	?	KP759475	KP725614	[5]	
T. ornatus (Holthuis, 1952)	[Additional illustrations]	-	-				[16]
T. pectinis (Kemp, 1925)	RMNH.CRUS.D.26972	Sagami Bay, Japan	?				New illus.
T. pectinis (Kemp, 1925)	[Additional illustrations]	-	-				[21 – 23]
OUTGROUPS							
***Actinimenes* Ďuriš & Horká, 2017**							
A. inornatus (Kemp, 1922)	MTQ W-33160	Lizard Island, Australia	Cnidaria: *Stichodactyla* sp.	KU064997	KU064841		
A. inornatus (Kemp, 1922)	RMNH.CRUS.D.48435	Cebu Strait, Philippines	Cnidaria: *Stichodactyla mertensii* Brandt, 1835				
A. inornatus (Kemp, 1922)	[Additional illustrations]	-	-				[6, 24 – 26]
A. ornatus (Bruce, 1969)	UO V08-80	Vietnam, Nhatrang Bay	Cnidaria: *Heteractis* sp.	KU065001	KU064843		
A. ornatus (Bruce, 1969)	RMNH.CRUS.D.47552	Indonesia, Moluccas, Ambon Strait	Cnidaria: *Entacmaea quadricolor* (Leuckart in Rüppel & Leuckart, 1828)				
A. ornatus (Bruce, 1969)	[Additional illustrations]	-	-				[25 – 27]
***Cuapetes* A.H. Clark, 1919**							

C. tenuipes (Borradaile, 1898)	RMNH.CRUS.D.48784	Bone Baku, Makassar, Indonesia	Free-living				
C. tenuipes (Borradaile, 1898)	UO V08-48	Nhatrang Bay, Vietnam	Free-living / Cnidaria: *Actinodendron* sp.	KU064965	KU064814	[11]	
C. tenuipes (Borradaile, 1898)	[Additional illustrations]	-	-				[6, 25, 28][2]
***Lipkemenes* Bruce & Okuno, 2010**							
L. lanipes (Kemp, 1922)	MNHN IU-2013-10012	Madang Bay, Papua New Guinea	Echinodermata: Ophiuroidea*	KU064980		[11]	
L. lanipes (Kemp, 1922)	M2010-N	Fort Dauphin, Madagascar	?		KJ584127	[15]	
L. lanipes (Kemp, 1922)	RMNH.CRUS.D.48452	Cebu strait, Philippines	Echinodermata: Ophiuroidea*				
L. lanipes (Kemp, 1922)	[Additional illustrations]	-	-				[26]
***Palaemonella* Dana, 1852**							
P. rotumana (Borradaile, 1898)	MTQ W-33176	Lizard Island, Australia	Cnidaria: Scleractinia: *Acropora* sp.	KU064984	KU064830	[11]	
P. rotumana (Borradaile, 1898)	RMNH.CRUS.D.48378	Cebu Strait, Philippines	Free-living				
P. rotumana (Borradaile, 1898)	[Additional illustrations]						[6, 24]
***Periclimenes* G.O. Costa, 1844**							
P. colemani Bruce, 1975	UO V08-104	Vietnam, Nhatrang Bay	Echinodermata: *Toxopneustes* sp.	KU064991		[11]	
P. colemani Bruce, 1975	OUMNH.ZC.2010-03-009	Vietnam	?		MW843322	[30]	
P. colemani Bruce, 1975	[Additional illustrations]	-	-				[31]
P. kempi Bruce, 1969	MTQ W-33147	Lizard Island, Australia	Cnidaria: Alcyonacea*	KU064999	KU170695	[11]	
P. kempi Bruce, 1969	RMNH.CRUS.D.47655	Moluccas, N.W. Seram, Indonesia	Cnidaria: Alcyonacea*				
P. kempi Bruce, 1969	[Additional illustrations]	-	-				[32]
***Zenopontonia* Bruce, 1975**							
Z. rex (Kemp, 1922)	UO V08-105	Nhatrang Bay, Vietnam	Echinodermata: Holothuroidea: *Holothuria* sp.*	KU065024	KU064867	[11]	
Z. rex (Kemp, 1922)	RMNH.CRUS.D.42857	St. François atoll, Seychelles	Echinodermata: Holothuroidea: *Thelenota ananas* (Jaeger, 1833)				
Z. rex (Kemp, 1922)	[Additional illustrations]	-	-				[33]
Z. soror (Nobili, 1904)	UO V08-111	Nhatrang Bay, Vietnam	Echinodermata: Asteroidea: *Culcita* sp.*	KU065025	KU064868	[11]	
Z. soror (Nobili, 1904)	RMNH.CRUS.D.58095	Lembeh Strait, Indonesia	Echinodermata: *Echinaster* sp.*				
Z. soror (Nobili, 1904)	[Additional illustrations]	-	-				[34]

