

Supplementary material

Molecular systematics of *Thouarella* (Octocorallia : Primnoidae) with the description of three new species from the Southern Ocean based on combined molecular and morphological evidence

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Table S1. GenBank accession numbers of the primnoids specimens used for the molecular analysis

Materials shown in bold are newly sequenced for this study

Specimen code and species name	GenBank ID (collection number)	<i>Cox1</i>	<i>MutS</i>	28S
<i>Callozostron acanthodes</i>	AR185	KP677947	KP324329	KP324561
<i>Thouarella diadema</i>	AE068	KP677915	KP324296	KP324534
<i>Thouarella diadema</i>	B34	KP677965	KP324347	KP324576
<i>Thouarella diadema</i>	S060	KP678001	KP324382	KP324606
<i>Thouarella diadema</i>	Z051	KP678026	KP324408	KP324632
<i>Thouarella undulata</i>	B48	KP677966	KP324348	KP324577
<i>Thouarella undulata</i>	S093	KP678002	KP324383	KP324607
<i>Thouarella undulata</i>	Z046	KP678025	KP324407	KP324631
<i>Thouarella antarctica</i>	AE064	KP677914	KP324295	KP324533
<i>Thouarella antarctica</i>	AR018	KP677921	KP324301	KP324539
<i>Thouarella cf. antarctica</i>	AR175	KP677946	KP324328	KP324560
<i>Thouarella cf. brucei</i>	T125	KP678021	KP324404	–
<i>Thouarella chilensis</i>	AE026	KP677910	KP324291	KP324530
<i>Thouarella chilensis</i>	N09	KP677983	KP324365	KP324592
<i>Thouarella chilensis</i>	R54	KP678000	KP324381	KP324605
<i>Thouarella crenelata</i>	AR091	KP677928	KP324308	KP324546
<i>Thouarella crenelata</i>	W54	KP678024	KP324406	KP324630
<i>Thouarella laxa</i>	AR194	KP677950	KP324331	KP324563
<i>Thouarella laxa</i>	AR200	KP677951	KP324332	KP324564
<i>Thouarella cf. laxa</i>	AR232	KP677960	KP324342	KP324571
<i>Thouarella pendulina</i>	AR135	KP677941	KP324321	KP324556
<i>Thouarella variabilis</i>	AE059	KP677913	KP324294	KP324532
<i>Thouarella variabilis</i>	AR027	KP677923	KP324303	KP324541
<i>Thouarella cf. variabilis</i>	A06	KP677902	KP324283	KP324524
<i>Thouarella viridis</i>	AE019	KP677908	KP324289	KP324528
<i>Thouarella viridis</i>	H13	KP677976	KP324358	KP324587
<i>Thouarella weddellensis</i>	OPRIM-1922 (MZB 2019–1967)	MN914149	MN916716	MN921246
<i>Thouarella weddellensis</i>	OPRIM-2081 (MZB 2019–1970)	MN914150	MN916717	MN921247
<i>Thouarella weddellensis</i>	OPRIM-307 (MZB 2019–1969)	MN914151	MN916718	MN921248
<i>Thouarella polarsterni</i>	OPRIM-2111 (MZB 2019–1984)	MN914145	MN916712	–
<i>Thouarella polarsterni</i>	OPRIM-2112 (MZB 2019–1983)	MN914146	MN916713	–
<i>Thouarella polarsterni</i>	OPRIM-2209 (MZB 2019–1986)	MN914147	MN916714	MN921245
<i>Thouarella polarsterni</i>	OPRIM-2282 (MZB 2019–1981)	MN914148	MN916715	–
<i>Thouarella islai</i>	OPRIM- 2168 (MZB 2019–1966)	MN914144	MN916709	–
<i>Thouarella islai</i>	OPRIM- 2169 (MZB 2019–1965)	MN914143	MN916710	–
<i>Thouarella islai</i>	OPRIM- 2194 (MZB 2019–1964)	MN914142	MN916711	MN921244
<i>Thouarella dolichoepinosa</i> sp. nov.	OPRIM 1253 (MZB 2020–0642)	MT894198	MT892693	MT892733
<i>Thouarella dolichoepinosa</i> sp. nov.	OPRIM-2268 (MZB 2020–0652)	MT894196	MT892691	–
<i>Thouarella dolichoepinosa</i> sp. nov.	OPRIM-2386 (MZB 2020–0654)	MT894197	MT892692	–
<i>Thouarella dolichoepinosa</i> sp. nov.	BECA-OPRIM-2299	MT894195	MT892690	–
<i>Thouarella pseudoislai</i> sp. nov.	OPRIM-2384 (MZB 2020–0641)	MT894219	MT892714	MT892730
<i>Thouarella pseudoislai</i> sp. nov.	OPRIM-2383 (MZB 2020–0653)	MT894218	MT892713	MT892729
<i>Thouarella pseudoislai</i> sp. nov.	BECA-OPRIM-2201	MT894217	MT892712	–
<i>Thouarella amundseni</i> sp. nov.	OPRIM 2105 (MZB 2020–0643)	MT894200	MT892703	MT892720
<i>Thouarella amundseni</i> sp. nov.	BECA-OPRIM-2091	MT894199	MT892702	MT892719
<i>Thouarella amundseni</i> sp. nov.	OPRIM-2113 (MZB 2020–0647)	MT894201	MT892704	MT892721
<i>Thouarella amundseni</i> sp. nov.	OPRIM-2202 (MZB 2020–0649)	MT894202	MT892706	–
<i>Thouarella amundseni</i> sp. nov.	OPRIM-2241 (MZB 2020–0650)	MT894203	MT892707	MT892723
<i>Thouarella amundseni</i> sp. nov.	OPRIM-2454	MT894205	MT892708	–

Specimen code and species name	GenBank ID (collection number)	<i>Cox1</i>	<i>MutS</i>	28S
<i>Thouarella amundseni</i> sp. nov.	(MZB 2020-0655) OPRIM-2455	MT894206	MT892709	–
<i>Thouarella viridis</i>	BECA-OPRIM-1933	MT894191	MT892683	MT892715
<i>Thouarella viridis</i>	BECA-OPRIM-1934	MT894192	MT892684	–
<i>Thouarella andeep</i>	OPRIM 2000 (ZIZMH-C11745a)	MT894190	MT892685	MT892716
<i>Thouarella andeep</i>	OPRIM 6262 (ZIZMH-C11745b)	MT894188	MT892686	MT892717
<i>Thouarella andeep</i>	OPRIM 6260 (BECA-OPRIM-2609)	MT894189	MT892687	MT892718

