

# Eight new freshwater mussels (Unionidae) from tropical Asia

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*Radiatula myitkyinae* (Prashad, 1930) on basalt outcrop in Lake Indawgyi (Photo: Ivan N. Bolotov)

**Supplementary Table 1.** List of sequences used in this study, including the species, locality and NCBI's GenBank accession numbers

Species	Locality	Specimen Voucher	COI	16S rRNA	28S rRNA
<b>UNIONIDAE Rafinesque, 1820</b>					
<b>PARREYSIINAE Henderson 1935</b>					
<b>Indochinellini Bolotov, Pfeifer, Vikhrev &amp; Konopleva, 2018</b>					
<i>Indochinella pugio pugio</i> (Benson, 1862)	Myanmar: Ayeyarwady River basin, Lake Nant Phar	RMBH biv_258_1	MF352261	MF352325	MF352386
<i>I. pugio pugio</i> (Benson, 1862)	Myanmar: Ayeyarwady River basin, Lake Nant Phar	RMBH biv_258_2	MF352262	MF352326	MF352389
<i>I. pugio pugio</i> (Benson, 1862)	Myanmar: Ayeyarwady River basin, Lake Myaung	RMBH biv_268_1	MF352285	n/a	n/a
<i>I. pugio pugio</i> (Benson, 1862)	Myanmar: Ayeyarwady River basin, Lake Myaung	RMBH biv_268_2	MF352286	MF352346	MF352403
<i>I. pugio pugio</i> (Benson, 1862)	Myanmar: Ayeyarwady River basin, Lake Myaung	RMBH biv_268_4	MF352287	MF352347	MF352404
<i>I. pugio pugio</i> (Benson, 1862)	Myanmar: Ayeyarwady River basin, Chindwin River, Pauk In Lake	UA 20739	JN243899	KP795046	JN243879
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Sittaung River basin, Myit Kyi Pauk stream	RMBH biv_251_1	MF352242	MF352312	MF352370
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Sittaung River basin, Myit Kyi Pauk stream	RMBH biv_251_2	MF352243	MF352313	MF352371
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Sittaung River basin, Myit Kyi Pauk stream	RMBH biv_251_3	MF352244	MF352314	MF352372
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Bilin River	RMBH biv_371_3	MK372428	n/a	n/a
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Bilin River	RMBH biv_375_1	MK372429	n/a	n/a
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Bilin River	RMBH biv_375_2	MK372430	n/a	n/a
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Moeyungyi Lake, Sittaung Basin	RMBH biv_377_2	MK372432	n/a	n/a
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Moeyungyi Lake, Sittaung Basin	RMBH biv_377_3	MK372433	n/a	n/a
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Bago River	RMBH biv_381_3	MK372434	n/a	n/a
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Bago River	RMBH biv_381_4	MK372435	n/a	n/a

