

Supplementary Material for

Resurrection of the family Grateloupiaceae emend.

(Halymeniales, Rhodophyta) based on a multigene phylogeny and comparative reproductive morphology

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Supplementary Table S1

Species and accession number with reference information used in *rbcL* analyses. Taxa shown in bold indicate taxa newly analyzed in this study.

Taxonomy	Accession number	Reference	taxonomic note
Halymeniales			
Grateloupiaceae			
<i>Dermocorynus</i>			
<i>D. dichotomus</i>	JX070628	Gargiulo et al. 2013	
<i>D. montagnei</i>	AY435171	Wilkes et al. 2005	
<i>D. horridus</i>	JX070627	Gargiulo et al. 2013	
<i>Grateloupia</i>			
' <i>G.</i> <i>acuminata</i>	AB055480	Kawaguchi et al. 2001	<i>Prionitis</i> clade
'<i>G.</i> <i>angusta</i>	MW690928	GAJ-1; Beomseom, Jeju, Korea; 26 Mar. 2011	<i>Pachymeniopsis</i> clade
'<i>G.</i> <i>asiatica</i>	MW690929	G3982; Sungsan, Jeju, Korea; 26 Apr. 2010	<i>Prionitis</i> clade
<i>G. boaoensis</i>	KC904940	Liu et al. 2014	
' <i>G.</i> <i>californica</i>	FJ013038	Miller et al. 2009	
' <i>G.</i> <i>carnosa</i>	AB038608	Wang et al. 2000	
<i>G. catenata</i>	MW690930	G741; Nujuckeum, OIyeondo, Korea; 12 Aug. 2008	
'<i>G.</i> <i>chiangii</i>	MW690931	P112; Misaki, Chiba, Japan; 25 Jul. 2002	<i>Pachymeniopsis</i> clade
' <i>G.</i> <i>cornea</i>	AB061381	Wang et al. 2001	<i>Pchymeniopsis</i> clade
' <i>G.</i> <i>crispata</i>	AB061383	Wang et al. 2001	<i>Pchymeniopsis</i> clade
'<i>G.</i> <i>divaricata</i>	MW690932	G3745; Jeoncheon, Donghae, Korea; 07 Feb. 2010	<i>Prionitis</i> clade
'<i>G.</i> <i>doryphora</i>	MW690933	UA980; Playa de San Francisco, Lima, Peru	Calderon et al. 2014a: <i>Mariaramirezia</i>
' <i>G.</i> <i>elata</i>	AB061388	Wang et al. 2001	<i>Prionitis</i> clade
' <i>G.</i> <i>fastigiata</i>	KP676387	Li and Wang unpublished	<i>Prionitis</i> clade
<i>G. filicina</i>	MW690934	UA745; Cala Aiguafreda, Begur, Spain	
<i>G. filiformis</i>	AF488822	Gavio and Fredericq 2002	
' <i>G.</i> <i>gibbesii</i>	JX645160	De Priest and Lopez-Bautista 2012	
<i>G. hawaiiiana</i>	AY772030	De Clerck et al. 2005b	
' <i>G.</i> <i>huangiae</i>	HM590410	Lin and Liang 2011	' <i>Grateloupia</i> ' <i>subpectinata</i> group
<i>G. huanghaiensis</i>	JN704572	Wang et al. 2015	
' <i>G.</i> <i>huertana</i>	AY178761	Mateo-Cid et al. 2005	
'<i>G.</i> <i>imbricata</i>	MW690935	G667; Daesamboodo, Yeosu, Korea; 10 Sep. 2006	<i>Pachymeniopsis</i> clade

<i>G. irregularis</i>	KY573991	Freshwater et al. 2017	
'G'. jejuensis	MW690936	G1482; Dodu, Jeju, Korea; 04 Jun. 2009	<i>Prionitis</i> clade
'G'. kurogi	MW690937	G1844; Sakyea, Jeju, Korea; 14 Mar. 2009	<i>Pachymeniopsis</i> clade
<i>'G'. lanceola</i>	AM422894	Figueroa et al. 2007	
'G'. livida	MW690938	G328; Nagasaki, Chiba, Japan; 01 Aug. 2004	<i>Prionitis</i> clade
<i>'G'. longifolia</i>	AY772034	De Clerck et al. 2005b	Calderon et al. 2014b: <i>Phyllymenia</i>
<i>'G'. minima</i>	AJ868470	De Clerck et al. 2005a	<i>Dermocorynus</i> clade
<i>G. orientalis</i>	EU292744	Lin et al. 2008	
<i>'G'. patens</i>	AB061390	Wang et al. 2001	<i>Prionitis</i> clade
<i>'G'. phuquocensis</i>	AY772022	De Clerck et al. 2005a	<i>'Grateloupia' subpectinata</i> group
<i>'G'. proteus</i>	JX070626	Gargiulo et al. 2013	
<i>G. ramosa</i>	JX974606	Cao et al. 2015	
<i>G. ramosissima</i>	AF488810	Gavio and Fredericq 2002	
<i>'G'. schizophylla</i>	KF601430	Calderon et al. 2014a	Calderon et al. 2014a: <i>Mariaramirezia</i>
'G'. schmitziana	MW690939	SH319; Inuwaka, Choshi, Japan; 31 Jul. 2004	<i>Prionitis</i> clade
<i>'G'. simplex</i>	ABMMC12263-10.rbcL	Barcode Of Life Data (BOLD) system	as <i>Prionitis simplex</i> , voucher: GWS022100
<i>Grateloupia</i> sp.	AJ868478	De Clerck et al. 2005a, Gargiulo et al. 2013	as <i>G. filicina</i> , Gargiulo et al. 2013: <i>G. filicina</i> group from FL, USA
	AJ868479	De Clerck et al. 2005a	as <i>G. filicina</i> from Moorea, French Polynesia
	AJ868485	De Clerck et al. 2005a, Gargiulo et al. 2013	as <i>G. filicina</i> , Gargiulo et al. 2013: <i>G. filicina</i> group from Papua New Guinea
	AJ868487	De Clerck et al. 2005a, Gargiulo et al. 2013	as <i>G. filicina</i> , Gargiulo et al. 2013: <i>G. filicina</i> group from Venezuela
	AF488823	Gavio and Fredericq 2002, Gargiulo et al. 2013	as <i>G. dichotoma</i> , Gargiulo et al. 2013: <i>G. filicina</i> group from Brazil
	AY294382	Gavio et al. 2005	from Panama
	AF212197	unpublished, Gargiulo et al. 2013, Calderon et al. 2014b	as <i>G. versicolor</i> , Gargiulo et al. 2013: <i>Grateloupia</i> sp. from Mexico, Calderon et al. 2014b: <i>Neorubra</i>
	AY435176	Wilkes et al. 2005	as <i>Grateloupia filicina</i> var. <i>luxurians</i> from Portsmouth, UK, Synonymized with <i>G. subpectinata</i> , <i>'Grateloupia' subpectinata</i> group
<i>'G'. sparsa</i>	AB055473	Kawaguchi et al. 2001	<i>'Grateloupia' subpectinata</i> group
'G'. stipitata	MW690940	ASL028; Blackhead, Dunedin, New Zealand; 03 Jan. 2011	from Jeju, Korea, <i>'Grateloupia' subpectinata</i> group
'G'. subpectinata	MW690941	G3983; Sungsan, Jeju, Korea; 26 Apr. 2010	from Western Australia, Australia <i>'Grateloupia' subpectinata</i> group
	AM422898	Figueroa et al. 2007	<i>'Grateloupia' subpectinata</i> group
<i>'G'. taiwanensis</i>	KC894740	De Priest et al. 2013	
<i>G. tenuis</i>	KC918542	Yu et al. 2013	
'G'. turuturu	MW690942	H1781; Hoidong, Jindo, Korea; 01 Mar. 2010	from Jindo, Korea, <i>'Grateloupia' subpectinata</i> group
	AB038611	Wang et al. 2000	from Hokkaido, Japan, <i>'Grateloupia' subpectinata</i> group

