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GLIOMASTIX GUÉGUEN

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Ten species and two varieties are accepted in the form genus *Gliomastix*. These are illustrated and described from host material and, where possible, from cultures. The relationship of *Gliomastix* to other genera is discussed and a check list of specific epithets is supplied.

INTRODUCTION

The form genus *Gliomastix* Guéguen was published in 1905 with the single species *G. chartarum*. The title of the paper was "*Gliomastix* (*Torula*) *chartarum*, n.gen. n.sp.; . . .", the Latin diagnosis of the species was entitled "*Gliomastix* (*Torula*) *chartarum* n.sp.", and the accompanying plates labelled "*Gliomastix chartarum* n.sp.". In a discussion of the "position systématique" Guéguen stated ". . . nous considérons le Champignon qui fait l'objet de cette étude comme identique au *Torula chartarum* Corda". Thus the designation of *Gliomastix chartarum* several times as a new species, especially in the species diagnosis, and also as identical with *Torula chartarum* Corda is confusing. In this paper, therefore, as was done by Mason (1941), *Gliomastix chartarum* is considered to be a new species and not a new combination of "*Torula chartarum* Corda".

Guéguen provided a good generic description and excellent figures but it was not until Mason's account was published (1941) that the name was used for several further species now known to be not at all uncommon. Between 1905 and 1941 at least 14 taxa were described or redescribed which might have been referred to the genus. Mason considered *G. chartarum* Guég. to be a later synonym of *Torula convoluta* Harz which was transferred as *G. convoluta*. A variety, *G. convoluta* var. *felina* (syn. *Periconia felina* Marchal) was also added to the genus. Mason established that the sporogenous cells of the type species were phialides and he discussed the nature of its spores in some detail.

Since 1941 a number of species have been described all of which are rightly included in *Gliomastix*. These include *G. protea* (Sacc.) Verona & Castella (1942), *G. luzulae* (Fuckel) Mason ex Hughes (1958) and *G. guttuliformis* Brown & Kendrick (1958).

In 1958 Hughes identified *G. chartarum* Guég. and *T. convoluta* Harz with the earlier *Torula murorum* Corda which was accordingly transferred to *Gliomastix* as *G. murorum* (Corda) Hughes.

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In another publication on *Gliomastix* in New Zealand (Hughes & Dickinson, 1968) four species are included, *G. murorum*, *G. novae-zelandiae* n.sp., *G. luzulae* and the *Gliomastix* state of the pyrenomycete *Wallrothiella subiculosa*. The last was previously described as *G. protea*. This is to date the only species of *Gliomastix* which has been reported with a perfect state.

Species now accepted in *Gliomastix* have been previously disposed in a number of other genera including some to which such fungi might conceivably belong and others now restricted in such a way as to be totally unacceptable. There are also several other genera which are similar to *Gliomastix* in such features as method of spore formation, dark pigmentation, etc., and as more species are described the dividing lines between this complex of amerosporous, phialide-producing genera is becoming somewhat obscured.

Cephalosporium Corda may be distinguished from *Gliomastix* in that its non-septate phialospores are hyaline even when viewed in mass. This distinction is not really valid in light of modern thought on the taxonomy of the fungi imperfecti but for the present it seems convenient to maintain the division between these two genera.

Fusidium Link is restricted to those species which form acropetal chains of non-septate conidia from the blown-out ends of simple conidiophores.

Oospora Wallroth is not an acceptable generic name (Hughes, 1958).

"*Basitorula*" Arnaud does not appear to have been validly described. Although none of Arnaud's material has been seen his two species are tentatively reduced to synonymy with *Gliomastix*.

Monocillium Saksena, which includes species with both hyaline and pigmented spores, is characterised by having phialides which are regularly swollen towards their apices.

Paecilomyces Bainier in its typical form may be readily recognized by the production of a complex penicillus and by its hyaline or brightly coloured phialospores. However, a number of species have been recently described which bear only a fractional penicillus or even single phialides and which produce dark pigmented spores (Onions & Barron, 1967). This has made the dividing line between these two genera less distinct.

Tilachlidium Preuss is probably synonymous with *Cephalosporium*. The formation of hyphal ropes seems to be insufficient to maintain the two genera as separate taxa.

Torula Pers. ex Fr. is now restricted to species forming acropetal chains of phragmospores from pores in dark, thick-walled, apical conidiophore cells.

The species of *Gliomastix* described here are all saprophytes and, with the exception of one variety, they are mostly found on decaying organic debris. Several species appear to be rare and have only been found in tropical regions. Of the more commonly encountered species *G. murorum* var. *felina* is perhaps the most widespread being particularly common in soil. It appears to be tolerant of a wide variety of soil types with the marked exception of acid peats (Rix, 1966). This species also appears to be important during the latter stages of the decay of *Pteridium* petioles (Frankland, 1966). It was, however, demonstrated that it lacks an oxidase system, such as is thought to be

required for lignin decomposition. Guillemat & Montégut (1958) have demonstrated an increase in the frequency of *G. convoluta* in soils treated with a balanced NPK fertiliser. *Gliomastix* species common on dead plant tissues include *G. murorum*, *G. murorum* var. *polychroma*, *G. luzulae*, and *G. cerealis*. None shows any marked preference for particular types of tissue.

It has been reported that a strain of *G. murorum* var. *felina* is a destructive parasite of *Ophiobolus graminis* (Mangan, 1967). In contrast the growth of *Fusidium viride* (=*G. luzulae*) was adversely affected when grown in dual cultures with other fungi including *O. graminis* (Jouan, Lemaire, & Arnoux, 1964). Jackson (1965) has reported that *G. convoluta* (=*G. murorum*) is moderately chitinolytic. Economically the genus is not especially important though the ability of most species to decompose cellulose, as demonstrated on cellulose agar (Eggins & Pugh, 1962), leads occasionally to the deterioration of manufactured materials, such as sacking and paper. Antibiotic production does not appear to have been recorded for any species of *Gliomastix*.

MATERIALS AND METHODS

(1) *Exsiccata*. *Gliomastix* folders in the Herbaria of the Commonwealth Mycological Institute (IMI) and the Mycological Herbarium of the Plant Research Institute, Ottawa (DAOM), were examined by courtesy of their Directors.

I am also grateful for the loan of exsiccata to the Directors of the Herbaria at the British Museum (Natural History) (BM), Cambridge, Massachusetts (FH), Geneva (G), Helsinki (H), the Royal Botanic Gardens, Kew (K), New York (NY), Padova (PAD) and Prague (PR).

Abbreviations are employed for collections made by F. C. Deighton (F.C.D.), M. B. Ellis (M.B.E.), S. J. Hughes (S.J.H.) and E. M. Rix (E.M.R.).

(2) *Cultures*. I am indebted to the C.M.I., Kew, to the C.B.S., Baarn, and to the P.R.I., Ottawa, for making *Gliomastix* cultures available to me. I am also grateful to the many individual mycologists who have supplied me with cultures.

(3) *Methods of examination*. All descriptions of cultures are given on 2% malt agar except where explicitly stated. Slides were made in lactophenol or lactic acid and phase contrast microscopy was employed wherever possible to examine specimens.

TAXONOMY

Gliomastix Guéguen, 1905, *Bull. trimest. Soc. mycol. Fr.*, **21**: 240.

="*Basitorula*" Arnaud, 1954, *Bull. trimest. Soc. mycol. Fr.*, **69**: 276.

Colonies on natural substrata green, brown or black, usually with sparse floccose aerial mycelium and abundant sporulation. In culture many species form mycelial ropes which are usually white contrasting sharply with the dark-pigmented spore masses. *Phialides* are simple, hyaline or dark, with a single apical pore which may or may not bear a collarette. They are formed directly on the vegetative hyphae or on hyphal branches which may be

slightly modified in being wider and/or darker than normal. Phialide proliferation occurs rarely in some species. *Phialospores* are formed in basipetal succession, dry and forming chains or slimy and aggregating in balls at the phialide apex, non-septate, globose, ovoid or elliptical, green, brown or black but not hyaline, with their pigment being especially noticeable when viewed in mass. Type species: *Gliomastix murorum* (Corda) Hughes.

KEY TO SPECIES

Phialospores in chains 1
Phialospores rarely in chains, usually aggregated into a ball at the phialide apex . 8

1. Phialides dark coloured or conidial chains forming columns 2
   Phialides hyaline for most of their length, frequently becoming subhyaline to dark coloured towards the apex, conidial chains not forming columns . 3
2. Phialides massive 42–71μ long, phialospores in chains not forming columns, mostly 13·8×4·8μ . . . . . *elata* (1)
   Phialides 16–51μ long, phialospores in chains which frequently adhere together forming columns, mostly 9·8×4·8μ . . . . *novae-zelandiae* (2)
   Phialides 22–45μ long, phialospores in chains not forming columns, mostly 10·2×2·4μ . . . . . *nigricans* (3)
3. Phialospores usually >12μ long . . . . . *fusigera* (4)
   Phialospores <8μ long 4
4. Phialospores lemon-shaped with a striate banding . *Paecilomyces striatisporus*
   Phialospores not so shaped or ornamented 5
5. At least some phialospores rough-walled 6
   All phialospores smooth-walled 7
6. Phialospores in chains, finely roughened, ovoid to elliptical, mostly 5·1×2·6μ *musicola* (5)
   Phialospores in long chains, coarsely roughened, globose to ovoid, mostly 3·6×2·9μ . . . . . *murorum* (6)
   Phialospores occasionally in short chains, mostly in balls at the phialide apex, smooth to coarsely roughened, ovoid to elliptical, mostly 4·0×2·6μ atypical forms of *murorum* var. *felina* (10)
7. Phialides smooth below, roughened towards the apex, phialospores brown, ovoid, smooth-walled, mostly 3·8×2·1μ . *murorum* var. *polychroma* (7)
   Phialides finely roughened along whole length, phialospores olive-green to brown, elliptical, smooth-walled, mostly 6·4×2·3μ . . . *luzulae* (8)
8. Phialides brown, smooth, phialospores brown, smooth-walled *Gliomastix* state of *Wallrothiella subiculosa* (9)
   Phialides not brown, frequently roughened at the apex, phialospores not brown 9
9. Colonies fast growing on malt agar, black when sporing, phialides often with an accumulation of dark material around their apex, phialospores ovoid to elliptical, smooth to rough-walled, mostly 4·0×2·6μ *murorum* var. *felina* (10)
   Colonies restricted on malt agar, green to dark green when sporing, phialides usually with a flared collarette, phialospores guttulate, smooth-walled, mostly 3·5×2·6μ . . . . . *cerealis* (11)
   Colonies restricted on malt agar, dark green when sporing, phialides often swollen below, with a tubular collarette, phialospores ovoid, cylindrical or allantoid, smooth-walled, mostly 2·8×1·9μ . . . . . *inflata* (12)

(1) **Gliomastix elata** spec. nov. (Plate 1, Fig. 1–3.)

Coloniae non effusae et minimum superficiale mycelium efferentes; phialides prominentes. *Mycelium* ex hyphis hyalinis, laevibus, septatis, ramosis, 1·6–2·0μ crassis compositum. *Conidiophora* simplicia vel ramosa, septata, laevia, grisea, 2·9–4·2μ crassa. *Phialides* rectae vel flexuosae, griseae, leves vel parce verruculosae, 42–71μ longae, 3·0–5·2μ crassae, attenuatae, apice 1·3–2·0μ crassae. *Conidia* in catenis, non-septata, fusiformia, basi et apice truncata, laevia vel echinulata, in massa nigra,

discretim pallide brunnea vel nigra in extremitatibus pallidiora, 10·0–22·5μ longa, 1·7–3·0μ crassa, pro parte maxima 13·8×4·8μ. *Habitat* in foliis *Musae*, Njala, Sierra Leone, C. T. Pyne, IMI 79595 (a) typus.

