
On the present status of coralline red alga *Archaeolithothamnium* Roth. from India

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During the last few years the studies on the extant and fossil algae by different palaeoalgalogists have indicated that both the genera *Archaeolithothamnium* Rothpletz and *Sporolithon* Heydrich belonging to Corallinaceae of Rhodophyta are synonymous. According to the International Code of Botanical Nomenclature, *Sporolithon* has priority over *Archaeolithothamnium*. In the present paper classification, synonymy, nomenclature and priority of the taxa have been discussed and accordingly all the species of *Archaeolithothamnium* Roth. described so far from India have been transferred to *Sporolithon* Heydrich.

Key-words—Nomenclature, *Sporolithon*, *Archaeolithothamnium*, Synonymy, Priority, India.

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सारांश

भारत से *आर्कियोलिथोथैम्नियम्* रोथ. नामक कोरेलाइन लाल शैवाल की वर्तमान स्थिति

अमित कुमार घोष एवं प्रभात कुमार माइती

कुछ वर्षों पहले विभिन्न शोध-कर्ताओं ने रोडोफाइटा समूह के कोरेलाइनेसी कुल से संबद्ध *आर्कियोलिथोथैम्नियम्* रोथ. एवं *स्पोरोलिथॉन* हैड्रिच नामक दोनों प्रजातियों के वर्तमान एवं अशिमित प्ररूपों के अध्ययन के आधार पर दोनों का एक ही नाम प्रस्तावित किया है। अन्तर्राष्ट्रीय वनस्पतिक नामपद्धति नियमावली के आधार पर *स्पोरोलिथॉन* के नाम को वरीयता जाती है। इस शोध-पत्र में वर्गीकरण, एकनाम तथा प्रजाति की वरीयता की विवेचना की गई है तथा उसी अनुसार *आर्कियोलिथोथैम्नियम्* रोथ. की सभी जातियों जो भारत से ज्ञात हैं, *स्पोरोलिथॉन* हैड्रिच में स्थानान्तरित कर दी गई हैं।

DURING the last two decades significant contributions have been made on the recent coralline algae. A better understanding of the systematic position and synonymy of many taxa resulted after careful studies on the morphology of the type material. As a matter of fact several classifications were proposed by Adey (1970), Adey and Johansen (1972), Cabioch (1972), Johansen (1981), Chamberlain (1983) and Woelkerling (1988).

However, comparable studies on the coralline fossil algae are still lacking. The re-identification of a number of fossil species creates a general problem for palaeoalgalogists. For this there are two main

reasons—(i) the original descriptions are too schematic in comparison to the knowledge of recent algae, and (ii) the original material (including the holotypes) is often missing and need to be sampled at the type localities again.

During the last century synonymy and priority of the genera *Archaeolithothamnium* Roth. and *Sporolithon* Heydrich have been debatable. The genus *Archaeolithothamnium* of Corallinaceae was proposed by Rothpletz (1891) who considered Schwager's species of *Lithothamnium*, i.e., *L. ascheroni* as a species of his genus *Archaeolithothamnium*. However, he finally described all species

under one generic name *Lithothamnium*. In 1893, Rothpletz established a new species of recent alga *Lithothamnium erythraeum* from the Red Sea. The species possesses the same generic characteristics as those classified by Rothpletz as *Archaeolithothamnium*.

From the Red Sea, Heydrich (1897a) established the genus *Sporolithon* based on a recent species and considered *Sporolithon ptychoides* as the type. According to Foslie (1904), Lemoine (1911) and Woelkerling (1988), the type species of *Sporolithon*, i.e., *S. ptychoides* actually represents younger synonym of *Lithothamnium erythraeum*. The controversy about the legitimation of both the genera was started by Foslie (1897a) who opined that *Sporolithon* is "echtes *Lithothamnium*." Later, Foslie (1897b) himself considered this genus as the younger synonym of Rothpletz's genus *Archaeolithothamnium*; but the author opined both the genera to be illegitimate. However, Foslie (1897b) used the correct name *Archaeolithothamnion* instead of erroneous name *Archaeolithothamnium* without any comment. Furthermore, Foslie (1898) recognised the independence of the genus and thus the priority was given to the older synonym as *Archaeolithothamnion* Rothpletz ex Foslie.

