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Dematiaceous *Hyphomycetes* from Pantelleria Mediterranean maquis litter. Third contribution

Abstract

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In the third contribution to the study of Pantelleria mediterranean maquis litter, thirteen species of Dematiaceous *Hyphomycetes* are found and described. Three of them are proposed as new species: *Anungitea pseudoramosa*, *A. sibaensis* and *Subulispora insularis*.

Key words: Pantelleria, litter Dematiaceous *Hyphomycetes*.

Introduction

The impact of Dematiaceous *Hyphomycetes* on natural environment is one of outstanding importance: these species act in forest's litter spoilage as primary and secondary degradators, the product of this digestion is the enhancement of soil fertility through the immission of humic acids and the constitution of specific humus in the superficial horizons of the pedogenetic profile. Every type of botanical consortium needs a specific humus in order to approximate the climatic balance, the only one that allows the undefined permanence of the privileged consortium on that soil. In order to expand knowledge of the biodiversity of litter-decaying filamentous microfungi in Pantelleria mediterranean maquis, the authors monitored in July 2009 the study area located in Montagna Grande, Santa Teresa, Sibà and Specchio di Venere. In this third investigation, thirteen species of Dematiaceous *Hyphomycetes* are found, three of them are proposed as new species belonging to the genera *Anungitea* and *Subulispora*. The determination and the morphological description of the filamentous microfungi is based on direct observation on the natural substratum after incubation in damp chambers.

Taxonomy

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

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

Synonyms:

Ceratosporella goidanichii Rambelli, 1958

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 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 presents a lageniform, doliform 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 exact.

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 macrone-matous, monone-matous, unbranched, dark-brown, clearer towards the apex, smooth, not lageniform at the base, erect or gently flexuous, 83-170×5 µm. 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 ends hyaline or subhyaline, 38-50×9-13 µm.

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

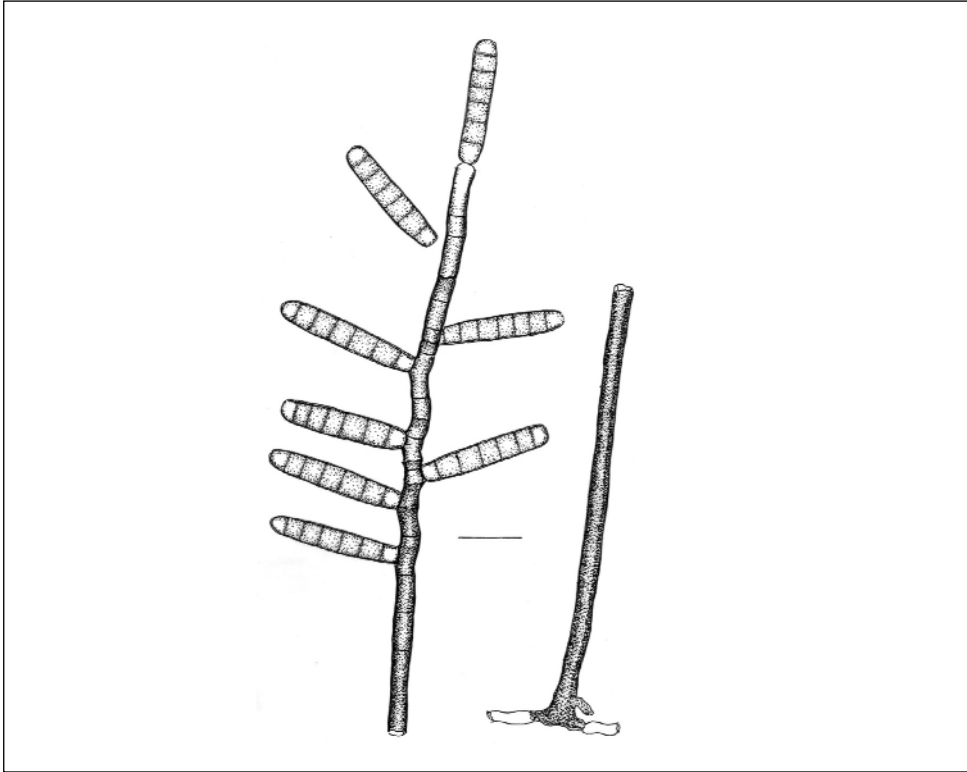


Fig.1. *Repetophragma goidanichii*. Percurrent conidiogenous cell and conidia. Bar 20 μ m.

conidiogenous cell. We presume that this morphological character could be influenced by the substratum composition. This seems confirmed 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

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***Subulispora insularis* Ciccarone & Tempesta sp. nov.**

Etym. *insularis* because found in a island (Pantelleria).

Type species: *S. procurvata* Tubaki, 1971.

Coloniae sparsae, plerumque inconspicuae, ex conidiophora solitaria constituta. Conidiophora macronematosa, mononematosa, oriunda plerumque solitaria, recta, erecta vel leniter flexuosa, brunnea, apicem versus dilute brunnea, laevia, septata, 99-117×4 um ad basim. Cellulae conidiogenae integratae, polyblasticae, sympodiales, terminales, cica-tricibus conidialibus attenuates. Conidia solitaria, acropleurogena, subulata, apicem abrupte curvata, ad basim truncata, apicibus rotundata, recta, hyalina, laevia, 6-7 septata, 36-60×1.8 um.