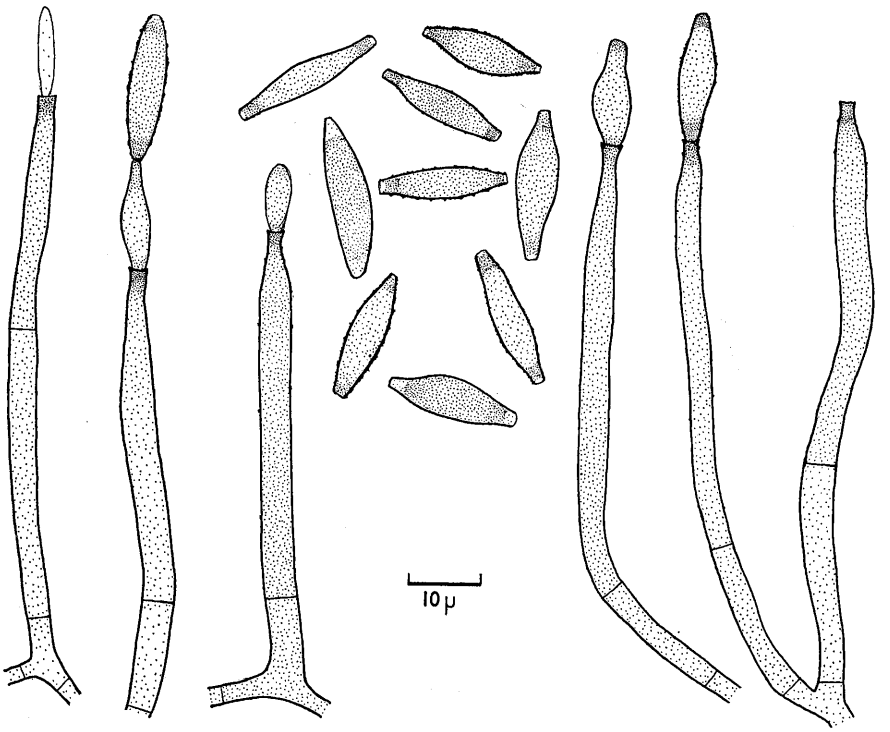

FIG. 1. *Gliomastix elata.*

Colonies on host with little superficial and no aerial mycelium, dark-coloured phialides prominent. *Mycelium* composed of hyaline, smooth-walled, septate hyphae, 1·6–2·0μ wide. *Phialophores* grey, smooth-walled, septate, branched, 2·9–4·2μ wide. *Phialides* straight to slightly sinuous, grey, smooth to very sparsely roughened, 42–71μ long, 3·0–5·2μ wide for most of their length, tapering abruptly to 1·3–2·0μ wide at the apex. *Phialospores* forming chains, non-septate, fusoid with truncate ends, walls smooth to finely roughened, black in mass, individually pale brown to black with the ends usually paler than the central portion, 10·0–22·5μ long, 3·8–6·2μ wide, mostly 13·8×4·8μ.

Distribution. Sierra Leone.

Host. Musa.

SPECIMEN EXAMINED

On *Musa*, Njala, Sierra Leone, C. T. Pyne, i, 1960 (IMI 79595a), Type.

(2) **Gliomastix novae-zelandiae** Hughes & Dickinson, 1968, *N. Z. Jl Bot.*, **6**: 108. (Plate 3, Fig. 1, 2.)

Colonies on host effuse, dark olivaceous to black, powdery, dominated by adhering spore chains. *Mycelium* mostly superficial and composed of hyaline to sub-hyaline, smooth-walled, septate, 1·3–3·5μ wide hyphae. *Phialides*, which occur singly or crowded, and arise from wider portions of the aerial and prostrate mycelium or from short upright branches up to 20μ long, are straight or sinuous, hyaline to pale brown, smooth-walled for the most part, 16–39 (−51)μ long, 2·0–4·5μ wide below, 1·3–3·3μ wide at the apex which is surrounded by an irregular dark deposit, which is sometimes relatively massive, forming a cupulate collarette. *Phialospores* forming persistent chains with the individual chains adhering together forming columns, non-septate, irregularly ovoid to rectangular with base truncate, apex truncate to rounded, walls smooth or roughened with a dark exospore, dark olivaceous brown to black, 6·8–12·4μ long, 2·9–6·0μ wide, mostly 9·8×4·8μ.

Distribution. New Zealand.

Hosts. Coprosma, Beilschmiedia.

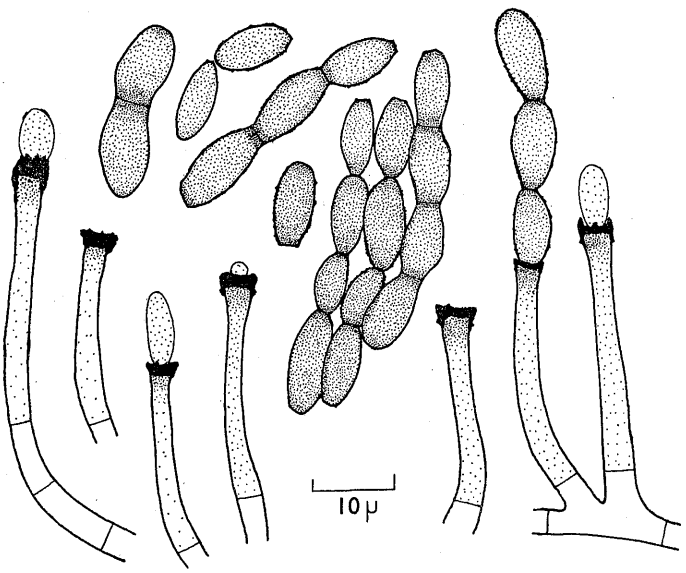

FIG. 2. *Gliomastix novae-zelandiae.*

DISCUSSION

Gliomastix novae-zelandiae is accommodated without difficulty in this genus and shows particularly well the dark accretions around the phialide apices and on the phialospore walls which are found in other *Gliomastix* species.

SPECIMENS EXAMINED

On *Beilschmiedia tawa*, Mamaku State Forest, Auckland Prov., S.J.H., iii, 1963 (DAOM 96181e), Type; on *Coprosma robusta*, Titirangi, Auckland Prov., S. J. H., ii, 1963 (DAOM 93813c); on *Coprosma robusta*, Cascade Kauri Park, Swanson, Auckland Prov., S. J. H., i, 1963 (DAOM 109742a); on *Coprosma australis*, Mamaku State Forest, Auckland Prov., iii, 1963 (DAOM 96014d).

(3) **Gliomastix nigricans** spec. nov. (Plate 1, Fig. 4–6.)

Coloniae aliquantum effusae, pulveraceae, fuscae. *Mycelium* superficiale, ex hyphis sub-hyalinis, laevibus, septatis, ramosis, 2·0–4·1μ crassis compositum. *Phialides* rectae vel flexuosae, griseae, verrucosae, ad apicem leves, subulatae, 22–45μ longae, ad basim 2·1–3·6μ crassae, apice 0·9–1·4μ. *Conidia* in catenis, non-septata, fusiformia, basi et plerumque apice truncata, echinulata, in massa nigra, discretim nigra in extremitatibus pallidiora, 6·2–14·0μ longa, 1·7–3·0μ crassa, pro parte maxima 10·2×2·4μ. *Habitat* in foliis *Marantochloae* sp., Bunsu, Ghana, S. J. Hughes, IMI 44391(a) typus.

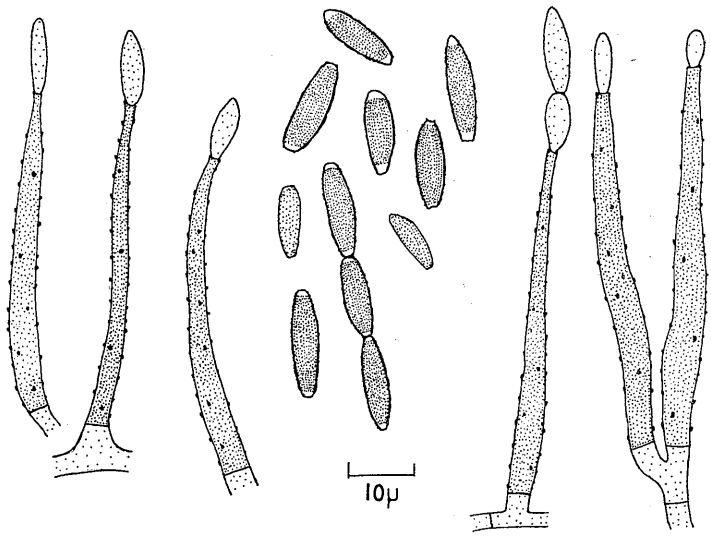

FIG. 3. *Gliomastix nigricans.*

Colonies on host thin, powdery, with some floccose mycelium, dark brown to black, long spore chains prominent. *Mycelium* superficial and composed of sub-hyaline, smooth-walled, septate, branched, 2·0–4·1μ wide hyphae. *Phialides* straight or slightly curved, grey, roughened along most of their length though less so towards the apex, subulate to the apex, 22–45μ long, 2·1–3·6μ wide below, 0·9–1·4μ wide at the apex. *Phialospores* forming readily seceding chains, non-septate, fusiform, base truncate, apex truncate or rounded, walls finely roughened, black in mass, individually black with both ends sub-hyaline, 6·2–14·0μ long, 1·7–3·0μ wide, mostly 10·2×2·4μ.
Distribution. Ghana.
Host. Marantochloa.

SPECIMEN EXAMINED

On *Marantochloa* sp. Bunsu, Ghana, S. J. H., vi, 1949 (IMI 44391a), Type.

(4) **Gliomastix fusigera** (Berk. & Br.) comb. nov. (Plate 1, Fig. 7, 8.)
≡*Monotospora fusigera* Berk. & Br., 1873, *J. Linn. Soc., Lond.*, **14**: 99.
Colonies on host with little superficial and no aerial mycelium, black with spores prominent. *Mycelium* superficial and composed of hyaline to pale brown, smooth-walled, septate, branched, 1·8–3·3μ wide, hyphae. *Phialides*

straight, hyaline below, sub-hyaline towards the apex, smooth-walled becoming irregularly roughened towards the apex, 30–50μ long, subulate towards the apex, 1·9–2·9μ wide below, 0·8–1·4μ wide at the apex which may have a tiny

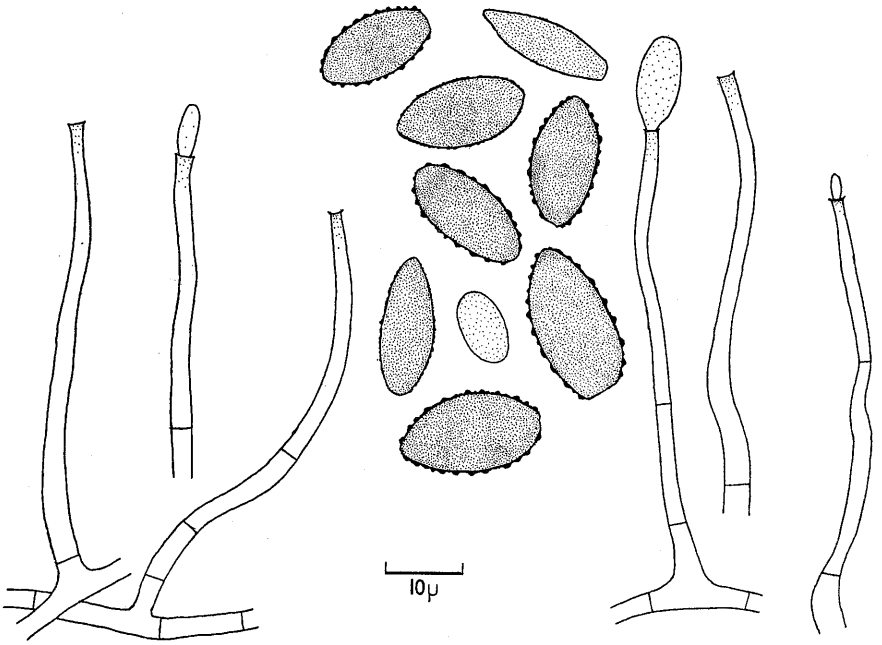

FIG. 4. *Gliomastix fusigera.*

flared collarette. *Phialospores* forming readily seceding chains, non-septate, elliptical or fusoid, base papillate, truncate or rounded, apex rounded to acute, walls finely to very coarsely roughened, black in mass, individually grey to black, 7·0–18·6μ long, 3·0–10·5μ wide, mostly 14·0×6·5μ.
Distribution. Ceylon, New Caledonia.
Hosts. Palm, *Bambusa.*

SPECIMENS EXAMINED

In Herb. Berk., *Monotospora fusigera* Berk & Br., Ceylon, G.H.K.T., xi, 1867, Type; on *Bambusa* sp., La Crouen, New Caledonia, B. Huguenin, vi, 1963 (IMI 102777b).

