

Short Communication

***Sticta aongstroemii*, a newly recognized species in the *S. damicornis* morphodeme (*Lobariaceae*) potentially endemic to the Atlantic Forest in Brazil**

Green, apotheciate species of the genus *Sticta* are among the most misunderstood lichens in terms of their taxonomy. To date, most samples at a worldwide level have been identified as *S. canariensis* (Bory) Bory ex Delise and more commonly as *S. damicornis* (Sw.) Ach. (Durand & Pittier 1891; Hitchcock 1898; Schiffner 1901; Riddle 1912; Merrill 1913; Howe 1914; Plitt 1921; Malme 1934; Welch 1950; Herre 1951; Imshaug 1956; Zahlbruckner 1956; Dix 1957; Thomasson 1959; Choisy 1960; Follmann 1976; Tønsberg 1990; Wolf 1993; Brodo 1994; Marcano *et al.* 1996; Nayaka & Upreti 2005; Holz 2006; Sipman 2006; Cerón & Quintero 2009; Joshi *et al.* 2011; Martins *et al.* 2011; Rincón-Espitia *et al.* 2011; Benítez *et al.* 2012; Bungartz *et al.* 2013; Mishra & Upreti 2014; Aptroot 2016; Nelson & Sandoval 2018). To reflect the apparent morphological diversity in these lichens from all parts of the world, numerous infraspecific taxa have been established in a broadly defined *S. damicornis*, with some authors even including *S. canariensis* at the level of form or variety (Flörke 1809; Acharius 1814; Nylander 1859*a, b*; Müller 1881; Stizenberger 1895; Malme 1934).

The name *Sticta damicornis* has frequently been used to identify green-algal *Sticta* species from the Atlantic Forest of Brazil (da Silva *et al.* 1990; de Oliveira *et al.* 2002; Kärfer & Martins 2005; Spielmann 2006; Kärfer *et al.* 2007, 2009; Gumboski & Eliasaro 2011; Martins *et al.* 2011). Molecular data have shown that green-algal species in the Neotropics represent multiple distinct taxa (Moncada *et al.* 2013, 2014),

particularly in the Brazilian Atlantic Forest where they are represented by several separate, and in most cases endemic, taxa unrelated to the European-Macaronesian *S. canariensis* and the Caribbean endemic *S. damicornis* (Moncada *et al.* 2018). These taxa are restricted to well-conserved areas in the few remnants of the Atlantic Forest and threatened by habitat loss. Here, we recognize a characteristic species with linear, much branched lobes with parallel, straight margins which taper to rounded ends, and apothecia arranged uniquely in dense lines along the margins (Fig. 1A). This lichen was originally described as *S. laciniata* var. *trichophora* Müll. Arg., based on three collections from Minas Gerais and Rio de Janeiro (Müller 1881). Unfortunately, the use of the epithet *trichophora* in the genus *Sticta* is blocked by *S. trichophora* Vain., an unrelated species described from the Philippines (Vainio 1913). We therefore introduce the replacement name, *Sticta aongstroemii*.

***Sticta aongstroemii* Dal Forno,
Moncada & Lücking nom. nov.**

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Sticta laciniata var. *trichophora* Müll. Arg., *Flora* 64: 85 (1881); *Sticta laciniata* f. *trichophora* (Müll. Arg.) Stizenb., *Flora* 81: 122 (1895); type: Brazil, Minas Gerais, Poços de Caldas, Johan Ångström s. n., comm. C. Müller (G-G00295522, lectotype!, selected here) [non *S. trichophora* Vain., *Philipp. J. Sci., C, Bot.* 8(2): 123 (1913)].

The epithet of the replacement name honours the collector of the type material, the Swedish bryologist Johan Ångström



FIG. 1. A, *Sticta aongstroemii* in situ (M. Dal Forno 2812). B, lectotype of *Sticta laciniata* var. *trichophora* Müll. Arg. (G-G00295522). In colour online.

(1813–1879). Müller (1881) cited three collections in the protologue; one from Rio de Janeiro (Deventer 16) could not be located

and another from there (Glaziou 2214) was later described as a different variety, *Sticta laciniata* var. *subdamicornis* Müll. Arg.

(Müller 1891). The specimen from Minas Gerais was therefore selected as lectotype for *S. laciniata* var. *trichophora*, now renamed *S. aongstroemii*.

