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Galaxaura lessepsiana _sp. nov._ (_Galaxauraceae, Florideophyceae_), a new species from Israel complicates Lessepsian migration paradigm for _G. rugosa_

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Galaxaura rugosa (J.Ellis & Solander) J.V.Lamouroux (type locality: "Jamaica coast", as *Corallina rugosa* J.Ellis & Solander; Ellis & Solander 1786: 115) is considered ubiquitous in tropical and subtropical ecosystems with numerous reports worldwide (Guiry & Guiry 2025). Multiple studies suggested it invaded the Mediterranean via the Suez Canal, first appearing in Syria in 1990, then proliferating and spreading along the coast of the Levant Basin, and is now pervasive in the flora of Israel, Lebanon, Syria, and Turkey (Mayhoub 1990, Galil 2007, Hoffman & al. 2008, Hoffman & al. 2014, Verlaque & al. 2015, Bitar & al. 2017, Israel & Einav 2017, Taşkin & al 2017, Rilov & al. 2018, Einav & Israel 2022). In Israel, *G. rugosa,* the only *Galaxaura* species known there, was first recorded by Papenfuss (1968) from the Red Sea as *G. lapidescens* (J.Ellis & Solander) J.V.Lamouroux. Huisman & Borowitzka (1990) considered *G. lapidescens* to be the hirsute tetrasporophyte phase of *G. rugosa*, and the two names remain in synonymy to present day. Hoffman & al. (2008) provided the first record for the Israeli coast of the Mediterranean Sea based on a 2003 collection. None of these studies, however, employed molecular tools for identification, and reports of *G. 'rugosa'* therefore are perhaps suspect. Here we describe a distinct species that likely represents the *G. 'rugosa'* from previous Levantine and the (northern) Red Sea reports that nevertheless populated the Mediterranean from the Red Sea.

Fourteen specimens morphologically assignable to the genus *Galaxaura* were collected in Israel – both the Red Sea and Mediterranean coasts – during surveys in 2019, and either mounted on herbarium paper as vouchers or dried in silica gel. All vouchers were deposited in the Connell Memorial Herbarium at the University of New Brunswick (**UNB**). Subsamples of presses (n = 4) were later dried in silica gel for DNA extraction, and all 14 specimens were extracted for DNA in accordance with Saunders & McDevit (2012). PCR amplification targeting two markers, COI-5P and *psb*A, followed Saunders & Moore (2013), and a third marker, *rbc*L/*rbc*L-3P, was amplified using the forward primer RedMetF4 5'-GTAATTCCATAYGCHAARATGGG-3' and reverse primer RedMetR4 5'-ACATTTGCHGTTGGWGTYTC-3' following a modified thermal profile as outlined in Saunders & Moore (2013) at an annealing temp of 50°C. PCR products were sequenced at Génome Québec. These sequence data were inspected and edited in Geneious 10.2.6 (Kearse & al. 2012), aligned using MUSCLE with intraspecific variation calculated using uncorrected pairwise distances, and each sequence then searched against GenBank records using nucleotide BLAST to calculate the distance to its nearest neighbour (Table 1). COI-5P and *rbc*L-3P sequences were also searched using BOLD Systems Identification Engine ver. 4 to calculate distance to nearest neighbour (Table 1). All newly generated sequences are publicly available on GenBank (accession numbers in Table 2). Additional COI-5P and *rbc*L sequences associated with currently accepted taxa were downloaded from GenBank and single gene alignments of 664 bp and 1358 bp respectively were produced using MUSCLE in Geneious. Each alignment was subjected to phylogenetic analyses using RAxML, GTR+I+G, partitioning by codon and 500 bootstrap replicates to assess robustness. Finding no major conflicts, a concatenated alignment of 2022 bp was produced and a phylogenetic tree was generated as previously outlined but with partitioning by gene and codon and 1000 bootstrap replicates. All analyses were rooted with an outgroup of three species from the sister genus *Actinotrichia* Decaisne (Fig. 1).

