Preslia, Praha, 59 : 229—242, 1987

Revision of several species of the genus *Homoeothrix* (*Cyanophyta*)

Revize několika druhů rodu *Homoeothrix* (*Cyanophyta*)

Jiří Komárek and Ľubomír Kováčik

Komárek J.[1]) et Kováčik Ľ.[2]) (1987): Revision of several species of the genus *Homoeothrix* (*Cyanophyta*). — Preslia, Praha, 59 : 229—242.

Several little known or new species of the genus *Homoeothrix* (filamentous cyanophytes/cyanobacteria) were revised. *H. stagnalis* (Hansg.) comb. nova (bas.: *Leptochaete stagnalis* Hansg. 1888) occurs in the littoral of shallow eutrophic fishponds in South Bohemia, Czechoslovakia. The morphologically similar *H. gloeophila* Starm., recently described from Poland, was found in Czechoslovakia for the first time in creeks in the Slovakian Carpathians. From Hansgirg's type materials (deposited in W) it was recognized that *H. rivularis* (Hansg.) Kom. et Kann from creeks in granitic regions (sensu Hansgirg, non Komárek et Kann) represents a different type from that wrongly used for the combination by Komárek & Kann 1973 from limestone regions in the Austrian Alps; the name *H. gracilis* (Hansg.) comb. nova is valid for the latter species. The first sample of *H. bornetii* (Sauv.) Mabille from central America (Cuba) is described. The variability of *H. violacea* [Kütz.] Kom. et Kann from a marine littoral habitat was studied in the exsiccate material. The new species *H. kannae* is described from alkaline tropical localities in Cuba.

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The genus *Homoeothrix* (Thur. ex Born. et Flah.) Kirch. (*Homoeotrichaceae, Oscillatoriales;* filamentous cyanophytes/cyanobacteria) is characterized by heteropolar trichomes with rounded bases and hair-like terminal parts, lacking both heterocysts and akinetes. The filamentous parts of two other and erroneously described genera, *Amphithrix* and *Leptochaete*, also belong to this genus (the "chroococcoid mass" on their trichome bases being mainly different species of coccoid cyanophytes). The review of the genus *Homoeothrix* with the revision of its most common species and with corresponding nomenclatural combinations was published by Komárek & Kann (1973) and further additions were made by Starmach (1980) and Li (1984). We have studied several little known or new species, corresponding with the generic diagnosis of *Homoeothrix*.

Homoeothrix stagnalis (Hansg.) comb. nova (Figs. 1—2, Plate IX)

Syn.: *Leptochaete stagnalis* Hansg. Nuova Notarisia 1888, p. 399, 1888 (basionym).

Filaments solitary, in small clusters or in disc-like dark colonies on the substrate, in old colonies ± densely gathered. Filaments slightly waved, up to 60—130(—220) μm long, attached by their rounded bases to the substrate, mainly embedded in a colourless, fine and diffluent mucilage around the bases (commonly colonized by bacteria). Occasionally *Calothrix*-like false branching occurs. The basis of a trichome is sometimes shifted within the

sheath in which an empty space remains in the basal part, sometimes with several separated necroidic basal cells (Fig. 1c, Plate IX : b). Sheaths colourless, very narrow, visible only at the ends of filaments after hormogonia formation and at the bases. Trichomes fine, 1.8—3(—4.5) μm wide at the basis, narrowed into a hyaline hair at the end or terminated with a narrowed empty sheath, 0.5—1 μm wide at the ends; the cross walls slightly constricted. Cells ± isodiametrical or slightly either shorter or longer than their width, in old parts up to 1.5× longer. Cell content pale blue-green, with slightly visible chromatoplasm, without granulation. Reproduction by hormogonia formation. Hormogonia rarely with a small number (mainly 12—20) of cells, developing particularly from the old filaments.

The species was described from stones and woody substrates in central Europe, occurring mainly together with *Chaetophora*. Our material was collected repeatedly from the periphyton on submerged parts of littoral vegetation in shallow eutrophicated fishponds near Třeboň (South Bohemia, Czechoslovakia). Both localities are probably ecologically similar; *Homoeothrix* occurs in our ponds together with *Chaetophora* in spring and with dominant *Stigeoclonium farctum* in summer.

The small differences between our material and the original description (smaller width of cells, longer filaments, different substrate) probably fall within the range of variation of this species. The determination of our material was supported by the comparison with the type material. An interesting fact is that several solitary necroidic cells, released from the trichome basis sometimes occur in the empty sheaths at the basis. This phenomenon corresponds with HANSGIRG's iconotype of this species (comp. Fig. 356 in GEITLER 1932, p. 569). Similar cells sometimes occur also between the separated hormogonia in the upper parts of the sheaths.

Homoeothrix gloeophila STARM. 1960 (Fig. 3)

H. gloeophila is morphologically very similar to *H. stagnalis*, but it was described from the mucilage of algae (*Tetraspora*, *Chaetophora*, *Batrachospermum*) from streams of the northern slopes of the Polish West Carpathians (STARMACH 1960). Specimens morphologically almost identical with the original description of this species were collected also in the small creek Rojkovec between Rojkov and Kraľovany in northern Slovakia (West Carpathians, Czechoslovakia), from the bases of *Cladophora glomerata* (leg. A. GARDAVSKÝ, VIII. 1976). Both species, *H. stagnalis* and *H. gloeophila*, thus differ mainly in their ecology; their further taxonomic comparison is therefore necessary.

The filaments were in the Slovakian specimens 3.2—4 μm wide at their bases and about 1 μm wide at the ends. In comparison with *H. stagnalis*, the sheaths are somewhat firmer and more distinct.

Homoeothrix rivularis (HANSG.) KOM. et KANN 1973 (Fig. 4)

Syn.: *Leptochaete rivularis* HANSG. Österr. Bot. Zeitschr. 38 : 117, 1888 (diagn., basionym), exs. no. 5306 (W); *Homoeothrix rivularis* (HANSG.) KOM. et KANN Arch. Protistenk. 115 : 206, 1973 (sensu typo, non sensu KOMÁREK & KANN 1973) (Tab. 1).

The description does not correspond with the type material (see Tab. 1, p. 231).
H. rivularis is known only from non-calcareous stony and wooden substrates in mountain creeks in the Šumava (Böhmerwald) Mts. (HANSGIRG 1888, revised type-material).

We studied the type material from "Herbar von Anton Hansgirg" deposited

Tab. 1.

