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Dematiaceous *Hyphomycetes* from Pantelleria mediterranean maquis litter

Abstract

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Fifteen Dematiaceous *Hyphomycetes* found on litter of several plants of mediterranean maquis in Pantelleria are described. *Anungitea raimondoi* and *Pleurotheciopsis asymmetrica* are proposed as new species.

Key words: Litter, Dematiaceous *Hyphomycetes*, Island of Pantelleria.

Introduction

Publications on biodiversity of Dematiaceous *Hyphomycetes* from mediterranean maquis of the Pantelleria island are, actually, inexistent: the perfect preservation of the island territory and vegetation suggested us a comprehensive study of the micro and macrofungal communities. The investigation was carried out with different samplings in order to cover the seasonal variability.

This first contribution is the result of two different samplings carried out in October 2007 and February 2008 and took place in typical local environments like Montagna Grande, Santa Teresa, Sibà and Specchio di Venere, a small lake supplied by volcanic springs.

This work deals with fifteen species of Dematiaceous *Hyphomycetes*: two are described as new species and of other thirteen species are reported the dimensional and morphological characters, just to point out discrepancies with the original descriptions.

Materials and methods

All the fungi investigated were microscopically examined on litter directly collected from natural environments. Samples were collected in new paper bags, transported to the laboratory and remoisted with tap water in Petri dishes on filter paper. A first examination at the stereomicroscope was carried out after 48 hours and a second after 10 days. From the colonies, developed on the different natural substrata, we collected the material to prepare microscopic slides for a taxonomic determination and photographs. Some species were not present as colonies but distributed as isolated conidiophores, while some others were unique

so we described them and documented their peculiar characters. To respect the proportions of the different morphological parts composing the mycological structures all the drawings were obtained directly from microscopic pictures. The slides examined and photographed were preserved in our personal collection. All the samples of natural substrata colonized by the described Dematiaceous *Hyphomycetes* were deposited into the Herbarium ROHB.

The vegetation of the island

A phytosociological survey on the Island of Pantelleria was previously published by Brullo & al. (1977). Other syntaxonomical and/or distributive references on the phytocoenoses of the island were reported by Di Martino (1963), Agostini (1973), Brullo (1983, 1984, 1985), Brullo & Marcenò (1983, 1985), Raimondo & al. (1990), Bartolo & Brullo (1993) and Gianguzzi (1995, 1999). The types of vegetation visited during our mycological investigation are represented by: a) *Rosmarinus officinalis* and *Coridothymus capitatus* garrigues, woods of *Quercus ilex*, low maquis of *Rosmarinus officinalis*, *Erica multiflora* and *Genista aspalathoides*, mixed wood with prevalence of *Pinus pinaster* subsp. *hamiltonii*, low maquis of *Genista aspalathoides* and *Arbutus unedo*, garrigue of *Cistus* sp.pl. and woody maquis of *Arbutus unedo* and *Erica arborea*.

The garrigue of *Rosmarinus officinalis* and *Coridothymus capitatus* evolved has a pioneer and xerophilous character and it is evolved on volcanic substrata.

The woods of *Quercus ilex* is located in the dry thermo-Mediterranean plane and it is characterized by a woody vegetation type, poor in floristic elements.

The low maquis of *Rosmarinus officinalis*, *Erica multiflora* and *Genista aspalathoides* is also widely distributed in the dry thermo-Mediterranean plane where is characterized by shrubs which substitute the *Pinus halepensis* vegetation.

The mixed wood with prevalence of *Pinus pinaster* subsp. *hamiltonii* is extended ca. 800 ha and cover an altitudinal range from 300 to 830 m. This mixed wood characterize the upper horizon of the thermo-Mediterranean plan where is mixed with *P. halepensis* and the meso-Mediterranean plan characterized by a mesophilous pine wood.

The low maquis of *Genista aspalathoides* and *Arbutus unedo* is a pioneer vegetation with a wide presence of *Cistus* species.

The garrigue of *Cistus* sp.pl., evolved on very poor soils, is characterized by shrubs with high colonizing capacity.

The woody maquis of *Arbutus unedo* and *Erica arborea* is a degradation state of the *Pinus pinaster* subsp. *hamiltonii* woods.

Taxonomy

Verticicladium trifidum Preuss, Linnea 1851

Anamorph of *Desmazierella acicola* Lib. Annl. Sci. Nat. Bot. Sér. 1 1829

Type species: *Verticicladium trifidum* Preuss 1851.

Colonies effused. Conidiophores macronematous, mononematous, frequently solitary, repeatedly branched towards the apex, straight, dark brown, 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, subulate, 16.2 \times 5 μm . Conidia solitary, dry, acropleurogenous, simple, ellipsoidal, hyaline or pale brown, smooth, not septate, 5.4 \times 3.6 μm .

On dead leaves of *Pinus pinaster* subsp. *hamiltonii*. Montagna Grande – Pantelleria. ROHB 476.

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 — 1892: *Verticicladium acuum* – Sylloge Fungorum, **X**: 594.
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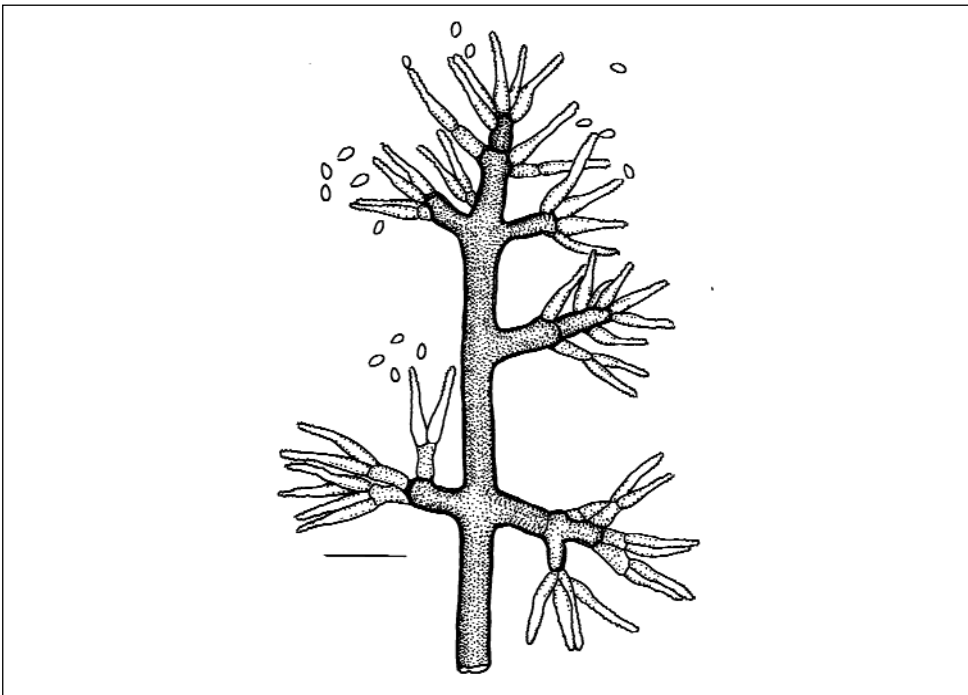


Fig. 1. *Verticicladium trifidum*, conidiophores and conidia. Scale bar 20 μm .

