

Supplementary Material

Algae 2018, 33(3): 215-229

<https://doi.org/10.4490/algae.2018.33.6.25>

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Supplementary Table S1. Collection and voucher information / source of species included in the concatenated analysis including GenBank accession numbers of *rbcl*, *psbA*, and COI-5P sequences

Species	Collection data	GenBank accession No.		
		<i>rbcl</i>	<i>psbA</i>	COI
<i>Acanthophora spicifera</i>	FK021: USA, Florida, Biscayne Bay; Aug 12, 2013	MH388517	MH388620	MH388703
<i>Adamsiella chauvinii</i>	UA0336: New Zealand, Stewart Island, Lee Bay; Nov 2, 2004; unknown	MH388577	MH388672	MH388748
<i>Alsidium corallinum</i>	AC061: Islas Canarias, S Gran Canarias; Sep 29, 2016; M. Sanson	MH204652	MH388610	MH388695
<i>Amansia glomerata</i>	641685: USA, Hawaii, Honolulu, Oahu; Aug 2, 2002; C. Schneider	-	MH388608	MH388692
<i>Amansieae</i> sp.1	UA0096: USA, Puerto Rico, Media Luna Reef; Mar 23, 1989; D. Ballantine	MH388552	MH388652	MH388729
<i>Amansieae</i> sp.2	CI006: Islas Canarias, Tenerife, Punta del Hidalgo; Feb 20, 2014; M. Sanson	MH388511	MH388613	MH388697
<i>Bryothamnion seaforthii</i>	G001: Venezuela, Falcon, Cabo San Roman	MH204653	MH388630	MH388706
	FK008: USA, Florida, Fort Pierce; Aug 10, 2013; G. Garcia-Soto	MH204657	MH388616	MH388701
	MICH644065: Barbados, Saint John, Bath; Feb 22, 2004; T. Sahai	MH204656	-	-
	PD644: Brazil, Espírito Santo, Ponta Castelhanos; Apr 9, 2014; intertidal	MF101430	MF101430	MF093968
<i>B. triquetrum</i>	G018: Venezuela, Buchuacos, Falcon; Jun 10, 2012; G. Garcia-Soto	MH204654	MH388634	MH388717
	UA0155: USA, Florida, West Summerland Key; M. H. Hommersand	MH204655	MH388654	-
<i>Bostrychia moritziana</i>	JW3660: culture strain, Díaz-Tapia et al. 2017	MF101419	MF101419	MF093965
<i>B. tenella</i>	JW3079: culture strain, Díaz-Tapia et al. 2017	MF101417	MF101417	MF093967
<i>Bostrychia</i> sp.	FK040: USA, Florida, Crandon Park; Aug 13, 2013	-	MH388625	MH388704
<i>Chondria atropurpurea</i>	FK012: USA, Florida, Biscayne Bay; Aug 10, 2013	MH388516	MH388619	-
<i>C. baileyana</i>	FK001: USA, Florida, Indian River Lagoon; Aug 8, 2013	MH388512	MH388614	MH388698
<i>Chondria</i> sp.	PD745: Australia, Victoria, Port Arlington; Nov 9, 2014; subtidal (-2 m)	MF101431	MF101431	MF093972
	PD620: Brazil, Espírito Santo, Praia de Parati; Apr 8, 2014; intertidal	MF101429	MF101429	MF093974
	PD1582: Western Australia, Rottneest Island; Mar 15, 2015; subtidal (-20 m)	MF101451	MF101451	MF093973
<i>Chondrieae</i> sp.	UA0166: Philippines Islands, Hilutungan; Apr 19, 1998; L. Lawrence	MH388562	MH388657	-
<i>Cladhymenia lyalii</i>	UA0338: New Zealand, Stewart Island, Lee Bay; Oct 31, 2004	MH388605	MH388673	-
<i>Cladurus elatus</i>	UA0540: South Australia, Port MacDonnell; Aug 28, 1995; M. H. H. & F. H.	MH388583	MH388678	-
<i>Cliftonaea pectinata</i>	PD1561: Western Australia, Rottneest Island; Mar 15, 2015; subtidal (-20 m)	MF101450	MF101450	MF093975
<i>Coeloclonium</i> sp.	UA0240: South Australia, Port MacDonnell; Aug 28, 1995; M. H. H.	MH388575	MH388670	MH388746

