

## Observations on Meliocolous Hyphales from Santo Domingo.

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With 13 Textfigures.

### 1) On Meliocolous species of the genus *Helminthosporium*.

Amongst the meliocolous, tropical fungi, species of the genera *Helminthosporium* and *Arthrobotryum-Podosporium* are the most frequent, so that, in the past, were considered as conidial stages of the *Meliolae*. In very many cases it is impossible to observe a *Meliola* specimen free from associate fungi, and the specific determination of *Meliola* (and other foliicolous *Ascomycetes*) is more or less ambiguous, because the poor fructification, if any, and the modification



Fig. 1. *Helminthosporium panici* Stev.: a) habitus; b) tuft with conidiophores and conidia; c) conidiophores; d) conidia.

of some vegetative organs (disposition, density and branching of mycelium; number and shape or size of hyphopodia; presence, number, disposition, size and shape of setae, and so on). This fact has been repeatedly noted in our revision of Dominican *Meliolae* (Mycopath. et Mycol. Appl. Vol. VII. N. 1/2, 1954), chiefly for the taxonomic, reciprocal position of glabrous and setose species. Together with keys of commonest or surest species found in the Dominican Republic, in the following pages we enlarged or emended or discussed a few species, based on average specimens more than on one typical specimen.

Hughes (I.M.I. Pap. N. 50, pag. 19—29, 1953) revised a number of species of meliolicolous *Helminthosporia* on material from the Gold Coast and Togoland. He recognized 4 species and one variety, reducing 8 species as synonym of *H. capense* Thuem.; 3 species under *H. dasy carpum* Mont. and 2 under *H. helleri* Stev. (not considering the species here attributed to the genus *Spiropes*).

In our opinion the species concept adopted by this well distinguished mycologist is too wide; e. g. for *H. capense* he considered the length of conidiophores variable from 50 to 650  $\mu$ , tufted or single, and the conidia up to 78  $\mu$  in length and 6 to 13  $\mu$  wide; for *H. dasy carpum* the conidiophores 30 to 750  $\mu$  long and conidia of very variable shape up to caudate, from 14—28 up to 55  $\mu$  long.

From the Hughes' widened descriptions is not possible to reconstitute the characteristics of the original *H. capense* and *H. dasy carpum*, so that these species are not considered here.

#### *Helminthosporium panici* Stev.

Foliar spots indefinite, brown to blackish, scattered, (evidently old *Melicola* colonies); conidiophores free and single, or aggregated and few in number, to truly fasciculated, rarely up to 30 in number, sub-reptant, dull-brown in color, with lighter end (up to sub-hyaline), not torulose or very slightly so, free end sub-dentate up to almost smooth, rounded, scarcely and obscurely septate, 115—180 by 8—10  $\mu$ ; conidia single, acrogenous or almost, elongated, very dull-brown, without differentiate end or, if so, short end not evident, as a rule 3-septate, infrequently 1—2-septate, very rarely 4-septate, not narrowed (or very little and rarely) narrowed at the septa, cells of the same color and size, most frequently ellipsoidal-truncate in shape, 50—75 by 10—13  $\mu$ , but also smaller (35—40 by 7—9  $\mu$ ) and also ellipsoidal-elongate, with rounded to truncate ends, not or very little narrowed at the ends, but rarely also very narrowed (and truncate) at the apical end, and more or less enlarged at the basal end (and truncate, never rounded).

A quite common species on different *Meliolae*, chiefly on truly epiphytic species with diffuse to crustose spots.

#### *Helminthosporium helleri* Stev.

Foliar spots velvety, diffuse, black, chiefly on old *Meliola* mycelium; conidiophores brown, single, erect or sub-erect, straight or flexuose, 100—200  $\mu$  long, 5—7  $\mu$  thick, sub-dentate or quite smooth at the free end; conidia as a rule 3-septate, variable in shape, as a rule sub-fusate, with truncate basal end and beaked free end, apical and basal cells light in color, central cells inflated and darkened, slightly constricted at the central septum or not, 20—40  $\mu$   $\approx$  6—10  $\mu$ ,

with a more or less evident apical beak, 5—10  $\mu$  long, wall thin, seldom roughened.

This species (identical, according Hughes, with *H. leucosycae* Yates and *H. maculosum* Sacc.) is very little distinct from *H. palmetto* Gerard, may be only because the conidia of the last named species are thick-walled. Probably *H. helleri* is but only a variety of *H. palmetto*, the last one — apparently — preferring the *Meliolae* on Palmae.

#### ***Helminthosporium portoricense* (Speg.) n. comb.**

*Napicladium portoricense* has been described by Spegazzini on living leaves of many species (chiefly on coriaceous leaves), probably parasitic on the mycelium of Perisporiaceae or *Meliolae* species in Puerto Rico (Bol. Acad. Nac. Ci. Cordoba, Vol. XXVI, pag. 363. 1927).

Many times we observed, on *Meliola* spp. in the Dominican Republic, a fungus having sterile hyphae 2—3  $\mu$  thick, olive-brown in color, with ascending conidiophores, single or aggregated in tufts, very variable in length (from 25 to 250  $\mu$ ), 2—5  $\mu$  wide, bearing one conidium each; conidia elongate-fusoid, with a more or less elongated free end, also very narrowed to acutate, with an almost rounded base, typically 5-cellular (4-septate), but also 3-septate (very rarely 2-septate), a little narrowed at the septa or not at all, smooth, olive-brown or brown, 30—60 by 6—10  $\mu$ .

In spite of the fact that we don't studied the authentic, Spegazzinian specimen, we have no doubt that our specimens are referable to *Napicladium portoricense*, a true meliicolous species. Probably this fungus has been attributed to the genus *Napicladium* because the tender, not rigid conidiophores, in spite of the fact that, in the Spanish description, the conidiophores are described as variable from tender to rigid; at least the conidiophores are shorter and tender than in the ordinary, meliicolous species of *Helminthosporium*. Also the conidia are thin-walled, the species of the genus *Helminthosporium* with thin-walled conidia being less frequent than the thick-walled one.

It is very possible that the fasciculated, more or less stilbaceous stage, is a *Podosporium* allied, if not identical, to the *Podosporium antillanum* (Frag. et Cif.) Cif. (see), but it is also allied to *H. caespitifera* Petr. et Cif.

An uncommon species in the unaggregated stage of fructification; more common in the presumed stilbaceous stage.

#### ***Helminthosporium melioloides* Sacc.**

Species described by Saccardo (Atti Acc. Ven. Trent.-Istr., Vol. X, pag. 89. 1917) associated with *Meliola* sp. on *Uvaria* sp., Philippine Islands.

An uncommon species, found on scattered, as a rule undeterminable *Meliola* specimens. It is evidently allied but distinct from *H. parathesicolum* Stev. (Bot. Gaz., Vol. LXV, pag. 242. 1918). In *H. parathesicolum* the mycelium is thin, not radiate, the conidiophores more or less reptant, the conidia of the same shade in color, while in *H. melioides* the mycelium is thick, more or less radiate, the conidiophores more or less erect (as a rule suberect), and one or both the central cells of the conidium darker.

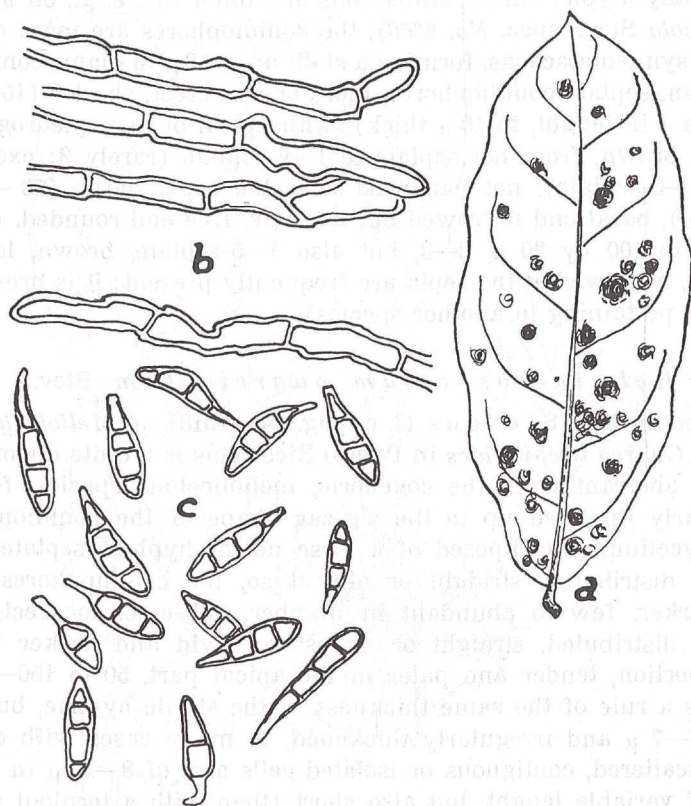


Fig. 2. *Helminthosporium ocoteae* Stev.: a) habitus on a leaf of *Ocotea*; b) conidiophores; c) conidia.

*Helminthosporium insignis* Sacc.

Described by Saccardo (l. c. p. 89. 1918) on *Meliola insignis* Gaill. (and figured by Gaillard, l. c., pl. VI, fig. 1) on *Mallotus philippinensis* in the Philippine Islands.

This species is variable from a true, sparingly fasciculated *Helminthosporium* up to and almost stilbaceous *Podosporium*-like fungus, and the attribution to one or the other genus may be matter of

personal opinion. The conidiophores are short, up to 500  $\mu$  in length (600—800  $\mu$  in the original description), 5—7  $\mu$  in thickness, dull-brown in color, the free end more or less laterally curved, denticulate, pluriconidial; conidia elliptic to subclavate, straight to sub-falcate, without beak, narrowed but truncate at the basal end, narrowed and sub-acutate at the free end, 3—5-septate, as a rule 4—5-septate, not narrowed at the septa, dull-brown and uniform in color, 40—60 by 6—8.5  $\mu$ , as a rule 42—55 by 7—8  $\mu$ .

In any atypic, almost stilbaceous specimen (as, e. g., on *Meliola amomicola* Stev., spec. No. 2860), the conidiophores are more or less clearly synnemataceous, forming a stalk up to 50  $\mu$  in diam., composed of brown, septate conidiophores, more or less erect, shorter (150—200 or more  $\mu$  in length, to 10  $\mu$  thick), with apical or acro-pleurogenous conidia brown, from not septate to 1—2-septate (rarely 3; exceptionally 4—5-septate), not narrowed near the septa, large (50—70 by 10—13  $\mu$ ), basal end narrowed but truncate, free end rounded. (Conidia up to 100 by 20  $\mu$ , 2—3, but also 4—5-septate, brown, longely caudate, narrowed at the septa are frequently present; it is presumed that are pertaining to another species).

#### *Helminthosporium guareicolum* Stev.

Described by Stevens (l. c. pag. 241. 1918) on *Meliola guareicola* on *Guarea trichilioides* in Puerto Rico. This is a quite uncommon species aberrant from the cogeneric, meliolicolous species, for the irregularly thickened up to the zig-zag shape of the conidiophores. The mycelium is composed of a loose net of hyphae, septate, irregularly distributed, straight or almost so, the conidiophores rigid and darker, few to abundant in number, sub-erect to erect, irregularly distributed, straight or almost so, rigid and darker in the basal portion, tender and paler in the apical part, 50 to 150—180  $\mu$  long, as a rule of the same thickness of the sterile hyphae, but also up to 6—7  $\mu$  and irregularly thickened, in many cases with one or a few scattered, contiguous or isolated cells also of 8—10  $\mu$  in thickness, of variable length, but also short (then with a toruloid aspect of the conidiophore), delimited by two septa, and, as a rule, here darker; conidia produced on a little evident apical denticulation, a few for each conidiophore and also only one, 3—5-septate, frequently 4—5-septate, 18—32 by 4—6.5  $\mu$ , brown and uniform in color, not or very slightly narrowed at the septa, straight or slightly curvate, without beak, free end narrowed but truncate at the top, basal end rounded-truncate.

It is a *Helminthosporium* like species, but it may eventually be distinguished in a separate genus in account of the characteristics of the conidiophore.