For anatomical observations, subsamples of each voucher were simultaneously decalcified and rehydrated in white vinegar. Sections were made using Leica CM1850 freezing microtome and then stained with acidified 1% aniline blue before mounting in 30% corn syrup. Photomicrographs were made with OMAX A3514OU digital camera mounted on Leica CTR5000 microscope. Images of dried specimens were captured with Epson Expression 10000XL scanner and Dinoscope 413 digital microscope (Fig. 2). All measurements were taken in DinoCapture 2.0 and Image J (Schneider & al. 2012).

Sequence data were successfully generated for 12 of the 14 specimens (Table 2) and DNA barcoding revealed that these formed a single genetic group with only slight intraspecific variation (Table 1). Although placed in a clade with *Galaxaura rugosa* and *G. elongata* J.Agardh, this genetic group was molecularly distinct (Table 1, Fig. 1) and therefore required taxonomic treatment. A review of the literature did not return any applicable species names and therefore a new species in the genus *Galaxaura* is described below. The two un-sequenced specimens presumptively represent tetrasporophytes of our new species given their anatomy/morphology and collection location.

Table 1. DNA barcode gap analyses for *Galaxaura lessepsiana sp. nov.* using three markers, COI-5P, *rbc*L-3P and *psb*A, searched against GenBank and BOLD (only for the first two markers) databases, with the nearest neighbour recorded from these databases.

Marker	n	Max. Intraspecific variation (%)	Nearest neighbour in GenBank [Accession #]	Distance to nearest neighbour (%)	Nearest neighbour in BOLD [Accession #]	Distance to nearest neighbour (%)
COI-5P	4	0.38	*Galaxaura elongata* (as *G. rugosa*) [KT886158]†	3.77	*Tricleocarpa sp.* [GRHOD339-10]	1.68
*rbc*L-3P	5	0	*G. elongata* (as *G. rugosa*) [NC_031657]†	0.50	*G. rugosa* [BERMR003-10]	0.89
*psb*A	7	0.05*	*G. elongata* (as *G. rugosa*) [NC_031657]†	0.21	N/A	N/A

*When excluding the single base difference due to an ambiguity in GWS049536 the max. intraspecific variation is 0.

†Although currently labelled as *Galaxaura rugosa* in GenBank, these sequences of Australian samples represent *G. elongata* as circumscribed by Huisman (2018) [see *cox*1: MG887867, *rbc*L: MG887879].

Galaxaura lessepsiana M.Cassidy & Krueger-Hadfield *sp. nov.* (Fig. 2)

Description: Thallus to 5 cm tall, pink to muted magenta sometimes drying grey-green, heavily calcified, with several axes arising from a discoidal holdfast to 3 mm broad; dichotomously to subdichotomously branched; dichotomies 2–10 mm apart (Figs 2A, 2B, 2I). Axes terete to subterete at apices, 1–2.5 mm diam. Gametophyte glabrous in upper portions, sometimes with faint annulations and axes slightly tapering at nodes; often a patchy cover of short filaments in more basal portions (Figs 2A, 2C). Medulla composed of branching filaments, with elongate cells 4–14 µm diam. (Fig. 2D). Gametophyte cortex with 3 cell layers (Fig. 2E); innermost large and hyaline, 21–43(–60) µm diam. x 21–39 µm, often adherent with adjacent cells and sometimes fusing laterally; subsequent layer of smaller and rounded cells, 11–23 µm diam. x 9–30 µm; outermost layer of darkly pigmented cells, wedge to obovoid in transverse section, 9–20 µm diam. x 8–20 µm, and (4–)5–6-sided in surface view with rounded cells occasionally interspersed, 18–23 µm diam. (Fig. 2E). Assimilatory filaments (where present) to 7 cells long, typically borne on outer cortical cells, cells of assimilatory filaments 12–17 µm diam. x 18–39 µm long (Fig. 2H). Tetrasporophyte hirsute (Figs 2I, 2J); medulla densely filamentous, with cells 5–14 µm diam. (Fig. 2K). Tetrasporophyte cortex with intermixed long (to at least 11 cells) and short (2 or 3 cells) assimilatory filaments, cells 14–21 µm diam. x 26–45 µm long, usually with slightly inflated suprabasal cells 16–28 µm diam. x 21–41 µm arising from inflated ovoid basal cells 22–37 µm diam. x 42–75 µm long (Fig. 2L). Spermatangial cavities to 200–350 µm diam.; spermatangia obovoid, 2–5 µm diam. x 6–8 µm long (Figs 2C, 2F). Tetrasporangia and carposporophytes not observed.