In foliis dejectis. Montagna Grande, Pantelleria.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macrone-matous, mononematous, solitary, straight, erect or gently flexuous, brown, clearer towards

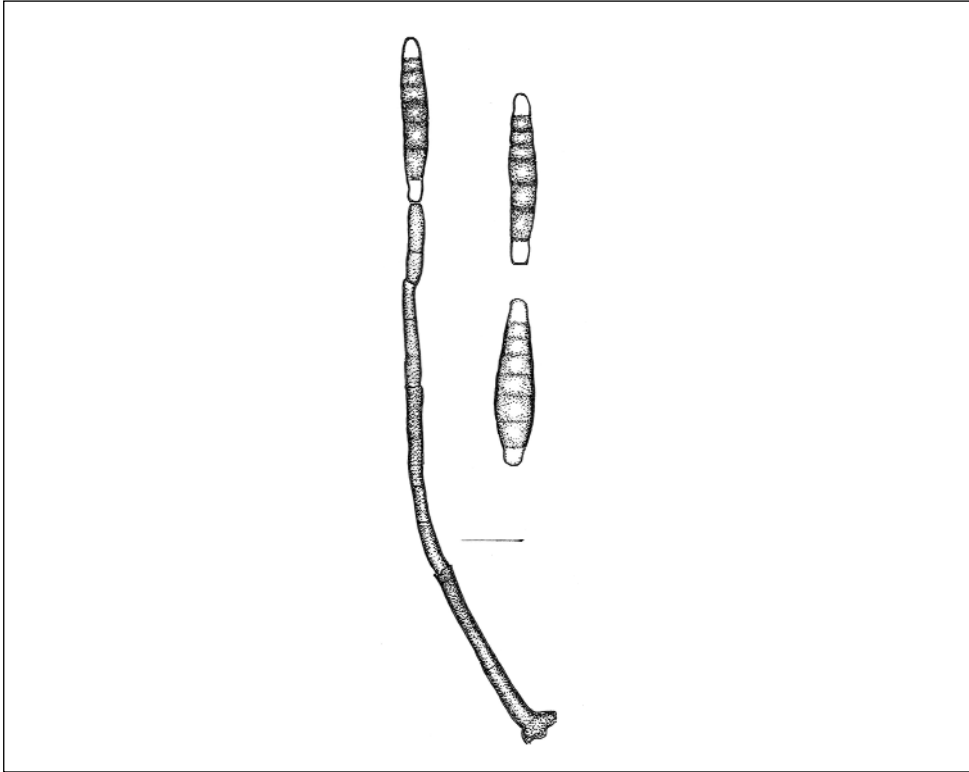


Fig.2. *Repetophragma cambrense*. Old and young conidia. Bar 18 µm.

the apex, smooth, septate, 99-117×4 µm near the base. Conidiogenous cells integrated, terminal, polyblastic, sympodial, cicatrized, with small flat scars. Conidia solitary, acropleurogenous, cuneiforms, not cylindrical, straight, with truncate base and thin, rounded apex, hyaline, smooth, 6 or 7 septate, 36-60×1.8 µm.

On dead leaves of indeterminate plants. Montagna Grande, Pantelleria.

Deposited: PAL.

The species described presents morphological characters closed to *S. britannica* Sutton (1973), but not coinciding are the dimensions of the conidiophores, longer in our strain and of the conidia larger in *S. britannica*. It differs from *S. cylindrospora* Kirk (1985) and *S. africana* (Kirk 1985) characterized by cylindrical conidia, from *S. minima*, *S. gracilis* de Hoog and *S. variabilis* de Hoog (1985) for general dimensions, from *S. rectilineata* Tubaki characterized by not septate conidia. The peculiar characters of our strain, like the perfect cuneiform conidia, the general dimensions of the conidiophores and conidia unlike to the mentioned species, suggest us to propose for our strain the new species *Subulispora insularis*.

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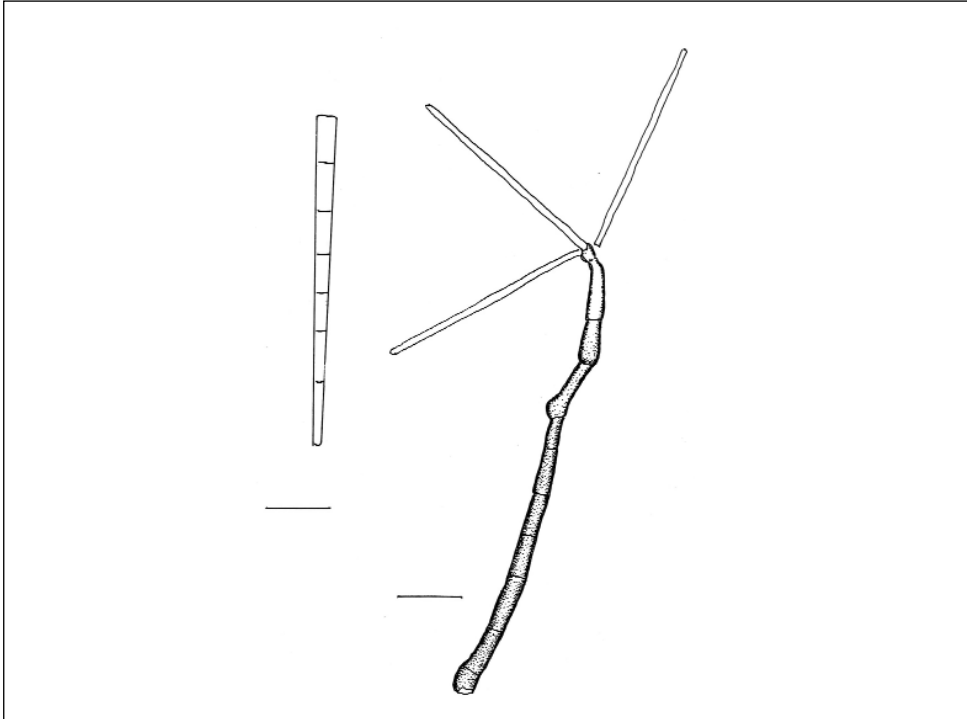


Fig. 3. *Subulispora insularis*. Left bar 8 μm , right bar 17 μm .

