

**ON SOME FRESH-WATER ALGAE
FROM NORTH SURIN ISLAND**

*Prasit Buri**

The material reported on in this paper was collected by the author during the expedition to Surin Island in the Andaman Sea from April 12-21, 1976. The collections were made from few fresh-water streams of the North Island. It is undoubtedly that the species given in this report represent only a fragment of those present on the Island.

Geography of Surin Island

Surin Island (Fig. 1), situated in the Andaman Sea lies approximately 50 kms from the west coast of the south peninsula of Thailand. The Islands consist of North and South Surin with the total area of more than 22 square kms. The highest peak on South Surin reaches up to 350 metres and 250 metres on North Surin. The Islands are influenced by the South West Monsoon.

Ecological conditions of fresh-water streams

The entire island is densely covered by rain forests. Fresh-water streams usually less than 1,5 metre wide and few inches deep seem to be found throughout the year. Thick plant growths are found along the streams especially in low altitude near the coast and in flat areas. In higher elevation water runs deep under rocks exposed from the cause of erosion.

As one would expect, algae especially fresh-water species are found unrestricted in every aquatic environment and on every moist substrate such as rocks, tree trunks and leaves. However, no luxuriant

* IFRPD, Kasetsart university, Bangkhen, Bangkok 9.

algal vegetations could be found in these cool, shaded and running water habitats which provide no favourable ecological conditions for growth. The problems encountered with the algae inhabiting flowing waters are the unstable nature of the medium and substratum. Most parts of the streams found on the island consist of loose materials. Other limiting factors are light and mineral content. The water is slightly acidic (pH 5,7-6,5)

As no one can deny that light is a very important habitat factor, it seems that the algal species reported in this paper are of low-light species. As the blue-green algae constitute an important part of the algal flora and representatives of few genera are found frequently, it is assumed that these algae possess high adaptability to low-light intensity. Eventhough it is difficult to draw precise characteristic of the nature of the habitat, it is a matter of convenience to distinguish certain habitat condition to show some ecological preferences.

Because of the nature of the environment, it is apparent that most of the algae found are filamentous forms or lead an epiphytic life in order to stay attached to the substrate. Semi-epiphytisms are most common in the samples. Whether or not they are obligate epiphytes cannot be justified, but they are usually found attached to plant parts, both dead and alive. The majority of the species found in the plankton are unicellular rather than colonial, such as *Scenedesmus* spp. and *Chlorella* spp. As mentioned above, the blue-green algae are found widely distributed in most samples; however, their growth are not luxurious enough to be visible to the unaided eyes. Only on the sand flats reached by the tides twice a day, bluegreen algae of the Family Nostocaceae are found in large numbers. Provided with efficient sunlight and nutrition from the sea, algal patches are distributed over the sand area. At times of incoming tides individual masses of the algal filament are detached and buoyed upwards floating on the water

surface by trapped oxygen bubbles. No such ideal habit is found on the island above sea level.

The collections

Collections of aquatic algae were made in localities where fresh water is clearly accessible. Aerial algae which obtain their water supply mostly from the rain and moisture in the air were collected from tree trunks, barks and rocks, usually on the shaded side. Submerged twigs, dead part of plant, stones and any material that can serve as a substrate were collected wholly. As algae form the natural food of many aquatic animals, fresh-water shrimps which are abundant in great numbers were netted and their intestines were examined. It is expected that this method will help to reveal small and rare algae which escaped from being sampled by the usual method. Attempts were made to keep the algae alive since many forms are inconspicuous and delicate and could only be detected and identified from the movement of the flagellum. Double samples were preserved in 4% Formalin.

Unattached or planktonic forms were taken from places where current is minimal, such as between thickets of plant materials or in slow-flowing and deeper water of side pools. In these places algal filaments which have been pulled off from the substrate and carried away will trend to entangle itself on obstructions or rest in calm areas where they could colonize themselves again. It is doubtless that part of the plankton of the streams derives from algae being drifted from the benthos.

It is a well-known fact that isolated islands usually have relatively high numbers of cosmopolitan and endemic species. The species reported in this paper represent only the more dominant species as many smaller and less conspicuous forms no doubt escaped notice. There were some odd species in the collections but it was too risky to merit their description.

