Carlgren's hesitation allayed: redescription and systematics of *Heteranthus verruculatus* Klunzinger, 1877 (Cnidaria, Actiniaria), with a redefinition of Heteranthidae Carlgren, 1900

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Supplementary material

TABLE S1 Sea anemone species included in the phylogenetic analyses

					Accession numbers			
Family	Genus	Species	Voucher	Cat. nos.	12S	16S	28S	*cox3*
Actiniidae	*Actinia*	*fragacea*	CAS	-	EU190714	EU190756	KJ483085	GU473334
	Actinia	*tenebrosa*	-	-	KT852045	KT852111	-	KT852330
	Anemonia	*erythraea*	-	-	KY789302	KY789335	-	KY789271
	Anemonia	*viridis*	CAS	-	EU190718	EU190760	KJ483095	GU473335
	Anthopleura	*anneae*	-	-	KY789327	KY789360	KY789392	KY789293
	Anthopleura	*artemisia*	-	-	KT852015	KT852081	-	KT852300
	Anthopleura	*atodai*	-	-	KT851993	KT852055	KT852247	KT852275
	Anthopleura	*ballii*	-	-	KY789311	KY789346	KY789376	KY789281
	Anthopleura	*buddemeieri*	-	-	KY789316	KY789351	KY789381	-
	Anthopleura	***buddemeieri* (NY27)**	**ZRC**	**In situ**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Anthopleura	***buddemeieri* (NY28)**	**ZRC**	**In situ**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Anthopleura	*dixoniana*	-	-	KY789307	KY789341	-	KY789276
	Anthopleura	*dowii*	-	-	KY789318	KY789353	KY789383	KY789286
	Anthopleura	*elegantissima*	KUNHM	-	EU190755	EU190755	KJ483104	GU473333
	Anthopleura	*fuscoviridis*	-	-	KY789303	KY789336	KY789369	KY789272
	Anthopleura	*handi*	-	-	KT852013	KT852079	KY789387	KT852298
	Anthopleura	*insignis*	-	-	KY789331	KY789364	KY789395	KY789297
	Anthopleura	*japonica*	-	-	KY789310	KY789345	-	KY789280
	Anthopleura	*krebsi*	-	-	KY789305	KY789339	KY789372	KY789275
	Anthopleura	*kurogane* Japan	-	-	KY789323	KY789356	-	-
	Anthopleura	*kurogane* Korea	-	-	KY789321	KY789355	KY789385	KY789288
	Anthopleura	*midori*	-	-	KY789324	-	KY789388	KY789289
	Anthopleura	*Nigrescens* Galapagos	-	-	-	KY789343	KY789373	KY789278
	Anthopleura	*nigrescens*	-	-	KY789309	KY789344	KY789375	KY789279
	Anthopleura	*nigrescens* Hawaii	-	-	KY789306	KY789340	KY789374	-
	Anthopleura	*pallida*	-	-	KY789308	KY789342	-	KY789277
	Anthopleura	*sola*	-	-	-	KY789365	-	-
	Anthopleura	sp.	-	-	KY789304	KY789338	KY789371	KY789274
	Anthopleura	sp. “Green”	-	-	-	KY789337	KY789370	KY789273
	Anthopleura	sp. South Africa	-	-	KY789329	KY789362	KY789393	KY789295