Supplementary Table S1. Continued

Species	Collection data	GenBank accession No.		
		<i>rbcL</i>	<i>psbA</i>	COI
<i>Dasya binghamiae</i>	UC2050572: USA, California, Tomales Bay; Jul 31, 2015; J. R. Hughey	KX247284	KX247284	KX247283
<i>Dasyclonium flaccidum</i>	UA0056: Western Australia, Tarcoola Beach; Sep 21, 1995; M. H. H. & F. H.	MH388548	MH388650	MH388726
<i>Digenea arenihauriens</i>	BDA0503: Bermuda; Aug 25, 2010; C. Schneider, C. Lane & T. Popolizio	MG648068	-	-
	BDA0713: Bermuda, Paget; Jan 20, 2012; C. Schneider, C. Lane & T. Popolizio	-	-	MG648076
<i>D. cymatophila</i>	USA: Hawaii; Sherwood et al. 2010	-	-	HQ422597
<i>D. simplex</i>	PD1820: Western Australia, Drumonde cove; Mar 27, 2015; intertidal	MF101465	MF101465	MF093979
<i>Digenea</i> sp.	UA0142: Bahamas, Andros, Lovehill Sound; May 25, 2004; S. M. Noble	MH388554	MH388656	MH388731
<i>Dictyomenia harveyana</i>	UA0188: Australia, Queenscliff; Aug 6, 1995; M. H. H. & F. H.	MH388567	MH388661	MH388740
<i>D. sonderi</i>	PD1725: Western Australia, Green Head; Mar 21, 2015; drift	MF101455	MF101455	MF093978
<i>Dipterocladia arabiensis</i>	DHO101: Oman, Dhofar, Mirbat; Sep 24, 2003	MF101408	MF101408	MF093980
<i>Dipterosiphonia australica</i>	PD1107: Australia, Victoria, Killornei; Dec 27, 2014; intertidal	MF101444	MF101444	MF093981
<i>D. rigens</i>	CI003: Islas Canarias, Tenerife, Punta del Hidalgo; May 16, 2014; M. Sanson	MH388509	MH388611	-
<i>Epiglossum smithiae</i>	UA0030: Australia, Victoria, Warrnambool; Jul 13, 1995; M. H. H.	MH388544	MH388645	MH388723
<i>Gredgaria maugeana</i>	PD1230: Australia, Victoria, The Rip; Jan 16, 2015; subtidal (-20 m)	MF101446	MF101446	MF093982
<i>Halopithys incurva</i>	CI004: Islas Canarias, Tenerife, Punta del Hidalgo; Feb 20, 2014; M. Sanson	MH388510	MH388612	-
<i>Herposiphonia</i> sp.	G029: Venezuela, Falcon, Puerto Escondido; Jun 10, 2012; G. Garcia-Soto	MH388529	MH388632	MH388712
<i>Heterodasya mucronata</i>	NCWeed-862: USA, North Carolina, Onslow Bay; Apr 17, 2012; D. W. Freshwater & S. Hall	KF367797	-	KC567678
<i>Kuetzingia canaliculata</i>	PD1540: Western Australia, Prevelly, Surfers Point; Mar 12, 2015; drift	MF101449	MF101449	MF093984
<i>Laurenciella marilzae</i>	HV1501: Pta Hidalgo, Tenerife, Spain; Jun 10, 2015	MF101410	MF101410	MF093987
<i>Laurencia snackeyi</i>	JFC0032: Western Australia, Coral Bay; Verbruggen & Costa 2015	LN833431	LN833431	MF093985
<i>Laurencieae</i> sp.	JFC17111: South Africa, KwaZulu-Natal, Margate; Dec 12, 2014; intertidal	MF101412	MF101412	MF093986
<i>Lenormandia spectabilis</i>	UA0018: Western Australia, Cervantes; Sep 20, 1995; M. H. H. & F. H.	MH388538	MH388638	MH388720
<i>L. pardalis</i>	UA0027: Western Australia, Hamelin Bay; Sep 26, 1995; M. H. H. & F. H.	-	MH388644	MH388722
<i>Lophocladia kuetzingii</i>	PD1509: Western Australia, Albany; Mar 11, 2015; subtidal (-5 m)	MF101465	MF101465	MF093988
<i>L. trichoclados</i>	662102: Bermuda: St. George's, St. George's Harbour; Feb 12, 2008; C. W. Schneider	MH388508	-	MH388693
<i>Lophothalieae</i> sp.	UA0226: Australia, Port Mac Donnell; Jul 15, 1995; M. H. H. & G. Kraft	MH388572	MH388665	-
<i>Lophurella</i> sp.	UA0534: South Australia, Robe, Evans Cave; Nov 11, 1995; M. H. H.	MH388580	MH388675	MH388742
<i>Melanothamnus harveyi</i>	PD890: Australia, Victoria, Queenscliff marina; Nov 29, 2014; pontoon	MF101437	MF101437	MF093989
<i>M. pseudovillum</i>	PHYKOS3533: Panama, Bocas del Toro, Isla Colon, Flat Rock Beach; Jul 17, 2008; D. W. Freshwater	HM573568	-	HM573524
<i>Murrayella pericladus</i>	FK029: USA, Florida, Crandon Park; Aug 13, 2013; G. Garcia-Soto	MH388518	MH388622	-