Species	Locality	Specimen Voucher	COI	16S rRNA	28S rRNA
<i>I. pugio viridissima</i> <b>ssp. nov.</b>	Myanmar: Moe Lut Stream, Bago Basin	RMBH biv_386_2	MK372436	n/a	n/a
<i>I. pugio daweiensis</i> <b>ssp. nov.</b>	Myanmar: Dawei River	RMBH biv_147_3	KX865852	KX865623	KX865724
<i>I. pugio daweiensis</i> <b>ssp. nov.</b>	Myanmar: Dawei River	RMBH biv_147_10	KX865853	KX865624	KX865725
<i>I. pugio daweiensis</i> <b>ssp. nov.</b>	Myanmar: Dawei River	RMBH biv_147_18	KX865854	KX865625	KX865726
<i>I. pugio daweiensis</i> <b>ssp. nov.</b>	Myanmar: Dawei River	RMBH biv_148_4	KX865855	KX865626	KX865727
<i>I. pugio daweiensis</i> <b>ssp. nov.</b>	Myanmar: Dawei River	RMBH biv_148_7	KX865856	KX865627	KX865728
<i>I. pugio daweiensis</i> <b>ssp. nov.</b>	Myanmar: Dawei River	RMBH biv_148_15	KX865857	KX865628	KX865729
<i>I. pugio daweiensis</i> <b>ssp. nov.</b>	Myanmar: Dawei River	RMBH biv_147_30	MK372395	n/a	n/a
<i>I. pugio paradoxa</i> <b>ssp. nov.</b>	Myanmar: Haungthayaw River	RMBH biv_361_1	MK372420	MK372465	MK372496
<i>I. pugio paradoxa</i> <b>ssp. nov.</b>	Myanmar: Haungthayaw River	RMBH biv_361_2	MK372421	MK372466	MK372497
<i>I. pugio paradoxa</i> <b>ssp. nov.</b>	Myanmar: Haungthayaw River	RMBH biv_361_3	MK372422	MK372467	MK372498
<i>Radiatula mouhoti</i> Vikhrev, Bolotov & Konopleva, 2017	Myanmar: Sittaung River near Taungoo	RMBH biv_248_1	MF352234	MF352305	MF352363
<i>R. mouhoti</i> Vikhrev, Bolotov & Konopleva, 2017	Myanmar: Sittaung River near Taungoo	RMBH biv_248_4	MF352236	MF352306	MF352364
<i>R. mouhoti</i> Vikhrev, Bolotov & Konopleva, 2017	Myanmar: Sittaung River near Taungoo	RMBH biv_253_1	MF352248	MF352317	MF352375
<i>R. mouhoti haungthayawensis</i> <b>ssp. nov.</b>	Myanmar: Haungthayaw River	RMBH biv_360_1	MK372417	MK372463	MK372493
<i>R. mouhoti haungthayawensis</i> <b>ssp. nov.</b>	Myanmar: Haungthayaw River	RMBH biv_360_2	MK372418	MK372464	MK372494
<i>R. mouhoti haungthayawensis</i> <b>ssp. nov.</b>	Myanmar: Haungthayaw River	RMBH biv_360_3	MK372419	n/a	MK372495
<i>R. chaudhurii</i> (Preston, 1912) [= <i>R. cf. bonneaudii</i> sp.1 sensu Bolotov et al.,	Myanmar: Ayeyarwady River basin, Tar Pein River	RMBH biv_260_5	MF352266	MF352330	MF352390

Species	Locality	Specimen Voucher	COI	16S rRNA	28S rRNA
2017]					
<i>R. chaudhurii</i> (Preston, 1912) [= <i>R. cf. bonneaudii</i> sp.1 sensu Bolotov et al., 2017]	Myanmar: Ayeyarwady River basin, Tar Pein River	RMBH biv_260_10	MF352268	MF352332	MF352392
<i>R. chaudhurii</i> (Preston, 1912) [= <i>R. cf. bonneaudii</i> sp.1 sensu Bolotov et al., 2017]	Myanmar: Ayeyarwady River basin, Tar Pein River	RMBH biv_260_9	MF352267	MF352331	MF352391
<i>R. chaudhurii</i> (Preston, 1912) [= <i>R. cf. bonneaudii</i> sp.1 sensu Bolotov et al., 2017]	Myanmar: Ayeyarwady River basin, midstream near Tha Phan Kone village	RMBH biv_427_2	MK372445	n/a	n/a
<i>R. chaudhurii</i> (Preston, 1912) [= <i>R. cf. bonneaudii</i> sp.1 sensu Bolotov et al., 2017]	Myanmar: Ayeyarwady River basin, midstream near Tha Phan Kone village	RMBH biv_427_1	MK372444	n/a	n/a
<i>R. chaudhurii</i> (Preston, 1912) [= <i>R. cf. bonneaudii</i> sp.1 sensu Bolotov et al., 2017]	Myanmar: Ayeyarwady River basin, midstream near Thin Baw Kone village	RMBH biv_421_3	MK372440	MK372472	MK372504
<i>R. chaudhurii</i> (Preston, 1912) [= <i>R. cf. bonneaudii</i> sp.1 sensu Bolotov et al., 2017]	Myanmar: Ayeyarwady River basin, midstream near Thin Baw Kone village	RMBH biv_421_2	MK372439	MK372471	MK372503
<i>R. myitkyinae</i> (Prashad, 1930)	Myanmar: Ayeyarwady River basin, Lake Indawgyi	RMBH biv_107_1	KX865838	KX865609	KX865710
<i>R. myitkyinae</i> (Prashad, 1930)	Myanmar: Ayeyarwady River basin, Lake Indawgyi	RMBH biv_106_3	KX865842	KX865614	KX865714
<i>R. myitkyinae</i> (Prashad, 1930)	Myanmar: Ayeyarwady River basin, Lake Indawgyi	RMBH biv_106_2	KX865843	KX865613	KX865715
<i>R. chindwinensis</i> <b>sp. nov.</b>	Myanmar: Myit Tha (Manipur) River	RMBH biv_345_2	MK372405	MK372453	MK372483
<i>R. chindwinensis</i> <b>sp. nov.</b>	Myanmar: Chindwin River	RMBH biv_348_2	MK372410	MK372458	MK372488
<i>R. chindwinensis</i> <b>sp. nov.</b>	Myanmar: Myit Tha (Manipur) River	RMBH biv_345_1	MK372404	MK372452	MK372482
<i>R. chindwinensis</i> <b>sp. nov.</b>	Myanmar: Nay Chin Sayar River	RMBH biv_357_1	MK372414	MK372462	MK372492
<i>R. chindwinensis</i> <b>sp. nov.</b>	Myanmar: Nay Chin Sayar River	RMBH biv_357_2	MK372415	n/a	n/a
<i>R. chindwinensis</i> <b>sp. nov.</b>	Myanmar: Nay Chin Sayar River	RMBH biv_357_3	MK372416	n/a	n/a
<i>R. myitthanensis</i> <b>sp. nov.</b>	Myanmar: Myit Tha	RMBH	MK372396	MK372450	MK372477

