

THE GENUS *GLOIOCEPHALA* MASSEE IN EUROPE

C. BAS
Rijksherbarium, Leiden
(With 30 Text-figures)

A detailed study is given of *Marasmius menieri* Boudier and *M. caricis* Karsten, both of which appear to belong to the genus *Gloiocephala* Massee. The new combination *G. caricis* is made. *Marasmius menieri* sensu Corner is shown to be an undescribed species of *Gloiocephala*. The merits of the genus *Gloiocephala* are discussed.

In the dry summer of 1959, Mr. W. J. Reijnders (Hugo de Vries-Laboratorium, Amsterdam) collected in the marsh-reserve "Het Naardermeer" near Amsterdam, on old culms of *Typha*, a small, brown, conchate, gelatinous fungus with gill-like folds on the underside.

It was first thought to be a species of the genus *Campanella*. Material was sent to the specialist of that genus, Dr. R. Singer at Tucumán, Argentina, and to the Rijksherbarium at Leiden. Dr. Singer and Dr. M. A. Donk independently came to the conclusion that the species belonged to the genus *Gloiocephala* Massee. Meanwhile I had identified the species with *Marasmius menieri* Boudier.

After the publication of the very clear original description and drawings, by Boudier (1894: 61), only one detailed study on *M. menieri* seems to have been published, viz. by Corner (1934: 285). However, on comparing Corner's and Boudier's descriptions, I found several discrepancies. Fortunately Mr. E. J. H. Corner (Cambridge) was so kind as to send me some elaborate drawings of his fungus. They actually show a species quite distinct from *Marasmius menieri*, obviously also belonging to *Gloiocephala* as defined by Singer (1960), but differing from the species included in that genus by that author.

A further collection under the name of *Marasmius menieri*, kindly sent to me by Mr. D. A. Reid (Kew), contained still another species of *Gloiocephala*. This material turned out to be conspecific with *Marasmius caricis* P. Karst.

KEY TO THE EUROPEAN SPECIES OF *GLOIOCEPHALA*

1. Cap pale brown to reddish-ochraceous brown; stalk abortive, blackish; cuticle with thin-walled cells, cystidia-like, thick-walled cells, and, at least at margin, fusiform-capitate cystidia. *G. menieri*
1. Cap white to pale ochraceous; stalk well developed, entirely white or with brown base; cuticle with one kind of cells and non-capitate cystidia.
 2. Pileocystidia $32-53 \times 7-15 \mu$, cylindrical to slender conical, with narrow but rounded apex; fold-like gills with cheilocystidia *G. caricis*
 2. Pileocystidia $50-120 \times 6-18 \mu$, with filiform apical appendage; hymenium at best with some folds or wrinkles; cheilocystidia absent (*Marasmius menieri* sensu Corner)
G. species

GLOIOCEPHALA MENIERI (Boud.) Sing. — FIG. 1—11

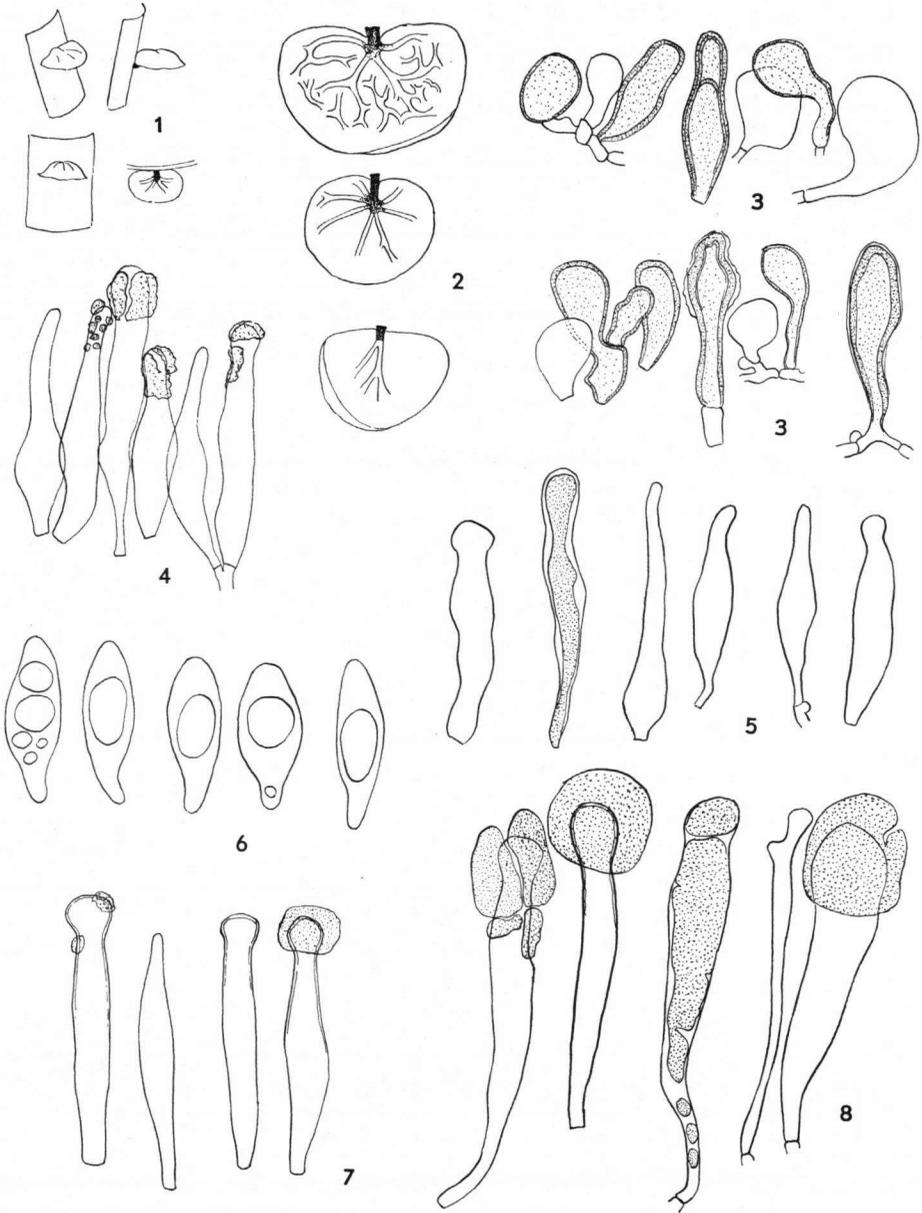
Marasmius menieri Boudier in Bull. Soc. mycol. France 10: 61 pl. 1 f. 4. 1894. — *Gloiocephala menieri* (Boud.) Sing. in Sydowia 14: 272. 1960.