	Anthopleura	*thallia*	-	-	KY789333	KY789366	KY789397	KY789300
	Anthopleura	*waridi*	-	-	KY789301	KY789334	KY789368	KY789270
	Anthopleura	*xanthogrammica*	-	-	-	KY789367	KY789398	-
	Anthostella	*stephensoni*	AMNH	-	JQ810719	JQ810721	KJ483132	JQ810726
	Aulactinia	*incubans*	-	-	KT852014	KT852080	KT852256	KT852299
	Aulactinia	*stella*	-	-	KT852044	KT852110	KT852263	KT852329
	Aulactinia	*veratra*	-	-	KT852001	KT852063	-	KT852283
	Aulactinia	*verrucosa*	KUNHM	-	EU190723	EU190766	KJ483084	-
	Bolocera	*kerguelensis*	AMNH	-	KJ482925	KJ482965	KJ483133	KJ482985
	Bunodactis	*reynaudi*	-	-	KT852041	KT852106	KT852260	-
	Bunodosoma	*biscayense*	-	-	KY789315	KY789350	KY789380	KY789284
	Bunodosoma	*californicum*	-	-	KY789312	KY789347	KY789377	-
	Bunodosoma	*capense*	-	-	KY789332	-	KY789396	KY789298
	Bunodosoma	*cavernatum*	-	-	KY789313	KY789348	KY789378	KY789282
	Bunodosoma	*grandis*	KUNHM	-	EU190722	EU190765	KJ483083	GU473336
	Bunodosoma	*granuliferum*	-	-	KY789314	KY789349	KY789379	KY789283
	Bunodosoma	sp. South Africa	-	-	KY789330	KY789363	KY789394	KY789296
	Dofleinia	***armata* (NY54)**	**ZRC**	**ZRC.CNI.1015**	**AB123456**	**AB123456**	**-**	**AB123456**
	Entacmaea	*quadricolor*	-	-	MK519401	MK519456	-	MK522439
	Entacmaea	*quadricolor*	-	-	MK519402	MK519457	-	MK522440
	Entacmaea	*quadricolor*	-	-	MK519403	-	MK519639	MK522441
	Entacmaea	*quadricolor*	-	-	MK519404	MK519458	MK519644	MK522442
	Entacmaea	*quadricolor*	-	-	MK519405	MK519459	MK519643	MK522443
	Entacmaea	*quadricolor*	-	-	MK519406	MK519460	MK519645	MK522444
	Entacmaea	*quadricolor*	-	-	MK519407	MK519461	MK519646	MK522445
	Entacmaea	*quadricolor*	-	-	MK519408	MK519462	MK519640	MK522446
	Entacmaea	*quadricolor*	-	-	MK519409	MK519463	MK519641	MK522447
	Entacmaea	*quadricolor*	-	-	MK519410	MK519464	MK519642	MK522448
	Epiactis	*japonica*	-	-	KY789317	KY789352	KY789382	KY789285
	Epiactis	*japonica*	-	-	KT852026	KT852091	-	KT852311
	Epiactis	*japonica*	-	-	KY789320	KY789354	KY789384	KY789287
	Epiactis	*lisbethae*	KUNHM	-	EU190727	EU190771	EU190816	GU473360
	Epiactis	*thompsoni*	-	-	KT852011	KT852074	-	KT852294
	Glyphoperidium	*bursa*	AMNH	-	KJ482923	KJ482961	KJ483136	KJ482982
	Gyractis	*sesere*	-	-	KT852012	KT852078	KY789386	KT852297

	Gyractis	sp. Oman	-	-	KY789325	KY789357	KY789390	KY789290
	Isosicyonis	*alba*	AMNH	-	-	KJ482959	KJ483134	KJ482981
	Isosicyonis	*striata*	AMNH	-	EU190736	EU190864	KJ483137	FJ489493
	*Isotealia_*	*antarctica*	AMNH	-	JQ810720	JQ810722	-	JQ810727
	Korsaranthus	sp.	AMNH	-	KJ482920	KJ482958	KJ483117	KJ482987
	Macrodactyla	*doreensis*	KUNHM	-	EU190739	EU190785	KJ483049	GU473342
	Macrodactyla	*doreensis*	-	-	MK519411	MK519465	MK519661	MK522449
	Macrodactyla	*doreensis*	-	-	-	MK519466	-	MK522450
	Macrodactyla	***doreensis* (NY55)**	**ZRC**	**ZRC.CNI.1016**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Macrodactyla	***doreensis* (NY227)**	**ZRC**	**ZRC.CNI.1201**	**-**	**AB123456**	**AB123456**	**AB123456**
	Phlyctenactis	*tuberculosa*	-	-	KY789326	KY789359	-	KY789292
	Pseudactinia	*varia*	-	-	KY789328	KY789361	-	KY789294
	Phymactis	*clematis*	-	-	-	KY789358	-	KY789291
	Urticina	*coriacea*	KUNHM	-	GU473282	EU190797	KJ483094	GU473351
	Urticina	*grebenlnyi*	-	-	KT852034	KT852098	-	KT852318
Actinostoloidea	*Paranthus*	*niveus*	AMNH	-	GU473277	GU473295	KJ483072	GU473344
Aliciidae	*Triactis*	*producta*	KUNHM	-	EU490525	-	KJ483125	GU473350
Haloclavidae	*Haloclava*	*producta*	KUNHM	-	EU190734	EU190779	KJ483097	JF833008
	Haloclava	sp.	AMNH	-	KJ482924	KJ482963	KJ483138	KJ482989
	Harenactis	*argentina*	AMNH	-	KJ482926	KJ482964	KJ483047	KJ482984
	Metapeachia	***tropica* (NY38)**	**ZRC**	**ZRC.CNI.1023**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Metapeachia	***tropica* (NY84)**	**ZRC**	**ZRC.CNI.1165**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Peachia	*cylindrica*	KUNHM	-	EU190743	EU190789	EU190732	-
	Stephanthus	*antarcticus*	AMNH	-	KJ482927	KJ482960	KJ483092	KJ482983
Heteranthidae	*Heteranthus*	*verruculatus*	KUNHM	-	KC812147	-	-	-
	Heteranthus	***verruculatus* (NY213)**	**ZRC**	**ZRC.CNI.1207**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY245)**	**ZRC**	**ZRC.CNI.1230**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY246)**	**ZRC**	**ZRC.CNI.1230**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY247)**	**ZRC**	**ZRC.CNI.1230**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY248)**	**ZRC**	**ZRC.CNI.1230**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY411)**	**ZRC**	**In situ**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY412)**	**ZRC**	**ZRC.CNI.1367**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY415)**	**ZRC**	**ZRC.CNI.1368**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY416)**	**ZRC**	**ZRC.CNI.1368**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
	Heteranthus	***verruculatus* (NY476)**	**ZRC**	**In situ**	**AB123456**	**AB123456**	**AB123456**	**AB123456**