	Thallus	Width of filaments	Sheaths	Length of filaments
Orig. descr. (comp. GEITLER 1932, p. 570)	brownish yellow	3—4 μm	very narrow, gold yellow to brown	mainly 12—18 μm
Type material (from W)	greenish	2—3.5 μm	very narrow, firm, colourless	mainly 30—60 μm, up to 140 μm

Note: The length-width ratio varies from 1 : 2 to 1 : 1 in cells of the type.

in W (no. 5306). The locality: "Böhmen an untergetauchten Steinen und Hölzern in schnellfliessendem Wasser, Pampferhütte bei Eisenstein, August 1887, leg. A. Hansgirg". This exsiccate is not unquestionable (it contains also *Lemanea* sp., hormogonia of *Phormidium autumnale*, diatoms and other algae) and does not correspond with HANSGIRG's description (long-time preservation in dried state?). The filaments are narrower, the sheaths are never yellow to brown. DROUET (1957) determined this specimen as "*Amphithrix janthina*" (it is really morphologically as well as ecologically similar to *Homoeothrix janthina*). Therefore, the species is problematical and must be revised.

According to the original descriptions, *H. rivularis* is morphologically similar to *H. gracilis*. However, when the type exsiccates are compared, the difference between the two species is conspicuous; the diacritical features are in their morphology of filaments, sheaths and colonies, in their average dimensions and in their ecology.

Homoeothrix gracilis (HANSG.) comb. nova (Fig. 5)

Syn.: *Leptochaete crustacea* var. *gracilis* HANSG. Sitzungsb. Böhm. Akad. Wiss., p. 138, 1892 (basionym); *Leptochaete gracilis* (HANSG.) GEITL. Süssw.-fl. Mitteleur., p. 208, 1925; exs.: leg. HANSGIRG (PRC); no. 6130 (W).
Homoeothrix rivularis (HANSG.) KOM. et KANN Arch. Protistenk. 115 : 206, figs. 38—47, 1973 (sensu KOMÁREK & KANN, non sensu originali in HANSGIRG 1888).

Filaments situated ± parallely in fascicles; colonies micro- to macroscopic, in the form of a brownish encrusted layer on calcareous stones, up to 0.5 mm thick. Filaments straight or slightly curved, without branching, up to 300 μm long, at the basis unwidened or only slightly widened, 3—6 μm wide, to the end continually narrowed and terminated with a hyaline hair without visible cross walls. Sheaths narrow, sometimes telescopic, clearly finely granular, intensely gold-yellowish or brownish, colourless in the upper parts. Trichomes clearly constricted at the cross walls, at the basis 2.5—5 μm wide. Cells mainly shorter than their width to ± isodiametric, only very rarely longer than their width near the old bases or in apical parts. Cell content pale blue-green or greyish, without granulation. Reproduction by hormogonia formation.

This species forms thin brownish-green crusts on the surfaces of stones in oligotrophic shallow waters. It is known only from limestone substrates in creeks and in littoral zones of small lakes

and pools in the calcareous Alps in Austria (Tirol, Steiermark, probably more common) and in a special form from Corsica(?).

We studied the material from calcareous creeks near Lunz am See (Austria; comp. KOMÁREK & KANN 1973) as well as the samples of HANSGIRG (exsiccates from PRC with no locality indicated, and from W no. 6130), all morphologically identical. In the original description by HANSGIRG only one locality is given (calcareous stones in Tirol, Austria). DROUET (1957) included the type material from W into *Amphithrix* (= *Homoeothrix*) *janthina;* however, the two species differ both morphologically and ecologically.

Homoeothrix bornetii (SAUV.) MABILLE 1954 (Fig. 6)

Syn.: *Tapinothrix bornetii* SAUV. Bull. Soc. bot. France 1892 : 123, 1892; *Homoeothrix bornetii* (SAUV.) MABILLE Rev. algol., ser. nov. 1 (1) : 11—13, 1954.

Filaments erect, joined into small, thin, yellow-green groups and colonies on the surfaces of calcareous stones, freely or densely packed together. Filaments never branched, with fine precipitations in the basal parts, up to 400 μm long, cylindrical, at the end narrowed into a hyaline, ± pointed hair (often lacking visible cross walls), unwidened at the basis, 2.8—3.2(—4) μm wide. Sheaths thin, firm, colourless. Trichomes slightly constricted at the cross walls, 2.5—3(—3.6) μm wide. Cells shorter than their width to isodiametrical, rarely (in hormogonia) longer than their width, with a pale greyish or blue-green content, without prominent granulation. Reproduction by hormogonia adhering by one end to the substrate, rarely (when not attached) growing at both poles.

The species is known from calcareous (only?) stones in creeks and springs in Algeria, France and Spain (Baleares-islands). Our specimens were collected from wet calcareous stones above the water level ("Spritzzone") in the creek Caburni, Sierra Escambray (north of Topez de Collantes), Cuba, in March 1981.

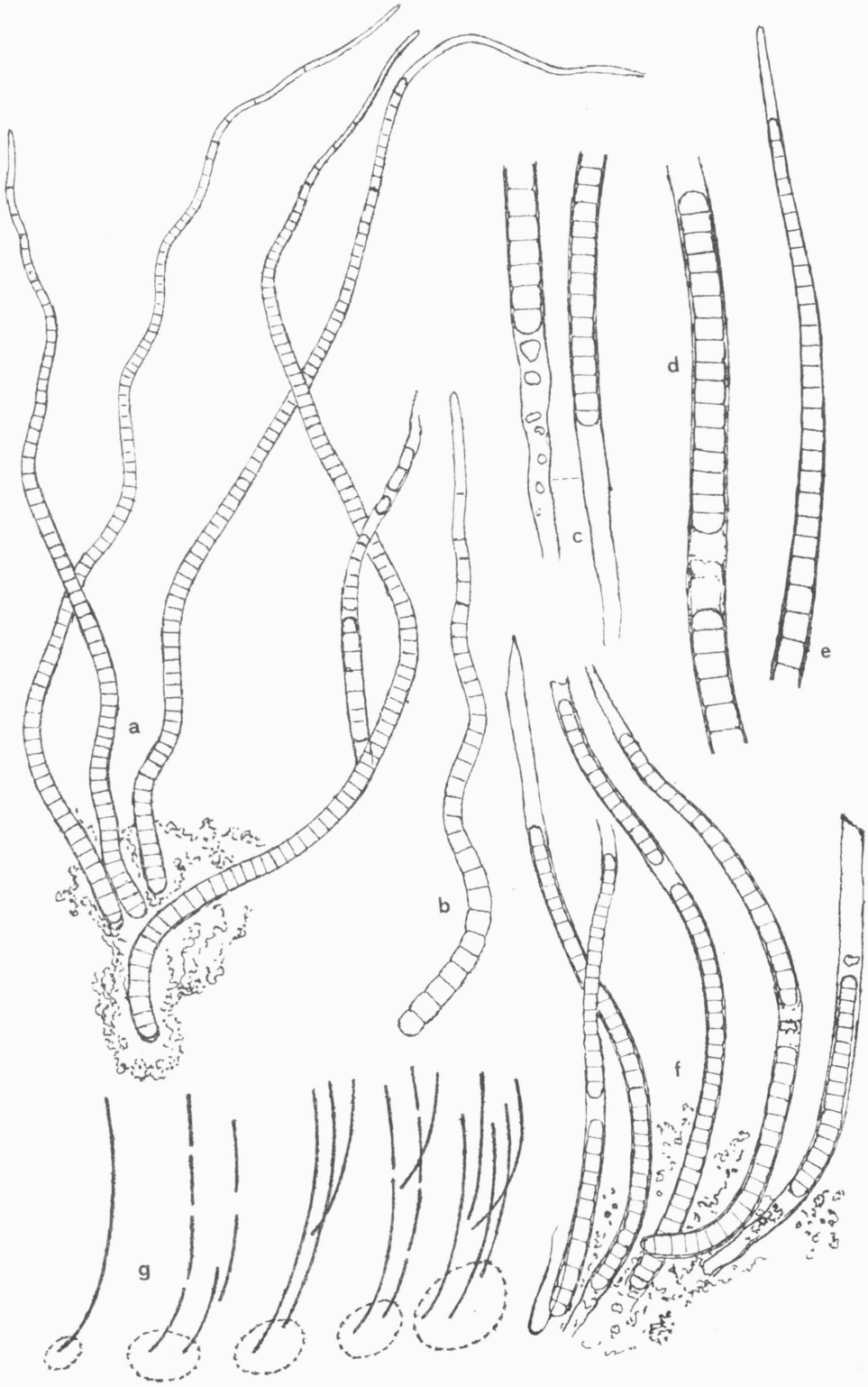
Our material corresponds morphologically as well as ecologically with the original description, only the filaments are slightly shorter. From the ecologically similar *H. varians* it differs mainly by the shorter and thicker filaments, by a different cell morphology and by the character of colonies. The hormogonia and young filaments sometimes grow (when not attached to the substrate) at either end and form short, isopolar filaments with both ends narrowed, resembling *Ammatoidea* (Fig. 6c). However, such stages occur only rarely and the old filaments have a heteropolar structure typical of *Homoeothrix* (Fig. 6b). Similar stages were found also in *H. nordstedtii* and *H. balearica* (STARMACH 1980).