***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 polyblastic, regularly and repeatedly percurrent but with annellide structures not regular, 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, $25\text{-}27 \times 10\text{-}11 \mu\text{m}$.

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 disposed at $25\text{-}35 \mu\text{m}$ 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 *Endophragma* 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 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.

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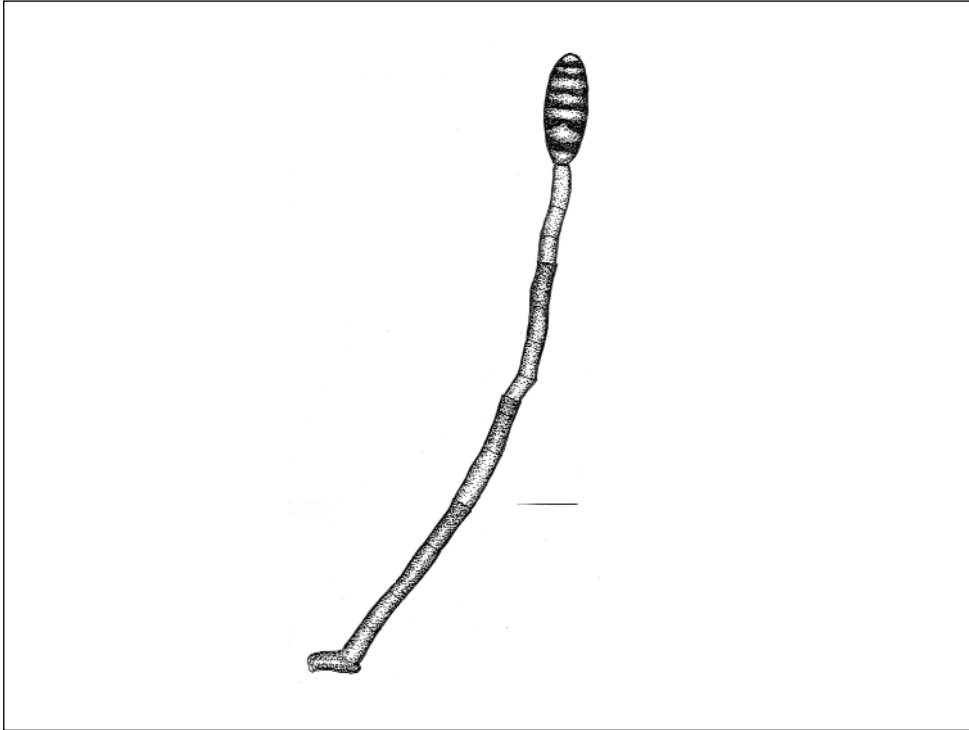


Fig.4. *Sporidesmiella* sp. Annellate conidiogenous cell and conidium. Bar 15 μ m.

***Triposporium elegans* Corda, 1837.**

Type species: *T. elegans* Corda, 1837.

Colonies not crowded, composed by isolated conidiophores. Conidiophores macrone-matous, mononematous, erect, scattered, unbranched, dark brown, smooth, 170-290 \times 6-8 μ m. Conidiogenous cells monoblastic, integrated, terminal, percurrent. Conidia solitary, dry, acrogenous, 2-3 times branched, branches composed by conical 3-4 septate arms joined by a base cell very difficult to distinguish because covered by a regular and hard deposit of a dark brown pigment up to the base of the third cell of each arm. The dark cover become fractured with slide preparations. Arms 13-23 \times 5-8 μ m, black cover 18-23 \times 18 μ m, conidia from arm to arm 50-63 \times 36-40, base conical and doliiform, 7 \times 5 μ m.

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

This species can be referred to *T. elegans* and the dark cover on conidia central part could be determined by an active production of melanin pigment when growing on dead leaves of *Q. ilex*. Since the phenomenon is very common in this strain could be considered a probable exemple of saprotrophic specialization.

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Troposporella monospora (W.B.Kendr.) M.B. Ellis, 1976.

Type species: *T. monospora* (W.B. Kendr.) 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.

