

## Camarops Karst. (Sphaeriales-Boliniaceae)

With Special Regard to its European Species

J. A. NANNFELDT

Institute of Systematic Botany, University of Uppsala

### Abstract

The present paper is a critical revision of the Pyrenomycete genus *Camarops* Karst., its delimitation, species and taxonomic position. The four European species (*C. lutea*, *C. microspora*, *C. polysperma*, and *C. tubulina*), which are all rare, are treated in detail as to their occurrence. The structure of the stromata, perithecia, asci and spores is described. The genus is found to take a most isolated position within the *Sphaeriales* and is regarded as the sole member of a separate family, *Boliniaceae* Rick (syn. *Sarcostromellaceae* Boedijn), the principal features being the structure and consistency of the stromata and of the perithecial walls, the small cylindrical asci with thin, early deliquescent walls and no visible apical apparatus, the very small, flattened, straight, one-celled and brown-walled ascospores with a minute terminal germ pore and the lack of any conidial state. Generic synonyms are *Bolinia* (Nke) Sacc., *Peridoxylon* Shear, *Phaeosperma* Nke ap. Fuck., *Sarcostromella* Boedijn, and *Solenoplea* Starb. In all 14 species are listed, 9 of them are new combinations, viz. *C. amorpha* (basionym *Sarcostromella a.* Boedijn), *C. goossensii* (bas. *Peridoxylon g.* Dennis), *C. lutea* (bas. *Sphaeria l.* A. & S. ex Fr.), *C. macrocenangium* (bas. *Hypoxylon m.* Ces.), *C. ohiensis* (bas. *Hypoxylon o.* Ell. & Ev.), *C. petersii* (bas. *Hypoxylon p.* Ell. & Ev.), *C. scleroderma* (bas. *Hypoxylon s.* Mont.), *C. spathulata* (bas. *Xylaria s.* B. & Br.), and *C. ustulinoides* (bas. *Nummularia u.* P. Henn.). Excluded from the genus are the following taxa: — *C. ferruginea* (Nke) Shear, *C. nigricans* Chevangeon, *C. quercicola* Berk. & Cke, and *C. tubulina* var. *gigas* (Phill. & Plowr.) Shear.

### Contents

The delimitation and affinity of the genus	336
Asci and spore discharge, p. 339. Spores, p. 340. Paraphyses and periphyses, p. 341. Perithecia, p. 342. Stromata, p. 344. Conclusions, p. 349.	
The European species	350
<i>C. tubulina</i> , p. 350. <i>C. polysperma</i> , p. 351. <i>C. lutea</i> , p. 354. [ <i>Nummularia gigas</i> , p. 355.] <i>C. microspora</i> , p. 356. Distinctive features of the European species, p. 356.	
Review of the non-European species	358
<i>Sphaeria Pugillus</i> , p. 358. <i>Hypoxylon Petersii</i> , p. 359. [ <i>C. quercicola</i> , p. 359.] <i>H. ohiense</i> and <i>H. atrovirens</i> , p. 359. <i>H. Scleroderma</i> , p. 360. <i>Nummularia ustulinoides</i> , p. 360. <i>Solenoplea peltata</i> , p. 361. <i>H. macrocenangium</i> , p. 361. <i>Xylaria spathulata</i> and the other "xylarioid" Old World species, p. 361. [ <i>C. nigricans</i> , p. 362.]	

Synopsis of the species: nomenclature, distribution and specimens studied	362
Excluded taxa, p. 371.	
Acknowledgements	371
References	372
Addenda	375

This study of the four Swedish (= European) species of *Camarops* (all very characteristic and rare) was prompted by beautifully developed fresh specimens from near Uppsala of a large *Hypoxylon*-like Pyrenomycete, which Dr John Eriksson and Mr Stellan Sunhede brought to me for determination in Oct. 1968 and in which I recognized *Camarops hypoxylodes* Karst. In the following summer, in a locality in Gävle thoroughly scrutinized by me for at least 30 years, I myself found a second *Camarops*, viz. *C. microspora* (Karst.) Shear, and in the same autumn I detected in UPS that a third species, *C. lutea* (A. & S. ex Fr.) (det. L. Holm), had been collected in 1965 in the Uppsala region by N. Lundqvist. Only of the fourth species, *C. tubulina* (A. & S. ex Fr.) Shear, is there no recent Swedish find.

Due to the rarity of the species, they are imperfectly known. Many inexactitudes are to be found in the literature, and the taxonomical position of the genus has remained doubtful. An intended short notice thus grew gradually into the present critical revision, in which I found it necessary to pay attention to the non-European species as well. I have attempted to treat the European finds as fully as possible, but as such may hide in the herbaria under the most unexpected names, I have certainly missed some. The number of consulted herbaria is also rather limited.

### The Delimitation and Affinity of the Genus

The *Xylaria-Hypoxylon*-group (*Xylariaceae-Hypoxyleae* + *-Xylarieae* sensu Munk 1957) within the true (ascohymenial or unitunicate) Pyrenomycetes is taxonomically very difficult, but the European species are on the whole easily recognized and well circumscribed. Although the size and shape of the spores afford excellent specific characters the microscopical features have been considered too uniform to be used for a natural grouping of the species, and the genera are based mainly on the shape and structure of the stromata and the arrangement of the perithecia within the stroma. Most species with pluriperithecial, sessile, applanate to pulvinate to subglobose stromata are placed in the genus *Hypoxylon* Bull. ex Grev. In its present scope *Hypoxylon* is certainly heterogeneous, comp. e.g. Munk (1957, p. 130), who aptly characterizes it "as a refuse-heap for species which cannot be placed in the other 'classic' genera of the tribus". A number of species aberrant in one respect or other have been described as separate genera but these "satellite" genera are treated variously by different students.

The four species listed in the introduction deviate markedly from each other as to

the shape of the stromata and the shape and arrangement of the perithecia but agree very closely *inter se* as to asci and spores, as will be shown below. Monotypical genera have been based on three of them. Oldest is *Phaeosperma* Nke ap. Fuck. (1870; non *Phaiosperma* Raf. 1836 nec *Phaeosperma* (Sacc.) Trav. 1906) based on *Ph. helvetica* Fuck. (syn.: *Anthostoma microsporum* Karst.). Next in seniority is *Camarops* Karst. (1873), based on *C. hypoxyloides* Karst. (syn.: *C. polysperma* (Mont.) J. H. Mill.). The third is *Bolinia* (Nke) Sacc. (1882; basionym: *Hypoxylon* sect. *Bolinia* Nke 1867), based on *Sphaeria Tubulina* A. & S. ex Fr. A fourth genus, *Solenoplea* Starb. (1901), is based on the South American *S. microspora* Starb., which species has proved to be conspecific to *C. polysperma*.

The first to realize the close affinity between all these genera and to unite them was Shear (1938). Without giving any reason he chose *Camarops* as the name for the combined genus, and this has been accepted by all subsequent authors. As *Phaeosperma* Nke ap. Fuck., the oldest name, must be regarded as a variant spelling of *Phaiosperma* Raf. (1836), it becomes a younger homonym, unavailable for Shear's genus.

In his genus Shear also included not only *Sph. lutea* and an exclusively North American species (*Hypoxylon ohiense* Ell. & Ev., syn.: *H. atroviride* Ell. & Ev.), both of which he considered as indistinguishable from *C. tubulina* but also *Solenoplea peltata* Lloyd and *Anthostoma ferrugineum* Nke. The *Solenoplea* is a true *Camarops* (comp. p. 361), but the very description of the *Anthostoma* (with *i.a.* relatively large spores) calls the correctness of its transfer into question. The type specimen (now in B) shows clearly that it has no affinity to *Camarops* but that it is no true *Anthostoma* either. It may be closely related to *Endoxyla operculata* (A. & S. ex Fr.) Fuck. (syn.: *Sph. parallela* Fr.) as surmised by Nitschke (1867, p. 119) himself.

Two years later, Shear (1940) added the North American *Sph. Pugillus* Schw. to the genus, and as will be shown below (p. 359), one more North American species (*Hypoxylon Petersii* B. & C.) belongs here. Because of a curious "peridium" surrounding the stroma, Shear had in 1923 based a new genus (*Peridoxylon*) on it, which means the fifth monotypical genus based on a member of *Camarops*. When establishing his new genus, Shear discussed its possible relation to *Sph. lutea* but evidently considered the "peridium" as a feature of such high taxonomic value that he did not think of *Peridoxylon* when later remodelling *Camarops*. The true affinity of this species was clear to Lloyd (1924*b*, p. 1283), who transferred it to *Bolinia*, and in this he was followed by Rick (1931, p. 67) and Miller (1961, p. 140). Arx & Müller (1954, p. 339) synonymized *Peridoxylon* with *Sarcoxydon* Cke, which genus in their sense becomes extremely heterogeneous.

Shear made no attempt to formulate the characteristics of the enlarged genus but concluded after discussing the species concerned: "In fact the similarity in stroma, perithecia, paraphyses, and spores might almost lead one to regard them as one polymorphic species, if differences of any importance were insisted on." (1938, p.

592). This is a clear overstatement, caused by the insufficient, mostly poor and old material seen by him.

Shear's delimitation of the genus was accepted by Munk (1953, 1957) and also by Arx & Müller (1954, pp. 335–337), but Dennis (1960, 1968) and Miller (1961, p. 6) thought it possible to keep *Camarops* and *Bolinia* as two different genera, characterizing the former by monostichous perithecia and the latter by polystichous.

In 1959 Boedijn described a new genus (*Sarcostromella*) for two xylarioid species from the East tropics (*Xylaria polysticha* Penz. & Sacc. and a nova species) and established even a new family (*Sarcostromellaceae*) for it and another monotypical, also new genus (*Pseudoxylaria* based on *Sph. nigripes* Klotzsch). Although it has not been possible for me to get any relevant specimens for study, Boedijn's descriptions and illustrations are so clear as to leave no doubt that *Sarcostromella* is the sixth genus based on species of *Camarops*. Dennis (1961, pp. 149–150) was on the same line but reached only half-way, when he synonymized *Sarcostromella* with *Peridoxylon*.

In a series of papers Martin (1967–1970) has treated the *Xylariaceae*, especially their South African members. A considerable number were cultured, *inter alia* *C. polysperma*, and their cultural characters described. He has proposed numerous changes in the generic delimitations, but has missed the special features of *Camarops* transferring all species mentioned by him (*hypoxyloides*, *lutea*, *petersii*, *polysperma*, and *tubulina*) to *Nummulariola* Howe (= *Nummularia* Tul., non Gilib.)

The affinities of the genus are very obscure. I soon became convinced that its resemblance to *Hypoxylon* is only superficial. If the family *Xylariaceae* is taken in the broad and loose sense of e.g. Arx & Müller (1954) with brown unicellular spores as the main criterion, then *Camarops* has its place there, of course. The previous year (1953) Munk had tried, by taking into consideration the structure of the perithecial wall, the apical apparatus of the ascus, and the germ slit of the spores etc., to give *Xylariaceae* a narrower and more natural circumscription. He kept *Camarops* in the family but declared it to give "a perfect transition to *Diatrypaeae*" (p. 61) and to "represent a fine transitory type. It may be placed arbitrarily in any of the families" (pp. 28–29). Later, he (Munk 1957) united these two families into one (*Xylariaceae*) recognizing seven tribes, of which the first five (*Clypeosphaerieae*, *Hypocopreae*, *Hypoxyleae*, *Xylarieae* and *Quaternarieae*) correspond to the typical *Xylariaceae* of his previous paper and the seventh (*Diatrypeae*) to his earlier *Diatrypaeae*. The sixth is *Camaropeae* with its single genus: "*Camarops* cannot be included in *Hypoxyleae* on account of the long ostioles, the small, longstipitate asci, and the very small, smoky greyish spores. — The genus shows a certain affinity to *Diatrypeae* in the occasionally flattened shape of the spores." (p. 149).

Ove Eriksson (1966) gave *Xylariaceae* a circumscription still narrower and more precise than Munk's of 1953. If this is accepted, *Camarops* clearly falls outside.

In *Camarops*, features now considered of fundamental importance, such as the

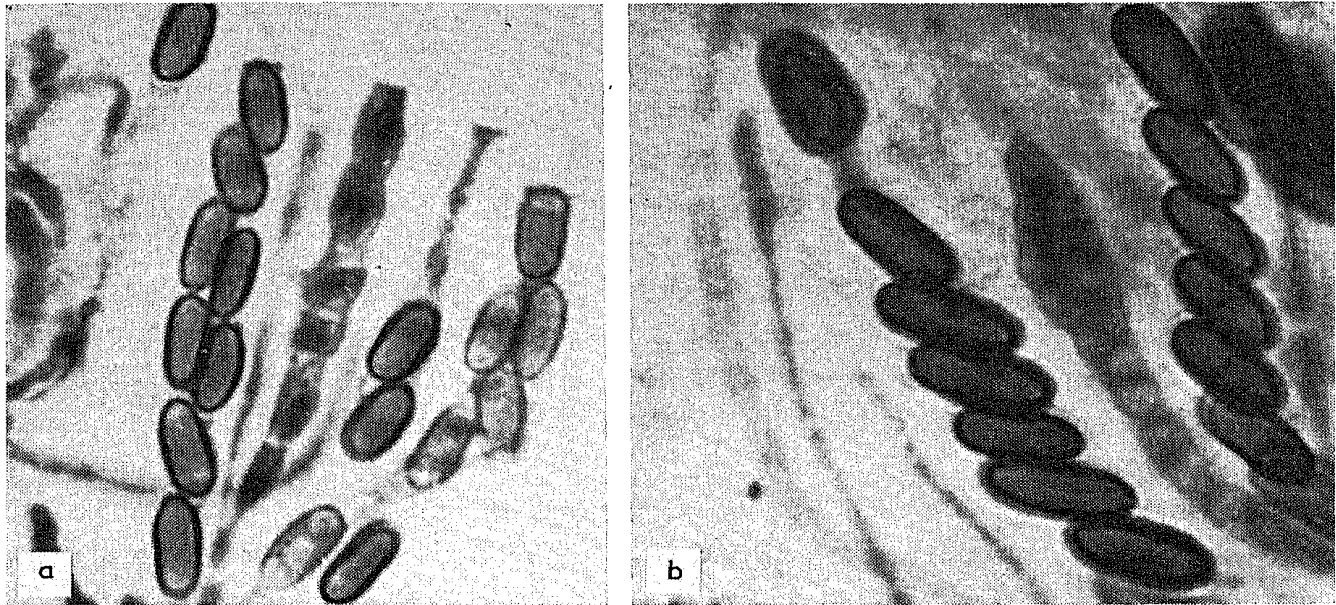


Fig. 1. Asci and spores of (a) *C. polysperma* (IMI 15158) and (b) *C. lutea* (IMI 10325). In (c) a young ascus with the "subapical chamber" is seen.  $\times$  ca. 1 800.

apical apparatus of the ascus as well as the presence or absence of germ-slits or germ-pores in the spores have been inadequately known.

#### *Asci and Spore Discharge*

Rehm (1901, p. 142) found the asci of his "*Nummularia* ? *Cycliscum* Mont." (i.e. *C. ustulinoides*) to be I— and Engelke (1909, p. 180) found the same in his "*Nummularia lutea*" (i.e. *C. polysperma*), which Höhnelt (1923, p. 99) confirmed. Munk (1953, p. 62; 1957, p. 149) described the asci of *C. microspora* with "a very delicate apical thickening" and those of *C. lutea* with "a very delicate apical ring". The asci of *C. "tubulina"* possess according to Arx & Müller (1954, p. 336)<sup>1</sup> "eine zarte und dünne, am Scheitel etwas verdickte und mit einer Apikalplatte versehene Membran" and Martin (1967, p. 217) places *Camarops*, *Bolinia* and *Peridoxylon* in a group of genera, in which the amyloid ascus plug is broader than high. Svrček (1969, p. 120) states the asci of *C. tubulina* to be very thin-walled and non-amyloid.

In spite of prolonged studies and the use of different embedding media (water, ammonia solution and lactophenol) combined with various stains, my results are very poor. However, it seems clear that the ascus has no apical ring, neither amyloid nor chitinoid nor strongly refractive, and that the top is rather thin-walled. During some early phases a long "apical dome" is developed, leaving only a very narrow plasma-filled lumen that apically enlarges into an obconical "subapical chamber" (Fig. 1).

The dark slime protruding through the ostiola and eventually covering the whole

<sup>1</sup> Their drawing shows that they can hardly have studied the true *C. tubulina*, but is too schematical for exact determination. Dr Müller has kindly informed me that, unfortunately, the authors no longer remember which material they used.

ostiolate part of the stroma has been described repeatedly. It originates from the early deliquescent paraphyses and asci and gets its colour from the embedded dark-walled spores. The mode of spore dispersal is thus clear. The ascus has lost its gun function. As is well known, the same phenomenon is to be found in several groups of Pyrenomycetes and has evidently evolved repeatedly and independently. Good examples are to be found in, *inter alia*, *Hypoxylon*, where I have studied especially *H. serpens* (Pers. ex Fr.) Kickx. In this the apical apparatus of the ascus ("the xylariaceous plug")—although it has lost its function—remains well developed and persistent, floating intact amongst the liberated spores in the protruding perithecial slime. In *Camarops*, on the contrary, the whole ascus wall is dissolved and no traces of it can be found in the slime.

These, mostly negative, findings give no clue to the phylogeny of the genus but strengthen the view that it is not primitive but highly derived. The apical apparatus of the ascus is so strongly reduced that it cannot be traced back to a particular "normal" type.