'G'. urvilleana	MW690943	ASM268; Balaena Bay, Wellington, New Zealand; 08 Aug. 2012	
'G'. variata	KC869681	Cao et al. 2016	<i>Prionitis</i> clade
'G'. violacea	GU598120	Hernández-Kantún et al. unpublished	
<i>G. yangjiangensis</i>	HQ324237	Wang et al. 2014	
<i>G. yinggenhaiensis</i>	HQ332514	Zhao et al. 2012	
<i>Kintokiocolax</i>			
<i>K. aggregatoceranthus</i>	MW690944	GH4-3; Kobawooi, Geomoondo, Korea; 21 Jul. 2010	<i>Pachymeniopsis</i> clade
<i>Mariaramirezia</i>			
<i>M. lapathifolia</i>	KF363929	Calderon et al. 2014a	
<i>M. osornoensis</i>	MG191653	Calderon et al. 2014a	
<i>Neorubra</i>			
<i>N. decipiens</i>	KJ561153	Calderon et al. 2014b	
<i>N. denticulata</i>	KJ561158	Calderon et al. 2014b	
<i>N. parvolacertoides</i>	KY573975	Freshwater et al. 2017	
<i>Pachymeniopsis</i>			
<i>Pa. elliptica</i>	MW690945	SH16; Gamchusa, Donghae, Korea; 14 Mar. 2010	from Donghae, Korea
	AB055476	Kawaguchi et al. 2001	from Kochi, Japan
<i>Pa. gargiulii</i>	KJ648574	Yang and Kim 2015	
<i>Pa. lanceolata</i>	MW690946	G3759; Uhan, Haenam, Korea; 21 Jan. 2010	
<i>Pa. volvita</i>	KF475734	Yang and Kim 2015	
<i>Phyllymenia</i>			
<i>P. acletoi</i>	KF363922	Calderon et al. 2014a	
<i>P. belangeri</i>	MW690947	UA753; Yzerfontein, Western Cape Province, South Africa	
<i>P. capensis</i>	AJ868466	De Clerck et al. 2005a, Gargiulo et al. 2013	as <i>Grateloupia capensis</i> , Gargiulo et al. 2013: <i>Phyllymenia capensis</i> comb. nov.
<i>P. lancifolia</i>	KF363931	Calderon et al. 2014b	
<i>Phyllymenia</i> sp.	KF363932	Calderon et al. 2014a	
<i>Prionitis</i>			
<i>Pr. australis</i>	ABMMC11312-10.rbcL	Barcode Of Life Data (BOLD) system	Voucher: GWS021249
<i>Pr. filiformis</i>	MW690948	A671; Pescadero State Beach, CA, USA; 27 Mar. 2010	
<i>Pr. lanceolata</i>	MW690949	P2665; Moss Beach, CA, USA; 27 Mar. 2010	
	AY772037	De Clerck et al. 2005b	as <i>Grateloupia americana</i> from Pigeon point, CA, USA, Algae Base: Synonymized with <i>Prionitis lanceolata</i>

	U04216	Freshwater et al. 1994	from Pigeon point, CA, USA
'Pr'. nodifera	AY772032	De Clerck et al. 2005b	
'Prionitis' sp.	AY772036	De Clerck et al. 2005b, Gargiulo et al. 2013	as <i>Prionitis filiformis</i> , Gargiulo et al. 2013: <i>Prionitis</i> sp. (<i>Grateloupia stipitata</i> Group)
<i>Pr. sternbergii</i>	AY772033	De Clerck et al. 2005a, Gargiulo et al. 2013	from South Africa as <i>Prionitis hyalii</i> , Gargiulo et al. 2013: <i>Pr. sternbergii</i> from CA, USA
<i>Yonagunia</i>			
<i>Y. atimo-vatae</i>	KU146865	Manghisi et al. 2015	
<i>Y. formosana</i>	AB116240	Kawaguchi et al. 2004	
<i>Y. ligulata</i>	KU146868	Manghisi et al. 2015	
<i>Y. tenuifolia</i>	AB116249	Kawaguchi et al. 2004	
<i>Y. zollingeri</i>	JX627436	Boo et al. 2013	
Halymeniaceae sensu lato			
<i>Acrodiscus</i>			
<i>A. vidovichii</i>	KJ594952	Manghisi et al. 2017	
<i>Aeodes</i>			
<i>A. nitidissima</i>	MW690950	ASM353; Mathesons Bay, North Auckland, New Zealand; 16 Nov. 2012	from North Auckland, New Zealand
	EU497914	Russell et al. 2009	from Tauranga, New Zealand
<i>Amalthea</i>			
<i>A. freemaniae</i>	KJ606651	D' Archino et al. 2014	
<i>A. rubida</i>	KX879776	Lee et al. 2016	
<i>Carpopeltis</i>			
'C'. maillardii	AY294400	Gavio et al. 2005	<i>Pachymeniopsis</i> clade
<i>C. phyllophora</i>	AB116364	Kawaguchi et al. 2004	from Victoria, Australia
	FN908164	Huisman et al. 2011	from Tasmania, Australia
<i>Codiophyllum</i>			
<i>C. natalense</i>	FN908160	Huisman et al. 2011	
<i>Corynomorpha</i>			
<i>C. clavata</i>	MW690951	UA741; Key Largo, Florida, USA	
<i>C. prismatica</i>	KJ594955	Manghisi et al. 2014	
<i>Cryptonemia</i>			
<i>C. abyssalis</i>	MF782465	Schneider et al. 2018	
<i>C. antricola</i>	MF782466	Schneider et al. 2018	
<i>C. asiatica</i>	KM272321	Yang and Kim 2014	<i>C. lactuca</i> from Korea -> <i>Cryptonemia asiatica</i> sp. nov.

