

## THE TYPIFICATION OF NONGENICULATE CORALLINALES (RHODOPHYTA) INVOLVING SIBOGA EXPEDITION COLLECTIONS

ERIC VERHEIJ<sup>1</sup> & WM J. WOELKERLING<sup>2</sup>

### SUMMARY

A comparative analysis of type material of nongeniculate coralline red algae (Corallinales, Rhodophyta) associated with the Siboga Expedition (1899–1900) to the Malay Archipelago and lodged in L and TRH has been undertaken. Of the 23 species and infraspecific taxa involved, 5 are based on holotype collections, 3 were properly lectotypified by previous authors, and 15 are properly lectotypified here. L contains 5 holotypes, no holotype fragments, 13 lectotypes, and no lectotype fragments while TRH contains no holotypes, 5 holotype fragments, 5 lectotypes, and 6 lectotype fragments. *Lithothamnion siamense* is correctly lectotypified with material from the Gulf of Thailand and not from Siboga material, and a new lectotype with conceptacles is proposed to supersede the existing sterile lectotype of *Archaeolithothamnion timorensis*. Isolectotypes and paratypes at L and TRH have been identified and marked, and information on the basionym, nature, extent, and location of type material, type locality and collection data, and references to published illustrations of type material have been provided for all species and infraspecific taxa. Brief comments on five rejected forma names are included.

### INTRODUCTION

During the course of the Siboga Expedition to the Malay Archipelago in 1899–1900, Anna Weber-van Bosse assembled over 1300 collections of nongeniculate coralline red algae (Corallinales, Rhodophyta). After returning to the Netherlands, she wrote Mikael Foslie of the Vitenskapsmuseet in Trondheim, Norway (TRH) on 8 September 1900 and asked him to undertake taxonomic studies of the crust-like species; and it is apparent from a subsequent letter dated 22 May 1902 that this request had been extended to include all the nongeniculate corallines. Before sending the collections to Trondheim, Weber-van Bosse had 12 × 18 mm numbered labels printed and affixed to 1334 collections, most consisting of single specimens. She also sent Foslie a notebook containing a list of the stations from which each of the numbered collections came. This notebook was extensively annotated and kept by Foslie at TRH.

After completing his studies, Foslie returned nearly all of the collections to Weber-van Bosse along with a set of detailed comments on sheets of notepaper. These comments included taxonomic identifications and indications as to which specimens or fragments Foslie retained for his own herbarium. The sheets of notepaper are now

1) Rijksherbarium / Hortus Botanicus, P.O. Box 9514, RA 2300 Leiden, The Netherlands.

2) Department of Botany, La Trobe University, Bundoora, Victoria, Australia 3088.

housed with the Siboga coralline collections in L, and the draft notes from which they were prepared were retained by Foslie at TRH. In a letter dated 14 July 1904, Weber-van Bosse thanked Foslie for returning the collections and commented "But after looking at the boxes full of specimens and slides, I asked myself whether you had kept enough for yourself," thus clearly implying that Foslie kept only a small portion of the total material.

The results of Foslie's studies appeared in four papers (Foslie, 1901a, 1904, 1906, 1907) and later were incorporated into the report on the Rhodophyta of the Siboga Expedition (Weber-van Bosse, 1928). Twenty-two species and infraspecific taxa of nongeniculate Corallinales were newly described by Foslie in these papers. Foslie designated a holotype specimen for only one of the 22 taxa, but four additional taxa were based on single collections, which thus are also holotypes. Subsequently, Adey in Adey & Lebednik (1967) flagged 10 Siboga Expedition collections as types, and Adey (1970) provided further comments on these. Adey, however, apparently was unaware that Foslie usually retained only fragments of Siboga specimens and that the major portion of these, types included, were in L and not in TRH (see fig. 1 on p. 280). Moreover, in several cases Adey improperly typified Siboga-based taxa or used Siboga collections to typify species which were described by Foslie from material other than that collected on the Siboga Expedition. In fact, only 8 of the 23 taxa described by Foslie and dealt with in this paper have been properly typified before the present study. The absence of properly designated type specimens has caused increasing problems in sorting out meaningful concepts for nongeniculate coralline species and infraspecific taxa, including those described from Siboga Expedition material.

The aims of the present paper are to properly typify or identify types of all nongeniculate coralline species and infraspecific taxa based on Siboga Expedition specimens and to determine precisely what the nature and extent of the type material of each taxon is at L and TRH. Brief comments on five rejected forma names are included after the taxonomic accounts.

#### MATERIALS AND METHODS

All relevant Siboga Expedition collections in L were located and brought to TRH for comparative analyses with Siboga material in the Foslie herbarium. For each species or form, holotypes, lectotypes, isoelectotypes and/or paratypes were identified or designated, noting the reproductive status and condition of the specimens. In cases where parts of a type specimen or collection are represented both in L and TRH, the proportion of material in each was determined. Apparently missing collections (i.e., numbered collections which could not be traced in L or TRH, most likely because the numbered labels have been lost) and specimens distributed by Weber-van Bosse involving type material were determined from the unpublished notes of Weber-van Bosse and Foslie and from comparisons with published illustrations in Foslie (1904) and Printz (1929). Boxes containing holotype, lectotype and isoelectotype material have been labelled appropriately in L and TRH.

A number of the associated microscope slides which Foslie and Weber-van Bosse had prepared commercially also have been examined for reproductive structures. These

slides contain calcified, ground sections rather than decalcified, embedded and stained sections, and thus only a limited amount of information is obtainable from them.

The taxonomic accounts below are organized alphabetically by the final epithet (species or forma). All taxa are referred to by their basionyms because, for most, new studies are required to determine their taxonomic status and generic disposition in a modern context, a task beyond the scope of the present study. Each account includes information on basionym & protologue, the nature and location of type material, published references containing typification information, type locality and collection data, published illustrations of type material, and comments which include explanations for the selection of lectotypes. The 'drawer' location of TRH material is also indicated (see Adey & Lebednik, 1967 for details). Herbarium abbreviations follow Holmgren et al. (1990) and the abbreviation ICBN is used for the International Code of Botanical Nomenclature (see Greuter, 1988).

#### TAXONOMIC ACCOUNTS

Of the 23 taxa dealt with below, 11 were originally described as species by Foslie and 12 were described as forms of species. One species (*Goniolithon megalocystum*) is based on a holotype designated by Foslie, and four other taxa (*Lithothamnion bandanum*, *Mastophora affinis*, *Mastophora macrocarpa* f. *condensata*, and *Melobesia subtilissima*) are based on single plants or collections which thus are also holotypes. Adey (1970) also indicated that *Archaeolithothamnion sibogae* was based on a holotype, but because the protologue was based on 32 collections from three stations, Adey in fact had designated a lectotype. Adey in Adey & Lebednik (1967) and Adey (1970) designated lectotypes for four additional taxa (*Archaeolithothamnion timorense*, *Lithophyllum reinboldii*, *Lithothamnion siamense*, and *Lithothamnion simulans* f. *crispescens*), but two designations have not been accepted here. Thus Siboga material cannot be used to lectotypify *Lithothamnion siamense* Foslie because the species is based on collections from the Danish Expedition (1899–1900) to the Gulf of Siam (= Gulf of Thailand) and not on material collected during the Siboga Expedition. In addition the TRH lectotype proposed by Adey for *Archaeolithothamnion timorense* is sterile, but because there is syntype material in L which is fertile, a new lectotype has been designated in accordance with ICBN Art. 8.1(b) (see Greuter, 1988). In addition, Adey (1970) listed co-types for *Lithothamnion fragilissimum* and *L. prolifer*, but as co-types have no status in botanical nomenclature, it was necessary to properly designate lectotypes. In total, 15 lectotypes have been designated in the present paper.