**Helminthosporium acalyphae** (Thuem.) n. comb.

Hab.: in foliis *Acalyphae angustifoliae* Sw. (Euphorbiaceae), Republic Dominicana, Cordillera Central, prov. La Vega, Bonao, in sylvis, coll. E. Ciferri, VIII. 1926 (sine numero).

This species is characterized by the colony asterinoid or confusely radiate, black, opac diffuse and undelimited, as a rule on the lower page of the leaf; the mycelium (growing on scanty remain of an old *Meliola* mycelium), is dense, formed by dull-brown or blackish,

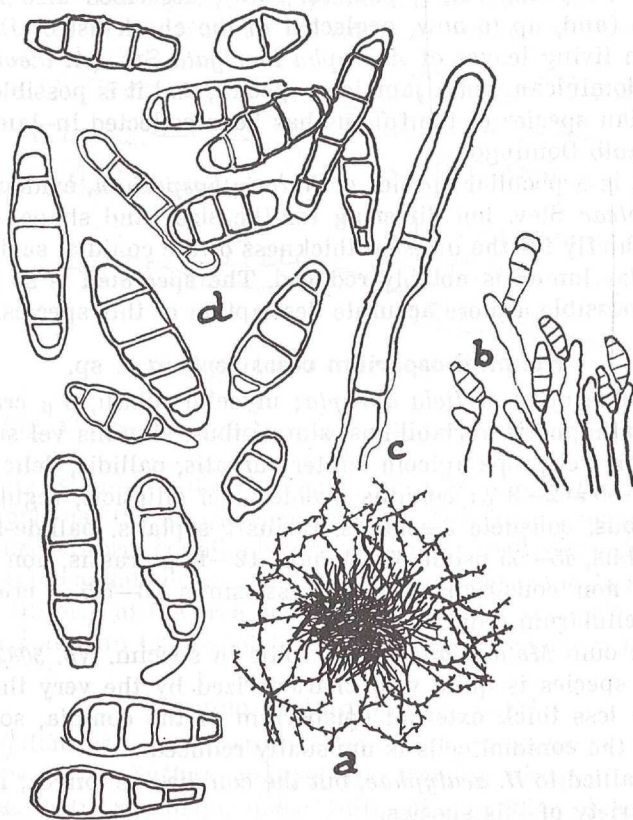


Fig. 3. *Helminthosporium carpocrinum* Cif.: a) tufts on the mycelium of a *Meliola*; b) conidiophores with conidia; c) conidiophores; d) conidia.

branched, almost nettled, sparingly septate hyphae, 2—3,5  $\mu$  in thickness; conidiophores erect, individually distinct but more or less loosely aggregate in tufts, simple, superficial, brown-blackish, septate, at the free tip more or less clearly geniculate, of very variable length, 2,5—4  $\mu$  thick; conidium one for each conidiophore, terminal or sub-terminal, ovate-ellipsoid, at the free end subacutate, at the basal end

subobtusate, 2—3-septate, olivaceous-brown or dull-brown, not constricted at the septa, 9—16 by 4—6  $\mu$ , as a rule 10—14 by 4—6  $\mu$ .

An interesting species, apparently growing on or together a *Meliola*, of which only a few residual, sparingly hyphopodiate mycelium is evident. In our opinion, is one of the *Helminthosporium* species with 3-septate conidia listed by Hansford (I. M. I., Bull. 15, pag. 214. 1946).

This species is surely identic to *Ophiotrichum acalyphae* Thue-  
men (Rev. Mycol., Vol. I, pag. 10. 1879), described also for Santo Domingo (and, up to-now, neglected in the check-list of Dominican fungi) on living leaves of *Acalypha laevigata* Sw. (*A. laevigata* Sw. is not a dominican, but a jamaican species, and it is possible that the thuemenian species of the fungus has been collected in Jamaica and not in Santo Domingo).

This, is a peculiar species of *Helminthosporium*, evidently allied to *H. ocoteae* Stev. but differing for the size (and shape) of many organs, chiefly for the unusual thickness of the conidial septa, so that the cellular lumen is notably reduced. The specimen is so poor that it is not possible a more accurate description of this species.

#### **Helminthosporium crassiseptum n. sp.**

Plagulae ut in *Meliola abrupta*; mycelio subtili, 2  $\mu$  crasso, diffuso; conidiophoris variabilibus, simplicibus, singulis vel sub-aggregatis, rectis vel prope apicem leniter curvatis, pallidis, delicatis, septatis, 30—50  $\Rightarrow$  2—3  $\mu$ ; conidiis ovoideis vel ellipticis, regularibus et uniformibus, consuete 3-septatis, rarius 2-septatis, pallide-brunneis, concoloribus, 45—55 usque 65  $\mu$  longis, 12—14  $\mu$  crassis, non caudatis, ad septa non constrictis, septis crassissimis (3—5,5  $\mu$  crassis) et lumine cellularum reducto.

Hab.: cum *Meliola abrupta* in foliis in specim. No. 3082.

This species is quite well characterized by the very thick septa and little less thick external episporium of the conidia, so that the lumen of the conidial cells is unusually reduced.

It is allied to *H. acalyphae*, but the conidia are longer; it may be only a variety of this species.

Unfortunately the specimen at hand is overgrowth by other unclassifiable fungi, and the species is to be fully redescribed on better material.

It has been found on fragments of mycelium of a sterile Meliolinea growing on *Cissus* sp., Dominican Republic, prov. Santiago, Hato del Yaque, in thickets, I. 1931, leg. R. C., without number.

#### **Spiropes Cif., n. gen.**

Typice fungicolus; conidiophora sub-torulosa vel spiralata, sed vere alterne lateraliter incisa, „zig-zag“ efformata; conidia singula,

alternantia, pleurogena et acrogena, fusca, elliptica, ovata vel apiculata, transversaliter pluriseptata ut in *Helminthosporio*.

Typus: **S. guareicola** (Stev.) Cif., n. comb. (= *Helminthosporium guareicolum* Stev. [*guareicola* emend. Hughes]; = *H. flagellatum* Yates; = *H. spirotrichum* Sacc.).

### **Cuspidosporium** n. gen.

This genus has been established on the original Saccardo's specimen of *Helminthosporium cuspidatum* (Atti Acc. Ven. Trent.-Istr., pag. 91. 1917) of the Baker collection, collected by Reyes in the



Fig. 4. *Cuspidosporium cuspidatum* (Sacc.) Cif.: conidia.

Philippine Islands on dead branches of *Afzelia rhomboidea*, in spite of the fact that the specimen is meagre. It is well characterized by the slender filiform conidiophores, with small, scattered enlargements, and longely caudate conidia, rounded or rounded-truncate at the base, longely filiform at the free end, when young short and 2—4 septate, then long and up to 12-septate, but, as a rule, not more than 8—10-septate.

### **Cuspidosporium** nob., n. gen.

Dematiaceus, macronemeus; conidiophora delicata, filiformia, hinc inde leviter inflata, monosporia; conidia acrogena, obclavato-elongata, longe attenuata, quasi filiformia-caudata, brunnea, primo 2—3 septata, deinde usque 12-septata, pro more 8—10 septata.

Typus: **C. cuspidatum** (Sacc.) n. comb. (= *Helminthosporium cuspidatum* Sacc.). It is possible that this genus is, really, identic with *Podoconis*, as quoted by Boedijn (Bull. Jard. Bot. Buitenzorg, Vol. XIII, p. 133. 1933) for *P. theae* (Bern.) Boed. (= *Helminthosporium theae* Bern.), and redescribed by Hughes (I. M. I. Myc. Pap. N. 50, p. 58. 1953) for *P. macrura* (Sacc.) Hughes (= *Helminthosporium macrurum* Sacc.) and *P. parva* Hughes (l. c. p. 59. 1953).

Apparently in the genus *Podoconis* the conidiophores are thick and regularly swollen just below the apex, while in *Cuspidosporium*



are filiform and a little swollen also below the tip; the conidia of *Podoconis* are 3—5 septate, while those of *Cuspidosporium* are at first 2—3-septate, then up to 12-septate (as a rule 8—10-septate).

The widening of the genus *Podoconis* to include also *H. cuspidatum* (eventually with two subgenera) may be another acceptable solution.

Key of the dominican species of Meliolicolous  
*Helminthosporium*:

- A) Conidia as a rule 3- to more septate (3—7 septate).
- B) Conidiophores not or very rarely fasciculate.
  - C) Spots diffused; conidiophores never fasciculated, 25—250 by 2—5  $\mu$ ; conidia typically 3—4, up to 1—2-septate, 30—60 by 6—10  $\mu$  *H. portoricense* (Speg.) Cif.
  - CC) Spots aggregated in tufts; conidiophores single to fasciculated, 150—300 by 6—8  $\mu$ ; conidia typically 3—5, up to 6—7 septate, 18—42 by 8—11  $\mu$  *H. caespitiferum* Petr. et Cif.
  - BB) Conidiophores variable from free to sub-fasciculate up to almost synnemmatoid.
    - E) Conidia 40—60 up to 70  $\mu$  in length *H. insigne* Sacc.
    - EE) Conidia 22—30  $\mu$  in length *H. carpocrinum* Cif.
  - AA) Conidia not often more than 3-septate.
    - F) Conidiophores pale, translucent.
      - G) Conidiophores 130—200  $\mu$  long; conidia 20—30 by 4—6  $\mu$ , with normally thin septa *H. ocoteae* Stev.
    - FF) Conidiophores brown, more or less opac, but also rarely paler at the free end.
      - GG) Conidiophores 30  $\mu$  long; conidia 45—55 by 22—44  $\mu$ , with very thickened septa *H. crassiseptum* Cif.
    - H) Conidia usually not strongly differentiated at the ends.
      - I) Conidiophores 250—300  $\mu$  long.
        - L) Conidiophores 3  $\mu$  in thickness; conidia thin-walled, rough *H. melastomacearum* Stev.
        - LL) Conidiophores 6—8  $\mu$  in thickness; conidia thick-walled, smooth *H. meliolooides* Sacc.
      - II) Conidiophores 100—250  $\mu$  long *H. panici* Stev.
    - HH) Conidia usually strongly differentiated at the ends.
      - M) Beak short, usually 7  $\mu$  or less.
        - N) Conidia of the same shade, thin-walled (conidiophores free) *H. parathesicola* Stev.
        - NN) Conidia with central darker cells thick-walled (conidiophores also sub-fasciculated; see above) *H. meliolooides* Sacc.
      - MM) Beak longer, usually more than 7  $\mu$ .
        - O) Conidiophores thick, 7  $\mu$ .

- P) Conidia thin-walled *H. helleri* Stev.  
 PP) Conidia thick-walled *H. palmetto* Gerard  
 OO) Conidiophores thinner, 4  $\mu$  *H. philodendri* Stev.  
 EEE) Conidia 9—16  $\mu$  in length *H. acalyphae* (Thüm.) Cif.

We suspect that also *H. naviculae* Syd. (Hedwigia, Vol. XLII, pag. 106. 1903), found on leaves of an Euphorbiacea in Brasil by Ule is another meliocolous species, but we never observed a full developed stage; as a rule, only a few, scattered conidia are found amongst other symbiotic fungi. It is clearly recognizable by the „navicular“ shape of the 2-septate, yellow to very pale-brown conidia, not narrowed at the septa, having both ends very narrowed, short and abruptly curved, simulating the side view of a boat with slightly raised prow and stern, of 55—90 by 10—15  $\mu$ .

## 2. On Meliocolous species of the genus *Podosporium*.

The nomenclature of the stilbaceous, meliocolous *Helminthosporia* is puzzling. The oldest generic name appears to be *Arthrographium* Ces., then substituted by *Arthrobotryum* Ces. Hughes (Naturalist, p. 171—173. 1951) revised the type of Cesati and identified the fungus as *Sporochisma saccardoii* Mason et Hughes. The last named students revised a few species erroneously attributed to this genus (Naturalist, p. 171, 1951), and redescribed *A. stilboideum* on british material (see also Mason and Hughes, ibid. p. 97 1951).