	AB061374	Wang et al. 2001, Yang and Kim 2014, Schneider et al. 2018	as <i>C. luxurians</i> from Japan, Yang and Kim 2014: <i>C. asiatica</i> sp. nov, Schneider et al. 2018: <i>C. luxurians</i> from Japan
	KM272323	Yang and Kim 2014, Schneider et al. 2018	Yang and Kim 2014b: <i>C. luxurians</i> from Japan -> <i>C. asiatica</i> sp. nov, Schneider et al. 2018: <i>C. asiatica</i> from Japan
<i>C. atrocotalis</i>	MF782469	Schneider et al. 2018	
' <i>C.</i> ' <i>bengryi</i>	AY178766	Mateo-Cid et al. 2005	
<i>C. bermudensis</i>	MF782470	Schneider et al. 2018	
<i>C. borealis</i>	AF488812	Gavio and Fredericq 2002	
' <i>C.</i> ' <i>kallymenioides</i>	MH311934	Rodríguez-Prieto et al. 2018	
<i>C. lacunicola</i>	MF782473	Schneider et al. 2018	
<i>C. lomation</i>	KJ594953	Manghisi et al. 2014	
<i>C. perparva</i>	MF782475	Schneider et al. 2018	
<i>C. seminervis</i>	MW690952	UA979; Praia Rasa, Rio de Janeiro, Brazil	
<i>Cryptonemia</i> sp.	MF782477	Schneider et al. 2018	from Bermuda
	GU598113	Hernández-Kantún et al. unpublished	from La Paz, Mexico
	GU598116	Hernández-Kantún et al. unpublished	from La Paz, Mexico
' <i>C.</i> ' <i>undulata</i>	KU382069	Saunders et al. 2016	
<i>Epiphloea</i>			
<i>Epiphloea bullosa</i>	KM360032	Yang et al. 2016	from Lord Howe Island, New South Wales, Australia
	FN908149	Huisman et al. 2011	from Escape Island, Australia
<i>Feliciinia</i>			
<i>F. marginata</i>	KJ594954	Manghisi et al. 2014	
<i>F. spathulata</i>	MG648477	Le Gall et al. 2018	
<i>Galene</i>			
<i>G. merdionalis</i>	KJ606649	D' Archino et al. 2014	
<i>G. profundae</i>	KJ606646	D' Archino et al. 2014	
<i>G. rotunda</i>	JQ363446	Kim et al. 2012	
<i>Galene</i> sp.	KJ606655	D' Archino et al. 2014	from North Island, New Zealand
<i>Gelinaria</i>			
<i>G. ulvoidea</i>	MW690953	GWS000932; Port Phillip Heads, Victoria, Australia; 04 Jan. 2000	
	FN908154	Huisman et al. 2011	from Escape Island, Australia
<i>Glaphyrosiphon</i>			
<i>G. intestinalis</i>	MW690954	UA972; Oaro, New Zealand	
<i>G. aucklandicus</i>	MW690955	ASM040; Enderby Island, Auckland Islands, New Zealand; 12 Feb. 2012	