***Anungitea raimondoi* Rambelli sp.nov.**

Type species: *Anungitea fragilis* Sutton, Mycol.Pap., 1973.

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

Conidiophora solitaria, macronematosa, mononematosa, erecta, simplicia, rigida, dilute brunnea usque brunnea, septata, 32-60×3 µm.

Cellula conidiogena ubi fertilis inflata, sympodialis, denticulis prominentibus praedita, dilute brunnea, rariter intercalaris, 21-48×5-9 µm. Conidia hyalina, in catenas acropetas disposita, cylindrata, continua vel interdum transverse 0-1-septata, 12-14×2µm.

In foliis deiectis arboris *Arbutus unedo*, Montagna Grande, Pantelleria.

Conidiophores solitary, not forming true colonies, macronematous, mononematous, straight or gently flexuous, smooth, clear brown, 32-60×3 µm. Conidiogenous cells inflated in the fertile part and over a delimiting septum, sympodially denticulate, denticles cylindrical, very clear brown, terminal, rarely intercalary, 21-48×5-9 µm. 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, 12-14×2 µm.

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

The strain described is similar to *Anungitea 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 micron wide in the fertile part and up to 48 micron in length. Our strain presents also some characters closed to *A. uniseptata* Matsushima (1975), but again differs for the larger 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 strain. If compared to *A. syzygii* Crous, Kendrick and Wingfield (1995) we have never found branched conidiophores in our strain.

Material examined: ROHB 165 Castelporziano on *Quercus ilex*.

Holotype ROHB 483.

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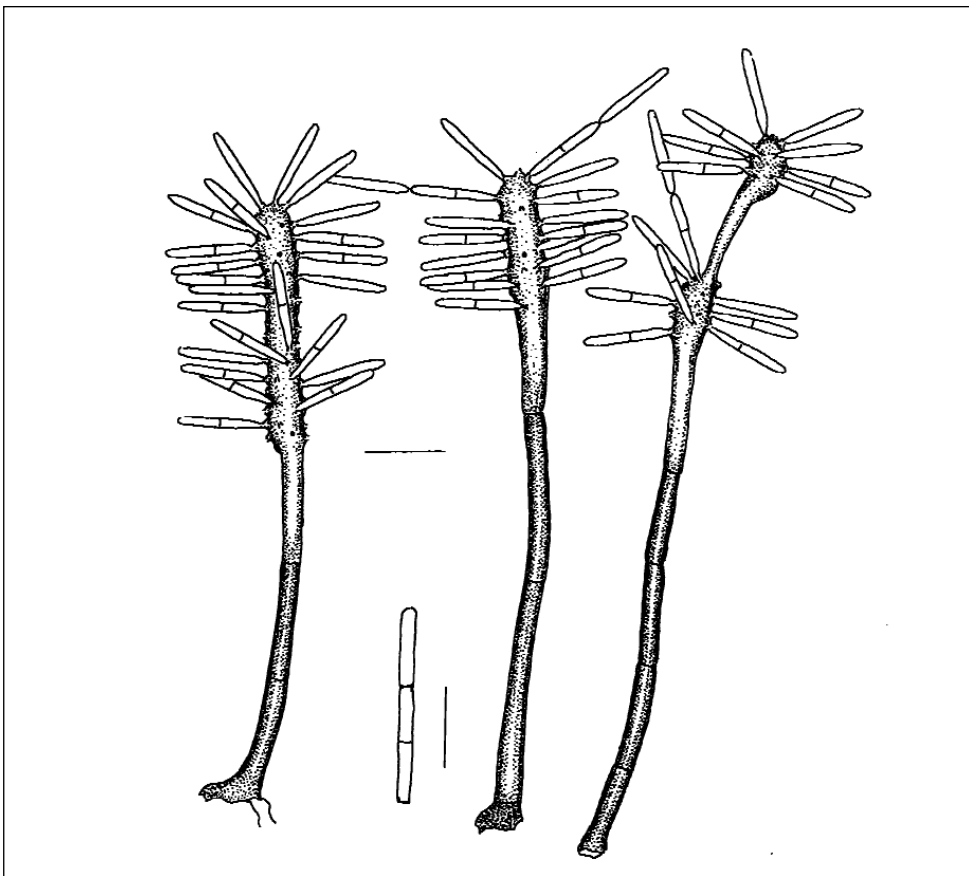


Fig. 2. *Anungitea raimondoi* sp. nov. with characteristic inflated conidiogenous cells. Scale bar 10 μ m; vertical scale bar 8 μ m

Circinotrichum maculiforme C.G. Nees ex Persoon.

Nees van Esenbeck C.G. – Das System der Pilze und Schwamme (Ueberblick), 1817.

Type species: *Circinotrichum maculiforme* Nees, 1816.

Colonies effused, greysh brown. Setae simple, erect, septate, dark brown, roughened, with bulbous base, verrucose, circinate, spirally coiled, 83-106×3 µm. Conidiogenous cells on the superficial hyphae, around the setae, obclavate subhyaline, 7x2 µm. 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, 12-14x2 µm.

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

The strain described showed some characters not exactly corresponding to with Pirozynski description (1962), such as the not corniform conidia, the size of conidiogenous cells, that presumably could be not completely developed in our strain when observed, the setae not so high, but also this character could be determined by the composition of the natural medium.

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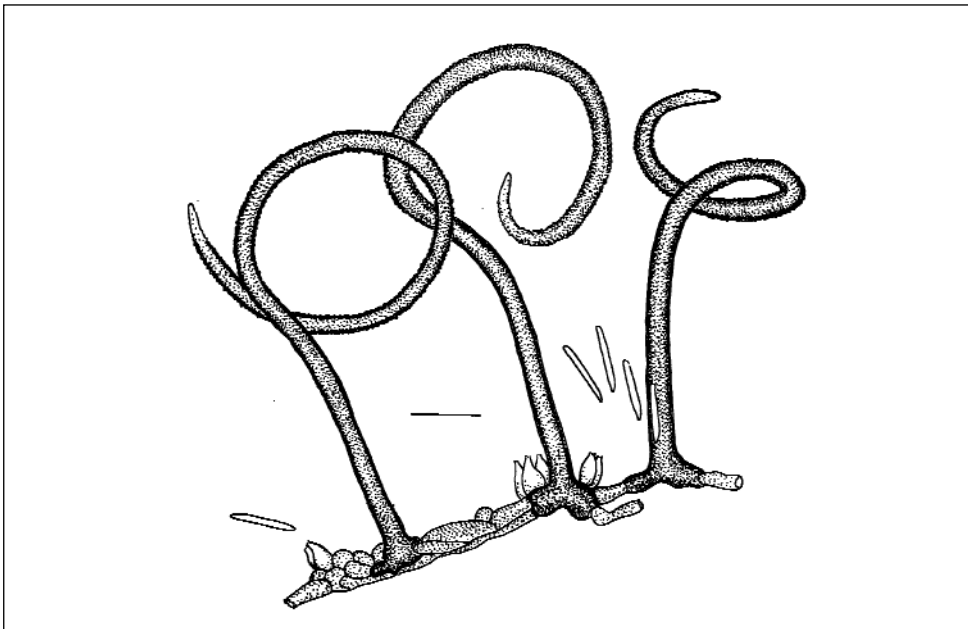


Fig. 3 *Circinotrichum maculiforme*, setae, conidiogenous cells and conidia. Scale bar 15 μ m.