### *Spores*

Even the first microscopists that studied members of this genus (Currey 1857, p. 268; Nitschke 1867, pp. 27, 59; Fuckel 1870, p. 224 and Karsten 1873, pp. 53–54) registered the small brown-walled biguttate spores and the presence of a median plasmatic band simulating a septum and by some authors also mistaken for such. The flattening of the spores has been observed by several authors. In their generic description, Arx & Müller (1954) mention "oft seitlich zusammengedrückte ... Ascosporen", and in his discussion of the taxonomical position of the genus, Munk (1957, p. 149) alludes to "the occasionally flattened shape of the spores".

The present author has found the spores of all species to be flattened, but to a varying degree, sometimes so strongly as to be almost "biscuit-shaped". Within the ascus the spores often arrange themselves in an oblique row with the flat sides touching each other. Seen in edge view the spores appear almost cylindrical, but when viewed from the flat side they appear ellipsoid or ovoid and imbricate.

Germ pores and germ slits are features unrecorded by the older microscopists, and in small spores they have remained unnoticed until rather recently, Munk (1953, p. 53) states about *C. microspora*: "germinating furrow probably present but rarely clearly visible". Arx & Müller (1954, p. 335) are more definite in their generic description: "mit einem Keimspalt versehenen Ascosporen". In 1957, Munk repeated this phrase about *C. microspora* but declared about *C. lutea*: "no germ slit observed" (p. 151).

The *Camarops* spores have generally been described as ellipsoid, oblong or ovate with rounded ends, but Boedijn (1959) described the spores of his two species of *Sarcostromella* as "almond-shaped with a minute germ pore at the pointed end" and Maas Geesteranus (1968, p. 121) found in *C. polysperma* the basal (proximal) end of

the spores to be acuminate. Svrček (1969, p. 121) described the spores of *C. tubulina* to possess "an indistinct germ pore". Martin (1969b, p. 269) keyed out all the species of *Camarops* mentioned by him under the heading "spores obconic, proximal end narrow", except *C. hypoxylodes* (evidently known to him only from descriptions) which got its place under the heading "spores with both ends similar, or if different then spores elliptic".

I have been able to establish (1) that one end of the spore always has a minute (ca.  $\frac{1}{4}$   $\mu$  in diam.) terminal germ pore, so minute that, even with oil immersion, it may be difficult to discern, (2) that the same end is slightly acuminate in comparison with the opposite and (3) that the porate half of the spore is as a rule somewhat narrower than the other half, the outline of the flattened side thus being  $\pm$  ovate or almond-shaped. The spores are straight both in plan view and edge view and thus possess two planes of symmetry perpendicular to each other. This too is an important difference from *Xylariaceae* and *Diatrypaceae*. The spores are as a rule so arranged in the ascus that the porate end becomes the proximal (basal), but the inverse position is not too rare, especially in the uppermost or lowermost spore.

The ability or inability to form "deBary bubbles" (Dodge 1957) is a sporal character that may have some taxonomical importance. It is thus worth recording that such bubbles are not seen in *Camarops* spores, whereas they are conspicuous and common in *Hypoxylon* (see e.g. the plates in Miller 1961). The thought cannot be dismissed, however, that their absence from *Camarops* may be due simply to the smallness of the spores.

The facts presented above exclude, in my opinion, the possibility of a close relationship with *Xylariaceae* and/or *Diatrypaceae* and thus also of *Camarops* being transitory between these families; neither do they point at any other known taxon.

The spores show of course some variation in size, shape and colour within each perithecium and even within a single ascus. It should be observed that the spores take their definite colour relatively late (often outside the ascus). Noteworthy is also that the end spores in an ascus (both the distal and the proximal) are often markedly prolonged and that, within an ascus with a reduced number of spores, one or more of them may be abnormally large (perhaps containing two nuclei). On the other hand, differences between various collections of the same species are mostly not discernible or hardly so. The differences between the existing species are so small that as a rule single spores remain indeterminable, but almost any microscopical slide showing a reasonable number of spores can be determined exclusively on them.

For spore descriptions of the European species see p. 357 and for such of the non-European see under each separate species.

#### *Paraphyses and Periphyses*

Shear (1938, p. 392) described as characteristic of the genus the presence in the perithecial slime of peculiar filaments (paraphyses ?) showing "intermittent sections of

homogeneous protoplasm separated by apparently shrunken empty sections not easily demonstrated except in very thin, crushed mounts with an oil immersion objective". No other students have described similar structures, and I have searched for them in vain. Paraphyses do exist, they exceed the asci in length, are very thin-walled, relatively thick, often as frizzed, and dissolve very early, and so several descriptions deny their existence.

The inside of the long perithecial necks are clad with a dense layer of periphyses, rather stiff, straight and persistent, filiform (ca.  $2\ \mu$  in diam.) with strong walls and narrow lumina, septate with the distal cell ca.  $10\text{--}15\ \mu$  long and the more proximal ones shorter.

### *Perithecia*

The unusual size and shape of the perithecia in some species have always attracted attention.

Most peculiar is *C. polysperma*, where the palisade of closely packed, almost tubiform (or by mutual pressure prismatical) perithecia, all of the same size, simulate the tube layer of a polypore (Fig. 3 *b*), as already Montagne (1842, p. 346) remarked. The perithecial body is  $5\text{--}8\ \text{mm}$  long when full-grown and  $0.5\text{--}0.6\ \text{mm}$  in diam., upwards rather abruptly constricted into the narrow cylindrical perithecial neck (outer diam ca.  $160\text{--}170\ \mu$ , inner ca.  $30\ \mu$ ) and downwards for ca.  $0.5\ \text{mm}$  conically attenuated. The perithecia seem to develop simultaneously and the bodies appear to continue stretching for a rather long period, until they touch the bottom of the stroma. The inside of the body is all over clad with asci and paraphyses.

The largest perithecia are those of *C. tubulina*. Their bodies are subglobose, ellipsoidal or usually ovoid, often deformed by mutual pressure and upwards gradually attenuated into the neck (Fig. 2 *a*). The bodies may reach a length of  $5\text{--}6\ \text{mm}$  and (in the broadest part) a breadth of  $1.0\text{--}1.6\ \text{mm}$ . The bodies are situated at different heights but a good part of them always reaches down to the bottom of the stroma. It seems probable that the different perithecia do not grow simultaneously as in the preceding species and that successively more and more perithecial bodies reach the bottom of the stroma. The successive growth combined with the shape of the perithecia and the mutual pressure, cause a longitudinal section through a stroma to look most complicated and make the controversy quite understandable whether the perithecia are monostichous or polystichous (comp. p. 350).

Only a third example will be described here, viz. *C. lutea*. In this the perithecia are clearly polystichous and remain so. The perithecial necks are accordingly of very different lengths. The perithecial bodies are relatively small, subglobose or ovoid, often deformed by mutual pressure, ca.  $1 \times 0.5\ \text{mm}$ , upwards attenuated into the cylindrical necks. The perithecia seem to develop successively. Not infrequently the basal part of the perithecium is transformed into a number of bladderlike protuberances, giving a single perithecium the appearance of a bunch of perithecia debouching



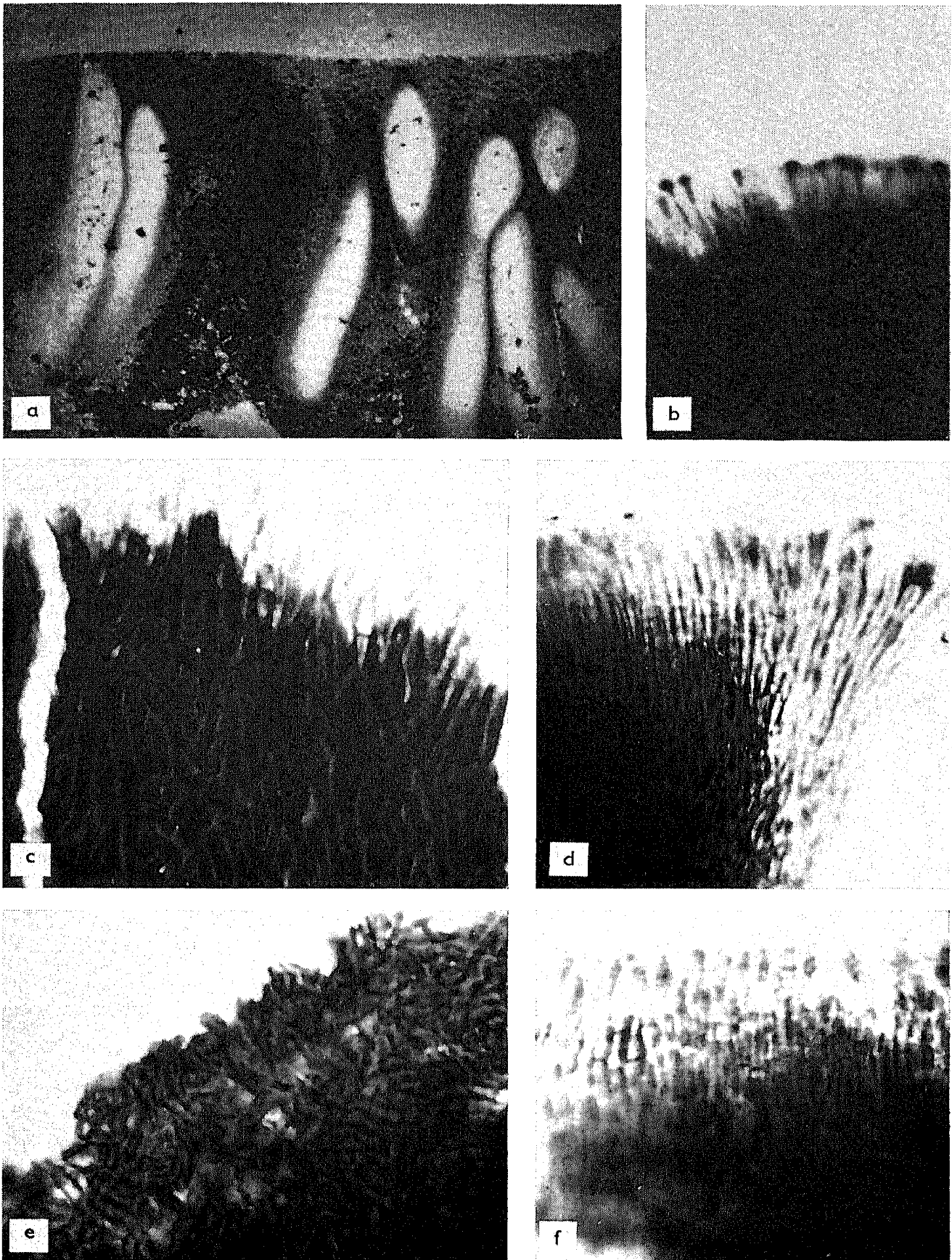


Fig. 2. (a) Section of upper part of perithecial layer of *C. tubulina* (PR 647008). (b) Ectostromatal palisade of *C. polysperma* (Eriksson & Sunhede), showing terminal cells with plasmafilled tops. (c) Ectostroma of the same. (d) Palisade and perithecial mouth of *C. petersii* (Parmasto 16303). (e) Entostroma of the same. (f) Palisade of the same. *a*,  $\times$  ca. 50. *b-f*,  $\times$  ca. 700.

into a common neck. An alternative explanation would of course be that the necks of a number of originally separate perithecia have coalesced into one, but this seems less probable.

In all species the perithecial bodies can easily be freed from the entostroma, only faint remnants of it remain attached to them, but the necks are inseparably connected with the ectostroma.

The texture of the perithecial wall is membranaceous, tough and elastic, composed of several layers of thick-walled, narrow hyphae. The inner layers are hyaline, and the outer layers are brown-walled to a varying degree. In *C. polysperma* with its tubiform perithecia the hyphae run parallel forming a typical "textura oblita" but in species with  $\pm$ bulging perithecia the hyphae are more irregularly interwoven tending to a "textura intricata" or "epidermoidea".

### *Stromata*

As to shape and size of the stromata *Camarops* shows a pattern of variation analogous to that of *Xylariaceae*. In *C. polysperma*, *C. ustulinoides* and *C. tubulina* the stromata look like those of a large applanate or flat-pulvinate *Hypoxylon* (Fig. 3). In the two former species they often show a tendency to expand horizontally beyond their area of attachment. This tendency is more marked in, e.g., *C. ohioensis*, and one species (*C. peltata*) has been characterized mainly by its button-shaped or peltate stromata. *C. petersii* is an extreme in this series. Small stromata are pulvinate and attached by almost the whole under-surface, but larger stromata become broadly turbinate and may even take the shape of a large cup-fungus with flat or slightly convex hymenium. Thus, Shear (1923, p. 128) compares the stromata of his Virginia specimens with the apothecia of *Sarcosoma rufum* (Schw.) (= *Galiella rufa* (Schw.) Nannf. & Korf). A further unique feature of this species is the peridium (comp. p. 359) that covers young stromata but soon ruptures into fragments and falls off except for a low (< 1 mm) collar surrounding the ostiolate "disc" and—here and there—some irregular flakes (a few mm across) still attached to the collar. In the largest specimen seen by me (Parmasto 15303) the dry stroma measures ca. 6 × 3.5 cm and the area of attachment is ca. 1.5 × 0.5 cm. *C. macrocenangium* shows also a distinct rim surrounding the ostiolate disc, perhaps homologous to the collar in *C. petersii*. A similar rim is present in *C. peltata* and can also be observed in *C. polysperma* and *C. ustulinoides*.

Sections through stromata of all these species show a sharp differentiation between a superficial "ectostroma" perforated by the perithecial necks and an inner "entostroma", in which the perithecial bodies are embedded. The ectostroma is very firm and compact, whereas the entostroma is much looser. The ectostroma flakes easily off from the entostroma, which is especially conspicuous in *C. polysperma*. The stroma is mostly described as very hard or even as brittle, but this is true only with regard to dry specimens. Shear (1923, p. 128) studying *C. petersii* characterizes its stroma as "fleshy-gelatinous when fresh, very elastic under pressure, shrinking much

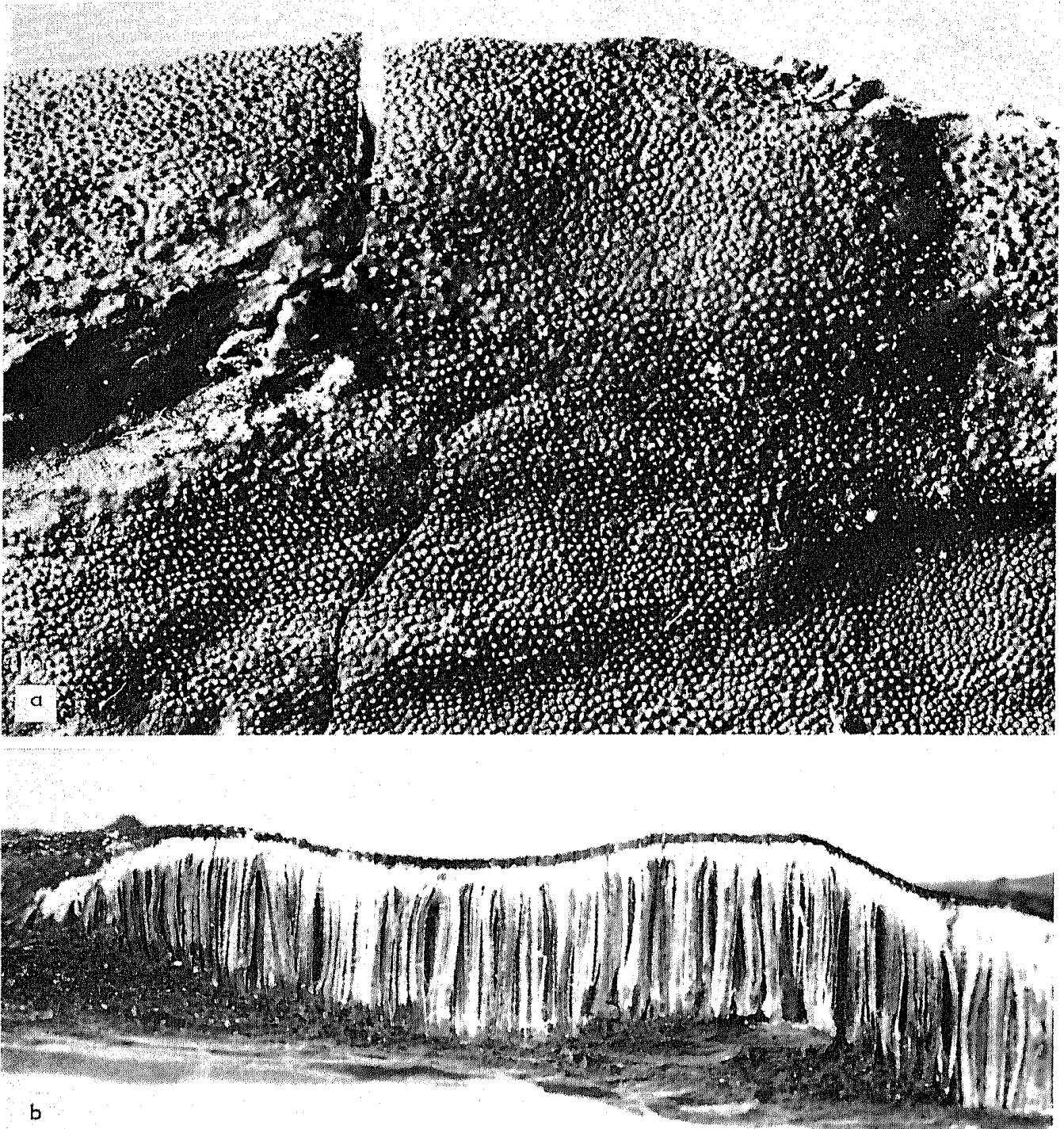


Fig. 3. Surface view (a) and section (b) of stroma of *C. polysperma* (Eriksson & Sunhede). Photo Helmuth Rasper.  $\times$  ca. 3.

in drying and becoming at first coriaceous and finally quite hard". This species is extreme in the amount of stromatic tissue beneath the bottoms of the perithecia. The thickness of this basal tissue may be the cause of the high elasticity, which is unknown from the other species. Herbarium specimens of all species absorb water eagerly, the stromata soften then, take a leathery or fleshy consistency and become easy to cut, not even senescent stromata showing the slightest trace of "carbonization".