(5) **Gliomastix musicola** (Spegazzini) comb. nov. (Plate 2, Fig. 1, 2.)

≡*Coniosporium musicola* Spegazzini, 1910, *An. Mus. nac. Hist. nat. B. Aires*, **20**: 430.

=*Botrytis funicola* E. & E. var. *corticola* Ellis & Everhart, Herbarium name.

=*Trichosporium aterrimum* Massee, 1899, *Bull. misc. Inf. R. bot. Gdns, Kew*, p. 167, non (Corda) Sacc., 1886, *Syll. Fung.*, **4**: 289.

≡*Trichosporium masseei* Sacc., 1913, *Syll. Fung.*, **22**: 1356.

≡*Phaeoscopulariopsis aterrimum* (Massee) C. V. Subramanian, 1956, *J. Indian bot. Soc.*, **35**: 447.

Colonies on host thin, effuse, black, sporing heavily. On malt agar at 25°C, 63 mm in 14 days, colony floccose with mycelial ropes, white, turning black when sporing. *Mycelium* superficial and composed of hyaline, smooth-walled, septate, branched, 1·0–2·9μ wide hyphae. *Phialides* straight or slightly sinuous, hyaline below becoming sub-hyaline at the apex, smooth or irregularly roughened, 9·0–36·0μ long, 1·3–4·0μ wide below, tapering to 0·8–1·8μ at

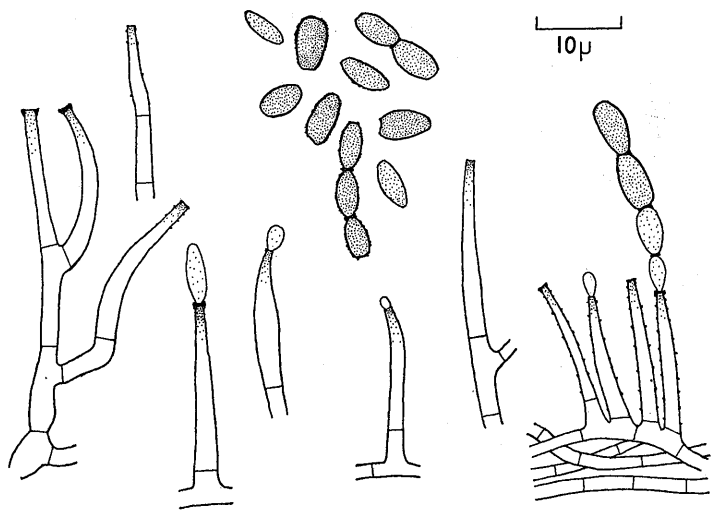

FIG. 5. *Gliomastix musicola.*

the apex around which there may be a substantial black deposit. *Phialospores* forming readily seceding chains, sometimes with dark coloured deposits between spores, non-septate, ovoid, base truncate, apex truncate to acute, walls smooth to finely roughened, black in mass, pale brown to black when viewed singly, 3·1–7·7μ long, 1·6–4·2μ wide, mostly 5·1 × 2·6μ.

Distribution. England, Canada, U.S.A., Argentina, Ghana, India, Cuba.

Hosts. Fagus, Hevea, Magnolia, Musa, paper and soil.

SPECIMENS EXAMINED

On *Hevea brasiliensis*, Tarkwa, Ghana, S. J. H., v, 1949 (IMI 38093); *Gliomastix* sp., ex LSHTM. TRL 4 2·422 (IMI 63216); isol. soil, S. India, C. S. Venkata Ram, xi, 1949 (IMI 78646); on *Musa sapientum*, Salta, Oran, Argentina, C. Spegazzini, iii, 1905 (IMI 101673), Type; on paper, Richmond, Surrey, H. A. Dade, viii, 1944 (IMI 119037); on *Musa paradisiaca*, Bayamo, Cuba, R. Urtiaga, i, 1967 (IMI 124331); *Trichosporium aterrimum*, on *Morus indica*, Changa Manga, Punjab, Pakistan, F. Gleadon, i, 1898 (Herb. K); in *Flora Ludoviciana* 1648 labelled "*Botrytis funicola* var. *corticola*, on *Magnolia* bark, St. Martinsville, P.O., La. (U.S.A.), A. B. Langlois, i, 1889", Herb. name (NY); on rotten wood of *Fagus grandifolia*, Christie Lake, Lanark Co., Ontario, S. J. H., ix, 1965 (DAOM 110321); isol. woodland soil, Ontario, Canada, G. L. Barron (No. 10078), vi, 1963 (CHD 4).

(6) **Gliomastix murorum** (Corda) Hughes, 1958, *Can. J. Bot.*, **36**:769. (Plate 3, Fig. 3, 4, 6.)

≡*Torula murorum* Corda, 1838, *Icon. Fung.*, **2**:9.

=*Torula olivacea β erecta* Corda, 1840, *Icon. Fung.*, **4**: 24.

=*Torula chartarum* Corda, 1840, *Icon. Fung.*, **4**: 24.

(=*Torula convoluta* Harz, 1871, *Bull. Soc. imp. Moscou*, **44**: 134.)

≡*Gliomastix convoluta* (Harz) Mason, 1941, *Mycol. Pap.* 5: 117.

(=*Gliomastix chartarum* Guéguen, 1905, *Bull. trimest, Soc. mycol. Fr.*, **21**: 240.)

Colonies on host form a dense effuse growth, dominated by long spore chains. On malt agar at 25°C, 48–72 mm in 14 days, white colony with some floccose mycelium, becoming black with sporulation, reverse pink-brown, usually with extensive feathery mycelial ropes especially in new isolates. *Mycelium* superficial and composed of hyaline, septate, branched, smooth-walled, 0·7–2·7μ wide hyphae with cells 12–24μ long. Hyphae bearing phialides are often aggregated into ropes. Poorly defined 1–3 celled phialophores may sometimes be distinguished consisting of hyaline, broader (1·9–3·9μ) shorter (4·7–13μ) cells than the vegetative hyphae. These bear a terminal phialide and frequently also a lateral, upturned, sessile or short–

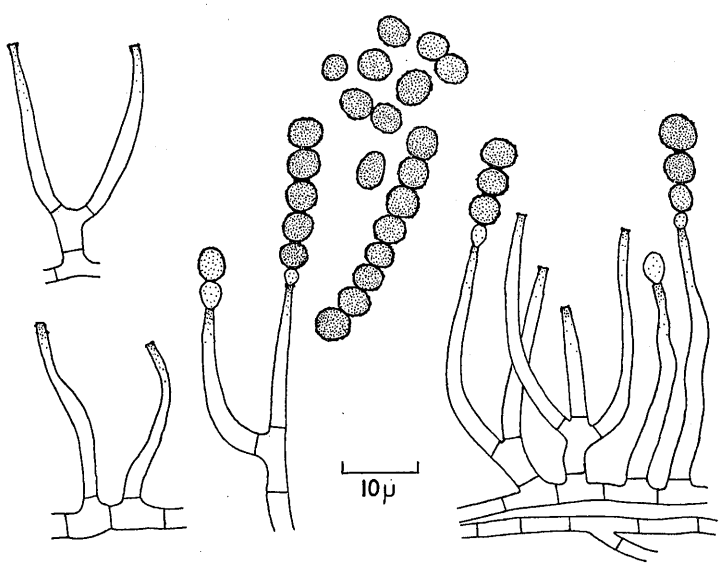

FIG. 6. *Gliomastix murorum.*

stalked phialide. *Phialides* frequently sinuous, hyaline and smooth below, becoming sub-hyaline to olivaceous brown and sometimes roughened with discrete granules towards the apex, subulate to the apex, 11–34μ long, 1·5–3·3μ wide below tapering slightly to 0·7–1·6μ at the apex which very occasionally has a tiny flared collarette, through which, rarely, the phialide

proliferates. *Phialospores* forming readily seceding chains, often with conspicuous separators between the spores, non-septate, sub-globose to ovoid, apex rounded or acute, thick-walled, usually markedly roughened, dark olivaceous brown to black, 2·3–5·5μ long, 2·0–4·4μ wide, mostly 3·6×2·9μ.

Distribution. England, Scotland, Ireland, Italy, Czechoslovakia, France, Canada, U.S.A., New Zealand.

Hosts. *Avena* seed, *Beilschmiedia*, *Coprosma*, *Hawea*, *Melicytus*, *Rhopalostylis*, *Solanum*, palm, man, asbestos, jute, wood and soil.

Discussion

This species has been collected frequently on plant debris but is rare in soil: only 4 of the 44 collections examined in this study were isolated from soil. The conidia are mostly rough and the chains they form are frequently distinguished by the presence of dark separators between each conidium as was clearly illustrated by Guéguen (1905) in his original diagnosis.

Specimens Examined

Labelled "*Torula murorum* Corda, *Icones Fungorum* II, p. 9, t. IX f. 39, legit. det. Corda, on limed wall, Prague" (PR 155690), Type; *T. olivacea β erecta* Corda, on conifer wood, Reichenberg, coll. Corda (PR 155692); *T. chartarum* Corda, on old paper, coll. Corda (PR 185724); *Torula chartarum*, in Herb. Berk. (K.); *Oidium chartarum* Link, in Herb. Berk., No. 3721 (K); *Trichosporium olivatrum* Sacc., on palms, Kew (K); in Herb. Wallroth as *Oidium chartarum* Ehrenberg, on cardboard (STR); *T. chartarum*, *Microfungi Britannici* No. 318, J. E. Vize (IMI 1398); *Oidium chartarum* Link, *Desmazières Crypt. France*, ser. 1, No. 663 (IMI 1401); isol. soil, Winnipeg, Manitoba, G. R. Bisby (No. 21), ii, 1932 (IMI 1437); on jute hessian cloth, Shirley Institute, L. D. Galloway (No. 233), vii, 1932 (IMI 1438); on damp papered wall, Castle Museum, Norwich, E. A. Ellis, xii, 1947 (IMI 1748); on potato, Leeds, F. A. Mason, iii, 1931 (IMI 2040); isol. bottled plums, England, L. D. Galloway, viii, 1946 (IMI 6118); isol. from man, Italy, ex C. B. S., Redaeli (IMI 8968); from asbestos, Birmingham, Miss English, v, 1947 (IMI 16272); on potato tuber, N. Harrow, Middx, P. D. Hewett, iii, 1948 (IMI 27596); isol. oat seed, N. Ireland, J. P. Malone, iii, 1948 (IMI 43610); isol. French Poplar, v, 1951 (IMI 45709); isol. soil, Ampthill forest nursery, Beds., Brind, viii, 1949 (IMI 45949); on face make-up, Malden, Surrey, B. Webster, vii, 1951 (IMI 46781); isol. soil, Cambs., H. T. Tribe, 1954 (IMI 55317); on *Solanum tuberosum*, Trumpington, Cambs., J. V. Ives, ii, 1960 (IMI 79603); isol. *Hawea* sp., Balliston, Glasgow, C. G. Elliott, 1963 (IMI 101996); on emulsion paint, London, P. B. Beldham, 1965 (IMI 112948); isol. soil, Rothamsted, Herts., D. L. Ebbels, 1966 (IMI 119192); isol. air dried sludge, Yellow Springs, Ohio, W. B. Cooke, x, 1952 (DAOM 35424); on potato, Quebec, P.Q., D. Leblond, ii, 1952 (DAOM 51878); on *Coprosma australis*, Mamaku State Forest, Auckland Prov., S. J. H., iii, 1963 (DAOM 96014c); on *Melicytus ramiflorus*, Pueora, Auckland Prov., S. J. H., iii, 1963 (DAOM 96180); on *Coprosma robusta*, Titirangi, Auckland Prov., ii, 1963 (DAOM 93813a, 96174a); on *Beilschmieda tawa*, Mamaku State Forest, Auckland Prov., S. J. H., iii, 1963 (DAOM 96220a, 96181b); on *Rhopalostylis sapida*, Whangapoua Saddle, Coromandel Peninsular; Kauri Reserve, Coromandel-Whitianga Road; Piha, Waitakere Range; Cascade Kauri Park, Swanson, Puketi Forest, North Auckland; S. J. H. and J. M. Dingley, i, vi, vii, ix, 1963 (DAOM 96224a, 96193a, 96196b, 96158b, 96192, 96198a, 96191, 96187c, 96186, 96177c); isol. soil, Bradford Marsh, Ontario, G. L. Barron (No. 10209), v, 1961 (CHD 5).

