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## Some Dematiaceous *Hyphomycetes* from Mediterranean maquis litters

### Abstract

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This is an account of investigations carried out on dematiaceous hyphomycetes colonizing the litter of different seven areas of mediterranean maquis. Hundred and eight species were observed, determined and a drawing for each, obtained from photographic pictures, to point out the most important morphological characters, was prepared keeping as fundamental the dimensions of the different structures. Some considerations on the role of the different species into the ecosystem are carried out.

*Key words:* Microfungi, saprotroph, litter.

### Introduction

In this work we are carrying out the description of 108 species of Dematiaceous *Hyphomycetes* found on Mediterranean maquis litters. Some of these species are of recent taxonomic identification and many others are reported as new records on the studied ecosystems. The taxonomic implication of the work is also the inclusion of the different description of the genera diagnosis, many original and many reported by Saccardo and other authors but accepted as original. Since an english interpretation of the genera and species is always reported, even if very modest, in its complexity the work could be stimulating the attention and curiosity of new mycologists.

The data included are the results of several years of investigations carried out on litters of six different areas in Italy. The Mediterranean maquis vegetation represent an ecosystem easy to study because of the good separation in nature of the litter composition under the different plants. Nevertheless the data are not complete: no fungal species distinction on the different seasons was carried out and more attention to local microambients (for instance the Bosco Isola area has a side along the Lesina lake) should be devoted. In this way the description of the mycological characters, the dimensions, the reported localities of findings and the drawings could be considered a starting point for more detailed investigations on the same areas and in news to give a more extensive idea of the Dematiaceous *Hyphomycetes* in Mediterranean maquis ecosystems.

## Materials and methods

Samples of litter were collected under plants of seven stations characterized by typical mediterranean maquis vegetation: Pantelleria island (Montagna Grande, Monte Gibele, Santa Teresa), Circeo National Park (Torre Paola), Ustica island, Bosco Isola (between Lesina lake and Adriatic coast), Salina island, Sardegna island (Torre del Sevo), Tuscania (Central West Italy). All the mycological species described were studied while growing on the natural substratum. The stereomicroscopic examination was carried out into the first 24 hours from the collection, and the second after 10 days of incubations in moist chamber. Permanent slides were prepared from each colonization or for solitary mycological structures, just to obtain enough material to determine genus and species. A deep bibliographic research was carried out on relevant publications and in different libraries: all the useful bibliographic material was copied, computer recorded, printed, preserved in the personal reprint collections of the author and employed for the taxonomic determinations. The morphological characters of each specimens were compared, when possible, with type exiccata. A drawing to show the mycological characters of each species was obtained from photographic pictures taken on complete subjects, that is to say containing in a single picture all the mycological structures (setae when present, conidiophores, conidiogenous cells and conidia) just to respect in the drawing the proportions. The description of each species was completed with a bibliographic documentation.

When the examination was concerning poor material the strain was leaved as “indetermined species”.

For each species we reported, when possible, the original genus diagnosis, the type species, the Author description in english of the morphological characters, just to compare them with those of our strain, to point out eventual differences, to check an influence of the substratum composition and to quote a possible saprotrophic specialization.

The taxonomic part is presented through an Index of Genera and Species in which the conidiogenesis and in particular the structures for the conidiogenesis, conidiophores and conidiogenous cell (sympodial denticulate, sympodial with scars, percurrent, percurrent calyciform, percurrent annellidic, phialidic, phialidic with collarettes) are considered, naturally also with the morphology of conidia important mycological structures, like shape, colour, septation (euseptation, distoseptation), presence of ornamentations (setulae, hilum, pegs), and then conidial solitary or in chains (acropetal, basipetal).

In particular in the Index the species described are divided into six groups and ten subgroups:

**Conidiophores macronematous, conidiogenous cells sympodial, polyblastic, denticulate.**

- Denticles slightly prominent.
- Denticles prominent.
- Denticles prominent cylindrical.
- Denticles as separating cells.
- Denticles prominent cone-shaped.

**Conidiogenous cells phialidic.**

- Conidiophores micronematous, conidiogenous cells phialidic.
- Conidiogenous cells mono-polyphialidic.

**Conidiogenous cells sympodial cicatrized, scars not protruding.**

- Conidiogenous cells sympodial, cicatrized, scars large and dark.
- Conidiophore macronematous, conidiogenous cells sympodial cicatrized, scars small, flat, conidia in acropetal chains.

**Conidiophore macronematous, conidiogenous cells percurrent.**

**Conidiophore micronematous, conidiogenous cells indistinguishable, conidia holoblastic in multiple columns.**

**Conidiophore macronematous, conidiogenous cells polyblastic, sympodial with scars and denticles, conidia holoartric in disarticulating chains.**

In each group the morphological characters of genus and species are carried out in a very synthetic way, and in the third column the attribution to the taxonomic part.

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**TAXONOMIC REVIEW****ACUMISPORA**

(Matsushima 1980, Matsush. Mycol. Mem. n.1. Kobe).

The genus *Acumispora* was described by Matsushima (1980) for three species characterized by conidiophores generally simple, or irregularly branched, producing solitary conidia with acuminate apex. The genus diagnosis as proposed by Matsushima is here reported.

*Acumispora* Matsushima, 1980.

Type species: *Acumispora uniseptata* Matsushima, 1980.

*Deuteromycotina, Hyphomycetes. Saprophytica. Conidiophora dispersa, brevia, simplicia vel irregulariter ramosa, pallide brunnea; ramis terminalibus cylindricis, apice angustatis conidio solitario ferentibus. Conidia longa, 1-numerose - septata, apice acuminata, hyalina vel pallide colorata.*

Conidiophores solitary, short, simple or irregularly branched, clear brown. Branches cylindrical. Conidia solitary, cylindrical-fusiform, with 1 or several septa, and acuminate apex, hyaline or clear brown.

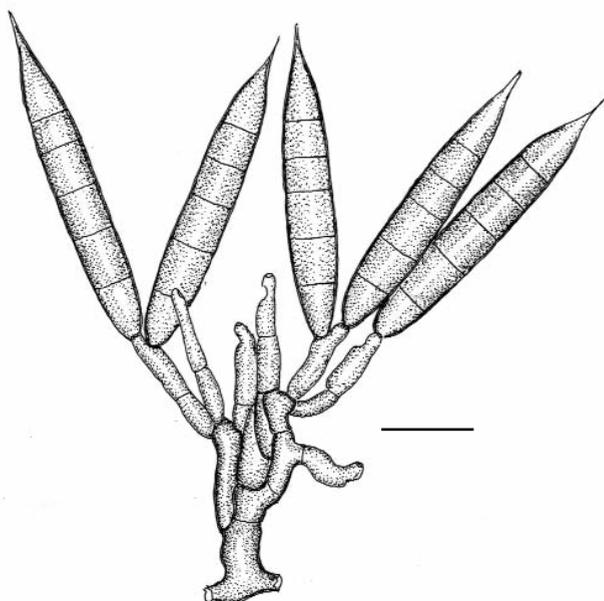


Fig. 1. *Acumispora fragmospora*. Conidiophores, conidiogenous cells sometimes developing sympodially, conidia. Bar 8  $\mu$ m.

*Acumispora fragmospora* Matsushima, 1980.

Colonies inconspicuous, composed by isolated groups of 2 or 3 specimens repeatedly branched. Conidiophores macronematous, mononematous, erect, clear brown or olive brown, smooth, with few septa, up to 22×4 µm near the base. Conidiogenous cells holoblastic, very irregular in shape and dimensions, generally erect, branched, sometimes developing sympodially on one side, clearer in colour. Conidia fusiform, cylindrical, with an acuminate apex and a narrow base without protuberant hilum, 4-5-euseptate, brown of the same colour of the conidiophores, smooth, 36-38×4-5 µm.

On dead leaves of *Pistacia lentiscus*. Bosco Isola, South-East Italy.

We have found only the species *A. fragmospora*, and never seen the other two species described by Matsushima.

### PLEUROPHRAGMIUM

(Costantin 1888, Mucéd. Simpl. : 100)

The genus *Pleurophragmium* was erected by Costantin (1888) for species with conidiophores erect, brown, conidiogenous cells sympodially denticulate, denticles cylindrical, conical and conidia solitary, acropleurogenous. This very simple description distinguishes the species of the genus from those with conidiogenous cells sympodially denticulate but with denticles protuberant and cylindrical characteristic of the genus *Anungitea*. Nevertheless another important morphological character distinguishes *Anungitea* from *Pleurophragmium* since in the former the conidia are in acropetal chains and in the second solitary.

*Pleurophragmium* Costantin, 1888 (fide Saccardo 1913)

*Hyphis conidiophoris erectis, filiformibus, septatis, brunneis, apice et sub apice denticulato-sporigeris, pallidoribus, 4 µm cr.; conidiis in denticulis insertis, oblongis, basi acutiusculis, apice rotundatis, plerunque 3-septatis, subhyalinis, coacervatis dilute coloratis, non v. vix constrictis, capitulum oblongum pallidum formantibus.*

*Hab. ad truncos ? in Gallia. - But: Conidia acropleurogena etiam in aliis generis speciebus occurrunt, hinc novum genus Costantinii non satis validum videtur.*

Saccardo considered not valid the genus and includes the species in the genus *Acrothecium* as *A. bicolor* (Cost.) Sacc. (1913).

The first type species of the genus was *P. bicolor* Costantin with successive synonyms in the genera *Spiropes* Ciferri (1955) and later *Nascimentoa* Ciferri & Batista (1956). But Hughes (1958) transferred *Acrothecium simplex* Berk & Broome (1861) into *P. simplex* that resulted synonym of *P. bicolor* Costantin. Ellis (1971) in his work *Dematiaceous Hyphomycetes* quotes *P. simplex* (Berk. & Broome) Hughes as type species and with the synonym *P. bicolor* Costantin. De Hoog & Arx (1973) considered *P. simplex* synonym of *Dactylaria parvispora*.

In this situation the genus *Pleurophragmium* seems without a valid type species even if some new taxa were proposed in these last years.

According to Ellis (1971) the *Pleurophragmium* genus description could be as follow.

***Pleurophragmium*** Costantin, 1888.

Colonies effuse, thinly hairy, pale brown to dark greyish brown. Mycelium mostly immersed. Stroma often present, partly or wholly immersed, mid or dark brown, often plate-like. Conidiophores macronematous, mononematous, unbranched, straight or flexuous, mid to dark brown, usually paler at the apex, smooth. Conidiogenous cells polyblastic, integrated, terminal, sympodial, cylindrical, denticulate; denticles usually tapered to a point (*denticles cylindrical, flat-topped in *Dactylaria**). Conidia solitary, dry, acropleurogenous, simple, narrowly ellipsoidal, to subclavate, rounded at the apex, tapered to a point at the base which has no flat scar, hyaline to brown, smooth or verruculose, with 0-1 or a few septa.

Type species: *Pleurophragmium simplex* (Berk. & Broome) Hughes = *P. bicolor* Cost. (?). Comparing the diagnosis of *Pleurophragmium* and *Dactylaria* the only one differences can be found in the morphology of the denticles and consequently in the base of the conidia. Is it really a valid character to distinguish *Pleurophragmium* from *Dactylaria* ?

Here we describe two species: *Pleurophragmium cylindrosporum* and *P. tricolor*.

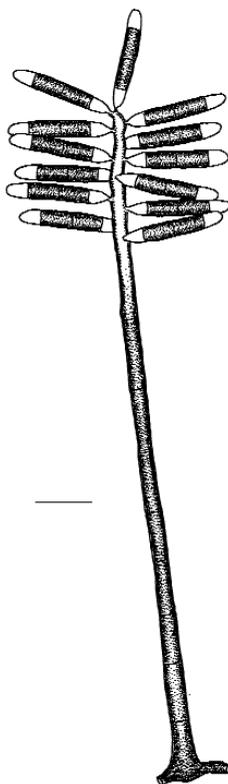


Fig. 2. *Pleurophragmium cylindrosporum*. Conidiophores and conidia. Bar 20  $\mu$ m.

***Pleurophragmium cylindrosporum*** Matsushima, 1975.

Type species: *P. bicolor*?

Conidiophores solitary, macronematous, mononematous, straight, septate, dark brown, clear towards the apex, smooth,  $209\text{-}350 \times 8\text{-}9 \mu\text{m}$ . Conidiogenous cells denticulate, sympodial,  $30\text{-}40 \times 7 \mu\text{m}$ . Conidia acropleurogena, solitary, cylindrical, rounded at the apex, pointed at the base, 3-septate, with brown central cells and hyaline apical and base cells, smooth,  $32\text{-}35 \times 6\text{-}7 \mu\text{m}$ .

On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

Our strain presents some size differences if compared to Matsushima description of *P. cylindrosporum* (1975), mainly in the conidiophores and conidia, differences presumably determined by the different substratum composition. It is also very closed to *P. bicolor* Matsushima (1975) quoted by the Author with smaller conidia and with central cells less pigmented.

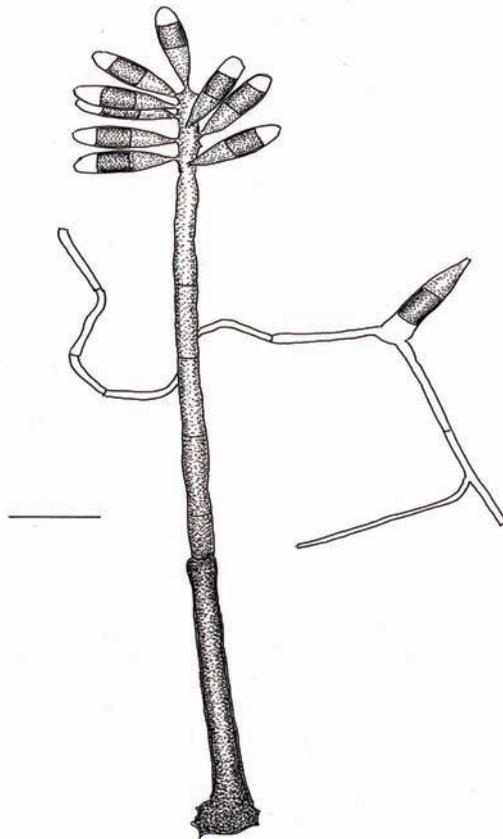


Fig. 3. *Pleurophragmium tricolor*. Conidiophore, conidia and germinating conidium. Bar 20  $\mu\text{m}$ .

***Pleurophragmium tricolor*** Rambelli, 2009.

Type species: ?

Colonies not crowded, composed by isolated conidiophores. Conidiophores macronematous, mononematous, unbranched, straight or slightly flexuous, brown, dark brown at the base and clearer towards the apex, smooth, 196-200×5-7 µm conidiogenous cell included. Conidiogenous cells polyblastic, integrated, terminal, sympodial, with short cylindrical denticles tapered to a point. Conidia solitary, dry, acropleurogenous, ellipsoidal with rounded apex and pointed base, 2-septate, with hyaline apical cell, brown central cell and clear brown basal cell, smooth, 17-18×4-5 µm.

On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

Some morphological characters, like the three celled conidia with different pigmentation, are not present in the description of the well-known taxa of the genus. This species appears with stable dimensions of the conidiophores and conidia. For the conidia germination seems mainly involved the apical clearer cell.

This beautiful species seems not very common on dead vegetal material in the areas investigated: we have found only a group of conidiophores in a *A. unedo* leaf. It will be interesting to carry out some more observations in the area to study its possible specialization on a well determined substratum.

### SOLOSYMPODIELLA

(Matsushima 1971, Microfungi of Solomon islands and Papua New Guinea. Kobe).

The genus *Solosympodiella* was erected by Matsushima (1971) for a species, found in forestry litter of Solomon Island and Papua New Guinea. As general morphology *Solosympodiella* is very similar to *Sympodiella*, differs for its conidia not catenate, solitary, with rounded apex and truncated base. The genus diagnosis as proposed by Matsushima is here reported.

***Solosympodiella*** Matsushima. 1971.

*Pertinent ad Fungos Imperfectos - Hyphomycetes.*

*Conidiophora erecta, simplicia vel parce ramosa, septata, hyalina vel colorata, in parte superiore conidiifera, sympodialiter elongascentia, cicatricibus late planis multis praedita, conidiis acropleurogene producta.*

*Conidia elliptica vel clavata, basi late truncata, continua vel transverse septata, hyalina vel pallide colorata.*

*Species typica: Solosympodiella clavata* Matsushima.

Conidiophores macronematous, mononematous, sometimes with few branches, solitary, erect, hyaline or pigmented. Conidiogenous cells polyblastic, integrated, terminal, sympodial, denticulate, denticles cone-shaped. Conidia acropleurogenous, ellipsoidal to clavate, truncate at the base, sometimes septate, clear brown.

***Solosympiella clavata*** Matsush. 1971.

Colonies inconspicuous, composed by solitary conidiophores. Conidiophores macronematous, mononematous, solitary, unbranched, erect, brown up to  $160 \times 2-3.5 \mu\text{m}$ . Conidiogenous cells polyblastic, integrated, terminal, sympodial, geniculate, denticulate, denticles cone-shaped and cicatrized. Conidia solitary, clavate, truncate at the base, 1-septate, rarely 2-septate, subhyaline,  $12-18 \times 2-3 \mu\text{m}$ .

On dead leaves of *Pistacia lentiscus*. Central West Sardinia, Italy.

This species can be easily recognizable not only for the particular clavate conidia, but also for the shape of the conidiogenous cells that, in the specimens well developed, is very irregular and nodose for several conical and cicatrized conidial loci.

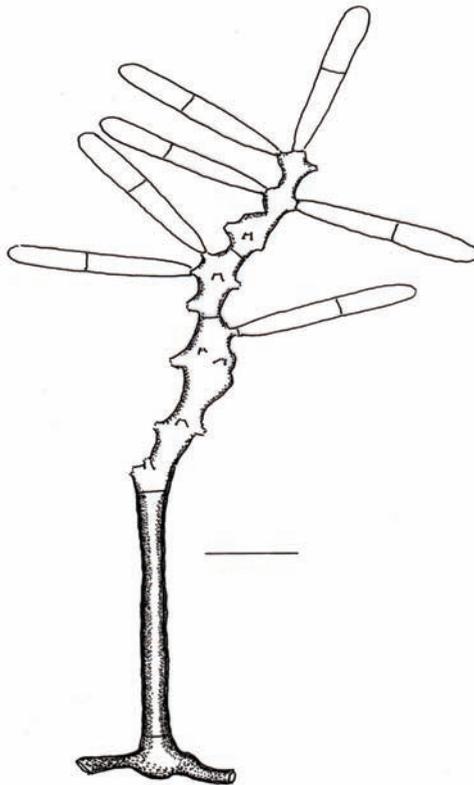


Fig. 4. *Solosympiella clavata*. Conidiophore, nodose conidiogenous cell and conidia. Bar  $8 \mu\text{m}$ .

### ARDHACHANDRA

(Subramanian & Sudha 1978, *Canad. J. Bot.* 56: 729).

The genus *Ardhachandra* was erected by Subramanian & Sudha (1978) for a fungus collected at Tambaram (India) on dead leaves of *Ixora parviflora*, fungus that was cause of mistakes for different interpretation of its morphology.

The Authors found the specimens collected as congeneric with a fungus described by Pirozynski (1972) as *Rhinocladiella critaspora* Matsushima (1971). In the strain collected at Tambaram Subramanian & Sudha observed two types of conidia, lenticular and selenoid. De Hoog & Hermanides-Nijhof (1977) classified the Matsushima fungus in the genus *Pseudobeltrania* as *P. critaspora* (Matsush.) De Hoog and Hermanides-Nijhof (1977) and considered the Pirozynski strain a new species, *Pseudobeltrania selenoides* de Hoog, as different from *P. critaspora*.

But *P. selenoides* resulted to be a parasite, with peculiar characters not found in the strain of Subramanian & Sudha and in the species classified by Matsushima as *Rhinocladiella critaspora*. According to these observations the new genus *Ardhachandra* was erected by Subramanian & Sudha with the following diagnosis:

*Ardhachandra* Subramanian & Sudha, 1978. *Hyphomycetes producentes blastoconidia. Hyphae vegetativae septatae, ramosae. Conidiophorae brunneae, septatae, distincte denticulatae in parte fertili. Conidia duorum typosum: selenoidea and lenticularia; uterque typus terminalis, producta singillatim et successive sequentia sympodiali portata in denticulis prominentibus, unicellularia, typice bivalva cum rima germinalia, brunnea.*

*Hyphomycetes* producing blastoconia. Vegetative hyphae septate, branched. Conidiophores brown, septate, branched. Conidiogenous cells, distinctly denticulate in the fertile part. Conidia of two types: selenoid and lenticular, both types terminal, produced singly and successively in a sympodial sequence, borne on prominent denticles, one-celled, typically bivalved with a germ slit, brown.

Type species: *Ardhachandra selenoides* (de Hoog) Subramanian & Sudha, 1978.

Basionym: *Pseudobeltrania selenoides* de Hoog, 1977.

The Authors examining the Matsushima's fungus, even if with production of only lenticular conidia, considered the specimens able to produce the two types of conidia and proposed the new combination *Ardhachandra critaspora* (Matsush.) Subramanian & Sudha with *Rhinocladiella critaspora* Matsush. as Basionym.

In our opinion the fungus examined by Matsushima, de Hoog & Hermanides-Nijhof and Subramanian & Sudha is not characterized by the production of two type of conidia, but the different position that they can occupy in the slide revealed a misinterpreting morphology (Pasqualetti & al., 2005). In this respect the two species, *A. critaspora* and *A. selenoides*, can be reduced to one and since the first finding can be attributed to Matsushima (*Rhinocladiella critaspora*, 1971), the valid species should be named *Ardhachandra critaspora* (Matsush.) Subramanian & Sudha (1978) also as type species.

For a better understanding of the complicated problem the genus description of Pasqualetti & al. (2005) is here reported:

***Ardhachandra*** (Matsush.) Subramanian & Sudha, 1978.

Conidiophores macronematous, mononematous, erect, clear brown to brown. Conidiogenous cells polyblastic, integrated, terminal, sympodial, with prominent denticles, clear brown. Conidia solitary, in *aspectu frontali* fusiform, ellipsoidal, in *aspectu laterali* selenoid or lenticular, pointed at the ends, with lateral crest or bands, aseptate, clear brown or light yellow.

***Ardhachandra critaspora*** (Matsush.) Subram. & Sudha, 1978.

Conidiophores macronematous, mononematous, solitary, erect, straight or flexuous, clear brown to brown, 40-140 (230)×3-4 μm. Conidiogenous cells polyblastic, terminal, integrate, sympodial, denticulate, clear brown. Conidia solitary with pointed ends, in *aspectu frontali* broadly fusiform, 21-24×6.5-7.5 μm, in *aspectu laterali* selenoid, 5-6 μm large, with lateral crest, clear brown.

Basionym: *Rhinochadiella critaspora* Matsush., 1971.

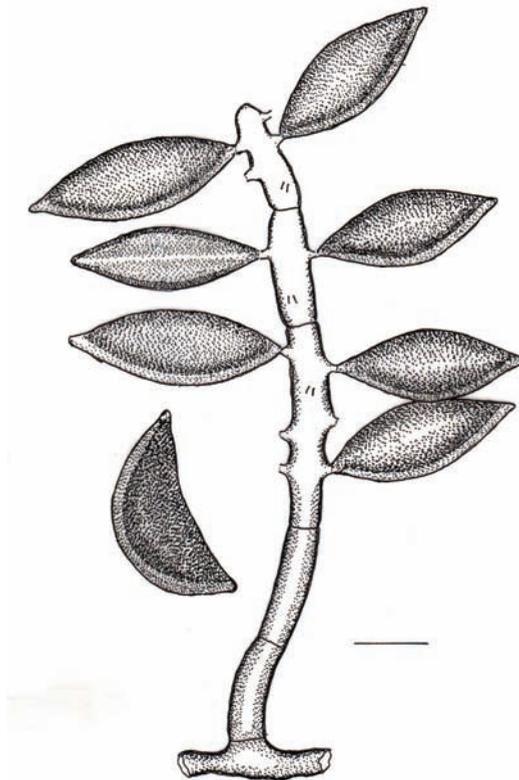


Fig. 5. *Ardhachandra critaspora* (Matsush.) Subramanian & Sudha. Conidiophores with conidia appearing in different position. Bar 7.5 μm.

Synonym: *Pseudobeltrania critaspora* (Matsush.) de Hoog, 1977.

On dead leaves of *Myrtus communis*, *Pistacia lentiscus*. Torre del Sevo, Central West Sardinia.

The Matsushima diagnosis concerns the fungus cultivated in artificial substratum, we prefer to describe our strain found on mediterranean litter.

*Ardhachandra aequilatera* Matsushima, 1987.

Type species: *Ardhachandra selenoides* (de Hoog) Subramanian & Sudha, 1978.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, solitary, unbranched, clear brown to brown, 20-50×3-4 µm. Conidiogenous cells polyblastic, integrated, terminal, sympodial, denticulate, clear brown. Conidia solitary, with pointed ends, clear brown, in *aspectu frontali* broadly fusiform, 15.5-18-5×5.5-7-5 µm, in *aspectu laterali* lenticular, 4.5-6 µm large, with two lateral bands.

On dead leaves of *Myrtus communis*, *Pistacia lentiscus*. Central West Sardinia, Italy.

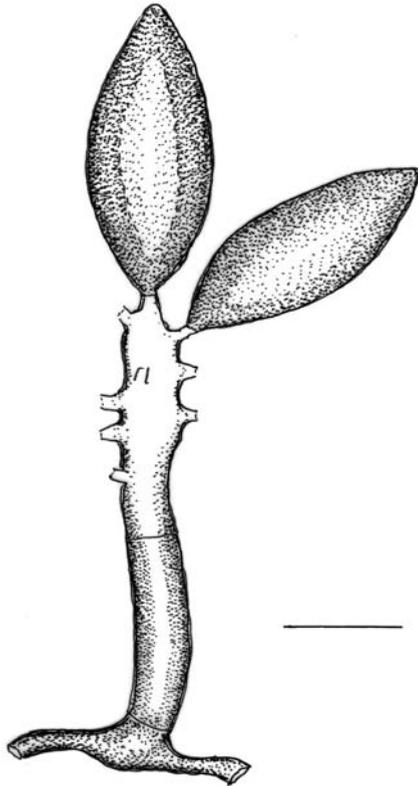


Fig. 6. *Ardhachandra aequilatera*. Conidiophores and conidia. Bar 6 µm.

## ANUNGITEA

(Sutton 1973, Mycol. Pap., 132: 1-15).

The genus *Anungitea* was erected by Sutton (1973) on mycological material collected in Canada (Manitoba and Saskatchewan) and in particular to include the species characterized by conidiophores not branched, sympodial denticulated, terminal and polyblastic conidiogenous cells and conidia in acropetal chains, developing from conspicuous denticles. The Author includes in the diagnosis description also the possible presence of solitary conidia, but presumably to be considered as first conidium production. The mention to 1-septate conidia on the genus diagnosis is a limitation obviously not observed by others authors, nevertheless to validate the proposal of the new genus the Author carries out a very good comparison with all the genera characterized by acropetal conidial development, pointing out the important morphological character of *Anungitea* represented by prominent denticles on the conidiogenous cells. Examining the comparison between *Stenella* and *Anungitea* the Author points out the branched conidiophores in *Stenella* and unbranched in *Anungitea*. Nevertheless, the most important character emerging from the comparison is the conidial production from conidiogenous cells through protuberant denticles. As we will see examining the genus *Anungitopsis* (Castaneda Ruiz 1990) the fertile denticles after the conidia production can be subject to a rather transformation that could be cause of discussion. The diagnosis of the genus as proposed by Sutton is here reported:

*Anungitea* Sutton, 1973.

Etym. anungite (Dakota), two-faced being.

*Coloniae effusae, pallide brunneae, pilosae. Mycelium immersum vel superficiale, ex hyphis septatis, ramosis, brunneis, laevibus compositum. Conidiophora macronemata, mononemata, non ramosa, recta vel leniter flexuosa, septata, brunnea, laevia. Cellulae conidiogenae polyblasticae, in conidiophoris incorporatae, terminales. Conidia solitaria vel catenata, sicca, cum catenis acropetis, non ramosis, rumpentibus, ad apices cellulorum conidiogenorum in denticulis formati, pallidissime brunnea, cylindrica, ad medium 1-septata, in quoque extremo cicatrice, laevia.*

*Species typica Anungitea fragilis* Sutton.

Colonies effuse, pale brown, hairy. Mycelium immersed or superficial, formed of septate, branched, brown, smooth-walled hyphae. Conidiophores macronematous, mononematous, unbranched, straight or flexuous, septate, brown, smooth. Conidiogenous cells polyblastic, integrated, terminal. Conidia solitary or catenate, dry, chains acropetal, unbranched, developing from conspicuous denticles at the conidiogenous cell apices, very pale brown, medianly 1-septate, smooth, with a scar at each end.

Type species: *Anungitea fragilis* Sutton.

*Anungitea fragilis*, *A. raimondoi*, *A. riessi*, *A. sp.*, *A. sibaensis*, *A. pantelleriae* are the species that we have found on different substrata and localities.

***Anungitea fragilis*** Sutton, 1973.

Type species: *Anungitea fragilis* Sutton, 1973.

Colonies not crowded, composed by solitary conidiophores. Conidiophores macronematous, mononematous, solitary, erect or slightly sinuous, brown, olive-brown, clearer towards the apices, smooth, septate, 51-106×4 μm conidiogenous cell included. Conidiogenous cell growing sympodially, denticulate, denticles prominent and cylindrical. Conidia in acropetal unbranched chains, cylindrical, hyaline, smooth, truncated and cicatrized at the ends, 0-1-septate, 12-21×3 μm.

On dead leaves of *Pistacia lentiscus*. Montagna Grande. Pantelleria.

Our species presents conidiophores up to 106 μm (in the original description conidiophores up to 65 μm, conidiogenous cells 11-17,5 μm long, conidia 10-13×1.5 μm), conidia cylindrical, 0-1-septate, but larger up to 3 μm if compared to the original data.

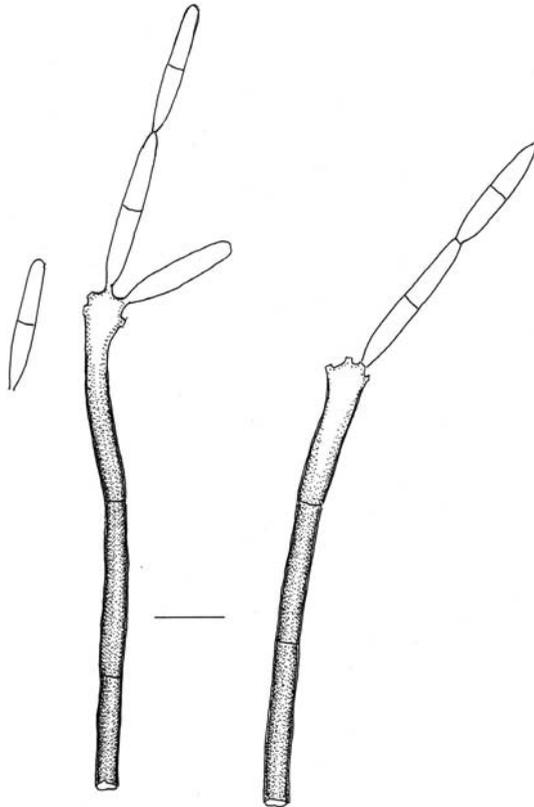


Fig. 7. *Anungitea fragilis* Sutton. Conidiophores with denticulated conidiogenous cells and conidia. Bar 8 μm.

***Anungitea raimondoi*** Rambelli, 2009.

Type species: *Anungitea fragilis* Sutton, 1973.

Etym. dedicated to Prof. Francesco Maria Raimondo. Botanist.

Conidiophores solitary, not forming true colonies, macronematous, mononematous, straight or gently flexuous, smooth, clear brown,  $32-60 \times 3 \mu\text{m}$ . Conidiogenous cells inflated in the fertile part and over a delimiting septum, sympodially denticulate, denticles cylindrical and prominent, very clear brown, terminal, rarely intercalary,  $21-48 \times 5-9 \mu\text{m}$ . Conidia rod shaped, in acropetal chains, hyaline, 0-1-septate, smooth, primary conidia truncated at the ends, secondary conidia, at the apex of the chains, with a truncated base and a rounded apex,  $12-14 \times 2 \mu\text{m}$ .

On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

The strain described is similar to *A. fragilis* Sutton (1973) mainly in the conidia dimensions, they are 0-1-septate and only a little larger, but it differs for the particular type of conidiogenous cell, regularly inflated up to  $9 \mu\text{m}$  wide in the fertile part and up to  $48 \mu\text{m}$

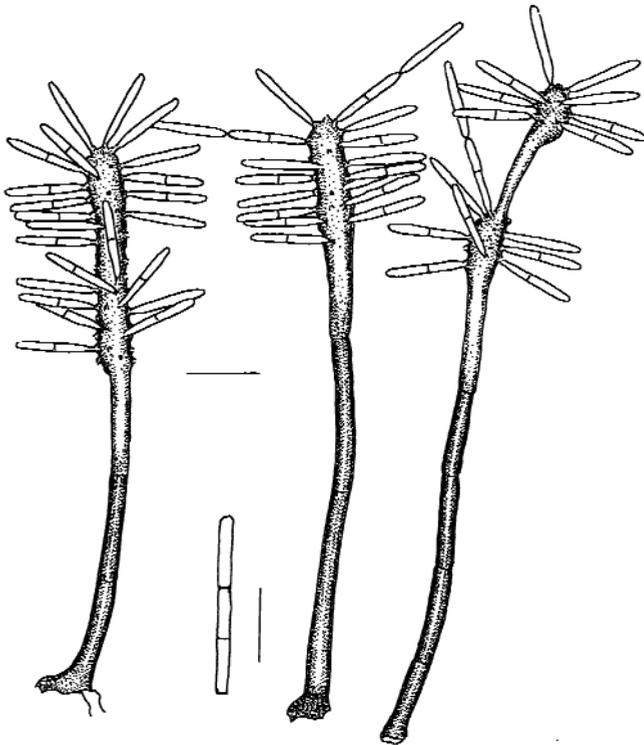


Fig. 8. *Anungitea raimondoi*. Conidiophores, inflated, denticulated conidiogenous cells, and conidia. Bar  $10 \mu\text{m}$ , vertical bar  $8 \mu\text{m}$ .

in length. Our specimens presents also some morphological characters closed to *A. uniseptata* Matsushima (1975), but again differs for the large conidiogenous cells and the conidia 0-1-septate. *A. fragilis* found in Devon by Kirk (1982) is described with a prolonged setiform structure originating from the apex of the conidiogenous cells; we have never found this type of development in our specimens. If compared to *A. syzygii* Crous, Kendrick & Wingfield (1995) we have never found branched conidiophores in our strain, but it needs to point out that unbranched conidiophores is an important morphological character of the genus *Anungitea*.

*Material examined*: ROHB 165, on *Quercus ilex*, Castelporziano, Central Italy.

*Anungitea riessi* Rambelli & Ciccarone, 2009.

Type species: *Anungitea fragilis* Sutton, 1973

Etym. dedicated to Dr. S. Riess, mycologist.

Colonies not crowded, composed by solitary conidiophores. Conidiophores macronematous, mononematous, unbranched, straight, smooth, brown, dark brown, clear brown towards the apex, septate, 165-170×5 µm conidiogenous cell included. Conidiogenous

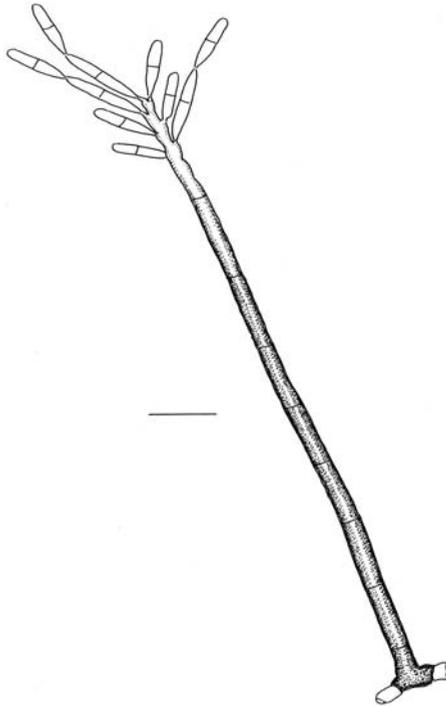


Fig. 9. *Anungitea riessi*. Conidiophores and acropetal chains of conidia. Bar 10 µm.

cells clear brown, growing sympodially with production of cylindrical and not crowded denticles disposed at acute angle on the conidiogenous cell. Conidia in acropetal chains, cylindrical-fusiform, pointed at the ends when into the chain and with rounded apex, when at the apex of the chain, hyaline, smooth, 1-septate,  $10-16 \times 3-4 \mu\text{m}$ .

On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

The species described is characterized by different conidiogenous cells if compared to *A. fragilis* and *A. raimondoi* both with cylindrical denticles disposed at right angle, crowded and covering the entire conidiogenous cell. In our strain the sympodial denticles are cylindrical but not crowded and are disposed at acute angle on the conidiogenous cell.

*Material examined:* ROHB *Anungitea fragilis* on *Pistacia lentiscus*, Pantelleria; ROHB 475 *A. raimondoi* on *Arbutus unedo*, Pantelleria; ROHB 435 *Anungitopsis triseptata* on *Newtonia duparquetiana*, ROHB 456 on *Corynante pachyceras*, Tai-Ivory Coast Forest.

*Anungitea* sp. (A1), 2009.

Type species: *Anungitea fragilis* Sutton, 1973.

Colonies composed by solitary and rare conidiophores. Conidiophores macronematous, mononematous, erect, compact and columnar, septate, smooth, chestnut brown in colour,

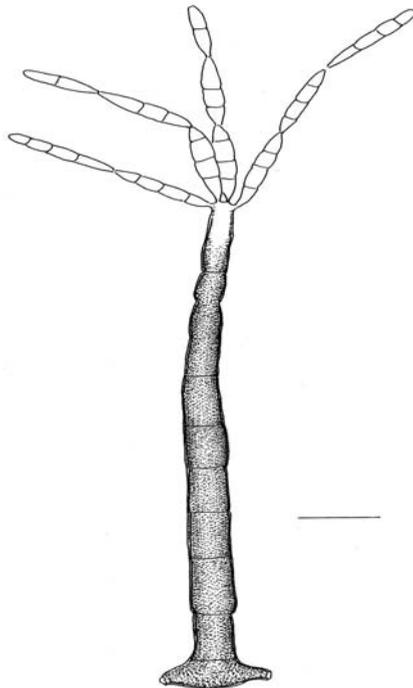


Fig. 10. *Anungitea* sp. (A1). Conidiophore and conidia in acropetal chains. Bar 20  $\mu\text{m}$ .

clear brown towards the apices, nor branched,  $143\text{-}227 \times 5\text{-}11 \mu\text{m}$ , conidiogenous cell included. Conidiogenous cell sympodial, with prominent and cylindrical denticles together collected at the apex, clear brown. Conidia in acropetal chains, cylindrical, fusiform, 3-septate, constricted at the septa, pointed at the apices, with rounded apices when at the end of the chain, hyaline, smooth,  $25\text{-}33 \times 4\text{-}5 \mu\text{m}$ .

On dead leaves of *Myrtus communis*. Montagna Grande, Pantelleria.

The specimens described shows very peculiar morphological characters like the structure of the columnar conidiophore, the conidia constricted at the septa and produced only at the apex of the conidiogenous cells. These characters, very different from those of the species actually described, could justify the proposal of a new species. The scanty examined material and the possibility to collect and study new samples of *Myrtus* litter in a future time obliged us to preserve it undetermined.

*Anungitea sibaensis* Tempesta & Venturella, 2010.

Etym. dedicated to Sibà the small village at the base of Montagna Grande, Pantelleria.

Type species: *Anungitea fragilis* Sutton, 1973.

Colonies composed by isolated conidiophores, not crowded. Conidiophores macronematous, mononematous, erect or gently flexuous, brown, yellow-brown, clearer at the apex, septate, smooth,  $280\text{-}340 \times 9\text{-}14 \mu\text{m}$ . Conidiogenous cells growing sympodially, denticulate, denticles prominent and cylindrical, becoming flattened after conidial production, clear brown. Conidia in acropetal chains, fusiform, 3-septate, not constricted at the septa, with flat scars at the apices, clear yellow-brown, smooth,  $20\text{-}25 \times 5 \mu\text{m}$ .

On dead leaves of *Pinus pinaster* var. *hamiltonii*. Montagna Grande, Pantelleria.

Afterwards many other species were included in the genus not always characterized by denticulate conidiogenous cells, but with conidiogenous loci flattened and cicatrized. These last species were separated by Castaneda Ruiz and Kendrick (1990) into the new genus *Anungitopsis* (type species *A. speciosa* Castaneda Ruiz & Kendrick 1990).

The specimens described is clearly characterized by a conidial production through cylindrical denticles located at the top of conidiogenous cells, that become flattened-cicatrized and unable to produce conidia with the sympodially growing of the conidiogenous cell apex that continues the conidial production through new denticulated loci. This conidiogenesis could justify to propose a new genus, but considering that this group of *Hyphomycetes* is more and more complicated mainly for characters difficult to identify and presumably determined by a strong morphological variability, we prefer to preserve our strain in the genus *Anungitea* and in the species *A. sibaensis*. Matsushima (1975) in the graphic representation of *A. triseptata* considers into the species also a strain with conidia central cells not pigmented. We have found *A. triseptata* on dead leaves of *Arbutus unedo* at Montagna Grande (Pantelleria) in 2009 with central conidial cells chestnut-brown in colour and, in our opinion, seems very difficult to accept the idea that a depigmentation could be determined by a different substratum composition.

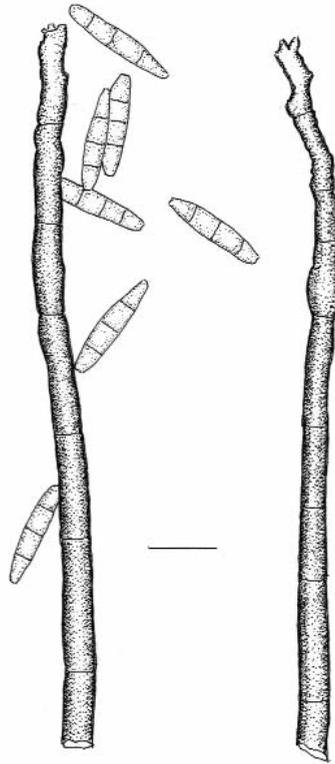


Fig. 11. *Anungitea sibaensis*. Conidiophores, denticulate conidiogenous cells and conidia. Bar 16  $\mu$ m.

***Anungitea pseudoramosa*** Venturella & Rambelli, 2010.

Etym. conidiophores with pseudo-branches.

Type species: *A. fragilis* Sutton, 1973.

Colonies not crowded, composed by isolated conidiophores. Conidiophores macronematous, mononematous, brown, clearer towards the apex, septate, smooth, with dimensions and shapes very irregular, 50-70 $\times$ 3-4  $\mu$ m. Conidiogenous cells growing sympodially, frequently laterally to a conidial locus as a branch, integrated, terminal or intercalary, denticulated, with protuberant, cylindrical and permanent denticles, sometimes separated each others by a not fertile growth. Conidia in acropetal chains, rod shaped, cylindrical, rarely with a medium septum, hyaline, smooth, 10-14 $\times$ 1.8-2  $\mu$ m.

On dead leaves of *Phillyrea latifolia* L. Montagna Grande, Pantelleria.

The permanent cylindrical denticles of the conidiogenous cells, the conidia in acropetal chains and their morphology suggest the inclusion of our strain in the genus *Anungitea* Sutton (1973). Nevertheless the lateral growing of the conidiogenous cell resembling a

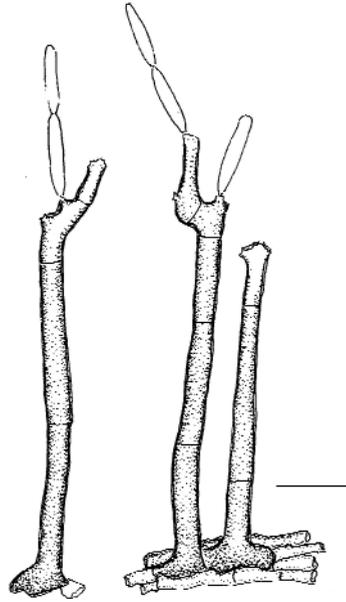


Fig. 12. *Anungitea pseudoramosa*. Denticulate conidiogenous cells and conidia. Bar 12  $\mu$ m.

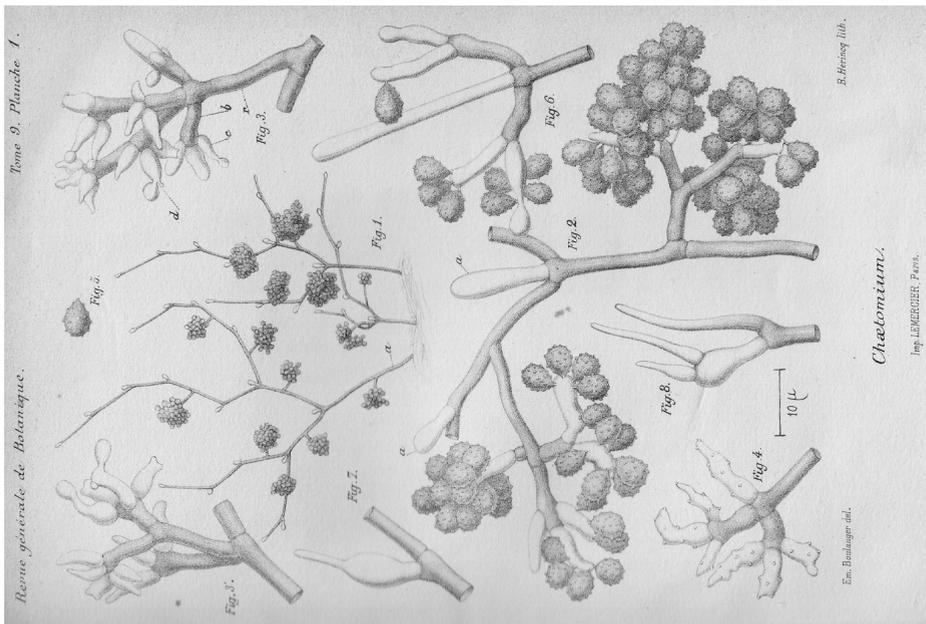
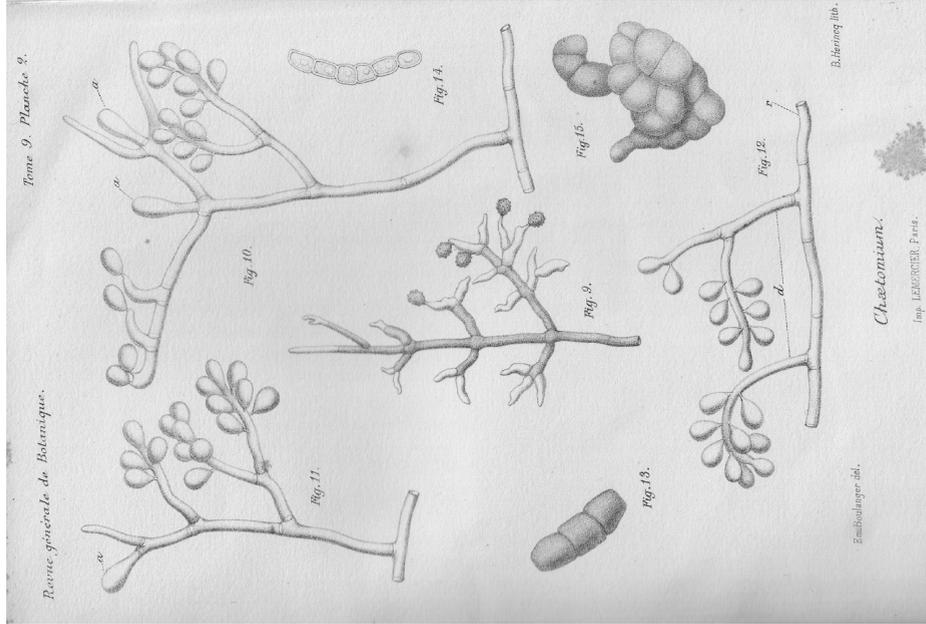
branch, not common into this group of Dematiaceous *Hyphomycetes*, the smaller conidia if compared to *A. fragilis*, suggested the name *Anungitea pseudoramosa*.

*Material examined*: *Anungitopsis triseptata* on *Quercus ilex*, *Arbutus unedo*; *A. pantelleriae* on *Pistacia lentiscus*; *Anungitea fragilis* on *Pistacia lentiscus*; *Anungitea riessi* on *A. unedo*; *Anungitea raimondoi*, on *A. unedo* (*Herbarium Mediterraneum Panormitanum*); *Anungitopsis triseptata* on *Newtonia duparquetiana*, on *Corynante pachyceras*, ROHB n. 456.

### DICYMA

(Boulanger 1897, *Revue gen. Bot.*, 9: 17).

The genus *Dicyma* was proposed by Boulanger (1897). The Author does not report a latin diagnosis but an extensive description of the anamorph *Dicyma ampullifera*, that awarded to *Chaetomium* teleomorph, later attributed to *Ascotricha* Berk., as Saccardo pointed out about *Chaetomium zopfii*, in *Syloge Fungorum* XIV: 491 (1899): *Status conidiophori sunt Dicyma ampullifera Boul. sp.n.1 e conidiis globoso-ovoideis brunneis echinulatis, 7,5×4,5 et Sporotrichi sp. (conidiis globoso-ovoideis, hyalinis levibus, 6×4). Tota species fere perfecte congruit cum Ascotricha chartarum Berk., Syll. I. p. 37, seu Chaetomio chartarum (Berk) Wint. Deutschl. Pilze II, p. 157 cum iconibus.*



Figs. 13-14. *Dicyma ampullifera* in the drawings of Boulanger, 1897.

Saccardo description could be considered as validating the genus *Dicyma* Boulanger even if he is referring to the species.

Ellis, (1971) gave an extensive description of the genus.

***Dicyma*** Boulanger 1897.

Colonies effuse, dark greenish grey becoming black, velvety. Mycelium immersed and superficial. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous or semi-macronematous, mononematous, straight or flexuous, dark brown or olivaceous brown near the base becoming paler upwards, smooth, sympodially and sometimes dichotomously or trichotomously branched, some of the branches remaining very short and non-septate as clavate, hyaline, sterile processes. Conidiogenous cells on branches polyblastic, integrated, terminal, or discrete, sympodial, cylindrical to clavate, denticulate, denticles cylindrical. Conidia solitary, dry, acropleurogenous, simple, obovoid, ellipsoidal or subspherical, 0-septate, olivaceous brown, smooth or verrucose.

Type species: *Dicyma* state of *Ascotricha chartarum* Berk. = *D. ampullifera* Boulanger.

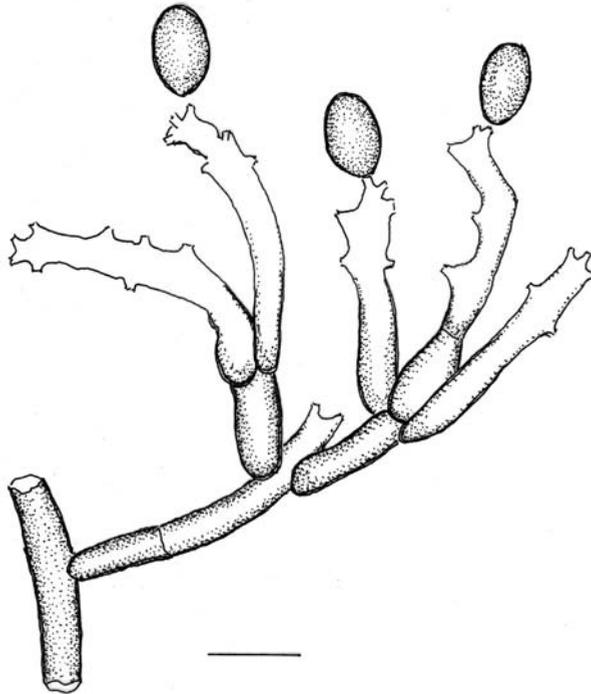


Fig. 15. *Dicyma ovalispora*. Conidiophores and conidia. Bar 10  $\mu\text{m}$ .

The species of the genus *Dicyma* are very similar to those of *Hansfordia* Hughes; both present conidiogenous cells denticulated with cylindrical denticles and also the general morphology of the colonies, of conidiophores and conidia are comparable. Nevertheless the conidiogenous cells of *Dicyma* are denticulated with true denticles, while the denticles of *Hansfordia* are separating cells for the rhexolytic disarticulation of conidia.