Species	Locality	Specimen Voucher	COI	16S rRNA	28S rRNA
	(Manipur) River	biv_337_3			
<i>R. myitthanensis</i> <b>sp. nov.</b>	Myanmar: Chindwin River	RMBH biv_348_1	MK372409	MK372457	MK372487
<b>Leoparreysiini Vihrev, Bolotov &amp; Kondakov, 2017</b>					
<i>Leoparreysia olivacea</i> (Prashad, 1930)	Myanmar: Ayeyarwady River, 3 mi SW Pakkoku, Magway Division. 21.2963° N, 95.0198° E	UMMZ 304641	KP795022	KP795044	KP795005
<i>L. canefrii</i> Vihrev, Bolotov & Kondakov, 2017	Myanmar: Sittaung River near Taungoo	RMBH biv_249	MF352237	MF352307	MF352365
<i>L. canefrii</i> Vihrev, Bolotov & Kondakov, 2017	Myanmar: Sittaung River near Taungoo	RMBH biv_252_1	MF352245	MF352315	MF352373
<i>L. canefrii</i> Vihrev, Bolotov & Kondakov, 2017	Myanmar: Sittaung River near Taungoo	RMBH biv_252_2	MF352246	MF352316	MF352374
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Ayeyarwady River	RMBH biv_424_3	MK372443	MK372474	MK372506
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Ayeyarwady River	RMBH biv_443_3	MK372447	n/a	n/a
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Chindwin River	RMBH biv_350_2	MK372413	MK372461	MK372491
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Ayeyarwady River	RMBH biv_424_2	MK372442	MK372473	MK372505
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Ayeyarwady River	RMBH biv_445_1	MK372448	n/a	n/a
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Ayeyarwady River	RMBH biv_419_3	MK372438	MK372470	MK372502
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Chindwin River	RMBH biv_350_1	MK372412	MK372460	MK372490
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Ayeyarwady River	RMBH biv_419_2	MK372437	n/a	n/a
<i>L. burmana</i> (Blanford, 1869)	Myanmar: Ayeyarwady River	RMBH biv_424_1	MK372441	n/a	n/a
<i>L. tavoyensis</i> (Gould, 1843)	Myanmar: Dawei River	RMBH biv_149	KX230543	KX230554	KX230565
<i>L. tavoyensis</i> (Gould, 1843)	Myanmar: Haungthayaw River	RMBH biv_362_1	MK372423	n/a	MK372499
<i>L. tavoyensis</i> (Gould, 1843)	Myanmar: Haungthayaw River	RMBH biv_362_2	MK372424	n/a	n/a
<i>L. tavoyensis</i> (Gould, 1843)	Myanmar: Haungthayaw River	RMBH biv_362_3	MK372425	n/a	n/a
<i>L. whitteni</i> <b>sp. nov.</b>	Myanmar: Chindwin River	RMBH	MK372411	MK372459	MK372489

