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The status of the name *Alysium holtingii* C. Agardh, a red alga described from Brazil, and a depiction of the type specimen

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ABSTRACT

The type specimen of the red alga *Alysium holtingii* C. Agardh, described from Brazil, is located in the Lund Herbarium, and it is depicted for the first time in a publication. It is taxonomically identical to *Dichotomaria obtusata* (J. Ellis and Solander) Lamarck and thus can be treated as a later taxonomic synonym. *Alysium* is regarded as congeneric with *Dichotomaria*.

Key words: *Alysium*, Brazil, *Dichotomaria obtusata*, red algae, taxonomy, type specimen.

INTRODUCTION AND BACKGROUND

In recent years the red algal genus *Galaxaura* Lamouroux (1812) has been shown to be heterogeneous. *Tricleocarpa* was proposed by Huisman and Borowitzka (1990) as a segregate genus from *Galaxaura*, and *Dichotomaria* Lamarck (1816), long regarded as congeneric with *Galaxaura*, has been reinstated (Huisman et al. 2004). In the ongoing revision of the family Galaxauraceae (Wang et al. 2005), the status of the ill-known genus *Alysium* deserves attention. *Alysium* was established by C. Agardh (1823), with the single species *A. holtingii* C. Agardh ("*Ulva holtingii* Mert. msc.") from the coast of Brazil, the specimen having been sent by Mertens to Agardh. Although the genus had only a brief description, the single species was provided with a more detailed account. C. Agardh (1824) repeated the name in his '*Systema algarum*'. Sprengel (1827) recognized the genus, referring to two species, the original species *A. holtingii* and a new species, *A. perrini* Sprengel from the West Indies. But because the legitimate and available name *Galaxaura oblongata* (J. Ellis and Solander) J.V. Lamouroux was cited after *A. perrini*, it is an illegitimate name. Léman (1828) referred to *Alysium holtingii* as a plant from Brazil distinguished by its membranous, hollow, inflated frond, provided with constrictions, giving it an articulated aspect as well as by its reticulate, pentagonal covering.

In their account of *Alysium holtingii* (as "*Hoeltingii*"), Martius et al. (1833) said it was discovered by "Hoelting" on the ocean shore near Sebastianópolis. It is not clear how they were able to provide this more precise information about the type locality.

Sebastianópolis is an earlier name for Rio de Janeiro, or officially "São Sebastião do Rio de Janeiro". Martens' (1870) summary of records of Brazilian algae included *Galaxaura obtusata* with *Alysium holtingii* listed as a synonym, and he referred to the record of *A. holtingii* from "Rio" by Martius et al. (1833).

Decaisne (1842) recognized *Galaxaura* and placed both *Alysium* C. Agardh and *Dichotomaria* Lamarck (1816) in its synonymy. Decaisne (1842) treated *Alysium holtingii* (as "*Hottingii*") as conspecific with *Galaxaura obtusata* (J. Ellis and Solander) Lamouroux (1816).

Kützing (1843) altered Agardh's orthography of the name to *Halysium*, a name that was already occupied by

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a genus of hyphomycetous fungi (Corda 1837). Kützing assigned the genus to the family Lemaneaceae ['Familia XXXVII. Lemanieae'] and recognized a total of ten species. The first of these was *H. holtingii*, with "*Alysium holtingii* Ag." cited, and significantly "*Corallina obtusata* Ellis and Solander Tab. 22, Fig. 2" was listed as a taxonomic synonym. Kützing also indicated "Westindien: Mertens! (Herb. berol.)", revealing that he had seen Mertens' authentic material then in the Berlin Herbarium. The other species that were placed in *Halysium* were: *H. oblongatum* (J. Ellis and Solander) Kützing, *H. cylindricum* (J. Ellis and Solander) Kützing, *H. rugosum* (J. Ellis and Solander) Kützing, *H. marginatum* (J. Ellis and Solander) Kützing, *H. fruticulosum* (J. Ellis and Solander) Kützing, *H. lapidescens* (J. Ellis and Solander) Kützing, *H. induratum* (J. Ellis and Solander) Kützing, *H. lichenoides* (J. Ellis and Solander) Kützing, and the new species *H. canaliculatum* Kützing, that was described from the coast of Brazil. All of these species occurred in the tropical western Atlantic (West Indies, the Bahamas, Jamaica, Brazil, or "Antillenmeer"). *Halysium rugosum* was the only one of these species depicted by Kützing (1843, Pl. 43, Fig. 1).

