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Short Communication

On the identity of "*Dendrilla membranosa*" (Porifera, Dendroceratida) *sensu* Burton, and the specimens collected in Argentina, SW Atlantic Ocean

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ABSTRACT. There has been confusion regarding the specimens identified as "*Dendrilla membranosa* (Pallas, 1766)" in Antarctic and subantarctic waters, considering that the original description corresponded to specimens from the Indian Ocean. In this study, we clarified the identification of the specimens collected in Argentinian waters, SW Atlantic Ocean, that should be identified as *Dendrilla antarctica* Topsent, 1905, updating its distributional range and considering the new records reported in the present study.

Keywords: *Dendrilla antarctica*; sponges; distribution; Burdwood bank; Tierra del Fuego

The sponge *Dendrilla membranosa* (Pallas, 1766) was originally described as *Spongia membranosa* based on a specimen collected in the Indian Ocean with no precise definition of the type locality. The specimen was likely collected along the way from Amsterdam to Indonesia, with stops at South Africa, Seychelles, India, and possibly China (Van Soest, *comm. pers*.). There is no physical type of this species, only an illustration by Seba (1759: Plate 95, Fig. 3) indicated by Pallas as the type (Pallas 1766: 398, Fig. 1a) from specimens of his collection, which has been dispersed over various museums and have not been reliably retrieved. Although Seba's illustration and Pallas' description are sufficient for typification under ICZN Art. 12.2.1 and 72.5.6, the properties of *S. membranosa* remain unclear (cf. Wiedenmayer 1989, Bergquist 1996). Further, the identity of it as a species of *Dendrilla* Von Lendenfeld, 1883 is not based on verifiable physical type material, and the taxonomic view of the species in this genus have been limited by inconsistency (Bergquist & Cook 2002).

Centuries later, Burton (1929) reported *D. membranosa* specimens from Antarctica and proposed the synonymy of *D. membranosa* with *D. antarctica* Topsent, 1905. Afterward, he registered this species again from Antarctica, Burdwood Bank, South Georgias, and the Malvinas (Falkland) Islands (Burton 1932, 1934a). However, in 1934, Burton also published a report on sponges from the Great Barrier Reef Expedition, performed in 1928-1929 (Burton 1934a), and also registered specimens under the name of "*Dendrilla membranosa*" collected in the North Australian waters. Remarkably, Burton did not describe any specimens he assigned to *D. membranosa*, merely listing the various names and specimens he considered synonymous. For the Antarctic material, he relied on Topsent's description of *D. antarctica*; for the tropical Indo-West Pacific material, he relied on Ridley's *Aplysina membranosa* and *A. pallasi*.

Bergquist (1980) created the genus *Dictyodendrilla*, and proposed to include the species *D. membranosa*, as