Supplementary Table S1. Continued

Species	Collection data	GenBank accession No.		
		<i>rbcL</i>	<i>psbA</i>	COI
<i>Neurymenia fraxinifolia</i>	UA0032: Western Australia, Cervantes; Sep 20, 1995; M. H. H. & F. H.	MH388545	MH388647	MH388724
<i>Odonthalia floccosa</i>	UA0172: USA, Washington, Cattle Point; Jul 4, 2001; unknown	MH388566	MH388660	-
	GWS021644: USA, California; May 17, 2010; B. Clarkton, K. Hind & S. Toews	-	-	KM254893
<i>Odonthalia</i> sp.	UA0171: USA, Washington, Whidbey Island; May 31, 1998; M. H. H.	MH388565	MH388659	-
<i>Ophidocladus simpliciusculus</i>	PD949: Australia, Victori, Queenscliff; Dec 2, 2014; intertidal	MH101440	MH101440	MF093990
<i>Osmundaria fimbriata</i>	JW2841: Culture strain; Díaz-Tapia et al. 2017	MF101415	MF101415	MF093991
<i>O. prolifera</i>	UA0023: Western Australia, Tarcoola Beach; Sep 21, 1995; M. H. H. & F. H.	MH388540	MH388641	-
<i>O. obtusiloba</i>	G004: Venezuela, Falcon, Cabo San Roman; Oct 6, 2012; G. Garcia-Soto	MH388524	MH388631	MH388708
<i>Palisada perforata</i>	G012: Venezuela, Falcon, Buchuacos; Oct 6, 2012; G. Garcia-Soto	MH388526	-	MH388710
	FK052: USA, Florida, Key West; Aug 14, 2013; G. Garcia-Soto	-	MH388627	-
<i>Palisada</i> sp.	UA0699: Philippines, Hilutungan; Apr 19, 1998; M. H. H. & L. L.	MH388595	MH388686	MH388753
<i>Periphykon beckeri</i>	JH1427: Western Australia, Barrow Island; Nov 16, 2014	MF101413	MF101413	MF093993
<i>Pollexfenia lobata</i>	UA0233: Australia, Queenscliff; Aug 6, 1995; M. H. H. & F. H.	MH388573	MH388666	MH388743
<i>Polyostea robusta</i>	UA0555: USA, Washington, Salt Creek; Jun 9, 1994; M. H. H.	MH388587	MH388681	-
<i>Polysiphonia brodiei</i>	PD516: Ireland, Donegal, Doaghbeg; May 11, 2014	MF101425	MF101425	MF093995
<i>P. confusa</i>	UA0623: USA, Oregon, Seal Rock; May 16, 1999; M. H. H.	MH388592	MH388684	-
<i>P. echinata</i>	FK011: USA, Florida, Biscayne Bay; Aug 12, 2013	MH388515	MH388618	-
	FL09-75: USA, Florida, Monroe Co., Long Key; Mar 10, 2009; N. Mamoozadeh	-	-	HM573506
<i>P. elongata</i>	PD547: Ireland, Donegal, Fanad Head; Jun 15, 2014; intertidal	MF101427	MF101427	MF093996
<i>P. fibrillosa</i>	UA0539: Falkland Islands, Rookery Bay; Dec 31, 1999; M. H. H.	MH388582	MH388677	-
	IA255: Ireland, Marble Hill; L. McIvor, C. Maggs, J. Provan & M. Stanhope	AF342912	-	-
	25538: France, Brittany, Loquemeau; Mar 20, 2011; intertidal	-	-	MF094031
<i>P. hendryi</i>	UA0625: USA, California, Santa Barbara, Alegria Beach; May 18, 2003; P.W. Gabrielson	MH388593	MH388685	-
<i>P. infestans</i>	PD763: Australia, Victoria, Lighthouse reef; Dec 8, 2014	MF101432	MF101432	MF093997
<i>P. schneideri</i>	PD1720: Western Australia, Jurien Bay marina; Mar 21, 2015	MF101454	MF101454	MF093998
<i>P. scopulorum</i>	PD899: Australia, Victoria, Queenscliff; Dec 1, 2014	MF101438	MF101438	MF093999
<i>P. sertularioides</i>	PD0001: Spain, Alicante, Cabo de las Huertas; Feb 24, 2014	MF101423	MF101423	MF094000
<i>P. stricta</i>	PD550: Ireland, Donegal, Fanad Head, Donegal; Jun 15, 2014	MF101428	MF101428	MF094004
<i>Polysiphonia</i> sp.	PD1760: Western Australia, Coral Bay; Nov 15, 2014	MF101456	MF101456	MF094003
	JH1432: Western Australia, Barrow Island; Nov 14, 1996	MF101414	MF101414	MF094002
<i>Polyzonia elegans</i>	UA0235: South Africa, 3rd Sister; Jul 20, 1993; M. H. H.	MH388574	MH388667	MH388744
<i>Pterochondria woodii</i>	UA0170: USA, California, Eagle point; P.W. Gabrielson	MH388564	MH388658	-
	GWS022318: USA, California, Bird Rock, Pacific Grove; May 22, 2010	-	-	KM254839
<i>Protokuetingia australasica</i>	UA0055: Western Australia, Cervantes; Sep 20, 1995; M. H. H. & F. H.	MH388547	MH388649	MH388725
<i>Rhodomela confervoides</i>	MW9065: France, Ile de Sieck, west of Roscoff; Mar 18, 1990; M. Wynne	MH388601	MH388688	MH388755
	PD508: Ireland, Donegal, Glashagh Bay; May 11, 2014	MF101424	MF101424	MF094006