Of the 23 taxa dealt with in this paper, L contains 5 holotypes, no holotype fragments, 13 lectotypes, and no lectotype fragments, while TRH contains no holotype collections, fragments of 5 holotypes, 5 lectotypes, and fragments of 5 additional lectotypes. Holotype, lectotype, or isolectotype material of all 23 species and infra-specific taxa is present in L, but TRH lacks type material of one (*Lithothamnion australe* f. *ubiana*). There are published illustrations of holotype or lectotype collections for 15 of the 23 taxa, and there are published illustrations of isolectotypes for 13 taxa. There are no published illustrations of type material of *Lithothamnion australe* f. *ubiana* and *L. siamense*. Paratype material has been identified for nine taxa.

**affinis**

Basionym & protologue: *Mastophora affinis* Foslie (1904: 71).

Holotype: L 943.7-29 (Siboga Expedition collection 1262); includes one slide.

Holotype fragment: TRH; includes one unnumbered slide.

TRH 'drawer': A-1; listed under *Mastophora affinis* in Adey & Lebednik (1967: 14).

References to typification: See below. Not explicitly mentioned in Adey (1970); cited in Adey & Lebednik (1967: 14) but not flagged there as type material.

Type locality and collection data: Tual Anchorage, Kei Islands, Indonesia; leg. A. Weber-van Bosse, 12–16 December 1899 (Siboga Expedition station 258).

Published illustrations of holotype: Foslie (1904) 72, text figs. 28, 29; Printz (1929) pl. 74, figs. 7–9.

Comments – Foslie (1904) based *Mastophora affinis* on a single collection which therefore is the holotype. The holotype element consists of specimens attached to three pieces of the red alga *Polyopes*. Two of these pieces (Printz, 1929: pl. 74, figs. 8, 9) are in L and contain intact conceptacles. The TRH portion of the holotype element is badly fragmented and contains only one intact conceptacle; it is no longer possible to match the TRH material with the piece depicted in fig. 7 of pl. 74 in Printz (1929).

The dates on the TRH box are incorrectly given as 1888–1889.

**bandanum**

Basionym & protologue: *Lithothamnion bandanum* Foslie (1904: 12).

Holotype: L 943.7-27 (Siboga Expedition collection 224); includes one slide.

Holotype fragment: TRH; includes one slide.

TRH 'drawer': B-15; listed under *Lithothamnion bandanum* in Adey & Lebednik (1967: 64).

References to typification: Adey & Lebednik (1967: 64, as *Lithothamnion*); Adey (1970: 19, as *Lithothamnion*).

Type locality and collection data: Banda Anchorage, Sumatra, Indonesia; leg. A. Weber-van Bosse, November 1899 (Siboga Expedition station 240).

Published illustrations of holotype: Foslie (1904) pl. 1, fig. 10, and text fig. 4, p. 12; Printz (1929) pl. 5, fig. 8.

Comments – Foslie (1904) based *Lithothamnion bandanum* on a single specimen which therefore is the holotype. The portion of the holotype in L is c. 12 × 9 × 8 mm in size and contains a number of multiporate conceptacles, many with broken roofs. The TRH holotype fragment is c. 4 × 3 × 2 mm in size and contains a small number of intact conceptacles. Adey (1970: 19) did not prepare sections from the TRH fragment.

**brachiata**

Basionym & protologue: *Lithothamnion australe* f. *brachiata* Foslie (1904: 24).

Lectotype: L 991.239-221 (Siboga Expedition collection 868); there are no associated slides.

Lectotype fragment: TRH (Siboga Expedition collection 868); there are no associated slides.

Isolectotypes: L 991.239-259 [Siboga Expedition collections 13, 865, 866, 868, 869, 873, 874 (slide only), 875, and 877]; additional isolectotypes were distributed by Weber-van Bosse; see comments below.

Isolectotypes: TRH [Siboga Expedition collections 864 (slide only), 867, 875 (slide only), and 876].

TRH 'drawer': C-17; listed under *Lithothamnion australe* in Adey & Lebednik (1967: 82).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Haingsisi, Samau Island, Timor; leg. A. Weber-van Bosse, 2–5 February 1900 (Siboga Expedition station 303).

Published illustrations of lectotype: Foslie (1904) pl. 2, fig. 25; Printz (1929) pl. 17, fig. 45.

Published illustrations of isolectotypes: Foslie (1904) pl. 2, figs. 26–30; Printz (1929) pl. 17, figs. 46–50.

Comments – Foslie (1904) based *Lithothamnion australe* f. *brachiata* on collections from Siboga Expedition stations 79b, 99, 109, 149, 240, 282, 299, 303, and 315. Of the 77 available collections identified by Foslie (unpublished notes) as f. *brachiata*, 62 are in L and 10 are in TRH, of which two (collections 868 and 1241) are represented by fragments of L material, three (collections 578, 864, and 875) are represented only by slides, and five [collections 576, 604 (including one slide), 867, 876 and 1079] are represented by complete specimens. Collection 868 is designated here as lectotype for f. *brachiata* because it is the largest specimen, possesses numerous multiporate conceptacles, and is depicted in the protologue. The lectotype includes a single specimen, of which about 90% is in L and 10% in TRH.

The four TRH isolectotypes apparently do not have any conceptacles. According to Weber-van Bosse's notebook and her annotations on Foslie's notes with the collections in L, there are five additional isolectotypes. Four of these were distributed as follows: BO (collections 870, 872, and 874); Institut Océanographique de Monaco (collection 864). The remaining one (collection 871) apparently is missing.

The protologue [Foslie (1904) pl. 2, figs. 31–38] also includes illustrations of collections 1238 and 1241 (station 99), 797 and 798 (station 109), and 571, 586, 593, and 594 (station 282); these collections therefore represent paratypes. A fragment of the specimen in collection 1241 and a slide of collection 571 are in TRH; the remaining material is in L.

## condensata

Basionym & protologue: *Mastophora macrocarpa* f. *condensata* Foslie (1907: 30).

Holotype: L 943.10-60 (Siboga Expedition collection 1334); there are no associated slides.

Holotype fragment: TRH (Siboga Expedition collection 1334); there are no associated slides.

TRH 'drawer': A-1; listed under *Mastophora macrocarpa*. in Adey & Lebednik (1967: 15).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Sanana Bay, east coast of Sula Besi Island, Indonesia; leg. A. Weber-van Bosse, 13–14 November 1899 (Siboga Expedition station 193).

Published illustrations of holotype: Foslie (1904) 71, text fig. 27; Printz (1929) pl. 74, fig. 6; Woelkerling (1988) 11, fig. 16.