(7) **Gliomastix murorum** (Corda) Hughes var. **polychroma** (van Beyma) comb. nov. (Plate 2, Fig. 6.)

≡*Oospora polychroma* van Beyma, 1928, *Verh. K. Akad. Wet.* (b), **26**: 5.

≡*Scopulariopsis baarnensis* Morton & Smith, 1963, *Mycol. Pap.* 86: 68.

Colonies on host thin, effuse, powdery, green-black. On malt agar at 25°C, 50–83 mm in 14 days, thin floccose colony with radiating feathery ropes, white at first then black when sporing, reverse pale pink. *Mycelium* superficial and composed of hyaline, smooth-walled, septate, branched, 1·2–2·8μ wide hyphae which may be aggregated into sub-hyaline ropes which often bear crowded, sessile phialides. Poorly defined phialophores may sometimes be distinguished. These bear a terminal phialide and 1–3 lateral, upturned, sessile or shortly stalked phialides. *Phialides* straight or sinuous, hyaline to sub-hyaline and smooth-walled below becoming sub-hyaline to brown and slightly roughened at the apex, subulate to the apex, 11–31μ long, 1·3–2·9μ wide below tapering slightly to 0·7–1·2μ at the apex which is occasionally enlarged

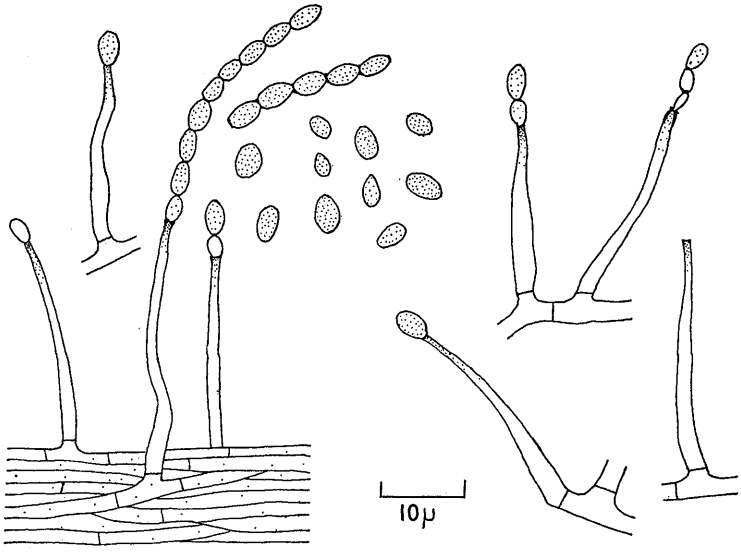

FIG. 7. *Gliomastix murorum* var. *polychroma*.

by a dark deposit. *Phialospores* forming chains, non-septate, ovoid, base rounded or truncate, apex rounded or acute, walls thin, smooth, dark brown in mass, brown to black brown when viewed singly, often with a small black deposit between spores, 2·2–5·5μ long, 1·6–2·9μ wide, mostly 3·8×2·1μ.

Distribution. England, Ireland, Canada, Trinidad, Sierra Leone, Ghana, Rhodesia, Sudan, Pakistan, Java.

Hosts. Ananas, Bougainvillea, Digitaria, Malus, Musa, Polyporus, Tectona, Theobroma, shoe sewing, man, soil, and air.

SPECIMENS EXAMINED

Isol. shoe sewing, Bougainville Isle, White, 1945 (IMI 45549); on *Musa sapientum*, nr. Koforidua, Ghana, S. J. H., vi, 1949 (IMI 37748b); isol. air, Buitenzorg, Java, Boedijn & Reitsma, 1949 (IMI 38981); on dead *Ananas comosus* leaf, Njala, Sierra Leone, F. C. D., i, 1954 (IMI 56086a); on dead twig of *Bougainvillea*, Njala, Sierra Leone, F. C. D., ii, 1954 (IMI 56093a); isol. apple, Rhodesia, G. R. Bates, 1956 (IMI

62158): *Oospora polychroma* van Beyma ex C. B. S. (IMI 62332), Type; isol. dust, London, R. R. Davies, 1956 (IMI 63332); isol. man, England, C. P. LaTouche, 1956 (IMI 67870); on *Theobroma cacao*, Tafo, Ghana, A. L. Wharton, 1956 (IMI 68424g); on Gropax seed pot, Kwadaso, Ghana, R. I. Leather, iii, 1958 (IMI 73059); on *Digitaria decumbens*, St. Augustine, Trinidad, E. F. Iton, i, 1960 (IMI 80806); on dead *Polyporus*, Kagan Valley, Sharham, W. Pakistan, S. Ahmad, viii, 1959 (IMI 85940); on *Tectona grandis*, Talanga, Sudan, R. L. Firmin, ii, 1961 (IMI 91477); isol. soil mixed wood, Hong Kong, S. Chan & M. Chu, 1964 (IMI 109590); isol. forest soil, Ontario, Canada, G. L. Barron (No. 10312), xii, 1964 (CHD 6); isol. sand dune soil, Freshfield, Lancs., A. Kibble, 1966 (CHD 34); isol. cedar bog soil, Aberfoyle, Ontario, G. C. Bhatt (No. 128), v, 1966 (CHD 37); isol. solution hollow soil, Mullagh More, Co. Clare, D. Hutton-Bury, iv, 1967 (CHD 757–759).

(8) **Gliomastix luzulae** (Fuckel) Mason ex Hughes, 1958, *Can. J. Bot.*, **36**: 769. (Plate 1, Fig. 9; 2, Fig. 3.) (*G. luzulae* (Fuckel) Mason, 1953, in Rimington, *Nat. Hist. Scarborough Dist.*, **1**: 154, nomen non rite publicatum.)

≡*Torula luzulae* Fuckel, 1870, *Symb. Mycol.*, p. 348.

=*Fusidium viride* Grove, 1885, *J. Bot., Lond.*, **23**: 164.

(=*Basitorula cingulata* Arnaud, 1954, *Bull. trimest. Soc. mycol. Fr.*, **69**: 276.)

Colonies on host extensive effuse green to greenish black, floccose, dominated by long spore chains. On malt agar at 25°C 6 mm in 14 days, white to pink colony, reverse pink to brown, extensive rope formation, sporulation poor, improving on further incubation in daylight, colony finally greenish-black where sporing. *Mycelium* mostly superficial and composed of hyaline to sub-hyaline, smooth-walled, septate, branched, 0·7–4·0μ wide

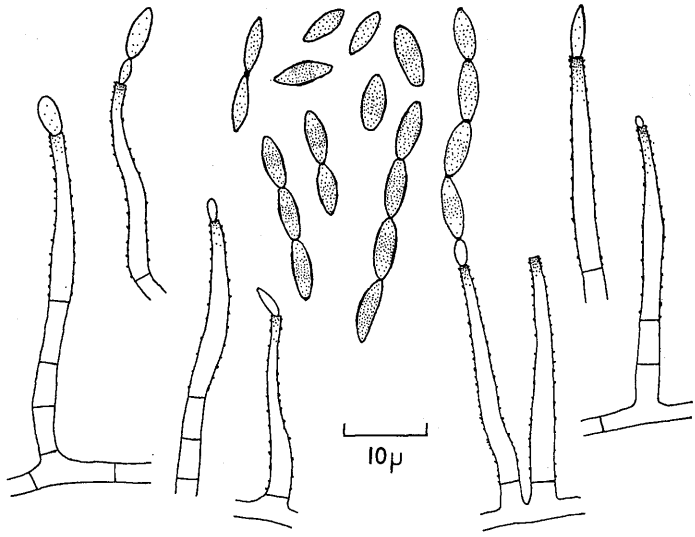

FIG. 8. *Gliomastix luzulae.*

hyphae. *Phialophores* bearing terminal phialides may sometimes be distinguished from the vegetative mycelium. They are erect, hyaline to sub-hyaline and have wider (2·4–2·7μ) cells than the vegetative hyphae. *Phialides* straight or sinuous, hyaline, sparsely roughened along their whole length with scattered

dark granules, subulate to the apex, 11–31μ long, 1·1–3·5μ wide below, 0·7–1·3μ wide at the apex at which there may be a small dark-coloured deposit. *Phialospores* forming readily seceding chains, non-septate, fusoid, with truncate ends, thin smooth walls, black in mass, individually olive green and often with a darker central band which appears to result from a thicker wall in the mid-zone, 3·9–9·3μ long, 1·5–2·9μ wide, mostly 6·4×2·3μ.

Distribution. England, Belgium, Germany, Italy, Ghana, Sierra Leone, New Zealand, Sabah.

Hosts. Ananas, Asparagus, Borassus, Gunnera, Heracleum, Luzula, Musa, Oenanthe, Petasites, Rhopalostylis, Schefflera, Solanum, Theobroma, Triticum, Urtica, Zea.

Discussion

All collections examined in this study were from dead plant tissues and there are few records of the occurrence of this species in soil. The one isolate studied in culture had rather shorter spores than the majority of specimens on host material and it also showed very distinctly the central dark pigment band in its spores. This species is easily distinguished on the basis of the sparsely roughened phialides and the characteristic morphology of the catenulate conidia.

Specimens Examined

Torula luzulae Fuckel, in Herbier Barbey-Boissier, labelled " F. Rh. No. 1624, Nassau's flora, *Torula luzulae* Fckl., 005358 ", on leaves of *Luzula maxima*, Dornbachsgraben, Nassau (Germany), 1894 (G), Type; on cut potato, Birmingham, W. B. Grove, vii, 1918 (BM); on *Heracleum* stem, Bradnock's Marsh, Wk., W. B. Grove, viii, 1884 (BM); on *Petasites*, Halifax, Yorks., Crossland, xi, 1898 (IMI 1536); on *Petasites ovatis*, Forge Valley, Yorks, ix, x, 1945–46 (IMI 1537, 7032); on dead Umbellifer stems, Hampton Court, Middx, ii, 1946 (IMI 4134); on *Petasites ovatis*, Masham and Mulgrave Woods, Yorks, ix, x, 1946–48 (IMI 7337, 8161, 19221a, 31445a, 31455a); on *Heracleum* dead stems, Buffwood, Cambs., x, 1946 (IMI 8083); on *Heracleum sphondylium* and *Urtica dioica*, Mulgrave Woods, Yorks., ix, 1946 (IMI 8111, 8114, 8116); on *Oenanthe crocata*, La Bouvée, Guernsey, M. B. E. and J. P. Ellis, vi, ix, 1947–48 (IMI 16182a, 31666); on wheat leaves, Aberystwyth, S. J. H. and D. K. Jones, viii, 1947 (IMI 17319); on *Heracleum* and *Gunnera scabra*, Thomas Hall, Exeter, S. J. H., ix, 1947 (IMI 19011, 19043); on *Heracleum sphondylium*, Ranmore Common, Surrey, S. J. H., xii, 1947 (IMI 20036c); on *Urtica dioica* and *Heracleum*, Masham, Yorks., S. J. H., ix, 1948 (IMI 31407a, 31408a); on *Musa paradisiaca*, Hohoe, Ghana, S. J. H., v, 1949 (IMI 37746c); on *Ananas comosus*, Dodowa, Ghana, S. J. H., vi, 1949 (IMI 37872j); on *Theobroma cacao* pods and *Ananas comosus*, Tafo, Ghana, S. J. H., vi, 1949 (IMI 39089c, 37897d); on *Borassus aethiopum*, Njala, Sierra Leone, F. C. D., ii, 1953 (IMI 51807b); on *Zea mays*, Njala, Sierra Leone, F. C. D., i, 1954 (IMI 56090a); on *Theobroma cacao* pods, Tafo, Ghana, A. L. Wharton, xi, 1956 (IMI 68700–1); on *Rhopalostylis sapida*, Little Barrier Isle, Auckland, J. M. Dingley, viii, 1958 (IMI 75093); on *Ananas comosus*, Tenom, Sabah, A. Johnston, ix, 1959 (IMI 79363c); isol. dead *Asparagus* stems, Belgium, J. Meyer (No. 12171) (DAOM 90262); on *Rhopalostylis sapida*, near Oamaru Bay and Whangapoua Saddle, Coromandel Peninsula, Auckland Prov., S. J. H., ix, 1963 (DAOM 96231a, 96233b, 96235c); on *Rhopalostylis sapida*, Piha, Waitakere Range, Auckland Prov., S. J. H., i, iii, 1963 (DAOM 96238, 96240); on *Schefflera digitata*, Kite Kite Track, Piha, Waitakere Range, Auckland Prov., S. J. H. and J. M. Dingley, vi, 1963 (DAOM 96239, 96330a); *Torula protea* Sacc., labelled " *Torula protea, Oospora* (*Torula*) *protea*, culture in chart. putri.,+fivore conidi paulo conjoubus oliv., 5–7/2–2·5, Pat. 81, 5 " (PAD).

