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Plectonema tatrica n. sp.,
Nowy gatunek sinicy z Tatr
Plectonema tatrica, a new species
of blue-green algae from the Tatra Mountains

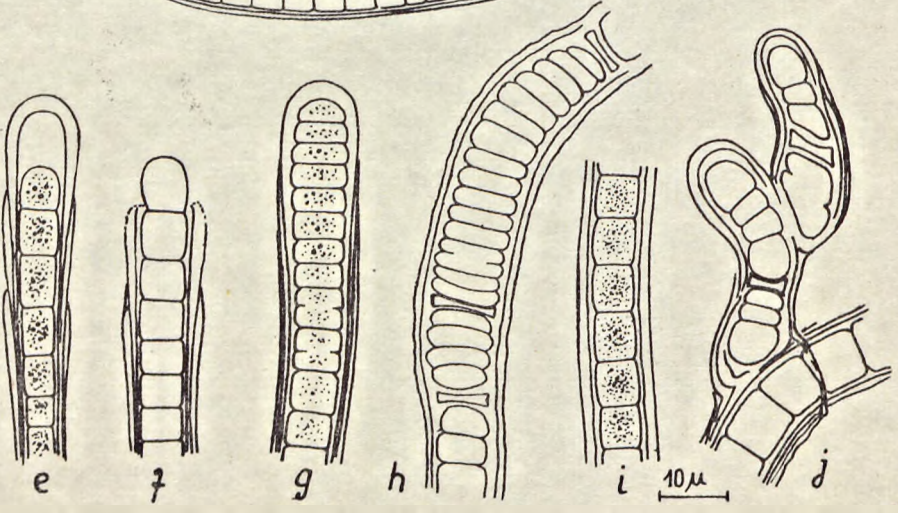
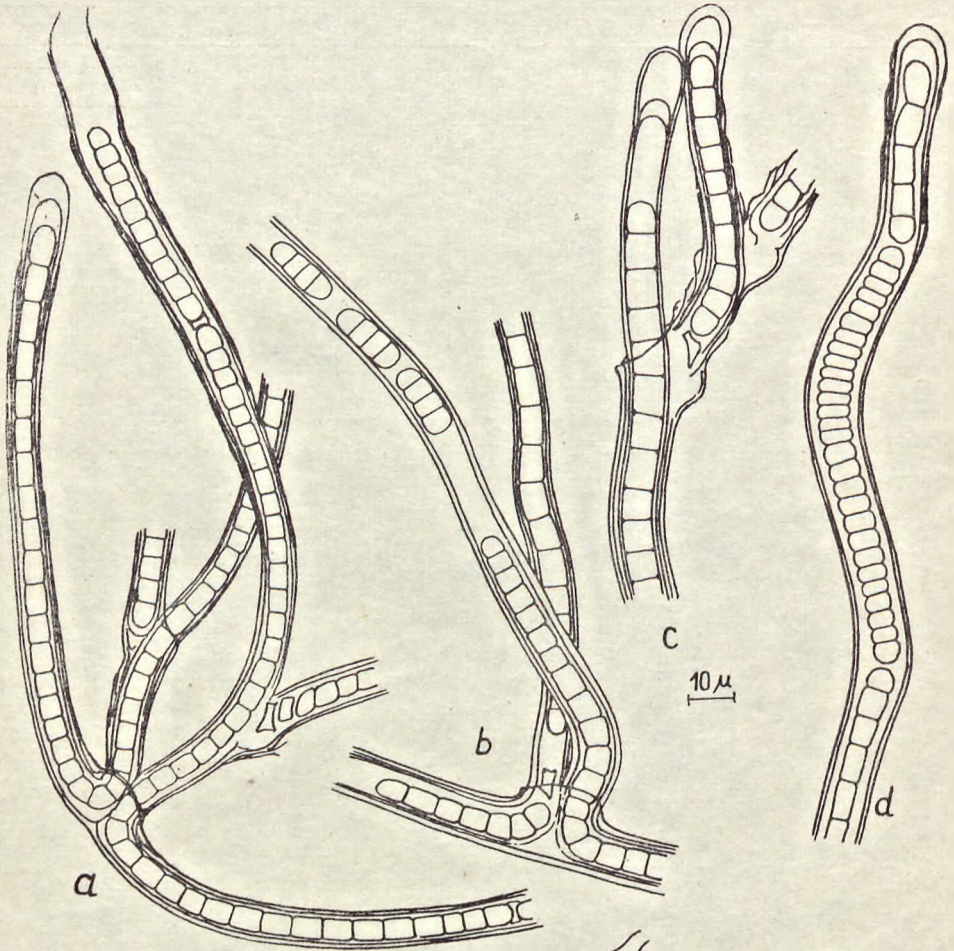
Mémoire présenté le 4 mars 1968 dans la séance de la Commission Biologique de l'Académie Polonaise des Sciences, Cracovie