Homoeothrix violacea [KÜTZ.] KOM. et KANN 1973 (Fig. 7)

Syn.: [*Hypheothrix violacea* KÜTZ. Spec. Alg., p. 267, 1849]; *Amphithrix violacea* [KÜTZ.] BORN. et FLAH. Ann. Sci. nat. Bot. 7, 3 : 344—345, 1886 (diagn., basionym); *Homoeothrix violacea* [KÜTZ.] KOM. et KANN Arch. Protistenk. 115 : 209, 1973; exs. no. 218 (Phyc. Bor.-Amer., SV).

? [*Schizothrix rubra* CROUAN Florul. Finistère, p. 118, 1867]; *Calothrix rubra* [CROUAN] BORN. et FLAH. Revis. Nost. hétéroc. 1 : 345, 1886; *Homoeothrix rubra* [CROUAN] FRÉMY Bull. Soc. Linn. Norm. 9 : 131, 1926.

Fig. 1. — *Homoeothrix stagnalis;* **a** — group of filaments with the mucilaginous pad, **b** — young trichome, **c** — bases of filaments with empty sheaths, **d** — hormogonia formation, **e** — end of filament, **f** — group of old filaments producing hormogonia, **g** — scheme of the branching of filaments. (Orig.)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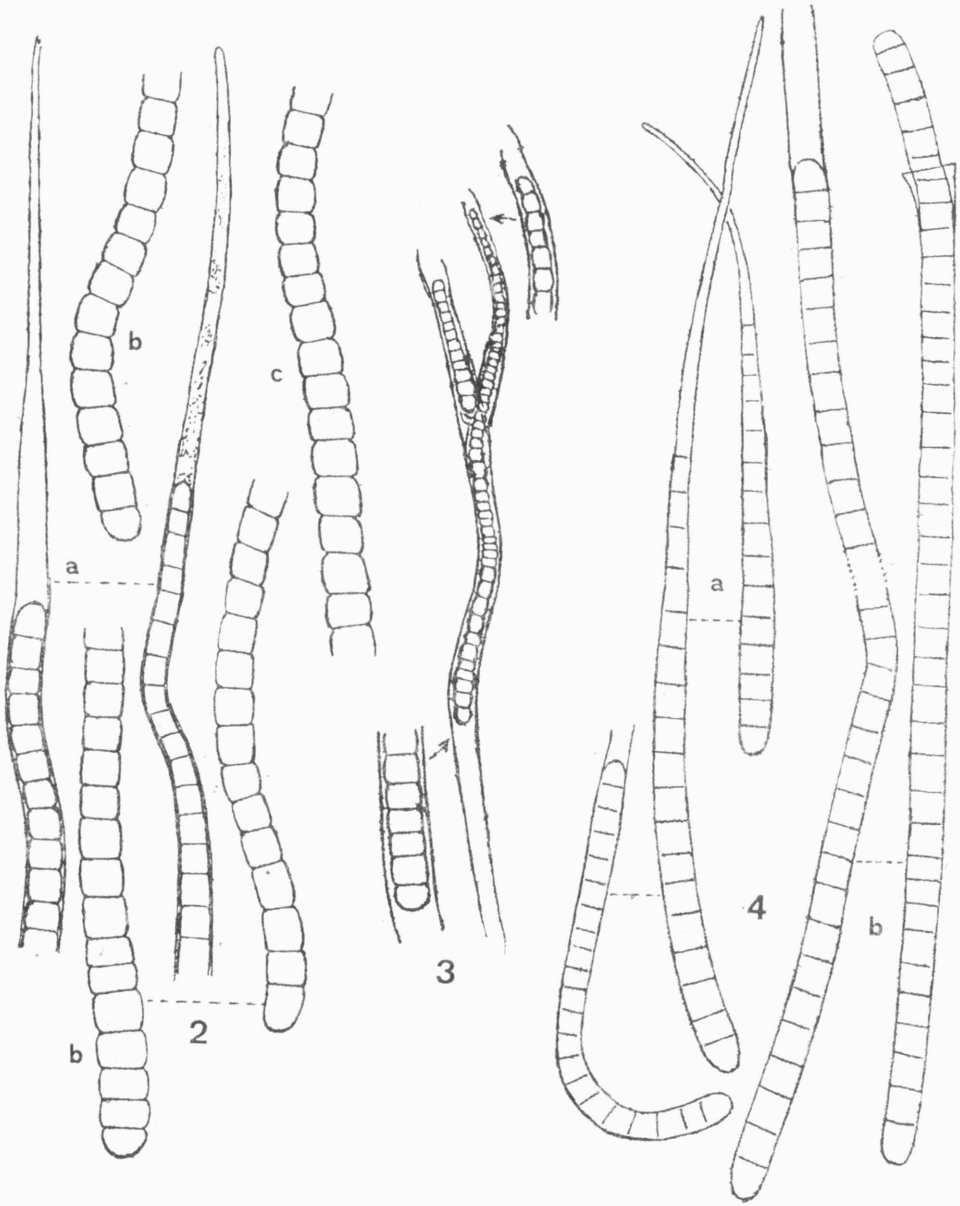

Fig. 2. — *Homoeothrix stagnalis;* **a** — ends of filaments, **b** — bases of trichomes, **c** — part of a trichome. (Orig.)
Fig. 3. — *Homoeothrix gloeophila.* (Orig. GARDAVSKÝ.)
Fig. 4. — *Homoeothrix rivularis* from the type material (exs. no. 5306 — W); **a** — young filaments, **b** — old filaments. (Orig.)

