

## NOTES ON MYXOMYCETES VII

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(*Doorwerth*)

(received October 23rd, 1963)

As in my previous papers dealing with *Myxomycetes* collected by me in the Netherlands, here too the specimens dealt with are preserved either in my private collection, in that of the Botanical Museum and Herbarium of the State University, Utrecht (in the last-mentioned case the numbers are followed by a "U"), or in both. I am much indebted to Prof. Dr. G. W. Martin for sending me valuable specimens, and for his help, to the British Museum for the facilities accorded to me for studying its Myxomycete collections, and to Dr. R. Santesson of the Institute of Systematic Botany of the University of Uppsala for advice and the loan of valuable specimens.

### CRIBRARIA PERS.

*Cribraria argillacea* (Pers.) Pers.; Fig. 1 and 2.

15; 51 U; 123 U; 319 U; 429 U; 547; 569 U; 587 U; 688 U; 826 U; 1068; 1104; 1304; 1389; 1934; 1970; 2022; 2023; 2121; 2385; 2657; 2733; 2745; 2815; 2910; 2963; 2973; 2985; 3030; 3031; 3061; 3062; 3091; 3497; 4127; 4145 U; 4158; 4194; 4218; 4250; 4365; 4594; 4613 (cf. Fig. 2); 4935; 5230 all from decaying coniferous wood, Heelsum-Doorwerth; 608 U from decaying coniferous wood Bilthoven, leg. M. A. Nannenga; 1388 from decaying wood in a living oak, Bilthoven; 2013 on pine needles next to a pine stump, Doorwerth; 5189 (cf. Fig. 1) a small collection obtained in a moist chamber on moss growing on a piece of bark from a living oak, Wolfheze.

Although variable, this species is, as a rule, not difficult to identify, even in the field. The sporangia are shortly stalked, usually crowded together, of a sandy yellow-brown colour with a delicate, silvery, fugaceous peridium, of which the lower part occasionally persists as a cup. The net is usually fairly wide-meshed, consisting of flat bands, which become broader towards the base, and which are connected by thin threads; at the base they sometimes form ribs. It is sometimes pale (ochraceous by transmitted light) Fig. 1, but may be nearly black (red-brown by transmitted light, with some dark granules with bright strongly refracting centres) Fig. 2; these dark bands often extend into the stipe in the form of prominent ribs, more or less in the same way as in *C. ferruginea*, but that species has a quite different colour (Fig. 4). Sometimes (15, 3091 and 2745), the typical *C. argillacea* net with its more or less even bands is modified at the apex of the sporangia, and passes into a net of thin threads with small nodes, very like those of *C. oregona*, but that species, although rather similar

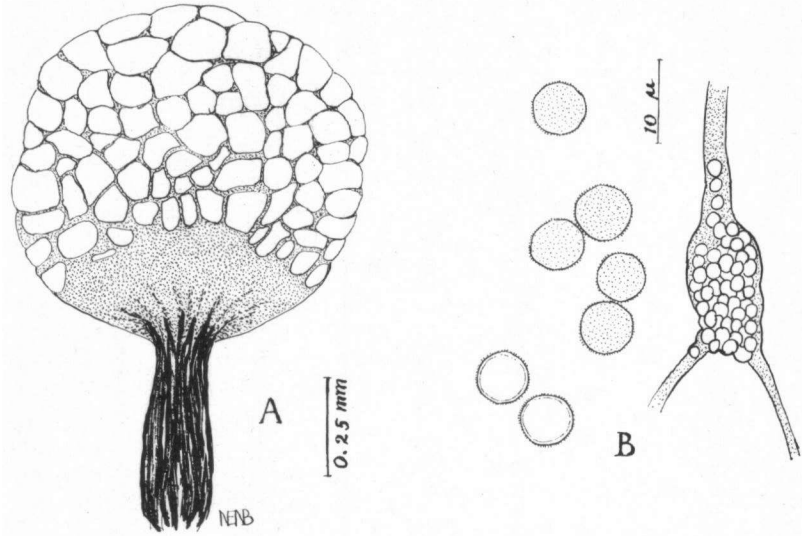


Fig. 1. *Cribraria argillacea*, 5189; A, sporangium; B, spores and a part of the peridial net.

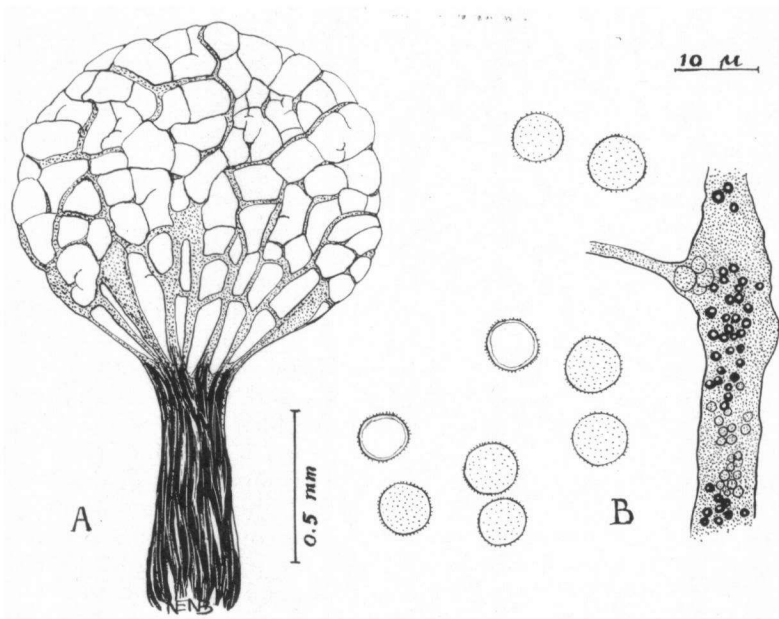


Fig. 2. *Cribraria argillacea*, 4613; A, sporangium; B, spores and a part of the peridial net, showing the dark granules with strongly refracting centres.

in general appearance, has a more persistent lax net consisting of glossy threads with small dark nodes at the intersections. The threads in *C. argillacea* are never glossy. *C. martinii* (Fig. 7) too is rather similar, see under that species. The plasmodium is dark grey.