***Dicyma ovalispora*** (S, Hughes) Arx, 1981.

Conidiophores macronematous, mononematous, brown in the lower part, branched, with apex setiform, up to 600×3-4 µm. Conidiogenous cells on branches, polyblastic, integrated, terminal, sympodial, denticulate, pale brown, up to 30×2-4 µm. Conidia solitary, ellipsoidal, aseptate, subhyaline, smooth, 8-11×4-6 µm.

Basionym: *Hansfordia ovalispora* Hughes, 1951.

Type species: *Dicyma* state of *Ascotricha chartarum* Berk. = *D. ampullifera* Boulanger.

On dead leaves of *Olea europaea* var. *sylvestris*. Central West Sardinia, Italy.

### ANUNGITOPSIS

(Castaneda Ruiz & Kendrick 1990, Ist. de Investig. Fund. en Agric. Trop. "Alejandro de Humboldt", La Habana)

The genus *Anungitopsis* was erected by Castaneda Ruiz & Kendrick (1990) to separate the *Anungitea* species characterized by conidiogenous loci not denticulated but composed by flat scars that the Authors call "pore-like". During our researches on microfungi of mediterranean maquis litters we had the opportunity to observe many species and strains of *Anungitea* all with a certain different development. The group of the species observed could be hypothetically divided into species characterized by conidiogenous cells with protuberant denticles in active production of conidia, like *A. fragilis*, *A. raimondoi* and others, and species with conidiogenous cells apically denticulated and in active production and in the below part conidiogenous loci inactive, flat and "pore-like". This observation rises a problem of structures interpretation since the presence of conidiogenous loci inactive could be the effect of a period of not suitable conditions for the development and conidia production. Since we consider this possibility we prefer to include in the genus *Anungitopsis* the species that Castaneda Ruiz and Kendrick transferred from *Anungitea*, and to discuss this arrangement after a more deep observations of new material, and to preserve in the genus *Anungitea* all the species with apical denticulated conidiogenous cells, over flat conidiogenous loci. Nevertheless we think right to consider the persistence of the denticulated conidiogenous cells as a character to utilize for species descriptions and on which, presumably, also the environmental conditions and substratum composition (differences between dead leaves and dead small woody branches) could influence the development and conidiogenesis.

The diagnosis of the genus *Anungitopsis* as proposed by Castaneda Ruiz & Kendrick (1990) is here reported.

***Anungitopsis*** Castaneda Ruiz & Kendrick, 1990.

*Ad fungos conidiales, Hyphomycetes, pertinent. Coloniae effusae, pilosae usque caespitosae, anphigenae, brunneae. Mycelium plerunque in substrato immersum, ex hyphis septatis, ramosis, laevibus, brunneis, compositum. Conidiophora conspicua, erecta, recta vel flexuosa, septata, mononemata vel fasciculata, cum stipite cylindrica interdum cum nonnullis cellulis inflatis sphaericis, chlamydozporis similibus, in aliquibus paribus intercalaribus; laevia, brunnea sed pallidiora ad apicem. Cellula conidiogena terminalis, polyblastica, sympodialiter proliferans, interdum septa demum formans, exiguis cicatricibus inconspicuis praedita, aspectu poroso, pallidior in loco conidiogeno. Conidia blastica, cylindrica, utrinque obtusa vel attenuata, utrinque parva cicatricata; conidia primaria singula, ex poris producta, persistentia; conidia secundaria in catenis acropetis ex apicibus conidiorum primariorum oriunda; septata, sicca laevia, incolora vel dilute brunnea, cellulae inferiores interdum obscuriores.*

*Specie typica: Anungitopsis speciosa* Castaneda & Kendrick.

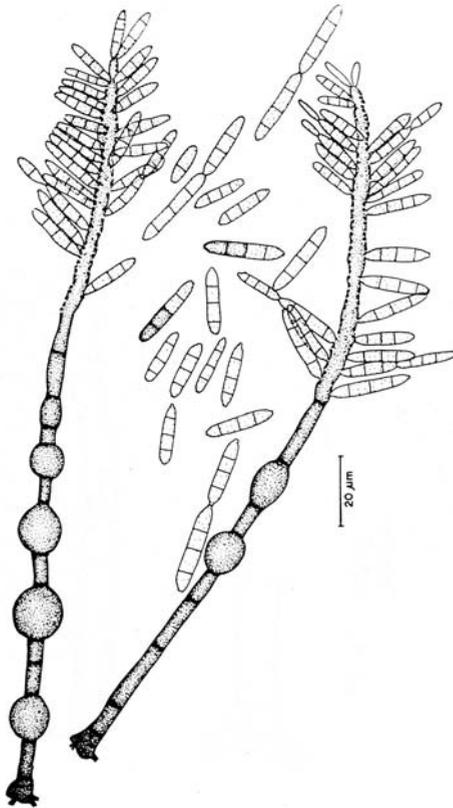


Fig. 16. *Anungitopsis speciosa* the type species of the genus *Anungitopsis* (from Castaneda Ruiz & Kendrick 1990).

Conidial fungi, *Hyphomycetes*, Colonies spreading, hairy or tufted, brown, anphigenous. Mycelium mostly immersed in the substrate, composed of septate, branched, smooth-walled, brown hyphae. Conidiophores conspicuous, upright, straight or flexuous, septate, solitary or in groups, stipe cylindrical, sometimes with intercalary swellings resembling chlamydospores; smooth, brown but paler at the apex. Conidiogenous cells terminal, proliferating sympodially as a result of repeated conidiogenesis, in age sometimes becoming divided by a septum; with many narrow, pore-like conidiogenous loci. Conidia blastic, cylindrical, rounded or sharply tapered at each end, with a small scar at base and apex, septate, dry, colourless or pale brown, smooth-walled: primary conidia single, produced from narrow, pore-like conidiogenous loci, persistent; secondary conidia in unbranched acropetal chains arising from the apices of primary conidia. Type species: *Anungitopsis speciosa* Castaneda & Kendrick 1990.

*Anungitopsis triseptata*, *A. pantelleriae* and *Anungitopsis* sp, the three described species found on different substrata and localities.

***Anungitopsis triseptata*** (Matsushima) Castaneda & Kendrick, 1991.

Type species: *Anungitopsis speciosa* Castaneda Ruiz & Kendrick, 1990.

Synonym: *Anungitea triseptata* Matsushima, 1975.

Colonies not crowded, composed by solitary conidiophores. Conidiophores macronematous, mononematous, erect, straight or sometimes flexuous, not branched, dark brown at the base and clearer towards the apices, 270-300×6-10 µm. Conidiogenous cells developing sympodially, with cylindrical denticles becoming flattened with the development of the conidiogenous cell, clear brown, 19-42×5-6 µm. Conidia in acropetal chains, cylindrical, pointed at the apices, but with rounded apex when at the end of the chain, 3-septate, with brown central cells and hyaline extremities, 22-30×4-5 µm.

On dead leaves of *Quercus ilex*. Monte Montagna Grande, Pantelleria.

Matsushima (1975) described this species as *Anungitea triseptata* since it presents conidiogenous cells with cylindrical denticles, however we observed becoming flattened with successive sympodial development of the fertile part. Castaneda & Kendrick (1991) proposed a new combination as *Anungitopsis triseptata*, but, considering the observations carried out in the presentation of the genus, we think that this arrangement should be discussed again, since in both genera the conidial production is always carried out by denticulated loci.

***Anungitopsis pantelleriae*** Rambelli & Ciccarone, 2009.

Type species *Anungitopsis speciosa* Castaneda Ruiz & Kendrick, 1990.

Colonies not crowded, composed by conidiophores solitary. Conidiophores macronematous, mononematous, erect, straight or slightly flexuous, dark brown at the base and clearer at the apex, 126-205×6 µm conidiogenous cells included. Conidiogenous cells not denticulated, with cicatrized conidiogenous loci, very irregular in shape and dimensions, 27-36×5 µm. Conidia cylindrical-fusiforms, sometimes curved, hyaline, smooth, 3-4-septate, in acropetal chains, with trunked apices, rounded when at the top of the chain, 20-30×5-6 µm, but elongating during the conidiogenesis.

On dead leaves of *Pistacia lentiscus*. Monte Gibe, Pantelleria.

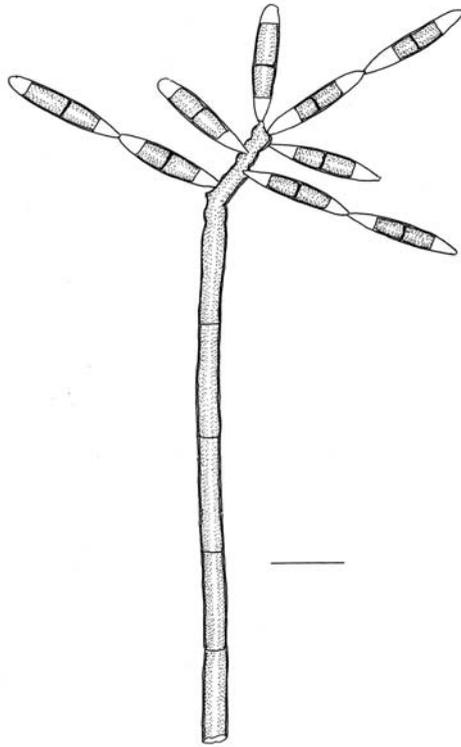


Fig. 17. *Anungitopsis triseptata*. Conidiophores and conidia in acropetal chains. Bar 18  $\mu\text{m}$ .

This strain shows some morphological characters not found in the known species of the genus *Anungitopsis*, like the conidiogenous cells completely without denticles and only with pretty large cicatrized conidiogenous loci, the very irregular conidia in form and dimensions, and characterized by large trunked ends. Nevertheless, as we pointed out before, the absence of denticles could be determined by a particular situation of the specimens and a re-examination of more material will be carried out as soon as possible.

*Anungitopsis* sp., 2009.

Type species: *Anungitopsis speciosa* Castaneda Ruiz & Kendrick, 1990.

Colonies composed by solitary conidiophores. Conidiophores macronematous, monone-matous, straight or slightly flexuous, septate, dark-brown, clearer towards the apex, smooth, 224-238 $\times$ 8  $\mu\text{m}$ . Conidiogenous cells clear brown, growing sympodially, with a cylindrical denticle at the apex and flat scars immediately in the lower part. Conidia in short acropetal chains, cylindrical, truncate in the chain and with rounded apex at the top of the chain, 1-septate, hyaline, 12-17 $\times$ 3-4  $\mu\text{m}$ .

On dead leaves of *Pinus pinaster* subsp. *hamiltonii*. Montagna Grande, Pantelleria.

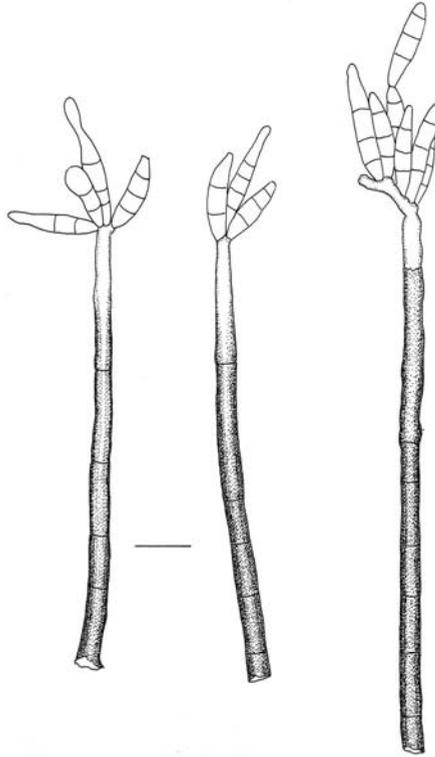


Fig. 18. *Anungitopsis pantelleriae* Rambelli & Ciccarone. Conidia in acropetal chains, very irregular in shape and dimensions. Bar 15  $\mu$ m.

Matsushima (1975) described *Anungitea longicatenata* with some morphological characters present also in our strain, like the shape and dimensions of the conidia. However our strain has conidiogenous cells denticulate only at the apex during the production of new conidia and with the others conidiogenous loci flat and cicatrized. We include our strain in the genus *Anungitopsis*, nevertheless since we observed only scanty material we leave it indeterminate, hoping to have the opportunity of more observations and to discuss its possible genus relocation.

### PLEUROTHECIOPSIS

(Sutton 1973, Trans. Br. Mycol. Soc. 61 (3): 417).

The genus *Pleurotheciopsis* was erected by Sutton (1973) to include species similar to *Pleurothecium* in having polyblastic sympodial conidiogenous cells, but in *Pleurotheciopsis* the conidiogenous cells are composed by few denticles produced with a small extension of the conidiogenous cell. Indeed the conidiogenesis in *Pleurotheciopsis*

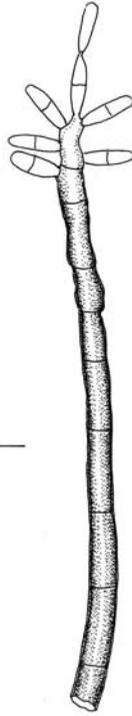


Fig. 19. *Anungitopsis* sp. Conidiophores and conidia. Bar 20  $\mu$ m.

is characterized by production of unbranched acropetal chains of conidia from the denticles of the conidiogenous cell. According to the Author the first formed conidium determines the rupture of the outer wall of the conidiogenous cell and the inner wall forms an upper part where subsequent conidia will be produced; they are characterized by light pigmentation in contrast with the dark pigmented conidiophore. The rupture of the conidiogenous cell apex remains as an annellation that, according to Ellis (1976), could be repeated more than once.

The diagnosis of the genus as proposed by Sutton is here reported.

***Pleurotheciopsis* Sutton, 1973.**

*Coloniae effusae, pilosae, brunneae. Mycelium immersum ex hyphis ramosis, septatis, brunneis vel atro-brunneis, laevibus compositum. Stromata, setae et hyphopodia nulla. Conidiophora macronemata, mononemata, recta vel flexuosa, non ramosa, brunnea vel atro-brunnea, apicem versus pallidiora, laevia. Cellulae conidiogenae integratae, terminales, polyblasticae, sympodiales, cylindricae, denticulatae; denticulae cylindricae. Paries externus cellulae conidiogenae saepe per conidium primum fructus. Conidia sicca,*

*catenata, acropeta, non ramosa, rumpentia, ex denticulis oriunda, simplicia, septata, hyalina, laevia, in medio latiora, extrema truncata versus descrescentia.*

*Specie typica: Pleurotheciopsis pusilla* Sutton.

Colonies effuse, hairy, brown. Mycelium mostly immersed, composed of branched, septate, brown or dark brown, smooth-walled hyphae. Stromata, setae and hyphopodia absent. Conidiophores macronematous, mononematous, straight or flexuous, unbranched, brown to dark brown, paler towards the apex, smooth. Conidiogenous cells integrated, terminal, polyblastic, sympodial, cylindrical, denticulate; denticles cylindrical. The outer wall of the conidiogenous cell is often fractured by the first conidium. Conidia dry, catenate, acropetal, unbranched, fragmenting, developing from the ends of denticles, simple, septate, hyaline, smooth, broader in the middle, and tapered towards the truncate ends.

Type species: *Pleurotheciopsis pusilla* Sutton. 1973.

*Pleurotheciopsis pusilla* was found on cupules and on branched cupular spines of *Castanea sativa*.

*Pleurotheciopsis bramleyi* and *P. asymmetrica* are here described.

***Pleurotheciopsis bramleyi* Sutton, 1973.**

Type species: *Pleurotheciopsis pusilla* Sutton, 1973.

Conidiophores solitary, not forming a true colony, macronematous, mononematous, straight or gently flexuous, unbranched, septate, smooth, dark brown at the base, clearer towards the apex, 250×7-9 µm. Conidiogenous cells integrated, terminal, polyblastic, sympodial, pale brown with several, short, not thickened denticles, and with a basal annellation. Frequently the conidiogenous cell continues to grow to form a clear filament up to 500-600 and more µm long fertile at the apex with formation of 3-4 denticles and conidia. Conidia in acropetal chains, 3-septate, very rarely 4-septate, hyaline, smooth, fusiform, with truncate apices at the base of the chain or intercalary, with rounded apex when at the top of the chain, 23-25(-39)×5-6 µm.

On dead leaves of *Phillyrea latifolia*, Santa Teresa, Pantelleria.

The strain examined presents morphological and size characters closed to Sutton description (1973). We never observed conidiophores with more than one annellations, but always with a strong pigmentation contrast between conidiophore color and conidiogenous cell, over the annellation, clearer color. The production of very long conidiophores, mixed with the regular one, could be the effect of a different natural medium composition.

***Pleurotheciopsis asymmetrica* Rambelli & Ciccarone, 2008.**

Type species: *Pleurotheciopsis pusilla* Sutton, 1973.

Conidiophores solitary, not forming a true colony, macronematous, mononematous, straight, erect, unbranched, septate, smooth, brown up to the annellation separating the conidiogenous cell, 370-400×7-8 µm. Conidiogenous cells integrated, terminal, polyblastic, sympodially denticulated at the apex, 5-7 cylindrical denticles, separated by a disarticulating basal septum and subsequent annellation, clear brown, colour contrasting with that of the conidiophores dark brown, smooth, 32-37×5 µm. Conidia in acropetal chains, 1-asymmetrically septate,

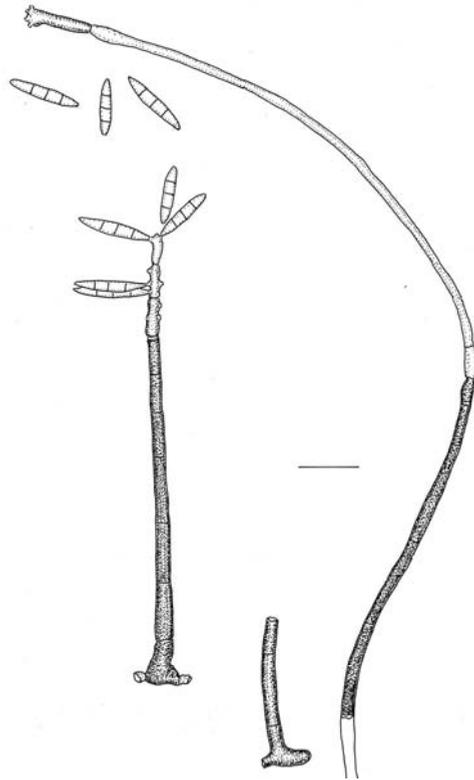


Fig. 20. *Pleurotheciopsis bramleyi*. Conidiophores, conidia and elongated conidiogenous cell. Bar 25  $\mu\text{m}$ .

ellipsoidal, obovoid, with slightly truncated end when inside the chain, with rounded apex when at the top of the chain, smooth, intense clear brown,  $22\text{--}31 \times 5 \mu\text{m}$ .

On dead leaves of *Phillyrea latifolia* and *Arbutus unedo*. Montagna Grande, Pantelleria.

The species examined shows two relevant morphological characters. The former is the strong separation between conidiophores and conidiogenous cells, very different in color up to the annellation and to a septum very easily disarticulating; the second relevant character is the presence of conidia with a septum always disposed asymmetrically in the upper part. *Pleurotheciopsis asymmetrica* is also characterized by a conidiogenous cell very similar to *P. bramleyi*, arising from the apex of the conidiophore after rupture of the outer wall for the production of the first conidium; the denticles are protuberant and cylindrical, very clear brown in colour. It does not form colonies on the natural substratum, but when observed is easily discernible for its white stellate structure of the conidia chains disposed at the apex of the conidiogenous cells.

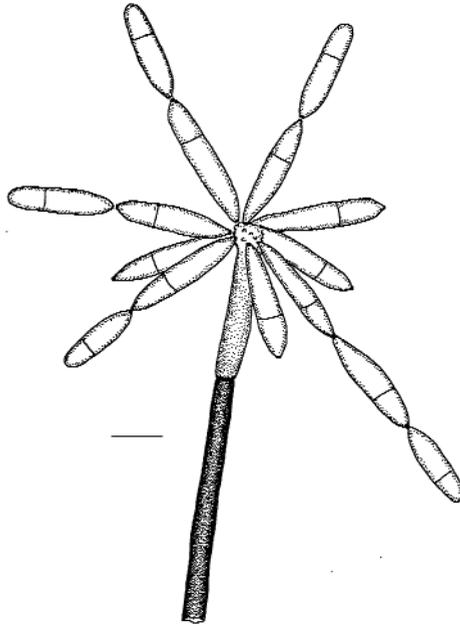


Fig. 21. *Pleurotheciopsis asymmetrica*. Rambelli & Ciccarone. Conidia with asymmetric septa. Bar 10  $\mu$ m.

### VERONAEA

(Ciferri & Montemartini 1957, Atti Ist. Bot. Univ. Lab. Crittogam. Pavia, Ser. 5, 15).

The genus *Veronaea* was erected by Ciferri & Montemartini (1957) to describe a *Dematiaceous Hyphomycetes* found on olive slag in Italy and composed by erect conidiophores, terminally fertile through conidiogenous cells with slightly protuberant scars, and conidia elliptical or clavate, with pointed base, 1- septate, smooth and clear brown in colour. De Hoog & al. (1983) carried out an excellent description comparing *Veronaea* with relatives genera like *Ramichloridium*, *Stenella* and *Zasmidium* stressing the determination difficulties of this group of *Dematiaceous Hyphomycetes* without the possibilities to control type materials. Another important contribution is carried out by Arzanlou & al. (2007), the Authors investigated the phylogeny and morphotaxonomy of *Ramichloridium* group applying the biomolecular analysis.

The diagnosis of the genus as proposed by Ciferri & Montemartini (1957) is here reported.

***Veronaea*** Ciferri & Montemartini, 1957.

*Dematiaceous, Didymosporous, Macronemeus, Mycelium brunneum, dense ramosum, ex hyphis brunneis, parce irregulariterque septatis, compositum; conidiophora reptantia vel*

*sub-assurgentia, consuete ramosa, brunnea, septata, apicaliter fertilia, sursum leviter incrassata aut clavata: conidia ex sterigmata oriunda, hyalina, elliptica vel mediocriter elongata, transverse 1-septata, dense botryoidea disposita; sterigmata minuta, typice in cochlam retorta, etiam irregulariter disposita.*

*Typus: V. botryosa* Ciferri & Montemartini, 1957

It is necessary to point out that the Ciferri & Montemartini diagnosis was carried out studying the fungus on artificial culture. Ellis (1971) added some more morphological characters, presumably from a direct observation of mycological material on natural substrata:

***Veronaea*** Ciferri & Montemartini, 1957.

Synonyms: *Sympodina* Subramanian & Lodha, 1964.

Colonies effuse, brown, greyish brown or blackish brown, cottony, hairy or velvety. Mycelium partly immersed, partly superficial. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, unbranched or occasionally loosely branched, straight or flexuous, sometimes geniculate, pale to mid brown or olivaceous brown, smooth. Conidiogenous cells polyblastic, integrated, terminal often becoming intercalary, sympodial, cylindrical, cicatrized; scars usually small, flat. Conidia solitary, dry, acropleurogenous, simple, usually ellipsoidal or fusiform, sometimes cylindrical, rounded at the apex truncate at the base, usually colourless, pale brown or olivaceous brown, smooth or minutely verruculose, with 0-1 or a few transverse septa.

Type species: *Veronaea botryosa* Cif. & Montemartini.

The morphological characters of our strain are here reported.

***Veronaea*** sp.

Type species: *Veronaea botryosa* Cif. & Montemartini, 1957.

Colonies effuse, composed by very crowded conidiophores, clear brown. Conidiophores macronematous, mononematous, erect or more frequently flexuous, clear brown, brown, septate, smooth, not branched, 74-140×3 µm conidiogenous cell included. Conidiogenous cells polyblastic, integrated, terminal and intercalary, sympodial, cylindrical, with slightly prominent scars, sometimes flat. Conidia solitary, dry, acropleurogenous, ellipsoidal to clavate, rounded at the apex, pointed or truncate at the base, clear brown, smooth, 1-septate, 11-15×4 µm.

On dead leaves of *Pinus maritima* and *Pistacia lentiscus*. Bosco Isola, South East Italy.

The species described presents morphological characters similar to those of *V. botryosa*, differs for the conidiophores never branched and for the conidiogenous loci cicatrized but frequently with slightly prominent and almost pointed scars. We have not the opportunity to examine type material and because of the difficulties of determination of this group of *Dematiaceous Hyphomycetes* we prefer at present to leave it indeterminate.

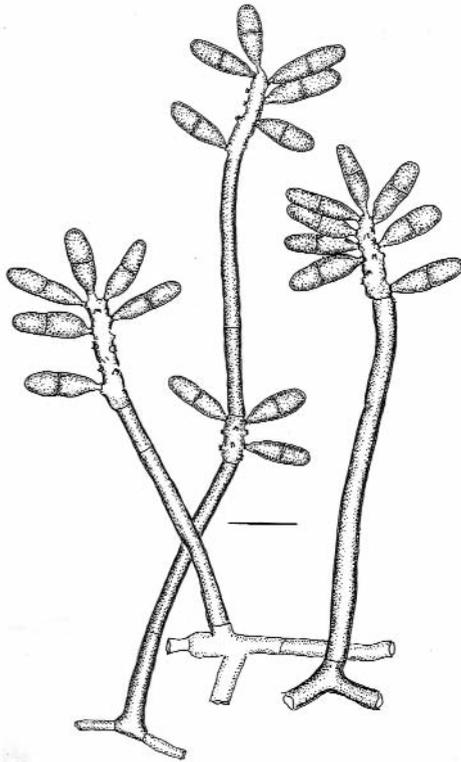


Fig. 22. *Veronaea* sp. Conidiophores with terminal and intercalary conidiogenous cells. Bar 12  $\mu$ m.

### HANSFORDIA

(Hughes 1951, Mycol. Pap. 43: 1-25).

The genus *Hansfordia* was erected by Hughes (1951) to describe *H. ovalispora* Hughes as type species. The genus is characterized for the presence of conidiogenous cells denticulated but with denticles as separating cells, character not pointed out by Hughes. The diagnosis of the genus as proposed by Hughes is here reported.

***Hansfordia*** Hughes, 1951.

*Fungi imperfecti saprophytici vel forsitan hyperparasitici. Mycelium immersum vel superficiale.*

*Conidiophora: stipe hyalinus vel brunneus erectus vel repens directus vel sinuatus; ramuli laterales primarii fertiles (aliquando steriles vel pro parte apicali steriles), distantes, solitarii vel bini oriundi; ramuli secundarii, ternarii bini et plerunque unilaterales; ramuli in 1-3 cellulis sporogenis denticulatis terminantes. Conidia acropleurogena, e den-*

*ticulis truncato-conicis singulatim oriunda, continua, hyalina, sicca, sphaerica, ovata vel fusioidea, laevia vel minute verrucosa.*

*Species typica: H. ovalispora* Hughes, 1951.

The genus description, carried out by Ellis (1971), is as follows.

***Hansfordia*** Hughes, 1951.

Colonies effuse, pale to dark olivaceous grey or greyish brown, hairy or velvety. Mycelium superficial or immersed. Stroma none. Separate setae absent but in some species the upper part of the conidiophore is sterile and setiform or there are setiform branches. Hyphopodia absent. Conidiophores macronematous, mononematous, erect or repent, branched, straight or flexuous, hyaline to brown, smooth, apex and branches sometimes setiform. Conidiogenous cells polyblastic, integrated and terminal, or discrete, sympodial, cylindrical or clavate, denticulate, each denticle a thin-walled separating cell. Conidia solitary, dry, acropleurogenous, liberated by a break across the separating cell, simple, ellipsoidal, fusiform, spherical or subspherical, hyaline to pale brown, smooth or verruculose, 0-septate.

Type species: *Hansfordia ovalispora* Hughes.

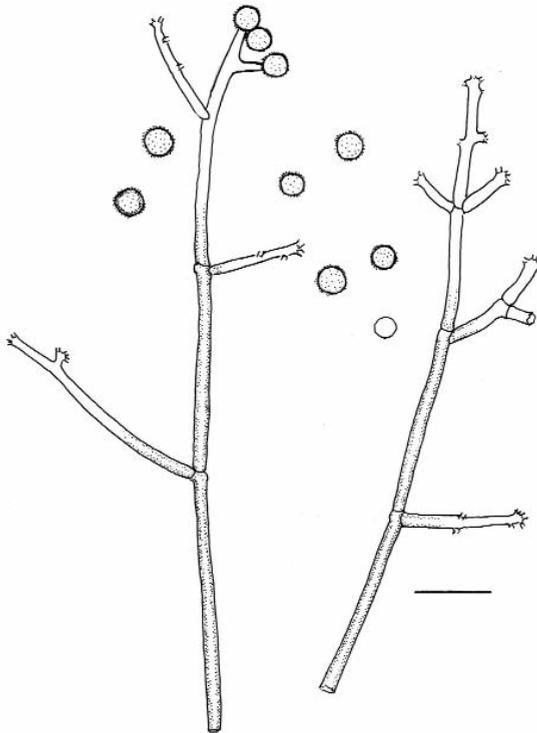


Fig. 23. *Hansfordia pulvinata*, conidiophores and conidia. Bar 24  $\mu$ m.

***Hansfordia pulvinata*** (Berk. et Curt.) Hughes, 1958.

Type species: *Hansfordia ovalispora* Hughes, 1951.

Colonies hairy, composed by solitary conidiophores. Conidiophores macronematous, mononematous, repeatedly branched, straight, pale brown in the lower echinulated part and paler in the upper smooth part, very variable in length. Conidiogenous cells as branches of the conidiophores, subhyaline, echinulate, sympodial, polyblastic, terminal, cylindrical, denticulated with denticles as separating cells, 25-34×4-5 µm. Conidia spherical, very clear brown, echinulated, 8-9×7-9 µm.

On dead leaves of *Arbutus unedo*. Circeo National Park, Central West Italy.

According to Index Fungorum the species has five synonymies: *Polyactis pulvinata* Berk. & Curtis, described in Grevillea (1875), *Botrytis pulvinata* (Berk & Curtis) Sacc. described in Sylloge Fungorum (1886), *Dicyma pulvinata* (Berk. & Curtis) Arx described in Genera of Fungi Sporulating in Cultures (1981). *Botrytis grisella* Sacc. (1886) and *Hansfordia grisella* (Sacc.) Hughes (1951) are species recognized by Hughes some years later as *H. pulvinata*.

## CONOPLEA

(Persoon 1797, Tent. Disp. Meth. Fung., p.55).

The genus *Conoplea* was erected by Persoon with the following generic diagnosis: *Fila persistencia in formam distinctam compacta, intus pulvere referta* (from Hughes, 1960). Saccardo (1892) considering the synonym of the type species *C. olivacea*, *Dematium sphaericum*, proposed the following genus diagnosis:

***Conoplea*** Persoon, 1797 (fide Saccardo, 1892)

*Caespitulis v. tuberculis sphaericis, extus per epidermidem erumpentibus, extus olivaceo-pruinosis, intus nigricantibus; conidiis ovoideis.*

*Hab. ad ramos emortuos v. frigore necatos Fagi et Syringae in Germania et Suecia.*

A very complete and extensive historical survey on the genus was carried out by Hughes (1960). The Author examines all the contributions to the study of different *Conoplea* species from Persoon (1797) to Albertini & Schweinitz (1805), De Candolle (1805), Link (1815), de Brondeau (?), Sprengel (1827), Fries (1832/33), Chevalier (?), Corda (1839) and proposes an extensive diagnosis of the genus as follows:

***Conoplea*** Pers., Tent. Disp. Meth. Fung. p.55, 1797, Syn.Meth. Fung. p.234, 1801; also in Fries, Syst. Mycol. 3: 490. 1832/33.

Lectotype sp. *C. sphaerica* (Pers.) Pers. (*C. olivacea* Fr.)

? = *Streblocaulium* Chev., Fungorum et Byssorum Illustrationes, Tomo 1. 1837.

Type sp. , *S. atrovirens* (Chev. = ? *Conoplea sphaerica* (Pers.) Pers. = *Streptothrix* Corda, Pracht-flora. p. 27.1839.

Type sp. *S. fusca* Corda = *Conoplea fusca* Pers.

*Conoplea* species forms brown fructifications which may be pulvinate or flattened in the form of a turf or may consist of solitary or groups of a few conidiophores scattered on the substratum.

The mycelium is usually immersed, sometimes superficial, and may form erumpent pulvinate stromatic aggregations on corticated woody twigs. Superficial and creeping hyphae are formed by one species on bare wood.

Conidiophores are pale brown to dark brown, septate, rough-walled, and may be helitically twisted; they are generally arborescent and the branching may be more or less irregular or a well-differentiated main stalk is evident with primary, secondary, and sometimes tertiary branches. Towards the base, conidiophores may show frequent anastomosis with neighboring conidiophores. Specialized sporogenous branchlets are produced in some species; these develop laterally and are rarely cut off from the cell that bears them. They are generally short and adpressed to the conidiophore. In two species at least, cells of the mature conidiophore may elongate by intercalary growth and may become detached, one from the other; the result is a pustule of conidiophore fragments and conidia.

Conidia are terminus spores produced singly as the blown-out end of each successive new growing point which develops just to one side of the previous terminal conidium which is itself pushed to a lateral position by the new developing conidium. They develop on short specialized sporogenous branchlets or on undifferentiated branches, and finally on the terminal cells of the arborescent conidiophore or conidia may develop directly on a sparingly branched conidiophore. During development, a thin disk-like separating cell may be differentiated between conidium and conidiophore or branchlet. Conidia fall readily from the conidiophore and form a dark-brown to black deposit. They are dry, powdery, subglobose to pyriform, or oval and occasionally angular, small (ca. 6-12 micron), pale brown to dark brown, inconspicuously or coarsely roughened, with a scar on a slightly or well raised base which may show a marginal frill of wall material. Conidia have a hyaline, longitudinal (?) germination slit, or a circular, terminal or lateral, thin-walled area (? germination pore).

Habitat: on bare wood, corticated branches and leaves of conifers, branches of broad-leaved trees, canes of *Rubus* and *Rosa*, woody herbaceous stems, and leaves of *Carex*.

This extensive description of the genus is a really good help for the systematic interpretation of strains that frequently present complicated morphological characters. Nevertheless we include also the Ellis genus description (1971); the Author evidences the rhexolytic conidia separation one of the most important morphological characters of the genus.

### ***Conoplea*** Persoon, 1797

Synonym: *Streptothrix* Corda, 1839.

Colonies effuse or pulvinate, brown, sometimes velvety. Mycelium mostly immersed. Stroma usually present. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, straight or flexuous, torsive in some species, branched, pale to dark brown, mostly finely and densely echinulate. Conidiogenous cells polyblastic, integrated and terminal or discrete, sympodial, more or less cylindrical, denticulate but often rather indistinctly, with cylindrical, thin, disk-like separating cells. Conidia solitary, dry, acropleurogenous, simple, ellipsoidal, obovoid, pyriform or subspherical, pale to dark brown, often finely and densely echinulate, rarely smooth, 0-septate, germ slits or pores frequently seen.

Lectotype species: *Conoplea olivacea* Fr. = *C. sphaerica* Pers. = *Dematium sphaericum* Pers. We describe two species, *C. manganotii* and *C. fusca*.

***Conoplea mangelotii*** Reisinger, 1966.

Lectotype species: *Conoplea olivacea* Fr. 1832 = *Conoplea sphaerica* Pers. 1797

Colonies pulvinate, brown. Conidiophores macronematous, mononematous, repeatedly branched, brown, smooth, clearer in the upper part and branches, that are septate, with septa dark and numerous. Conidiogenous cells terminal, 5-12×5-7 μm, denticulate, denticles cylindrical, as separating cells for a rhexolytic conidia separation. Conidia obovoid, ellipsoidal, brown, smooth, 8-11×6-10 μm.

On dead leaves of *Arbutus unedo*. Salina island, Italy.

We never observed germ slits on conidia. All the others morphological characters are well coinciding with those of the Reisinger description.

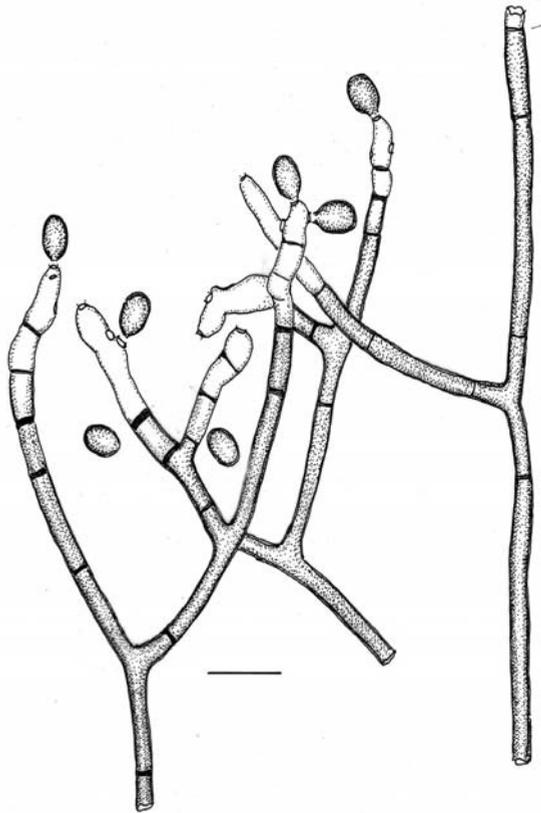


Fig. 24. *Conoplea mangelotii*. Conidiophores, conidiogenous cells with disk-like separating cells, and conidia. Bar 10 μm.

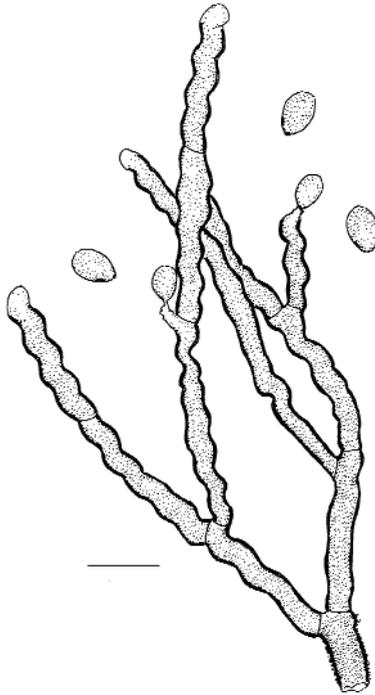


Fig. 25. *Conoplea fusca*, torsive conidiophores and conidia. Bar 13  $\mu\text{m}$ .

***Conoplea fusca* Pers., 1822**

Lectotype species: *Conoplea olivacea* Fr., 1832.

Colonies red-brown, powdery. Conidiophores macronematous, mononematous, in crowded tufts, brown, minutely echinulate, torsive, branched, with branches disposed at acute angle,  $90\text{-}215 \times 5 \mu\text{m}$ . Conidiogenous cells terminal on branches, clear brown, polyblastic, sympodial, with small denticles,  $7\text{-}12 \times 3 \mu\text{m}$ . Conidia ellipsoidal, with small cicatrized pointed base and a germ pore just above the base,  $7 \times 5 \mu\text{m}$ .

On dead leaves of *Smilax aspera*. Montagna Grande, Pantelleria.

**NAKATAEA**

(Hara 1939, Diseases of the rice plant., ed. 2: 1-185).

The genus *Nakataea* was erected by Hara (1939) to describe the anamorph of *Leptosphaeria salvinii* Catt., *N. sigmoidea*, a parasite of rice cultivations. Subramanian (1956), presumably observing the same disease on Indian rice, proposed *Vakrabeeja sigmoidea* (Cav.) Subram. as new combination of *Helminthosporium sigmoideum* Cav.

(1889). This genus was interpreted not always in a good way: Castaneda Ruiz & al. (1996) included *N. cylindrospora*, a species characterized by rhexolytic conidial secession that Baker & al. (2001) segregated in the new genus *Rhexodenticula* as *R. cylindrospora*. We didn't have the opportunity to find the publication of Hara (Diseases of the rice plant, 1939), anyway we propose the diagnosis of *Helminthosporium sigmoideum* synonym of *Nakataea sigmoidea* Hara, the genus description carried out by Ellis (1971) and the description of a strain of *Nakataea fusispora* Matsushima (1975) found on mediterranean maquis litter.

***Helminthosporium sigmoideum*** Cavara 1889 (fide Saccardo, 1892)

*Effusum, atrum; hyphis fertilibus sparsis erectis, rigidiusculis, hinc inde nodulosis 8-10-septatis, simplicibus, olivaceis, 100-150×5 μm; gonidiis magnis, falcato-sigmoideis, utrinque obtusis, triseptatis, cellulis mediis crassioribus, granulosis, dilute olivaceis, extimis hyalinis 55-65×11-14 μm.*

*Hab. in foliis, vaginis culmisque Oryzae sativae pr. Pavia, Ital. bor.*

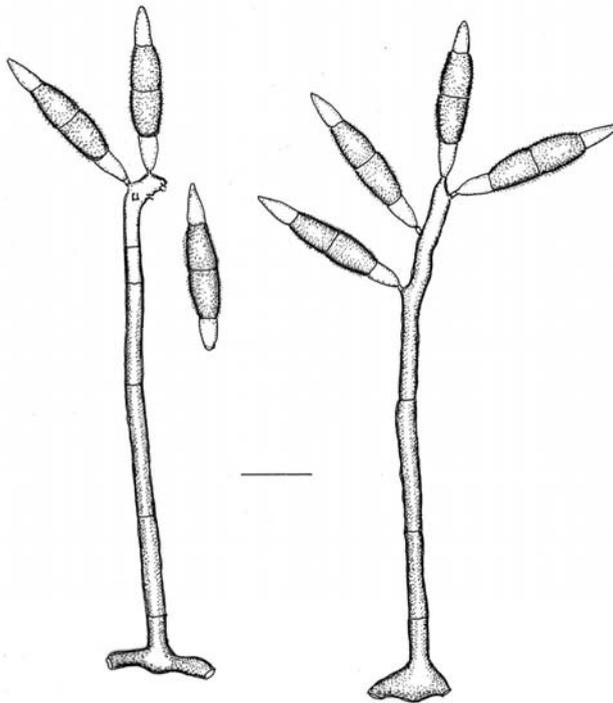


Fig. 26. *Nakataea fusispora*. Conidiophores, conidiogenous cells with separating cell denticles and conidia. Bar 12 μm.

From Ellis, 1971:

*Nakataea* Hara 1939.

*Vakrabeeja* Subramanian, 1956.

Colonies effuse, black. Mycelium partly immersed, partly superficial. Spherical or sub-spherical black sclerotia are formed on natural substrata and in culture. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, unbranched, or rarely branched, brown, smooth. Conidiogenous cells polyblastic, integrated, terminal becoming intercalary, sympodial, cylindrical, sometimes geniculate, denticulate; denticles thin-walled, cylindrical or broadly conical, each cut off by a septum to form a separating cell. Conidia solitary, dry, acropleurogenous, becoming detached by a break across the thin separating cell wall, simple, usually falcate, often sigmoid, smooth, almost always 3-septate, cells unequally coloured, the cell at each end hyaline or very pale brown, intermediate cells pale to mid-pale brown.

Type species: *Nakataea* state of *Leptosphaeria salvinii* Catt. = *N. sigmoidea* Hara.

*Nakataea fusispora* Matsushima 1975.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, unbranched, solitary, erect, flexuous, brown, smooth. Conidiogenous cells polyblastic, integrated, terminal, sympodial, denticulate. Separating cells formed from septation of denticles. Rhexolytic conidial secession. Conidia solitary, fusiform, with basal scar, 3-septate, intermediate cells clear brown, end cells very clear brown, verruculose, 26-34×4.5-6 µm.

Basionym: *Vakrabeeja fusispora* Matsush. 1971.

On dead leaves of *Pistacia lentiscus*, *Quercus ilex*. Torre del Sevo, Central West Sardinia, Italy.

## CAMPOSPORIUM

(Harkness 1884, Bull. Calif. Acad. Sci. 1: 37)

The genus *Camposporium* was erected by Harkness in 1884 to describe a species, *C. antennatum* characterized by conidia septate produced at the apex of pedicels and with filiform setae located on the apical cell. Later some more species were identified: *C. cambrense* S. Hughes and *C. pellucidum* (Grove) S. Hughes (1951), *C. japonicum* Ichinoe (1971), *C. laundonii* Ellis (1976), *C. ontariense* Matsushima (1983).

***Camposporium*** Harkness, 1884 (fide Saccardo, 1886).

*Hyphae fertiles flexuosae, simplices, septatae, brunneae. Conidia in hyphae apice subpedicellata solitaria vel bina, cylindracea, pluriseptata, olivaceo-brunnea, apice longe 1-3-ciliata. - A genere Helminthosporio pedicellis conidiorum setigerorum abunde differt.*

According to Ellis (1971):

Colonies effuse, grey, brown or olivaceous brown, sometimes glistening. Mycelium all immersed or partly superficial. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, straight or flexuous, often irregularly bent, unbranched, smooth, brown or dark brown, paler towards the apex. Conidiogenous cells integrated, ter-

minal, polyblastic, sympodial, cylindrical or subulate, denticulate; each denticle a narrow, cylindrical pedicel or separating cell. Conidia solitary, dry, acropleurogenous, simple or appendiculate, multiseptate, pale brown, often unequally colored, the end cells being colorless or subhyaline, smooth, generally cylindrical, rounded at both ends or rounded at the apex, conico-truncate at the base, but sometimes tapered towards the apex, rostrate.

Type species: *Camposporium antennatum* Harkness 1884.

We have found two species in two different areas of mediterranean maquis: *C. antennatum* and *C. pellucidum*.

***Camposporium antennatum* Harkness, 1884.**

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, erect, straight, more frequently flexuous, brown, clearer towards the apex, smooth, septate, up to  $85 \times 7 \mu\text{m}$  and more. Conidiogenous cells integrated, terminal, polyblastic, sympodial, denticulate, with denticles as separating cells. Conidia solitary, dry, acropleurogenous, multiseptate, brown, yellow-brown, with end cells subhyaline and rounded,  $67\text{--}74 \times 7\text{--}9 \mu\text{m}$ , with 2-3 hyaline setulae on the apical cell up to  $40 \mu\text{m}$  long and  $1 \mu\text{m}$  wide.

On dead leaves of *Pistacia lentiscus*. Salina island, Sicily.

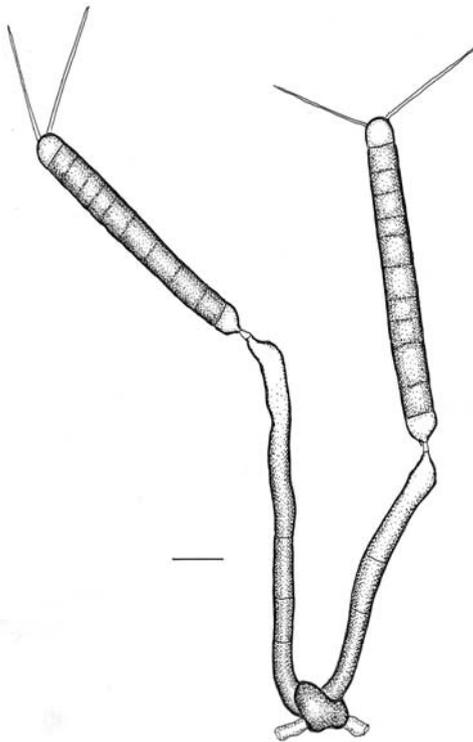


Fig. 27. *Camposporium antennatum*. Conidiophores and conidia. Bar  $14 \mu\text{m}$ .

The species described presents morphological characters well coinciding with Hughes (1951) and Ellis (1971) descriptions.

***Camposporium pellucidum*** (Grove) Hughes, 1951.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, irregularly flexuous, brown, clearer towards the apex, smooth, septate, up to 40  $\mu\text{m}$  long and 6  $\mu\text{m}$  wide and more near the base. Conidiogenous cells integrated, terminal, polyblastic, sympodial, with denticles as separating cells. Conidia solitary, dry, acropleurogenous, multiseptate, brown, end cells subhyaline and rounded, 100-130 $\times$ 8-12  $\mu\text{m}$ , with sometimes 1-setula up to 140  $\mu\text{m}$  long and more at the apex of the top cell.

On dead leaves of *Pistacia lentiscus*. Bosco Isola, South-East Italy.

Our strain presents dimensions not always coinciding with the mentioned descriptions, mainly for the conidiophores, long about 1/3 of the conidia, and for their irregular morphology.

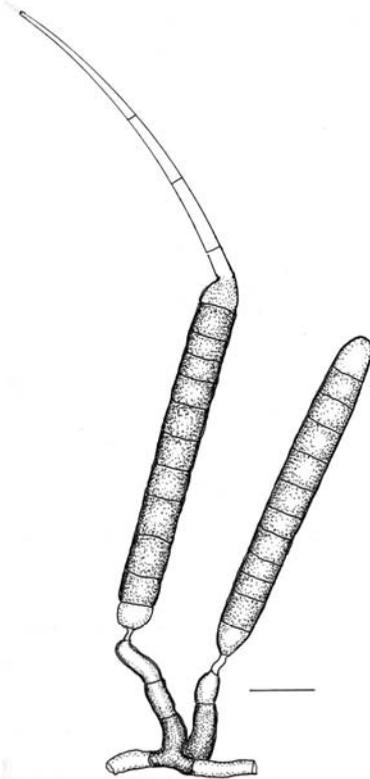


Fig. 28. *Camposporium pellucidum*. Conidia with long setula. Bar 20  $\mu\text{m}$ .

## REPETOPHRAGMA

(Subramanian 1992, Proc. Indian Nat. Sci. Acad. B58, 4: 179)

The genus *Repetophragma* was erected by Subramanian (1992) in a wide reassessment of the genus *Sporidesmium* Link (1809). According to the Author “ a re-appraisal of the genus was urgently needed. Criteria such as euseptation/distoseptation of conidia, the nature, regularity and other features of percurrent proliferation of conidiophores, and the presence or absence of conidiophores are considered to be important and a diagnostic value in any such appraisal”. It is necessary to point out that the genus *Sporidesmium* is mainly characterized by percurrent conidiogenous cells even if with different morphological shapes and structures. Into percurrent proliferation Subramanian distinguishes the term “annellate conidiogenous cells” as a group with euseptate conidia and includes these species into the new genus *Repetophragma*, separating all the species always with annellate conidiogenous cells but with distoseptate conidia in the genus *Sporidesmiella*. Moreover the Author, always into the percurrent proliferation of conidiogenous cells distinguishes in another genus the species not annellidic but “with conidiophores with characteristic lageniform, doliiform, or nodose percurrent proliferation”.....”species in this group with euseptate conidia are accommodate in the new genus *Penzigomyces*”, and the others with the same conidiogenous cells but with distoseptate conidia into the genus *Polydesmus* Mont. “ Finally, a few species in *Sporidesmium* in which conidiophores appear to be absent and the conidia that are euseptate are produced directly on simple conidiogenous cells are removed from *Sporidesmium* and placed in a new genus *Stanyehughesia*. “The genus *Sporidesmium* is accepted for the species congeneric to *S. ehrenbergii* M.B. Ellis which is considered to be congeneric with the type species. *S. atrum* Link.: these species have non-hyphopodiate mycelium, simple, non proliferating conidiophores or conidiophores with irregular percurrent proliferations; the conidia are solitary, gangliar (holoblastic), acrogenous and euseptate. Species with the same feature, but with pseudoseptate conidia, are disposed in a new genus *Ellisembia*”, Since we will have to consider in this paper other species of the *Sporidesmium* group appears useful to include the “Key to the Genera” as proposed by Subramanian (1992).

### *Conidia euseptate*

Conidiophores absent, conidia on conidiogenous cells	STANJEHUGHESIA
Conidiophores present Conidiophores proliferations none or percurrent and irregular	SPORIDESMIUM
Conidiophores terminally annellate	REPETOPHRAGMA
Conidiophores with lageniform, ovoid, doliiform or nodose percurrent proliferations	PENZIGOMYCES

***Conidia pseudoseptate***

Conidiophores proliferations none, or percurrent and irregular	ELLISEMBIA
Conidiophores terminally annellate	SPORIDESMIELLA
Conidiophores with lageniform, ovoid or doliiform percurrent proliferations	POLYDESMUS

The diagnosis of the genus *Repetophragma* Subramanian is here reported:

***Repetophragma* Subramanian 1992.**

*Hyphomycete dematiacea conidia ganglica producentes. Conidiophora fusca, non-ramosa, septata. Cellula conidiogena integrata, apicalia, annellata. Conidia acrogena, solitaria, euseptata, truncata ad basim, sicca.*

*Dematiaceous Hyphomycetes* producing gangliar conidia. Conidiophores brown, simple, septate. Conidiogenous cell integrated, apical, annellate. Conidia acrogenous, solitary, euseptate, truncate at base, dry.

Type species: *Repetophragma biseptata* (M.B.Ellis) Subramanian, 1992.