I have studied the anatomy of the stromata in greatest detail in *C. polysperma* but the above species all follow the same scheme and the differences between them are only quantitative. Both ectostroma and entostroma consist of rather stout hyphae (4–5  $\mu$  in diam.) with narrow lumina and thick walls of a characteristic, pure and bright brown. In the entostroma they form a loose “textura intricata”, which as a result of the growing of the perithecial bodies and the ageing of the stroma becomes torn and crushed and dries up. *C. polysperma* is the extreme with its very long tubiform perithecial bodies that eventually reach right down to the bottom of the stroma and in which the entostromatal tissue becomes crumbled almost into powder. In other species a thinner or thicker bottom layer may persist and the interperithecial tissue remain more or less coherent.

The firm and compact ectostroma shows also a “textura intricata” that outwards changes into a palisade-like “textura oblita”, which outwards terminates in hyaline cell-rows with at least the terminal cell partly thin-walled and plasma-filled (Fig. 2 b–f). This apical cell may simulate a conidium but is permanently attached to the stroma. By the way, it should be noted that conidial formation is unknown within the genus and that also in culture *C. polysperma* and *C. lutea* fail to produce conidia (Chesters 1960, pp. 108–109: two English isolates of the former and “very numerous” of the latter, published under the erroneous name of *C. tubulina*; Martin 1969 b, p. 299: one South African isolate of the former).

In *C. polysperma* the hyaline top layer is 10–15  $\mu$  thick and the transitional zone beneath it ca. 10  $\mu$ . The terminal cell is 10–15  $\mu$  long and ca. 3  $\mu$  in diam., its lower part is thick-walled with only a narrow, filiform lumen, but towards the apex the wall thins out rather abruptly providing the lumen with a globose head. The change from brown to hyaline walls does not coincide with the septation, the proximal part of the apical cell sometimes being brown-walled or the apical part of the subapical cell hyaline-walled.

In *C. petersii* both the top layer and the transitional zone are slightly thicker.

In *C. tubulina* the early stages of stroma formation have been described by Svrček (1969, pp. 119–120) and are well shown by some samples in PR. The surface of the rotten wood becomes covered by felt-like, pale chocolate-brown hyphal carpets, not dissimilar to certain species of *Tomentella*. Within these carpets the definitive stromata form. Their surface is chocolate-brown and turns then into black. Anatomically they agree exactly with the stromata of the preceding species with entostroma and ectostroma, a palisade-like hyaline top-layer etc. The *Tomentella*-like carpet in this right from the beginning superficial species may correspond to the peridium- or rim-forming tissue in the preceding, erumpent species.

Each of the remaining four species studied shows a stroma-type *sui generis*, and if *Camarops* were to be subdivided, the natural arrangement would be to combine all the

species treated above into one group and to treat the following species as four coordinated groups.

In *C. scleroderma* the stromata are subglobose, pyriform or broadly clavate, resembling those of a stout *Xylaria* or a slender substipitate *Daldinia*. When dry they reach a height of ca. 2.5 cm and a maximum breadth of ca. 2 cm and their area of attachment is ca. 0.5 cm in diam. When sectioned, a young stroma shows a pale-brown spongy core surrounded by a thick (2–5 mm) firm dark wall, in which the polystichous perithecia are embedded. Old stromata show instead of the core an empty cavity. The surface is black with a tinge of copper-red, uneven and dotted by the protruding perithecial necks. In sections the entostroma is bright copper-red and coherent with the blackish-brown entostroma. The ectostroma does not flake off so easily as in *C. polysperma* and allies, and if a superficial flake breaks away, the rupture occurs within the ectostroma.

The stroma is of a dense "textura intricata" formed by the same kind of brown-walled hyphae as in the preceding species. The difference between entostroma and ectostroma is rather slight. Outwards there is no palisade. The hyphae run in all directions, but if a main direction can be discerned, it is rather parallel to the surface than perpendicular. The surface itself is formed by a loose weft of narrow hyphae with thick hyaline walls and the core by similar, loosely and intricately interwoven hyphae. The protruding perithecial necks form above the surface of the stroma hyaline cylinders (ca. 50–75  $\mu$  in diam. and up to 250  $\mu$  high), coated by a layer (ca. 50  $\mu$  thick) of the same structure as the surface of the stroma.

It remains to be studied whether the other "xylarioid" species (*C. amorpha*, *C. goossensii* and *C. spathulata*) show the same structure.

In *C. lutea* the stromata form within the wood and burst forth as cushions with steep bulging sides, to which pieces of wood as a rule adhere, and a flattened or even slightly concave, circular or broadly elliptic ostiolate disc, only rarely >1 cm in length. The young discs are covered by a grey powder consisting of cells of wood, broken hyphae and microscopical crystals. The ostiola appear as black spots and form eventually low warts.

Unlike the stromata of the preceding species those of *C. lutea* enclose in their outer parts numerous fragments of wood (especially pieces of vessels). As a consequence it is almost impossible to get satisfactory sections. It can, however, be clearly seen that the hyphae of the stroma are of the same general type as in the other species and that no palisade layer is formed.

The stromata of *C. microspora* develop within the bark, raise the outer layers and remain covered by them except for small ostiolate discs (mostly only a few mm in diam.), protruding through cracks. In *Alnus incana*, the principal host, they are grouped into irregularly raised round patches, ca. 5 cm in diam. (Fig. 4). I cannot decide





Fig. 4. *C. microspora* on *Alnus incana* (Nannfeldt 20581).  $\times$  ca. 1.5.

whether such a patch is formed by one stroma producing several discs or by confluence of a number of small stromata (each with a single disc), but the descriptions by Fuckel, Karsten and Munk are formulated according to the latter alternative. On the other hand, the regular shape and size of the patches intimate their origin from a single mycelium. The appearance of the patches is strongly dependent upon the structure of the bark. The fungus looks thus very different in *Betula* with its peculiar smooth and very tough outer bark, which cracks only exactly transversally. Through such cracks the discs protrude, often remaining almost hidden by the margins of the crack. They are often compressed and elongated in the direction of the crack. The swellings caused by the stromata are very slight, and the most conspicuous sign of the presence of the fungus may be the staining of the surroundings from the protruding perithecial slime.

Remnants of bark are often found adhering to the young discs and cover them partly. The ostiola are at first barely discernible. The perithecial necks (some tens per disc) prolong gradually, and eventually distinct cones (up to 0.5 mm high) are formed. Lower and smaller cones are as a rule to be found intermingled with larger, which strengthens the view expressed by Munk (1953, p. 62; 1957, p. 149) that new perithecia arise successively.

Also in this species stroma and bark tissue are firmly coalesced. Hyphae penetrate intercellularly the innermost layer(s) of the covering bark. Single cork-cells or groups of such are also enclosed in the outer parts of the stroma. The stroma consists of the

usual kind of hyphae, although stouter (up to 10  $\mu$  in diam.) and with thinner walls (ca. 1  $\mu$ ).

*C. pugillus*, in contrast to all its congeners, has small stromata, deeply sunken in very rotten, as a rule rather soft wood. The stromatal bodies are subglobose or ellipsoidal with the long axis parallel to the fibres of the wood, 1.5–3.0  $\times$  1.5–2.0  $\times$  1.5–2.0 mm. Towards the surface of the substrate the body is continued by a cylindrical, usually compressed neck (ca. 0.6–0.7 mm thick and up to 2 mm long) crowned by slightly divergent finger-like cylinders with a hemispherical cap, perforated by an apical ostiolum. The “fingers” are mostly 3–5 in number, looking together with the stromatal neck “ut digiti pugilli subclausi” (hence the specific epithet), but the largest stromata may carry as much as ca. 15 “fingers”. Horizontal sections through even the smallest stromata show at least 15–20 perithecial cavities, thus widely surpassing the “fingers” in number, but the number of tubes within the stromatal neck seems to equal (at least approximately) that of the “fingers”, and the “fingers” contain only one tube (= perithecial neck) each ending in the ostiolum. The explanation may be the same as in *C. lutea*: the perithecial bodies are “branched” and make a single perithecium look like a bunch of perithecia with a common neck.

The stromata are formed by such brown- and thick-walled hyphae as are typical of the genus. At least round the ostiola there is a distinct palisade. A detailed study of the structure and development would be most interesting but can only be undertaken by a student having access to abundant fresh material.

### Conclusions

In the preceding paragraphs I have tried to show that the members of *Camarops* are very homogeneous in all fundamentally (taxonomically and phylogenetically) important characters and that the specific differences concern only more “superficial” features such as size, shape and position of stromata and perithecia although these differences are very conspicuous. Several of the “fundamental” characters are very fixed and most striking, assigning an isolated position to the genus and giving the impression that it represents a special, both old and highly derived evolutionary branch within Sphaeriales, but not one of them gives any clue to the relationship of the genus.

If we aim at getting natural, phylogenetically coherent families also in mycology, we shall have to accept such of very different scope, even such comprising a single small genus. *Camarops* is clearly such a case. According to the *International Code* the correct name of its family becomes *Boliniaceae* Rick<sup>1</sup> (1931) in spite of the facts that *Bolinia* is merged into *Camarops* and that the definition and the scope of the family have been totally changed. The definition of the remodelled family is necessarily

<sup>1</sup> This name is lacking in the list of family names by Cooke & Hawksworth (1970).

that of its sole genus but special emphasis should be put on the structure of the spores, of the perithecial wall and of the stroma.

“*Boliniaceae* familia nova. — Familia haec nova genera illa omnia [*i.e.* *Bolinia*, *Paucithecium* Lloyd, *Penzigia* Sacc., *Poronia* Willd. ex Fr., *Solenoplea*] complectitur, quae hucusque Xylariaceis et Hypoxylariaceis adscribebantur, ab eis tamen stromate interno et externo non carbonaceo distinguuntur.” Thus begins the paper by Rick (1931, pp. 65–71), which undoubtedly means a valid publication of the family in spite of some curious terminological inconsistencies. The title of the paper runs “Monographia Bolinearum [sic!] Riograndensium”, and the concluding “Clavis analytica Xylariacearum” shows the three subgroups, *Xylarieae*, *Hypoxyleae* and *Bolinieae*!

A second and later (1959) family name based on members of *Camarops* is *Sarcostromellaceae* Boedijn (comp. pp. 338, 362).

### The European Species

#### *C. tubulina*

*C. tubulina* is a very conspicuous species, evidently extremely rare in Europe on the whole and perhaps on the verge of extinction due to intensified silviculture.

It was originally described and illustrated as *Sphaeria Tubulina* by Albertini & Schweinitz (1805, p. 6) from “Lusatia superior” (Oberlausitz) in Silesia “in trunco paene consumto abietino (semel etiam alneo?) in sylvis opacis passim”. As far as is known, there are no specimens extant, but the illustrations and the excellent, (for its time) unusually detailed and instructive description leave no doubt about its identity. They described, however, the perithecia much too large ( $3-5 \times 1-1\frac{1}{2}$ ”) but their plate is more correct on this point.

Fries (1816, pp. 140–141) detected the same species in the south of Sweden (“rather rare; found on dead spruce stumps in moist places in Bökeberg Forest in Femsjö”; translated from the Swedish). The specimens distributed in *Scl. Suec.* 341 as well as another sample in UPS and a fragment from Hb. Kunze in Hb. Nitschke (B) are certainly all of this provenience.

Lloyd (1924*b*, p. 1283; 1924*c*, p. 1313) doubted the correctness of Fries’s determination after examining the Fries specimens in K. He was especially worried by the circumstance that the perithecia of *Sph. Tubulina* were illustrated as monostichous, whereas he found them to be polystichous in the Kew specimens. Nitschke (1867, p. 26), who had studied other Fries specimens, describes them expressly as monostichous. I have found the specimens in K to agree exactly with those in UPS, and from my description of the perithecia (p. 342) it is easily understood how the interpretation may vacillate between monostichous and polystichous arrangement.

A third European find was reported by Duby (1830, p. 682) “ad truncos emortuos *Aceris Pseudoplatani* in Vogesis (cl. Mougeot)”. Two specimens of this provenience labelled “*Sphaeria Tubulina* v.  $\beta$  Fries in litt.” are in K. Both are old *Hypoxylon rubiginosum* (Pers. ex Fr.) Fr.



In *Kryptogamen-Flora von Schlesien* Schroeter (1897, p. 465) reported a recent second find from Silesia, this time on silver fir ("*Picea alba*" = *Abies alba* Mill.). It should be remembered that the substrate "lignum abietinum" given by Albertini & Schweinitz according to the usage of their time means wood of (Norway) spruce (*Pinus Abies* L. = *Picea Abies* (L.) Karst.), whereas wood of silver fir (*Pinus Picea* L. = *Abies alba*) was correspondingly called "lignum piceinum".

As far as I am aware there are no more records, until Svrček (1969, p. 121) published five finds from Czechoslovakia (on *Picea* and *Abies*) and one from Ukr. S.S.R.

The recent report from Poland by Domansky et al. (1970, p. 140) is erroneous and based on *C. polysperma* (comp. p. 353).

My examination of a specimen from Hb. Nitschke (now in B) revealed unexpectedly an old, hitherto misunderstood find from Switzerland (probably from near Bern) by G. Otth. The specimen is labelled: "No. 132. *Sphaeria*—in *Polyporo*—9/58—Die Oberfläche sieht aus wie in ein *Sphaeria*-Stroma verwandelt.". This number had been studied already by Shear (1938, p. 585) and was referred by him to *C. polysperma* with some reservation ("perithecia shorter than in type, spores  $4-6.5 \times 3-4 \mu$ "). The sample seen by me lacks the inscription "*Hypoxylon pulvinatum* Otth ined." and may thus be another than that studied by Shear. That seen by me is very poor, consisting of some few pieces of ectostroma (a few mm<sup>2</sup>) and a number of mostly broken and crumbled perithecia. No substrate is present, and the alleged polypore is evidently the palisade of perithecia. The shape and size of perithecia and spores leave no doubt that *C. tubulina* (and not *C. polysperma*) is the correct determination.

Moreover, there are two old records from North America, both by Schweinitz himself, viz. from North Carolina "in trunco Juglandis" (Schweinitz 1822, p. 30; Fries 1823, p. 346) and "etiam Pennsylv. plerumque in laeso arbore adhuc vigente" (Schweinitz 1832, p. 193). In the Ellis Collection (NY) I have seen a poor fragment from "Herb. Sz", consisting of a few perithecia. These together with Ellis's written remark "has the outer aspect of *N[ummularia] Bulliardii*" are sufficient to show the fungus to be *C. polysperma*. Unfortunately, on the evidence given it cannot be decided to which find of Schweinitz' this fragment belongs.

An Alaskan find published as *H. ohiense* Ell. & Ev. (Saccardo et al. 1904, p. 34) deviates according to description, illustration and host (*Picea* sp.) from that species but could very well be *C. tubulina*. I have not seen the specimens in question (Trelease sine num).

### *C. polysperma*

*C. polysperma* is also very conspicuous and has many features in common with the preceding. It is rare and mostly "meteoric" in Europe, where its principal substrate is dead trunks of *Alnus glutinosa*. However, it is not so rare by far as *C. tubulina* and has in the last decennium been found several times, in fact so often that it can hardly be explained only by the increased number of mycologists. Could it not for some

unknown reason just now be in a period of prosperity, just as e.g. *Hypocreopsis lichenoides* (Tode ex Fr.) Seav. evidently is? It has also a much wider distribution than the preceding, being known also from the Americas and Africa.

As mentioned above, Albertini & Schweinitz (1805, p. 7) thought to have seen their *Sph. tubulina* also on *Alnus* ("semel etiam alneo?"). This find may very well have been *C. polysperma* but the first indubitable European find is a Finnish one ("paucissima specimina") by Karsten (1872, p. 53) published as *Camarops hypoxylodes*. It has not been found again in Finland, and Karsten's collection remained long unique.

The only record from Sweden is one by Höhnel (1923, p. 100) and refers to a find from Stockholm by Romell in 1893. This and two more samples from 1893 and 1896 may be from the same spot and perhaps even from the same trunk. The next Swedish find is that mentioned in the introduction. In "Vårdsätra Naturpark" (near Uppsala) J. Eriksson and St. Sunhede found on the shore of Lake Mälaren a dead, still standing trunk of *Alnus glutinosa* bearing large stromata in the best condition. In the following spring I visited the locality together with Mrs Kerstin Holm and Mrs Ragnhild Nannfeldt. Some stromata left on the trunk were seen but they were dead, decaying and very brittle. In spite of an eager search we were unable to find additional infected trunks. On a renewed inspection in the autumn of 1970 only a few moulded and insect-eaten stromata were seen, also these on the same trunk. It should also be observed that this small wood has been frequented by mycologists for more than 150 years and that a good 40 years ago Dr S. Lundell and I undertook a special study of it (comp. Lundell 1952). Just in time to be inserted in this paper a number of finds made in the spring of 1972 were communicated by Messrs. J. and M. Jeppson (Västergötland and Öland) and St. Sunhede (Västergötland and Bohuslän).