Lemoine (1911, 1978), Pfender (1926), Maslov (1956), Johnson (1963), Segonzac (1967), Adey (1970) and Adey *et al.* (1982) favoured *Archaeolithothamnium*, while few other algologists like Kylin (1956), Denizot (1967), Cabioch (1972), Johansen (1981) and Woelkerling (1988) favoured for the younger synonym *Sporolithon* to be the legitimate genus. Johansen (1969) opined that "the name *Archaeolithothamnium* was used only provisionally by Rothpletz (1891) and therefore, Heydrich's (1897a) generic epithet *Sporolithon* should be applied." Accordingly, Litter (1972), Dixon (1973) and Johansen (1976) have followed the same treatment and described the recent species of this extant genus under the generic name *Sporolithon* Heydrich. However, the generic name *Archaeolithothamnium* was also retained by Orszag-Sperber *et al.* (1977), Wray (1977) and Bosence (1983).

However, Woelkerling (1988) regarded *Archaeolithothamnium/Archaeolithothamnion* as a genus of uncertain status and the priority was given

to *Sporolithon* based on Article 34.1 and Article 58.1 of the "International Code of Botanical Nomenclature" (ICBN 1988; see Greuber, 1988):

"Article 34.1—A name is not validly published (a) When it is not accepted by the author in the original publication, (b) When it is merely proposed in anticipation of the future acceptance of the group concerned, or of a particular circumscription, position or rank of the group (so called provisional name);..."

"Article 58.1—When a non-fossil taxon of plants (algae excepted) and a fossil (or subfossil) taxon of the same rank are united, the correct name of the non-fossil taxon is treated as having priority."

It should be noted here that no type species was established for the genus *Archaeolithothamnium/Archaeolithothamnion* and moreover, the complete original material of Rothpletz (1891, 1893) should be compared with the recent species described by Heydrich (1897a, 1897b).

A perusal of the foregoing account reveals that both the genera *Archaeolithothamnium/Archaeolithothamnion* and *Sporolithon* are synonymous. According to Article 34.1 of ICBN *Sporolithon* has the priority over *Archaeolithothamnium* and undoubtedly the priority of *Sporolithon* is justified.

It must be taken into consideration that Rothpletz did not participate in the later discussions between Foslie and Heydrich, in relation to the preference of both the genera, i.e., *Archaeolithothamnium/Archaeolithothamnion* and *Sporolithon*. Furthermore, till date nobody attempted to establish a lectotype, neotype or to conserve a species mentioned by Rothpletz as genotype. Therefore, Moussavian and Kuss (1990) opined that the old discussion concerning the synonymy should come to an end. Systematic studies on recent and fossil algae by Moussavian and Kuss (1990) confirmed the synonymy of both the genera *Archaeolithothamnium* and *Sporolithon*. After detailed investigations and comparisons with recent algae they (Moussavian & Kuss, 1990) were in favour of the genus *Sporolithon* and concluded that *Sporolithon* is the only legitimate generic name for all the species earlier described under *Archaeolithothamnium*.

The fossil algae from the Cretaceous of Varagur, Tiruchirapalli District, Tamil Nadu (India) was described in recent years by Misra and Kumar (1988) and adopted the same criterion. In relation to the present nomenclatural problem the slides of Misra and Kumar (1988) were carefully examined and photographs were taken. Only these figures are incorporated in the present paper.

The newly revised classification system proposed by Moussavian and Kuss (1990) is as follows :

SYSTEMATIC DESCRIPTION

Division—Rhodophyta Witterstein 1901

Class—Rhodophyceae Harvey 1853

Order—Corallinales Silva & Johansen 1986

Family—Corallinaceae Lamouroux 1812

Genus—*Sporolithon* Heydrich 1897a

Synonyms:

Archaeolithothamnium Rothpletz 1891; *Archaeolithothamnion* Rothpletz 1891 ex Foslie 1898a.

Type species—*Sporolithon ptychoides* Heydrich 1897a; the type species represents a younger, heterotypic synonym of *Sporolithon erythraeum* (Rothpletz) Kylin (basionym : *Lithothamnium* Rothpletz 1893) (See Foslie 1904; Lemoine 1911; Kylin 1956; Woelkerling 1988).