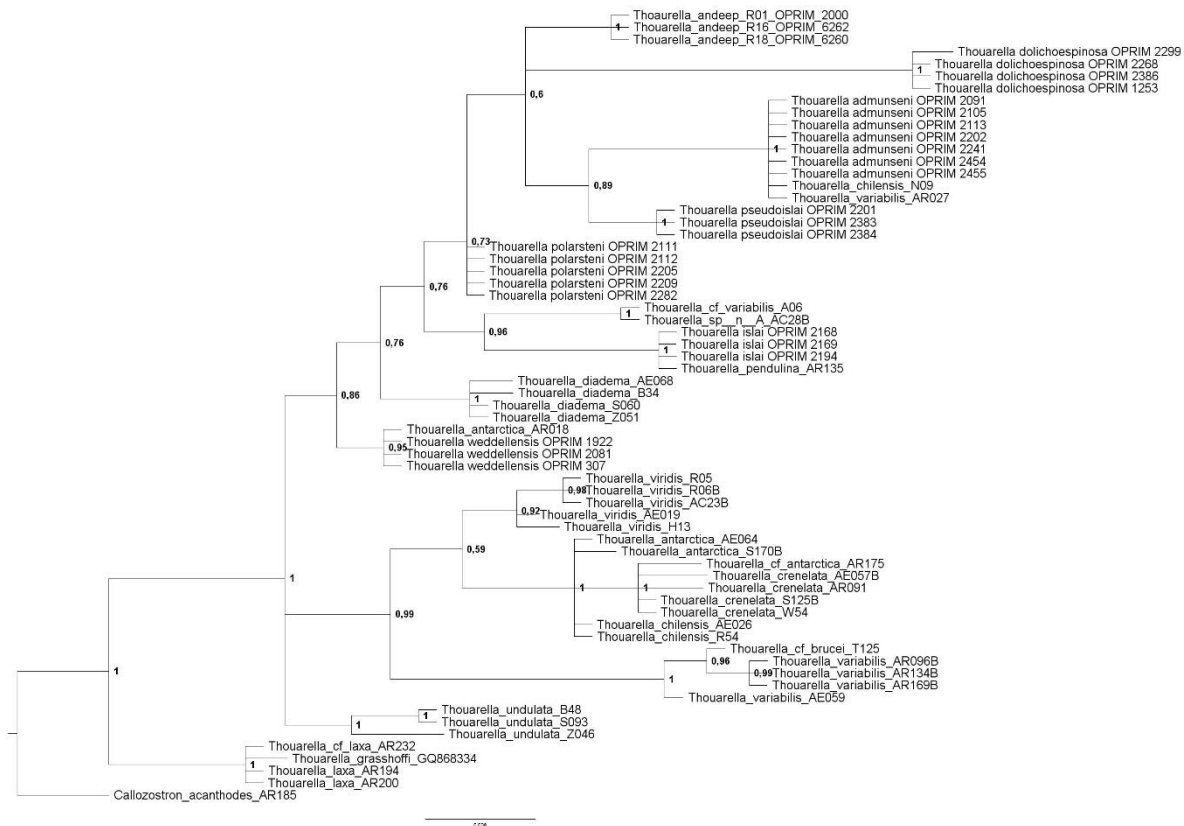


Figure S1. Bayesian phylogeny based on the *mtMutS* locus. The number near nodes represent the posterior probabilities support.

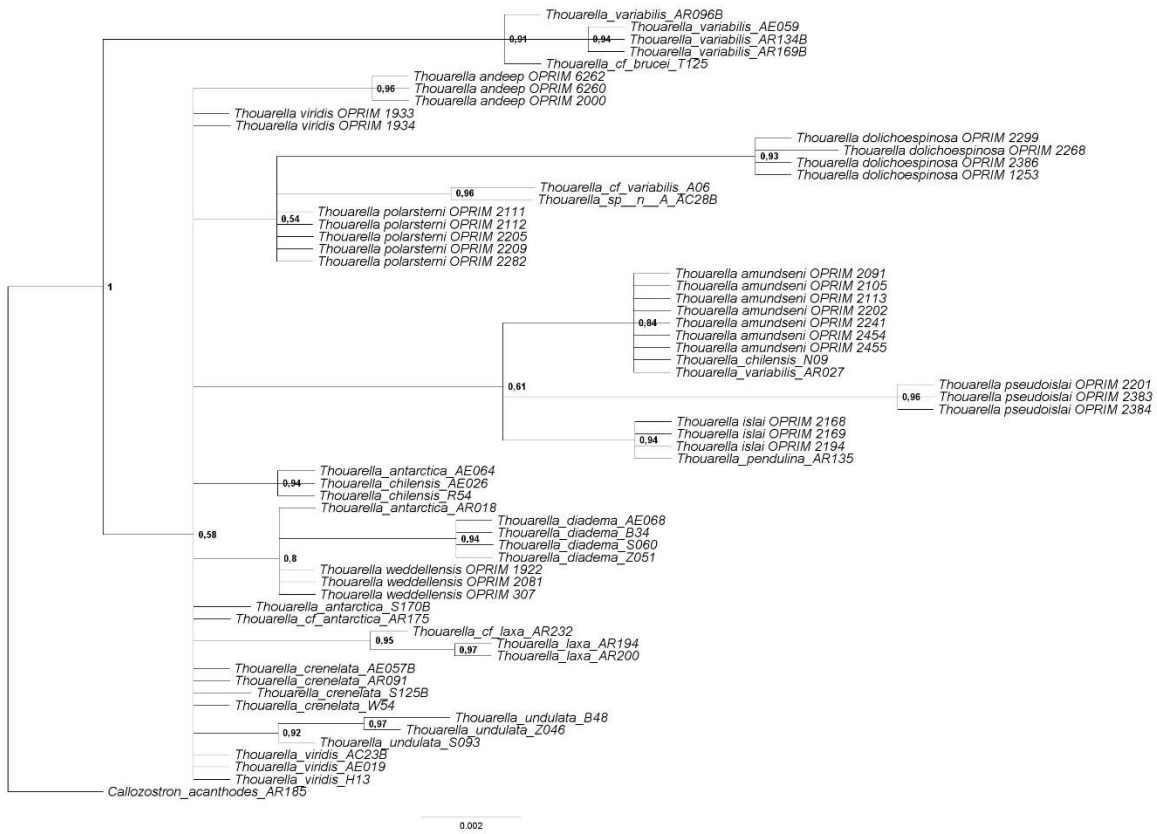


Figure S2. Bayesian phylogeny based on the *CoxI* locus. The number near nodes represent the posterior probabilities support.

