

**Supplementary material**

**Few and far apart: integrative taxonomy of Australian species of *Gladiobela* and *Pagodibela* (Conoidea : Raphitomidae) reveals patterns of wide distributions and low abundance**

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**Table S1. Museum registration numbers, voucher status, locality, BOLD IDs and GenBank accession numbers of samples used for the molecular analyses**

Names of species described herein are in bold

Taxon	Museum	Registration number	Voucher	Locality or expedition	BOLD ID	COI	ITS
<b>Ingroup</b>							
<b><i>Gladiobela abyssicola</i> sp. nov.</b>	AMS	C.571656	Ht	Australia, NSW, off Bermagui, (−36.351, 150.914), IN2017_V03_043, 4750–4763 m.		MT081415	
	AMS	C.571717	Pt	Australia, NSW, off Bermagui, (−36.351, 150.914), IN2017_V03_043, 4750–4763 m.		MN983182	
	AMS	C.519329	Pt	Australia, TAS, Bass Strait, (−39.552, 149.553), IN2017_V03_030, 4133–4197 m.		MT081413	
	AMS	C.519389	Pt	Australia, NSW, off Bermagui, (−36.351, 150.914), IN2017_V03_043, 4750–4763 m.		MT081414	
<b><i>Gladiobela acris</i> sp. nov.</b>	AMS	C.571697	Ht	Australia, VIC, East Gippsland CMR, (−38.479, 150.185), IN2017_V03_032, 3850–3853 m.		MN983181	MN985673
	MNHN	IM-2009-19029	Pt	Solomon Islands, (−6.417, 156.35), SALOMON 2, CP2231, 1083–1100 m.	CONO3079-20	MT256948	
<i>Gladiobela angulata</i> Criscione <i>et al.</i> , 2020	AMS	C.571651	Ht	Australia, NSW, Hunter CMR, (−32.575, 153.162), IN2017_V03_070, 2474–2595 m.		MN983180	MN985672
	AMS	C.571735	Pt	Australia, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MT081403	
	AMS	C.572166	Pt	Australia, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MT081404	
	AMS	C.572167	Pt	Australia, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MT081405	
	AMS	C.571737	Pt	Australia, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MT081406	
	AMS	C.571738	Pt	Australia, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MT081407	
	AMS	C.572168	Pt	Australia, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MT081408	
	SAMA	D49341	Pt	Australia, GAB, (−34.574, 129.572), IN2017_C01_198, 3389–3540 m.		MT081409	
	SAMA	D67750	Pt	Australia, GAB, (−34.574, 129.572), IN2017_C01_198, 3389–3540 m.		MT081410	
	SAMA	D67751	Pt	Australia, GAB, (−34.574, 129.572), IN2017_C01_198, 2474–2595 m.		MT081411	
	SAMA	D49343	Pt	Australia, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MT081412	
<b><i>Gladiobela sinuosa</i> sp. nov.</b>	AMS	C.571625	Ht	Australia, NSW, Hunter CMR, (−32.575, 153.162), IN2017_V03_070, 2474–2595 m.		-	MT081495