Generic diagnosis—"Thallus nongeniculate, epigenous or nonepigenous with various growth forms; tissue differentiated in a primary (basal) and often also secondary developing coaxial or non-coaxial tissue (hypothallus) and a cortical tissue (perithallus) with coaxial and noncoaxial protuberances. Male and female reproductive organs

in uniporate conceptacles; tetra-(bi-)sporangia characterised by individual pores, mainly grouped in zonately arranged fertile regions with interspersed calcified filaments; fertile regions sometimes slightly raised or contrast against the surrounding tissue but not clearly delimited" (after Moussavian & Kuss, 1990, p. 932).

In accordance with the foregoing account the following species of *Archaeolithothamnium* previously recorded from India have been transferred here under the genus *Sporolithon* and the new combinations are proposed as follows:

Sporolithon archisporangia (Sripada Rao) comb. nov.

Synonymy:

1943 *Archaeolithothamnium archisporangia*
Sripada Rao: p. 274; pl. 1, fig. 6; text-fig. 1.

Sporolithon chamorrosum (Johnson) comb. nov.

Synonymy :

1957 *Archaeolithothamnium chamorrosum*
Johnson : p. 217, pl. 39, figs 3,6.

1963 *Archaeolithothamnium chamorrosum*
Johnson in Johnson : p. 183, table 2; p. 194, table 5.

1964 *Archaeolithothamnium chamorrosum*
Johnson in Johnson : p. 3.

1989 *Archaeolithothamnium chamorrosum*
Johnson in Badve & Kundal : p. 254, pl. 1, figs 1-2.

Sporolithon cherrapunjiensis (Sripada Rao) comb. nov.

Synonymy:

1943 *Archaeolithothamnium cherrapunjiensis*
Sripada Rao: p. 271.

PLATE 1

- 1, 2, 3, 4. *Sporolithon lugeoni* (Pfender) comb. nov. : 1. section of thallus showing arrangement of sporangia. X 50; 2. section of thallus showing sporangia arranged in clusters. X 50; 3. magnified view of the sporangial clusters. X 100.; 4. oval shape of sporangia showing somewhat acuminate end. X 150; Slide no. BSIP 8512 - mark 2.
- 5, 6. *Sporolithon nongsteinensis* (Sripada Rao) comb. nov. : 5. section of fertile thallus. X 50; 6. enlarged portion of the same thallus

- showing rectangular cells. X 150; Slide no. BSIP 8512 - mark 3.
7. *Sporolithon parisiense* (Lemoine) comb. nov. : Section of thallus with tetrasporangia in scattered condition. X 50; Slide no. BSIP 8516 - mark 1.
8. *Sporolithon rude* (Lemoine) comb. nov. : Section of fertile thallus showing arrangements of sporangia. X 50; Slide no. BSIP 8515 - mark 2.

