



# Notes on the marine algae of the International Biosphere Reserve Seaflower, Caribbean Colombia IX: new records of *Lobophora declerckii*, *Taonia abbottiana* and *Verosphacela ebrachia* for Colombia

## Notas sobre las algas marinas de la Reserva Internacional de la Biosfera Seaflower, Caribe Colombiano IX: nuevos registros de *Lobophora declerckii*, *Taonia abbottiana* and *Verosphacela ebrachia* para Colombia

Y. Carla M. Daza<sup>1</sup> , Paola Andrea Franco<sup>2</sup> , Victor Díaz<sup>2</sup> , Álvaro A. Sandoval<sup>2</sup> , Brigitte Gavio<sup>2,3</sup> 

### Abstract:

**Background and Aims:** During the Seaflower Scientific Expedition in 2019, extensive seaweed collection was carried out around Old Providence and Santa Catalina islands. Despite the intensive phycological studies realized during the past decade, new reports of macroalgae are still recorded for the Seaflower Biosphere Reserve. The objective of this work is to present three new records of brown algae for Colombia.

**Methods:** The algal sampling was carried out in September 2019 during the Seaflower Scientific Expedition. The samples were collected around the Providencia and Santa Catalina islands in coral patches ecosystems, by SCUBA diving at depths between 3 and 16 m. The algae collected were preserved in a 4% formalin/seawater solution. The identification was carried out using optical and stereoscopic microscopes. All specimens were deposited in the herbarium JIW of the Biology Department of the Universidad Nacional de Colombia, Bogotá, Colombia.

**Key results:** Three species of brown algae are newly reported for Colombia: *Lobophora declerckii*, *Taonia abbottiana* and *Verosphacela ebrachia*. *Verosphacela* has been reported, to date, only from the type locality in Florida and from Isla Mujeres, in Mexico. Due to its cryptic and small habit, it may be much more common than actually reported. *Lobophora declerckii* is apparently the most common species of *Lobophora* in the Archipelago. *Taonia abbottiana* may be much more common than reported to date, but it is easily confused with *Styopodium zonale*.

**Conclusions:** Despite the intense phycological research carried out in the past decade in the Archipelago of San Andrés, Old Providence and Santa Catalina, there is still much to be discovered.

**Key words:** brown algae, macroalgal diversity, Old Providence, Seaflower Scientific Expedition.

### Resumen:

**Antecedentes y Objetivos:** Durante la Expedición Científica Seaflower realizada en 2019, se hizo una extensa recolecta de macroalgas alrededor de las islas de Providencia y Santa Catalina. No obstante el intenso trabajo ficológico de la última década, se siguen encontrando nuevos registros de macroalgas para la Reserva de la Biosfera Seaflower. El objetivo del presente trabajo es presentar tres nuevos registros de algas pardas para Colombia.

**Metodos:** El muestreo de algas se realizó en septiembre de 2019 durante la Expedición Científica Seaflower. Las muestras fueron recolectadas alrededor de las islas Providencia y Santa Catalina en ecosistemas de parches de coral, por medio de buceo SCUBA a profundidades entre 3 y 16 m. Las algas recolectadas se conservaron en una solución de formalina/agua de mar al 4%. La identificación se realizó mediante microscopios óptico y estereoscopio. Todos los especímenes fueron depositados en el herbario JIW del Departamento de Biología de la Universidad Nacional de Colombia, en Bogotá, Colombia.

**Resultados clave:** Tres especies de algas pardas son reportadas por primera vez para Colombia: *Lobophora declerckii*, *Taonia abbottiana* y *Verosphacela ebrachia*. *Verosphacela* ha sido reportada, hasta la fecha, solamente en la localidad tipo en Florida y en Isla Mujeres, en México. Debido a su hábito pequeño y críptico, puede ser mucho más común de lo actualmente reportado. *Lobophora declerckii* parece ser la especie más común de *Lobophora* en el Archipiélago. *Taonia abbottiana* puede ser mucho más común de lo reportado actualmente, pero es fácilmente confundida con *Styopodium zonale*.

**Conclusión:** No obstante la intensa investigación ficológica llevada a cabo en la última década en el Archipiélago de San Andrés, Providencia y Santa Catalina, hay todavía mucho por descubrir.

**Palabras clave:** algas pardas, diversidad de macroalgas, Expedición Científica Seaflower, isla de Providencia.

<sup>1</sup>Universidad de Cundinamarca Facacativá, Facultad de Ciencias Agropecuarias, Transversal 15, Facacativá, Cundinamarca, Colombia.

<sup>2</sup>Universidad Nacional de Colombia, Sede Bogotá, Departamento de Biología, edificio 421, Laboratorio de Biología Marina, Carrera 30 Calle 45, Ciudad Universitaria, Bogotá, Colombia.

