SUPPLEMENTARY INFORMATION

Discovery of *Novaculina myanmarensis* **sp. nov.** (Bivalvia: Pharidae: Pharellinae) closes the freshwater razor clams range disjunction in Southeast Asia

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Habitat of *Novaculina myanmarensis* **sp. nov.**, Ayeyarwady River, near Minbu, 20.1911° N, 94.8788° E (Photo: Nyein Chan).

Contents

Supplementary Table 1. List of additional sequences from GenBank used in this study for phylogenetic reconstructions. Species names and environmental preference are on the basis of the World Register of Marine Species database[1].

Taxa	Environment	Locality	*COI*	*16S rRNA*	*28S rRNA*
Sinonovacula constricta (Lam., 1818)	Marine	China	JN859986	JN859901	AF131005
S. mollis (G. B. Sowerby II, 1874) (=*S. rivularis* Huang & Zhang, 2007)	Marine	China	JN859994	JN859908	n/a
Pharella javanica (Lam., 1818)	Marine	Thailand	n/a	n/a	AM779683
Cultellus attenuatus Dunker, 1862	Marine	China	JN859998	JN859913	n/a
Ensiculus cultellus (L., 1758)	Marine	Queensland, Australia	n/a	n/a	AM779682
Pharus legumen (L., 1758)	Marine	South Wales, UK	n/a	n/a	AM779684
Phaxas pellucidus (Pennant, 1777)	Marine	Sweden, Tjärnö	KC429145	KC429309	KC429508
Ensis magnus Schumacher, 1817*	Marine	Ireland & Spain**	EU523690	AJ586445	n/a
E. leei Huber, 2015*	Marine	Europe & USA**	EU523673	HF970450	JF909603
E. macha (Molina, 1782)*	Marine	Chile**	JF301780	HF970471	n/a
Siliqua alta (Broderip & Sowerby, 1829)*	Marine	Hokkaido, Japan	n/a	AB751362	AB746908
S. radiata (Linnaeus, 1758)*	Marine	China	JN860004	JN859917	n/a

*Outgroup taxa. **Chimeric sequence. n/a – not available.

Supplementary Table 2. List of available georeferenced records of *Novaculina* species

Species	Locality	Latitude	Longitude	Reference
N. myanmarensis **sp. nov.**	Myanmar: downstream of Donthami River	16.6935	97.5819	This study (RMBH)
N. myanmarensis **sp. nov.**	Myanmar: Ayeyarwady River, Pakokku Region, near Thin Baw Kone village*	21.3146	95.0591	This study (RMBH)
N. myanmarensis **sp. nov.**	Myanmar: Ayeyarwady River, large sandbar 0.5 mi SE of Nyaung-U	21.2066	94.9062	This study (CAS)
N. myanmarensis **sp. nov.**	Myanmar: Ayeyarwady River, near Minbu	20.1911	94.8788	This study (FFI)
N. gangetica	India: Ganges River at Vindhyachal upstream of Mirzapur	25.1666	82.5072	Ref. 5
N. gangetica	India: Hooghly River downstream of Howra	22.4278	88.1368	Ref. 5
N. gangetica	India: Ganges River at Varanasi	25.3279	83.0464	Ref. 6
N. gangetica	India: Ganges River at Patna	25.6589	85.1573	Ref. 7
N. gangetica	India: Calcutta*	22.6000	88.3000	MCZ 224805; UMZC I.102125
N. gangetica	India: Jumna [Yamuna] River at Hamirpur	25.9617	80.1525	Ref. 8
N. gangetica	India: Gomti River at Jaunpur	25.7474	82.6874	Ref. 8
N. gangetica	India: Burhi Gandak River at Khagaria	25.5009	86.4776	Ref. 9
N. gangetica	Bangladesh: Turag River at Tangi Bridge	23.8997	90.4081	Ref. 10
N. gangetica	Bangladesh: Moyur River	22.7719	89.5402	Ref. 11
N. gangetica	Myanmar: Kaladan River	21.0094	92.9813	Ref. 12
N. gangetica	Myanmar: Lemro River	20.6150	93.2481	Ref. 12
N. siamensis	Thailand: Chantakam [Bang Pakong River basin]*	14.0000	102.0000	Ref. 2
N. siamensis	Thailand: Pa Sak River near Saraburi	14.5304	100.9113	Ref. 3
N. siamensis	Vietnam: Ba Lai River, Mekong Delta	10.2647	106.4397	Ref. 4
N. chinensis	China: Lake Taihu, Wuxi*	31.4402	120.3143	Ref. 13, 14
N. chinensis	China: Lake Taihu, southwest	31.1843	120.4267	Ref. 15
N. chinensis	China: Lake Hongze	33.3075	118.7100	Ref. 16
N. chinensis	China: Lake Chaohu	31.5224	117.5616	Ref. 17
N. chinensis	China: Yintan	28.0333	117.0667	Ref. 18

*Type locality (see Taxonomic Account for details).