<i>G. lindaueri</i>	GU252169	Hommersand et al. 2010	
<i>G. chilensis</i>	GU252162	Hommersand et al. 2010	
<i>Halymenia</i>			
<i>'H'. abyssicola</i>	GU598119	Hernández-Kantún et al. unpublished	Lee et al. 2016: <i>Amalthea</i> , Rodriguez-Prieto et al. 2018: NOT <i>Halymenia</i>
<i>H. actinophylla</i>	GU598117	Hernández-Kantún et al. unpublished	
<i>H. cearensis</i>	KX586174	Azevedo et al. 2016a	
<i>H. dilatata</i>	AB038604	Wang et al. 2000, Tan et al. 2015	Tan et al. 2015: <i>H. "dilatata"</i> from Japan
<i>H. durvillei</i>	MW690956	H1787; Del Carmen, Siargao Island, Philippines; 23 Jan. 2006	<i>H. durvillei</i> complex from Siargao Island, Philippines
	MW690957	SH303; MMSU Ilcos Norte, Philippines; 11 Mar. 2005	<i>H. durvillei</i> complex from Ilcos Norte, Philippines
	JX000240	Kawaguchi et al. 2006	<i>H. durvillei</i> complex from Yonaguni Island, Japan
	JX000244	Kawaguchi et al. 2006	<i>H. durvillei</i> complex from Bintan Island, Indonesia
	AB038603	Wang et al. 2000, Kawaguchi et al. 2002, 2006	as <i>H. floresii</i> , Kawaguchi et al. 2002: <i>H. durvillei</i> , Kawaguchi et al. 2006: <i>H. durvillei</i> complex from Langkawi, Malaysia
	JQ976883	Hernández-Kantún et al. 2012	<i>H. durvillei</i> complex from Mabibi reef, South Africa
	JQ976884	Hernández-Kantún et al. 2012	<i>H. durvillei</i> complex from Janzibar, Tanzania
	AY772020	De Clerck et al. 2005b	<i>H. durvillei</i> complex from Beruwela, Sri Lanka
<i>'H'. elongata</i>	KX586168	Azevedo et al. 2016a	Azevedo et al. 2016a, Tan et al. 2017: NOT <i>Halymenia</i>
<i>H. floresii</i>	KU382051	Saunders et al. 2016	
<i>'H'. floridana</i>	MW690958	UA978; Parati Beach, Anchieta, Espiritu Santo, Brazil	Azevedo et al. 2016a, Tan et al. 2017: NOT <i>Halymenia</i>
<i>H. harveyana</i>	JQ976886	Hernández-Kantún et al. 2012	
<i>H. hawaiiiana</i>	AM422899	Figuerola et al. 2007, Hernández-Kantún et al. 2012	as <i>H. formosa</i> , Hernández-Kantún et al. 2012: <i>H. hawiana</i> sp. nov.
<i>H. ignifera</i>	KT807826	Azevedo et al. 2016b	
<i>'H'. johorensis</i>	KX958403	Tan et al. 2017	
<i>H. maculata</i>	MW690959	M80; Sanya, Hainan, China; 09 Mar. 2009	<i>H. maculata</i> complex from Hainan, China
	MW690960	SH306; Bonbon, Cagayancity, Philippines; 20 Jan. 2006	<i>H. maculata</i> complex from Bonbon, Philippines
	AB061397	Wang et al. 2001	<i>H. maculata</i> complex from Sarawak, Malaysia
	KP202338	Tan et al. 2015	<i>H. maculata</i> complex from Busuanga Island, Philippines
<i>H. malaysiana</i>	KP202324	Tan et al. 2015	
<i>H. cf. mirabilis</i>	KX586170	Azevedo et al. 2016a	
<i>H. pinnatifida</i>	KT807828	Azevedo et al. 2016b	
<i>'H'. plana</i>	MW690961	GWS001572; Point Lonsdale Lighthouse Reef, Vic, Australia; 07 Dec. 2002	Rodriguez-Prieto et al. 2018: NOT <i>Halymenia</i>
<i>H. pseudofloresii</i>	MW690962	GWS011902; Cliff Pool, Walsingham, Bermuda; 05 Oct. 2003	
<i>H. silviae</i>	KT807827	Azevedo et al. 2016b	

<i>Halymenia</i> sp.	KP202339	Tan et al. 2015	from Siquijor Island, Philippines (as <i>Halymenia</i> sp. 1)
	KP202341	Tan et al. 2015	<i>H. maculata</i> complex from Subic Bay, Philippines (as <i>Halymenia</i> sp. 2)
	KP202342	Tan et al. 2015	<i>H. maculata</i> complex from South Gam, Indonesia (as <i>Halymenia</i> sp. 3)
<i>H. stipitata</i>	JQ976891	Hernández-Kantún et al. 2012	
<i>H. todoana</i>	JQ976888	Hernández-Kantún et al. 2012	
<i>Howella</i>			
<i>H. latifrons</i>	FN908156	Huisman et al. 2011, Schneider et al. 2019	as <i>Thamnoclonium latifrons</i> , Schneider et al. 2019: <i>Howella latifrons</i> comb. nov.
<i>H. lemanniana</i>	FN908161	Huisman et al. 2011, Schneider et al. 2019	as <i>Thamnoclonium lemannium</i> , Schneider et al. 2019: <i>Howella lemanniana</i> comb. nov.
<i>Isabbottia</i>			
<i>I. ovalifolia</i>	KM360033	Yang et al. 2016	
<i>Neofolia</i>			
<i>N. rosea</i>	MH311938	Rodríguez-Prieto et al. 2018	
<i>Nesoia</i>			
<i>N. delicatula</i>	MH751481	Lee and Kim 2019	
<i>N. latifolia</i>	KJ606643	D' Archino et al. 2014, Lee and Kim 2019	as <i>Halymenia latifolia</i> , Lee and Kim 2019: <i>Nesoia latifolia</i> comb. nov.
<i>N. pulchella</i>	MH751480	Lee and Kim 2019	
<i>Norrissia</i>			
<i>N. setchellii</i>	MW690963	GWS001338; Seppings Island, Bamfield, British Columbia, Canada; 01 May 2002	
<i>Pachymenia</i>			
<i>P. dichotoma</i>	MW690964	ASM601; Stewart Island, New Zealand; 11 Dec. 2012	
<i>P. carnosa</i>	KU382049	Saunders et al. 2016	
<i>P. cornea</i>	U21588	Fredericq et al. 1996	
<i>P. crassa</i>	U21598	Fredericq et al. 1996	Russell et al. 2009: consider as new monotypic genus
<i>P. laciniata</i>	MW690965	ASI072; Doubtful Sound, Fiodland, New Zealand; 28 Jan. 2008	
<i>P. lusoria</i>	MW690966	P1849; Ocean beach, Northland, New Zealand; 23 Jun. 2007	
<i>P. orbitosa</i>	U21599	Fredericq et al. 1996	as <i>Aeodes orbitosa</i> Russell et al. 2009: <i>Pachymenia orbitosa</i> comb. nov.
<i>Pachymenia</i> sp.	U22096	Fredericq et al. 1996	Russell et al. 2009: NOT <i>Pachymenia</i>
<i>P. ulvoidea</i>	AF385638	Hommersand and Fredericq 2003	as <i>Aeodes ulvoidea</i> Russell et al. 2009: <i>Pachymenia ulvoidea</i> comb. nov.
<i>Polyopes</i>			
<i>P. affinis</i>	MW690967	G666; Daesamboodo, Yeosu, Korea; 10 Sep. 2006	
<i>P. constrictus</i>	MW690968	UA771; Kommetjie, Western Cape Province, South Africa	from Kommetjie, South Africa
	AB055468	Kawaguchi et al. 2001	from Victoria, Australia