Kützing (1849, 1858) subsequently followed Decaisne (1842) in treating these species as belonging to the genus *Galaxaura*. His list included the species *Galaxaura canaliculata* (Kützing) Kützing (1849). Decaisne's (1842) inclusion of *Alysium* in *Galaxaura* has also been followed by Schmitz and Hauptfleisch (1897), De Toni (1897), and Kylin (1956). J.G. Agardh (1876) treated his father's genus *Alysium* as a new subgenus of *Galaxaura*, and he assigned the following three species to this subgenus: *G. obtusata*, *G. umbellata* (Esper) J.V. Lamouroux, and *G. decaisnei* J. Agardh. Two varieties, α and β, were recognized within *Galaxaura obtusata*: α *Opuntioides* included *Corallina obtusata* J. Ellis and Solander and thus would be the nominate variety; β *oblongata* included *Corallina oblongata* J. Ellis and Solander (1786) as well as *Alysium holtingii* C. Agardh. At present, *Corallina oblongata* is placed in *Tricleocarpa*, where it is treated as conspecific with *T. fragilis* (Linnaeus) Huisman et Townsend (1993). Therefore, if J. Agardh's (1876) treatment of *A. holtingii* in the synonymy of *G. obtusata* (J. Ellis and Solander) Lamouroux [var.] *oblongata* (J. Ellis and Solander) J.G. Agardh is correct, then the generic name *Alysium* would predate *Tricleocarpa* Huisman and Borowitzka (1990). On the other hand, if *Alysium holtingii* is a taxonomic synonym of *Corallina obtusata*, which is now *Dichotomaria obtusata* (J. Ellis and Solander) Lamarck, then *Alysium* can be relegated to synonymy with *Dichotomaria*.

The detailed floristic accounts by Taylor (1960) and Oliveira (1977) made no specific mention of *Alysium holtingii* C. Agardh, nor did the historical accounts by Taylor (1931) and Joly (1952) refer to C. Agardh's *Alysium holtingii*. The fact that the type specimen of *A. holtingii* has never been depicted in the literature motivated me to locate it and also to determine whether its taxonomic assignment lies with *Tricleocarpa fragilis* or *Dichotomaria obtusata*.

OBSERVATIONS

The type specimen of *Alysium holtingii* (Fig. 1) was located in the Agardh Herbarium (as No. 32432) in Lund, Sweden, and received on loan. Label information (Fig. 2a) includes the following words near the specimen: "*Ulva holtingii* M. ab oris Brasil. Holting 1819" and "Cm. 1821" [meaning that it was communicated/sent from Mertens to Agardh in 1821]. Also near the species name is "n.$\int$p.", which is interpreted as "n.sp.". In the bottom left corner of the sheet (Fig. 2b) are the words: "*Alysium holtingii* Ag." and "*Ulva holtingii* Mert." The specimen has a bushy, spreading aspect with an overall height of 5 cm. It is made up of distinctly segmented axes (Fig. 3), with branching from 5 to 8 orders. The branching pattern is dichotomous or sub-dichotomous. The axes appear to be cylindrical rather than flattened but have collapsed due to their hollow nature. Individual segments are 1-2.5 mm in width and 3-5 (-6) mm in length. The specimen appears chalky and bleached, but the distal tips are relatively dark, reflecting the non-calcified condition of these growing regions. The surface of the segments is glabrous. The joints appear to be uncalcified.

A small fragment was excised and treated with dilute HCl to decalcify. Then sections were gently made with a single-edged razor blade. The outer layer of cortical cells were mostly adherent upon decalcification and presented a continuous aspect of polygonal cells (5-, 6-, and 7-sided) in surface view, the cells measuring 20-

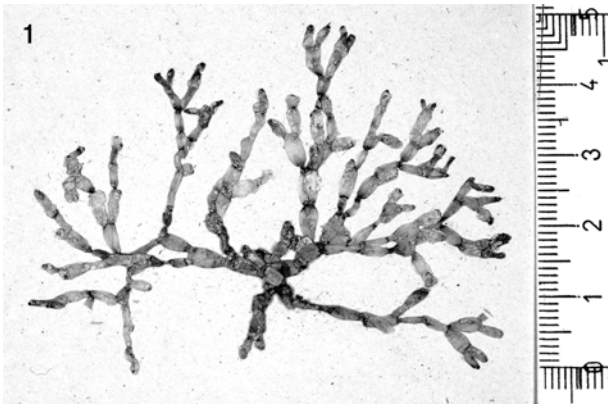

Fig. 1 – Lectotype specimen of *Alysium holtingii* C. Agardh. Agardh Herbarium No. 32432, Lund.

