Phoebe nitida BL; cf. Kostermans, l.c. 1292 no 114. — Typus: *Praetorius* s.n., Palembang, ster. (L).

Phoebe lamponga Miq.; cf. Kostermans, l.c. 1284 no 84. — Typus: *4.222 H. B.* (U), Tarabangi, Lampongs, "Kajoe Helah (Hoeroe mehrang)".

Phoebe sumatrana Miq.; cf. Kostermans, l.c. 1302 no 165a. — Typus: *Junghuhn* s.n., Sumatra, Hochankola, ster. (L, U) et *Junghuhn* s.n., herb, de Vriese, leaves with large, hairy galls, Battak region, Sumatra (L, 2 sheets, U).

Ocotea excelsa Bl., p.p., no collector, no number, ster. (L).

Laurus longifolia Reinw. ex Blume; cf. Kostermans, l.c. 649 no 214d. — Typus: two loose leaves (L).

Laurus gewmdflora Reinw. ex Blume (nomen) ; cf. Kostermans, l.c. 628 no 156b (non 156a). — Typus: *Reinwardt 831* (L), "Huru hiries", Java, fl. (in Leiden the number 831 appears also on one type sheet of *Ocotea declinata* BL, marked "Huru leuur", Salak, Dec. 1822).

Persea rimosa Zoll. ex Meissn. (non *Machilus riinosa* Bl.) ; cf. Kostermans, l.c. 1253 no 250, quoad *Zollinger 13484* (L).

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THE HYPHOMYCETE GENUS DACTYLARIA SACC.

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SUMMARY

An emended delimitation of the genus *Dactylaria* Sacc. is proposed and the two accepted species, which are non-predaceous and dematiaceous, are redescribed and illustrated. The affinity of many nematode-trapping species currently classified in *Dactylaria* with the didymosporous genera *Arthrobotrys* Corda, *Candelabrella* Rifai & R. C. Cooke and *Genicularia,* Rifai & R. C. Cooke is discussed and the scopes of the latter genera are enlarged, and consequently several new combinations are made.

INTRODUCTION

In an earlier attempt to find the appropriate genera for some species of didymosporous nematode-trapping Hyphomycetes of the *Trichothecium-Arthrobotrys* complex (Rifai & Cooke, 1966), several phragmosporous genera have been seriously considered. Of these the genus *Dactylaria* Sacc. has received a special attention, especially because Soprunov (1958) transferred *Arthrobotrys dactyloides* Drechsler (1937) to it. This disposition was tentatively rejected by Rifai & Cooke (1966) because they believed that the affinity of *A. dactyloides* with *A. superba* Corda, the type species of the genus *Arthrobotrys* Corda, was sufficiently close to warrant their inclusion in one genus. They further pointed out that the limits of the genus *Dactylaria* was not yet fully understood. The result of the subsequent study on the taxonomy of *Dactylaria* reported below does not only prove that the retention of *A. dactyloides* in *Arthrobotrys* is fully justified, but also shows that the majority of species now included in *Dactylaria* cannot be retained in this genus any longer.

In 1877 Saccardo described and illustrated *Acrothecium purpurellum* Sacc, a purplish phragmosporous hyphomycete which was found growing saprophytically on a piece of decayed *Quercus* wood in Italy. Based on this species the new genus *Dactylaria* was created by Saccardo (1880) three years later, which he described as follows: "..... Saprophila. Hyphae fertiles erectae, simplices, apice capitulum conidiorum gerentes; conidia fusoidea v. clavulata, 2-pluriseptata....." In compiling the fourth

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volume of Sylloge Fungorum Saccardo (1886) transferred four more phragmosporous species to this genus, which he placed in the family Mucedineae (= the Moniliaceae). Since then all species with similar kind of conidia which cannot be ranged in *Arthrobotrys, Dactyllela* Grove or *Monacrosporium* Oud. have been assigned to *Dactylaria.* In a long series of excellent papers Drechsler (1937, 1940, 1944, 1950) described and illustrated in great details the morphology and biology of several species of *Dactylaria.* Unfortunately, however, the morphological charaters and the biology of the type species of this genus is still imperfectly known.

While investigating the ecology of microfungi colonizing forest leaf litter in Great Britain, Hering (1965, 1965a) came across with an interesting hyphomycete growing on decaying leaves of *Quercus* which had been in the ground for over six months. Dr. M. B. Ellis of the Commonwealth Mycological Institute (Kew) identified this fungus as *Dactylaria purpurella* (Sacc.) Sacc.; he (pers. comm., 1967) has also compared this British collection with the original specimen of the latter and found them to be identical. A study of an isolate of this species kindly supplied to me by Dr. T. F. Hering shows that it differs considerably from almost all species currently classified as *Dactylaria,* so that it has been found necessary to emend the limits of this genus.

Dactylaria purpurella, which is a non-predaceous species, markedly differs from the nematode-trapping species of *Dactylaria* in its macroscopic as well as its microscopic characters. In culture *D. purpurella* forms compact, fluffy or thickly cottony colonies with a very slow growth rate; they only attain a 19 mm diameter after 12 days at 25°C (Hering, 1965a). These colonies are greyish brown to dark brown because most of their mycelia are composed of distinctly brown walled hyphae. When seen from the reverse of the Petri-dish these colonies often appear almost opaque. In contrast colonies of the nematophagous group of species have a much faster growth rate and are capable of covering a 90 mm diameter Petri-dish in about one or two weeks at 25 °C. Their colonies are translucent and smooth surfaced because they do not normally form aerial hyphae and the network of their creeping hyphae are thin and sparse. They are whitish or pale pinkish and their individual hyphae are colourless; the colonies do not also discolour their media. The difference in the cultural characters of *D, purpurella* and the other species of *Dactylaria* is such that those who have seen the colonies of the two groups side by side would certainly classify them in different genera. Although in recent years the significance of the hyphal pigmentation as a major taxonomic evidence has occasionally been doubted (Barron, 1962, 1964; Rifai, 1964), it is worth noting here

that should Saccardo (1877, 1877a, 1880, 1886) see the colonies of *D. purpurella* in culture, undoubtedly he would have put the genus *Dactylaria* in the Dematiaceae and not in the Moniliaceae.