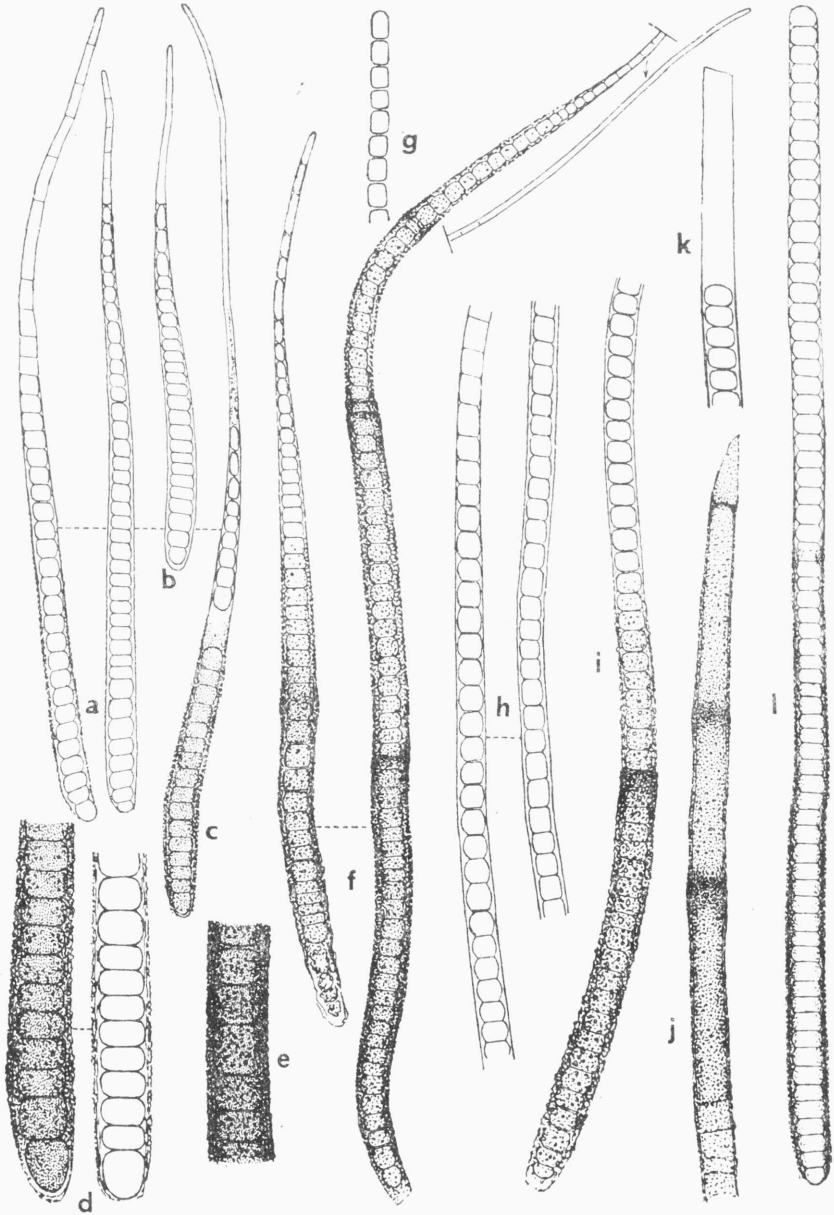

Fig. 5. — *Homoeothrix gracilis*. (From KOMÁREK et KANN 1973, sub "*H. rivularis*".)

Amphithrix laminariae KUCKUCK Bem. mar. Algenveg. Helgoland, p. 263, fig. 29, 1894.

Filaments solitary or in dense reddish clusters and fascicles, attached to the substrate by their rounded bases; colonies microscopic to macroscopic, small, discoid, olive blue-green, yellow-brown, purplish or brownish-red.

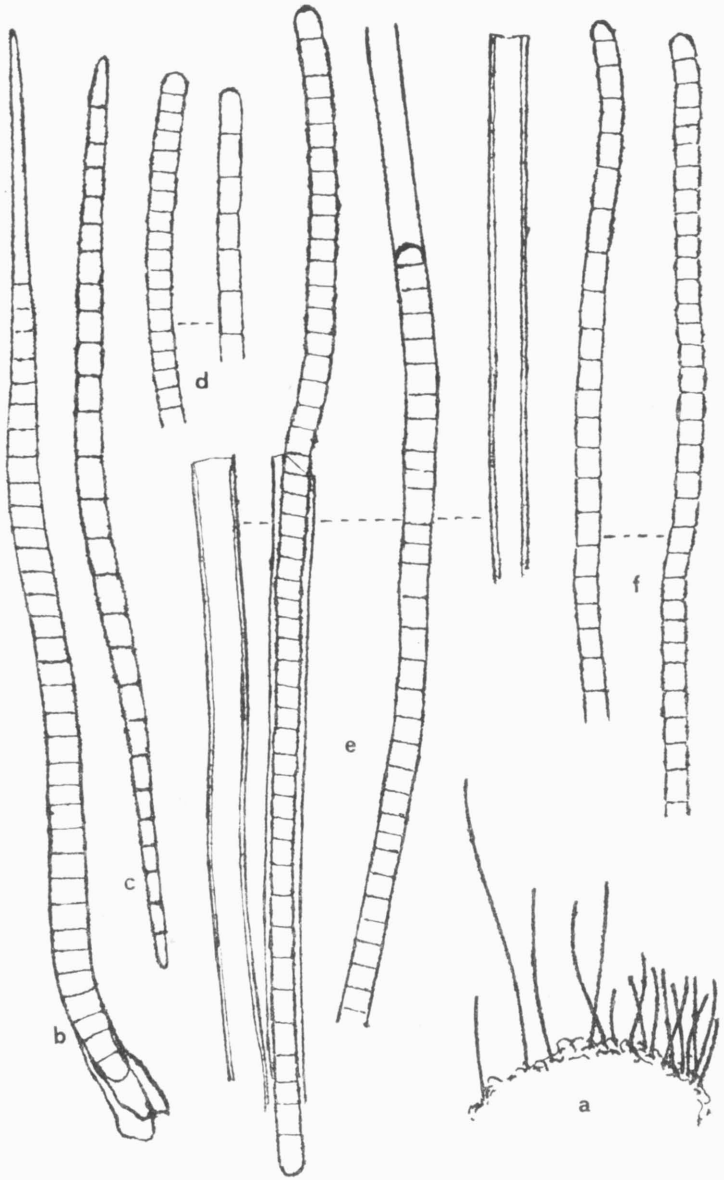

Fig. 6. — *Homoeothrix bornetii;* **a** — filaments attached to the substrate, **b** — young filament, **c** — both-sided germinating hormogonium, **d** — ends of trichomes, **e** — filaments in sheaths and empty sheaths, **f** — trichomes. (Orig.)