Supplementary Table S1. Continued

Species	Collection data	GenBank accession No.		
		<i>rbcL</i>	<i>psbA</i>	COI
<i>Sonderella linearis</i>	PD1151: Australia, Victoria, Merry Island; Dec 29, 2014	MF101445	MF101445	MF094007
<i>Streblocladia</i> sp.	UA0237: New Zealand, Otago, Aramoana; Mar 29, 1994	MH388606	MH388668	MH388745
<i>Symphyocladia baileyi</i>	UA0726: Mexico, Baja California, La Bufadora; Jul 6, 1996; M. H. H. & M. V.	MH388597	MH388687	-
<i>S. brevicaulis</i>	UA0550: USA, California, China Rock; M. H. H. & P. W. G.	MH388585	MH388680	MH388751
<i>S. dendroidea</i>	JW3780: Culture strain; Díaz-Tapia et al. 2017	MF101420	MF101420	MF094009
<i>Symphyocladia</i> sp.	UA602: USA, California, Cannery Row; May 5, 2003; P. W. G., P. M. & R. G.	MH388589	MH388682	MH388752
<i>Thaumatella adunca</i>	PD1388: Australia, Victoria, The Rip; Jan 29, 2015	MF101447	MF101447	MF094011
<i>Tolypiocladia glomerulata</i>	PD1825: Western Australia, Flat Rocks; Mar 23, 2015	MF101467	MF101467	MF094013
<i>Vertebrata australis</i>	UA0200: New Zealand, Akaroa Harbour; Mar 28, 1994	MH388568	MH388662	-
	PD0931: Australia, Victoria, Pope´s Eye; Dec 1, 2014	MF101439	MF101439	MF094014
<i>V. fructiculosa</i>	UA0268: France, Roscoff, Ile Verte; Jun 22, 1993; M. H. H.	MH388576	MH388671	-
	RMAR2977: France, Brittany, Le Loup; Aug 30, 2011; Couceiro & Robuchon	-	-	KJ960346
<i>V. isogona</i>	PD0831: Australia, Victoria, Frankston, Dave´s Bay; Nov 19, 2014	MF101433	MF101433	MF094015
<i>V. lanosa</i>	Salomaki et al. (2015)	KP308097	KP308097	KX687880
<i>V. thuyoides</i>	PD546: Ireland, Donegal, Fanad Head; Jun 15, 2014	MF101426	MF101426	MF094016
<i>Wilsonosiphonia howei</i>	ZAP001: Venezuela: Zulia, Isla Zapara; Apr 12, 2012; G. Garcia-Soto	MH388602	MH388689	MH388756

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Supplementary Table S2. Additional species included in the phylogenetic analysis of *rbcl* gene, collection information, references, and accession numbers