*Cribraria aurantiaca* Schrad.; Fig. 3.

50; 155 U; 357 U; 554; 563 U; 589; 594; 606; 651 U; 672; 768; 803; 1058; 1059; 1071 (cf. Fig. 3); 1081; 1210 U; 1333; 1334; 1440; 1497; 1513; 1514; 1535; 1562; 1563; 1959; 1971-b; 2007; 2008 U; 2033; 2034; 2122; 2699; 2863; 2865; 2866; 2879; 3498; 3499; 3501; 4001; 4096; 4100; 4129; 4137; 4138; 4164; 4165; 4166; 4167; 4256; 4287; 4288; 4289; 4388; 4391 U; 4392; 4394; 4998 all on decaying coniferous wood Heelsum-Doorwerth; 606 leg. M. A. Nannenga, 1390, 1407, 2040, 4344, 4345, 4355 and 4371 from decaying coniferous wood, Bilthoven; 4400 from a decaying pine stump, Leersum.

After Persoon (1801) had reduced *Cribraria aurantiaca* Schrader to a variety of *C. vulgaris* Schrader, in which Lister followed him, Macbride and Martin in their monograph (1934) united them under the name *C. aurantiaca* Schrad., which vision was shared by Hagelstein (1944).

Careful study of those of my specimens to which the descriptions of these authors apply, and of some of those in the Listers' collection at the British Museum (in this collection the note "var. *aurantiaca*" placed at the bottom of sheets containing both varieties is rather confusing) viz. *C. aurantiaca* B.M. 1430, and *C. vulgaris* B.M. 1431, 2737 and 3622, as well as that of Schrader's descriptions (Nov. Gen. Pl. 1797) has convinced me that Schrader's species are sufficiently distinct to be retained. They may be known apart by the following characters. Hypothallus usually brown and opaque in *C. aurantiaca*, inconspicuous in *C. vulgaris*. *C. aurantiaca* is larger in all its parts than *C. vulgaris*. When fresh, *C. aurantiaca* is bright yellow, fading however to an ochraceous dusty brown, against which the numerous small dark nodes stand out; *C. vulgaris*, on the other hand, is hazelnut-brown, with the much fewer nodes not always conspicuous for they may be either pale or dark. In *C. aurantiaca* the peridium often persists on a part of the sporangium, tinting this part rusty-brown; in this case it is as though about a third has dried prematurely, a feature which is never seen in *C. vulgaris*. The cups of both species are striate by bands of granules; in *C. vulgaris* they are usually finely, concentrically wrinkled, whereas in *C. aurantiaca* these wrinkles are usually absent. The connections between the cup and the net are more numerous, longer, finer and simple in *C. aurantiaca*, while in *C. vulgaris* these are few, short, broad and toothed. The nodes of *C. aurantiaca* are more or less elongate in the lower part, numerous, small, convex and often rounded above; in *C. vulgaris* they are broad, flat, much branched, angular and few; both species have thin connecting threads, but these are shorter in *C. aurantiaca*, forming smaller meshes (the dictydine granules are much alike, 1-2  $\mu$  in diameter). The spores of *C. aurantiaca* are 6-7  $\mu$  in diameter; they have one or two large, brilliantly refracting inclusions, probably consisting of etherial oil,

which disappear in time, but keep for years in herbarium specimens if not too intensely heated for drying and disinfecting purposes, though even then traces may usually be found in specimens over ten years old (B.M. no. 1430 collected in 1888 still has them practically intact); the spores are so minutely spinulose as to appear smooth, and the dry spore (Fig. 3c), shows a more or less reniform outline under the microscope. The spores of *C. vulgaris* are 6.5–8.5  $\mu$  in diameter; they lack the yellow inclusions and are distinctly, though minutely spinulose; viewed under the microscope they have a somewhat angular outline, due to the presence of 4–6 larger spinules on the circumference; connecting these there is a lax reticulation formed of rows of spinules, which is often quite as conspicuous and of the

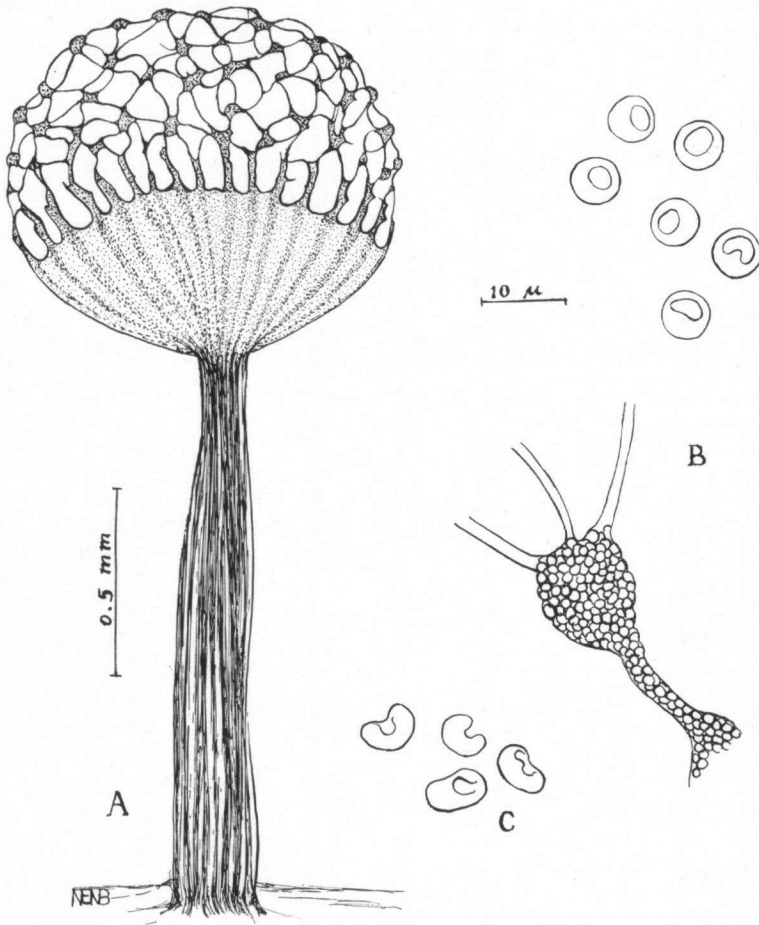


Fig. 3. *Cribraria aurantiaca*, 1071; A, sporangium; B, spores and node of the peridial net; C, spores.