Fruit-bodies very small and thin, elastic, soft, extremely eccentrically and short stipitate, appearing laterally attached in more mature specimens, on erect culms, often gregarious. Cap up to 10 mm, in very young stages convex with central stalk and slightly involute margin, soon developing asymmetrically, becoming convex conchate with straight margin, appressed to substrate near stalk, often with some radial furrows, varying in colour from very pale brownish to reddish-ochraceous brown (Séguy 191, Expo. E 36), sometimes rather spotted in old specimens, dull, minutely granular, brown punctate and with fimbriate margin under hand-lens, sometimes with more or less reticulate ridges in old specimens. Hymenium smooth at first, later on with 1–6 fold-like gills, which do not reach the margin of the cap and become more or less intervenose with age, often slightly irregularly alveolate in old specimens, especially near the stalk, white to very pale pinkish-brownish, with concolorous gill edge, which is fimbriate under hand-lens, in dried specimens brown punctate near stalk, especially on gill edges. Stalk up to 1×0.2 mm, equal, always horizontal and pressed against the hymenium, extremely eccentric and hardly visible in mature specimens, insititious, pale when very young, soon very dark brown, entirely concolorous pubescent under hand-lens. Context very thin, glassy, elastic. Spore print white. Smell faint. Taste not noted.

Spores $15.5\text{--}21.0 \times 5.5\text{--}7.5 \mu$ ($22.0\text{--}25.0 \times 4.5\text{--}6.3 \mu$ in Orton's material) (apiculus included), fusiform, the apex rounded, the base tapering into a broad, more or less rounded, slightly bent apiculus, colourless, thin-walled, mostly with one, sometimes with several refractive droplets, neither amyloid nor pseudoamyloid. Basidia $40\text{--}60 \times 9\text{--}13 \mu$, clavate, 4-spored, with basal clamp. Cystidia rather numerous on edges of folds and on edge of cap, scarce or lacking in hymenium. Cystidia on edges of gills $50\text{--}100 \times (5\text{--}8\text{--}12\text{--}20) \mu$, slender, cylindrical, fusiform or clavate, the apex subacute to broadly rounded, often subcapitate, often with large yellow-brown apical globules, up to 30μ across, which in NH_4OH or KOH turn dingy purplish in fresh material and olive brown in dried, sometimes with similar contents. Cystidia on edge of cap $45\text{--}70 \times 8\text{--}14 \mu$, with $4.5\text{--}11 \mu$ broad apex, fusiform, lageniform or subcylindrical, with slender neck and subacute apex, or with broad neck and subcapitate, seldom capitate apex often with a globule, or remnants of it, as in the cheilocystidia. Cuticle hymeniform, with pileocystidia and two kinds of cells: one $10\text{--}30\text{--}(40) \times 10\text{--}20\text{--}(25) \mu$, vesiculose to clavate, thin-walled, colourless; the other $25\text{--}50 \times 7\text{--}15\text{--}(20) \mu$, clavate to utriform, often irregular, with thick, 2- or 3-layered, yellow-brown to reddish brown wall, not changing colour in NH_4OH and KOH , sometimes encrusted with hyaline matter (disintegrating outer wall?); many transitions between the two types; pileocystidia abundant on outmost margin of cap and sometimes near place where cap is pressed against substrate, elsewhere scarce or even absent, $45\text{--}80 \times 8.5\text{--}12 \mu$, the neck $3.5\text{--}7 \mu$ broad, the apex $2\text{--}10 \mu$ broad, fusiform, sublageniform or subcylindrical,

EXPLANATION OF FIGURES 1–8

Figs. 1–8. *Gloiocephala menieri* (Boud.) Sing. 1. Carpophores ($\times 1$). 2. Carpophores seen from below ($\times 3$). 3. Cells of cuticle ($\times 500$). 4. Cystidia from edge of cap ($\times 500$). 5. Pileocystidia ($\times 500$). 6. Spores ($\times 1250$). 7. Hymenial cystidia ($\times 500$). 8. Cystidia from edge of fold near apex of stem. (1–8 from Bas 1757.)



Figs. 1-8

subcapitate or capitate, seldom acute, often with large yellow-brown globules, the contents hyaline or yellow-brown (globules and contents reacting with NH_4OH and KOH as in cheilocystidia), the wall slightly thickened. Caulocystidia $40\text{--}60 \times 7\text{--}17 \mu$, $4\text{--}13 \mu$ broad, mostly fusiform-capitate, seldom slender-fusiform with subacute apex, sometimes hyaline, often with large yellow-brown globules, mostly with yellowish brown contents (reaction of globules and contents with NH_4OH and KOH as in cheilocystidia). Trama of cap gelatinized throughout, $150\text{--}250 \mu$ thick, of irregularly arranged, distant, $1.5\text{--}4(-6) \mu$ wide hyphae, with some $1.5\text{--}2 \mu$ wide hyphae running obliquely but straight from cuticle to hymenium. Trama of gills of same structure as trama of cap. Subhymenium $10\text{--}20 \mu$ thick, made up of densely interwoven hyphae. Stalk with brown, $10\text{--}20 \mu$ thick cortex; central part consisting of colourless, longitudinal, $1.5\text{--}10 \mu$ wide hyphae with circa 0.5μ thick walls, embedded in gelatinous matter, interstices $0.5\text{--}3 \mu$ wide; cortex of several layers of $2\text{--}5 \mu$ wide, thick-walled, brown hyphae embedded in brownish gelatinous matter, the outer hyphae obscured by pigmentation. All elements turn yellowish in Melzer's solution. In Cresyl Blue the cell walls of all elements except the spores turn purplish-pinkish, while the contents of the basidia, cystidia and the hyphae of the cap remain blue.