<sup>3</sup>Author for correspondence: bgavio@unal.edu.co

Received: July 5, 2023.

Reviewed: July 31, 2023.

Accepted by Marie-Stéphanie Samain: August 21, 2023.

Published Online first: September 19, 2023.

Published: Acta Botanica Mexicana 130 (2023).

To cite as: Daza, Y. C. M., P. A. Franco, V. Díaz, A. A. Sandoval and B. Gavio. 2023. Notes on the marine algae of the International Biosphere Reserve Seaflower, Caribbean Colombia IX: new records of *Lobophora declerckii*, *Taonia abbottiana* and *Verosphacela ebrachia* for Colombia. Acta Botanica Mexicana 130: e2235. DOI: <https://doi.org/10.21829/abm130.2023.2235>



This is an open access article under the Creative Commons 4.0 Attribution-Non commercial Licence (CC BY-NC 4.0 International)

## Introduction

In tropical environments, brown algae are not very diverse, when compared to other groups of macroalgae (Mateo-Cid et al., 2019). The order Dictyotales is the exception to the rule because its diversity is greatest in tropical and warm temperate waters (Vieira et al. 2017). They are very conspicuous members of benthic communities, and aggressive competitors of corals for substrate (Vieira et al., 2019; Ramseyer et al., 2021), due to their fast growth, dispersal through fragmentation (Herren et al., 2006), as well as the production of secondary metabolites deterring herbivory (Vieira et al., 2019). In the past decade, molecular-assisted research has revealed a great diversity of members of the order, specifically for the genera *Dictyota* J.V. Lamouroux (Tronholm et al., 2013) and *Lobophora* J. Agardh (e.g., Schultz et al., 2015; Vieira et al., 2020) in the great Caribbean Sea. It is probable that in the near future several other species will be newly described, as many members of these genera are still a complex of species. Most of the described new species to date are morphological distinct, which eases the identification in the laboratory when molecular analyses are not feasible.

During the Scientific Expedition Seaflower 2019, macroalgal collection was undertaken at different depths and environments, around the islands of Old Providence and Santa Catalina, in the southwestern Caribbean Sea. We present here three new records of brown algae for Colombia: *Lobophora declerckii* N.E. Schultz, C.W. Schneider & L. Le Gall, *Taonia abbottiana* D.S. Littler & Littler and *Verosphacela ebrachia* E.C. Henry. All the morphological features of the species reported here are illustrated and discussed.

## Materials and Methods

Sampling was undertaken around the islands of Old Providence and Santa Catalina, which are part of the International Biosphere Reserve Seaflower, located in the southwestern Caribbean, Colombia (Fig. 1). The expedition took place in September 2019, where sampling was carried out in a depth range of 3–16 m. Most sites were coral reef patches or sand plains, with some seagrass beds at depth ranges of 6–8.5 m.

Algae were collected by hand during SCUBA diving. The algae collected were preserved in a 4% formalin/sea-

water solution and kept cool until their identification. The identification was carried out using a binocular stereoscope Zeiss Stemi DV4 (Jena, Germany) and an optical microscope Olympus BX51 (Tokyo, Japan) connected to a digital camera Moticam 2300 3.0M pixel (Hong Kong, China). Cross-sections of the specimens were made by hand with a razor blade. Images were edited using Adobe Photoshop CS6 v. 13.0 (Adobe, 2012). To identify the species specialized literature was used (e.g., Dawes and Mathieson, 2008; Schultz et al., 2015). The specimens were deposited in the Herbarium JIWUKORI (JIW) of the Universidad Nacional de Colombia, in Bogotá. Information on nomenclature and taxonomy classification was obtained from AlgaeBase (Guiry and Guiry, 2023).

## Results

We here report for the first time the taxa *Lobophora declerckii*, *Taonia abbottiana* and *Verosphacela ebrachia* for Colombia.