Gyrothrix circinata (Berkeley & Curtis) Hughes – *Can. J. Bot.* 1958
 Type species: *Gyrothrix podosperma* (Corda) Rabenhorst, 1844.

Colonies effused, dark brown, velvety. Setae intertwined, erect, septate, dark brown, rough, circinate, repeatedly branched, 127-140 \times 5 μ m. Branches markedly verrucose, circinate. Conidiogenous cells on the superficial mycelium near the base of the setae, obclavate, intense clear brown, smooth, 6-8 \times 3-5 μ m. Conidia in masses at the base of the setae, cylindrical-fusiform, straight or gently curved, pointed at the base and corniform apically, hyaline, 0-septate, 12-14 \times 2 μ m.

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

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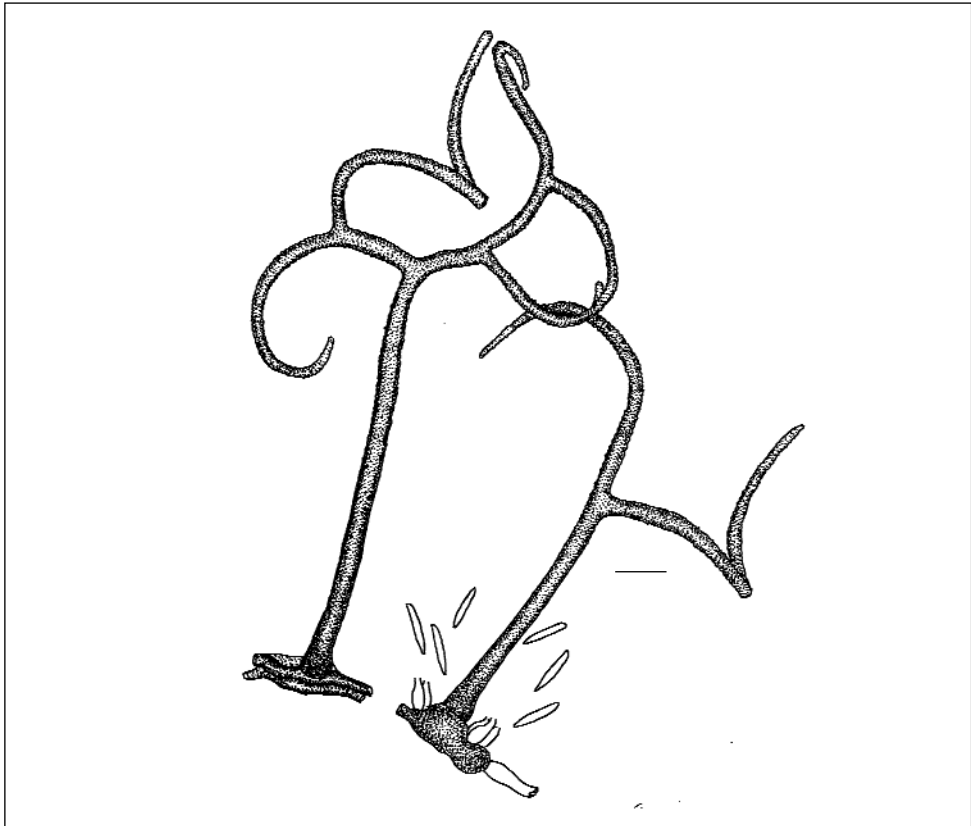


Fig. 4. *Gyrothrix circinata*, setae, conidiogenous cells and conidia. Scale bar 15 μ m.

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Gyrothrix verticiclada (Goid.) Hughes & Pirozynski – *New Zealand Journal of Botany*, 1970.

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

Colonies effused, velvety, clear brown to brown. Setae crowded, erect, straight, smooth, intense dark brown, septate, 97-106×7 µm, 2-3 times apically branched, branches septate, straight not slender, dark brown and clear brown at the flattened apices, 29-46×5 µm. Conidiogenous cells obclavate, intense clear brown, percurrent, 8-12×1,5-3 µm. Conidia falcate, with pointed apices, 0-septate, hyaline, 16-18×2.3 µm.

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

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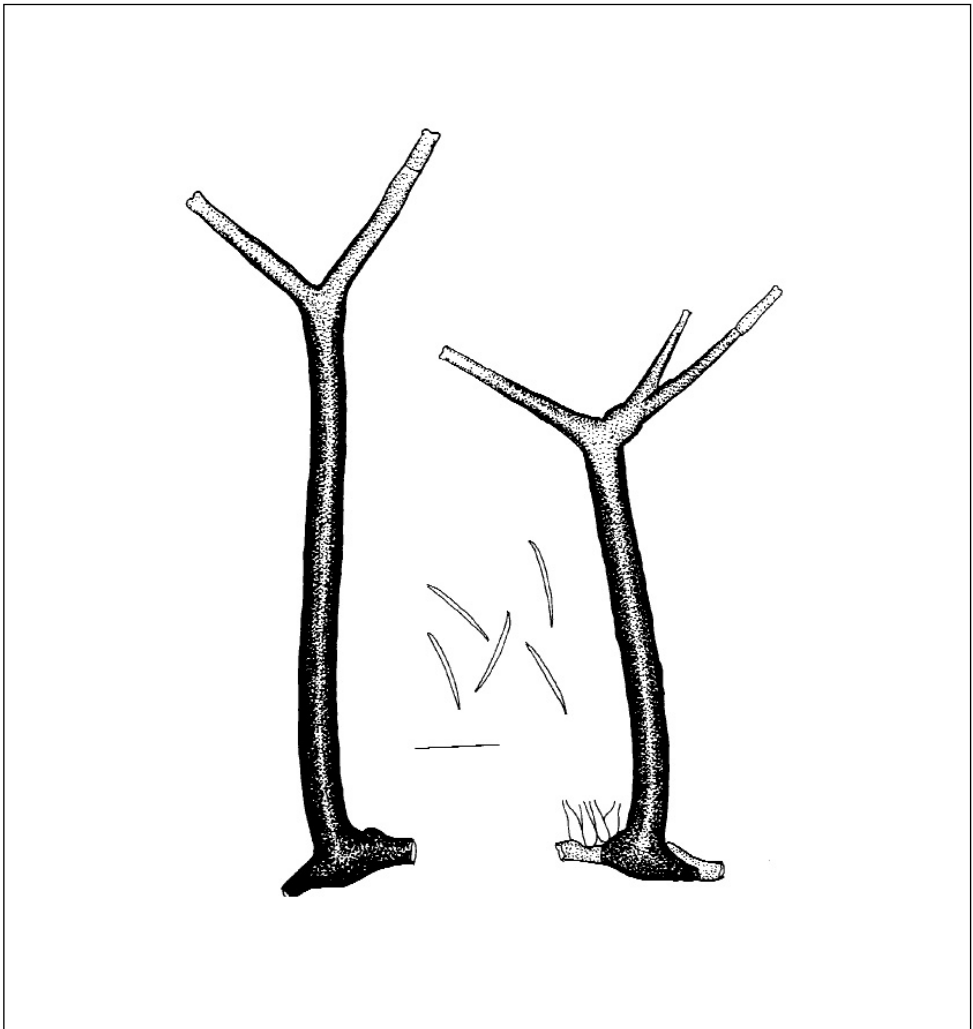


Fig. 5. *Gyrothrix verticiclada*, with dark brown branched setae. Scale bar 15 μ m.