<i>P. hakauiensis</i>	AB096711	Kawaguchi et al. 2003	
<i>P. lancifolius</i>	MW690969	G1818; Sodol, Kangneung, Korea; 12 Apr. 2008	
<i>P. polydeoides</i>	AB084538	Kawaguchi et al. 2002	
<i>P. prolifer</i>	AB084532	Kawaguchi et al. 2002	
<i>P. tasmanicus</i>	AB084544	Kawaguchi et al. 2002	
<i>P. tenuis</i>	AF385645	Hommersand and Fredericq 2003	
<i>P. tosaensis</i>	AB096715	Kawaguchi et al. 2003	
<i>Spongophloea</i>			
<i>S. tissotii</i>	FN908163	Huisman et al. 2011	
<i>Thamnoclonium</i>			
<i>T. dichotomum</i>	FN908152	Huisman et al. 2011	
<i>Thamnoclonium</i> sp.	FN908153	Huisman et al. 2011	
<i>Zymurgia</i>			
<i>Z. chondriopsidea</i>	KM360035	Yang et al. 2016	
Tsengiaceae			
<i>Tsengia</i>			
<i>T. lanceolata</i>	MW690970	UA780; Kommetjie, Western Cape Province, South Africa	
<i>T. laingii</i>	MW690971	ASG011; Wellington, New Zealand	
<i>Tsengia</i> sp.	KU726717	Filloramo and Saunders 2016	
Sebdeniales			
Sebdeniaceae			
<i>Sebdenia flabellata</i>	KU726730	Filloramo and Saunders 2016	Outgroup
<i>Crassitegula imitans</i>	KM360043	Yang et al. 2016	Outgroup, from Lord Howe Island, Australia
Rhodymeniales			
Champiaceae			
<i>Champia chathamensis</i>	FJ195606	Yang et al. 2016	Outgroup, from Wellington, New Zealand
Lomentariaceae			
<i>Fushitsunagia catenata</i>	FJ195607	Yang et al. 2016	Outgroup, from Sachon, Gyeongnam, Korea
Rhodymeniaceae			
<i>Rhodymenia intricata</i>	MW690972	R54; Gijang, Busan, Korea; 28 Feb. 2010	Outgroup

Supplementary Table S2

Species and accession number with reference information used in multi-gene analyses. Taxa shown in bold indicate the type species of each genus.

Taxonomy	Voucher	Collection information	<i>rbcL</i>	<i>psaA</i>	<i>psbA</i>	<i>cox1</i>	LSU	Reference
Halymeniales								
Grateloupiaceae								
<i>'Grateloupia' angusta</i>	GAJ-1	Beomseom, Jeju, Korea; 26 Mar. 2011	MW690928	MW690973	MW691005	MW691038	MW691069	This study
<i>'G'. asiatica</i>	G3982	Sungsan, Jeju, Korea; 26 Apr. 2010	MW690929	MW690974	MW691006	MW691039	MW691070	This study
<i>G. catenata</i>	G741	Nujuckeum, Oiyeeondo, Korea; 12 Aug. 2008	MW690930	–	MW691007	MW691040	MW691071	This study
<i>'G'. chiangii</i>	P112	Misaki, Chiba, Japan; 25 Jul. 2002	MW690931	MW690975	MW691008	–	MW691072	This study
<i>'G'. divaricata</i>	G3745	Jeoncheon, Donghae, Korea; 07 Feb. 2010	MW690932	MW690976	MW691009	MW691041	MW691073	This study
<i>'G'. doryphora</i>	UA980	Playa de San Francisco, Lima, Peru	MW690933	MW690977	MW691010	MW691042	MW691074	This study
<i>G. filicina</i>	UA745	Caia Aiguafredia, Begur, Spain	MW690934	MW690978	–	MW691043	MW691075	This study
<i>'G'. imbricata</i>	G667	Daesamboodo, Yeosu, Korea; 10 Sep. 2006	MW690935	MW690979	MW691011	MW691044	MW691076	This study
<i>'G'. jejuensis</i>	G1482	Dodu, Jeju, Korea; 04 Jun. 2009	MW690936	MW690980	MW691012	MW691045	–	This study
<i>'G'. kurogii</i>	G1844	Sakyea, Jeju, Korea; 14 Mar. 2009	MW690937	MW690981	MW691013	MW691046	MW691077	This study
<i>'G'. livida</i>	G328	Nagasaki, Chiba, Japan; 01 Aug. 2004	MW690938	MW690982	MW691014	MW691047	MW691078	This study
<i>'G'. schmitziana</i>	SH319	Inuwaka, Choshi, Japan; 31 Jul. 2004	MW690939	MW690983	MW691015	MW691048	MW691079	This study
<i>'G'. stipitata</i>	ASL028	Blackhead, Dunedin, New Zealand; 03 Jan. 2011	MW690940	MW690984	MW691016	MW691049	MW691080	This study
<i>'G'. subpectinata</i>	G3983	Sungsan, Jeju, Korea; 26 Apr. 2010	MW690941	MW690985	MW691017	MW691050	MW691081	This study
<i>'G'. taiwanensis</i>		Orange Beach, AL, USA; 06 Apr. 2011	KC894740 ¹	KC894740 ¹	KC894740 ¹	KM999231 ²	–	¹ De Priest et al. 2013, ² De Priest et al. 2014
<i>'G'. turuturu</i>	H1781	Hoidong, Jindo, Korea; 01 Mar. 2010	MW690942	MW690986	MW691018	MW691051	MW691082	This study
<i>'G'. urvilleana</i>	ASM268	Balaena Bay, Wellington, New Zealand; 08 Aug. 2012	MW690943	MW690987	MW691019	–	MW691083	This study
<i>Kintokiocolax aggregatoceranthus</i>	GH4-3	Kobawooi, Geomoondo, Korea; 21 Jul. 2010	MW690944	MW690988	MW691020	MW691052	MW691084	This study
<i>Pachymeniopsis elliptica</i>	SH16	Gamchusa, Donghae, Korea; 14 Mar. 2010	MW690945	MW690989	MW691022	MW691053	MW691085	This study
<i>Pa. lanceolata</i>	G3759	Uhran, Haenam, Korea; 21 Jan. 2010	MW690946	MW690990	MW691021	MW691054	MW691086	This study
<i>Phyllymenia belangeri</i>	UA753	Yzerfontain, Western Cape Province, South Africa	MW690947	–	MW691025	MW691057	MW691087	This study
<i>Prionitis filiformis</i>	A671	Pescadero State Beach, CA, USA; 27 Mar. 2010	MW690948	MW690991	MW691023	MW691056	MW691088	This study
<i>Pr. lanceolata</i>	P2665	Moss Beach, CA, USA; 27 Mar. 2010	MW690949	MW690992	MW691024	MW691055	MW691089	This study
<i>Yonagunia zollingeri</i>	CNU023563	Malang, Indonesia; 09 Jun. 2012	JX627436 ¹	MW690993	MW691026	MW691058	MW691090	¹ Boo et al. 2013, This study