Liponematidae	*Liponema*	*brevicornis*	KUNHM	-	EU190738	EU190866	KJ483139	KJ483001
	Liponema	*multiporum*	AMNH	-	KJ482922	KJ482962	-	-
Metridiidae	*Metridium*	*senile*	-	-	KJ482916	KJ482950	KJ483113	KT852309
Phymanthidae	*Phymanthus*	*crucifer* (CRU)	KUNHM	-	-	KC812159	-	KC812228
	Phymanthus	*crucifer* (RG182A)	AMNH	-	KJ910344	KJ910345	-	KJ910346
	Phymanthus	*crucifer* (RG132A)	AMNH	-	KJ910344	-	-	-
	Phymanthus	*loligo*	KUNHM	-	EU190745	EU190791	-	GU473345
	Phymanthus	***loligo* (NY490)**	**ZRC**	**ZRC.CNI.1389**	**AB123456**	**AB123456**	**AB123456**	**AB123456**
Preactiniidae	*Dactylanthus*	*antarcticus*	AMNH	-	GU473272	AY345877	KJ483086	GU473358
	Preactis	*millardae*	AMNH	-	KJ482921	KJ482957	KJ483118	KJ482986
Sagartiidae	*Cereus*	*herpetodes*	KUNHM	-	JF832956	JF832969	JF832992	-
	Cereus	*pedunculatus*	KUNHM	-	EU190724	EU190767	EU190813	FJ489471
	Sagartia	*elegans*	KUNHM	-	-	-	JF832994	JF833012
Stichodactylidae	*Heteractis*	*aurora*	-	-	MK519412	MK519467	-	MK522451
	Heteractis	*aurora*	-	-	MK519413	MK519468	-	MK522452
	Heteractis	*aurora*	-	-	MK519414	MK519469	MK519647	MK522453
	Heteractis	*crispa*	-	-	MK519416	MK519471	MK519648	MK522455
	Heteractis	*crispa*	-	-	MK519417	MK519472	MK519649	MK522456
	Heteractis	*crispa*	-	-	MK519418	MK519473	MK519650	MK522457
	Heteractis	*crispa*	-	-	MK519419	MK519474	-	MK522458
	Heteractis	*crispa*	-	-	MK519421	MK519476	-	MK522460
	Heteractis	*crispa*	-	-	MK519422	MK519477	-	MK522461
	Heteractis	*crispa*	-	-	MK519423	MK519478	MK519654	MK522462
	Heteractis	*crispa*	-	-	MK519424	MK519479	-	MK522463
	Heteractis	*crispa*	-	-	MK519425	MK519480	-	MK522464
	Heteractis	*crispa*	-	-	MK519426	MK519481	MK519574	MK522465
	Heteractis	*crispa*	-	-	MK519427	MK519482	-	MK522466
	Heteractis	*crispa*	-	-	MK519428	MK519483	MK519652	MK522467
	Heteractis	*crispa*	-	-	MK519429	MK519484	MK519653	MK522468
	Heteractis	*magnifica*	KUNHM	-	EU190732	EU190777	KJ483093	KJ482988
	Heteractis	*magnifica*	-	-	MK519430	MK519485	MK519656	MK522469
	Heteractis	*magnifica*	-	-	MK519431	MK519486	MK519657	MK522470
	Heteractis	*magnifica*	-	-	MK519432	MK519487	MK519658	MK522471
	Heteractis	*magnifica*	-	-	MK519433	MK519488	MK519659	MK522472
	Heteractis	*magnifica*	-	-	MK519434	MK519489	MK519660	MK522473