Comments – Foslie (1907) based *Mastophora macrocarpa* f. *condensata* on a single cited specimen which therefore is the holotype. TRH contains only a small, sterile fragment representing less than 0.01% of the specimen; the remainder of the holotype is in L.

**crispescens**

Basionym & protologue: *Lithothamnion simulans* f. *crispescens* Foslie (1904: 16).

Lectotype: L. 991.239-256 (Siboga Expedition collection 409); there are no associated slides.

Lectotype fragment: TRH (Siboga Expedition collection 409); includes one slide.

TRH 'drawer': B-18; listed under *Lithothamnion simulans* in Adey & Lebednik (1967: 70).

References to typification: Adey & Lebednik (1967: 70, as *Mesophyllum crispescens*); Adey (1970: 23, as *M. crispescens*).

Type locality and collection data: Between Nusa Besi and the northeast point of Timor, Indonesia; leg. A. Weber-van Bosse, 15–17 January 1900 (Siboga Expedition station 282).

Published illustrations of lectotype: Foslie (1904) pl. 1, fig. 23; Printz (1929) pl. 8, fig. 18. The figure legend in Printz (1929) is missing but the specimen matches that shown in Foslie (1904).

Comments – Foslie (1904: legends to figs. 21–23 of pl. 1) based *Lithothamnion simulans* f. *crispescens* on specimens from Siboga Expedition stations 261, 282, and 299 but did not specify a type. Adey in Adey & Lebednik (1967: 70) designated as lectotype specimen 409 from station 282, and Adey (1970: 23) commented that asexual conceptacles were not located. About 85% of specimen 409 is in L, is broken into two pieces, and has small, intact, multiporate conceptacles. The remaining 15% of the lectotype specimen is in TRH and has one intact conceptacle and one additional conceptacle on a fragment in the box. The locality on the boxes in L and TRH and in Adey & Lebednik (1967: 70) is given as Oosthoek, Timor.

There are two paratype specimens in L, with the base number L 991.239-260. One (Siboga Expedition station 299, specimen 624) is depicted in pl. 1, fig. 21 in Foslie (1904) and pl. 8, fig. 16 in Printz (1929); the other (Siboga Expedition station 261, specimen 516) is depicted in pl. 1, fig. 22 in Foslie (1904) and pl. 8, fig. 17 in Printz (1929).

**fragilissimum**

Basionym & protologue: *Lithothamnion fragilissimum* Foslie (1904: 13).

Lectotype: L 943.7-21 (Siboga Expedition collection 971-b-I); there are no associated slides. The Leiden box numbered L 943.7-21 also contains the isolectotypes.

Isolectotypes: L 943.7-21 [Siboga Expedition collections 971-b-II, 971-c (including one slide), 408-a-I (including one slide), 408-a-II, 408-b, 408-c].

Isolectotype fragments: TRH [Siboga Expedition collections 408-a, 408-b (slide only), 971-b-II & 971-c (one box with a mixture of fragments from the two collections and two slides labelled 971-b and 971-c)].

TRH 'drawer': B-18; listed under *Lithothamnion fragilissimum* in Adey & Lebednik (1967: 69).

References to typification: Adey & Lebednik (1967: 69, as *Lithothamnion*); Adey (1970: 24, as *Mesophyllum*).

Type locality and collection data: Pulau Sebangkatan (Island), Borneo Bank, Indonesia; leg. A. Weber-van Bosse, 14 June 1899 (Siboga Expedition station 81).

Published illustrations of lectotype: Foslie (1904) pl. 1, figs. 14–16; Printz (1929) pl. 8, figs. 9–11.

Published illustrations of isolectotypes: Foslie (1904) pl. 1, figs. 11, 12 (collection 408-a-I), fig. 13 (collection 408-b); Printz (1929) pl. 8, figs. 6, 7 (collection 408-a-I), fig. 8 (collection 408-b).

Comments – Foslie (1904) based *Lithothamnion fragilissimum* collections from Siboga Expedition stations 78, 81, and 234 without specifying a type. Subsequently, Adey [in Adey & Lebednik (1967) 69] flagged an entry involving material from stations 78 and 81 as type material, and Adey (1970: 24) called these specimens co-

types (co-types have no status in botanical nomenclature) but did not designate any one as lectotype.

Foslie (unpublished notes) identified seven collections from station 81, three from station 78, and two (with uncertainty) from station 234 as *L. fragilissimum*. Fragments of four of these and slides of two others are in TRH; all remaining material is in L. Foslie (1904: 14) considered the material from station 81 to be the best developed, and after examining all seven station 81 collections, the one numbered 971-b-I is designated here as the lectotype element of *L. fragilissimum*. It consists of three large thallus fragments which are depicted both in the protologue and in Printz (1929). All three fragments possess multiporate conceptacles.

The lectotype element is represented in L but not in TRH. The remaining six collections from station 81 become isolectotypes; fragments of three of these and a slide of a fourth are in TRH.

Contrary to statements in Adey (1970: 24), stations 78 and 81, while both on the Borneo Bank, represent distinct localities [Lumu-Lumu shoal and Pulau Sebangkatan (Island), respectively] visited on different dates (10–11 June 1899 and 14 June 1899, respectively). The year on one TRH box is erroneously given as 1892.

### haingsisiana

Basionym & protologue: *Lithothamnion erubescens* f. *haingsisiana* Weber-van Bosse et Foslie in Foslie (1901a: 4).

Lectotype: L 991.239-220 (Siboga Expedition collection 17); there are no associated slides.

Isolectotypes: L 943.7-19 [Siboga Expedition collections 27, 287–292, 294, 300, 306–308, 312, 314, 316, 323 (19 specimens), 324, 345, 362–364, 371, 380, 381, and 397]. The following additional isolectotypes appear to be missing: 16, 26, 30, 284, 290, 329, 331, 339, 342, 343, 355, 378, 860, and one unnumbered collection.

Isolectotypes: TRH [Siboga Expedition collections 29, 309, 323 (2 specimens), 337, 350, 1285 (with one slide) and one unnumbered specimen (with slide 529)].

TRH 'drawer': C-15; listed under *Lithothamnion erubescens* in Adey & Lebednik (1967: 79, 80). References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Haingsisi, Samau Island, Timor; leg. A. Weber-van Bosse, 2–5 February 1900 (Siboga Expedition station 60/303).

Published illustrations of lectotype: Foslie (1904) pl. 3, fig. 13; Printz (1929) pl. 15, fig. 13.

Published illustrations of isolectotypes: Foslie (1904) pl. 3, figs. 1–7 (collection 324), figs. 8–11 (collection 323), fig. 12 (collection 378), fig. 14 (collection 362), fig. 15 (collection 287), fig. 16 (unnumbered collection), fig. 17 (collection 364), fig. 18 (collection 296), fig. 19 (collection 339), and text fig. 17 (p. 35; prepared from slide 529); Printz (1929) pl. 15, figs. 1–12, 14, 15, 17–19 (information on collection numbers for figures identical to Foslie, 1904).

Comments – Foslie (1901a) based *Lithothamnion erubescens* f. *haingsisiana* on collections from Haingsisi, Samau Island, Timor but did not specify a type. In the protologue, Foslie indicated that the sporangial conceptacles were like those in the type form of the species (i.e. multiporate). Of the 50 collections from the type locality which Foslie identified (unpublished notes) as f. *haingsisiana*, 30 are in L and 7 are in TRH and 14 apparently are missing. The single specimen comprising collection 17, which is in L, possesses the best developed multiporate conceptacles and thus is designated here as lectotype of f. *haingsisiana*. The remaining specimens become isolectotypes.