### Taxonomy

#### Phaeophyceae

#### Dictyotales

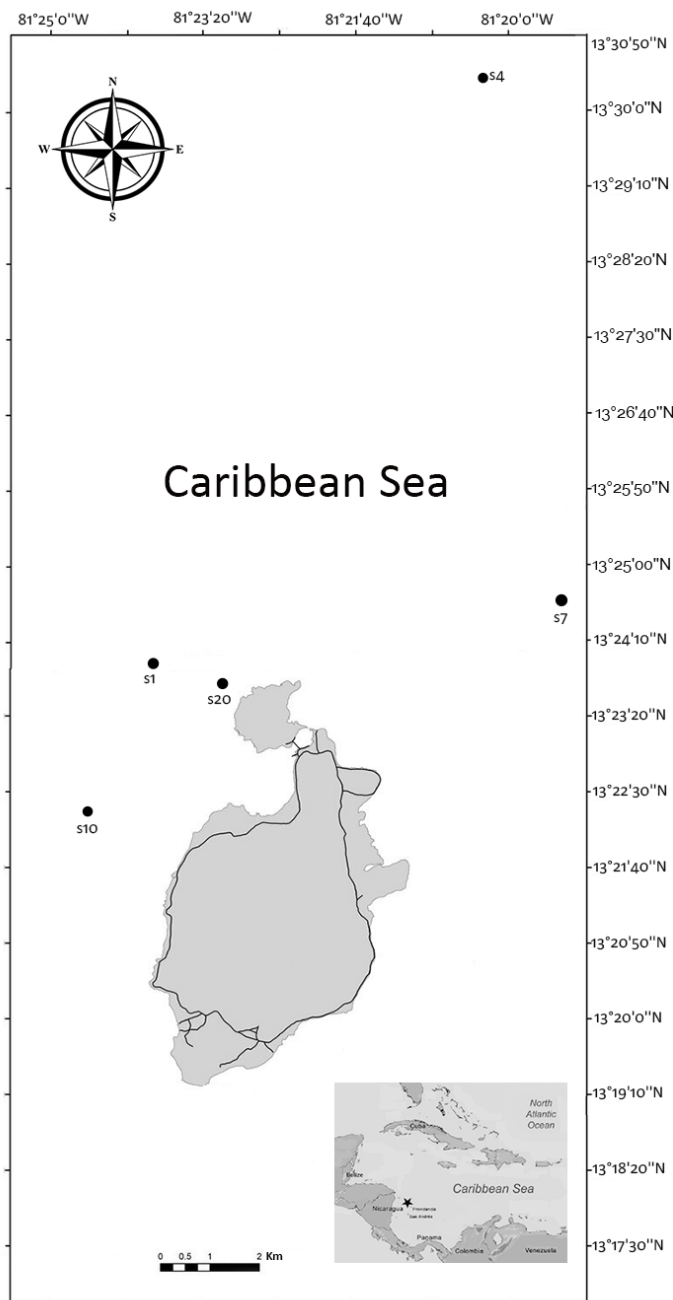
#### Dictyotaceae

***Lobophora declerckii*** N.E. Schultz, C.W. Schneider & L. Le Gall, Eur. J. Phycol. 50(4): 481–500. 2015.

TYPE: GUADELOUPE. Tombant de Port-Louis, 29 m, 16°23'44.34"N, 61°32'4.318"W, 15.V.2012, L. Le Gall et al. (holotype: FRA1676).

Thallus decumbent, fan-shaped, brown in color, with rhizoids on the ventral side of the blade; blades 4–5 cm wide and 2–3 cm tall, lobate, with entire margins (Fig. 2A); thallus 98–102 µm thick; alga composed by 3–4 cell layers: one medullary layer, two dorsal cortical layers and one ventral cortical layer (Fig. 2B, C); medullary cells 48–54 µm tall, 76–83 µm long, 37–39 µm wide (Figs. 2B, C); the outer dorsal cortical layer composed by cells 10–11 µm tall,





**Figure 1:** Sampling site location where specimens were collected in the Caribbean Sea.

13-39  $\mu\text{m}$  long, 13-18  $\mu\text{m}$  wide (Figs. 2B, C); in transverse section (Fig. 2B) 2-3 outer cortical cells, covering the width of one medullary cell on the dorsal side; in the subcortical layer, only one cell covers the width of a medullary cell; on the ventral side, 1-2 cortical cells cover the width of the