Halymeniaceae sensu lato

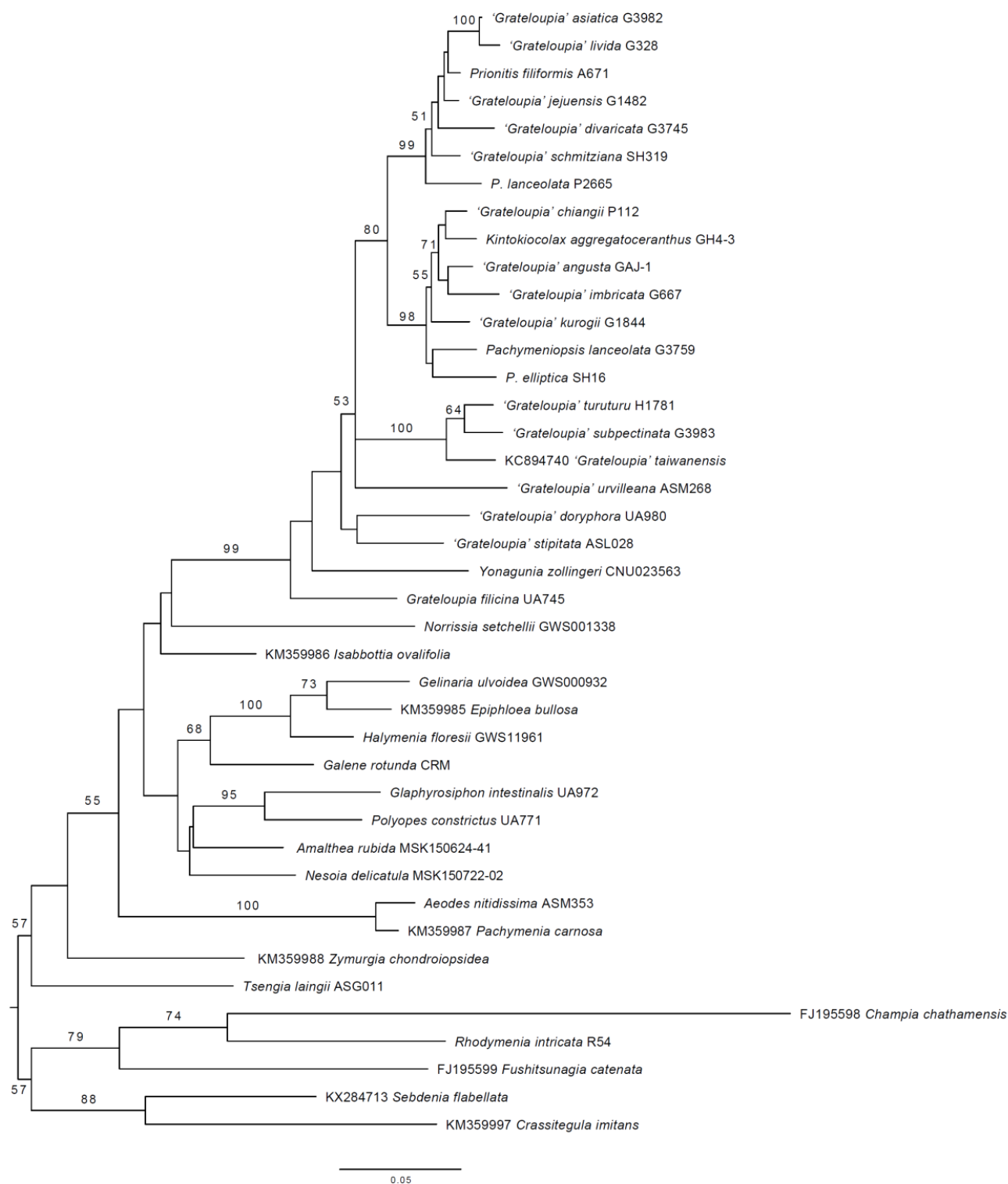
<i>Acrodiscus vidovichii</i>	LLG0393	Vis Islands, Croatia; 20 Jun. 2007	KJ594952	–	–	KJ594944	KJ594947	Manghisi et al. 2017
<i>Aeodes nitidissima</i>	ASM353	Mathiesons Bay, North Auckland, New Zealand; 16 Nov. 2012	MW690950	MW690994	MW691027	MW691059	MW691091	This study
<i>Amalthea rubida</i>	MSK150624-41	Udo, Jeju, Korea; 24 Jun. 2015	KX879776 ¹	MW690995	MW691028	MW691060	MW691092	¹ Lee et al. 2016, This study
<i>Corynomorpha prismatica</i>	PC0171835	Rocher de l'Albatros, Androy, Madagascar; 18 May 2010	KJ594955	–	–	KJ594946	KJ594950	Manghisi et al. 2014
<i>Cryptonemia lomation</i>	PC0162380	La Gabinière, Port-Cros, French Riviera, France; 06 Aug. 2009	KJ594953	–	–	–	KJ594948	Manghisi et al. 2014
<i>Epiphloea bullosa</i>	GWS001054	Rupert's Reef, Lord Howe Island, NSW, Australia; 13 Mar. 2001	KM360032 ¹	KM359985 ¹	KM360008 ¹	–	DQ343693 ²	¹ Yang et al. 2016, ² Withall and Saunders 2006
<i>Feliciinia marginata</i>	MNG:004	L'Imbutu, Scandola, Corsica, France; 24 Aug. 1992	KJ594954	–	–	KJ594945	KJ594949	Manghisi et al. 2014
<i>Galene rotunda</i>	CRM	Hongdo, Maemuldo, Korea; 24 Jul. 2011	JQ362446 ¹	MW690996	MW691029	–	MW691094	¹ Kim et al. 2012, This study
<i>Gelinaria ulvoidea</i>	GWS000932	Port Phillip Heads, Victoria, Australia; 04 Jan. 2000	MW690953	MW690997	MW691030	MW691061	GQ471910 ¹	¹ Schneider et al 2010, This study
<i>Glaphyrosiphon intestinalis</i>	UA972	Oaro, New Zealand	MW690954	MW690998	MW691031	MW691062	MW691095	This study
<i>Halymenia floresii</i>	GWS011961	Armazão de Pêraa, Portugal; 21 Aug. 2005	KU382051 ²	MW690999	MW691032	GQ862071 ¹	GQ471912 ¹	¹ Schneider et al 2010, ² Saunders et al. 2016, This study
<i>Isabbottia ovalifolia</i>	GWS001334	Bamfield, British Columbia, Canada; 30 Apr. 2002	KM360033 ²	KM359986 ²	KM360009 ²	MW691063	EF033616 ¹	¹ Le Gall and Saunders 2007, ² Yang et al. 2016, This study
<i>Nesoia delicatula</i>	MSK150722-02	Gwideok, Jeju, Korea; 22 Jul. 2015	MH751481 ¹	MW691000	MW691034	–	MW691093	¹ Lee and Kim 2019, This study
<i>Norrissia setchellii</i>	GWS001338	Seppings Island, Bamfield, British Columbia, Canada; 01 May 2002	MW690963	MW691001	MW691035	MW691066	DQ343694 ¹	¹ Withall and Saunders 2006, This study
<i>Pachymenia carnososa</i>	GWS000347	Kommetjie, Western Cape Province, South Africa	KU382049 ¹	KM359987 ²	KM360010 ²	KU382032 ¹	DQ343695 ³	¹ Saunders et al. 2016, ² Yang et al. 2016, ³ Withall and Saunders 2006
<i>Polyopes constrictus</i>	UA771	Kommetjie, Western Cape Province, South Africa	MW690968	MW691002	MW691033	MW691064		This study
	G0071	Point Lonsdale Lighthouse Reef, Victoria, Australia; 27 Feb. 1992					DQ343697 ¹	¹ Withall and Saunders 2006
<i>Zymurgia chondriopsidea</i>	GWS000966	Victoria, Australia	KM360035 ²	KM359988 ²	KM360011 ²	MW691067	DQ343698 ¹	¹ Withall and Saunders 2006, ² Yang et al. 2016, This study