Species	Collection data	GenBank accession No.
<i>Acanthophora spicifera</i>	AC192: USA, Hawaii, Kihei, Maui; Apr 5, 2006	GQ252538
<i>Amplisiphonia pacifica</i>	GWS014483: Canada, British Columbia, Bamfield; Jun 28, 2011; G. Saunders & K. Dixon	KU564470
<i>Bostrychia radicans</i>	ZAP002: Venezuela, Zulia, Isla Zapara; Apr 12, 2012; G. Garcia-Soto	MH388603
<i>Bryocladia cuspidata</i>	Venezuela, Falcon, Cabo San Roman; Oct 6, 2012; G. Garcia-Soto	MH388522
<i>Chiracanthia arborea</i>	UA0216: Western Australia, Augusta, Duke Head; Sep 26, 1995; M. H. H. & F. H.	MH388570
<i>Chondria baileyana</i>	G013: Venezuela, Falcon, Playa Buchuacos; Oct 6, 2012; G. Garcia-Soto	MH388527
<i>C. capensis</i>	D1004: South Africa; Mar 2, 2011; M. Rothman	KY927799
<i>C. collinsiana</i>	Brazil, Rio de Janeiro, Armacao dos Buzios, Praia Rasa; 2005; V. Cassano & J. C. De Paula	GU330225
<i>C. decipiens</i>	USA, California, San Diego, Point Loma Nazarene University; Jul 1, 1996; M. H. H.	KF672855
<i>C. littoralis</i>	USA, North Carolina, Beaufort, Duke University Marine Station; May 16, 2003; M. H. H.	KF672853
<i>C. succulenta</i>	NSW879470: Australia, New South Wales, Batehaven; Mar 30, 2005; Y. Metti	KY120336
<i>Coronaphycus elatus</i>	NSW900764: Australia, Western Australia, Rottneest Island; Nov 15, 2008; J. Eu	KY120339
<i>Dipterosiphonia dendritica</i>	PD1654: Western Australia, Rottneest Island; Mar 17, 2015	MF094058
<i>Echinothamnion hystrix</i>	GWS025230: Australia, Western Australia, Eagle Bay Bommie	KU564514
<i>E. hookeri</i>	PD916: Pope's Eye, Victoria, Australia; Dec 1, 2014	MF094065
<i>Herposiphonia plumula</i>	GWS027411: Canada, British Columbia, Panther Pt.; May 3, 2013; G. Saunders & K. Hind	KU564517
<i>H. versicolor</i>	UA0536: Australia, Queenscliff; Aug 6, 1995; M. H. H. & F. H.	MH388581
<i>Laurencia clavata</i>	PD1300: Díaz-Tapia et al. 2017	MF101449
<i>L. complanata</i>	South Africa, Port Edward, S. Natal; S. Fredericq & O. DeClerck	AF465813
<i>L. intricata</i>	USA, Florida, Long Key, Channel 5 (Ocean Side); Dec 10, 1998; B. Wysor & T. Frankovich	AY588410
<i>L. obtusa</i>	LBC0053: France, Languedoc-Roussillon; Jul 11, 2007; L. Le Gall	KX146185