HABITAT.—On dead, still erect plants of *Typha angustifolia*; 0–20 cm above water level; in dense vegetation. Collected on *Carex riparia* by Orton.

DISTRIBUTION.—England, France, and the Netherlands.

SPECIMENS EXAMINED.—E n g l a n d: Norfolk, Surlingham, Thackmarsh, 17 July 1956, Orton 782 (L). N e t h e r l a n d s: Noord-Holland, Naardermeer, 23 Aug. 1959, W. J. Reijnders s.n. (L); 4 Sept. 1959, Bas 1757 (L); 22 July 1960, Bas 1925 (L).

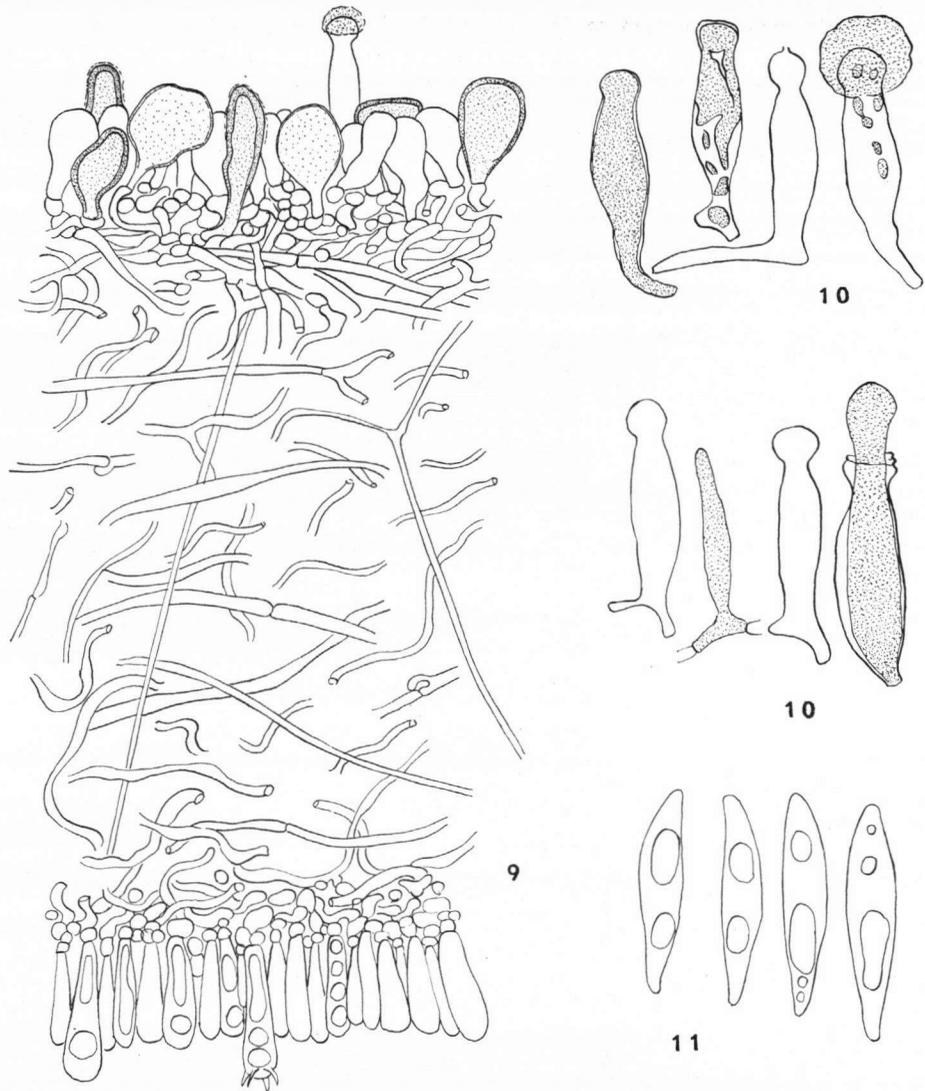
On the whole Boudier's original description and figures fit the Dutch material extremely well. There are only a few minor discrepancies. Boudier found the caulocystidia hyaline; I found most of them filled with a brown substance. Boudier saw only a gelatinous zone above the hymenium; in the material, which I studied, the whole context is gelatinous.

The British collection needs some comments.

Mr. P. D. Orton kindly sent me one specimen of the few he collected. This specimen has all the essential characters of *G. menieri*; there are, however, several quantitative differences. In comparison with the Dutch material the spores of his specimen are considerably longer and more slender, $15.5\text{--}21.0 \times 5.5\text{--}7.5 \mu$ against $22\text{--}25 \times 4.5\text{--}7.5 \mu$ (in both cases spores taken from a deposit). One would be tempted to describe a variety 'macrospora', if Boudier had not given the spores as $18\text{--}25 \times 5\text{--}7 \mu$ in the original description. Orton's specimen is very pale, owing to the presence of many large thin-walled sphaerocysts and very few thick-walled cells in the cuticle; however, the pileocystidia are more numerous. It remains possible that a distinct taxon is involved, especially as it was collected on a different host.