same type as that seen in *C. dictyospora*; the dry spore of *C. vulgaris* shows a more or less "starry" outline (Fig. 12d). In 5% KOH or NaOH, cup, net and nodes of *C. aurantiaca* turn purple, but not the spores. In *C. vulgaris* the spores too turn purple. The plasmodium of *C. aurantiaca* is brilliant green, that of *C. vulgaris* dark grey. Of course Schrader could not describe the spore characters; neither did he mention the difference in the colour of the plasmodium (Lister does), but the characters described by him are correlated with these. See also under *Cribraria vulgaris*.

*Cribraria cancellata* (Batsch) Nannenga var. *cancellata*.

113; 158 U; 159 U; 420 U; 731; 1023; 1191; 1916; 1951; 2672; 2732; 2739; 2829 from decaying wood, Heelsum-Oosterbeek, and 1382 from Bilthoven.

The black plasmodia of this species, and also those of its variety *fusca*, are often large, commonly producing hundreds of sporangia, and they often stain the wood from which they emerge purple. On dispersal of the spores the ribs of the more or less globose sporangia turn inwards like those of a lobsterpot, except in those, rare, cases where they unite to form a net at the top of the sporangium.

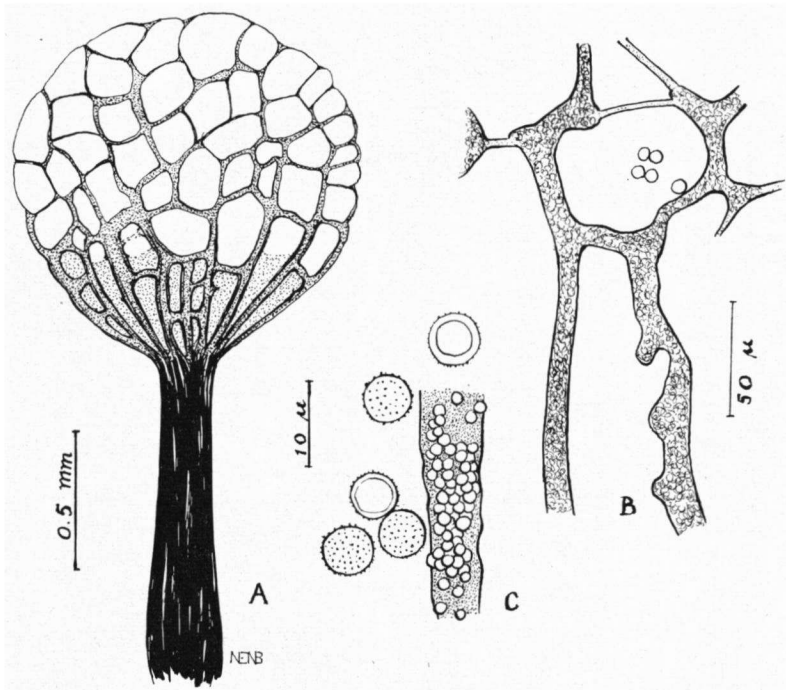


Fig. 4. *Cribraria ferruginea*, 4402; A, sporangium; B, spores and a piece of the peridial net; C, part of the same, further enlarged.

*Cribraria cancellata* (Batsch) Nannenga var. *fusca* (G. Lister) Nannenga.

8; 186; 284 U; 1041 U; 1051; 1070; 1133; 1243; 2635; 2703; 3355; 3832; 4031; 4919; 4928; 4972; 5177; 5203 from decaying wood, 4013 and 4428 developed in moist chambers on decaying coniferous wood, Heelsum-Oosterbeek.

See note under var. *cancellata*.

*Cribraria ferruginea* Meylan; Fig. 4.

4402, from a decaying pine stump, west of Leersum, 27-8-1960.

A small, rather weathered colony on a conspicuous concolorous hypothallus. The ribs of the sporangia are very prominent in the lower third. This is sometimes seen in *C. argillacea* too, but that species may be known by its yellowish brown colour, while this is of a rich redbrown.

*Cribraria intricata*, Schrader; Fig. 5 and 6.

Not found by me in the Netherlands; the specimens doubtfully referred here in my list are all *C. vulgaris*. However, Prof. Dr. W. K. H.

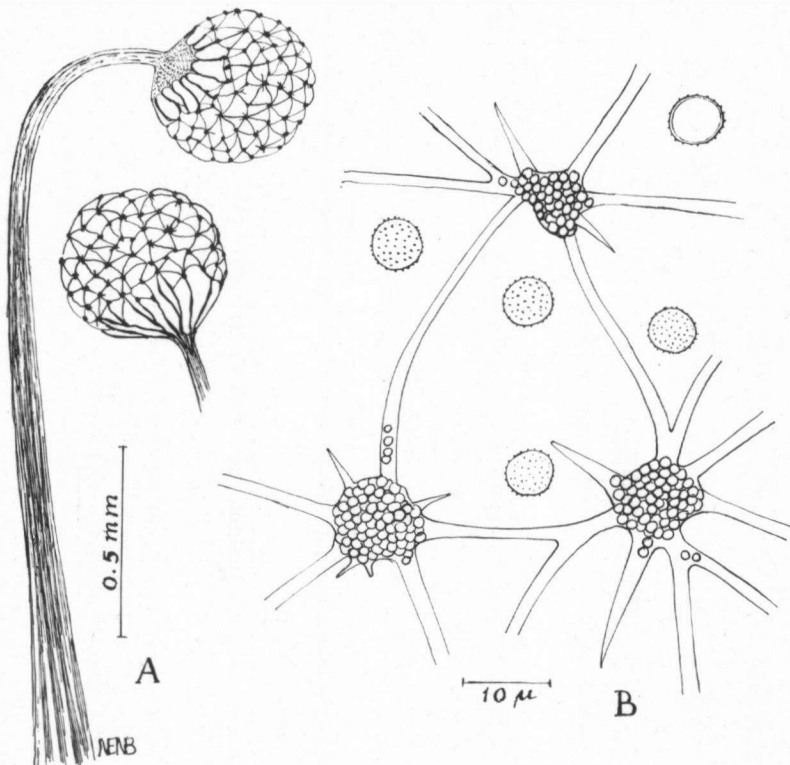


Fig. 5. *Cribraria intricata* var. *dictyoidea*, Karstens 842; A, two sporangia; B, spores and nodes.