***Repetophragma goidanichii* (Rambelli) W.P.Wu, 2005.**

Basionym: *Ceratosporella goidanichii* Rambelli, 1958.

Synonyms: *Sporidesmium biseptatum* M.B.Ellis, 1963.

*Endophragmia alternata* Tubaki & Saito, 1969.

*Sporidesmium goidanichii* (Rambelli) S. Hughes, 1979.

Colony not crowded and composed by isolated conidiophores. Conidiophores macrone-matous, monone-matous, not lageniform at the base, erect or gently flexuous, brown, smooth, with septa difficult to observe, 200-290×6 µm, conidiogenous cells included. Conidiogenous cells monoblastic, integrated, terminal, growing percurrently and with frequent annellations, brown, clearer towards the apex. Conidia solitary, rod shaped, clear brown, 6-septate, with apical and base cells clearer, commonly persistently laterally attached in proximity of an annellation, smooth, 37-41×7-8 µm.

On dead leaves of *Arbutus unedo* L. Montagna Grande, Pantelleria.

This species was found, determined and described by Rambelli (1958) as *Ceratosporella goidanichii*. Some years later (1969) Tubaki and Saito discovered the species that, presumably without knowing the Rambelli's determination, included in the genus *Endophragmia* as *E. alternata* Tubaki and Saito new species. The percurrent proliferation of the conidiogenous cell of the fungus is not caliciform and Hughes (1979) proposed the new combination *Sporidesmium goidanichii* (Rambelli) Hughes. After the reassessment of the genus *Sporidesmium* carried out by Subramanian (1992), the species was transferred by W.P.Wu (2005) into the genus *Repetophragma* as *R. goidanichii* (Rambelli) W.P.Wu. Recently Rambelli & al. (2009), continuing the researches on *Dematiaceous*

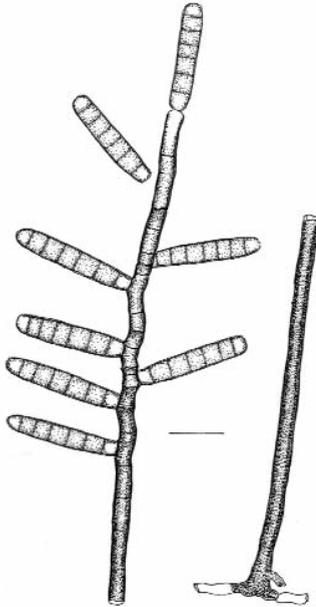


Fig. 29. *Repetophragma goidanichii*. Percurrent conidiogenous cell and conidia. Bar 20  $\mu\text{m}$ .

*Hyphomycetes* of mediterranean maquis litters observed again this species on dead leaves of *A. unedo* at Montagna Grande in the Pantelleria island. Since the fungus does not present a lageniform, doliiform conidiophora, characters of the genus *Penzigomyces* and the frequent annellations, not caliciform, occupy a very long conidiogenous cell, according to Subramanian (1992), we presume the Wu determination correct.

***Repetophragma cambrense*** (M.B. Ellis) McKenzie, 1995.

Type species: *R. biseptatum* (M.B. Ellis) Subram. 1992.

Synonym: *Sporidesmium cambrense* M.B.Ellis, 1958.

Colonies composed by isolated conidiophores. Conidiophores macronematous, monone-matous, unbranched, dark-brown, clearer towards the apex, smooth, not lageniform at the base, erect or gently flexuous, 83-170 $\times$ 5  $\mu\text{m}$ . Conidiogenous cells monoblastic, integrated, terminal, growing percurrently, with 3-4 annellations not closed in the upper part. Conidia fusiform or rod-shaped, with enlarged base and rounded apex, 7-septate, brown, dark-brown, with cells at each end hyaline or subhyaline, 38-50 $\times$ 9-13  $\mu\text{m}$ .

On dead leaves of *Pinus pinaster* var. *hamiltonii* Aiton. Montagna Grande, Pantelleria.

This species presents some characters not completely according to the original description (McKenzie 1995), like the production of a not closed annellation at the apex of the conidiogenous cell. We presume that this morphological character could be influenced by

the substratum composition. This seems conformed by the description of Ellis (1958) for the synonym *Sporidesmium cambrense* and also for the variability of this character in the observed material. A strain of *R. cambrense* found on indeterminate dead leaves in Costa Rica (Rambelli & Ciccarone, 2008) presents a very short conidiogenous cell with only 2 apical annellations. It is useful to point out the colour differences of the conidia: dark when young and very dark coloured in the old conidia.

*Material examined:* *R. cambrense*, on indetermined dead leaves, Costa Rica, ROHB n. 510

***Repetophragma lignicola*** (Hughes) Rambelli n. comb., 2011.

Basionym: *Endophragmiella lignicola* Hughes, 1979.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macrone-matous, mononematous, unbranched, brown, clearer towards the apex, septate, smooth, 115-130×4-5 µm conidiogenous cell included. Conidiogenous cells monoblastic, terminal,

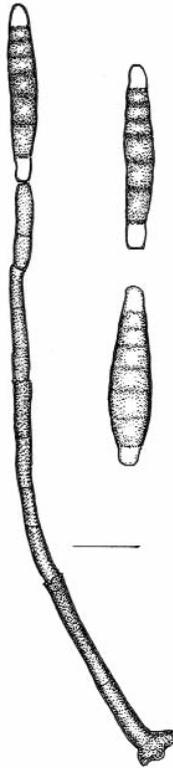


Fig. 30. *Repetophragma cambrense*. Old and young conidia. Bar 18 µm.

clear brown, elongating percurrently with several and regular annellations, up to  $45 \times 4 \mu\text{m}$ . Conidia acrogenous, but remaining adherent to annellations, fusiform, 2-septate, with central cell dark-brown, apical and basal cells hyaline, with truncate base,  $13\text{--}16 \times 5 \mu\text{m}$ , central cell  $7\text{--}9 \times 5 \mu\text{m}$ .

*Endophragiella lignicola* was proposed as new species by Hughes (1979). According to the Author “branching of conidiophores and conidium septation are considered to have little or no generic value”. Nevertheless, after the Subramanian reassessment the species, for their typical annellate conidiogenous cells and the two septate conidia, can be more accommodate in the genus *Repetophragma*. We have found the species on dead leaves of *Quercus suber* in the surroundings of Tuscania, Central Italy.

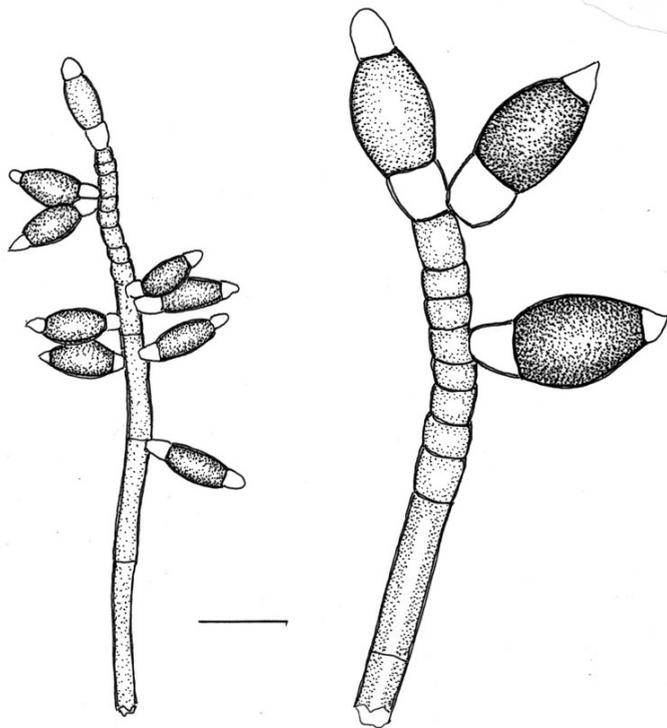


Fig. 31. *Repetophragma lignicola* (Hughes) Rambelli. Conidiophores with annellate conidiogenous cells and conidia. Bar: left  $15 \mu\text{m}$ , right  $30 \mu\text{m}$ .

***Repetophragma inflatum*** (Berk. & Ravenel) W.P. Wu, 2005.

Type species: *Repetophragma biseptata* (M.B. Ellis) Subramanian, 1992.

Colonies inconspicuous, composed by isolated or tufted conidiophores. Conidiophores macronematous, mononematous, frequently flexuous, composed by several regular cells, brown chestnut brown, with smooth walls and septa clearly visible, 500-600×8-9 μm. Conidiogenous cells percurrent, without calyciform structures, but with very frequent annellations, about one for every cell. Conidia straight, fusiform, rarely sigmoid, 3-euseptate, frequently slightly constricted at the septa, with trunked base cell and elongated apical cell hyaline, second cell from the base brown, dark-brown, third cell clear brown, smooth, 50-55×15 μm.

On dead leaves of *Quercus suber*. Tuscania, Central Italy.

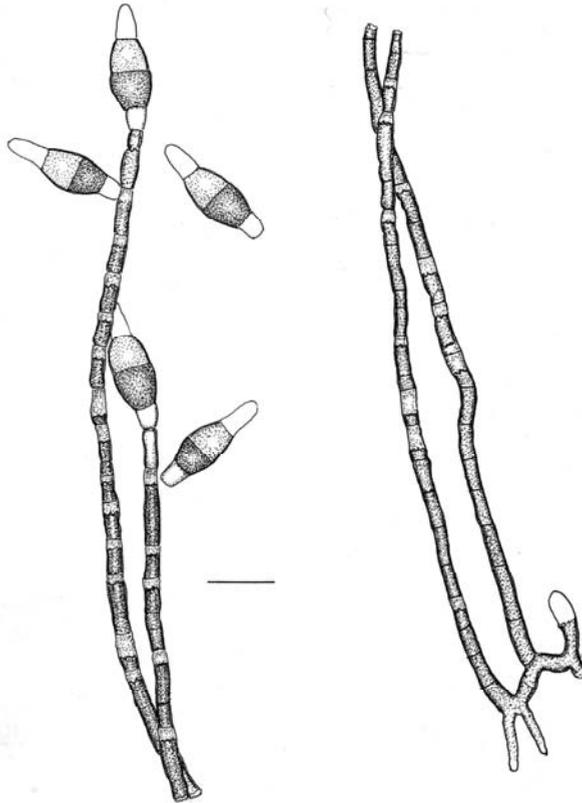


Fig. 32. *Repetophragma inflatum*. Conidiophores, percurrent conidiogenous cells and conidia. Bar 25 μm.

## PENZIGOMYCES

(Subramanian 1992, Proc. Indian Nat. Sci. Acad. B58, 4: 179)

The genus *Penzigomyces*, dedicated to the Italian Prof O. Penzig, is one of the seven genera proposed by Subramanian (1992) for a reassessment of the genus *Sporidesmium*. The most important morphological characters of this genus are conidia euseptate and conidiophores with lageniform, ovoid, doliiform or nodose percurrent proliferation. For a more detailed discussion on this genus we recommend to read what written for the genus *Repetophragma*. The diagnosis of the genus as proposed by Subramanian (1992) is here reported.

***Penzigomyces*** Subramanian, 1992.

*Hyphomycete dematiacea conidia gangliar producentes. Conidiophora simplicia, septata, fusca, cum proliferationes successivae doliiformis vel lageniformis vel nodosis. Conidia solitaria, acrogena, euseptata, fusca, sicca.*

*Dematiaceous hyphomycetes* producing gangliar conidia. Conidiophores simple, septate, brown, with regular successive, doliiform, lageniform or nodose percurrent proliferations. Conidia solitaria, acrogenous, euseptate, brown, dry.

Type species: *Penzigomyces nodipes* (Penz. & Sacc.) Subramanian, 1992.

***Penzigomyces ilicis*** Ramb. & Ciccarone, 2009.

Type species: *Penzigomyces nodipes* (Penz. & Sacc.) Subram., 1992.

Etym. *ilicis* on dead leaves of *Quercus ilex*.

Colonies effuse, not crowded, composed by solitary conidiophores. Mycelium partly immersed. Conidiophores macronematous, mononematous, solitary, erect, frequently gently flexuous and nodose, not branched, septate, brown, yellow-brown, smooth, 190-250×7 µm, conidiogenous cell included. Conidiogenous cells monoblastic, integrated, terminal, with 1-2 percurrent proliferations, with conidia schizolytic secession, cylindrical, with truncate apex, clear brown. Conidia solitary, acrogenous, 3-euseptate, with apical and lower cells clear brown and central cells brown, smooth, navicular, slightly constricted at the septa, apex rounded and base conico-truncate not protruding, 41-49×12-14 µm.

On dead leaves of *Quercus ilex* L. Circeo Nat. Park. Central West Italy.

According to Subramanian (1992), because of the percurrent-nodose proliferation of the conidiophores and conidiogenous cells, our species must be included into the genus *Penzigomyces*. For some morphological characters is similar to *P. coprophilus* (Matsush.) Subram. (Basionym: *Sporidesmium coprophilum* Matsush, 1975) like the general morphology of conidiophores, but differs in the conidial shape, dimensions and colours. Since we didn't find any species with morphological characters of our strain we proposed (Rambelli & al. 2009) the new species *Penzigomyces ilicis*.

***Penzigomyces*** sp.

Type species: *Penzigomyces nodipes* (Penz. & Sacc.) Subram. 1992.

Colonies inconspicuous, composed by isolated conidiophores. Mycelium partly immersed. Conidiophores macronematous, mononematous, solitary, erect, straight or

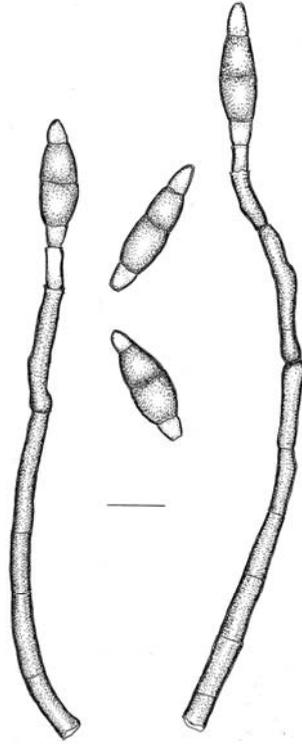


Fig. 33. *Penzigomyces ilicis*. Percurrent conidiogenous cells on nodose conidiophores. Bar 20  $\mu\text{m}$ .

slightly flexuous, not branched, septate, sometimes nodose and with a percurrent-irregular annellation, smooth, brown, clear towards the apex, up to 43  $\mu\text{m}$  long (conidiogenous cell included) and 6  $\mu\text{m}$  wide near the base. Conidiogenous cells monoblastic, integrated, terminal, cylindrical, with truncate apex, brown, clear brown, with 1 or 2 sometimes nodose percurrent proliferations. Conidia solitary, acrogenous, 8-10 euseptate, straight, fusiform, obpyriform, brown, yellow-brown, with clear apex, smooth, 42-60 $\times$ 7-13  $\mu\text{m}$ .

On dead leaves of *Pistacia lentiscus* L. Circeo Nat. Park. Central-West Italy.

The species described presents morphological characters of the genus *Penzigomyces* (Subramanian 1992), but since we observed only poor material we left the species indeterminate hoping in other findings (Rambelli & al. 2009).

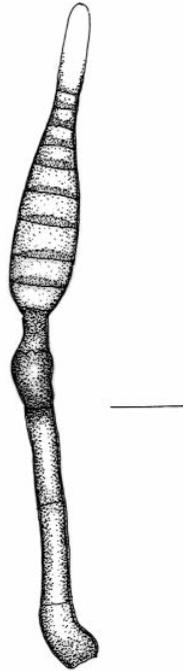


Fig. 34. *Penzigomyces* sp. Euseptate conidia on percurrent, nodose conidiogenous cells. Bar 12  $\mu\text{m}$ .

***Penzigomyces salinae*** Rambelli sp. nov., 2010.

Etym. *salinae*, Salina island, the place where the species was collected.

*Coloniae dilute griseae, ex innumeris et dense coactis conidiophoris composita, ad sporodochiis simillime gregantibus. Conidiophora macronemata, mononemata, caespitulis insidentia, cylindrica, simplicia, laevia, brunnea, septata, 29-45 $\times$ 3-4  $\mu\text{m}$  metientia. Cullulae conidiogenae nodosae, irregulariter, successive prolificae. Conidia dilute fusca, regulariter lanceolata, basim usque ad 2.5-3  $\mu\text{m}$  crassa, ad apicem recte elongantia et attenuata, septis crassis et dense fuligineis bi-tetra euseptata, 41-47 $\times$ 3  $\mu\text{m}$  metientia.*

*Ad foliis emortuis Pini maritimae et Pistaciae lentisci. Insula Salina.*

Colonies sporodochium - like, clear grey, composed by numerous and very crowded conidiophores. Conidiophores macronematous, mononematous, caespitose, cylindrical, unbranched, smooth, septate, brown, 29-45 $\times$ 3-4  $\mu\text{m}$ . Conidiogenous cells with an irregular, nodose, percurrent proliferation, with large apex. Conidia very regular spear shaped, with large base up to 2.5-3  $\mu\text{m}$  and long thin apex, straight, very clear brown, 2-4- euseptate, septa wide and dark brown, 41-47 $\times$ 3  $\mu\text{m}$ .

On dead leaves of *Pinus maritima* and *Pistacia lentiscus*. Salina island, Sicilia.

Type species: *Penzigomyces nodipes* (Penz. & Sacc.) Subramanian, 1992.

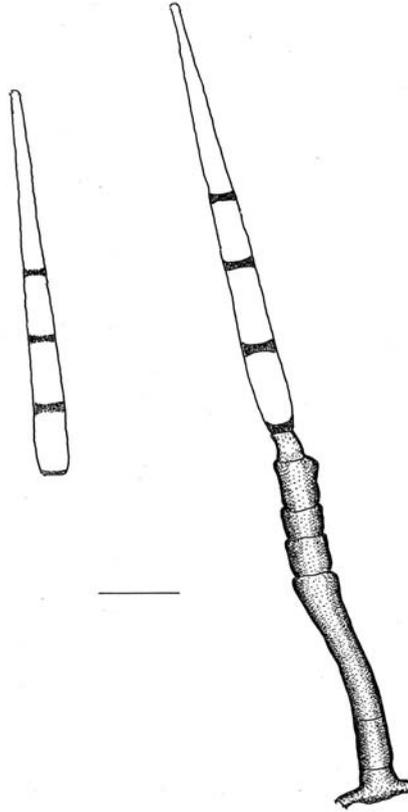


Fig. 35. *Penzigomyces salinae*. Percurrent-nodose conidiogenous cells and spear shaped conidia. Bar 8  $\mu\text{m}$ .

The species described presents percurrent-nodose conidiogenous cell, typical of the *Penzigomyces* genus (Subramanian 1992) and clear spear shaped conidia with colour contrasting with that of the proliferating structure. If compared to the known species of the genus, this species seems very different not only for the euseptate spear shaped conidial, but also for the type of the sporodochium-like colonies. For these particular morphological characters we propose our strain as a new species.

Deposited: PAL.

### **SPORIDESMIUM**

Link, 1809 ex Fries, 1821.

The genus *Sporidesmium* was erected by Link (1809) and validated by Fries (1821). Saccardo (1886) in Syll. Fung. vol. IV, pag. 382, Sez 3 Phragmosporae reports the genus

diagnosis of *Clasterosporium* Schweinitz (1832) that considered valid also for many species of the genus *Sporidesmium*.

*Hyphae repentes (saprogenae), hinc inde conidia fusioidea vel cylindracea subrecta, 2-pluriseptata, fusca exerentes. Species plures herbaricolae colore olivaceo et rigiditate, minore a typo desciscunt sed limes ambiguus.*

Subramanian (1992) gives a short description: “*simple, brown, septate conidiophores and the acrogenous, solitary, gangliar, euseptate conidia. The conidiophores may show irregular percurrent proliferations*”.

Type species: *Sporidesmium atrum* Link, 1809.

***Sporidesmium* sp.**

Colonies inconspicuous, composed by isolated conidiophores mixed with *Dictyochoaeta* conidiophores. Conidiophores macronematous, mononematous, erect, stright, hyaline and very clear brown only near the base, septate, smooth,  $48 \times 5 \mu\text{m}$ . Conidiogenous cell monoblastic, acroauxic, rarely with one annellation, almost indistinguishible from the conidiophores. Conidia acrogenous, fusiform, 4-5-septate, with trunk basal cell very clear brown like the penultimate apical cell, apex prominent, elongated and rounded, hyaline, two central cells brown, chestnut brown, smooth,  $38-48 \times 8 \mu\text{m}$ .

We have found this species on dead leaves stipes of *Quercus suber*, but, since the sample was very poor we prefer to leave it indeterminate hoping in new findings.

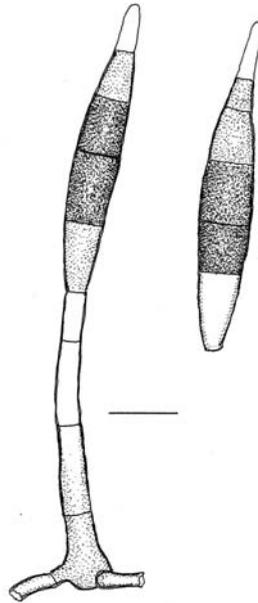


Fig. 36. *Sporidesmium* sp. Conidiophores and conidia. Bar 10  $\mu\text{m}$ .

### MINIMELANOLOCUS

Castaneda Ruiz & Heredia 2001, Cryptog., Mycol. 22. 2001

The genus was erected by Castaneda Ruiz & Heredia (2001) to separate from the genus *Pseudospiropes* Ellis (1971) the species with euseptate conidia. The Authors considered the importance of the conidiogenous loci morphology pointing out the differences between protuberant and flat scars, characters, in our opinion more important for species distinction.

The diagnosis of the genus is here reported:

***Minimelanolocus*** R.F. Castaneda & Heredia, anam., 2001.

*Ad fungos conidiales, hyphomycetes, pertinens. Coloniae in substrato naturali effusae, pilosae, olivaceae, brunneae, atrobrunnea vel nigra. Mycelium partim superficiale et partim in substrato immersum, ex hyphis septatis, ramosis, laevibus vel verrucosis, pallide brunneis vel brunneis compositum. Stromata absentia. Conidiophora conspicua, mononemata, solitaria vel fasciculata, septata, recta vel flexuosa, levia vel verrucosa, cylindrica, sinuosa usque geniculata, atrobrunnea vel nigra, apice versus pallidiora. Cellulae conidiogenae holoblasticae, polyblasticae, indeterminatae, terminales vel intercalares mutantibus, pallide brunneae vel brunneae, in conidiophoris incorporatae, saepe cum proliferationibus sympodiales holoblasticae et interdum aliquot proliferationibus percurrentibus enteroblastica praeditae. Loco conidiogeno inconspicuo vel interdum minime prominentis, angusto, opaco, refractivo vel obscuro. Conidiorum secessio schizolytica. Conidia oblonga, obovoidea, cylindrica, navicularia, clavata, obclavata, late fusiformia, usque turbinate, attenuata, truncata, obscura vel refractiva ad basim, solitaria, euseptata, acropleurogena, sicca, levia vel verrucosa, pallide olivacea, dilute brunnea usque atrobrunnea.*

Type species: *Minimelanolocus navicularis* (R.F. Castaneda) R.F. Castaneda.

Conidial fungi, hyphomycetes. Colonies on the natural substratum effuse, hairy, olivaceous, brown, dark brown or black. Mycelium superficial and immersed, composed of septate, branched, smooth or verrucose, pale brown or brown, hyphae. Stromata absent. Conidiophores conspicuous, mononematous, solitary or fasciculate, septate, erect, straight or flexuous, smooth or verrucose, cylindrical, sinuate or geniculate, brown to dark brown, paler towards the apex. Conidiogenous cells holoblastic, polyblastic, indeterminate, terminal becoming intercalary, pale brown or brown, integrated, always with holoblastic sympodial proliferations and sometimes with some enteroblastic percurrent proliferations. Conidiogenous loci inconspicuous or slightly prominent, narrow, opaque, refractive to somewhat obscure. Conidial secession schizolytic. Conidia oblong, ovoid, cylindrical, navicular, clavate, obclavate, broadly fusiform to turbinate, attenuate and narrowly truncate and obscure or refractive at the base, solitary, euseptate, acropleurogenous, dry, smooth or verrucose, pale olivaceous, pale brown to dark brown.

***Minimelanolocus dumeti*** (Lunghini & Pinzari) R.F. Castaneda & Heredia

Colonies inconspicuae, composed by isolated conidiophores. Conidiophores macronematous. mononematous, unbranched, erect or gently flexuous, smooth, dark- brown, septate, 175-190×5 µm. Conidiogenous cells integrated, terminal, polyblastic, sympodial, with flat

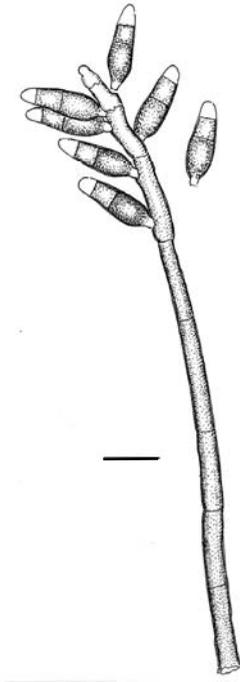


Fig. 37. *Minimelanolocus dumeti*. Conidiophores and conidia. Bar 12  $\mu\text{m}$ .

but discernible scars, clear brown. Conidia solitary, dry, acropleurogenous, obpyriform, smooth, with 2 transverse septa, with basal cell brown and clearer the others, 18-19 $\times$ 6  $\mu\text{m}$ . On dead leaves of *Quercus suber*, Tuscania, Central Italy.

This species was collected by Lunghini on dead wood of *Pistacia lentiscus* at Elba island and again by Pinzari at Macchiagrande, near Rome (1996) and determined as *Pseudospiropes dumeti* for the characteristic conidia loci scars not so inconspicuous and for euseptate conidia. The accommodation in the genus *Minimelanolocus*, in our opinion, should be discussed.

### PARAPLEUROTHECIOPSIS

P.M. Kirk, Trans. Br. Mycol. Soc. 78: 63, 1982.

The genus *Parapleurotheciopsis* was erected by Kirk (1982) to separate from the genus *Pleurotheciopsis* those species mainly characterized by production of branched conidia chains from ramoconidia with one or more denticles at the apex and developing secondary or tertiary ramoconidia, and produced by percurrent conidiogenous cells. The genus diagnosis is here reported:

***Parapleurotheciopsis*** P.M. Kirk, 1982.

*Colonies effusae, pilosae, brunneae ad fuscae, saepe inconspicuae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis septatis, pallide brunneis ad brunneis, laevibus, ramosis compositum. Conidiophorae macronematous, mononematous, erectae, simplices, laeves, septatae, rectae vel leviter flexuosae, brunneae ad atrobrunneae, ad basem cellululorum quaeque radialiter lobatam inflatae formantes. Cellulae conidiogenae in conidiophoris incorporatae, holoblasticae, monoblasticae, terminales, cylindricae ad lageniformes, percurrentes. Conidia acrogena, sicca, laevia, hyalina ad pallide brunnea, catenata cum unico ramoconidio primo septato vel aseptato ad apice uno vel pluribus denticulis latis induto, deinde nonnumquam secundis vel tertiis cum ramoconidiis primo similaribus, quae catenis brevibus gaudent e conidiis ellipsoideis vel latefusiformibus, septatis vel aseptatis compositis.*

Specie typica: *Cladosporium inaequiseptatum* Matsushima.

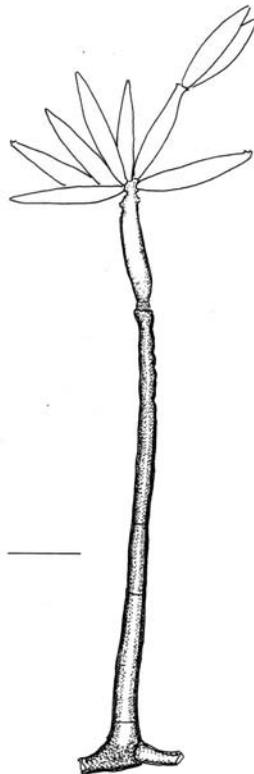


Fig. 38. *Parapleurotheciopsis ilicina*. Conidiophores, ramoconidia and conidia. Bar 16  $\mu\text{m}$ .

***Parapleurotheciopsis ilicina*** P.M. Kirk, 1982.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macrone-matous, mononematous, erect, not branched, smooth, septate, straight or gently flexuous, dark-brown, 92-120×4-5 µm. Conidiogenous cells integrated, monoblastic, terminal, cylindrical, with percurrent proliferation. Conidia acrogena, hyaline to clear brown, smooth, 0-septate, fusiform, 20-23×5 µm. Ramoconidia very similar to conidia, 22-25×5 µm, but with one or two broad denticles at the apex each producing an acropetal chain of conidia.

On dead leaves of *Quercus suber*, Tuscania, Central Italy.

This genus, very similar to *Pleurotheciopsis*, is characterized by a percurrent conidiogenous cell, apparently through a single annellide, producing a first ramoconidium elongating into secondary ramoconidia and acropetal chains of conidia. Castaneda & Kendrick (1990) described *P. coccolobae* that differs from *P. ilicina* in conidia and ramocomia dimensions.

**MENISPORA**

Persoon, Mycol. Eur. 1822.

The genus was erected on the type species *M. glauca* characterized by conidiogenous cells monophialidic, cylindrical, uncinata and borne on the conidiophores or on short branches. The genus diagnosis proposed by Persoon (1822) is very short:

***Menispora*** Persoon, 1822. *Fibrillae erectae, sub-corymbosae. Sporulae lineari-lunatae s. curvatae.*

Type species: *Menispora glauca* Pers.

***Menispora ciliata*** Corda, 1837.

Colonies composed by very crowded conidiophores, cottony for the prolonged and flexuous setiform conidiophores, gray, clear gray. Conidiophores macrone-matous, mononematous, frequently branched, fertile in the lower part, setose and flexuous in the upper part, brown, clearer at the apices, septate, up to 900 µm or more x 3-5 µm wide near the base: Conidiogenous cells at the apex of branches or laterally to conidiophores, clear brown, monophialidic, with uncinata conidiogenous loci, 15×4 µm, but very variable in dimensions. Conidia aggregated at the base of the conidiophores, curved, round at the apices with a short setula at each ends, hyaline, 0-septate, 14-16×4 µm, setulae up to 8 µm long.

On dead leaves of *Quercus suber*, Tuscania, Central Italy.

**DIGITODESMIUM**

P.M. Kirk, Trans. Br. Mycol. Soc. 77: 284, 1981.

The genus was erected by Kirk (1981) to separate from the genus *Dictyosporium* the species with digitate, acrogenous, euseptate conidia as most important morphological characters. The original diagnosis is here reported.

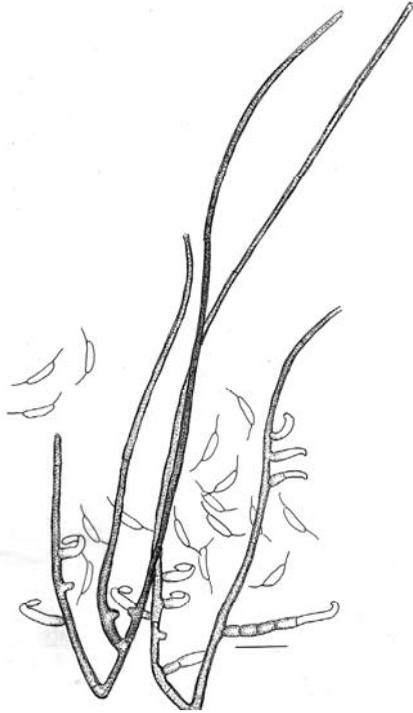


Fig. 39. *Menispora ciliata*. Conidiophores and conidia. Bar 26  $\mu$ m.

***Digitodesmium*** P.M. Kirk, 1981.

*Sporodochia sparsa, punctiformia, pulvinata, pallide brunnea ad brunnea. Mycelium in substrato plerunque immersum. Conidiophora semi-macronematosa, mononematosa, fasciculata, ex hypha, pallidissime brunnea, laevia, septata, moniliformia composita. Cellulae conidiogenae oblasticae, monoblasticae, in conidiophoris incorporatae, terminales, determinatae, globosae ad doliiformes, minute cicatricatae. Conidia acrogenosa, solitaria, secedentia schizolytice, euseptata, sicca, digitata, subinde in apice brachiorum calyptra gelatinosa hyalina induta.*

Specie typica: *Digitodesmium elegans* P.M. Kirk.

***Digitodesmium elegans*** P.M. Kirk, 1981.

Colonies inconspicuous, composed by isolated and punctiform sporodochia, clear red-brown. Conidiophores semi-macronematous, or micronematous, mononematous, composed by brown or dark-brown cells. Conidiogenous cells holoblastic, monoblastic, integrated, terminal, determinate, irregularly globose. Conidia acrogenous, solitary, euseptate, digitate, 45-54 $\times$ 5  $\mu$ m, up to 15 irregularly divergent arms 5  $\mu$ m wide.

On dead leaves of *Quercus suber*, Tuscania, Central Italy.

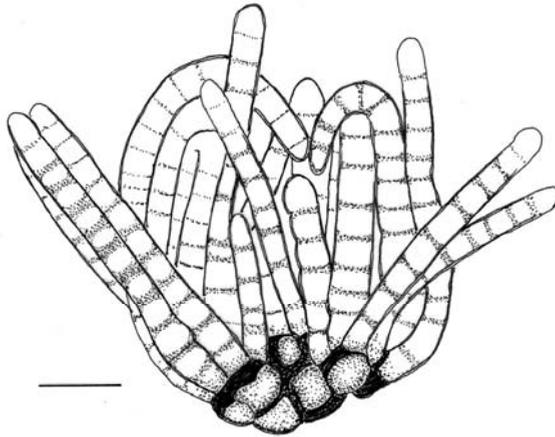


Fig. 40. *Digitodesmium elegans*. Digitate conidia. Bar 12  $\mu$ m.

The specie described presents morphological characters closed to *D. elegans* found by Kirk on dead wood of *Quercus robur* a species very similar to *Q. suber*. Nevertheless, some characters, like the pigmented conidiogenous cells and the number of arms of our strain, appear a little different presumably influenced by ecological conditions.

### ENDOPHRAGMIELLA.

(Sutton 1973, Mycol. Pap. 132: 1-143).

The genus *Endophragmiella* was erected by Sutton (1973) to include all the species with conidiophores branched towards the base, with conidiogenous cells monoblastic, integrated, terminal, determinate or more frequently percurrent but without flared cups deriving from the lower part of the conidium as frequently shows in *Endophragmia*, abruptly tapered at the apex, conidia acrogenous, pigmented, but mainly to separate from *Endophragmia* those species arbitrarily included and with heterogeneous morphological characters. Unfortunately the Author included in the diagnosis of the genus some characters more convenient to identify the species like the conidia 1-3 septate without mentioning if euseptate or distoseptate, differences not considered in the Ellis description as conformed by the plate of pag. 155 of *Dematiaceous Hyphomycetes* (1971).

In this figure (from Ellis 1971) *Endophragmia hyalosperma* with distoseptate conidia, later recombined in *Sporidesmiella* Kirk (1982), is together with different species with euseptate conidia, all as *Endophragmia*.

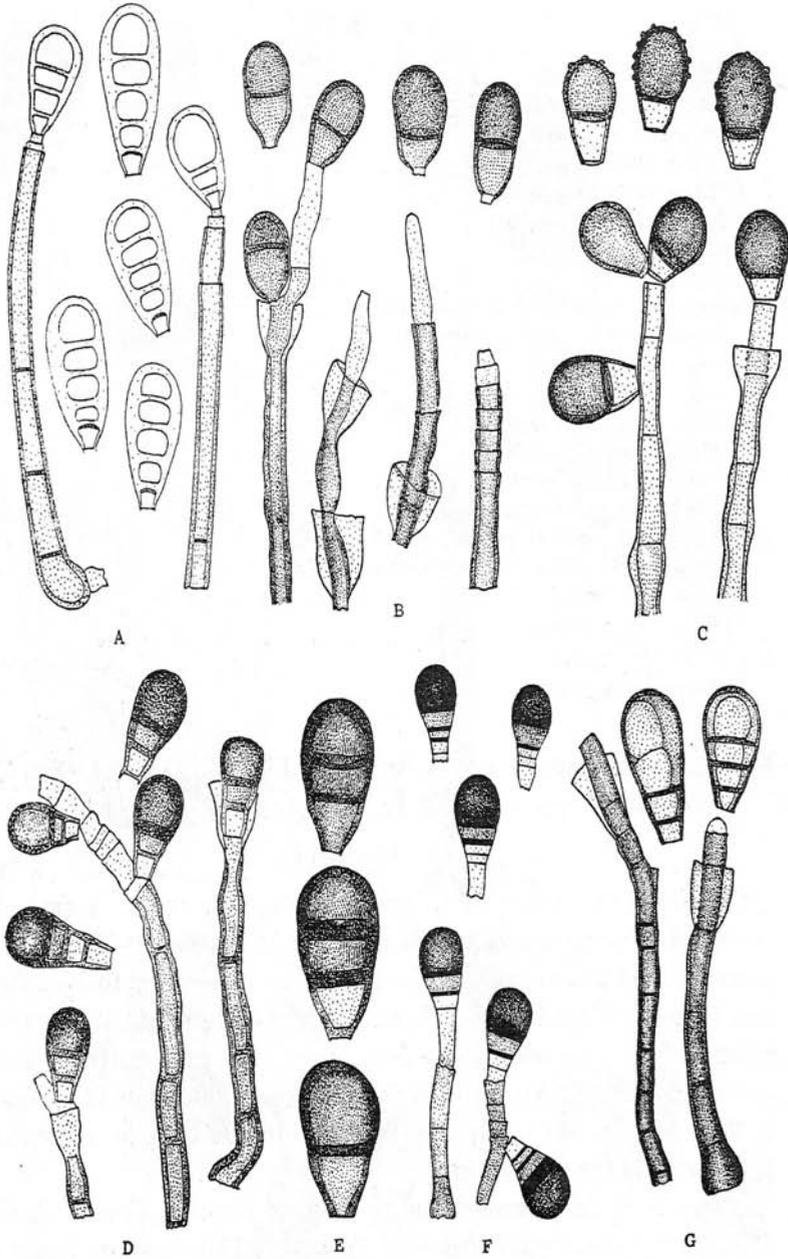


FIG. 104. *Endophragma* species (2): A, *hyalosperma*; B, *uniseptata*; C, *verruculosa*; D, *biseptata*; E, *nannfeldtii*; F, *glanduliformis*; G, *boothii* ( $\times 650$ ).

Fig. 41. *Endophragma* species (from Ellis 1971).

The diagnosis of the genus as proposed by Sutton (1973) is here reported:

***Endophragmiella*** Sutton, Mycol. Pap. 1973.

*Mycelium partim immersum, partim superficiale ex hyphis ramosis, septatis, pallide brunneis, laevibus compositum. Conidiophora macronemata, mononemata, erecta recta vel flexuosa, pallide brunnea, basim versus irregulariter ramosa, septata, laevia, parietibus tenuibus. Cellulae conidiogenae monoblasticae, in conidiophoris incorporatae, terminales, determinatae, vel percurrentes, apicem versus truncatum abrupte decrescentes. Conidia solitaria, sicca, acrogena, simplicia, pallide brunnea, 1-3 septata, fimbriata, parietibus tenuibus, aequaliter pigmentifera.*

*Species typica E. pallescens* Sutton.

Mycelium partly immersed, partly superficial, composed of branched, septate, pale brown, smooth hyphae. Conidiophores macronematous, mononematous, erect, straight or flexuous, pale brown, branched irregularly towards the base, septate, smooth, thin-walled. Conidiogenous cells monoblastic, integrated, terminal, determinate or percurrent, abruptly tapered towards the truncate apex. Conidia solitary, dry, acrogenous, simple, pale brown, 1-3 septate, fimbriate, thin-walled, easily pigmented.

***Endophragmiella boewei*** (J.L.Crane) S. Hughes, 1979.

Basionym: *Endophragmia boewei* J.L. Crane, 1972.

Type species: *Endophragmiella pallescens* Sutton. 1973.

Colonies composed by crowded conidiophores, not caespitose. Conidiophores macronematous, mononematous, solitary, erect, brown, smooth, 130-173×5 µm. Conidiogenous cells monoblastic, integrated, terminal, percurrent, cylindrical, clear brown. Conidia solitary, acrogenous, obovoid, pyriform, 1-euseptate, brown, 14-15×9-12 µm.

On dead leaves of *Pistacia lentiscus* and *Pinus pinaster*. Santa Teresa (Pantelleria), Circeo Nat. Park, Lazio (Italy), Bosco Isola, Puglia (Italy), Salina, Sicilia (Italy).

This species is very common on dead leaves of *Pistacia lentiscus* L. in all the mediterranean areas considered in this work. It was determined by Crane (1972) as *Endophragmia boewei*, but Hughes (1979), according to a particular type of percurrent proliferation of the conidiogenous cell without calyciform or cylindrical formations, characteristic of the genus *Endophragmia* Duvernoy & Maire (1920), recombined the species into the genus *Endophragmiella* Sutton (1973). But it is necessary to point out that Hughes did not consider another important morphological character of the genus *Endophragmiella*: the conidiophores branched several times near the base, morphology very rare in *E. boewei* and in any case to consider not character of this species. For this observation we think that the systematic position of the species should be reconsidered.

In the mediterranean areas of Salina island we have found the species on dead leaves of *Pistacia lentiscus* and *Pinus pinaster* and on this last substratum with some very small differences: the conidia present the upper cell less rounded and a more pyriform general morphology; the medium dimensions on the two substrata remain almost similar.

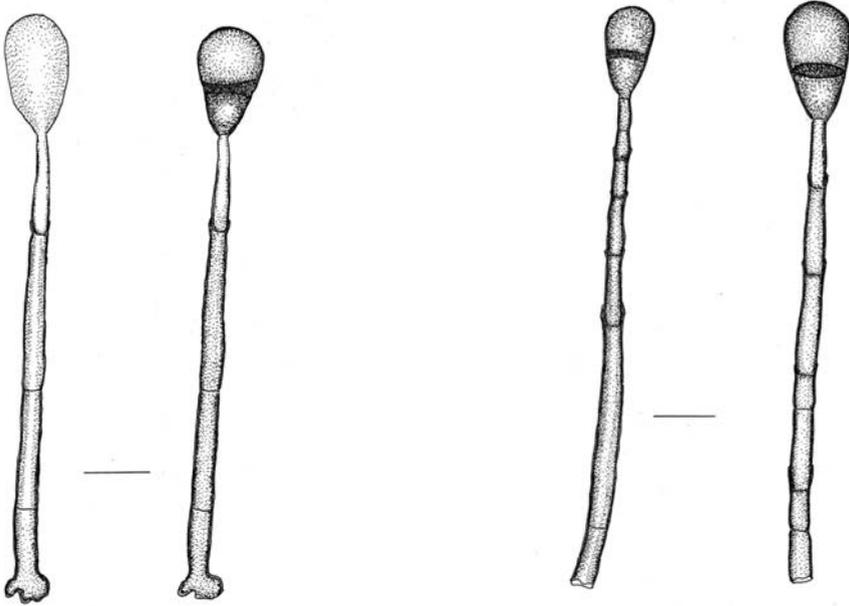


Fig. 42. *Endophragmiella boewei* (Crane) Hughes. Conidiophores, conidiogenous cells with percurrent proliferation and conidia. Left. A developing conidium and a ripe one on dead leaves of *Pistacia lentiscus*. Right. On dead leaves of *Pinus pinaster*. Bar 10  $\mu$ m.

### DOMINGOELLA

(Petraik & Ciferri 1932, Ann. Mycol. 30 (3/4): 149).

The genus *Domingoella* was erected by Petraik & Ciferri in 1932 for the species *D. asterinarum* Petraik & Ciferri, with the following diagnosis:

***Domingoella*** Petraik & Ciferri 1932.

*Mycelium superficiale, ex hyphis reticulato-ramosis, indistincte articulatis, griseo-olivaceis compositum; conidia vel in apice hypharum lateraliter sessilia vel in conidiophoris simplicibus acrogena, globosa, continua, brunnea.*

The diagnosis of the species, *D. asterinarum* is here reported:

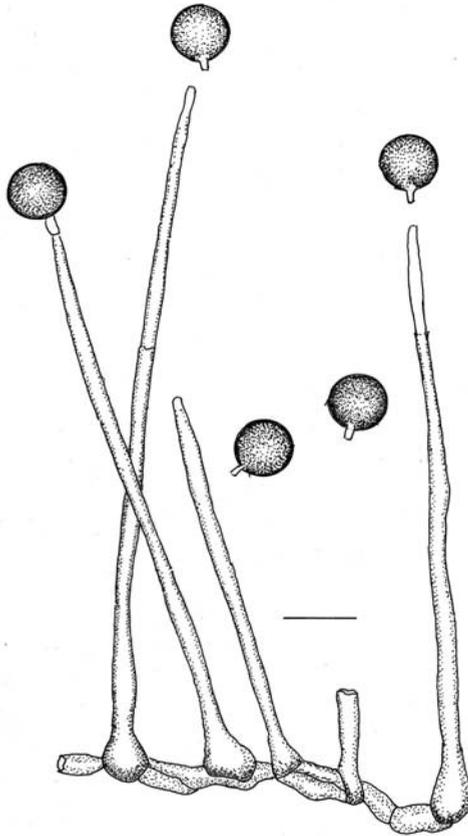


Fig. 43. *Domingoella asterinarum* (left) from mediterranean maquis litter, bar 10  $\mu\text{m}$ , and *D. arcostaphyli* from Kirk (1986).

***Domingoella asterinarum* Pet. & Cif., 1932.**

*Mycelium superficiale, ex hyphis densissime reticulato-ramosis, 2-3,5  $\mu\text{m}$  latis, sat breviter sed indistincte articulatis, pellucide olivaceis compositum; conidia vel in apice hypharum ad earum latera sessilia vel in ramulis conidiophoris simillimis, ad 25  $\mu\text{m}$  longis 1,5-2  $\mu\text{m}$  latis, subhyalinis, erecto-patentibus, plus minusve curvulis acrogena, vel in conidiophoris simplicibus typicis, basi bulboso-inflatis 4,5-7  $\mu\text{m}$  crassis apicem versus paulatim attenuatis, ad 80  $\mu\text{m}$  longis orta; conidia regulariter globosa, continua, pellucide olivacea, episporio ca.1  $\mu\text{m}$  crasso, 6,5-8  $\mu\text{m}$  diam.*

*In plagulis Asterinae spec. ad folia viva Passiflorae rubrae:* Valle del Cibao, prov. Espaillat. Moca, Estacion Nacional Agronomica. 6. I. 1930, leg. R. Ciferri no. 3611. - llano Costero, prov. S. to Domingo, S. to Domingo City. banks of Rio Ozama, 14. XII. 1929, leg. E.L. Ekman no. 2738 in Her. Ciferri.

The genus remained monospecific up to 1986 when Kirk described *D. arctostaphyli*, a species with morphological characters very closed to the type species and differing for the color of the conidiophores and conidia and for the conidial peg more protuberant in *D. asterinarum*. The conidiogenous cells of the two species are percurrently elongating and the general dimensions are very similar.

Our strain found on dead leaves of *Myrtus communis* and *Pistacia lentiscus* is described as follows:

***Domingoella asterinarum*** Petr. & Cif, 1932.

Conidiophores macronematous, mononematous, straight or flexuous, unbranched, cylindrical, pale brown, smooth, up to 120×1-3 µm. Conidiogenous cells monoblastic, integrated, terminal, percurrent, cylindrical. Conidia solitary, acrogenous, spherical with a narrow cylindrical protuberant peg at the base, aseptate, clear brown to olivaceous brown, smooth, 7-10 µm in diameter.

Type species: *Domingoella asterinarum* Pet. & Cif. 1032.

On dead leaves of *Myrtus communis* and *Pistacia lentiscus*. Central West Sardinia.

From these descriptions and from a comparative analysis of the morphological characters of *D. asterinarum* and *D. arctostaphyli*, is very difficult to establish a synonymy or the distinction in two different species. Also in this case the substratum could be responsible in some way of the morphological characters and a deeper investigation could be decisive.

### SPORIDESMIELLA

(Kirk 1982, Trans. Br. Mycol. Soc., 79 (3): 479).

The genus *Sporidesmiella* was erected by Kirk (1982) to accommodate some species of *Sporidesmium* which appear to form a distinct group and with some morphological characters suggesting a better identification. The Author includes in this new genus species with conidia distoseptate, contributing to a revision not only of the genus *Sporidesmium* but also of the genus *Endophragma*. An important morphological character of the genus *Sporidesmiella* is the percurrent development of the conidiogenous cells and in this view the inclusion of the variety *novae-zelandiae* of *Sporidesmiella hyalosperma* with sympodial conidiogenous cell is unacceptable up to compromise the validity of the genus: under this point of view the proposal of the genus *Sporidesmiella* should be rediscussed or at least the cited taxon should find a different collocation.

The diagnosis of the genus as proposed by Kirk is here referred:

***Sporidesmiella*** Kirk, 1982.

*Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, pallide brunneis ad brunneis compositum. Conidiophora macronematosa, mononematosa, solitaria, simplicia, recta vel leviter flexuosa, septata, brunnea ad atrobrunnea. Cellulae conidiogenae holoblasticae, monoblasticae, in conidiophoris incorporatae, terminales, proliferationis respectu percurrentes, vel raro sympodiales. Conidia acrogena, solitaria,*

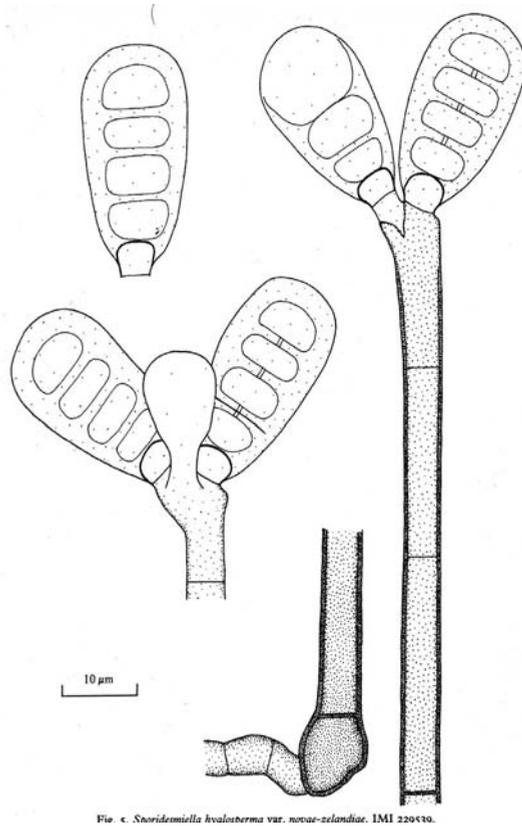


Fig. 44. *Sporidesmiella hyalosperma* var. *novae-zelandiae*. IMI 220430.

Fig. 44. *Sporidesmiella hyalosperma* var. *novae-zelandiae*, with sympodial proliferation. (From Kirk 1982).

*sicca, schizolytice secedentia, cylindrica, anguste clavata, obovoidea ad late obovoidea vel cuneiformia, ad basim truncata, ad apicem rotundata vel raro coronata, 1 ad 5-distoseptata, cellularum luminibus deminutis, pallide olivacea ad olivaceobrunnea vel brunnea. Species typica: Sporidesmiella claviformis* P. M. Kirk, 1982.

Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, pale brown to brown hyphae. Conidiophores macronematous, mononematous, solitary, simple, straight or slightly flexuous, septate, brown to dark brown. Conidiogenous cells holoblastic, monoblastic, integrated, terminal, proliferating percurrently, rarely sympodially. Conidia acrogenous, solitary, dry, seceding schizolytically, cylindrical, narrowly clavate, obovoid to broadly obovoid or cuneiform, truncate at the base, rounded or rarely coronate at the apex, 1-to 5-distoseptate, cell lumina reduced, pale olivaceous to olivaceous brown or brown.

Type species: *Sporidesmiella claviformis* P.M. Kirk, 1982.

***Sporidesmiella hyalosperma*** (Corda) P.M. Kirk var. *hyalosperma*, 1982.

Synonyms: *Helminthosporium hyalospermum* Corda, 1837.

*Brachysporium hyalospermum* (Corda) Sacc., 1886.

*Endophragma hyalosperma* (Corda) Morgan-Jones & Cole, 1964.

*Sporidesmium hyalospermum* (Corda) Hughes, 1978.