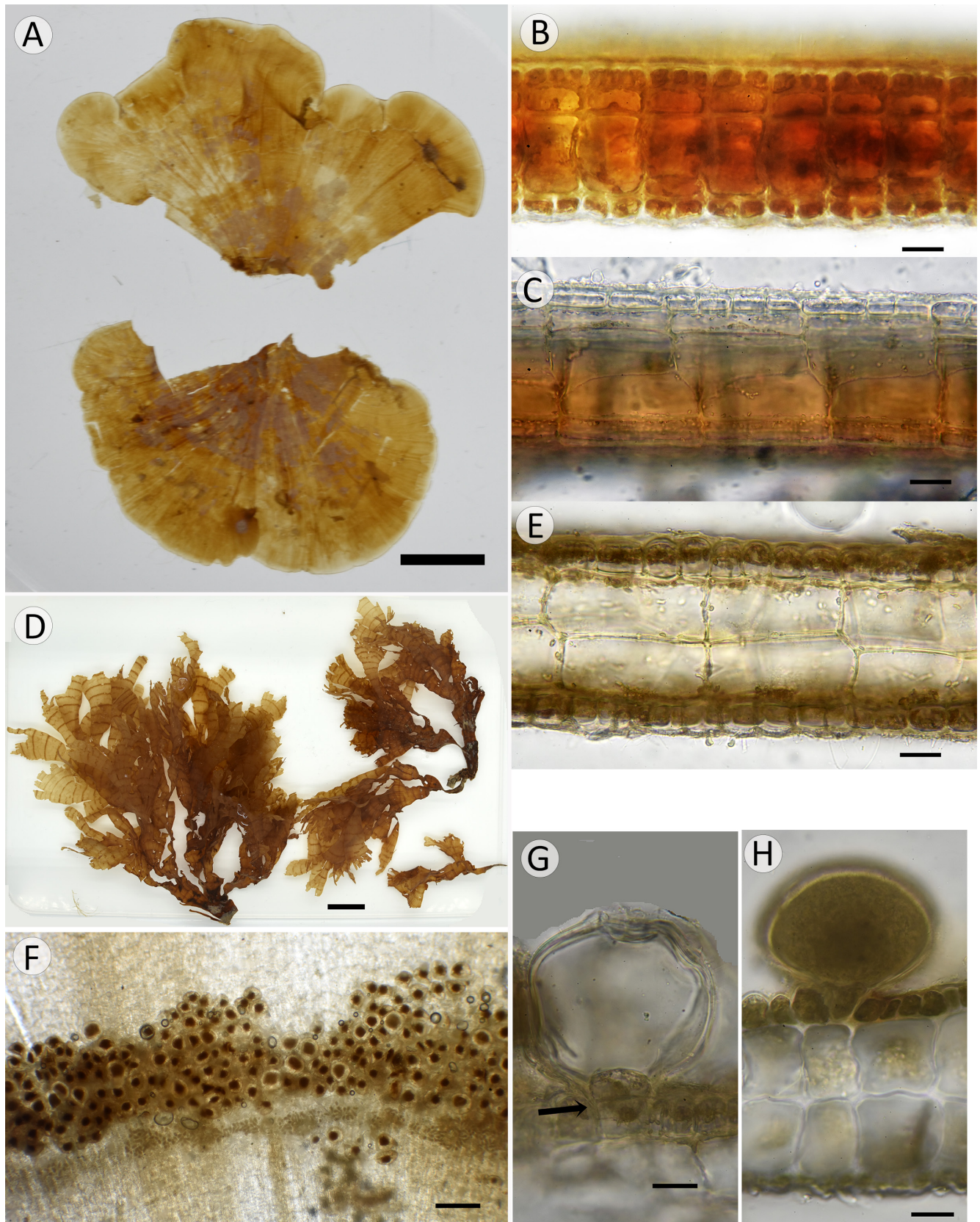
medullary cells; in longitudinal section (Fig. 2C), 2-4 cortical cells on the dorsal side cover a medullary cell, while on the ventral side one cell covers the length of a medullary cell; reproductive structures not observed.

Notes: the genus *Lobophora* (Dictyotaceae) has suffered a large rearrangement in the past decade, with the description of a great number of taxa in all oceans (Camacho et al., 2019). Most species have unique morphological features, which is of great help when molecular analyses cannot be performed. In the Western Atlantic, we went from one reported species, *Lobophora variegata* (J.V. Lamouroux) Womersley ex E.C. Oliveira to eighteen species in the latest checklist (Wynne, 2022). *Lobophora declerckii* was described by Schultz et al. (2015) to accommodate specimens with large decumbent blades, thin thallus, few cell layers and the presence of 2-3 cells dorsally and 1-2 cells ventrally over each medullary cell in transverse section. Our specimens differ from the type description in the thallus thickness, with 98-102  $\mu\text{m}$  vs. 55-85  $\mu\text{m}$  as described by Schultz et al. (2015). Furthermore, the authors reported strictly five cell layers in the thallus, while we found mostly four cell layers. More recently, Godínez-Ortega et al. (2018) reported the species along the Caribbean coast of Mexico, based on both molecular and morphological analyses. Their specimens of *L. declerckii* had a *cox3* sequence identical to the holotype material, and a morphology very similar to our specimen in terms of thallus thickness, number of cell layers, and overall morphology. The authors found specimens with a thallus 70-110  $\mu\text{m}$  thick, 4-5 layers of cells and lighter brown in color compared to the holotype material. Our specimens match in all the characters those described by Godínez-Ortega et al. (2018). Likewise, the habitat where the species was found matches the one described for it, which is in waters deeper than 10 m. Our specimens were collected at 13 m depth in a reef patches habitat.