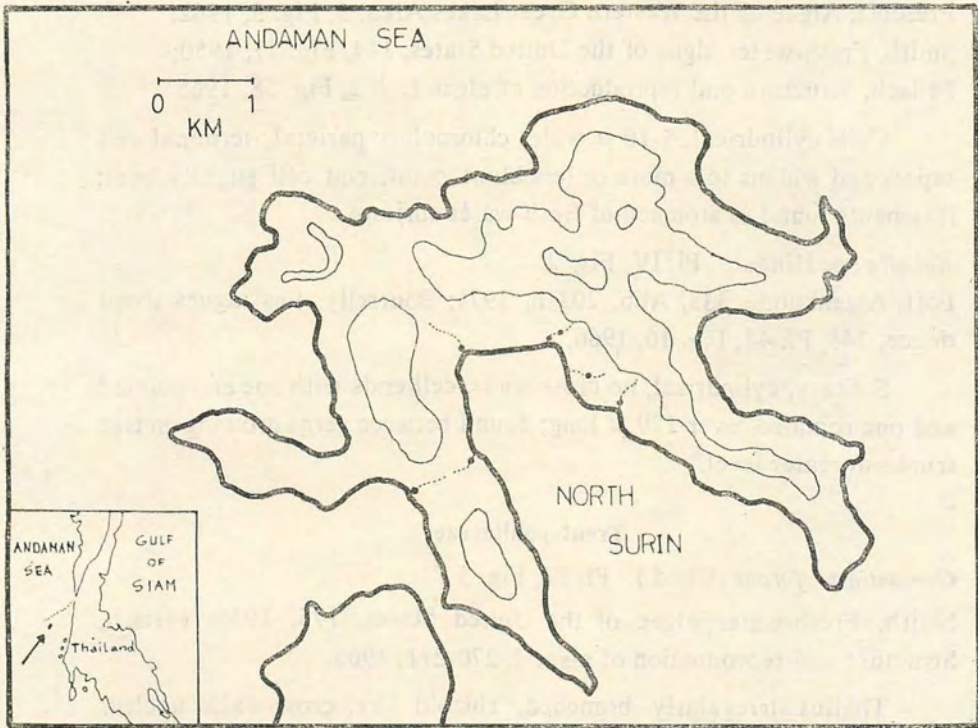


Fig. 1. Sketch map of North Surin Island to show localities where fresh-water algae were collected. Dashed lines indicate fresh-water streams.

C H L O R O P H Y T A

CHLOROPHYCEAE

Ulotrichales

Ulotrichineae

Ulotrichaceae

Uronema elongatum Hodgetts Pl. IV, Fig. 1

Prescott, Algae of the Western Great Lakes Area, 5, Fig. 5, 1962;
Smith, Fresh-water algae of the United States, 144, Fig. 77, 1950;
Fritsch, Structure and reproduction of algae I: 202, Fig. 58, 1965.

Cells cylindrical, 5-10 μ wide, chloroplast parietal, terminal cell tapers and widens to a more or less blunt point, end cell slightly bent; fragments found in stomach of fresh-water shrimps.

Koliella sp. Hindak Pl. IV, Fig. 2

Fott, Algenkunde, 333, Abb. 203 h, 1971; Bourrelly, Les algues d'eau douce, 248, Pl. 45, Fig. 16, 1966.

Solitary, cylindrical, no cross-walls, cell ends with one end pointed and one rounded, over 170 μ long; found between ferns growing on tree trunks at water level.

Trentepohliaceae

Gomontia perforans (Chod.) Pl. IV, Fig. 3

Smith, Fresh-water algae of the United States, 175, 1950; Fritsch, Structure and reproduction of algae I, 270-271, 1965.

Thallus irregularly branched, rhizoid like, cross-walls unclear homogenous chloroplast, multinucleate; attached on submerged decaying branches.

Trentepohlia aurea (L.) ? Pl. IV, Fig. 4

Smith, Fresh-water algae of the United States, 179, 1950; Bourrelly, Les algues d'eau douce, 322, Pl. 67, Fig. 4, 1966.

Thallus filamentous, few short erected branches, alternate branching, cells cylindrical, cell-wall thick, cell twice as long as broad, approx. 50-60 μ long; on tree trunks on shaded side (according to SMITH (1950): strictly aerial).

Physolinum monilia (de Wildeman) Printz ? Pl. IV, Fig. 5
Smith, Fresh-water algae of the United States, 181, Fig. 111, 1950.

Thallus irregularly branched, thick cell walls; on tree trunks in association with *Trentepohlia aurea*.

Cladophorales

Cladophoraceae

Cladophora sp. Pl. V, Fig. 1

Smith, Fresh-water algae of the United States, 213, 1950.

Cells with very thick walls, branching appears to be dichotomous few pyrenoids, parenchymatous characteristic of growth; attached to green leaves hanging over streams.