Tsengiaceae

<i>Tsengia laingii</i>	ASG011	Wellington, New Zealand	MW690971	MW691003	MW691036	MW691065		This study
	GWS001265	Port MacDonnell, South Australia, Australia; 20 Oct. 2001					DQ343703 ¹	¹ Withall and Saunders 2006

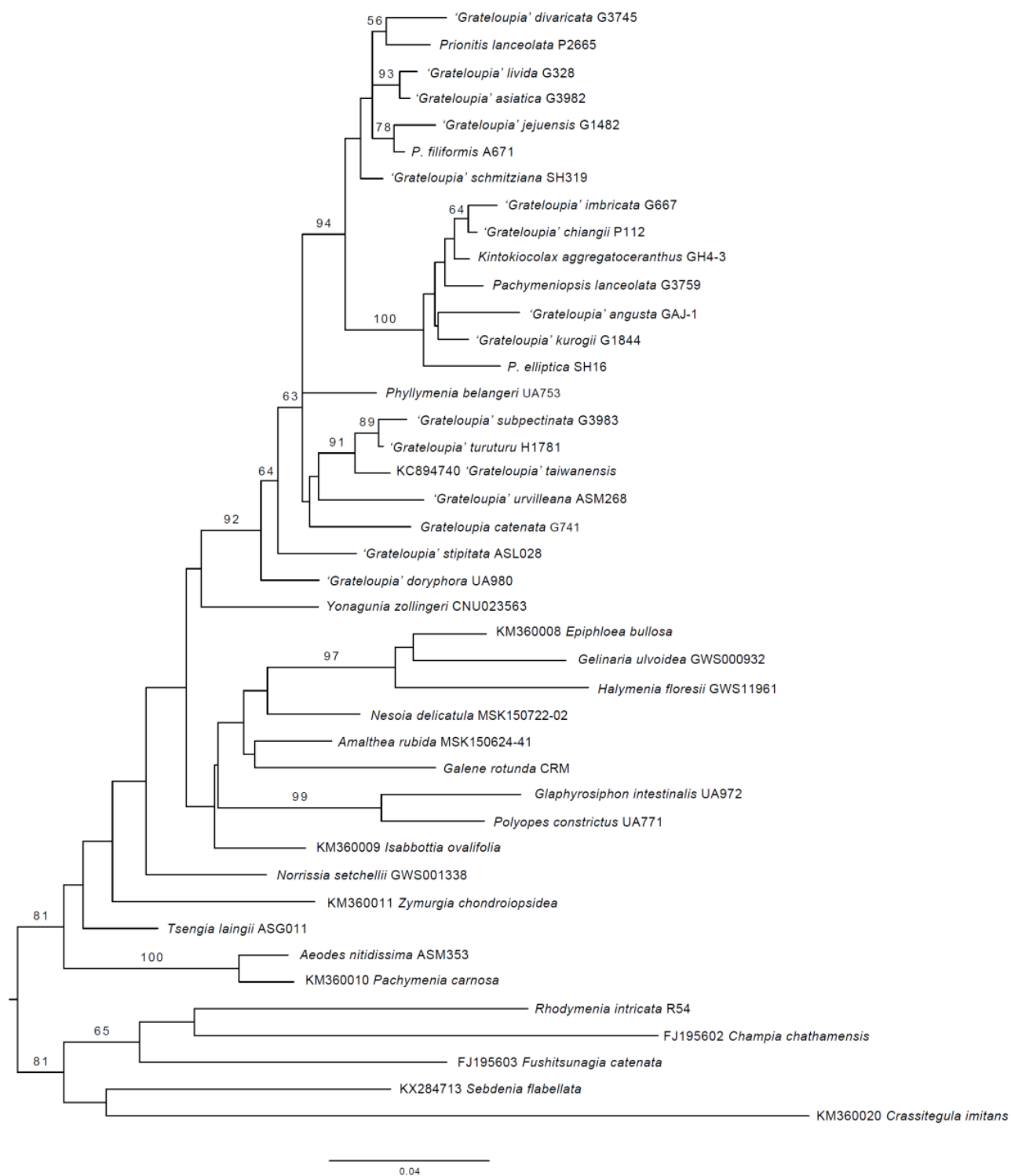
Sebdeniales

Sebdeniaceae								
<i>Crassitegula imitans</i>	GWS002089	Lord Howe Island, New South Wales, Australia; 02 Mar. 2004	KM360043 ¹	KM359997 ¹	KM360020 ¹	JN641182 ¹		¹ Yang et al. 2016
	GWS001076	Lord Howe Island, New South Wales, Australia; 16 Mar. 2001					DQ343700 ¹	¹ Withall and Saunders 2006
<i>Sebdenia flabellata</i>	BDA0051	Tucker's Town Bay, Castle Harbour, Bermuda	KU726730 ¹			KF761649 ²		¹ Filloramo and Saunders 2016, ² Schneider et al. 2014,
	not available	Northwestern Gulf of Mexico, offshore Louisiana, USA; 23 Jun. 2005		KX284713 ³	KX284713 ³			³ Lee et al. 2016
Rhodymeniales								
Champiaceae								
<i>Champia spp. (C. chathamensis)</i>	C255	Lyll Bay, Wellington, New Zealand; 03 Aug. 2001	FJ195606 ¹	FJ195598 ¹	FJ195602 ¹			¹ Yang et al. 2016