Notes:

[1]) Two GenBank records of *Anchistus australis* Bruce, 1977 from Sanya (Hainan), China, appear to be identical. The full-genome sequences of the species are found under two different GenBank Accession numbers, but come from the same publication (reference nr. 2; Liu, 2019). Although the first mentioned record (from February, 2020) was published in the paper (Acc. nr. MN412556), another one was uploaded a month later (Acc. nr. NC046034). Since duplicates do not interfere with the current methods, both records are kept in.

[2]) One of the illustrations from reference nr. 28 (Bruce, 1992) was used to score the morphological features of *Cuapetes tenuipes* (Borradaile, 1898). However, the species illustrated by Bruce (1992) is actually *Cuapetes ischiospinosus* (Bruce, 1991) (as *Periclimenes lacerate* Bruce, 1992). The morphological features scored in this study are the same for both *C. ischiospinosus*, as *C. tenuipes*.

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APPENDIX S1 Morphological character state analysis: character states.

Notes:

- The following characters were scored based on newly made illustrations using museum specimens, and existing literature.
- Aberrant growth forms, such as the additional movable spines on the telson of *Anchistus miersi* (see Systematic account) and *A. australis* (Bruce, 1977), and the outgrowths of two of the posterior telson spines in the previously recognized forma *A. australis* f. *dendricauda*, were not included in this character state analysis.
- If no specimens could be obtained, or if the existing literature did not describe a specific character or when this character was not clearly depicted, an unknown character state was added to the dataset. Unknown character states are indicated in the matrix (supplementary table S2) with a question mark (?).

Carapace and rostrum:

1. Rostrum length. The rostrum can be longer, shorter or as long as the antennular peduncle. Rostrum longer than antennular peduncle: 0; rostrum as long as antennular peduncle: 1; rostrum shorter than antennular peduncle: 2. A shorter rostrum is thought to be a morphological adaptation, evolved to facilitate in an endosymbiotic lifestyle. In addition, the rostrum can't evolve in one step from being longer to shorter than the antennular peduncle. This is character consequently coded as ordered.
2. Rostrum tip shape. The rostrum tip shape can vary from acute to very rounded in dorsal view. Rostrum tip acute in dorsal view: 0; rostrum tip somewhat rounded in dorsal view: 1; rostrum tip very rounded: 2. As with character 2, a rounded rostrum tip is thought to be a characteristic feature of endosymbionts, and can't evolve from sharp to very rounded in one step. This character is similarly coded as ordered.
3. Rostrum shape. The rostrum base can vary from being thin to broad in dorsal view. Rostrum shape in dorsal view thin: 0; rostrum shape in dorsal view broad: 1.
4. Rostrum shape. The rostrum shape can be arched or horizontally oriented in lateral view. Rostrum horizontally oriented: 0; rostrum arched in lateral view: 1.
5. Rostrum dentition. The rostrum can bear many to no teeth on the ventral side. More than two ventral teeth: 0; two ventral teeth: 1; one to none ventral teeth: 2. Character state 2 was chosen to include both none or one ventral teeth since intraspecific variation is visible in a few species: *Anchistus demani* (pers. obs.; see Systematic account), *Dasella brucei* (Bruce, 1981 – as *D. herdmaniae*), *Paranchistus armatus* (Bruce, 2000), and *Polkamenes nobilii* (pers. obs.; see Systematic account). This character is coded as ordered.
6. Rostrum dentition. Various types of dentitions can also be found on the dorsal side of the rostrum. Many teeth along whole rostrum (reaching behind the ocular cavity): 0; 1-8 teeth, only at distal part of the rostrum: 1; various minute teeth, only at distal part of the rostrum: 2; no teeth on dorsal side of the rostrum: 3. This character is coded as ordered.
7. Rostrum setaetion. Plumose setae can be present between the dorsal teeth (if present) on the rostrum, or absent. Plumose setae present: 0; plumose setae absent: 1.
8. Antennal spine. The antennal spine can be present or absent in the selected species. Antennal spine present: 0; antennal spine absent: 1.
9. Inferior orbital angle. The inferior orbital angle can vary in shape and placement. A broad, large orbital angle placed above the antennal spine: 0; a small orbital angle placed above or behind (in lateral view) the antennal spine: 1; an orbital angle that is