Colonies effuse, hairy, brown to dark brown. Mycelium partly superficial but mostly immersed in the substratum, composed of branched, septate, pale brown to brown, smooth, 1.5-3  $\mu\text{m}$  wide hyphae. Conidiophores macronematous, mononematous, solitary, simple, straight or slightly flexuous, smooth, septate, golden brown to brown, paler towards the apex, initially 60-125  $\mu\text{m}$  high, finally up to 250  $\mu\text{m}$  or more high, 3-5(-6)  $\mu\text{m}$  wide, often swollen at the base to 15  $\mu\text{m}$  wide, with up to 20 or more cylindrical proliferations at the apex. Conidiogenous cells holoblastic, monoblastic, integrated, terminal, cylindrical, pro-

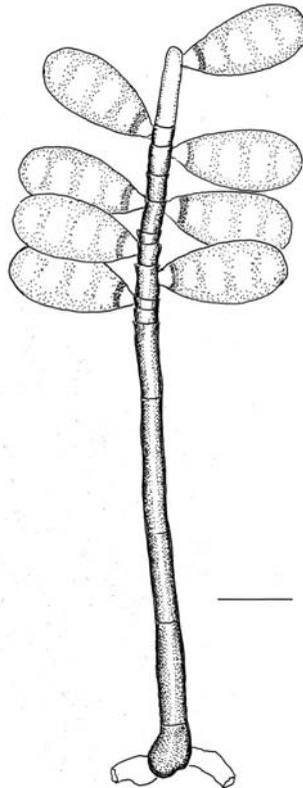


Fig. 45. *Sporidesmiella hyalosperma* var. *hyalosperma*. Conidiogenous cell with percurrent cylindrical development and distoseptate conidia. Bar 15  $\mu\text{m}$ .

liferating percurrently. Conidia acrogenous, solitary, dry, seceding schizolytically, clavate to obovoid, truncate at the base, (3-) 4-distoseptate, cell lumina reduced, less so in the basal cell the apical septum of which is convex and deeply pigmented, pale olivaceous to olivaceous brown or golden brown, (17-) 22-25 (-29)  $\mu\text{m}$  long, 9-12 (-13)  $\mu\text{m}$  wide, 2.5-3 (-3.5)  $\mu\text{m}$  wide at the base.

On dead leaves of *Pinus pinaster* and *Quercus ilex*. Salina island. Italy.

The strain that we have found on dead leaves of *Pinus pinaster* and *Quercus ilex* at Salina island presents morphological characters well coinciding with those of the Kirk description. It differs only for less brown pigment in the conidiophores and in the clearer golden yellow conidia.

This species was found by Corda (1837) but we have no informations on which substratum was observed. Presumably because of the septate conidia, was included in the *Helminthosporium* genus at that time collecting many different species. Saccardo (1886) moved the species in the genus *Brachysporium* as *B. hyalospermum*. It could be reasonable to imagine the difficulties of these authors to observe the presence of distosepta in the conidia. In the new combinations carried out by Morgan-Jones & Cole (1964) and Hughes (1978) the presence of distoseptate conidia was observed, but the two genera, *Endophragmia* and *Sporidesmium*, at that time were including species with very different morphological characters to justify their accomodation. Nevertheless, the actual accomodation carried out by Kirk in the genus *Sporidesmiella*, if limited at species with percurrent conidiogenous cells, could be considered exact.

### ***Sporidesmiella* sp.**

Type species: *S.claviformis* P.M.Kirk, 1982

Colonies inconspicuous, composed by solitary conidiophores. Conidiophores macronematous, mononematous, not branched, solitary, erect or gently flexuous, brown, smooth, septate, up to 160 $\times$ 5  $\mu\text{m}$ , conidiogenous cell included. Conidiogenous cells regularly and repeatedly percurrent, brown, dark brown in proximity of the annellide structures, septate, smooth, integrated, terminal. Conidia acrogenous, solitary, obovoid, truncate at the base rounded at the apex, 5-7 distoseptate, olivaceous brown, 25-27 $\times$ 10-11  $\mu\text{m}$ .

On dead leaves of *P. pinaster* var. *hamiltonii*. Montagna Grande, Pantelleria.

The species described presents morphological characters not completely in agreement with Kirk diagnosis of the genus (Kirk,1982): our strain has distoseptate conidia but the structure of the conidiogenous cell, terminal, is not organized in a true *Sporidesmiella* annellide, even if the annellations are regularly disposed at 25-35  $\mu\text{m}$  of distance each other. Our strain can't be included in the genus *Brachysporiella* characterized by branched conidiophores and eu-disto septate conidia; can't be included into the genus *Penzigomyces* because of the regular and not doliiform conidiophores and for distoseptate conidia (Subramanian 1992). Neither in the genus *Endophragmia* and *Endophragmiella*, the former with frequent caliciform percurrent conidiogenous cells and the second with conidiophores repeatedly branched near the base and conidia with a protuberant peg at the base. Even if the genus determination should be discussed, as *Sporidesmiella* for the morphological characters described our strain is not in agreement to any known species and should

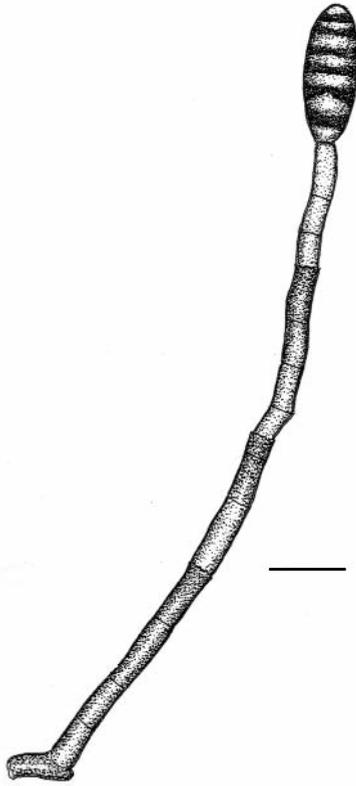


Fig. 46. *Sporidesmiella* sp. Conidiophore and distoseptate conidium. Bar 15  $\mu$ m.

be correct to study the generic determination and to propose for it a new species, but since we examined a relatively poor material, and also in consideration of new samplings that we will carry out at Pantelleria mediterranean maquis, at present we prefer to leave this species indeterminate hoping in new findings.

### ENDOPHRAGMIA

(Duvernoy & Maire 1920, Bull. Soc. Mycol. France. 36: 86).

The genus *Endophragmia* was established by Duvernoy and Maire (1920) to accommodate many species of *Dematiaceous Hyphomycetes* with conidiophores not branched, monoblastic, terminal and percurrent development of the conidiogenous cells frequently through a calyciform structure as remains of the previous conidium production. Unfortunately any distinction was considered about the different conidia septation (eusep-

tation o distoseptation), and the genus was open to conidia solitary and catenate, without considering the chain development as acropetal or basipetal.

For all these different characters, result also of a periode of not easy microscopic observation, the genus resulted very heterogeneous and able to collect many very different species. This heterogeneity stimulated the proposal of new genera, like *Endophragmiella* Sutton (1973) and *Sporidesmiella* Kirk (1982), with a better definition of the morphological characters.

The species, that we propose as new combination into the genus *Endophragmia*, presents a morphology, like not branched conidiophores, conidiogenous cells developing percurrently through a calyciform formation and euseptate conidia, that could be important for a correct definition of the genus.

The diagnosis of the genus as proposed by Duvernoy & Maire (1920):

***Endophragmia*** Duvernoy & Maire, 1920.

*Hyphis repentibus brunneis, septatis, ramosis; conidiophoris simplicibus, erectis, brunneis septatis, 1-2-involucris cyathiformibus erectis praeditis; conidiis acrogenis, ovoideis, 3-septatis, atro-brunneis, cellulis extremis pallidioribus.*

According to Ellis (1971):

***Endophragmia*** Duvernoy & Maire, 1920.

Colonies effuse, dark brown to black. Mycelium all immersed or partly superficial. Stroma present or absent, setae and hyphopodia absent. Conidiophores macronematous, monone-matous, sometimes caespitose, or synnematus, unbranched, straight or flexuous, brown, smooth; the wall of the lower part of a conidium may remain attached to the apex of the conidiophore forming a cup and the conidiophore then proliferates straight on through the cup. Conidiogenous cells monoblastic, integrated, terminal, occasionally determinate, but more frequently percurrent, calyciform or cylindrical. Conidia mostly solitary, in a few species catenate, dry, acrogenous, simple, ellipsoidal, pyriform, obovoid or clavate, pale or dark brown, cell often unequally coloured, 1-5 septate, frequently with very dark brown or black bands at the septa, smooth or verrucose, generally becoming detached through a break or tear in the conidiophore wall below the base of the conidium.

Type species: *Endophragmia mirabilis* Duvernoy & Maire, (1920).

***Endophragmia biconstituta*** (Matsushima) Rambelli, new. comb.

Synonym: *Endophragmiella biconstituta* (Rambelli) Matsushima. Matsush. Mycol. Mem. n 6 (1989). *Endophragmiella dimorphospora* Awao & Udagawa, (1974).

Basionym: *Brachysporiella biconstituta* Rambelli, (1961).

Colonies inconspicuous, composed by separated, brown, dark-brown hyphae. Conidiophores macronematous, mononematous, simple, not branched, straight, developing from the superficial mycelium, brown, olive-brown, septate, smooth, 75-80×2.5 µm. Conidiogenous cells monoblastic, integrated, terminal, percurrently, frequently calyciform.

Conidia rounded, brown, dark brown or black, smooth, up to 22 µm in diameter, with a basal cup shaped cell clear brown or olive-brown, 10×5 µm.

On dead leaves of *Arbutus unedo* L., Salina island (Italy).

This *Dematiaceous Hyphomycetes* was found and described by Rambelli (1961) as *Brachysporiella biconstituta*. The inclusion in this genus was suggested by some conidiophores apparently branched, on the contrary to be considered as new conidiophores differentiated at the base of a previous conidium. The name of the species, *B. biconstituta*, was suggested by the presence of a second type of conidial production of the synanamorph *Selenosporella*. Matsushima (1989), considering the conidial morphology and the described branching of the conidiophore as reported by Rambelli, included the fungus in the genus *Endophragmiella* as *E. biconstituta* (Rambelli) Matsushima new combination. The recent finding by Rambelli of this *Dematiaceous Hyphomycetes* on dead leaves of *Arbutus unedo* allowed a reexamination of the fungus morphology and in particular the presence of simple not branched conidiophores, the percurrent

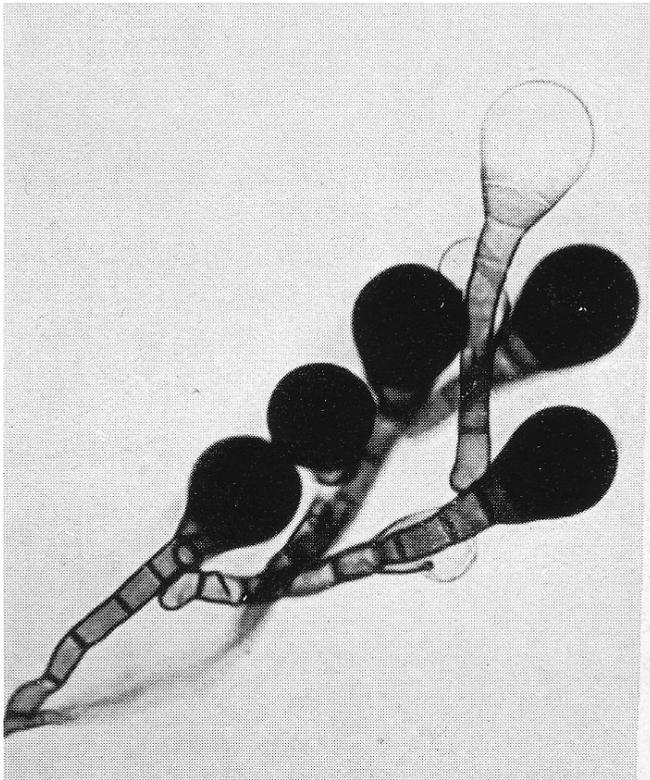


Fig. 47. *Endophragmia biconstituta* in a picture of 1961 that induced erroneously to consider the conidiophores repeatedly branched (Rambelli 1961).

conidiogenous cells developing through the calyciform structures released by the previous conidium as monoblastic, integrated, terminal and without a protuberant small peg at the base of the conidia (character of the genus *Endophragmiella*).

A similar species was described by Awao & Udagawa (1974) as *Endophragmiella dimorphospora*, considered by Matsushima (1989) a synonym of *E. biconstituta*, but this specimens presents different dimensions of the conidia and, as we had the opportunity to understand, with conidiogenous cells not developing through calyciform structures.

It is according to the morphological characters examined, typical of the genus *Endophragmia*, that we propose the new combination *Endophragmia biconstituta* (Matsushima) Rambelli for our specimens.

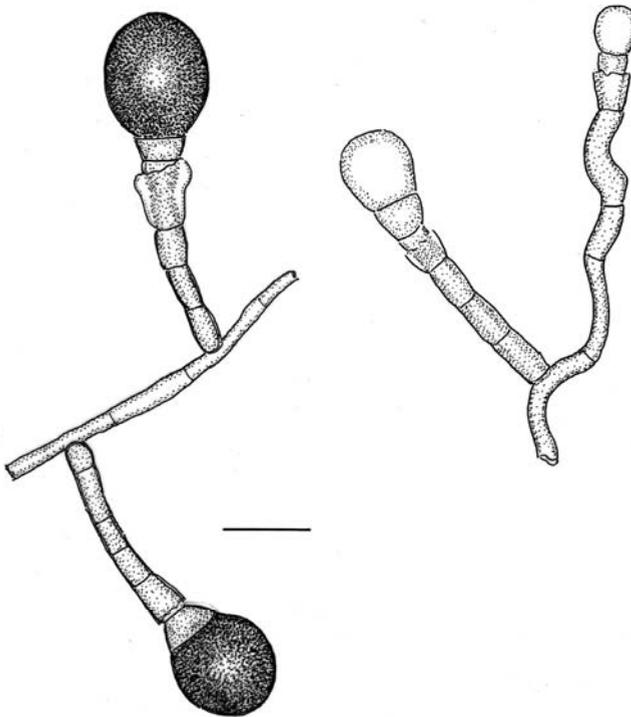


Fig. 48. *Endophragmia biconstituta* (Matsushima) Rambelli n. comb. Conidiophores with calyciform conidiogenous cells developing percurrently. On the right: conidia development. Bar: 20  $\mu$ m.

### TROPOSPORELLA

(Karsten 1892, *Hedwigia* 31: 297).

The genus *Troposporella* was established by Karsten (1892) for the type species *T. fumosa* a beautiful helicosporous *Hyphomycetes* characterized by helicoid, golden brown conidia. Recently Zhao & al. (2007) proposed the new combination *Helicoma fumosum* (P. Karst.) G.Z. Zhao, X.Z. Liu & W.P. Wu also as type species. But the genus *Troposporella* is already valid since Ellis (1976) proposed the new combination *T. monospora* from *Helicoma monospora* Kendrick (1958), even if in 1986 Minter transferred *T. monospora* in *Slimacomycetes monospora* (W.B. Kendr.) Minter not valid combination since not reported by Index Fungorum.

***Troposporella*** Karsten, 1892.

*Sporodochia pulvinata, superficialia, farinacea, fuliginosa, vel olivacea. Hyphae (sen. conidiophora) ramosiusculae, articulatae, subfuligineae (sub lente). Conidia cylindracea, in spiras arcte convoluta, septata, subfuliginea (sub lente).*

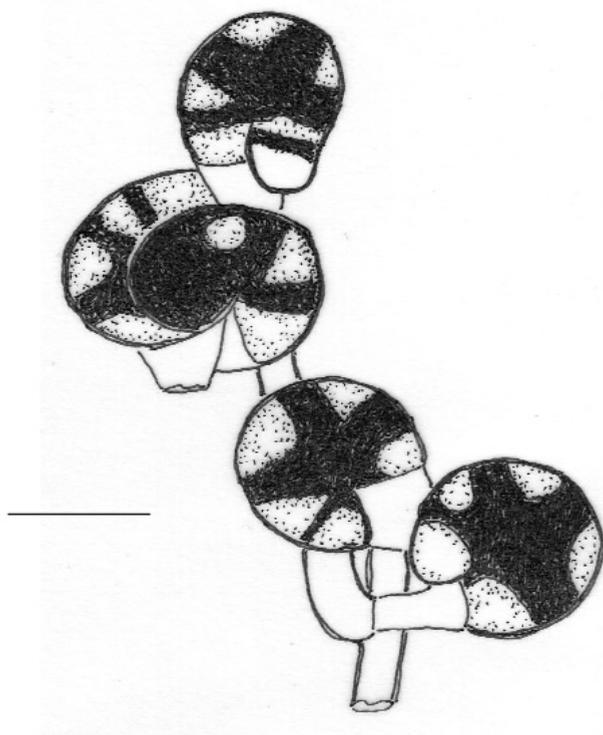


Fig. 49. *Troposporella monospora*. Conidiophores and conidia. Bar 8  $\mu$ m.

According to Ellis the description of the genus, even if previously related to *T. fumosa*, transferred in *Helicoma fumosum*, could be as follows:

***Troposporella*** Karsten, 1892.

Colonies scattered, small, pulvinate, fawn or snuff-coloured. Mycelium partly superficial, partly immersed, hyphae aggregated and interwoven near the point of origin of the conidiophores. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous or semi-macronematous, loosely branched or unbranched, pale brown, smooth. Conidiogenous cells monoblastic, integrated, terminal on stipe and branches, determinate, cylindrical. Conidia solitary, dry, acrogenous, simple, helicoid, pale to mid golden brown, smooth, with numerous transverse septa, often constricted at the septa.

Type species: *Troposporella monospora* (W.B. Kendrick) M.B. Ellis, 1976.

***Troposporella monospora*** (W.B. Kendrick) M.B. Ellis, 1976.

Synonyms: *Helicoma monospora* W.B.Kendr., 1958.

*Slimacomycetes monosporus* (W.B.Kendr.) Minter (as “*monospora*”), 1986.

Colonies scattered, composed by crowded conidiophores produced by aerial mycelium, clear brown. Mycelium frequently superficial and composed by smooth, clear-brown hyphae. Conidiophores semi-macronematous, very clear brown, frequently covered by several and crowded conidia, commonly unbranched, 9-18×1.8-3 μm. Conidia solitary, acrogenous, helicoid, with 3-5 very dark and large septa, smooth, 11-13 μm in diameter. On dead leaves of *P. pinaster* var *hamiltonii*. Montagna Grande, Pantelleria

## HELICOON

(Morgan 1892, Cincinnati Soc. Nat. Hist. J. 15: 39).

The genus *Helicoon* was erected by Morgan 1892 to accommodate the species of helicosporous *Hyphomycetes* characterized by conidia composed by a septate and twisted filament disposed in three planes just to form a cylindrical or ellipsoidal body, and produced by sympodial and denticulate conidiogenous cells. The original diagnosis (fide Saccardo 1895) is here reported.

***Helicoon*** Morgan 1892.

*Etym.* helix et oon ovum. *Hyphae variae; conidia filiformia in tubulum conicum vel ovatum pluries transverse convoluta, hyalina vel colorata, plerumque continua.* — *Huc spectat quoque H. tubulosum* (Riess sub *Helicomycete*) Sacc.

***Helicoon*** Morgan, 1892.

*Helicosporous Hyphomycetes.* Conidiophores micronematous or macronematous, mononematous, erect, simple or branched, hyaline to brown, smooth or verrucose. Conidiogenous cells blastic, integrated, terminal or intercalary, sympodial or determinate, denticulate. Conidia solitary, dry, acrogenous or acropleurogenous, consisting of a septate filament coiled in three planes to form a cylindrical or ellipsoidal conidium; hyaline, yellow or fuscous.

Type species: *Helicoon sessile* Morgan, 1892.

From Ellis, 1971:

Colonies effuse, yellow, grey, olivaceous or brown, velvety or loosely cottony. Mycelium partly superficial partly immersed. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous or micronematous, mononematous, unbranched or branched, straight or flexuous, hyaline to brown, smooth. Conidiogenous cells polyblastic or monoblastic, integrated, terminal and intercalary, sympodial or determinate, denticulate; denticles cylindrical. Conidia solitary, dry, acropleurogenous or pleurogenous, simple, coiled in 3 planes to form an ellipsoidal or sometimes a cylindrical spore body, colourless to brown; filament smooth, multiseptate.

Type species: *Helicoon sessile* Morgan, 1892.

***Helicoon fuscosporum*** Linder, 1929.

Type species: *Helicoon sessile* Morgan, 1892.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macrone-matous, mononematous, unbranched, straight, clear brown, smooth. Conidiogenous cells monoblastic, integrated, terminal, determinate. Conidia solitary, acrogenous, simple, coiled in 3 planes to form an ellipsoidal or cylindrical body, dark brown and composed by a smooth filament multiseptate with 11-15 coils 4-5  $\mu\text{m}$  wide, 28-32 $\times$ 43-47  $\mu\text{m}$ .

On dead small branches of *Phillyrea latifolia* L. Bosco Isola, South East Italy.

This species has been found also on small dead branches of *Pistacia lentiscus* L., where the fungus is present with solitary conidiophores and slightly reduced dimensions of the conidia (16-27 $\times$ 34-43 $\mu\text{m}$ ), composed by 16-17 coils, hyphae 3  $\mu\text{m}$  wide and short conidiophores, (13 $\times$ 3  $\mu\text{m}$ ).

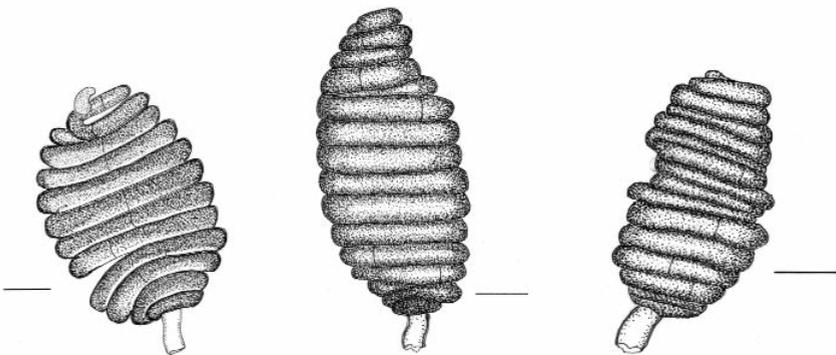


Fig. 50. *Helicoon fuscosporum*; left from dead leaves of *Phillyrea latifolia* (Bar 20  $\mu\text{m}$ ), center and right on dead leaves of *Pistacia lentiscus* (Bars 15  $\mu\text{m}$ ).

The species described presents morphological characters well coinciding with the original description (Linder 1929) even if from the bibliographic references appears difficult to find dimensional characters coinciding each other. We think important to point out that in our strain, studied on natural substratum and not in pure culture, the conidiophores appear not branched and with conidiogenous cells monoblastic and determinate.

### HELICOMA

(Corda 1837, *Icones Fungorum*, 1: 15)

The genus *Helicoma* was erected by Corda (1837) on the type species *H. muelleri* Corda and to include species characterized by helicosporous and acropleurogenous or pleurogenous conidia, rather thick in proportion to length (Zhao & al. 2007). The Corda original diagnosis, here reported, is very synthetic.

***Helicoma*** Corda, 1837.

*Flocci caespitosi, erecti, septati, velati; sporis heterogeneis spiraliter involutis, septatis, spiris inter se connatis.*

A more extensive description is carried out by Zhao & al. (2007):

***Helicoma*** Corda, 1837.

Type species: *Helicoma muelleri* Corda, 1837.

Colonies effuse, often hairy or velvety, variable in colour but frequently yellowish, greish brown, brown or olivaceous. Mycelium immersed or superficial. Conidiophores macrone-matous, mononematous, or lacking, simple or branched; sometimes apex setiform, pale to olivaceous, or dark brown, smooth. Conidiogenous cells mono- or polyblastic, integrated, terminal and/or intercalary, determinate or sympodial, cylindrical, denticulate. Conidia dry, solitary, acropleurogenous or pleurogenous, simple, helicoid or circinate, hyaline to brown or olivaceous brown, smooth, multiseptate. Conidial filament rather thick in proportion to length, non hygroscopic.

The species that we have found on mediterranean maquis litter presents characters very closed to *H. viridis* (Corda) Hughes; since we examined only poor material we prefer to leave the species indeterminate, hoping to have the possibility to collect some new samples.

***Helicoma*** sp. Corda, 1837.

Colonies effuse, yellowish. Conidiophores macrone-matous, erect, setiform, gently flexuous, golden brown, paler and tapering towards the apex, 150-200×7-10 µm. Conidiogenous cells blastic, intercalary, integrated, sympodial, denticulate, denticles cylindrical. Conidia solitary, pleurogenous, helicoid, septate, subhyaline or very clear brown, smooth, 25-30 µm in diameter. Conidial filament 7-10 µm thick, coiled 1, 1/2 to !, 3/4 times, non-hygroscopic, 8-10 pale septa.

On dead leaves of *Cistus monspeliensis*. Central West Sardinia, Italy.

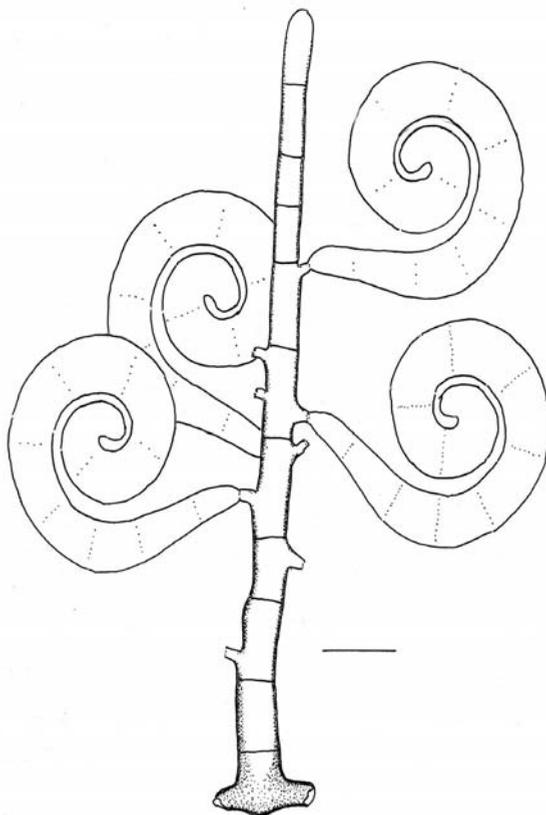


Fig. 51. *Helicoma* sp. Denticulated conidiogenous cells and conidia. Bar 10  $\mu$ m.

### SPEGAZZINIA

(Saccardo 1880, *Michelia*, II, 37).

The genus *Spegazzinia* was erected and dedicated by Saccardo to Prof. C. Spegazzini. (In *Michelia* II, pag. 37, 1880: etym. *a Prof. C. Spegazzini, tarvisino, de flora austro-americana meritissimo*). Saccardo reports the following diagnosis:

***Spegazzinia*** Sacc., 1880.

*Sporodochium convexum, densiusculum, atrum. Hyphae dense fasciculatae, in sporophorum sarciniforme pluricellulare apice desinente. Conidia e sporophoro per sterigmata oriunda aequae sarciniformia, saepius cruciatim 4-cellularia, fusca.*

Type species *Spegazzinia tessarthra* (Berk. & Curt.) Sacc., 1886.

Synonymy: *Sporidesmium tessarthrum* Berk. & Curtis, 1869.

The Saccardo's diagnosis of the species:

***Spegazzinia tessarthra*** (Berk. & Curt.) Sacc. *Sporidesmium tessarthrum* Berk. & Curt. Fungi n. 582. *Sporodochiis olivaceis magnitudine variis; hyphis erectis gracilibus, apice conidium subquadratum e cellulis quatuor constructum gerentibus; cellulis primum levibus, demum fortiter echinulatis 25 µm, diam.*

*Hab. in culmis Maydis et Andropogonis in insula Cuba, Venezuela et California.*

Ellis (1971) gives an extensive genus description:

***Spegazzinia*** Saccardo, 1880.

Colonies discrete, orbicular, or effuse, dark blackish brown to black. Mycelium superficial; hyphae branched and anastomosing to form a close network. Stroma none. Setae and hyphopodia absent. Conidiophores basoauxic, macronematous, mononematous, arising usually singly from subspherical, ampulliform, cupulate or doliiform conidiophore mother cells, unbranched, straight or flexuous, narrow, subhyaline to brown, smooth to verrucose; there are usually long ones and short ones with bear different kinds of conidia referred to here as a and b conidia, a conidia being borne on the long conidiophores, b conidia on the shorter ones. Conidiogenous cells monoblastic, integrated, terminal, narrow, cylindrical. Conidia solitary, dry, acrogenous, a conidia divided into 4 or 8 subglobose or obovoid cells, dark brown, with very long spines; b conidia subspherical or broadly ellipsoidal, usually flattened in one plane, pale to dark brown, smooth or with short spines, sometimes lobed or lobulate, cruciately septate or muriform, constricted at the septa.

Type species: *Spegazzinia tessarthra* (Berk. & Curt.) Sacc.

Synonym: *S. ornata* Sacc., 1886.

The morphological characters of our specimens can be described according to *S. tessarthra*:

***Spegazzinia tessarthra*** (Berk. & Curt.) Sacc., 1886.

Mother cells 4-8×3-6 µm. Conidiophores basoauxic, macromematous, mononematous. Long conidiophores, producing spiny conidia, dark brown and often verrucose in the upper part, up to 180 µm long; short conidiophores, producing muriform conidia, up to 15 µm long. Conidiogenous cells monoblastic, integrated, terminal, cylindrical, clear brown. Spiny conidia 12-18 µm with spines up to 10 µm long, and composed by subglobose dark brown cells; muriform conidia cruciately septate, flattened, smooth or with short spines, brown, 13-17×8-9 µm.

Basionym: *Sporidesmium tessarthrum* Berk. & Curtis, 1868

On dead leaves of *Pistacia lentiscus*. Torre del Sevo, Central West Sardinia. Italy.

The species described, considering the strong variability of this fungus, presents morphological characters coinciding with Saccardo and Ellis descriptions.

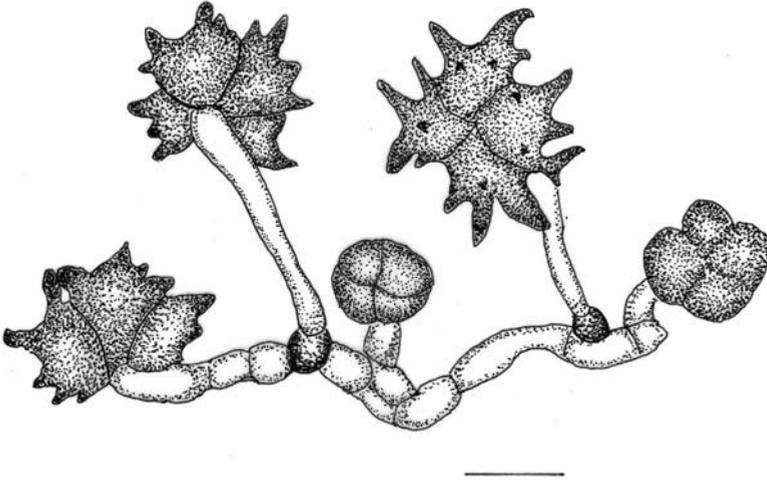


Fig. 52. *Spiegazzinia tessarthra*. Conidiophores with two types of conidia. Bar 10  $\mu$ m.

### CIRCINOTRICHUM

(Nees ex Persoon 1817, Syst. Pilze Schwamme: 18)

The genus *Circinotrichum* was erected by Nees (ex Persoon) (1817) to include *dematiaceous hyphomycetes* characterized by the production of setae arising from the superficial mycelium colonizing vegetal remains, by conidiogenous cells phialidiform at the base of the setae and with conidia simple hyaline.

The genus was erected for a single species, *Circinotrichum maculiforme*, found on dead oak leaves. One of the most difficult and fascinating problems of this genus was the conidiogenesis, Pirozynski (1962) investigating the conidiogenous cells and the conidial ontogeny observed a production up to 10 spores strongly adherent, apparently blown out simultaneously just below the apex of the sporogenous cell. According to the Author the apex of the conidiogenous cell appears attached to a liberated group of spores and immediately after the production the apex seems to elongate vertically leaving a sort of annular scar. This process seems to repeat for several times.

The difficulties of observations with optical microscope were pointed out by Pirozynski. Nevertheless Ellis (1971) accepted the Pirozynski observations and considered the conidiogenous cells of *C. maculiforme* polyblastic and percurrent. Also Sutton (1973) described the conidiogenous cells of *C. capitulatum* as annellidic. Onofri (1995) observed that "more than a simple conidium appears attached to the apex of the conidiogenous cell, indicating that if this indeed occurs in spite of the presence of anellides, the conidiogenous loci may be mul-

tiple". Using the SEM Onofri observed in *C. maculiforme* a phialidic conidial ontogeny; without the contribution of the external wall layer of the conidiogenous cell, the conidiogenesis appeared holoblastic for the contribution of an inner layer of the conidiogenous cell wall and presumably of the wall material deposits along the apex of the phialides. After the first production multiple conidiogenous loci were formed. For every conidial production was observed on the outer wall layer of the conidiogenous cell the formation of a frill below the tip, initially erroneously interpreted as ring of a percurrent elongation.

***Circinotrichum* Nees (1817).**

*Hyphae steriles erectae, repetito-dichotome ramosae, ramis arcuatis. Basidia cylindrica, ad pedem hypharum sita, hyalina, brevia. Conidia bacillaria, hyalina, solitarie acrogena.* This diagnosis reported by Saccardo (1886) should be referred also to the genus *Gyrothrix* that Nees presumably considered synonym of *Circinotrichum*.

A description of the genus is reported by Pirozynski (1962).

Colonies punctiform or effused, dark brown to black, velvety. Mycelium partly superficial, partly immersed in the substratum. Superficial mycelium composed of a network of branched and anastomosing, smooth walled, septate, subhyaline to brown hyphae bearing setae and sporogenous cells. Immersed mycelium composed of ramifying, hyaline to brown hyphae, often aggregated into a pseudoparenchymatous stroma. Setae arising from enlarged and dark brown cells of the superficial mycelium, simple, erect, continuous or septate, verrucose, opaque, dark brown and wider at the base, tapering towards the apex which is paler in colour and circinate. Sporogenous cells obclavate to lageniform, thin-walled, hyaline to subhyaline, arising laterally on the superficial hyphae. Conidia adherent, aggregated into a whitish layer at the base of setae, acerose or falcate, continuous, smooth, hyaline.

Type species: *Circinotrichum maculiforme* Nees (1817).

Four *Circinotrichum* species, *C. maculiforme*, *C. mediterraneum*, *C. papakurae* and *C. oliveum* found on different substrata and localities are here described.

***Circinotrichum maculiforme* Nees, 1817**

Colonies punctiforms, greyish-brown, velvety, very variable in size. Setae very abundant, crowded, simple, erect, thick-walled, with septa very difficult to observe, dark-brown or almost black, roughened, circinate and frequently repeatedly spirally coiled and intertwined, up to 400 µm high and up to 6-7 µm wide near the bulbous base. Conidiophores micronematous, arising from the superficial mycelium near the base of the setae, obclavate to lageniform, subhyaline, 10-11×3-6 µm. Conidia adhering together to form a white layer at the base of the setae, straight or slightly curved and corniform at the ends, hyaline, simple, 15-16×1.5 µm.

On dead leaves of *Arbutus unedo*. Salina island, Italy.

This strain presents some dimensional differences if compared to Pirozynski description. The setae are very high and generally intertwined to form a compact, continuous and protecting layer on the conidia. *C. maculiforme* is characterized by a high variability on the different natural substrata and this induced different interpretations and wrong determinations.

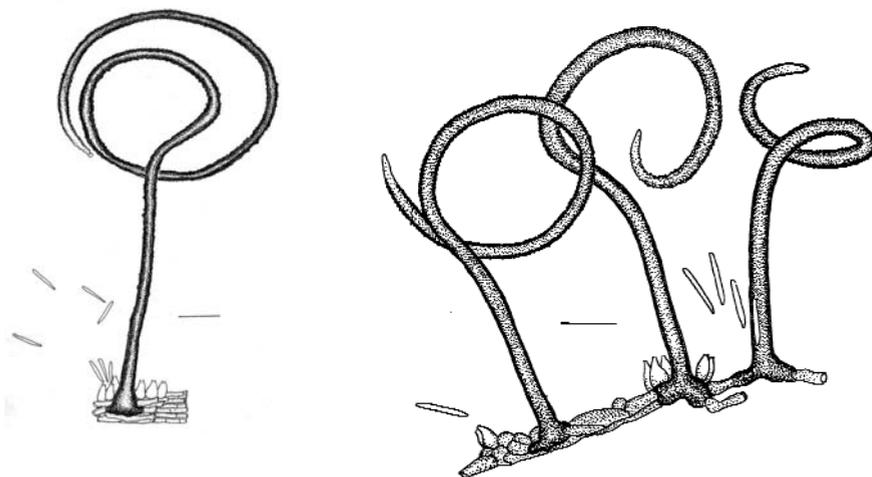


Fig. 53. *Circinotrichum maculiforme* from Salina (Left) Bar 20  $\mu\text{m}$  and from Pantelleria Bar 15  $\mu\text{m}$ .

A strain of *C. maculiforme* found on dead leaves of *Pinus pinaster* var. *hamiltonii* at Montagna Grande, Pantelleria has been described as follows:

Colonies effused, grayish brown. Setae simple, erect, septate, dark brown, roughened, with bulbous base, circinate, spirally coiled,  $83\text{--}106 \times 3 \mu\text{m}$ . Conidiogenous cells on the superficial hyphae, around the setae, obclavate sub-hyaline,  $7 \times 2 \mu\text{m}$ . Conidia in whitish large masses at the base of the setae, straight, slightly curved, not corniform, rounded at the apex and pointed at the base, not septate, hyaline,  $12\text{--}14 \times 2 \mu\text{m}$ .

The strain described presents some differences if compared to Pirozynski description: not corniform conidia, smaller conidiogenous cells and conidia.

***Circinotrichum mediterraneum*** Rambelli & Tempesta, 2009.

Type species: *Circinotrichum maculiforme* Nees, 1817.

Colonies solitary, tufted, sporodochial like, very well circumscribed. Setae simple, erect, not circinate or spirally coiled, slightly flexuous, very dark brown, smooth, sometimes with a bulbous base, commonly around the fertile part of the colony, with septation obscured by strong pigmentation, up to 350  $\mu\text{m}$  and more long, and 6  $\mu\text{m}$  wide near the base. Conidiophores semi-macronematous, cylindrical, not branched and arising from the basal mycelium, percurrent, clear brown,  $9 \times 5 \mu\text{m}$ . Conidiogenous cells phialidic, obclavate, clear brown,  $16\text{--}20 \times 5 \mu\text{m}$ . Conidia fusiform, slightly curved, not corniform, with apices slightly pointed, not septate, hyaline, in large masses at the center of the colony and at the base of the setae,  $25\text{--}28 \times 4 \mu\text{m}$ .

On dead leaves of *Hedera helix* and *Quercus ilex* L. Circeo Nat. Park. Italy.

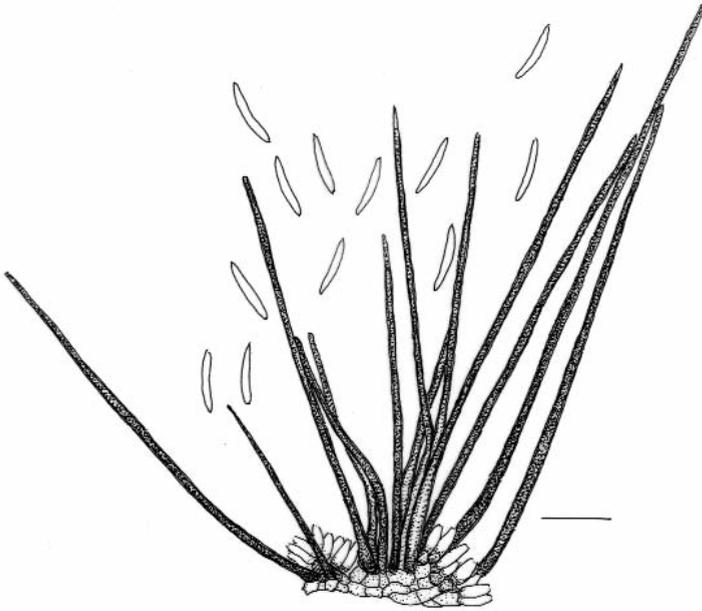


Fig. 54. *Circinotrichum mediterraneum* Rambelli & Tempesta. Sporodochium like colony with conidiophores, setae and conidia. Bar 35  $\mu$ m.

This species is characterized by large dimensions. Peculiar are the percurrent conidiophores and the long, thick and sizable apices of the phialidic conidiogenous cells.

***Circinotrichum papakuræ* Hughes & Pirozynski, 1971**

Type species: *Circinotrichum maculiforme* Nees, 1917.

Colonies anphigenous, developing regularly from immersed and superficial mycelium and with conidiophores and setae not crowded, brown, dark brown. Setae erect or gently flexuous, dark brown at the base and clearer towards the very thin apex, with septa difficult to observe, up to 340  $\mu$ m long and 4-5  $\mu$ m large near the base and tapering up to 1  $\mu$ m wide at the apex. Conidiogenous cells growing from the superficial mycelium near the base of the setae, obclavate, lageniform, phialidic, very clear brown, 7-13 $\times$ 3-4  $\mu$ m. Conidia forming a white layer at the base of the setae, cylindrical, with gently rounded apices, not corniform, 0-septate, hyaline, 14-18 $\times$ 2-4  $\mu$ m.

On dead leaves of *Rhamnus catharticus* L. Circeo Nat. Park. Central West Italy.

The original description of *C. papakuræ* is referred to a strain with some morphological and dimensional characters not completely corresponding to those observed in our study. In our strain the setae can be very long, dark brown and with the fine above part flexuous; nevertheless the size of the conidia and of the conidiogenous cells are corresponding to the original description.

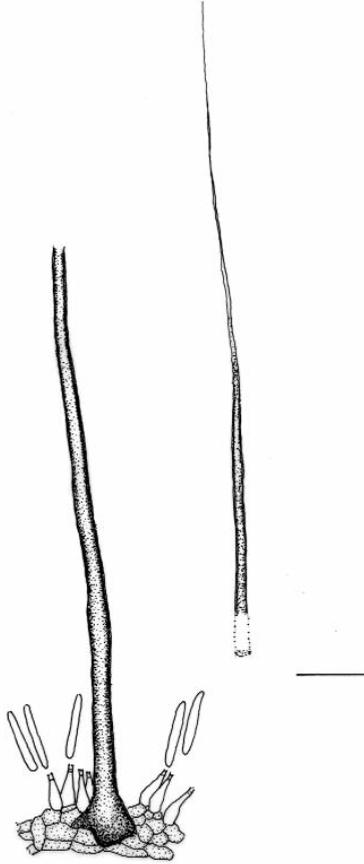


Fig. 55. *Circinotrichum papakurae* Hughes & Piroz. Setae, conidiophores micronematous, conidiogenous cells and conidia. Bar 20  $\mu\text{m}$ .

***Circinotrichum olivaceum* (Speg.) Piroz., 1962.**

Type species: *Circinotrichum maculiforme* Nees, 1917.

Basionym: *Helicotrichum olivaceum* Speg., 1889.

Setae erect, circinate, unbranched, verrucose, 35-75 $\times$ 2.5-3.5  $\mu\text{m}$ . Conidiophores micronematous, subhyaline to pale brown, smooth. Conidiogenous cells phialidic, discrete, obclavate to lageniform, colourless, 5-8 $\times$ 2-4  $\mu\text{m}$ . Conidia forming a whitish layer at the base of the setae, cylindrical to fusiform, straight or slightly curved, 0-septate, hyaline, smooth, 8.5-13 $\times$ 1.3-1.6  $\mu\text{m}$ .

On dead leaves of *Arbutus unedo*, *Cistus monspeliensis*, *Phillyrea angustifolia*, *Pistacia lentiscus*.

Torre del Sevo, Central West Sardinia. Italy.

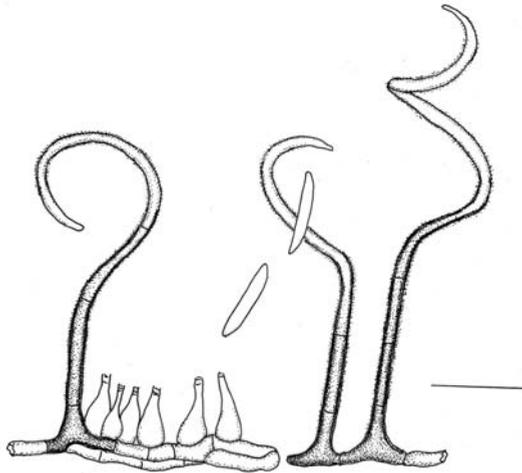


Fig. 56. *Circinotrichum olivaceum* (Speg.) Piroz. 1962. Setae, conidiogenous cells and not corniform conidia. Bar 10  $\mu\text{m}$ .

This species was found and included in the genus *Helicotrichum* by Spegazzini (1889) as *H. olivaceum*. The Author, presumably, interpreted as conidia the circinate setae. Pirozynski (1962) proposed the new combination *Circinotrichum olivaceum*.

## GYROTHRIX

(Corda Icones Fungorum, 1842, fide Goidanich, Malpighia, 1935)

The genus *Gyrothrix* was erected by Corda (1842) to include species very closed to *Circinotrichum* but with branched setae. Nevertheless Corda did not propose a type species and preserved the specimens with *Gyrothrix* characters in the genus *Campsotrichum* Ehrenberg (1819) as *C. podopermum* section *Gyrothrix*. Rabenhorst (1844) transferred *Campsotrichum podospermum* Corda to *Gyrothrix podosperma* (Corda) Rabenhorst.

The morphological characters of *Gyrothrix* specimens are very closed to *Circinotrichum*: presumably they have the same phialidic conidiogenesis, in some species, like *G. verticiclada* it is easy to find specimens with not branched setae and all the species of the two genera are characterized by a strong morphological variability. In our opinion the division of the species between *Circinotrichum* and *Gyrothrix* should be discussed.

Goidanich (1935) described *Peglionia verticiclada* as new genus and new species found on dead leaves of *Laurus nobilis* and *Prunus cerasus* in Italy. This species presents morphological characters closed to *Gyrothrix* and *Circinotrichum* but enough different as between *Circinotrichum* and *Gyrothrix*, mainly for the particular shape of the setae and of

strongly falcate conidia. In 1971 Hughes, without any particular documentation and leaving some perplexities, considers *Peglionia* as synonym of *Gyrothrix* and established the new combination *Gyrothrix verticiclada* (Goidanich) Hughes. Nevertheless since we are in the impossibilities to find the original diagnosis of the genus we propose the diagnosis of *Peglionia* as Goidanich published in 1935 and that could be extended to *Gyrothrix* genus.

***Peglionia*** Goidanich, 1935. (*Gyrothrix* Corda, 1842).

(Etym. a praeclaro phytopathologo Victorio Peglion, cui amantissime dico)

*Hyphae steriles erectae, atrae, septatae, rigidae, apice verticillato ramosae. Conidiophora brevissima ampulliformia, hyalina, ad hypharum sterilium basim sita. Conidia hyalina falciformia, solitarie acrogena.*

*Ad genus Helicotrichum Nees proximum, sed cum eo, ob appendicum sterilium fabrica, nequaquam comparandum.*

A description of the genus is carried out by Pirozynski (1962).

***Gyrothrix*** (Corda) Corda, Icones Fungorum, 1842.

*Campsotrichum* Ehrenberg, (section *Gyrothrix* Corda).

Colonies punctiform to effused, grey to dark brown, velvety. Mycelium superficial or partly superficial and partly immersed in the substratum. Superficial mycelium composed of a network of branched and anastomosing, smooth walled, septate, subhyaline to olivaceous hyphae, bearing setae and sporogenous cells. Immersed mycelium, when present, composed of ramifying, hyaline to brown hyphae, often aggregated into a pseudoparenchymatous stroma. Setae arising from enlarged and dark brown cells of the superficial mycelium, repeatedly branched, erect, straight or flexuous, septate, thin or thick-walled, translucent or opaque, smooth to coarsely verrucose, olivaceous brown, darker and broader at the base, tapering and paler in colour towards the apices or the branches. Sporogenous cells obclavate to lageniform, thin-walled, hyaline to subhyaline, arising laterally on the superficial hyphae. Conidia adherent, aggregated into a whitish layer at the base of the setae, acerose to fusiform, straight or curved, continuous, smooth, hyaline. The conidia are formed in the same way as in *Circinotrichum*.

Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

***Gyrothrix podosperma*** (Corda) Rabenhorst. 1844.

Synonyms: *Campsotrichum podospermum* Corda, 1839.

Colonies very well delimited, velvety, pulvinate, grey-brown, composed by crowded setae intertwined. Setae numerous, erect, thick-walled, septate, brown, dark brown at the base, rough in the subapical part, repeatedly branched, branches flexuous, 149-180×4-5 µm. Conidiogenous cells growing on the superficial mycelium near the base of the setae, obclavate, phialidiform, subhyaline, up to 8-9 µm high. Conidia aggregated in a white layer at the base of the setae, rod shaped or slightly falcate, with a apex corniform and the second rounded, hyaline, smooth, 0-septate, 14-16×1.8-2 µm.

On dead leaves of *Pinus maritima*. Bosco Isola, South East Italy.

The species described presents morphological characters well coinciding with the diagnosis reported by Pirozynski (1962).

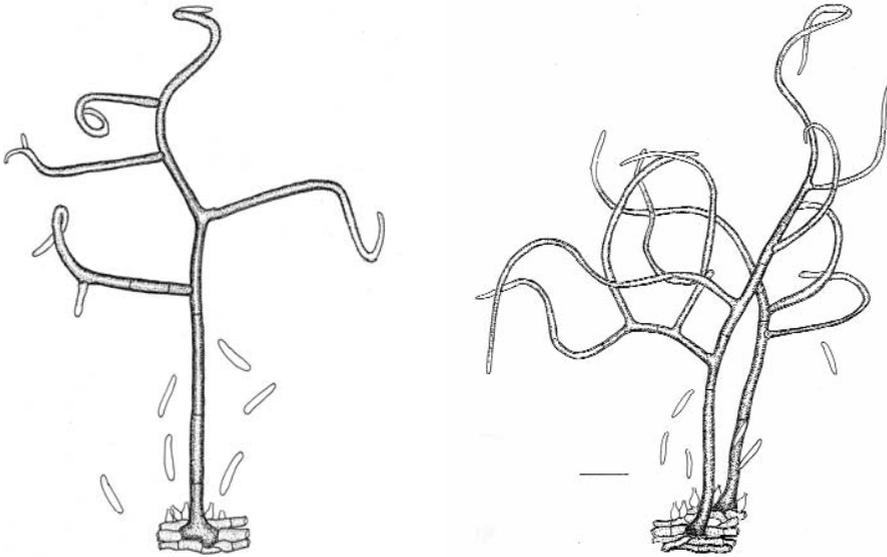


Fig. 57. *Gyrothrix podosperma* (Corda) Rabenhorst. Left strain found at Bosco Isola South-east Italy, bar 16  $\mu\text{m}$ . Right strain found at Ustica island, bar 20  $\mu\text{m}$ .

Another strain of *Gyrothrix podosperma* found at Ustica Island on dead leaves of *Eucalyptus* sp. is characterized by the same general dimensions, but flexuous main seta and branches, clearer brown colour, branches never circinate.

***Gyrothrix verticillata*** Pirozynski, 1962

Type species: *G. podosperma* (Corda) Rabenhorst 1844.

Colonies grey, compact and composed by several and very crowded setae and conidiophores. Setae erect, straight, very crowded, brown, clear brown, septate, smooth, sometimes simples, more frequently 2-3 times branched, with branches disposed at right angles and opposite, sometimes with the main seta apex and branches sinuous or flexuous, 150-225 $\times$ 4  $\mu\text{m}$ . Conidiophores micronematous, on the basal hyphae and at the base of the setae. Conidiogenous cells obclavate, hyaline, 4-9 $\times$ 4-5  $\mu\text{m}$ . Conidia aggregated at the base of the setae and forming a white layer, they are cylindrical or gently curved, with rounded or gently corniform apex and pointed base, hyaline, 0-septate, 10-14 $\times$ 1.8  $\mu\text{m}$ .

On dead leaves of *Pistacia lentiscus* L. and *Phillyrea latifolia* L. Bosco Isola, South East Italy.

The species described presents little differences if compared to the original description (Pirozynski 1962): the apex of the main seta can be twisted. We have found the species on dead leaves of *Pistacia lentiscus* L. and *Phillyrea latifolia* L.