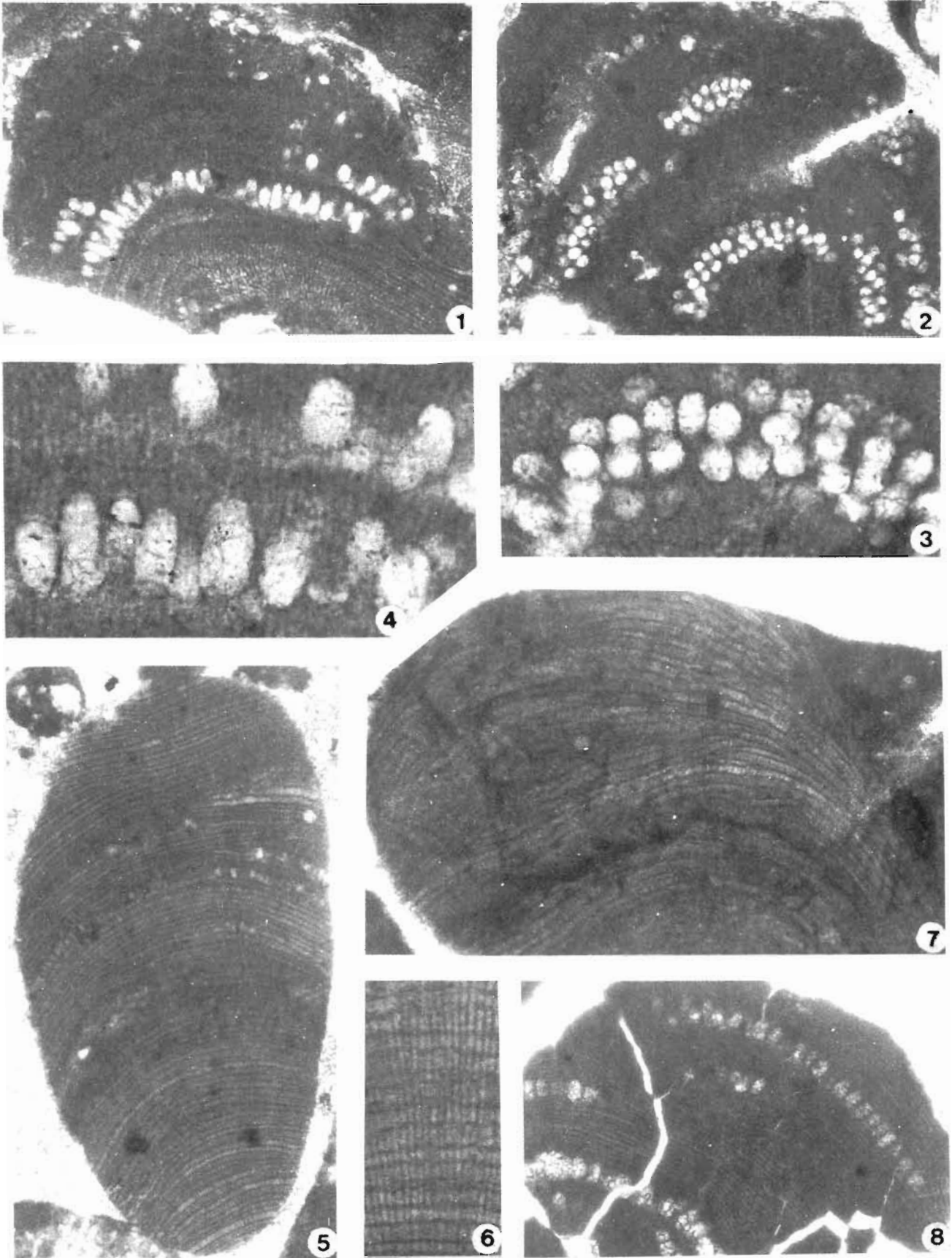


PLATE 1

- Sporolithon feddeni* (Chiplonkar & Borkar) comb. nov.
- Synonymy:*
 1972 *Archaeolithothamnium feddeni* Chiplonkar & Borkar: p. 143, pl. 1, figs 3-4, text-fig. 2.
 1972 *Archaeolithothamnium feddeni* var. *bhadukaensis* Chiplonkar & Borkar: p. 145, pl. 1, figs 5-9, text-fig. 3.
- Sporolithon hemchandri* (Sripada Rao) comb. nov.
- Synonymy:*
 1943 *Archaeolithothamnium hemchandri* Sripada Rao: p. 275; pl. 1, fig. 7; text-fig. 3.
- Sporolithon lakiensis* (Varma) comb. nov.
- Synonymy:*
 1952 *Archaeolithothamnium lakiensis* Varma: p. 304; pl. 12, fig. 3.
- Sporolithon langrinensis* (Sripada Rao) comb. nov.
- Synonymy:*
 1943 *Archaeolithothamnium langrinensis* Sripada Rao: p. 273; pl. 1, figs 3-5; text-fig. 4.
- Sporolithon lugeoni* (Pfender) comb. nov.
 Pl. 1, figs 1-4
- Synonymy:*
 1926 *Archaeolithothamnium lugeoni* Pfender: p. 324; pls. 9, 13.
 1936 *Archaeolithothamnium lugeoni* Pfender in Rama Rao & Pia: p. 35; pl. 4, figs 1-3.
 1988 *Archaeolithothamnium lugeoni* Pfender in Misra & Kumar: p. 46; pl. 4, figs 7, 9, 11, 14, 17.
- Sporolithon nammalensis* (Varma) comb. nov.
- Synonymy:*
 1952 *Archaeolithothamnium nammalensis* Varma: p. 305; pl. 12, fig. 4.
- Sporolithon nongsteinensis* (Sripada Rao) comb. nov.
 Pl. 1 figs 5-6
- Synonymy:*
 1943 *Archaeolithothamnium nongsteinensis* Sripada Rao: p. 270; pl. 1, figs 1, 2; text-fig. 2.
 1988 *Archaeolithothamnium nongsteinensis* Sripada Rao in Misra & Kumar: p. 46; pl. 3, figs 5, 8-10; pl. 4, fig. 13.
- Sporolithon nummuliticum* (Rothpletz) comb. nov.
- Synonymy:*
 1891 *Archaeolithothamnium nummuliticum* (Gumbel) Rothpletz: p. 316; pl. 17, fig. 5.
 1971 *Archaeolithothamnium nummuliticum* (Gumbel) Rothpletz in Pal b: p. 21.
- Sporolithon oulianovi* (Pfender) comb. nov.
- Synonymy:*
 1957 *Archaeolithothamnium oulianovi* Pfender in Johnson: p. 218, pl. 38, fig. 5.
 1963 *Archaeolithothamnium oulianovi* Pfender in Johnson: p. 186, table 2; p. 196, table 5.
 1965 *Archaeolithothamnium oulianovi* Pfender in Johnson & Kaska: p. 20-21, pl. 30, fig. 3.
 1989 *Archaeolithothamnium oulianovi* Pfender in Badve & Kundal: p. 254, pl. 1, figs 3-4.
- Sporolithon parisiense* (Lemoine) comb. nov.
 Pl. 1, fig. 7
- Synonymy:*
 1923 *Archaeolithothamnium parisiense* (Gumbel) Lemoine: p. 63; figs 1-3; pl. 6, fig. 1.
 1988 *Archaeolithothamnium parisiense* (Gumbel) Lemoine in Misra & Kumar: p. 46; pl. 3, figs 3, 10.
- Sporolithon pondicherriensis* (Sastry, Rao & Iqbaluddin) comb. nov.
- Synonymy:*
 1963 *Archaeolithothamnium pondicherriensis* Sastry *et al.*: p. 63; pl. 8, fig. 1.
 1972 *Archaeolithothamnium pondicherriensis* Sastry *et al.* in Pal: p. 245; pl. 1, fig. 1.
- Sporolithon ranikotensis* (Narayan Rao) comb. nov.
- Synonymy:*
 1941 *Archaeolithothamnium ranikotensis* Narayan Rao: p. 48; pl. 3, fig. 4; text-figs 8, 10.