Chlorococcales

Oöcystaceae

Closteriopsis longissima Lemmermann var. *tropica* W. & G.S. West
Pl. V, Fig. 2

Smith, Fresh-water algae of the United States, 266, Fig. 182, 1950;
Bourrelly, Les algues d'eau douce, 197, Fig. 1, 1966. Prescott, Algae of the Western Great Lakes Area, 255, Pl. 57 Figs. 1-3, 1962.

Cell solitary (Planktonic), no gelatinous sheath, elongated pointed cell ends, approx. 15 μ long; planktonic in calm water areas.

Scenedesmaceae

Scenedesmus spp.

Only single coenobium with four cells is found in the samples, cell wall smooth and without spines; in water sample.

Zygnematales

Mesotaeniaceae

Gonatozygon sp. de Bary Pl. V, Fig. 3

Bourelly, Les algues d'eau douce, 394, Pl. 85, Fig. 4, 1966; Smith, Fresh-water algae of the United States, 306, 1950; Fott, Algenkunde, 487, Abb. 248, 1, 1971; Wildeman, Les algues de la flore de Buitenzorg, 123, 1900.

Cell cylindrical, spiny cell wall, parallel sides, cell slightly bent, flat cell ends, 10-15 μ broad, 150 μ long; in plankton sample collected in stream portion near sea level.

Desmidiaceae

Closterium spp.

Many members belonging to this genera are found in the collection but because of the various shapes of these algae it was not possible to describe and identify them.

EUGLENOPHYTA

EUGLENOPHYCEAE

Euglenales

Peranemaceae

Entosiphon sulcatum (Duj) Stein Pl. V, Fig. 4

Smith, Fresh-water algae of the United States, 364, Fig. 271, 1950; Fott, Algenkunde, 415, Abb. 256 C, 1971; Kosmos, Leben im Wassertropfen, 152, Fig. 11, 1974; Fritsch, Structure and reproduction of algae I: 737, Fig. 242 I 1965.

Cell ovoid, two flagella one for swimming and extends directly forward, the other slightly longer than the body is a trailing flagellum, longitudinal ribs barely seen; found under piles of dead plant materials in streams.

CHRYSOPHYTA

XANTHOPHYCEAE

Heterococcales

Characiopsidaceae

Characiopsis acuta Borzi ? Pl. V, Fig. 5

Smith, Fresh-water algae of the United States, 390, Fig. 302, B, 1950; Kosmos, Algenkunde, 144, Fig. 14, 1974; Prescott, Algae of the Western Great Lakes Area, 357, Pl. 95, Figs. 29-31, 1962.

Unicellular, epiphytic, cell ovoid, rounded apex, sessile upon submerged and decaying leaves by a stipe-like prolongation of the cell, big gas vacuol; attached on dead plant materials.

BACILLARIOPHYCEAE

Chrysphaerales

Large numbers of species belonging to the family Tabellariaceae, Diatomaceae, Achnantheaceae, Naviculaceae, Nitzschiaceae and Surirellaceae are found in most samples and in shrimps' intestines.

C Y A N O P H Y T A

MYXOPHYCEAE

Chroococcales

Chroococcaceae

Aphanocapsa sp. Pl. V, Fig. 6

Smith, Fresh-water algae of the United States, 555-556, 1950; Desikachary, Cyanophyta, 130, 1959.

Thallus gelatinous, cells 5 μ diameter, spherical, loosely arranged, no distinct sheaths around cells; free floating in calm waters.

Chamaesiphonales

Chamaesiphonaceae

Chamaesiphon curvatus var. *elongatus* Pl. V, Fig. 7

Smith, Fresh-water algae of the United States, 572, 1950; Desikachary, Cyanophyta, 169, Pl. 32, Figs. 7,8; Pl. 33, Fig. 7, 1959; Wildeman, Les algues de la flore de Buitenzorg, 12, Fig. 2, 1900.

Cell elongated with abstricting exospores at the apex (clubshape) sheath not found, approx. 25 μ long; attached in groups on dead leaves and minute stems.

Oscillatorineae

Oscillatoriceae

Spirulina laxissima West, G.S. Pl. V, Fig. 8

Desikachary, Cyanophyta, 196, Pl. 36, Figs. 5,6, 1959; Prescott, Algae of the Western Great Lakes Area, 480, Pl. 107, Fig. 17, 1962.

Very slender trichome, colourless, less than 1 μ broad, spiral loose but regular, end-cells rounded, cell content homogenous cross-walls obscure; found in sand samples, benthic, in stomach of fresh-water shrimps.