Filaments ± straight or slightly curved, narrowed at the apex, sometimes elongated with a narrowed empty sheath, up to 1(—3) mm long, (1.5—) 2—3.8(—4) μm wide. Occasionally *Calothrix*- or (very rarely) *Scytonema*-like false branching. Sheaths colourless, firm, thin or slightly widened, hyaline,

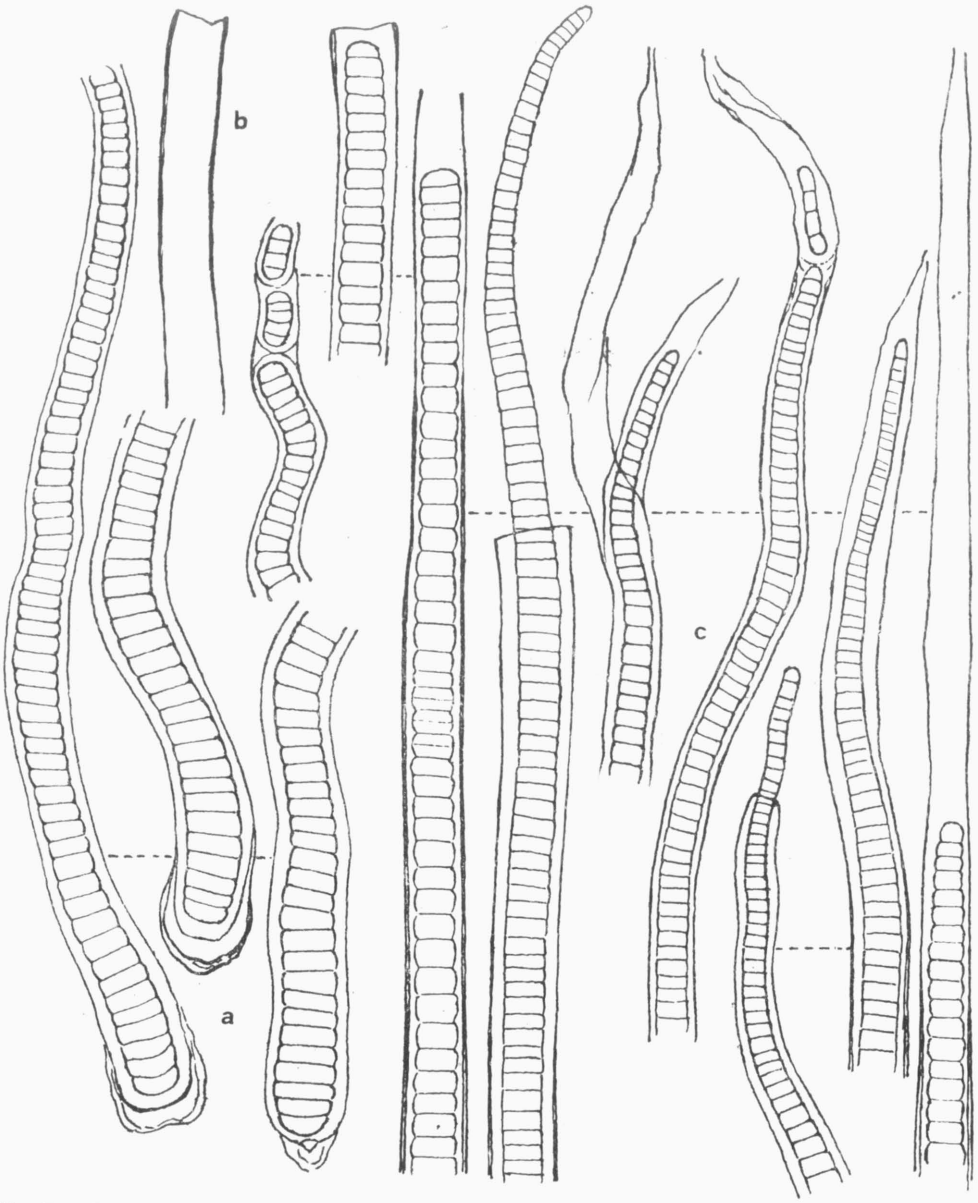

Fig. 7. — Homoeothrix violacea (from the exs. no. 218 — Phyc. Bor. — Amer); **a** — bases of filaments, **b** — empty end of a sheath, **c** — variability of filament ends (Orig.)

wider and slightly lamellated near the basis, narrowed and mainly opened to the ends. Trichomes rounded on the basis, 1.8—2.5(—3) μm wide, narrowed to the ends, apical cells rounded; cross walls slightly constricted (immersion!). Cells commonly shorter than their width, with a homogeneous or slightly granular content. Cell content varies from pale grey-blue and

yellow-green to greenish, reddish or purple, cross walls slightly visible. Reproduction by hormogonia formation.

Locality of the material studied: Phycotheca Bor.-Amer. (leg. F. S. COLLINS, July 1892), on cliffs at high watermark, Eagle Island, Penobscot Bay, Maine, USA. Other localities from the literature: marine shores of the Baltic Sea, England, France, FRG, Norway, Spain, USA-California.

The exsiccate used in our study was from Phycotheca Boreali-Americana, marked by no. 218 under the name "*Amphithrix violacea* (Kuetz.) Born. et Flah.; BORNET & FLAHAULT, Revision des Nost. Het., part 1, p. 344, 1886". In this sample, all the features characteristic of the species included in synonyms of *H. violacea* were distinguishable (shorter trichomes in *Amphithrix laminariae*, thickness of sheaths and false branching of *Homoeothrix rubra*, etc.). Our study supports, therefore, the hypothesis about the identity of all these taxa.

Homoeothrix ***kannae***, spec. nova (Figs. 8—9)

Diagnosis: Filamenta plus minusve paralleliter in strata brunescentia intricata, ad 0.5 mm longa, basim 10—19.2 μm lata; trichomata aeruginosa, basim rotundata, 7.2—13.2 μm lata, ad dissepimenta distincte constricta, ad apices abrupte attenuata in filum hyalinum, breve, ad 3.5 μm latum, cellula apicalis rotundata; vaginae firmae, latae, basim dilatatae, lamellatae, incolores vel (in filamentis adultis) fusco-luteae; cellulae in zonas meristematicas ad 1/4 breviores, in partes apicales ad 3× longiores diametro trichomatis. — Locus classicus: Cuba, ad parietes lacus artificialis "Niña Bonita", prov. Habana, ad rupium calcareum. — Etymologia: Ad honorem Dr. Edith KANN (Vienna, Austria) nominata.