***Gyrothrix* sp. V. 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 setae, 31-74 \times 4-5 μm . Conidiogenous cells at the base of the setae, originating from the superficial mycelium, obclavate, very irregular in forms and dimensions, 3-12 \times 3-5 μm . Conidia with pointed base and apex gently rounded, slightly falcate, not corniform, hyaline, 0-septate, 9-12 \times 3 μm .

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

Notes: the poor material examined does not allow a species determination.
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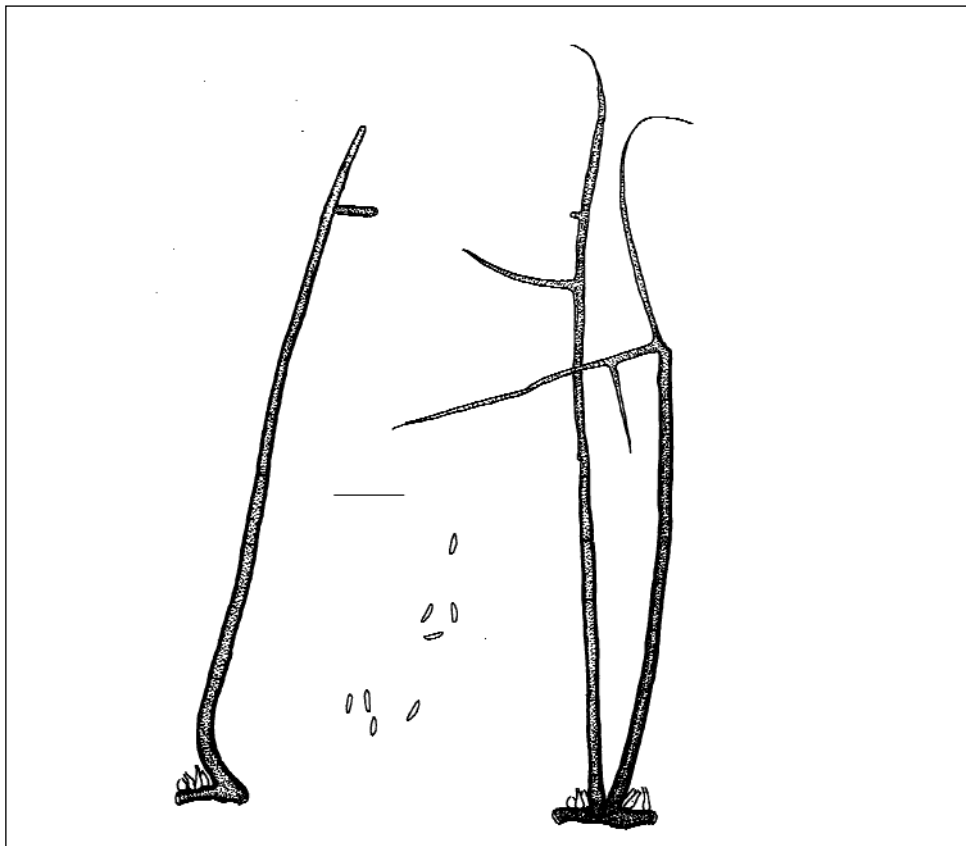


Fig. 6. *Gyrothrix* sp., irregularly branched setae. Sclae bar 40 μ m.

***Ulocladium* sp. V.4 bis.**

Type species: *Ulocladium botrytis* Preuss. 1851.

Conidiophores macronematous, mononematous, branched, flexuous, geniculate, clear brown, smooth, 31-38 \times 4 μ m fertile part included. Conidiogenous cells integrated, sometimes intercalary, sympodial, cylindrical, cicatrized. Conidia solitary, acropleurogenous, dry, ellipsoidal, ovoid, golden-brown or red-brown, smooth, with transverse and oblique septa, 15-17 \times 10-12 μ m.

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

Notes: the morphological characters of our strain are very close to *U. microsporum* Moubasher & Abdel-Hafez (1977), but since we examined only poor material we prefer to consider the species indeterminate.

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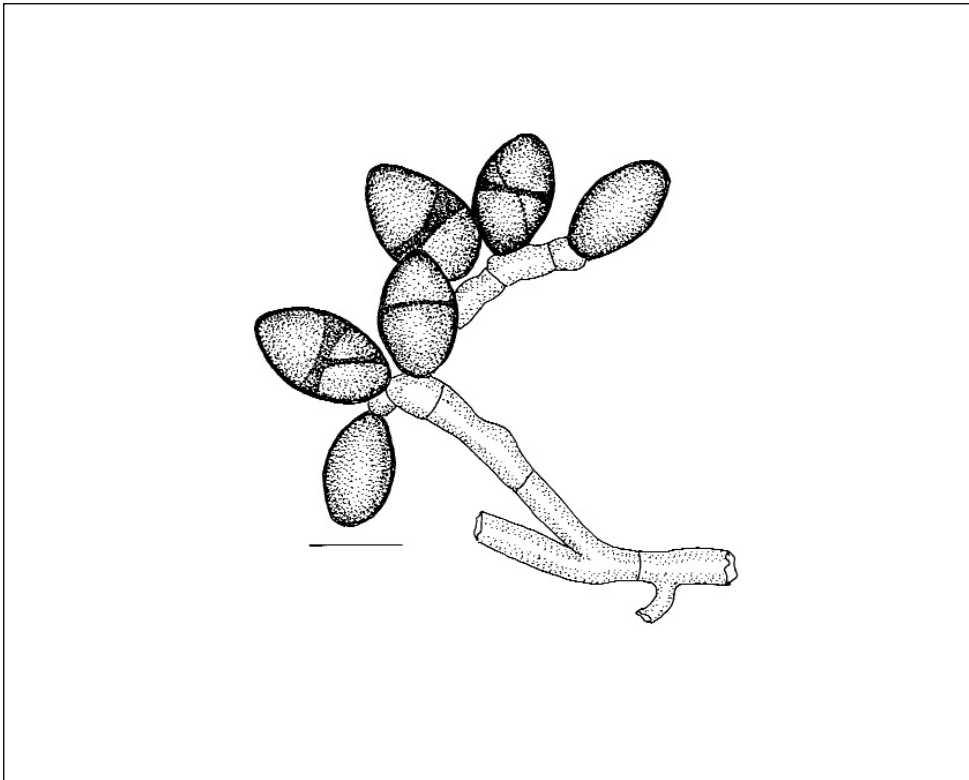


Fig. 7 *Ulocladium* sp. Sclae bar 12 μ m.