Sporolithon rude (Lemoine) comb. nov.

Pl. 1, fig. 8

Synonymy :

- 1925 *Archaeolithothamnium rude* Lemoine : p. 3; pl. 1, figs 1, 2.
 1926 *Archaeolithothamnium rude* Lemoine in Pfender : p. 18, pl. 5, fig. 3; pl. 8, fig. 3.
 1963 *Archaeolithothamnium rude* Lemoine in Johnson : pl. 17, figs 1-3.
 1988 *Archaeolithothamnium rude* Lemoine in Misra & Kumar: p. 46, pl. 4, figs 6, 8, 16.

Sporolithon saipanense (Johnson) comb. nov.

Synonymy :

- 1957 *Archaeolithothamnium saipanense* Johnson : p. 220; pl. 38, figs 1-4, 6.
 1963 *Archaeolithothamnium saipanense* Johnson in Sastry, Rao & Iqbaluddin : p. 62; pl. 8, fig. 2.
 1989 *Archaeolithothamnium* sp. cf. *A. saipanense* Johnson in Badve & Kundal: p.254, pl. 1, fig. 5.

Sporolithon samanensis (Narayan Rao) comb. nov.

Synonymy :

- 1941 *Archaeolithothamnium samanensis* Narayan Rao : p. 45; pl. 3, figs 3, 4; pl. 4, figs 1, 3, 4, 5; text-figs 7, 9, 11.
 1963 *Archaeolithothamnium* sp. cf. *A. samanensis* Narayan Rao in Sastry *et al.*: p. 61; pl. 8, fig. 4.

Sporolithon saurashtraensis (Chiplonkar & Borkar) comb. nov.

Synonymy :

- 1972 *Archaeolithothamnium saurashtraensis* Chiplonkar & Borkar : p. 141; pl. 1, figs 1-2; text-fig. 1.

Sporolithon zonatum (Varma) comb. nov.

Synonymy :

- 1952 *Archaeolithothamnium zonatum* Varma : p. 303; pl. 12, figs 1, 2.
 1963 *Archaeolithothamnium zonatum* Varma in Sastry *et al.* : p. 63; pl. 8, fig. 3.
 1972 *Archaeolithothamnium zonatum* Varma in Pal: p. 245; pl. 1, fig. 2.

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