Additional material examined: COLOMBIA. Old Providence, Station 20, depth 13 m, 13°23'33.7"N, 81°22'52.3"W, 15.IX.2019, *B. Gavio* CMD248 (JIW); Station 10, depth 13 m, 13°22'09.5"N, 81°24'30.0"W, Old Providence, 12.IX.2019, *B. Gavio* CMD112 (JIW), CMD196 (JIW).







**Figure 2:** A-C. *Lobophora declerckii* N.E. Schultz, C.W. Schneider & L. Le Gall. A. habit; B. transverse section; C. longitudinal section; D-G. *Taonia abbottiana* D.S. Littler & Littler. D. habit; E. transverse section; F. surface view of sporangial sori; G. transverse section showing pedicellate sporangia (arrow); H. *Stypopodium zonale* (J. V. Lamouroux) Papenfuss. Cross section showing sporangium without pedicel. Scale bars: A=1 cm, B, C, E, G, H=25  $\mu$ m, D=2 cm, F=250  $\mu$ m.

***Taonia abbottiana*** D.S. Littler & Littler, *Cryptogamie, Algologie* 25(4): 419-427. 2004.

TYPE: JAMAICA, two miles west of Discovery Bay, 10-20 m, 18°29.071'N, 77°30.154'W, 2.V.1996, *D.S. Littler et al.* (holotype: US Alg. Coll. 208962).

Thallus large, 7-15 cm tall, 8-13 cm wide, erect, light to dark brown, fan-shaped with a divided blade (Fig. 2D) concentric line of phaeophycean hairs, attached to the substrate in a single point by a discoid base; thallus 165-205 µm thick, formed by four cell layers, two medullary layers and one cortical layer on each side (Fig. 2E); medullary cells 38 µm high, 83-98 µm wide in transverse section; cortical cells 24-29 µm high, 12-24 µm wide, each medullary cell covered by four cortical cells; sporangia in sori forming horizontal lines above the hair lines (Fig. 2F), round, 100 µm diameter, 86 µm tall, with a two-celled pedicel at the base (Fig. 2G).

Notes: the species was originally described by Littler and Littler (2004) based on specimens from Jamaica. The authors mention that this species is easily confused with *Styopodium zonale* (J.V. Lamouroux) Papenfuss. The main character distinguishing the two species are the pedicellate sporangia in *Taonia abbottiana* vs. the sessile sporangia in *Styopodium zonale*. Our specimen was fertile and had pedicellate sporangia (Fig. 2G) compared to those of *Styopodium zonale* (Fig. 2H). This species is possibly much more widespread, but easily confused with *S. zonale*.

Additional material examined: COLOMBIA. Old Providence, Station 7, depth 14 m, 13°24'41.6"N, 81°19'20.5"W, 11.IX.2019, *B. Gavio PAFM075* (JIW).

Sphacelariales

Onslowiaceae

***Verosphacela ebranchia*** E.C. Henry, *Phycologia* 26: 182-191. 1987.

TYPE: UNITED STATES OF AMERICA. Florida, Vero beach, no collection information (holotype: NFLD No. 28091).

Thallus small, epiphytic on *Lobophora*, with heterotrichous thallus (Fig. 3A); prostrate axes biserial, 20 µm diameter, from which multicellular branched rhizoids arise (Fig. 3B), up to 75 µm long, 20 µm diameter, sometimes with attachment pad; erect axes uni- or biserial, to 600 µm high, 20 µm diameter, seldom branched (Fig. 3C), with a unique large apical cell, which may be much darker in color than the rest of the thallus (Fig. 3D); sometimes the apex of the erect filament topped by large phaeophycean hairs, up to 400 µm long; when phaeophycean hairs are present, there is a trichotalic meristem at the base of the hair (Fig. 3E); sporangia on prostrate or erect branches 22 µm diameter, 25 µm long (Fig. 3F).

Notes: this small alga was found as epiphyte on *Lobophora* J. Agardh. It fits the original description by Henry (1987), who described it from the Atlantic coast of Florida. To date, it has only been reported from the type locality and from Isla Mujeres, Yucatán, Mexico (Mateo-Cid et al., 2002). This species is possibly much more widely distributed, as it is easily overlooked due to its very small size and cryptic habit. To date, it has been found only as an endophyte of brown algae of the order Dictyotales.