Rhinocladiella sp. V. 4. Nannfeldt, 1934.

Type species: *Rhinocladiella atrovirens* Nannf. 1934.

Conidiophores solitary or aggregated in small groups, macronematous, mononematous, unbranched, gently flexuous, mid to clear brown, smooth, 180-198×4-5 µm. Conidiogenous cells polyblastic, integrated, frequently intercalary, sympodial, cicatrized, with small and not pigmented scars, 14-90×3 µm. Conidia solitary, dry, acropleurogenous, ellipsoidal, very clear brown, smooth, 0-septate, rarely 1-septate, 5-12×2-3 µm.

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

The strain examined presents intercalary conidiogenous cells with small conidial scars, not pigmented, and conidia prevalently solitary. Unfortunately we observed only poor material, not enough to a species determination.

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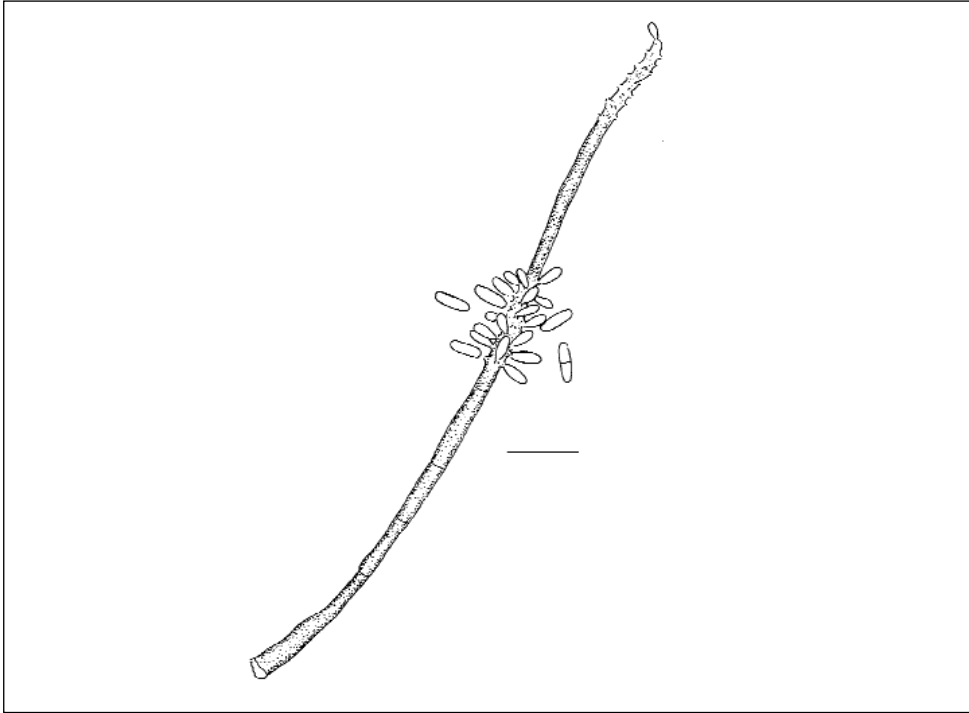


Fig. 8. *Rhinocladiella* sp., intercalary conidiogenous cells. Sclae bar 15 μ m.

Pleurotheciopsis bramleyi Sutton Trans . Br. Mycol. Soc. 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, $250 \times 7-9 \mu$ m. Conidiogenous cells integrated, terminal, polyblastic, sympodial, pale brown with several, short, not thickened denticles, and with a basal annellation. Frequently the conidiogenous cell continue to grow to form a clear filament up to 500-600 and more μ m long fertile at the apex with formation of 3-4 denticles and conidia. Conidia in acropetal chains, simple, 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 apex of the chain, $23-25 (-39) \times 5-6 \mu$ m.

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

Notes: the strain examined presents morphological and size characters corresponding to Sutton's description (1973). The production of very long conidiophores, mixed with the regular ones, could be the effect of a different natural medium composition.

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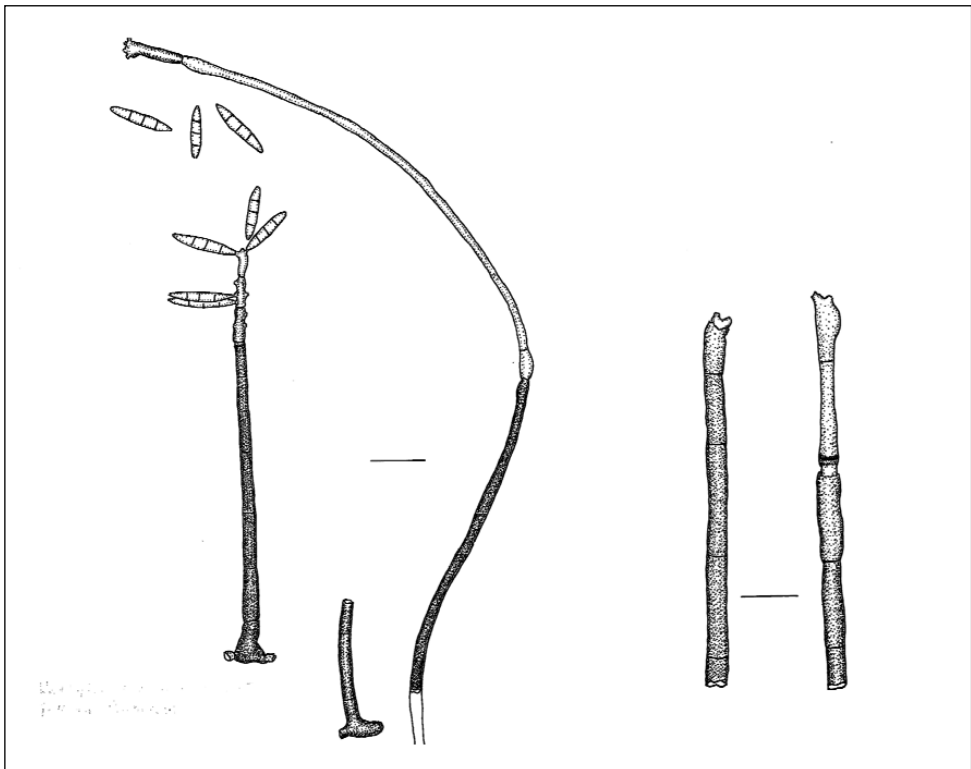


Fig. 9. *Pleurotheciopsis bramleyi*, fertile hyphae growing from the apex of conidiophores. Scale bar 25 μ m, second scale bar 20 μ m.

Pleurotheciopsis asymmetrica Rambelli & Ciccarone sp. nov.

Type species: *Pleurotheciopsis pusilla* Sutton, 1973.

Conidiophora macronematosa, mononematosa, septata, erecta, simplicia, solitaria, brunnea, 370-400x7-8µm. Cellulae conidiogenae polyblasticae, integratae, sympodiales, hyalinae vel dilute brunneae, denticulis cylindratis praeditae, 32-37x5 µm. Conidia cylindrata, leviter truncata, asymmetrica 1-septata, in catenas acropetas disposita, hyalina vel dilute brunnea, 22-31x5µm. In foliis deiectis arboris *Phillyrea latifolia* et *Arbutus unedo*. Montagna Grande, Pantelleria.