The habit of conidiophores of *D. purpurella* shows also some differences from that of the nematode-trapping series. As has been well known, in the latter group of species the conidiophores are usually long, erect, regularly septate, generally straight or sometimes jointed, and normally they arise from the creeping or submerged hyphae. Depending upon the species the apices of the conidiophores of the nematode-trapping species of *Dactylaria* may become slightly swollen and bear numerous small denticles, or they may become simply geniculate, or form a candelabrum-like branching system to which their obovoid or ellipsoid conidia are attached. On the other hand the conidiophores of *D. purpurella* are rather short, frequently and irregularly septate; in colonies grown on artificial media these conidiophores normally arise from the aerial hyphae and are straight or curved, whereas their apices become irregularly dilated and bear a few denticles which produce narrowly subcylindrical or subclavate conidia.

Cooke & Satchuthananthavale (1966) considered that *D. purpurella* and the nematode-trapping species of *Dactylaria* could be placed in one genus, but the cultural and morphological characters enumerated above do not seem to support their view. In fact among the many species which in the last thirty years have been assigned to *Dactylaria* there is only one species that can be accepted as a member of the genus *Dactylaria,* namely the Indian species *Dactylaria fulva* Roy & Gujarati (1965), which is also a non-predaceous fungus.

It is very likely that *Diplorhinotrichum juncicola* MacGarvie (1965) belongs also to *Dactylaria* as this genus is understood here, but I have not seen this species. MacGarvie (1965), who described the cultural behaviour of this species very briefly, stated that it had a slow growing colony which at first appeared white, becoming light grey and finally dark grey towards its centre and produced short, flask-shaped, subcapitate and pigmented conidiophores and 1-septate subcylindrical conidia. The shape of the sporogenous cell of *Diplorhinotrichum juncicola* seems to be basically different from that of the two species of the genus *Diplorhinotrichum* von Hohnel accepted by Hughes (1951), namely *Diplorhinotrichum candidulum* von Hohnel and *Diplorhinotrichum africanum* Hughes. Papendorf (1967) suggested that *Diplorhinotrichum* might not be generically distinct from *Dactylaria* but the cylindrical shape of its sporogenous cells appears to be acceptable as the leading character which distinguish this genus from

Dactylaria. Unfortunately these two hyaline species of *Diplorhinotrichum* have not been grown in culture so that it has not been possible to assess the taxonomic value of their cultural charaters.

The generic name *Dactylaria* has been much used in mycological and phytopathological literature for the nematophagous species that its conservation might be preferred to preserve current usage. Since it will be shown later that the commonly accepted circumscription of *Dactylaria* (Clements & Shear, 1931; Drechsler, 1937, 1940, 1944, 1950; Dollfus, 1946; Bessey, 1950; Soprunov, 1958; Barnett, 1960; Cooke & Godfrey, 1964; Cooke & Satchuthananthavale, 1966) is a heterogeneous one and because its species can be referred to some existing genera, the conservation of *Dactylaria* which will exclude its original type species is unnecessary.

THE TAXONOMY OF DACTYLARIA

DACTYLARIA Sacc. *emend.* Rifai

Dactylaria Sacc. *in* Michelia 2: 20. 1880; Syll. Fung. 4: 194. 1886; Lindau apud Eng-ler & Prantl, Nat. Piflanzenfam. I, 1: 448. 1900; Clem. & Shear, Gen. Fung.: 207. 1931; Bessey, Morph. Tax. Fung.: 615. 1950; Barnett, 111. Gen. Imp. Fung.: 70. 1960.

In pure culture *colonies* grow very slowly, restricted, fluffy or thickly cottony, compact, grey to dark brown; colour of reverse also brown or dark brown to almost opaque. *Mycelium* composed of compact network of septate, much branched, subhyaline to brown coloured and smooth walled *hyphae,* with abundant but paler aerial hyphae. *Conidiophores* arise from aerial or creeping hyphae, generally short, straight or flexuous, frequently septate, smooth walled, occasionally irregularly branched, pale brown to suhyaline below, paler towards the dilated subcapitate apex; the latter bears a few small conical truncate conidial pegs which arise through repeated subapical proliferations, a process which makes the conidiophores very slightly elongate and dilated at the apex; sometimes a renewed growth of conidiophore occurs after the formation of the first group of conidial pegs and a second group will be formed at some distance above the first. *Conidia* arise singly as blown out ends of the conidiophores, blastogenous, hyaline to pale pink, 1—many-septate, smooth walled, subcylindrical or narrowly subclavate, distally rounded but truncate at the base.

The slow growing, restricted, fluffy, compact, dematiaceous colonies, the generally rather short conidiophores with subcapitate apices which produce subcylindrical conidia and the non-predaceous habit serve to distinguish this genus from other radulasporous nematode-trapping genera of Hyphomycetes, to which *Dactylaria* is only remotely related.

HABITAT: mostly saprophytic in soil or on decayed vegerable matter.

TYPE SPECIES: *Acrothecium purpurellum* Sacc.

KEY TO SPECIES OF DACTYLARIA

1a. [Parasitic on *Juncus;* conidiophores bulbous, conidia at maturity regularly 1-septate ..... *"Diplorhinotrichum" juneicola]*

b. Saprophytic; conidiophores not bulbous, conidia at maturity 1—3-septate. 2

2a. Colonies grey brown to dark brown; conidia 1—3-septate, 17.2—26.3(—30) X 2.7—4 n. Italy, Great Britain ..... *Dactylaria purpurella*

b. Colonies at maturity grey to brownish grey; conidia 1—2-septate, 13.6—23.9 (—50) x 1.5—2.2(—3)n. India ..... *Dactylaria fulva*

< DACTYLARIA PURPURELLA (Sacc.) Sacc.

Acrothecium purpurellum Sacc, Fung. Ital. Autograph. Del., Fasc. I-IV: t.8. May 1877; Fung. Ital. Autograph. Del. Comm.: 75. June 1877. •— *Dactylaria purpurella* (Sacc.) Sacc. *in* Midhelia 2: 20. 1880.

