

DNA sequencing of the holotype of *Goniolithon elatocarpum* (Hapalidiaceae, Florideophyceae) resolves this South African species as *Roseolithon superpositum*

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Goniolithon elatocarpum was described by Foslie (1900: 23) based upon a specimen he observed in the British Museum (Natural History), London (now Natural History Museum, **BM** 000568944; herbarium acronyms follow Thiers 2026), and from which he apparently removed a piece and deposited in **TRH** (Fig. 1). The specimen was collected by W. Tyson, from the Cape of Good Hope (20.iv.1895), but without a more precise locality. Foslie (1900: 23) described this new species as encrusting and warty to 7 mm thick, with sporangial conceptacles (presumably the chamber) 500–700 µm in diam., and he observed a single bisporangium 100 µm long and 50 µm broad. He compared this new species to *G. notarisii* (Dufour) Foslie (1900: 21, type locality Antibes, France) that Foslie, in the same paper, had transferred to *Goniolithon* from *Melobesia*. Foslie noted that *G. elatocarpum* lacked heterocysts (= trichocytes) and buried megacells (remains of buried trichocytes) in the perithallus that were present in *G. notarisii*. Printz (1929, pl. XLVII [47]: fig. 1) illustrated the *G. elatocarpum* specimen in **BM** using a photograph likely taken by Foslie.

Adey (1970: 19) proposed the new combination *Lithothamnion* (as ‘*Lithothamnium*’) *elatocarpum* (Foslie) W.H.Adey, and this was included by Dr. Paul Silva in *Index Nominum Algarum* (<https://herbariadb.berkeley.edu/cgi-bin/ina/porp.cgi?588357>), but missed by all subsequent workers. Adey (1970) called the specimen in **TRH** the holotype and further noted that he did not observe asexual (tetra/bisporangial) conceptacles and that he had doubts about Foslie’s observation of a bisporangium.

Woelkerling (1993: 83) referred to both the material in **BM** and **TRH** as the holotype of *Goniolithon elatocarpum* and cited Printz (1929, pl. XLVII [47]: fig. 1) for a published illustration of the holotype. Woelkerling commented, “The **TRH** portion of the holotype constitutes less than 10% of the specimen depicted in Printz (1929). **BM** contains a specimen numbered 17b (Tittley & al. 1984: 7) which may constitute the remains of the holotype, but this has not been verified during the present study.” Woelkerling (1993: 83) also cited two slides in **TRH** made by Foslie, #344 and #847. Chamberlain & Keats (1995: 145), in their treatment of what they called *Mesophyllum engelhartii* (type locality: Cape Jaffe, South Australia, Australia) in South Africa, suggested that *M. engelhartii* and *G. elatocarpum* were conspecific, but with some doubt. They included photographs of the specimens in **BM** that they called isotypes (**BM** 000568944) and the fragment in **TRH** that they called the holotype (Chamberlain & Keats 1995, fig. 8 and fig. 9, respectively). From the **BM** isotypes, they also illustrated pre- and post-fertilization female conceptacles (Chamberlain & Keats 1995, figs. 54–56), confirming Adey’s (1970) questioning of Foslie’s (1900) report of a bisporangium. Based on Article 9.1 of the *ICN* (Turland & al. 2025) we concur with Adey’s (1970) and Chamberlain & Keats’ (1995) designation of the **TRH** material as the holotype of *G. elatocarpum* and the **BM** material as isotypes, as it was the **TRH** material Foslie had in hand when he described *G. elatocarpum* as is evidenced by the slides that he prepared in **TRH**.

When Athanasiadis (2020) proposed a new genus *Phragmope* Athanasiadis for South African specimens previously considered by Chamberlain & Keats (1995) as belonging to *Mesophyllum engelhartii*, he rejected *Goniolithon elatocarpum* as a possible generitype species. This was because the type specimen of *G. elatocarpum* lacked a coaxial hypothallus that was pronounced in at least some part of the thallus and the uncertainty about the generational identity of the conceptacles, whether female or tetra/bisporangial. Thus, the identity of *G. elatocarpum* remained uncertain.