fused with the antennal spine: 2. It is believed a reduced orbital angle is thought to be a characteristic feature of endosymbionts, and that the angle can't evolve from broad and large to merged with the antennal spine in one step. This character is therefore coded as ordered.

10. Hepatic spine. The hepatic spine can be visible as an articulating or non-articulating tooth. Non-articulating hepatic spine: 0; articulating hepatic spine: 1; hepatic spine absent: 2.

Anterior appendages and mouthparts:

11. Scaphocerite. The size of the distolateral tooth of the scaphocerite can vary between small and relatively large. Small sized tooth, less than 15% of lateral margin scaphocerite: 0; large sized tooth, more than 15% of lateral margin scaphocerite: 1.
12. Antennular peduncle. Distolateral angel produced in tooth: 0; distolateral angle not produced in tooth: 1.
13. Antennular peduncle. Anterior margin rounded: 0; anterior margin with tooth. This latter character state is present in *Tympanicheles ornatus* and *Polkamenes nobili*.
14. Maxillula. The lower of the two lacinias can be developed to be around the same size as the upper lacinia and be quite slender, while some species have developed a larger and broader lower lacinia. Slender, small lower lacinia: 0; broad, larger lacinia: 1.
15. First maxillipeds. The coxal endite of the first maxillipeds can be covered in setae or bear no setae. Normal setation of the coxal endites: 0; no setae on the coxal endite: 1.
16. Third maxillipeds. The (sometimes merged) basis and ischiomerus of the third maxillipeds can be curved to fit the ventral body shape of the mouth-region. Straight basis and ischium: 0; curved basis and ischium: 1.
17. Third maxillipeds. The basis and ischium of the third maxillipeds can be merged into a basi-ischiomerus, and can easily be distinguished by examining the attachment of the exopod, which is always attached to the basis. Basis and ischiomerus distinct: 0; basis and ischiomerus partly fused: 1; basis and ischiomerus merged into basi-ischiomerus: 2. This character is coded as ordered, since the fusion of the two segments cannot happen without the intermediate stage. This character was scored as a question mark if there were no illustrations available, or if the published illustrations could not be checked with collection materials.

Pereiopods:

18. First cheliped dentition. In certain clades, minute teeth can be found on the cutting edges of the first chelipeds. No teeth on cutting edge of the first chelipeds: 0; serrated edge of first chelipeds: 1.
19. First cheliped ornamentation. The first chelipeds are often ornamented with various tuffs of setae on the exterior surface, but some species bear an extra row of elongated, curved setae. These setae are located on the dorsal and ventral side on the first chelipeds' palms, and are curved inwards. No additional elongated setae on first chelipeds: 0; row of elongated setae on first chelipeds palms: 1.
20. Second cheliped veil organ. The second chelipeds of some species have been found to bear an oval-shaped veil on the ventral side of the palm, resembling an insect tympanal organ. Oval-shaped veil organ absent: 0; long oval-shaped veil organ: 1; short oval-shaped veil organ in proximal part of palm present: 2; The character states are ordered.
21. Second cheliped dentition. Most clades of shrimp possess teeth on the cutting edges of the second chelipeds, but some species have developed straight, toothless cutting edges. Cutting edges with teeth: 0; cutting edges straight, without teeth: 1.