Taxon	Museum	Registration number	Voucher	Locality or expedition	BOLD ID	COI	ITS
<i>Gladiobela stupa</i> sp. nov.	AMS	C.571683	Ht	Australia, NSW, Hunter CMR, (−32.138, 153.527), IN2017_V03_078, 3980–4029 m.		MN983183	MN985675
<i>Gladiobela stupa</i> sp. nov.	AMS	C.519345	Pt	Australia, NSW, Hunter CMR, (−32.138, 153.527), IN2017_V03_078, 3980–4029 m.		MT081416	
<i>Gladiobela vitrea</i> sp. nov.	AMS	C.482311	Ht	Australia, NSW, Hunter CMR, (−32.479, 152.994), IN2017_V03_069, 1006–1036 m.		MN983184	MN985676
	MNHN	IM-2013-52094	Pt	New Caledonia, (−22.267, 167.383), EXBODI, CP3793, 951–1180 m.	CONO3087-20	MT256973	
<i>Gladiobela</i> sp. A	MNHN	IM-2013-52055		Papua New Guinea, (−6.933, 147.133), BIOPAPUA, CP3632, 700–740 m.	CONO3085-20	MT256949	
<i>Gladiobela</i> sp. A	MNHN	IM-2013-59402		Taiwan, (19.8, 116.483), ZHONGSHA 2015, CP4157, 1205–1389 m.	CONO3091-20	MT256959	
<i>Gladiobela</i> sp. B	MNHN	IM-2013-52059		Papua New Guinea, (−5.067, 154.483), BIOPAPUA, CP3755, 662 m.	CONO3086-20	MT256969	
<i>Gladiobela</i> sp. B	MNHN	IM-2013-61802		Taiwan, (19.217, 113.933), ZHONGSHA 2015, DW4138, 470–494 m.	CONO3090-20	MT256961	
<i>Gladiobela</i> sp. C	MNHN	IM-2007-39375		Tuamotu Archipelago, (−17.45, −149.833), TARASOC, DW3462, 1000–1145 m.	CONO3074-20	MT256957	
<i>Gladiobela</i> sp. D	MNHN	IM-2013-61660		Taiwan, (19.833, 116.45), ZHONGSHA 2015, CP4134, 1128–1278 m.	CONO3092-20	MT256951	
<i>Gladiobela</i> sp. E	MNHN	IM-2007-39254		Tuamotu Archipelago, (−16.7, −151.517), TARASOC, CP3449, 780 m.	CONO3073-20	MT256972	
<i>Pagodibela baruna</i> (Sysoev, 1997)	MNHN	IM-2009-29111		New Caledonia, (−21.683, 166.617), EXBODI, CP3809, 685–880 m.	CONO3080-20	MT256963	
	MNHN	IM-2007-42312		New Caledonia, Chesterfield Islands, (−21.483, 162.6), EBISCO, CP2651, 883–957 m.	CONO578-08	MT256968	
	MNHN	IM-2013-19691		Papua New Guinea, (−4.733, 146.183), PAPUA NIUGINI, CP3979, 540–580 m.	CONO3084-20	MT256955	
	MNHN	IM-2009-17156		Papua New Guinea, (−4.967, 145.833), BIOPAPUA, CP3708, 502–529 m.	CONO3076-20	MT256954	
	MNHN	IM-2009-17197		Papua New Guinea, (−4.967, 145.833), BIOPAPUA, CP3708, 502–529 m.	CONO3077-20	MT256950	
	MNHN	IM-2013-19729		Papua New Guinea, (−5.183, 147.05), PAPUA NIUGINI, CP3981, 688 m.	CONO3082-20	MT256962	
	MNHN	IM-2013-9836		Papua New Guinea, (−5.367, 145.85), PAPUA NIUGINI, CP4026, 620–677 m.	CONO3083-20	MT256974	
	MNHN	IM-2009-17116		Papua New Guinea, (−9.15, 152.25), BIOPAPUA, CP3739, 503–546 m.	CONO3075-20	MT256960	
	MNHN	IM-2007-42518		Solomon Islands, (−7.717, 156.417), SALOMON 2, CP2246, 664–682 m.	CONO793-08	MT256966	
	MNHN	IM-2007-42519		Solomon Islands, (−7.75, 156.933), SALOMON 2, CP2269, 768–890 m.	CONO794-08	MT256953	
	MNHN	IM-2007-42528		Solomon Islands, (−9.15, 158.983), SALOMON 2, CP2176, 600–875 m.	CONO804-08	MT256967	