Conidiophores solitary, not forming a true colony, macronematous, mononematous, straight, erect, unbranched, septate, smooth, brown up to the septum separating the conidiogenous cells, 370-400x7-8 µm. Conidiogenous cells integrated, terminal, polyblastic, sympodially denticulated at the apex, 5-7 cylindrical denticles, separated by a disarticulating basal septum and subsequent annellation, intense clear brown, smooth, 32-37x5 µm. Conidia in acropetal chains, simple, 1-asymmetrically septate, ellipsoidal, obovoid, with slightly truncated ends when into the chain, with rounded apex when at the chain apex, smooth, intense clear brown, 22-31x5 µm.

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

Notes: The species examined shows two relevant morphological characters. The former is the strong separation between conidiophores and conidiogenous cells, very different in colour, by a septum very easily disarticulating; the second relevant character is the presence of conidia with a septum always disposed asymmetrically, in the upper part.

Holotype ROHB 483

Material examined

On dead leaves of *Arbutus unedo*, Montagna grande. Pantelleria. *Pleurotheciopsis bramleyi* on dead leaves of *Phillyrea latifolia*, Santa Teresa, Pantelleria.

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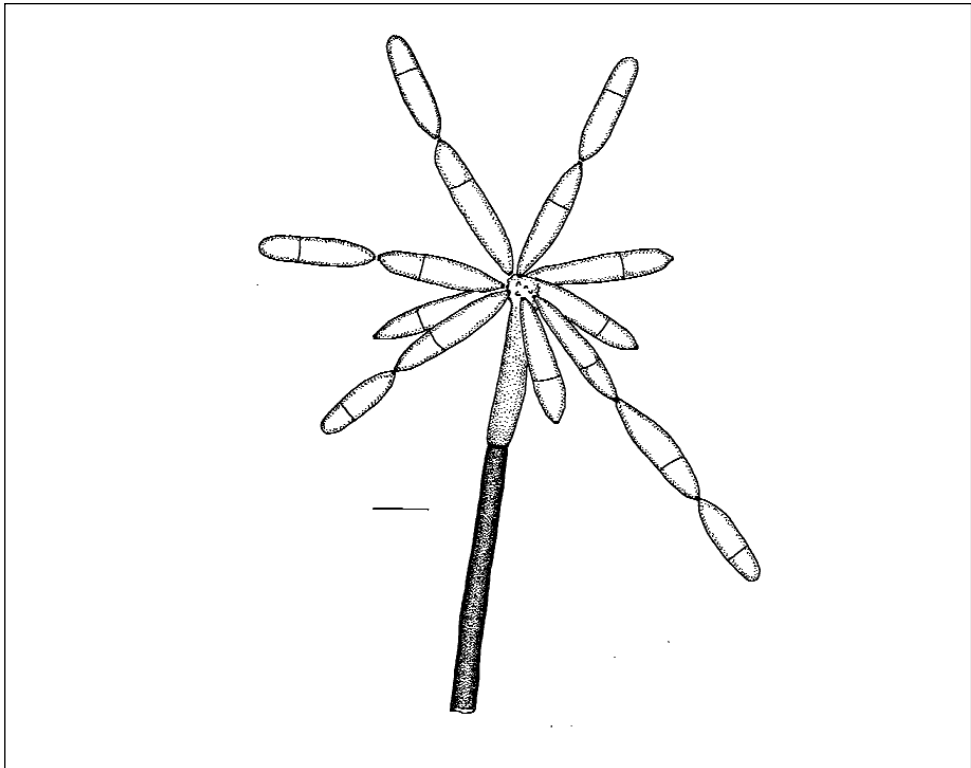


Fig. 10. *Pleurotheciopsis asymmetrica* sp. nov., conidiogenous cells disarticulating from the conidiophores. Sclae bar 10 μ m.

Pleurophragmium cylindrosporium Matsushima, *Icones Microfungorum a Matsushima Lectorum*, 1975.

Type species: *Pleurophragmium bicolor* Costantin, 1888.

Conidiophores solitary, macronematous, mononematous, straight, septate, dark brown, clear towards the apex, smooth, 209-350×8-9 µm. Conidiogenous cells denticulate, sympodial, 30-40×7 µm. Conidia acropleurogena, solitary, cylindrical, round at the apex and pointed at the base, 3-septate, with brown central cells and hyaline apical and base cells, smooth, 32-35×6-7 µm.

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

Notes: this strain presents some size differences if compared to Matsushima's description of *P. cylindrosporium* (1975), mainly in the conidiophores and conidia, differences presumably determined by the different substratum composition. It is also very closet to *P. bicolor* Matsushima (1975) reported by the Author with smaller conidia and with central cells less pigmented.

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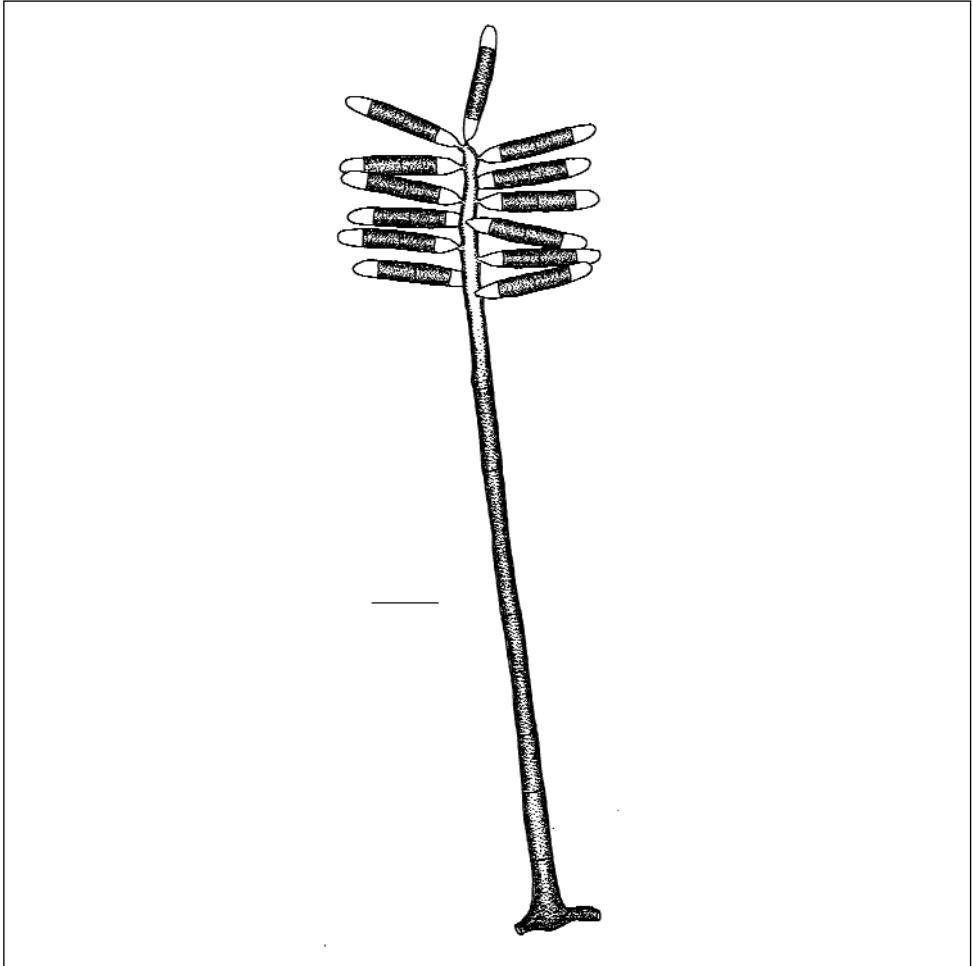


Fig. 11. *Plerophragmium cylindrosporum*. Scale bar 20 μm .

