

ROSENVINGEA INTRICATA (J. Agardh) Börgs., A PHAEOPHYCEAE NEW TO CHILKA LAKE IN INDIA

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ABSTRACT

Rosenvingea intricata (J. Agardh) Börgs. a brown sea-weed is reported here for the first time from Chilka Lake in Orissa. The structure of the alga is described in detail. The habitat and geographical distribution of the alga are briefly discussed. A Chaetophoraceous alga occurring as an endophyte in *Rosenvingea intricata* (J. Agardh) Börgs. is referred to.

Börgesen (1914, p. 22) while working on the Marine Algae of the Danish West Indies, created a new genus *Rosenvingea* to include some of the species till then referred to by earlier authors to one or the other of the following already known genera viz., *Asperococcus*, *Striaria*, *Encoelium* and *Hydroclathrus*. Two species of this genus were reported by him from Indian coasts also viz., *Rosenvingea intricata* (J. Agardh) Börgs., from Dwarka, Okha, Tuticorin and Hare Island (Börgesen, 1930, 1934, 1937) and *Rosenvingea orientalis* (J. Agardh) Börgs., from Bombay and Tuticorin (Börgesen, 1930, 1937). In April, 1950, the author collected from Chilka Lake (lat. 19°28' & 19°54' N; long., 85°6' & 85°35' E) good specimens of *Rosenvingea*. Although some records of algae from Chilka Lake are available, no member of the Phaeophyceae, however, appears to have been reported so far from this locality. In the present note, therefore, this alga is newly reported from Chilka Lake.

The collection of a fragment of the thallus of this alga cast ashore on the bank in the Outer Channel of the Lake parallel to and adjoining the Bay of Bengal Coast, led to a search for fresh specimens in the lake, by wading through waist-deep of water for a good distance. Ultimately, the alga was found growing in the lake over an appreciable area, which was within a mile and a half from the mouth of the lake proper and opposite to the shore between Manikpatna and Arkakhuda, two stations on the western bank of the Outer Channel.

The alga was found growing luxuriantly as free floating loosely tangled aggregates or suspended masses in two to three feet of calm and comparatively clear water. The bed was found to be composed of sand with dead shells scattered here and there. Species of *Gracilaria* were found growing intermingled with this alga, forming major associations.

The alga is profusely branched (Fig. 1), the branching being wide angled and very irregularly dichotomous or pseudo-dichotomous. It is light brown in colour and is tubular and hollow inside even to the ultimate hair-like branches. In its older parts, it is highly compressed with quite an un-even surface. The thallus measures about

10 mm. or even more across at its widest part. The several branches which suddenly decrease in size, ultimately end in very minute ramifications, which are very fine, hair-like and terete, measuring much less than 0.5 mm. across. In a transverse section, the thallus is seen to be made up of three to four layers of cells (Fig. 8). The innermost layer of cells lining the hollow cavity are generally considerably larger than the peripheral cells. They measure from 30 μ to 66 μ across.

In surface view, the outermost layer is seen to be made up of irregularly-polygonal cells (Fig. 2). Each cell contains a single chromatophore and measures 9.9 μ -13.2 μ across. Although intercellular spaces are generally absent, occasionally, however, small spaces occur in this layer.

Very occasionally it is noticed that rhizoid-like processes are formed from some of the innermost cells lining the hollow cavity inside (Figs. 3, 4, 5). Sooner or later, they are seen to develop into short filamentous structures consisting of a few elongated, somewhat cylindrical or irregularly shaped cells (Fig. 4). The exact significance of these structures is not clearly understood. Börgesen (1914) observed in the case of *Rosenvingea sanctae crucis* Börgs., a few hyphal filaments running along the walls of the large inner cells now and then. He (1914) also found hyphal filaments growing downwards from the innermost cells in the lower part and filling up the lumen. These filaments together with numerous rhizoids from the peripheral cells in the basal part of the frond are described by him to form a small disc by means of which the plant is fastened to the substratum. In the present case, however, the filamentous structures do not appear to be functionally similar to the hyphal filaments met with in *Rosenvingea sanctae crucis* Börgs. Judging from their nature and their relative position in the thallus, it is just possible that these structures help to increase the absorptive surface of the tubular alga.

The alga bore plenty of plurilocular sporangia. The sporangia occur several together, in more or less well defined circular to oval sori which are spread over the whole surface of the thallus (Fig. 8). The sori may either

be situated in a small concave depression on the surface of the thallus or on a convex surface of the same. The sporangia are developed from the outermost surface cells of the thallus. The mature sporangium is more or less a clavate structure, measuring about 19.8μ long and $6-7\mu$ broad.