Oscillatoria rubescens de Candelle ? Pl. VI, Fig. 1

Desikachary, Cyanophyta, 235, Pl. 42, Fig. 12, 1959; Kosmos, Leben im Wassertropfen, 126, Fig. 5, 1974; Prescott, Algae of the Western Great Lakes Area, 490, Pl. 107, Fig 21, 1962.

Trichome straight, cell 8μ broad 4μ long, trichome ends slightly attenuated, end-cell capitate, not constricted at cross-walls; between submerged aquatic objects, not attached to substrates.

Phormidium calcicola Gardner Pl. VI, Fig. 2

Desikachary, Cyanophyta, 267, Pl. 43, Figs. 4,5, 1959.

Thallus firm, filament straight or scarcely curved, 7μ broad, sheath thick, trichomes not attenuated, not constricted at cell-walls, cells quadratic, end-cell rounded, no calyptra; on rocks along streams.

Phormidium ambiguum Gomont Pl. VI, Figs. 4,5

Desikachary, Cyanophyta, 266, Pl. 44, Fig. 16; Pl. 45, Figs. 5-8 1959; Smith, Fresh-water algae of the United States, 576, 1950; Prescott, Algae of the Western Great Lakes Area, 493, Pl. 111, Fig. 1, 1962.

Filament flexuous, variously entangled, end-cell rounded, sheath thin trichome 5μ broad, cells slightly shorter than broad; on submerged decaying leaves, not attached but not abundant in plankton samples.

Lyngbya contorta Lemm. Pl. VI, Fig. 6

Smith, Fresh-water algae of the United States, 577, Fig. 492, A, 1950; Desikachary, Cyanophyta, 290, Pl. 48, Fig. 5; Pl. 50, Figs. 5,9, 1959; Kosmos, Algenkunde, 125, Fig. 4, 1974.

Filament regularly spirally coiled, cross-walls diffluent, colourless, end cell rounded, trichome $1-2 \mu$ broad; entangled in submerged hair roots.

Lyngbya martensiana Meneghini Pl. VI, Fig. 3

Desikachary, Cyanophyta, 318, Pl. 52, Fig. 6, 1959; Prescott, Algae of the Western Great Lakes Area, 502, Pl. 112, Fig. 11, 1962.

Filament straight, 8μ broad, cells $4-5 \mu$ long, not constricted at cross-walls, trichome end not attenuated, end-cells rounded, sheath thick, some what loosely covered and lamellated; free floating.

Lyngbya perelegans Lemm. Pl. VI, Fig. 7

Smith, Fresh-water algae of the United States, 577, 1950; Desikachary, Cyanophyta, 309, Fig. 306, 1, 1959.

Thallus straight, cells $2\ \mu$ broad, $7\ \mu$ long, not constricted at the cross-walls, filament cylindrical, end-cell rounded, sheath very thin; on submerged roots in calm places of the stream.

Nostochineae

Rivulariaceae

Calothrix fusca (Kütz) Bornet et Flahaut Pl. VII, Fig. 1

Desikachary, Cyanophyta, 527, Pl. 107, Fig. 10, 520, 1959; Smith, Fresh-water algae of the United States, 599, Fig. 520, 1950; Prescott, Algae of the Western Great Lakes Area, 533, 551, Pl. 132, Figs. 4,5, 1962.

Filament single, sheath abundant, basal cell inflated-heterocyst, trichome tapers from base to apex and terminates in a fine rounded point, cell approx. $10\ \mu$ broad, cell shorter than broad; attached to submerged rocks and plants.

Raphidiopsis curvata Fritsch & Rich Pl. VII, Figs. 2,3

Fritsch, Structure and reproduction of algae II: 837, Figs. 322 C-I 1965; Desikachary, Cyanophyta, 422, Pl. 68, Figs. 5,7; Pl. 79, Fig. 4, 1959; Smith, Fresh-water algae of the United States, 603, Fig 527, 1950.

Bent trichome, $15\ \mu$ long, without sheath, cell cylindrical, both poles of a trichome may taper to a fine point or one pole may be tapered and the other be broadly rounded, cross-walls unclear; on submerged leaves.

R H O D O P H Y T A

FLORIDEOPHYCIDAE

Cryptonemiales

Hildenbrandiaceae

Hildenbrandia rivularis (Liebm.) Pl. VII, Fig. 4

Fott, Algenkunde, 245, Abb. 150, 1971.

Parenchymatous encrusting type, cells 2 μ diameter, irregularly shaped; attached on stones under water.

Acknowledgements

I am indebted to Dr. Tem Smitinand, Curator of the Forest Herbarium and Expedition leader, who invited me to join the expedition. I would like to thank Dr. Prateap Rachapaetayakom, Assistant to Director of IFRPD, Kasetsart University, for his understanding and for giving me permission to join the trip. Finally I would like to acknowledge the help of Miss Bulan Phithakpol who kindly arranged the supply of provision for the whole party.