Our fungus has been found twice in Denmark, first on Sjælland and then in 1965 on Jylland. The second find was kindly communicated by Professor A. Munk, who made the comment that, during the 8 years he lived in Silkeborg, he had repeatedly visited that very locality and never seen the *Camarops*.

It is so far unknown from Norway.

In Germany it was first found in 1908 by C. Engelke (1909 as *Nummularia lutea*) but its true identity was not established until 1923 by Höhnel. There are several later finds from different parts of the country. One of the records (Dörfelt 1970) erroneously gives the substrate as *Tilia cordata*.

The species has also been known from England for several decades. The first record (no exact locality) is that by Miller (1930, p. 152), who at the same occasion, on the authority of E. W. Mason, united the European *C. hypoxylodes* with *Hypoxylon polyspermum* Mont., described from Cuba as early as 1842. Several localized finds have later become known.

Recently it has been published also from The Netherlands (Maas Geesteranus 1968;

one find, on *Fagus silvatica*) and from Poland (Domansky et al. 1970 as *C. tubulina*; two finds, one of them on *Carpinus betulus*).

Strasser (1907, p. 322) published a fungus on *A. incana* from Austria as *C. hypoxyloides* and Tranzschel & Serebrianikow distributed in 1912 in their *Mycoth. ross.* n. 278 a fungus on the same substrate under the same name. As shown by Höhnelt (1923, p. 98) both are in fact *C. microspora*. Shear (1938, p. 585) lists with some reservation a Swiss specimen as *C. polysperma* but this is instead *C. tubulina* (comp. p. 351).

At the beginning of my studies I strongly doubted the advisability of uniting two phytogeographically-so different species as the rare North and Central European, *Alnus glutinosa*-inhabiting *C. hypoxyloides* and the obviously less rare Central and South American *C. polysperma*. However, no morphological differences could be detected, and later, when also other European substrates became known and North American specimens turned up, my objections lost their strength.

As alluded to above, the first find to be described (as *Hypoxylon polyspermum*) was one from Cuba (Montagne 1942, p. 345). Although well characterized by "perithecia confertissima, linearia, longissima, fere 2 lin. longa, angustissima, 1/5 mm crassa" (l.c.) and "peritheciis immersis stipatis linearibus mollibus" (Montagne 1856, p. 215), this species was later completely misunderstood. In *North American Pyrenomycetes* Ellis & Everhart (1892, p. 642) used Montagne's name for *H. stygium* (Lév.) Sacc, and it emerges from the Ellis Herbarium (NY) that they consistently treated Central American samples in the same way. When they met with a Nicaraguan specimen of Montagne's species, they described it as *H. cylindrophorum* (Ellis & Everhart 1893, p. 407). Starbäck (1901, p. 13) classified a sample from Paraguay as "*Solonoplea microspora* n. gen. et sp." with "peritheciis cylindricis altissimis" as the principal generic character without any reference to Montagne's species.

Shear (1938, p. 585) listed—although with some reservations—two samples from North America (Louisiana). Both have remained unknown to me, but at least one of them (Overholts & Siggers 484) can hardly be correct ("an intermediate form at first referred to *C. tubulina*. The perithecia are less regular and the epistroma somewhat thicker than in typical *C. hypoxyloides*"). It should be compared with *C. ohiensis*. Later, Shear himself collected indubitable *C. polysperma* in three Florida localities. And I have had the opportunity to elicit a most noteworthy collection made farther north already by Schweinitz and published by him as *Sph. tubulina* (comp. p. 351) but representing the oldest certain find of *C. polysperma*.

Further, a single sample has been seen from Tropical Africa (the Congo), and there is a record from South Africa (Martin 1969b, p. 299) but, as far as I am aware, there are no records nor specimens from Asia or Australia.

It is possible and even rather probable that there exists a still older name for this species, viz. *Sphaeria arecaria* (= *Hypoxylon arecarium* Bory in sched.) described by Fries (1830, p. 543) on a specimen in Hb. Willdenow collected in 1801–02 by Bory on Réunion ("Insul. Bourbon") on a dead palm trunk. It is described with "peritheciis stipatis linearibus", and "fungus

evacuatis peritheciis transverse sectus Polyporum fere referat. Inserenda pone *Sph. Tubulinam*." Without access to specimens and microscopical details an identification would be mere guesswork, especially as *C. polysperma* is not otherwise known from Réunion nor as growing on palm trunks. Hb. Willdenow (B) was destroyed during World War II, and there is no specimen in UPS, but an isotype may hide in some other (French?) herbarium.

### *C. lutea*

*C. lutea* is like *C. tubulina* highly characteristic, was described by Albertini & Schweinitz (1805, p. 10–11) from Silesia and was refound by Fries in Sweden. When fully exposed it may become very conspicuous but when hidden in bark- or wood-cracks it may be easily overlooked. It is regularly seen in England (especially on *Buxus*) but is otherwise very rare and not known outside Europe.

Albertini & Schweinitz found it "in disco trunci unici *alnei* putridi ... sed satis frequens". Their description and illustrations are also here detailed, instructive and unmistakable. Only one point may give rise to some doubt, viz. the colour of the interior of the stroma, which is given as "laete ac vivide luteus" (hence the specific epithet). In the herbarium material seen by me I have nowhere observed a distinct yellow colour of the stroma but there is no other fungus known to which the description could refer and authors who have had access to fresh specimens attribute at least some shade of yellow to it, e.g. Dennis (1960, p. 179, 1968, p. 283: "flesh ... light yellowish"). It may also be worth mentioning that the wood below the stromata is often stained intensely yellow. Moreover (supposedly) authentic specimens have been studied by Nitschke (1867, p. 59) and Shear (1938, p. 591).

Next find was one in Sweden by Fries (1816, p. 147: "Rare with us. I have only found it on dry branches of willow"; translated from the Swedish). There is a sample in UPS but the material seems to have been very scarce for it was not distributed in *Scl. Suec.* nor to his usual correspondents.<sup>1</sup> No exact locality is given, neither here nor in any subsequent publication.

The locality is certainly not Femsjö, as the species is not listed in the "Stirpes Agri Femsionensis" (Fries 1825–27), but probably some other part of west Småland, for in his *Summa vegetabilium Scandinaviae* Fries (1849, p. 383) gives it the designation "4", which means: "Regio pineomontana, quae provincias nostras macriores piniferas et praecipue Smolandia occidentalem complectitur."

The second Swedish find, this time on *Corylus*, is that mentioned in the introduction. In the autumn of 1970, I searched the locality for the fungus but without success.

It has also been found once in Denmark on *Corylus* (Munk 1957, p. 151) but not in Finland, nor in Norway.

An alleged second German find (from Hannover on *Alnus*) was published by Engelke (1909) but his fungus is *C. polysperma* (comp. p. 352). In 1917, Kirschstein collected it, however, in Brandenburg on *Quercus*.

<sup>1</sup> A Fries (?) specimen is S labelled "*Sphaeria lutea* Alb." shows a totally different pyrenomycete.

This species is known from only one more country, viz. England, but there it is met with regularly in numerous localities, especially on *Buxus*, but is also known to inhabit *Betula*, *Corylus*, *Fagus* and *Sambucus nigra*. The first record is from Nottinghamshire on "elder" (*Sambucus nigra*) (Berkeley 1841, p. 360; 1860, p. 386).

### *Nummularia gigas*

*Nummularia gigas* was described and illustrated by Phillips & Plowright (1880, p. 106) as growing on *Betula* at Ringstead (in Norfolk), a locality where Plowright had repeatedly collected *C. lutea* on the same substrate. Cooke (1883*b*, p. 5) stated the original spore measurements to be erroneous, the spores not exceeding  $6-7 \times 3 \mu$  (instead of being  $10-12 \times 8-10 \mu$ ) but neither he nor anybody else has refound the fungus. Its identity has remained doubtful and much speculated about. Without access to specimens Theissen (1909, p. 158) supposed it to be conspecific with *C. hypoxylodes* (i.e. *C. polysperma*), Höhnelt (1923, p. 100) suggested it rather to be "eine abnorm grosse *Anthostoma microsporium*" and Miller (1932*a*, p. 131) *C. lutea*.

Shear (1938, pp. 586-588) found a specimen (in K) from Hb. M. C. Cooke (supposedly that studied by Cooke in 1883) labelled in Plowright's own hand: "*Hypoxylon luteum* Fr.? on birch, Oct. 1876, Ringstead, C. B. P." and considered it to be "undoubtedly a part of the original gathering" of *N. gigas*. He found it to be very close to *Sph. lutea*, which he merged with *C. tubulina*, but "would regard it for the present at least as a variety". Dr Dennis has kindly re-examined it for me and found it to be typical *C. lutea*. The spore size given by Cooke is also in agreement.

It turns out that Shear was mistaken in connecting the above sample with *N. gigas*, for a specimen of indubitable authenticity has now become available (transferred in 1953 from Birmingham to BM and later from there to K). This specimen is widely different from the preceding. Plowright did certainly know *C. lutea* well enough not to be duped by a luxuriant specimen. The said specimen has a printed schedule "Herbarium C. B. Plowright" filled out in Plowright's own hand: "*Nummularia gigas* Plowr." and a separate written label also in his hand: "on Birch - Ringstead 15/6 - C. B. P."

Unfortunately, this "new" specimen is poor and overripe; nevertheless it yields a profusion of spores. A few remnants of asci were also seen, sufficient to prove that the spores are uniseriate but not how they are orientated, nor the structure of the ascus top. The spores show a certain resemblance to those of *Camarops*, being one-celled, small, brown-walled and provided with one terminal germ-pore, but fall definitely far outside the "pattern of variation" of that genus. The walls are much thicker, their colour is a more saturated and brighter, more reddish brown, and the pore is larger (ca.  $\frac{1}{2} \mu$  in diam.). In *Camarops* the spore is flattened, equilateral in both side and edge view and the porate half a trifle narrower and more pointed than the opposite half. In *N. gigas*, the spore is not flattened, the opposite half is much broader than the porate, very obtuse or almost truncate, not rarely  $\pm$  oblique and the maximum breadth of the spore often rather close to the obtuse end. In all *Camarops* specimens studied the spores are very uniform (with due regard, of course, to different stages of development) but in *N. gigas*, as observed already by its authors, the spores are "rather various in form and shape". My measurements are:  $(5.5-6.0-7.0) \times 3.5-4.0(-5.0) \mu$ , thus considerably smaller than those given in the diagnosis.

In my opinion the spore characters point towards the heterogeneous assemblage still known as *Anthostoma*, but I feel not sure that *N. gigas* is a single organism. It may be perithecia of one Pyrenomycete inhabiting decaying stromata of another (perhaps *C. lutea*). The problem can hardly be solved, unless additional, preferably fresh, specimens become available.

*C. microspora*

*C. microspora*, the fourth European species, is also conspicuous and rare. It grows in bark of *Alnus* (preferably *incana*) forming large swollen patches spotted by erumpent stromatal discs, but occurs occasionally also on *Betula* and *Carpinus*. It is known from scattered localities in Central and North Europe as well as in northern North America, but is still unknown from Asia, as far as I see.

It begins its literary history as "*Anthostoma ? microsporum* n. sp." in Karsten's *Fungi Fenniae exsiccati* (1869). His oldest collection is dated 1862. About the same time it was observed in Switzerland too (also on *A. incana*) and published by Fuckel (1870, pp. 224–225) as "*Phaeospora helvetica* n. gen. et sp.". This new genus was accepted by Karsten (1873, pp. 53–54), who transferred his species as *Ph. microspora* and gave it a detailed description. This is almost literally borrowed from Fuckel's description of *Ph. helvetica*, but, strange to say, Fuckel is not even mentioned. On this occasion *Betula* was added as a substrate. I have seen three later Finnish gatherings, these too on *A. incana*.

In Sweden it has been found only in four localities (on *A. incana*), first in Västerbotten (Vleugel 1911, p. 326), secondly in Hälsingland by T. Vestergren, and thirdly in Gästrikland by me as mentioned in the introduction. My locality is a small dense *Alnus* grove (with *A. glutinosa* and *A. incana*) on the bank of the River Gavleån, where in 1969 I found about a dozen patches on one piece of a decaying trunk lying on the ground. Numerous similar logs lying close by were inspected but no *Camarops* was seen. Re-examinations the following three years gave the same negative result, and not even the first log yielded any fresh stromata. Similar localities in the neighbourhood have also been scrutinized, but in vain, until June 1972, when numerous decaying last year's stromata were found on one log in a similar habitat some 100 m down-stream.

In Denmark the species is known from a number of localities in northern Sjælland (Munk 1957, p. 149). Although the native *A. glutinosa* is common all over the country, the fungus is so far recorded only from the introduced and naturalized *A. incana*. In one locality (Aasevang) it has been collected in quantities, both in 1895 by O. Rostrup and in 1907 by J. Lind.

It is so far unknown from Norway.

Other European finds are the following. In Germany it has been collected in Holstein (on *A. incana*), Hessen (on *A. glutinosa*) and Brandenburg (on *Carpinus betulus*, one very rich collection on this hitherto unreported host). — From Britain it was not listed by Bisby & Mason (1940) but has later been found, at least in Yorkshire (on *A. glutinosa*). — Two finds are known from European Russia (on *A. incana*), one of them originally distributed as *C. hypoxyloides* (comp. p. 353). — There are further finds (on *A. incana*) from Austria and north Italy.

When first found in North America (USA: Maine) this species was described as a  
*Svensk Bot. Tidskr.* 66 (1972)

new *Diatype* (Ellis 1881, p. 74) and got the epithet *microspora*. Saccardo (1882, p. 398) transferred it to *Anthostoma*, but because of Karsten's *A. microsporum* he had to change its epithet and named it *A. Ellisii*. After receiving authentic material of Karsten's species, Ellis & Everhart (1892, p. 582) synonymized the two *microspora*e. Meanwhile it had been described once more, viz. by Peck (1887, p. 67) as *Valsa exudans*, which species Ellis & Everhart (l.c.) soon reduced to a variety of *A. microsporum*. There is, however, no tangible difference from normal *C. microspora*.

When transferring this species to *Camarops* Shear (1938, p. 588) recorded it from Canada and USA (Alaska, Idaho and New York). By distraction, he gave in the cited paper the substrate of it (as well as of *C. polysperma*) consistently as "*Ulmus*" instead of "*Alnus*". In the "Index of Plant Diseases in the United States" (1960, p. 468) it is accordingly placed under *Ulmus*. — Additional finds are listed below (p. 365). It is now known from Canada (Ontario) and USA (Alaska, Idaho, Michigan, Maine, New Hampshire, Massachusetts, and New York). More localities are certainly to be found in North American herbaria.

#### *Distinctive Features of the European Species*

Instead of detailed descriptions only some of the most distinctive characteristics will be summarized below.

*C. polysperma*. Stromata early erumpent, flat-pulvinate, large (up to > 10 cm in length and some few cm in breadth); surface (when still unstained from protruding perithecial slime) dark chocolate brown to blackish, rough like goose-skin from low warts regularly spaced and perforated by perithecial necks. — Perithecial bodies cylindrical or (by mutual pressure) prismatic, 5–8 × 0.5–0.6 mm, closely packed, all of the same length, forming a palisade resembling the tube layer of a polypore. — Spores small, (4.0–)4.5–6.0(–6.5) × (2.0–)2.5–3.0 × 2.0 μ, distinctly flattened, the porate half as a rule markedly narrower than the other half both in plan view and in edge view; wall relatively thick and dark. — On frondose trees (in Europe mostly *Alnus glutinosa*).

*C. tubulina*. Stromata superficial, flat-pulvinate, large (as in the preceding species); surface (when adult but unstained) dark chocolate brown to blackish, with lower, sparser and more irregularly spaced warts. — Perithecial bodies subglobose, ellipsoidal or usually ovoid, often deformed by mutual pressure, upwards gradually attenuated into the long necks, 3–6 × (in the broadest part) 1–1.5 mm, situated at different heights. — Spores relatively large, (5.0–)5.5–7.0(–7.5) × 2.5–3.5(–4.0) × 2.0–2.5 μ, strongly flattened, the porate half often markedly narrower than the other, the spores in plan view thus rather pipshaped; wall relatively thick and dark. — On *Abies* and *Picea*.

*C. lutea*: Stromata erumpent, truncate with steep, bulging sides and a circular or elliptical, flat or slightly concave disc, relatively small (rarely > 1 cm in length); surface of the disc (when still unstained) farinaceous to furfuraceous, yellowish- to olive-grey, dotted by low, irregularly spaced, dark warts perforated by perithecial necks. Perithecia polystichous. — Entostroma yellowish-, ash- or olive-grey (but no tinge of brown or red as in the two preceding species). — Spores relatively large, (4.0–)5.5–6.0(–7.0) × 2.0–3.0 × 2.0 μ, very little flattened,

the sides both in plan view and edge view almost straight and parallel, the spores in edge view thus short-bacilliform; spore wall relatively thin and pale. — On frondose trees, especially *Buxus*.