Diagnosis: Differing from Australian *G. elongata* by its overall smaller size, shorter interdichotomies and smaller outer cortical cells in gametophytes and differing from Brazilian *G. rugosa* by the cortical structure in tetrasporophytes. Tentatively, most easily distinguished by its distribution as it is currently restricted to the Mediterranean and Red Seas, but best distinguished with molecular data.

Holotype: *K.M. Schoenrock (KMSR)* **UNB** GWS049536 [♂ gametophyte], 10 Apr. 2019, North Beach, Eilat, Gulf of Aqaba, Israel, 29.5441611, 34.97323889 (Fig. 2A).

Paratypes: *KMSR & S.A. Krueger-Hadfield (SAKH)* **UNB** GWS048386 [tetrasporophyte], 12 Mar. 2019, Akziv, Israel, 33.042164, 35.097156, depth 7 m. *KMSR & SAKH* **UNB** GWS048387 [tetrasporophyte], 12 Mar. 2019, *loc. cit.*, depth 7 m. *KMSR & SAKH* **UNB** GWS048388 [gametophyte], 12 Mar. 2019, *loc. cit.*, depth 7 m. *KMSR & SAKH* **UNB** GWS048389 [gametophyte], 12 Mar. 2019, *loc. cit.*, depth 7 m (Fig. 2B). *KMSR, Gil Rilov (GR) & SAKH* **UNB** GWS049539 [tetrasporophyte], 13 Mar. 2019, Rosh Hanikra, Israel, 33.086997, 35.10008889. *KMSR* **UNB** GWS049540, 9 Apr. 2019, Israel Oceanographic and Limnological Research, Tel Shikmona, Haifa, Israel, 32.8251944, 34.94835556, depth 1 m. *KMSR* **UNB** GWS049541, 26 Apr. 2019, Akziv, Israel, 33.042164, 35.097156. *KMSR, GR, & SAKH* **UNB** GWS049542 [gametophyte], 13 Mar. 2019, Rosh Hanikra, Israel, 33.086997, 35.10008889. *KMSR* **UNB** GWS049543 [tetrasporophyte], 6 Apr. 2019, Sdot Yam, Israel, 32.4932139, 34.88690556. *KMSR* **UNB** GWS049544 [tetrasporophyte], 8 Apr. 2019, North Beach, Eilat, Gulf of Aqaba, Israel, 29.5441611, 34.97323889. *KMSR* **UNB** GWS049545 [tetrasporophyte], 8 Apr. 2019, *loc. cit*. *KMSR* **UNB** GWS049546 [♂ gametophyte], 8 Apr. 2019, *loc. cit*. *KMSR* **UNB** GWS049547 [♂ gametophyte], 8 Apr. 2019, *loc. cit*.

Registration: http://phycobank.org/105831

Eponymy: In reference to its likely migration from the Red Sea to the Mediterranean via the Suez Canal, joining many other species often referred to as Lessepsian migrants, for Ferdinand de Lesseps (1805–1894), who played a key role in the canal's construction.