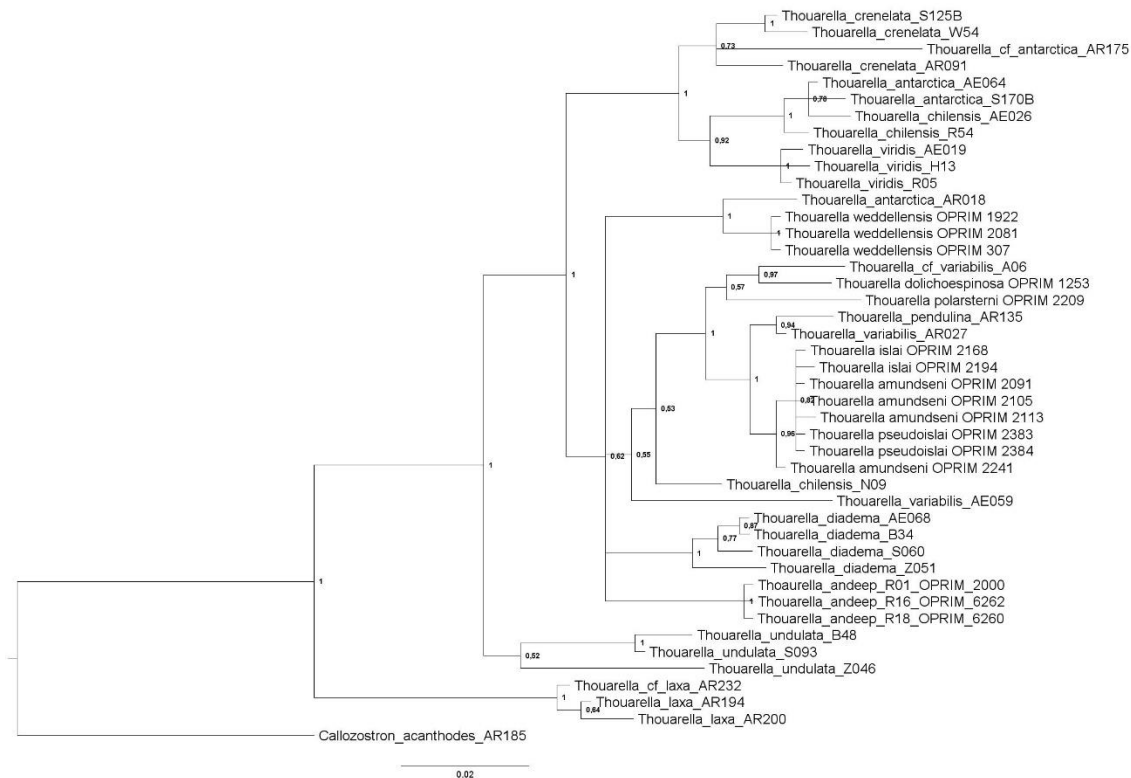
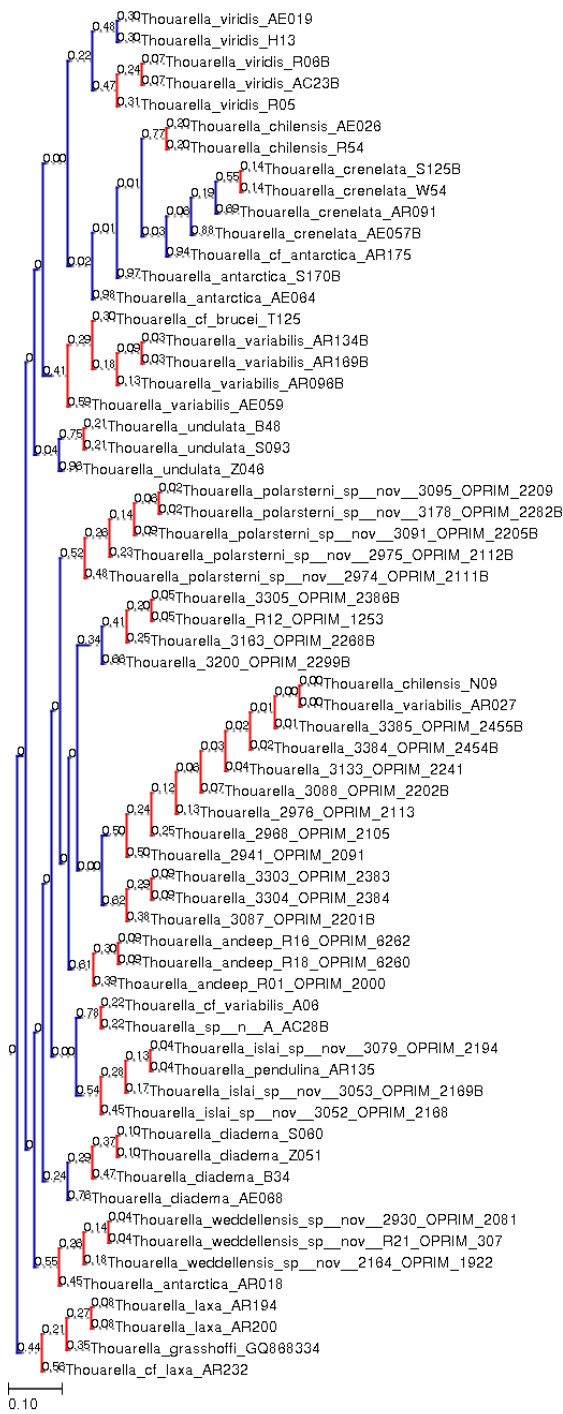


Figure S3. Bayesian phylogeny based on the 28S locus. The number near nodes represent the posterior probabilities support.



Most supported partition found by simple heuristic search

Species 1 (support = 0.439): *Thouarella_cf_laxa_AR232*, *Thouarella_grasshoffi_GQ888334*, *Thouarella_laxa_AR194*, *Thouarella_laxa_AR200*

Species 2 (support = 0.612): *Thouarella_andeep_R01_OPRIM_2000*, *Thouarella_andeep_R16_OPRIM_6262*, *Thouarella_andeep_R18_OPRIM_6260*

Species 3 (support = 0.517): *Thouarella_polarsterni_OPRIM_2111B*, *Thouarella_polarsterni_OPRIM_2112B*, *Thouarella_polarsterni_OPRIM_2205B*, *Thouarella_polarsterni_OPRIM_2209*, *Thouarella_polarsterni_OPRIM_2282B*

Species 4 (support = 0.555): *Thouarella_antarctica_AR018*, *Thouarella_weddellensis_OPRIM_1922*, *Thouarella_weddellensis_OPRIM_2081*, *Thouarella_weddellensis_OPRIM_307*

Species 5 (support = 0.409): *Thouarella_cf_brucei_T125*, *Thouarella_variabilis_AR096B*, *Thouarella_variabilis_AR134B*, *Thouarella_variabilis_AR169B*, *Thouarella_variabilis_AE059*

Species 6 (support = 0.502): *Thouarella_OPRIM_2091*, *Thouarella_OPRIM_2105*, *Thouarella_OPRIM_2113*, *Thouarella_OPRIM_2202B*, *Thouarella_OPRIM_2241*, *Thouarella_OPRIM_2454B*, *Thouarella_OPRIM_2455B*, *Thouarella_chilensis_N09*, *Thouarella_variabilis_AR027*