*C. microspora*: Stromata developing within the bark, small (0.5–1.0 cm in diam.) grouped into circular patches (ca. 5 cm in diam.) covered by the raised peridermis, which ruptures in spots exposing small discs with high, cylindrical to conical warts perforated by perithecial necks. — Perithecia bottle-shaped, radially convergent towards the disc. — Spores small, (4.0–)4.5–6.0(–7.0) × 2.0–3.0 × 2.0  $\mu$ , in shape and colour similar to those of the preceding species but distinctly flattened. — In bark of *Alnus* (mainly *incana*), *Betula* and *Carpinus*.

### Review of the Non-European Species

A number of species have been based on material from the Americas. *Hypoxylon polyspermum* and its synonyms *H. cylindrophorum* and *Solenoplea microspora* as well as *Diatrype microspora* and *Valsa exudans*, synonyms of *C. microspora*, have been treated above, as they grow also in Europe.

*Sphaeria Pugillus* was the first American species to be described (Schweinitz 1822, p. 38), on *Acer* from North Carolina. Later it was reported also from Pennsylvania (Schweinitz 1832, p. 200). Curtis (1867, p. 142) transferred it to *Valsa*, and W. C. Stevenson Jr (1878, p. 86) declared it to be “evidently a *Sphaeronaema*”. Shear (1940, p. 548) found a small sample “still preserved in Schweinitz’ original autographed packet” and “a bit of the same specimen in the Michener herbarium” to show a *Camarops*. He suggested that the “mounted collection at the Philadelphia Academy of Science” (comp. Shear et al. 1917, pp. 6–13, Shear 1917*a* & *b*) studied by Stevenson contains a later gathering (viz. one from Pennsylvania). In his emended description of *Sph. Pugillus* Fries (1823, p. 383) states “v. s.” (= vidi sicca), and there are still in his herbarium (UPS) two samples labelled in Schweinitz’ own hand, one of them even with the locality “Salem”. They are thus clearly part of Schweinitz’ original find and show both Shear’s fungus. In my opinion it is not necessary to assume that Stevenson studied another species, for *C. pugillus* with its small spores, deliquescent asci and the long fingerlike necks could at his time easily be regarded as a *Sphaeronaema*. — Shear considered *C. pugillus* to show so great resemblance to dwarfed specimens of *C. lutea* that “it is possible that this may be a variety of that species” but as shown above (pp. 347, 349) their stromatal characters are too different to justify such a treatment. The spores are also distinctive, those of *C. pugillus* being darker and stouter, (5.0–)6.0–6.5 × 3.0–3.5  $\mu$ .

Although *C. pugillus* in contrast to the four European species is small, inconspicuous and easily overlooked, it must be very rare, for Schweinitz’ finds remained the only ones, until Shear in 1940 published it from Virginia and Tennessee. No further finds have become known until now, when I can add localities in New York and Massachu-



setts. The known geographical distribution remains thus very restricted, but it is of course much too early to decide whether this picture is true.

*Hypoxylon Petersii* was described (Berkeley 1868, p. 384) on two collections, one from Cuba by Ch. Wright and another from Alabama. Miller (1961, p. 139) took the former as the type, but the specific epithet points clearly to the latter, although the collector's name (Peters) was not given in the diagnosis. Shear (1923, p. 126) had also previously selected the latter as the type. On specimens from Ohio, Ellis & Everhart (1888, p. 39) observed a feature which they considered as most unique, viz. that the stroma is "covered at first by a thick coriaceo-membranaceous veil which soon disappears except around the margin". As mentioned above (p. 337), Shear considered this feature so distinctive as to motivate a new monotypical genus (*Peridoxylon*), but all essential characters of the species are those of *Camarops*; even in the anatomical structure of the stroma there is close agreement with i.a. *C. tubulina* and *C. polysperma* (comp. p. 346). Consequently, it is below (p. 366) formally transferred to *Camarops*. Lloyd (1924b, p. 1283) saw the true affinity of it and transferred it to *Bolinia* but on the same occasion he mixed it up with *C. ohiensis*, the Lowater collection belonging to the latter species. The manylayeredness of the perithecia shown on his fig. 2856 is mainly due to the section being oblique, as I have been able to ascertain by re-examining the figured stroma.

Various authors have recorded this species from a number of states in eastern USA and from Brazil (Rio Grande do Sul). As it has been much confused with the completely forgotten *C. ohiensis*, all records need confirmation.

*C. petersii* is so far known with certainty from the following states of USA, viz. Alabama, Kentucky, North Carolina, Ohio, and Virginia, as well as from Cuba and Asia (Japan and the Far East). The recorded substrates are *Quercus* and *Castanea*.

*C. quercicola* was described by Cooke (1892, p. 81) from N. Carolina. The description (spores uniseptate,  $20 \times 4 \mu$ ) shows convincingly that it does not belong to the genus, and Saccardo (1895, p. 318) transferred it to *Endoxylina*. Its true taxonomic positions remains doubtful, until it has been re-examined.

*H. ohiense* and *H. atrovirens* were described with two years' interval by Ellis & Everhart (1892, p. 648; 1894, p. 346), the first from Ohio, the second from West Virginia. Both were compared with *H. Petersii*, but in the description of *H. atrovirens* no allusion was made to *H. ohiense*. Shear (1938, p. 686; 1945, p. 260) included both in the synonymy of *C. tubulina*. My studies of the type specimens have confirmed that they are both true members of *Camarops* and conspecific but convinced me that they are specifically distinct from both *C. tubulina* and *C. petersii*.

As far as I am aware, the only later gathering published under any of the two names is one from Alaska (on *Picea*) published by Saccardo et al. (1904, p. 59) as *H. ohiense*. As suggested above (p. 351) this may be *C. tubulina*.

According to the original description *H. ohiense* should differ from *H. Petersii* "in the effused stroma without any membranaceous veil, in its larger perithecia and smaller asci and sporidia". The diagnostic value of these features remains undisturbed, although the presence of a veil may be difficult to establish in herbarium specimens with only a low collar left of the veil and the difference in spore size is less than that given by the authors, the spores of *C. petersii* being  $6.0-7.0(-7.5) \times 3.0-4.0 \times 2.5 \mu$  and those of *C. ohiensis*  $(5.0-5.5-6.5(-7.0) \times (2.5-3.0-3.5) \times 2.0-2.5 \mu$ . In *C. petersii* the perithecia are distinctly polystichous, their bodies subglobose, ovoid or pyriform, up to  $1 \times 0.5$  mm, whereas in *C. ohiensis* they are, when full-grown, (sub)monostichous and their bodies cylindrical with rounded and slightly enlarged base, measuring up to  $4 \times 0.8$  mm.

I have seen material only from some eastern states in USA (Pennsylvania, Ohio, West Virginia, and Georgia), but additional collections may certainly be found in North American herbaria. The only specified substrate is so far *Quercus*.

It should be mentioned in this connection that I have seen a collection of this relationship determined by J. H. Miller to *C. polysperma* but certainly representing an undescribed species, viz. USA: Louisiana, St. Martinville (*Fraxinus*) 29.I.1899 A. B. Langlois (BPI). It has flat stromata with the ectostroma easily flaking away. The perithecia are small and strictly monostichous, their bodies short-cylindrical, ca.  $0.7-1.0 \times 0.3-0.4$  mm. As too many species have been described on single gatherings, we had better await more collections and better insight into development and variability. The number of species of *Camarops* known from Eastern USA is remarkable.

*H. Scleroderma*. More than a century ago (Montagne 1850, p. 150) this species was described and depicted from South America (French Guiana), but no second find has become known. Lloyd (1924a, p. 1284) after studying the type specimen (PC) found it to belong to *Bolinia*, but did not formally transfer it. Miller (1961, p. 141) after examining only fragments (BPI and Hb. Lloyd) combined it with *C. tubulina*. He had thus seen only small perithecia-bearing pieces of the stroma (not a complete stroma) and evidently not studied the diagnosis with its accompanying plate.

Perithecia, asci and spores are typical of the genus. The spores are  $5.0-6.0(-6.5) \times 2.5-3.0 \times 2.5 \mu$ , only slightly flattened, often almost pipshaped in plan view, the porate end as a rule decidedly narrower than the other. Spore wall rather dark. The characters of the stroma are most distinctive (comp. p. 347).

*Nummularia ustulinoides* is another South American species (Hennings 1897, p. 227) based on a single gathering (from Brazil: Santa Catarina). From the description Theissen (1909, p. 158) and Shear (1938, p. 305) synonymized it with *C. polysperma*, and I was long inclined to follow them, although I found the spores to be unusually short (ca.  $4.0-5.0(-5.5) \times 2.5-3.0 \times 2.0-2.5 \mu$ ), and only little flattened and to have unusually dark walls. When I had learnt the amplitude of variation in *C. polysperma* it was

found to deviate in so many respects that it must be restored as a species of its own. Besides the differences in the spores, the ostiolate warts are lower, sparser and more irregularly spaced, the surface of the stroma thus showing a certain resemblance to that of *C. tubulina*. The same is true also for the anatomical structure of the ectostroma. The perithecial bodies are stouter than in *C. polysperma*, more widening downwards, their bases rounded, but the perithecia are still clearly monostichous. It shows also similarities to *C. ohiensis* but is distinct on both perithecial and sporal characters.

I have seen a very fragmentary, second Brazil collection that tentatively may be referred here.

*Solenoplea peltata* from Puerto Rico is still another species described from a single collection (Lloyd 1925, p. 1354). The few stromata I have seen are young but nevertheless most of their interior has been consumed by insects. The subcylindrical perithecial bodies have evidently not reached their final length. The longest seen are ca. 2.5 mm, their diameter is 0.3–0.6 mm, and their bases are slightly enlarged and rounded. The spores are  $4.0\text{--}5.5 \times 2.5\text{--}3.0 \times 2.0 \mu$ , in all respects closely agreeing with those of *C. ustulinoides*. The ostiolate disc is surrounded by a distinct rim. It is rather improbable that the peltate shape of the stromata is a good specific mark. Until Puerto Rican specimens in later stages of development have become known, the validity of this species remains doubtful. It may prove conspecific with the also insufficiently known *C. ustulinoides*.

Besides the doubtful *Sph. arecaria* mentioned above (p. 353) a number of species have been described from the Old World tropics, although their authors quite naturally referred them to *Hypoxylon* and *Xylaria*.

*H. macrocenangium* is an old species (Cesati 1879, p. 19) described from a single find in Asia (Borneo) and never refound. It is in every respect a typical *Camarops* of the *polysperma* group, and Miller (1961, p. 138) regarded it as very close to that species. The perithecia are monostichous and subcylindrical but much shorter and thicker than in *C. polysperma*. It has a distinct rim surrounding the ostiolate disc. The spores are pale and tiny, only ca.  $3.5\text{--}4.5 \times 2.0 \times 1.5 \mu$  (thus much smaller than given in the diagnosis), strongly flattened and both in plan view and edge view with almost parallel sides, in edge view appearing almost bacilliform, thus closely resembling those of the otherwise very different *C. microspora*.

*Xylaria spathulata* and the other "xylarioid" Old World species.

*X. spathulata* was described from Ceylon by Berkeley & Broome (1873, p. 118) with a short diagnosis, the minute spores and the chestnut-brown ("castaneus") colour of the stroma being the only remarkable details. Cooke (1883a, p. 83) found its spores

to be only  $6 \times 3 \mu$  (instead of  $10 \mu$  long as given in the diagnosis) and depicted it, with *inter alia*, a section showing monostichous perithecia as the rule is in *Xylaria*. Penzig & Saccardo (1897, p. 498) when describing their *X. polysticha* from Java declared it to be very close to *X. spathulata* but for its polystichous perithecia. Five years later they described a second small-spored Javanese species (*X. xanthophaea*) with polystichous perithecia without any reference to their previous species.

Petch (1924, p. 145) found the perithecia in the type of *X. spathulata* to be polystichous and concluded that *X. polysticha* is probably conspecific. He found also the cortical stroma layer of *X. spathulata* to be "non-carbonaceous" and transferred the species to *Sarcoxylo*n. Unaware of Petch's paper, Boedijn (1959) studied the types of Penzig & Saccardo's two Javanese species, found them to be conspecific and to deviate fundamentally from *Xylaria*, *inter alia*, by fleshy and rather pale stromata, polystichous perithecia and small spores with a minute terminal germ pore, and established for them and a simultaneously described new species the genus *Sarcostromella* and the family *Sarcostromellaceae*. The new species (*S. amorpha*) deviates mainly in the shape and colour of the stroma. — When studying Congo *Xylarioideae* Dennis (1961, 1962) came across an undescribed member of this kinship. He found the differences between *Sarcostromella* and *Peridoxylon* to be too insignificant to motivate separate genera and consequently transferred *X. spathulata* to *Peridoxylon* and described his new species as *P. goossensii*.

The stromatal anatomy of these Old World species is still unknown. In external shape they have a counterpart in the New World *C. scleroderma*.

*C. nigricans* is the most recently described species (Chevangeon 1956, p. 48), growing in West Africa on dead branches of *Manihot utilissima* Pohl. "Le grand nombre des périthèces réunies dans un même stroma sessile, l'absence de zonation, l'allongement de ces périthèces et leur compression, le rangent dans le genre *Camarops* Karst." He was evidently not aware of the more essential characters of the genus. According to the description his species possesses large ( $13-20 \times 7-10 \mu$ ), inequilateral spores with a long germ slit and asci with xylariaceous plugs. It is thus a typical member of the genus *Hypoxylon* in its conventional sense, but the description is not sufficient to judge its position in the genus and its validity.

### Synopsis of the Species: Nomenclature, Distribution and Specimens Studied

#### 1. *Camarops amorpha* (Boed.) Nannf. n. comb.

*Sarcostromella amorpha* Boed., *Persoonia* 1(1): 17 (1959). — Typus: Java, Tjibodas (on wood) IX.1924 Bruggeman 8251 (holotypus: BO n.v.).

*Exs.* O

*Distribution*

ASIA. *Java*: known only from the type collection.

*Svensk Bot. Tidskr.* 66 (1972)

## 2. *Camarops goossensii* (Dennis) Nannf. n. comb.

*Peridoxylon goossensii* Dennis, Bull. Jard. Bot. Etat Bruxelles 31(2): 150 (1961). – Typus: The Congo, Distr. Forestier Central, Binga (on dead wood) I.1943 M. Goossens-Fontana 3019 (holotypus: BR n.v.).

*Exs.* O

*Distribution*

AFRICA. *The Congo*: known only from the type collection.

## 3. *Camarops lutea* (A. & S. ex Fr.) [Shear, Mycol. 32(4): 549 (1940); non rite publ.]; Nannf. n. comb.

*Sphaeria lutea* A. & S. [, Consp. fung. nisk. p. 10 (1805)] ex Fr., Syst. Myc. 2(2): 347 (1823). – *Hypoxylon luteum* Fr., S. Veg. Scand. 2: 383 (1849). – *Nummularia lutea* Nitschke, Pyr. Germ. 1(1): 59 (1867). – *Bolinia lutea* J. H. Mill., Monogr. World Sp. Hypoxylon p. 138 (1961). – *Nummulariola lutea* P. Martin, J. S. Afr. Bot. 35(5): 288 (1969; non rite publ.). – Typus: Germany, Oberlausitz (*Alnus glutinosa*) I. B. von Albertini & L. D. von Schweinitz. A specimen in Hb. Kunze supposed to be collected by A. & S. studied by Nitschke (l.c.), other pieces of supposedly the same origin in Hb. Schweinitz and Hb. Michener studied by Shear (1938, pp. 586, 591).

*Exs.* Plowr., Sph. Brit. I: 16 (n.v.).

*Misdetermination*

Engelke, 1909, pp. 176–181 = *C. polysperma*.

*Distribution and specimens studied*

EUROPE. *Sweden*: Småland (?): exact locality unknown (*Salix*, dry branches) E. Fries (1816, p. 147; UPS!).

Uppland: Uppsala (Bondkyrka), Kvarnbo (*Corylus avellana*, base of dead trunk) 19.IX.1965 N. Lundqvist 4744 (UPS!).

*Denmark*: Sjælland: Herfølje (*Cor. av.*, base of dead trunk) Febr. Ø. Winge (Munk 1957, p.151).

*Germany*: Brandenburg: Kr. Osthavelland, Bredower Forst (*Quercus robur*, rotten fallen branches) 18.VI.1916 W. Kirschstein (B!).

Sachsen: Oberlausitz, “Jänkendorfer Anlagen” (nr. Niesky) (*A. glut.*, rotten stump) Apr.–May I. B. von Albertini & L. D. von Schweinitz (typus).

*Great Britain*: “dead branches and stumps, usually of *Buxus* in England. Uncommon.” (Dennis 1960, p. 180; 1968, p. 283).

Somerset: Bathaston IV.1867 C. E. Broome (K fide Miller 1932b, p. 146). – St. Catharina’s (nr. Bath) 9.IV.1867 C. E. Broome (K fide Miller l.c.).

Surrey: Box Hill (*Buxus sempervirens*) numerous collections, i.a. VII.1930 E. W. Mason (IMI 10698 S!) and 21.IX.1930 C. L. Shear & E. W. Mason (Shear 1938, fig. 1; U.S. Dept. Agric. 71701; B!, BPI!, NY!, UPS!). – Kew Gardens (*B.s.*, dead wood) XI.1902 G. N. (K fide Miller l.c.). – Norbury Park (*B.s.*) 16.VII.1926 J. H. H. Bloom (Hb. Mason 14 S!).

Gloucestershire: Quenington (nr. Cirencester), Grandage (*B.s.*) 19.IX.1971 C. G. C. Chesters (UPS!).