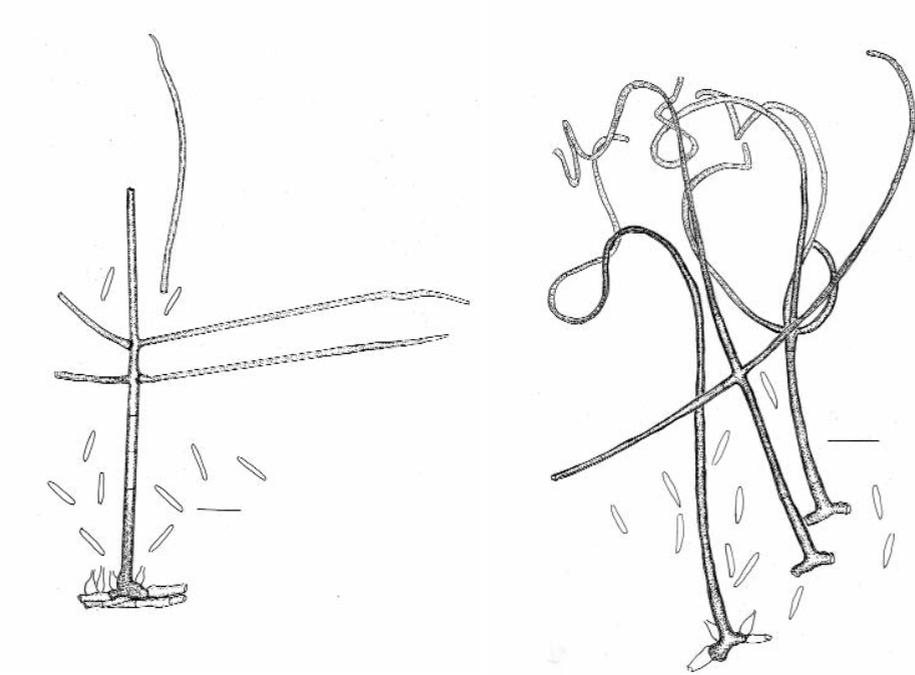


Fig. 58. Two strains of *Gyrothrix verticillata* on dead leaves of *Phillyrea latifolia*. Bars 20  $\mu\text{m}$ .

***Gyrothrix verticiclada*** (Goid.) Hughes & Pirozynski, 1970.

Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

Synonym: *Peglionia verticiclada* Goidanich, 1935.

Colonies effused, velvety, clear brown to brown. Setae crowded, erect, straight, smooth, dark brown, septate, 97-106 $\times$ 7  $\mu\text{m}$ , 2-3 times apically branched, branches septate, straight not slender, dark brown and clear brown at the flattened apices, 29-46 $\times$ 5  $\mu\text{m}$ . Conidiogenous cells obclavate, phialidiform, clear brown, 8-12 $\times$ 1.5-3  $\mu\text{m}$ . Conidia falcate, with pointed apices, 0-septate, hyaline, 16-18 $\times$ 2.3  $\mu\text{m}$ .

On dead leaves of *Smilax aspera*. Montagna Grande, Pantelleria.

This species was found and described by Goidanich (1935) and included in the new genus *Peglionia*. Because of the morphological characters, like setae erect and branched, conidia produced by phialidiform conidiogenous cells at the base of the setae where form a white layer, Hughes and Pirozynski (1970) proposed the new combination *Gyrothrix verticiclada* (Goid.) Hughes & Pirozynski. It is a species very common on dead leaves of *S. aspera* but also on different substrata with frequent morphological variations.

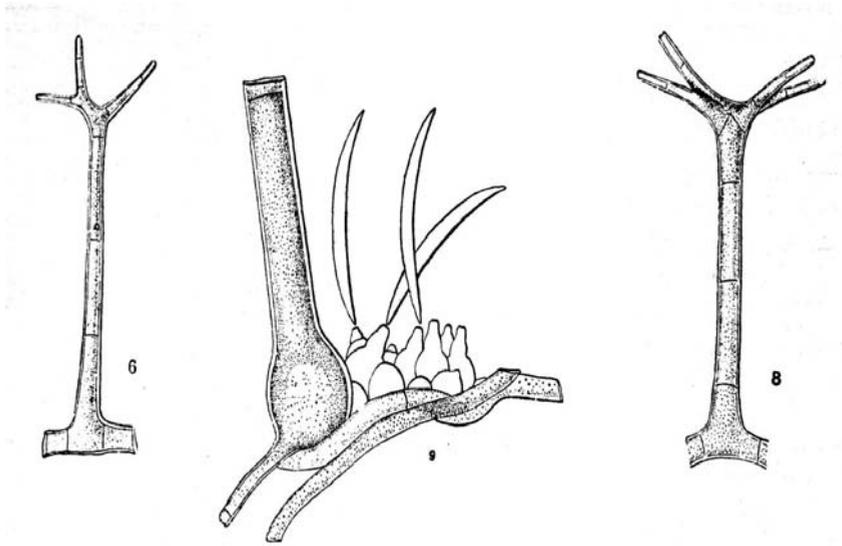


Fig. 59. *Peglionia verticiclada* from the drawings of Goidanich (1935).

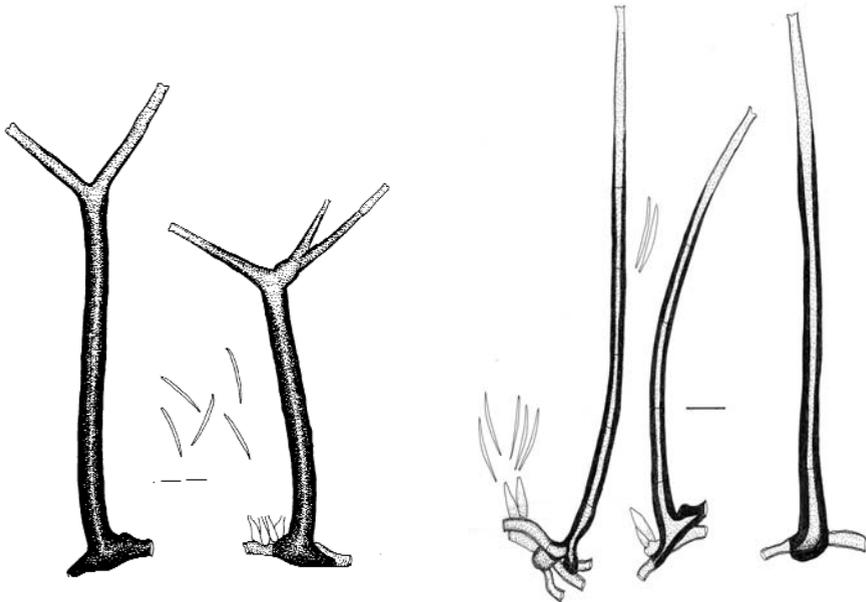


Fig. 60. Two different strains of *Gyrothrix verticiclada* found on dead leaves of *Smilax aspera*. Bar 15  $\mu\text{m}$ .

Another strain on *S. aspera* dead leaves and in the same place forms colonies less crowded, grey, grey-brown and with setae not branched but with all the others morphological characters coinciding with *Gyrothrix verticiclada*. It is interesting to point out the presence on the same substratum of colonies composed by specimens with branched setae and colonies with setae not branched.

***Gyrothrix ramosa*** Zucconi & Onofri, 1989.

Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

Setae erect, 1-3 times branched, branches circinate, septate, brown, verrucose, up to  $150 \times 3-3.5 \mu\text{m}$ . Conidiophores micronematous, flexuous, subhyaline to pale brown, smooth. Conidiogenous cells, discrete, phialidiform, obclavate to lageniform, hyaline or subhyaline,  $6-9 \times 3-4.5 \mu\text{m}$ . Conidia aggregated in white layer at the base of the setae, straight or slightly curved, o-septate, hyaline, smooth,  $14-19 \times 2-3 \mu\text{m}$ .

On dead leaves of *Olea europaea* var. *sylvestris*, *Pistacia lentiscus*. Torre del Sevo, Central West Sardinia.

This species was found and described as new species by Zucconi and Onofri on not determined dead leaves collected at Tai Nat. Park in the Ivory Coast (1988). Its finding in Sardinian mediterranean maquis is supposed to be the first record in Europe.

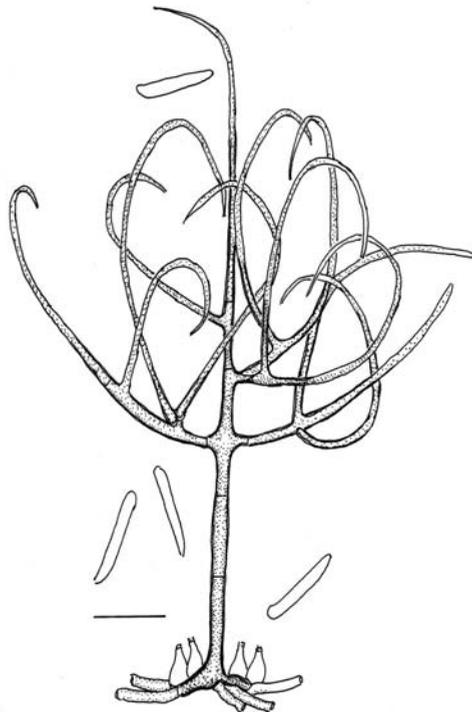


Fig. 61. *Gyrothrix ramosa*. Setae, conidiogenous cells and conidia. Bar 15  $\mu\text{m}$ .

***Gyrothrix citricola*** Piroz., 1962.

Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

Setae erect, flexuous, 1-2 times branched or unbranched, branches flexuous, brown, smooth, up to  $240 \times 3-4 \mu\text{m}$ . Conidiophores micronematous, flexuous, subhyaline to pale brown. Conidiogenous cells discrete, phialidiform, obclavate, to lageniform, subhyaline,  $5.5-9 \times 2.5-3.5 \mu\text{m}$ . Conidia aggregated at the base of the setae in a white layer, cylindrical, straight or gently curved, 0-septate, hyaline, smooth,  $8-14 \times 1.5-2 \mu\text{m}$ .

On dead leaves of *Chamaerops humilis*, *Phillyrea angustifolia*, *Pistacia lentiscus*, *Quercus ilex*, *Thymelaea tartonraira*. Central West Sardinia.

This species was found on dead twigs of citrus in the Sudan Republic and determined by Pirozynski (1962). It is able to colonize many different natural substrata, almost seemingly preserving the described morphological characters.



Fig. 62. *Gyrothrix citricola*. Setae, conidiogenous cells and conidia. Bar 20  $\mu\text{m}$ .

***Gyrothrix circinata*** (Berkeley & Curtis) Hughes, 1958.

Synonym: *Campsotrichum circinatum* Berkeley & Curtis, 1874.

Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

Colonies effused, velvety, dark brown to black, scattered. Superficial mycelium composed of a network of branched and anastomosing, smooth walled, septate, subhyaline to clear olivaceous hyphae. Setae numerous, frequently intertwined, erect, septate, dark brown, rough, circinate, 80-140×4 µm. Branches clear brown, spinulose, circinate. Conidiogenous cells on the superficial hyphae near the base of the setae, phialidiform, obclavate, lageniform, 8×3-4 µm but very variable in dimensions. Conidia aggregated in a white layer near the base of the setae, cylindrical, straight or gently curved, corniform at the apex and pointed at the base, hyaline, 0-septatae, 12-14×2 µm.

On dead leaves of *Smilax aspera*. Montagna Grande Pantelleria.

The species described was found and included into the genus *Campsotrichum* as *C. circinatum* by Berkeley and Curtis in 1874 and, for the typical morphological characters transferred in the genus *Gyrothrix* as *G. circinata* by Hughes on 1958. It has been found on many different substrata from North America to Indonesia and Africa and of course also in Europe mainly, as many other *Gyrothrix* species, on *Smilax aspera*.

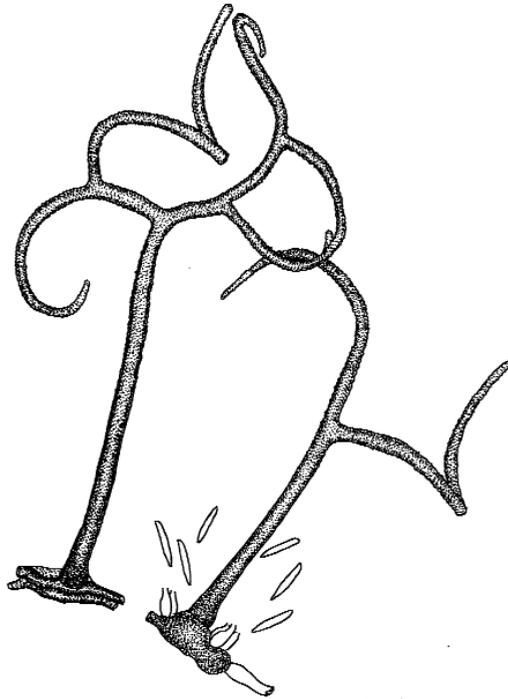


Fig. 63. *Gyrothrix circinata*. Setae, conidiogenous cells and conidia. Bar 15 µm.

***Gyrothrix grisea*** Piroz., 1962.

*Type species: Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

Follows the diagnosis as proposed by Pirozynski:

Colonies hypophyllous, effused, reddish brown, velvety, irregular, coalescing to cover most of the leaf surface. Superficial mycelium composed of a network of branched and anastomosing, smooth walled, septate, subhyaline to olivaceous hyphae bearing sporogenous cells, here and there becoming thickened and brown at the point of origin of the setae. Setae numerous erect, flexuous, thin walled, distinctly septate, olivaceous to light brown, translucent, darker near the base, paler above, smooth, 2-4 times branched, 100-160  $\mu\text{m}$  high, 3-5  $\mu\text{m}$  thick at the base (above the bulbous swelling), 0.5  $\mu\text{m}$  at the apices of branches. Branching imperfectly dichotomous, branches long and slender, dilute olivaceous, flexuous, intertwined, extremities flagellate or spirally twisted. Sporogenous cells formed laterally on the superficial hyphae, lageniform to conical, subhyaline, 6-10 $\times$ 3.5  $\mu\text{m}$ . Conidia adhering together to form a whitish pellicle at the base of the setae, acerose, straight or slightly curved, with free end corniform and the attached end subulate, continuous, hyaline, 10-18 $\times$ 1-1.5  $\mu\text{m}$  (mostly 12 $\times$ 1  $\mu\text{m}$ ).

On indetermined leaves, India.

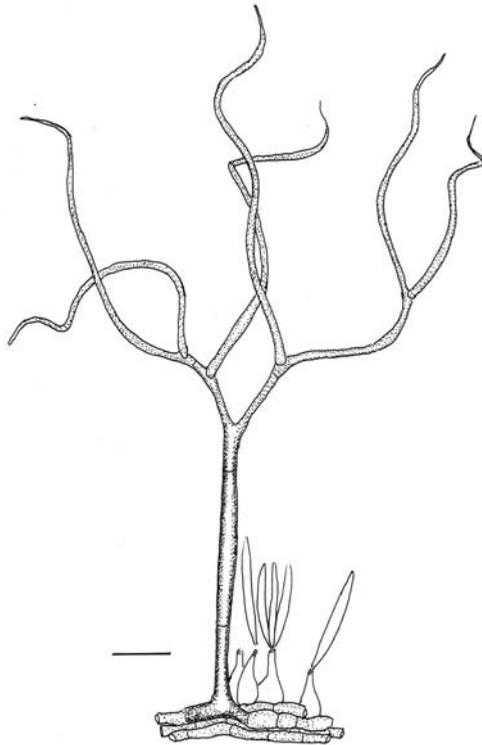


Fig. 64. *Gyrothrix grisea*. Seta, conidiogenous cells and conidia. Bar 10  $\mu\text{m}$ .

We have found this species at Torre del Sevo, Central West Sardinia, on dead leaves of numerous plants without variability of morphological characters also comparing our strains to Pirozynski diagnosis: *Chamaerops humilis*, *Cistus incanus*, *Ceratonia siliqua*, *Ilex aquifolium*, *Juniperus phoenicea*, *Olea europaea* var. *sylvestris*, *Phillyrea angustifolia*, *P. latifolia*, *Pistacia lentiscus*, *Rosmarinus officinalis*, *Smilax aspera*.

***Gyrothrix macroseta*** Piroz., 1962.

Type species: *Gyrothrix podosperma* (Corda) Rabenhast, 1844.

Follows the diagnosis as proposed by Pirozynski.

Colonies effused, dark reddish brown, hairy. Superficial mycelium composed of branched and anastomosing, subhyaline to olivaceous, smooth-walled, septate hyphae bearing setae and sporogenous cells. Setae originating from enlarged, dark brown, thick-walled cells of the superficial mycelium, erect, thick-walled, dark reddish brown, opaque, indistinctly septate, rough, spirally twisted, 5-10 times branched, 250-400  $\mu\text{m}$  high, 5-8  $\mu\text{m}$  thick at the base, tapering to a width of 1  $\mu\text{m}$  at the apices of branches. Branching subdichotomous, nearly monopodial, branches straight or somewhat flexuous, brown extremities dilute oli-

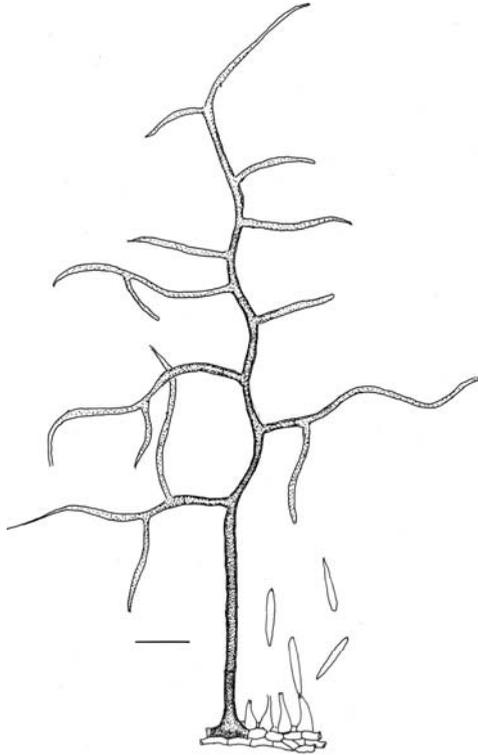


Fig. 65. *Gyrothrix macroseta*. Setae, conidiogenous cells and conidia. Bar of conidia 15  $\mu\text{m}$ , of seta 28  $\mu\text{m}$ .

vaceous and markedly verrucose. Sporogenous cells borne laterally on the superficial hyphae or on basal cells of the setae, obclavate to lageniform, pointed above, 8  $\mu\text{m}$  or more long, 3-5  $\mu\text{m}$  wide at the base, 0.5-1  $\mu\text{m}$  at the apex. Conidia adherent, aggregated at the base of the setae, cylindrical to fusiform, straight or slightly curved, with blunt and somewhat corniform ends, continuous, hyaline, 13-16 $\times$ 1.5  $\mu\text{m}$ .

On twigs of *Eucalyptus*, North America.

Our strain, found on dead leaves of *Arbutus unedo* and *Pistacia lentiscus* in Central West Sardinia, is coinciding with Pirozynski description. In our opinion this species is one of the most rare on European mediterranean maquis.

***Gyrothrix* sp. (G.1).**

Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

Colonies well circumscribed, composed by several setae and reproductive structures very crowded, brown, dark brown. Setae growing from the basal mycelium, erect, thick-walled, dark brown, with septa very difficult to observe, twisted on the first basal branches and sinuous in the upper branches, branches slightly rough, 225-400 $\times$ 6-8  $\mu\text{m}$ . Conidiogenous

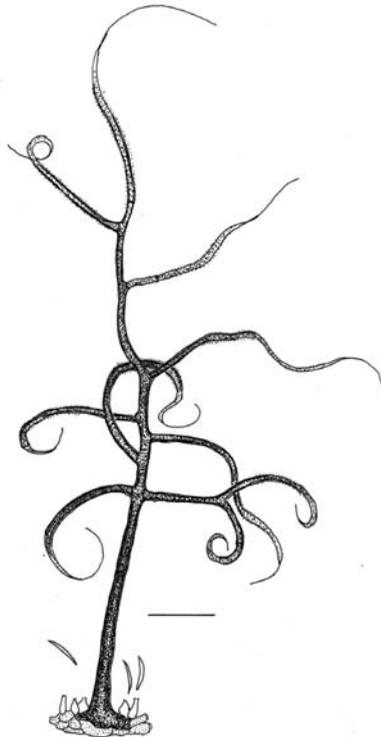


Fig. 66. *Gyrothrix* sp. Conidia, conidiogenous cells and setae. Bar 40  $\mu\text{m}$ .

cells growing on micronematous conidiophores near the base of the setae, obclavate, lageniform, 7-14×5 µm. Conidia aggregated at the base of the setae, falcate, with apices gently pointed, not corniform, 0-septate, hyaline, 19-23×3 µm.

On dead leaves of *Rhamnus catharticus* L. Circeo National Park. Central, West Italy.

The strain described has some morphological characters coinciding with *Gyrothrix macroseta* Pirozynski and *G. flexuosa* Rambelli, like the dimension of the setae, the presence of basally twisted and apically sinuous branches as in *G. macroseta*, but differs for the dimensions of the conidia that, in our strain are also clearly falcate and not corniform. Nevertheless, the opportunity to propose our strain as a variety of *G. macroseta* seems not suggestible due to striking morphological differences at conidial level between these two species as well as versus *G. flexuosa*. But, considering that the mediterranean maquis vegetation is exposed to strong seasonal climatic conditions, and of course the same is for the saprotrophs colonizing the dead leaves, the morphological characters observed in our strain could be the result of particular ecological conditions. In this situation we prefer to leave our strain indeterminate, hoping in the chance to observe the product of a more fruitful collection.

***Gyrothrix* sp. (G.9).**

Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844

Setae scattered, never in groups to form colonies, brown, clear brown at the apices, septate, smooth, very irregularly branched, up to 250 µm and more high, 6-7 µm wide, branches not straight, flexuous, frequently disposed at right angle on the main seta, 31-74×4-5 µm. Conidiogenous cells at the base of the setae, originating from the superficial mycelium, obclavate, very irregularly in forms and dimensions, 3-12×3-5 µm. Conidia slightly falcate, not corniform, with pointed base and apex gently rounded, hyaline, 0-septate, 9-12×3 µm.

On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

Since we examined only poor material we prefer to leave this species indeterminate, hoping in new findings.

## ZYGOSPORIUM

(Montagne 1842, Ann.Sci. Nat., Sér.2, 17: 120).

The genus *Zygosporium* was erected by Montagne (1842) on the morphological characters of *Z. oscheoides* Mont., but without a generic description. Vuillemin (1910) proposed the genus *Urophiala* to describe a species, *U. micophila* found on dead organic material, but the species was transferred to *Zygosporium* as *Z. mycophilum*, by Saccardo in 1911. Previously others synonymy were proposed by Grove, *Pimina* (1888), with the type species *P. parasitica* Grove, then *Urobasidium* by Giesenhagen (1892), type species *U. rostratum* Giesenh., up to Vuillemin (1910) with *U. mycophila*.

Saccardo (1886) in *Sylloge Fungorum* (IV: 328-329) reports a proposal of genus diagnosis, presumably obtained from a description of *Z. oscheoides*:

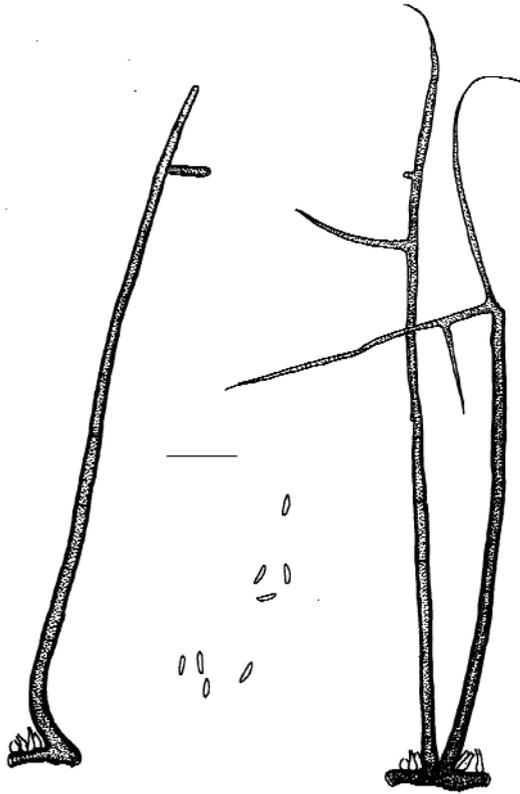


Fig. 67. *Gyrothrix* sp. (G.9) Irregularly branched setae. Bar 40  $\mu$ m.

***Zygosporium*** Mont. Cuba p. 303 - *Hyphae steriles caespitosae, repentes, continuae, fertiles uni-aut saepius biseptatae, fuligineae, apice subincrassato-clavato pellucidae, basin versus hinc unicum ramum uniarticulatum clavae-formem subrecurvum emarginatum emittentes. Conidia ovalia vel globosa pellucida, nucleo vix colorato, cuique emarginaturae lateri imposita.*

This Saccardo's diagnosis, attributed to Montagne, can be considered an important point of reference. Nevertheless, one of the most acceptable is the generic description of Ellis (1971) even if with some questionable statements.

***Zygosporium*** Montagne. 1842.

Synonymy:

*Pimina* Grove, 1888.

*Urobasidium* Giesenhagen, 1892.

*Urophiala* Vuillemin, 1910

Colonies effuse or sometimes compact, often thin grey, brown, blackish brown or black. Mycelium mostly superficial, reticulate. stroma none. Separate setae absent but in a number of species the upper part of the conidiophore is sterile and setiform. Hyphopodia absent. Conidiophores macronematous or sometime micronematous, mononematous, scattered, unbranched or branched, brown, smooth or minutely echinulate; stipe and branches bearing solitary or in 1-species catenate dark brown, curved, swollen vesicles often on short or long stalks, upper part of stipe frequently sterile, sometimes ending in a knob. Conidiogenous cells usually monoblastic, discrete, determinate, ampulliform or ellipsoidal, often curved and tapering to a point, thin-walled, colourless or pale, borne in pairs, threes or fours on the dark brown vesicles. Conidia solitary, acrogenous, simple, ellipsoidal, spherical or subspherical, hyaline to brown, smooth, verruculose or verrucose, 0-septate.

Type species: *Zygosporium oscheoides* Mont.

Mason (1941) published in one of the first Mycological Papers an extensive description of *Z. oscheoides* the type species, that we report for a better understanding of these species characterized by structures with a particular morphology.

***Zygosporium oscheoides* Mont. 1842.**

Synonymy: *Cladotrichum passiflorae* Pim. 1885.

*Zygosporium paraense* Vincens, 1915,

*Zygosporium blighiae* Frag. & Cif., 1927.

The repent hyphae may be sub-hyaline, indistinctly septate, and about 2 µm broad; or brown, distinctly septate, and up to 3-5 µm broad; further, either individual cells, or rows of cells, of the hyaline hyphae may broaden and turn brown. The falciophores are erect, simple, tapering upwards, except for the apical cell concolorous with the brown hyphae, two- to a few-septate, 30 to 50 µm long, and about 3 µm broad at the base. The apical cell of the falciophore remains sub-hyaline, and apparently is at first acicular; its distal portion as well as to narrow clavate, but soon collapses and finally falls off. The falces arise normally at a right angle as lateral branches, one from the base of each falciophore. The stipe is one-celled, usually obconic, concolorous, and measures 3 to 5 µm long and 2.5 to 4 µm broad. The phialide is opaque blackish brown, and strongly curved. In side view it is broadly clavate or quarter to half-moon shape. It is 9-12 µm along its greatest length and 7-8 µm across its greatest breadth. At its apex two truncate conical projections (one on either side of a median sinus) each bear a phialide, so that, viewed from behind at different angles, the phialide appears cuneate, shield shaped, or cordate. The phialides at first are oval, and later obpyriform; they soon form an acute apex, and sometimes a tapering neck; they can often be found burst, and are finally caducous; they measure 4-6×3 µm. The conidia (phialospores) are oval, smooth, and hyaline, and measure 7-9×4-5 µm.

In the mediterranean maquis litter we have found four species of *Zygosporium* that we compare to the original descriptions.

***Zygosporium echinosporum* Bunting & Mason, 1941.**

Colonies effuse, clear grey, composed by several conidiophores regularly distributed and not crowded. Setae present, not part of the conidiophores, arising from the super-



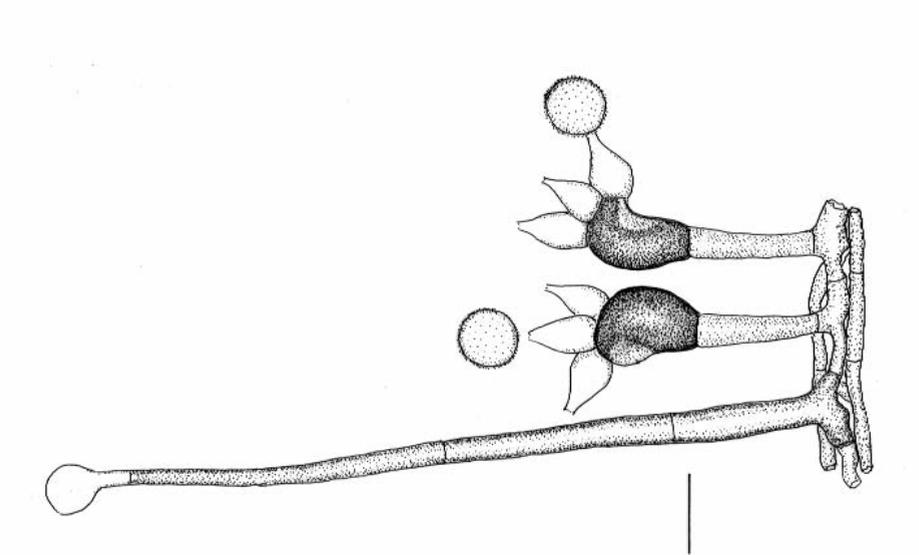
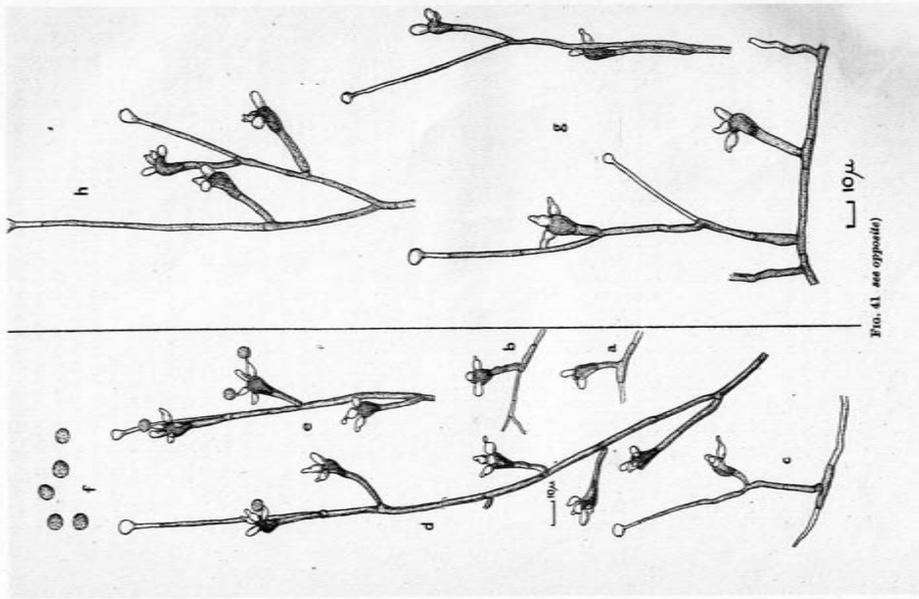


Fig. 69. *Zygosporium echinosporum*. Strain with setae. Bar 10  $\mu$ m. Right: *Z. echinosporum* as observed by Mason (1941).

ficial mycelium, erect or gently flexuous,  $56-74 \times 2-3 \mu\text{m}$ , with a small apical hyaline vesicle  $4.3 \times 8.6 \mu\text{m}$ . Conidiophores macronematous, mononematous, unbranched, brown, smooth,  $22 \times 2-3 \mu\text{m}$ , supporting a swollen, solitary, dark-brown, curved vesicle,  $9-15 \times 7-10 \mu\text{m}$ . Conidiogenous cells monoblastic, determinate, phialidiform, hyaline, 2 or 3 at the apex of the vesicles,  $4.3-10.8 \times 3.6-8 \mu\text{m}$ . Conidia solitary, spherical, hyaline, verruculose,  $6.5 \times 8.5 \mu\text{m}$ .

On dead leaves of *Pistacia lentiscus*. Salina island. Sicily.

The species described presents dimensional characters well coinciding with those of the original description, but with true setae and not setiform conidiophores.

***Zygosporium minus*** S.J.Hughes, 1951.

Colonies effuse, composed by several specimens but not crowded. Conidiophores macronematous, mononematous, setiform, branched, up to  $50 \mu\text{m}$  long, with a single lateral vesicle on short stalk near the base, vesicles  $8-12 \times 4-8 \mu\text{m}$ . Conidiogenous cells monoblastic, discrete, determinate, hyaline, ellipsoidal, on dark brown vesicles. Conidia solitary, spherical, 0-septate, hyaline to pale brown, verruculose,  $6-9 \mu\text{m}$  in diameter.

On dead leaves of *Smilax aspera*. Torre del Sevo. Central West Sardinia. Italy.

The species described presents morphological and dimensional characters well coinciding with the original diagnosis. We have observed many specimens of *Z. minus* from different country also out of the area of mediterranean maquis vegetation but always with a very stable morphology.

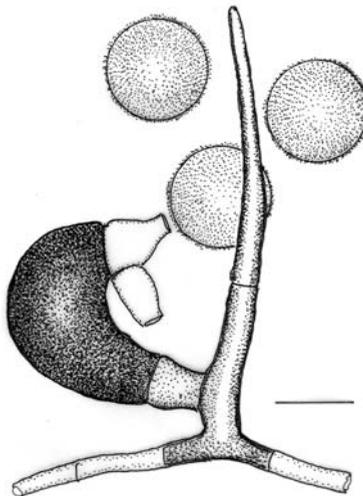


Fig. 70. *Zygosporium minus*. Setiform conidiophore and conidia. Bar  $8 \mu\text{m}$ .

***Zygosporium mycophilum*** (Vuill.) Sacc., 1911.

Colonies effuse, not crowded. Conidiophores macronematous, mononematous, erect, unbranched, with apical vesicles, 12-15×6-8 μm. Conidiogenous cells monoblastic, discrete, determinate, hyaline, ellipsoidal, on dark brown vesicles. Conidia solitary, ellipsoidal, 0-septate, hyaline, smooth or minutely verrucose, 5-10×4-6 μm.

Basionym: *Urophiala mycophila* Vuill., 1909. On dead leaves of *Myrtus communis*. Torre del Sevo. Central East Sardinia.

***Zygosporium gibbum*** (Sacc., M.Rousseau & E. Bommer) S.J. Hughes. 1958.

Colonies effuse, composed by several specimens, not crowded. Conidiophores semi-macronematous, erect, unbranched, with apical vesicles, 10-15×7-9 μm. Conidiogenous cells monoblastic, discrete, determinate, hyaline, ellipsoidal, on dark brown vesicles. Conidia solitary, spherical, 0-septate, hyaline, smooth or minutely verruculose, 4.5-6 μm in diameter.

Basionym: *Clasterosporium gibbum* Sacc. Rousseau, Bommer, 1884.

Synonym: *Zygosporium parasiticum* (Grove) Bunting & Mason, 1941.

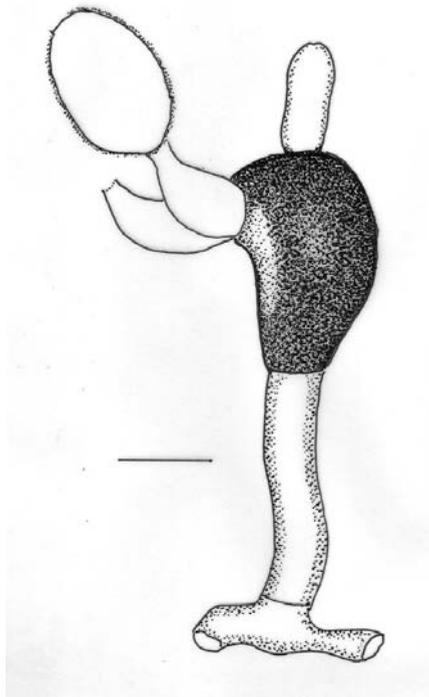


Fig. 71. *Zygosporium mycophilum*. Conidiophore and conidium. Bar 5 μm.

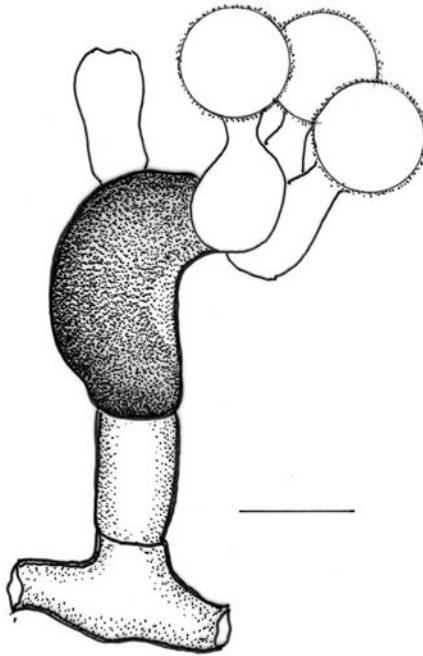


Fig. 72. *Zygosporium gibbum*. Bar. 5  $\mu$ m

On dead leaves of *Arbutus unedo*, *Ceratonia siliqua*, *Chamaerops humilis*, *Cistus monspeliensis*, *C. salvifolius*, *Myrtus communis*, *Olea europaea* var. *sylvestris*, *Phillyrea angustifolia*, *P. latifolia*, *Pistacia lentiscus*, *Quercus ilex*, *Smilax aspera*. Torre del Sevo. Central West Sardinia. Italy.

### CYLINDROTRICHUM

(Bonorden 1851, Handbuch der allgemeinen Mykologie. 1-98. Stuttgart).

The genus *Cylindrotrichum* was erected by Bonorden (1851) to include species of *Dematiaceous Hyphomycetes* characterized by polyphialidic-sympodial conidiogenous cells with collarettes and conidia semi-endogenous. The first species included, *C. oligospermum* is the result of a new combination from *Menispora oligosperma* proposed by Corda in 1838, while, according to Bonorden, the conidiogenous cells of the species were not characteristic of the genus *Menispora*.

***Cylindrotrichum*** Bonorden, 1851.

*Hyphae steriles repentes; fertiles adscendentes simplices, rarius parce ramosae. Conidia pleurogena breve cylindracea, continua, subhyalina.*

*Lectotype species: Cylindrotrichum oligospermum* (Corda) Bonorden, 1851.

Colonies inconspicuous, composed by several but isolated conidiophores. Conidiophores macronematous, mononematous, straight or gently flexuous, unbranched, clear brown to brown, paler in the apical part. Conidiogenous cells polyphialidic, sympodial, integrated, terminal, cylindrical, each conidiogenous locus a collaret. Conidia aggregated in masses, rod shaped, with rounded ends, hyaline or very clear brown, semi-endogenous, smooth, 0-septate.

***Cylindrotrichum oligospermum*** (Corda) Bonorden, 1851.

Setae present, simple, dark brown, up to 450  $\mu\text{m}$ . Conidiophores macronematous, monone-matous, unbranched, brown, usually less than 75 (- 125 or more)  $\times$  5-7  $\mu\text{m}$ . Conidiogenous cells polyphialidic, integrated, terminal, sympodial, cylindrical to lageniform, with col-

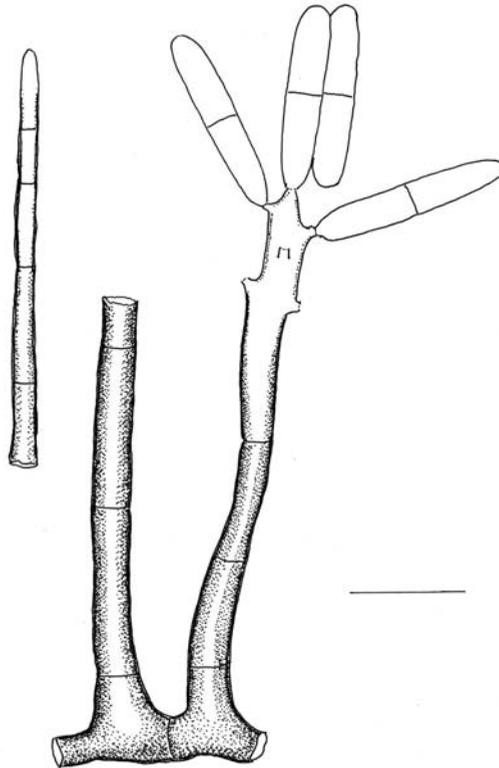


Fig. 73. *Cylindrotrichum oligospermum*. Conidiophores and conidia. Bar 10  $\mu\text{m}$ .

larettes. Conidia aggregated, semi-endogenous, cylindrical, colourless, smooth, 12-22×2.5-3 µm (11-16×2-2.5 µm according to Gams & Holubová-Jechová, 1976).

On dead leaves of *Chamaerops humilis*, *Cistus monspeliensis*, *Ilex aquifolium*, *Juniperus phoenicia*, *Myrtus communis*, *Phillyrea angustifolia*, *P. latifolia*, *Pistacia lentiscus*, *Quercus ilex*, *Smilax aspera*. Torre del Sevo. Central West Sardinia, Italy.

The morphological characters of our strain are well coinciding with *C. oligospermum*.

### SELENSPORELLA

(Arnaud 1954, Soc. Mycol. Fr. 69: 265; ex MacGarvie, 1968, Scient. Proc. R. Dublin Soc., Ser.B 2, 16: 153).

The genus *Selenosporella* was established by Arnaud ex MacGarvie (1968) for the type species *S. curvispora* McGarvie. The first description of the genus and species was carried out by Arnaud and published on the “Bulletin trimestriel de la Société mycologique de France (69, 1954)” but without valid diagnosis: the genus was validated by MacGarvie with the description of the type species *Selenosporella curvispora*.

***Selenosporella curvispora*** Arnaud, 1954, ex MacGarvie, 1968.

*Coloniae effusae, albae. Mycelium immersum. Conidiophora solitaria, erecta, rigida, deorsum crassitunicata, superne subverticillatim ramosa, 70-150 µm alta, prope basim 4.5-10 µm crassa, prope apicem 2.7-5.5 µm crassa, atrobrunnea sursum brunnea. Cellulae conidiogenaе anguste obclavatae, apice sympodialiter proliferatae denticulatae, pallide brunneae. Conidia (sympodulosporeae) acerosa, continua, laevia, albida in massa, 7.5-12×0.8-1.3 µm, apice cellulae conidiogenaе adhaerentia.*

According to Ellis 1971, the description of the genus.

***Selenosporella*** Arnaud, 1954, ex MacGarvie, 1968.

Colonies effuse, inconspicuous. Mycelium immersed. Stroma none. Setae and hyphopodia absent. Conidiophora macronematous, mononematous, branched, with branches in verticils; stipe straight or flexuous, subulate, with a swollen and lobed base, brown, smooth. Conidiogenous cells polyphialidic, integrated and terminal on stipe and branches or discrete, arranged in verticils, sympodial, cylindrical, lageniform or subulate, with protruding collarettes. Conidia aggregated in slimy masses, semi-endogenous, simple, straight or slightly curved, aceroso or almost cylindrical, rounded at the apex tapered towards the base, colourless or pale olive, smooth, 0-septate.

Type species: *Selenosporella curvispora* MacGarvie 1968.

A good description of the type species is carried out by Matsushima (1975). The morphological characters of our strain are here reported.

***Selenosporella curvispora*** McGarvie, 1968.

Type species: *Selenosporella curvispora* McGarvie, 1968.

Colonies inconspicuous, composed by isolated conidiophores arising all from a superficial hypha. Conidiophores macronematous, mononematous, with branches disposed in verti-

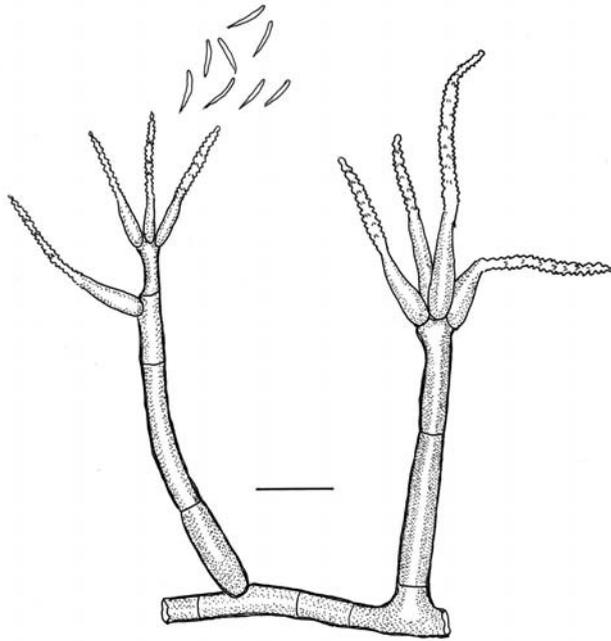


Fig. 74. *Selenosporella curvispora*. Conidiophores with polyphialidic conidiogenous cells and acerose conidia. Bar 12  $\mu\text{m}$ .

cils, straight or gently flexuous, brown, clear brown towards the apex, smooth, septate, up to 150  $\mu\text{m}$  high and more, 10-12  $\mu\text{m}$  wide near the base. Conidiogenous cells polyphialidic, integrated, terminal on branches, verticillate, sympodial, with protruding denticles, 15-16 $\times$ 3-4  $\mu\text{m}$ . Conidia simple, straight or gently curved, acerose, rounded at the apex and pointed at the base, hyaline, smooth, 0-septate, 6 $\times$ 0.5-0.8  $\mu\text{m}$ .

On dead leaves of *Arbutus unedo*. Salina island, Italy.

Our strain appears clearer in all the morphological structures if compared to Matsushima description, phenomenon presumably connected to the nature of the substratum.

### SYMPODIELLA

(Kendrick 1958, Trans. Br. Mycol. Soc. 41(4): 519).

The genus *Sympodiella* with the type species *S. acicola* was established by Kendrick in 1958. Even if the acropetal conidia development was not mentioned in the latin diagnosis, the Author well described this type of conidiogenesis from sympodially proliferating conidiogenous cells. But Subramanian & Vittal (1972) described *Sympodiella laxa* as a new

species with arthric chains of conidia obviously originating for disarticulation. The clear description of Kendrick, supported also with drawings, induced Rambelli & al. (2009) to consider erroneous the Subramanian & Vittal interpretation. Later Cole & Samson (1979) with very clear explanations confirmed the holoarthric origin of the conidia also for *S. acicola* that we accept and in this view become useless any considerations on acropetal or basipetal conidiogenesis.

The genus was emended by Ponnappa (1975); according to the Author *S. laxa* can't be included in the genus *Sympodiella* Kendrick because of an irregular distance of the conidiogenous loci and for punctiform septal plugs, not always present, at each conidium ends. The Author proposed the new genus *Parasympodiella* Ponnappa and the new combination *P. laxa* (Subramanian & Vittal) Ponnappa. After Ponnappa (1975) many different species of *Parasympodiella* were proposed (cf. References examined) and in every descriptions the presence of arthric conidia was pointed out. We consider the morphological characters discussed by Ponnappa with some perplexities, not enough to propose a new genus but of more specific value.

The genus diagnosis as proposed by Kendrick (1958) is here reported.

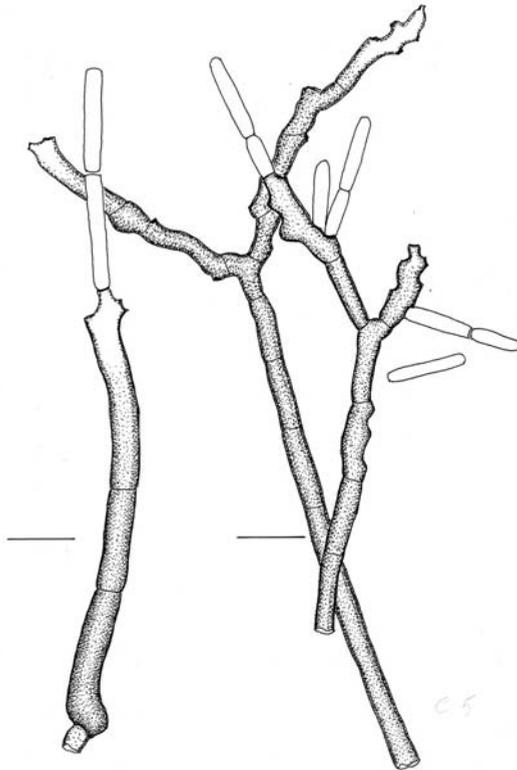


Fig. 75. *Sympodiella acicola*. Branched conidiophores and chains of conidia. Left bar 8  $\mu\text{m}$ , right bar 12  $\mu\text{m}$

***Sympodiella*** Kendrick, 1958.

*Fungi Imperfecti hyphomycetes saprophytici.*

*Conidiophora solitaria, erecta vel ascendente, simplicia, septata, atrobrunnea. Conidia acropleurogena, cylindrica, utrinque truncata, continua, hyalina, catenas siccas non ramosas formantes.*

*Typus generis: Sympodiella acicola* Kendrick.

***Sympodiella acicola*** Kendrick, 1958.

Type species. *Sympodiella acicola* Kendrick, 1958.

Colonies not crowded, composed by isolated conidiophores. Conidiophores macronematous, mononematous, erect, frequently flexuous and branched, septate, brown, yellow brown, clearer at the apices, 29 (-59)-137×4-5 µm, conidiogenous cell included. Conidiogenous cells terminal, polyblastic, sympodial, clear brown, with large scars and 1 or 2 large apical denticles. Conidia holoartric, in disarticulating chains, cylindrical, with truncated ends when into the chain and with rounded apex at the apex of the chain, hyaline, 0-septate, 11-14×2.1-2.3 µm.

On dead leaves of *Pistacia lentiscus*. Santa Teresa, Pantelleria.

Our specimens presents morphological characters well coinciding with *S. acicola* Kendrick even if with frequently branched conidiophores, observed in artificial cultures also by the Author; the conidiogenous cells are regularly sympodially developing, they become more irregular with branching development.

## BELTRANIA

(Penzig, 1882. Nuovo Giorn. Bot. Ital. 14: 72).

The genus *Beltrania* was established by Penzig in 1882 on mycological material, leaves of “*Citri Limonum Risso, prope Licata (Sicilia)*” colonized by the fungus and received from “*lecta a clarissimo V. Beltrani, cui genus perpulchrum et distinctissimum dicatum volui*”. The genus was erected on morphological characters of the type species *Beltrania rhombica*, this is the genus diagnosis.

***Beltrania*** Penzig, 1882.

*Caespitulis hypophyllis, stratum fusco-olivaceum constituentibus; hyphis erectis vel adscendentibus, dense aggregatis, continuis vel 1-2-septatis, subsimplicibus, sinuosis; setulis sterilibus longioribus inter hyphas fertiles intermixtis; conidiis vel in hypharum apice sessilibus vel sterigmate ex apice oriundo suffultis, solitariis vel fasciculatis, 1-septatis, apice rostratis.*

The description is correct and exhaustive even if the conidia are referred 1-septate and we know that the supposed septum is only a clear band approximately in the medium part, error completely justifiable if we think to the optical possibilities of observation of that period.

A more extensive description of the genus characters is carried out by Ellis (1971).