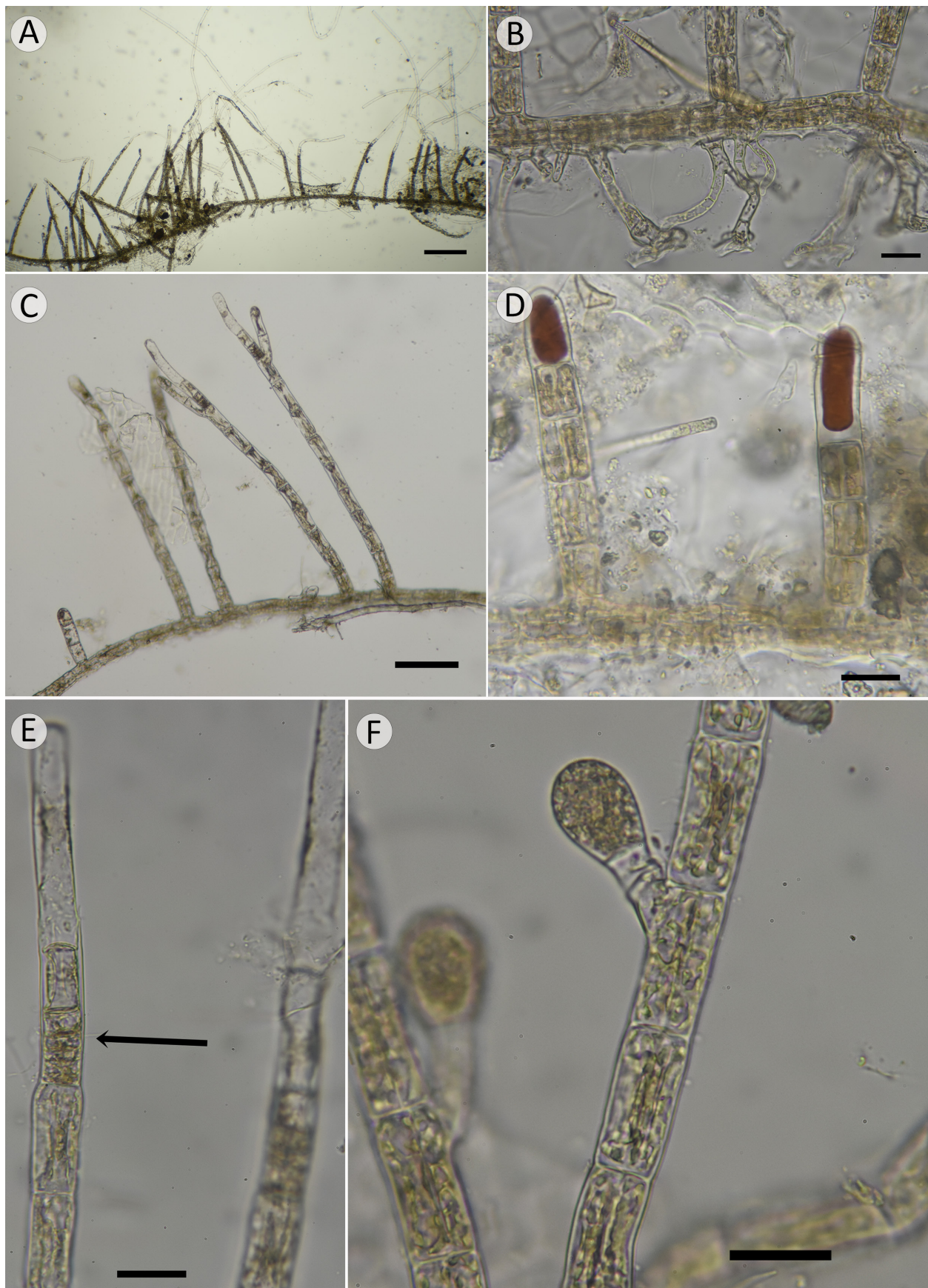
Additional material examined: COLOMBIA. Old Providence, Station 4, depth 12m, 13°35'25.1"N, 81°20'07.2"W, 10.IX.2019, *B. Gavio VH050* (JIW). Old Providence, Station 1, depth 6m, 13°23'52.1"N, 81°23'46.9"W, 9.IX.2019, *B. Gavio PAFM 217* (JIW).

## Discussion

*Lobophora declerckii* seems to be the most common species of *Lobophora* in the Archipelago of San Andres, Old Providence and Santa Catalina. Its thin, large, decumbent thallus may cover a great percentage of hard substrate in coral reef environments, and directly compete with coral colonies (Vieira et al., 2019). As many other members of the Dictyotaceae, the genus *Lobophora* produces a great vari-







**Figure 3:** A-F. *Verosphacela ebrachia* Henry A. habit; B. branched rhizoids; C. branched erect filaments; D. pigmented apical cells of erect branches; E. trichothallic meristem (arrow); F. pedicellate sporangia. Scale bars: A=250 µm, B=100 µm, C-F=25 µm.