Warwickshire: Sutton Park (nr. Sutton Coldfield) (*Fagus silvatica*) 26.VIII.1971 R. Evans (ex Hb. Chesters UPS!).

Leicestershire: Gopsal A. B. Bloxam (K fide Miller l.c.).

Norfolk: Castle Rising II.1872 C. B. Plowright (K fide Miller l.c.). – King’s Lynn, several

collections by C. B. Plowright, i.a. on *Cor. av.* (fide Miller l.c.), on *Betula alba* VII.1875 (S!, HEL!) and Sph. Brit. I: 16. – Ringstead (*B. a.*) X.1876 C. B. Plowright (K fide R. W. G. Dennis in litt.; comp. p. 355).

Nottinghamshire: Clifton (*Sambucus nigra*, very rotten branches) M. J. Berkeley (1841, p. 360; 1860, p. 386; Cooke 1871, p. 793).

#### 4. *Camarops macrocenangium* (Ces.) Nannf. n. comb.

*Hypoxylon macrocenangium* Ces., Atti R. Accad. Sci. Fis. Mat. Napoli 8:3: 19 (1879). – Typus: Borneo, Sarawak O. Beccari 196 (holotypus: RO!; isotypus: K!).

Exs. O.

*Distribution and specimen studied*

ASIA. Borneo: known only from the type collection.

#### 5. *Camarops microspora* (Karst.) Shear, Mycol. 30(5): 588 (1939).

*Anthostoma ? microsporum* Karst., F. fenn. exs. 860 (1869); Acta Soc. F. Fl. Fenn. 2:6: 75 (1885). – *Phaeosperma microspora* Karst., Mycol. fenn. 2: 53 (1873). – *Nummulariola microspora* P. Martin, J. S. Afr. Bot. 35(5): 291 (1969; non rite publ.). – Typus: Finland, Tavastia australis (*Alnus incana*) P. A. Karsten (F. fenn. exs. 860; holotypus: = Hb. Karsten 704 H!, isotypus: UPS!).

*Phaeosperma helvetica* Nitschke in Fuck., Symb. mycol. p. 224 (“1869” = 1870 fide Rogers, Mycol. 46(4): 534). – *Fuckelia helvetica* Fuck., Symb. mycol. Nachtr. 2: 40 (1873). – *Nummulariola helvetica* P. Martin, J. S. Afr. Bot. 35(5): 291 (1969; non rite publ.). – Typus: Switzerland, Neuchâtel (*A. inc.*) P. Morthier (lectotypus: Fuck., F. rhen. 2466).

*Diatrype microspora* Ellis, Bull. Torrey Bot. Cl. 8(7): 74 (1881). – *Anthostoma Ellisii* Sacc., Syll. fung. 1: 398 (1882). – Typus: USA., Maine (*A. sp.*) J. Blake (n.v.). – Syn. fide Ellis & Everhart 1892: 582.

*Valsa exudans* Peck, Ann. Rep. N.Y. State Mus. Nat. Hist. 40: 67 (1887). – *Anthostoma Ellisii* var. *exudans* Sacc., Syll. fung. 9: 521 (1891). – *A. microsporum* var. *exudans* Ell. & Ev., N. Am. Pyr. p. 582 (1892). – Typus: USA., New York (*A. inc.*) Ch. H. Peck (NYS n.v.).

Exs. Fuck., F. rhen. 2466 (*Fuckelia helv.*). – Jaap. F. sel. exs. 684 (*A. microsp.*). – Karst., F. fenn. exs. 860 (ditto). – Rehm, Ascom. 1478, 1478b (ditto). – Tranzsch. & Serebr., Mycoth. ross. 278 (“*C. hypoxyloides*”).

*Distribution and specimens studied*

EUROPE. Sweden: Gästrikland: Gävle, Lövudden, alder-grove on the bank of R. Gavleån (*A. inc.*) 16.VII. & 11.X.1969 J. A. Nannfeldt 20581 & 20581b (UPS!); Vallshage, on the bank of R. Gavleån (*A. inc.*) 30.VI.1972 J.A.N. 22389 (UPS!).

Hälsingland: Hassela, Älvåsen (*A. inc.*) 8.VIII.1915 T. Vestergren (S!).

Västerbotten: Umeå (*A. inc.*) VI.1908 J. Vleugel (1911, p. 326; S!).

Finland: Nylandia: Esbo (= Espoo), Kasberg (*A. inc.*) 18.VIII.1947 V. Kujala 689 (HFR!, DAOM 105404 fide Hughes in litt.).

Tavastia australis: Tammela (*A. inc.*) Oct. P. A. Karsten (F. fenn. exs. 860, typus *A. microsp.*); Mustiala (*A. inc.*) 13.IX.1872 P. A. Karsten (Hb. Karsten 700 H!); Myllyperä (*Betula alba*) 3.X.1870 P. A. Karsten (Hb. Karsten 698, 699, 702 H!, S!, UPS!).

Savonia australis: Punkaharju (*A. inc.*) 31.VIII.1929 & 20.VIII.1945 V. Kujala (HFR!).

*Svensk Bot. Tidskr.* 66 (1972)

Ostrobottnia media: Jakobstad (*A. inc.*) 2.XI.1862 P. A. Karsten 703 H!).

Denmark: Sjælland: "Northern S: Found in several localities." (Munk 1957, p. 147). – Aasevang ("*A. glutinosa*" = *A. inc.*) 11.X.1895 O. Rostrup (ut *Chamarops* [sic!] *hypoxyloides*; Lind 1913, p. 236; FH!, LD!, S!, UPS!); "prope Hassnia [sic!, sphalm. pro Hafniam] Daniae" = Aasevang (*A. inc.*) IV.1908 J. Lind (l.c.; Rehm, Ascom. 1478b; B!, S!).

Great Britain: Yorkshire: Masham, Melbush (*A. glut.*, dead erect trunk) 12.X.1947 S. J. Hughes (IMI 19226 S!, DAOM 48451 fide Hughes in litt.).

Germany: Schleswig-Holstein: Ahrensburg (*A. inc.*, dead trunks) 20.X.1907 O. Jaap 474 (S!); "Gehölz am Bredenbekteich bei Ahrensburg" (*A. inc.*, dry trunks) 29.VII.1913 O. Jaap (F. sel. exs. 684 B!, L!, S!).

Hessen: "Gebüsch b. der Lorelei a. Rh." (*A. glut.*) 6.VII.1938 J. Sponheimer (B!).

Brandenburg: Kr. Osthavelland, Bredower Forst (*Carpinus betulus*, mouldered piece of trunk) 18.VI.1916 W. Kirschstein (B!).

Switzerland: Ct. Neuchâtel: "Ca. Neuchâtel, hieme" (*A. inc.*) P. Morthier (Fuck., F. rhen. 2466, lectotypus *Phaeosp. helv.*; L!, S!); "Trois-Rois, près Neuchâtel" (*A. inc.*, old bark) X.1871 P. Morthier (Hb. Barbier-Boissier 136 S!); Neuchâtel, Boudry (*A. inc.*) X.1872 (B!, S!).

Italy: Rimo (*A. inc.*, branches) VIII.1896 G. Bresadola (S!).

Austria: Wien: Prater, Heustadlwasser (*A. inc.*) 21.IX.1902 Fr. v. Höhnel (FH!; Rehm, Ascom. 1478 FH!, S!, UPS!).

Nieder-Österreich: Sonntagsberg (*A. inc.*) VII.1905 P. P. Strasser 1233 (1907, p. 322 ut *C. hypox.*; Höhnel 1923, p. 98; FH!).

Soviet Union: Russian S.S.R.: Leningrad Obl., "prov. Petropolitanae, prope Sieverskaja" (*A. inc.*) 24.VIII./5.VIII.1898 W. Tranzschel 102 (S!). – Yaroslavl Obl., "prov. Jaroslawl, Schedenewo (*A. inc.*) VIII.1911 J. Serebrianikow & Schestakow 18 (Höhnel 1923, p. 98; S!; Tranzsch. & Serebr., Mycoth. ross. 278 BPI!, K!, NY!, UPS!).

AMERICA. Canada: ("*Ulmus*", certe sphalm. pro *Alno*) J. Macoun 284 (fide Shear 1938, p. 588).

Ontario: Ottawa (*Alnus sp.*) J. Macoun 232 p.p. ("*Diatrype microspora* Ell." scr. Ellis DAOM 35562). – Algonquin Park, Costello Lake (*A. inc.*) 22.VIII.1939 R. F. Cain 12898 (Univ. Toronto Hb. 15947, DAOM 82440). (Both fide Hughes in litt.)

USA.: Alaska: Skagway (*A. sp.*) D. V. Baxter (fide Shear l.c.; Cash 1953, p. 8).

Idaho: ("*Ulmus*" = *Alnus*) A. S. Rhoades 16624 (fide Shear l.c.).

Michigan: Rock River (*A. inc.*) 28.VIII.1927 D. Swartz (DAOM 7536 fide Hughes in litt.).

Maine: York Co., Walls (*A. sp.*) J. Blake (typus *Diatr. microsp.*).

New Hampshire: Grafton Co., Hanover (*A. sp.*) 9.IX.1902 A. H. Chivers (FH!). – Cocos Co., Shelburne ("*Carpinus*") X.1899 R. Thaxter (FH!). – Carroll Co., Intervale (*A. sp.*) VIII.1901 R. Thaxter (acc. n. 5298 FH!).

Massachusetts: Middlesex Co., Weston, Stony Brook (*A. sp.*) X.1895 & X.1896 R. Thaxter (acc. ns. 42 & 43 FH!).

New York: Albany ("*Ulmus*" = *Alnus*) C. H. Peck (fide Shear l.c.). Essex Co., Elizabethtown (*A. inc.*) IX.1886 Ch. H. Peck (typus *Valsae exud.*).

## 6. *Camarops ohiensis* (Ell. & Ev.) Nannf. n. comb.

*Hypoxylon ohiense* Ell. & Ev., N. Am. Pyr. p. 648 (1892). – Typus: USA., Ohio A. P. Morgan (lectotypus: 883 NY!; paratypus: 965 NY!).

*Hypoxylon atroviride* Ell. & Ev., Proc. Acad. Nat. Sci. Philadelphia 1894: 346 (1894). – Typus: USA., West Virginia (*Quercus sp.*) L. W. Nuttall 275 (holotypus: FH!; isotypus: NY!).

*Exs. O.*

*Misdetermination*

Saccardo et al. 1904, p. 34: probably *C. tubulina* (comp. p. 359).

*Distribution and specimens studied*

AMERICA. USA: Ohio: (no exact locality given, but probably not too far from his home at Preston) A. P. Morgan 883 & 965 (lectotypus et paratypus *H. ohiensis*). – Preston (nr. Cincinnati) A. P. Morgan (“*Bolinia tubulina*”, ex Hb. Ellis FH!). – Toledo W. R. Lowater (Hb. Lloyd 7293 BPI!; comp. Lloyd 1924*b*, pp. 1282–1284 & fig. 2886 as *B. petersii*).

Pennsylvania: Barbour 1268 (NY!).

West Virginia: 1894 L. W. Nuttall (NY!). – Fayette Co., Nuttallburg (*Quercus sp.*) 16.XII.1893 L. W. Nuttall 275 (typus *H. atroviridis*).

Georgia: Clarke Co., Athens, Mitchell Bridge (“*Acer negundo*” = *Quercus sp.*?) 14.XII.1928 & 1.II.1929 J. H. Miller 5941 & 6101 (Hb. Thaxter acc. ns. 148 & 147 FH!). – Rabun Co. (*Quercus sp.*) 31.VIII.1932 J. H. Miller 1454 (“*C. polysp.*”; S!).

**7. *Camarops peltata* (Lloyd) Shear, Mycol. 30(5): 589 (1938).**

*Solenoplea peltata* Lloyd, Mycol. Writ. 7(10): 1354 (1925). – Typus: Puerto Rico, Mayaguez 29.XI.1924 C. M. Tucker 424 (holotypus: Hb. Lloyd 13027 BPI!; isotypus: NY!).

*Exs. O.*

*Distribution and specimen studied*

AMERICA. Puerto Rico: known only from the type collection.

**8. *Camarops petersii* (Berk. & Curt.) Nannf. n. comb.**

*Hypoxylon Petersii* Berk. & Curt., J. Linn. Soc. 10: 384 (1869). – *Peridoxylon Petersii* Shear, Mycol. 15(3): 126 (1923). – *Bolinia Petersii* Lloyd, Mycol. Writ. 7(7): 1283 (1924). – *Nummulariola Petersii* P. Martin, J. S. Afr. Bot. 35(5): 288 (1969; non rite publ.). – Lectotypus: USA, Alabama Peters 4903 (K!); paratypus: Cuba Ch. Wright 229 (K!).

*Exs. O.*

*Misdetermination*

Lloyd 1924*b*, p. 1283 (leg. Lowater) & fig. 2886: = *C. ohiensis*.

*Distribution and specimens studied*

AMERICA. USA: Alabama: Peters 4903 (lectotypus).

Ohio: (*Quercus sp.*) A. P. Morgan (fide Ellis & Everhart 1888, p. 39; 1892, p. 629). – Cincinnati C. G. Lloyd (fide 1924*b*, p. 1283 & fig. 2885).

North Carolina: Pisgah National Forest, Claw Hammer Cove (*Castanea dentata*) 15.VIII.1924 G. G. Hedgcock 11590 (BPI!, Hb. Lloyd 12861 BPI!).

Kentucky: (*Quercus sp.*) A. P. Morgan (fide Ellis & Everhart ll.cc.).

Virginia: Arlington Cemetery (*Quercus sp.*) VIII.1922 C. L. Shear (fide 1923, p. 126).

Cuba: Ch. Wright 229 (paratypus).

ASIA. Soviet Union: Reg. Primorsk, Kedzovaya Padj Reservation (*Quercus mongolica*) 14.IX.1961 E. Parmasto 16303 (K!).

Japan (fide Iwade 1944 sec. Dennis 1961).

*Unverified records*

USA: Alabama (Stevenson & Cash 1936, p. 4). – Indiana (Shear 1923, p. 126). – Maryland (Stevenson & Cash l.c.). – North Carolina (l.c.). – Ohio (l.c.).

Brazil: Rio Grande do Sul (Rick 1931, p. 67).



9. *Camarops polysperma* ("polyspermum") (Mont.) J. H. Mill., Trans. Brit. Mycol. Soc. 15(1-2): 151 (1930).

*Hypoxylon polyspermum* Mont., Bot. Pl. Cell. p. 345. In: Sagra, Hist. phys., pol. nat. Cuba 9: 2 (1842). – *Nummulariola polysperma* P. Martin, J. S. Afr. Bot. 35(5): 296 (1969). – Typus: Cuba, R. de la Sagra (holotypus: PC!; fragments: Hb. Lloyd 11467 FH!, K!).

*Camarops hypoxyloides* Karst., Mycol. fenn. 2: 53 (1873). – *Nummulariola hypoxyloides* P. Martin, J. S. Afr. Bot. 35(5): 290 (1969; non rite publ.). – Typus: Finland, Tavastia australis (*Alnus glutinosa*) P. A. Karsten (holotypus: H. In 1970 only three microscopical slides prepared by C. A. Jørgensen about 1935 could be found (!). The specimen was previously studied also by Shear.)

*Hypoxylon cylindrophorum* Ell. & Ev., Bull. Lab. Nat. Hist. Univ. Iowa 2: 407 (1893). – Typus: Nicaragua C. L. Smith 82 (holotypus: NY!).

*Solenoplea microspora* Starb., Bih. K.Sv.Vet.-Akad. Handl. 27:3:9: 13 (1901). – Typus: Paraguay C. Lindman 390 (holotypus: S!).

? [*Hypoxylon arecarium* Bory in sched. –] *Sphaeria arecaria* Fr., Linnaea 5: 543 (1830). – *Hypoxylon ? arecarium* Sacc., Syll. fung. 1: 383 (1882). – Typus: Réunion ("Ins. borbon.") Bory de St Vincent (holotypus: once in Hb. Willdenow B; destroyed during World War II). Comp. p. 353.

*Exs.* O. [Rick, F. austro-amer. 196 is labelled *C. hypoxyloides*, was cited as such by Theissen (1909a, p. 15) and stated by Höhnel (1923, p. 98) to be the base for his description of this species. However, previous to Theissen's paper and in the same periodical Rick himself (1908, p. 108) had announced: "196. *Hypocreopsis moriformis* Starb. Auf Laubholz. – Die Etikette wurde aus Versehen verwechselt. Die Art ist eine *Nectria*." The copies I have seen (FH, S) are labelled *C. hypoxyloides* and contain a *Nectria*. We must assume that Theissen and Höhnel (via Theissen ?) had got samples in advance, while Rick still had the intention of distributing *C. hypoxyloides*. – Tranzsch. & Serebr., Mycoth. ross. 278 ("*C. hypoxyloides*") is *C. microspora* (comp. Höhnel l.c.).]

#### Misdeterminations

Ellis & Everhart 1893, p. 642 and in sched.: = *Hypoxylon stygium* (Lév.) Sacc.

Shear 1938, p. 585: includes *C. ohioensis* and (one specimen of) *C. tubulina*.

Strasser 1907, p. 322 (as *C. hypoxyloides*): = *C. microspora*.

#### Distribution and specimens studied

EUROPE. Sweden: Öland: Vickleby, Beijershamn (*A. gl.*, two dead fallen trunks ca. 500 m from each other) 12.V.1972 M. Jeppson (UPS!).