Karstens kindly sent me specimens from a hothouse at Leiden as *C. intricata* Schrader var. *dictyoides* Lister. The beautifully developed sporangia vary in the presence of a small cup to the complete absence thereof, it being then replaced by ribs. Although common in the

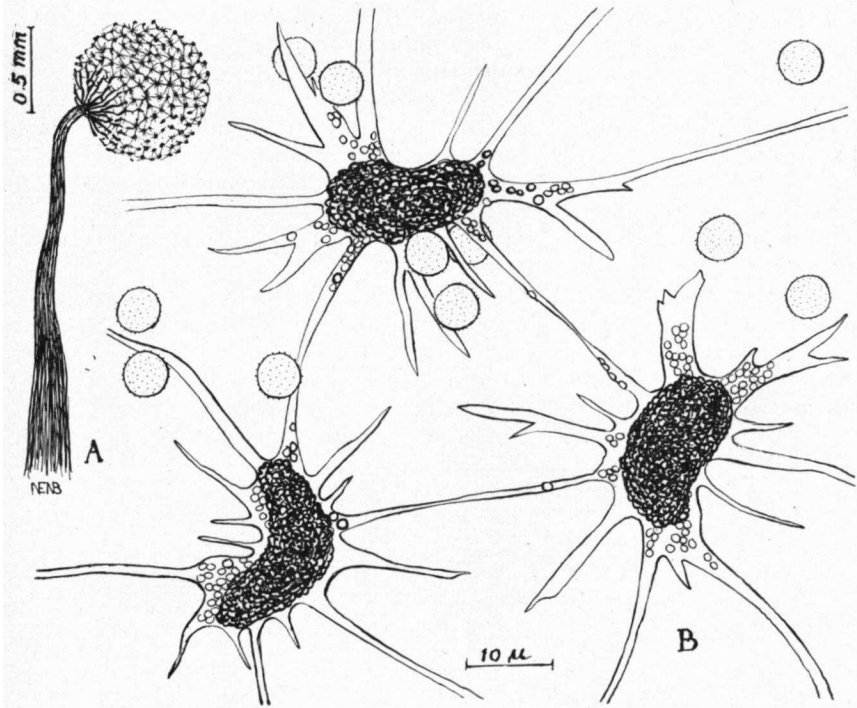


Fig. 6. *Cribraria intricata* var. *intricata*, G. W. Martin 4707, Iowa, Aug. 1934; A, sporangium; B, spores and nodes.

U.S.A., it is only known from hothouses in Europe. Martin does not acknowledge this variety, which seems to differ from the type solely in the absence of parallel connecting threads between the nodes. The specimens from Leiden have many free ends, but lack parallel connecting threads.

Karstens 610, 31-8-1946; id. 842, 9-8-1963.

A specimen from Iowa, kindly sent by Prof. Dr. G. W. Martin, collected 19 August 1934, represents the typical variety. It is slightly taller, 3 mm instead of 2 mm, and has parallel connecting threads between some of the nodes, the nodes themselves appear to be more crowded, and the spores are even less conspicuously warted than those from the Leiden specimens (cf. Fig. 5 and 6).

**Cribraria martinii** nov. spec.; Fig. 7.

Sporangia stipitata, erecta, gregaria, a hypothallo communi vix conspicuo orientia; altitudo totalis 2 mm non excedens; stipes sporangio aequilongus vel usque ad 1.2 mm elongatus, niger sed lucem orientem versus visus obscure brunneus, fragilis, plicatus; sporangium globosum, circ. 0.8 mm diam., colore argillaceo cum *C. argillacea* congruens; reticulum peridiale e filamentis gracilibus, circ. 1.5  $\mu$  diam., pallidis, nitidis compositum; filamenta inter nodos obscuros parvos sed crassos et peridii calyculum qui in costas hic inde cohaerentes dissolutus est extendentia, plurima in triangula connecta, pauciora apice libera; granula in nodis inclusa parva, 1–1.5  $\mu$  diam.; calyculus dissolutus altitudine dimidiam partem sporangii non excedens, inter costas perforatus; sporae lucem orientem versus visae pallide brunneae, sub-angulares, minute verruculosae, 5–6.5  $\mu$  diam. Plasmodium ignotum.

De Pan, Zeist (Netherlands), on fallen, practically undecayed pine needles and on a pine branch, Nannenga-Bremekamp 2867 U; 13-8-1958, type, cf. Fig. 7.