Filaments situated densely and ± parallely, perpendicularly to the stony substrate (limestone), forming dark brownish colonies. Filaments waved, with a clearly widened basis, up to 450 μm long, 10—16(—19.2) μm wide, in the middle part cylindrical, narrowed to the ends to 6.5 μm, their false branching very rare. Sheaths thick, firm, lamellated, intensely widened at the basis, colourless or (only in old filaments) yellow-brown. Trichomes ± cylindrical, 7.2—13.2 μm wide, shortly narrowed to the ends to 3.5 μm (mainly only along the 12—20 terminal cells), mostly clearly constricted at the cross walls, terminal cells rounded. Cells very short in the young trichomes (in the meristematic zone up to 4-times shorter than their width), later elongating, becoming isodiametrical to 2(—3)-times longer than their width (old trichomes, terminal cells). Cell content blue-green, finely and homogeneously granular, narrowed terminal cells sometimes vacuolized (Fig. 8e). Reproduction by hormogonia (Fig. 9g), mainly 4.3—4.5 μm wide.

The typical material was collected several times from the calcareous substrates in the littoral region near the outflow from the tropical reservoir („presa Niña Bonita") near Habana (prov. Habana) in Cuba, during the winter season (October to February 1980—1981). Water temperature 18 to 21 °C.

The species is morphologically clearly different from all other *Homoeothrix* members.

ACKNOWLEDGMENT

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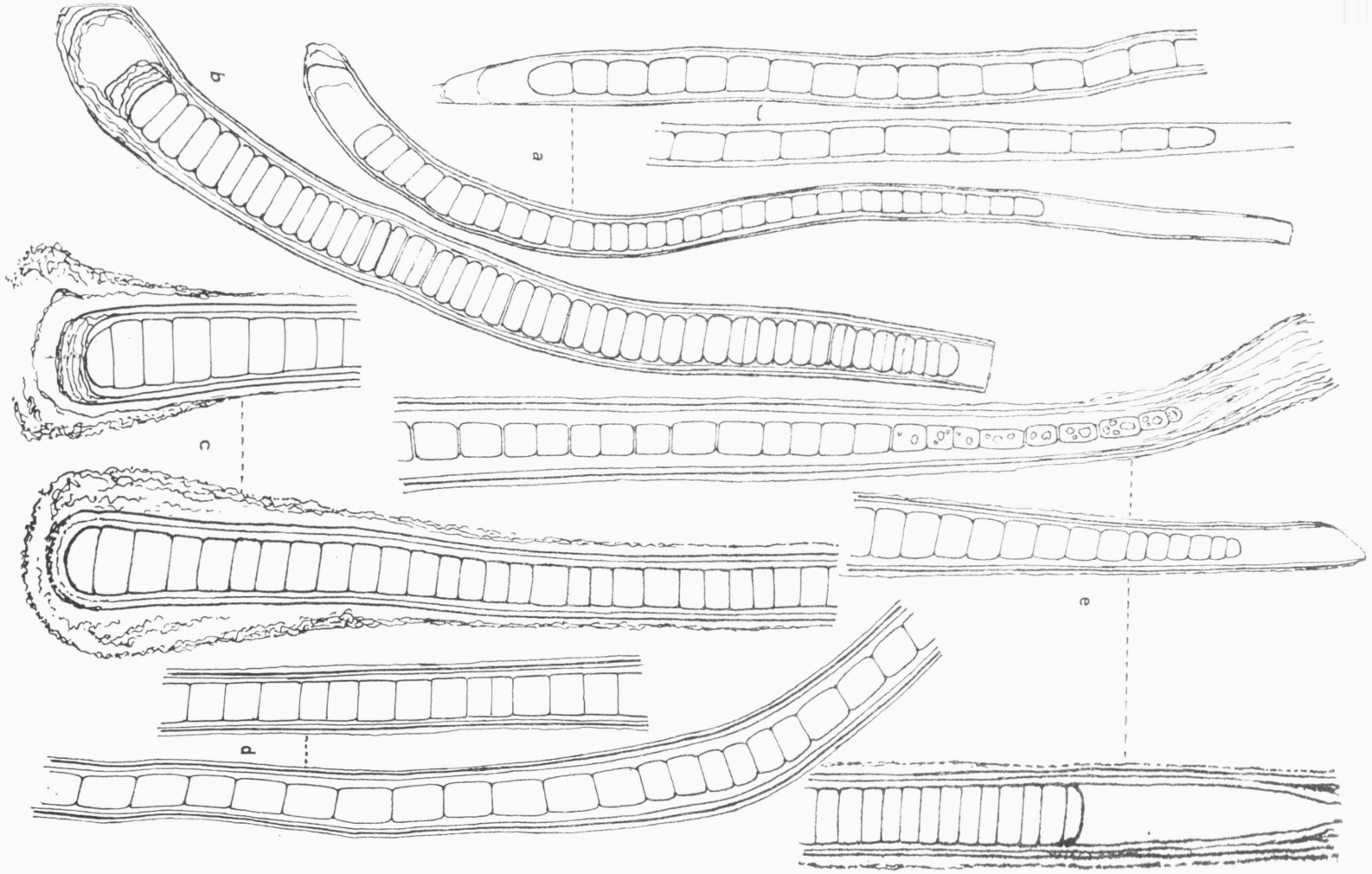
Fig. 8. — *Homoeothrix kannae;* **a** — young filaments **b** — old filament after hormogonia release and with intensely dividing cells, **c** — bases of old filaments, **d** — middle parts of filaments, **e** — terminal parts of filaments. (Orig.)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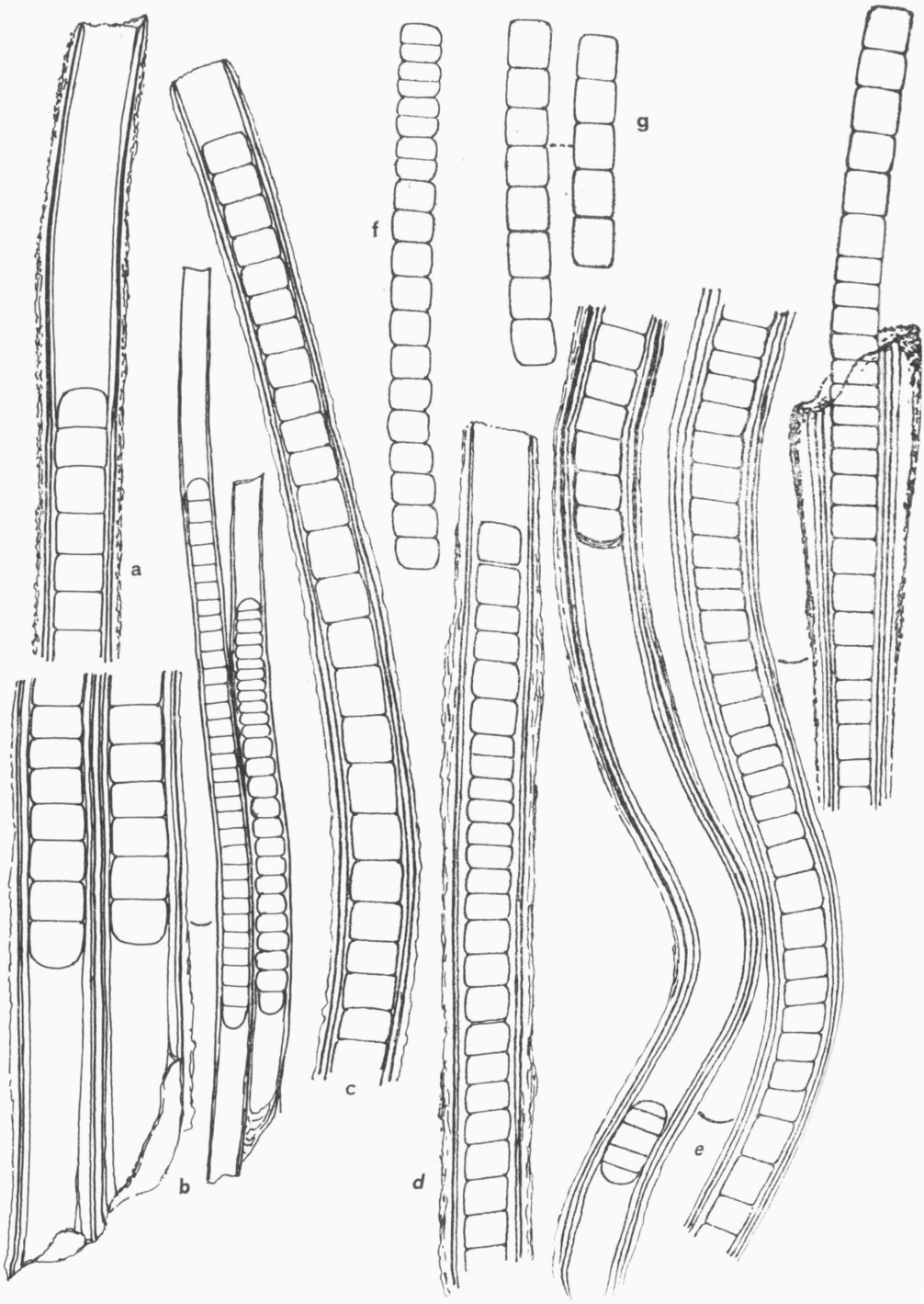

