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**Dwa nowe gatunki sinic z rodzaju *Homoeothrix* (Thur) Kirchn. —
Two New Species of the Genus *Homoeothrix* (Thur.) Kirchn.**

Mémoire présenté le 21 mars 1960 dans la séance de la Commission Biologique de l'Académie Polonaise des Sciences, Cracovie

The two species of Blue-green Algae described below have been found in the mucilaginous investment of the algae: *Tetraspora*, *Chaetophora* and *Batrachospermum*. In the mucilage of mature thalli, or even of those already over-mature and partly mortified, one may find an abundance of endophytic Blue-green Algae. They are attached to these original habitats, which fact is shown by the appearance of the same species in the mucilage of algae gathered in localities distant from each other. The Blue-green Algae in question live inside the mucilaginous investments of algae; they do not fasten to the filaments of the host, though they may adhere to or twist around them. They are then endophytes of mucilages that do not affect the algae; there is therefore little probability of their being either harmful or useful. The endophytes gain a quiet place, a protection against being flushed by a current of water, and perhaps they profit from the feeding substance enclosed in the mucilages. Certainly the algae do not take advantage of their endophytes; losses which they may suffer depend on the shading of the assimilating branches when the Blue-green Algae multiply intensely.

Homoeothrix gloeophila sp. n.

The filaments have the features typical for the *Homoeothrix* genus. They do not form thalli but they appear in the shape of radially arranged bunches of filaments or, more rarely, in the mucilaginous thalli of *Tetraspora gelatinosa* (Vauch.) Desv., *Chaetophora pisiformis* (Roth) Agardh and *Batrachospermum moniliforme* Roth (fig. 1). In the investigated material the filaments were 70—410 μ long, irregularly curved, sometimes hooked at the base, narrowing gradually from the base and passing to the apex into a long colourless hair (fig. 2). The filaments are not branched out but appear in gatherings in which they are arranged



Fig. 1. *Homoeothrix gloeophila* sp. n. The groups of filaments in the mucilage of an algae.

close to each other; however, one filament never grows out of another. The sheaths are colourless, thin, disappearing towards the apex so that the hairs grow as a rule above them. They do not take a blue colour from chlor-zinc-iodine. In the older filaments the sheaths are empty at the apex; the trichomes move upwards in them. The trichomes are of a yellowish blue-green colour. Their cells in the basal parts are, by the transverse walls, distinctly incised and have an almost elliptical shape, shorter than the width; in the middle of the trichomes, not incised, almost square, the cells are longer and longer as they draw nearer to the apex and in the hair considerably longer than the width. The protoplasm of the cells is fine-grained. Hormogonia originate from the decay of filaments into sectors, mostly 6—8 celled, which, after the disappearance of the hair, emerge from the sheaths (fig. 2c).