ety of secondary metabolites, which may cause bleaching in coral members of the genus *Acropora* Oken 1815 (Vieira et al., 2016). Due to the recent understanding of *Lobophora* diversity, we still do not know, at least in the Caribbean Sea, whether different species of the genus harbor different secondary metabolites and if there are species-specific interactions among *Lobophora* taxa and scleractinian corals. As at other locations in the Caribbean, e.g., Belize (McClanahan et al., 1999) and Curaçao (Ruyter van Steveninck and Bak, 1986), many coral environments in the Archipelago are actually dominated by brown algae of the order Dictyotales. A better understanding of specific metabolic defense of the dominant taxa would give us better cues about interactions among algae, corals and herbivores. The same is true for *Styopodium zonale*: this taxon has shown intraspecific variation in its chemical composition (Pereira et al., 2004; Soares et al., 2015). However, secondary metabolite characterization is generally not carried out by macroalgal taxonomists, and the superficial resemblance of *Taonia abbottiana* with *Styopodium zonale* may confuse taxonomists as well. Therefore, it is possible that the metabolic intraspecific variation reported for *Styopodium* J. Agardh hides an identification confusion of morphologically similar samples. It would be interesting to determine the metabolic composition of *Taonia* J. Agardh and compare it with that of *Styopodium*. The species *Taonia abbottiana* is probably much more widely distributed in the Caribbean Sea than actually reported. The same might be true for *Verosphacela ebrachia*, which, to date, has been reported only along the Caribbean coast of Mexico (Mateo-Cid et al., 2002) after its original description (Henry, 1987). Its cryptic habit and small size go easily undetected.

## Author contributions

BG conceived and designed the study. BG collected the species. YCMD, VD and PAF identified the species. The photos were taken by AAS. All authors contributed to the discussion, review, and approval of the final manuscript.

## Funding

The research was funded by the Universidad Nacional de Colombia, sede Bogotá, through the project Hermes 50890, and by MinCiencias, CCO and UNAL through the Convenio especial de cooperación No. 80740-248-2021 (Hermes 52539).

Specimens were collected with collecting permit issued to the Universidad Nacional de Colombia through Resolución 0255, March 12<sup>th</sup> 2014, by ANLA.

## Acknowledgements

The authors wish to acknowledge the Colombian Ocean Commission (CCO), who organized the Scientific Expedition Seaflower 2019, with the contribution of the Colombian Navy, Dimar and Minciencias. We thank Violeta Posada, who helped in the field. Stefano Draisma helped with the identification of *Verosphacela ebrachia*, for which he is acknowledged.

## Literature cited

- Adobe. 2012. Adobe Photoshop CS6, ver. 13.0. Adobe Systems Incorporated. San José, USA. <https://www.adobe.com/products/photoshop.html> (consulted March, 2023).
- Camacho, O., C. Fernández-García, C. Vieira, C. F. D. Gurgel, J. N. Norris, D. W. Freshwater and S. Fredericq. 2019. The systematics of *Lobophora* (Dictyotales, Phaeophyceae) in the western Atlantic and eastern Pacific Oceans: eight new species. *Journal of Phycology* 55(3): 611-624. DOI: <https://doi.org/10.1111/jpy.12850>
- Dawes, C. J. and A. C. Mathieson. 2008. *The seaweeds of Florida*. University Press of Florida. Gainesville, USA. Pp. 592.
- Godínez-Ortega, J. L., L. I. Cabrera, R. García-Sandoval, M. J. Wynne, H. F. Olivares-Rubio, P. Ramírez-García and A. Granados-Barba. 2018. Morphological and molecular characterization of *Lobophora declerckii* and *L. variegata* (Dictyotales, Ochrophyta) on the Atlantic coast of Mexico. *Phytotaxa* 382(1): 57-73. DOI: <https://doi.org/10.11646/phytotaxa.382.1.2>
- Guiry, M. D. and G. M. Guiry. 2023. *AlgaeBase*. World-wide electronic publication, National University of Ireland. Galway, Ireland. <https://www.algaebase.org> (consulted July 2023).
- Henry, E. C. 1987. Morphology and life histories of *Onslowia bahamensis* sp. nov. and *Verosphacela ebrachia* gen. et sp. nov., with a reassessment of the Choristocarpaceae (Sphacelariales, Phaeophyceae). *Phycologia* 26(2): 182-191. DOI: <https://doi.org/10.2216/i0031-8884-26-2-182.1>
- Herren, L. W., L. J. Walters and K. S. Beach. 2006. Fragment generation, survival, and attachment of *Dictyota* spp. at