In pure culture on corn-meal agar *colonies* grow very slowly (only attain a 60 mm diameter after 6 weeks at room temperature of 25 °C), restricted, at first smooth surfaced but soon becoming compactly fluffy or cottony from the formation of abundant interwoven aerial hyphae which usually form raised thick cushions, indistinctly zonate, greyish brown to blackish brown or rarely dark olive brown, often tinge with some shades of pink; colour of reverse also dark blackish or reddish brown, often almost opaque, whereas the media are discoloured by a red brown pigment; according to Hering (1965a) on its natural substrates colonies of this species form conspicuous white patches. *Mycelium* composed of a compact network of profusely branched *hyphae* which are subhyaline, pale brown to dark brown, 1.3—4*μ*. diameter, frequently septate and their cells sometimes slightly inflated or barrel shaped, their walls rather thick, smooth or very rarely minutely echinulate; the aerial hyphae mostly composed of lighter coloured elements, but some of these may become tightly aggregated with each other to form irregular capillitium-like hyphal cords which are dark blackish brown and appear shining under the reflected light. *Conidiophores* arise singly as lateral branches of the aerial or sometimes also, of the creeping hyphae, straight or gently curved, simple or irregularly branched, pale brown below and becoming paler towards the subhyaline apex, smooth walled, many septate, 2—4.8 *μ*. diameter by 20—100 μ long (but on its natural substrate the length of the conidiophore may reach 500μ according to Hering, 1965a) ; the apices of the conidiophores ultimately become slightly dilated and bear a few pronounced, flat-topped, irregularly disposed conidial pegs or scars which arise by successive subapical proliferations of the conidiophores; through a renewed growth another group of conidial pegs may be formed at a higher level. *Conidia* arise singly and successively as blown out ends of the conidiophores, hyaline to subhyaline, smooth walled, subclavate to subcylindrical, rounded at the apex, base obconical and truncate, mostly 1-septate but a few are 3-septate, 17.2—26.3(—30) X 2.7—4*μ;* Saccardo (1877a, 1886) and Hering (1965a)

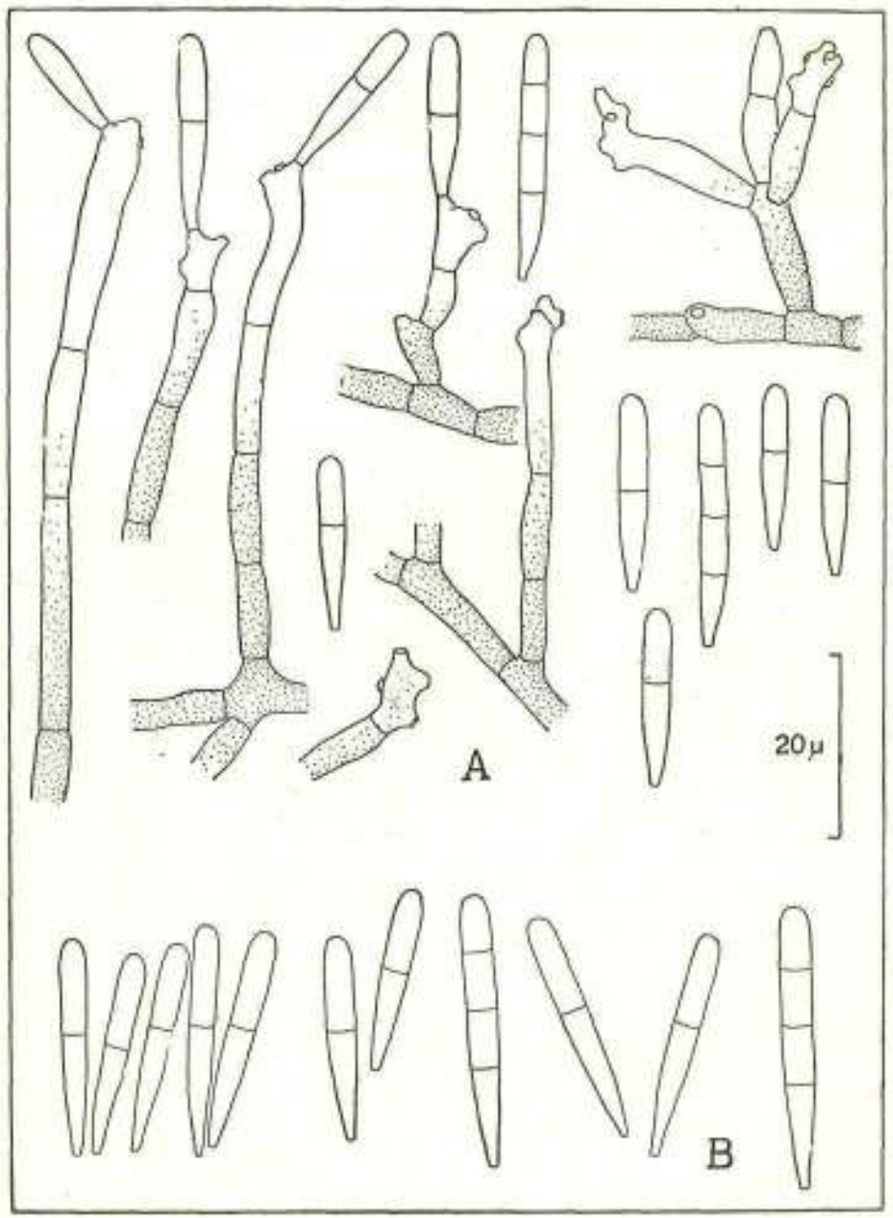

Fig. 1. *Dactylaria purpurella:* A, eonidiophores and conidia (from *T.F. Hering BC/ 1040,* living culture) ; B, conidia (from *T.F. Hering BCJ10AO,* on leaf litter).

gave the range of the spore size J.S being 20—25 x 4 \i. and 16—23 X 3_5 *p.* respectively (fig. 1).