(9) **Gliomastix** state of **Wallrothiella subiculosa** Höhnel, 1912, *S. B. Akad. Wiss. Wien.*, **121**: 381. (*Fragmente zur Mykologie* 763.) (Plate 2, Fig. 9; 3, Fig. 5, 7.)

=*Torula protea* Sacc., 1881, *Michelia*, **2**: 292.

≡*Gliomastix protea* (Sacc.) Verona & Castella, 1942, *Annali Fac. Agr. Univ. Pisa, N. S.* **5**: 383.

Colonies on host almost lacking aerial mycelium, dominated by erect phialides bearing large spore balls, brown to black. On malt agar 50 mm in 60 days, brown colony with white floccose mycelium. *Mycelium* immersed superficial, composed of sub-hyaline to brown, smooth-walled, septate, branched, 1·2–3·9μ wide hyphae which are not conspicuously aggregated together. *Phialophores* may be 1–5 celled and bear a terminal phialide and 1–3 lateral sessile or shortly stalked phialides. *Phialides* sessile or on phialophores, erect, straight or sinuous, sub-hyaline to brown, smooth-walled, 12–47μ long, 1·4–3·5μ wide at the base tapering to 0·9–1·7μ at the apex which usually has a hyaline, straight or incurved collarette slightly wider than the

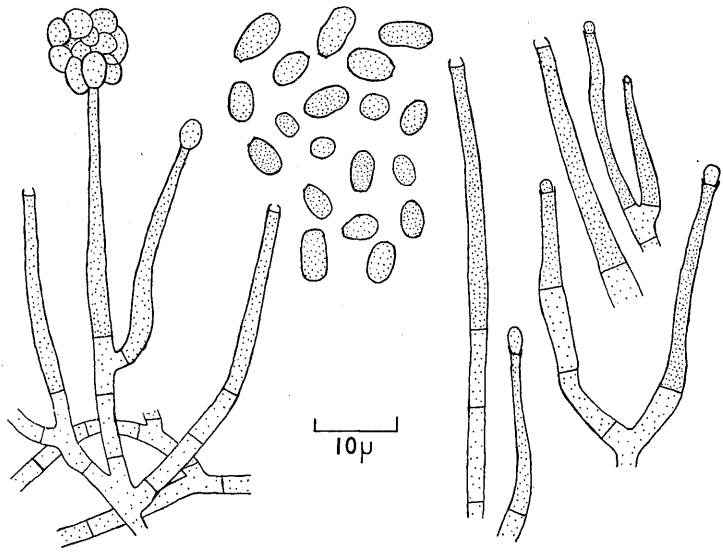

FIG. 9. *Gliomastix* state of *Wallrothiella subiculosa.*

phialide apex and about 1μ deep. *Phialospores* accumulate in balls at the phialide apex and are non-septate, broadly ellipsoidal to subcylindrical and occasionally waisted, with a rounded or truncate base, smooth-walled, dark brown in mass, pale brown to brown when viewed singly, 2·8–8·4μ long, 1·8–4·1μ wide, mostly 4·3×2·4μ.

Distribution. Wales, Italy, Ghana, Sierra Leone, Java, Hong Kong, New Zealand.

Hosts. *Arundo, Bambusa, Elaeis, Hoheria, Melicytus, Olax, Phormium, Rhipogonum, Schefflera, Solanum, Thaumatococcus, Theobroma* and soil.

Discussion

In his original description von Höhnel (1912) noted that amongst the ascocarps of *Wallrothiella subiculosa* were numerous upright " hyphae " producing brown, unicellular, elliptical conidia. Subsequent collections of the ascomycete from Ghana, Sierra Leone and New Zealand have also had similar conidiophores associated with them. Sections of the New Zealand material have shown the origin of some conidiophores to be in the ascocarp wall, which fact has been taken as establishing the connection between these two states as one species. It would be useful if this association was demonstrated in culture when fresh material of *Wallrothiella* is available.

Specimens Examined

Wallrothiella subiculosa v. Höhnel, Morschen Bambussohr, Java, Buitenzorg, leg. von Höhnel, 1907–08 (FH), a.n.3105, Type; *Torula protea* Sacc. in caul. *Arundo donax*, H. P., 76.3 (PAD); on *Bambusa*, Trawscoed, Aberystwyth, Wales, S. J. H. and D. K. Jones, viii, ix, 1947–48 (IMI 17321b, 31229a, 31450); on dead culms of *Bambusa vulgaris*, Njala, Kori, Sierra Leone, F. C. D., vii, 1949 (IMI 37438); on *B. vulgaris*, Hohoe, Ghana, S. J. H., v, 1949 (IMI 37855); on *Theobroma cacao*, Tafo, Ghana, H. Owen (No. 699), i, 1950 (IMI 40642); on dead branches of *Olax*, Jasikan, Ghana, S. J. H., v, 1949 (IMI 42115b); on *Elaeis guineensis*, Pelewahun, Sierra Leone, F. C. D., viii, 1965 (IMI 47218b); on *B. vulgaris*, Njala, Sierra Leone, F. C. D., xi, 1952 (IMI 51630a); on *Thaumatococcus danielii*, Newton, Sierra Leone, F. C. D., iv, 1953 (IMI 53114); on dead stem of *Solanum melongena*, Njala, Sierra Leone, viii, 1965 (IMI 56091); on *Bambusa*, road Musaia to Ohentu, River Mongo, Sierra Leone, P. W. Sellar, viii, 1963 (IMI 103347d); isol. soil mixed wood, Hong Kong, S. Chan and M. Chu, 1964 (IMI 109591); on *Melicytus ramiflorus*, Kauaeranga Valley, Thames, Auckland Prov., J. M. Dingley, ix, 1963 (DAOM 114364a); on *Melicytus ramiflorus*, Anawhala Road, Waitakere Range, Auckland Prov., J. M. Dingley, x, 1963 (DAOM 114366); on *Melicytus ramiflorus*, Titirangi, Auckland Prov., S. J. H., ii, 1963 (DAOM 114358a); on *Melicytus ramiflorus*, Piha, Waitakere Range, Auckland Prov., J. M. Dingley, vi, 1963 (DAOM 93826a); on *Schefflera digitata*, Kauaeranga, Thames, Auckland Prov., J. M. Dingley, ix, 1963 (DAOM 93758c); on *Schefflera digitata*, Piha and Upper Piha Valley, Waitakere Range, Auckland Prov., v, vi, 1963 (DAOM 93329c, 114360, 93828a); on *Rhipogonum scandens*, Titirangi and Oamaru Bay, Coromandal Peninsula, Auckland Prov., S. J. H., viii, ix, 1963 (DAOM 114362–3); on *Hoheria populnea*, Waiatarua, Waitakere Range, Auckland Prov., S. J. H., v, 1963 (DAOM 93838b); on *Phormium tenax*, Piha, Waitakere Range, Auckland Prov., S. J. H., vii, 1963 (DAOM 114361).

(10) **Gliomastix murorum** (Corda) Hughes var. **felina** (Marchal) Hughes, 1958, *Can. J. Bot.*, **36**:769. (Plate 1, Fig. 10.)

(≡*Periconia felina* Marchal, 1895, *Bull. Soc. r. Bot. Belg.*, **34**:141.)

(≡*G. convoluta* (Harz) Mason var. *felina* (Marchal) Mason, 1941, *Mycol. Pap.* 5:117.)

=*Botrytis funicola* Ellis & Everhart, 1888, *J. Mycol.*, **4**:124.

=*Tilachlidium nigrescens* El. & Em. Marchal, 1921, *Bull. Soc. r. Bot. Belg.*, **54**:133.

=*Graphium malorum* Kidd & Beaumont, 1924, *Trans. Br. mycol. Soc.*, **10**:113.

=*Torula cephalosporioides* van Beyma, 1937, *Zent. Bakt. ParasitKde*, II, **96**:411.

=*Cephalosporium roseo-griseum* Saksena, 1955, *Mycologia*, **47**:895.

Colonies on host lacking aerial mycelium, dominated by spore drops which coalesce in some conditions to form large black masses. On malt agar at 25°C, 40–77 mm in 14 days, floccose colony with some ropes, white to pink, becoming black with spore formation, reverse pink-brown. *Mycelium* is superficial and composed of hyaline, septate, branched, smooth-walled 1·1–3·3μ wide hyphae with cells 9–29μ long. The hyphae are frequently aggregated into ropes. Poorly defined 1–3 celled phialophores may sometimes be distinguished. These bear a terminal phialide and lateral, upturned sessile or

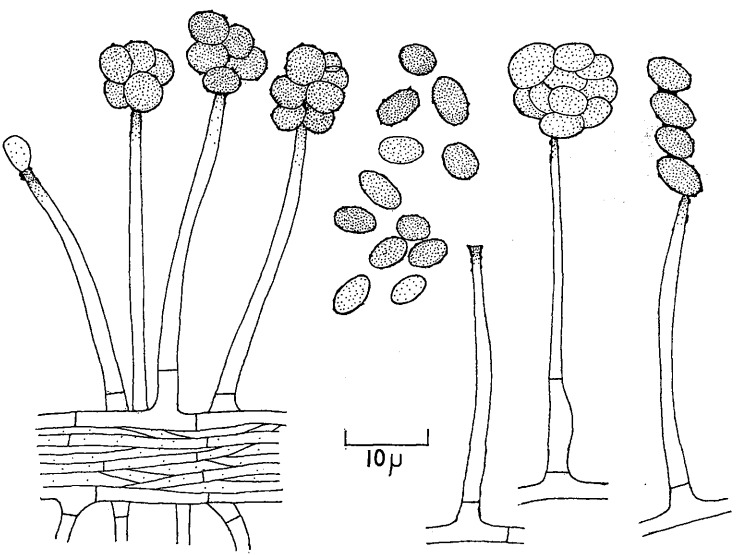

FIG. 10. *Gliomastix murorum* var. *felina*.

short-stalked phialides. *Phialides* sessile or on ill-defined phialophores, often sinuous, hyaline and smooth below becoming sub-hyaline and roughened towards the apex, subulate to the apex, 17–39μ long, 1·5–2·7μ wide below and 0·8–1·3μ at the apex which may have a tiny flared collarette. *Phialospores* which usually accumulate in balls at the phialide apex, rarely forming short chains, are non-septate, ovoid to elongate, with rounded base, thick-walled, smooth or roughened, dark olivaceous brown to black, 2·6–7·0μ long, 1·8–4·0μ wide, mostly 4·0×2·6μ.

Distribution. England, Ireland, Scotland, Sweden, Canada, U.S.A., Hong Kong, New Caledonia, New Zealand, Australia.

Hosts. *Beta* seed, *Malus*, *Pteridium*, *Gunnera*, *Typha*, *Fagus*, *Xanthosoma*, *Solanum*, *Fragaria*, rope, cardboard, air, paint and soil.