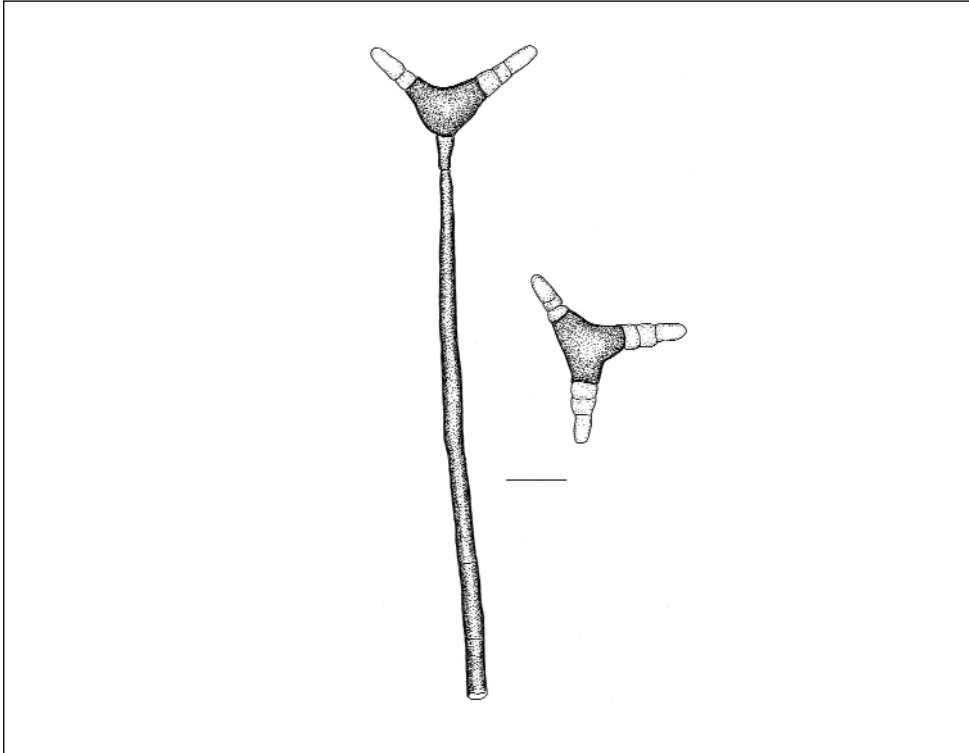


Fig. 5. *Triposporium elegans*. Conidiophores and conidia. Bar 20 μ m.

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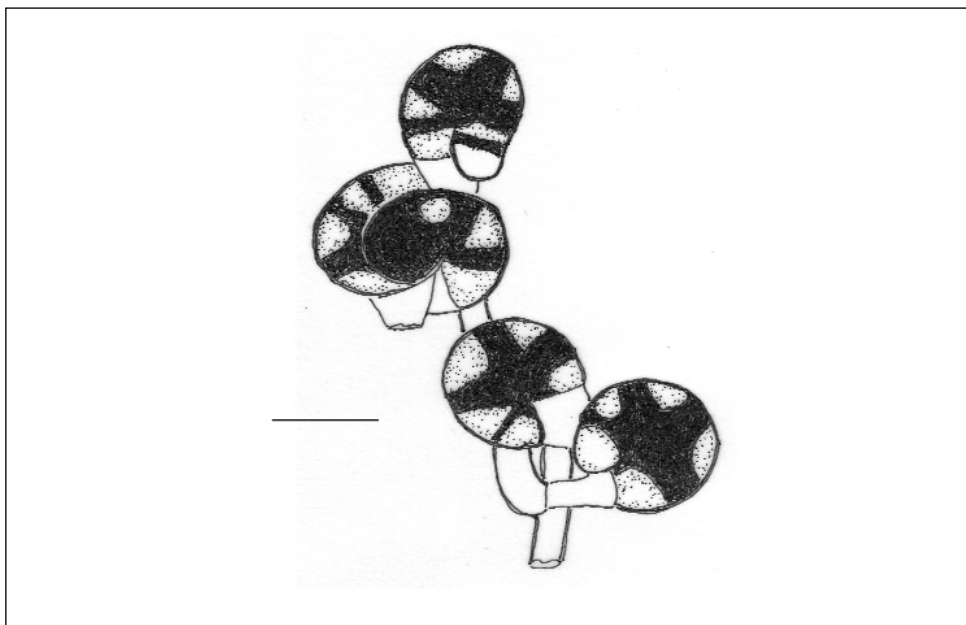


Fig. 6. *Trosporella monospora*. Conidiophores and conidia. Bar 8 μ m.

Anungitea sibaensis Tempesta & Venturella sp. nov.

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

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

Coloniae effusae, dispersae, ex conidiophora solitaria constituta.

Conidiophora macronematosa, mononematosa, recta vel leniter flexuosa, brunnea vel aureobrunnea, apicem versus subhyalina, septata, laevia, 280-340 \times 14 μ m.

Cellulae conidiogenae pallide brunnea, sympodiales, in conidiophoris incorporatae, terminales, denticulatae, denticulis prominentibus praeditae, cylindricae, post generationem collobentes usque ad cicatricibus conidialibus attenuatis.

Conidia in catenas acropetas disposita, fusiformia, 3-septata, ad septa haud constricta, ad apices cicatrices collapsas, pallide brunnea vel aureobrunnea, laevia, 20-25 \times 5 μ m.

In foliis dejectis *P. pinaster* var. *hamiltonii*. Montagna Grande, Pantelleria.

Colonies composed by isolated conidiophores, not crowded. Conidiophores macronematous, mononematous, erect or gently flexuous, brown, yellow - brown, clearer at the apex, septate, smooth, 280-340 \times 9-14 μ 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, 20-25 \times 5 μ m.

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

Deposited: PAL.

Anungitea is a genus established by Sutton (1973) to include all the species characterized by conidiogenous cells proliferating sympodially, denticulate, with denticles cylindrical and producing conidia in acropetal chains. 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 continue 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 to propose the new species *A. sibaensis*. Matsushima (1975) in the graphic representation of *A. triseptata* consider 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 in Pantelleria 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.

Material examined

Anungitopsis triseptata on *Quercus ilex*, *Arbutus unedo*; *A. pantelleriae* Rambelli & Ciccarone on *Pistacia lentiscus*; *Anungitea fragilis* on *Pistacia lentiscus*; *Anungitea riesi* Rambelli & Ciccarone on *A. unedo*; *Anungitea raimondoi* Rambelli, on *A. unedo* (Herbarium Mediterraneum Panormitanum); *Anungitopsis triseptata* on *Newtonia duparquetiana*, on *Corynante pachyceras*, ROHB n. 456.

Anungitea pseudoramosa Venturella & Rambelli, sp. nov.

Etym. conidiophores with pseudo-branches.

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

Coloniae haudquaquam spissae, dispersae, ex conidiophora solitaria constituta.

Conidiophora macronematosa, mononematosa, brunnea, apicem versus pallidiora, septata, laevia, mensura et forma enormiter mutabiles, 50-70×3-4um.