Västergötland: Göteborg, Botanic Garden, "Naturparken" (*A. gl.*) 21.VIII.1971 St. Sunhede (GB, UPS!); (*A. gl.*, at least 8 different trunks) 28.IV., 12, 19 & 20.V.1972 St. Sunhede 4814-17 & 4819-22 (all GB, 4814 also UPS!). – V. Tunhem, ca. 300 m N. of "Hembygdsgården" (*A. gl.*) 31.III.1972 J. Jeppson (UPS!).

Bohuslän: Lycke, Älgön (*A. gl.*, dead, still-standing trunk) 6.V.1972 St. Sunhede 4818 (GB!).

Uppland: Stockholm (*A. gl.*) 20.IV.1893 L. Romell (S!); Djurgården (*A. gl.*) 21.VI.1893 L. Romell 15567 (comp. Höhnel 1923, p. 100; S!); Djurgårdsbrunn (*A. gl.*, stump) 7.VI.1896 L. Romell 15522 (S!). – Uppsala (Bondkyrka), "Vårdsätra naturpark" on the shore of Lake Mälaren (*A. gl.*) 19.X.1968 J. Eriksson & St. Sunhede (GB, UPS!), 6.V.1969 Kerstin Holm, Ragnhild & J. A. Nannfeldt 20593 (UPS!), 8.X.1970 Kerstin Holm & J. A. Nannfeldt 21545 (UPS!).

Finland: Tavastia australis: Tammela, Mustiala (*A. gl.*) Oct. P. A. Karsten (typus *C. hypox.*).

*Denmark*: Sjælland: Hvalsøvej at Skjoldnæsholm (rotten wood) O. Rostrup (Munk 1957, p. 151).

Jylland: Silkeborg (*A. gl.*) XI.1965 A. Jakobsen (UPS!).

*Great Britain*: "rare in England" (Dennis 1960, p. 179; 1968, p. 282); no exact locality J. H. Miller (UPS! fragm.), E. W. Mason 105 (IMI! 15158; comp. Miller 1930, p. 152).

Buckinghamshire: Burnham Beeches (*A. sp.*) 4.X.1953 A. H. S. Brown (IMI! 53587), 4.X.59 D. A. Reid (BPI!, K!, L!).

Nottinghamshire: Nottingham, University Park (*A. gl.*) I.1949 (Hb. Chesters IMI! 38787; Chesters 1960, p. 105).

Warwickshire: nr. Meriden (*A. gl.*) 1.IX.1959 F. W. Shotton (fide Chesters l.c.).

Surrey: Ranmore Common (*A. gl.*) 3.X.1959 C. G. C. Chesters (fide Chesters l.c. p. 109).

*The Netherlands*: Zuid-Holland: Wassenaar, Storm van s'Gravensande Weg (*Fagus sylvatica*, confirm. E. Åberg, rotten wood) 29.X.1967 J. Karman (Maas Geesteranus 1968, pp. 121–123; L!).

*Germany*: Schleswig-Holstein: Sachsenwald (*A. gl.*) 1.IX.1907 O. Jaap 464 (S!).

Hamburg: Ladenbek (nr. Bergedorf) (*A. incana*, stump) 7.IX.1915 O. Jaap (S!).

Niedersachsen: Misburg, "Misburger Holz" (*A. gl.*) IX.1908 C. Engelke 4320 (S!) & XI.1908 C. Engelke (1909, pp. 176–181 as *Nummularia lutea*, comp. Höhnelt 1923, p. 98; S!).

Westfalen: Teutoburger Wald, Kr. Detmold, Naturschutzgebiet "Donoper Teich" (nr. Detmold) (*A. gl.*) 23.V.1970 H. Jahn (UPS!).

Brandenburg: Kr. Niederbarnim, forest at Zehlendorf (*A. gl.*, felled thin trunk) 3.V.1917 W. Kirschstein (B!).

Ostthüringen: Greiz, Leninpark, west bank of R. Weisse Elster ("*Tilia cordata*" = *A. sp.*, determ. E. Åberg) 4.VII. & 5.VIII.1968 H. Dörfelt (1970, pp. 7–12; UPS!).

*Poland*: Bieszczady, "prawy stok doling Hylatego" (*A. gl.*) VIII.1965 W. Truszkowska (Domanski et al. 1970, p. 140 ut *B. tubulina*) – Białowieża Reservate, "w rowie przy drodze pałacowej, w gradzie" (*Carpinus betulus*) VIII.1961 W. Truszkowska. (Both communicated by Prof. Truszkowska.)

AMERICA. *USA*: North Carolina or Pennsylvania: L. v. Schweinitz (NY!).

Florida: Lake Co., Groveland (*Magnolia sp.*) 31.III.1938 C. L. Shear (BPI!). – Seminola Co., Longwood (*Ulmus sp.*) 9.II.1940 C. L. Shear 4545 (BPI!). – Volusia Co., Daytona (*Citrus sp.*) R. Thaxter 38 (acc. n. 6621 FH!). – Rock Spa (lignum) 4.I.1944 C. L. Shear (BPI!).

*Cuba*: "S. Marcos" ("ad cortices et ligna") R. de la Sagra (typus *H. polysp.*).

*Puerto Rico*: "Fungi n. 2726, Hb. Cornell" (fide Miller 1930, p. 152).

*Nicaragua*: Isla de Ometepe (in Lago de Nicaragua) winter of 1893 C. L. Smith 82 (typus *H. cylindr.*).

*Brazil*: Rio Grande do Sul: São Leopoldo J. Rick 196 (Hb. Lloyd 35754 BPI!), J. Rick 013 & 021 (comp. Lloyd 1924b, p. 1313 & figs. 2983–5; Hb. Lloyd 35753 & 7294 BPI!), IX.1905 J. Rick 39 (S!), 1907 J. Rick (FH!), 1916 J. Rick 381 (Hb. Lloyd 7245 BPI!), 1932 J. Rick (Hb. Mo. Bot. G. 150331 BPI!), 1933 Braun (FH!). – Parecy Novo 1928 J. Rick (FH!).

*Paraguay*: San Antonio (nr. Asuncion) 20.VII.1893 C. Lindman Exp. I. Regn. Fungi 389 B (S!, UPS!) & 390 (typus *Sol. microsp.*).

*Argentina*: Prov. Buenos Aires, Llavallol, Sta. Catalina (fallen trunk in very moist place) 11.IV.1971 Monica Cattanini (BAFC!).

AFRICA. *The Congo*: Distr. Forestier Central, Yangambi (*Scordophloeus zenkeri*) B. Fassi 569 (K!).

*South Africa*: E. Transvaal: Blyde River Canyon 1968 P. Martin 1836 (fide Martin 1969, p. 299).

*Unverified record*

*Haiti*: "On *Mimusops balata* (for Haiti; U.S.D.A.) and *Castilloa elastica* (as above)" (Ciferri 1961, p. 224 as *H. polyspermum*). Rather probably *H. stygium*.

10. **Camarops pugillus** (Schw.) Shear, Mycol. 32(4): 549 (1940).

*Sphaeria Pugillus* Schw., Syn. Fung. Car. Sup. (=Schr. Naturf. Ges. Leipzig 1) p. 38 (1822); Fr., Syst. Myc. 2(2): 383 (1823). – *Valsa Pugillus* Curt., Geol. & Nat. Hist. Surv. N. Carol. 3. Bot.: 142 (1867; n.v.). – Typus: USA: North Carolina (*Acer*) L. v. Schweinitz (holotypus: ?; isotypi: Hb. Michener BPI n.v., UPS!).

*Exs.* O.

*Distribution and specimens studied*

AMERICA. USA: Massachusetts: Norfolk Co., Sharon ("Castanea vel Acer") 5.XII.1908 A. P. G. Piguet (FH!).

New York: Essex Co., Schroon Lake (*Acer*) 4.VIII.1927 C. L. Shear (BPI!).

Tennessee: Indian Gap Road (*Rhododendron*) 18.VIII.1939 C. L. Shear 4239 (1940, p. 549; BPI!).

Virginia: Arlington Co. (*Fagus*) 22.X.1933 C. L. Shear 4238 (l.c.). – Arlington Cemetery (*Liriodendron*) 27.III.1927 & 11.II.1939 C. L. Shear 5593 & 4237 (l.c.; BPI!).

North Carolina: Forsyth Co., Salem (*Acer*) L. v. Schweinitz (typus).

*Unverified record*

Pennsylvania L. v. Schweinitz (1832, p. 200; comp. p. 358).

11. **Camarops scleroderma** (Mont.) Nannf. n. comb.

*Hypoxyton Scleroderma* Mont., Ann. Sci. Nat. Bot. 2:13: 350 (1850). – Typus: French Guiana "in sylvis circa Cayenne" ("lignum emortuum") V.1839 Leprieur 431 (holotypus: PC!; fragment: BPI!).

*Exs.*: O.

*Distribution and specimen studied*

AMERICA. *French Guiana*: known only from the type collection.

12. **Camarops spathulata** (B. & Br.) Nannf. n. comb.

*Xylaria spathulata* B. & Br., J. Linn. Soc. Bot. 14 (=n. 74): 118 (1873). – *Sarcoxyton spathulatum* Petch, Ann. R. Bot. Gard. Peradeniya 8: 145 (1924). – *Peridoxylon spathulatum* Dennis, Bull. Jard. Bot. Etat Bruxelles 31(2): 150 (1961). – Typus: Ceylon, Central Province 1868 Thwaites 1114 (holotypus: K n.v.; isotypus: PDA n.v.).

*Xylaria polysticha* Penz. & Sacc., Malpighia 11: 500 (1897); Icon. fung. javan. p. 30 (1904). – *Sarcostromella polysticha* Boedijn, Persoonia 1(1): 16 (1959). – Typus: Java (no further data given) (BO n.v.) – Syn. fide Petch l.c.

*Xylaria xanthophaea* Penz. & Sacc., Malpighia 15, p. 226 (1902); Icon. fung. javan. p. 31 (1904). – Typus: Java, Tjibodas (on trunks) 5.III.1899 M. Fleischer 979 (holotypus: PAD n.v.; isotypus: BO n.v.). – Syn. fide Boedijn l.c.

*Exs.*: O.

*Distribution*

ASIA. *Ceylon* (Central Prov.) and *Java* (Tjibodas). Besides the three type collections only two more finds (both from Tjibodas) have become known, viz. X.1938 K. B. Boedijn 3305 and XI.1952 Hoogland (fide Boedijn 1959, p. 17; BO n.v.).

13. *Camarops tubulina* (A. & S. ex Fr.) Shear, Mycol. 30(5): 585 (1938).

*Sphaeria Tubulina* A. & S. [Consp. fung. nisk. p. 6 (1805)] ex Fr., Syst. mycol. 2(2): 346 (1823). – *Hypoxylon Tubulina* Fr., S. veg. Scand. 2: 383 (1849). – *Bolinia Tubulina* Sacc., Syll. fung. 1: 352 (1882). – *Ustulina Tubulina* Schroet. in Cohn, Krypt-Fl. Schlesien 3:2: 465 (1897). – *Nummularia Tubulina* J. H. Mill., Trans. Brit. Mycol. Soc. 17(1–2): 134 (1932). – *Nummulariolaria tubulina* P. Martin, J. S. Afr. Bot. 35(5): 288 (1969; non rite publ.). – Typus: Germany, Oberlausitz (*Picea abies*) I. B. von Albertini & L. D. von Schweinitz (no specimen known to be extant).

*Exs.*: Sclerom. Suec. 341 (two copies K!, UPS!; also Hb. Greville E and STR fide Shear 1938, p. 586).

*Misdeterminations*

Domanski et al. 1970, p. 140: = *C. polysperma*.

Duby 1830, p. 682: = *Hypoxylon rubiginosum* (Pers. ex Fr.) Fr.

Fries 1823, p. 346: = *C. polysperma* quoad pl. americ.

Schweinitz 1822, p. 30: = *C. polysperma*.

Schweinitz 1832, p. 193: = *C. polysperma* (saltem p.p.)

Shear 1938, p. 585: includes *C. lutea* and *C. ohiensis*.

*Distribution and specimens studied*

EUROPE. *Sweden*: Småland: Femsjö par., Bökeberg Forest (*Picea abies*, old stumps) May–June. E. Fries (1816, p. 140–141; Scl. Suec. 341; B! UPS!).

*Germany*: Sachsen: Oberlausitz, Niesky (*P. a.*, rotten wood) March–Apr. I. B. von Albertini & L. D. von Schweinitz (typus).

*Switzerland*: probably from near Bern (substrate unknown) IX.1858 G. Otth 132 (B!; comp. p. 351).

*Poland*: Opole Prov.: Falkenberg (= Niemodlin), Guschwitz (*Abies alba*, old stump) 10.VII.1884 J. Schroeter (1897, p. 465; WRSL!).

*Czechoslovakia* (comp. Svrček 1969): Čechy: Šumava Mts, silva virginea “Boubínský prales” pr. Zátoň (*P. a.*, rotten fallen trunk) 28.IX.1967 Z. Pouzar (PR! 628921). – Novohradské hory Mts, silva virginea “Žofínský prales” (*P. a.*) 18.X.1967 (PR! 646760 & 647608), 9.X.1968 Z. Pouzar & Kubička (PR! 661454), (*A. a.*, fallen trunk) 9.X.1968 Z. Pouzar (PR! 661453).

*Slovensko*: Banská Bystrica Distr., Slovenské Rudhorie Mts, silva virginea “Dobročský prales” pr. Čierny Balog (*P. a.*, rotten trunk) 30.VIII.1961 F. Kotlaba & Z. Pouzar (PR! 615711).

*Soviet Union*: Ukr. S.S.R.: Zakarpatskaja Obl., silva virginea in valle rivi Berlebaš pr. Trebušany VIII.1937 A. Pilát (Svrček 1969; PR! 488648).

14. *Camarops ustulinoides* (P. Henn.) Nannf. n. comb.

*Nummularia ustulinoides* P. Henn., Hedw. 36(4): 227 (1897). – Typus: Brazil, S:ta Catarina, A. Möller 692 (holotypus: once in B but destroyed during World War II; isotypus: S!).

*Svensk Bot. Tidskr.* 66 (1972)

Exs.: O.

*Distribution and specimens studied*

AMERICA. Brazil: S:ta Catarina, Blumenau A. Möller 692 (typus).

Amazonas: Rio Purús ("Puru"; certainly near Hyutanuhām I.1889 Dr Ehrenreich ("Ehrenberg") (Rehm 1901, p. 142 as *Nummularia* ? *Cycliscum* Mont.; S!). Specimen very fragmentary; determination only tentative.

**Excluded Taxa**

*Camarops ferruginea* (Nke) Shear, Mycol. 30(5): 588 (1938).

*Anthostoma ferrugineum* Nke, Pyren. German. 1: 118 (1867).

Probably a species of *Endoxyla* (comp. p. 337).

*Camarops gigantea* ("giganteum") (Mont.) Cke, Grevillea 13(4) (=n. 68): 108 (1885).

*Sphaeria gigantea* Mont., Ann. Sci. Nat., Bot. 2:1: 304 (1834).

Is a *Pleospora*, *Pl. gigantea* (Mont.) Sacc., comp. Wehmeyer 1961, p. 250.

*Camarops grandinea* (Berk. & Rav.) Cke, Grevillea 13(4) (=n. 68): 108 (1885).

*Diatrype grandinea* Berk. & Rav., Ibid. 4(3) (=n. 31): 95 (1876).

Is a *Hypoxylon*, *H. grandineum* (Berk. & Rav.) J. H. Mill., comp. Miller 1941, p. 74; 1961, p. 84.

*Camarops nigricans* Chevangeon, Encycl. Mycol. 22: 48 (1956).

Belongs to *Hypoxylon* (comp. p. 362).

*Camarops quercicola* Berk. & Cke, Grevillea 20(:3): 81 (1892).

*Eutypa quercicola* Berk. in hb. – *Endoxylina quercicola* Sacc., Syll. fung. 11: 318 (1895).

On account of the large, uniseptate spores *Camarops* is excluded. Taxonomic position doubtful (comp. p. 359).

*Camarops tubulina* var. *gigas* (Phill. & Plowr.) Shear, Mycol. 30(5): 586 (1938).

*Nummularia gigas* Phill. & Plowr., Grevillea 8(3): 106 (1880).

Probably a species of "*Anthostoma*" (at least the perithecia) (comp. p. 355).

**Acknowledgements**

This paper could not have been written without the kind and unselfish cooperation of numerous colleagues, too numerous all to be mentioned by name. I am highly indebted to all of them. I owe a special debt of gratitude to Drs J. Eriksson and St. Sunhede (Göteborg), who brought the material that gave the impetus to this study, Professor C. G. C. Chesters (Cirencester), Dr H. Dörfelt (Halle/Saale), Dr G. N. Greenhalgh (Liverpool), Dr H. Jahn (Heiligenkirchen), Messrs J. and M. Jeppson (Trollhättan), Dr R. A. Maas Geesteranus (Leiden), Professor A. Munk (København), Professor Wanda Truszkowska (Wroclaw) and Dr J. E.