We are in condition to confirmate that the specimen of Cesati fungus (in Klotzsch, Herb. Myc. Viv., E. N., N. 139, 1855) is devoid of any stilbaceous fungus. Of other hand the italian material (see Ferraris, Hyphales, p. 191. 1910) of *A. stilboideum* is that of a lignicolous, stilbaceous fungus, with densely penicillate synnemata, fertile at the very top and in some case producing conidia aggregated with slime; the conidia are elliptic or ovoidal, thin-walled and smooth, typically 3-septate, brownish in color, of a *Helminthosporium* general shape.

*A. stilboideum* Ces. (= *Arthrographium stilboideum* Ces.) is a fungus, quite frequent in Italy on more or less rotten wood, of course, not meliocolous. The first doubtful meliocolous described species is *A. melanoplaca* Berkeley et Curtis (Journ. Linn. Soc. Bot., Vol. X, p. 360. 1869) found in Cuba on *Psychotria* leaves, in spite of the fact that no *Meliola* species are quoted. Without an examination of the authentic specimen, this species is unrecognizable, having been described with uniseptate conidia; probably is not a species of the genus *Arthrobotryum*. The first true meliocolous species are *A. scoparium* P. Hennings from Peru on *Meliola* sp. (*A. soparium*, pro error, in Sacc. Syll., Vol. XVIII, p. 655), and probably also *A. tecomae*

P. Henn. from Peru and *A. strichni* P. Henn. from Brasil, in spite of the fact that no *Meliolae* are indicated in the description.

The genus *Arthrosporium* has been described by Saccardo (Michelia, Vol. II, p. 32. 1880) based on *Arthrobotryum albicans* Saccardo (Michelia, Vol. I, p. 75. 1877). The authentic specimen of the Saccardo's herbarium is very poor; in our opinion is very allied to *Arthrographium stilboideum*, but having slightly greater conidia and light to subhyaline conidiophores. The systematic position of this genus is uncertain: a better knowlegde of the variability and life-cycle of *A. stilboideum* is needed.

The first meliocolous species is *A. parasiticum* Winter (Hedwigia, Vol. XXV., p. 103. 1886) on *Meliola inermis* from S. Thome. The description is not complete, but the synnemata are fulvous and the conidia very light ochraceous in color.

The genus *Podosporium* has been described by Schweinitz (Syn. Fung. Am. Bor., No. 2609. 1834) on the base of *P. rigidum*, corticolous fungus and a not clearly recognizable species. Probably the conidiophora are black and black the conidia.

The first meliocolous species is *P. penicillium* Spegazzini (Bull. Ac. Nac. Ci. Cordoba, N. 471. 1889), previously published as *Meliola penicillata* Speg. (Ann. Soc. Ci. Argent., Vol. XII, n. 117. 1881) on *Meliola calva* in Brasil. It has been described with dull synnemata, but with verruculated-rough tip, and pale smocky conidia.

The genus *Helminthosporiopsis* has been described by Spegazzini (Ann. Soc. Ci. Argent., Vol. X, N. 159. 1880), with a not meliocolous species: *H. typica* Speg., on rotted stem of an *Eryngium* from Argentina. Apparently is has been discriminated by the conidiophores dull but with hyaline tip. Saccardo (Syll. Fung., Vol. IV, p. 628. 1886) referred this species to *Podosporium spegazzinii* Sacc.

The situation is puzzling and it is cannot be solved without the comparison of authentic specimens or by the study of specimens to be referred to the original species.

To sum up, a tentative interpretation of the meliocolous and not meliocolous genera of stilbaceous *Helminthosporia* is referred in the table:

Genus	Meliocolous	Author	Date	Conidiophores	Conidia
<i>Arthrobotryum</i>	No	Casati	1854	Dull with light tip	Light
<i>Arthrobotryum</i>	? (doubtful)	Berkeley et Curti (doubtful)	1869	Dull	Dull
<i>Arthrobotryum</i>	Yes	P. Hennings	1904	Dull Dull with lighter tip	Dull Dull with lighter end.
<i>Arthrosporium</i>	No	Saccardo	1877	Light	Light

Genus	Meliocolous	Author	Date	Conidiophores	Conidia
<i>Arthrosporium</i>	Yes	Winter	1886	Halfway	Halfway
<i>Podosporium</i>	No	Schweinitz	1834	Dull	Dull
<i>Podosporium</i>	Yes	Spegazzini	1881 1889	Dull	Halfway
<i>Helminthosporiopsis</i>	No	Spegazzini	1880	Dull with hyaline tip	Dull

Evidently the conidiophores of meliocolous species are variable from dull or dull with hyaline tip, to halfway, while the conidia are dull to halfway in color. Of the meliocolous sections of the above quoted genera, the best fitting appears to be the genus *Podosporium*, and we adopted this generic name in expect of better information.

It is possible that the genera *Sporhelminthium* Speg., *Pseudographium* Jacz., *Podosporella* Ell. et Ev. etc. are to be considered here.

A provisional tabulation in key form of the species of the genus *Podosporium* found in the Dominican Republic, together with a few species found in the bibliography, may be:

A) Conidia 2—3-septate only *P. insularis* Cif.\*

AA) Conidia typically 3—4-septate

B) Conidia as a rule 3-septate

C) Conidia to 25—35  $\mu$  long

D) Conidia as a rule 25  $\mu$  or less in length, up to less than 40  $\mu$ .

E) Conidia 14—18  $\mu$  long; 3—5  $\mu$  width

*P. glabroides* (Stev.)\*

EE) Conidia 20—25  $\mu$  long, 6  $\mu$  width

*P. densum* Pat.

DD) Conidia as a rule to 30  $\mu$  long

F) Conidia brown; terminal cells from shortly oblong to elongate; synnemata loose, not expanded at the base

*P. effusum* Pat.\*

FF) Conidia pale; terminal cells fusoid; synnemata rigid, not expanded at the base

*P. pallidum* Pat.\*

FFF) Conidia yellow to pale brown, basal and apical cells paler; synnemata expanded at the base

*P. ugadense* (Hansf.)

DDD) Conidia as a rule to 35  $\mu$  long

G) Terminal cells of conidia elliptic, not beaked

*P. penicillatum* (Lév.)\*

GG) Conidia with evident beak cells

H) Conidia very beaked; septa more or less equidistant, and cells concolor

*P. caudatum* (Syd.)\*

- HH) Conidia less beaked; central cells shorter than the terminal and darker  
 I) Middle cells verruculose (?) *P. melanoplaca* (B. et C.)  
 II) Middle cells smooth *P. consors* Sacc.
- CC) Conidia 40  $\mu$  long or more in length  
 I) Synnemata apically expanded as in a fan-shaped bush *P. dieffenbachiae* (Stev.)\*  
 II) Synnemata not or a little expanded at the free end *P. parasiticum* Wint.\*
- BB) Conidia as a rule 4-septate *P. clerodendri* (Sacc.)\*
- CCC) Conidia to 50—80  $\mu$  long *P. deightonii* (Hansf.)\*
- AAA) Conidia 2—5-septate  
 L) Conidia 16—26  $\mu$  long *P. strychni* (P. Henn.)  
 LL) Conidia 50—75  $\mu$  long *P. penicilloides* Karst. et Roum.,  
 AAAA) Conidia 3—7-septate *P. antillanum* (Frag. et Cif.)\*

The species marked with \* are found in the Dominican Republic.

Of course, this is an artificial and provisional key, and may be matter of discussion the discrimination of a so large number of species, chiefly in the group with species having conidia as a rule 3-septate, because primarily based on the length of conidia.

***P. caudatum*** (Syd.) n. comb.

Syn.: *Arthrobotryum caudatum* Syd., in De Wild., Fl. Bas et Moy. Congo, An. Mus. Congo, Vol. III, p. 22 (1909).

A species very frequently found in many species of Meliolineae. In the specimen on *Meliola anacardii* Zimm. (on leaves of *Anacardium occidentale*), the coremia are 500—750  $\mu$  long, broadened at the free ends, but not fan-shaped, black, with yellowish tip of the conidiphores. The conidia are 38—42  $\mu$  long.

***P. clerodendri*** (Sacc.) n. comb.

Syn.: *Podosporium penicillium* Speg. var. *clerodendri* Sacc., Bull. Orto Bot. Napoli, p. 25. 1918.

***P. deightonii*** (Hansf.) n. comb.

Syn.: *Arthrobotryum deightonii* Hansf., I.M.I. Pap.No. 15, p. 218. 1946.

***P. dieffenbachiae*** (Stev.) n. comb.

Syn.: *Arthrobotryum dieffenbachiae* Stev., Bot. Gaz., Vol. LXV, p. 237. 1918.

***P. glabroides* (Stev.) n. comb.**

Syn.: *Arthrobotryum glabroides* Stev., Bot Gaz., Vol. LXV, p. 237. 1918.

On many species of *Meliola* is not unfrequent a *Helminthosporium* more or less correspondent to the true *A. glabroides* [e. g.: on? *Meliola glabroides* Stev., found on *Nectandra coriacea* (Sw.) Griseb., Llano Costero, prov. Santo Domingo, Ciudad Trujillo, Banks of Rio Ozama, 14. XII. 1929, coll. E. L. Ekman (No. 2749)].

Previously known in Santo Domingo on *Nectandra antillana*, in a local form (f. *antillanum* Frag. et Cif.) that is, really, another species; see below).



Fig. 5. *Podosporium pallidum* Pat. on *Meliola angusta* Stev.: a) synnema with conidia; b) conidia.

In our opinion *Helminthosporium insigne* Sacc. (Atti Ist. Ven. Trent.-Istr., Vol. X, p. 89, 1917) found on *Meliola insignis* Gaill. on *Mallotus philippinense* in the Philippine Islands, may be the half-aggregated, sub-columnar aspect (arthrobotryoid) of *M. glabroides*; Saccarda himself observed that „ob hyphes conidiophores densiuscule fasciculatis, ad *Podosporium* vergit“, and Stevens noted that, on *Meliola comocladiae*, the conidiophores are darker than in the types, sometimes slightly toruloid (in the type specimen often bent but never toruloid) and occasionally there is a strong tendency to be grouped.

For the full description of a typical *A. glabroides*, see Petrak and Sydow (Ann. Myc., Vol XXVII, p. 83. 1929).

**P. insularis** n. sp.

Maculis nigris, velutinis, indefinitis, hypophyllis; mycelium inconspicuum, brunneum; conidiophoris plus vel minus fasciculatis, flavido-brunneis, erectis, septatis, rectis, variabilibus, pro more 300—350  $\approx$  15—28  $\mu$ , apice libero flavidulo; conidiis acrogenis, nigro-fumosis, primo ovoideis, dein elongatis, 2—3-septatis, rarius 4—7-septatis, apice libero truncato, ad septa constrictis, 38—45  $\approx$  10—11  $\mu$ , cellulis asymmetricis, superne minoribus, basaliter longioribus.

Hab.: in mycelio vetusto *Meliola* ? vel genus affine, in foliis *Palicoureae*, Reipublica Dominicana.

Found at least once on old, not fructified mycelium of *Meliola* ? or allied genus on leaves of *Palicourea* sp., Republica Dominicana, Cordillera Central, prov. La Vega, Bonao, rain forest, coll. R. C. (without number).

Black, more or less velvety, indefinite, colonies found on the lower pages of the leaf; hyphae inconspicuous or a little evident, brown, with conidiophores more or less fasciculated; conidiophores brown-yellowish, more or less erect, septate, straight or almost so, variable in length, as a rule 300—350 by 15—18  $\mu$ , with paler free end: conidia smoky-black, at first ovoid, than more elongated, with only 2 or 3 septate (rarely four), with truncate free end, clearly narrowed at the septa, 38—45  $\mu$  in length at all, 10—11  $\mu$  in size, with the cells asymmetric, the superior being smaller than the others, and the basal longer (up to 15—20  $\mu$  in length).

A species distinct from the allied of the same genus for the 2—3-septate conidia, and the asymmetry of the cells, the apical being shorter and the basal longer.

We suppose that the same species has been found on *Meliola seminata* B. et C. on *Palicourea* in Cuba, by Berkeley (F. cub. No. 885), at least following the description of Gaillard (e. c. p. 60), but we don't know the authentic specimen.