Species 7 (support = 0.618): *Thouarella_OPRIM_2201B*, *Thouarella_OPRIM_2383*, *Thouarella_OPRIM_2384*

Species 8 (support = 0.981): *Thouarella_antarctica_AE064*

Species 9 (support = 0.975): *Thouarella_antarctica_S170B*

Species 10 (support = 0.765): *Thouarella_chilensis_AE026*, *Thouarella_chilensis_R54*

Species 11 (support = 0.780): *Thouarella_cf_variabilis_A06*, *Thouarella_sp_n_A_AC28B*

Species 12 (support = 0.545): *Thouarella_islai_OPRIM_2168*, *Thouarella_islai_OPRIM_2169B*, *Thouarella_islai_OPRIM_2194*, *Thouarella_pendulina_AR135*

Species 13 (support = 0.939): *Thouarella_cf_antarctica_AR175*

Species 14 (support = 0.876): *Thouarella_crenelata_AE057B*

Species 15 (support = 0.752): *Thouarella_undulata_B48*, *Thouarella_undulata_S093*

Species 16 (support = 0.957): *Thouarella_undulata_Z048*

Species 17 (support = 0.292): *Thouarella_diadema_B34*, *Thouarella_diadema_S060*, *Thouarella_diadema_Z051*

Species 18 (support = 0.765): *Thouarella_diadema_AE068*

Species 19 (support = 0.472): *Thouarella_viridis_R05*, *Thouarella_viridis_R06B*, *Thouarella_viridis_AC23B*

Species 20 (support = 0.304): *Thouarella_viridis_AE019*

Species 21 (support = 0.304): *Thouarella_viridis_H13*

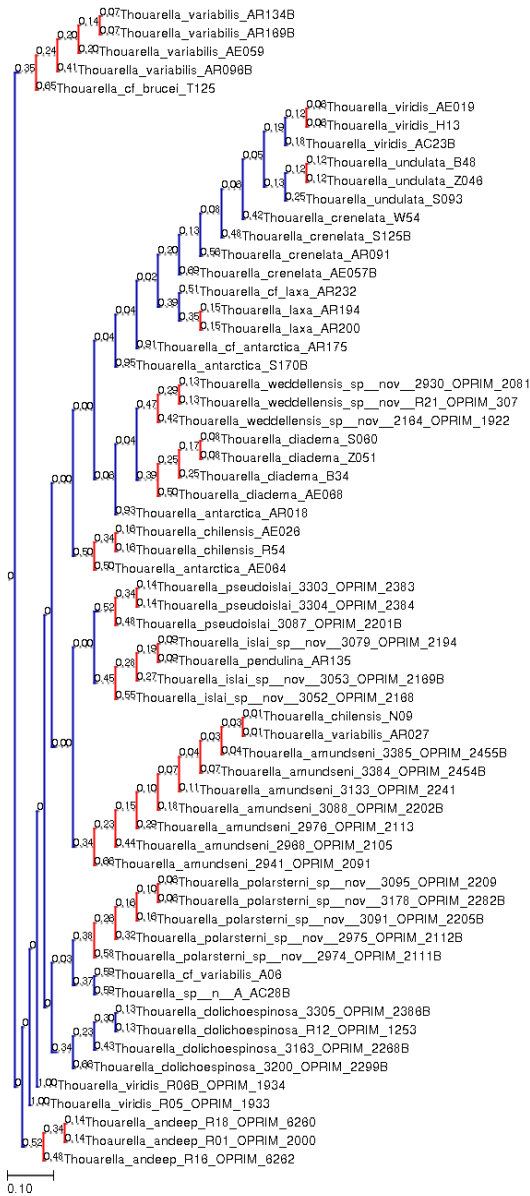
Species 22 (support = 0.545): *Thouarella_crenelata_S125B*, *Thouarella_crenelata_W54*

Species 23 (support = 0.687): *Thouarella_crenelata_AR091*

Species 24 (support = 0.410): *Thouarella_OPRIM_2268B*, *Thouarella_OPRIM_2386B*, *Thouarella_OPRIM_1253*

Species 25 (support = 0.661): *Thouarella_3200_OPRIM_2299B*

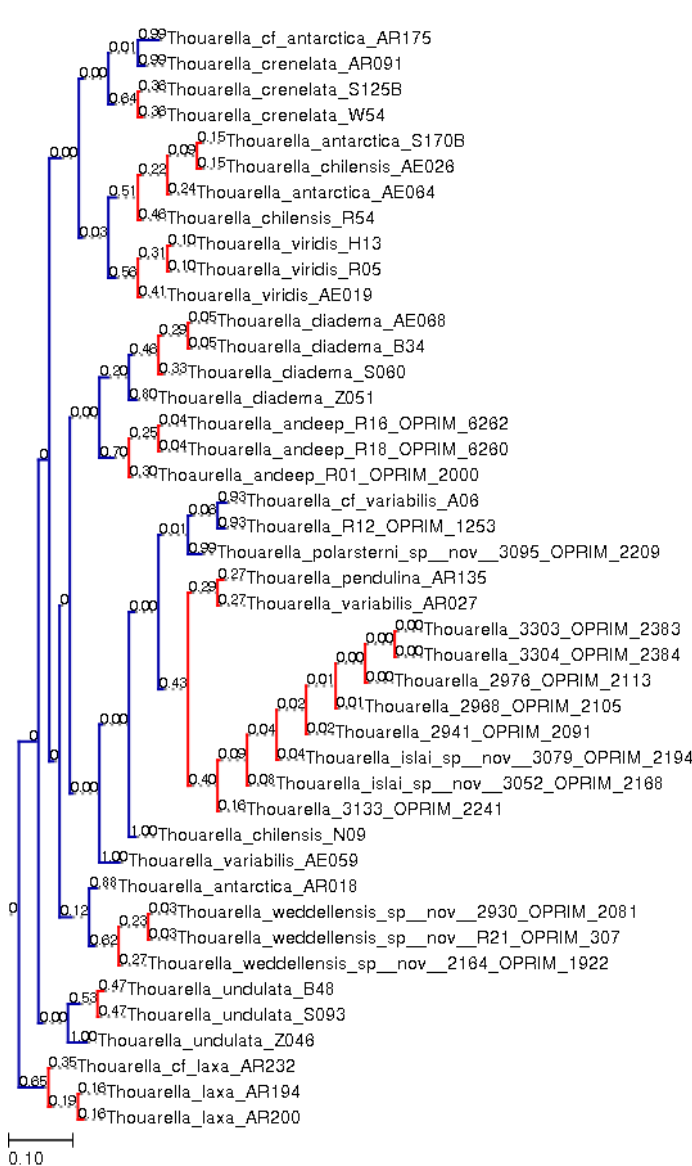
Figure S4. Highest Bayesian supported solution based on the single locus *mtMuts* and the bPTP approach. On the left are details of the 25 putative species provided by the bPTP analysis.