	Heteractis	*magnifica*	-	-	MK519420	MK519475	MK519655	MK522459
	Heteractis	*malu*	-	-	-	-	-	MK522474
	Heteractis	*malu*	-	-	-	MK519490	-	MK52275
	Stichodactyla	*gigantea*	-	-	EU190747	EU190793	EU190835	KY789299
	Stichodactyla	*haddoni*	-	-	MK519435	MK519491	MK519662	MK522476
	Stichodactyla	*helianthus*	-	-	MK519436	MK519492	MK519667	MK522477
	Stichodactyla	*helianthus*	-	-	MK519437	MK519493	MK519668	MK522478
	Stichodactyla	*helianthus*	-	-	MK519438	MK519494	MK519669	MK522479
	Stichodactyla	*helianthus*	-	-	MK519439	MK519495	MK519670	MK522480
	Stichodactyla	*mertensii*	-	-	MK519440	MK519496	MK519584	K522481
	Stichodactyla	*mertensii*	-	-	MK519441	MK519497	MK519585	K522482
	Stichodactyla	*mertensii*	-	-	MK519442	MK519498	MK519665	K522483
	Stichodactyla	*mertensii*	-	-	MK519443	MK519499	MK519666	-
Thalassianthidae	*Cryptodendrum*	*adhaesivum*	-	-	-	MK519500	MK519638	K522484

Table includes information on voucher specimens and associated museum catalogue numbers, if available. Dashes denote that information is unavailable. Accession numbers in **bold** denotes new sequences to this study. Abbreviations: AMNH, American Museum of Natural History, New York; CAS, California Academy of Sciences, San Francisco; Cat. nos., Catalogue numbers; KUNHM, University of Kansas Natural History Museum; ZRC, Zoological Records Collection, Lee Kong Chian Natural History Museum, Singapore.

TABLE S2 GPS coordinates, collection dates and literature associated with the *Heteranthus verruculatus* materials examined in this study

Catalogue no.	Specimen type	Lot size	Locality	Latitude	Longitude	Collection date	Literature
ZMB1852; NRS 4861*	Syntype	1	Egypt, Kosseir	26.102254	34.285127	?; no later than 1877	Klunzinger, 1877; Carlgren, 1943, 1950
NRS 4076	Holotype	1	Vietnam, . Côn Sơn Island [= Poulo Condore]	8.682549	106.613431	?; no later than 1943	Carlgren, 1943, 1950
MNHN-IK-2019-8	Voucher	3	French Polynesian Islands, Mangareva, Rikitea	-23.121548	-134.966731	-	This study
MTQ-G59391	Voucher	21	Eastern Australia, Moreton Bay	-27.5	153.383333	16-Feb-2005	Fautin et al. (2008)
MTQ-G59392	Voucher	1	Eastern Australia, Moreton Bay	-27.416667	153.516667	18-Feb-2005	Fautin et al. (2008)
MTQ-G59393	Voucher	5	Eastern Australia, Mystic Sands, Townsville	19.026667	146.42	23-May-2005	Fautin et al. (2008)
MTQ-G59967	Voucher	2	Eastern Australia, Moreton Bay	-27.416667	153.516667	18-Feb-2005	Fautin et al. (2008)
MTQ-G59968	Voucher	3	Eastern Australia, Moreton Bay	-27.25	153.25	?-Nov-2005	Fautin et al. (2008)
NHM 1954.6.28.23	Voucher	1	Eastern Australia, Great Barrier Reef, Snapper Island, Low Isles	-16.384907	145.559981	?; no later than 1950	Carlgren (1950)
RCLA.Cni.003	Voucher	4	Indonesia, Pulau Ambon, Tial	-3.638690	128.331613	16-Oct-2018	This study
RCLA.Cni.004	Voucher	3	Indonesia, Pulau Ambon, Latuhalat	-3.793912	128.095383	15-Oct-2018	This study
RCLA.Cni.008	Voucher	2	Indonesia, Pulau Ambon, Tial	-3.638690	128.331613	12-Oct-2018	This study
UFM 4220	Voucher	2	Oman, Bar Al Hikan Peninsula	20.33835	58.3819	21-Jan-2001	This study
WAM Z33600	Voucher	1	Western Australia, Perth, Rottnest Island, Radar Reef	-32.0166667	115.5	13-Jan-1991	This study
WAM Z33601	Voucher	3	Western Australia, Perth, Rottnest Island, Cape Vlamingh	-32.0166667	115.5	9-Jan-1991	This study
WAM Z33604	Voucher	6	Western Australia, Perth, Rottnest Island, Radar Reef	-32.0166667	115.5	9-Jan-1991	This study
ZRC.CNI.0496	Voucher	2	Cyrene Reef	1.256300	103.74704	11-Jun-2007	This study
ZRC.CNI.0505	Voucher	8	Cyrene Reef	1.256300	103.74704	11-Jun-2007	This study