The type locality was visited twice during the course of the Siboga Expedition (Weber-van Bosse, 1904: 4); the first visit was designated station 60 while the second visit was designated station 303. Foslie (1901a: 4), probably in oversight, omitted mention of station 303 in the protologue, but it is clear from the comments of Weber-van Bosse (1904: 4) and unpublished notes of Foslie that all specimens were collected at station 303 on the second visit.

**malaysica** – Fig. 1.

Basionym & protologue: *Lithophyllum yendoi* f. *malaysica* Foslie (1906: 19).

Lectotype: L 943.7-7 (Siboga Expedition collection 930); includes three slides.

Lectotype fragment: TRH (Siboga Expedition collection 930); includes one slide. An additional fragment was sent to BO; see comments below.

TRH 'drawer': A-1; listed under *Lithophyllum yendoi* in Adey & Lebednik (1967: 15).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Piapis Bay (Telok Sapira), northwest coast of Waigeo Island, Indonesia; leg. A. Weber-van Bosse, 14 August 1899 (Siboga Expedition station 155).

Published illustrations of lectotype: Foslie (1904) pl. 11, fig. 2.

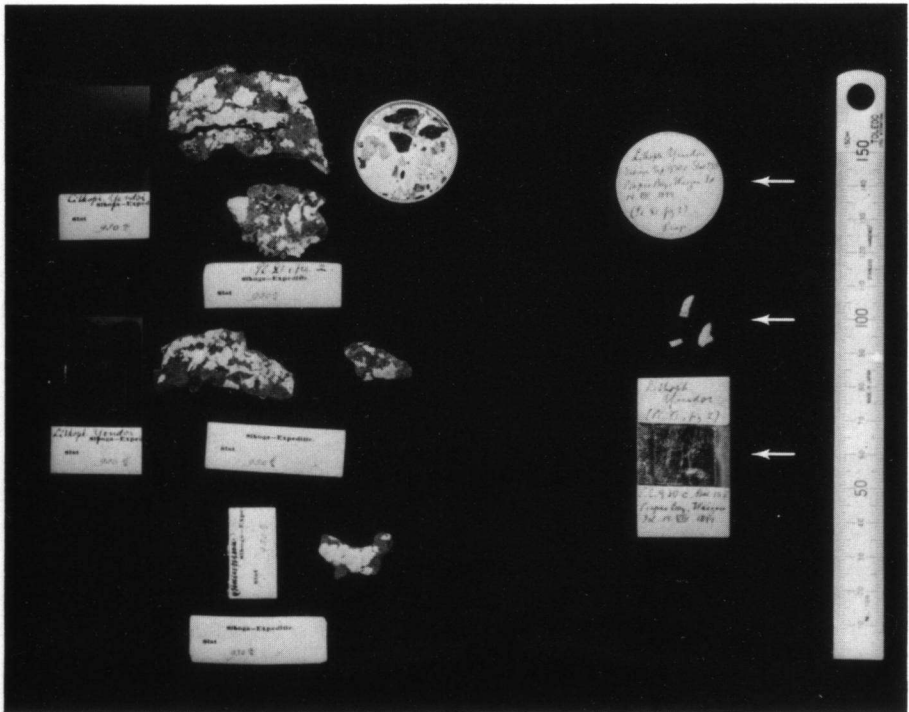


Fig. 1. *Lithophyllum yendoi* f. *malaysica*. The material marked with white arrows is the portion of Siboga Expedition collection 930, present in TRH. The remaining material is the portion of this collection present in L.



Comments – Foslie (1906) based *Lithophyllum yendoi* f. *malaysica* on Siboga Expedition specimens which he had earlier (Foslie, 1904: 61) referred to *L. yendoi* (f. *yendoi*). He did not specify a type. In TRH, Siboga Expedition collections labelled *L. yendoi* are present from stations 61, 86, 155, 193, and 240; the first four are listed in Adey & Lebednik (1967: 14). The only collection containing notes with measurements of cells and conceptacles is specimen 930 from station 155, and thus it is designated here as lectotype for *L. yendoi* f. *malaysica*. The lectotype as depicted in fig. 2, pl. 11 in Foslie (1904) no longer is intact; about 80% of the lectotype is in L, about 1% is in TRH, and an undetermined amount (not seen) is in BO (unpublished notes of Weber-van Bosse).

### **megalocystum**

Basionym & protologue: *Goniolithon megalocystum* Foslie (1904: 48).

Holotype: L 991.239-234 (Siboga Expedition collection 965).

Holotype fragment: TRH (Siboga Expedition collection 965); includes one slide.

TRH 'drawer': A-10; listed under *Goniolithon megalocystum* in Adey & Lebednik (1967: 25).

References to typification: Foslie (1904: pl. 9, legend to fig. 8); Printz (1929: pl. 46, legend to fig. 9);

Adey & Lebednik (1967: 25, as *Goniolithon*); Adey (1970: 9, as *Neogoniolithon*).

Type locality and collection data: Kawio and Karuboling Islands, Indonesia; leg. A. Weber-van Bosse, 22–23 July 1899 (Siboga Expedition station 129).

Published illustrations of holotype: Foslie (1904) text fig. 20A & pl. 9, fig. 8; Printz (1929) pl. 46, fig. 9.

Comments – Foslie (1904: pl. 9, legend to fig. 8) typified *Goniolithon megalocystum* with a single fragmentary specimen from Siboga Expedition station 129. About 99% of this specimen is in L; the holotype and holotype fragment are sterile.

The protologue (Foslie, 1904: pl. 9, fig. 9) also contains an illustration of collection 1017 from station 93; this collection (in L) therefore is a paratype.

### **minutula**

Basionym & protologue: *Lithothamnion australe* f. *minutula* Foslie (1904: 24).

Lectotype: L 991.239-231 (Siboga Expedition collection 673, portion in L; the portion in TRH is an isolectotype); includes one slide.

Isolectotypes: L 943.5-147 (Siboga Expedition collections 1 and 34); includes one slide.

Isolectotypes: TRH (Siboga Expedition collection 673, portion in TRH; the portion in L is the lectotype); includes one slide.

TRH 'drawer': C-17; listed under *Lithothamnion australe* in Adey & Lebednik (1967: 82).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Tual, Kei Islands, Indonesia; leg. A. Weber-van Bosse, 12–16 December 1899 (Siboga Expedition station 258).

Published illustrations of lectotype: Foslie (1904) pl. 2, figs. 51–63; Printz (1929) pl. 17, figs. 71–83.

Comments – Foslie (1904) based *Lithothamnion australe* f. *minutula* on collections from Siboga Expedition stations 109 and 258. Of the four available collections identified by Foslie (unpublished notes) as f. *minutula*, four are in L and portions of two are in TRH. TRH collection 673 includes 24 specimens or fragments and one slide; TRH collection 1203a includes 15 specimens or fragments and one slide.