Most supported partition found by simple heuristic search

- Species 1** (support = 0.352): Thouarella_cf_brucei_T125, Thouarella_variabilis_AE059, Thouarella_variabilis_AR134B, Thouarella_variabilis_AR169B, Thouarella_variabilis_AR096B
- Species 2** (support = 1.000): Thouarella_viridis_R06B_OPRIM_1934
- Species 3** (support = 1.000): Thouarella_viridis_R05_OPRIM_1933
- Species 4** (support = 0.523): Thouarella_andeep_OPRIM_6262, Thouarella_andeep_OPRIM_2000
- Species 5** (support = 0.337): Thouarella_amundseni_OPRIM_2091, Thouarella_amundseni_OPRIM_2105, Thouarella_amundseni_OPRIM_2113, Thouarella_amundseni_OPRIM_2202B, Thouarella_amundseni_OPRIM_2241, Thouarella_amundseni_OPRIM_2454B, Thouarella_amundseni_OPRIM_2455B, Thouarella_chilensis_N09, Thouarella_variabilis_AR027
- Species 6** (support = 0.499): Thouarella_antarctica_AE064, Thouarella_chilensis_AE026, Thouarella_chilensis_R54
- Species 7** (support = 0.931): Thouarella_antarctica_AR018
- Species 8** (support = 0.467): Thouarella_weddellensis_OPRIM_1922, Thouarella_weddellensis_OPRIM_2081, Thouarella_weddellensis_OPRIM_307
- Species 9** (support = 0.391): Thouarella_diadema_AE068, Thouarella_diadema_B34, Thouarella_diadema_S060, Thouarella_diadema_Z051
- Species 10** (support = 0.516): Thouarella_pseudoislai_OPRIM_2201B, Thouarella_pseudoislai_OPRIM_2383, Thouarella_pseudoislai_OPRIM_2384
- Species 11** (support = 0.447): Thouarella_islai_OPRIM_2168, Thouarella_islai_OPRIM_2169B, Thouarella_islai_OPRIM_2194, Thouarella_pendulina_AR135
- Species 12** (support = 0.383): Thouarella_polarsterni_OPRIM_2111B, Thouarella_polarsterni_OPRIM_2112B, Thouarella_polarsterni_OPRIM_2205B, Thouarella_polarsterni_OPRIM_2209, Thouarella_polarsterni_OPRIM_2282B
- Species 13** (support = 0.659): Thouarella_dolichoepinosa_3200_OPRIM_2299B
- Species 14** (support = 0.951): Thouarella_antarctica_S170B
- Species 15** (support = 0.914): Thouarella_cf_antarctica_AR175
- Species 16** (support = 0.692): Thouarella_crenelata_AE057B
- Species 17** (support = 0.559): Thouarella_crenelata_AR091
- Species 18** (support = 0.482): Thouarella_crenelata_S125B
- Species 19** (support = 0.422): Thouarella_crenelata_W54
- Species 20** (support = 0.595): Thouarella_cf_variabilis_A06
- Species 21** (support = 0.595): Thouarella_sp_n_A_AC28B
- Species 22** (support = 0.125): Thouarella_undulata_B48, Thouarella_undulata_Z046
- Species 23** (support = 0.246): Thouarella_undulata_S093
- Species 24** (support = 0.431): Thouarella_dolichoepinosa_OPRIM_2268B
- Species 25** (support = 0.122): Thouarella_viridis_AE019, Thouarella_viridis_H13
- Species 26** (support = 0.180): Thouarella_viridis_AC23B
- Species 27** (support = 0.508): Thouarella_cf_laxa_AR232
- Species 28** (support = 0.354): Thouarella_laxa_AR194, Thouarella_laxa_AR200
- Species 29** (support = 0.131): Thouarella_dolichoepinosa_OPRIM_2386B
- Species 30** (support = 0.131): Thouarella_dolichoepinosa_OPRIM_1253

Figure S5. Highest Bayesian supported solution based on the single locus *CoxI* and the bPTP approach. On the left are details of the 30 putative species provided by the bPTP analysis.



Most supported partition found by simple heuristic search

Species 1 (support = 0.652):
 Thouarella_cf_laxa_AR232, Thouarella_laxa_AR194, Thouarella_laxa_AR200

Species 2 (support = 1.000):
 Thouarella_variabilis_AE059

Species 3 (support = 0.998):
 Thouarella_chilensis_N09

Species 4 (support = 0.526):
 Thouarella_undulata_B48, Thouarella_undulata_S093

Species 5 (support = 0.999):
 Thouarella_undulata_Z046

Species 6 (support = 0.433):
 Thouarella_pendulina_AR135, Thouarella_variabilis_AR027, Thouarella_islai_OPRIM_2168, Thouarella_islai_OPRIM_2194, Thouarella_OPRIM_2091, Thouarella_OPRIM_2105, Thouarella_OPRIM_2113, Thouarella_OPRIM_2383, Thouarella_OPRIM_2384, Thouarella_OPRIM_2241

Species 7 (support = 0.640):
 Thouarella_crenelata_S125B, Thouarella_crenelata_W54

Species 8 (support = 0.991):
 Thouarella_cf_antarctica_AR175

Species 9 (support = 0.991):
 Thouarella_crenelata_AR091

Species 10 (support = 0.700):
 Thouarella_andeep_OPRIM_2000, Thouarella_andeep_OPRIM_6262, Thouarella_andeep_OPRIM_6260

Species 11 (support = 0.987):
 Thouarella_polarsterni_OPRIM_2209

Species 12 (support = 0.510):
 Thouarella_antarctica_AE064, Thouarella_antarctica_S170B, Thouarella_chilensis_AE026, Thouarella_chilensis_R54

Species 13 (support = 0.559):
 Thouarella_viridis_AE019, Thouarella_viridis_H13, Thouarella_viridis_R05