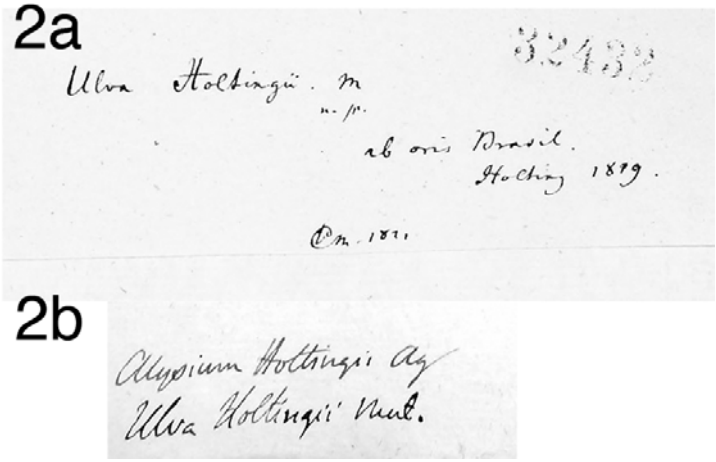

Fig. 2 – Label data: *a*, words near specimen; *b*, words at bottom corner of sheet.

Fig. 3 – Close-up of portion of lectotype specimen.

28 μm across. Older surface cells were more rounded in outline and ranged from 30-50 μm. There were 2 or 3 layers of cortical cells. In the interior of the thallus were very loosely-organized branching medullary filaments, 10-22 μm in width and of indeterminate length.

The moniliform habit and the collapsed nature of the thallus upon drying conform to the accounts given for *Dichotomaria obtusata* by various workers, such as Papenfuss et al. (1982), Huisman and Borowitzka (1990), Littler and Littler (2000) (all as *Galaxaura obtusata*) and Chou (1945, as the taxonomic synonym *G. robusta*). Huisman and Kurihara (2006) characterized *Dichotomaria obtusata* as having thalli that are terete throughout and segmented. According to Abbott (1999), the terete axes in this species are "often collapsed", in agreement with the condition in the specimen of *Alysium holtingii*. In *Tricleocarpa*, the outer cortical cells become disengaged upon decalcification (Huisman and Borowitzka 1990, Abbott 1999), and the cortical cells become smaller toward the surface (Huisman and Kurihara 2006). These observations allow us to conclude that *Alysium holtingii* is taxonomically identical to *Dichotomaria obtusata* and thus can be placed in its synonymy. This confirms the ideas of Decaisne (1842), Kützing (1843), Martens (1870), De Toni (1897), and Kjellman (1900) but not of J. Agardh (1976), who treated the species as identical with *Galaxaura oblongata* (now *Tricleocarpa fragilis*). Similarly, *Alysium* C. Agardh is to be listed as a heterotypic synonym of *Dichotomaria*.

The illegitimate name *Alysium perrini* Sprengel (1827), for which the available name *Galaxaura oblongata* was cited, can be listed in the synonymy of *Tricleocarpa fragilis* (Linnaeus) Huisman and R.A. Townsend. Huisman and Townsend (1993) demonstrated that *Eschara fragilis* Linnaeus (1758) is an older taxonomic synonym for *Corallina oblongata* J. Ellis and Solander (1786).

The Brazil-based *Galaxaura canaliculata* (Kützing) Kützing is treated in the synonymy of *Dichotomaria marginata* (J. Ellis and Solander) Lamarck (Lamarck 1816, De Toni 1897, Silva et al. 1996).

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RESUMO

O espécime tipo da alga vermelha *Alysium holtingii* C. Agardh, descrito para o Brasil, está localizado no Herbário Lund, e é aqui apresentado. Ele é taxonomicamente idêntico a *Dichotomaria obtusata* (J. Ellis e Solander) Lamarck e portanto deve ser tratado como um sinônimo taxonômico posterior. *Alysium* é considerado como congenérico com *Dichotomaria*.

Palavras-chave: *Alysium*, Brasil, *Dichotomaria obtusata*, algas vermelhas, taxonomia, espécime tipo.

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