HABITAT: on decayed leaves and wood of *Quercus.*

DISTRIBUTION: Italy (type locality) and the Great Britain.

ILLUSTRATIONS: Saccardo, Fung. Ital. Autograph. Del., Fasc. 1-1V: t.8. 1877; Lindau apud Engler & Prantl, Nat. Pflanzenfam. I, 1: 449, fig. 232J. 1900; Hering *in* Trans. Br. mycol. Soc. 48: 665, fig. 5. 1965; Cooke & Satchuthananthavale *in* Trans. Br. mycol. Soc. 49: 30, fig. 2E. 1966.

GREAT BRITAIN. On *Querous* leaf litter, Merlewood, Lancashire, 8 January 1963, *T.F. Hering BC/lOiO* (IMI 101627) ; a culture was isolated from the latter and a dried culture on corn-meal agar is preserved in BO.

DACTYLARIA FULVA Roy & Gujarati

Dactylaria fulva Roy & Gujarati *in* Lloydia 28: 53. 1965.

The following description is drawn from the dried type culture isolate and supplemented with Roy & Gujarati's (1965) original account: In pure culture on potato-dextrose-agar *colonies* grow very slowly, only reach a 9 mm diameter after one week at 25 °C, restricted, fluffy or compactly cottony, at first dirty white, becoming grey to brownish grey at maturity; colour of reverse also brownish at maturity. *Mycelium* made up of intricate network of *hyphae* which are subhyaline to yellowish brown or brown, 1—3 µ diameter, smooth walled, septate, much branched, sometimes aggregated with each other to form hyphal cords. *Chlamydospores* present in older cultures, subglobose to elongated, mostly intercalary or arise laterally to the hyphae, thick walled, dark reddish brown and measure 5.4—36.4 x 5.4—21.8 *µ.* according to Roy & Gujarati. *Conidiophores* mostly arise as lateral branches of the hyphae, straight or flexuous, irregular in length, may be very short and only 4*µ,* long but mostly vary from 6 to 50 *µ,* long by 2—3*µ.* diameter, septate, subhyaline to pale yellowish brown below; the apex of conidiophore hyaline, subhyaline or yellowish, distinctly dilated to 2.7—4.5 *µ.* diameter, bearing numerous irregularly disposed, flat-topped conidial pegs to which conidia formerly attached; a conidium-producing apex may be formed at a higher level through a renewed growth of the conidiophores. *Conidia* arise singly as blown out ends of the conidiophores, smooth walled, hyaline, subcylindrical to almost subclavate, only slightly or hardly narrower at the base, at maturity generally regularly 2-septate, 13.6—23.9 X 1.5—2.2 µ.; Roy & Gujarati gave the range of the spore size as being 13—50 x 1.5—3*µ* (fig. 2).

HABITAT: in rhizosphere of *Dichantium annulatum.*

DISTRIBUTION: India.

ILLUSTRATION: Roy & Gujarati *in* Lloydia 28: 54, fig. 1—11. 1965.

INDIA. Isolated from decayed roots of *Dichantium annulatum,* Botanical Garden, Banaras Hindu University, Varanasi, U. P., 1963, *S. Gujarati* (IMI 104480, isotypus).

A REASSESSMENT OF THE EXCLUDED SPECIES

In recent years it has been more or less generally accepted that the taxonomic value of the spore septation in delimiting genera of some groups of fungi has been given an undue emphasis. In many cases modern authors have ignored this character and classified numerous species of Hyphomycetes with various types of spore septation in one genus, which in Saccardoan (1880, 1886) system of classification will require two, three or four separate genera. Boedijn & Reitsma (1950) pointed out that the genera *Cylindrocladium* Morgan and *Candelospora* Rea & Hawley were separated form each other solely by the formation of 3—many-septate conidia and 1-septate conidia respectively; since all their other morphological and cultural characters are basically identical, they justifiably merged the two genera. Hughes (1958) erected the genus *Scheleobrachea* Hughes, which has been shown to represent a later synonym of the genus *Pithoniyces* Berk. & Br. by Ellis (1960) ; in both Hughes' and Ellis' accounts