22. Second cheliped dactylus. Compared to the pollex, the dactylus of the major chelipeds can be overreaching, or around the same size. The dactylus and the pollex share approximately the same size: 0; the dactylus being much longer than the pollex, overreaching it: 1.
23. First walking legs, propodal ornamentation. The ventral side of the propodus of the walking legs can be armed with one or two spines on four/fifth of the propodal length. Ventral spines present: 0; ventral spines absent: 1.
24. First walking legs, propodal ornamentation. The distal, ventral spines of the propodus of the walking legs can vary in shape and size. Long distal spines: 0; short distal spines: 1; absent spines: 2; club-shaped spines: 3. The club-shaped spines of *Dasella herdmaniae* are coded separately due to their unique shape and size.
25. First walking legs, dactylus shape. The walking leg dactyls can be elongated and hooked, or subrectangular in their shape. An elongated dactylar shape: 0; dactyls subrectangularly shaped: 1. The dactyls of *Tympanicheles ornatus* look elongated at a first glance, but comparing them to the elongated dactyls of *Ensiger custoides* and *E. custos*, they more so resemble the other ingroup species.
26. First walking legs, dactyl corpus ornamentation. A unique feature can be found in two species of the ingroup, where the unguis seems "sunken" inside of the corpus of the dactyls of the walking legs. This feature is easily distinguishable as "wrinkles" on the dorsal side of the corpus. Unguis not sunken inside of corpus: 0; unguis sunken inside of corpus: 1.
27. First walking legs, dactyl flexor margin dentation. The flexor margin of the dactyls of the walking legs can bear various types of teeth and denticles. No teeth present: 0; one large, broad tooth, perpendicular to the unguis curvature: 1; one small, or various small denticles: 2; one large, sharp tooth, parallel to unguis curvature: 3.
28. First walking legs, dactyl flexor margin microspinules. Microspinules can be seen on the distal part of the flexor margin or the dactyls of the walking legs. These microspinules can be present on the toothless border of the flexor margin, or on an additional large tooth (character 29). No microspinules on flexor margin: 0; microspinules present on flexor margin: 1.
29. First walking legs, unguis microspinules. The unguis of the dactyls of the walking legs can bear microspinules on the dorsal side. The structured area of the unguis can vary in size. No microspinules: 0; dorsal side of unguis sparsely covered or partly covered on the base of the unguis: 1; entire dorsal surface covered: 2. Since full coverage cannot evolve in one step, this character state is coded as ordered.
30. First walking legs, unguis shape. The unguis can vary quite a lot in shape and size. A hooked, elongated unguis: 0; a broader, rounded unguis with a sharp tip: 1; a broader, rounded unguis with a rounded tip: 2. Character state 2 is unique in *A. demani* and was coded as such to account for its aberrant shape. We believe *A. demani* evolved its broad, rounded unguis from a similar, but sharp unguis. Therefore, this character is coded as ordered.
31. First walking legs, unguis size. The ratio between the width and the length explains the basic shape of the unguis in relation to the morphology of the corpus-unguis border. The width was measured as the corpus-unguis border, while the length was measured as the distance between the tip of the unguis to the middle of the corpus-unguis border. Width / length of unguis: between 0.2 and 0.5: 0; between 0.5 and 0.75: 1; between 0.8 and 1.0: 2; above 1.0: 3. This character is coded as ordered.

Abdomen and pleopods:

32. First male pleopod. The first male pleopod's endopod shape can vary between bilobed, rounded, and an intermediate shape. Rounded endopod: 0; weakly bilobed endopod: 1; very bilobed: 2. Because the weakly bilobed endopod can be distinguished as an intermediate stage, this character is coded as ordered.

Uropods and Telson:

33. Protopodite shape. The median angle of the protopodites can be blunt or sharp in dorsal view. Median angle blunt: 0; median angle sharp: 1.
34. Telson spines. The size of the telson's dorsal spines is compared to the overall telson length. The length of the posterior, dorsal telson spines is measured from base to tip, and the overall length of the telson is measured from the base of the posterior spines to the attachment to the last abdominal segment. Spine length / telson length: above 0.08: 0; under 0.08: 1.