Species 14 (support = 0.925):
 Thouarella_cf_variabilis_A06

Species 15 (support = 0.925):
 Thouarella_R12_OPRIM_1253

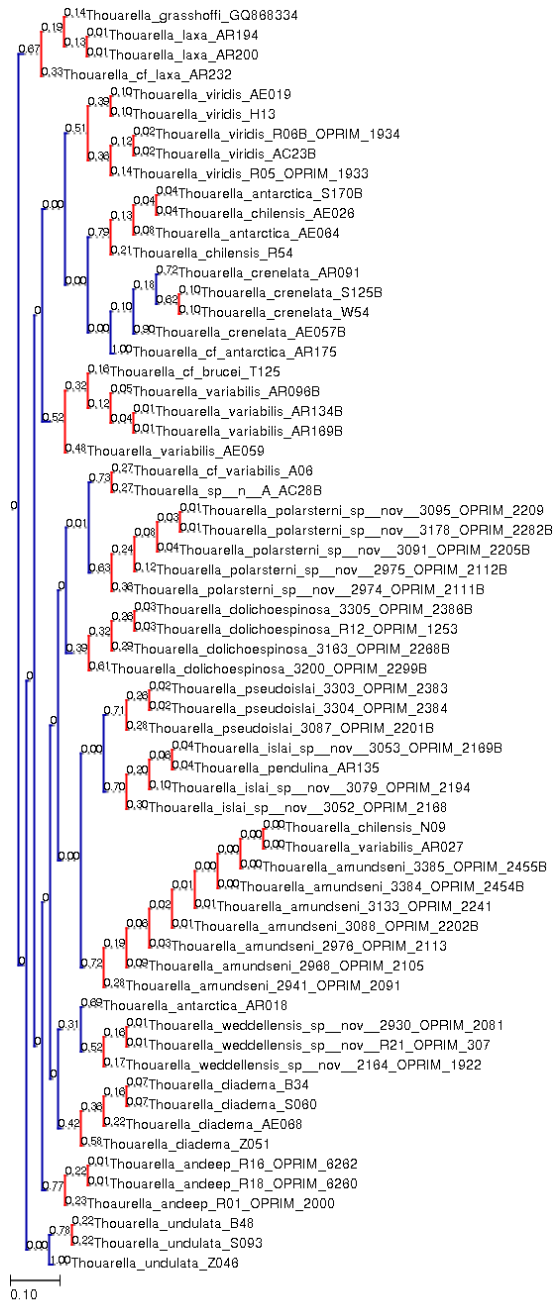
Species 16 (support = 0.465):
 Thouarella_diadema_AE068, Thouarella_diadema_B34, Thouarella_diadema_S060

Species 17 (support = 0.799):
 Thouarella_diadema_Z051

Species 18 (support = 0.884):
 Thouarella_antarctica_AR018

Species 19 (support = 0.617):
 Thouarella_weddellensis_OPRIM_1922, Thouarella_weddellensis_OPRIM_2081, Thouarella_weddellensis_OPRIM_307

Figure S6. Highest Bayesian supported solution based on the single locus 28S and the bPTP approach. On the left are details of the 19 putative species provided by the bPTP analysis.



Most supported partition found by simple heuristic search

Species 1 (support = 0.669): *Thouarella_cf_laxa_AR232*, *Thouarella_grasshoffi_GQ868334*, *Thouarella_laxa_AR194*, *Thouarella_laxa_AR200*

Species 2 (support = 0.515): *Thouarella_cf_brucei_T125*, *Thouarella_variabilis_AR096B*, *Thouarella_variabilis_AR134B*, *Thouarella_variabilis_AR169B*, *Thouarella_variabilis_AE059*

Species 3 (support = 0.394): *Thouarella_dolichoepinosa_OPRIM_2299B*, *Thouarella_dolichoepinosa_OPRIM_2268B*, *Thouarella_dolichoepinosa_OPRIM_2386B*, *Thouarella_dolichoepinosa_OPRIM_1253*

Species 4 (support = 0.766): *Thouarella_andeep_OPRIM_2000*, *Thouarella_andeep_OPRIM_6262*, *Thouarella_andeep_OPRIM_6260*

Species 5 (support = 0.508): *Thouarella_viridis_OPRIM_1933*, *Thouarella_viridis_OPRIM_1934*, *Thouarella_viridis_AC23B*, *Thouarella_viridis_AE019*, *Thouarella_viridis_H13*

Species 6 (support = 0.418): *Thouarella_diadema_AE068*, *Thouarella_diadema_B34*, *Thouarella_diadema_S060*, *Thouarella_diadema_Z051*

Species 7 (support = 0.781): *Thouarella_undulata_B48*, *Thouarella_undulata_S093*

Species 8 (support = 1.000): *Thouarella_undulata_Z046*

Species 9 (support = 0.785): *Thouarella_antarctica_AE064*, *Thouarella_antarctica_S170B*, *Thouarella_chilensis_AE026*, *Thouarella_chilensis_R54*

Species 10 (support = 0.999): *Thouarella_cf_antarctica_AR175*

Species 11 (support = 0.722): *Thouarella_amundseni_OPRIM_2091*, *Thouarella_amundseni_OPRIM_2105*, *Thouarella_amundseni_OPRIM_2113*, *Thouarella_amundseni_OPRIM_2202B*, *Thouarella_amundseni_OPRIM_2241*, *Thouarella_amundseni_OPRIM_2454B*, *Thouarella_amundseni_OPRIM_2455B*, *Thouarella_chilensis_N09*, *Thouarella_variabilis_AR027*

Species 12 (support = 0.713): *Thouarella_pseudoislai_OPRIM_2201B*, *Thouarella_pseudoislai_OPRIM_2383*, *Thouarella_pseudoislai_OPRIM_2384*

Species 13 (support = 0.697): *Thouarella_islai_OPRIM_2168*, *Thouarella_islai_OPRIM_2169B*, *Thouarella_pendulina_AR135*, *Thouarella_islai_OPRIM_2194*

Species 14 (support = 0.727): *Thouarella_cf_variabilis_A06*, *Thouarella_sp_n_A_AC28B*

Species 15 (support = 0.631): *Thouarella_polarsterni_OPRIM_2111B*, *Thouarella_polarsterni_OPRIM_2112B*, *Thouarella_polarsterni_OPRIM_2205B*, *Thouarella_polarsterni_OPRIM_2209*, *Thouarella_polarsterni_OPRIM_2282B*

Species 16 (support = 0.688): *Thouarella_antarctica_AR018*

Species 17 (support = 0.522): *Thouarella_weddellensis_OPRIM_1922*, *Thouarella_weddellensis_OPRIM_2081*, *Thouarella_weddellensis_OPRIM_307*

Species 18 (support = 0.899): *Thouarella_crenelata_AE057B*

Species 19 (support = 0.718): *Thouarella_crenelata_AR091*

Species 20 (support = 0.615): *Thouarella_crenelata_S125B*, *Thouarella_crenelata_W54*

Figure S7. Highest Bayesian supported solution based on the concatenated multilocus dataset and the bPTP approach. On the left are details of the 20 putative species provided by the bPTP analysis.