DISCUSSION

Mason (1941) noted, when making the combination *G. convoluta* var. *felina*, that he was doubtful if this variety did constitute a separate taxon. Further studies since then have shown that there are collections which consistently

lack catenulate spores and whose spores are more elongate and less conspicuously roughened than in *G. murorum*. It may, however, be noted that in consideration of spore dimensions alone separation of these two species is usually but not always possible. The character of non-catenulate spores appears to be constant under various conditions such as on different media, on drying agar and on oat straws in moist sand. It is proposed to retain this taxon at varietal level recognizing its close relationship with *G. murorum*. 37 out of the 61 isolates examined were isolated from soil which contrasts markedly with the distribution of *G. murorum*.

Specimens Examined

Isol. soil, Winnipeg, Manitoba, J. E. Machacek, 1934 (IMI 1439); isol. beet seed, Sweden, B. T. Palm, 1934 (IMI 1440–1443); isol. soil, Birmingham, C. G. C. Chesters (IMI 1444); isol. soil, Rothamsted, G. Samuel, xi, 1934 (IMI 1445); isol. salt marsh soil, Norfolk, A. Burges, 1939 (IMI 1446); *Graphium malorum* Kidd & Beaumont, on apple, Cambs., type of *G. malorum* ex N. T. C. C. (IMI 1447); type of *Torula cephalosporioides* van Beyma ex C. B. S. (IMI 1755); on *Pteridium*, Loch Torridon, Scotland, R. W. G. Dennis, vi, 1947 (IMI 15803); ex C. B. S. (IMI 16403); on dead petiole of *Gunnera scabra*, Thomas Hall, Exeter, M. B. E., ix, 1947 (IMI 19056); on *Typha*, Swinton Park, Yorks., S. J. H., x, 1947 (IMI 19223); on cardboard, Cambs., R. G. Tomkins, 1947 (IMI 19390); on bark of *Fagus sylvatica*, Banstead Common, Surrey, S. J. H., i, 1948 (IMI 21082b); on soap carton, G.B., F. D. Armitage, ii, 1948 (IMI 23663); isol. mouldy suitcase, Chislehurst caves, Kent, G. Smith, 1942 (IMI 24430); isol. paint, Princes Risborough, Bucks., J. G. Savory, iii, 1950 (IMI 40394); isol. soil, Canada, R. G. Atkinson, 1950 (IMI 41740, 41741); isol. soil, Chobham Common, Surrey, Bull, 1953 (IMI 52640); isol. dust, London, R. R. Davies, vi, 1956 (IMI 63331); isol. soil under *Picea*, Kennington Old, Oxford, M. A. Ram Reddy, v, vi, 1960 (IMI 82698, 82700); isol. roots of *Xanthosoma*, Noumea, New Caledonia, B. Huguenin, xi, 1962 (IMI 98085); on potato, G.B., M. Clark, 1963 (IMI 98836); isol. soil, New Caledonia, B. Huguenin, 1964 (IMI 104124); isol. soil wheat rhizosphere, Rothamsted, R. Sherratt, 1964 (IMI 104628); isol. mycorrhizal beech roots, Newcastle, K. G. Singh, 1963 (IMI 104664); isol. soil, N. Ireland, A. E. Muskett, 1964 (IMI 105201); isol. grassland soil, Canterbury, N.Z., R. M. Jackson, v, 1963 (IMI 107709); isol. soil, Hong Kong, S. Chan and M. Chu, 1964 (IMI 109584); isol. air, Brisbane, Australia, R. G. Rees, vii, 1964 (IMI 109874); isol. pine forest soil, G.B., P. Hitchen, 1965 (IMI 111008); isol. soil, M. Hodkinson, 1965 (IMI 114048); isol. soil, Rothamsted, D. L. Ebbels, 1966 (IMI 119223); isol. rhizosphere of *Dacrydium*, Noumea, New Caledonia, B. Huguenin, 1966 (IMI 121165); isol. soil, Harrow, Ontario, R. K. Wensley, xii, 1954 (DAOM 45558); isol. wheat rhizosphere, Ithaca, New York, W. J. Jooste, vii, 1962 (DAOM 89170–72); isol. strawberry hulls, Kentville, Nova Scotia, C. O. Gourley, vii, 1962 (DAOM 90694); *Botrytis funicola* Ellis and Everhart, on old rope lying on ground, Newfield, U.S.A., x, 1888 (NY); *Cephalosporium roseo-griseum* S. B. Saksena, Type of *C. roseo-griseum* (CBS); *Tilachlidium nigrescens* El. and Em. Marchal (CBS); isol. peat soil, Guelph, Ontario, G. L. Barron (No. 10329), xii, 1964 (CHD 3); isol. wheat rhizosphere soil, Co. Carlow, Ireland, A. Mangan (S. 26), viii, 1965 (CHD 15); isol. sand dune soil, Bull Island, Co. Dublin, E. M. R., ii, 1966 (CHD 19); isol. chalk grassland soil, Wye, Kent, E. M. R., i, 1966 (CHD 26); isol. *Picea* forest soil, Rathfarnham, Co. Dublin, E. M. R., ii, 1966 (CHD 27); isol. grassland soil, Ballymure, Co. Tipperary, E. M. R., i, 1966 (CHD 28); isol. pine forest soil, St. Williams, Ontario, P. Widden, vii, 1966 (CHD 35); isol. cedar bog soil, Aberfoyle, Ontario, G. C. Bhatt, v, 1966 (CHD 36); isol. cornfield soil, Waterloo, Ontario, vii, 1966 (CHD 41); isol. sand dune soil, Porter County, Indiana, U.S.A., G. Wohlrab, xii, 1965 (CHD 43); isol. cedar bog soil, Pushlinch, Ontario, G. C. Bhatt, viii, 1966 (CHD 44); isol. permanent pasture soil, Milton, Ontario, G. C. Bhatt, vii, 1966 (CHD 45); isol. calcareous drift soil, Islandbridge, Co. Dublin, E. M. R., ii, 1966 (CHD 49); isol. salt marsh soil, Bull Island, Co. Dublin, E. M. R., ii, 1966 (CHD 53); isol. solution hollow soil, Burren, Co. Clare, D. Hutton-Bury, 1967 (CHD 756); isol. limestone grassland soil, Kinvarra, Co. Clare, E. M. R., ii, 1966 (CHD 61); isol. esker soil, Tyrellspass, Co. Westmeath, E. M. R., i, 1966 (CHD 62); isol. wet

grike soil, Poulsallagh, Co. Clare, E. M. R., i, 1966 (CHD 63); isol. dune soil, Fanore, Co. Clare, E. M. R., i, 1966 (CHD 64); isol. dune soil, Malahide, Co. Dublin, E. M. R., ii, 1966 (CHD 65).

(11) **Gliomastix cerealis** (Karst.) comb. nov. (Plate 2, Fig. 7, 8.)

≡*Coniosporium cerealis* Karsten, 1887, *Meddn. Soc. Fauna Flora fenn.*, **14**: 109.

=*Gliomastix guttuliformis* Brown & Kendrick, 1958, *Trans. Br. mycol. Soc.*, **41**: 499.

Colonies on host have little aerial mycelium, dominated by spore balls which in damp habitats coalesce to form large drops. On malt agar at 25°C, 14–20 mm in 14 days, broad hyaline margin, becoming eventually green-black in the centre, usually with pronounced radiating feathery aerial ropes on which are produced numerous phialides, reverse dark brown. *Mycelium* superficial and composed of hyaline, smooth-walled, septate, branched, 1·6–2·3μ wide hyphae which may be aggregated together forming ropes. Poorly defined phialophores may sometimes be distinguished consisting of erect, hyaline cells similar to those of the vegetative hyphae. These bear a terminal phialide and 1–3, wide-spreading, sessile or short-stalked, lateral phialides.

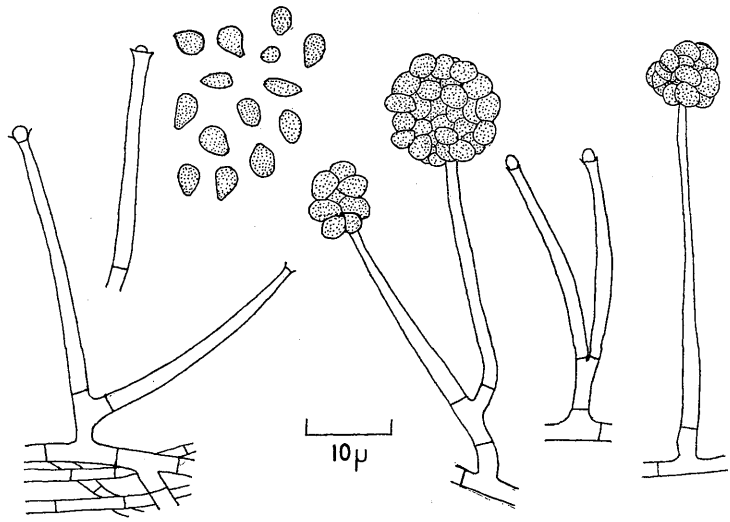

FIG. 11. *Gliomastix cerealis.*

Phialides sessile or on phialophores, straight, hyaline, smooth except near the apex which is occasionally slightly roughened, subulate to the apex, 13–52μ long, 1·5–2·8μ wide below tapering gradually to 0·7–1·4μ at the apex which has a shallow, hyaline collarette expanding to 1·0–1·8μ diam. *Phialospores* accumulating in a slimy ball at the phialide apex, non-septate, drop shaped, base truncate, with thin smooth walls, olive brown when viewed singly, dark brown to green in mass, 2·0–5·1μ long, 1·8–3·3μ wide, mostly 3·5×2·6μ.

Distribution. England, Wales, Ireland, Finland, Venezuela.

Hosts. Fagus, Secalis, Pinus, Solanum, dead wood, sacking and soil.

Discussion

The characteristic features of this species are its drop-shaped conidium, its hyaline phialide surmounted by a flared collarette and the slow growing, green-black colony on malt agar. The collarette may be seen only with difficulty in some collections; in all instances it is best observed in unstained preparations using phase contrast microscopy. *G. cerealis* appears to be a characteristic inhabitant of decomposing pine needles and it has also been infrequently isolated from soil.

Specimens Examined

In herb. P. A. Karsten labelled "*Coniosporium cerealis* Karst., ad fol. *Secalis*, Mustiala, P. A. Karsten, May, 1867" (H), Type; on sacking on woodland floor, Great Bookham Common, Surrey, vi, 1947 (IMI 16005a); on wound in potato, Peterborough, Northants., La Touche, viii, 1947 (IMI 17421); on bark of *Fagus sylvatica*, Banstead Woods, Surrey, S. J. H., i, 1947 (IMI 21082b); isol. sand dune soil, Bamburgh, Northumberland, J. C. Brown, 1955 (IMI 61279); on decaying *Pinus sylvestris* needles, Delamere, Cheshire, W. B. Kendrick (IMI 64275); isol. pine forest soil, Delamere, Cheshire, B. A. Indraratne, 1962 (IMI 96143); on dead wood, Lagunda, Venezuela, R. W. G. Dennis, viii, 1958 (IMI 98253); isol. soil under *Picea*, Rathfarnham, Co. Dublin, E. M. R., ii, 1966 (CHD 20); isol. esker soil, Tyrellspass, Westmeath, Ireland, E. M. R., ii, 1966 (CHD 21); isol. dune soil, Bull Island, Co. Dublin, E. M. R., ii, 1966 (CHD 24); on decaying potato, Rush, Co. Dublin, C. H. D., x, 1966 (CHD 59); isol. sand dune soil, Ynyslas, Cardigan, G. Morgan-Jones, 1962 (CHD 60).

(12) **Gliomastix inflata** spec. nov. (Plate 2, Fig. 4, 5.)

Coloniae in agaro "malt" dicto lente crescentes, velutinae, viridi-nigrae, reverso pallido viride. *Mycelium* ex hyphis hyalinis, laevibus, septatis, ramosis, 1·2–2·0μ crassis compositum; in funiculos floccosos saepe assurgens. *Phialides* rectae vel flexuosae, hyalinae, laeves, 11–22μ longae, ad basim ad 1·9–3·3μ inflatae, apice 0·6–1·0μ, apice cum collo parvo. *Conidia* ex apice phialidibus in capitulum mucosum aggregata, non-septata, globosa, ovoidea vel allantoidea, laevia, in massa viridia, discretim pallide viridia, 2·0–4·3μ longa, 1·6–2·3μ crassa, pro parte maxima 2·8×1·9μ. *Habitat* in solo inventa, Gibraltar Point, Lincolnshire, England, C. H. Dickinson, IMI 100877 typus.