<i>L. venusta</i>	Mexico, Punta Brava, Puerto Morelos, Quintana Roo; 2004; J. Diaz-Larreal & A. Senties	EF061655
<i>L. viridis</i>	Spain, Islas Canarias, Tenerife, Punta del Hidalgo; Oct 6, 2005; G. Rodriguez	EF685999
<i>L. yamadana</i>	USA, Hawaii, Maui, Kihei, Lipoa Street; Apr 7, 2006; A. Carlile	GQ252550
<i>Lophurella pericladus</i>	GWS016008: Australia, Tasmania, Hells Gates; Jan 25, 2010; L. Kraft	KU564481
<i>Neorhodomela oregona</i>	USA, Alaska, Sitka, Japonski Island, John Brown's Beach; Jun 22, 2005; A. Carlile	GQ252556
<i>Odonthalia corymbifera</i>	Japan, Hokkaido, Muroran; Jul 11, 2001; J. H. Oak	JX828138
<i>Ohelopapa flexilis</i>	01A07: French Polynesia, Tahiti, Tahiti, Tahara reef; Mar 24, 2007; L. Le Gall	KX146187
<i>Osmundaria fimbriata</i>	JW2841: Culture strain, Díaz-Tapia et al. 2017	MF101415
<i>Osmundea osmunda</i>	France, Brittany, Roscoff; Dec 5, 2002; F. Rousseau	FJ785318
<i>O. pinnatifida</i>	CH528: Ireland, Galway, Black Head; H. Choi & M. Guiry	JX828140
<i>O. spectabilis</i>	AC163: USA, Washington, Clallam Co.; Aug 28, 2004	GQ252562
<i>Palisada cf. cruciata</i>	IRD127: Ile des Pins, New Caledonia; Dec 4, 2005; C. Payri	FJ785319
<i>P. flagellifera</i>	Brazil, Rio de Janeiro, Rio das Ostras, Areias Negras; 2005; V. Cassano & Barros-Barreto	GU330221
<i>Placophora monocarpa</i>	GWS036420: South Africa, Western Cape; Nov 29, 2014; K. Dixon & J. Costa	KU564484
<i>Coeloclonium umbellatum</i>	PD1606: Western Australia, Rottneest Island; Mar 15, 2015	MF094052
<i>Polysiphonia subtilissima</i>	G061: Venezuela, Falcon, Cabo San Roman; Oct 6, 2012; G. Garcia-Soto	MH388521
<i>Rhodomelopsis africana</i>	GWS036450: South Africa, Eastern Cape, Port Alfred; Dec 6, 2014; K. Dixon & J. Costa	KU564479
<i>Symphyocladia latiuscula</i>	GWS011933: Japan, Hokkaido University Marine Station; Dec 1, 2008; G. Saunders & T. Abe	KU564458
<i>Waldoia antillana</i>	USA, Louisiana, off shore; Jun 4, 2005; S. Fredericq	KF564784
<i>Womersleyella setacea</i>	Italy, NUIG Marine Algal Culture Collection collected by F. Rindi & M. D. Guiry	JX828160
<i>Yuzurua poiteaui</i>	Mexico, Yucatan, Cancun, Playa del Carmen; 2005; J. Diaz-Larrea & A. Senties	EF061652