Wright (Buenos Aires), who have sent recent material for study, to Dr M. Svrček (Praha) for a translation into German of part of his paper on *C. tubulina*, to Dr S. J. Hughes (Ottawa) for a list of the specimens of *C. microspora* in DAOM, to Mr E. Åberg (Uppsala) for examining several dubious substrates, and to Dr L. Holm (Uppsala) for freezing microtome sections of these reluctant objects. Discussions (verbal and by correspondence) with Profs Chesters and Munk as well with Drs Holm, N. Lundqvist and R. Santesson (Uppsala) have been of great help to me. I also highly appreciate the assistance of the staffs of the consulted herbaria, viz. B, BAFC, BPI, FH, H, HFR, IMI, K, L, LD, NY, O, PC, PR, S, UPS, WRSL.

### References

- Albertini, I. B. de & Schweinitz, L. D. de 1805. *Conspectus Fungorum in Lusatiae superioris Agro niskiensi crescentium*. Lipsiae.
- Arx, J. A. von & Müller, E. 1954. Die Gattungen der amerosporen Pyrenomyceten. *Beitr. Krypt. flora Schweiz* 11:1.
- Berkeley, M. J. 1841. Notices of British fungi. *Ann. Mag. Nat. Hist.* 1(6): 335–365.
- 1860. *Outlines of British Fungology*... London.
- 1868. On a collection of fungi from Cuba. Part 2. *J. Linn. Soc., Bot.* 10: 341–392. ("1869")
- Berkeley, M. J. & Broome, C. E. 1873. Enumeration of the fungi of Ceylon. Part 2. *J. Linn. Soc., Bot.* 14 (= ns 73–74): 29–140. ("1875")
- Bisby, G. R. & Mason, E. W. 1940. List of Pyrenomycetes recorded for Britain. *Trans. Brit. Mycol. Soc.* 24(2): 127–243.
- Boedijn, K. B. 1959. On a new family of the Sphaeriales. *Persoonia* 1(1): 15–19.
- Cash, Edith K. 1953. A check list of Alaskan fungi. *The Plant Dis. Reporter, Suppl.* 219. Beltsville, Md.
- Cesati, V. 1879. Mycetum in itinere borneensi lectorum a cl. Od. Beccari enumeratio. *Atti R. Accad. Sci. Fis. Mat.* 8:3. Napoli.
- Chesters, C. G. C. 1960. *Camarops polyspermum* (Mont.) Mill. *Coventry Nat. Hist. Sci. Soc.*
- Chevangeon, J. 1956. Les maladies cryptogamiques du manioc en Afrique occidentale. *Encycl. Mycol.* 28.
- Ciferri, R. 1961. Mycoflora domingensis integrata. *Quaderno* 19.
- Cooke, M. B. 1871. *Handbook of British Fungi. Second Part*. Lewes.
- 1877. The Valsei of the United States. *Proc. Acad. Nat. Sci. Philadelphia* 1877(2–3): 110–127.
- 1883 a. On Xylaria and its allies. *Grevillea* 11(3) (= n. 59): 81–94.
- 1883 b. Nummularia and its allies. *Ibid.* 12(1) (= n. 61): 1–8.
- 1892. Neglected diagnoses. *Ibid.* 20(3) (= n. 95): 81–85.
- Cooke, W. B. & Hawksworth, D. L. 1970. A preliminary list of the families proposed for Fungi (including the Lichens). *Mycol. Pap.* 121.
- Currey, F. 1858. Synopsis of the fructifications of the Compound Sphaeriae of the Hookerian Herbarium. *Trans. Linn. Soc.* 22(3): 257–287.
- Curtis, M. A. 1867. *Geological and Natural History Survey of North Carolina. 3. Botany ...* Raleigh (n.v.).
- Dennis, R. W. G. 1960. *British Cup Fungi and their allies ...* London (Ray Society).
- 1961. Xylarioideae and Thamnomycetoideae of Congo. *Bull. Jard. Bot. Etat Bruxelles* 31(2): 109–152.
- 1962. Xylarioideae et Thamnomycetoideae. In: *Flore iconographique des champignons du Congo ... Fasc. 11*. Bruxelles.

- 1968. *British Ascomycetes*. Stuttgart.
- Dodge, B. D. 1957. Oil drops and de Bary "bubbles" in ascospores. *Bull. Torrey Bot. Cl.* 84(6): 431–441.
- Domanski, S. *et al.* 1970. Mikoflora Bieszczadów Zachodnich 4 (Zatwarnica, 1965) Mycoflora of West Bieszczady 4. *Acta Mycol.* 6(1): 129–179.
- Dörfelt, H. 1970. *Camarops polysperum* [sic] (Montagne) Miller, ein bemerkenswerter Fund aus Ostthüringen. *Westfäl. Pilzbriefe* 8(1): 7–11.
- Duby, J. E. 1830. ... *Botanicon Gallicum* (ed. sec.) *Pars secunda*. Paris.
- Ellis, J. B. 1881. New species of North American fungi. *Bull. Torrey Bot. Cl.* 8(7): 73–75.
- Ellis, J. B. & Everhart, B. W. 1888. Synopsis of the North American species of Hypoxylon and Nummularia. *J. Mycol.* 4(4–5): 38–44.
- 1892. *The North American Pyrenomycetes* ... Vineland, N.J.
- 1894. New species of fungi from various localities. *Proc. Acad. Nat. Sci. Philadelphia 1894*: 322–386.
- Engelke, C. 1909. Eine seltene Pyrenomyceten-Art. *Ann. Mycol.* 7(2): 176–181.
- Eriksson, O. 1966. On Anthostomella Sacc., Entosordaria (Sacc.) Höhn. and some related genera (Pyrenomycetes). *Svensk Bot. Tidskr.* 60(2): 315–324.
- Fries, E. 1818. Uppställning af de i Sverige funne Vårtsvampar (Scleromyci). *K. [Sv.] Vet. Acad. Handl.* 37(1): 126–157.
- 1823. *Systema mycologicum* 2. *Sect. secunda*. Lundae.
- 1825–27. *Stirpes agri femsionensis*. Londoni Gothorum.
- 1830. *Eclogae fungorum, praecipue ex herbariis germanorum descriptorum*. *Linnaea* 5: 497–553.
- 1849. *Summa vegetabilium Scandinaviae* ... *Sect. posterior*. Upsaliae.
- Fuckel, L. 1870. *Symbolae mycologicae* ... *Jb. Nassau. Ver. Naturk.* 23–24. ("1869")
- 1873. *Id. Zweiter Nachtrag*. *Ibid.* 27–28: 1–99. ("1873–74")
- Hennings, P. 1897. Beiträge zur Pilzflora Südamerikas 2. *Hedwigia* 36(2–3): 190–246.
- Höhnelt, Fr. 1923. Fragmente zur Mykologie 25. *Sitz. ber. Akad. Wiss. Wien, Math.-nat. Kl. I*: 132: 89–118.
- Index of Plant Diseases in the United States, 1960. *U.S. Dept. Agric., Agric. Handb.* 165.
- Iwade, 1944. In: *Bull. Tokyo Imp. Univ. Forests* 33 (n.v.; cited from Dennis 1961).
- Karsten, P. A. 1869. *Fungi Fenniae exsiccati* ... *Cent.* 9. Åbo.
- 1873. *Mycologia fennica. Pars secunda. Pyrenomycetes*. *Bidr. känned. Finl. nat. folk* 23.
- 1885. *Revisio monographica atque synopsis ascomycetum in Fennia hucusque detectorum*. *Acta Soc. F. Fl. Fenn.* 2:6.
- Lind, J. 1913. *Danish fungi as represented in the herbarium of E. Rostrup*. Copenhagen.
- Lloyd, C. G. 1924a. *Mycological Notes* 71. *Mycol. Writ.* 7(6): 1237–1268.
- 1924b. *Id.* 72. *Ibid.* 7(7): 1269–1300.
- 1924c. *Id.* 73. *Ibid.* 7(8): 1301–1332.
- 1925. *Id.* 75. *Ibid.* 7(10): 1349–1364.
- Lundell, S. 1932. *Bidrag till Uppsalatraktens hymenomycetflora. 1. Vårdsättra naturpark*. *K. Sv. Vet.-akad. Skr. Naturskyddsår.* 22.
- Maas Geesteranus, R. A. 1968. Een zeldzame Pyrenomycete. *Coolia* 13(6): 121–123.
- Martin, P. 1967a. *Studies in the Xylariaceae. 1. New and old concepts*. *J. S. Afr. Bot.* 33(3): 205–240.
- 1967b. *Id.* 2. *Rosellinia and the Primocinerea Section of Hypoxylon*. *Ibid.* 33(4): 315–328.
- 1968a. *Id.* 3. *South African and foreign species of Hypoxylon sect. Entoleuca*. *Ibid.* 34(3): 153–199.
- 1968b. *Id.* 4. *Hypoxylon, sections Papillata and Annulata*. *Ibid.* 34(5): 303–330.

- 1969*a*. Id. 5. Euhypoxylon. *Ibid.* 35(3): 149–206.
- 1969*b*. Id. 6. Daldinia, Nummulariola and their allies. *Ibid.* 35(5): 267–320.
- 1969*c*. Id. 7. Anthostomella and Lopadostoma. *Ibid.* 35(6): 393–410.
- 1970. Id. 8. Xylaria and its allies. *Ibid.* 36(2): 73–138.
- Massee, G. 1886. British Pyrenomycetes ... *Grev.* 15(2) (= n. 74): 33–39.
- Miller, J. H. 1928*a*. Biologic studies in the Sphaeriales. 1. *Mycol.* 20(4): 187–213.
- 1928*b*. Id. 2. *Ibid.* 20(6): 305–339.
- 1930. British Xylariaceae. *Trans. Brit. Mycol. Soc.* 15(1–2): 134–154.
- 1932*a*. Id. 2. *Ibid.* 17(1–2): 125–135.
- 1932*b*. Id. 3. A revision of specimens in the Herbarium of the Royal Botanic Gardens, Kew. *Id.*: 136–146.
- 1941. Georgia Pyrenomycetes. 2. *Mycol.* 33(1): 74–81.
- 1949. A revision of the classification of the Ascomycetes with special emphasis on the Pyrenomycetes. *Ibid.* 41(2): 99–127.
- 1961. *A Monograph of the world species of Hypoxylon*. Athens, Ga. (Univ. of Georgia Press).
- Montagne, J. F. C. 1842. Botanique—Plantes cellulaires. In: Sagra, R. de la, *Histoire physique, politique et naturelle de l'île de Cuba* 9:2. Paris 1838–42.
- 1850. Seconde Centurie de Plantes cellulaire exotiques nouvelles, décades 3, 4 et 5. *Ann. Sci. Nat. Bot.* 2:13: 338–359.
- 1856. *Sylloge generum specierumque Cryptogamarum* ... Parisiis.
- Munk, A. 1953. The system of the Pyrenomycetes ... *Dansk Bot. Ark.* 15:2. (Also diss., Copenhagen.)
- 1957. Danish Pyrenomycetes ... *Ibid.* 17:1.
- Nannfeldt, J. A. 1932. Studien über die Morphologie und Systematik der nicht-lichenisierten inoperculaten Discomyceten. *N. Acta R. Soc. Sci. Upsal.* 4:8:2. (Also diss., Uppsala.)
- Nitschke, Th. 1867. *Pyrenomycetes germanici* ... 1:1–2. Breslau.
- Peck, Ch. H. 1887. Plants not before reported. *Ann. Rep. N. Y. State Mus. Nat. Hist.* 40: 52–71.
- Penzig, O. & Saccardo, P. A. 1897. Diagnoses fungorum in insula Java collectorum. Series secunda. *Malpighia* 11: 491–530.
- 1901. Id. Series tertia. *Ibid.* 15: 201–260.
- 1904. *Icones fungorum javanicorum*. Leiden.
- Petch, T. 1924. Xylariaceae Zeylaniae. *Ann. R. Bot. Gard. Peradeniya* 8: 119–170.
- Phillips, W. & Plowright, Ch. B. 1880. New and rare British fungi. *Grevillea* 8(3) (= n. 47): 97–109.
- Rehm, H. 1901. Beiträge zur Pilzflora von Südamerika ... 13. Xylariaceae. *Hedwigia* 40(2–3): 141–149.
- Rick, J. 1908. Fungi austro-americi. Fasc. 9 u. 10. *Ann. Mycol.* 6(2): 105–108.
- 1931*a*. Monographia das Hypoxyleas Riograndenses. *Brotéria, ser. bot.* 25(1): 21–50.
- 1931*b*. Monographia Bolinearum riograndensium. *Ibid.* 25(2): 65–71.
- Rogers, D. P. 1954. On the dates of Fuckel's Symbolae. *Mycol.* 46(4): 533–534.
- Saccardo, P. A. 1882. *Sylloge Fungorum* 1. Patavii.
- 1891. *Id.* 9.
- 1895. *Id.* 11.
- *et al.* 1904. The Fungi of Alaska. In: *Harriman Alaska Expedition* ... 5. *Cryptogamic Botany*. New York.
- Schroeter, J. 1897. Pilze. Zweite Hälfte. In: Cohn, Fr., *Kryptogamen-Flora von Schlesien* 3. Breslau 1893–1908.



- Schweinitz, L. D. de 1822. Synopsis fungorum Carolinae superioris ... *Schr. Naturf. Ges. Leipzig* 1: 20–131.
- 1832. Synopsis fungorum in America boreali media degentium. *Trans. Amer. Phil. Soc.* 2:4: 141–316.
- Seaver, F. J. & Chardon, C. E. 1926. Mycology. In: *Scientific Survey of Porto Rico and the Virgin Islands* 8:1. New York Acad. Sci.
- Shear, C. L. 1917*a*. Studies of the Schweinitz collections of fungi. 1. Sketch of his mycological work. *Mycol.* 9(4): 191–204.
- 1917*b*. Id. 2. Distribution and previous studies of authentic specimens. *Ibid.* 9(6): 333–344.
- 1923. Life histories and undescribed genera and species of fungi. *Ibid.* 15(3): 120–131.
- 1938. Mycological notes. 2. *Ibid.* 30(5): 580–593.
- 1940. Id. 4. *Ibid.* 32(4): 541–549.
- 1945. Studies of types and authentic specimens of Hypoxylon. 1. *Lloydia* 8(4): 245–262.
- Shear, C. L. *et al.* 1917. Endothia parasitica and related species. *U.S. Dept. Agric. Bull.* 380.
- Starbäck, K. 1901. Ascomyceten der ersten Regnellschen Expedition. 2. *Bih. K. Svenska Vet.-Akad. Handl.* 27:3:9.
- Stevenson, J. A. & Cash, Edith K. 1936. The new fungus names proposed by C. G. Lloyd. *Bull. Lloyd Libr. Mus.* 35 (= *Mycol. ser.* 8).
- Stevenson Jr, Wm. C. 1878. Additions to Mr Cooke's paper on "The Valsei of the United States". *Proc. Acad. Nat. Sci. Philadelphia* 1878(3): 86–88. ("1879")
- Strasser, P. 1907. Vierter Nachtrag zur Pilzflora des Sonntagsberges (N.-Ö.). 1904. *Verh. k.k. zool.-bot. Ges. Wien* 57: 299–340.
- Svrček, M. 1969. *Bolinia tubulina* (Alb. et Schw. ex Fr.) Sacc. v Československu. (*Bolinia tubulina* ... in der Tschechoslowakei gefunden.) *Česká Mykol.* 23(2): 118–122.
- Theissen F. 1909*a*. Xylariaceae austro-brasilienses. Zweiter Teil. *Ann. Mycol.* 9(1): 1–18.
- 1909*b*. Id. (Forts.). *Ibid.* 9(2): 141–167.
- Vleugel, J. 1911. Zweiter Beitrag zur Kenntnis der Pilzflora in der Umgebung von Umeå. *Svensk Bot. Tidskr.* 5(3): 325–350.
- Wehmeyer, L. E. 1961. *A world monograph of the genus Pleospora and its segregates*. Ann Arbor (Univ. of Michigan Press).
- Winter, G. 1887. Die Pilze Deutschlands, Oesterreichs und der Schweiz. 2. Abth. Ascomyceten: Gymnoasceen und Pyrenomyceten. In: *Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz.* 2. Aufl. 1. Pilze. Leipzig 1884–1887.

### Addenda

Several interesting and important finds have recently become known to me through the courtesy of Mr J. Jeppson and of participants of the Autumn Foray 1972 of the British Mycological Society, which I had the favour to attend as a guest of the Society.

#### Camarops lutea

Great Britain: Buckinghamshire: Ivinghoe (*Fagus s.*) 19.VI.1971 P.C. Holland 2669 (UPS!).

Lancashire: Ainsdale Sand Dunes (*Alnus glut.*; very strong yellow staining of the wood) 8.IX.1972 G. M. Roe (UPS!). — Anglezark, High Bullough Wood (rotten wood) 12.IX.1972 Mrs M. C. Clark (!).

Denbighshire: Loggerheads Nature Trail (*Fraxinus excelsior*: new host) 11.IX.1972 G. M. Roe (UPS!).

**Camarops polysperma**

*Sweden*: Skåne, Hyby, Bökeberga (*A. gl.*; one fresh stroma ca. 18 × 2 cm) 13.VII.1972 J. Jeppson 286 (UPS!). — Löberöd, "Rövarkulan" in the valley of the R. Bråån (*A. gl.*; one last year's stroma) 16.VII.1972 J. Jeppson (not collected).

Västergötland: V. Tunhem, N. of "Hembygdsgården" (*A. gl.*; 14 stromata on the same trunk as earlier) 22.VII. & 10.IX.1972 J. Jeppson 325 (UPS!).

*Great Britain*: Shropshire: Pontesford, Earl's Hill Nature Reserve (nr. Shrewsbury) (*A. gl.*) 1.IX.1972 M. C. Clark (UPS!).