ZRC.CNI.0506	Voucher	3	Cyrene Reef	1.256300	103.74704	11-Jun-2007	This study
ZRC.CNI.0507	Voucher	17	Cyrene Reef	1.256300	103.74704	11-Jun-2007	This study
ZRC.CNI.0583	Voucher	3	Cyrene Reef	1.256300	103.74704	11-Jun-2007	This study
ZRC.CNI.1207	Voucher	8	Cyrene Reef	1.256300	103.74704	28-May-2017	This study
ZRC.CNI.1230	Voucher	>50	Cyrene Reef	1.256300	103.74704	26-Jul-2017	This study
ZRC.CNI.1367	Voucher	18	Cyrene Reef	1.256300	103.74704	12-Aug-2017	This study
ZRC.CNI.1368	Voucher	>35	Pulau Jong	1.215297	103.787082	14-08-2018	This study

An asterisk (*) denote that the specimen NRS 4861 is a fragment from ZMB 1852, see main-text for details; '?' indicates that the information was not found on the label associated with the specimen. For abbreviations to the institutions, refer to main-text.

FIGURE S1 Localities for which *Heteranthus verruculatus* Klunzinger, 1877 was found, and where fieldwork was conducted. 1. Oahu, Hawaii. 2. Rikitea, French Polynesia. 3. Zanzibar, Tanzania. 4. Thuwal, Saudi Arabia. 5. Kosseir, Egypt. 6. Hurgharda, Egypt. 7. Eilat, Israel. 8. Bar Al Himan Peninsula, Oman. 9. Pulau Langkawi, Malaysia. 10, Singapore. 11. Pulau Tioman, Malaysia. 12. Pulau Perhentian, Malaysia. 13. Côn Sơn Island [= Poulo Condore], Vietnam. 14, Pulau Ambon, Indonesia. 15. Great Barrier Reef, Australia. 16, Moreton Bay, Australia. 17. Rottnest Island, Australia. Filled dots indicates localities for which *H. verruculatus* had been encountered. Unfilled dots represent sites where fieldwork was conducted by first author NWL Yap but no *H. verruculatus* were encountered. Star symbols denote type localities for *H. verruculatus* (i.e., No. 5) and *H. insignis* Carlgren, 1943 (i.e., No. 13), see main text for full details.