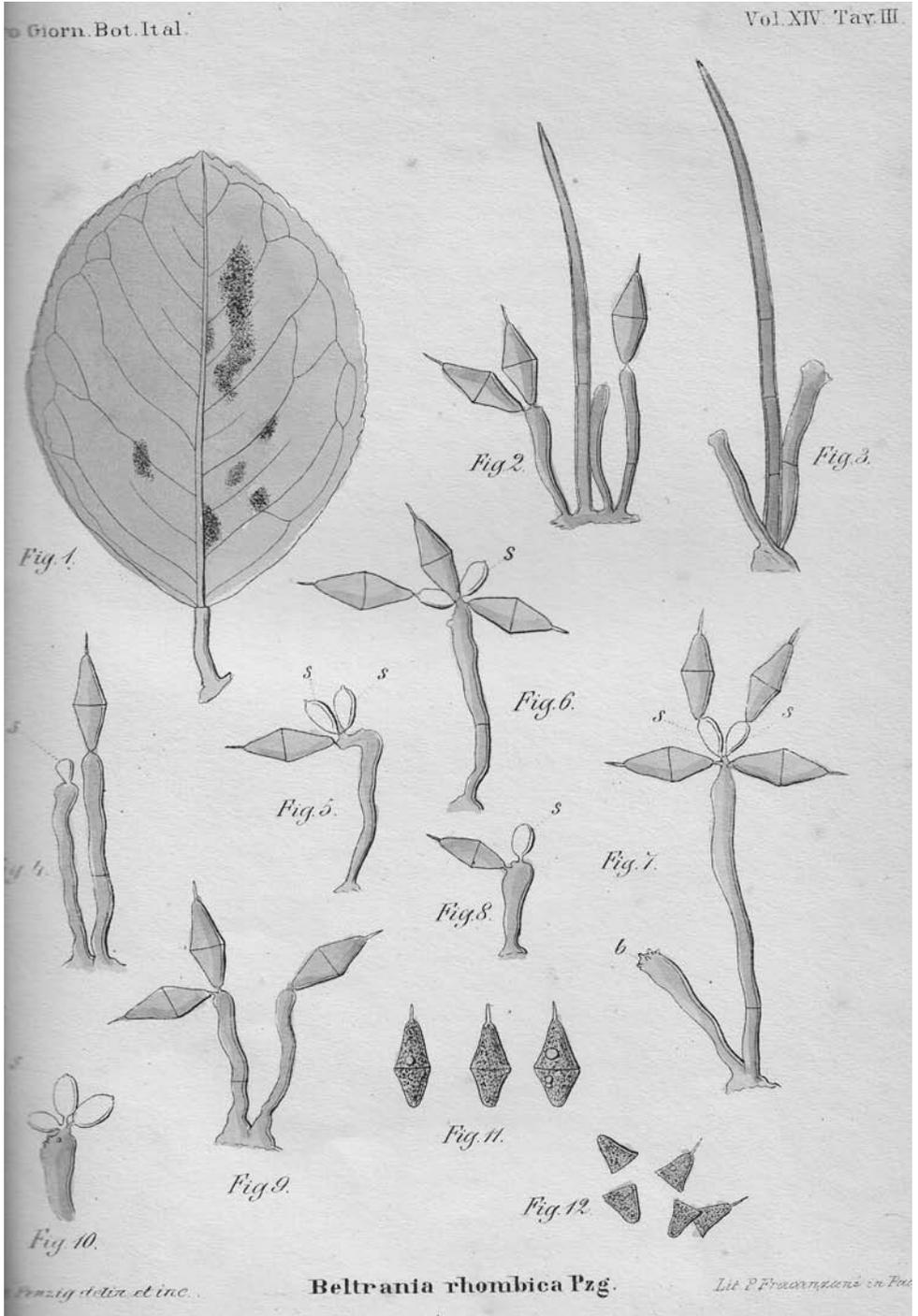


Fig. 76. *Beltrania rhombica* from the original Penzig drawing, 1882.

***Beltrania*** O.Penzig, 1882.

Colonies effuse, velutinous, brown to black. Mycelium all immersed or partly superficial. Stroma usually present, often confined to epidermis. Setae simple, dark, smooth or verrucose, thick-walled, arising from flat, radially lobed basal cells. Hyphopodia absent. Conidiophores macronematous, mononematous, usually simple, straight or flexuous, pale olive to brown, smooth, septate, arising from basal cells of setae or from separate radially lobed cells. Conidiogenous cells integrated, terminal, polyblastic, sympodial, clavate or cylindrical, denticulate (denticles cylindrical); separating cells when present swollen. Conidia solitary, acropleurogenous, biconic, appendiculate, the free end being usually spicate or appendiculate, 0-septate, smooth, pale olive to dark reddish brown with a distinct hyaline transverse band immediately above the widest part of the conidium.

Type species: *Beltrania rhombica* O. Penzig.

To the type species some others were joined and found on different substrata and environments, but all seem characterized by frequent and strong variability in the morpholog-

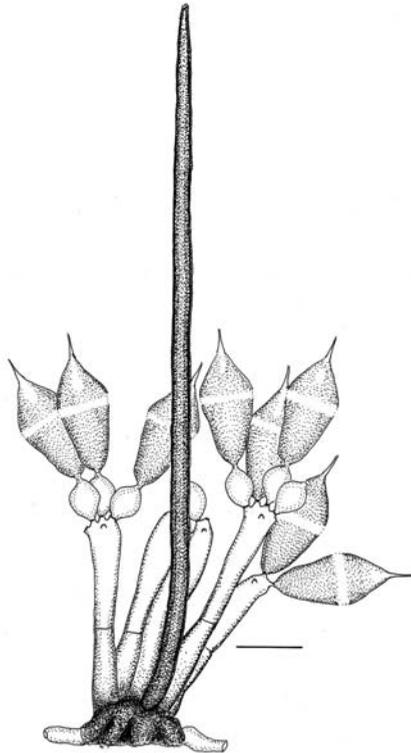


Fig. 77. *Beltrania rhombica* Penzig. Setae, conidiophores with separating cells and conidia. Bar 12  $\mu$ m.

ical characters and not only concerning the dimensions. This phenomenon seems determined by the substratum composition and also in the ability of these species to withstand extreme environmental conditions like the high temperature and a very low moisture.

On mediterranean maquis litter we have found two species: *B. rhombica*, *B. querna*, and a strain of *B. querna* with some particular morphological characters.

***Beltrania rhombica*** O. Penzig, 1882.

Type species: *Beltrania rhombica* Penzig, 1882.

Colonies effuse, dark red-brown. Setae erect, smooth, very dark brown, arising from radially lobed basal cells,  $130-160 \times 5-6 \mu\text{m}$ . Conidiophores macronematous, mononematous, simple, gently flexuous, clear brown, smooth, septate, arising from the radially lobed basal cells,  $36-41 \times 3-5 \mu\text{m}$  fertile part included. Conidiogenous cells integrated, terminal, polyblastic, sympodial, denticulate, sub-clavate; separating cells oval, swollen,  $9.5 \times 8 \mu\text{m}$ . Conidia solitary, acropleurogenous, biconic, appendiculate-spicate, 0-septate, smooth, dark reddish-brown, with hyaline transverse band in the widest part of the conidium,  $21-25 \times 9-12 \mu\text{m}$ .

On dead leaves of *Quercus ilex*. Santa Teresa, Pantelleria.

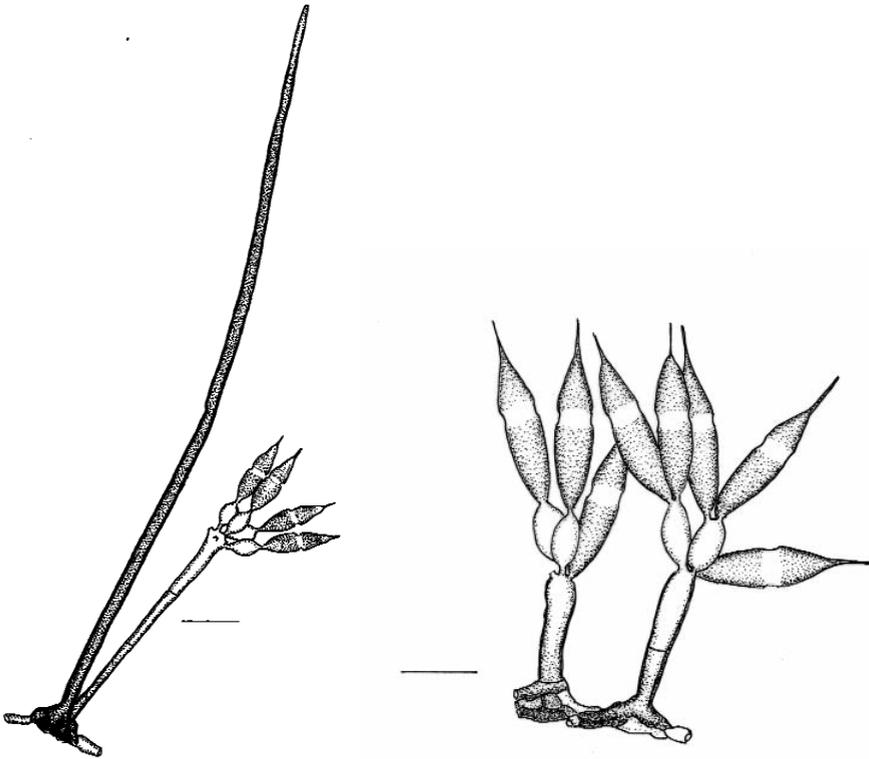


Fig. 78. *Beltrania querna* Harkn. Left, setae, conidiophores and conidia with separating cells, bar 18  $\mu\text{m}$ ; right, a strain without setae, bar 15  $\mu\text{m}$ .

***Beltrania querna*** Harkn., 1884.

Type species: *Beltrania rhombica* Penzig, 1882.

Colonies effuse, brown. Setae erect, smooth, dark brown, arising from radially lobed basal cells, 400-500×7 µm. Conidiophores macronematous, micronematous, simple, straight, erect, clear brown, smooth, septate, arising from the setae radially lobed basal cells, 60-120×5 µm fertile part included. Conidiogenous cells integrated, terminal, polyblastic, sympodial, denticulate, cylindrical, smooth, clear brown, separating cells elliptical, 12×6-7 µm. Conidia solitary, acropleurogenous, biconic, appendiculate-spicate (conidial appendix 5-8 µm long), 0-septate, smooth, clear brown, with a hyaline transverse band just above the widest part of the conidium, 22-28×5-7 µm.

On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

A strain of *B. querna* with reproductive structures, morphological and dimensional characters of the species but without setae in the whole colonies examined was found on dead leaves of *Rhamnus chatarticus* L. at Circeo Nat. Park.

*Material examined*: ROHB 411, *Beltrania onirica* on *Duboscia viridiflora*, 475/e on *Uapaca guineensis*; 417, *Beltrania rhombica* on *Tarrietia utilis*, 426/b on *Didelotia idae*; *Beltrania maxima* on dead leaves of indetermined plant, Costa Rica, ROHB, 477.

## MAXIBELTRANIA

(Rambelli 2010, new genus and species)

***Maxibeltrania*** Rambelli, gen. nov.

*Etym.*: related to the general dimensions

*Coloniae effusae, farinaceae, atrobrunneae. Setae erectae, vel modice curvatae, crassitunicate, atrobrunneae, obscure septatae, cellulis basilaribus radiatim lobatis oriundae. Conidiophora macronematosa, mononematosa, erecta, brunnea; ab eadem basi setarum oriuntur. Cellulae conidiogenae monoblasticae, integrate, brunneae, ad lateraliter locus fertile longascentia, dentibus conspicuis praedita. Cellulae separantes absentes. Conidia rhombica, apice acute rostrata, dilute olivacea, zona supraequatorialis subhyalina. In foliis dejectis Pistacia lentiscus, Montagna Grande, Pantelleria.*

***Maxibeltrania maxima*** (Rambelli) Rambelli comb. nov.

*Etym.*: *maxima* related to the general dimensions

*Basionym*: *Beltrania maxima* Rambelli, 2008.

*Coloniae effusae, farinaceae, atrobrunneae. Setae erectae, vel modice curvatae, crassitunicate, atrobrunneae, obscure septatae, cellulis basilaribus radiatim lobatis oriundae, 550×2.3-6 µm. Conidiophora macronematosa, mononematosa, erecta, brunnea; ab eadem basi setarum oriuntur; 230×5-6 µm. Cellulae conidiogenae monoblasticae, integrate, brunneae, ad lateraliter locus fertile longascentia, dentibus conspicuis praedita et 5 µm crassa. Cellulae separantes absentes. Conidia rhombica, apice acute rostrata, dilute olivacea, zona supraequatorialis subhyalina, 44-46×16-18 µm, appendix 2-4 µm longa.*

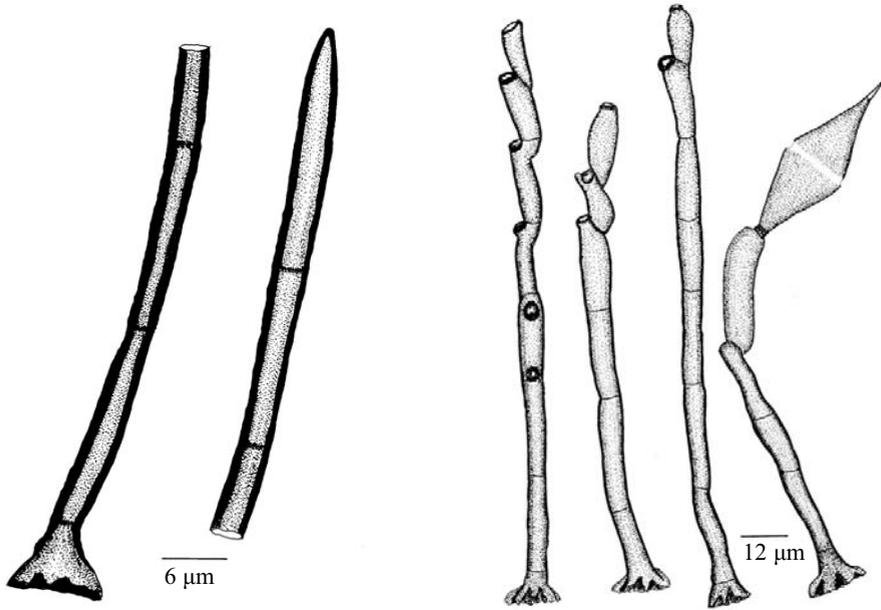


Fig. 79. *Maxibeltrania maxima*, setae, conidiophores and conidiogenous cells. - Figure published by Rambelli & Ciccarone (2008) to illustrate the fungus found in Costa Rica. The strain collected at Montagna Grande (Pantelleria) shows the same morphological characters and dimensions.

Type species: *Maxibeltrania maxima* (Rambelli) Rambelli.

*In foliis dejectis Pistacia lentiscus, Montagna Grande, Pantelleria.*

Colonies effuse, velutinous, brown, golden-brown. Setae unbranched, dark brown, smooth, arising from a radially lobed base, septate, up to  $550 \times 2,3-6 \mu\text{m}$ . Conidiophores macrone-matous, mononematous, never branched, erect or slightly flexuous, arising from the setae basal cells, brown, smooth, including the conidiogenous cells up to  $230 \times 5-6 \mu\text{m}$ . Conidiogenous cells monoblastic, discrete, integrate, brown, elongating laterally of the previous fertile apical locus, almost always at the same site and producing a succession of cells, each with one, rarely two, cicatrized locus, scars up to  $5 \mu\text{m}$  wide. Separating cells never present. Conidia solitary, biconic, with clear transverse band just above the middle part, yellow brown, smooth,  $44-46 \times 16-18 \mu\text{m}$ ; appendage  $2-4 \mu\text{m}$  long. On dead leaves of *Pistacia lentiscus*, Montagna Grande, Pantelleria.

The first finding of this species was in Costa Rica (Rambelli & Ciccarone 2008) on dead leaves of *Clusia* sp. If compared to *Beltrania rhombica* Penzig the fungus examined presents some morphological characters very different, also considering that *B. rhombica* is

characterized by a large morphological and dimensional variability mainly on different substrata (Rambelli & Pasqualetti 1990). The fungus presents conidia that could be dimensionally related to *B. africana* Hughes, but in the former single conidia are directly produced by single cicatrized loci, that could be regarded as big denticles, and the conidiogenous cell elongates laterally to produce other cells fertile through prominent scars. In the work carried out on Costa Rica material (2008) the specimens was described as a new species belonging to *Beltrania* genus, but after recent observations and new findings on mediterranean maquis litter collected at Pantelleria and mainly for the morphological characters of the conidiogenous cells, we presume more correct to separate it in a new genus with a new combination.

*Material examined:* ROHB 411, *Beltrania onirica* on *Duboscia viridiflora*, 475/e on *Uapaca guineensis*; 417, *Beltrania rhombica* on *Tarrietia utilis*, 426/b on *Didelotia idae*; the specimen as *Beltrania maxima* on dead leaves of *Clusia sp.*, USJ, isotype ROHB n. 489.

### MATSUSHIMAEA

(Subramanian 1977, Kavaka, 6: 96)

The genus *Matsushimaea* was erected by Subramanian (1977) to separate from the genus *Torula* the species *T. fasciculata* since characterized by a general structures of the specimen, like the conidia shape frequently disarticulating in a single cell, disposed in erect columns in *Torula* and more irregular in *Matsushimaea*. At microscopic observation the development of the conidial chains appears clearly acropetal even if, at the moment, any information on this important characters is reported in the examined references.

*Matsushimaea fasciculata* (T. Matsushima) Subramanian, 1977.

Synonym: *Torula fasciculata* Matsushima, 1975.

*Effusa, hyphis aeriis sparsis, olivacea, Hyphae vegetativae ramosae, septatae, 1.5-4.0 µm latae, laeves, pallide brunneae. Conidiophora deficientia. Conidia sessilia in hyphis vegetativis repentibus, aequaliter dispersa, solitaria vel aggregata, obconica ad cupulata 30-45 µm alta, ex cellula basali et ramis torulosis basi multo ramis persistentibus constantia; rami cylindrici, septati, ad septa constricti, pallide brunnei, laeves; quaque cellula doliiformis, 3.5-6.0 in diam., 3.0-5.5 µm longa. Conidia ad maturitatem intacta, sicca, olivacea in massa.*

Colonies effuse, olivaceous-gray. Conidiophores absent or micronematous. Conidia originating from superficial hyphae, in columns of 10-12 spherical cells clear brown, smooth and disposed in acropetal chains, up to 28-32 µm long and up to 4 µm wide, frequently diverging irregularly.

Type species: *Matsushimaea fasciculata* (T. Matsushima) Subramanian, 1977.

On dead leaves of *Pistacia lentiscus* L. Bosco Isola. South East Italy.

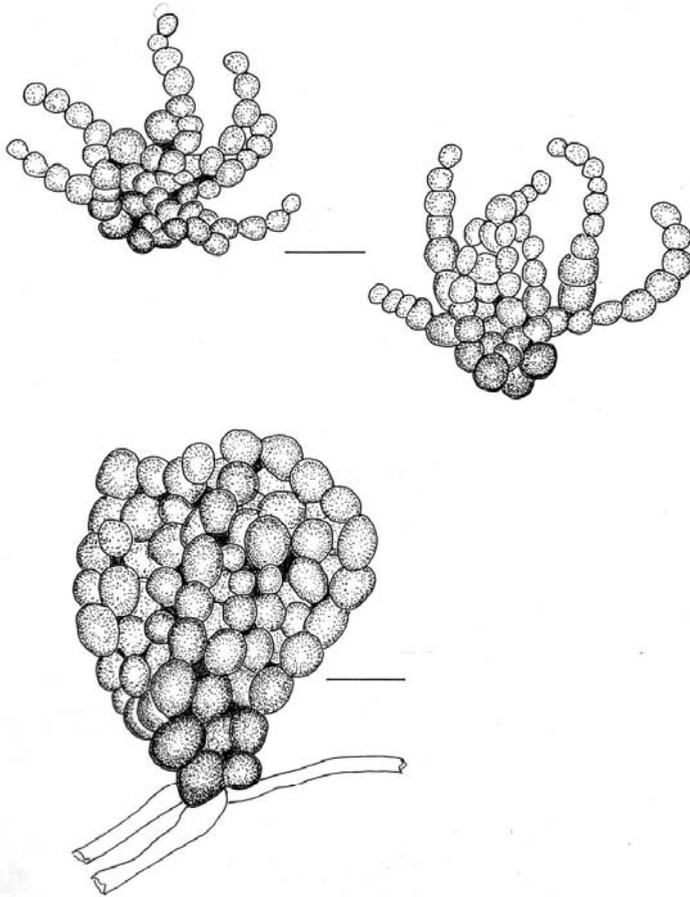


Fig. 80. *Matsushimaea fasciculata*. Up, bar 15  $\mu\text{m}$ ; down, bar 20  $\mu\text{m}$ .

## TORULA

(Persoon 1794, Ann. Bot. 15: 25)

As general morphology the genus *Torula* is very closed to *Matsushimaea* even if some characters, like the conidiogenous cells and the shape of the conidia columns are different in the two genera. Nevertheless the most important character of the genus is the acropetal conidial development. The genus was erected by Persoon (1794) on the type species *T. monilis* than transported to *Monilia* as *M. herbarum* (1801). In 1809 Link proposed the new combination *Torula herbarum* (Pers.) Link.

***Torula*** Pers., 1794 (fide Saccardo, 1886).

*Hyphae steriles decumbentes; fertiles breves vel brevissime v. a conidiis vix diversae. Conidia in catenas digesta, singulatim v. per series (Tetracolum Link) secedentia, homomorpha continua, fusca v. atra globosa, oblonga v. subfusoides. - Genus in posterum accuratius revisendum et forte dividendum. Adsunt species conidiis globosis asperi (Trachytora Sacc.) et aliae conidiis subcuboideis, quae a typo desciscunt. Hae postremae, ubi conidiis satis inter se cohaerentibus utantur, vix differunt a genere Hormiscio, cui accedit Gyroceras.*

***Torula*** Persoon 1794 (fide Ellis, 1971)

Type species: *Torula herbarum* (Pers.) Link ex S.F. Gray.

Colonies usually effuse but sometimes small and discrete, olive, brown, dark blackish brown or black, often velvet. Mycelium superficial and immersed. Stroma none, Setae and hyphopodia absent. Conidiophores micronematous or semi-macronematous, unbranched or irregularly branched, straight or flexuous, subhyaline to mid brown, smooth or verruculose. Conidiogenous cells polyblastic or sometimes monoblastic, integrated and terminal, or more commonly discrete, determinate, usually spherical, sometimes becoming cupulate, smooth, verruculose or echinulate, distal fertile part thin-walled, sometimes collapsing, proximal sterile part dark brown or reddish brown, thick walled. Conidia dry, in simple or branched chains arising from the surface of the upper half of the very characteristic conidiogenous cells, cylindrical with rounded ends, ellipsoidal or subspherical, brown or olivaceous brown, smooth, verruculose or echinulate, with 0-1 or several transverse septa, usually strongly constricted at the septa. The terminal cell of a multiseptate conidium is frequently a conidiogenous cell.

Saccardo in *Sylloge Fungorum* (1886) reports the Link diagnosis of the type species *T. herbarum*:

*Caespitulis effusis, olivaceo-ochraceis, dein nigricantibus, subvelutinis; hyphis sterilibus repentibus septatis, fuliginis; fertilibus erectis brevibus mox in conidia globulosa olivaceo-nigricantia, longiuscule simpliciter v. ramoso-catenulata 6-7 µm diam. abeuntibus. Hab. in caulibus putrescentibus Rumicis, Umbelliferarum, Solani, Zeae, Rutae, Allii, Cucurbitae, Agaves, Dipteris, etc. in Germania, Italia, Gallia, Belgio, Britannia, Austria, Sibiria, Algeria, America bor., Cuba, et verisimiliter in toto orbe.*

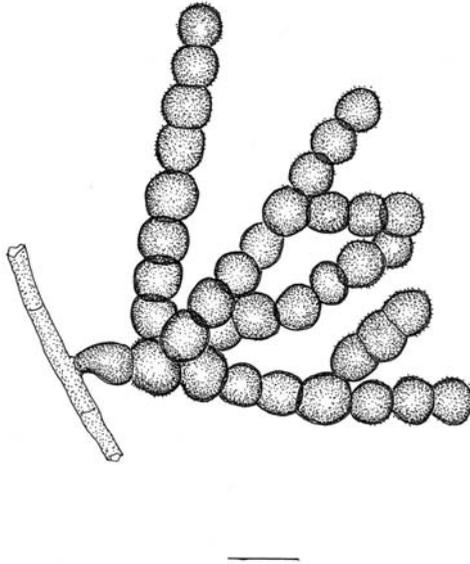


Fig. 81. *Torula herbarum*. Ampulliform conidiophore and polyblastic conidiogenous cell, conidia in acropetal chains. Bar 10  $\mu\text{m}$ .

***Torula herbarum*** (Pers.) Link ex S.F. Gray, 1821.

Colonies composed by separated specimens, tufted, olive or clear brown. Conidiophores micronematous, ampulliform. Conidiogenous cells discrete, integrated and terminal, determinate, polyblastic, cupulated or spherical, smooth. Conidia in straight acropetal chains, cylindrical, rounded at the ends, brown, olive-brown, composed by 3-8 cells constricted at the septa, slightly echinulate, 14-21 $\times$ 5-7  $\mu\text{m}$ .

On dead flowers of *Pistacia lentiscus*. Salina island, Sicilia.

## PERICONIA

(Tode ex Fries 1791, Fung. Mecklenb., 2: 2)

The genus *Periconia* was erected by Tode and validated by Fries (1791), to accommodate species characterized by macronematous conidiophores, conidiogenous cells frequently polyblastic, and conidia in basipetal chains, 0-septate and with various shapes. We hadn't the opportunity to examine the original diagnosis, anyway is interesting to note that the genus was differently examined by several authors: Fries (1825) as *Sporocybe*, Corda (1836) as *Sporodum*, Costantin (1887) as *Trichocephalum*, Kuntze (1898) as *Berkeleyna* and the type species, *Periconia lichenoides* Tode, was validated by Mérat (1801). Persoon in Synopsis Methodica Fungorum (1801) reports a short diagnosis:

***Periconia*** Tode ex Fries, 1791 (fide Persoon, 1801).

*Stipes rigidus (simplex), capitulo farinaceo sicco terminatus.* And of the type species:

***Periconia lichenoides*** Tode ex Fries, 1791.

*Capitulo globoso vesiculari, stipite capillari recto rigidiusculo.*

*Prov. aestate in caulibus plantarum e macula atra crustaeformi. Vesicula et stipes sensim pulvisculo fusco obteguntur, qui fructescentia peracta deiicitur, quo facto fungus argenti instat nitet. Capit: demum ouatum et rugosum fit. Tode.*

Saccardo (1886) reports the following diagnosis:

***Periconia*** (Tode) Bon.

*Hyphae steriles repentes, saepe obsoletae, fertiles simplices, fuscae, apice sporigero simplici v. breve ramuloso. Conidia globulosa, fusca, non catenulata. - De genere Periconia et Sporocybe etsi inter se disparatis mira apud auctores confusio, nam alii sumunt Periconiam pro Sporocybe, alii hanc pro illa, alii postremo utrumque confundunt.*

We report the extensive description of the genus by Ellis (1971).

***Periconia*** Tode ex Fries, 1791.

Colonies effuse or, in a few species, small and compact, gray, brown, olivaceous brown or black, hairy. Mycelium mostly immersed but sometimes partly superficial. Stroma frequently present, mid to dark brown, pseudoparenchymatous. Separate setae absent but in few species the apex of the conidiophore is sterile and setiform. Hyphopodia absent. Conidiophores macronematous and sometimes also micronematous, monone-matous. Macronematous conidiophores mostly with a stipe and spherical head, looking like round-headed pins, branches present or absent, stipe straight or flexuous, in one species torsive, pale to dark brown, often appearing black and shining by reflected light, smooth or rarely verrucose; sometimes the apex is sterile and setiform. Conidiogenous cells monoblastic or polyblastic, discrete on stipe and branches, determinate, ellipsoidal, spherical or subspherical. Conidia catenate, chains often branched, arising at one or more points on the curved surface of the conidiogenous cell, simple, usually spherical or subspherical, occasionally ellipsoidal, oblong or broadly cylindrical, pale to dark brown, verruculose or echinulate, 0-septate.

Type species: *Periconia lichenoides* Tode, 1791.

***Periconia digitata*** (Cooke) Sacc., 1886

Type species: *Periconia lichenoides* Tode, 1791.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macrone-matous, monone-matous, frequently branched at the apex, straight, or gently flexuous, dark brown, smooth, septate, 560-670×14 µm near the base. Conidiogenous cells monoblastic, discrete, determinate, subspherical. Conidia in basipetal chains, simple, spherical, brown, dark brown, at the apex of the conidial chain slightly verruculose, 0-septate, 7-8×7 µm. On dead leaves of *Arundo donax* L. Bosco Isola, South East Italy.

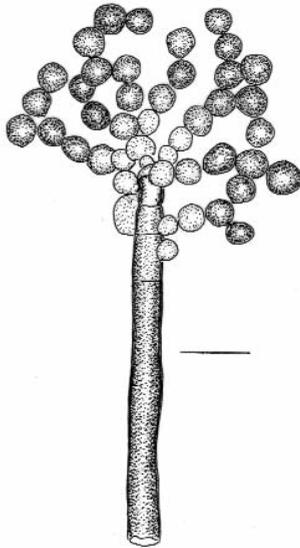


Fig. 82. *Periconia digitata*. Conidiophore and conidia in basipetal chains. Bar 20  $\mu\text{m}$ .

### DENDRYPHION

(Wallroth 1833, Fl. Crypt. Germ., 2: 300)

The genus *Dendryphion* was established by Wallroth (1833) on the type species *D. comosum* Wallr. even if the Author interpreted differently the specimens as *Entomyclium* (1833) to be considered a synonym. Some years later Corda (1838) included his specimens in the genus *Brachycladium* again to be considered as synonym. The genus *Dendryphion* is characterized by conidiophores macronematous, frequently branched, conidiogenous cells and conidiogenous loci with large and black scars and by conidia of very different forms and dimensions. The original diagnosis of the genus is here reported.

***Dendryphion*** Wallr. 1833.

*Hyphae erectae solidae continuae opacae rigidulae simplicissimae, apice sporidiorum sphaericorum catenulas liueares continuas (facile tamen secedentes), in capitulum laxum penicillatum congestas exserens.*

Type species: *Dendryphion comosum* Wallroth, 1833.

The extension Ellis diagnosis is here reported.

***Dendryphion*** Wallroth, 1833.

*Entomyclium* Wallroth, 1833; *Brachycladium* Corda, 1838.

Colonies effuse, dark grey, olive, reddish brown or black, hairy or velvety. Mycelium

immersed, Stroma when present immersed or partly superficial. Setae and hyphopodia absent. Conidiophores macronematous, usually branched at the apex forming a stipe and head; stipe straight or flexuous, usually stout, erect, brown to black, smooth or with the upper part verruculose; branches usually paler, smooth or verruculose. Conidiogenous cells monotretic or polytretic, usually integrated, terminal and intercalary on branches, occasionally discrete, sympodial, clavate, cylindrical or doliiform, cicatrized; scars usually large and dark. Conidia catenate or solitary, dry, acropetrogenous, simple or branched, cylindrical with rounded ends or obclavate, sometimes cheiroid, pale to mid brown or olivaceous brown, multiseptate, smooth or verrucose.

Type species: *Dendryphion comosum* Wallroth, 1833.

***Dendryphion comosum* Wallr., 1833.**

Type species: *Dendryphion comosum* Wallr., 1833.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macrone-matous, mononematous, erect, straight, brown, clearer towards the apex, smooth, 270-330×14-16 µm, repeatedly branched at the apex, branches mid brown, smooth, 13×8 µm. Conidiogenous cells polyblastic, sympodial, cicatrized, clear brown. Conidia composed by 3-5 cells constricted at the septa, cylindrical, rounded at the apices, in acropetal chains, clear brown, verruculose, 14-20×6 µm.

On dead leaves of *Phillyrea latifolia* L. Montagna Grande, Pantelleria.

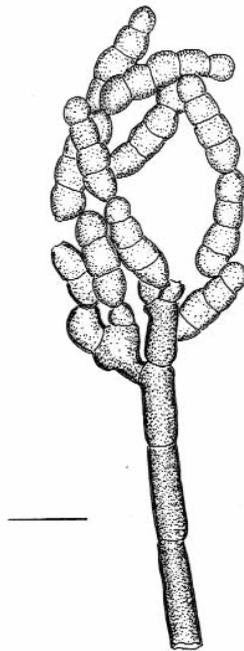


Fig. 83. *Dendryphion comosum*. Conidia composed by 4 or 5 cells in acropetal chains. Bar 16 µm.

**BIPOLARIS**(Shoemaker 1959, *Bipolaris*, *Canad. J. Bot.* 1959)

The genus *Bipolaris* was erected by Shoemaker (1959) to separate the species previously included in the genus *Helmisporium* Link characterized by conidia fusoid, septate, germinating by one germ tube from each ends. The genus is not accepted by Ellis (1971) that includes several species into the genus *Drechslera* Ito (1930). The original diagnosis of the genus according to Shoemaker is here reported.

***Bipolaris*** Shoemaker, 1959.

*Fungi imperfecti hyphomycetes, parasitici.*

*Conidiophori brunnei, septati, geniculati, in apice perforati. Conidia acrogena, phaeophragmospora, fusoides, recta vel paulum curvata, per ambas extremas germinantis; exosporium laeve, brunneum, firmum; endosporium hyalinum, et amorphum.*

= *Helmisporium* Link ex S.F. Gray, subgenus *Eu-Helmisporium* Nisikado.

Conidiophores brown, producing conidia through an apical pore and forming a new apex by growth of the subterminal region. Conidia fusoid, straight or curved, germinating by

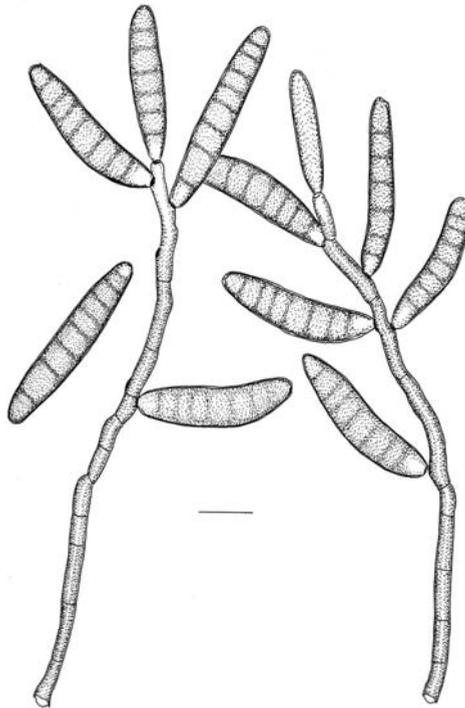


Fig. 84. *Bipolaris sacchari*. Conidiophores and conidia. Bar 18  $\mu$ m.

one germ tube from each end; exosporium smooth, rigid, brown; endosporium hyaline, amorphous, separating cells of mature phragmospores.

Parasitic chiefly on Gramineae.

Perfect state, where known, in *Cochliobolus* Drechs.

Lectotype species: *Bipolaris maydis* (Nisikado) Shoemaker

Synonym: *Helmisporium maydis* Nisikado, 1926.

We report the description of the strain found at Pantelleria island.

***Bipolaris sacchari*** (E.J. Butler) Shoemaker. 1959.

Basionym: *Helminthosporium sacchari* E.J. Butler

Colonies not crowded, composed by solitary conidiophores. Conidiophores macronematous, mononematous, solitary, brown, paler towards the apex, septate, smooth, up to 180  $\mu\text{m}$  long, conidiogenous cell included and 5-6  $\mu\text{m}$  wide. Conidiogenous cells sympodially proliferating, smooth, septate, clear brown. Conidia gently curved, ellipsoidal, without protuberant hilum 3-4  $\mu\text{m}$  wide, golden brown, 6-8 distoseptate, 38-60 $\times$ 12-14  $\mu\text{m}$ .

On dead leaves of *Smilax aspera*. Montagna Grande, Pantelleria.

*Material examined*: Isotype ROHB 493 on dead leaves of *Orchid* 2819 D.B. collected in Costa Rica; isotype ROHB 494, 498 on dead leaves of *Clusia* sp. collected at Lankester Botanical Garden, Cartago, Costa Rica.

## CURVULARIA

(Boedijn 1933, Bull. Jard. Bot. Buitenz. III, 13: 1)

The genus *Curvularia* was established by Boedijn (1933) to include species characterized by sympodial-cicatrized conidiogenous cells, conidia acropleurogenous, often curved and distoseptate.

***Curvularia*** Boedijn, 1933.

*Mycelium ramosum, septatum, subhyalinum vel brunneum; conidiophoris brunneis, filiformibus, simplicibus, septatis, conidiis acrogenis, verticillatis, vel spiraliter nascentibus, olivaceis vel brunneis, ellipsoideis vel cylindraceutis, inaequalibus, curvatis vel geniculatis (raro rectis) 3- vel 4-septatis, loculo tertio vel proximo et tertio ab ultimo quam aliis distincte majori et obscuriori, oculis terminalibus subhyalinis, germinatio bipolaris.*

Type species: *Curvularia lunata* (Wakker) Boedijn, 1933.

An extensive description of the genus is reported by Sivanesan (1987).

Mycelium brown, grey or black, hairy, cottony or velvety. Conidiophores straight to flexuous, multiseptate, usually simple, sometimes branched, smooth to verruculose, macrone-matous, mononematous, often geniculate, sometimes nodose, cylindrical. Conidiogenous cells cylindrical, integrated, terminal and intercalary, proliferating sympodially, cicatrized. Conidia solitary, often curved, acropleurogenous, often fusoid, elliptical, obovoid or obpyriform, mostly smooth, sometimes verruculose, echinulate, or tuberculate, 3 or more

distoseptate, with or without a disproportionately swollen cell which is more pigmented than the other cells, septa sometimes accentuated with a dark band in some or all the cells, germinating principally from one or both polar cells with the basal germ tube growing semi-axially, hilum in a slightly protruding truncate basal section of the conidial wall and often visible as two dark lenticular spots in optical section arranged close together with a small obscure narrow separating canal between them or distinctly protuberant, first conidial septum median or submedian, second septum often delimiting the basal cell of the mature conidium, third septum then distal, conidiogenous nodes smooth to verrucose.

Type species: *Curvularia lunata* (Wakker) Boedijn, 1933.

***Curvularia clavata*** B.L. Jain, (1962).

Conidiophores macronematous, mononematous, singly, straight, apically flexuous, brown, septate, smooth. Conidiogenous cells clear brown, sympodial, septate, smooth, not nodose, cicatrized. Conidia clavate, acropleurogenous, gently curved, 3 septate, brown with basal cell clear brown, smooth, hilum slightly protuberant, 21-31×12-14 µm.

On dead leaves of *Chamaerops humilis*. Torre del Sevo, Central West Sardinia, Italy.

Type species: *Curvularia lunata* (Wakker) Boedijn, teleomorph: *Cochliobolus lunatus* Nelson & Haasis.

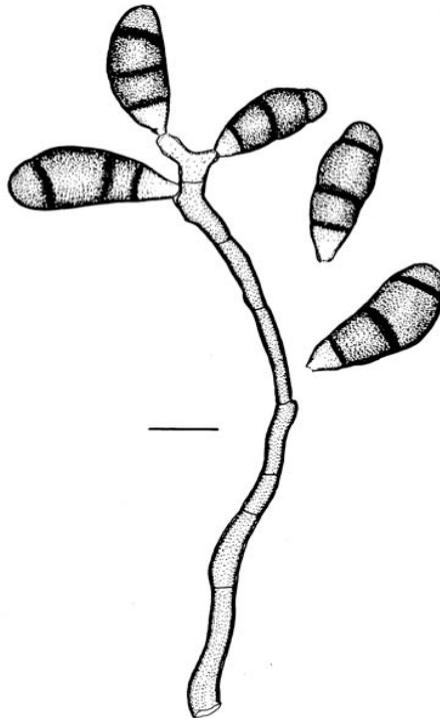


Fig. 85. *Curvularia clavata*. Conidiophores and conidia, Bar 12 µm. From: Rambelli & Ciccarone (2008).

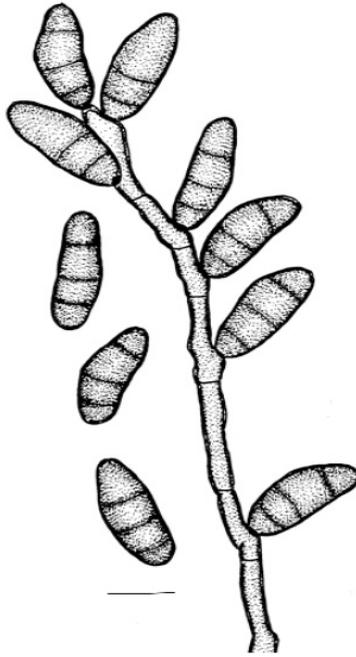


Fig. 86. *Curvularia pallescens*. Conidiophores and conidia. From Rambelli & Ciccarone (2008). Bar 15  $\mu\text{m}$ .

***Curvularia pallescens*** Boedijn, (1933).

Type species: *Curvularia lunata* (Wakker) Boedijn, teleomorph: *Cochliobolus lunatus* Nelson & Haasis.

Conidiophores macronematous, mononematous, solitary, irregularly flexuous, clear brown, smooth, up to 500  $\mu\text{m}$  long. Conidiogenous cells integrated, sympodial, cicatrized, septate, clear brown. Conidia solitary, acropleurogenous, irregularly ellipsoidal and slightly curved, frequently corniform, 3, rarely 4 septate, clear brown, hilum not protuberant, 23-32 $\times$ 12-13  $\mu\text{m}$ .

On dead leaves of *Phillyrea angustifolia*, Central West Sardinia, Italy.

**IDRIELLA**

(Nelson & Wilhelm 1956, *Mycologia*, 48: 547)

The genus *Idriella* was erected by Nelson & Wilhelm (1956) for specimens characterized by conidiogenous cells polyblastic, terminal, sympodial, with conical and short denticles. The original diagnosis of the genus is here reported.

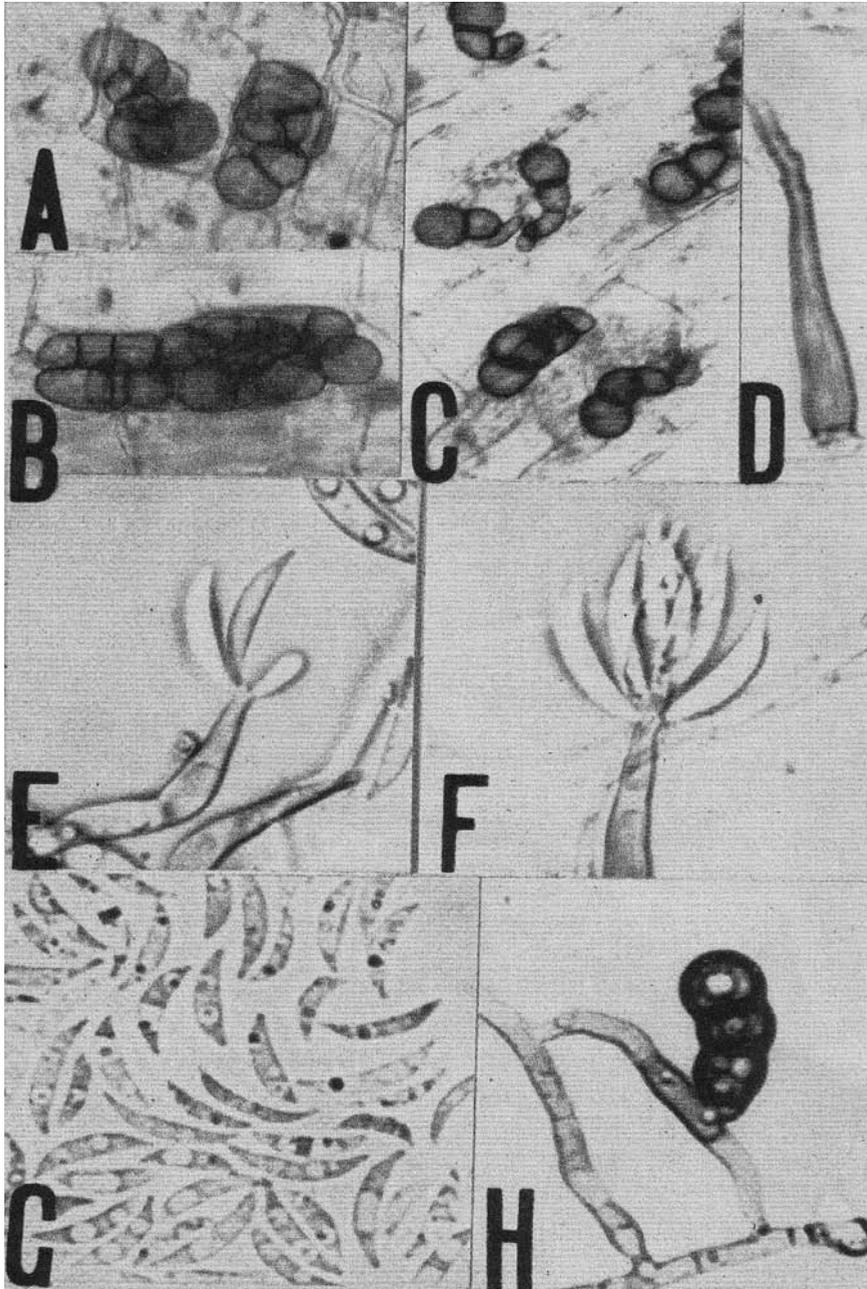


Fig. 87. In this figure the photographic documentation of the type species *Idriella lunata* from the work of Nelson & Wilhelm (1956) published on *Mycologia* (48: 547-551). "A-C. Chlamydospore masses formed in the outer cortical tissues of strawberry roots. Two different isolates of the fungus are represented,  $\times 500$ . D. Mature conidiophore showing conidial scars and geniculate tip,  $\times 1500$ . G. Mature conidia,  $\times 1500$ . H. Chlamydospore mass developing in culture,  $\times 1250$ ".

***Idriella*** Nelson & Wilhelm, 1956.

*Hyphis hyalinis vel brunneis. Conidiophoris brunneis, simplicibus, non-septatis, non-numquam 13-33  $\mu\text{m}$  longis sed plerumque 16-26  $\mu\text{m}$ , ad basim 3-5  $\mu\text{m}$  crassis, bullatis, sursum attenuatis, geniculatis, conidia in capitibus siccis ferentibus. Conidiis lunatis vel falcatis, hyalinis, cum verticibus acuminatis. Chlamydo sporis brunneofuscis, unicellularibus vel pluricellularibus, sessilibus vel stipitatis, hypharum lateribus natis.*

*Hab. in radicibus vivis Fragariae chilensis Duchesne var. ananassae*

*Type species: Idriella lunata* Nelson & Wilhelm, 1956.

***Idriella*** sp.

Type species: *Idriella lunata* Nelson & Wilhelm, 1956.

Colonies effuse, composed by very crowded conidiophores of different size and appearing white for an abundant production of conidia at the apex of the conidiophores and at the base. Conidiophores of two types macronematous and micronematous, acroauxic, the former brown, dark brown, with 2 or 3 annellations, clearer at the apex after one annellation immediately under the conidiogenous cell, repeatedly branched, 120-240 $\times$ 4-5  $\mu\text{m}$ . The

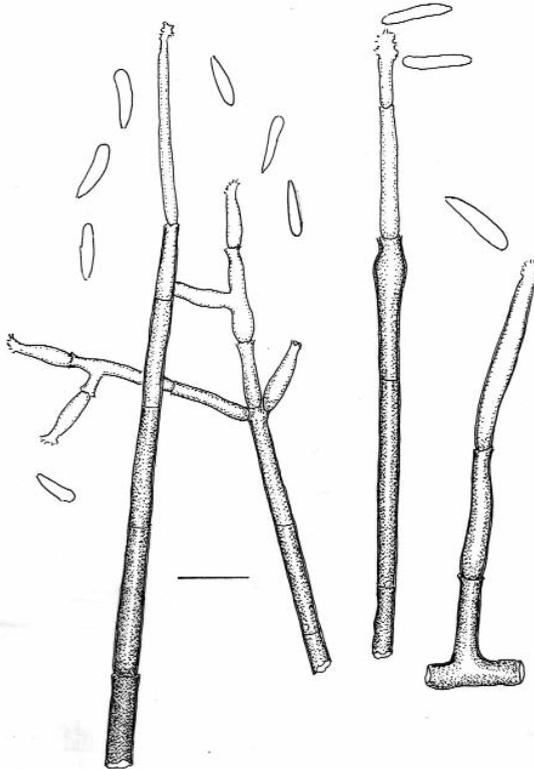


Fig. 88. *Idriella* sp. Conidiophores of different morphology. Bar 8  $\mu\text{m}$ .

second type is represented by smaller conidiophores without branches, with 1 or 2 annellations, they are brown, clear brown, smooth, septate, up to  $40 \times 2 \mu\text{m}$ . A third side of conidial production is carried out by micronematous conidiophores producing short conidiogenous cells from the superficial hyphae on the natural substratum. This abundant production of conidia gives rise to a white and continue layer of conidia just at the base of the two mentioned conidiophores. Conidiogenous cells originating after the highest annellation, clear brown, smooth, sympodially denticulated,  $11\text{-}27 \times 2 \mu\text{m}$  and denticulated part  $5\text{-}9 \times 1.8 \mu\text{m}$ . Conidia acrogenous, solitary, clavate, gently falcate, rounded at the apex and pointed at the base, hyaline, smooth, 0-septate, remaining at the apex of the different levels of conidiogenous cells and forming a white layer at the base,  $7\text{-}9 \times 1.8 \mu\text{m}$ . On dead leaves of *Pinus domestica*. Bosco Isola, South East Italy.

The species described presents a conidial production from very different conidiophores inconstant and variable in the morphological characters and dimensions. The inclusion in the genus *Idriella* seems the most convenient for the apical, sympodial, denticulated conidiogenous cells, even if the percurrent elongation of the conidiophores and the production of a clearer conidiogenous cells immediately after the most apical annellation seems more characteristic of *Pleurotheciopsis* that however does not include species with branched conidiophores.

Nevertheless, we consider “pro tempore” the inclusion of this specimens into the genus *Idriella*, we hope to find more material and to have the opportunity to reconsider its taxonomic position.

### POLYSCYTALUM

(Riess 1853, Bot. Ztg., 11: 138)

The genus *Polyscytalum* was established by Riess (1833) for species with conidiogenous cells polyblastic, integrated and terminal on stipe and branches and with conidia in acropetal chains but easily fragmenting. The diagnosis of the genus is here reported, and an extensive description is given by Ellis (1971).

***Polyscytalum*** Riess, 1853 (fide Saccardo, 1886).

*Hyphae parce ramulosae, hyalinae v. fimosae. Conidia bacillaria, utrinque truncata concatenata.*

Colonies white or greenish when sporulating freely. Mycelium immersed. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, unbranched or irregularly branched, usually straight, sometimes slightly flexuous, often swollen at the base, rather pale brown or olivaceous brown, smooth. Conidiogenous cells polyblastic, integrated, terminal on stipe and branches or sometimes discrete, determinate, cylindrical, often denticulate; denticles short, cylindrical. Conidia catenate, dry, chains acropetal, usually branched, fragmenting readily, developing at the apices of stipe and branches usually on 2-3 short pegs, cylindrical at the ends or fusiform, hyaline or pale brown, smooth, 0-1-septate.

Type species: *Polyscytalum fecundissimum* Riess, 1853.

We have found a strain of *P. fecundissimum* at Pantelleria island.

***Polyscytalum fecundissimum*** Riess, Bot. Ztg., 1853 (3).

Type species: *Polyscytalum fecundissimum* Riess, 1853.

Colonies very clear brown, composed by very crowded conidiophores. Conidiophores macronematous, mononematous, apically repeatedly branched, straight or gently flexuous, brown at the base and clearer at the apices, 66-110×4-6 μm conidiogenous cell included. Conidiogenous cells polyblastic, integrated, terminal on branches of two or three level, rarely on conidiophores, determinate, with short and pretty wide pegs. Branches of first level can produce conidia as the branches of second and successive levels. Conidia in acropetal and very long chains, fragmenting and developing on short pegs, cylindrical, with rounded apices, hyaline, smooth, sometimes 1- septate, 13-23×3 μm.

On dead leaves of *Pistacia lentiscus*. Montagna Grande, Pantelleria.

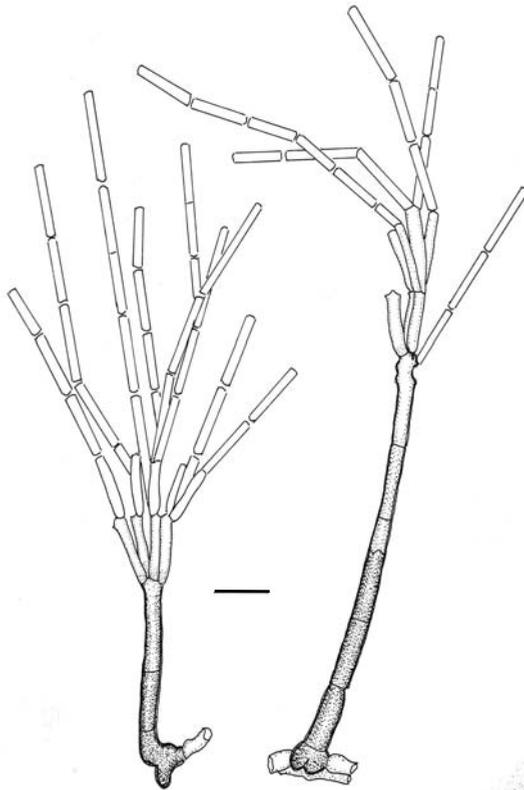


Fig. 89. *Polyscytalum fecundissimum* Riess, conidiophores with acropetal chains of conidia. Bar 14 μm.