REFERENCES

- BOURRELLY, P. 1966 : Les algues d'eau douce. Initiation à la systematique. Editions N. Boubée & Cie. Pp. 1-400.
- DESIKACHARY, T.V. 1959 : Cyanophyta. Indian Council of Agricultural Research New Delhi.
- ECHLIN, P. 1966 : The Blue-Green Algae. Scientific American. 214, (6) : 74-81.
- FOTT, B. 1959 : Algenkunde. Fischer, Jena. Pp. : 1-502.
- FRITSCH, F.E. 1965 : The structure and reproduction of the algae. Vol. I & II. Cambridge Univ. Press.
- STREBLE H. und KRAUTER, D. 1974 : Das Leben im Wasser-tropfen. Kosmos Naturführer, Frankh'sche Verlags-handlvng.
- PRESCOTT, G.W. 1962 : Algae of the Western Great Lakes Area. WM. C. Brown Compans Publishers.
- SMITH, G.M. 1950 : The fresh-water algae of the United States. McGraw-Hill Book. Pp. : 660.
- 1938 : Cryptogamic Botany. Vol. I McGraw Hill, New York.
- WILDEMAN, E. 1900 : Les algues de la flore de Buitenzorg. E.J. Brille, Leide.

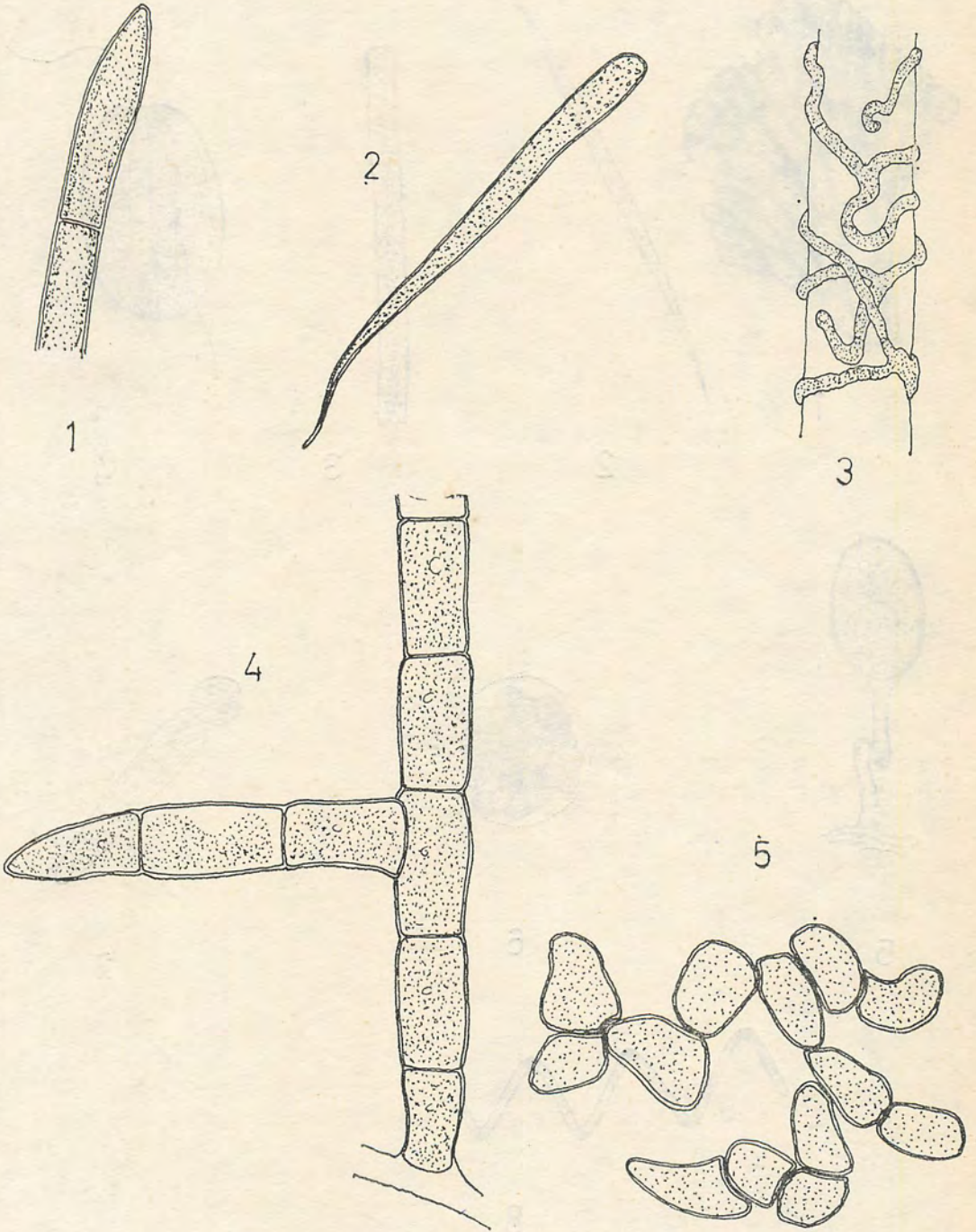


Fig. 1. *Uronema elongatum* Hodgetts
Fig. 2. *Koliella* sp. Hindak
Fig. 3. *Gomontia perforans* (Chod.)
Fig. 4. *Trentepohlia aurea* (L.)
Fig. 5. *Physolinum monilia* (de Wildeman) Printz