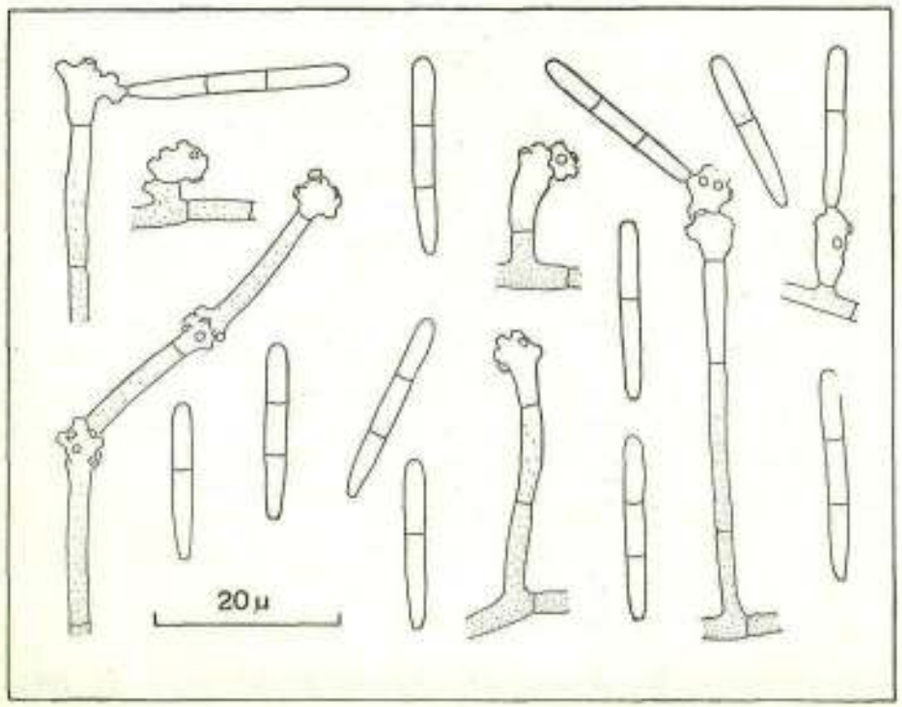

Fig. 2. *Dactylaria fulva:* conidiophores and conidia (from *S. Gujarati).*

species with 1-celled, 1-—3-septate conidia and even those with muriform conidia are accommodated in the same genus. *Endophragmia* Maire & Duvernoy now does not only contain species with phragmosporous conidia but also a few species which have 1-septate conidia (Ellis, 1959). Sutton & Pirozinsky (1965) united *Taeniophora* Karst, and *Alysisporium* Pyronel with *Pragmotrichum* Kunze & Schmidt because of their overall similarity except in the possession of phragmosporous and muriform conidia respectively ; similarly the genus *Hansfordiella* Hughes also embraces species with phragmosporous and muriform conidia (Hughes, 1951). Madelin (1966) correctly transferred *Botrytis acridiorum* Trabut to the traditionally didymosporous genus *Trichothecium* Link ex Fr., although this species has 1-celled, 1—3-septate conidia; because of this the taxonomic relation of *Cylindrophora apiculata* Tubaki and *Trichothecium roseum* (Pers.) Link ex S. F. Gray should now be reconsidered (cf. Tubaki, 1954; Rifai & Cooke, 1966). In the Ascomycetes we find that the helotiaceous genus *Hymenoscyphus* S. F. Gray emend. Dennis (= *Helotium* auct., non *Helotium* Tode ex Lehman, which is agaricaceous) has species with both 1-celled as well as 1—many-septate ascospores (Dennis, 1964) ; the same situation can also be found in the hyaloscyphaceous genus *Dasyscyphus* S. F. Gray (Dennis, 1960). In the pyrenomycete genus *Massarina* Sacc. there are many species with 1-septate ascospores besides those with phragmosporous ones (Bose, 1961; Muller & von Arx, 1962).

Although it must be admitted that a character widely accepted as having a generic value in one group will not always be of equal importance in a different context, it seems that the unsuitability of the spore septation to serve as a major taxonomic evidence in delimiting the genera of nematode-trapping Hyphomycetes is manifest. The currently accepted conception that *Arthrobotrys* is a didymosporous genus with *Dactylaria* sensu lato serving as its phragmosporous counterpart has not been consistently put into practise: though definitely exceptional, conidia of *Arthrobotrys superba* and *A. dactyloides* (Drechsler, 1937) may have more than one septum. This anomaly, however, has always been played down largely because there is no doubt whatsover that these species are good members of *Arthrobotrys.* It follows that it would not be possible to use the number of spore septation as a key character to separate *Arthrobotrys* from *Dactylaria* sensu lato because of the existence of these intermediate forms. The taxonomic value of the spore septations is further weakened by the fact that in nematode-trapping Hyphomycetes the types of media appear to have an effect on the number of septa produced. When grown on a nematode-infected agar *Dactylaria clavispora* R. C. Cooke produces conidia

which are "..... 1—2-septate, about twice as many having one septum as two....." but on corn-meal agar the conidia of this species become 1—3-septate, the majority of which have "..... 2 septa, about three times as many with 1 or 3 septa....." (Cooke, 1964). A similar situation can also be found in *Dactylaria eudermata* Drechsler (1950).

As has been hinted earlier, the conidiophores of the nematode-trapping species to be excluded from *Dactylaria* can be grouped into at least three types, each of which corresponds to the conidiophore type found in the didymosporous genera *Arthrobotrys, Genicularia* Rifai & R. C. Cooke and *Candelabrella* Rifai & R. C. Cooke respectively. The only character which these species have in common with each other is the phragmosporous nature of their conidia, which is also the only character which so far has prevented them from being referred to the three didymosporous genera. From the above consideration it would be obvious, however, that for the nematode-trapping species the number of spore septation should not be accorded a generic value. Therefore it would be fully justifiable to distribute these species among the genera *Arthrobotrys, Candelabrella* and *Genicularia* and at the same time to enlarge the scopes of these originally didymosporous genera to enable them to accommodate the phragmosporous species as well. The other alternative would be the proliferation of newly described phragmosporous genera for the reception of the numerous species currently classified as members of *Dactylaria,* but this is wholly undesirable because it will only make the ralationship of these species becomes more obscure than as it is.

GENICULARIA Rifai & R. C. Cooke *emend.* Rifai

Genicularia, Rifai & R. C. Cooke *in* Trans. Br. mycol. Soc. 49: 153. 1966.

In pure culture *colonies* grow quite rapidly, effused, pale pink to whitish. *Mycelium* composed of septate, hyaline, smooth walled, branched *hyphae* which mostly form thin and sparse mat over the surface of the media, with scanty aerial growth. *Conidiophores* arise from creeping or submerged hyphae, hyaline, smooth walled, septate, erect or ascending, at first straight, becoming geniculate or flexuous, elongating, sometimes considerably, by repeated subapical renewal of growth; its apex is blown out blastogenously to form a conidium and after the first conidium has been formed a new growing point appears at one side of it and the second conidium is formed at the new apex, displacing the first conidium to a lateral position, this process being repeated several times. *Conidia* short obpyriform, obpyriform to obvoid-turbinate or broadly fusoid-ellipsoidal, 1—many-septate, the basal cell usually obconical and truncate, hyaline when viewed singly but appearing pale pinkish-white in mass, smooth walled.

HABITAT: mostly (? always) capturing and parasitizing nematodes by means of various kinds of traps in soil or debris.

TYPE SPECIES: *Trichothecium cystosporium* Duddington.