Sutton & Hodges (1977) described *P. truncatum* from *Eucalyptus* litter as differing from *P. fecundissimum* by terminal or intercalare, determinate conidiogenous cells on the conidiophores main axis and more frequently discrete arranged on the first branches of the conidiophores. *P. fecundissimum* and our strain are characterized by very long conidial chains and originating from conidiogenous cells on branches of different level and not discrete and, in our strain, very rarely integrated on conidiophores.

### XYLOHYPHA

(Mason 1960, Mycol. Pap., 78: 43.)

The genus *Xylohypha* was erected by Mason (1960) to include microfungi with colonies tufted, conidiophores micronematous not easily observable and long acropetal chains of conidia.

*Xylohypha* (Fr.) Mason, 1960.

*Mycelium immersum*. *Conidiophora simplicia, septata, brunnea, in pustulas aggregata, interdum parum ex conidiis distincta. Conidia ellipsoidea vel subcylindrica, levia, continua, brunnea, hilo gemino carentia, ex apice conidiophori oriunda, in catenulas simplices vel plerunque ramosas producta, plus minusve facile secedentia.*

*Sp. typ. Xylohypha nigrescens* (Pers. ex Fr.) Mason.

According to Mason:

Mycelium immersed. Conidiophores simple, septate, brown, densely aggregated in small pustules, the upper cells sometimes hardly distinct from the conidia. Conidia ellipsoid or subcylindric, smooth, continuous, brown, formed in acropetal succession in single or usually branched chain from the apex of the conidiophore, more or less readily caducous. The conidia do not possess a true hilum, but separate by fracture at the septum. The 1-celled conidia distinguish *Xylohypha* from *Bispora* Corda and *Septonema* Corda.

*Xylohypha ferruginosa* (Corda) Hughes, 1960.

Type species: *Xylohypha nigrescens* (Pers. ex Fr.) Mason, 1960.

Colonies composed by solitary tufts of long chains of conidia. Conidiophores micronematous, caespitose, arising from the superficial mycelium, straight, brown, red-brown, smooth, very difficult to distinguish from the conidial chains. Conidia in acropetal chains composed by 50-60 and more individuals, chains erect, rarely slightly flexuous and branched; conidia fusiform, suboval, smooth, brown, red-brown, with trunked ends, 0-septate, not easily disarticulating, rarely one by one, frequently in fragmented chains of 15-30 individuals, 5-8×4 μm, 1.2-1.8 μm at the trunked ends.

On dead leaves of *Pistacia lentiscus*. Santa Teresa, Pantelleria.

The species described well coincide with *X. ferruginosa* (Corda) Hughes, mainly by the red-brown colour of conidiophores and conidia, for the very short conidiophores and the conidia dimensions. Differs from *X. nigrescens* characterized by long conidiophores and conidia, from *X. lignicola* with verrucose conidiophores and globose conidia, from *X. pinicola* forming powdery and effuse colonies, from *X. bowdichiae* with conidia generally globose and with germ slits.

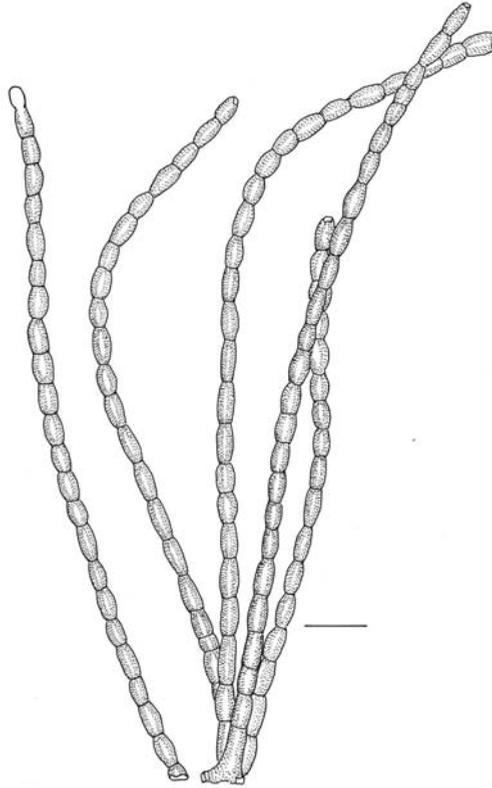


Fig. 90. *Xylohypha ferruginosa* (Corda) Hughes. Acropetal chains of conidia. Bar 9  $\mu$ m.

### TRIPOSPORIUM

(Corda 1837, *Icones Fungorum*, 1: 16)

The genus *Triposporium* was erected by Corda (1837) on the type species *T. elegans* Corda; it is characterized by conidiophores erect, macronematous, unbranched, generally dark brown, conidiogenous cells percurrent and conidia composed by 2 or 3 septate branches.

***Triposporium*** Corda, 1837.

*Locci erecti septati, hypothallo repente suffulti; sporis pedicellatis, primum hypothallo innatis, dein liberis, stellatis, bi-tri-vel quadripartitis; particulis oblongis, acuminatis, septatis, basi pedicello innatis, et inter se connatis.*

Type species: *Triposporium elegans* Corda. 1837.

The characters of our strain are here reported.

***Triposporium elegans* Corda, 1837.**

Colonies not crowded, composed by isolated conidiophores. Conidiophores macronematous, mononematous, erect, scattered, unbranched, very dark brown, smooth,  $198\text{--}235 \times 5\text{--}9\ \mu\text{m}$ . Conidiogenous cells monoblastic, integrated, terminal, percurrent. Conidia solitary, dry, acrogenous, 2 or 3 times branched, branches composed by conical 3-4 septate arms joined by a rounded base, arms  $22\text{--}38 \times 9\text{--}11\ \mu\text{m}$ , dark brown at the base and clearer towards the apices; conidial base cylindrical, doliiform, clear brown,  $7\text{--}13 \times 5\text{--}7\ \mu\text{m}$ .

Type species: *Triposporium elegans* Corda, 1837.

On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

The species described presents morphological characters closed to *T. elegans* even if some differences are concerning the number of cells composing the arms, the dimensions of the conidiophore and the percurrent proliferation of the conidiogenous cell not observable in our strain because very dark pigmented (cf. Hughes, 1951; Ellis, 1971; Matsushima, 1985). It differs from *T. boydii* Smith & Ramsbottom (1915) and *T. leder-*

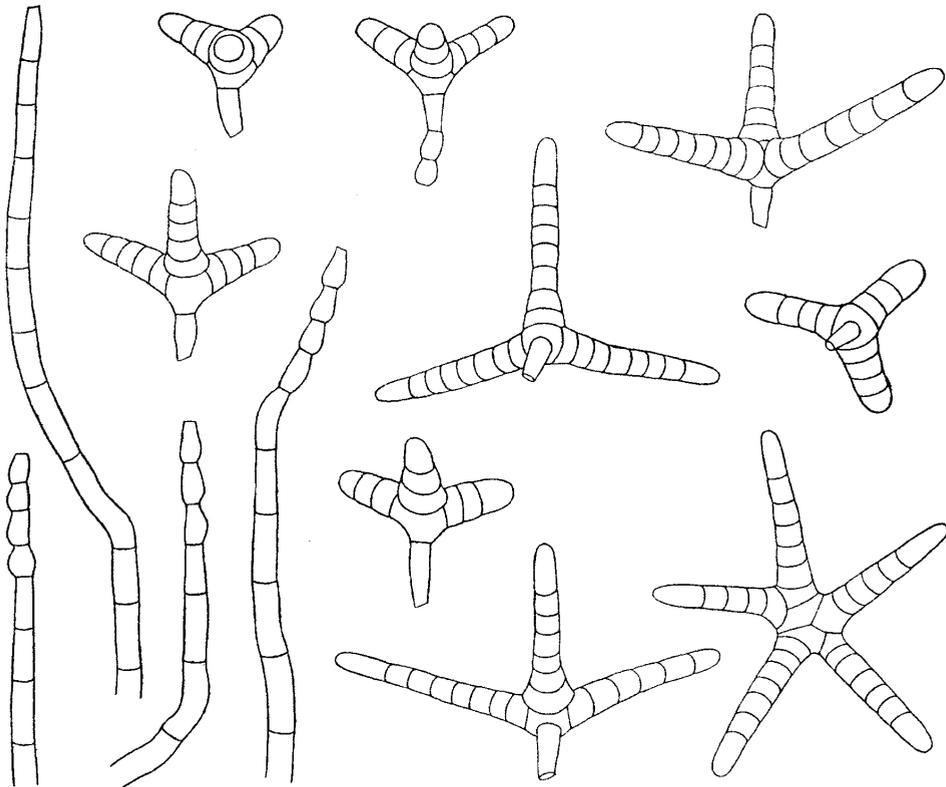


Fig. 91. *Triposporium elegans* in a drawing of Hughes (1951).

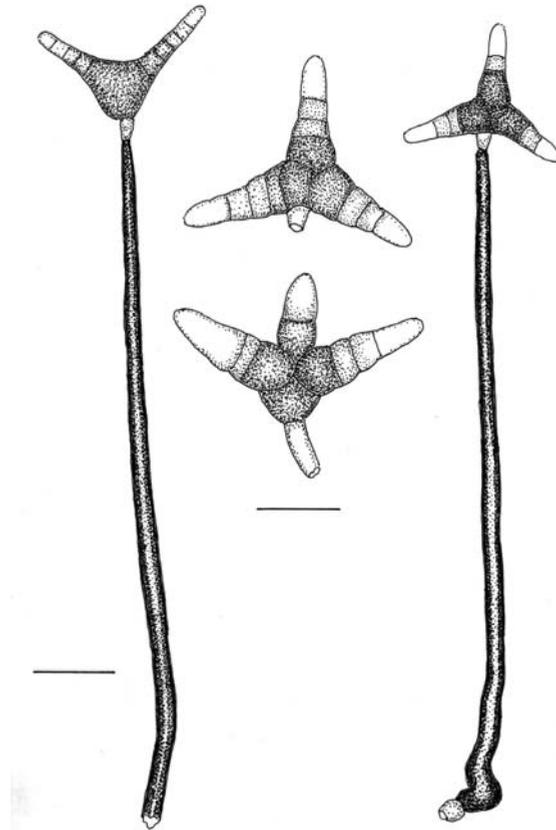


Fig. 92. *Triposporium elegans* Corda. Conidiophores and conidia. Left bar 30  $\mu\text{m}$ , central bar 20  $\mu\text{m}$ .

*mannii* Hansford (1955) species with short conidiophores, from *T. verruculosum* Castaneda, Gené & Guarro (1996) that has verrucose conidia; we haven't examined the exiccata of *T. psidii* Hasija (1967), this species is reported with conidiophores and conidia dimensions and pigmentations very similar to *T. elegans* of which it could be a synonym. *T. batistae* is characterized by small conidia and, on the contrary, *T. lambdaseptatum* by conidia with long arms.

*Material examined:* *Triposporium elegans* on dead leaves of *Quercus ilex* collected at Torre del Sevo, Sardinia, Italy.

**CHALARA**

(Corda 1838, Rabenhorst 1844, Deutschl. Krypt. Flora, 1: 38)

The genus *Chalara* was erected by Corda (1838) and validated by Rabenhorst (1844) to include species with monophialidic conidiogenous cells and conidia endogenous as most important characters.

***Chalara*** (Corda) Rabenhorst, 1844 (fide Saccardo, 1886).

*Hyphae steriles nullae v. obsoletae, fertiles simplices, breves, rectae, fuscae subinde ampulliformes, conidia hyalina, cylindrica, utrinque truncata, catenulata.*

Type species: *Chalara fusidioides* (Corda) Rabenhorst, 1844.

Conidiophores macronematous, sometimes micronematous, mononematous, scattered or caespitose, straight or slightly flexuous, simple, rarely branched, hyaline, subhyaline, brown, smooth or verrucose. Conidiogenous cells monophialidic, integrated, terminal, determinate,

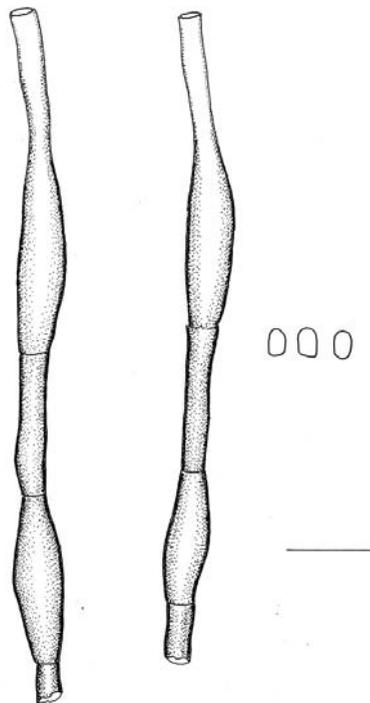


Fig. 93. *Chalara brevispora*. Conidiogenous cells monophialidic, occasionally percurrent. Bar 10  $\mu$ m.

occasionally percurrent, composed of a well-differentiated venter and usually a long neck. Conidia solitary or catenate, endogenous, cylindrical, or oblong with rounded or truncate ends, 0-3-septate, colourless, sometimes brown, smooth or with verruculose ends.

Type species: *Chalara fusidioides* (Corda) Rabenhorst, 1844.

On Mediterranean maquis litter we have found *Chalara brevispora*, *C. aurea* and *C. microspora*.

***Chalara brevispora*** Nag Raj & Kendrick, 1975.

Conidiophores macronematous, mononematous, erect, straight or variously bent, simple, cylindrical, brown, smooth or slightly verrucose, 41-145×3-5 µm. Conidiogenous cells monophialidic, integrated, terminal, sometimes percurrent, obclavate to lageniform, pale brown, smooth, venter 19-45×3.5-6 µm, neck cylindrical 9-20×2-3 µm. Conidia frequently catenate, endogenous, cylindrical with rounded or blunt ends, 0-septate, colourless, smooth, 2-4×1.5-2 µm.

On dead leaves of *Myrtus communis*. Torre del Sevo. Central West Sardinia, Italy.

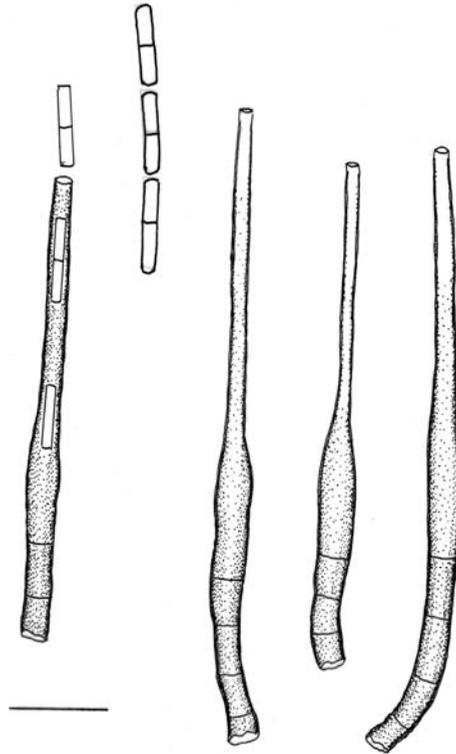


Fig. 94. *Chalara aurea*. Conidiogenous cells monophialidic and catenate conidia. Bar 20 µm.

***Chalara aurea*** (Corda) S.Hughes, 1958.

Colonies composed by very crowded conidiophores completely covered by an abundant conidia production disposed in long chains and forming a white superficial layer. Conidiophores macronematous, mononematous, erect or slightly flexuous, unbranched, golden brown, smooth,  $33-97 \times 3.5-7.5 \mu\text{m}$ . Conidiogenous cells monophialidic, integrated, terminal, rarely percurrent, lageniform with a long cylindrical neck,  $29-76 \times 3.5-8.3 \mu\text{m}$  at the swollen base ( $2-4 \mu\text{m}$  at the neck). Conidia endogenous, catenate, cylindrical with rounded apex and truncate base, 1-septate rarely 0-septate, colourless, smooth,  $8-19 \times 2-2.5 \mu\text{m}$ .

Synonym: *Cylindrocephalum aureum* (Corda) Bonord., 1851.

On dead leaves of *Quercus ilex*. Central West Sardinia, Italy.

***Chalara microspora*** (Corda) Hughes, 1958.

Colonies composed by isolated conidiophores. Conidiophores macronematous, often micronematous, scattered to caespitose, unbranched, pale brown, moderately constricted at the septa, smooth,  $19-51 \times 2.5-6.5 \mu\text{m}$ . Conidiogenous cells monophialidic, integrated, terminal, rarely percurrent, obclavate to lageniform,  $18-36 \times 2.5-6.5 \mu\text{m}$  ( $1-2.5 \mu\text{m}$  at the neck). Conidia endogenous, in long chains, cylindrical, 0-septate, hyaline, smooth,  $3-8.5 \times 1-1.5 \mu\text{m}$ .

Synonym: *Cylindrium clandestinum* var. *microsporum* (Corda) Sacc., 1886.

On dead leaves of *Myrtus communis*. Central West Sardinia, Italy.

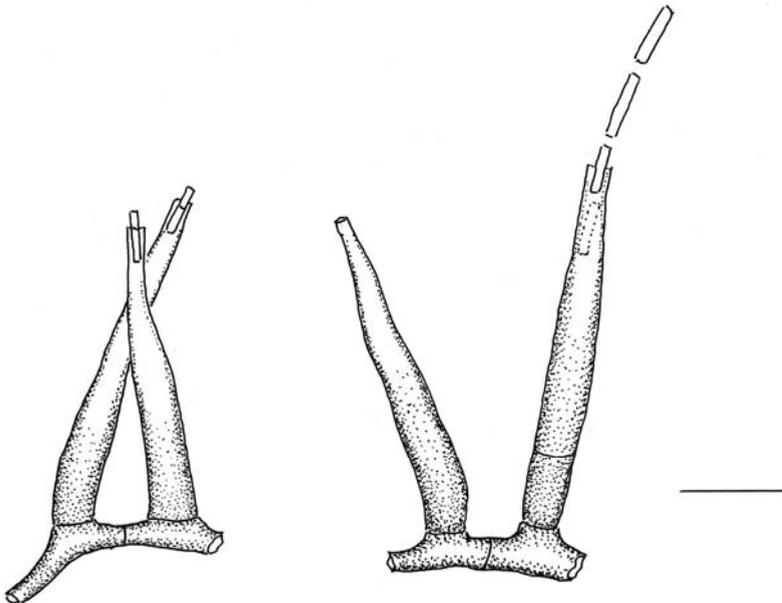


Fig. 95. *Chalara microspora*. Conidiophores, conidiogenous cells monophialidic and conidia. Bar 10  $\mu\text{m}$ .

## DICTYochaeta

(Spegazzini 1923, Physis., B. Aires 7:7)

The genus *Dictyochaeta* was erected by Spegazzini (1923) on the single species *D. fuegiana* Speg. found on dead leaves of *Notophagus betuloides* collected in Tierra del Fuego. The Spegazzini diagnosis of the genus from Arambarri & Cabello (1990) is here reported.

### *Dictyochaeta* Spegazzini (1923)

*Hyphae olivaceae repentes superficiales roectusculae reticulato-anastomosantes, septulatae pullucidae, steriles, hinc inde, ad anastomoses praecipue, setulis erectis rectis atris subopacis simplicibus armatae; hyphae fertiles circa bases setularum exsurgentes, breviusculae graciles simplices pallidae septulatae, articulo supremo parum crassiore, conidia linearia acuta continua hyalina gerentes.*

Type species: *Dictyochaeta fuegiana* Spegaz.

Unfortunately from the examination of the type material, preserved at LPS Herbarium, only poor morphological characters were observed so that the finding of new species were included in the genus *Codinaea* Maire (1937) and for many years the genus *Dictyochaeta*, according to Hughes (1968), was considered only a possible earlier name for *Codinaea*. The rediscovery and redescription of the type species *D. fuegiana* Spegazzini by Gamundi, Arambarri and Giaiotti (1977) revealed the opportunity to reconsider the species previously included in the genus *Codinaea* Maire as *Dictyochaeta* Spegaz. Previously in *Codinaea* were included species also with some different morphological characters, in any case not corresponding to Spegazzini description, like species with conidiogenous cells on branched conidiophores, conidia septate or with multisetulate apices and so on (Hughes & Kendrick, 1968). For a useful comparison the original diagnosis of the genus *Codinaea* Maire is here reported.

### *Codinaea* Maire (1937).

*Hyphae externae dimorphae; steriles longissime rectae erectae, obscure brunneae, simplices; fertiles breviores, dilute brunneae, pauciseptatae, flexuosae, apice conidia in capitulum depauperatus disposita, hyalina, apice ciliata gerentes: Ab affini Ellisiella recedit hyphis conidiferis elongatis septatis; conidiis capitulatis. A Myxotrichella differt hyphis sterilibus haud ramosis, hyphis fertilibus liberis (nec in steriles insertis) et conidiis ciliatis.*  
Type species: *Codinaea aristata* Maire.

According to Arambarri & Cabello (1990) in *Dictyochaeta* Spegazzini the conidiogenous cell is terminal with collarette, on single conidiophore accompanied by sterile setae and conidia not multisetulate. Proposals of new genera to accommodate species with characters not corresponding to Spegazzini description were carried out (Arambarri & Cabello 1990; Kuthubutheen & Nawawi 1991a, 1991b, 1991e; Kirschner & Chee-Jen Chen 2002; Reblova 2000). In any case the rearrangement of these species, with characters not corresponding to Spegazzini diagnosis, in the new genera *Dictyocheatopsis* carried out by Arambarri & Cabello (1990) is a contribution to order this complex group of *Hyphomycetes*.

Kuthubutheen & Nawawi (1991e), stressing the difficulties to accommodate all the species into the two genera *Dictyochoaeta* and *Codinaea*, considered also the eventual amendment of the former genus on the basis of Hughes & Kendrick (1968) redescription of *Codinaea*. Nevertheless they propose to divide the 69 species at that time described, in four groups on the basis of particular morphological characters of conidia, conidiophores and setae with the purpose to build a key to facilitate the species determination in case of new findings.

In any case we agree with the opinion that the group needs some more considerations, mainly for the inclusion of the new findings and we can't fail to mention that a simple amendment of the Spegazzini genus diagnosis, based on only one species, could facilitate the taxonomic comprehension of this group.

***Re-description of Codinaea* genus from Hughes & Kendrick (1968)**

Colonies are effuse, sparse or dense, composed of conidiophores alone (with or without sterile prolongations), or conidiophores mixed with setae which arise independently. In some species conidiophores and setae arise together in groups from knots of hyphal cells. Setae are present or absent, are independent structures or comprise the sterile prolongations of conidiophores; both type occur in one of the species. They are generally straight or slightly bent, lack anastomosis, and are usually thick-walled, somewhat darker and always longer than, the conidiophores. The terminal cell of the setae in many species may become modified into a phialide or polyphialide.

Phialides (polyphialides) are borne terminally and singly on simple conidiophores in the majority of species, or terminally and laterally on branched conidiophores. When the conidiophore is extended into a sterile prolongation the phialides are lateral and sessile, or terminal and lateral on divergent lateral branches. Conidiophores, their branches, and phialides are usually smooth-walled but in two species they bear numerous ragged, annular excrescences. Phialides are straight, not recurved at the apex and usually proliferate to produce a polyphialide. Collarettes are conspicuous, being funnel-shaped to cupulate and flaring, and somewhat thick-walled and often refringent toward the base. As the polyphialide proliferates, the successive fertile ends become displaced in turn to a lateral position and appears as flat or more or less denticulate scars with or without the remains of the collarettes. Elongation of the polyphialide is often accompanied by septation. In older preparations in lactic acid the distal portion of the collarette may disappear.

Phialospores are hyaline, curved, continuous, 1-septate or 3-septate, non-setulate or terminally or subterminally setulate, more or less falcate and symmetrical or asymmetrical, or botuliform, bluntly rounded or pointed at the apex, usually tapered toward the inconspicuous basal scar. They accumulate in compact, slimy, colourless to straw coloured to brown fascicles on the polyphialides.

In Mediterranean maquis we have found two species.

***Dictyochoaeta* sp. (D.1).**

Type species: *Dictyochoaeta fuegiana* Speg., 1923.

Colonies effuse, very large and crowded, brown, composed by regular groups of conidiophores. Setae absent. Conidiophores macronematous, mononematous, straight or gently

flexuous, not branched, septate, smooth, brown, paler towards the apex, 50-65×4 μm. Conidiogenous cells monophialidic, integrated, terminal, cylindrical, with collarettes. Conidia aggregated at the apex of the conidiogenous cells, 0-septate, hyaline, smooth, falcate, with apices slightly acuminate, setulated, 18-20×2 μm, setulae 4-9×0,9 μm. On dead leaves of *Rhamnus cathartica* L. and *Phillyrea latifolia* L. Circeo Nat. Park. Central West Italy.

Our monophialidic strain has conidia similar to *D. simplex* (Hughes & Kendr.) Hol.-Jech. (1984) in shape and dimensions, but differs in the conidiogenous cells (polyphialidic in *D. simplex*), and in conidiophores dimensions.

The description of a species found on *Quercus suber* dead leaves is here reported.

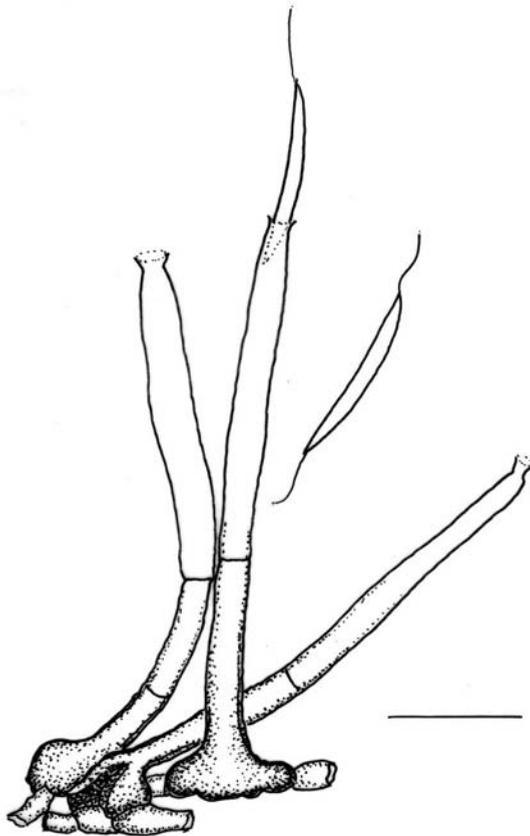


Fig. 96. *Dictyochaeta* sp. (D1), a monophialidic and not setose species. Bar 12 μm.

***Dictyochoeta* sp. (D2)**

Colonies effuse, very large, composed by crowded conidiophores and setae, white and shining for the apical production of conidia remaining in cluster at conidiophores apices. Setae erect, brown, dark-brown near the base and clearer towards the apices, septate, smooth,  $130-190 \times 4-5 \mu\text{m}$ . Conidiophores macronematous, mononematous, generally straight, not branched, septate, smooth, brown, paler towards the apices,  $38-50 \times 3-4 \mu\text{m}$ . Conidiogenous cells monophialidic, integrated, terminal, cylindrical, with collarettes. Conidia falcate, with apices gently pointed, hyaline, 0-septate,  $15-16 \times 3 \mu\text{m}$ , with setulae at each ends, up to the half of the conidia dimension.

On dead leaves of *Quercus suber*, Tuscania, Central Italy.

The species described for some characters is similar to *D. simplex* (Kuthubutheen & Nawawi 1991), but we have never seen polyphialide conidiogenous cells. In the genus actually are included numerous species that should be necessary to examine in the herbaria; since we do not have this possibility we prefer to leave our species indeterminate.

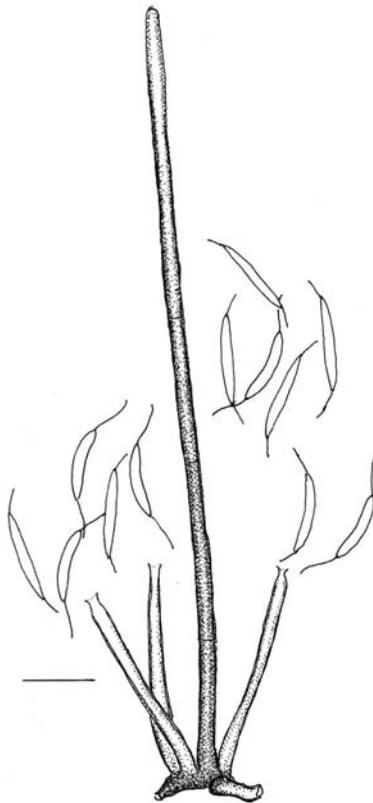


Fig. 97. *Dictyochoeta* sp. (D2). Setae, conidiophores and conidia. Bar  $16 \mu\text{m}$ .

***Dictyochaeta circei*** Tempesta & Ramb.

Type species: *Dictyochaeta fuegiana* Speg. 1923.

Etymology: *circei* from Circeo National Park the place where the holotype was collected. Colonies effuse, composed by not crowded conidiophores. Setae erect, gently flexuous, brown, dark brown near the base and clearer towards the apices, septate, smooth,  $190\text{--}320 \times 5\text{--}6 \mu\text{m}$  near the base. Conidiophores growing near the base of the setae, macrone-matous, mononematous, straight, erect, brown, clear brown towards the apices, smooth, septate,  $47\text{--}110 \times 4\text{--}6 \mu\text{m}$ , conidiogenous cells included. Conidiogenous cells growing sympodially and percurrently. Collarettes cylindrical. The first conidiogenous locus becomes lateral by a new growing point and then the conidiogenous cell grows percurrently up to a new fertile locus, preserving laterally the residuals of the previous loci. Conidia slightly falcate, with apices gently pointed, hyaline, 0-septate, without setulae,  $16\text{--}19 \times 1,8 \mu\text{m}$ . On dead leaves of *Rhamnus cathartica* L. Circeo Nat. Park. Central West Italy.

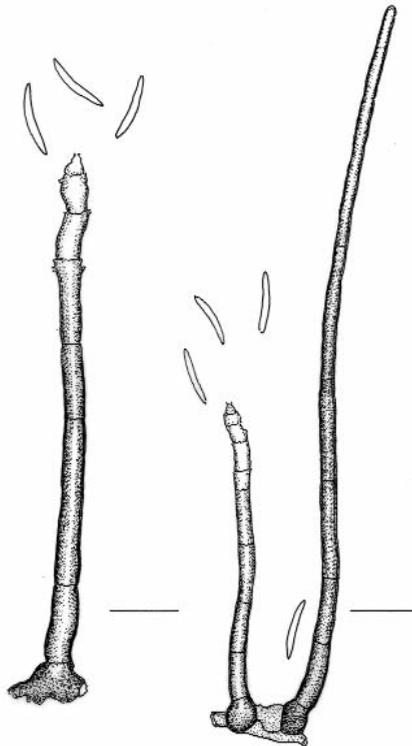


Fig. 98. *Dictyochaeta circei*. Left bar  $15.5 \mu\text{m}$ , right bar  $20 \mu\text{m}$ .

The species described is characterized by alternately sympodial and percurrent development. This behavior is different from what is described for many species of *Dictyochoeta* in which the percurrent development is realized through the apical funnel or cylindrical conidiogenous locus (Whitton & al., 2000; Kuthubutheen and Nawawi, 1991; Morgan-Jones, 1982; Rodrigues da Cruz & al., 2008; Kirschner and Chen, 2002; Hughes and Kendrick, 1968). Since morphology and dimensions of the conidia of the species described seem different from the others mentioned in the references examined and for the particular sympodial and percurrent proliferation of the conidiogenous cell, we proposed *Dictyochoeta circei* as new species (2009).

### DICTYOSPORIUM

(Corda 1836, Ic. Fung. II p.87)

The genus *Dictyosporium* was erected by Corda (1836) on the type species *D. elegans* Corda to include *dematiaceous hyphomycetes* characterized by colonies sporodochial - like or effuse, conidiophores micronematous or absent, conidiogenous cells discrete, subspherical, and conidia holoblastic, solitary, cheiroid composed by cells in multiple columns, branched near the base.

***Dictyosporium* Corda, 1836 (fide Saccardo, 1886).**

*Conidia ovoidea v. cordiformia, veluti e catenulis articulorum parallele coalitis efformata, numquam fissilia, mutica.*

On dead leaves of mediterranean maquis we have found two species.

***Dictyosporium freycinetiae* McKenzie, 2008.**

Type species: *Dictyosporium elegans* Corda, 1836.

Colonies sporodochial like, punctiform, not crowded, clear gray. Conidiophores micronematous and conidiogenous cells almost indistinguishable. Conidia very clear yellow, smooth, collected in great number all around the sporodochial point, not complanate and composed by three rows closely appressed and originating from a basal cell (5×5 µm) approximately rounded but with pointed base, rows frequently not of the equal length and differing each other by one cell in number, each row is composed by 6-10 cells constricted at septa, 27-40×5-6 µm. The apical cell of each row is hyaline, inflated, irregularly subglobose, 7-10×7-9 µm.

On dead leaves of *Phillyrea latifolia* L. Circeo Nat. Park. Central West Italy.

This species was recently described by McKenzie (2008) and the small differences in the morphological characters of our strain could be presumably the result of a different substratum and mainly of the different ecological environment.

From the examined references this is presumably the first finding of the species in the european mediterranean area.

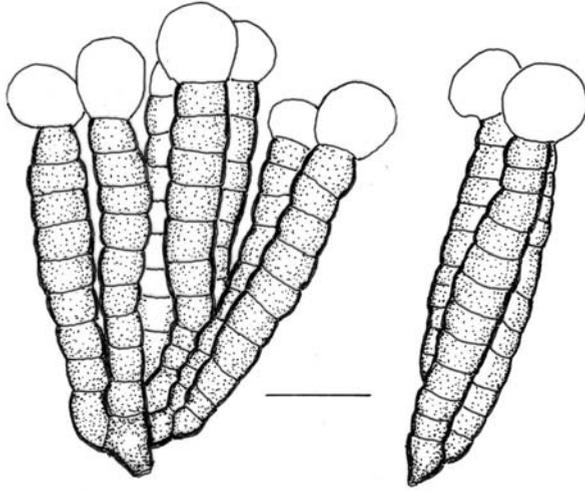


Fig. 99. *Dictyosporium freycinetiae* McKenzie, not complanate conidia. Bar 10  $\mu\text{m}$ .

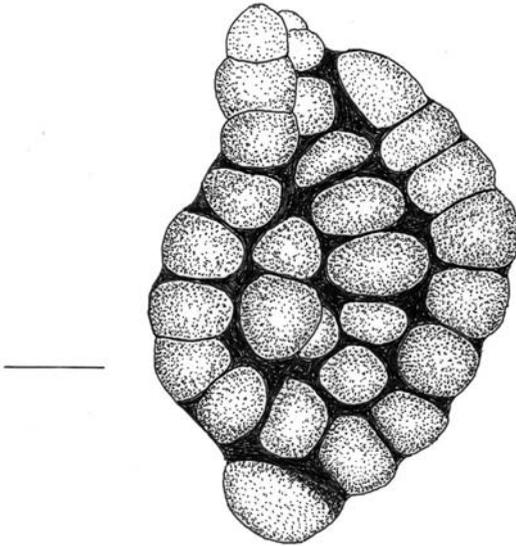


Fig. 100. *Dictyosporium* sp. (D1), complanate conidia. Bar 8  $\mu\text{m}$ .

***Dictyosporium* sp. (D.1).**

Type species: *Dictyosporium elegans* Corda, 1836.

Colonies effuse. Conidiophores micronematous and conidiogenous cells almost indistinguishable. Conidia brown, red-brown, smooth, complanate and composed by four closely appressed rows, originating from a roundish basal cell and with the outer two rows longer; rows composed by 8-9 cells constricted at the septa,  $22.5\text{-}25 \times 14\text{-}16 \mu\text{m}$ .

On dead leaves of *Rhamnus cathartica* L. Circeo Nat. Park. Central West Italy.

This species is close to *Dictyosporium brahmaswaroopii* M.D. Mehrotra (1990), but, because of the poor material examined, we leave the species indeterminate, hoping in the opportunity of more findings.

**PSEUDODICTYOSPORIUM**

(Matsushima 1971, Microfungi of the Solomon Islands and Papua New Guinea. Kobe).

The genus *Pseudodictyosporium* was erected by Matsushima (1971) on the type species *P. wauense* characterized by cheiroid conidia produced at the apices of long and branched conidiophores. The original diagnosis of the genus is here reported.

***Pseudodictyosporium* Matsushima, 1971.**

*Pertinens ad Fungos Imperfectos - Hyphomycetes. Conidiophora dispersa, bene evoluta. Morphologia conidii ex Dictyosporio Corda haud distinguibilis.*

Type species: *Pseudodictyosporium wauense* Matsushima, 1975.

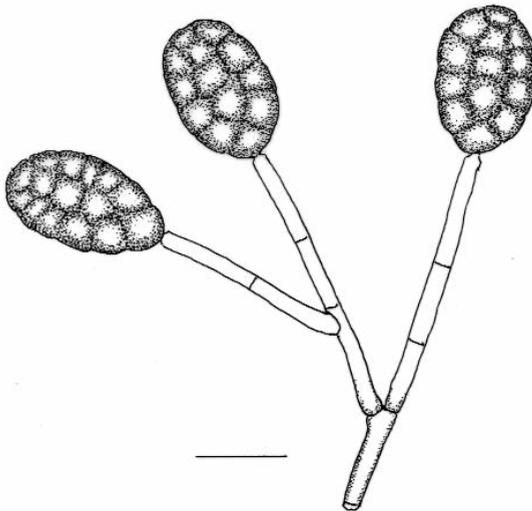


Fig. 101. *Pseudodictyosporium wauense*. Bar 15  $\mu\text{m}$ .

***Pseudodictyosporium wauense* Matsushima, 1975**

Type species: *Pseudodictyosporium wauense* Matsushima, 1975.

Colonies effuse, frequently composed by isolated conidiophores. Conidiophores macronematous, mononematous, solitary, erect, branched, clear brown, 27-61×3-4 µm conidiogenous cells included. Conidia composed by 3 parallel and appressed rows of 12- 15 cells, brown, clear brown, smooth, 23×14-15 µm.

On dead leaves of *Rhamnus cathartica* L. Circeo Nat. Park. Central West Italy

The species described presents morphological characters very close to *P. wauense* Matsushima (1975).

**VERTICICLADIUM**

(Preuss 1851, *Linnaea*, 24: 127)

The genus *Verticicladium* was erected by Preuss (1851) for the single species *V. trifidum* characterized by conidiophores generally solitary, with apices repeatedly branched, verticillate, conidiogenous cells polyblastic, sympodially denticulate and conidia solitary. The original diagnosis of the genus is here reported.

***Verticicladium* Preuss, 1851.**

*Stipes erectus septatus, supra verticillato- ramosus; ramis subternato-decompositus; ramis ultimis subulatis; sporae simplices in apicibus ramulorum singulatim innatae, dein deciduae.*

Type species: *Verticicladium trifidum* Preuss.

The Autor found colonies of the fungus on dead leaves of *Pinus* at Hoyerswerda: this species seems frequent on dead leaves of conifers mainly of *Pinus*. A more extensive description of the genus is carried out by Pasqualetti & al. (2005).

***Verticicladium* Preuss, 1851.**

Conidiophores macronematous, mononematous, solitary, sometimes caespitose, repeatedly branched at the apex, erect, branches verticillate usually at right angles, mid to dark brown, smooth. Conidiogenous cells polyblastic, sometimes integrated, terminal, frequently discrete on branches, sympodial subulate. Conidia solitary, acropleurogenous, simple, ellipsoidal, 0-septate, hyaline or clear brown, finely verruculose.

Type species: *Verticicladium trifidum* Preuss.

***Verticicladium trifidum* Preuss.**

Colonies inconspicuous, composed by solitary conidiophores regularly distributed on the colonized surface. Conidiophores macronematous, mononematous, straight, dark brown, repeatedly branched towards the apex, smooth, up to 500 µm and more in length and 7-10 µm wide. Branches in verticils and frequently at right - angles on the conidiophores. Conidiogenous cells polyblastic, integrated, terminal, sympodial, sub-

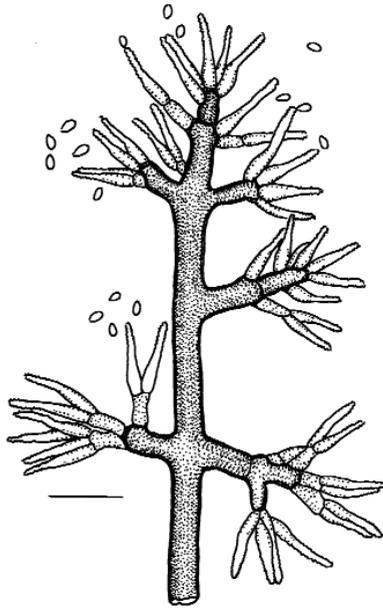


Fig. 102. *Verticicladium trifidum*. Conidiophores repeatedly branched. Bar 20  $\mu\text{m}$ .

ulate,  $16 \times 5 \mu\text{m}$ . Conidia solitary, dry, acropleurogenous, simple, ellipsoidal, hyaline or pale brown, smooth, 0-septate,  $5.4 \times 3.6 \mu\text{m}$ .

On dead leaves of *Pinus pinaster* subsp. *hamiltonii*. Montagna Grande, Pantelleria.

The species described presents morphological characters well coinciding with those of the type species.

### CHAETOPSINA

(Rambelli 1956, Atti Accad. Sci. Ist. Bologna. Rendic., 11(3): 1)

The genus *Chaetopsina* was erected by Rambelli (1956) for the type species *C. fulva* characterized by conidiophores setiform with sterile apex, conidiogenous cells phialidiform on branches growing on the middle low part of the conidiophore and conidia hyaline rod shaped. The original diagnosis of the genus is here reported.

***Chaetopsina*** Rambelli, 1956.

*Conidiophora cylindracea - setiformia, rigida, brunnea, septata, apice sterilia, ramis fertilibus prope basim constricta, conidia hyalina, cylindracea, continua, mucosa, ex conidiogenis globoso-ampulliformibus exilientia.*

Type species: *Chaetopsina fulva* Ramb. 1956.

*Hab. in foliis dejectis Cedri deodarae Linn.*: North East Italy.

***Chaetopsina fulva*** Ramb. 1956.

Type species: *Chaetopsina fulva* Ramb. 1956.

Colonies effuse, composed by isolated conidiophores. Conidiophores macronematous, mononematous, straight, setiform, smooth, yellow-brown or red-brown, septate, branched in the middle lower part, apices very rarely fertile, 135-185×5-7 µm. Branches hyaline or light yellow, adhering to setiform conidiophores and originating in the proximity of a septum, 24-40×3 µm. Conidiogenous cells monophialidic, on the lateral branches, discrete, determinate, ampulliform, hyaline, 6-7×4 µm. Conidia rod shaped, cylindrical, simple, not septate, with rounded apices, hyaline, smooth, in slimy masses, 11-13×1.8 µm.

On dead leaves of indeterminate species. Circeo Nat. Park. Central West Italy

The species described presents some dimensional and morphological characters not exactly matching with the original description (Rambelli 1956), like a frequent variability in the setiform conidiophores and in its pigmentation varying from light yellow-brown to clear red-brown.

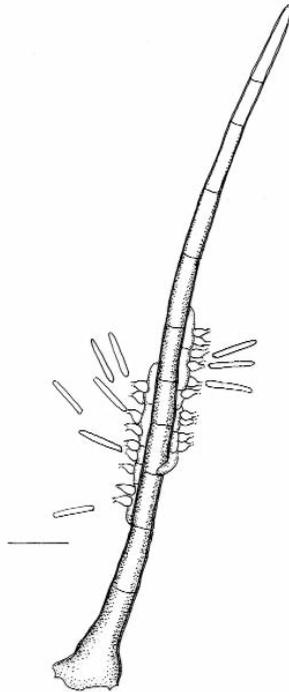


Fig. 103. *Chaetopsina fulva*. Conidiophores and conidia. Bar 18 µm.

**ARACHNOPHORA**(Hennebert 1963, *Canad. J. Bot.* 41: 1163).

The genus *Arachnophora* was established by Hennebert on the type species *A. fagicola*; the fungus is characterized by conidiophores erect, conidiogenous cells annellidic and conidia with inwardly curved, hyaline spines. The original diagnosis of the genus is here reported.

***Arachnophora*** Hennebert, 1963.

*Fungi imperfecti, hyphomycetes, annellophori.*

*Coloniae dematiaceae. Hyphae vegetativae, septatae. Conidiophora singula vel catervata, erecta, fuliginosa, septata, annellophora, proliferationibus paucis, elongatis. Conidia solitaria, terminalia, successiva, conidiophori apice rupto, vertentia, dum proliferatio nova crescet per cicatricem, et tarde labentia, complexa, composita et centralibus cellulis pluribus, raro una, magnis, fuliginosis, crasso - tunicatis, et lateralibus cellulis pluribus, minoribus, successive efformantibus, digitos plures geniculatos recurvatos pallidescentes ferentibus.*

*Species typica: A. fagicola* Hennebert.

***Arachnophora fagicola*** Hennebert, 1963.

Type species: *Arachnophora fagicola* Hennebert, 1963.

Colonies effuse. Conidiophores macronematous, mononematous, solitary, straight, septate, brown in the lower part, clearer in the upper part, 67-83×4-7 µm. Conidiogenous cells integrated, terminal, monoblastic, percurrent. Conidia solitary, composed by a central body, with a mean septum, brown, smooth, upper cell 5-18×7-13 µm, lower cell 11-18×8-12 µm; the two main cells present lateral protuberances pale brown, 5-7×5-7 µm: each protuberance is adorned by 2 or more inwardly curved hyaline spines, 9-14×2-3 µm.

On dead leaves of *Quercus ilex* L. Circeo Nat. Park. Central West Italy.

The species described has morphological characters perfectly matching with the Hennebert description.

**SUBRAMANIOMYCES**(Varghese & Rao 1980, *Kavaka*, 7: 83)

The genus *Subramaniomyces* was erected by Varghese & Rao (1980) on the type species *S. indicus* Varghese & Rao. Matsushima (1971) described a similar species under the name *Ramularia fusisaprophytica* characterized by evident acropetal chains and elongate, fusiform and more pigmented terminal conidia. Kirk (1982) evidenced the morphological similarity of the genus *Subramaniomyces* and *Ramularia* based on the more pigmented terminal conidia, and proposed an emendement of the genus *Subramaniomyces* and the new combination *Subramaniomyces fusisaprophyticus* (Matsushima) Kirk to include the determination of Matsushima even if the genus *Ramularia* was established many years before (Unger 1833) and utilized by Matsushima in 1971 to describe the new species *Ramularia fusisaprophytica*. Unfortunately we had not access to the Kavaka journal to report the

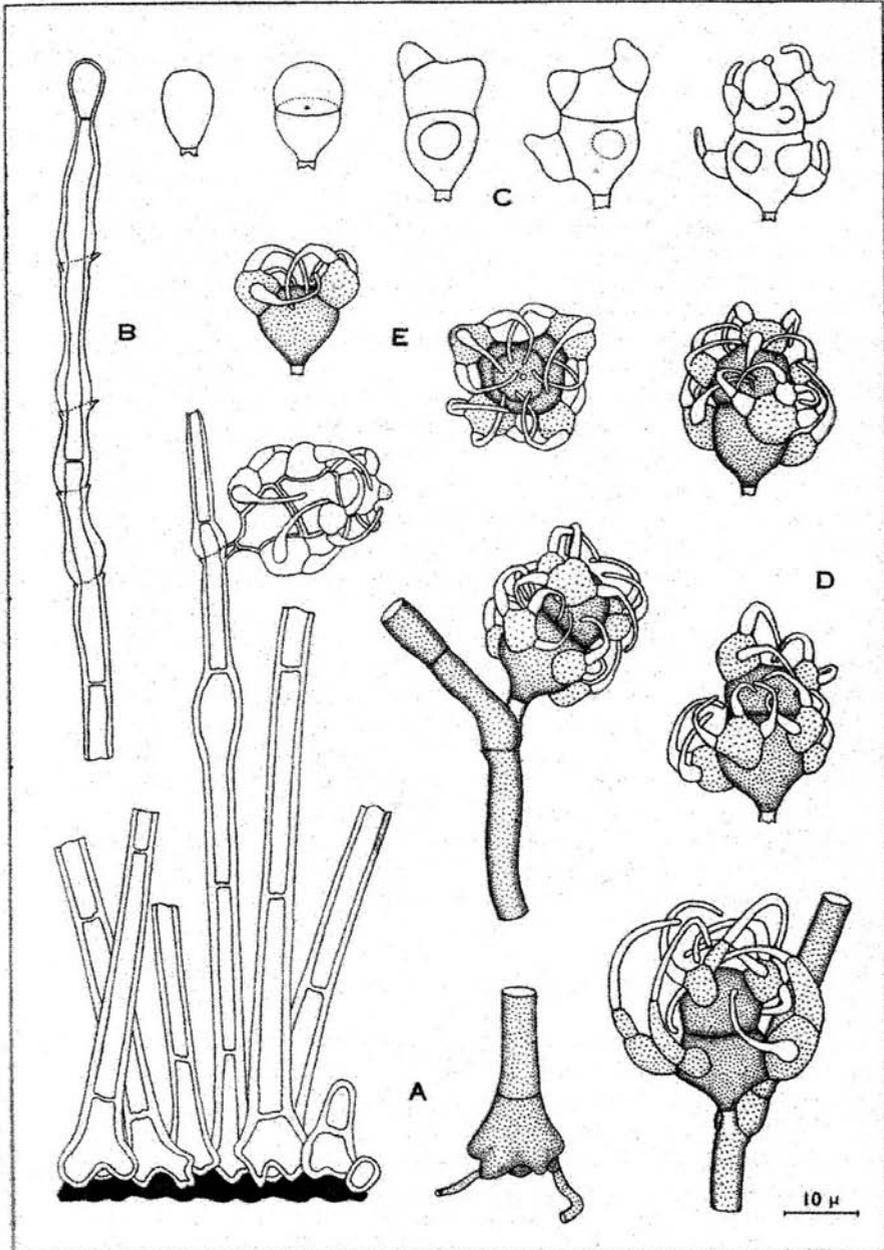


FIG. 1. *Arachnophora fagicola* spécimen type (DAOM 84716). A, conidiophores groupés par leur base enflée; B, repousses successives du conidiophore; C, stades de développement de la conidie; D, conidies à maturité, en vue latérale; E, conidie unicellulaire, et vue apicale d'une conidie bicellulaire. 1000X

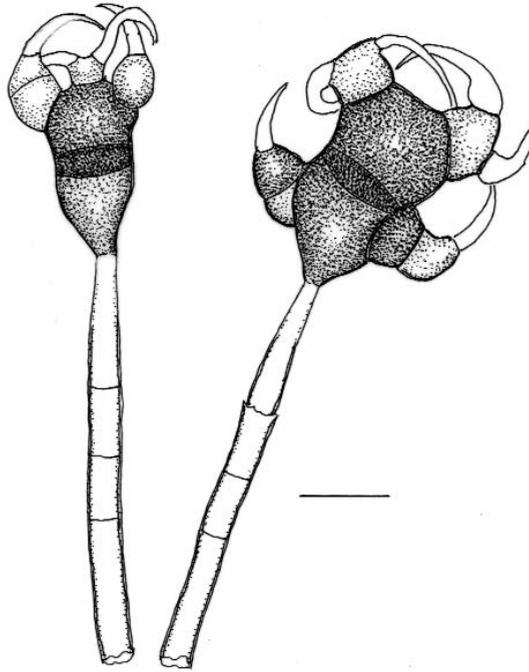


Fig. 105. *Arachnophora fagicola*. Arachnoid conidia. Bar 12  $\mu$ m

genus diagnosis of *Subramaniomyces*, nevertheless we give the original diagnosis or *Ramularia*, basionym of *Subramaniomyces* and the description of the emended genus *Subramaniomyces* as reported by Kirk (1982).