Species	Locality	Specimen Voucher	COI	16S rRNA	28S rRNA
		biv_349			
<i>L. whitteni</i> sp. nov.	Myanmar: Ayeyarwady River	RMBH biv_435	MK372446	MK372475	MK372507
<i>L. whitteni</i> sp. nov.	Myanmar: Ayeyarwady River	RMBH biv_449	MK372449	MK372476	MK372508
<b>Coelaturini Modell, 1942</b>					
<i>Nitia teretiuscula</i> (Philippi, 1847)	Egypt	ANSP 416305	JN243897	n/a	JN243875
<i>Coelatura</i> aff. <i>aegyptiaca</i> (Caillaud, 1827)	Egypt	ANSP 416304	JN243894	KP795045	JN243872
<b>RECTIDENTINAE Modell, 1942</b>					
<b>Contradentini Modell, 1942</b>					
<i>Yaukthwa nesemanni</i> (Konopleva, Vikhrev & Bolotov, 2017)	Myanmar: Sittaung River basin, Thauk Ye Kupt River	RMBH biv_144_14	KX865906	KX865663	KX865777
<i>Y. nesemanni</i> (Konopleva, Vikhrev & Bolotov, 2017)	Myanmar: Sittaung River basin, Thauk Ye Kupt River	RMBH biv_144_25	KX865907	KX865664	KX865778
<i>Y. nesemanni</i> (Konopleva, Vikhrev & Bolotov, 2017)	Myanmar: Sittaung River basin, Thauk Ye Kupt River	RMBH biv_144_19	KX865908	KX865665	KX865779
<i>Y. panhai</i> (Konopleva, Bolotov & Kondakov, 2017)	Myanmar: Sittaung River basin, Kyan Hone River	RMBH biv_138_4	KX865909	KX865666	KX865780
<i>Y. panhai</i> (Konopleva, Bolotov & Kondakov, 2017)	Myanmar: Sittaung River basin, Kyan Hone River	RMBH biv_138_12	KX865913	KX865670	KX865784
<i>Y. panhai</i> (Konopleva, Bolotov & Kondakov, 2017)	Myanmar: Sittaung River basin, Kyan Hone River	RMBH biv_155_4	KX865911	KX865668	KX865782
<i>Y. inlenensis</i> Konopleva et al., 2019	Myanmar: Salween River basin, Inle Lake Channel	RMBH biv_114_1	KX865915	KX865672	KX865786
<i>Y. inlenensis</i> Konopleva et al., 2019	Myanmar: Salween River basin, Inle Lake Channel	RMBH biv_114_2	KX865917	KX865674	KX865788
<i>Y. inlenensis</i> Konopleva et al., 2019	Myanmar: Salween River basin, Mway Stream	RMBH biv_139_7	KX865922	KX865676	KX865793
<i>Y. cf. dalliana</i> (Frierson, 1913)	Myanmar: Ayeyarwady River basin, Nanyinhka Chaung River	RMBH biv_111_21	KX865890	KX865657	KX865761
<i>Y. cf. dalliana</i> (Frierson, 1913)	Myanmar: Ayeyarwady River basin, Mali Hka River basin, Pan Khai stream	RMBH biv_101_5	KX865894	KX865659	KX865763
<i>Y. cf. dalliana</i> (Frierson, 1913)	Myanmar: Ayeyarwady River basin, Mali Hka River	RMBH	KX865899	KX865660	KX865768