Fig. 9. — *Homoeothrix kannae;* **a**—**e** — filaments after hormogonia release **f** — germinating hormogonium, **g** — hormogonia. (Orig.)

risches Museum, Wien) for having kindly provided the exsiccate materials (type specimens) from the cryptogamic herbarium.

SOUHRN

Rod *Homoeothrix* (Thur. ex Born. et Flah.) Kirchn. 1898 nom. cons. (Komárek 1965) (*Homoeotrichaceae, Oscillatoriales, Cyanophyceae*) má heteropolární vlákna, která jsou přisedlá zaoblenými basemi k podkladu a na apikálním konci zakončená zúženými, vláskovitě protaženými trichomy. Trichomy jsou uzavřeny v pochvách, heterocysty a akinety chybí. Do tohoto rodu byly později přeřazeny některé druhy z nesprávně popsaných rodů *Amphithrix* a *Leptochaete* (včetně jejich nomenklatorických typů), charakterizovaných masou jednotlivých buněk na bázi vláken. Tyto bazální solitární buňky však patří jiným kokálním rodům a druhům (Geitler 1932, 1942, Starmach 1959, Komárek & Kalina 1965, aj.), jednalo se tedy v těchto případech vlastně o epilitické společenstvo sinic z tekoucích vod, jejichž vláknitá složka odpovídá druhům z r. *Homoeothrix*. Revize a základní přehled r. *Homoeothrix* byly publikovány Komárkem a Kannovou (1973), kteří provedli i nutné nomenklatorické kombinace u druhů, jejichž materiál měli k dispozici.

V minulých letech jsme studovali několik málo známých druhů tohoto rodu. *Homoeothrix stagnalis* (Hansg.) comb. nova (basionym = *Leptochaete stagnalis* Hansg. 1888) byl ověřen téměř po 85 letech od původního popisu (Figs. 1—2, Pl. IX). Vyskytuje se v litorálu jihočeských obhospodařovaných rybníků jako součást perifytonu na ponořených částech pobřežní vegetace. Náš materiál byl srovnáván s morfologicky velice podobným druhem *H. gloeophila* Starm., popsaným z Polska z potoků severních svahů Karpat a u nás poprve nalezeným na podobné lokalitě u Kraľovan (Fig. 3). Ze studia Hansgirgova typového materiálu (z muzea ve Vídni — W), popsaného v r. 1888 ze Šumavy jako *Leptochaete rivularis* (Fig. 4) vyplynulo, že dříve publikovaná nomenklatorická kombinace „*Homoeothrix rivularis* (Hansg.) Kom. et Kann" je sice platným jménem pro tuto sinici, avšak materiál, použitý k této kombinaci Komárkem a Kannovou (1973) z vápencových lokalit v Alpách, reprezentuje jiný druh, jehož platné jméno je *Homoeothrix gracilis* (Hansg.) comb. nova (rovněž potvrzeno revizí typového materiálu) (Fig. 5). Vedle nenápadných, ale významných morfologických rozdílů se oba tyto druhy (*H. rivularis* a *H. gracilis*) liší i ekologicky a jejich dřívější synonymizace nebyla oprávněná. V horských, vápencových potocích na Kubě (Sierra Escambray) byla nalezena *H. bornetii* (Fig. 6), známá dosud jen z podobných lokalit ve Středomoří (Alžír, jižní Francie, Baleary). Morfologickou variabilitu mořského druhu *H. violacea* [Kütz.] Kom. et Kann 1973 jsme studovali z exsikkátů ze sev. Ameriky (Fig. 7). Tento druh je znám z mořského litorálu na atlantickém i pacifickém pobřeží mírného pásma, kde roste přisedle na řasách a kamenech. Mimo tyto revidované taxony je v práci popsán nový tropický druh *H. kannae* z litorálu alkalických vodních nádrží na Kubě (Figs. 8—9), nazvaný na počest Dr. Edith Kannové (Vídeň), která podstatně přispěla k poznání r. *Homoeothrix*.

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See also Plate IX in the Appendix

F. Köhlein:

Enziane und Glockenblumen

Verlag Eugen Ulmer, Stuttgart 1986, 326 str., 115 barev. fotografií, 80 obr., cena 98.— DM. (Kniha je v knihovně ČSBS.)