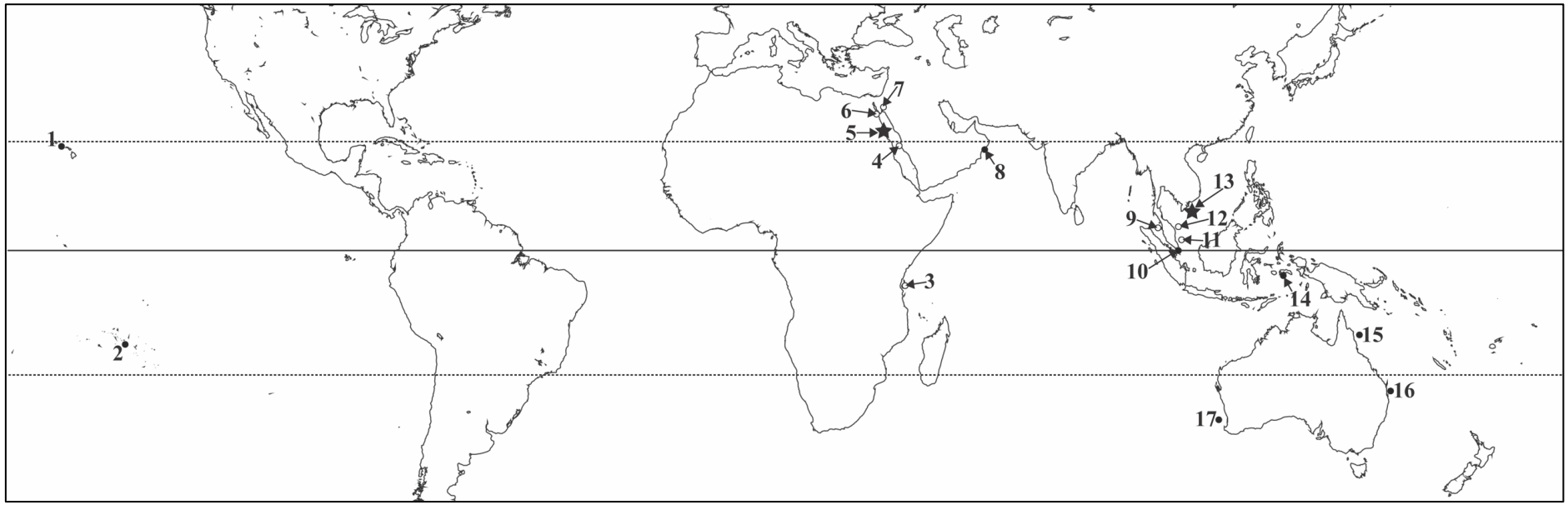


FIGURE S2 Complete maximum likelihood phylogram (RAxML) of concatenated dataset. Bootstrap values (≥50) are indicated on branches. Bootstrap resampling values under ML, and posterior probability values of Bayesian inference (BI), are indicated at the branches as ML/BI. Only bootstrap values ≥50 and posterior probability ≥0.8 are shown; values <50 and <0.8 are indicated by (-). Numbers in parentheses are tissue sample catalogue numbers of new sequences in this study; (*) denotes *H. verruculatus* sample collected from Australia, previously published in González-Muñoz et al. (2015).