Conoplea fusca Pers. Mycologia Europaea, 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, 90-215 \times 5 μm . Conidiogenous cells terminal on branches, clear brown, polyblastic, sympodial, with small denticles, 7-12 \times 3 μm . Conidia ellipsoidal, with small cicatrized pointed base and a germ pore just above the base, 7 \times 5 μm .

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

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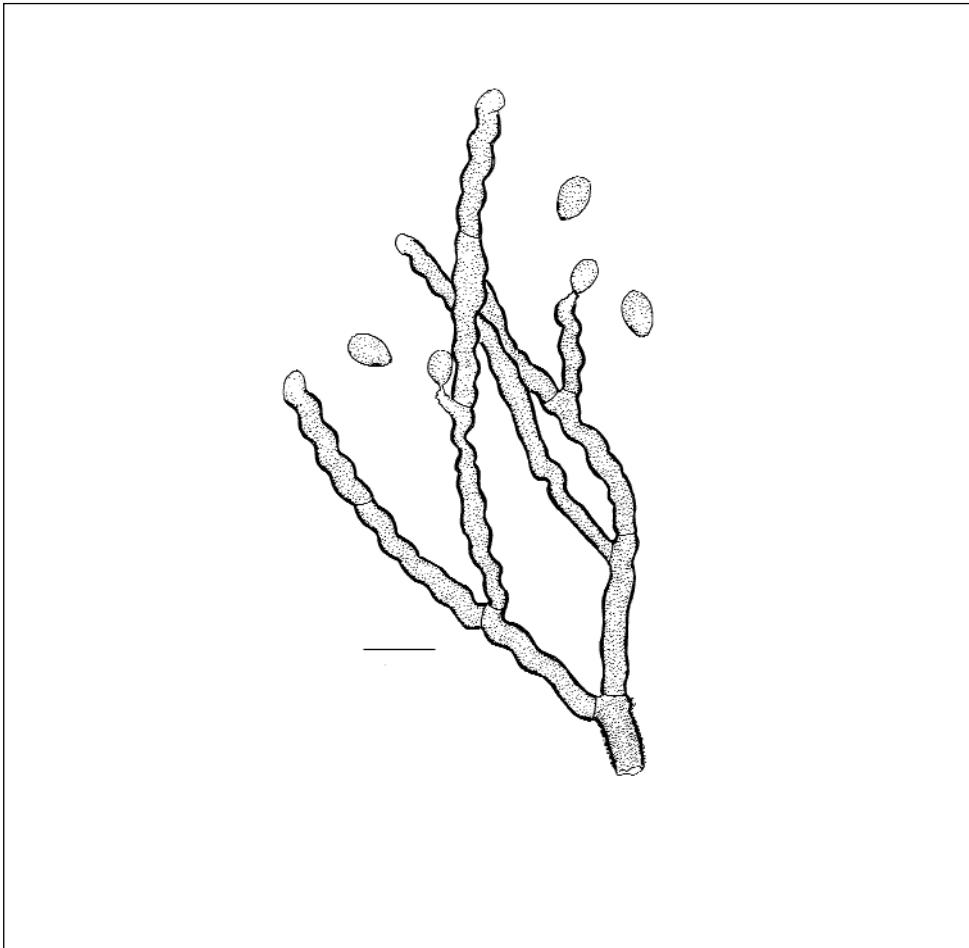


Fig. 12. *Conoplea fusca*. Scale bar 13 μ m.

Beltrania rhombica O. Penzig, Nuovo Giorn. Bot. Ital., 1882.

Type species: *Beltrania rhombica* O. Penzig 1882.

Colonies effuse, dark red-brown. Setae erect, smooth, very dark brown, arising from radially lobed basal cells, 130-160×5-6 µm. Conidiophores macronematous, mononematous, simple, gently flexuous, clear brown, smooth, septate, arising from the radially lobed basal cells, 36-41×3-5 µm fertile part included. Conidiogenous cells integrated, terminal, polyblastic, sympodial, denticulate, sub-clavate; separating cells oval, swollen, 9.5×8 µm. Conidia solitary, acropleurogenous, biconic, appendiculate-spicate, 0-septate, smooth, dark reddish-brown, with hyaline transverse band in the widest part of the conidium, 21-25×9-12 µm. On dead leaves of *Quercus ilex*. Santa Teresa, Pantelleria.
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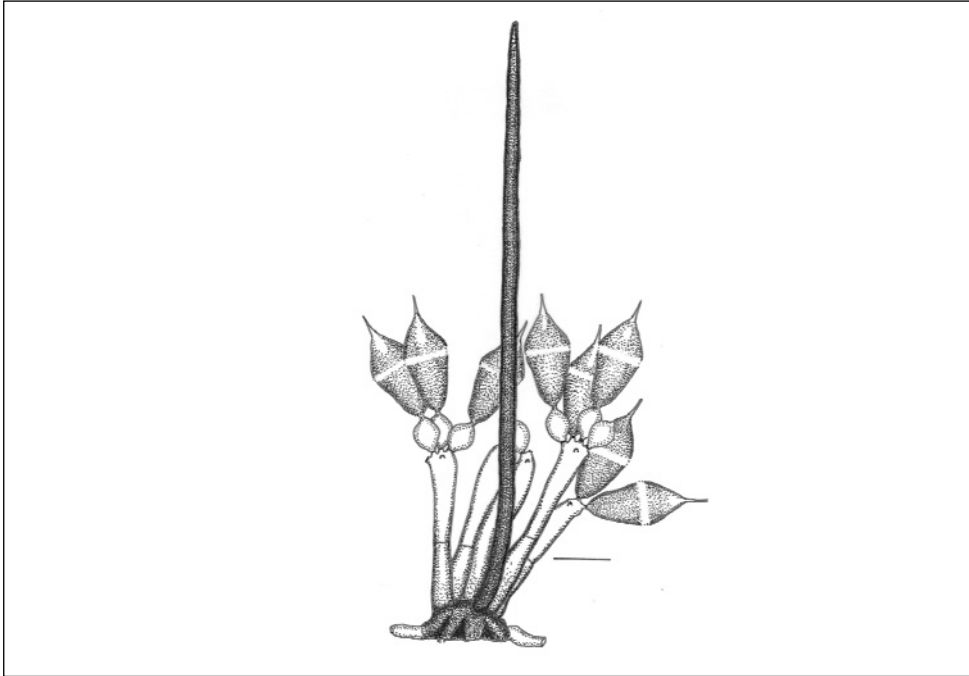


Fig. 13. *Beltrania rhombica*, with red brown conidia. Scale bar 12 μm .