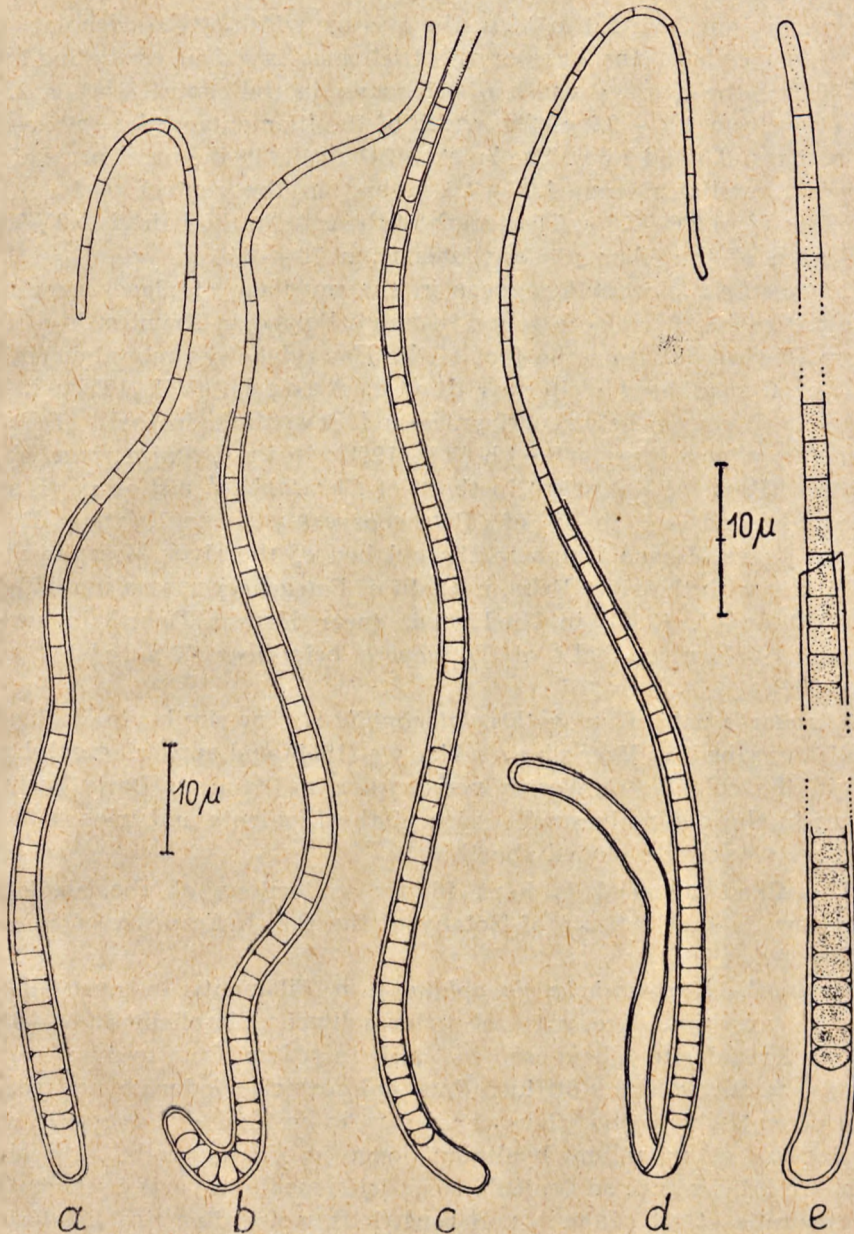


Fig. 2. *Homoeothrix gloeophila* sp. n.: a, b. The most frequently found types of filaments; c. a filament forming hormogonia; d. a filament with an empty sheath at the base; e. fragments of a filament (greater magnification)

The average width of the filaments measured at the base at its widest point is 3.2μ , oscillating from 2.5 to 4.0μ in the middle of the filaments

2.6 μ , oscillating from 2.0 to 2.8 μ ; the average width of the trichomes and also of the cells at the base of the trichomes is 2.5 μ , oscillating from 2.3 — 3.0 μ ; the average width of trichomes in the central part is 2.5 μ , oscillating from 1.8 — 2.2 μ . The width of the filaments at the apex oscillates between 0.6 and 1.5 μ . The length of the cells in the basal parts of the trichomes oscillates from 1.0 — 2.0 μ , and in the central parts of the trichomes from 2.0 — 2.8 μ . The length of the cells in the hairs is 5.0 — 7.0 μ ; the length of the filaments oscillates from 70 — 410 μ .

Homoeothrix gloeophila appear in the mucilage of algae, sometimes quite profusely. It has been found in South Poland in Krynica, in a small stream flowing out from the foot of the Hawrylakówka mountain, in the thalli of *Chaetophora pisiformis* (Roth) Agardh (VII. 1957); in the Szczawniczy stream between Krynica and Powroźnik, in thalli of *Batrachospermum moniliforme* Roth (VII. 1958); in the Brynica river, above Niedzara (Prov. of Katowice) in thalli of *Chaetophora pisiformis* (Roth) Agardh and in thalli of *Batrachospermum moniliforme* Roth (IX. 1956); in Mszana Dolna in the old bed of the river Mszanka at its confluence with the river Raba, in thalli of *Batrachospermum moniliforme* (X. 1959 and I. 1960); in Niedźwiedz (near Mszana Dolna) in springs beside the river in thalli of *Tetraspora gelatinosa* (Vauch.) Desv. (VI. 1959).