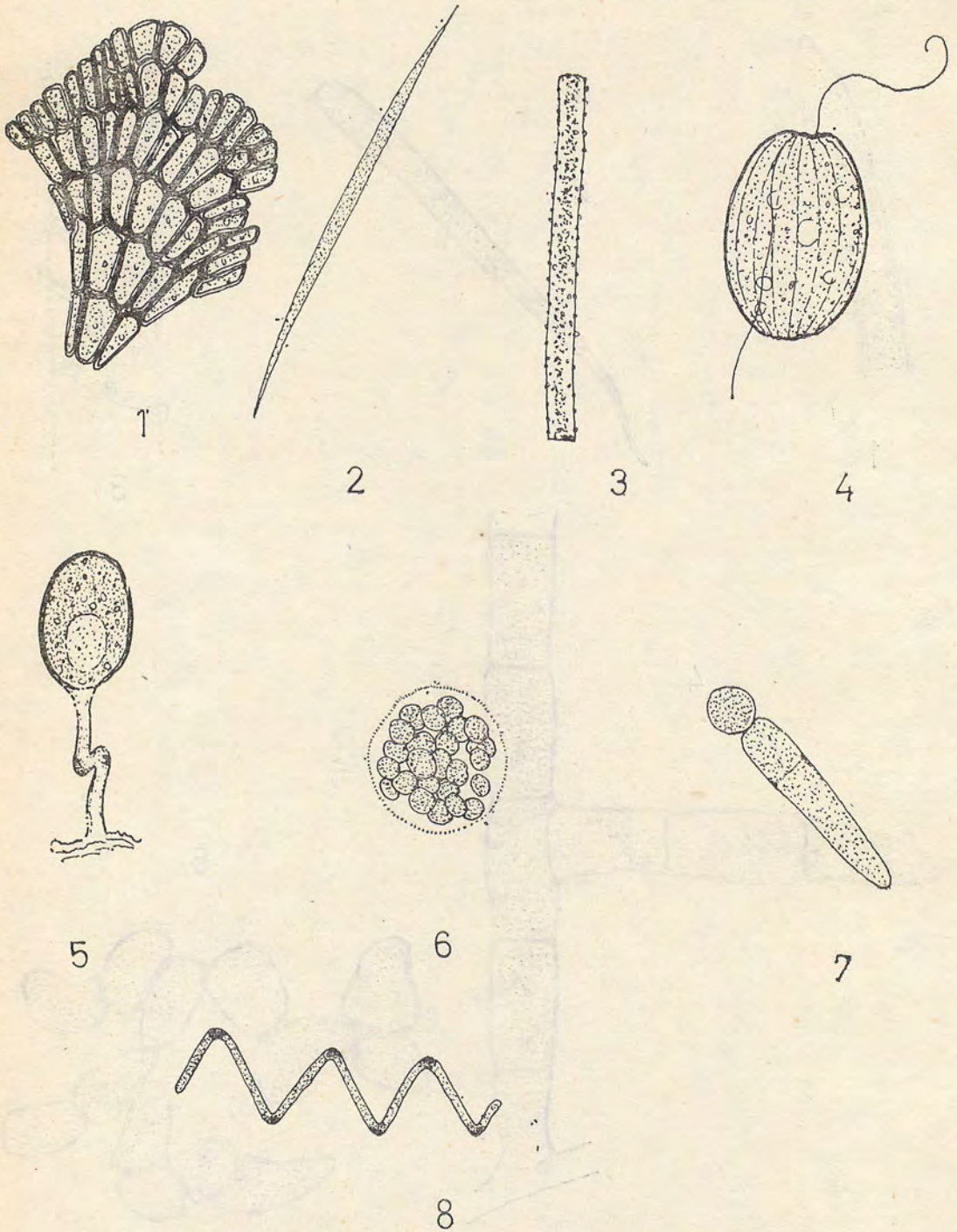


Fig. 1. *Cladophora* sp.
 Fig. 2. *Closteriopsis longissima* Lemm. var. *tropica* W & G.S. West
 Fig. 3. *Gonatozygon* sp. de Bary
 Fig. 4. *Entosiphon sulcatum* (Duj) Stein
 Fig. 5. *Characiopsis acuta* Borzi
 Fig. 6. *Aphanocapsa* sp.
 Fig. 7. *Chamaesiphon curvatus* var. *elongatus*