Sporangia gregarious, stipitate, erect, om a common, hardly conspicuous hypothallus; total height not exceeding 2 mm; stipe 1–1.5 times the height of the sporangium, black (dark brown by

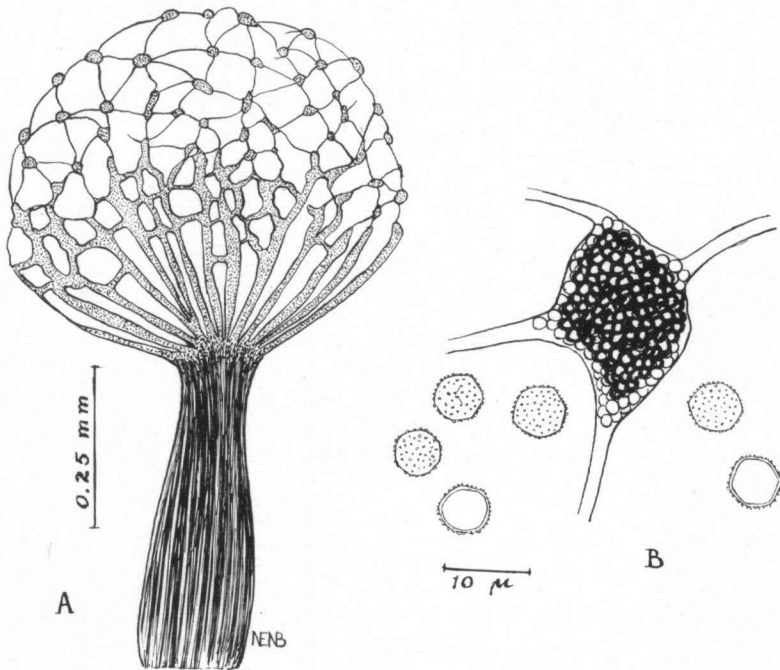


Fig. 7. *Cribraria martinii*, 2867; A, sporangium; B, spores and nodes.



transmitted light, brittle, plicate. Sporangium globose, about 0.8 mm in diameter, clay-coloured like that of *C. argillacea*; peridial net consisting of fine, pale, glossy filaments, which are about  $1.5 \mu$  in diameter and which connect the small dark thick nodes and the strong ribs with their transverse connections into which the cup has been split up; the meshes of the net are mostly triangular, and only a few of the filaments end free in the meshes; the granules in the nodes are small,  $1-1.5 \mu$  in diameter; the ribs of the almost obsolete cup attain about half the height of the sporangium; spores pale brown by transmitted light, very slightly angular in outline, minutely warted,  $5-6.5 \mu$  in diameter. Plasmodium unknown.

In my list (p. 86) this specimen is cited as *Cribraria macrocarpa*. As may be seen from the description given above, it is not the species described by Schrader under this name, which is larger and pyriform, not globose, and has no regular net with small but thick rounded nodes, but flattened bands connected by thin filaments which rupture easily and then assume the aspect of curly threads. The latter Schrader probably had in mind when he wrote "Reticuli cani 12 et plures, inaequales, sursum attenuati, saepius curvatim ascendentes et frequens ramulos tenuiores, pariter curvatim divisos et subdivisos emittentes . . ." and of which he gave a curious figure stressing the curly threads of the peridial net (cf. my Fig. 8; however, in other specimens, B.M. 2729 and Bot. Mus. Upsaliense 185 and 186 from Sweden, the ribs are more distinct). It differs from *C. martinii* also in the nearly smooth

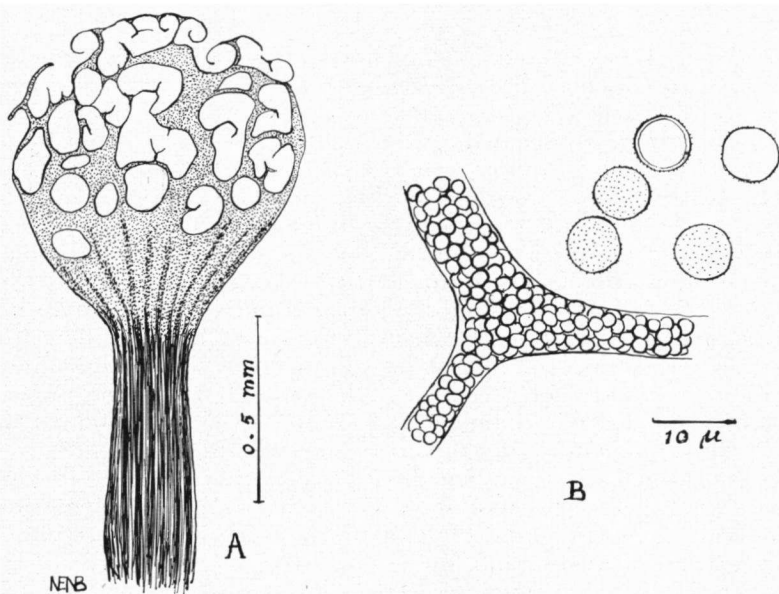


Fig. 8. *Cribraria macrocarpa*, B.M. 3678 (Brandza 74); A, sporangium; B, spores and a piece of the peridial net.

spores and in the larger size of the granules, which are circ.  $2 \mu$  in diameter.

To *C. martinii* belong in my opinion several specimens from the U.S.A. identified as *C. macrocarpa*, e.g. a specimen kindly sent me by Dr. C. W. Martin and collected by R. J. Cain in Ontario, and some numbers in the collection of the British Museum, viz. 1918, 1429, 1433 and 3858. B.M. 1918 has the following note by Lister on the label "not typical, a variant form approaching *C. intricata*."

Several specimens which in my opinion are to be included in *C. martinii*, differ from the type specimen in having a larger number of free ends radiating from the nodes into the meshes of the peridial net, e.g. B.M. 1918. Some of these specimens have for this reason been placed with *C. intricata* (B.M. 2743 from New Zealand and B.M. 3858 from Chocorua, U.S.A.); part of the last quoted specimen is in the herbarium of the Museum Botanicum Upsaliense, "Reliqua Farlow no. 389", but here as *C. macrocarpa*.

*C. martinii* is macroscopically like *C. argillacea*, but the tiny dark nodes can be detected with the aid of a hand lens, so that the two species can be distinguished even in the field.

*Cribraria microcarpa* (Schrad.) Pers.; Fig. 9 and 10.

1511 (cf. Fig. 10 D); 3408; 3420; 3473; 3875 (cf. Fig. 9 A and B); 3880; 3902; 3911; 3962; 3970; 3974; 3982; 4035 U; 4036; 4037 (cf. Fig. 9 C); 4319; 4908; 5156; 5183; of these only 1511 was a field collection taken from a decaying pine stump; the others developed in moist chambers on decaying pine wood and on the bark of oak, Wolfheze-Doorwerth; 4542 from decaying pine wood in moist chamber, Bilthoven.