As regards habit *Homoeothrix gloeophila* is very similar to *H. flagelliformis* described by Vozzhennikova (1953) and appearing epiphytically in the colonies of *Nostoc verrucosum* in the Amu Daria basin. It differs in the distinctly smaller size of the filaments and trichomes and by more weakly developed sheaths.

The fixed material is kept in the collections of the algological laboratory in the Institute of Botany of the Polish Academy of Sciences in Kraków.

Diagnosis: *Homoeothrix gloeophila* sp. n. Filamentis in muco aliarum algarum viventibus, gregariis vel rarius solitariis, simplicibus 70 — 410 μ longis, irregulariter flexuosis in basi interdum hamiformis; vaginis achrois, tenuibus, apice diffluentibus, chlorozincico iodurato non coerulescentibus; trichomatibus flavo-aerugineis, in basi leviter incrassatis, apice tenuioribus et in pilum hyalinum longe productis; cellulis basalibus diametro brevioribus, ad genicula constrictis, media in parte trichomatibus subquadratis et ad genicula non constrictis, apice diametro longioribus; contentus cellularum tenuissime granulatus. Hormogonia complura saepissime 6 — 8 cellulis constantia ex apice filamentorum oriuntur. Filamentis ad basim 2,5 — 4,0 μ , mediocriter 3,2 μ latis, media in parte 2,0 — 2,8 μ , mediocriter 2,6 μ latis. Trichomatibus ad basim 2,3 — 3,0 μ , mediocriter 2,5 μ latis, media in parte 1,8 — 2,2 μ , mediocriter 2,0 μ latis;

latitudo pilorum 0,6 — 1,5 μ . Cellulis ad basim trichomatibus 1,0 — 2,0 μ longis, media in parte 2,0 — 2,8 μ longis, in pilis 5,0 — 7,0 μ longis.

Habitatio: In strato mucoso aliarum algarum, interdum abundans. Inventa in Polonia meridionali in rivulo e monte Hawrylakówka fluence apud oppidum Krynica in muco *Chaetophorae pisiformis* (Roth) Agardh (VII. 1957); in rivulo Szczawniczy prope Krynica in muco *Batrachospermi moniliformis* Roth (VII. 1958); in Brynica flumine prope Niezdara (ad Katowice) in muco *Chaetophorae pisiformis* et *Batrachospermi moniliformis* (IX. 1956); in Mszana Dolna in muco *Batrachospermi moniliformis* (X. 1959 et I. 1960); in Niedźwiedz (prope Mszana Dolna) in muco *Tetrasporae gelatinosae* (Vauch.) Desv. (VI. 1959).

Iconotypus fig. 2, a-e.

Homoeothrix articulata sp. n.

This species does not form thalli but appears most frequently singly or, more rarely, in small gatherings (about 2 — 6 filaments) among the mucilage covered branches of *Batrachospermum moniliforme*. The filaments with hairs 130 — 480 μ long, usually non-branched, undulatingly curved or, more rarely, almost straight, lie close to the branches of *Batrachospermum* whorls, but they do not fuse with them. They separate very easily under pressure and are often slightly narrowed at the base, then of almost constant width up to the apex. Sometimes apparently false branching is visible; on closer observation, however, it may be seen that these are two filaments adhering to each other as the lateral trichome does not grow from the main one. It may happen, however, that hormogonia develop in situ and then in the apical parts of the filaments short lateral branches emerging from the sheath of the mother filament are visible. It would appear that these branches are not permanent because in the material they are very seldom visible; however, more often the short filaments can be found developing from the hormogonia, lying loosely among older filaments. Filaments of this kind have no tendency to form branches. The width of mature filaments, i. e. those ending with a hair or forming hormogonia, oscillates from 4.5 — 6.6 μ . The sheaths are colourless, distinctly stratified or non-stratified, longer than the trichomes at the lower part and usually narrowed. They are widened at the apex, frayed, wrinkled, partly liquefying, and usually no longer than the hair itself. The trichomes are blue-green and from the base up to the point in which the trichome passes into a hair, they are of almost constant width or only slightly narrowed at the base. At the apex they change rather suddenly into a thin colourless hair. The width of the trichomes at the widest point is from 3.3 — 4.5 μ and the width of the hair 1 — 2 μ . The cells at the transverse walls are distinctly incised, square or shorter