Colouration in life:

35. Colouration in life. While the colouration patterns can vary quite a lot between species, similar placement of chromatophores can be distinguished. In this case, the size of the spots in the polka-dotted pattern can be a coding character. Spots absent: 0; minute white, red or yellow dots: 1; somewhat larger red, blue or yellow and orange spots: 2; large red spots: 3.

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TABLE S2 Morphological character state analysis: Data matrix.

Character	*Anchistus australis*	*Anchistus demani*	*Anchistus gravieri*	*Anchistus miersi*	*Dasella ansoni*	*Dasella brucei*	*Dasella herdmaniae*	*Ensiger custoides*	*Ensiger custos*	*Neoanchistus cardiodytes*	*Neoanchistus nasalis*	*Paranchistus armatus*	*Polkamenes liui*	*Polkamenes nobilii*	*Polkamenes pycnodontae*	*Polkamenes spondylis*	*Tymapicheles pectinis*	*Tymapicheles ornatus*	*Cuapetes tenuipes*	*Palaemonella rotumana*	*Zenopontonia soror*	*Zenopontonia rex*	*Lipkemenes lanipes*	*Periclimenes colemani*	*Periclimenes kempi*	*Actinimenes ornatus*	*Actinimenes inornatus*
1	2	2	2	2	1	1	2	1	1	1	2	2	2	2	2	2	2	2	0	1	2	0	1	2	1	1	1
2	0	0	0	0	0	0	0	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0
5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	1	2	2	2	2	1	2	2
6	1	1	1	1	1	1	3	2	3	3	3	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
7	1	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1
8	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	1	1	1	1	1	1	1	1	2	2	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
10	2	2	2	2	1	1	1	2	2	2	2	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0
11	1	1	1	1	0	?	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	1	0	0	0	0	0
14	1	1	0	1	0	?	0	1	1	1	1	1	1	1	1	?	1	1	0	0	0	0	0	0	0	0	0
15	0	0	0	0	1	?	1	0	0	0	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	0	0
16	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
17	2	2	2	0	2	2	2	1	2	2	2	1	0	?	0	?	2	0	0	0	1	0	1	2	2	2	2
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1
19	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	3	3	3	3	0	0	0	0	0	?	2	0	?	0	0	?	1	1	0	0	0	0	0	0	0	0	0
21	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
22	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
23	1	1	1	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0
24	1	1	1	1	0	0	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
25	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	?	0	0	0	1	1	0	0	0	0	0	0	0	0	0
27	2	2	0	3	1	1	1	0	0	0	2	1	0	3	3	3	2	2	0	0	2	2	3	2	0	0	0
28	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0
29	2	2	2	2	?	?	1	0	0	2	2	1	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
30	1	2	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
31	3	3	1	3	0	0	0	1	0	0	2	1	0	2	2	?	1	0	0	0	1	1	0	0	0	0	0
32	1	1	0	0	0	0	0	0	1	1	1	0	?	2	2	1	0	1	0	0	0	1	?	1	0	0	0
33	0	0	1	1	0	0	0	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
34	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	1	0	0
35	2	2	2	2	1	?	1	1	1	3	?	1	?	?	2	2	3	1	0	0	1	1	1	0	1	0	0

FIGURE S1 Single-gene phylogenetic trees: Phylogeny based on the RAxML tree topology of the 16S marker. Bayesian posterior probabilities and RAxML bootstrap support values are expressed respectively as percentages. Dashes (--) indicate RAxML values <50; asterisk (*) indicates different topology of the BI tree. Support and probability values of intraspecific nodes were dismissed. Newly generated barcodes are indicated as collection accession numbers (RMNH.CRUS.D.).