Beltrania querna Harkn., Bulletin of the California Academy of Sciences, 1884.

Type species: *Beltrania rhombica* Penzig, 1882.

Colonies effuse, brown. Setae erect, smooth, dark brown, arising from radially lobed basal cells, 400-500 \times 7 μm . Conidiophores macronematous, mononematous, simple, straight, erect, clear brown, smooth, septate, arising from the setae radially lobed basal cells, 60-120 \times 5 μm fertile part included. Conidiogenous cells integrated, terminal, polyblastic, sympodial, denticulate, cylindrical, smooth, clear brown; separating cells elliptical, 12 \times 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 \times 5-7 μm .

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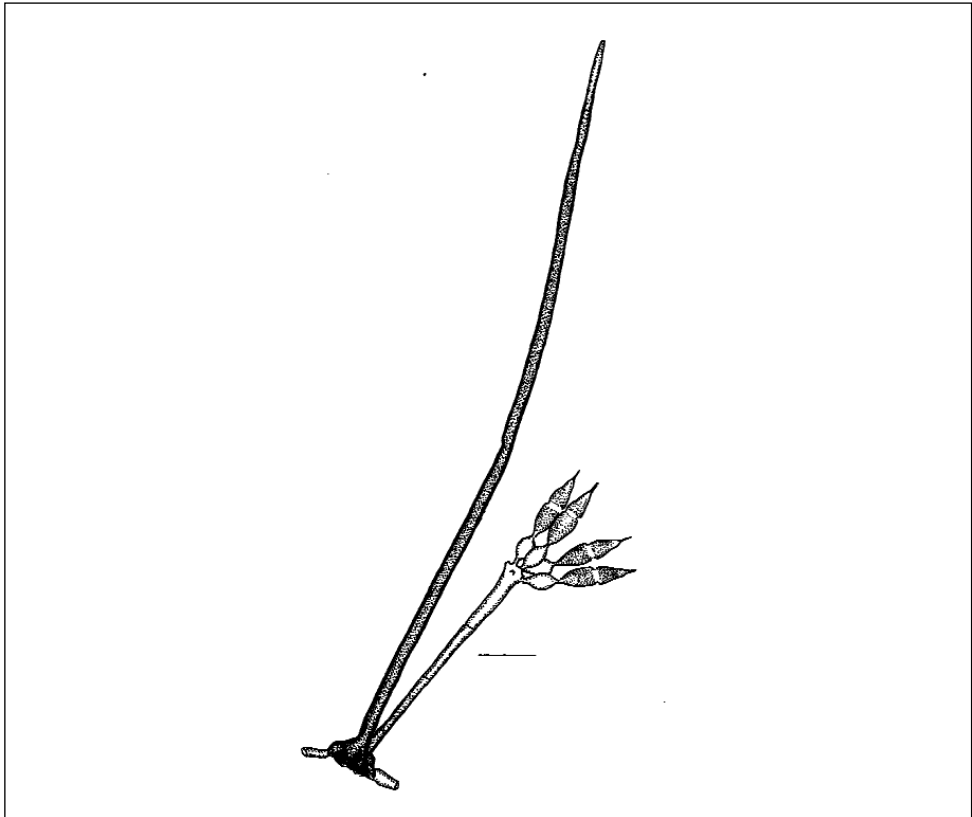


Fig. 14. *Beltrania querna*. Scale bar 20 μ m.

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Endophraggiella boewei (J.L. Crane) S. J. Hughes, *New Zealand Journal of Botany*, 1979.
 Basionym: *Endophraggia boewei* J.L. Crane, 1972.

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-septate, brown, seceding rhexolytically, 14-15×9-12 µm.

On dead leaves of *Pistacia lentiscus*. Santa Teresa, Pantelleria.
 ROHB 487.

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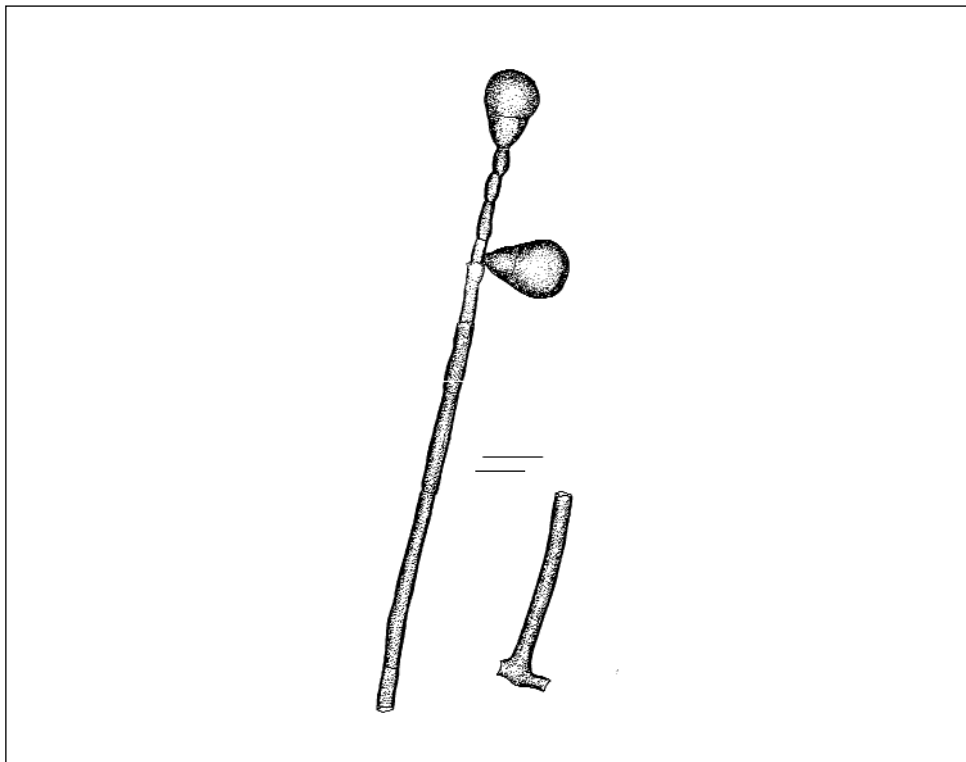


Fig. 15. *Endophragmiella boewei*. Scale bar. 10 μ m.

Conclusions.

This study is a first contribution on the distribution of saprotrophic Dematiaceous *Hyphomycetes* in natural ecosystems which characterize the island of Pantelleria, with the aim to identify a possible specialization between different type of litter and different species of fungi. Of course the phenomenon will be verified through several investigations to carry out also in different seasonal periodes.

The study will be extended in the future to the vegetation of other islands like Marettimo and Ibiza (Spain), just to compare the results obtained at Pantelleria with those of different ecological situations.

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