Marasmius menieri was reported once from the Netherlands, near Breda, by Schweers (1948: 3). However, no specimens or figures are left to substantiate this record.

Among the species of *Gloiocephala* described by Singer in his recent monograph (1960: 262–272), *G. palmarum* Sing. is the one most closely related. It resembles *G. menieri* in the pigmented cap, the short eccentric stalk, the gelatinous context



Figs. 9-11. *Gloiocephala menieri* (Boud.) Sing. 9. Radial section of cap ($\times 500$). 10. Caulocystidia ($\times 500$). 11. Spores ($\times 1250$). (9-10 from Bas 1757, 11 from Orton 782.)

and the presence of three kinds of elements in the cuticle. However, the form of these elements is different, e.g. the large cystidia on the cap of *G. menieri* are thin-walled and mostly fusiform-capitate while those of *G. palmarum* are thick-walled¹ and lageniform.

¹ In my opinion the use of the term metuloids for cystidia so unlike the metuloids in their original sense, e.g. the cystidia of *Peniophora* and *Hohenbuehelia*, is rather misleading.

Gloiocephala caricis (P. Karst.) Bas, *comb. nov.* — FIG. 12—25.

Marasmius caricis P. Karst. in Bidr. Finl. Nat. Folk 25: 231. 1876. — *Androsaceus caricis* (P. Karst.) P. Karst. in Bidr. Finl. Nat. Folk 32: 174. 1879.

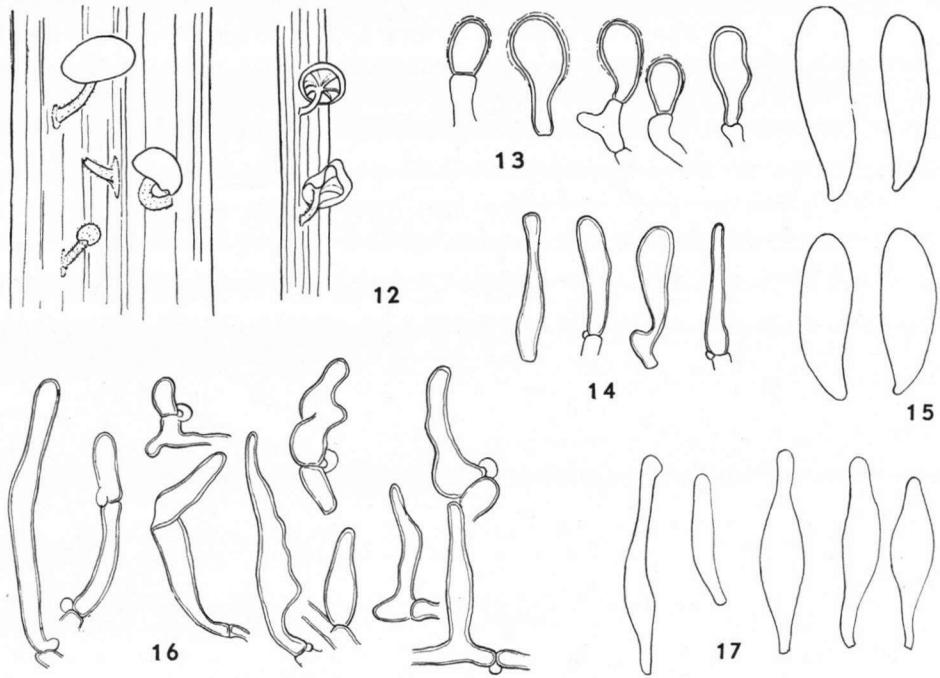
Fruit-bodies very small, gregarious on putrescent leaves of *Carex*. Cap (1.5-)2-4(-5) mm across, convex with margin slightly inflexed at first, then plano-convex, circular when young, sometimes slightly elongated when old, white to pale ochraceous with whitish margin, puberulous under hand-lens, smooth, sometimes slightly wrinkled at margin when fresh, dull. Gills 3-6(-10), very distant, rather narrow and thick, more or less fold-like, straight, very seldom forked, radial, reaching margin of cap, white (yellow in the dried type-material), with fimbriate edge under hand-lens. Stalk 1.5-4 × 0.1-0.3 mm, equal or slightly attenuated upwards, curved sideways, insititious, sometimes with slightly bulbous or disk-shaped base, central at first, then eccentric, white at apex, whitish to pale brown at base, densely puberulous, sometimes minutely villose at base. Flesh white, somewhat hyaline over hymenium, rather firm, comparatively thick in cap, up to 0.5 mm.

Spores (14.5-)17.7-21.5(-24.4) × (4.5-)5.3-6.3(-7.2) μ (inclusive of apiculus), slender-clavate to oblong-ellipsoid, with broadly rounded apex and tapering, slightly curved base, tapering into a rather small apiculus, colourless, rather thin-walled, with several oil-like droplets. Basidia 28-40(-50) × 8-11 μ, as a rule 2-spored (in two cases a small third sterigma was observed), clavate, with basal clamp. Cheilocystidia occurring mixed with basidia, 25-58 × 7-12 μ, fusiform to ventricose-fusiform, neck often elongated and 2.7-3.6 μ wide, the apex narrow but rounded, sometimes subcapitate and then 3.6-5 μ broad, often somewhat encrusted with hyaline matter, the wall slightly thickened, the base often rather broad and with clamp. Pleurocystidia 30-42 × 9-12 μ, fusiform, the apex 4-4.5 μ wide and rounded, with slightly thickened wall, colourless, easily overlooked. Cuticle irregularly hymeniform with scattered cystidia, made up of colourless to pale yellow, lozenge-shaped to clavate cells, 10-44 × (7-)11-15 μ, with thick more or less gelatinizing outer wall and rather thick inner wall which is metachromatic in Cresyl Blue, interstices much narrower than diameter of cells and filled with gelatinous matter. Pileocystidia 30-53 × 6-11.5 μ, cylindrical to very slender conical, sometimes fusiform, broad at base, originating from same parent hyphae as cells of cuticle, apex narrow but rounded, 2.7-5.4 μ wide; with basal clamps; wall slightly thickened, colourless. Caulocystidia up to 80 × 10 μ, very variable, e.g. (1) cystidia similar to the pileocystidia; (2) cylindrical, septate, sometimes subcapitate hairs; and (3) short projections of superficial hyphae; all possible transitions between these three types present; walls slightly thickened. Trama of stalk made up of longitudinal, thick-walled hyphae, embedded in a gelatinous matter; hyphae 3-9 μ wide; narrow and close together near surface, increasing in diameter towards centre, with the interstices becoming more distinct, but these not wider than diameter of hyphae and filled up with gelatinous substance. Trama of cap consisting of irregularly arranged, 5-10 μ wide hyphae with thick walls, not embedded. Trama of gills irregular to somewhat regular, composed of 3-7 μ wide hyphae, embedded in a gelatinous matter, the interstices on an average about as wide as the hyphae; with a thin, about 10 μ wide, densely ramose subhymenial layer. Clamps present. All elements pale yellowish in Melzer's solution. Inner walls of cells of cuticle and of hyphae of stalk slightly metachromatic in Cresyl Blue.