Poslední díl knižního kvarteta „Horské rostliny v zahradě" Kritze Köhleina je věnován hořcovitým a zvonkovitým rostlinám. (Předchozí díly pojednávají o prvosenkách, lomikamenech a pěstovaných sukulentech.) Kniha se zabývá rody *Gentiana, Gentianella, Gentianopsis, Megacodon, Swertia* a dále *Campanula, Adenophora, Codonopsis, Cyanthus, Edraianthus, Jasione, Ostrowskia, Physoplexis, Phyteuma, Platycodon, Symphyandra, Trachelium* a *Wahlenbergia.*

Největší část knihy je logicky věnována nejrozsáhlejším rodům *Gentiana* (137 stran textu) a *Campanula* (87 stran). U těchto rodů je zachován i stejný způsob zpracování (u ostatních rodů pak adekvátně přizpůsobený znalostem): uvedena je stručná historie pěstování v zahradních kulturách, pěstovaný sortiment a jeho využití. Jsou připojeny návody na pěstování, vysévání semen, možnosti rozmnožování aj. Krátce jsou zmiňováni škůdci a nemoci. Další kapitoly jsou věnovány systematice a klasifikaci. Při popisu druhů je jednotně uvedeno latinské jméno, německé jméno, případná latinská synonyma, popis druhu, rozšíření, podmínky pěstování v zahradě. Druhy jsou v rámci rodů seřazeny podle abecedy, ke konci kapitoly jsou uvedeny kříženec a odrůdy (kultivary). Přehled druhů s popisy je úctyhodný. Jen u rodu *Gentiana* je uvedeno 167 druhů ve dvou skupinách (známé a důležité druhy; méně důležité a vzácné druhy) a 88 kříženců, resp. odrůd. U agregátu *Gentiana acaulis* je připojen určovací klíč rozlišující 7 druhů. U rodu *Campanula* je uvedeno více než 175 druhů, z nichž zvláště u *C. carpatica, C. cochleariifolia, C. glomerata, C. persicifolia* a *C. poscharskyana* je zmíněno množství zahradnických sort a kultivarů. Připojeno je 40 kříženců. Obdobným způsobem jsou v knize zpracovány všechny uvedené rody. Závěr knihy tvoří přehledy a rejstříky (synonyma hořcovitých a zvonkovitých, rozdělení do skupin podle nároků na pěstování a užití, chromosomová čísla, chráněné druhy hořců a zvonků v Bavorsku, Rakousku a Švýcarsku). Doplňkem je adresář firem, zabývajících se pěstováním, dále seznam literatury a rejstřík jmen rostlin užitých v knize.

Kniha není striktně vědeckým dílem; z komerčních důvodů je zaměřena k širšímu okruhu čtenářů. Je však metodicky výborně zpracovaná, lehce v ní najdeme např. přehled o globálním rozšíření druhů, nároky na pěstování a substrát, cenné poznatky z biologie jednotlivých druhů, nomenklatorické a další poznámky, které budou zajímat i specialisty těchto rodů. Je doplněna exkluzivními fotografiemi a názornými kresbami. Svojí úpravou patří mezi příklady populárně-vědeckého knižního zpracování a je vybraným estetickým zážitkem.

J. Kolbek

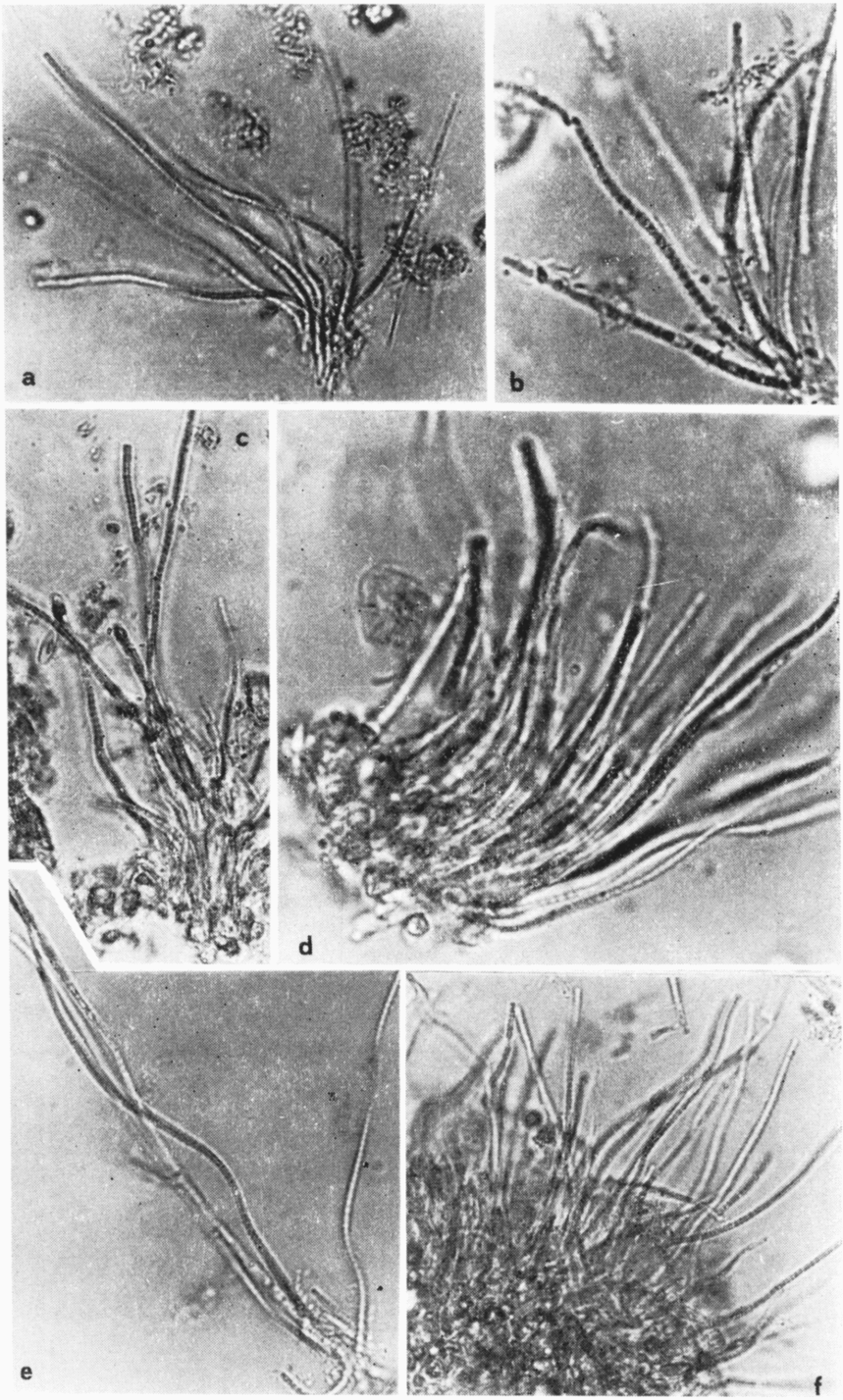

Plate IX – *Homoeothrix stagnalis*. (Foto Kováčik)