 Fig. 8. *Spirulina laxissima* West, G.S.

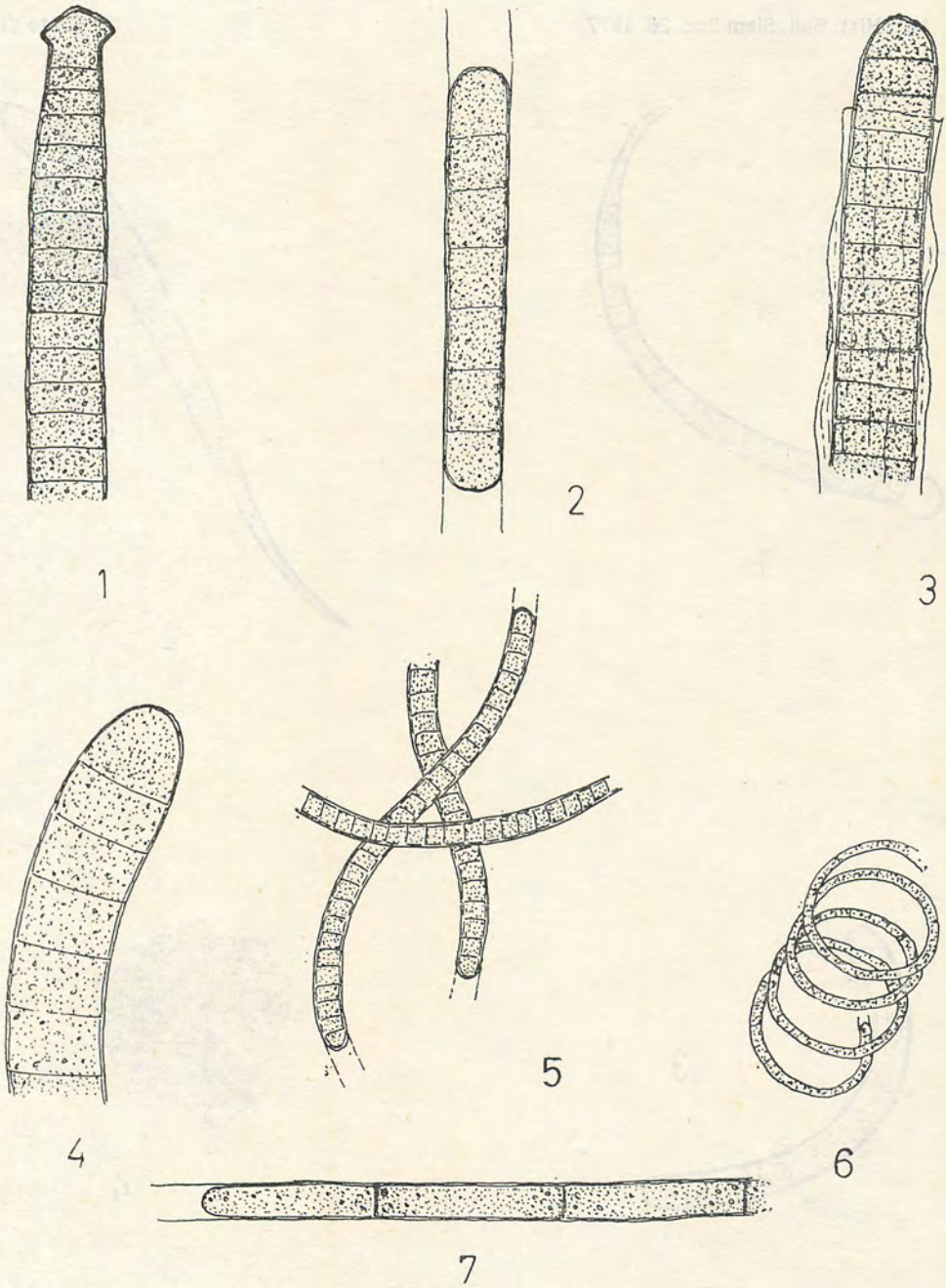


Fig. 1. *Oscillatoria rubescens* de Cadelle
Fig. 2. *Phormidium calcicola* Gardner
Fig. 3. *Lyngbya martensiana* Meneghini

Fig. 4, 5. *Phormidium ambiguum* Comont
Fig. 6. *Lyngbya contorta* Lemm.
Fig. 7. *Lyngbya perelegans* Lemm.