All specimens in L and TRH appear to be sterile, and this means that it may not be possible to determine the taxonomic status and disposition of *L. australe* f. *minutula*. Nevertheless, it is necessary to designate a lectotype, and the L portion of collection 673 is designated here because it contains the greatest number of specimens, some of which are depicted in the protologue. The lectotype element includes more than 150 specimens or fragments.

The protologue (Foslie, 1904: pl. 2, figs. 39–50) also includes illustrations of specimens in the L portion of collection 1203a (station 109); this collection therefore is a paratype, but all specimens also appear to be sterile.

### prolifer

Basionym & protologue: *Lithothamnion prolifer* Foslie (1904: 18).

Lectotype: L 943.7-40 (Siboga Expedition collection 146); includes two slides. The Leiden box L 943.7-40 also contains the L isolectotype.

Lectotype fragment: TRH (Siboga Expedition collection 146; includes one slide).

Isolectotype: L 943.7-40 (Siboga Expedition collection 139).

Isolectotype fragment: TRH (Siboga Expedition collection 139); includes one slide.

TRH 'drawer': B-16; listed under *Lithothamnion prolifer* in Adey & Lebednik (1967: 67).

References to typification: See below; also see Adey & Lebednik (1967: 67, as *Lithothamnion*); Adey (1970: 25, as *Mesophyllum*).

Type locality and collection data: Lumu-Lumu shoal, Borneo Bank, Indonesia; leg. A. Weber-van Bosse, 10–11 June 1899 (Siboga Expedition station 78).

Published illustrations of lectotype: Foslie (1904) pl. 1, fig. 17; Printz (1929) pl. 8, fig. 12.

Published illustrations of isolectotype: Foslie (1904) pl. 1, fig. 18; Printz (1929) pl. 8, fig. 13.

Comments – Foslie (1904) based *Lithothamnion prolifer* on collections from Siboga Expedition stations 78 and 81 but did not specify a type. Subsequently, Adey (in Adey & Lebednik, 1967: 67) flagged a TRH collection containing specimens 971a and 971d from Siboga Expedition station 81; Adey (1970) referred to these as co-types (co-types have no status in botanical nomenclature) and noted that there were no intact conceptacles, but he did not designate a lectotype.

Foslie (unpublished notes) identified three collections from station 81 and two from station 78 as *L. prolifer*. Fragments of four of these collections are in TRH, each with with one slide; all remaining material is in L. In the protologue, Foslie (1904: 19) states that the conceptacles are multiporate. Of the collections identified as *L. prolifer* by Foslie, only collection 146, which consists of one specimen, has multiporate conceptacles, and consequently it has been designated here as lectotype for the species. The lectotype fragments in TRH also possess multiporate conceptacles.

The protologue (Foslie, 1904: pl. 1, figs. 19, 20) also contains two illustrations from collection 971a from station 81; this collection therefore represents a paratype. The two specimens comprising the L portion of collection 971a have uniporate conceptacles; the TRH portion of collection 971a only has sterile fragments.

### pseudoramosa

Basionym & protologue: *Lithothamnion siamense* f. *pseudoramosa* Foslie (1904: 10).

Lectotype: L 943.7-15 (Siboga Expedition collection 673b); there are no associated slides.

Isolectotypes: L 943.7-42 (Siboga Expedition collections 3, 673a, and 675f); there are no associated slides.

Isolectotypes: TRH (Siboga Expedition collection 1263); includes one slide.

TRH 'drawer': B2; listed under *Lithothamnion siamense* in Adey & Lebednik (1967: 52).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Tual, Kei Islands, Indonesia; leg. A. Weber-van Bosse, 12–16 December 1899 (Siboga Expedition station 258).

Published illustrations of isolectotypes: Foslie (1904) pl. 1, fig. 4 (collection 3), figs. 5 & 6 (collection 673a), fig. 7 (collection 675f), figs. 8 & 9 (collection 1263).

Comments – Foslie (1904) based *Lithothamnion siamense* f. *pseudoramosa* on specimens from Siboga Expedition stations 109, 125, 234, and 258 but did not specify a type. Of the seven available collections identified by Foslie (unpublished notes) as f. *pseudoramosa*, all seven are represented in L and two are represented in TRH. Collection 673b (in L), which consists of three specimens and is from station 258, is designated here as lectotype because it contains the best reproductive material.

The protologue (Foslie, 1904: pl. 1, fig. 3) also includes an illustration of collection 523 from station 234 which therefore represent a paratype.

### **pteridoides**

Basionym & protologue: *Lithothamnion fruticosum* f. *pteridoides* Foslie (1904: 19).

Lectotype: L 991.239-236 (Siboga Expedition collection 178); there are no associated slides.

Lectotype fragment: TRH (Siboga Expedition collection 178); there are no associated slides.

Isolectotypes: L 991.239-239 (Siboga Expedition collection 176); there are no associated slides.

Isolectotypes: TRH [Siboga Expedition collections 179 (slide only) and 207 (no associated slides)].

TRH 'drawer': B-7; listed under *Lithothamnion indicum* in Adey & Lebednik (1967: 59).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Banda Island, Indonesia; leg. A. Weber-van Bosse, November–December 1899 (Siboga Expedition station 240).

Published illustration of lectotype: Foslie (1904) pl. 2, fig. 2.

Published illustration of isolectotype: Foslie (1904) pl. 2, fig. 1.

Comments – Foslie (1904) based *Lithothamnion fruticosum* f. *pteridoides* on collections from Siboga Expedition stations 64, 66, 78, 123, and 240. Of the seven available collections identified by Foslie (unpublished notes) as f. *pteridoides*, six are in L and four are in TRH, of which two (collections 207 and 178) are represented by fragments of L material, one (collection 179) is represented only by a slide, and one (collection 207) is represented by a single specimen. Collection 178 is designated here as lectotype for f. *pteridoides* because it is the largest specimen which is not partly covered by other algae, possesses numerous multiporate conceptacles, and is depicted in the protologue. The lectotype includes a single specimen, of which about 95% is in L and 5% in TRH.

The TRH isolectotype specimen in collection 207 possesses uniporate (carposporangial?) conceptacles while the slide of collection 179 shows multiporate conceptacles. The L isolectotype specimen in collection 176 possesses numerous multiporate conceptacles.

The protologue (Foslie, 1904: pl. 2, figs. 3, 4) also includes illustrations of collections 531 and 1118 (from stations 64 and 123, respectively); these collections therefore represent paratypes. A fragment of the specimen in collection 531 is in TRH; the remaining material is in L.

### pulchrum

Basionym & protologue: *Lithothamnion pulchrum* Weber-van Bosse et Foslie in Foslie (1901a: 3). Lectotype: TRH (Siboga Expedition collection 470); includes one slide of specimen 470.

Isolectotypes: TRH (Siboga Expedition collection 468); there are no associated slides. There also are fragments from collections 463 and 465 and prepared slides only of collections 462, 475, and 1264.

Isolectotypes: L 943.7-17 [Siboga Expedition collections 6 (two associated slides), 25 (three slides only), 454, 459, 460, 463, 465 (including one slide), 468 (one slide only), 469 (including one slide), 472 (including one slide), 477, 1264, and one box of fragments (unnumbered)]. All L isolectotypes are placed in one box with the indicated L number. Additional isolectotypes were distributed by Weber-van Bosse; see comments below. — In addition, the isolectotype box contains collection 264 from station 96, the only other collection which Foslie identified as *Lithothamnion pulchrum*. Collection 264 is not paratype material because it was not mentioned in the protologue.