Notes: Three taxa referred to the family *Galaxauraceae* with type localities in the Mediterranean and Red Seas were considered and ultimately rejected for this new entity. These included *Galaxaura adriatica* Zanardini (type locality: "Dalmazia – Lesina, *Botteri*"), *G. dactyliophora* Piccone & Grunow (type locality: "Baja d'Assab") and *G. schimperi* Decaisne (type locality: "*In mari rubro prope* el Tor"), all of which Athanasiadis (2016) referred to *Tricleocarpa fragilis* (Linnaeus) Huisman & R.A.Townsend. Einav & Israel (2008) included *G. adriatica* in their checklist for the Israel flora, but illustrations of the type in Zanardini (1862: Pl. XXII, Figs A2, A3) display well separated inner cortical cells, unlike our specimens where these cells are closely adjacent and even at times fusing, a feature Huisman & Borowitzka (1990) employed to distinguish the genus *Tricleocarpa* from *Galaxaura*. Although anatomical observations of type material were not available for either *G. dactyliophora* or *G. schimperi*, the former appeared to have regular whorls of hairs throughout the thallus (Piccone 1884: pl. VIII: Fig. 7), which were not noted in our specimens, and the latter appeared to fracture frequently at dichotomies (Decaisne 1842: see **MO** in **UC** 2051347 as *G. annulata* J.V.Lamouroux = *G. rugosa*), which occurred only rarely in our specimens. A lack of genetic data from type material for these species render molecular comparisons with our specimens impossible, however morphological comparisons suggest our genetic group represents a new species.

Distribution: Israel (Mediterranean and Red Seas).

Genetically, *Galaxaura lessepsiana sp. nov.* allied most closely in COI-5P with a collection from Kenya (BOLD: GRHOD339-10), currently labelled *Tricleocarpa sp.*, however clearly representative of a *Galaxaura* species based on sequence data (Table 1). Unfortunately, no image or other morphological information was available for this voucher for comparison. The closest neighbour in *psb*A and *rbc*L was *G. elongata*, a species currently only known from Australia (Table 1). Subtle differences in size ranges for these species can distinguish them from each other as *G. lessepsiana sp. nov.* tends to be shorter than *G. elongata* (to 5 cm vs. to 20 cm), has shorter interdichotomies (2–10 mm vs. 10–30 mm), and smaller outer cortical cells in gametophytes (9–20 µm diam. vs. 25–40 µm). However younger thalli of *G. elongata* may overlap entirely (Huisman 2018). Definitive identification requires DNA barcoding. In fact, Huisman (2018) resurrected this taxon from synonymy with western Atlantic *G. rugosa*.

Galaxaura lessepsiana sp. nov., *G. elongata,* and *G. rugosa* all formed a closely related clade (Fig. 1). Although no sequence data were available for *G. rugosa* from the type locality of Jamaica, our Israeli collections were clearly genetically distinct from other western Atlantic collections represented by material from Brazil and Florida (Fig. 1). Schneider & al. (2016) did not record any morphological data for their Florida collections of *G. rugosa*, but descriptions of Brazil collections provided by Do Nascimento Santos & al. (2020) allowed for comparison with our Israeli species. Gametophytes overlapped almost entirely in morphological and anatomical characters and cell sizes, proving difficult to distinguish without molecular data. However, tetrasporophytes differed in cortical structure and size with *G. lessepsiana sp. nov.* producing assimilatory filaments from inflated basal cells (Fig. 2L) much longer than the subcortical cells in the gametophyte-like tetrasporophyte cortex of *G. rugosa*, 42–75 µm vs. 15–33 µm respectively (Do Nascimento Santos & al. 2020: Fig. 6g). These inconsistent differences (i.e. only apparent between certain phases or certain size thalli) highlight the need for molecular data to reliably distinguish *G. lessepsiana sp. nov.* from all other *Galaxaura* species.

Galaxaura rugosa has been widely reported in the Mediterranean and Red Seas, but a review of the literature revealed few other currently accepted *Galaxaura* species for this region (Guiry & Guiry 2025). Previous *Galaxaura* records represented either current synonyms of *G. rugosa* (i.e. *G. lapidescens*) or another genus in the family [i.e. *G. oblongata* (J.Ellis & Solander) J.V.Lamouroux = *Tricleocarpa cylindrica* (J.Ellis & Solander) Huisman & Borowitzka]. However, El-Tabakh & al. (2023) collected and sequenced three specimens of *G. 'rugosa'* from Ras Muhammad National Park, along the Egyptian coast of the Red Sea (*cox*1: OR362159, OR362160, OR362161). When searched against GenBank these sequences matched to two distinct taxa in the genus *Galaxaura*: OR362159 matched to Hawaiian collections of *G. glabriuscula* Kjellman (as *G. rugosa*) and OR362160 and OR362161 matched to an unidentified species of *Galaxaura* (OM460655). These sequences therefore tentatively represent the first report for *G. glabriuscula* in Egypt and the Red Sea, and support the presence of an additional *Galaxaura* species, however anatomical/