HABITAT.—In swamps, on putrescent leaves and culms of species of *Carex*, viz. *C. vesicaria* (coll. Karsten) and *C. rostrata* (coll. Reid).

DISTRIBUTION.—Finland and Scotland, probably also in the Netherlands.

SPECIMENS EXAMINED.—F i n l a n d: Tavastia australis, Mustiala, 30 Sept. 1870,



Figs. 12–17. *Gloiocephala caricis* (P. Karst.) Bas. 12. Carpophores ($\times 5$). 13. Cells of cuticle ($\times 500$). 14. Pileocystidia ($\times 500$). 16. Caulocystidia ($\times 500$). 17. Cheilocystidia. (12–17 from type.)

P. A. Karsten s.n., type (H). Scotland: Inverness-shire, Lily Pond, between Rothiemurchus and Loch an Eilean, 16 July 1957, *D. A. Reid & P. M. Reid s.n.* (K).

Mr. W. J. Reijnders (Amsterdam) showed me his notes and drawings of a species of *Marasmius*, collected on *Phragmites* in the Naardermeer near Amsterdam, 1 November 1952, very similar to *G. caricis*. The macroscopical description entirely matched this species, and the notes on the microscopical features, although rather brief, comprised no facts that would preclude the identity with *G. caricis*. However, as no material is available, the occurrence of *G. caricis* in the Netherlands has still to be definitely demonstrated.

All elements of *G. caricis*, except the cystidia, basidia and spores, have a wall consisting of two rather thick layers, the outer one of which has a tendency to gelatinize; its outline fades in NH_4OH and KOH . Where the elements are rather close together, as in the stalk, the trama of the gills and the cuticle, the intercellular space is filled up with gelatinous matter. Only in the upper part of the trama of the cap and in the hymenium are the elements not agglutinated.

According to Singer, the present species has to be placed in *Gloiocephala* on account of the gelatinizing hyphae in the trama of the cap. See further the discussion below.

Among the species of *Gloiocephala* described by Singer (1960), especially *G. inobasis* Sing. and *G. confusa* Sing. bear a certain resemblance to the present species. The hymenial cystidia of these two species are, however, completely different from those of *G. caricis*.

Still another small, white agaric, growing on *Carex*, has to be taken into consideration in this connection, viz. *Agaricus caricicola* Lasch (1828: 391). No original material seems to be available. Lange (1936: 63) placed this taxon as a variety under *Omphalia integrella* (Pers. ex Fr.) Kummer. This in accordance with Fries's suggestion in the general index of the "Systema Mycologicum" (1832: 11). Cejp (1938: 139) put *A. caricicola* in the synonymy of *Delicatula hirsuta* (Tode) Cejp, together with *Androsaceus caricis* (P. Karst.) P. Karst.

There is a great similarity between the original descriptions of *Agaricus caricicola* Lasch and *Marasmius caricis* P. Karst. However, the original description of the gills of *Agaricus caricicola* makes it very plausible that Lasch's species belongs to the genus *Delicatula* sensu K hner & Romagnesi.

As K hner (1938: 666) pointed out, it is not probable that *Agaricus caricicola* sensu E. J. Lange is conspecific with *Delicatula integrella*, as Lange mentioned the presence of cystidia; it is closer to *D. delectabilis* (Peck) K hner & Romagn.

Another species which bears a great resemblance to *Marasmius caricis* P. Karst. is *M. caricicola* Kauffman apud Murrill & Pennington (1915: 277).