Cellulae conidiogenae, integratae, terminales, intercalare, sympodialiter sicut ramos lateraliter conidigenos locos interdum adsunt, denticula cylindracea protuberantia, quandoque in textura sterile insidentes.

Conidia in catenas acropetas disposita, cylindraceo-baculiformia, raro 1-septata, hyaline, laevia, 10-14×1.8-2 um.

In foliis dejectis *Phillyrea latifoliae*. Montagna Grande, Pantelleria.

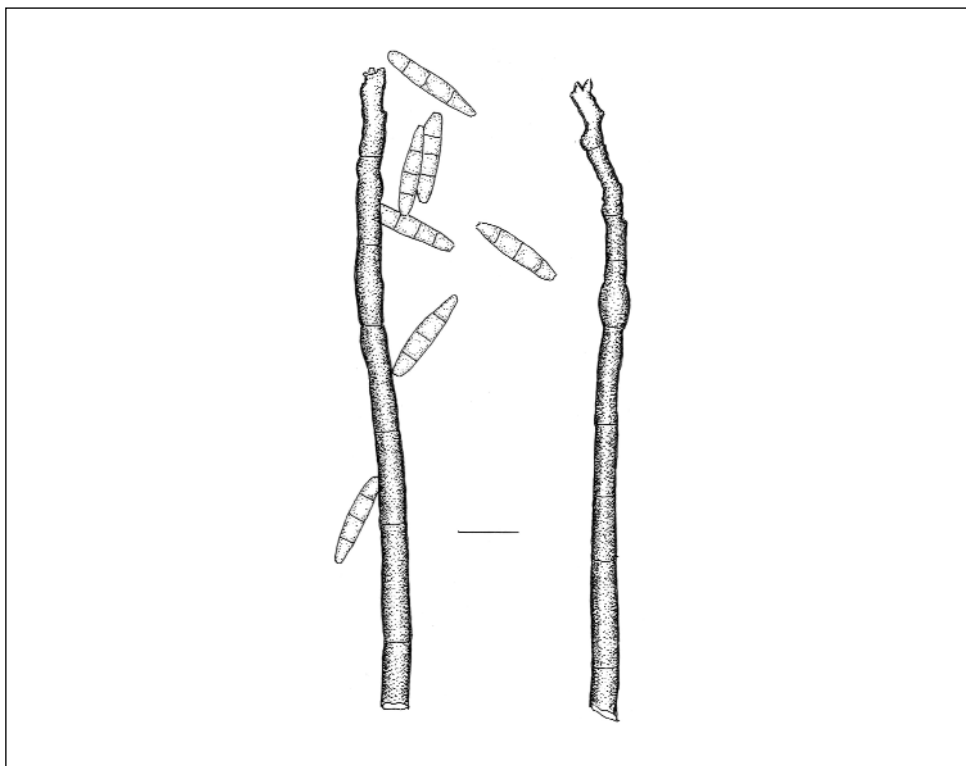


Fig. 7. *Anungitea sibaensis*. Conidiophores, denticulate conidiogenous cells and conidia. Bar 16 μm .

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 μm . 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 other 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 μm .

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

Deposited: PAL.

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 branch, not common into this group of Dematiaceous *Hyphomycetes*, the smaller conidia if compared to *A. fragilis*, suggest to propose for our strain the new species *Anungitea pseudoramosa*.

Material examined

Anungitopsis triseptata on *Quercus ilex*, *Arbutus unedo*; *A. pantelleriae* Rambelli & Ciccarone on *Pistacia lentiscus*; *Anungitea fragilis* on *Pistacia lentiscus*; *Anungitea riesi* Rambelli & Ciccarone on *A. unedo*; *Anungitea raimondoi* Rambelli, on *A. unedo* (Herbarium Mediterraneum Panormitanum); *Anungitopsis triseptata* on *Newtonia duparquetiana*, on *Corynante pachyceras*, ROHB n. 456.

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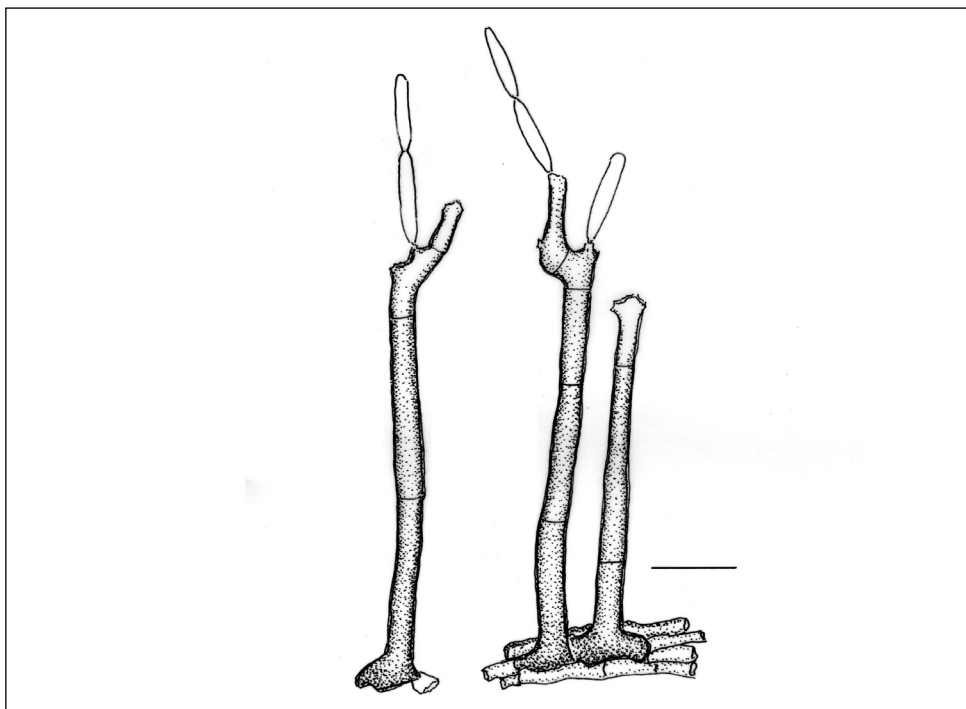


Fig. 8. *Anungitea pseudoramosa*. Denticulate conidiogenous cells and conidia. Bar 12 μm .