The species included in this genus by Rifai & Cooke (1966) so far are didymosporous. As has been indicated above in Geniculairia clavispora (R. C. Cooke) Rifai, *comb. nov.* (basionym: *Dactylaria clavispora* R. C. Cooke *in* Trans. Br. mycol. Soc. 47: 307, fig. 1. 1964) the number of spore septation in each conidium varies from 1, 2 or 3, mostly one or two depending on the type of media used. As far as the spore septation is concerned, this species appears to represent an intermediate form between the didymosporous members of *Genicularia* and Genicularia psychrophila (Drechsl.) Rifai, *comb. nov.* [basionym: *Dactylaria psychrophila* Drechsl. *in* Mycologia 36: 161. 1944. — *Monacrosporium psychrophilum* (Drechsl.) R. C. Cooke & Dickinson *in* Trans. Br. mycol. Soc. 48: 622. 1965], because the latter has 2—{mostly 3—)4-septate conidia. The type of conidiophore of *G. clavispora* and *G. psychrophila* is similar to that of *G. cystosporia* (Duddington) Rifai & R. C. Cooke.

Drechsler (1950) described the conidiophores of *Dactylaria eudermata* as follows: "..... simple conidiophores bear terminally a single conidium much like the simple conidiophores, for example, of *Dactylella aphrobrocha* and *D. bembicodes,* which, indeed, in their dimensions they resemble rather closely. The fungus likewise puts forth distally branched conidiophores that beside producing a spore at the tip of the main hypha bear additional spores singly on its primary branches and also on its secondary branches if such are present. As the branches are often rangy, sometimes exceeding 50 µ, in length, the conidia produced plurally are in many instances attached at generous distances from one another....." There is no doubt that this species (fig. 3) likewise should be known as Genicularia eudermata (Drechsl.) Rifai, *comb. nov.* [basionym: *Dactylaria eudermata* Drechsl. *in* Mycologia 42: 40. 1950. — *Monacrosporium eudermatum* (Drechsl.) Subram. *in* J. Indian bot. Soc. 42: 293. 1963]. As Cooke & Dickinson (1965) already stated this species is closely related to Genicularia bogoriensis Rifai, *nom. nov.* [basionym: *Monacrosporium cystosporum* R. C. Cooke & Dickinson *in* Trans. Br. mycol. Soc. 48: 623. 1965; non *Genicularia cystosporia* (Duddington) Rifai & R. C. Cooke]. On nematode-free media these two species often produce conidia which are similar in outline to those of *G. perpasta* R. C. Cooke apud Rifai & R. C. Cooke.

Subramanian (1963) and Cooke & Dickinson (1965) placed *G. psychrophila, G. eudermata* and *G. bogoriensis* in the genus *Monacrosporium.*

However, this last named genus appears to be aleuriosporous, whereas these three species should be considered to belong to the Radulasporae (cf. Rifai & Cooke, 1966). Admittedly it is very difficult to ascertain the relationship

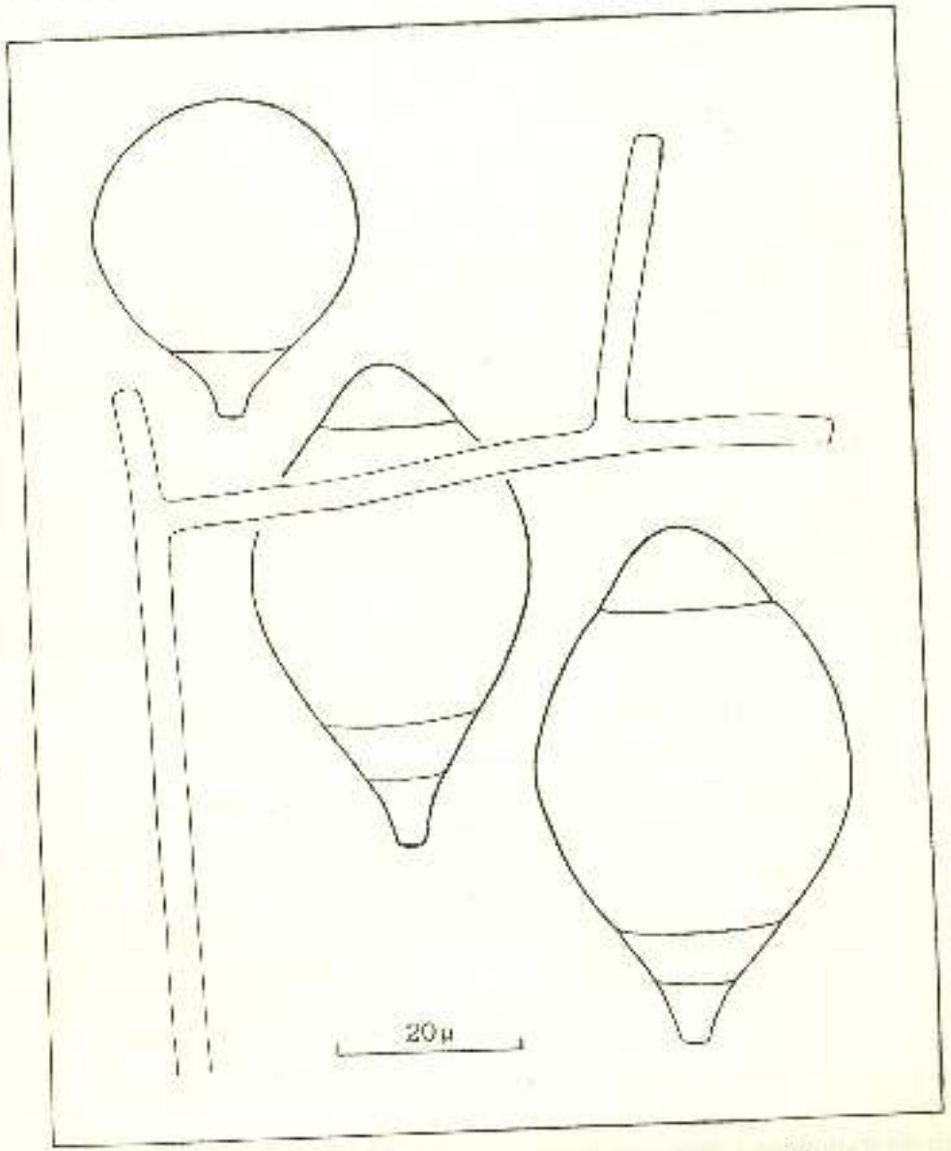

Fig. 3. *Geniculuria cubiformis*: conidiophores and conidia (redrawn from Drechsler, 1959).

of some species of *Dactylella-Monacrosporium* complex, especially in those species where the typically unbranched and monosporous conidiophores produce side branches near their apices; further cultural and developmental studies are required to elucidate this point.