As outlined above, *Sticta aongstroemii* is set apart from other green-algal *Sticta* species by the combination of lacinate lobes with parallel margins and rounded to tapering tips, and particularly the densely arranged, marginal apothecia in combination with a thin but distinct, dark brown lower tomentum contrasting with the conspicuous, whitish cyphellae; the branching pattern is distinctly anisotomous, with the lobes growing at an angle of c. 45–60° (Fig. 1A & B). *Sticta damicornis* s. str., known from Cuba, Jamaica and the Dominican Republic (Moncada *et al.* 2018), has much narrower lobes (c. 2 mm wide compared to c. 5–8 mm in *S. aongstroemii*) and scattered apothecia; it corresponds in the dark lower tomentum but its cyphellae are much smaller. *Sticta canariensis* s. str., which is known with certainty from only western Europe and Macaronesia, matches *S. aongstroemii* in size and lobe width but differs in the following characters: the lobes branch subdichotomously rather than anisotomously, with truncate tips and generally shorter internodes and the branches growing at an angle of 60–90°; the underside is light to medium (ochraceous) brown with rather small cyphellae not contrasting with the lower tomentum and the apothecia are usually scattered over the lobe surface, becoming more dense towards the margins but usually not in conspicuous, regular lines. The type material of *Sticta laciniata* var. *subdamicornis* (Rio de Janeiro, Glaziou 2214), is similar to *S. canariensis* in most characters, but our molecular data suggest that the latter is not present in the Neotropics or southern Brazil (B. Moncada, E. Sérusiaux, B. Goffinet *et al.*, unpublished data) and that there is a considerable level of cryptic speciation, with high morphological congruence even in unrelated lineages, as is also the case for the names *S. fuliginosa* and *S. weigeli* (Moncada *et al.* 2014; Magain & Sérusiaux 2015). We are currently preparing an updated phylogeny of the genus *Sticta* based on the ITS barcoding locus, which includes numerous green-algal species of *Sticta* from

South America (B. Moncada, E. Sérusiaux, B. Goffinet *et al.*, unpublished data). Our data suggest that none of these species, including the present taxon, is related to either *S. canariensis* or to the clade that underwent substantial radiation in Madagascar and the Mascarenes, including *S. dichotoma* Bory, another often misapplied name (Simon *et al.* 2018).

Sticta aongstroemii is one of several potentially endemic green-algal *Sticta* species in the Atlantic Forest of Brazil, largely restricted to the southern part of this biome, ranging from Minas Gerais to Rio Grande do Sul. The Atlantic Forest ranges among the most diverse ecosystems on Earth, including high levels of endemism (Mittermeier *et al.* 1998). It originally covered 13% of Brazil but has been diminished to c. 1%, with high levels of degradation and fragmentation (Brooks & Balmford 1996; Ranta *et al.* 1998; Ribeiro *et al.* 2009; Fundação SOS Mata Atlântica & INPE 2009, 2016; Tabarelli *et al.* 2010). *Lobariaceae* lichens, particularly green-algal species, are threatened by this dramatic loss of habitat but can also be used as bioindicators to monitor remaining forest fragments for conservation purposes, which is the case for the specimen in Fig. 1A (*M. Dal Forno* 2812). This sample of *S. aongstroemii* was observed in a tropical montane cloud forest (also known as Mata or Matinha Nebular) in South-eastern Brazil, in a small forest close to the road, in the surroundings of the touristic city of Campos do Jordão, São Paulo. Despite being small, the area is rich in lichen species, including several undescribed taxa of asco- and basidiolichens. The presence of multiple species of *Lobariaceae*, including large individuals such as the one shown here, indicates that this forest is a remnant of the once dominant Atlantic Forest in this region. The correct identification of species, such as *S. aongstroemii*, is crucial in assessing the biodiversity and conservation status of such fragments and this contribution is a first step towards a thorough inventory of the *Lobariaceae* of this region.

Additional specimens examined. **Brazil:** São Paulo: Campos do Jordão, road to Pico do Itapeva, Serra da

Mantiqueira, 22°45'58"S, 45°32'27"W, 1882 m, Mata Atlântica domaine, montane cloud forest (matinha nebular), along roadside, *M. Dal Forno* 2812 (with A. Gerlach, P. Clerc & R. Penati).

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