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

Type species: *Pleurotheciopsis pusilla* Sutton, 1973.

Colonies not crowded, composed by solitary conidiophores. Conidiophores macronematous, mononematous, not branched, erect, straight or gently flexuous, brown, clearer towards the apex, septate, smooth, up to 400 μm and more in length and 10 μm wide near the base. Conidiogenous cells integrated, terminal, polyblastic, sympodial, sometimes apically denticulated, but with inconspicuous denticles laterally and in the lower parts, very clearly separated by a percurrent and irregular annellation, pale brown in colour. Conidia in acropetal chains, 3-septate, hyaline, slightly constricted at the septa, smooth, fusiform, commonly truncated at the ends, 23-30 \times 4-5 μm .

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

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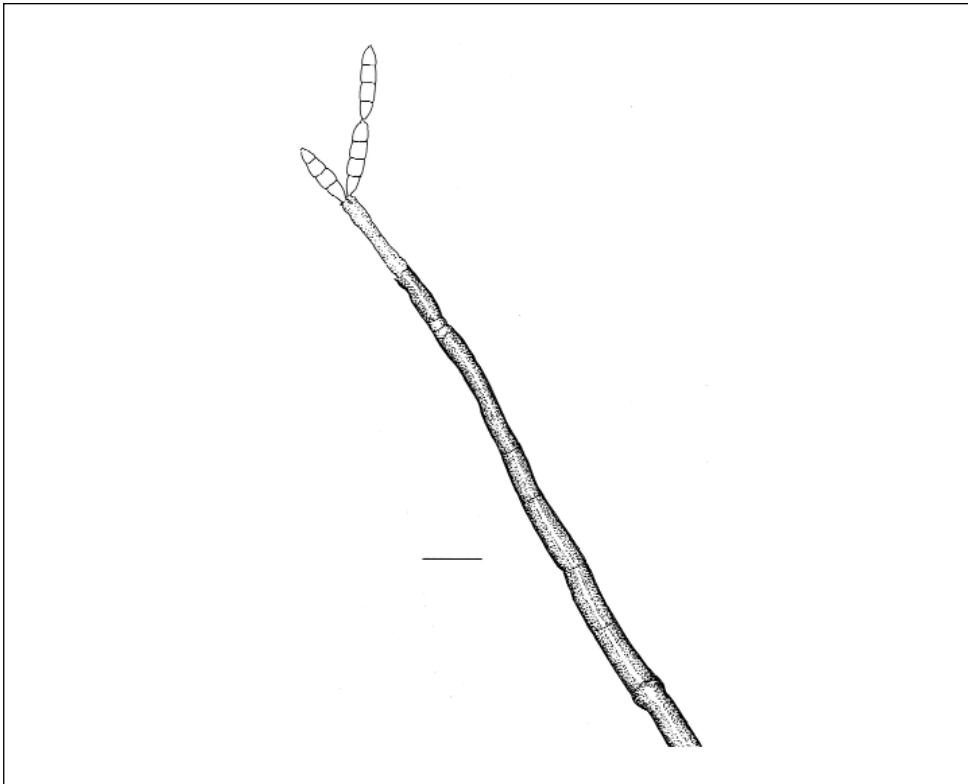


Fig. 9. *Pleurotheciopsis bramleyi*. Bar 20 μm .

***Bipolaris* sp.**

Type species: *B. maydis* (Y. Nisik. & Miyake C.) Shoemaker, 1959.

Colonies composed by isolated conidiophores, Conidiophores macronematous, monone-matous, very variable in shape and dimensions, solitary, yellow-brown, arising from aerial hyphae, geniculate, unbranched, smooth, 19-27×5-6 µm conidiogenous cell included. Conidiogenous cells integrated, polytretic, terminal, sympodial, cicatrized. Conidia solitary, acropleurogenous, cylindrical, rounded at the apices, straw coloured, distoseptate, basal cell clear with a small protuberant hilum, smooth, 31-43×9-11 µm.

On dead leaves of indeterminate plant. Montagna Grande, Pantelleria.

This species is characterized by conidia yellow, golden-yellow and seems closed to the anamorph of *Cochliobolus spicifer* Nelson. Nevertheless the material examined is very poor and we prefer to leave it indeterminate.