This species has caused me much trouble. The exceedingly long stipe and the absence of a cup suggest *C. microcarpa* (*Dictydium microcarpum* as depicted by Schrader fits very well), but specimens kindly sent by Dr. G. W. Martin, while showing the same general appearance, have smaller ( $1-2 \mu$  in diam.) and darker granules in the nodes and much thinner connecting threads (Fig. 10A-C). However, my 1511 (Fig. 10D), which unfortunately has been badly eaten since it was collected, and of which not much more than a permanent slide in Hoyer's chloral-hydrate medium is left which bears the note "turns purple in 5% KOH", has similar nodes and similar slender connecting threads as the American specimens (Fig. 10A-C), and differs from my other specimens also in the slightly darker and even more minutely spinulose spores. In all my other collections the dictydine granules are larger, i.e.  $2-3 \mu$  in diameter, in mounted specimens often looking like bubbles; moreover, the threads connecting the nodes are glossy, short and thick, and consequently they keep straighter in slides (Fig. 9B and C). The spores of the Netherlands specimens are a little larger than those from the United States, i.e.  $6.5-8 \mu$  as opposed to  $5-6 \mu$  in diameter, and the minute spinules are slightly more pronounced. In all specimens studied by me the nodes are more or less cup-shaped, i.e. hollow and open at one side, a character found also in the closely related species which have a cup and a relatively

shorter stipe, e.g. *C. tenella* and *C. intricata*. I do not think that the two forms of *C. microcarpa* can be regarded as identical, but they are doubtless very closely related, and therefore it will be difficult to decide which is Schrader's "*microcarpum*". Incidentally both turn purple in dilute KOH or NaOH, but so do several other brown *Cribraria*'s, e.g. *C. vulgaris*, *C. aurantiaca* and *C. argillacea*.

*Cribraria mirabilis* (Rost) Masee.

2004; 2005; 2132; on much decayed pine stumps, Doorwerth.

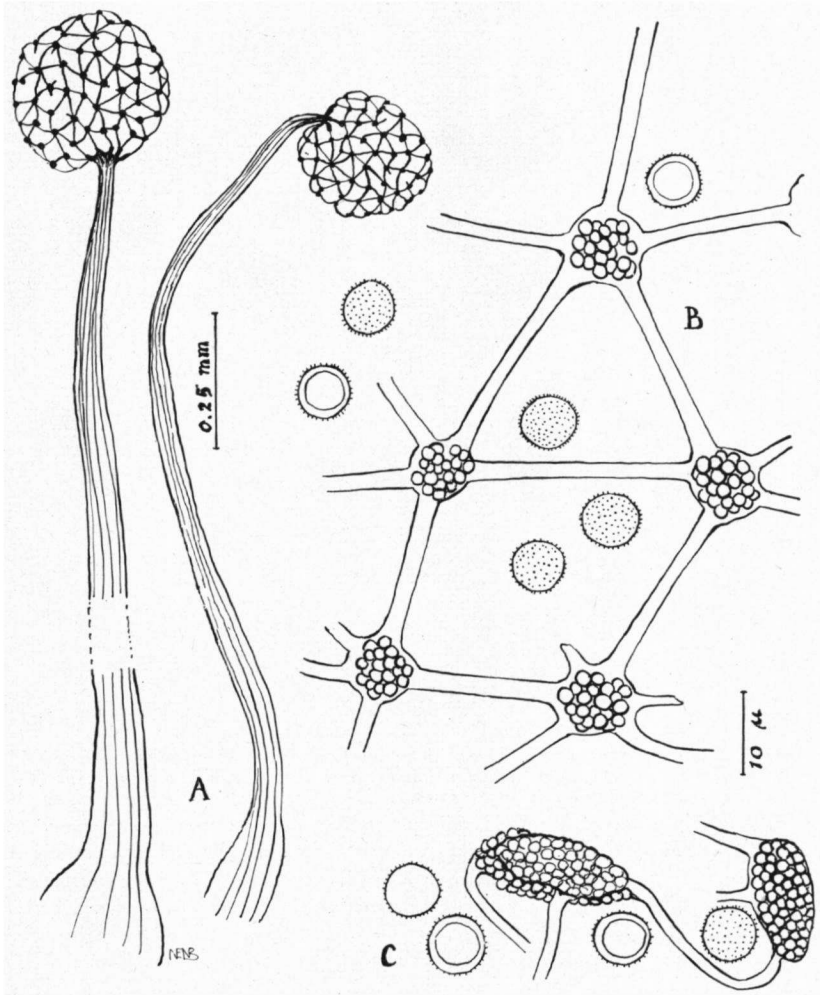


Fig. 9. *Cribraria microcarpa*, 3875; A, two sporangia; B, spores and part of the net showing the pale thickened nodes; 4037; C, spores and nodes.

Very like *Cribraria cancellata*, but the stipe thicker just under the sporangium, so that the latter is carried erect or nearly so, the head globose to slightly prolate, retaining its shape after spore dispersal, cf. my note on these two species in *Acta Bot. Neerl.* **11**: 21–22, 1962.