CANDELABRELLA Rifai & R. C. Cooke *emend.* Rifai

Candelabrella Rifai & R. C. Cooke in Trans. Br. mycol. Soc. 49: 160. 1966.

In pure culture *colonies* spread rather rapidly, effused, at first translucent, becoming watery white to very pale pinkish white. *Mycelium* made up of septate, branched, hyaline, smooth walled *hyphae* which occasionally aggregate with each other to form creeping hyphal cords; the hyphae sometimes bear lateral or terminal *chlamydospores* and normally form sparse network of mycelial mat on the surface of the media, with scanty aerial hyphae. *Conidiophores* arise from the creeping or sometimes submerged hyphae, smooth walled, septate, hyaline, erect, straight, subulate, terminated by small candelabrum-like or irregularly ramified branching system arising by irregular subapical proliferations of the conidiophore apices. *Conidia* arise singly as blown out ends of the conidiophore apices and at the ends of the successively produced new growing points to form a lax conidial head, hyaline, smooth walled, narrowly obpyriform or obovoid, fusoid-ellipsoidal or ellipsoidal, occasionally curved and banana-like, 1—many-septate. Detached conidia left behind distinctive, stout, subcylindrical, often relatively long conidial pegs which constitute the arms of the candelabrum-like branching system.

HABITAT: in soil or debris, mostly capturing and preying on nematodes or insects by means of variously constructed traps.

TYPE SPECIES: *Candelabrella javanica* Rifai & R. C. Cooke.

With the above circumscription the genus *Candelabrella* can now accommodate the phragmosporous species such as **Candelabrella thaumasia** (Drechsl.) Rifai, *comb. nov.* (basionym: *Dactylaria thaumasia* Drechsl. in Mycologia 29: 522. 1937), **Candelabrella candida** (Nees ex Pers.) Rifai, *comb. nov.* [*Dactylium candidum* Nees, Syst. Pilze u. Schw.: 58. 1817 (devalidated name). — *Dactylium candidum* Nees ex Pers., Mycol. Eur. 1: 40. 1822 (basionym); Fr., Syst. Mycol. 3: 440. 1832. — *Dactylaria candida* (Nees ex Pers.) Sacc., Syll. Fung. 4: 195. 1886; Drechsler in Mycologia 29: 532. 1937; Cooke & Satchuthananthavale in Trans. Br. mycol. Soc. 49: 31. 1966] and **Candelabrella haptotyla** (Drechsl.) Rifai, *comb. nov.* (basionym: *Dactylaria haptotyla* Drechsl. in Mycologia 42: 48. 1950). *Dactylaria solerahypha* Drechsler (1950) is probably only a variety or form of *C. haptotyla* (fig. 4), as has also been suggested by Cooke & Satchuthananthavale (1966). Together with those enumerated by Rifai & Cooke (1966) these new transfers bring the number of species of *Candelabrella* up to six, but

apparently one or two more species of *Dactylaria* will have to be included in the present genus as well.

ARTHROBOTRYS Corda *emend.* Rifai

Arthrobotrys Corda apud Engler & Prantl, Pracht Fl • 43 1839; Sacc. Syll. Fung. 4: 181. 1886; Lindau Nat.Planzenfam . I, 1: 445. 1900; Clem. . Shear, **Gen. Fung.**

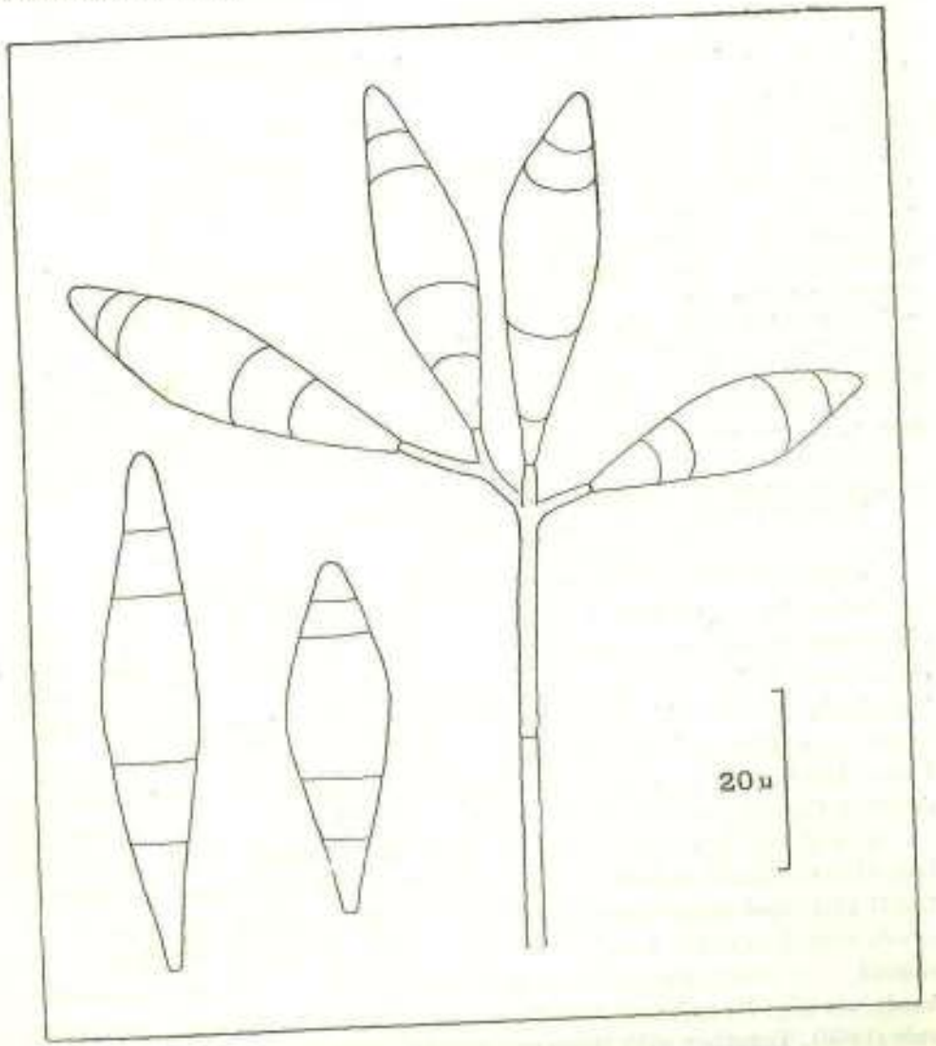

Fig 4. *CandelobreUa haptotyla:* comdiophores and conidia (redrawn from Drechsler, 1950).