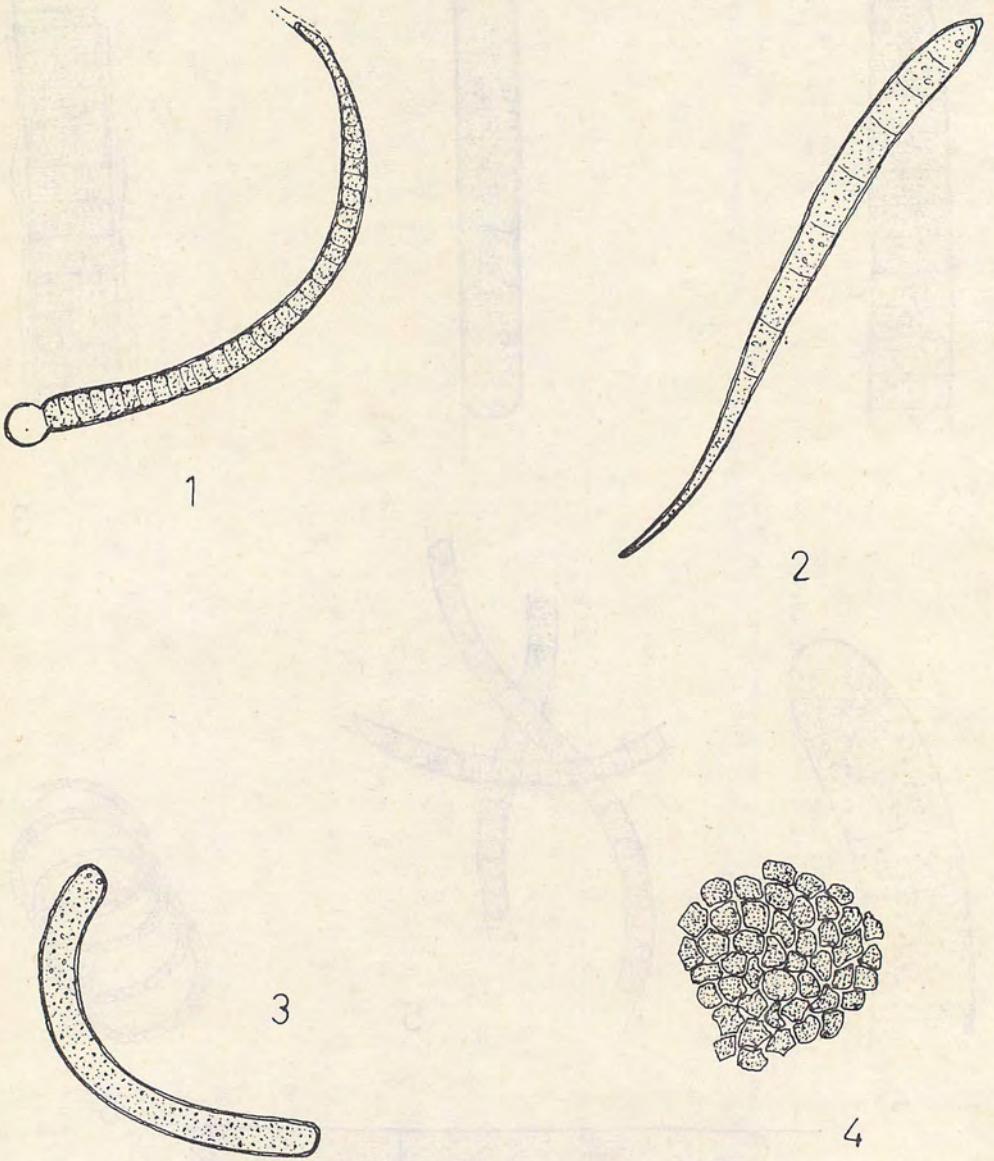


Fig. 1. *Calothrix fusca* (Kütz) Borne et Flahaut
Fig. 2, 3. *Raphidiopsis curvata* Fritsch & Rich
Fig. 4. *Hildenbrandia rivularis* (Liebm.)