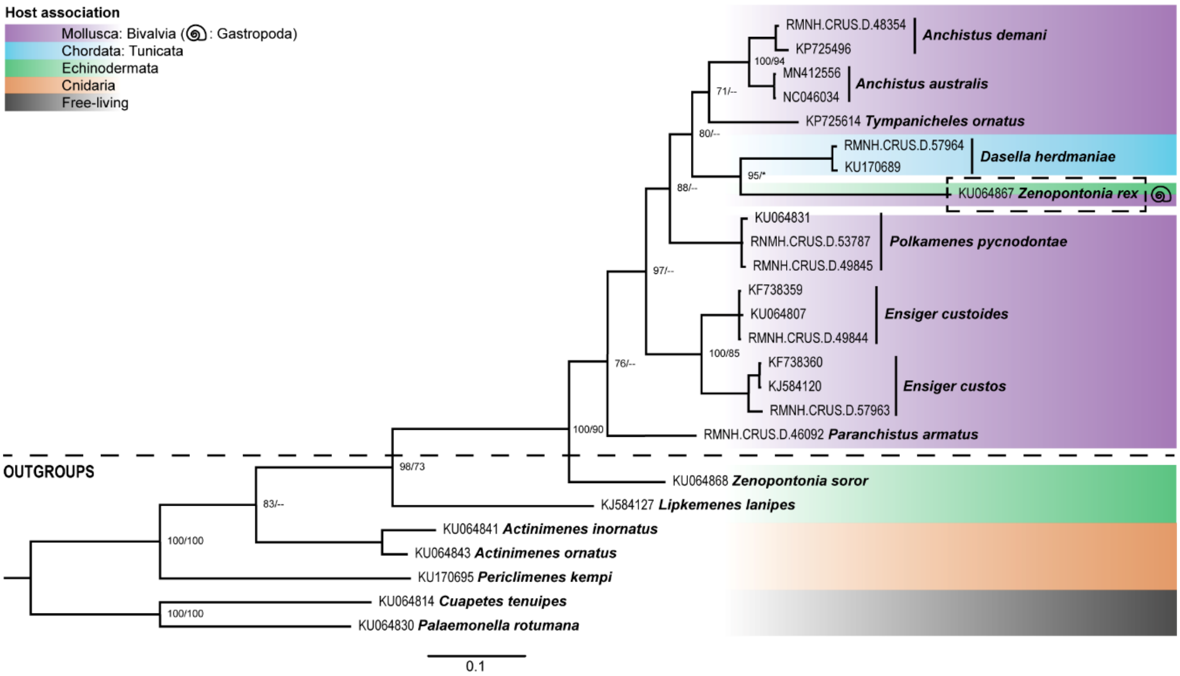

FIGURE S2 Single-gene phylogenetic trees: Phylogeny based on the RAxML tree topology of the COI marker. Bayesian posterior probabilities and RAxML bootstrap support values are expressed respectively as percentages. Dashes (--) indicate RAxML values <50; asterisk (*) indicates different topology of the BI tree. Support and probability values of intraspecific nodes were dismissed. Newly generated barcodes are indicated as collection accession numbers (RMNH.CRUS.D.).