Initial Partition with prior maximal distance $P=1.02e-03$
Distance Jc69 Jukes-Cantor MinSlope=1.000000
Download (left click and save) or see below the tree file corresponding to this partition: [click here](#)



Group 1] n: 3 ;id: Thouarella_andeep_R01_OPRIM_2000 Thouarella_andeep_R16_OPRIM_6262 Thouarella_andeep_R18_OPRIM_6260
Group 2] n: 3 ;id: Thouarella_viridis_R05_OPRIM_1933 Thouarella_viridis_R06B_OPRIM_1934 Thouarella_viridis_AC23B
Group 3] n: 1 ;id: Thouarella_3200_OPRIM_2299B
Group 4] n: 3 ;id: Thouarella_3163_OPRIM_2268B Thouarella_3305_OPRIM_2386B Thouarella_R12_OPRIM_1253
Group 5] n: 9 ;id: Thouarella_2941_OPRIM_2091 Thouarella_2968_OPRIM_2105 Thouarella_2976_OPRIM_2113 Thouarella_3088_OPRIM_2202B Thouarella_3133_OPRIM_2241 Thouarella_3384_OPRIM_2454B Thouarella_3385_OPRIM_2455B
Thouarella_chilensis_N09 Thouarella_variabilis_AR027
Group 6] n: 3 ;id: Thouarella_3087_OPRIM_2201B Thouarella_3303_OPRIM_2383 Thouarella_3304_OPRIM_2384
Group 7] n: 3 ;id: Thouarella_antarctica_AE064 Thouarella_chilensis_AE026 Thouarella_chilensis_R54
Group 8] n: 4 ;id: Thouarella_antarctica_AR018 Thouarella_weddellensis_OPRIM_1922 Thouarella_weddellensis_OPRIM_2081 Thouarella_weddellensis_OPRIM_307
Group 9] n: 4 ;id: Thouarella_antarctica_S170B
Group 10] n: 1 ;id: Thouarella_cf_brucei_AR175
Group 11] n: 4 ;id: Thouarella_cf_brucei_T125
Group 12] n: 3 ;id: Thouarella_cf_laxa_AR232 Thouarella_laxa_AR194 Thouarella_laxa_AR200
Group 13] n: 2 ;id: Thouarella_cf_variabilis_A06 Thouarella_sp_n_A_AC28B
Group 14] n: 1 ;id: Thouarella_crenelata_AE057B
Group 15] n: 1 ;id: Thouarella_crenelata_AR091
Group 16] n: 2 ;id: Thouarella_crenelata_S125B Thouarella_crenelata_W54
Group 17] n: 1 ;id: Thouarella_diadema_AE068
Group 18] n: 1 ;id: Thouarella_diadema_B34
Group 19] n: 2 ;id: Thouarella_diadema_S060 Thouarella_diadema_Z051
Group 20] n: 1 ;id: Thouarella_grasshoffi_GQ868334
Group 21] n: 4 ;id: Thouarella_islai_OPRIM_2168 Thouarella_islai_OPRIM_2169B Thouarella_islai_OPRIM_2194 Thouarella_pendulina_AR135
Group 22] n: 5 ;id: Thouarella_polarsterni_OPRIM_2111B Thouarella_polarsterni_OPRIM_2112B Thouarella_polarsterni_OPRIM_2205B Thouarella_polarsterni_OPRIM_2209 Thouarella_polarsterni_OPRIM_2282B
Group 23] n: 2 ;id: Thouarella_undulata_B48 Thouarella_undulata_S093
Group 24] n: 1 ;id: Thouarella_undulata_Z046
Group 25] n: 1 ;id: Thouarella_variabilis_AE059
Group 26] n: 3 ;id: Thouarella_variabilis_AR096B Thouarella_variabilis_AR134B Thouarella_variabilis_AR169B
Group 27] n: 1 ;id: Thouarella_viridis_AE019
Group 28] n: 1 ;id: Thouarella_viridis_H13

Figure S8. Results from the ABGD approach based on the *mtMuts* locus. Note the presence of 28 putative species or MOTUs.

Initial Partition with prior maximal distance $P=1.15e-03$
Distance Jc69 Jukes-Cantor MinSlope=1.000000
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Group 1] n: 3 ;id: Thouarella_andeep_R16_OPRIM_6262 Thouarella_andeep_R18_OPRIM_6260 Thouarella_andeep_R01_OPRIM_2000
Group 2] n: 5 ;id: Thouarella_viridis_R05_OPRIM_1933 Thouarella_viridis_R06B_OPRIM_1934 Thouarella_viridis_AC23B Thouarella_viridis_AE019 Thouarella_viridis_H13
Group 3] n: 3 ;id: Thouarella_dolichoepinoza_3200_OPRIM_2299B Thouarella_dolichoepinoza_3305_OPRIM_2386B Thouarella_dolichoepinoza_R12_OPRIM_1253
Group 4] n: 1 ;id: Thouarella_dolichoepinoza_3163_OPRIM_2268B
Group 5] n: 9 ;id: Thouarella_amundseni_2941_OPRIM_2091 Thouarella_amundseni_2968_OPRIM_2105 Thouarella_amundseni_2976_OPRIM_2113 Thouarella_amundseni_3088_OPRIM_2202B Thouarella_amundseni_3133_OPRIM_2241
Thouarella_amundseni_3384_OPRIM_2454B Thouarella_amundseni_3385_OPRIM_2455B Thouarella_chilensis_N09 Thouarella_variabilis_AR027
Group 6] n: 3 ;id: Thouarella_pseudoisalai_3087_OPRIM_2201B Thouarella_pseudoisalai_3303_OPRIM_2383 Thouarella_pseudoisalai_3304_OPRIM_2384
Group 7] n: 3 ;id: Thouarella_antarctica_AE064 Thouarella_chilensis_AE026 Thouarella_chilensis_R54
Group 8] n: 4 ;id: Thouarella_antarctica_AR018 Thouarella_weddellensis_OPRIM_1922 Thouarella_weddellensis_OPRIM_2081 Thouarella_weddellensis_OPRIM_307
Group 9] n: 4 ;id: Thouarella_cf_antarctica_AR175 Thouarella_crenelata_AE057B Thouarella_crenelata_AR091 Thouarella_crenelata_W54
Group 10] n: 2 ;id: Thouarella_cf_brucei_T125 Thouarella_variabilis_AR096B
Group 11] n: 1 ;id: Thouarella_cf_laxa_AR232
Group 12] n: 1 ;id: Thouarella_cf_variabilis_A06
Group 13] n: 4 ;id: Thouarella_diadema_AE068 Thouarella_diadema_B34 Thouarella_diadema_S060 Thouarella_diadema_Z051
Group 14] n: 4 ;id: Thouarella_islai_OPRIM_2168 Thouarella_islai_OPRIM_2169B Thouarella_islai_OPRIM_2194 Thouarella_pendulina_AR135
Group 15] n: 2 ;id: Thouarella_laxa_AR194 Thouarella_laxa_AR200
Group 16] n: 5 ;id: Thouarella_polarsterni_OPRIM_2111B Thouarella_polarsterni_OPRIM_2112B Thouarella_polarsterni_OPRIM_2205B Thouarella_polarsterni_OPRIM_2209 Thouarella_polarsterni_OPRIM_2282B
Group 17] n: 1 ;id: Thouarella_sp_n_A_AC28B
Group 18] n: 1 ;id: Thouarella_undulata_B48
Group 19] n: 1 ;id: Thouarella_undulata_S093
Group 20] n: 1 ;id: Thouarella_undulata_Z046
Group 21] n: 3 ;id: Thouarella_variabilis_AE059 Thouarella_variabilis_AR134B Thouarella_variabilis_AR169B

Figure S9. Results from the ABGD approach based on the *Cox1* locus. Note the presence of 21 putative species or MOTUs.