morphological observations of these specimens are required for confirmation. Nevertheless, these collections are genetically distinct from *G. lessepsiana sp. nov.*, differing in COI-5P by at least 4.15% (OR362159) and 8.52% (OR362161).

Although genetic confirmation is required from other reports of *Galaxaura* in the Levant Basin, this newly described species likely corresponds to the previous reports of an introduction from the Red Sea to the Mediterranean Sea. Therefore, there is likely a single *Galaxaura* species for this region, morphologically similar but genetically distinct from its western Atlantic counterpart *G. rugosa*. Thus, previous work in this region, such as by Garval (2015), Mulas & al. (2022), or Peleg & al. (2020), likely was *G. lessepsiana sp. nov.* rather than *G. rugosa*. Alternatively, but less likely, previous reports indeed represent *G. rugosa* and this newly described species coexisted undetected in the region. Regardless, *G. lessepsiana sp. nov.* represents a taxon new to science and we document its presence on both the Mediterranean and Red Sea coasts of Israel.

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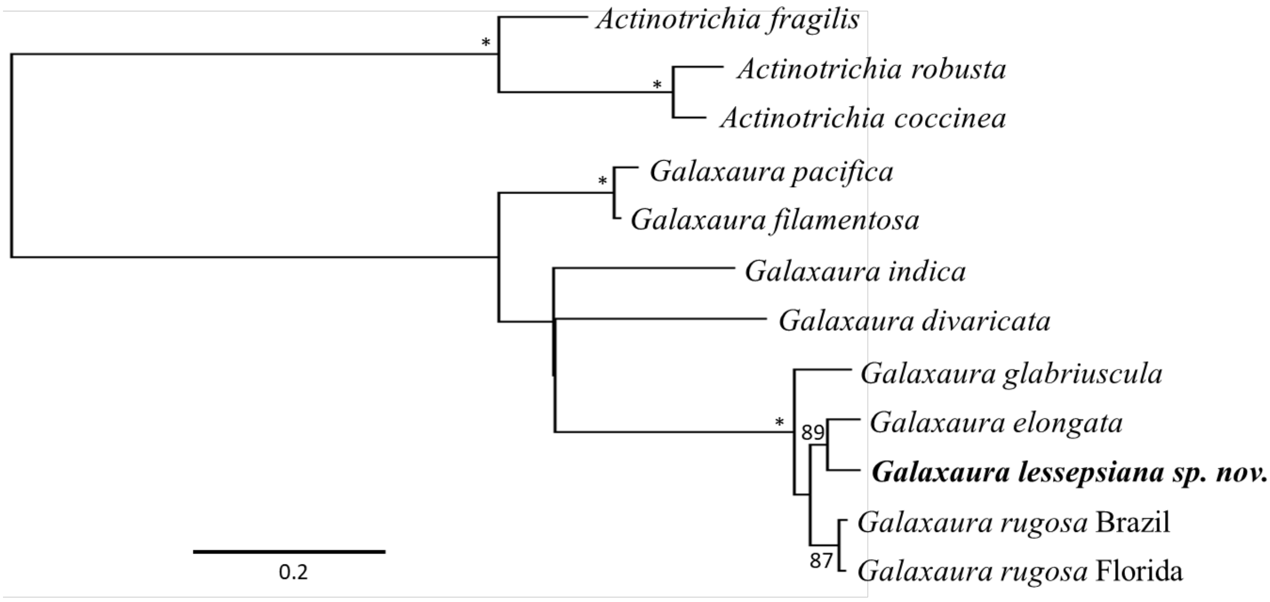

Fig. 1. RAxML phylogenetic tree of the genus *Galaxaura* using the markers COI-5P and *rbc*L. Bootstrap values over 70% are labelled on nodes, while asterisks (*) denote full bootstrap support. Collection location follows species name where applicable. GenBank accession numbers for all sequences used can be found in Table 2.