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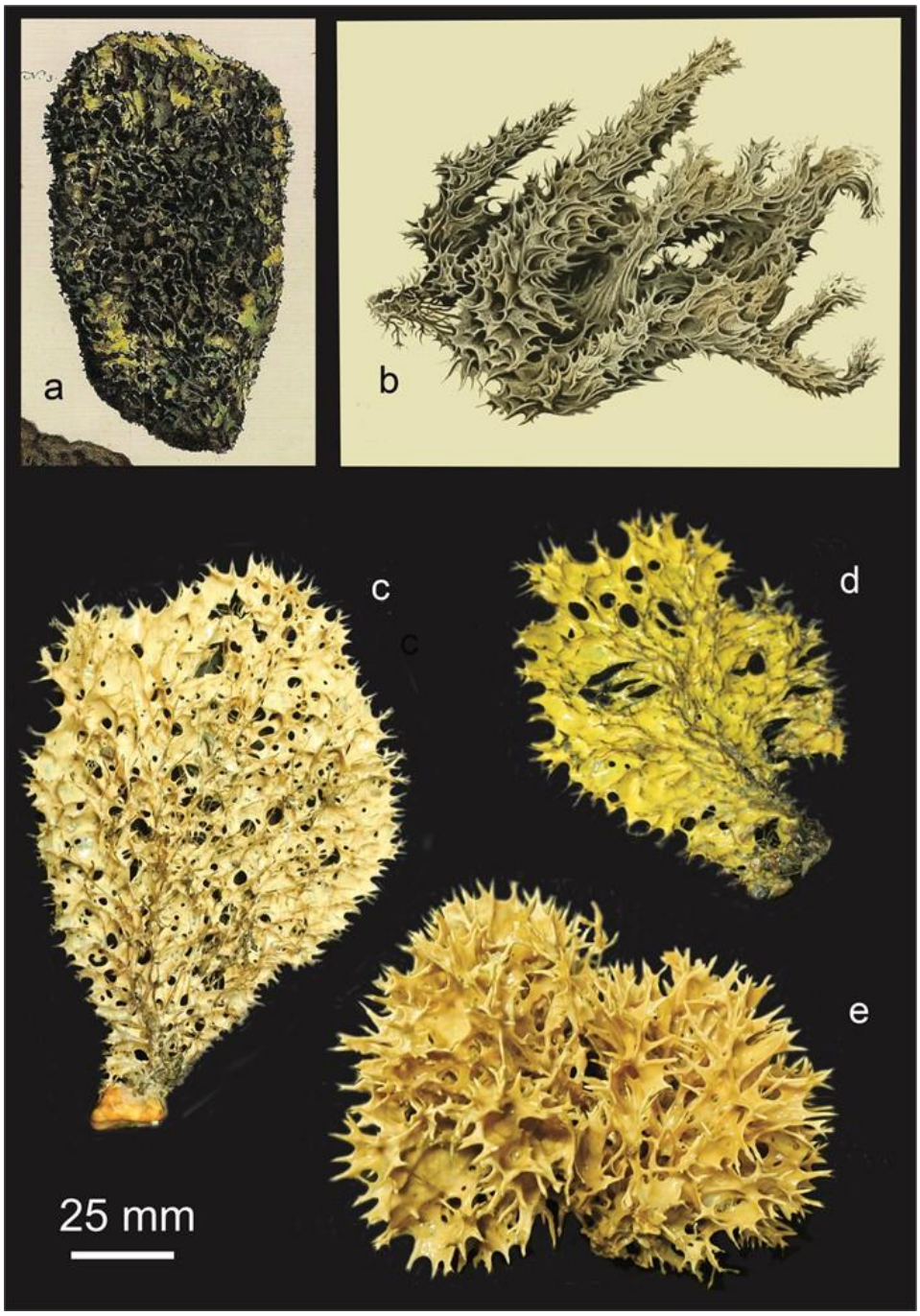

Figure 1. a) *Dendrilla membranosa* (from Seba 1759, Plate 95 Fig. 3), b) *Dendrilla antarctica* (from Topsent, 1908), c-e) *D. antarctica* from Burdwood Bank and Tierra del Fuego (present study).

she distilled from Burton's (1934a) descriptive notes that his specimens from the Great Barrier Reef were reticulated. Later, Bergquist (1996) argued that there is no way we can establish whether Pallas' specimen was reticulated or not, so she proposed that Pallas' material be reassigned as *D. membranosa*, and the tropical specimens of Burton be kept in *Dictyodendrilla*. This transfer needed Burton's tropical material to have a new name, for which she proposed *Dendrilla pallasi* (Ridley, 1884) (originally *Aplysina*). In the Bergquist (1996) publication, she wrote "*Dendrilla membranosa sensu* Burton, 1932", but this was probably an

unfortunate misspelling because it makes sense that the discussed specimens were those collected during the Great Barrier Reef Expedition (Burton 1934a), not those referenced from Antarctic waters (Burton 1932, 1934b). Although Bergquist (1996) proposed that the tropical *D. membranosa sensu* Burton should be renamed *Dictyodendrilla pallasi* (Ridley, 1884), the evidence she presented for this proposal lacks substance, as Ridley's material was not redescribed. To solve the identity and name for the tropical "*Dendrilla membranosa*" is beyond this present short communication, although it should be addressed soon using integrative systematics. It is still considered a valid species; however, it is listed as inaccurate for the Antarctic region by World Register of Marine Species (WoRMS) (De Voogd et al. 2022).

Returning to colder waters, *D. antarctica* was extensively described by Topsent (1905) for Wandel, Wiencke, and Anvers Islands (Antarctica), from shallow waters of 20-40 m, and illustrated later in Topsent (1908) (Fig. 1b). This is a common and often abundant species distributed in coastal Antarctic waters, reported and studied from a taxonomic, biological, ecological, and chemical perspective by Hentschel (1914), Vacelet (1958), Desqueyroux-Faúndez (1989), Koutsouveli et al. (2018), Sacristán-Soriano et al. (2020) and Bory et al. (2020), among others. Desqueyroux-Faúndez (1989) and Goodwin et al. (2019) also noted the confusion generated by Burton (1929, 1932, 1934b) with *D. membranosa* when they were studying Antarctic specimens of *Dendrilla*, but this information was overlooked in their extensive descriptive works.