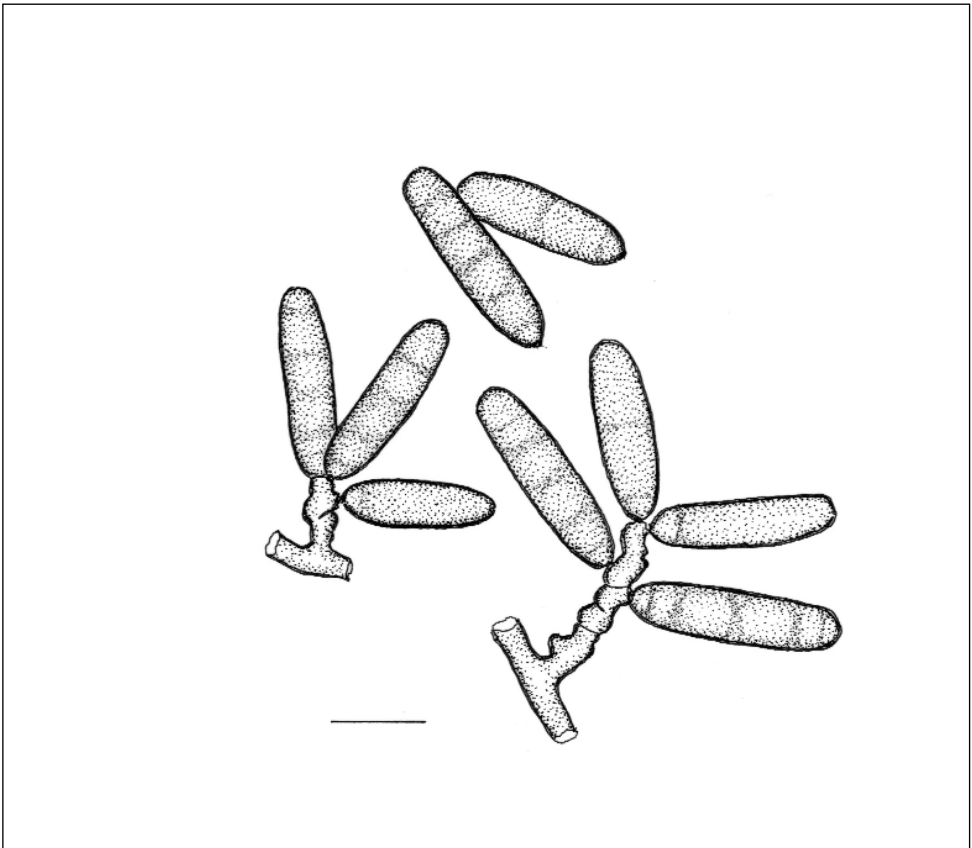


Fig. 10. *Bipolaris* sp. Sympodial conidiogenous cells and conidia. Bar 18 µm.

Ulocladium consortiale (Thum.) Simmons, 1967. Vetr. 4c

Type species: *U. botrytis* Preuss, 1851.

Synonyms:

Alternaria consortialis (Thum.) J.W.Groves & S.Hughes (as “consortiale”), 1953.

Macrosporium consortiale Thum, 1876.

Pseudostemphylium consortiale (Thum) Subram., 1961.

Stemphylium ilicis Tengwall, 1924.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, unbranched, originating from aerial hyphae, gently flexuous or geniculate, clear brown, smooth, 18-36×4 µm. 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, 20-25×12-13 µm.

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

The morphological characters of our strain are well coinciding with the original description (Simmons 1967).

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Ulocladium sp.

Type species: *U. botrytis* Preuss, 1851.

Colonies not crowded, composed by isolated conidiophores. Conidiophores macronematous, mononematous, unbranched, flexuous, very dark brown, smooth, septate, up to 101×5 µm. Conidiogenous cells polytretic, integrated, sympodial, septate, geniculate, cicatrized, smooth, dark brown, clearer in the apical part. Conidia solitary, secondary conidia not formed, acropleurogenous, subspherical, obovoid, with a very small hilum, dark brown,

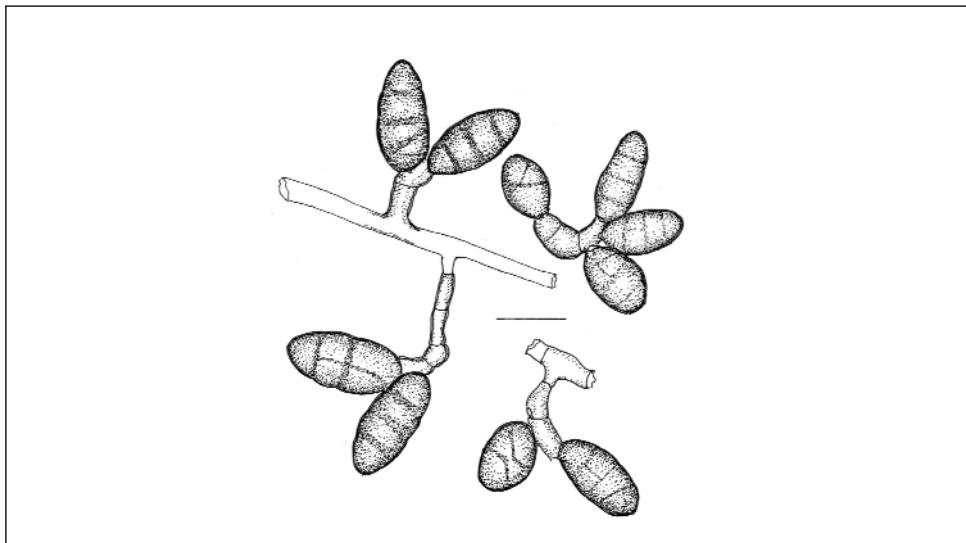


Fig. 11. *Ulocladium consortiale*. Sympodial conidiogenous cells and conidia. Bar 16 μ m.

smooth, with transverse, longitudinal and oblique septa, 17-22 \times 11-22 μ m²121.
On dead leaves of *Arbutus unedo*. Montagna Grande, Pantelleria.

This fungus, growing as isolated conidiophores, presents characters not comparable with species examinable in the references that we have the opportunity to read. Since we hope to examine more material and literature we prefer at present to leave it indeterminate.