TRH 'drawer': C-2; listed under *Lithothamnion pulchrum* in Adey & Lebednik (1967: 75).

References to typification: Adey & Lebednik (1967: 75, as *Lithothamnion*). Not mentioned in Adey (1970).

Type locality and collection data: Sailus Besar, Celebes, Indonesia; leg. A. Weber-van Bosse, 17–18 February 1900 (Siboga Expedition station 315).

Published illustrations of isolectotypes: Foslie (1904) pl. 4, fig. 1 (collection 477), fig. 2 (collection 459), fig. 3 (collection 6; apparently missing), fig. 4 (collection 456; apparently missing), fig. 5 (collection 469), fig. 6 (collection 455), fig. 7 (collection 454), fig. 8 (collection 472), fig. 9 (collection 463), fig. 10 (collection 1264); Printz (1929) pl. 18, fig. 1 (collection 477), fig. 2 (collection 459), fig. 3 (collection 6), fig. 4 (collection 456; apparently missing), fig. 5 (collection 469), fig. 6 (collection 455), fig. 7 (collection 454), fig. 8 (collection 472), fig. 9 (collection 463). Collection 1264 is not illustrated in Printz (1929).

Comments — Foslie (1901a) based *Lithothamnion pulchrum* on material from Siboga Expedition station 315, but did not specify a type. Adey in Adey & Lebednik (1967: 75) flagged as type material an entry encompassing three collections but did not comment on it subsequently (Adey, 1970). Of the three collections, two (468 and 470) are represented by single plants whereas 463 is represented by fragments of a plant which is in L. Only 470 possesses obvious conceptacles (uniporate), and consequently it is designated here as the lectotype for *L. pulchrum*. All isolectotype collections in TRH and L contain single plants, but none of the specimens possess obvious conceptacles. According to annotations of Weber-van Bosse on Foslie's notes with the L collections, five isolectotypes (not seen) have been distributed as follows: 455 (BO); 461 (Setchell, UC); 462 (Howe, NYBG); 473 (Institute Océanographique de Monaco); 475 (Prof. Moll).

### reinboldii

Basionym & protologue: *Lithophyllum reinboldii* Weber-van Bosse et Foslie in Foslie (1901a: 5). Lectotype: TRH (Siboga Expedition collection 38); there are no associated slides.

Isolectotypes: TRH (Siboga Expedition collections 57 and 74); there are no associated slides.

Isolectotypes: L 991.239-240 and L 991.239-241 [Siboga Expedition collections 5 (slide only), 39 (slide only), 43 (one associated slide), 44-46, 53, 56, 58, 59, 61, 67, 71, 78, and 128]. These isolectotypes are contained in one box. Additional isolectotypes were distributed by Weber-van Bosse; see comments below.

TRH 'drawer': A-14; listed under *Goniolithon reinboldii* in Adey & Lebednik (1967: 32).

References to typification: Dawson (1960: 29, as *Hydrolithon.*); Adey & Lebednik (1967: 32, as *Goniolithon*); Adey (1970: 11, as *Hydrolithon*).

Type locality and collection data: Moearas Reef, east coast of Borneo, Indonesia; leg. A. Weber-van Bosse, 22 June 1899 (Siboga Expedition station 91).

Published illustrations of lectotype: Penrose & Woelkerling (1988) figs. 1-9; (1992) fig. 3.

Published illustrations of isolectotypes: Foslie (1904) pl. 10, fig. 5 (collection 39; apparently missing), fig. 6 (collection 53); Printz (1929) pl. 52, fig. 5 (collection 39; apparently missing), fig. 6 (collection 53).

Comments – The basis for selection of the designated lectotype is explained by Adey (1970: 11).

According to Weber-van Bosse's notebook and her annotations of Foslie's notes with the collections in L, there are nine additional isolectotypes. Four of these were distributed as follows: BO (collection 40); Prof. Moll (collection 69); Howe (NYBG, collection 73); Institut Océanographique de Monaco (collection 79). The remaining five (collections 5, 39, 51, 60, and 75) apparently are missing.

### **siamense**

Basionym & protologue: *Lithothamnion siamense* Foslie (1901b: 19).

Lectotype: TRH, unnumbered; includes slides 470 & 471.

TRH 'drawer': B2; listed under *Lithothamnion siamense* in Adey & Lebednik (1967: 52).

References to typification: See below. Not correctly typified in Adey in Adey & Lebednik (1967: 52, as *Lithothamnion*) or by Adey (1970: 26, as *Mesophyllum*).

Type locality and collection data: Between Mesan Island and Chuen Island, Gulf of Thailand; leg. J. Schmidt, 6 February 1900.

Published illustrations of lectotype: None.

Comments – The protologue of *Lithothamnion siamense* (Foslie, 1901b: 19, 20) contains descriptions of *f. minuta* and *f. simulans* but without indication as to which represents the type-form of the species. Subsequently, however, Foslie (1904: 10) established *L. siamense f. typica* and listed *L. siamense f. minuta* as a synonym, thus explicitly indicating that he considered *f. minuta* to be the type-form of the species. In accordance with ICBN Articles 24.3 and 26.1 (see Greuter, 1988), the form containing the type of the species must repeat the specific epithet; thus, *f. minuta* must be known as *L. siamense f. siamense*.

Foslie (1901b: 20) listed five collections of *f. siamense* (as *f. minuta*) in the protologue. The Siboga Expedition collection chosen by Adey (in Adey & Lebednik, 1967: 52) and mentioned by Adey (1970: 26) is not one of these, and thus it cannot serve as lectotype for the species (see ICBN Articles 7.4, 7.5, 7.7) because three of the five syntype collections listed by Foslie (1901b) are represented in TRH. The best one of these syntypes is selected here to serve as lectotype element; details are provided above.

Some confusion exists between slide numbers listed on the boxes and the collection data given on the slides. Slides 470 & 471 have collection data which match those on the lectotype box and thus are taken to form part of the lectotype element. The lectotype box lid, however, refers to slides 468 & 469. Slides 468 & 469 both pertain to specimens collected 11 nautical miles NW of Kam Island, but the box containing this collection lists slide 471 as the associated slide. Adey & Lebednik (1967: 52) list the data in the mismatched manner.

### **sibogae**

Basionym & protologue: *Archaeolithothamnion sibogae* Weber-van Bosse et Foslie in Foslie (1901a: 3).  
Lectotype: TRH (Siboga Expedition collection 297); there are no associated slides.

Isolectotype: TRH [Siboga Expedition collection 14 (slide only)].

Isolectotypes: L 942.361-69 [Siboga Expedition collections 14 (including three slides), 37, 249, 254, 256-259, 261 (one slide), 262, 266 (slide only), 267, and one box of unnumbered fragments]. Additional isolectotypes were distributed by Weber-van Bosse; see comments below.  
TRH 'drawer': C-19; listed under *Archaeolithothamnion sibogae* in Adey & Lebednik (1967: 85).

References to typification: Adey & Lebednik (1967: 85, as *Archaeolithothamnion*); Adey (1970: 18, as *Archaeolithothamnion*).