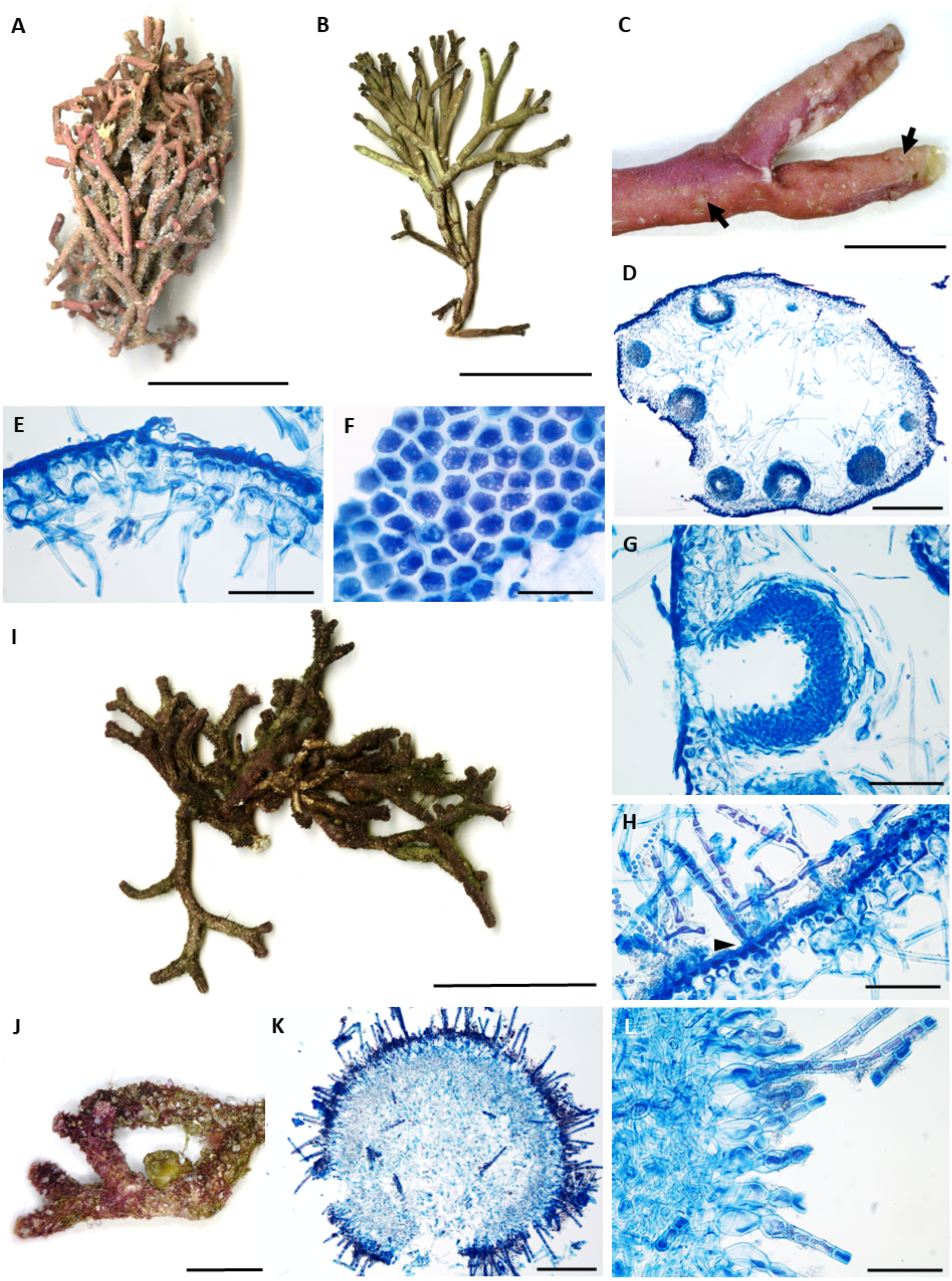

Fig. 2. *Galaxaura lessepsiana sp. nov.* (A) Habit of holotype (in silica), male gametophyte [**UNB** GWS049536], scale bar = 2 cm. (B) Habit of paratype (pressed herbarium specimen), gametophyte, showing variation in colour [**UNB** GWS048389], scale bar = 2 cm. (C) Glabrous gametophyte cortex [**UNB** GWS049546] with conceptacles apparent (arrows), scale bar = 2 mm.

(D) Transverse section of slightly flattened gametophyte axis with numerous embedded spermatangial conceptacles [**UNB** GWS049547], scale bar = 500 µm. (E) Transverse section of gametophyte axis with sparse filamentous medulla and three layers of cortical cells, the outermost darkly pigmented [**UNB** GWS049542], scale bar = 100 µm. (F) Surface view of outer cortical cells [**UNB** GWS049546], scale bar = 50 µm. (G) Section of mature spermatangial conceptacle [**UNB** GWS049546], scale bar = 100 µm. (H) Transverse section of axis with single emergent filament (arrowhead), not to be confused with epiphytes including *Bangia sp.* [**UNB** GWS049542], scale bar = 100 µm. (I) Presumptive habit of tetrasporophyte (press) [**UNB** GWS048387], scale bar = 2 cm. (J) Hirsute tetrasporophyte cortex [GWS049543], scale bar = 3 mm. (K) Transverse section of terete tetrasporophyte axis [**UNB** GWS049543], scale bar = 300 µm. (L) Transverse section of tetrasporophyte axis with dense filamentous medulla producing a cortex with inflated basal cells bearing emergent filaments [**UNB** GWS049543], scale bar = 100 µm.

Table 2. Accession numbers for GenBank, or BOLD (indicated by double asterisks, **), of sequence data for the markers COI-5P, *psb*A, *rbc*L and *rbc*L-3P used in this study with associated voucher number and collection information where possible (collector; date; location). Newly generated sequences are in bold font. Asterisks (*) denote sequence used in phylogenetic analyses where more than one option is available for that species. Dagger (†) denotes sequence obtained from complete chloroplast genome.