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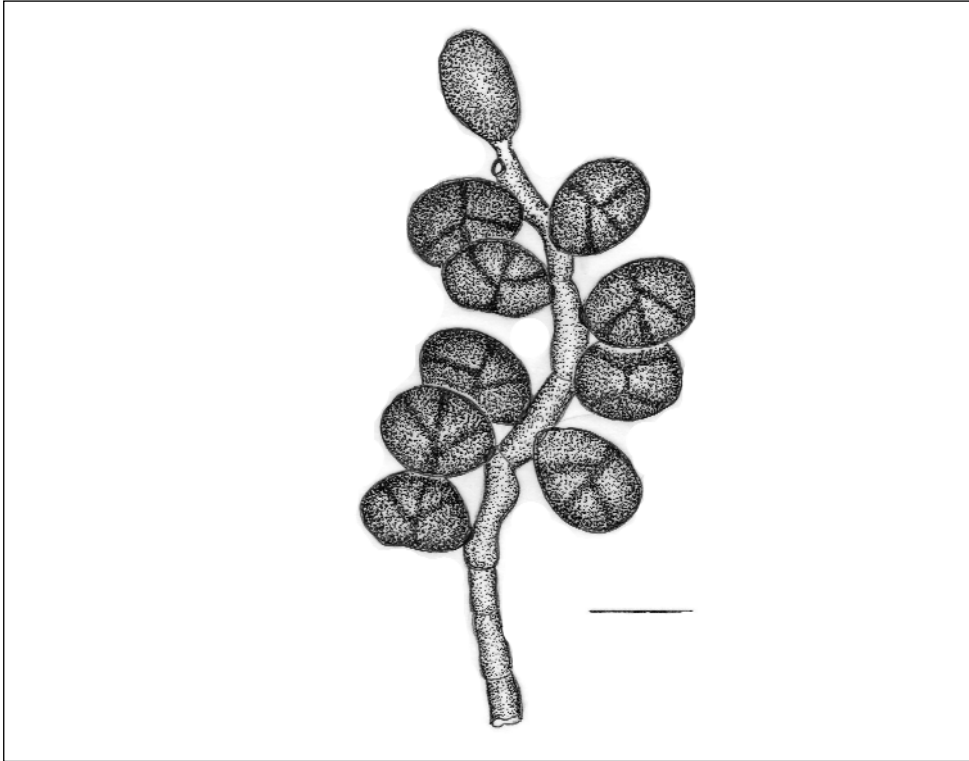


Fig. 12. *Ulocladium* sp. Bar 20 μm .

Oncopodiella trigonella (Sacc.) Rifai, 1965.

Type species: *O. trigonella* (Sacc.) Rifai, 1965.

Synonyms:

Piricauda trigonella (Sacc.) R.T.Moore, 1959.

Sporidesmium trigonellum Sacc., 1882.

Colonies inconspicuous, brown, dark brown. Conidiophores macronematous, mononematous, slender, gently flexuous, unbranched, clear brown, smooth, $30 \times 2-3 \mu\text{m}$. 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, $14-19 \times 12-16 \mu\text{m}$.

On dead leaves of indeterminate plant. Montagna Grande, Pantelleria.

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Conclusions

This third contribution to the discovery of the biodiversity in the group of Dematiaceous *Hyphomycetes* naturalized in the Mediterranean maquis litter of Pantelleria can't be considered conclusive because other interesting areas of the island must be investigated as we foresee that some more species, at least, should be sampled and described. Nevertheless, considering the results of the previous and present works altogether (Rambelli & al. 2008, 2009), forty-four species of Dematiaceous *Hyphomycetes* were found in the sampled areas until now. We find this result a rather satisfactory one, especially if we consider the fact that the Mediterranean maquis litter is composed by highly inhibitory plant debris as to spore germination and fungal colonization.

These grounds support the extension of our investigations all the island's territory throughout, with the additional aim to sharpen the mycological contours of such an interesting ecosystem which sets widely apart from the continental territories.

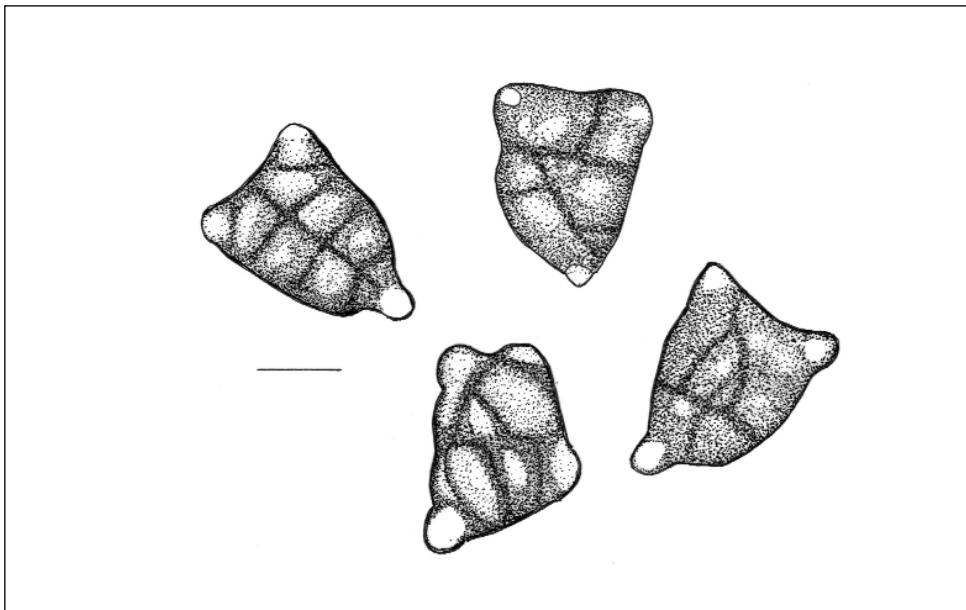


Fig. 13. *Oncopodiella trigonella*. Conidia. Bar 6 μ m.

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Databases online

Index Fungorum

(CABI) <http://www.indexfungorum.org>

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