Hairs are commonly seen in small groups both in the sori and in the sterile part of the thallus. Individual hairs are also to be noticed scattered in the thallus. The hairs are multicellular structures with slight constrictions at the joints. They are developed from the surface cells of the thallus as epidermal growths (Fig. 7). The cells bearing the hairs are found to be richer in contents than the neighbouring cells. A young hair, when it is made up of four or five cells only, is more or less uniform in thickness with rich contents, although the length of the individual cells might show slight increase from base upwards. A fully developed hair may consist of about 20 cells. At the basal part of the hair the cells are generally broader than long, measuring about 6.6μ across. From the sixth cell or so from the base, they increase considerably in length, with the result that they become longer than broad. The next few cells from the sixth cell from base measure about 9.9μ across and occasionally 13.2μ across, while the length of the cell at this part may reach up to 130μ . From about the tenth cell or so from base, the cells of the hair, however, show more or less a uniform diameter of about 13.2μ only, and nearer the tip the cells attain a length of about $130\mu-150\mu$. The cells above the basal part of the hair are without contents except for a few spherical bodies seen within them. The tip of the hair is rounded (Fig. 6).

The Chilka alga agrees well with the species *Rosenvingea intricata* (J. Agardh) Börgs., and is, therefore, assigned to that species.

As regards the habitat of this species, it is usually known to be a denizen of shallow bays and lagoons with quiet and clear, calm waters in the tropics, and with a substrata of loose gravel or coarse sand and broken shells (Dawson, 1944). From the records so far published of this species, it is also seen that this species descends down to over 19 fathoms (Taylor, 1928). Börgesen's record of this species from Okhamandal seas was based on material which was cast ashore (Börgesen, 1930). There is also no reference to the habitat of this species reported by him from the Gulf of Mannar (Börgesen, 1937). Both these coasts are characterised by strong surf-actions and tidal effects. During low tides, several places get exposed with larger or smaller intertidal pools here and there, supporting a luxuriant and characteristic vegetation. The Chilka Lake alga was, however, found to inhabit quiet and calm water of two to three feet depth, in the outer channel of the Lake, very near the sea and within a mile and a half from the mouth of the lake, which is of the nature a very large lagoon of about 906.5 sq. km. The substratum was found to be of loose sand and silt with broken and dead shells scattered over. In this respect the Chilka Lake alga bore a great affinity to the species

reported from the Gulf of California (Dawson, 1944) and that from the Salt-Marsh at the mouth of the River Adyar in Madras (Krishnamurthy, 1954).

As regards its geographical distribution, this species has been reported from Tropical waters of the Atlantic, the Pacific and the Indian Ocean. The largest report is, however, from the Atlantic where its distribution is to be seen in the Tropical American waters and especially in the Caribbean region, ranging from Bermudas and Florida to Brazil (Fig. 9.) Elsewhere it is reported only from a few restricted localities. In the Pacific, it is reported from Polynesia, Samoa, America and Gulf of California. In the Indian Ocean, it is recorded from Melanesia, Malayan Indonesia and Indonesia. In India proper, it is known from the Arabian Sea coast at Dwaraka and Okha, and from Gulf of Mannar at Tuticorin, Hare Island, and in Bay of Bengal from Madras. The present additional record from Chilka Lake in the Bay of Bengal coast is thus of great interest.

No record of this species is seen by me from Europe and African coasts although Börgesen (1934) indicates of its occurrence in those localities as well in his table of species showing the geographical distribution of some marine algae from the Northern part of the Arabian Sea.

Generally speaking, this species is found to be more or less limited to the tropical belts in the world. East to West it shows roughly a range from $150^{\circ}\text{E. long.}$, to $171.0^{\circ}\text{W. long.}$; and North to South from $32.15^{\circ}\text{N. lat.}$, to $20.30^{\circ}\text{S. lat.}$ The only other species so far known from India of this genus is *Rosenvingea orientalis* (J. Agardh) Börgs. Compared with *Rosenvingea intricata* (J. Agardh) Börgs., *Rosenvingea orientalis* has a much restricted range of distribution, being confined to $121^{\circ}\text{E. long.}$, to $61.30^{\circ}\text{W. long.}$, and $23.30^{\circ}\text{N. lat.}$, to $5.0^{\circ}\text{S. lat.}$, and occurring in India, Maccasar and Formosa in the Eastern regions, and Guadelope in the Western region.