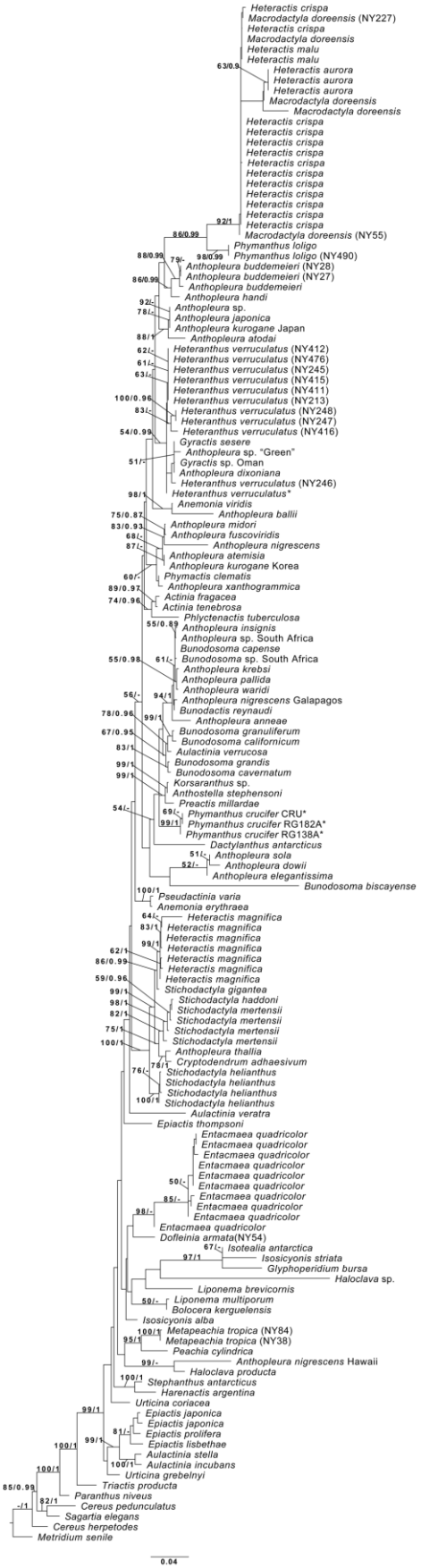

Heteractis crispa
Macrodactyla doreensis (NY227)
Heteractis crispa
Macrodactyla doreensis
Heteractis malu
Heteractis malu
Heteractis aurora
Heteractis aurora
Heteractis aurora
Macrodactyla doreensis
Macrodactyla doreensis
Heteractis crispa
Heteractis crispa
Heteractis crispa
Heteractis crispa
Heteractis crispa
Heteractis crispa
Heteractis crispa
Heteractis crispa
Heteractis crispa
Heteractis crispa
Macrodactyla doreensis (NY55)
Phymanthus loligo
Phymanthus loligo (NY490)
Anthopleura buddemeieri (NY28)
Anthopleura buddemeieri (NY27)
Anthopleura buddemeieri
Anthopleura handi
Anthopleura sp.
Anthopleura japonica
Anthopleura kurogane Japan
Anthopleura atodai
Heteranthus verruculatus (NY412)
Heteranthus verruculatus (NY476)
Heteranthus verruculatus (NY245)
Heteranthus verruculatus (NY415)
Heteranthus verruculatus (NY411)
Heteranthus verruculatus (NY213)
Heteranthus verruculatus (NY248)
Heteranthus verruculatus (NY247)
Heteranthus verruculatus (NY416)
Gyractis sesere
Anthopleura sp. "Green"
Gyractis sp. Oman
Anthopleura dixoniana
Heteranthus verruculatus (NY246)
Heteranthus verruculatus*
Anemonia viridis
Anthopleura ballii
Anthopleura midori
Anthopleura fuscoviridis
Anthopleura nigrescens
Anthopleura atemisia
Anthopleura kurogane Korea
Phymactis clematis
Anthopleura xanthogrammica
Actinia fragacea
Actinia tenebrosa
Phlyctenactis tuberculosa
Anthopleura insignis
Anthopleura sp. South Africa
Bunodosoma capense
Bunodosoma sp. South Africa
Anthopleura krebsi
Anthopleura pallida
Anthopleura waridi
Anthopleura nigrescens Galapagos
Bunodactis reynaudi
Anthopleura anneae
Bunodosoma granuliferum
Bunodosoma californicum
Aulactinia verrucosa
Bunodosoma grandis
Bunodosoma cavernatum
Korsaranthus sp.
Anthostella stephensoni
Preactis millardae
Phymanthus crucifer CRU*
Phymanthus crucifer RG182A*
Phymanthus crucifer RG138A*
Dactylanthus antarcticus
Anthopleura sola
Anthopleura dowii
Anthopleura elegantissima
Bunodosoma biscayense
Pseudactinia varia
Anemonia erythraea
Heteractis magnifica
Heteractis magnifica
Heteractis magnifica
Heteractis magnifica
Heteractis magnifica
Heteractis magnifica
Heteractis magnifica
Stichodactyla gigantea
Stichodactyla haddoni
Stichodactyla mertensii
Stichodactyla mertensii
Stichodactyla mertensii
Stichodactyla mertensii
Anthopleura thallia
Cryptodendrum adhaesivum
Stichodactyla helianthus
Stichodactyla helianthus
Stichodactyla helianthus
Stichodactyla helianthus
Aulactinia veratra
Epiactis thompsoni
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Entacmaea quadricolor
Dofleinia armata(NY54)
Isotealia antarctica
Isosicyonis striata
Glyphoperidium bursa
Haloclava sp.
Liponema brevicornis
Liponema multiporum
Bolocera kerguelensis
Isosicyonis alba
Metapeachia tropica (NY84)
Metapeachia tropica (NY38)
Peachia cylindrica
Anthopleura nigrescens Hawaii
Haloclava producta
Stephanthus antarcticus
Harenactis argentina
Urticina coriacea
Epiactis japonica
Epiactis japonica
Epiactis prolifera
Epiactis lisbethae
Aulactinia stella
Aulactinia incubans
Urticina grebelnyi
Triactis producta
Paranthus niveus
Cereus pedunculatus
Sagartia elegans
Cereus herpetodes
Metridium senile
0.04

FIGURE S3 Maximum likelihood phylogram (RAxML) of mitochondrial 12S sequences. Bootstrap values (≥50) are indicated on branches.



FIGURE S4 Maximum likelihood phylogram (RAxML) of mitochondrial 16S sequences. Bootstrap values (≥50) are indicated on branches.