**P. melanoplaca** (Berk. et Curt.) n. comb.

Syn.: *Arthrobotryum melanoplaca* Berk. et Curt., Journ. Linn. Soc. Lond., Vol. X, p. 360 (1869).

The Saccardo's species *P. consors* (from the description) appears to be very allied to *A. melanoplaca* B. et C., as stated by Hansford (I.M.I. Myc., Pap. No. 15, p. 220. 1946, sub *P. consors* instead of *P. consors* and confirmed by Hughes (l. c. p. 4), but the Berkeley and Curtis species (Journ. Linn. Soc. London, Vol. X, p. 360. 1869) has been described with the central, darker cells often granulose to verruculose.

**P. penicillatum** (Lév.) n. comb.

Syn.: *Meliola* ? *penicillata* Lév., Ann. Sci. Nat. Bot., ser. 9, Vol. V, p. 266. (1846).

See under *P. penicillium*.

*P. penicillatum penicillium* Speg., Bull. Ac. Nac. Ci. Cordoba, Vol. XI, p. 638. (1899).

Syn.: *Arthrobotryum strychni* P. Henn., Hedwigia, Vol. XLIII, p. 397 (1918).

It may be matter of discussion if it is also identic to *Meliola ? penicillata* Lév. (Ann. Sci. Nat. Bot., ser. 3, vol. V, p. 266. 1846) as stated by Seaver and Chardon (Sci. Survey Porto Rico etc., Vol. VIII, 1, p. 102. 1926).

**P. strychni** (P. Henn.) n. comb.

Syn.: *Arthrobotryum strychni* P. Henn., Hedwigia, Vol. XLIII, p. 297 (1904).

**P. ugandense** (Hansf.) n. comb.

Syn.: *Arthrobotryum ugandense* Hansf., Proc. Linn. Soc. London, Vol. CLV, p. 65 (1942).

**P. antillanum** (Frag. et Cif.) n. comb.

Syn.: *Arthrobotryum glabroides* Stev. f. *antillanum* Frag. et Cif., Boll. R. Soc. Esp. Hist. Nat., Vol. XXVIII, p. 141 (1928).

In the original paper we expressed the doubt that this form would be, really, a separate species. This form has been never collected after the first description. The original specimen is quite poor, but we suspect, now that two different species are present in the same spot.

It is possible that the conidia 3—4-septata, asymmetric, obtuse-conoidal, 25—42 by 6—10  $\mu$  are pertaining to one species; the conidia symmetric, lengthened, almost caudate, 5—7-septate, 40—70 by 7—11  $\mu$  are to be referred to another species.

This specimen has not been collected by ourselves, but by Dr. Chardon. In conclusion this new combination is doubtful.

### 3) On the genera *Sarcinella* Sacc. (*Mycelia sterilia*) and *Mitteriella* Syd. (Fig. 1).

Forms of this genus are not infrequently found in the Dominican Republic, and about twenty years ago we had the opportunity to compare a number of extra-antilleean specimens for the kindness of the late Dr. H. Sydow and to the previous Curator of the Saccardo's Herbarium in Padua, Prof. Gola, including the type specimens.

The genus *Sarcinella* (type *S. heterospora* Sacc.) has been described by Saccardo (Myc. Ven., No. 153—154; Michelia, Vol. I, p. 18. 1877; Vol. II, p. 31. 1880. F. Ital. tab. 126) for a fungus considered to be connected, as conidial stage, to *Dimerosporium pulchrum* Sacc., with two types of conidia: one black or blackish, sarciniform, and the other hyaline and phragmosporeous. This species has been found



many time in Europe (Italy, Switzerland, Germany) and North America, but apparently never in the tropical regions. Other species described were: *S. milletiae* Syd. (Ann. Mycol., Vol. XXV, p. 151. 1927); *S. oreophila* Syd. (Ibid., Vol. XXXVI, p. 242. 1927); *S. tandonii* Mitter (Ibid., Vol. XXXV, p. 243. 1927); *S. acalyphae* Syd. (Ibid., Vol. XXVIII, p. 219. 1930).

In addition *Coniothecium questieri* Desm. has been referred by Arnaud (Ann. Sc. Nat. Agr. Montpellier, N. S., Vol. XVI, p. 88. 1918; see also v. Höhnelt in Weese Centr. f. Bakt., II Abth., Vol. 60, p. 23. 1924) to the genus *Sarcinella*.



Fig. 7. *Sarcinella*. A. Sarcinopodia with mycelic hyphae of *S. heterospora*. B. Sarcinopodia of *S. acalyphae*. C. Sarcinopodia of *S. raimundi*. D. Sarcinopodia of *S. milleriae*.

The dominican specimens are always associated with undeveloped Ascomycetes, with the only exception of a specimen on *Schiffnerula domingensis* Petr. et Cif. (Ann. Mycol., Vol. XXVIII, p. 400. 1930), but on this specimen the *Sarcinella* is well developed only when the *Schiffnerula* is immature and in the empty parenchymatous stage. The other specimens were undetermined, being, probably, species of *Schiffnerula* or *Questiera*, even *Clypeolella* or allied fungi.

In our opinion, the so called sarciniform conidia are only a superior, morphologically evolutive stage of capitate hyphopodia, here called sarcinopodia, as a rule developing from a simple, enlarged stigmopodium; apparently only a few, normal stigmopodia are capable to evolve to sarcinopodia. This aspect is distinct from other hyphopodia because, as a rule, they are acrogenous and found

on the top of a small branch of the hypha, in spite of the fact that sessile sarcinopodia are frequent. The modality of development is quite variable; in most cases, at first a bipartite cell, forming a double hemisphere, with a central, more and more differentiate septum, is evident; in a few cases, the cell is not septate or it is tripartite. The other cells are formed centrifugally by one or more proliferation of the hyphal tip, as a rule by one. The mature sarcinopodia are isolated, with or without a fragment of the mother hypha.

The signification of the sarcinopodia is unknown; we never observed the germination even not the first beginning. They are not conidia in true sense, nor chlamydo-spores: in the sarcinopodia, as a rule, the septa formation is more or less contemporaneous to its development, while in the thallospores the septa formation is posterior to the development.

In our opinion, the sarcinopodium is an upper evolutive stage of a hyphopodium. In the scale of the morphological complexity, we found, at first the simple, scattered, poor differentiated, as a rule rounded hyphopodia; then the simple hyphopodia, but differentiated in capitate and mucronate, without evident basal cell; then differentiated, biform hyphopodia with an evident, basal cell and a lobed antrorse, incise, etc. head cell; at last the more complex sarcinopodia.

It is well possible also that the signification is that of bulbil-like form of hyphopodia. Arnaud (l. c.; also pl. XLI, fig. E—J) in relation to *Questieria* and *Coniothecium questierii* Desm. (Pl. Crypt., XVI, p. 798. 1887) wrote that they are „des jeunes ascostromes dont les cellules ont été évolué en chlamydo-spores“, a not clear statement; in any case they are different from the true bulbils as described, e. g., by V i n c e n s (C. R. Acad. Sci. Paris, CLXIII, p. 572. 1916) for *Melanospora*.

More recently Arnaud published the combination *Questierella raimundi* (Sacc.) Arn. (Bull. Soc. Myc. France, Vol. LXIX, p. 284. 1953) for *Sarcinella raimundi* Sacc. p. p., for the conidial, noth the bulbillar stage, a genus apparently not truly justified.

If the sarcinopodia are bulbilear organs, a morphological evolutive scale may be traced starting from the pluriseptate chlamydo-spores of many genera of Hyphales (chiefly Dematiaceae in culture), to the 1—6-septate sarcinopodia of *Sarcinella heterospora*, to the up 20-septate sarcinopodia of *S. oreophila*, ending to the multiple and complex bulbilar of sporidesmioid type, as in *Papulospora* and allied genera.

The comparison of a number of specimens yielded the following data:

*Sarcinella heterospora* Sacc.

f. *ligustri* D. Sacc. in foliis *Ligustri vulgaris*, Aug. 1903. Montello, Treviso. D. Sacc., Myc. Ital. No. 1396.

Black, diffuse, undelimitate, ampligenous spots. A poor specimen.

No. of cells	1	2	3	4	5
Frequency	1	3	8	35	3 = 50

Diam. of sarcinopodia: from 20 to 38  $\mu$ , chiefly 22–35  $\mu$ .

*Sarcinella heterospora* Sacc.

f. *corni* D. Sacc. As above No. 1395.

Black, diffuse, undelimitate spots.

No. of cells	2	3	4	5	6
Frequency	3	5	11	27	4 = 50

Diam. of sarcinopodia: from 23 to 40  $\mu$ , chiefly 24–36  $\mu$ .

*Sarcinella heterospora* Sacc.

in foliis siccis *Ligustri*. Torre d'Isola, Pavia, without data. Leg. G. Briosi (Myc. Horti Bot. Paviae).

Blackish to black-brownish, definite, roundish spots, chiefly on the upper page.

No. of cells	1	2	3	4	5	6
Frequency	1	3	6	33	5	2

Diam. of sarcinopodia: from 19 to 35  $\mu$ ; chiefly 21–25  $\mu$ .

*Sarcinella heterospora* Sacc.

In foliis vivis *Fraxini* sp., Beaumont, Texas, Am. bor., Nov. 1889, leg. Dr. B. F. G. Egeling in Ell. et Ev. N. Am. Fungi, No. 2683 (fide cl. Auct. socia *Dimerosporium pulchri* Sacc.).

Or the upper surface of the leaf, forming black, diffuse, microthyriaceous colonies; in the lower page colonies black, confluent, cladosporiaceous.

No. of cells	2	3	4	5	
	2	7	40	1	= 50

Diam. of sarcinopodia: from 22 to 36  $\mu$ , chiefly 28–31  $\mu$ .

*Sarcinella heterospora* Sacc.

in foliis vivis *Ligustri vulgaris*, Montello, Treviso, without data, leg. P. A. Saccardo (type specimen).

No. of cells	1	2	3	4	5	6
Frequency	1	2	10	26	8	3 = 50

Diam. of sarcinopodia: from 18 to 32  $\mu$ , chiefly 20–26  $\mu$ .

In this poor specimen the *Dimerosporium pulchrum* Sacc., if any, is very little developed and unrecognizable. Also the species with hyaline, phragmospore conidia is not evident.

*Sarcinella heterospora* Sacc.

Rodero, Como, leg. O. Mattiolo, Oct. 1898 (ex Herb. Horti Bot. Patavini).

Colonies subcrustose, black or blackish, dense, covering most of the leaf surface.

No. of cells	1	2	3	4	5	6
Frequency	1	3	7	33	3	3 = 50

Diam. of sarcinopodia: from 20 to 34  $\mu$ , chiefly 25–30  $\mu$ .

*Sarcinella heterospora* Sacc.

Ad *Ligustri vulgaris* folia viva, prope Zürich, Helvetiae, Oct. 1880, leg. G. Winter (Rabenh. Wint., F. europaei, No. 2684) (ex Herb. O. Pazschke).

Small, amphigenous, black, subcrustaceous spots.

No. of cells	2	3	4	5	6
Frequency	8	9	28	4	1 = 50

Diam. of sarcinospodia: from 21 to 37  $\mu$ , chiefly 22–28  $\mu$ .

*Sarcinella acalyphae* Sydow (type specimen).

Spots black, amphigenous, fumarioid, effuse, almost indelimitate.

No. of cells	1	2	3	4	5	6	7
Frequency	1	3	8	16	14	7	1 = 50

Diam. of sarcinopodia: from 21 up to 32  $\mu$ ; chiefly 25—29  $\mu$ .

*Sarcinella milleriae* Sydow (type specimen).

Spots blackish; irregularly distributed and irregular, effuse to delimitate.

No. of cells	3	4	5	6		
Frequency	2	12	25	11		= 50

Diam. of sarcinopodia: from 22 to 36  $\mu$ , chiefly 28—31  $\mu$ .

*Sarcinella raimundi* Sacc. (type specimen).

in foliis *Solani melongenae*, Morong Valley, Luzon, Ins. Philipp., 8. II. 1913, leg. M. B. R a i m u n d o, No. 2016 (in Herb. Horti Bot. Patavini).