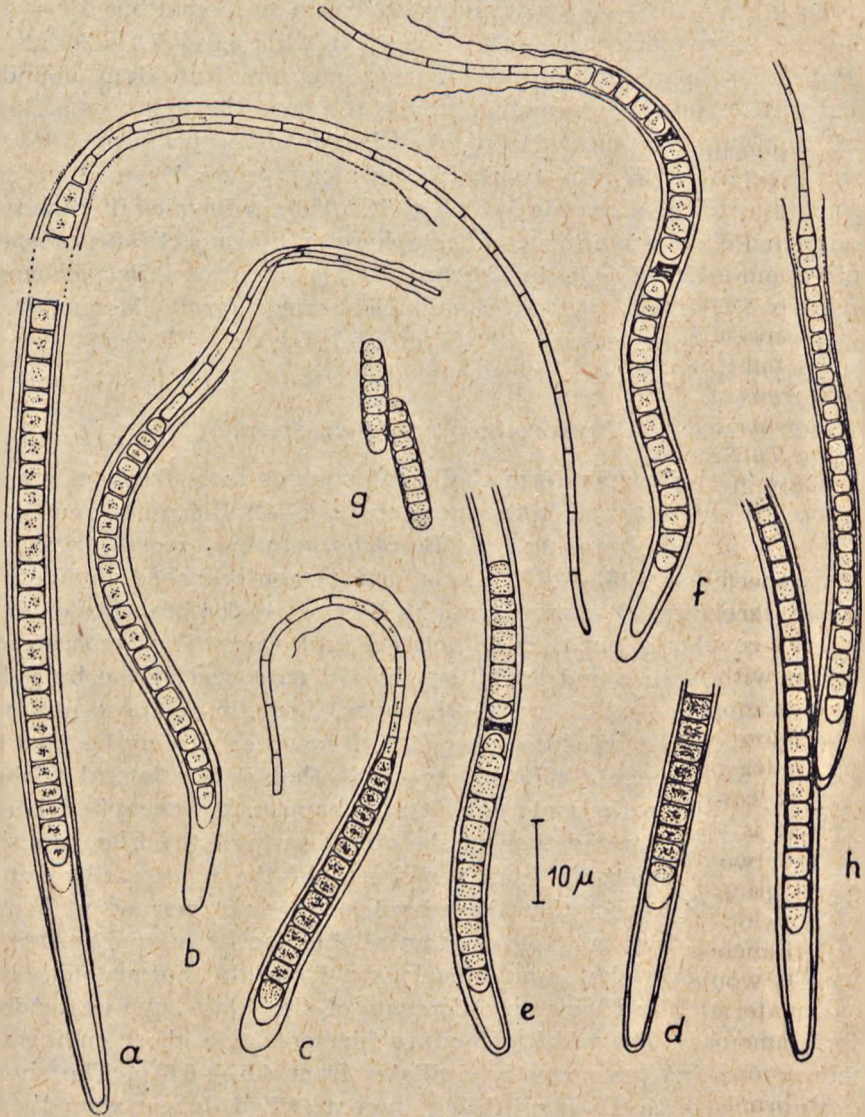


Fig. 3. *Homoeothrix articulata* sp. n.: a. a large filament with a stratified sheath, b-f. filaments most frequently found in the investigated material; e-f. the forming of Hormogonia separated by the necrotic cells; g. hormogonia surrounded by their own membrane; h. filaments imitating branching.

than the width, more rarely slightly longer, separated from each other by the thick transverse walls reaching sometimes 0.5μ in thickness, as a result of which the trichomes appear to be distinctly articulated. The

length of the cells oscillates from 2.0 — 3.5 μ , and of the hair from 5.0 — 7.5 μ . The width of the cells is similar to that of the trichomes. The protoplasm of the cells is fine-grained, and in the centre of the cells there are, as a rule, gatherings of slightly thicker grains. The hormogonia, mostly 6 — 10 celled, are formed in filaments in rows (fig. 2c) and are separated by necrotic cells. After the decline of the hair they emerge from the sheaths and become covered with a new, delicate sheath, that is at first closed at both ends. They grow by division of intercalary cells.