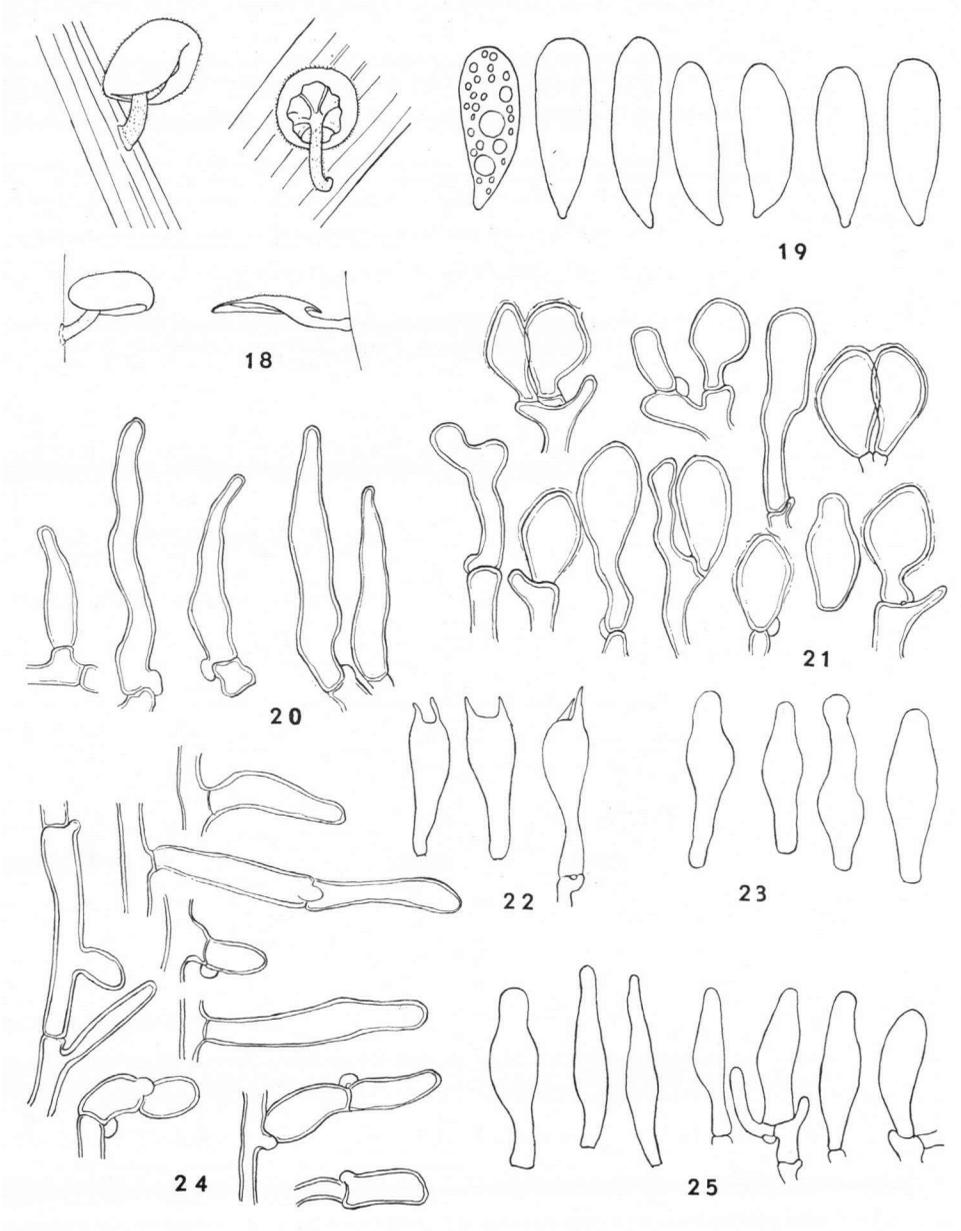
According to Kauffman's rather detailed description (1918: 74) *M. caricicola* differs from *M. caricis* in the broadly radially sulcate or alveolate surface of the cap, the rather broad gills, the subglabrous stalk, and the larger size (cap 4–8 mm across, stalk up to 0.7 mm thick).

By the kindness of Dr. A. H. Smith (Ann Arbor) I was able to study authentic material of *M. caricicola* Kauffm. (Whitmore Lake, Horshoe Lake and Mud Lake, Michigan, 12 Nov. 1910; probably erroneously labelled as the type). Unfortunately this material is in a very bad condition and it appeared impossible to check Kauffman's statement that the cuticle consisted of globose hyaline cells. I found one ellipsoid spore, $19.6 \times 7.9 \mu$; one fusiform subcapitate (cheilo-?)cystidium, about $50 \times 14 \mu$; some hairlike caulocystidia; clamped hyphae; no gelatinous tissue in the cap; no amyloid or pseudoamyloid elements; thick-walled hyphae in the stalk, which were metachromatic in Cresyl Blue.

On account of these perhaps still insufficient facts this species has to be placed in section *Epiphylli* of the genus *Marasmius*. But the possibility still remains that it will turn out to be a species of *Marasmiellus* when the exact structure of the cuticle will be known.

EXPLANATION OF FIGURES 18–25

Figs. 18–25. *Gloiocephala caricis* (P. Karst.) Bas. 18. Carpophores ($\times 5$). 19. Spores ($\times 1250$). 20. Pileocystidia ($\times 500$). 21. Cells of cuticle ($\times 500$). 22. Basidia ($\times 500$). 23. Pleurocystidia ($\times 500$). 24. Caulocystidia ($\times 500$). 25. Cheilocystidia ($\times 500$). (18–25 from Reid & Reid 16 VII 1957.)



Figs. 18-25

GLOIOCEPHALA species — FIG. 26—30

Marasmius menieri Boud. *sensu* Corner in Trans. Brit. mycol. Soc. 19: 285. 1934.

Cap 2–6 mm across, 120–250 μ thick, convex then plane, sometimes subconcave, rarely umbonate, circular to almost spatulate, puberulous, even or subreticulate, not striate, white to pale yellowish or brownish; margin straight at first, often becoming slightly inflexed. Stalk 2–10 \times 0.15–0.8 mm, attenuate upwards, with slightly bulbous base, central or slightly eccentric, generally more or less horizontal and pressed against the hymenium, rarely vertical, white at apex, ferruginous downwards, dark brown or black at base, puberulous below, glabrous above. Hymenium plane or with a few shallow folds or wrinkles, white or cream-coloured. Flesh pallid, slightly gelatinous over hymenium.