Superficial, a little visible spots, subdiffuse up to confluent, rarely single, covering most of the surface of the leaf.

No. of cells	3	4	5	6	7	8
Frequency	4	6	7	23	7	3 = 50

Diam. of sarcinopodia: from 30 to 38  $\mu$ , chiefly 32—36  $\mu$ .

*Sarcinella oreophila* Sydow.

Specimen unknown to us; from the description this species appears to be distinct from the other for the kinds of „oidia“ : smaller, 4—6-cellular, and greater up to 20-cellular.

*Sarcinella tandonii* Mitter.

As above; from the description, apparently allied to the preceding.

*Sarcinella ancoche* Speg.

As above; from the description, apparently a species, very allied to *S. heterospora*, and differing chiefly for the slightly greater sarcinopodia.

*Sarcinella questieri* (Desm.) Arn.

It has been studied on a poor specimen, cotype, according A r n a u d (l. c.) of *Questiera pulchra* (Sacc.) Arn. var. *corni-sanguinei* Sacc. (under *Apiosporium pulchrum* Sacc. f. *corni-sanguinei* Sacc.; Myc. Ven. No. 154, Selva, Treviso, Sept. 1874). The mycelium is branched, also to a right angle, more frequently irregularly branched, yellowish-brown to dull-brown, 2.5—3.5  $\mu$  diam.; normal hyphopodia always sessile, more or less spheric or ovoid or elliptic, irregularly distributed, alternate or unilateral, rarely opposite, 3—6.5  $\mu$  diam. or 4—7  $\mu$ ; sarcinopodia as a rule 4-cellular, rarely 3- or 5-cellular, tetragonous, rarely sub-trigonous up to pentagonous, with the rounded borders, at first yellow-brownish then brown and, at last, very dull-brown, as a rule 20—25  $\mu$  diam.

From the morphological standpoint, it is not distinct from *S. heterospora*, having priority on the last named species, to which is to be reported as synonym.

The conclusion is that the sarcinopodia are notably homogeneous, and, in absence of the corresponding fructiferous stages, *S. acalyphae* Syd., *S. millerii* Syd. and *S. raimundii* Sacc. (and probably *S. ancoche* Speg.) cannot be differentiated from *S. questieri* (= *S. heterospora* Sacc.). According the description, *S. oreophila* Syd. (including ? *S. tandonii* Mitter) is distinct on the account of sarcinopodia up to 20-cellular.

The genus is to be placed amongs the group of *Mycelia sterilia* (Agonomycetes).

In conclusion, we have:

A) Sarcinopodia 1—7-cellular, as a rule 4—5-cellular:

*Sarcinella questieri* (Desm.) v. H. = *S. heterospora* Sacc.; = *S. acalyphae* Syd.; = *S. millerii* Syd.; = *S. raimundii* Syd.; = ? *S. ancoche* Speg.

AA) ? Sarcinopodia up to 20-cellular:

*S. oreophila* Syd. (? with *S. tandonii* Mitter).

In the specimen of *S. raimundii* we found many sterile stromata, and also brown, nonseptate conidia, of 20—23 by 9,5—11  $\mu$ , similar to an imperfect form of an *Asterinea* (*Asterostomella* or an allied genus).

The specimen of *S. milleriae* harboured also the *Phaeodimeriella asperula* Syd. with the imperfect stage of *Cicinnobella asperula* Syd.

No mature ascosporic fungi were found in the other specimens.

Associated with *Sarcinella* we found a number of Hyphales, as a rule superposed and not easily recognizable. Yet in the type specimen of *S. heterospora* two forms were recognized, one Moniliaceous fungus with 3-septate, hyaline conidia, fusate to cylindric 25—30 by 10—12  $\mu$ , is found, and a second Moniliaceous fungus but with unseptate, hyaline, spheric to ovoid or elliptic conidia, as a rule 6 by 3  $\mu$ . The specimen studied by ourselves was too poor for the determination of these species. Associated with *S. oreophila* another fungus has been shortly described by Sydow (Ann. Mycol., Vol. XXXV, p. 243. 1947) as parasitic, with brown, unseptate, rounded and regular, conidia 7—10  $\mu$  diam. and hyaline, septate mycelium, 3—4,5  $\mu$  diam.

In the specimen of *S. raimundii*, while the sarcinopodia are scarce, a Hyphales is found frequent and abundant; it has been shortly described by Saccard himself; the mycelium and conidiophore are not evident; the conidia are fusarioid in shape, slightly curved, acutate at the free end, and acutate-obtusate at the basal end, at first hyaline or subhyaline, then brown, with 3 septa almost equidistant, slightly narrowed near the septa 22—30 by 8—11  $\mu$ , as a rule 24—24 by 9  $\mu$ , with the two central locules dull-brown to blackish, and the apical and basal lighter to subhyaline. A mycelium (of this species?) hyaline, septate, sparingly branched, of 1,5  $\mu$  in thickness, is present.

(Also a few conidia cylindroid to spindle-shaped 3-septate, as a rule 18 by 4–5  $\mu$ , yellowish to brownish, evidently of another species, are present).

In addition to typical, ascomyceticolous *Helminthosporium* spp., we found at least two times a species with hyaline or yellowish, septate, irregularly but sparingly branched mycelium, having undifferentiated short conidiophora of the same color to light-brown, and acrogenous or acropleurogenous, single and scattered conidia, elliptic to ovate, with both ends rounded or the basal end rounded-truncate, at first hyaline and unseptate, then with one or, more frequently, 2 septa, at maturity dull-brown; the septum may be more or less central but, if two septa are present, the central cell is longer and darker than the basal and the apical ones; in many cases the shade of the three cells is more or less the same, but also the apical end is lighter to almost hyaline, and prolonged in a kind of short, apical appendix, also lighter to subhyaline, 2–5  $\mu$  in bright and 1–3  $\mu$  thick (almost a thick, light seta) formed by an extrusion of the conidial episporium; the size of the conidia is 22–30 by 12–18  $\mu$ .

Also H a n s f o r d (I.M.I. Pap.No. 15, p. 27–29. 1946) recorded a conidial stage of *Schiffnerula*, shortly describing also conidia (on *S. mirabilis* v. H.) of the falcate type, 30–40 by 10–13  $\mu$ , conidia [on *S. radians* (Syd.) Petr.] falcate, pale olivaceous, then darker, 3-septate, not or slightly constricted, 50 by 11  $\mu$ , tip abruptly rounded, „base ending in a flat hilum“, and „*Helminthosporium*“ conidia (with short, scarcely differentiated, repent, 1-septate conidiophores) colored, usually 3-septate, with central cell darker than the end cells and sometimes much larger than the latter, as shown is *Mitteriella ziziphina* Syd. The last fungus appears to be allied to the species found with *S. raimundi*.

Our conidial fungus is to be referred to the genus *Mitteriella* Syd. and apparently identic with *M. ziziphina* Syd. (Ann. Mycol., Vol. XXXI, p. 95. 1933), found in India and described as conidial stage of *Schiffnerula* or other Englerulaceae. In our opinion the genus is one the many, helminthosporioid, ascomyceticolous, tropical fungi. It is well characterized, but we don't agree in considering it as an imperfect form of the Englerulaceae. According our observation, the hyphopodiate mycelium is that of the Ascomycetes, while the mycelium of *Mitteriella* is characterized by a simple, common hyphae; it is true that the hyphomycetic mycelium is poorly developed and not easily recognizable, in contrast the hyphopodiate mycelium of Englerulaceae, undeveloped fungus. The Dominican specimen has been found on the old mycelium of an Englerulaceous fungus (Dominican Republic, Valle del Cibao near La Cumbre, X. 1929, without number and name of the collector).

The fungus with falcate, 3-septate conidia with darker central cells described by Saccardo and by Hansford appears to be one the very many, pauciseptate *Helminthosporium*-like, tropical fungi, found on or together with foliicolous Ascomycetes, but without metagenetical connection with the same group of fungi.

#### 4) On the genera *Spegazzinia* Sacc. and *Isthmospora* Stev.

Species of the genus *Spegazzinia* and *Isthmospora* are frequently found on leaves of plants harbouring foliicolous Ascomycetes, but it is unusual to observe well developed, complete specimens.

The nomenclature has been established both by Sydow (Ann. Mycol., Vol. XVIII, p. 187. 1921) and by Hansford (I.M.I. Myc. Pap., No. 15, p. 220. 1946), reducing to synonymy of *S. meliolae* Zimm. (Centr. f. Bakter, II Abth., Vol. VIII, p. 221. 1902) the species: *Isthmospora glabra* Stev., *Spegazzinia meliolicola* P. Henn., *Tetrachia singularis* Sacc., and probably *Stemphylium muriculatum* Sacc. and *Spegazzinia coffeae* P. Henn.

An excellent monographic revision of the regretted, late Dr. Damon (Bull. Torrey Bot. Club, Vol. LXXX, p. 155—165. 1953) accepted two species, each one for the genera *Spegazzinia* and *Isthmospora*; namely: *Spegazzinia tessarthra* (B. et C.) Sacc. (= *Sporidesmium tessarthrum* B. et C.; = *Spegazzinia ornata* Sacc.; = *S. tucumanensis* Speg.; = *Tetrachia quadrigemina* B. et C.; = *Triposporium cristatum* Pat.; = *Spegazzinia brasiliensis* Speg.) and *Isthmospora trichophila* (Atk.) Damon (= *Spegazzinia trichophila* Atk.; = *S. meliolae* Zimm.; = *S. meliolicola* P. Henn.; = *S. coffeae* P. Henn.; = ? *Tetrachia singularis* Sacc.; = ? *Stemphylium muriculatum* Sacc.; = *Isthmospora spinosa* Stevens). Other species of *Spegazzinia* (*S. effusa* Karst., *S. lobata* v. H., *S. calyptospora* v. H., *S. ammophila* Rostr. and *S. rubra* Dearness et House) are excluded from this genus.

Almost simultaneously Hughes (I.M.I. Myc., Pap. No. 50, p. 77—97. 1953) published, under *Trichothyrium*, a very good study on developmental morphology of the "isthmospores". Agreeing with Damon's conclusion on the independence of the *Spegazzinia* and *Isthmospora*, both genera are considered as conidial stage of *Trichothyrium*. To *Trichothyrium asterophorum* (Berk. et Br.) v. H. are referred *Isthmospora spinosa* Stev., *Stemphylium muriculatum* Sacc., *Tetrachia singularis* Sacc. and, doubtfully, *Spegazzinia meliolae* Zimm., *S. meliolicola* P. Henn. and *S. coffeae* P. Henn.; to *T. reptans* (Berk. et Curt.) Hughes are referred *Isthmospora glabra* Stev. and *Spegazzinia chandleri* Hansf. (The reference of *Hansfordiella meliolae* (Hansf.) Hughes [= *Teratospermum meliolae* Hansf.] to *T. hansfordii* Hughes is not interesting to our purposes).

We cannot agree with the methagenetical linkage of *Spegazzinia* and *Isthmospora* with *Trichothyrium*. The species of the genus *Trichothyrium* are overgrowing by meliocolous fungi (as well as asterinaceous and allied species), very frequently in Neotropical fungine flora, but — at least in our experience — rarely on well developed, full fructified specimens. In most case there are a suspicion of *Trichothyrium* for a more or less rudimental development of a sterile thyrothecium. While the association of *Trichothyrium* with *Spegazzinia* and/or *Isthmospora* is very frequent, it is possible to see "isthmospores" on Meliolaceous fungi without any thyrothecium, and — rarely — also full mature and fructified species of *Trichothyrium* without *Spegazzinia* and/or *Isthmospora*. Hughes himself listing 39 specimens of *Trichothyrium asterophorum*, only in 4 observed both thyrothecia and "isthmospores".

In conclusion, in our opinion the presence of *Spegazzinia-Isthmospora* together with trichothyriaceous fungi is one aspect of the multiple association of fungi in the same leaf, even the same spot. These associations (with a more or less evidence of antagonistic, not truly parasitic effect) is of very common occurrence in the Neotropical fungine flora of the mesophytic, rain and mountain forests, chiefly in West Indies and Central America. The late Dr. Sydow told me that he found in Costa Rica up to 8 meliocolous fungi in the same spot (5 of which were identified), and we found up to 6 in the Dominican Republic.