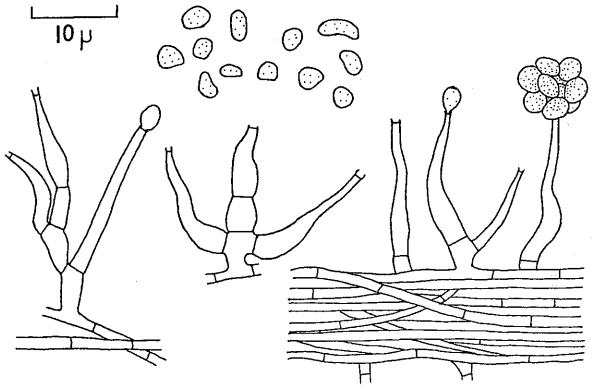

Fig. 12. *Gliomastix inflata.*

Colonies on malt agar at 25°C, 8–9 mm in 14 days, restricted, velvety, with little aerial mycelium, narrow, entire margin, heavily sporing, colony hyaline

becoming dark green, reverse pale green. *Mycelium* composed of hyaline, smooth-walled, septate, branched, 1·2–2·0μ wide hyphae which may occasionally aggregate forming ropes. Phialophores are not readily distinguished but frequently vegetative cells increase in size and produce 2 to 3 erect, sessile phialides. *Phialides* straight or sinuous, hyaline, smooth-walled, 11–22μ long, often swollen below to 1·9–3·3μ wide then tapering to a narrow tube 0·6–1·0μ wide at the apex which is usually surmounted by a small, hyaline, tubular collarette. *Phialospores* accumulate at the phialide apex, non-septate, variable in shape being globose, ovoid, cylindrical or allantoid, with thin smooth walls, green in mass, dilute green when viewed singly, 2·0–4·3μ long, 1·6–2·3μ wide, mostly 2·8×1·9μ.

Distribution. England.

Substratum. Soil.

Discussion

This species is accommodated with difficulty in *Gliomastix* as its spores are only faintly coloured when viewed singly. However, in other respects, including the elongate phialides, the tiny collarette and the colony characteristics, it may be considered to be a valid addition to the genus.

Specimen Examined

Isol. salt marsh mud, Gibraltar Point, Lincs., C. H. D., 1962 (IMI 100877), Type.

CHECK-LIST OF SPECIFIC EPITHETS

Accepted species of *Gliomastix* are in bold type. *G.*=*Gliomastix*. *T.*=*Torula*.

Phaeoscopulariopsis aterrimum (Massee) C. V. Subramanian, 1956, *J. Indian bot. Soc.*, **35**: 447. =*G. musicola*.

Trichosporium aterrimum Massee, 1899, *Bull. misc. Inf. R. bot. Gdns, Kew*, p. 167, non *T. aterrimum* (Corda) Sacc., 1886, *Syll. Fung.*, **4**: 289. =*G. musicola*.

Tilachlidium atratum Lindfors, 1920, *Svensk. bot. Tidskr.*, **14**: 276. Specimen not examined but from description could be *G. murorum* var. *felina*.

Scopulariopsis baarnensis Morton & Smith, 1963, *Mycol. Pap.* 86: 68. =*G. murorum* var. *polychroma*.

Coniosporium cerealis Karst., 1887, *Meddn. Soc. Fauna Flora fenn.*, **14**: 109. =*G. cerealis*.

G. cerealis (Karst.) Dickinson, p. 19.

"*Basitorula*? *cephalosporioides* (van Beyma) Arnaud", 1953, *Bull. trimest. Soc. mycol. Fr.*, **69**: 276. Probably =*G. murorum* var. *felina*.

T. cephalosporioides van Beyma, 1937, *Zent. Bakt. ParasitKde.*, II, **96**: 411. =*G. murorum* var. *felina*.

G. chartarum Guéguen, 1905, *Bull. trimest. Soc. mycol. Fr.*, **21**: 240. Specimen not examined but probably =*G. murorum*.

T. chartarum Corda, 1840, *Icon. Fung.*, **4**: 24. =*G. murorum.*

Basitorula cingulata Arnaud, 1954, *Bull. trimest. Soc. mycol. Fr.*, **69**: 276. =*G. luzulae.*

Fusidium coccineum Fuckel, 1869, *Symb. Mycol.*, p. 370. Probably a *Paecilomyces.*

G. convoluta (Harz) Mason, 1941, *Mycol. Pap.* 5: 117. =*G. murorum.*

T. convoluta Harz, 1871, *Bull. Soc. imp. Moscou*, **44**: 134. =*G. murorum.*

G. elata Dickinson, p. 4.

Periconia felina Marcha, 1895, *Bull. Soc. r. Bot. Belg.*, **34**: 141. ≡*G. murorum* var. *felina.*

Botrytis funicola Ellis & Everhart, 1921, *J. Mycol.*, **4**: 124. =*G. murorum* var. *felina.*

"*Botrytis funicola* Ellis & Everhart var. *corticola* Ellis & Everhart", Herbarium name =*G. musicola.*

G. fusigera (Berk & Br.) Dickinson, p. 7.

Monotospora fusigera Berk. & Br., 1873, *J. Linn. Soc., Lond.*, **14**: 99. A further account of the same material is given in Petch, T., 1916, *Ann. R. bot. Gdns Peradeniya*, **6**: 178. ≡*G. fusigera.*

Trichosporium glomerigerum Demelius, 1923, *Verh. zool.-bot. Ges. Wien*, **62**: 107. Specimen not examined but Mason (1941) indicated that it was probably a *Gliomastix.*

G. guttuliformis Brown & Kendrick, 1958, *Trans. Br. mycol. Soc.*, **41**: 499. =*G. cerealis.*

Cephalosporium humicola (Oudemans) Batista & Maia, 1955, *Ann. Soc. Biol. Pernambuco*, **13**: 90, non *Cephalosporium humicola* Oudemans. Specimen not examined but could be *G. murorum* var. *felina.*

Tilachlidium humicola Oudemans, 1902, *Arch. neérl. Sci.*, 2 ser., **7**: 297. ≡*Cephalosporium humicola* (Oudemans) Batista & Maia.

G. inflata Dickinson, p. 20.

G. lavitskiae Zhdanova, 1966, *Mykrobiolohychnyi Zhurnal*, **28**: 37. A culture of this fungus was obtained from the Moscow Institute of Microbiology (BKM F. 1324). This isolate grew well on both malt agar and potato dextrose agar but in both instances it produced hyaline spores. As the original diagnosis also described the spores as being "hyalinis vel virescentibus" it is considered by the present author that this fungus is probably a *Cephalosporium* species.

Hadrotrichum lunzinense Szilvinyi, 1940, *Zent. Bakt. ParasitKde.*, II **103**: 182. Specimen not examined but possibly *G. murorum* var. *felina.*

Oedocephalum lunzinense Szilvinyi, 1940, *Zent. Bakt ParasitKde.*, II, **103**: 141. Specimen not examined but possibly *G. murorum* var. *felina.*

G. luzulae (Fuckel) Mason ex Hughes, 1958, *Can. J. Bot.*, **36**: 769. (*G. luzulae* (Fuckel) Mason, 1953, in Rimington, *Nat. Hist. Scarborough Dist.*, **1**: 154, nomen non rite publicatum), p. 13.

T. luzulae Fuckel, 1870, *Symb. Mycol.*, p. 348. ≡*G. luzulae.*

Graphium malorum Kidd & Beaumont, 1924, *Trans. Br. mycol. Soc.*, **10**:113. =*G. murorum* var. *felina.*

Trichosporium masseei Sacc., 1913, *Syll. Fung.*, **22**:1356. =*G. musicola.*

G. murorum (Corda) Hughes, 1958, *Can. J. Bot.*, **36**: 769, p. 10.

T. murorum Corda, 1838, *Icon. Fung.*, **2**: 9. =*G. murorum.*

G. murorum (Corda) Hughes var. **felina** (Marchal) Hughes, 1958, *Can. J. Bot.*, **36**: 769, p. 16.

G. murorum (Corda) Hughes var. *fulva* Rambelli, 1961, *Publ. Cent. Sper. agric. for.*, **5**: 214. No material available but seems likely to =*G. murorum* var. *felina* in view of the variation encountered in cultures of this variety.

G. murorum (Corda) Hughes var. **polychroma** (van Beyma) Dickinson, p. 11.

Coniosporium musicola Speg., 1910, *An. Mus. nac. Hist. nat. B. Aires*, **20**:430. =*G. musicola.*

G. musicola (Speg.) Dickinson, p. 8.

G. nigricans Dickinson, p. 7.

Tilachlidium nigrescens El. & Em. Marchal, 1921, *Bull. Soc. r. Bot. Belg.*, **54**:133. =*G. murorum* var. *felina.*

G. novae-zelandiae Hughes & Dickinson, 1968, *N. Z. Jl Bot.*, **6**: 108, p. 5.

T. olivacea β erecta Corda, 1840, *Icon. Fung.*, **1**: 24. =*G. murorum.*

Trichosporium olivaceum (Link ex S. F. Gray) Fries, 1846, *Summ. Veg. Scand.*, p. 492. Specimen not examined but probably *G. murorum.*

Cephalosporium oudemansii Pidoplichko (nom. nov.) 1953, in (*Fungus flora of coarse fodders*), p. 176. =*Cephalosporium humicola* (Oudemans) Batista & Maia, non *Cephalosporium humicola* Oudemans.

Oospora polychroma van Beyma, 1928, *Verh. K. Akad. Wet.* (b), **26**:5. =*G. murorum* var. *polychroma.*

G. protea (Sacc.) Verona & Castella, 1942, *Annali Fac. Agr. Univ. Pisa, N.S.*, **5**: 383. *Gliomastix* state of *Wallrothiella subiculosa.*

T. protea Sacc., 1881, *Michelia*, **2**:292. =*G.* state of *Wallrothiella subiculosa.*

Cephalosporium roseo-griseum Saksena, 1955, *Mycologia*, **47**:895. =*G. murorum* var. *felina.*

Torulina serotinae (Oudemans) Sacc. & D. Sacc., 1906, *Syll. Fung.*, **18**:566. Specimen not examined but possibly *G. murorum.*

Torulopsis serotinae Oudemans, 1894, *Ned. kruidk. Archf.*, 3 ser. II, **4**:917. Specimen not examined but probably =*G. murorum.*

Wallrothiella subiculosa v. Höhnel, 1912, *S. B. Akad. Wiss. Wien*, **121**: 381. (Fragmente zur Mykologie 763.) The perfect state of *G. protea*, p. 15.

Fusidium viride Grove, 1885, *J. Bot., Lond.*, **23**: 164. =*G. luzulae.*

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1965 Jackson, R. M., Studies of fungi in pasture soils III Physiological studies on some fungal isolates from the root surface and from organic debris, *N. Z. Jl agric. Res.*, **8**: 878–888.