Type locality and collection data: Pearlbank, North Coast of Borneo; leg. A. Weber-van Bosse, 9 May 1899 (Siboga Expedition station 96).

Published illustrations of isolectotypes: Foslie (1904) pl. 7, figs. 3 (collection 254), fig. 4 (collection 259), fig. 5 (collection 257), fig. 6 (collection 263), fig. 7 (collection 251), fig. 9 (collection 256), fig. 10 (collection 255), fig. 11 (collection 37), fig. 12 (collection 261), fig. 15 (collection 262), fig. 17 (collection 14); Printz (1929) pl. 43, fig. 5 (collection 257), fig. 6 (collection 263), fig. 7 (collection 251), fig. 8 (collection 256), fig. 9 (collection 255), fig. 10 (collection 37), fig. 11 (collection 261), fig. 14 (collection 262), fig. 15 (collection 14).

Comments – Foslie (1901a) based *Archaeolithothamnion sibogae* on material from Siboga Expedition station 96. In TRH there is a single specimen (collection 297) labelled *A. sibogae* from this station, and Adey (1970: 18) termed it the holotype. However, there are 12 additional specimens and a box of fragments identified by Foslie as *A. sibogae* from Siboga Expedition station 96 in L. Consequently the TRH specimen must be considered the lectotype and the specimens in L isolectotypes. Moreover, there are four further isolectotypes (collections 15, 251, 255, 263) which, according to annotations of Weber-van Bosse on Foslie's notes accompanying L 942.361-69, have been sent respectively to Lemoine, BO, Howe, and the Institut Océanographique de Monaco. These last four specimens have not been seen during the present study, but the Monaco, BO, and Howe specimens are respectively depicted in figs. 6, 7 & 10 in Foslie (1904) and in figs. 6, 7 & 9 in Printz (1929).

In Adey & Lebednik (1967: 85), the TRH isolectotype slide and the lectotype specimen are grouped under a single entry.

### **subflabellata**

Basionym & protologue: *Lithothamnion erubescens* f. *subflabellata* Foslie (1904: 31).

Lectotype: L 991.239-235 (Siboga Expedition collection 168); there are no associated slides.

Isolectotypes: TRH [Siboga Expedition collection 169 and collection 187 (includes one slide)].

TRH 'drawer': C-15; listed under *Lithothamnion erubescens* in Adey & Lebednik (1967: 80).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Banda Anchorage; leg. A. Weber-van Bosse, November 1899 (Siboga Expedition station 240).

Published illustrations of lectotype: Foslie (1904) pl. 3, fig. 25; Printz (1929) pl. 15, fig. 25.

Published illustrations of isolectotype: Foslie (1904) pl. 3, fig. 24 (collection 187); Printz (1929) pl. 15, fig. 24 (collection 187).

Comments – Foslie (1904) based *Lithothamnion erubescens* f. *subflabellata* on Siboga Expedition stations 240 and 303. Of the four available collections identified by Foslie (unpublished notes) as f. *subflabellata*, two are represented in L and two are represented in TRH, of which collection 187 consists of a fragment and one slide and collection 169 consists of a complete specimen. Collection 168 is designated here as lectotype because it has numerous multiporate conceptacles and is depicted in the protologue. The lectotype consists of a single specimen.

The TRH isolectotype collection 169 contains a single specimen which also has numerous multiporate conceptacles. One additional isolectotype (collection 187) apparently is missing.

The protologue (Foslie, 1904: pl. 3, fig. 23) also includes an illustration of collection 31 from station 303; this collection (L 991.239-237) therefore represents a paratype.

### **subtilis**

Basionym & protologue: *Goniolithon frutescens* f. *subtilis* Foslie (1904: 53).

Lectotype: L 991.239-232 (Siboga Expedition collection 554); there are no associated slides.

Isolectotypes: L 991.239-244 and L 991.239-245 (Siboga Expedition collections 9, 553, 556–560, and 565); there are no associated slides.

Isolectotypes: TRH (Siboga Expedition collection 555); includes two slides.

TRH 'drawer': A-12; listed under *Goniolithon frutescens* in Adey & Lebednik (1967: 29).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: South of the Lucipara Islands, Indonesia; leg. A. Weber-van Bosse, 8–10 November 1899 (Siboga Expedition station 225).

Published illustrations of isolectotypes: Foslie (1904) pl. 10, fig. 12 (collection 560), fig. 13 (collection 556); Printz (1929) pl. 48, fig. 11 (collection 555).

Comments – Foslie (1904) based *Goniolithon frutescens* f. *subtilis* on material from Siboga Expedition station 225. Of the nine available collections identified by Foslie (unpublished notes) as f. *subtilis*, nine are in L and one is in TRH. Collection 554 from L, containing a single specimen, is designated here as lectotype because it has a number of conceptacles (uniporate) and appears to be one of four which were alive at the time of collection.

### **subtilissima**

Basionym & protologue: *Melobesia subtilissima* Foslie (1904: 55).

Holotype: L 941.98-194 (No Siboga Expedition collection number); there are no associated slides.

Holotype fragment: TRH, includes two unnumbered slides.

TRH 'drawer': A-16; listed under *Melobesia subtilissima* in Adey & Lebednik (1967: 37).

References to typification: Adey & Lebednik (1967: 37, as *Melobesia*); Adey (1970: 17, as *Heteroderma*).

Type locality and collection data: Off Atjatuning, west coast of New Guinea; leg. A. Weber-van Bosse, 23–25 August 1899 (Siboga Expedition station 169).

Comments – Foslie (1904) based *Melobesia subtilissima* on a single collection which therefore is the holotype. About 95% of the holotype element is housed at L and about 5% is housed at TRH.

### timorensis

Basionym & protologue: *Archaeolithothamnion timorensis* Foslie (1904: 42).

Lectotype: L 935.207-13 (Siboga Expedition collection 443); includes two slides. The box numbered L 935.207-13 also contains 17 isoelectotype specimens and four slides.

Isoelectotypes: L 935.207-13 [Siboga Expedition collections 431 (includes one slide), 442, 446, 449–452, 453 (includes one slide), 457, 458, 466, 471 (includes one slide), 474, 476, 478 (includes one slide), 479 (includes one slide), and 482].

Isoelectotypes: TRH [Siboga Expedition collections 444, 474 (slide only) and 480].

TRH 'drawer': C-19; listed under *Archaeolithothamnion timorensis* in Adey & Lebednik (1967: 85).

References to typification: See below.

Type locality and collection data: East of Sailus Besar, Paternoster Islands, Indonesia; leg. A. Weber-van Bosse, 17–18 February 1900 (Siboga Expedition station 315).

Published illustrations of isoelectotypes: Foslie (1904) pl. 8, fig. 1 (collection 482), fig. 3 (collection 450), fig. 4 (collection 451), fig. 5 (collection 457), fig. 6 (collection 458), fig. 9 (collection 435) fig. 10 (collection 471), fig. 11 (collection 479), fig. 12 (collection 474), fig. 14 (collection 466); Printz (1929) pl. 44 (figure and collection numbers identical to those in Foslie, 1904).