From the historical standpoint, we must remember that in the beginning of study of tropical microfungi, members of Dematiaceous fungi were considered as conidial stage of follicolous Ascomycetes. Yet in the well known Gaillard's monograph of *Meliolae*, species of *Helminthosporium* (and of the stilbaceous forms of *Helminthosporia*) were regarded as conidial stages of *Meliolae*.

In one case at least we demonstrated the independence of the *Helminthosporium* from the ascomycetous fungi, easily cultivating in artificial, laboratory media *H. hurae* Syd., that Arnaud considered as conidial stage of *Parodiopsis perae* Arn. (see Ciferri, Ann. Mycol., Vol. XXIX, p. 292. 1931).

At last, three genera of imperfect, conidial stages for the same genus of Ascomycetes, is an unusual record.

We never observed the abscission of the "isthmospores" in several portions, as in Hughes (p. 46) but allways (and rarely) in two bicellular conidia. Also the observation "ex natura" of the germination of a composed conidium is, apparently, rare: only once we observed two short germinating hyphae starting from two, diametrically opposite side of a composed conidium of *Isthmospora spinosa*, without abscission of the two bicellular conidia.



*Stemphylium muriculatum* has been described by Saccardo (Atti Acc. Veneto-Trentino, Vol. X, p. 86. 1917) on *Meliola lepidanthea* on leaves of *Lepisanthus*, in the Philippine Islands.

A reexamination of the authentic specimen (in Herb. Sacc.) demonstrated that this species is strictly allied to *Spegazzinia*, but it has been placed in the genus *Stemphylium* probably on account of the loose fructification, in opposition to the compact aggregation of



Fig. 8. *Isthmospora glabra* Stev.: a) conidia from the type specimen; b) conidia from the Dominican specimen.

*Spegazzinia*. But in spite of the fact that the typical fructifications of *Spegazzinia* are also almost sporodochial, on species of this genus (frequent in tropical *Meliolae* and other foliicolous Ascomycetes) any intermediate stage from the loose to the compact fructification may be easily observed. (The same condition may be observed from the stilbaceous coremia of *Podosporium* [*Arthrobotryum*] to the loose aspect of meliolicolous *Helminthosporium*).

We confirmate, then, that *Stemphylium muriculatum* is to be placed as synonym of *Spegazzinia meliolae* A. Zimm. (Centr. f. Bakt., II. Abt., Vol. VIII, p. 221. 1902), found on *Meliola anacardi* (Java) and on *M. ? ambigua* (India), but frequent on *Meliolae* of the tropical New World, as observed by Hansford (I.M.I. Myc. Pap., N. 15, p. 221. 1946), under *Trichothyrium asterophorum* (B. et B.) v. H. according Hughes *ibid.*, N. 50, p. 78. 1953).

For the courtesy of the late Dr. F. L. Stevens, about twenty years ago, we obtained a fragment of the type specimen of *I. glabra* Stev. (on *Meliola glabroides* Stev. on leaf of *Nectandra patens*, Puerto Rico, No. 8973), apparently considered by the complaint student of fungi as the type specimen, in spite of the fact that in the publication of the species (Bot. Gaz., Vol. LXV, p. 244. 1918) it has been quoted as the fourth specimen. The *Meliola* is densely overgrown by a series of fungi, a *Trichothyrium* at first, then many Hyphales, one of which is *Isthmospora*.

Mycelium and conidiophores are uncognizable; the conidia are very variable but typically constituted by two couples of smooth cells, more or less symmetric, connected by a kind of isthmus, as a rule shorter and narrow than the cells. Each pair of cells may be considered, at the best, by two cells with one central septum. Together with the isthmus — and rarely also appended to one cell — another, obconic cell is present, in many cases connected with a fragment of the mother hypha, as a short sterigma. The upper portion of the cells are frequently apiculated (rarely the lower part) and always irregularly. The isthmus may be not septate or longitudinally septate; if it is long as the lateral cells, it may be subdivided by two transversal septa, and, in this case, 4 transversal and one longitudinal septa are present. This morphology is evident only to a front view; by lateral or transversal views the aspect is strange and variable, and much more if the conidia are aggregated in two or three.

It is possible that *Isthmospora glabra* and possibly *Spegazzinia chandleri*; (see below) is to be attributed to a separate genus, as stated also by Damon; but it would be necessary a better knowledge of the developmental morphology and of the germination. In any case it may be attributed better to the group *Titea-Aorate* than to *Spegazzinia-Isthmospora*, the first group having a much more complex and variable morphology than the latter.

The morphology of *Isthmospora spinosa* Stev. (studied on a specimen send by F. L. Stevens, on *Meliola psidii* Fr. on *Psidium guajava*, Puerto Rico, Yauco, No. 3120, type specimen) is allied but simpler, and very coincident with Sydow's redescription of *Tetrachia singularis* Sacc. It has been observed many times in Dominican specimens but sparingly and confusely, the spots being overgrown

by fungi. The morphology, as rule, agree well with Stevens' type specimen, and we agree with Damon's conclusions.

While *S. meliolae* is of the general type of an aggregated *Epicoccum* (and in *E. granulatum* Penz. there are some tendency to phaeophragmious conidia), very rough (in general prominently echinulated to spiny), the morphology of the glabrous *Isthmospora glabra* is more complex and variable. But a real comparison would be made on a developmental study of the conidia, up to-now particularly made only by Hughes. In the meantime, it seems best to me to retain the genus *Isthmospora* for the species with glabrous conidia with a large isthmus and without tendency to the formation of sporodochia (namely, of the Moniliaceous family), and the genus *Spegazzinia* for the species with rough conidia, a more or less indistinct isthmus and the tendency to aggregate in sporodochial forms, in addition to the morphological difference of the conidia. This is in agreement with Damon's statement.

At least from the description (and the fig. 48 of Hughes) *S. chandleri* Hansf. (Proc. Linn. Soc. Lond., Vol. CLV, p. 62. 1943) is a species of a genus different both from *Spegazzinia* and *Isthmospora*, and allied to *Isthmospora glabra*, as stated by Hansford in the year 1946. In any case, it is more allied to *Titaea-Aorate* than to *Spegazzinia*.

In a specimen of *Meliola banarae caseariae* (No. 33313; see our revision of the Dominican *Meliolae*) we found a number of conidia of the *Spegazzinia* type, with four black cells and a little evident isthmus, muriculate to spinulose, tetrangular-rounded and narrowed following two cross lines, up to almost rounded (and then not or very little narrowed), having on average of 40  $\mu$  in diam., namely, more than the double of *S. meliolae*. It may be another species of the same genus, but it was densely overgrown by a mucedinaceous fungus with fusoid to ovate-oblong, 1- to 3-septate conidia, as a rule 12—14 by 6—7  $\mu$ , apparently a small-spored species of the genus *Eriomyopsis*.

Recently Arnau (Bull. Soc. Myc. France, Vol. LXIX, p. 294. 1953) shortly described the genus *Cartosia*, as *C. meliolae* (Zimm.) Arn. for *Spegazzinia meliolae* Zimm., for the sessile „bulbils“ in opposition to the long-stalked conidia of *Spegazzinia*. In our experience, the conidiophores of *Spegazzinia* are very variable from long (and simple), straight or sinuose, to very short or almost lacking, being reduced to a short papilla on the mother hypha. We see no reason for the subdivision of *Spegazzinia* in two genera following this characteristic.

A few words about the genus *Hansfordiella*. At least in our collection, this genus is of exceptional occurrence in Santo Domingo.

We observed a few times scattered conidia of the shape of the conidiophora and conidium of *H. meliolae* (Hansf.) Hughes, on leaves harbouring Meliolaceous fungi, but never well developed colonies.

5) ***Acremoniella melioliphila*** Cif., n. sp. and a tentative subdivision of the genus *Acremoniella*.

***Acremoniella melioliphila*** Cif., n. sp.

Parasitica in *Meliola*; coloniis fungorum nigris, velutinis, quasi fumagoideis vel quasi-asterinoideis, 0,5—2 mm diam.; mycelio delicato, hyalino, parce ramoso; conidiophoris (aleurophoris) hyalinis, 1—2  $\mu$  diam., longitudine variabilibus, irregulariter multiramosis; conidiis (aleuriis) acrogenis, singulis, nigris, opacis, sphaericis vel pyriformibus, 7,5—9,5  $\mu$  diam. vel 8—11  $\mu$   $\rightleftharpoons$  7—9  $\mu$ .

Hab.: cum *Meliolae swieteniae* Cif., Llano Costero, prov. Santo Domingo, Ciudad Trujillo, banks of Rio Ozama, 14. XII. 1929, leg. E. L. Ekman (No. 2739); cum *Meliolae tonkinensis* Karst. et Roum. var. *cecropiae* Stev., loc. plur., 15. XII. 1929, leg. Id. (No. 2795).

Parasitized colonies of *Meliola*, black, velvety, irregular, mostly confluent, of an asteroid-subfumagoid type, often star-like, small (0,5—2 mm diam.); colonies of the *Acremoniella* may also occur seemingly independent from the *Meliola*, and sometimes even on the lower surface of the leaf. Mycelic hyphae very thin, hyaline, sparingly branched. Conidiophores (aleuriophores) indistinctly septate, hyaline, 1—2  $\mu$ , as a rule 1,5  $\mu$  in thickness, very variable in length, many times and irregularly branched, prostrate, each branch producing only one conidium. Conidia (aleuria) acrogenous, single, completely black and opaque, spheric to pyriform, normally 7,5—9,5  $\mu$  in diam. or 8—11 by 7—9  $\mu$ , with an indistinct epispore. (Young conidia are light brown with the epispore outlined in black). If, as often happens, the conidiophores are repeatedly branched, and the branches short, closely approximate and like sterigmata, the fructification appears to be pseudoracemose, but not truly racemose. Phialospores not observed.

An interesting new species, characterized primarily by the peculiar habitat, differing from the symbiotic species *A. sarcinellae* Pat. et Har. (Journ. Bot., Vol. XIV, p. 245. 1900; see also Hansford, I. M. I. Myc. Pap., N. 15, p. 213. 1946).

Ciferi and Ashford (Mycologia, Vol. XXII, p. 67. 1930) subdivided this genus in *Eu-Acremoniella* with conidiophores (aleuriophores) erect, and *Acremoniellopsis* with prostrate conidiophores. Not considering here phialophores and phialides, as a rule lacking in uncultivated samples (see Mason, I. M. I. Pap. 3, p. 29—39. 1933), a more complete, subgeneric division may be:

A) Mature conidia with an appendage (part of the sterigma)

*Caudacremoniella* (type: *A. sarcinellae* Pat. et Har.).

- AA) Mature conidia without residual portion of the sterigma.  
 B) Conidia smooth; conidiophores ramose or scarcely so.  
 C) Conidiophores prostrate, profusely irregularly, ramose: *Acremoniellopsis* (type *A. atra* (Cda.) Sacc.; lectotype: *A. olivae-  
 spora* Cif. et Ashf.).  
 CC) Conidiophores more or less erect, not sparingly ramose:  
*Eu-Acremoniella* (type: *A. cucurbitae* Schulz. et. Sacc.).  
 BB) Conidia verrucose; conidiophores regularly ramose: *Spinacremoniella* (type: *A. verrucosa* Togn.).

**Caudacremoniella** n. subg. Conidia (aleurosporia) matura levia, hypharum appendiculata.

**Spinacremoniella** n. subgen. Conidia (aleurosporia) non appendiculata, verruculosa.



Fig. 8. *Grallaeomyces portoricensis* Stev.: A. Young budding mycelium. B. Old mycelium with holdfast organs. C. Details of the last organs.

In conclusion, we are not sure that the conidia of all the species of *Acremoniella*, with exception of the subg. *Caudacremoniella*, are really aleuriae.