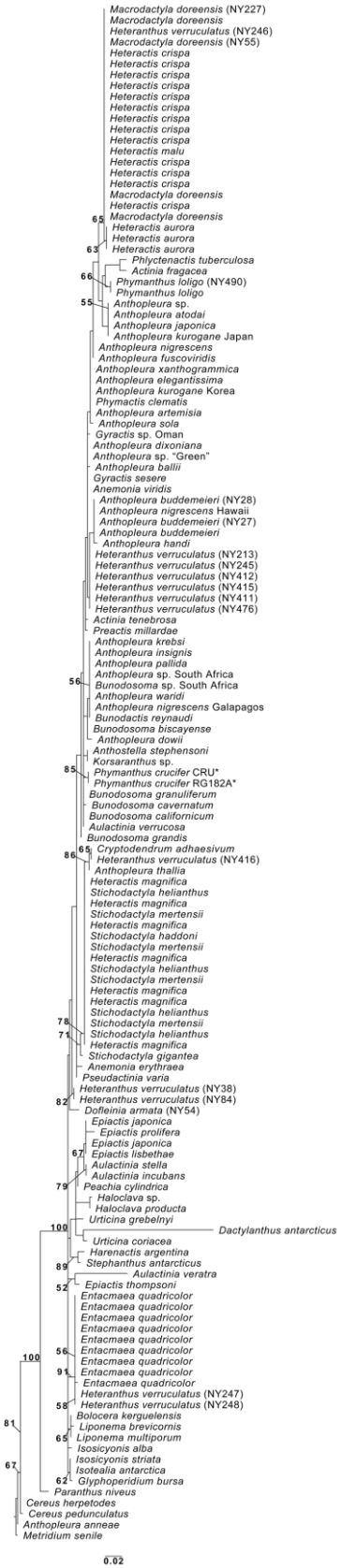


FIGURE S5 Maximum likelihood phylogram (RAxML) of nuclear 28S sequences. Bootstrap values (≥50) are indicated on branches.

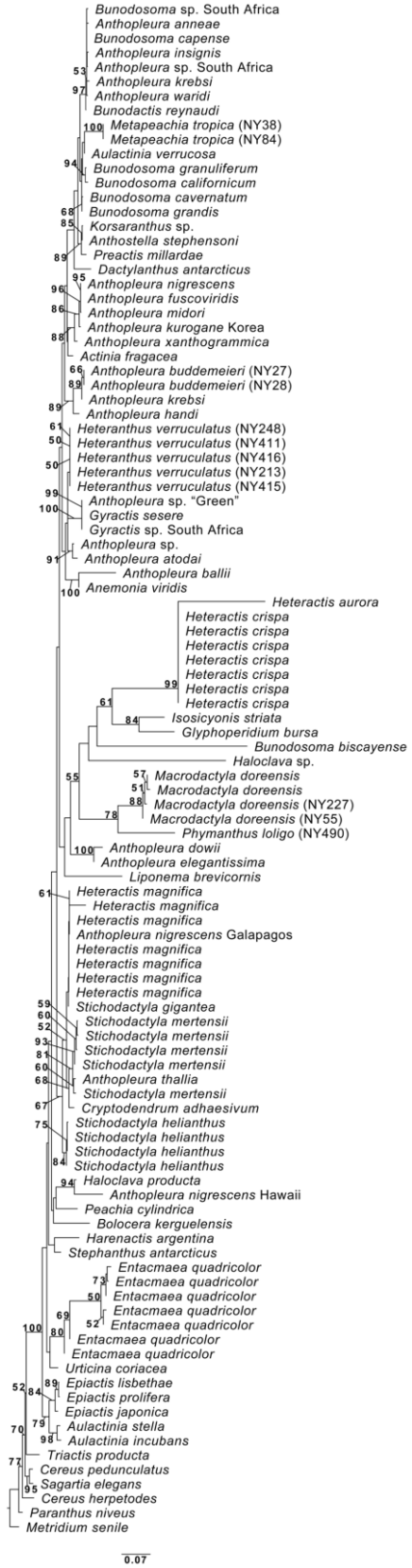


FIGURE S6 Maximum likelihood phylogram (RAxML) of mitochondrial *cox3* sequences. Bootstrap values (≥50) are indicated on branches.



VIDEO S1 Files corresponding to fig. 4 in main-text. These (i.e., fig. 4) can be found on figshare.com, using the following links provided. The video is presented as two separate media files due to resolution and file size restriction:

VIDEO S1a: https://figshare.com/s/4728433c6bc58009587b

Heteranthus verruculatus undergoing longitudinal fission, in real time of 1 h 12 m 30 s. Note video resolution is low for this to retain its low media file size. Video by Yap NWL, Reef Ecology Lab, National University of Singapore (NUS).

VIDEO S1b: https://figshare.com/s/bbc68f1e92d78d6efa8a

The same video as S1a, but sped up 200X to retain its video resolution and reduce media file size. Video by Yap NWL, Reef Ecology Lab, National University of Singapore (NUS).