206. 1931; Bessey, Morph. Tax. Fung.: 615. 1950; Barnett, 111. Gen. Imp. Fung.: 66. 1960; Rifai & Cooke *in* Trans. Br. mycol. Soc. 49: 164. 1966.

Didymozoophaga Soprunov & Galiulina *in* Mikrobiologiya 20: 494. 1951 (sine diagnose latina).

In pure culture *colonies* grow rapidly, translucent, watery white to pale pinkish white, mostly smooth surfaced. *Mycelium* made up of smooth walled, septate, branched and hyaline *hyphae* forming a thin sparse mycelial mat on the media, typically with scanty aerial growth. *Conidiophores* arise from creeping or submerged hyphae, hyaline, smooth walled, septate, subulate or subcylindrical, mostly erect and straight but sometimes jointed, very rarely branched; at maturity conidiophore apex typically capitate, namely terminated by a swelling which is mostly subglobose or sometimes irregularly elongated, lobed or clavate and bearing numerous minute and sterigma-like conidial pegs which previously produce the conidia ; sometimes renewed growth of the conidiophore occurs after the formation of the first conidial head and a second head will be formed at some distance above the first; the process may be repeated and leads to the production of several such swellings along the length of the conidiophores, which cause the latter to become jointed. *Conidia* distinctly blastogenous, arising singly as blown out ends of the conidiophore and the ends of the newly formed growing points, narrowly obovoid to oblong-ellipsoidal, sometimes slightly curved, 1—many-septate, smooth walled, hyaline.

HABITAT: in soil or debris, mostly capturing nematodes by means of simple or elaborate traps.

TYPE SPECIES: *Arthrobotrys superb a* Corda.

Besides *A. superba* and *A. dactyloides*, there are other normally didymosporous species of *Arthrobotrys* which occassionally have been observed to produce conidia with more than 1 septum, such as *A. oligospora* Fres. (Drechsler, 1937), *A. anchoina* Drechsler (1954) and *A. longispora* Soprunov (1958; non *A. longispora* Preuss, 1851). In Arthrobotrys vermicola (R. C. Cooke & Satchut.) Rifai, *comb. nov.* (basionym: *Dactylaria vermicola* R. C. Cooke & Satchut. *in* Trans. Br. mycol. Soc. 49: 27. 1966) the conidia produsced have 1 to 3 septa, but mostly have 2 septa.

It is of interest to note that in referring the predominantly 4-septate spored species Arthrobotrys polycephala (Drechsl.) Rifai, *comb. nov.* (basionym: *Dactylaria polycephala* Drechsl. *in* Mycologia 29: 530. 1937) to the genus *Dactylaria* a remark was made by Drechsler (1937) that this species ". . . . . shows such obvious parallelism, both in reproductive habit and in make up of predaceous apparatus, to the retiary species of *Arthrobotrys* that its assignment to another genus, however clearly necessitated by the plural septation of its conidia, cannot be regarded with any

gratification....." Since the number of spore septation is no longer maintained to be of important generic value there is nothing to prevent the inclusion of this species in *Arthrobotrys*, especially because the morphology of its conidiophore and conidium-producing organ is essentially identical with that of *A. superba*.

I have not been able to study the developments of the first conidia of a few more species currently classified as *Dactylaria* so that their eventual classification cannot be proposed at the moment. *Dactylaria haptospora* Drechsler (1940), however, does not seem to belong to any of the genera discussed above because of its peculiar sporogenous cells as well as the unusual morphology of its conidia; ultimately it may be necessary to propose a new genus for it.

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KOSTERMANSINDA RIFAI GENUS NOVUM HYPHOMYCETARUM

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SUMMARY

The conidial development of *Sclerographium magnum* Boedijn is described and illustrated; based on this species the new aleuriosporous genus *Kostermansinda* Rifai is proposed.

The morphology of the conidiophores and conidia of *Sclerographium aterrimum* Berk., the type species of the stilbaceous genus *Sclerographium* Berk., was described and illustrated in details by Hughes (1951). The murif orm conidia of this species are radulaspores because they arise blastogenously and produced on numerous small denticles on the somewhat dilated apices of the fasciculated conidiophores, which during the process of the conidial development elongate slightly by subapical proliferations. Therefore this genus has been correctly included in the section II of Hughes' (1953a) experimental system of classification of Hyphomycetes or in the Radulasporae of Tubaki (1963), Nilsson (1964) and Rifai & Cooke (1966).

In 1960 Boedijn described *Sclerographium, magnum* Boedijn, based on a collection of a fungus which he found growing on the decaying petiole of a palm species in Bogor Botanic Garden, Java. From Boedijn's description and illustration, as well as from the results of my own observations on more recent collections of this species which were made from decaying petioles of several palm species cultivated in Bogor Botanic Garden, it is evident that *Sclerographium magnum* has murogenous conidia produced by simple conidiophores, so that it is an aleuriosporous species which consequently should be referred to the Aleuriosporae or to the section III of Hughes' system of classification. Although Boedijn (1960) was fully aware that this species was not at all related to *Sclerographium aterrimum,* he nevertheless preferred to place it in the genus *Sclerographium* because of the superficial similarity between the two species, and also because of the artificial nature of the classification of Deuteromycetes; in recent years, however, substantial evidence are available to show that the system of classification proposed by Hughes (1953a), which is based on the methods

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