Spores 13–23 \times 4–5.5 μ , fusiform pip-shaped, thin-walled, clouded vacuolate. Basidia 40–55 \times 9–11 μ , 4-spored, seldom 2-spored; sterigmata 4–5 μ long. Hymenial cystidia absent. Cuticle consisting of clavate, pale yellowish brown cells, 25–80 \times 12–30 μ , with slightly thickened walls, often more or less encrusted, mixed with numerous, colourless, thin-walled, smooth, ventricose pileocystidia with 1.5–2.5 μ wide, filiform appendages, 50–120 \times 6–18 μ . Caulocystidia of two kinds, either ventricose to subtriangular with filiform apex, or irregularly cylindrical to clavate, 30–70 \times 5–20 μ , with dark brown walls. Trama of cap according to description partly gelatinized; according to drawing entirely gelatinized. Clamps present.

HABITAT.—In fens, on decayed leaves of *Cladium mariscus* and *Typha*, July–Oct.

DISTRIBUTION.—England.

SPECIMENS EXAMINED.—No material available. Description copied from Corner's publication. Figures copied from Corner's original drawings.

None of the species in Singer's publication on *Gloiocephala* (1960) appears closely related. In the species with hair-like pileocystidia these are thick-walled and always combined with smaller spores.

I have refrained from naming this presumably new species, as no material is available. No doubt this species will be found again when looked for in the proper places. Corner stated it to be common in the fens in Cambridgeshire, England.

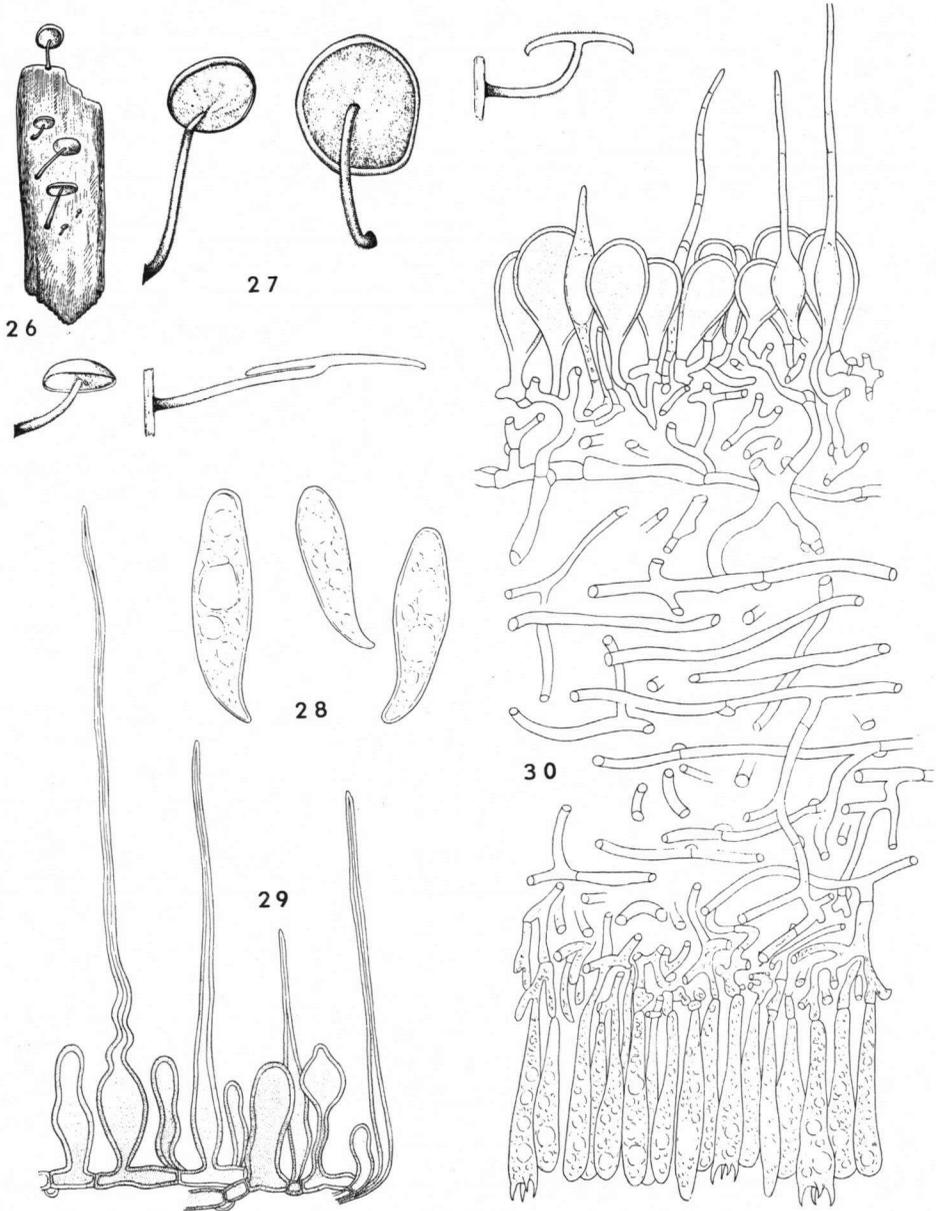
According to Singer, this species is to be placed in *Gloiocephala* on account of the long, hair-like dermatocystidia and the gelatinizing trama of the cap.

Singer (1960: 261) placed in the genus *Gloiocephala* all species differing from those of the section *Epiphylli* of the genus *Marasmius* by one or more of the following features: (1) characteristic dermatocystidia, viz. cystidia which are large, or thick-walled, or pseudoamyloid, or capitate to subcapitate; (2) hymenial cystidia, which are not thin-walled and fusiform; (3) basal fibrils; (4) spatulate carpophores; (5) pigmented caps; (6) gelatinous tissue in the trama of the cap.

Especially in the case of *Gloiocephala caricis*, I cannot help wondering at the

EXPLANATION OF FIGURES 26–30

Figs. 26–30. *Gloiocephala* sp. 26. Carpophores (\times 1). 27. Carpophores (\times 5). 28. Spores (\times 1250). 29. Caulocystidia (\times 500). 30. Section of cap (\times 500). (After Corner's original drawings.)