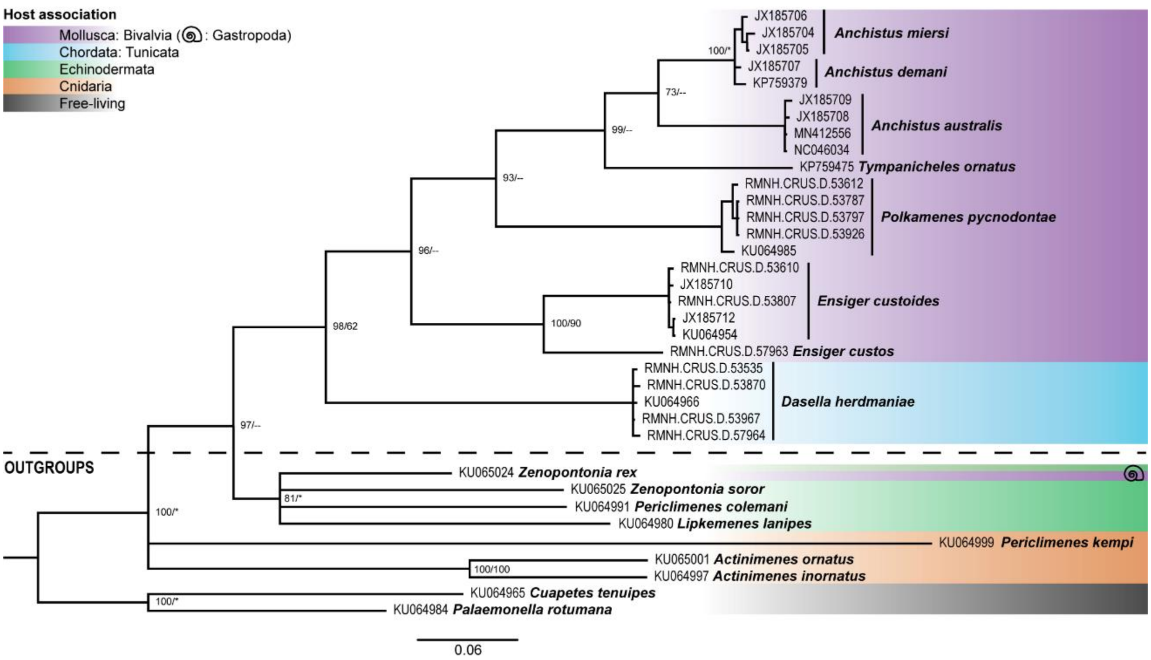

FIGURE S3 Phylogeny based on the MrBayes tree topology of a combined marker: 16S and COI. Bayesian posterior probabilities and RAxML bootstrap support values are expressed respectively as percentages. Dashes (--) indicate RAxML values <50; asterisk (*) indicates different topology of the BI tree. Support and probability values of intraspecific nodes were dismissed. Newly generated barcodes are indicated as collection accession numbers (RMNH.CRUS.D.).

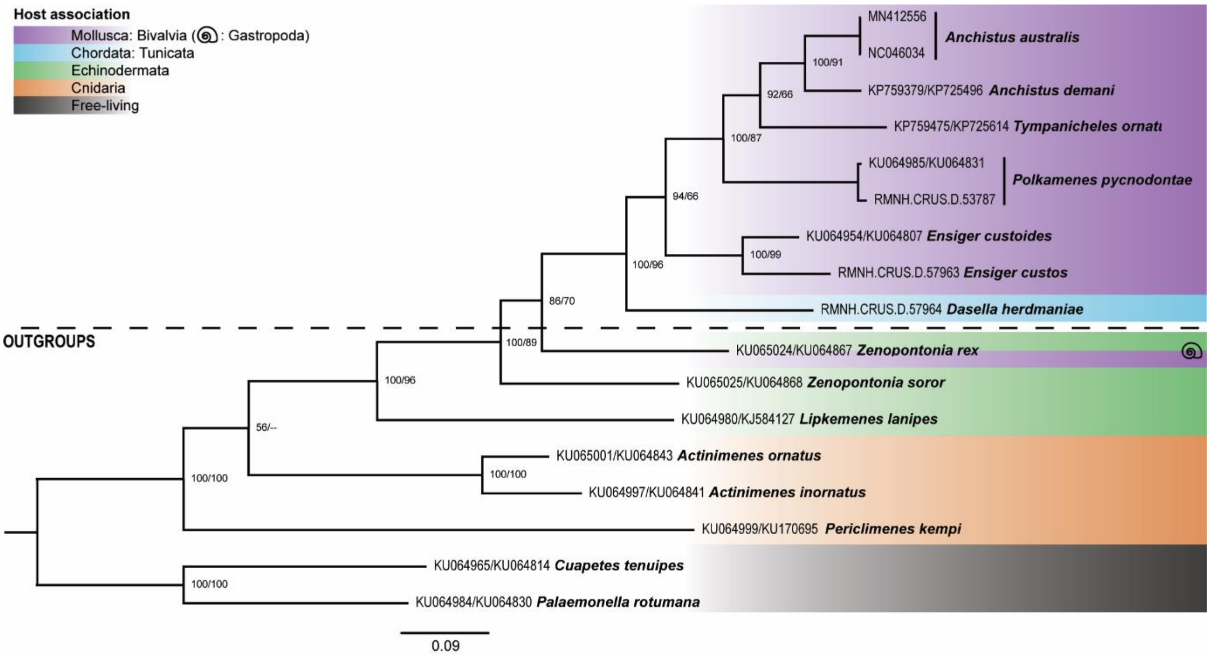

FIGURE S4 Corresponding tree topology with node numbers for table S2. Asterisks (*) next to species names indicate species which are included with exclusively morphological data.