The assimilation of *Allescheriella* P. Henn. as subgenus of *Acremoniella* (see Ciferri and Baldacci, Atti Ist. Bot. Univ. Pavia, serie IV, Vol. VII, p. 337. 1946) after the revision made by Linder is not justified, *Allescheriella* being synonym of *Rhino-trichum* Corda; in addition, apparently, the conidiophores (aleuriophores) are from hyaline to yellowish or light-brown, never black as in all the species of the genus *Acremoniella*.

6) *Grallaeomyces portoricensis* Stev. (Fig. 2).

This fungus has been described by Stevens (Bot. Gaz., Vol. LXV, pag. 245, 1918) as *Grallomyces portoricensis* (spelling corrected in *Grallaeomyces* by the late Author in lett. dated Oct. the 1th, 1931) on leaves of nine host species in Puerto Rico, very often associated with *Meliolae*.

We found the same fungus in many dominican specimens, as a rule growing together with species of the genus *Meliola*, but always incompletely developed, and we compared the dominican specimens with the type specimen (on *Clusia minor*), kindly sent by the regretted, north american botanist.

Also in the Puerto Rican specimen, the true mycelium is composed by irregular chain of cells, dark-brown in color, irregular in shape as well as in size, as a rule elliptic-truncate or ellipsoid to cylindric (also spheric if smaller), averaging 15—19 by 8—10  $\mu$ . The bodies described by Stevens as „links composed of usually 4 or 5 cells each“, with same constriction at the septa are, in our opinion, a kind of composed chlamydospores, cylindric-elongated, thin, brown-blackish in color, 5 to 6 septate, very slightly constricted at the septa, as a rule of 100—134 by 14—18  $\mu$ , and frequently arranged at „zigzag“ („rail fence“) appearance. Not rarely the chlamydospore is much shorter and only 1—2-septate. Each composed, pluriseptate chlamydospore is more or less narrowed at both ends (but frequently very little narrowed), and producing a branch at right to acute angle with the chlamydospore. This branchlet („stilt“ in the Stevens' nomenclature) is up to 26—30  $\mu$  in length, 2—3 (even less)  $\mu$  wide, and possess, at the free end, a sphaeric, more or less diaphanous enlargement, as a rule 13—14  $\mu$  in diam. The interpretation of Stevens as a holdfast organ is, probably, correct; it appears to be an adhesive organs on the mycelium of the *Meliolae* or on the leaf surface.

The genus *Grallaeomyces* appears, then, to be a member of the group of *Mycelia sterilia* (Adelomycetes), but the affinities are doubtful.

The most typical, dominican specimen, has been found on *Meliola amomicola* Stev., Cordillera Central, prov. Santo Domingo, Villa Altigracia, 7. I. 1930, coll. E. L. Ekman (No. 2860).

7) *Fusarium dominicanum* Cif., n. s. p.

Mycelio albido, laxo, mycelio *Meliolae* intermixto; conidiophoris hyalinis, rectis, simplicibus, plus vel minus aggregatis, septatis, brevibus, 5—7  $\mu$  crassis; conidiis singulis, acrogenis, leviter falcatis usque rectis (etiam uncinatis), 3—4-septatis, etiam 4—8 septatis, 87—94  $\mu$   $\approx$  5—7  $\mu$  usque 93—107  $\mu$   $\approx$  6—8  $\mu$ .

Hab.: cum mycelio *Meliolae byrsonimae* Stev. on *Byrsonima* sp., Cordillera Central, prov. Santo Domingo, Villa Altigracia, 12. II. 1930, leg. E. L. Ekman (No. 3290).

Mycelium whitish, very loose, scattered among the mycelium of the *Meliola*; conidiophores hyaline, straight, erect, simple, more or less aggregated (but never on true sporodochia), septate, short (but variable in length), 5–7  $\mu$  wide, with one apical conidium each; conidia hyaline, slightly falcate (also hooked at the ends) to straight, as a rule 3–4-septate (but also up to 4–8-septate), 87–94 by 5–7  $\mu$ , up to 93–107 by 6–8  $\mu$ .

May be distinguished from *Fusarium meliolicolum* Stev. (Bot. Gaz., Vol. LXV, pag. 245. 1918), found on *Meliola paulliniae* in Puerto Rico, for shape and size of conidia, and because it has not been found



Fig. 9. *Divinia diatricha* Cif.: A. Conidiophores with an acrogenous conidium; B. Conidia.

together with a species of *Nectria* or allied genera. Of course, this is a „conventional“ species, in expect of better knowledge from cultural characteristics.

#### 8) *Divinia diatricha* Cif., n. sp. (Fig. 3).

***Divinia* Cif., n. gen.** (dedicated the opticien *Eustachio Divini*, ideator of one of the first composed microscope [„microscopio a braccio“, Rome 1648], firstly introducing the use of plano-convex lenses with polar contrast).

Biophilum; mycelio parce evoluta, externo, fusco, septato; conidiophoris bene evolutis, fasciculatis, septatis, fuscis, erectis, monosporis, densissime incrustato-asperatis; conidiis acrogenis, singulis, ovoideis, transverse pluriseptatis, fuscis, levibus vel punctulatis.

Typus: *Divinia diatricha* Cif., n. sp.

Maculis nullis; coloniis nigris, velutinis, effusis, individualiter indistinctis sed confluentibus, indelimitatis, semper hyphophyllis, totam paginam inferiorem foliorum occupantibus, intra pilis nidulantibus; mycelio sterili parcissime evoluto, externo, ex hyphis paucis, laxe ramosis, septatis, olivaceo-fuscis, 3,5—5  $\mu$  composito; caespitulis singulis isolatisve vel pluribus confluentibus, sed laxe aggregatis, valde variabilibus, 100—500  $\mu$  diam., pro more 200—400  $\mu$ , 350—600  $\mu$  altis, ob canescentia foliorum pro parte velatis, ex conidiophoris pluribus (50—100 et ultra) compositis, fasciculatis sed non congestis; conidiophoris simplicibus, non ramosis, erectis, rectis vel curvulatis, densissime septatis, ad septa non vel leniter constrictis, brunneis usque nigris, base applanata, apice truncato-obtusato, pallidior, leniter inflato-geniculato, per totam superficiem incrustato-asperatis vel indistincte spinuloso-dentatis, scaberrimis, 145—375  $\mu$  longis, 6—8  $\mu$  crassis; conidiis singulis, isolatis, perfecte acrogenis, rarius ovatis ellipsoideisque, saepe ovato-spathulatis, ad basem rotundato-truncatis, prope apicem plus vel minus conoideis, breviter elongatis usque sub-cylindricis, sub-truncatis vel sub-rotundatis, primo hyalino-fuscidulis, 1-septatis, dein brunneis usque nigrescentibus, typice 3-septatis, (rarius 4-septatis, rarissime 2-septatis), ad septa non vel vix modice constrictis, septis inaequaliter et irregulariter distributis, pro more cellulis centralibus brevioribus, tunica crassa sed irregulariter incrassata, levia vel punctulata, 28—43 by 12—15  $\mu$ , pro more 34—38 by 12—15  $\mu$ .

Hab.: in mycelio vetustissimo *Meliolae* sp. in foliis *Tournefortiae hirsutissimae*, in Republica Dominicana, Cordillera Central, prov. Santo Domingo, Haina, 13. VI. 1926, ipse legi (No. 993).

This genus is a meliicolous *Helminthosporium* (s. latiore) for the shape of conidiophore and conidia, but distinct from the 3-septate members of this genus on *Meliola* (see Hansford, I. M. I. Myc. Pap. 15, p. 214. 1946) for the well developed and constant asperation covering the conidiophores, in many cases similar to small teeth or small thorns. It is also characteristic for the very scanty mycelium, size of fascicles, and so on. Only a few traces of the mycelium of *Meliola* are present.

9) *Oospora pucciniophila* Syd.

On *Meliola bidentata* Cooke, on leaves of *Distictis lactiflora* (Vahl.) P. DC., Valle del Cibao, prov. Santiago, Hato del Yaque, Dominican Republic, 6. VI. 1930, coll. R. Ciferri (No. 4340).

The specimen has been classified as *O. pucciniophila* Syd. (Ann. Myc., Vol. XV, p. 263. 1917) on the base of the almost total morphological identity of the *Oospora* on *Meliola* with *Oospora* on a specimen



of *Puccinia*, collected also in the Dominican Republic the same province (on *Puccinia heterospora* Beck. et Curt. on leaves of *Sida spinosa* L., Valle del Cibao, prov. Santiago; Santiago, road to S. José de las Matas, 16. XI. 1931, coll. R. Ciferri (No. 4946). The Sydow's species has been described also on *P. heterospora* but on *Sida javensis*, East Indies.

Here the description of the *Oospora* on *Puccinia*, better developed of the same species on *Meliola*: very small colonies, delicate and white, more or less effuse up to arachnoid, 0,5—1,5 mm diam., scattered, more frequently confluent or very near, but individually distinct; sterile hyphae hyaline, irregularly but scarcely branched, without evident septa, 1—1,5  $\mu$ , wide up to 2  $\mu$ ; conidiophores very little differing from the hyphae reptant, without septa, 1,5—2  $\mu$  in thickness, but variable in length, from 15 to 50 or more  $\mu$ , straight to sinuate, uniform in thickness or slightly thinned at the free end, hyaline; conidia in apical chains, easy to dissolve in individual members, from 2—3 up to 30 in number, without septa, oblong, ellipsoid or cylindric, obtuse but a little thinned at both ends, 2—6  $\mu$   $\approx$  1,5—2,5  $\mu$ , hyaline.

This species is clearly distinct from *O. meliolae* Hansf. (Proc. Linn. Soc. London, Vol. CLV, p. 40. 1943) found on *Meliola* in Uganda, having shorter conidia.

It is possible that the same or very allied species is *Oospora hyalinula* Sacc. (*Michelia*, Vol. II, p. 453. 1882) found on *Capnodiales* and *Hyphales* in temperate regions of Europe and America, at least from the morphological point of view; but lacking of further informations on this subject, we retain *O. hyalinula* Sacc. as distinct from *O. pucciniophila* Syd., on *Puccinia* and on *Meliola*.

- 10) **Titaea (Eu-titaea) pes-avis** n. sp. and  
**T. papilio mimeoma** n. sp. (Fig. 4 and 5).

**Titaea pes-avis** Cif., n. sp.

Coloniis in grege fungorum aliorum, et singulis indistinctis, nigris, velutinis, ut in *Meliola*; mycelio delicatissimo, ex hyphis hyalinis probabilititer septatis sed indistincte reptantibus, parcissime irregulariterque ramificatis, guttulatis, irregulariter distributis, 1,5—2  $\mu$  crassis; conidiophoris ab hyphis myceliariibus non vel parum distinctis, lateralibus, irregulariter dispositis, hyalinis, indistincte vel non septatis, simplicibus vel parce (1—2) ramificatis, non incrassatis, rectiusculis usque sinuosis, horizontalibus usque sub-erectis, 5—45  $\mu$  longis, 1,5—2,2  $\mu$  crassis; cellula apicali seu sterigma solitaria, ovoidea, ellipsoidea, et breviter cylindracea, hyalina, continua, variabili, facillime secedente sed cum conidio conjuncta, 2—3,5  $\mu$  diam., vel 2,5—2, 2—3  $\mu$ , conidiis singulis, stellatis vel ramoso-divaricatis, acro-

genis, isolatis, hyalinis, imperspicuis, a cellula basali et 2—4 cellulis lateralibus constitutis, ramulis 14—25  $\mu$  longis, circ. 3  $\mu$  latis, sursum longiuscule acuminatis vel acutatis, valde variabilis, quandoque aequilateris, quandoque 1—3 longioribus, symmetricis vel asymmetricis, non incrassatis, non septatis.

Hab.: in pagina superiore v. inferiore foliorum *Coccolobae* sp., cum *Meliolae* sp., *Cicinnobella epimeliolae* Cif., *Dactylaria dominagregem* Cif., *Helminthosporio panici* Stev. et fungis aliis, in Republica Dominicana, Valle del Cibao, prov. Santiago, Santiago, Hato del Yaque, prope Yaque flumen, 28. III. 1932, leg. R. et E. Ciferri (No. 4931).



Fig. 10. *Titaea pes-avis* Cif.: conidia.