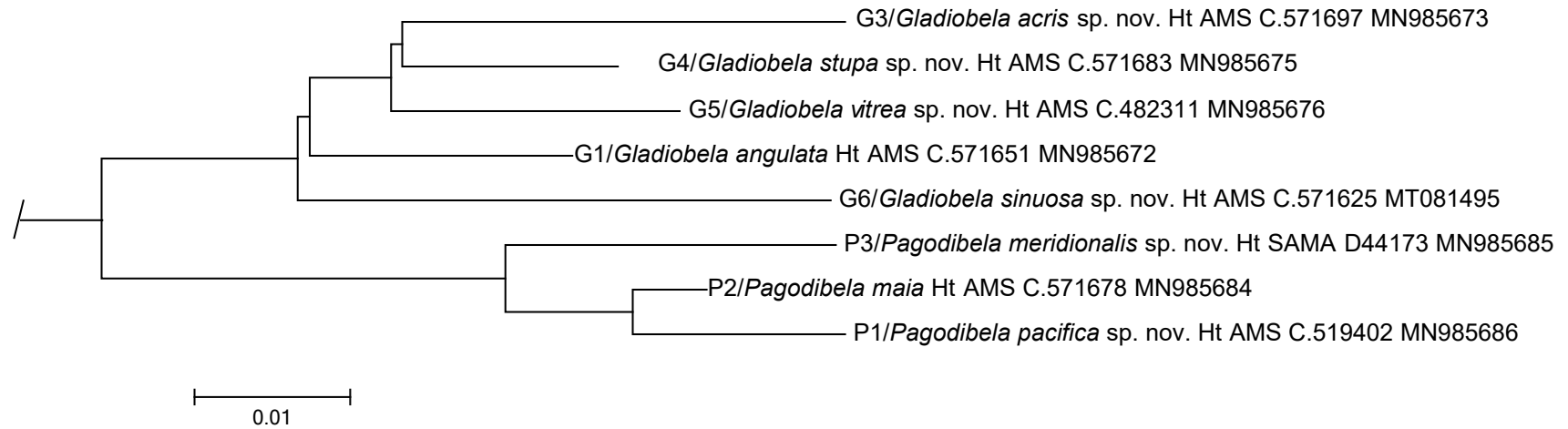
Taxon	Museum	Registration number	Voucher	Locality or expedition	BOLD ID	COI	ITS
	MNHN	IM-2013-62987		Glorioso Islands, (−12.5, 44.933), BIOMAGLO, DW4863, 606–610 m.	CONO3093-20	MT256965	
	MNHN	IM-2009-14887		South Madagascar, (−25.617, 46.367), ATIMO VATAE, CP3566/DW3565, 618–624 m.	CONO3078-20	MT256958	
	MNHN	IM-2013-59316		Taiwan, (16.233, 114.5), ZHONGSHA 2015, CP4153, 318 m.	CONO3088-20	MT256964	
	MNHN	IM-2013-59352		Taiwan, (16.25, 114.567), ZHONGSHA 2015, CP4154, 321–326 m.	CONO3089-20	MT256970	
	MNHN	IM-2007-17695		Vanuatu, (−16.717, 167.983), BOA1, CP2465, 770 m.	CONO143-08	MT256956	
<i>Pagodibela maia</i> Criscione <i>et al.</i> , 2020	AMS	C.571678	Ht	Australia, QLD, Coral Sea CMR, (−23.587, 154.194), IN2017_V03_121, 1013–1093 m.		MN983188	MN985684
<i>Pagodibela pacifica</i> sp. nov.	MNHN	IM-2007-17844	Ht	New Caledonia, Chesterfield Islands, (−20.967, 160.967), EBISCO, CP2645, 641–652 m.	CONO186-08	EU015652	
	AMS	C.519402	Pt	Australia, QLD, Coral Sea CMR, (−23.587, 154.194), IN2017_V03_121, 1013–1093 m.		MN983190	MN985686
	MNHN	IM-2009-29189	Pt	New Caledonia, (−22.283, 171.3), EXBODI, DW3876, 518–833 m.	CONO3081-20	MT256971	
	MNHN	IM-2013-69658	Pt	New Caledonia, (−23.283, 167.933), KANACONO, CP4750, 750–850 m.	CONO3094-20	MT256947	
	MNHN	IM-2007-38860	Pt	Tuamotu Archipelago, (−17.783, −149.383), TARASOC, DW3489, 450–720 m.	CONO3072-20	MT256952	
<i>Pagodibela meridionalis</i> sp. nov.	SAMA	D44173	Ht	Australia, SA, GAB, (−35.043, 134.079), IN2015_C02_126, 367–409 m.		MN983189	MN985685
<b>Outgroups</b>							
<i>Aplotoma brevitentaculata</i> Criscione <i>et al.</i> , 2020	AMS	C.571635	Ht	Australia, VIC, East Gippsland CMR, (−37.792, 150.382), IN2017_V03_035, 2338–2581 m.		MN983163	
<i>Austrobela micraulax</i> (Sysoev, 1997)	AMS	C.519275		Australia, QLD, Coral Sea CMR, (−23.587, 154.194), IN2017_V03_121, 1013–1093 m.		MN983164	
<i>Austrobela</i> sp. nov. 2	AMS	C.571693		Australia, SA, GAB, (−34.074, 129.182), IN2015_C01_064, 2649–2803 m.		MN983165	
<i>Austrobela</i> sp. nov. 3	AMS	C.571670		Australia, SA, GAB, (−34.823, 132.692), IN2015_C02_167, 998–1015 m.		MN983166	
<i>Austrobela</i> sp. nov. 4	AMS	C.571644		Australia, NSW, Hunter CMR, (−32.575, 153.162), IN2017_V03_070, 2474–2595 m.		MN983167	
<i>Austrobela rufa</i> Criscione <i>et al.</i> , 2020	AMS	C.571699	Pt	Australia, SA, GAB, (−35.345, 134.045), IN2015_C02_134, 1509–1544 m.		MN983168	
<i>Biconitoma cretosa</i> sp. nov.	AMS	C.482313	Ht	Australia, NSW, off Byron Bay, (−28.677, 154.203), IN2017_V03_090, 2562–2587 m.		MN983169	
<i>Mioawateria</i> sp. nov. 1	AMS	C.482239		Australia, VIC, East Gippsland CMR, (−37.815, 150.373), IN2017_V03_040, 2600–2746 m.		MN983186	
<i>Nodothauma magnifica</i> Criscione <i>et al.</i> , 2020	AMS	C.532707	Ht	Australia, SA, GAB, (−35.558, 134.083), IN2015_C02_137, 1927–1995 m.		MN983187	