<i>Champia spp. (C. parvula)</i>	ARS01115	Hawaii, USA				HQ422763 ¹		¹ Sherwood et al. 2010
<i>Champia spp. (C. gigantea)</i>	17092000-10-01						EU624159 ¹	¹ Le Gall et al. 2008
Lomentariaceae								
<i>Fushitsunagia catenata</i>	L76	Sachen, Gyeongnam, Korea; 18 Jul. 2001	FJ195607 ¹	FJ195599 ¹	FJ195603 ¹			¹ Yang et al. 2016
	E0201	Korea				KF547032 ¹		¹ Koh and Kim unpublished
	G0201	not available					EU624155 ¹	¹ Le Gall et al. 2008
Rhodymeniaceae								
<i>Rhodymenia intricata</i>	R54	Gijang, Busan, Korea; 28 Feb. 2010	MW690972	MW691004	MW691037	MW691068	MW691096	This study



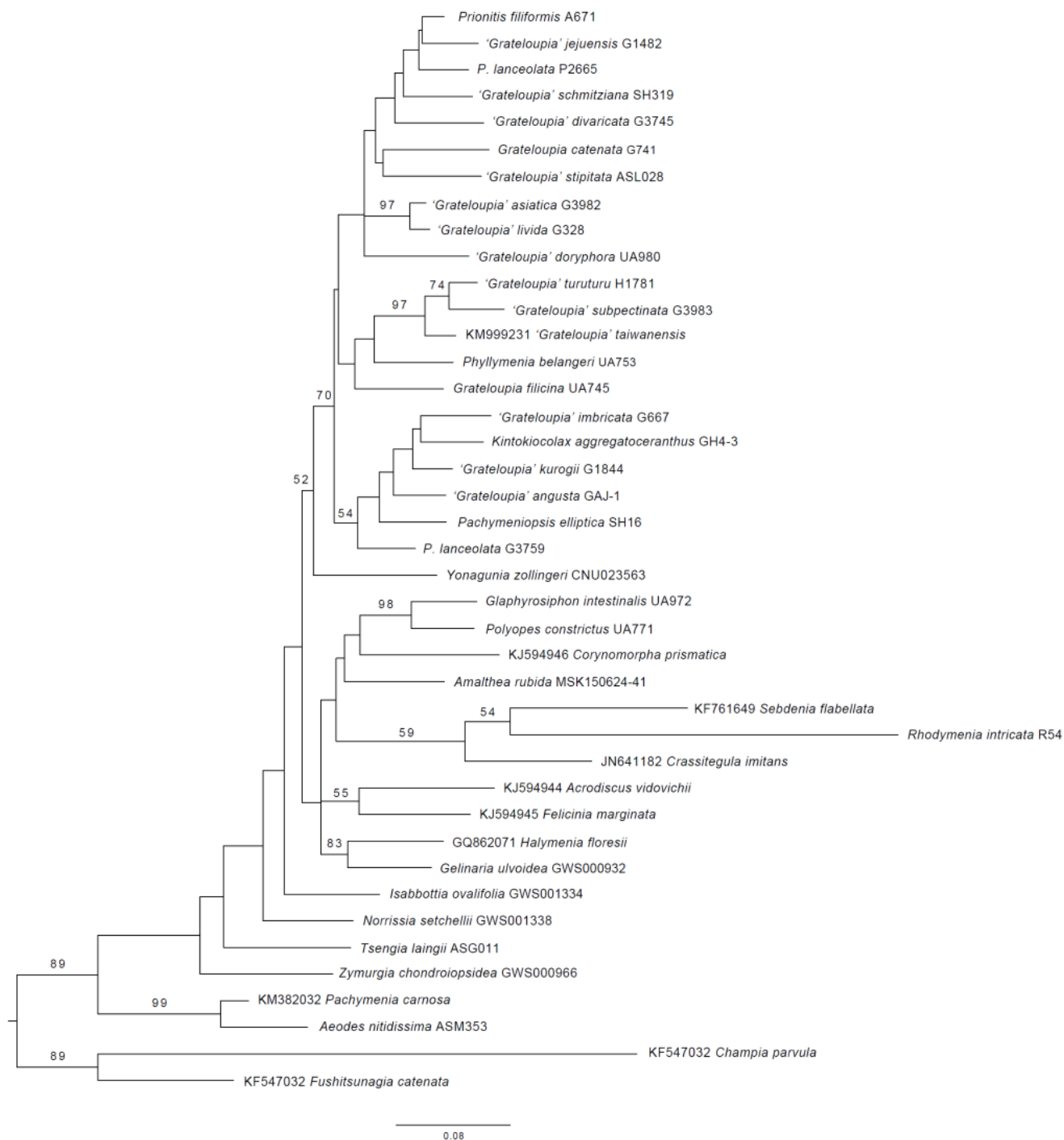
Supplementary Figure S2

ML phylogeny of Halymeniales based on 41 *psaA* sequences.



Supplementary Figure S3

ML phylogeny of Halymeniales based on 42 *psbA* sequences.



Supplementary Figure S4
ML phylogeny of Halymeniales based on 41 *cox1* sequences.



Supplementary Figure S5

ML phylogeny of Halymeniales based on 44 LSU sequences.

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