Abstract — The description and diagnosis is presented of *Plectonema tatrica* n. sp., found on the surface of granite stones in the oligotrophic lake Wielki Staw in the Valley of the Five Polish Lakes in the High Tatra Mts at a depth of 5—40 m. The accompanying species of blue-green algae are also reported. The included drawing illustrates the characteristic particulars of filaments and trichomes.

In September 1963 Dr M. Kwapisiewicz and other frogmen of the Warsaw group collected samples of stones from depths of 5, 10, 20, 30, and 40 m in the inshore zone of the Wielki Staw in the Valley of the Five Polish Lakes. It was found that, beginning from a depth of 5 m., blue-green algae of colours ranging from violet to carmine-red chiefly occurred in this material. A species of the genus *Plectonema* formed among them rich, felt like coatings. It had features different from those of species known so far. For this reason the author devotes the present paper to its description.

Description of the species

Thalli form on the surface of stones delicate, flat, brownish-red coatings composed of matted, lying and rising filaments. Examined under a binocular microscope, thalli of this blue-green alga have a felted appearance. They are composed of filaments richly branched and closely matted together. The branches occur in pairs or singly, being therefore of the *Scytonema* or *Tolypothrix* type. Heterocystes are absent.



The filaments have colourless sheaths, mostly thick and distinctly layered. Less frequently they are thin with no pronounced stratification. In young filaments the sheaths are closed, often slightly broadened at the apex (fig. 1, c, e) and gradually becoming gelatinous. In older filaments the sheaths are open at the apex, gelatinous or frayed (fig. 1, a, f). The stratification of the sheaths in the apical parts is oblique, whereas, in the central parts of the filaments it is almost parallel. The exterior extremities of the individual oblique layers become gelatinous, owing to which the exterior border of the sheath is often uneven. At the base of the branches the sheaths are distinctly saccately broadened. After treatment with zinc chloride and iodine they do not become blue. The breadth of filaments amounts to 6.7—13.3 μ , the mean from 100 measurements being: $M = 9.3 \mu$, $\sigma = \pm 0.17$, $v = 1.82$ per cent.

The measurements were carried out on normally developed filaments, i.e. not excessively thick or deformed; they were, always taken beneath the apex.

The trichomes are variously developed. At cross-walls they are usually distinctly incised, although in some fragments, mostly in the more central parts of the filaments, they are only slightly incised or not incised at all. In the apical and subapical parts a meristematic zone develops, having shorter, rapidly dividing cells, strongly incised at cross-walls (fig. 1, d and g). The cells are usually barrel-shaped, but sometimes at intestine divisions in the meristematic zone they are flattened and clypeiform. In the same filament there occur both barrel-shaped cells, distinctly incised at cross-walls, and cylindrical cells almost completely non-incised. The latter are usually encountered in the central parts of the filaments, which are generally thinner and more elongated. Barrel-shaped cells are most pronounced in the apical parts of the filaments.