1966 Rix, E. M., The genus *Gliomastix* Guéguen, B.A. thesis, University of Dublin.

1966 Frankland, J. C., Succession of fungi on decaying petioles of *Pteridium aquilinum*, *J. Ecol.*, **54**: 41–63.

1967 Onions, A. H. S. & G. L. Barron, Monophialidic species of *Paecilomyces*, *Mycol. Pap.* 107: 1–25.

1967 Mangan, A., Studies on wheat rhizosphere soil fungi, *Ir. J. agric. Res.*, **6**: 9–14.

1968 Hughes, S. J. & C. H. Dickinson, New Zealand fungi XI. *Gliomastix* Guéguen, *N. Z. Jl Bot.*, **6**: 106–114.

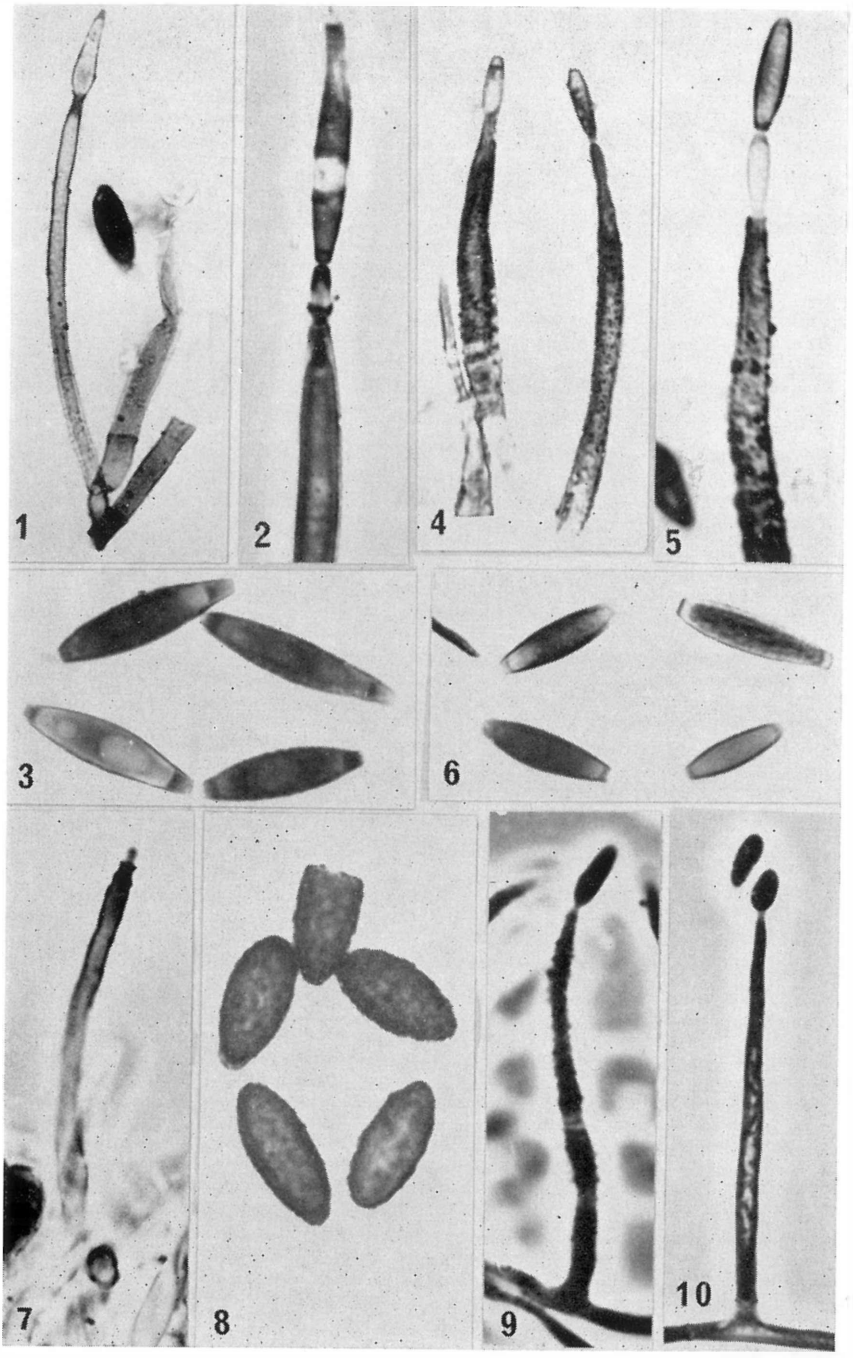

PLATE 1. FIG. 1. *G. elata* phialides, ×700. FIG. 2. *G. elata* detail of phialide apex and developing spores, ×1500. FIG. 3. *G. elata* spores, ×1150. FIG. 4. *G. nigricans* phialides, ×1400. FIG. 5. *G. nigricans* detail of phialide apex and developing spores, ×1500. FIG. 6. *G. nigricans* spores, ×1450. FIG. 7. *G. fusigera* apical portion of phialide, ×1750. FIG. 8. *G. fusigera* spores, ×1100. FIG. 9. *G. luzulae* phialide, ×1900. FIG. 10. *G. murorum* var. *felina* phialide, ×1450.

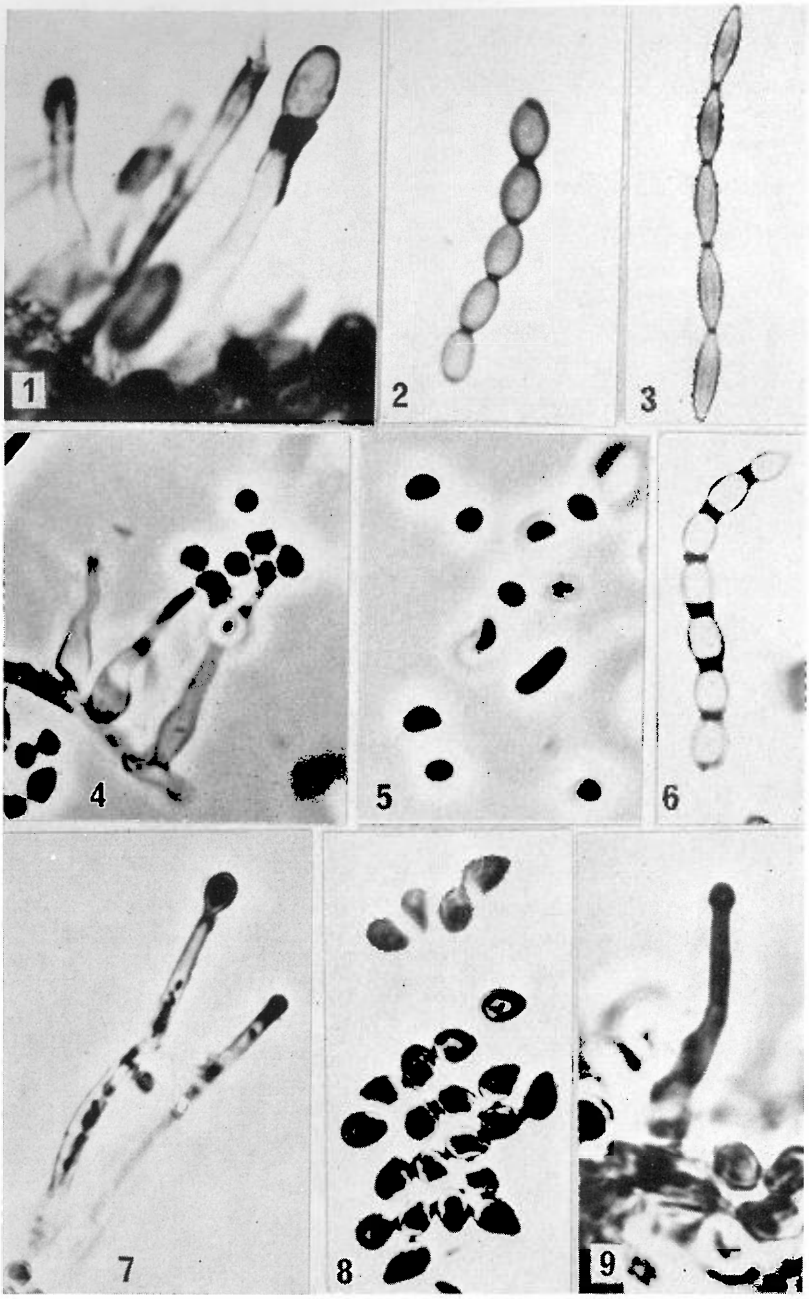

PLATE 2. FIG. 1. *G. musicola* phialide apices, ×2050. FIG. 2. *G. musicola* spores, ×1450. FIG. 3. *G. luzulae* spores, ×1450. FIG. 4. *G. inflata* phialides, ×1500. FIG. 5. *G. inflata* spores, ×1500. FIG. 6. *G. murorum* var. *polychroma* spores, ×1650. FIG. 7. *G. cerealis* phialides, ×1650. FIG. 8. *G. cerealis* spores, ×1900. FIG. 9. *Gliomastix* state of *W. subiculosa* phialide, ×1950.

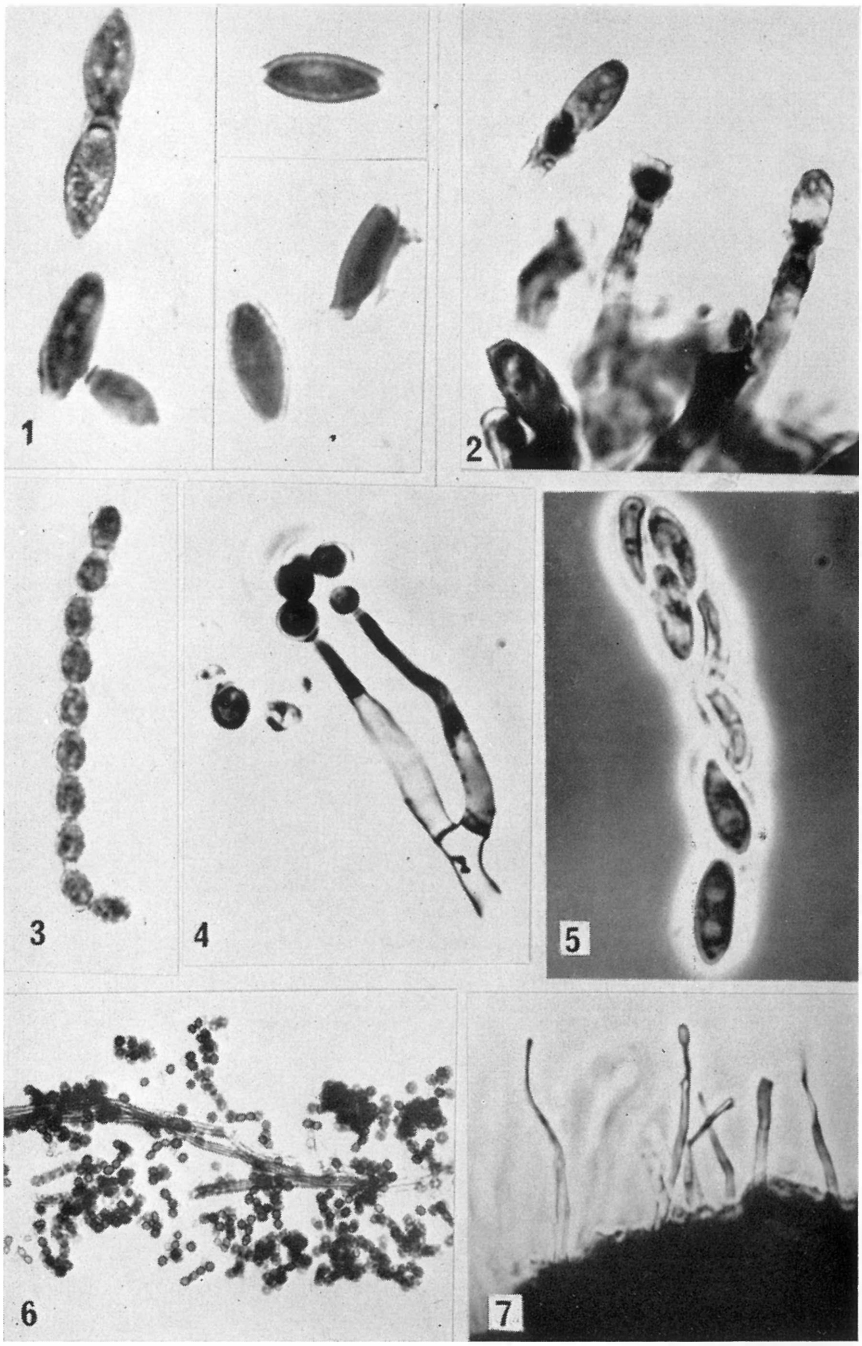

PLATE 3. FIG. 1. *G. novae-zelandiae* spores, ×1776. FIG. 2. *G. novae-zelandiae* phialides with dark collars and developing spores, ×1705. FIG. 3. *G. murorum* spore chain, ×1705. FIG. 4. *G. murorum* phialides, ×1705. FIG. 5. *Wallrothiella subiculosa* ascus, phase contrast photograph, ×1705. FIG. 6. *G. murorum* general appearance of an hyphal rope with associated phialides and spore chains, ×355. FIG. 7. *W. subiculosa* portion of a section through a perithecium showing the development of phialides of the *Gliomastix* state, ×569.