We borrowed from **TRH** the holotype specimen (A14-737) of *Goniolithon elatocarpum* (Fig. 1), extracted total cellular DNA following the protocol in Hernández-Kantún & al. (2016) and the precautionary guidelines of Hughey & Gabrielson (2012). A portion of the *rbcL* gene was amplified using the primer pair F1150 (Sissini & al. 2014) / R1460 (Hernández-Kantún & al. 2016) and the PCR protocol of Lindstrom & al. (2011). The PCR product was purified and sequenced by Functional Biosciences, Inc. (Madison, WI, USA). The two amplicons were assembled and aligned with the assistance of Sequencher (Gene Codes Corp., Ann Arbor, MI, USA) and adjusted manually using MUSCLE as implemented in Geneious Prime (2020.2.4, Biomatters, Auckland, New Zealand).

The 263 bp *rbcL* sequence, not including the primer sequences, GenBank accession # QB209209, was identical to the same 263 bp sequence from the holotype of *Lithothamnion superpositum* Foslie (1900). As *Goniolithon elatocarpum* and *Lithothamnion superpositum* were described in the same paper (Foslie 1900), they have equal priority. We here select *L. superpositum* for priority as it is already widely in use for the currently accepted *Roseolithon superpositum*. The synonymy is summarised as follows.

Roseolithon superpositum (Foslie) P.W.Gabrielson, Maneveldt, Hughey & V.Peña 2023: 764.
 Basionym: *Lithothamnion superpositum* Foslie 1900: 8.
 Homotypic synonym: *Mesophyllum superpositum* (Foslie) W.H.Adey 1970: 26.
 Heterotypic synonyms: *Goniolithon elatocarpum* Foslie 1900: 23; *Lithothamnion elatocarpum* (Foslie) W.H.Adey (as '*Lithothamnium*') 1970: 19.

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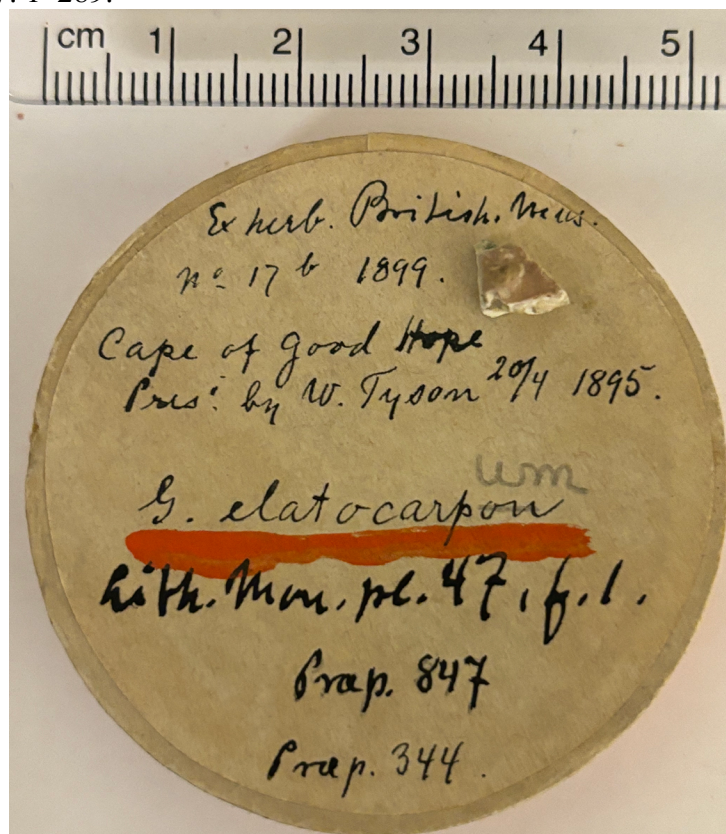


Fig. 1. Holotype specimen of *Goniolithon elatocarpum* **TRH** (A14-737)