This species appears in *Batrachospermum moniliforme* thalli in the Szczawniczy stream, between Krynica and Powroźnik, where it was found on 26. VII. 1957 and 28. VII. 1958.

The fixed material is kept in the algological laboratory of the Institute of Botany of the Polish Academy of Sciences in Kraków.

Homoeothrix articulata is distinguished by a particularly characteristic habit of the filaments which have empty and narrowed sheaths at the base, of constant width, and as if articulated trichomes that narrow somewhat suddenly into a hair at the apex. The filaments and the trichomes, in contrast to other species of *Homoeothrix*, are not widened at the base and therefore are not especially like other species of this genus.

Diagnosis: *Homoeothrix articulata* sp. n. Filamentis in muco *Batrachospermi* viventibus, sparsis, solitariis vel binis-quadernis, simplicibus, irregulariter flexuosis vel rarius fere rectis, 130 — 480 μ longis 4,5 — 6,6 μ latis; vaginis achrois, lamellosis vel non lamellosis, basim saepius angustatis, apice ampliatis, pannosis, rugosis, diffluentibus; Trichomatibus aerugineo-coeruleis, 3,3 — 4,5 μ latis, ad basim non incrassatis, apice in pilum hyalinum fere subito productis; cellulis ad dissepimenta evidenter constrictis, subquadratis, vel paulo brevioribus quam latis, 2,0 — 3,5 μ longis in pilis 5,0 — 7,5 μ longis, contenu tenui granulato, media in parte cum nonnullis granulis maioribus. Dissepimenta cellularum clare evidantia, nonnumquam usque ad 0,5 μ crassa. Hormogoniis 6 — 10 cellulis constantibus, interdum in situ germinantibus.

Habitatio: In muco *Batrachospermi moniliformis* Roth, in rivulo Szczawniczy prope Krynica (Polonia meridionalis) 26. VII. 1957 et 28. VII. 1958 lecta.

Iconotypus fig. 3 a-h.

STRESZCZENIE

Opisano dwa nowe gatunki sinic: *Homoeothrix gloeophila* i *H. articulata* występujące w galaretowatych osłonach glonów: *Tetraspora gelatinosa* (Vauch.) Desv., *Chaetophora pisiiformis* (Roth.) Agardh i *Batrachospermum moniliforme* Roth. Nowe gatunki są endofitami galaretek glonów, przywiązanymi do tego oryginalnego siedliska, czego dowodem jest, że występują na odległych od siebie stanowiskach.

Homoeothrix gloeophila znaleziona została np. w potokach w okolicy Krynicy, Mszany Dolnej, Niedźwiedzia i w rzece Brynicy na Śląsku. W galaretkach glonów znajdują one ochronę przed splukaniem prądem wody i zapewne korzystają z zawartych w nich materiałów pokarmowych. Występują w dużej ilości tylko w starych plechach, jednakże wydaje się, że nie są przyczyną obumierania glonów, na których żyją.

Podane zostały szczegółowe opisy, diagnozy łacińskie oraz rysunki nowoopisanych gatunków.

References

- Elenkin A. A., 1949. Monographia algarum cyanophycearum aquidulcium et terrestrium in finibus U. S. S. R. inventarum. Fasc. II. Acad. Sc. U. S. S. R. Moskva, Leningrad.
- Geitler L., 1932, *Cyanophyceae* in Rabenhorst's Kryptogamen-Flora Bd. 14. Akad. Verlagsges. Leipzig.
- Hollerbach M. M., Kosinskaja E. K., Poljanskij W. I., 1953. Sinezele-nyje vodorosli. Sov. Nauka. Moskva.
- Vozzhennikova T. Th., 1953. Algae novae e fluvii montanis Tadzikistaniae. Bot. Mat. Otd. Spor. Rast., Inst. V. L. Komarova. Akad. Nauk U. S. S. R. Moskva — Leningrad.

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