The breadth of trichomes is between 3.3—11 μ , the mean of 100 measurements being: $M = 5.7 \mu$, $\sigma = \pm 0.22$ $V = 3.83$ per cent.

At the apices of filaments the trichomes are in most cases neither narrowed nor broadened. Sometimes, however, though seldom, they are broadened or narrowed both in the apical and in the other parts of the filaments. These cases occur in a non-uniform growth leading to the deformation of trichomes and filaments (fig. 1, h and j).

The content of cells is homogeneous or granular, sometimes with distinct granules of darker colour. At the cross-walls, however, there is no granulation. The apical cell is rounded, having no thickened membrane at the apex.

Fig. 1. a—d fragments of filaments; near b hormogonia are visible, near d a subapical meristematic zone is marked; e, f, g — variously developed apices of filaments, near g a growing apical zone is visible; i — fragment of the middle part of a filament of typical shape; h, j — fragments of deformed filaments

The cells are generally square, their length being equal to their breadth. The values for the length of cells are similar to those for the breadth of trichomes, ranging from 3.3 to 11 μ , the mean of 100 measurements being: $M = 5.7 \mu$, $\sigma = \pm 0.22$, $V = 3.82$ per cent. These measurements do not refer to the meristematic parts of the trichomes, characterized by increased divisions and then transitionally by much shorter cells.

In the closely matted mass of branched filaments deformed trichomes are often encountered. Their cells are usually shortened and broadened sideways, uneven, smaller and larger ones lying side by side. Concave, dead cells with a homogeneous and usually darker content are distributed in the trichomes non-uniformly. They separate the individual sections of the trichomes. The latter, separated by a dead cell, grow on both ends, owing to which double branches develop, breaking the sheath and growing in pairs in one direction, or intercrossing and growing in two different directions. There also occur single branches, when only one end of the broken trichome grows on the outside of the sheath.

Hormogonia are as a rule short, being composed of 2—5 cells; they develop in series in the terminal sections of the filaments (fig. 1, b). Apart from short hormogonia not separated by dead concave cells, there appear longer sections of trichomes behaving similarly as hormogonia, i. e. having a tendency to leave the sheath (fig. 1, a). In cases when the sheath remains closed, sections of trichomes and hormogonia continue to grow within it, this bringing about a deformation of the filaments or sometimes the breaking of the sheath and development of a new lateral branch, which is usually deformed as well. Reproduction, therefore, takes place through the medium of hormogonia and fragments of trichomes disengaging themselves.

Occurrence

Plectonema tatraica occurs at a depth of 5—40 m. in the lake Wielki Staw in the Valley of the Five Polish Lakes in the Tatra Mountains. It is not known whether it occurs at greater depths as well, for stones could be collected only to a depth of 40 m. Nor is it known whether it occurs in other Tatra lakes, which were not investigated in this regard. In samples from a smaller depth this species was not found.

The species shows some similarities to *Plectonema tenue*, *P. africanum*, *P. indicum*, and *P. phormidioides*. It differs from *P. tenue* Thuret in that the trichomes are incised at cross-walls, it has an unnnarrowed apical cell, layered sheaths, which do not become blue under the effect of zinc chloride with iodine, and a characteristic carmine-red colouring. From *P. africanum* Borge it differs in that it has a smaller breadth of

filaments, a smaller mean breadth of trichomes, longer cells and an unnarrowed apical cell, broader sheaths, and a different colour. It differs from *P. indicum* Dixit in having slighter breadth of filaments and trichomes, colourless sheaths, and a different colour. From *P. phormidiodes* it differs in having longer cells, broader sheaths, rich ramification of filaments, and in general in the character of the thalli and colour.