Figs. 26-30

merits of the genus *Gloiocephala* as interpreted by Singer. In that species only one of the characters enumerated above is present, viz. the gelatinized trama of the cap, whereas in other respects *G. caricis* is very similar to *Marasmius epiphyllus*. In both species the cuticle consists of thin-walled, rather small more or less fusiform pileocystidia and vesiculose cells with a gelatinizing outer wall, on account of which the cells are embedded.

Cystidia play a prominent part in Singer's delimitation of *Gloiocephala*. It seems worth while to stress the fact that pileocystidia are rather frequent in the sections *Hygrometrici* and *Epiphylli* of *Marasmius*.¹ The pileocystidia in these sections may be (1) thick-walled and hair-like, as in *M. hudsoni* (Pers. ex Fr.) Fr. (see Patouillard 1883: 149 pl. 108 f. 327); (2) rather thick-walled and fusiform subcapitate, as in *M. buxi* Quél. (see Favre 1933: 8 f. 1; this species has a remarkable tendency to reduction of the hymenophore); (3) small, thin-walled, subcylindrical to ventricose in *M. epiphyllus* (Pers. ex Fr.) Fr. (Bas 1647); (4) large, slightly thick-walled and lageniform-subcapitate in *M. epiphyloides* Rea (Bas 1190); (5) medium, clavate-fusiform, thin-walled and heavily encrusted in *M. recubans* Quél. (Bas 1318). The question now arises whether or not these pileocystidia in the species mentioned above are fundamentally different from those occurring in species of *Gloiocephala*.

In the species placed in *Gloiocephala* by Singer, two types of characteristic cystidia may be distinguished. One is thick-walled and ventricose with a hair-like elongated neck; the other, fusiform-ventricose and capitate or subcapitate, mostly thin-walled and often encrusted.

In connection with the first type, the caulo- and pileocystidia of the unnamed species of *Gloiocephala* described above are very interesting. The pileocystidia of this species are thin-walled, ventricose-fusiform with an elongated hair-like neck (fig. 30). Especially the short ones among them bear a great resemblance to the pileocystidia of *Marasmius epiphyllus*, whilst the hair-like caulocystidia which resemble the pileocystidia but have thickened walls (fig. 29) are quite similar to the pileocystidia of, for instance, *G. longifimbriata* Sing. Thus, in the unnamed species of *Gloiocephala* transitions can be found between the dermatocystidia of the *Marasmius epiphyllus* type and the dermatocystidia of the first type in *Gloiocephala*.

The second type of cystidia in *Gloiocephala* occurs in *G. menieri* in its extreme form, viz. capitate fusiform-ventricose with a brown apical incrustation. However, at the margin of the cap of *G. menieri* (fig. 4) one will find all transitions from fusiform cystidia to the second type of cystidia in *Gloiocephala*.

In my opinion the two kinds of characteristic cystidia occurring in *Gloiocephala* are not only homologous to each other but also to the less conspicuous cystidia in *Marasmius epiphyllus*.

In this paper I have treated the genus *Gloiocephala* entirely in accordance with the formula given by Singer. In this way, two species have inevitably been introduced

¹ This is in opposition to Singer's statement (1951: 321) "... epicutis of the pileus consisting of irregular ... or hymeniformly arranged elements or an epithelium, but among these elements no differentiated hairs or dermatocystidia projecting ..."

which seem to represent important bridging elements between *Marasmius* and *Gloiocephala*.

There exists at the boundary of the genus *Marasmius*, a group of species in which reduction of the hymenophore is associated with a tendency to differentiation of the cystidia, formation of gelatinized tissue in the cap, and eccentric attachment and reduction of the stipe. I am afraid, however, that it will not be possible to maintain this group as a separate genus.

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REFERENCES

- BOUDIER, J. L. E. (1894). Nouvelles espèces des champignons de France. *In* Bull. Soc. mycol. France **10**: 59-67 pl. 1.
- CEJP, K. (1938). *Delicatula*. *In* Atl. Champ. Europe **4b**. Praha.
- CORNER, E. J. H. 1934. The fungi of Wicken Fen, Cambridgeshire. *In* Trans. Brit. mycol. Soc. **19**: 280-287.
- "EXPO".—Cailleux, A. & Taylor, G. 1958. Code expolaire. Paris.
- FAVRE, J. (1933). Le marasme du buis (*Marasmius buxi* Quélet) à rechercher en Suisse. *In* Schweiz. Z. Pilzk. **11**: 7-9.
- KAUFFMAN, C. H. (1918). The Agaricaceae of Michigan. Lansing (Publ. Michig. geol. biol. Surv. **26**, Biol. Ser. 5).
- KÜHNER, R. (1938). Le genre *Mycena*. Paris (Encycl. mycol. **10**).
- LANGE, J. E. (1936). Flora agaricina danica 2. Copenhagen.
- LASCH, W. G. (1828). Enumeratio Agaricorum Marchiae brandenburgicae . . . *In* Linnæa **3**: 378-430.
- MURRILL, W. A. & PENNINGTON, L. H. (1915). *Marasmius*. *In* North Amer. Fl. **9**: 250-286.
- PATOUILLARD, N. (1883). Tabulae analyticae fungorum **1**: 41-85 pls. 101-200. Paris.
- SCHWEERS, A. C. S. (1948). Door het rietland. *In* Fungus **18**: 1-4.
- SÉGUY, E. (1936). Code universel des couleurs. Paris (Encycl. prat. Nat. **30**).
- SINGER, R. (1951). The "Agaricales" (Mushrooms) in modern taxonomy. *In* Lilloa **22**: 1-832. (1949).
- SINGER, R. (1960). Monographs of South American Basidiomycetes, especially those of the East slope of the Andes and Brazil. 3. Reduced marasmioid genera in South America. *In* Sydowia **14**: 258-280.