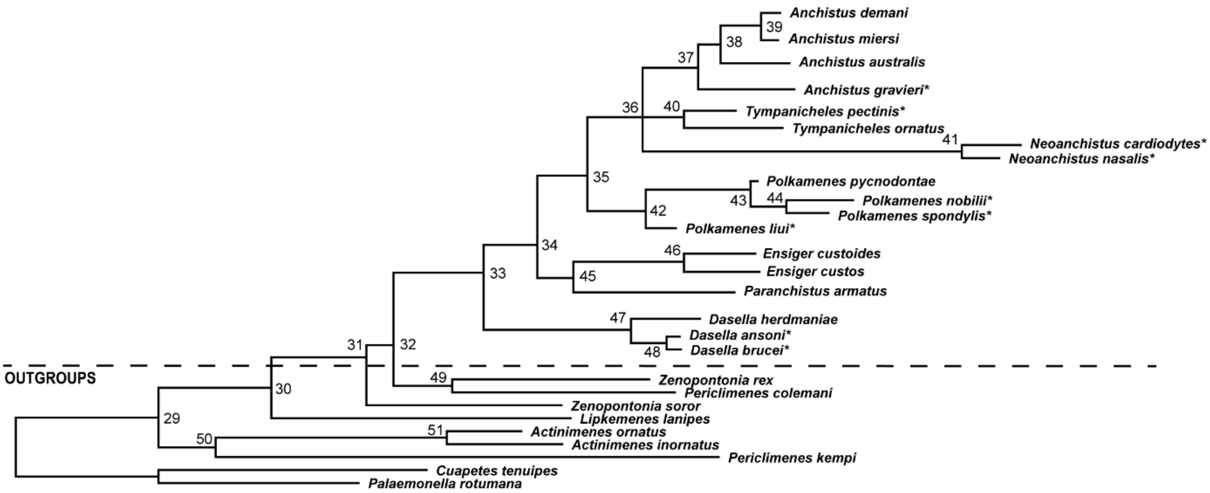

TABLE S3 ML-probability values for the ancestral state reconstruction (host associations), with a corresponding tree topology with node numbers. Host associations with the highest probability values are indicated in **bold** for all nodes.

		ML-values: Host associations				
Node in topology	**Node (list)**	**Cnidaria**	**Echinodermata**	**Free-living**	**Mollusca: Bivalvia**	**Tunicata**
28	1	0,022	0,017	**0,954**	0,003	0,003
29	2	**0,483**	0,359	0,137	0,011	0,011
30	3	0,031	**0,954**	0,010	0,003	0,002
31	4	0,002	**0,994**	0,001	0,003	0,001
32	5	0,001	**0,991**	0,000	0,005	0,002
33	6	0,007	0,299	0,007	**0,508**	0,180
34	7	0,000	0,003	0,000	**0,995**	0,002
35	8	0,000	0,000	0,000	**1,000**	0,000
36	9	0,000	0,000	0,000	**1,000**	0,000
37	10	0,000	0,000	0,000	**1,000**	0,000
38	11	0,000	0,000	0,000	**1,000**	0,000
39	12	0,000	0,000	0,000	**1,000**	0,000
40	13	0,000	0,000	0,000	**1,000**	0,000
41	14	0,000	0,000	0,000	**1,000**	0,000
42	15	0,000	0,000	0,000	**1,000**	0,000
43	16	0,000	0,000	0,000	**1,000**	0,000
44	17	0,000	0,000	0,000	**1,000**	0,000
45	18	0,000	0,000	0,000	**0,999**	0,000
46	19	0,000	0,000	0,000	**1,000**	0,000
47	20	0,000	0,001	0,000	0,002	**0,996**
48	21	0,000	0,000	0,000	0,000	**1,000**
49	22	0,000	**0,998**	0,000	0,001	0,000
50	23	**0,804**	0,132	0,052	0,006	0,006
51	24	**0,998**	0,001	0,001	0,000	0,000