- Conch Reef in the Florida Keys, USA. *Coral Reefs* 25: 287–295 DOI: <https://doi.org/10.1007/s00338-006-0096-7>
- Littler, D. S. and M. M. Littler. 2004. *Taonia abbottiana* sp. nov. (Dictyotales, Phaeophyceae) from the Tropical Western Atlantic. *Cryptogamie, Algologie* 25(4): 419-427.
- Mateo-Cid, L. E., A. C. Mendoza-González and R. B. Searles. 2002. New Mexican records of marine algae including *Crouania mayae* sp. nov. (Ceramiaceae, Rhodophyta). *Caribbean Journal of Science* 38(3-4): 205-221.
- Mateo-Cid, L. E., A. C. Mendoza-González and C. M. Hernández Casas. 2019. Diversity of brown algae (Ochrophyta, Phaeophyceae) of Sian Ka'an Reserve Biosphere, Mexican Caribbean. *Pakistan Journal of Botany* 51(1). DOI: [https://doi.org/10.30848/PJB2019-1\(40\)](https://doi.org/10.30848/PJB2019-1(40))
- McClanahan, T. R., R. B. Aronson, W. F. Precht and N. A. Muthiga. 1999. Fleshy algae dominate remote coral reefs of Belize. *Coral Reefs* 18: 61-62.
- Pereira, R. C., A. R. Soares, V. L. Teixeira, R. Villaca and B. A. P. da Gama. 2004. Variation in chemical defenses against herbivory in southwestern Atlantic *Styopodium zonale* (Phaeophyta). *Botanica Marina* 47(3): 202-208. DOI: <https://doi.org/10.1515/BOT.2004.020>
- Ramseyer, T. N., A. Tronholm, T. Turner, M. E. Brandt and T. B. Smith. 2021. Elevated nutrients and herbivory negatively affect *Dictyota* growth dynamics. *Marine Ecology Progress Series* 671: 81-95. DOI: <https://doi.org/10.3354/meps13788>
- Ruyter van Steveninck, E. D. and R. P. M. Bak. 1986. Changes in abundance of coral-reef bottom components related to mass mortality of the sea urchin *Diadema antillarum*. *Marine Ecology Progress Series* 34: 87-94
- Schultz, N. E., C. E. Lane, L. Le Gall, D. Gey, A. R. Bigney, B. De Reviere, F. Rousseau and C. W. Schneider. 2015. A barcode analysis of the genus *Lobophora* (Dictyotales, Phaeophyceae) in the western Atlantic Ocean with four novel species and the epitypification of *L. variegata* (J.V. Lamouroux) E.C. Oliveira. *European Journal of Phycology* 50(4): 481-500. DOI: <https://doi.org/10.1080/09670262.2015.1078500>
- Soares, A. R., H. M. Duarte, L. W. Tinnoco, R. C. Pereira and V. L. Teixeira. 2015. Intraspecific variation of meroditerpenoids in the brown alga *Styopodium zonale* guiding the isolation of new compounds. *Revista Brasileira de Farmacognosia* 25(6): 627-633. DOI: <https://doi.org/10.1016/j.bjp.2015.09.006>
- Tronholm, A., J. Afonso-Carrillo, M. Sansón, F. Leliaert, C. Fernández-García and O. De Clerck. 2013. Taxonomy of the *Dictyota ciliolata-crenulata* complex (Dictyotales, Phaeophyceae). *Phycologia* 52(2): 171-81. DOI: <https://doi.org/10.2216/12-005.1>
- Vieira, C., O. P. Thomas, G. Culioli, G. Genta-Jouve, F. Houlbreque, J. Gaubert, O. De Clerck and C. E. Payri. 2016. Allelopathic interactions between the brown algal genus *Lobophora* (Dictyotales, Phaeophyceae) and scleractinian corals. *Scientific Reports* 6: 18637. DOI: <https://doi.org/10.1038/srep18637>
- Vieira, C., P. L. Stenger, T. Moleana, O. De Clerck and C. E. Payri. 2019. Limited interspecific variation in grazing susceptibility of the brown alga *Lobophora* to herbivory. *Journal of Experimental Biology and Ecology* 518: 151175. DOI: <https://doi.org/10.1016/j.jembe.2019.151175>
- Vieira, C., O. Camacho, Z. Sun, S. Fredericq, F. Leliaert, C. Payri and O. De Clerck. 2017. Historical biogeography of the highly diverse brown seaweed *Lobophora* (Dictyotales, Phaeophyceae). *Molecular Phylogenetics and Evolution* 110: 81-92. DOI: <https://doi.org/10.1016/j.ympev.2017.03.007>
- Vieira, C., K. Morrow, S. D'Hondt, O. Camacho, A. H. Engelen, C. E. Payri and O. De Clerck. 2020. Diversity, Ecology, Biogeography, and Evolution of the Prevalent Brown Algal Genus *Lobophora* in the Greater Caribbean Sea, Including the Description of Five New Species. *Journal of Phycology* 56(3): 592-607. DOI: <https://doi.org/10.1111/jpy.12986>
- Wynne, M. J. 2022. Checklist of benthic marine algae of the tropical and subtropical western Atlantic: fifth revision. *Nova Hedwigia* 153: 1-180.