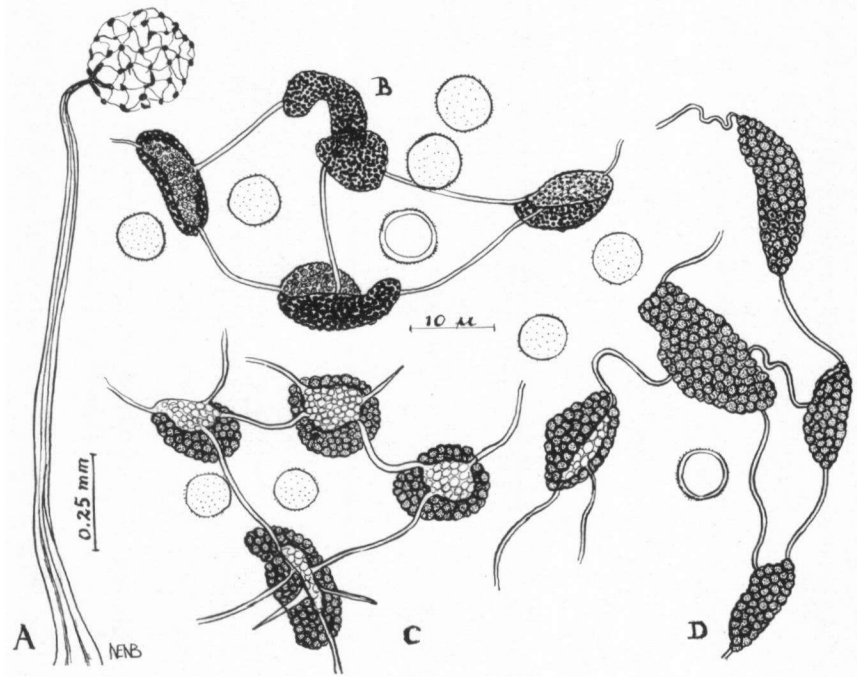


Fig. 10. *Cribraria microcarpa*, 4708 from Iowa, U.S.A.; A, sporangium; B, spores and nodes; 3223, also from Iowa; C, spores and nodes; 1511, Doorwerth; D, spores and nodes.

*Cribraria rufa* (Roth) Rost.; Fig. 11.

55; 464 U; 630 U; 696 U; 769 U; 770 U; 871; 934; 1012; 1519; 1537 U; 1560; 1607 U; 1640; 1733; 1842 (cf. Fig. 11); 2164; 2207; 2270; 2394; 2972; 2979; 3152; 3183; 3267 U; 4185; 4730; 5013; from decaying coniferous wood, Renkum-Doorwerth; 932 from an oak stump, Doorwerth.

This species has pale spores covered with pale minute warts, with a few larger ones scattered about, which give the spores a somewhat angular appearance as seen by transmitted light; there are 3–6 of these larger warts on the “circumference”, and between them the smaller warts produce a minutely undulate outline. A few lines of warts, often forming a broken reticulation, can be detected on the episporium. The plasmodium in most cases is dirty white on emerging, sometimes dark grey, but turning whitish as the sporangia are formed.

*Cribraria violacea* Rex.

5508 U; on decaying Elm bark from Hemelse Berg, Oosterbeek, brought to our garden at Doorwerth, 11-9-1963.

The collection is a typical one; the cup variable, but mostly about half the height of the sporangium. The plasmodium was black on emerging from the substrate, but when the stipe has been formed,

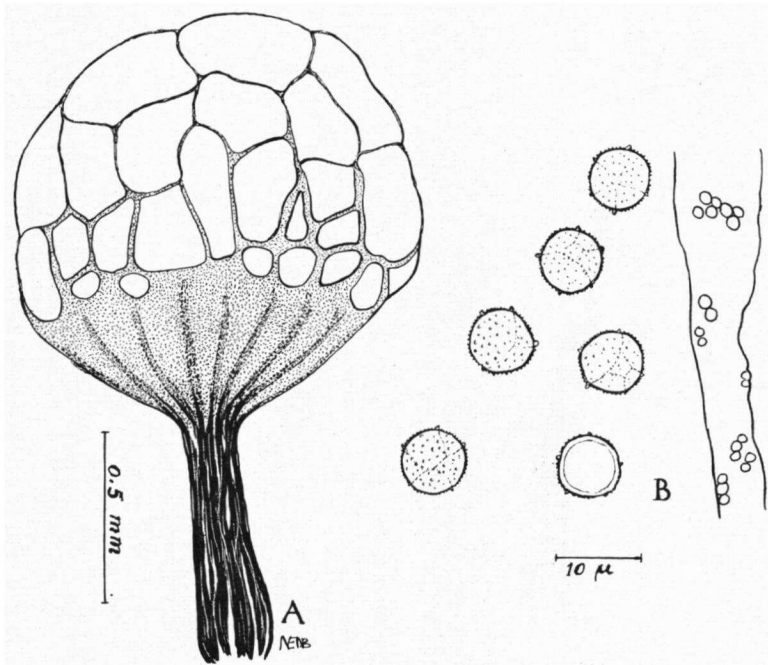


Fig. 11. *Cribraria rufa*, 1842; A, sporangium; B, spores and part of the peridial net.

the young sporangia turned hyaline before becoming violet; the dark nodes and cup were very conspicuous in the hyaline phase. New sporangia were formed on the same piece of bark in the week after the first hundred or so had matured.

*Cribraria vulgaris* Schrader; Fig. 12.

102 U; 117 U; 121 U; 316 U; 543; 544; 593; 664 U; 666; 990; 993; 1057; 1185 U; 1211; 1260; 1261 U; 1549; 1561; 1620; 1632; 1691; 1897; 1901; 1902; 1912; 1971-a; 2126 U; 2196; 2631; 2633; 2634; 2701; 2971; 2976; 3032 (cf. Fig. 12); 3057; 3058; 3334; 3347; 3811; 4002; 4003; 4004; 4005; 4006; 4007; 4047; 4048; 4049 (cf. Fig. 12); 4075; 4101; 4110; 4111; 4112; 4154; 4159; 4169; 4244; 4249; 4364; 4389; 4390; 4612; 4653; 4918; 4927; 4931; 5167; 5178 all from decaying coniferous wood, Heelsum-Doorwerth.