Comments – Foslie (1904) based *Archaeolithothamnion timorensis* on material from Siboga Expedition stations 99, 144, 277, 282, and 315 and commented that the most typically developed specimens are from station 315, but he did not specify a type. On this basis, Adey in Adey & Lebednik (1967: 85) chose specimens 444, 474 and 480 from station 315 as the lectotype element of *A. timorensis*, but noted (Adey, 1970: 18) that sporangia described by Foslie were not seen in his chosen specimens. Collections 444 and 480 are represented at TRH by single specimens while collection 474 is represented at TRH by one slide (the rest of the collection is in L). Adey apparently was unaware that most of collection 474 and seventeen additional collections/specimens identified by Foslie (unpublished notes) as *A. timorensis* from station 315 are lodged in L.

The selection of sterile specimens to serve as lectotype element of a species when fertile material is available and required for unequivocal identification is not in accordance with ICBN Art. 8.1(b) (see Greuter, 1988); that is, such a selection is considered here to be in serious conflict with the protologue (where details of reproductive structures were provided) and thus can be superseded. We propose, therefore, to designate Siboga Expedition collection 443 as lectotype of *A. timorensis* to supersede the sterile specimens chosen by Adey. Collection 443 consists of a single specimen with tetrasporangial conceptacles, and it appears to be the only fertile specimen from station 315. In the absence of such supersedence, it would not be possible to provide a lectotype specimen from station 315 for *A. timorensis* which possessed diagnostic features essential for identification and determination of species affinities and relationships.

The remaining 19 specimens from station 315 become isoelectotypes of *A. timorensis*, but because they are sterile, they are of limited taxonomic value.



The protologue (Foslie, 1904: pl. 8, figs. 2, 7, 8, 13) also includes illustrations of collection 580 from station 282 (fig. 2; specimen sent by A. Weber-van Bosse to M. Lemoine) and three collections from station 277, namely: 635 (fig. 7; specimen apparently missing), 637 (fig. 8; specimen apparently missing) and 638 (fig. 13, in L). The above collections therefore represent paratypes. The specimen in collection 638 has tetrasporangial conceptacles.

### **tualensis**

Basionym & protologue: *Lithothamnion australe* f. *tualensis* Foslie (1904: 24).

Lectotype: TRH (Siboga Expedition collection 675a, portion in TRH; the portion in L is an isolectotype); there are no associated slides.

Isolectotypes: TRH [Siboga Expedition collections 668 (partly in L, includes one slide), 670 (partly in L, includes one slide) and 676 (slide only)].

Isolectotypes: L 943.5-145 [Siboga Expedition collections 32, 668, 670, 675a (portion in L; the portion in TRH is the lectotype), 675b (includes one slide), and 676].

TRH 'drawer': C-17; listed under *Lithothamnion australe* in Adey & Lebednik (1967: 82).

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Tual, Kei Islands, Indonesia; leg. A. Weber-van Bosse, 11 December 1899 (Siboga Expedition station 258).

Published illustrations of isolectotypes: Foslie (1904) pl. 2, figs. 10-17 (all from collection 675a in L; specimen depicted in fig. 13 apparently is missing); Printz (1929) pl. 17, figs. 30-37 (all from collection 675a in L; specimen depicted in fig. 33 apparently is missing). In addition text fig. 11 in Foslie (1904: 28) is based on a slide (in L) prepared from collection 675a.

Comments – Foslie (1904) based *Lithothamnion australe* f. *tualensis* on collections from Siboga Expedition stations 79b and 258. Of the seven available collections identified by Foslie (unpublished notes) as f. *tualensis*, seven are represented in L and three in TRH with a fourth represented only by a slide. The TRH portion of collection 675a is designated here as lectotype, because it contains the most appropriate specimen with intact conceptacles (multiporate). In addition, the TRH portion of collection 675a contains seven apparently sterile plants. The L portion of collection 675a contains 10 individuals, but none appear to have intact conceptacles.

Specimens in the isolectotype collections do not appear to have intact conceptacles either, but buried conceptacles are evident on the TRH slide prepared from material in collection 676.

### **ubiana**

Basionym & protologue: *Lithothamnion australe* f. *ubiana* Foslie (1904: 24).

Lectotype: L 991.239-242 (Siboga Expedition collection 1046); there is one associated slide.

Isolectotype: L 991.239-238 (Siboga Expedition collection 1045); there is one associated slide.

TRH does not possess lectotype or isolectotype material.

References to typification: See below. Not explicitly mentioned in Adey & Lebednik (1967) or in Adey (1970) under basionym.

Type locality and collection data: Pulu Sanguisiapo, Tawi-Tawi Islands, Sulu Archipelago, Indonesia; leg. A. Weber-van Bosse, 24-25 June 1899 (Siboga Expedition station 93).

Published illustrations of lectotype: None.

Published illustrations of isolectotype: None.

Comments – Foslie (1904) based *Lithothamnion australe* f. *ubiana* on material from Siboga Expedition stations 86, 91, 93, 99, 106, 109, 240, 258, 277, and 282, but commented in the protologue (p. 29) that conceptacles were not seen. Of the 81 collections identified by Foslie (unpublished notes) as f. *ubiana*, L has 60, TRH has 5 and fragments of two L collections, 11 have been sent elsewhere by Weber-van Bosse, and 5 appear to be missing. Amongst the 65 collections in L and TRH, two (collections 1046 in L and 214 in TRH, both containing one plant) possess multiporate conceptacles, while all remaining plants appear sterile. The larger of the two (collection 1046) has the greater number of conceptacles and thus is designated here as lectotype.

In his notes accompanying the specimens, Foslie placed a question mark after the identifications of both fertile specimens but nevertheless placed them in f. *ubiana*. While it would have been possible to designate a sterile specimen without a question mark as lectotype, such action would have made it very difficult to assess the taxonomic status of *L. australe* f. *ubiana*, and consequently a fertile specimen was selected.

The protologue (Foslie, 1904: pl. 2) contains illustrations of seven additional specimens (all sterile) which therefore represent paratypes. These are: fig. 18 [collection 768 (station 86), in L]; fig. 19 [collection 780 (station 86), in L]; fig. 20 [collection 1224 (station 99), in L]; fig. 21 [collection 1225 (station 99), specimen in L; prepared slide in TRH]; fig. 22 [collection 1243 (station 99), in L]; fig. 23 [collection 399 (station 106), in L], and fig. 24 [collection 837 (station 109), specimen apparently missing]. These specimens also are depicted in Printz (1929: pl. 17, figs. 38–44).

#### REJECTED NAMES

Five additional forma names associated with Siboga nongeniculate corallines were published by Foslie (1904) but must be rejected under various provisions of the ICBN. Thus the names *Goniolithon frutescens* f. *typica* (p. 53), *Lithophyllum moluccense* f. *typica* (p. 67), *Lithothamnion siamense* f. *typica* (p. 10) and *L. simulans* f. *typica* (p. 16) are all invalid under Art. 24.3 because they include the type of the name of the species, and Art. 26.1 requires that form names for such taxa repeat the specific epithet unaltered as the final epithet. Similarly, the name *Lithothamnion australe* f. *americana* (p. 25) includes the type of the name of the species and therefore must be rejected under Art. 63.1 because of the requirements of Art. 26.1 just outlined. None of the species with which these form names are associated are based on Siboga Expedition collections.

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