***Ramularia*** Unger, 1833 (fide Saccardo, 1886).

(*Etym.* a ramulo). - *Biophila*. *Hyphae simplices v. breve vage ramulosae, sursum denticulato-sporigeræ. Conidia ovato-cylindræcea, varia, denique typice 2-pluriseptata (et interdum catenulata), hyalina, rarius laete colorata.*

***Subramaniomyces*** Varghese & Rao emended by P.M. Kirk (1982).

Colonies effuse, velvety or hairy, buff to brown or dark brown, sometimes inconspicuous. Mycelium partly superficial partly immersed in the substratum, composed of pale brown to brown, smooth, branched, septate hyphae. Conidiophores macronematous, mononematous, solitary or fasciculate, erect, straight or slightly flexuous, pale brown to dark brown, either short, 0-to 3-septate, unbranched or proximally branched and with an integrated, apical conidiogenous cell or taller, often setiform, multiseptate, unbranched, sometimes fertile

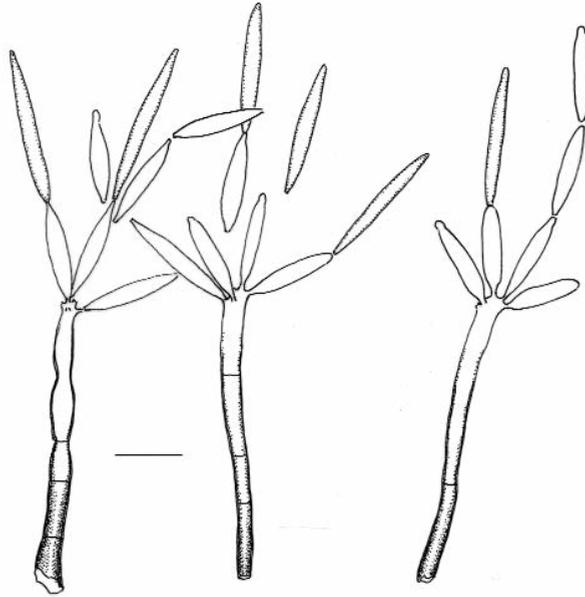


Fig. 106. *Subramaniomyces fusisaprofiticus*. Bar 15  $\mu\text{m}$ .

apically and with discrete, lateral, ampulliform conidiogenous cells. Conidiogenous cells either lateral and discrete on the conidiophores and / or terminal and integrated on short or long conidiophores, holoblastic, polyblastic, sympodial, denticulate, denticles cylindrical with unthickened apices. Conidia dry, catenate, formed in simple or proximally branched, readily fragmenting, acropetally elongating chains, non-septate, smooth, very pale olivaceous brown to pale brown, narrowly ellipsoid to broadly fusiform, truncate at the apices with indistinct, unthickened scars, terminal conidia often elongate fusiform and distinctly more deeply pigmented than the other conidia.

Type species: *S. indicus* Varghese & Rao.

***Subramaniomyces fusisaprophyticus* (Matsushima) P.M. Kirk, 1982**

Basionym: *Ramularia fusisaprophytica* Matsushima (1971).

Colonies effuse or discrete, sometimes inconspicuous, velvety, white to buff. Mycelium partly superficial, partly immersed in the substratum, composed of pale brown, branched, smooth, septate hyphae 1.5-2.5  $\mu\text{m}$  wide. Conidiophores macronematous, mononematous, erect, straight or slightly flexuous, smooth, typically 1-septate, pale brown, paler towards the apex, 12-28  $\mu\text{m}$  high, 3.5-5.5  $\mu\text{m}$  wide, somewhat radially lobed at the base. Conidiogenous cells integrated, terminal, polyblastic, sympodial, denticulate, denticles cylindrical. Conidia dry, formed in short, proximally branched, acropetal chains, ellipsoid to broadly fusiform, smooth, very pale olivaceous brown, (13-) 17-18.5 (-21)  $\mu\text{m}$  long, 2.5-3.5  $\mu\text{m}$  wide, terminal conidia acicular, smooth, brown, (18-) 25-31  $\mu\text{m}$  long, 2.5-3  $\mu\text{m}$  wide.

***Subramaniomyces fusisaprofiticus*** (Matsush.) P.M. Kirk, 1982.

Type species: *Subramaniomyces indicus* Varghese & Rao 1980.

Colonies effuse, very crowded and composed by several conidiophores, white or clear buff. Mycelium partly immersed. Conidiophores macronematous, mononematous, erect, straight, smooth, septate, clear brown, paler towards the apex, 22-65×2-5 µm, conidiogenous cell included. Conidiogenous cells integrated, terminal, polyblastic, sympodial, with cylindrical denticles. Conidia dry, in acropetal chains, fusiform, smooth, hyaline, 16-18×4 µm; terminal conidia, at the top of the chains, acicular, smooth, very clear brown, 25-32×3-4 µm.

On dead leaves of *Quercus ilex* L., *Rhamnus cathartica* L. and *Phillyrea latifolia* L. Circeo Nat. Park. Central West Italy.

The species described is very widely distributed on different dead leaves species of plants, like *Rhamnus cathartica* L., *Phillyrea latifolia* L., *Quercus ilex* L. and others but without morphological characters variability. Nevertheless our strain differs in the conidiophores dimensions and in the conidia pigmentation from what reported by Kirk (1982).

## DACTYLARIA

(Saccardo 1880, Michelia, 2: 20)

The genus *Dactylaria* was established by Saccardo (1880) to include species characterized by macronematous conidiophores, conidiogenous cells with cylindrical denticles and conidia acropleurogenous, hyaline or clear brown, septate, smooth. The type species, *D. purpurella* (Sacc.) Sacc. (1880) was studied by several Authors with descriptions and proposals of generic emendations. Bhatt & Kendrick (1968) in a interesting work on synonymy of *Dactylaria* and *Diplorhinotrichum* report the original diagnosis of the genus:

***Dactylaria*** Sacc. *Dactylium* Bon.

*Saprophila*. *Hyphae fertiles erectae, simplices, apice capitulum conidiorum gerentes; conidia fusioidea v. clavulata, 2-pluriseptata.*

*Ex. D. purpurella* Sacc., *sub Acrotectio*

and an emended generic description:

***Dactylaria*** Sacc. emend. Bhatt & Kendrick (1968).

*Mycelium ex hyphis hyalinis vel pigmentiferis, septatis, ramosis. Conidiophora simplicia, singulariter orientia, recta vel flexa, internum septata. Cellula apicalis(sympodula) sympodialiter per proliferationes successivas elongascens vel tumescens; proliferatio unaquaeque unum conidium in dente conspicuo saepe truncato fert. Conidia (sympodioconidia) sicca, hyalina vel pigmentifera, elongata, cylindrica vel fusiformia vel ampulliformia vel anguste clavata vel anguste ellipsoidea, 1- ad 4-septata, cicatricem basalem exhibentia.*

*Lectotype species: Dactylaria purpurella* (Sacc.) Sacc. syn. *Acrotectium purpurellum* Sacc.

Mycelium composed of hyaline or pigmented, septate, branched hyphae. Conidiophores solitary, simple, erect, straight or flexuous, arising laterally or terminally from vegetative hyphae, sometimes septate; the apical cell of sympodula which elongates or becomes terminally swollen as it produces a succession of spores; each conidium, as it secedes, leaves a conspicuous, often flat-topped, denticle. Conidia hyaline or pigmented, dry, elongate, cylindrical to fusiform to ampulliform to narrowly clavate to narrowly ellipsoidal, 1-to 4-septate, with a flat abstriction scar at the base.

Our strain presents morphological characters well coinciding with *D. chrysosperma*.

***Dactylaria chrysosperma*** (Sacc.) G.C. Bhatt & W.B. Kendrick, 1968.

Conidiophores macronematous, mononematous, erect, brown, up to  $120 \times 3-5 \mu\text{m}$ . Conidiogenous cells polyblastic, integrated, terminal, sympodial, denticulate. Conidia solitary, acropleurogenous, fusiform, 1-septate, hyaline or yellowish, smooth,  $18-26 \times 3-4 \mu\text{m}$ . Basionym: *Rhinotrichum chrysospermum* Sacc., 1876.

Lectotype species: *Dactylaria purpurella* (Sacc.) Sacc., 1880.

On dead leaves of *Chamaerops humilis*, Torre del Sevo, Central West Sardinia, Italy.

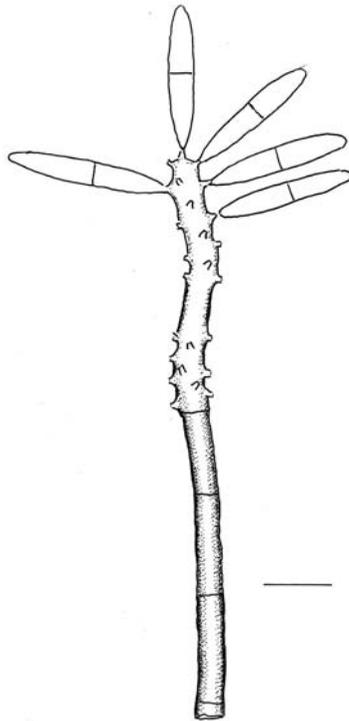


Fig. 107. *Dactylaria chrysosperma*. Conidiophores and conidia. Bar 10  $\mu\text{m}$ .

Section *Mirandina* - Conidiophores brownish, usually erect. Conidia hyaline, clavate, filiform or fusiform, in apical clusters or usually short-cylindrical denticles.

***Mirandina corticola*** Arn. 1952 ex Mats. 1975.

Colonies composed by several and crowded conidiophores. Conidiophores macronematous mononematous, erect, brown, clear-brown towards the apex, smooth, septate, 75-85×4 µm. Conidiogenous cells sympodially elongating, with prominent denticles. Conidia hyaline, fusiform, straight, 9-12-septate, 80-95×3 µm.

On dead leaves of *Quercus suber*, Tuscania, Central Italy.

This species, validated by Matsushima (1975), on dead leaves of *Quercus suber* appears with inconspicuous colonies even if composed by crowded conidiophores but difficult to observe. A specimen was found also on dead leaves of *Fagus sylvatica* collected at the Foreste Casentinesi National Park (Central Italy).

If compared to other observations the conidia dimensions doesn't present a strong variability (Matsushima 1975; De Hoog 1985; Cazau & al. 1990).

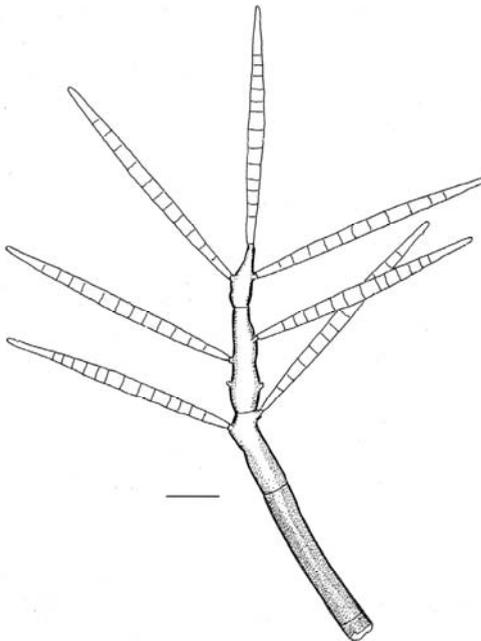


Fig. 108. *Mirandina corticola*. Conidiophores, conidia. Bar 12 µm.

**CRYPTOCORYNEUM**

(Fuckel 1866, Hedwigia, 5 (2): 25)

The genus was erected by Fuckel (1870) on the species *Cryptocoryneum fasciculatum* Fuckel characterized by conidiophores collected in sporodochia, conidia solitary cheiroid with arms developing downwards.

***Cryptocoryneum*** Fuckel, 1866.

*Sporidia cylindracea, multiseptata, basi applanata, fasciculatim adnata, perpendiculariter densa disposita, in acervulis absque perithecio conglutinata.*

Type species: *Cryptocoryneum fasciculatum* Fuckel, 1866.

An extensive description of the genus is reported by Pasqualetti & al. (2005).

***Cryptocoryneum*** Fuckel, 1866.

Sporodochia pulvinate, flat, dark blackish brown to black. Mycelium mostly immersed. Stroma mid to dark brown. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, unbranched, erect or flexuous, subhyaline to pale brown, smooth. Conidiogenous cells monoblastic, integrated, terminal, determinate, cylindrical. Conidia solitary, acrogenous, branched, cheiroid, composed by swollen cap cells dark brown and by septate, subhyaline arms developing downwards towards the substratum.

Type species: *Cryptocoryneum fasciculatum* Fuckel, 1866.

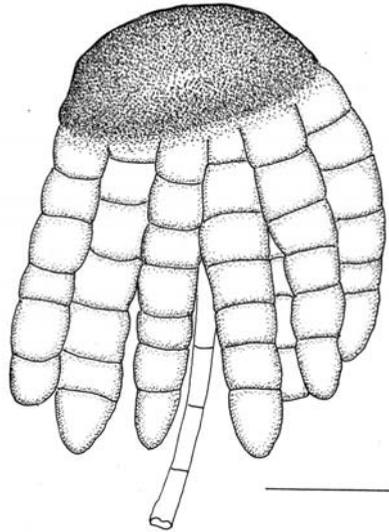


Fig. 109. *Cryptocoryneum rilstonii*. Cheiroid conidium with branches downwards. Bar 10 µm.

On mediterranean maquis litter we have found two species: *C. rilstonii* Ellis (1972) and *C. condensatum* (Wallr.) Mason & Hughes (1953).

***Cryptocoryneum rilstonii* Ellis, 1972.**

Sporodochia pulvinate, brown to black. Stroma brown. Conidiophores macronematous, up to  $40 \times 1-3 \mu\text{m}$ . Conidiogenous cells monoblastic, integrated, terminal, determinate. Conidia solitary, acrogenous, cheiroid, composed by black cap cells and 3-9 branches,  $20-45 \times 12-30 \mu\text{m}$ ; branches developing towards the substratum, subhyaline to pale brown, 1-9-septate, smooth,  $10-30 \times 4-6 \mu\text{m}$ .

Type species: *Cryptocoryneum fasciculatum* Fuckel, 1866.

On dead leaves of *Pistacia lentiscus* and *Quercus ilex*. Central West Sardinia, Italy.

***Cryptocoryneum condensatum* (Wallr.) Mason & Hughes, 1953.**

Sporodochia pulvinate, dark brown. Conidiophores macronematous up to  $80 \times 1-3 \mu\text{m}$ . Conidiogenous cells monoblastic, integrated terminal, determinate, cylindrical, subhyaline. Conidia solitary, acrogenous, cheiroid, with arms developing towards the substratum,  $40-85 \times 20-30 \mu\text{m}$ , composed by a brown swollen cap cell and branches clear brown, with up to 17 septa, 3-5  $\mu\text{m}$  wide.

Type species: *Cryptocoryneum fasciculatum* Fuckel, 1866.

On dead leaves of *Pistacia lentiscus*. Torre del Sevo, Central West Sardinia, Italy.

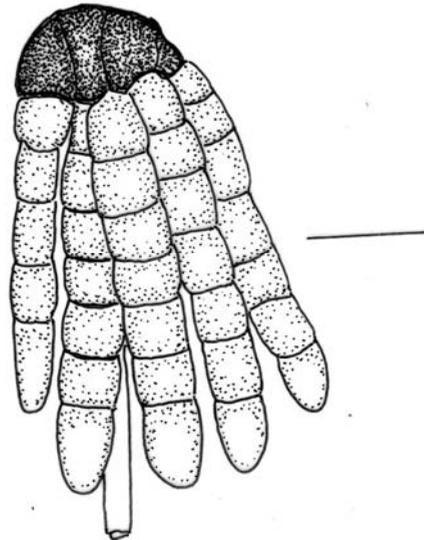


Fig. 110. *Cryptocoryneum condensatum*. Conidium with branches developing toward the substratum. Bar 10  $\mu\text{m}$ .

### ACREMONIELLA

(Saccardo 1886, Sylloge Fungorum, 4:302).

The genus *Acremoniella* was erected by Saccardo (1886) on the morphological characters of *A. atra* (lectotype species).

*Acremoniella* Sacc., 1886. (Etym. ab *Acremonio* cui analogum genus).

*Hyphae repentes* v. *obliquae simplices* v. *ramosae hyalinae* v. *coloratae*, *ramulos sporigeros simplices breviusculos hinc inde exserentes*. *Conidia globosa* v. *ovoidea*, *continua*, *fusca solitarie acrogena*. - *Est Acremonium phaeosporum*.

Lectotype species: *A. atra* (Corda) Sacc.

An extensive description of the genus is carried out by Ellis (1971).

*Acremoniella* Saccardo, 1886.

Colonie effuse, cottony, at first colourless, later often brown or cinnamon brown. Mycelium superficial and immersed. Stroma none. Setae and hyphopodia absent. Conidiophores semi-macronematous, mononematous, simple or loosely branched, the branches often being at right angles and usually tapered to a fine point, colourless, smooth, septate, sometimes with 1-3 septa close together just below the apex. Conidiogenous cells monoblastic, integrated, terminal. Conidia solitary, dry, non-septate, ovoid, obovoid or sub-globose, golden brown or cinnamon brown, smooth or verrucose, double-walled, the inner wall thick, with a pore at the base. *Acremoniella* has also a phialidic state.

Lectotype species: *A. atra* (Corda) Sacc.

The description of our specimens is here reported.

*Acremoniella atra* (Corda) Sacc., 1886.

Colonies effuse, clear brown. Conidiophores macronematous, mononematous, up to 80-100×4-5 µm, rarely septate, hyaline or very clear brown, with branches usually at right angles and tapered to a very fine peduncle. Conidiogenous cells monoblastic, integrated, terminal. Conidia solitary, 0-septate, ovoid, brown or clear brown, smooth, 25-30×15-20 µm. Phialidic state not observed.

On dead leaves of indetermined plant. Bosco Isola, South East Italy.

The species described presents morphological characters well coinciding with *A. atra* as described by Ellis. The small differences concerning the conidia and conidiophores colours could be the effect of the substratum composition.

According to Holubová-Jechová (1974) the fungus was initially described as *Acremonium atrum* by Corda (1837), but actually no type material can be verified. Nevertheless Saccardo described the Corda fungus as *Acremonium atrum* Corda in *Michelia* (1878) and later as *Acremoniella atra* (Corda) Sacc. (1878) in *Sylloge Fungorum* 1886. But Corda description was concerning of a strain developing black colour in the colonies and this characters does not correspond to the colour observed by Saccardo. According to Mason (1933) the Saccardo strain must be considered *Acremoniella atra*

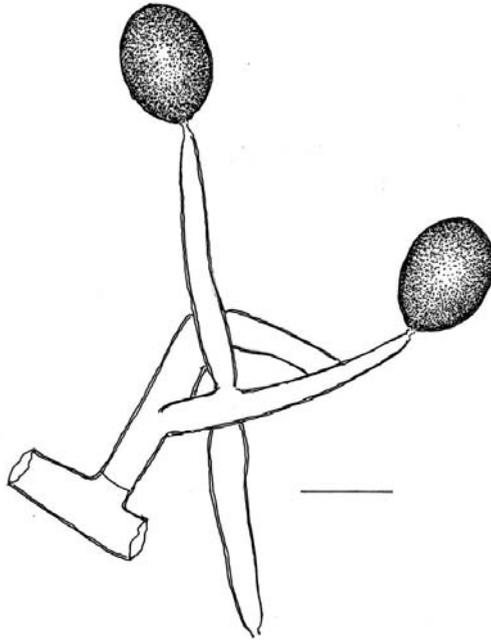


Fig. 111. *Acremoniella atra*. Conidiophores and conidia. Bar 20  $\mu$ m.

Sacc. The species was described also by Harz (1871) but under the name *Monosporium acremonioides*, considered a *nomen illegitimum* (Hughes, 1958). Costantin (1888) established for the fungus the genus *Harzia* Cost. to include the new combination *Harzia acremonioides* (= *Acremoniella atra* and *Monosporium acremonioides*). Unfortunately Costantin publication of the new genus is dated 1888 some years later of Saccardo determination (1886). In this situation “Index Fungorum” does not accept the proposal of Holubovà-Jechovà for *H. acremonioides* and recognize valid the Saccardo name as *Acremoniella atra* (Corda) Sacc.

### ONCOPODIELLA

(Arnaud ex Rifai 1965, *Persoonia*, 3 (4): 407)

The genus *Oncopodiella* was established by Arnaud (1954) with description of the new species *O. tetraedrica*; genus and species were not valid since published without latin diagnosis. The species was initially described by Saccardo (1882) as *Sporidesmium trigonel-*

*lum* Saccardo that did not consider the different morphological characters of the specimens with the type species of the genus *Sporidesmium*. Others proposals were carried out to accomodate this group of fungi (Hughes 1958; Moore 1959b; Ellis 1960, 1961; Jones 1963). The genus was validated by Rifai (1965) that proposed the following diagnosis:

***Oncopodiella*** Arn. ex Rifai, 1965.

*Fungi imperfecti, hyphomycetes, saprophytici. Coloniae effusae, vel punctiformes, atrobrunneae. Mycelium immersum ex hyphis septatis, brunneis, ramosis compositum. Conidiophora dispersa vel densa, simplicia, subhyalina vel pallide brunnea, 0-1-septata, gracilia, curta, recta vel flexuosa, per proliferationes successivas sub-apicales elongascentia. Conidia singula in apice conidiophori oriunda, subtrigona, obovoidea vel subglobosa, levia, breviter hyalino-papillata, sicca.*

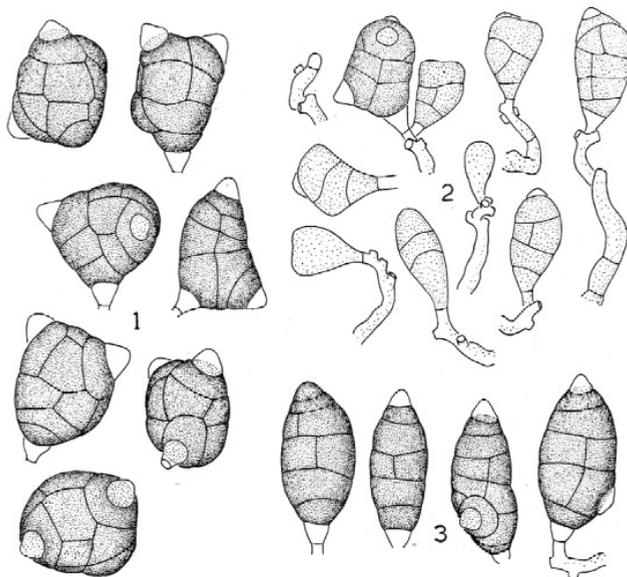
*Species generis typica: (Oncopodiella tetraedrica Arn. =) Sporidesmium trigonellum Sacc.*

Our *O. trigonella*, found on mediterranean litter, is here described.

***Oncopodiella trigonella*** (Sacc.) Rifai, 1965.

Type species: *O. trigonella* (Sacc.) Rifai, 1965.

Synonyms: *Piricauda trigonella* (Sacc.) R.T.Moore, 1959. *Sporidesmium trigonellum* Sacc., 1882.



Figs. 1-3. *Oncopodiella trigonella*. — 1. Conidia. — 2. Young conidia and conidiophores. — 3. Abnormal conidia (from *Libert* 432,  $\times 1250$ ).

Fig. 112. Drawing of *Oncopodiella trigonella* (Sacc.) Rifai as proposed by Rifai (1965).

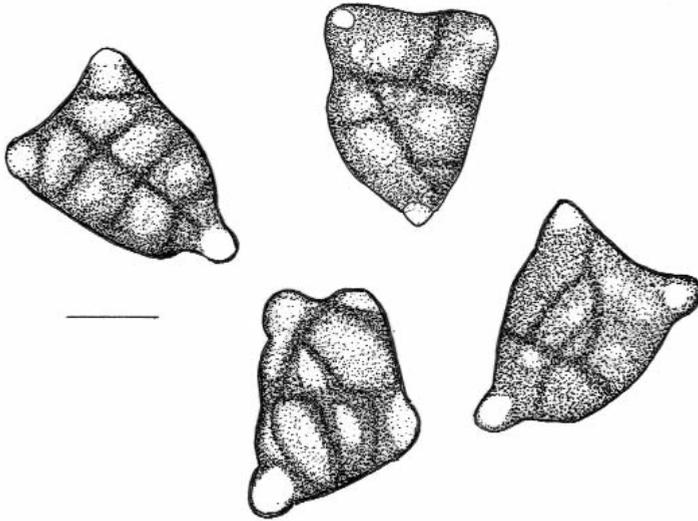


Fig. 113. *Oncopodiella trigonella*. Conidia found on indetermined litter at Montagna Grande (Pantelleria). Bar 6  $\mu$ m.

Colonies inconspicuous, brown, dark brown. Conidiophores macronematous, mononematous, slender, gently flexuous, unbranched, clear brown, smooth,  $30 \times 2-3 \mu$ m. Conidiogenous cells polyblastic, integrated, terminal, sympodial, with cylindrical denticles. Conidia solitary, acropleurogenous, 2-3 corniculate, horns clear brown, irregularly triangular, dark reddish brown, with transverse, longitudinal and oblique large, black septa difficult to observe, with a protuberant hilum,  $14-19 \times 12-16 \mu$ m.

On dead leaves of indeterminate plant. Montagna Grande, Pantelleria.

From the morphological characters described our strain seems coinciding well with *O. trigonella* as described by Rifai (1965).

### SCOLECOBASIDIUM

(Abbott 1927 ex Graniti 1962, Giorn. Bot. Ital.; Boll. Soc. Bot. Ital. 1962)

The genus *Scolecobasidium* was erected by Abbott (1927) on the type species *S. terreum* with the following description:

***Scolecobasidium*** gen. nov.

Hyphae creeping, septate; conidiophores arising as short side branches from aerial hyphae, not erect, non-septate. Conidia elongate, two celled, smooth, light olivaceous to almost

hyaline, born singly on short, terminal, thread- like sterigmata; one to three sterigmata on each conidiophore.

Type species: *Scolecobasidium terreum*.

Unfortunately the Author did not publish a latin diagnosis, but some years later (1962) Graniti validated the Abbott new genus with the following diagnosis that include also an amendment, concerning the conidia septation, opening in this way the inclusion to species with more that one septum:

***Scolecobasidium*** Abbott ex Graniti, 1962.

*Hyphae septatae ramosae brunneae. Conidiophora plerumque simplicibus et ex lateribus hypharum singulariter oriunda, continua vel septata, brunnea. Conidia singula, per sterigmata filiformia ad apicem lateresque conidiophori oriunda, continua vel septata, brunnea.*

*Species typica: Scolecobasidium terreum* Abbott.

On mediterranean maquis litter we have found two species: *S. constrictum* and *S. tshawytschae*.

***Scolecobasidium constrictum*** Abbott, 1927.

Conidiophores macronematous, mononematous, solitary, unbranched, clavate or cuneiform, clear brown, that can be also very short, 5-30×1.5-2.5 µm. Conidiogenous cells polyblastic, terminal, intercalary, sympodial, denticulate, denticles thread-like, usually breaking in two parts, one remains attached to the conidium. Conidia solitary, acropleurogenous, oblong ellipsoidal, 1-septate, usually constricted at the septum, pale olivaceous brown, verruculose or finely echinulate, 5-12.5×2-4 µm.

Synonym: *Heterosporium terrestre* A. G. Atk., 1974.

On dead leaves of *Arbutus unedo*, *Cerotonia siliqua*, *Chamaerops humilis*, *Cistus salvifolius*, *Myrtus communis*, *Phillyrea angustifolia*, *Pistacia lentiscus*, *Quercus ilex*, *Smilax aspera*.

Torre del Sevo. Central West Sardinia, Italy.

***Scolecobasidium tshawytschae*** (Doty & Slater) MacGinnis & Aiello, 1974.

Conidiophores macronematous, mononematous, erect, unbranched, clear brown, smooth, 4-25×1.5-2.5 µm. Conidiogenous cells polyblastic, integrated, terminal, sympodial, denticulate, denticles thread-like, usually breaking in two parts, one remains attached to the conidium. Conidia solitary, acropleurogenous, cylindrical rounded at the ends, 1-3-septate, sometimes constricted at the septa, clear brown, verruculose or finely echinulate, 9-20×2.5-4.5 µm. Clamydospores rarely present.

Synonyms: *Scolecobasidium variabile* Barron & Busch, 1962; *S. macrosporum* Toy, Dwivedi & Mishra, 1962; *Ochroconis tshawytschae* (Doty & Slater) Kiril & Al-Achmed, 1977.

On dead leaves of *Chamaerops humilis*, *Pistacia lentiscus*, *Quercus ilex*. Torre del Sevo. Central West Sardinia. Italy

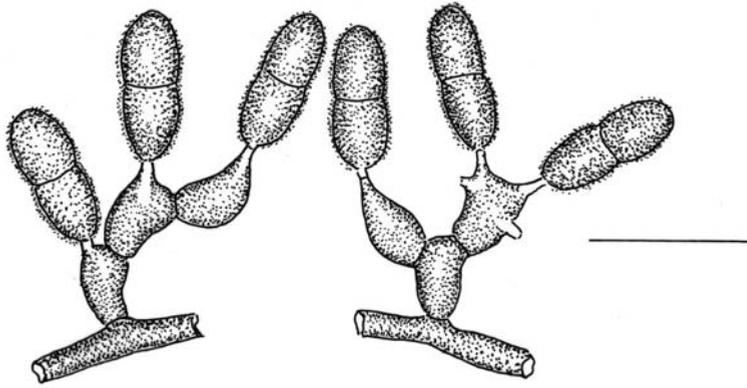


Fig. 114. *Scolecobasidium constrictum*. A very common species with clavate conidiogenous cells. Bar 10  $\mu\text{m}$ .

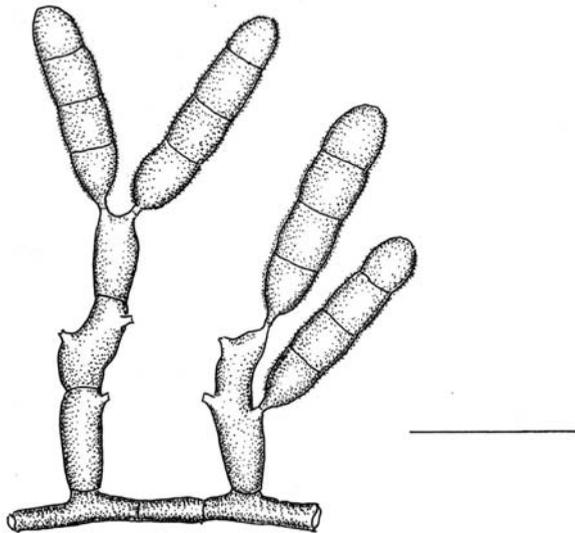


Fig. 115. *Scolecobasidium tshawytschae*. Denticulate conidiogenous cells and conidia. Bar 10  $\mu\text{m}$ .

## STEMPHYLIUM

(Wallroth 1833, Fl. crypt. Ger. :300)

The genus *Stemphylium* was erected by Wallroth (1833) on the type species *S. botryosum* to include species with dictiosporous conidia and percurrent conidiogenous cells. The genus diagnosis (fide Saccardo, 1886) is here reported.

***Stemphylium*** Wallr., 1833.

*Hyphis articulato-nodulosis abbreviatis erectis in fasciculos distinctos pulvinatos gregatimque excurrentes junctis, fragilibus; conidio ovato subangulato longitudinaliter transversimque septato, veluti concamerato laxe appenso opaco nigro majusculo terminatis.*

*Hab. ad caules exsiccatos, in hortis, in strues congestos e.g. Asparagorum in Germania.*

*Type species: Stemphylium state of Pleospora herbarum* (Pers. ex Fr.) Rabenh.

An extensive description of the genus is reported by Ellis (1971).

***Stemphylium*** Wallroth, 1833.

Colonies effuse grey, brown, olivaceous brown or black, velvety or cottony. Mycelium immersed or partly superficial. Stroma sometimes present. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, scattered or caespitose, unbranched or occasionally loosely branched, straight or flexuous, usually nodose with a number of vesicular swellings, pale to mid brown or olivaceous brown, smooth or in part verruculose. Conidiogenous cells monoblastic, integrated, terminal, percurrent, at first clavate or subspherical with the wall at the apex thin, later often becoming calyciform by invagination. Conidia solitary, dry, acrogenous, oblong, rounded at the ends, ellipsoidal, obclavate or subspherical, some species with a pointed conical apex and one with lateral conical protrusions, pale to mid dark or olivaceous brown, smooth, verrucose or echinulate, muriform, often constricted at one or more of the septa, cicatrized at the base.

*Type species: Stemphylium state of Pleospora herbarum* (Pers. ex Fr.) Rabenh. = *S. botryosum* Wallr.

From mediterranean maquis litter we have found only one specimens that we prefer to leave indeterminate since observed only on poor material.

***Stemphylium*** sp. a2 (11).

*Type species: Stemphylium state of Pleospora herbarum* (Pers. ex Fr.) Rabenh.

Colonies composed by small groups of conidiophores, olivaceous brown. Conidiophores macronematous, mononematous, scattered, caespitose, unbranched, flexuous, characterized by the presence of vesicular swellings, pale olivaceous brown, smooth, 63-79×7 µm conidiogenous cell included. Conidiogenous cells monoblastic, integrated, terminal, percurrent, almost clavate, clear brown. Conidia solitary, dry, acrogenous, oval, ellipsoidal or subspherical, olivaceous brown, gently verrucose, muriform, constricted at the medium septum, cicatrized at the base, 26-31×16-19 µm.

On dead leaves of *Euphorbia* sp. Montagna Grande, Pantelleria.

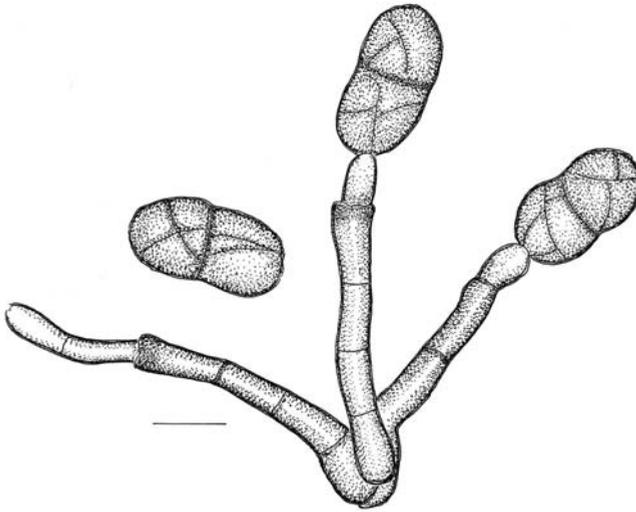


Fig. 116. *Stemphylium* sp. a2 (11). Conidiophores and conidia. Bar 14  $\mu$ m.

## ULOCLADIUM

(Preuss 1851, *Linnaea*, 24: 111)

The genus *Ulocladium* was established by Preuss (1851) on the type species *U. botrytis* Preuss and to include species with dictiosporous (muriform) conidia and sympodial cicatrized conidiogenous cells. The genus diagnosis (fide Saccardo, 1886) is here reported.

***Ulocladium*** Preuss, 1851.

*Mycelio effuso lato; hyphis ramosissimis, flexuosis, fusco-diaphanis, septatis; acervulis conidiorum confertis, atro-fuscis, prima pellucidis, tum impellucidis, apicibus innatis dein deciduis; conidiis polymorphis oblongis, 3-5-septato-muriformibus, septis longit. 1-2-seriatis, apiculo basilari instructis.*

*In lignis Quercuum, in calidariis sub testis floralibus, Hoyerswerda.*

A more extensive description of the genus is reported by Ellis (1971).

***Ulocladium*** Preuss, 1851.

Colonies effuse, brown, olivaceous brown, dark blackish brown or black. Mycelium partly superficial, partly immersed. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, mononematous, unbranched or branched, straight or flexuous, often geniculate, pale to mid brown, smooth or verruculose. Conidiogenous cells polytretic, integrated, terminal becoming intercalary, sympodial, cylindrical, cicatrized. Conidia solitary

in most species but secondary conidia on short secondary conidiophores give rise to chains in some, dry, acropleurogenous, simple, mostly broadly ellipsoidal or obovoid, sometimes clavate, pyriform or subspherical but not obclavate or rostrate, frequently with a minute projecting hilum, pale to dark blackish brown, smooth or verrucose, with transverse and usually also longitudinal or oblique septa; septation sometimes cruciate.

Type species: *Ulocladium botrytis* Preuss.

On mediterranean maquis litter we have found five species: *Ulocladium botrytis*, *U. alternariae*, *U. atrum*, *U. oudemansii* and *U. consortiale*.

***Ulocladium botrytis* Preuss, 1851.**

Conidiophores macronematous, mononematous, frequently dichotomously branched, geniculate, clear to mid golden brown, smooth, up to  $100 \times 3.5 \mu\text{m}$ . Conidiogenous cells polytretic, integrated, terminal becoming intercalary, cicatrized, sympodial, cylindrical. Conidia solitary, ellipsoidal or obovoid, frequently with a minute basal hilum, with 1-3 transverse and 1 or more longitudinal septa, rarely cruciately septate, golden brown, verruculose or verrucose,  $13\text{-}30 \times 6\text{-}19 \mu\text{m}$ .

On dead leaves of *Cistus monspeliensis*. Torre del Sevo. Central West Sardinia, Italy.

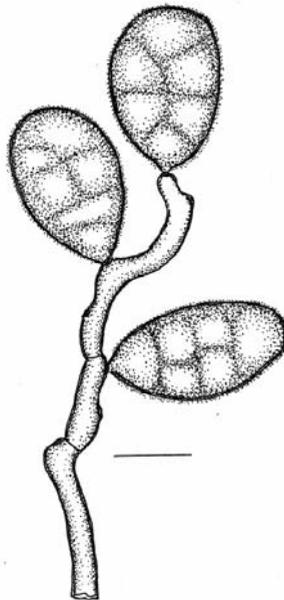


Fig. 117. *Ulocladium botrytis*. Conidiophore and verrucose conidia. Bar  $10 \mu\text{m}$ .

***Ulocladium alternariae*** (Cooke) E. G. Simmons, 1967.

Conidiophores macronematous, mononematous, unbranched, pale golden brown, smooth or inconspicuously roughened, up to  $100 \times 4-7 \mu\text{m}$ . Conidiogenous cells polytretic, integrated, terminal becoming intercalary, sympodial, cicatrized, cylindrical. Conidia ellipsoidal, with 1-5 transverse and 1 or more longitudinal or oblique septa, golden brown, smooth or finely roughened,  $18-35 \times 15-20 \mu\text{m}$ .

On dead leaves of *Chamaerops humilis*, *Cistus salvifolius*. Torre del Sevo. Central West Sardinia, Italy.

***Ulocladium atrum*** Preuss, 1852.

Conidiophores macronematous, mononematous, solitary, sometimes branched, clear to golden brown, smooth rarely verrucose, up to  $120 \times 3-8 \mu\text{m}$ . Conidiogenous cells polytretic, integrated, terminal becoming intercalary, sympodial, cylindrical, cicatrized. Conidia ellipsoidal, obovoid, spherical or subspherical, irregular with 1-3 transverse and 1 or more longitudinal septa, frequently subspherical cruciately septate, golden brown or dark reddish brown, verrucose,  $15-32 \times 11-18 \mu\text{m}$ .

On dead leaves of *Cistus salvifolius*, *Phillyrea angustifolia*, *Pistacia lentiscus*. Torre del Sevo. Central West Sardinia, Italy.

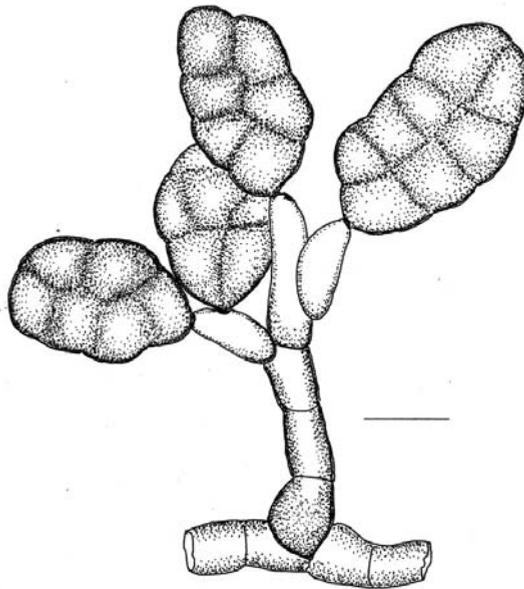


Fig. 118. *Ulocladium alternariae*. Conidiophore and conidia. Bar  $10 \mu\text{m}$ .

***Ulocladium oudemansii*** E. G. Simmons, 1967.

Conidiophores macronematous, mononematous, branched, straight or flexuous, golden brown, smooth, up to  $250 \times 5-8 \mu\text{m}$ . Conidiogenous cells polytretic, integrated, terminal becoming intercalary, sympodial, cylindrical, cicatrized. Conidia obovate, clavate or ellipsoidal, with 3-5 transverse and several longitudinal septa, golden brown or dark reddish brown, verrucose, with basal cell usually smooth,  $18-34 \times 9-17 \mu\text{m}$ .

On dead leaves of *Chamaerops humilis*, *Phillyrea angustifolia*. Torre del Sevo. Central West Sardinia, Italy.

***Ulocladium consortiale*** (Thum.) Simmons, 1967.

Type species: *U. botrytis* Preuss, 1851.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, unbranched, originating from aerial hyphae, gently flexuous or geniculate, clear brown, smooth,  $18-36 \times 4 \mu\text{m}$ . Conidiogenous cells polytretic, integrated, generally terminal, sympodial, cylindrical, cicatrized. Conidia solitary, acropleurogenous, ellipsoidal, obovoid, with a short hilum, brown, clear brown, smooth, with transverse and oblique, longitudinal septa, secondary conidia often formed, originating by germination of primary conidia that are able to produce short conidiophores,  $20-25 \times 12-13 \mu\text{m}$ .

On dead leaves of *Quercus ilex*. Montagna Grande, Pantelleria.

The morphological characters of our strain are well coinciding with the original description (Simmons 1967).

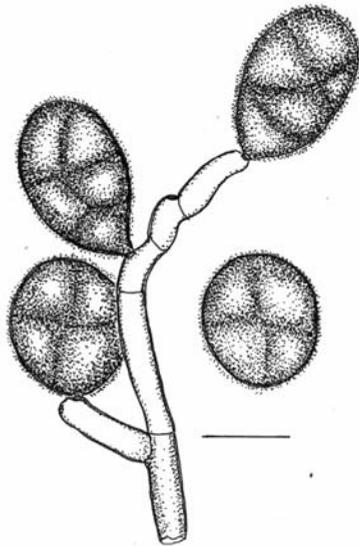


Fig. 119. *Ulocladium atrum*. Conidiophore and verrucose conidia. Bar  $15 \mu\text{m}$ .

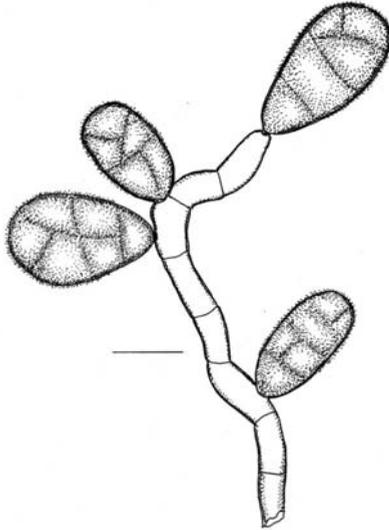


Fig. 120. *Ulocladium oudemansii*. Conidiophore and conidia, the conidial basal cell is smooth. Bar 12  $\mu$ m.

### Discussion and conclusions

Seven mediterranean areas were investigated about the presence of *Dematiaceous Hyphomycetes* as litter colonizers. It is necessary to point out that the vegetation of the areas was sufficiently similar; only small differences were found at Circeo National Park the only area in which *Rhamnus cathartica* is present with a very nice vegetation.

Hundred and eight species belonging to 62 genera were found and described.

Examining the distribution of the different conidiogenous cells of the microfungal community found on different substrata, *sympodial*, *percurrent*, *phialidic* and *determinate*, the number of species belonging to the first morphological type appears very high, 48 %, followed by phialidic conidiogenous cells, 20%, and by determinate, 19%, while only the 13% of the species presents percurrent conidiogenous cells. Since the transformation of the vegetal organic material is commonly carried out by interaction and succession of two or more species, it appears obvious to consider as first colonizers those species with great ability of penetrating the dead tissues and more resistant to unfavorable environmental conditions that are conditioning the colonization on more superficial litter layer, like *Repetophragma*, *Penzigomyces*, *Endophragmia*, *Endophragmiella* spp., with percurrent development and conidiogenesis (Pasqualetti & al. 2006), or sympodial species with easy spore germination and developing structures protected by pigmented walls, *Bipolaris*, *Curvularia*, *Exserohilum* spp. (Ciccarone & Rambelli 1998), as those able to prepare the substratum to host new colonizers for further transformations or complete mineralization,

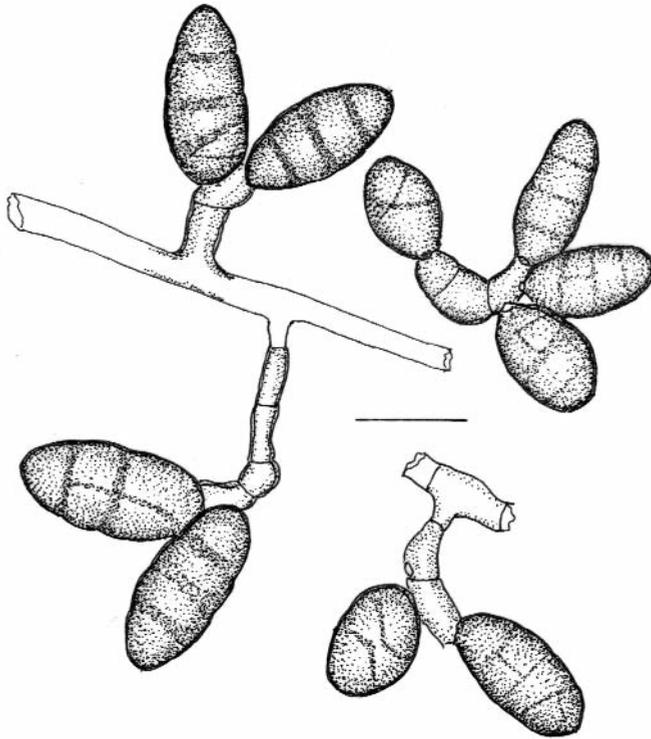


Fig. 121. *Ulocladium consortiale*. Sympodial conidiogenous cells and conidia. Bar 16  $\mu\text{m}$ .

that could be carried out by sympodial species belonging to *Anungitea*, *Veronaea*, *Sympodiella* spp. and so on, or by phialidic as *Circinotrichum*, *Gyrothrix*, *Chalara* spp. and more others. In any case, even if these actions are supported by researches and investigations (Mulas & al. 1990, 1995; Tempesta & al. 2003; Tempesta & al. 2005; Tokumasu 1996; Zucconi & al. 1997) in these phenomena of organic material transformation should be interesting to evaluate, as very important or determinant, the enzymatic activities of the different saprotrophs.

Considering 89 *Dematiaceous Hyphomycetes*, excluding the species on unknow substratum, *Pistacia lentiscus* resulted to be the more colonized: 35 species, followed by *Arbutus unedo* with 18 species, *Phillyrea latifolia* with 16 species, *Quercus ilex* with 16 species, *Pinus pinaster* var. *hamiltonii* with 11 species, *Myrtus communis* with 10 species, *Smilax aspera* with 9 species, *Rhamnus cathartica* with 7 species, *Olea europaea* with 4 species, *Euphorbia* sp. and *Arundo donax* with 1 species.

Some species of microfungi are able to colonize also several different substrata, like *Zygosporium gibbum* found on 12 substrata; *Scolecobasidium constrictum* on 6 substrata;

*Cylindrotrichum oligospermum* colonizes 5 substrata. Frequently all these microfungi are present on the same substrata and this seems a behaviour of the species more active as colonizers.

Other species of *Dematiaceous Hyphomycetes* were identified on only two substrata, this is the case of *Ardhachandra critaspora* and *A. aequilatera*, both on *Pistacia lentiscus* and *Myrtus communis*; *Pleurotheciopsis asymmetrica* on *Phillyrea latifolia* and *Arbutus unedo*.

More interesting is the presence of *Dematiaceous Hyphomycetes* colonizing only one substratum: on *Phillyrea latifolia* we find *Anungitea pseudoramosa*, *Pleurophragmum bramleyi*, *Dendryphion comosum*, *Dictyochaeta* sp. 1, *Dictyosporium freycinetiae* and *Ulocladium oudemansii*. On *Pistacia lentiscus*: *Acumispora fragmospora*, *Solosyodiella clavata*, *Anungitea fragilis*, *Anungitopsis pantelleriae*, *Nakataea fusispora*, *Camposporium antennatum*, *C. pellucidum*, *Penzigomyces* sp., *Spegazzinia tessartha*, *Zygosporium echinosporum*, *Syngodiella acicola*, *Maxibeltrania maxima*, *Matsushimaea fasciculata*, *Torula herbarum*, *Polyscytalum fecundissimum*, *Xylohypha ferruginosa*, *Cryptocoryneum condensatum*.

About this group it needs to point out the behaviour of *Acumispora fragmospora* that we observed on dead leaves of *P. lentiscus* collected not only in the six areas studied but also in other samplings not considered in this work: we have never found the fungus on other substrata. We think that *A. fragmospora* could be considered a saprotroph specialized to *P. lentiscus*. An analogous observation could be carried out for *Endophragmiella boewei* not included in this list because found also on *Pinus pinaster* var. *hamiltonii*. We observed this *stress tolerant* fungus for many years always on *P. lentiscus* dead leaves with colonizations very abundant that could be defined “*optimal colonization*”. Its presence on dead leaves of *Pinus* is composed by only few conidiophores and not forming a true colony that we can define “*adaptive colonization*”, this carry us to consider also this species as saprotroph specialized to *P. lentiscus*.

Three species of the genus *Gyrothrix*, *G. citricola*, *G. grisea* and *G. macroseta* are present respectively on 3, 4 and 2 substrata, they have in common the ability to colonize *Pistacia lentiscus* dead leaves.

*Myrtus communis* is a very common plant in all the mediterranean areas and dead leaves on the surface of the soil form an abundant litter, nevertheless in our researches resulted colonized only by 10 species and among these 4 only on this substratum: *Anungitea* sp.n.1, *Zygosporium mycophilum* and two *Chalara*, *C. brevispora* and *C. microspora*, presumably this substratum contains some substances inhibiting the fungal colonization (Pasqualetti & al. 1999) and under this respect a study on fungal selection of this substratum would be very interesting. On the contrary *Smilax aspera* deposits on the soil only few leaves that are colonized and transformed in a very short time, even if we have found only 9 species and among these: *Conoplea fusca*, *Gyrothrix verticiclada*, *G. circinata*, *Zygosporium minus* and *Bipolaris sacchari*, all species forming several, large, well delimited colonies.

The substrata more selective in fungal colonization seems to be *Euphorbia* sp. with only *Stemphylium* sp. and *Arundo donax* with *Periconia digitata*.

In general a common character of all these colonizations is the heterogeneity of the species of microfungi observed, with different morphology, mechanisms of conidiogenesis and presumably of penetration into the substrata, but this could be the results of a strategy dominated by the interactions of the different species in carrying out a succession of actions that lead to a complete transformation of the organic material.

A new genus is proposed, *Maxibeltrania*, with the new combination *Maxibeltrania maxima*, on basionym *Beltrania maxima* Rambelli & Ciccarone (2008). The fungus, found on forest litter in Costa Rica was included in the genus *Beltrania* for its characteristic biconic conidia. A new finding at Pantelleria on dead leaves of *Pistacia lentiscus* and a reexamination of the morphological characters mainly of the conidiogenous cells, very different if compared with those of the species belonging to the genus *Beltrania*, suggested to accommodate it in a new genus with etymology connected to the conidiogenous cells dimensions.

*Penzigomyces salinae* is proposed as new species for its sporodochium like colonies, percurrent nodose conidiogenous cells and spear shaped euseptate conidia.

A new combination is concerning the genus *Endophragmia*. This genus is characterized by conidiogenous cells calyciform and conidiophores unbranched. The species was described by Rambelli as *Brachysporiella biconstituta* (1961) for a wrong interpretation of a structure resembling branched conidiophores and for the presence of a synanamorph of the genus *Selenosporella*. Matsushima proposed a new accommodation in the genus *Endophragmiella* as *E. biconstituta* (Rambelli) Matsushima (1989), but not considered the calyciform structure of the conidiogenous cells. The recent finding of the species on dead leaves of *Arbutus unedo* at Salina island and the reexamination of the conidiophores not branched and of the conidiogenous cells with clear calyciform structures suggested the new combination *Endophragmia biconstituta* (Matsushima) Rambelli with basionym *Brachysporiella biconstituta* Rambelli (1961).

We laid particular attention in including the original diagnosis or quoted as original in the different description of genera and species, this to help the determinations, mainly for the new taxa, to evaluate and respect the most important morphological characters, and to avoid the utilization of less important in proposing new genera. In the eighteenth and nineteenth century some authors described new genera without a latin diagnosis, but these determinations were frequently validated by others, for instance by Saccardo and more recently by Graniti and others. For this reason frequently the diagnosis reported are referred to the validating authors.

The researches carried out are not conclusive since many others mediterranean maquis ecosystems present in different countries, and then characterized by different climatic and in general ecological conditions and presumably with interesting micro-fungal species could be investigated; this could be done with very fruitful results with a more extensive participation to these difficult but fascinating studies.

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