Supplementary Table 3. Models of sequence evolution for each partition based on corrected Akaike Information Criterion (AICc) of MEGA6[19] that were applied within Bayesian models

Data set and partition	Model	Gamma	Invariant
1st codon of *COI*	TN93+G	0.10	n/a
2nd codon of *COI*	HKY+G	0.05	n/a
3rd codon of *COI*	HKY+G	0.87	n/a
16S rRNA	GTR+G+I	0.40	0.51
28S rRNA	GTR+G+I	7.15	0.58

n/a – not available.

Supplementary references

1. *World Register of Marine Species* http://marinespecies.org (2018).
2. Morlet, L. Catalogue des Coquilles recueillies, par M. Pavie, dans le Cambodge et le Royaume de Siam, et description d'espèce nouvelles. *Journal de Conchyliologie* **37**, 121–199 (1889).
3. Brandt, R. A. M. The non-marine aquatic mollusca of Thailand. *Archiv für Mollusckenkunde* **105**, 1–423 (1974).
4. Sayenko, E.M., Quang, N.X. & Lutaenko, K.A. Bivalves of the Ba Lai River – one of estuary of the Mekong Delta, Vietnam. in *Life-Supporting Asia-Pacific Marine Ecosystems, Biodiversity and Their Functioning* (ed. Dautova, T.N, Sun, X., Sun, S. & Adrianov, A.V.) 178–184 (Science Press Beijing, 2017).
5. Nesemann, H. A., Sharma, S. U., Sharma, G. O. & Sinha, R. K. Illustrated checklist of large freshwater bivalves of the Ganga river system (Mollusca: Bivalvia: Solecurtidae, Unionidae, Amblemidae). *Nachrichchtenblatt der Ersten Vorarlberger Malakologischen Gesellschaft* **13**, 1–51 (2005).
6. Subba Rao, N.V. *Handbook of freshwater molluscs of India* (Calcutta, 1989).
7. Nesemann, H., Sharma, G. & Sinha, R. Benthic macro-invertebrate fauna and "marine elements" sensu Annandale (1922) highlight the valuable dolphin habitat of river Ganga in Bihar-India. *Taprobanica* **3,** 18–30; DOI:10.4038/tapro.v3i1.3230 (2011).
8. Benson, W.H. Characters of *Tanysiphon*, a new genus of fluviatile shells, allied to Myacidae. *Annals and Magazine of Natural History (3rd series)* **1**, 407–410 (1858).
9. Prabhakar, A. K. & Roy, S. P. Taxonomic diversity of shell fishes of Kosi Region of North-Bihar (India). *The Ecoscan* **2**, 149–156 (2008).
10. Baki, M. A., Hossain, M. M. & Bhouiyan, N. A. Checklist of freshwater mollusca (Gastropoda and Bivalvia) recorded from the Buriganga and Turag rivers, Dhaka, Bangladesh. *The Festivus* **48,** 221–228 (2016).

11. Khan, A. N., Kamal, D., Mahmud, M. M., Rahman, M. A. & Hossain, M. A. Diversity, distribution and abundance of benthos in Mouri River, Khulna, Bangladesh. *International Journal of Sustainable Crop Production* **2**, 19–23 (2007).

12. Bolotov, I. N. et al. Discovery of a silicate rock-boring organism and macrobioerosion in fresh water. *Nature Communications* **9**, 2882; DOI:10.1038/s41467-018-05133-4 (2018).

13. Liu, Y. Y. & Zhang, W. Z. A new species of freshwater razor clam, *Novaculina chinensis*, from Jiangsu Province, China. *Acta Zootaxonomica Sinica* **4**, 356–357 (1979).

14. Qin, B. (Ed.). Lake Taihu, China: Dynamics and environmental change. *Monographiae Biologicae* **87**, 1–348 (2008).

15. Ji, L., Song, C., Cao, X., Zhou, Y. & Deng, D. Spatial variation in nutrient excretion by macrozoobenthos in a Chinese large shallow lake (Lake Taihu). *Journal of Freshwater Ecology* **30**, 169–180; DOI:10.1080/02705060.2014.997816 (2015).

16. Hu, Z., Sun, X., Cai, Y., Guo, L., Chen, Q., Liu, T., Shi, F. & Yang, L. The habitat type and trophic state determine benthic macroinvertebrate communities in lowland shallow lakes of China. *Journal of Limnology* **75**, 330–339; DOI:10.4081/jlimnol.2016.1220 (2016).

17. Cai, Y., Gong, Z. & Xie, P. Community structure and spatiotemporal patterns of macrozoobenthos in Lake Chaohu (China). *Aquatic Biology* **17**, 35–46; DOI:10.3354/ab00455 (2012).

18. Wen, C. & Zhu, Z. Seven species of water mites in the genus *Unionicola* from Jiangxi (Acari: Unionicolidae). *Acta Zootaxonomica Sinica* **24**, 30–37 (1999).

19. Tamura, K., Stecher, G., Peterson, D., Filipski, A. & Kumar, S., MEGA6: Molecular Evolutionary Genetics Analysis version 6.0. *Molecular Biology and Evolution* **30**, 2725–2729; DOI:10.1093/molbev/mst197 (2013).