Name	Voucher #	Collection Info.	COI-5P	*psb*A	*rbc*L	*rbc*L-3P
Actinotrichia coccinea	PERTH 08781737	J.M. Huisman (JMH); 30.09.2013; Ashmore Reef, south side, Western Australia, Australia.	MG887858	-	MG887874	-
Actinotrichia fragilis	GWS000151	JMH; 17.08.1995; Ningaloo, Western Australia, Australia (-22.683, 113.683).	HM915848	KT886226	KC134325	-
Actinotrichia robusta	CNU21495	K. Lewmanomont; 06.04.2012; Surin Islands, Phang Nga, Thailand.	KC609377	-	KC609389	-
Galaxaura divaricata	ARS00995	Lanai, Hawaii, USA (20.7416, -156.888).	HQ422677	-	-	-
	R90B12	C. Nieder & S.-L. Liu; 14.02.2018?; Dongsha Atoll, South China Sea, Taiwan (20.614683, 116.823383).	-	-	MH048942	-
Galaxaura elongata	GWS000144	JMH; 28.11.1995; Barrow Island, Western Australia, Australia (-20.8, 115.433).	HM915841	KT886230	KC134352	-
	GWS000143	JMH; 28.11.1995; Barrow Island, Western Australia, Australia (-20.8, 115.433).	HM915840	-	-	-
	6.2.14.2.9	JMH; 06.02.2014; Rottnest Island, Western Australia, Australia.	MG887867*	-	MG887879*	-
	JFC0074	Australia.	-	NC_031657†	NC_031657†	-
Galaxaura filamentosa	ARS03487	Oahu, Hawaii, USA (21.286, -157.669).	HQ422797	-	-	-
	-	S.M. Lin; 17.04.2001; Five Caves, Lanyu Island, Taiwan.	-	-	AY688006	-
Galaxaura glabriuscula	PERTH 08781567	JMH; 01.10.2013; Ashmore Reef, northern channel, Western Australia, Australia.	MG887863	-	-	-
Galaxaura indica	PERTH 08775524	JMH; 29.09.2013; Ashmore Reef, north side, Western Australia, Australia.	MG887864	-	MG887877	-
Galaxaura lessepsiana sp. nov.	GWS048386	S.A. Krueger-Hadfield (SAKH) & K.M. Schoenrock (KMSR); 12.03.2019; 7 m depth, Akziv, Israel (33.042164, 35.097156).	-	-	-	-
	GWS048387	SAKH & KMSR; 12.03.2019; 7 m depth, Akziv, Israel (33.042164, 35.097156).	-	-	-	-
	GWS048388	SAKH & KMSR; 12.03.2019; 7 m depth, Akziv, Israel (33.042164, 35.097156).	-	**PX064363**	-	-
	GWS048389	SAKH & KMSR; 12.03.2019; 7 m depth, Akziv, Israel (33.042164, 35.097156).	**PX064355**	**PX064360**	-	**PX064349**
	GWS049536	KMSR; 10.04.2019; North Beach, Eilat, Gulf of Aqaba, Israel (29.5441611, 34.97323889).	-	**PX064364**	-	-
	GWS049539	KMSR, G. Rilov (GR) & SAKH; 13.03.2019; Rosh Hanikra, Israel (33.086997, 35.10008889).	-	**PX064358**	-	-
	GWS049540	KMSR; 09.04.2019; 1 m depth, Institute for Seas and Lakes Research, Israel (32.8251944, 34.94835556).	-	**PX064361**	-	-
	GWS049541	KMSR; 26.04.2019; Akziv, Israel (33.042164, 35.097156).	-	**PX064359**	-	-
	GWS049542	KMSR, GR, & SAKH; 13.03.2019; Rosh Hanikra, Israel (33.086997, 35.10008889).	-	-	-	**PX064351**
	GWS049543	KMSR; 06.04.2019; Sdot Yam, Israel (32.4932139, 34.88690556).	-	-	-	**PX064352**
	GWS049544	KMSR; 08.04.2019; North Beach, Eilat, Gulf of Aqaba, Israel (29.5441611, 34.97323889).	**PX064357**	**PX064362**	-	-
	GWS049545	KMSR; 08.04.2019; North Beach, Eilat, Gulf of Aqaba, Israel (29.5441611, 34.97323889).	**PX064354**	-	-	-
	GWS049546	KMSR; 08.04.2019; North Beach, Eilat, Gulf of Aqaba, Israel (29.5441611, 34.97323889).	-	-	-	**PX064353**
	GWS049547	KMSR; 08.04.2019; North Beach, Eilat, Gulf of Aqaba, Israel (29.5441611, 34.97323889).	**PX064356***	-	**PX064350**	-
Galaxaura pacifica	PERTH 08781613A	JMH; 04.10.2013; Hibernia Reef, south-west side, Western Australia, Australia.	MG887865	-	MG887878	-
Galaxaura rugosa Brazil	ALCB 129742	G.N. Santos, C.C. Santos, E.M.S. Pestana, R.G.S. Correia, E.J. Marques, & J.M.C. Nunes; 30.07.2015; Pontaponã Beach, Tinharé Island, Cairú, Bahia, Brazil.	MT472792	-	MT482436	-
Galaxaura rugosa Florida	KW176	C.W. Schneider, C. Lane & T. Popolizio; 30.05.2013; 6–8 m depth, Sand Key Lighthouse Reef, Key West, Florida, USA.	KU321667	-	KU321678	-
Tricleocarpa sp.	ODC1517	O. De Clerk; 30.03.2008; Diani Beach, Kenya (-4.3, 39.599).	GRHOD339-10**	-	-	-