Species	Locality	Specimen Voucher	COI	16S rRNA	28S rRNA
1913)	basin, Nam Palat River	biv_102_7			
<i>Y. elongatula</i> sp. nov.	Myanmar: Chindwin River	RMBH biv_346_2	MK372407	MK372455	MK372485
<i>Y. elongatula</i> sp. nov.	Myanmar: Chindwin River	RMBH biv_346_3	MK372408	MK372456	MK372486
<i>Y. elongatula</i> sp. nov.	Myanmar: Chindwin River	RMBH biv_346_1	MK372406	MK372454	MK372484
<i>Y. elongatula</i> sp. nov.	Myanmar: Myit Tha (Manipur) River	RMBH biv_344_3	MK372403	n/a	n/a
<i>Y. elongatula</i> sp. nov.	Myanmar: Myit Tha (Manipur) River	RMBH biv_344_1	MK372402	n/a	n/a
<i>Y. elongatula</i> sp. nov.	Myanmar: Myit Tha (Manipur) River	RMBH biv_341_3	MK372401	n/a	MK372481
<i>Y. elongatula</i> sp. nov.	Myanmar: Myit Tha (Manipur) River	RMBH biv_339_3	MK372399	n/a	n/a
<i>Y. elongatula</i> sp. nov.	Myanmar: Myit Tha (Manipur) River	RMBH biv_339_1	MK372397	n/a	MK372478
<i>Y. elongatula</i> sp. nov.	Myanmar: Myit Tha (Manipur) River	RMBH biv_339_2	MK372398	n/a	MK372479
<i>Y. elongatula</i> sp. nov.	Myanmar: Myit Tha (Manipur) River	RMBH biv_341_2	MK372400	MK372451	MK372480
<b>Outgroup Taxa</b>					
<b>MARGARITIFERIDAE Henderson, 1929</b>					
<i>Gibbosula laosensis</i> (Lea, 1863)	Laos: Mekong River basin, Nam Long River	RMBH biv 186_1	JX497731	KC845943	KT343741
<i>Margaritifera daturica</i> (Middendorff, 1850)	Far East of Russia: Amur River basin, Ilistaya River	RMBH biv 92_6	KJ161516	KJ943526	KT343747
<i>M. margaritifera</i> (Linnaeus, 1758)	Northwestern Russia: Onega River basin, Somba River	RMBH biv 618	KX550089	KX550091	KX550093
<i>M. laevis</i> (Haas, 1910)	Far East of Russia: Kurile Archipelago, Kunashir Island, Sennaya River	RMBH biv d0036/22	KJ161500	KJ943523	KT343742
<i>M. middendorffi</i> (Rosén, 1926)	Far East of Russia: Kamchatka, Bolshaya River basin, Nachilova River	RMBH biv d0099/6	KJ161547	KJ943528	KT343745
<b>IRIDINIDAE Swainson, 1840</b>					
<i>Aspatharia pfeifferiana</i> (Bernardi, 1860)	Zambia: Chambeshi River	BIVAToL-330	KC429107	KC429264	n/a
<i>Chambardia wahlbergi</i> (Krauss, 1848)	Zambia: Zambezi River	ANSP 419403	JN243886	KP184845	JN243864

Species	Locality	Specimen Voucher	COI	16S rRNA	28S rRNA
<b>ETHERIIDAE Deshayes, 1832</b>					
<i>Etheria elliptica</i> Lamarck, 1807	Zambia: Chambeshi River	FMNH 343390	KP184897	KP184847	KP184873
<b>MYCETOPODIDAE Gray, 1840</b>					
<i>Anodontites elongata</i> (Swainson, 1823)	Peru	FMNH 343931	KP184896	KP184846	KP184872
<b>HYRIIDAE Swainson, 1840</b>					
<i>Triplodon corrugatus</i> (Lamarck, 1819)	Peru	ANSP 416338	JN243890	KP184851	JN243868
<i>Castalia ambigua</i> Lamarck, 1819	Peru	ANSP 416341	JN243889	KP184848	JN243867
<i>Microdontia anodontaeformis</i> (Tapparone Canefri, 1883)	Guyana	UMMZ 304509	KP184909	KP184861	KP184885
<i>Alathyria jacksoni</i> Iredale, 1934	New Guinea	UMMZ 304512	KP184912	KP184864	KP184888
<i>A. pertexta</i> Iredale, 1934	Australia: New South Wales	UMMZ 304510	KP184910	KP184862	KP184886
<i>A. profuga</i> (Gould, 1850)	Australia: Queensland	UMMZ 304513	KP184913	KP184865	KP184889
<i>Lortiella froggatti</i> Iredale, 1934*	Australia: New South Wales	n/a	AF231746	KP184867	KP184891
<i>Velesunio ambiguus</i> (Philippi, 1847)	Western Australia	FMNH 337195	KP184915	KP184868	KP184892
<b>TRIGONIIDAE Lamarck, 1819</b>					
<i>Neotrigonia margaritacea</i> (Lamarck, 1804)*	Tasmania and Australia	n/a	U56850	DQ280034	DQ279963
<i>N. lamarckii</i> (Gray, 1838)	Australia: Coral Sea, North Stradbroke Island, Queensland	BIVAToL-97	KC429105	KC429262	KC429443

\*Chimeric sequences.



**Supplementary Table 2.** Models of sequence evolution for each partition based on Bayesian information criterion (BIC) of jModelTest 2<sup>1,2</sup> and IQ-TREE<sup>3,4</sup>

Partition	Model by jModelTest 2	Model by IQ-TREE
<i>COI</i>		
1st codon of <i>COI</i>	TPM1uf	K3Pu+G
2nd codon of <i>COI</i>	TPM3uf+G	TPM3u+G
3rd codon of <i>COI</i>	TrN+I+G	TN+I+G
<i>28S rRNA</i>	TIM3+I+G	TIM3+I+G
<i>16S rRNA</i>	TIM2+G	TIM2+I+G

## Supplementary References

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