Very variable, small, hazelnut-brown on a slender stipe; the cup, which is never lacking in the specimens studied by me, merges into the net by means of rather few broad, toothed and short projections; nodes few, large, flat, angular, dark or pale, with small ( $1-2 \mu$  in

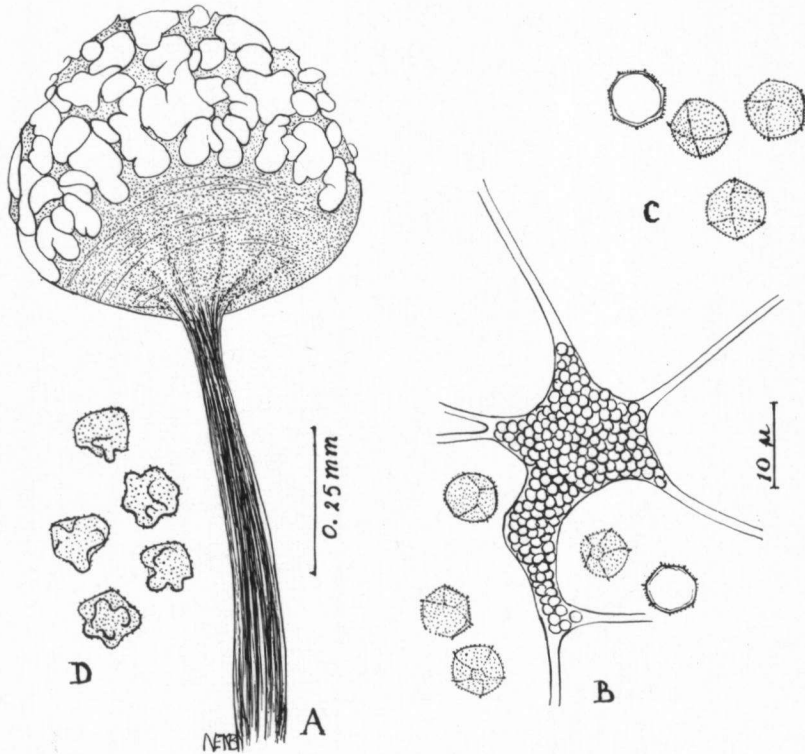


Fig. 12. *Cribraria vulgaris*, 3032; A, sporangium; B, spores and node; 4049; C, spores; D, dry spores.

diameter) dictydine granules; connecting threads thin, with a few free ends present. The spores are minutely spinulose, with a lax, sometimes not very conspicuous, reticulation of spinules placed in lines.

This species has caused much confusion; specimens sent me from different localities as *C. dictyospora*, *C. piriformis*, *C. intricata*, and *C. minutissima* belong here. From *C. dictyospora* (Fig. 13) it seems to differ only by its small granules ( $3-4 \mu$  in diameter in *C. dictyospora*); from the other species it may be known by the reticulate spores, from *C. intricata* moreover, by it having conspicuously fewer threads radiating from the nodes, which moreover are flat, and from *C. piriformis* in the smaller size of the dictydine granules. Small forms of *C. vulgaris* differ from *C. minutissima* in having very few and very large nodes connected by thin threads; moreover, this species always

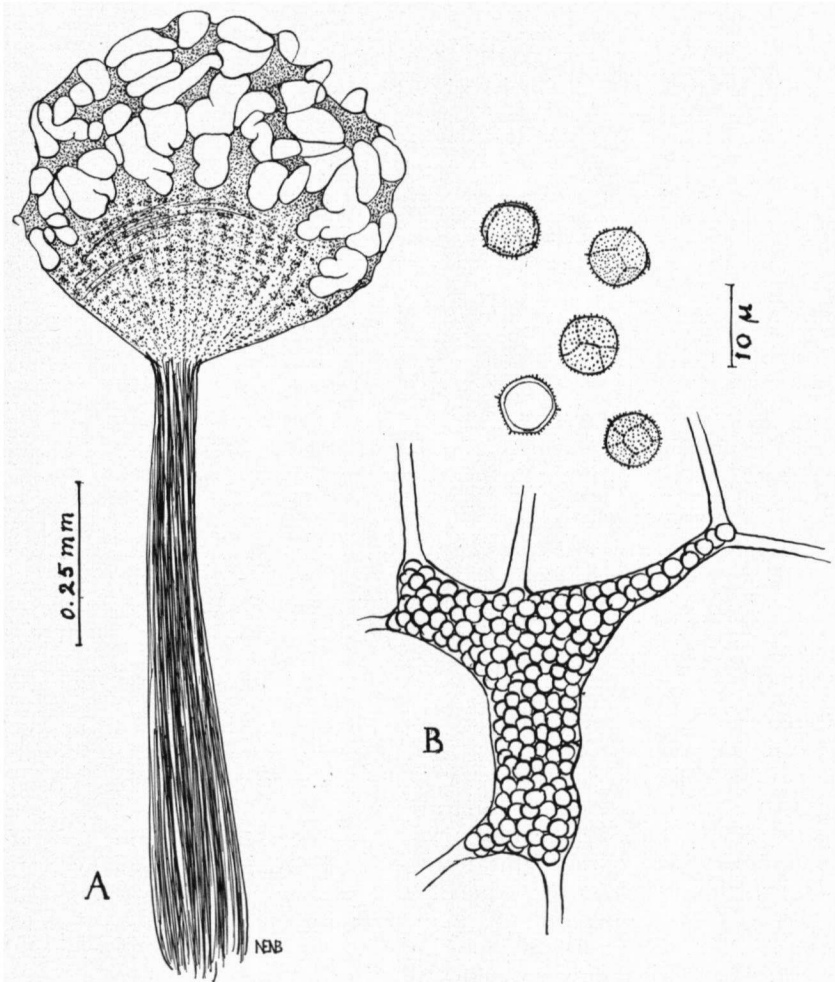


Fig. 13. *Cribraria dictyospora*, Martin and Lovejoy 4758 from Oregon, collected by M. E. Peck, named by Dr. G. W. Martin; A, sporangium; B, node and spores.

has a cup, which may be present or not in *C. minutissima*. For differences with *C. aurantiaca* see under that species. A specimen from Salem, Oregon, collected by M. E. Peck, and identified as *C. oregona* seems to belong here. According to Schrader's own account *C. tenella* would come very near it; *C. tenella*, however, apart from being smaller, has more numerous nodes and filaments, smaller spores, without reticulation, and is in general appearance intermediate between *C. vulgaris* and *C. intricata*, though it usually has a relatively longer stipe than either of these species.

In my list of Myxomycetes from the Netherlands (*Acta Bot. Neerl.* 10: 85, 1961) this species was doubtfully referred to *C. intricata*.