A Chaetophoraceous alga was seen growing endophytically in the thallus of *Rosenvingea intricata* (J. Agardh) Börgs., which will be reported in a separate communication.

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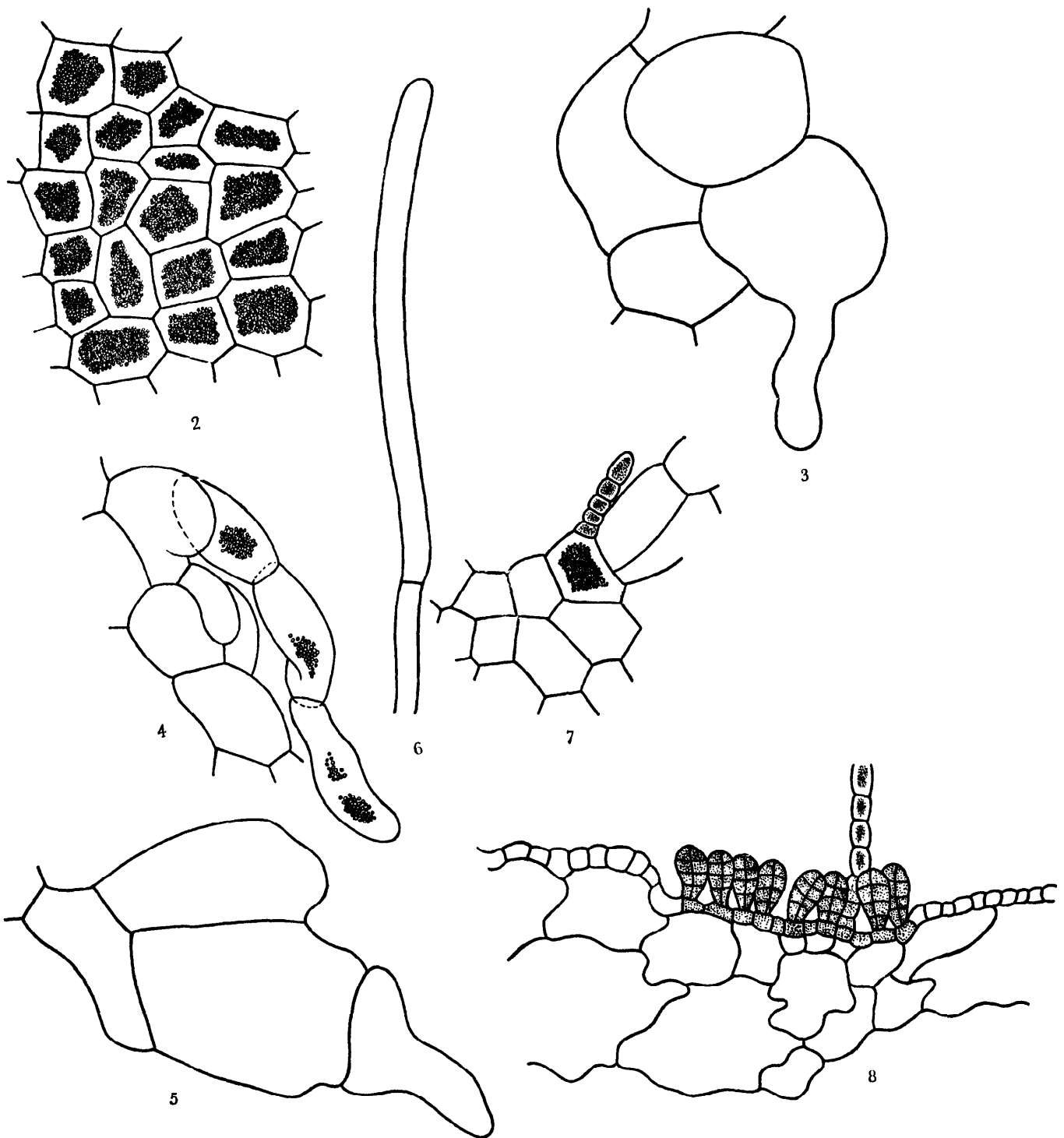
[Figs. 2-8. *Rosenvingea intricata* (J. Agardh) Börgs.]

Fig. 2. Epidermal cells in surface view, x 520; fig. 3, 4, 5. Rhizoid like processes from the innermost cells of the thallus, x 520; fig. 6. Terminal portion of a fully developed hair, x 520; fig. 7. A young hair, developed out of an epidermal cell, x 520; fig. 8. Transverse section of the thallus showing 3 to 4 layers of cells, and a group of sporangia and hair on the sugarcane, x 520.