Between April 22 and May 12, 2017, an Argentinian Expedition onboard the research vessel "Puerto Deseado" was undertaken. This expedition aimed to acquire knowledge on oceanography, geology, biology, ecology, and the conservation value of the Marine Protected Area Namuncurá/ Burdwood Bank (created in 2013, Law 26875) and nearby regions (Falabella et al. 2017). Samples of the benthic community were collected using bottom trawls to characterize the bottom landscape and to create a species inventory of this understudied region where fragile, vulnerable, and also many undescribed species inhabited (e.g. Schejter et al. 2016, 2017, 2020, López-Gappa et al. 2018, Pérez & Cordeiro 2020). During sponge sampling procedures, specimens that fit the description of the genus *Dendrilla* were recorded (Figs. 1c-e). They were collected at stations 24 (54°19.9'S, 59°53.7'W; 97 m depth; Marine Protected Area Namuncurá-Burdwood Bank; deposited at MACN-In 43803) and 40 (58°S, 67°01'W; 49 m; Tierra del Fuego coastal waters; deposited at MACN-In-43804) of the "Puerto Deseado" 2017 Expedition to Burdwood Bank. It was the first time (after Burton's studies) that specimens of *Dendrilla* were collected in the SW Atlantic Ocean, outside Antarctic waters. The collected specimens are flabellate to irregularly branched. Some were beige, others bright yellow in life, while the preserved specimens were beige or became violet to nearly black. They have a smooth conulose surface. The skeleton was composed of spongin fibers visible at the terminal parts, protruding in the conules (Figs. 1c-e). Additionally, new bioactive compounds were recently discovered from specimens collected at Tierra del Fuego during the expedition mentioned above (Prieto et al. 2022).

According to the literature, only "*Dendrilla membranosa*" was previously reported among the Dendroceratida and Darwinellidae in the studied area (Burton 1934b, López-Gappa & Landoni 2005). It is widely accepted that many Antarctic species could reach Argentinian subantarctic waters in their distributions (i.e. Bertolino et al. 2007, Figuerola et al. 2014, Schejter & Bremec 2015). Moreover, according to Leiva et al. (2019), *D. antarctica*, was found to have high levels of gene flow and the potential for long-distance larval dispersal. Our specimens very much fit the description of *D. antarctica* provided by Topsent (1905, 1908), but also that of "*Dendrilla membranosa*" provided by Burton (1929, 1932, 1934a). Given the previous confusion mentioned above and based on our experience and the arguments discussed, we propose that the specimens identified as *D. membranosa sensu* Burton (1929, 1932, 1934b) in the SW Atlantic Ocean, outside Antarctica, should be considered to belong to *D. antarctica*. In accordance with the observations made by Desqueyroux-Faúndez (1989) and Goodwin et al. (2019) for Antarctic specimens. In this way, the distribution range of *D. antarctica* should be updated. It would comprise not only the Antarctic domain (Antarctica, Kerguelen Islands, South Georgias Islands) but also Tierra del Fuego (Argentina) (data from the present study), Burdwood Bank (data from the present study), and Malvinas (Falkland) Islands. Wrong identification of a species may produce a cascade-like process, with consequences at multiple levels (ecology, biogeography, diversity, conservation) (Bortolus 2008, Thomson et al. 2018); hence, molecular and integrative systematics should be encouraged. Of the 10 valid species under the genus *Dendrilla* (De Voogd et al. 2022), only *D. antarctica* is distributed in the cold waters of Antarctica and the southern South American waters. The other eight species (besides *D. membra-*

nosa) are distributed in Australian waters (*D. cactos* (Selenka, 1867), *D. cruor* (Carter, 1886), *D. rosea* Von Lendenfeld, 1883), New Zealand, and New Caledonia (*D. rosea*), West Pacific Ocean (*D. lendenfeldi* Hentschel, 1912, *D. mertoni* Hentschel, 1912), Maldives (*D. cactos*), Mediterranean Sea (*D. acantha* Vacelet, 1958, *D. cirsioides* Topsent, 1893), North Atlantic Ocean (*D. acantha*) and the Caribbean Sea (*D. camera* (de Laubenfels, 1936)) (De Voogd et al. 2022).

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