Accompanying species

The thalli of *Plectonema tatrlica* are accompanied by other species of blue-green algae, which also mostly have violet-red cells. They are represented by *Microcystis* cf. *elachistha* W. et G. S. West, whose cells are violet red; *Chlorogloea* cf. *purpurea* Geitler with cells 2—3 μ in diameter, arranged in indistinct rows, carmine-red, forming lumpy aggregates; *Lyngbya purpurascens* (Kütz.) Hansg., *Phormidium foveolarum* (Mont.) Gom., *Oscillatoria simplicissima* Gom., *Schizothrix Braunii* (A. Br.) Gom. and *Schizothrix tinctoria* (Ag) Gom. *Hydrocoleus Cesatti* Rabenh. and *Chamaesiphon subglobus* (Rostaf.) Lemm. grew epiphytically on filaments of *P. tatrlica*.

Diagnosis

Plectonema tatrlica sp. mihi

Strata coloris fulvorubri, ex filis ramosis et iner se flexis composita, in superficie lapidum consistentibus. Vaginae filorum colore carent, magna ex parte crassae, lamellosae, quarum novella fila in apice clausa, aetate proevecta gelata aut discisa et aperta, chlorozincico iodurato non caerulescentia. Fila 6,7—13,3 μ lata, mediocriter 9,3 μ lata. Trichomata cocco-rubra aut violaceo-rubra, ad dissipimenta transversa certe costricta, perquam roro in quibusdam partibus leviter incisa, ex cellulis paene quadratis composita. Rami simplices aut gemini, ex una parti explicati aut in decusses obliqui. Trichomata 3,3—11 μ lata, mediocriter 5,7 μ lata, cellularum longitudo consimilis. Apices trichomatum magna ex parte nequae coangustata nec extenta. Cellula in apice rotundata. Heterocystae desunt. Multiplicantur brevibus hormogoniis, ex 2—5 cellulis compositis aut fragmentatione trichomatum.

Habit. In altitudine 5—40 m Lacus, qui vocatur Magnus, in Valle Quinque Lacuum Polonorum, lapidibus litorosis adhaeret. Iconotypus: tabl. 1. a—j.

STRESZCZENIE

Opisano nowy gatunek sinicy: *Plectonema tatrca* n. sp. zebrany w Wielkim Stawie w Dolinie 5 Stawów Polskich, na głębokości 5—40 m. Sinica ta rośnie na powierzchni kamieni i tworzy na nich brązowoczerwone, filcowate naloty. Obok opisu nowego gatunku zestawiono również inne gatunki sinic, które rosły razem z nim.

Diagnoza. Plechy barwy brązowoczerwonej złożone są z nici porozgałęzionych i poplątanych ze sobą, osiadłych na powierzchni kamieni. Pochwy nici są bezbarwne, przeważnie dość grube, warstwowane, w młodych niciach na szczycie zamknięte, w starszych zgalaretowaciałe lub postrzępione i otwarte, nie niebieszczejące od chlorku cynku z jodem. Szerokość nici wynosi 6,7—13,3 μ , średnio 9,3 μ . Trychomy są karminowoczerwone lub fioletowoczerwone, przy ściankach poprzecznych wyraźnie wcięte, rzadziej w niektórych częściach słabo wcięte, złożone z komórek prawie kwadratowych. Rozgałęzienia są pojedyncze lub parzyste, rozwinięte jednostronnie lub krzyżujące się. Szerokość trychomów wynosi 3,3—11 μ , średnio 5,7 μ . Długość komórek jest podobna. Szczyty trychomów przeważnie nie są zwężone ani też rozszerzone, komórka szczytowa jest zaokrąglona. Heterocyst brak. Rozmnażanie odbywa się za pomocą krótkich, 2—5 komórkowych hormogoniów lub przez fragmentację trychomów.

Występuje na głębokości 5—40 m w Wielkim Stawie w Dolinie 5 Stawów Polskich na powierzchni kamieni przybrzeżnych.

Ikonotyp: ryc. 1, a—j.

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