Taxon	Museum	Registration number	Voucher	Locality or expedition	BOLD ID	COI	12S
<i>Pueridaphne cirrisulcata</i> Criscione <i>et al.</i> , 2020	AMS	C.572165	Ht	Australia, SA, GAB, (−34.452, 129.492), IN2017_C01_197, 3235–3350 m.		MN983198	
<i>Spergo fusiformis</i> (Habe, 1962)	AMS	C.482154		Australia, QLD, Coral Sea CMR, (−23.587, 154.194), IN2017_V03_121, 1013–1093 m.		MN983201	
<i>Spergo</i> sp. nov. 1	AMS	C.519290		Australia, TAS, Freycinet CMR, (−41.731, 149.12), IN2017_V03_004, 2751–2820 m.		MN983202	
<i>Spergo</i> sp. nov. 2	AMS	C.519331		Australia, Bass Strait, (−39.552, 149.553), IN2017_V03_030, 4133–4197 m.		MN983203	
<i>Spergo</i> sp. nov. 3	AMS	C.519392		Australia, TAS, Flinders CMR, (−40.473, 149.397), IN2017_V03_015, 4114–4139 m.		MN983204	
<i>Spergo</i> sp. nov. 4	AMS	C.571638		Australia, NSW, Hunter CMR, (−32.575, 153.162), IN2017_V03_070, 2474–2595 m.		MN983205	
<i>Spergo</i> sp.	MNHN	IM-2007-17841		New Caledonia, (−21.533, 162.5), EBISCO, CP2648, 458–750 m.	CONO184-08	EU015650	
<i>Taranis</i> sp.	MNHN	IM-2007-42296		Philippines, Aurora, off Dipaculao, (15.95, 121.833), AURORA 2007, CP2749, 473 m.	CONO561-08	HQ401584	
<i>Teretiopsis</i> sp.	AMS	C.571622		Australia, QLD, Coral Sea CMR, (−23.587, 154.194), IN2017_V03_121, 1013–1093 m.		MN983206	
<i>Thatcheria mirabilis</i> Angas, 1877	MNHN	IM-2007-17924		Solomon Islands, (−8.283, 160), SOLOMON 2, CP2184, 464–523 m.	CONO349-08	EU015736	
<i>Theta lyronuclea</i> (A. H. Clarke, 1959)	AMS	C.482290		Australia, NSW, Jervis CMR, (−35.114, 151.469), IN2017_V03_053, 3952–4011 m.		MN983207	
<i>Theta</i> sp. nov. 2	AMS	C.532711		Australia, SA, GAB, (−35.818, 134.109), IN2015_C02_141, 2800–2852 m.		MN983209	
<i>Theta</i> sp. nov. 3	AMS	C.571657		Australia, NSW, Hunter CMR, (−32.575, 153.162), IN2017_V03_070, 2474–2595 m.		MN983210	
<i>Trochodaphne cuprosa</i> Criscione <i>et al.</i> , 2020	AMS	C.571611	Ht	Australia, NSW, Jervis CMR, (−35.333, 151.258), IN2017_V03_056, 2650–2636 m.		MN983211	
<i>Typhlosyrinx</i> sp.	AMS	C.519335		Australia, NSW, off Byron Bay, (−28.054, 154.083), IN2017_V03_100, 999–1013 m.		MN983212	

**Table S2. Inter-PSHs/specific genetic differentiation of 12S sequences in *Gladiobela* by means of *p*-distances**

Reciprocal distances of G6/*G. sinuosa* shaded. Species codes: acr, *G. acris* sp. nov.; ang, *G. angulata.*; sin, *G. sinuosa* sp. nov.; stu, *G. stupa* sp. nov.; vit, *G. vitrea* sp. nov. Codes of species described herein in bold

	G3/acr	<b>G1/ang</b>	<b>G6/sin</b>	<b>G4/stu</b>
G1/ang	0.051			
<b>G6/sin</b>	0.066	0.051		
<b>G4/stu</b>	0.042	0.035	0.053	
<b>G5/vit</b>	0.046	0.04	0.061	0.033



**Fig. S1.** Detail of the optimal Neighbour-Joining tree based on 179 *12S* sequences of species of Raphitomidae. The tree is drawn to scale, with branch lengths in the same units as those of the evolutionary p-distances used to infer the phylogenetic tree. GenBank accession numbers (MN-) are indicated on branch labels.