Partition with prior maximal distance P=1.02e-03
Distance JC69 Jukes-Cantor MinSlope=1.000000
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Group[1] n: 3 ;id: Thouarella_crenelata_S125B Thouarella_crenelata_AR091 Thouarella_crenelata_W54
Group[2] n: 4 ;id: Thouarella_antarctica_AE064 Thouarella_antarctica_S170B Thouarella_chilensis_AE026 Thouarella_chilensis_R54
Group[3] n: 4 ;id: Thouarella_antarctica_AR018 Thouarella_weddellensis_OPRIM_1922 Thouarella_weddellensis_OPRIM_2081 Thouarella_weddellensis_OPRIM_307
Group[4] n: 1 ;id: Thouarella_cf_antarctica_AR175
Group[5] n: 3 ;id: Thouarella_cf_laxa_AR232 Thouarella_laxa_AR194 Thouarella_laxa_AR200
Group[6] n: 1 ;id: Thouarella_cf_variabilis_A06
Group[7] n: 1 ;id: Thouarella_chilensis_N09
Group[8] n: 4 ;id: Thouarella_diadema_AE068 Thouarella_diadema_B34 Thouarella_diadema_S060 Thouarella_diadema_Z051
Group[9] n: 1 ;id: Thouarella_pendulina_AR135
Group[10] n: 2 ;id: Thouarella_undulata_B48 Thouarella_undulata_S093
Group[11] n: 1 ;id: Thouarella_undulata_Z046
Group[12] n: 1 ;id: Thouarella_variabilis_AE059
Group[13] n: 3 ;id: Thouarella_viridis_AE019 Thouarella_viridis_H13 Thouarella_viridis_R05
Group[14] n: 1 ;id: Thouarella_polarsterni_OPRIM_2209
Group[15] n: 1 ;id: Thouarella_R12_OPRIM_1253
Group[16] n: 3 ;id: Thouarella_andeep_R01_OPRIM_2000 Thouarella_andeep_R16_OPRIM_6262 Thouarella_andeep_R18_OPRIM_6260
Group[17] n: 1 ;id: Thouarella_variabilis_AR027
Group[18] n: 8 ;id: Thouarella_islai_OPRIM_2168 Thouarella_islai_OPRIM_2194 Thouarella_2941_OPRIM_2091 Thouarella_2968_OPRIM_2105 Thouarella_2976_OPRIM_2113 Thouarella_3133_OPRIM_2241

Figure S10. Results from the ABGD approach based on the 28S locus. Note the presence of 18 putative species or MOTUs.

Partition with prior maximal distance P=1.05e-03
Distance JC69 Jukes-Cantor MinSlope=1.000000
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Group[1] n: 3 ;id: Thouarella_andeep_R01_OPRIM_2000 Thouarella_andeep_R16_OPRIM_6262 Thouarella_andeep_R18_OPRIM_6260
Group[2] n: 5 ;id: Thouarella_viridis_R05_OPRIM_1933 Thouarella_viridis_R06B_OPRIM_1934 Thouarella_viridis_AC23B Thouarella_viridis_AE019 Thouarella_viridis_H13
Group[3] n: 4 ;id: Thouarella_dolichoepinosa_3200_OPRIM_2299B Thouarella_dolichoepinosa_3163_OPRIM_2268B Thouarella_dolichoepinosa_3305_OPRIM_2386B Thouarella_dolichoepinosa_R12_OPRIM_1253
Group[4] n: 9 ;id: Thouarella_amundseni_2941_OPRIM_2091 Thouarella_amundseni_2968_OPRIM_2105 Thouarella_amundseni_2976_OPRIM_2113 Thouarella_amundseni_3088_OPRIM_2202B
Thouarella_amundseni_3133_OPRIM_2241 Thouarella_amundseni_3384_OPRIM_2454B Thouarella_amundseni_3385_OPRIM_2455B Thouarella_chilensis_N09 Thouarella_variabilis_AR027
Group[5] n: 3 ;id: Thouarella_pseudoisalai_3087_OPRIM_2201B Thouarella_pseudoisalai_3303_OPRIM_2383 Thouarella_pseudoisalai_3304_OPRIM_2384
Group[6] n: 4 ;id: Thouarella_antarctica_AR018 Thouarella_weddellensis_2164_OPRIM_1922 Thouarella_weddellensis_2930_OPRIM_2081 Thouarella_weddellensis_R21_OPRIM_307
Group[7] n: 5 ;id: Thouarella_cf_brucei_T125 Thouarella_variabilis_AE059 Thouarella_variabilis_AR096B Thouarella_variabilis_AR134B Thouarella_variabilis_AR169B
Group[8] n: 4 ;id: Thouarella_cf_laxa_AR232 Thouarella_grasshoffi_GQ868334 Thouarella_laxa_AR194 Thouarella_laxa_AR200
Group[9] n: 2 ;id: Thouarella_cf_variabilis_A06 Thouarella_sp__n__A_AC28B
Group[10] n: 4 ;id: Thouarella_diadema_AE068 Thouarella_diadema_B34 Thouarella_diadema_S060 Thouarella_diadema_Z051
Group[11] n: 4 ;id: Thouarella_islai_3052_OPRIM_2168 Thouarella_islai_3053_OPRIM_2169B Thouarella_islai_3079_OPRIM_2194 Thouarella_pendulina_AR135
Group[12] n: 5 ;id: Thouarella_polarsterni_2974_OPRIM_2111B Thouarella_polarsterni_2975_OPRIM_2112B Thouarella_polarsterni_3091_OPRIM_2205B Thouarella_polarsterni_3095_OPRIM_2209
Thouarella_polarsterni_3178_OPRIM_2282B
Group[13] n: 2 ;id: Thouarella_undulata_B48 Thouarella_undulata_S093
Group[14] n: 1 ;id: Thouarella_undulata_Z046
Group[15] n: 4 ;id: Thouarella_antarctica_AE064 Thouarella_antarctica_S170B Thouarella_chilensis_AE026 Thouarella_chilensis_R54
Group[16] n: 4 ;id: Thouarella_cf_antarctica_AR175 Thouarella_crenelata_AE057B Thouarella_crenelata_S125B Thouarella_crenelata_W54
Group[17] n: 1 ;id: Thouarella_crenelata_AR091

Figure S11. Results from the ABGD approach based on the concatenated dataset (three loci). Note the presence of 17 putative species or MOTUs.