The generic position of this species — and possibly of other species of the same genus — is to be revised, in relation also to the monotypic genus *Araneomyces* v. Hoehn. (with *A. acarosporum* v. Hoehn.), a genus placed in the Tuberculariaceae family, an opinion expressed by Rostrup also for *Titaea* (see *T. maxilliformis* Rostr.) In the Hansford's list of the species of *Titaea* (I. M. I. Myc. Pap., No. 15, p. 207. 1946) the characteristics of the genus are widened in relation to the Saccardo's typus (*T. callispora* Sacc.).

The species are to be revised also in relation to the genus *Tri-nacrium* Riess, and possibly also *Triposporium* Corda and *Tripospermum* Speg.

In our specimen, the study of the species is complicated not only by the small size of the caducous conidia, but also for the presence of many fungi in the same colonies of which four or five only were determined.

Of the species up to-now described (*T. callispora* Sacc., *T. maxilliformis* Rostr., *T. rotula* v. Hoehn., *T. ornithomorpha* Sacc. et Trott.,

*T. bialowiczensis* Siemaszco, *T. hemileiae* Hansf., *T. doidgeae* Hansf., *T. triradiata* Hansf., *T. ugandae* Hansf., *T. toddaliae* Hansf., and *T. verrucosa* Hansf.) our species appears to be allied to *T. triradiata*.

***Titaea mimeoma* Cif., n. sp.**

Coloniis nigris, punctiformibus, valde imperspicuis, melioloideis, rotundatis, singulis vel late confluentibus, amphigenis, 1—2 mm diam.; mycelio parcissime evoluto, hyalino-fumoso, ex hyphis ramosis, delicatis, indistincte septatis, irregulariter distributis, 1,2—1,7  $\mu$  crassis composito; conidiophoris repentibus, variabilibus, ob hyphis saepe indistinctis, lateralibus vel irregulariter insertis, non vel parce ramosis, rectiusculis vel sinuosis aut undulatis, non vel indistincte remote septatis, sub-hyalinis vel dilute fumosis, apice monosporis, circ. 1,5  $\mu$  crassis, 30—75  $\mu$  longis, non incrassatis; conidiis rotundatis, ovoideis, ellipsoideis, aut sub-irregularibus, 4—7 cellularibus, frequenter 2 cellulis binatis oppositis compositis, sine vel cum isthmo 1—3 cellulari connexis vel 4—6 cellulis symmetricis, triangularibus vel sub-polygonoideis in circulo dispositis, formatis, flavo-brunneis usque brunneis, cellulis lateralibus triangularibus (apicibus saepe obtusatis), applanatis, cellulis centralibus plus vel minus irregulariter quadrangularibus, flavo-brunneis usque sub-hyalinis, saepe a cellulis irregularibus vel polygonoideis compositis, crassiusculis, leviter tunicatis, 1—5 aculeis longis, acuminatis aut acutatis, simplicibus, continuis, hyalinis, divergentibus, plus vel minus regulariter oppositis usque sub-radiate dispositis, pro more 3—4 (1—2 basali, 2 apicali), rectis habentibus; conidiis in toto 10—15  $\mu$  diam., vel 12—15 by 10—13  $\mu$ , cellulis lateralibus 4—6  $\mu$  diam., cellulis centralibus 2,5—3,5  $\mu$  diam., ciliis 10—25  $\mu$  longis, consuete 15—20  $\mu$ , 1,2—1,5  $\mu$  crassis.

Hab.: in mycelio *Meliolae* (*Irenopsis*) *coronatae* var. *triumfettae* Stev., in foliis *Triumfettae semitrilobae* Jacq., socia *Cicinnobella truncatula* Cif. et *Isthmospora glabra* Stev., in Republica Dominicana, Valle del Cibao, prov. Santiago, Santiago, Hato del Yaque, 16. VIII. 1931, leg. R. Ciferri (No. 4925).

This species is belonging to the genus *Titaea* in the wider sense adopted by Hansford (l. c.), as well as to the genus *Aorate* Syd. (Ann. Mycol., Vol. XXVII, p. 84. 1929), a monotypic genus described for *A. costaricana* Syd. on *Eugenia* in Costa Rica. In the genus *Aorate* the conidial complex is formed by a central cell and 5 peripheral, globose cells, of which the first possess from 3 to 4 cilia, being hyaline and without septum. The habitus of our species is similar to the habitus of *Aorate*, but color, disposition and shape of cellular elements, number of cilia and relative size of organs are different. Of other hand, our species is allied also to the genus *Titaea* (as typified by *T. callispora*), but having 2 pairs of lateral cells (instead of 3), 2 pairs of setae (instead of 3), and for minor characteristics.

Boedijn (Sydowia, Vol. V, p. 225, 1951) referred *Aorate costaricana* to the genus *Titaea*. This statement may be accepted but only in part.

In spite of the difference in the colour of conidia, in our opinion this group of fungi is clearly allied, and may be enclosed in the genus *Titaea* s. latiore but with two of subgeneric, taxa namely:

1) *Titaea* subg. **Eu-titaea** nov. [typus: *T. callispora* Sacc.].



Fig. 11. *Titaea mimeoma* Cif.: Conidia, side and front view.

2) *Titaea* subg. **Aorata** (Syd.) comb. nova [typus: *T. costaricana* (Syd.) Boedijn 1951].

3) *Titaea* subg. **Papilio** nov. [typus: *T. mimeoma* Cif.].

Here the diagnosis of *Titaea* subg. *Papilio*:

Hyphis sterilibus fumosis non vel vix septatis, ramosis; conidio-phora repentia brevia, plus vel minus indifferentiata; conidia brunnea, e cellulis simplicibus 4—7 quadrangularibus composita, quandoque 2 cellulis binatis lateralibus oppositis, 0—3 cellulis centralibus connexis composita, vel e 5—6 cellulis triangularibus, in circulo

dispositis formata, cum 1—5 ciliis longis, acuminatis, hyalinis, longiusculis, divergente-oppositis, continuis.

It is possible that a fourth subgenus may be founded on *T. toddaliae* Hansf. (l. c.). The shape of the conidial complex of *T. mimeoma* is very variable, having up to 5 or 6 almost triangular (never spherical) cells, disposed following the sectors of a circle, and then without (or a not evident) axial cell. The cilia are similar to those of *Aorate*, but apparently are generated by thickening of the cellular wall. In



Fig. 12. *Dactylaria domina-gregem* Cif.: A. Conidia; B. Fertile tip of conidiophores.

the most typical shape, the conidial complex of *T. mimeoma* is like a butterfly, of which the two pairs of lateral cells are the wings, and the three small central cells are respectively the head, the torax and the abdomen.

The study of the specimen is complicated by the presence of *Isthmospora glabra* Stev., of an allied general aspect, but differing in many characteristics from *Titaea*.

#### 11. *Dactylaria domina-gregem* n. sp. (Fig. 6).

Coloniis albo-griseis vel cinerascensibus, frequenter griseo-violaceis, effusis, pulverulentibus, mox evidentibus, pro-more sub-

nitidis, coloniis *Meliolae* obtegentibus, rotundatis, orbicularibus aut irregularibus, singulis vel confluentibus, pro more pluribus unitis, 2—6 mm diam., vel 2—8  $\Rightarrow$  3—6 mm; mycelio ex hyphis hyalinis, septatis (saepe indistincte), irregulariter denseque ramificatis, rarius rectis, saepe arcuatis usque sinuosis, repentibus, 3—3,5  $\mu$  crassis constituto; conidiophoris hyalinis, repentibus vel sub-repentibus, rarius sub-erectis, irregulariter insertis, non ramificatis, longis, rectis vel curvatis aut sinuosis, prope base non incrassatis, rarissime prope medium sub-inflatis, 115—220  $\mu$  longis, pro more 145—175  $\mu$ , 8—10  $\mu$  latis, prope medium 2—4-septatis, vel tota longitudine 5—8 septatis, non constrictis, totaliter scaberrimis, usque dense incrassato-denticulatis, prope apicem non vel paullo irregulariter inflatis, sparsis, singulis, non aggregatis; conidiis pluribus, pro more 2—5, rarius ultra, rarissime singulis, ex apice conidiophorum aggregatis, facillime secedentibus, saepe leniter falcatis usque arcuatis, non, rarius plus vel minus, rectis, ad apicem contortis, fusarioideis, rarius cylindrico-attenuatis vel sub-fusoideis usque irregularibus, hyalinis, base bene attenuato-truncata, apice, rotundato, sub-rotundato, obtuso usque truncato, semper abrupte attenuato, junioribus elliptico-vel ovoideo-attenuato usque fusoideis, continuis vel 1-septatis, dein 2—4 (typice 3-) septatis, typice non constrictis, cellulis conidiorum symmetricis vel cellulis centralibus minoribus, apicalibus basalibusque longioribus, 40—75  $\Rightarrow$  7—11  $\mu$ , pro more 50—70  $\mu$  longis.

Hab.; parasiticus in mycelio *Meliolae* sp., in follis *Coccolobae* sp., in consortio cum *Cicinnobella epimeliola* Cif., *Helminthosporio panici* Stev., *Titaea pes-avis* Cif., etc., in Republica Dominicana, Valle del Cibao, prov. Santiago, Santiago, Hato del Yaque, prope Yaque flumen, 28. III. 1932, leg. R. et E. Ciferrì (No. 4931).

This species is the first described in association with *Meliolae* or other groups of tropical Ascomycetes, and well distinct from the other few species attributed to the same genus *Dactylaria*.

In the pluristratified colonies on the leaves of *Coccoloba*, the *Dactylaria* species is found in the uppermost layer of the associated fungi.

12. **Sepedonium epimeliola** n. sp., **S. oidioides** (Speg.) n. comb. and **S. meliola** (Stev.) n. comb.

**Sepedonium epimeliola** Cif., n. sp.

Coloniis superficialibus, saepe indistinctis, meliolicolis, rarius plus vel minus distinctis, sordide roseis vel roseo-luteolis, diffusis, rotundatis vel orbicularibus aut irregularibus, indelimitatis, isolatis usque confluentibus, pulverulentibus aut effuso-pulverulentibus, rarius usque arachnoideis, 2—3,5 mm diam. vel longis; mycelio ex hyphis repentibus, hyalinis usque dilute flavidis, rectiusculis usque sinuosis,

parce irregulariter ramosis, remote indistincte septatis, irregulariter effusis, 3—4,5  $\mu$  crassis composito; conidiophoris sparsis, late irregulariterque distributis, erectis vel sub-erectis, 1—3 septatis, rectis vel varie curvatis, non fasciculatis nec ramosis, hyalinis usque flavidulis, variabilibus, usque 130—170  $\mu$  longis, 5—6  $\mu$  crassis, apice monosporis; conidiis isolatis singulis, perfecte acrogenis, globosis, rarius sub-globosis, facillime secedentibus, saepe ob fragmentatum apicem conidiophorum sub-caudatis, hyalinis, roseo- vel viridulo-hyalinis, dein flavidulis usque dilutissime flavo-brunneis, 10—30  $\mu$  diam., pro more 10—20  $\mu$ , episporio sub-indistincto, sed amplissime irregulariterque verrucoso vel tuberculato, verrucis irregularibus, saepe conoideo-truncatis aut mamilliformibus, valde variabilibus, usque 2  $\mu$  latis ornatis.



Fig. 13. *Sepedonium epimeliola* Cif.: different size and agglomeration of conidia.

Hab.: in mycelio *Meliola ambigua* var. *caseariaecola* Cif. in foliis *Caseariae guianensis* (Aubl.) Urb., in Republica Dominicana, Llano Costero, prov. Santo Domingo City, banks of Rjo Ozama, 15. XII. 1931, leg. R. C., No. 2776 (typus); in *Meliola abrupta* H. et P. Syd. in foliis *Pictetiae spinifoliae* (Desv.) Urb., Ibidem, road from Santo Domingo City to La Caleta, 12. III. 1931, ipse legi, No. 3082; in *Meliola angusta* Stev. et Teh., in foliis *Coccolobae laurifoliae* Jacq., Ibidem, La Caleta, 10. II. 1930, ipse legi cum E. L. Ekman, No. 3295; in *Meliola anonaceari* Stev., in foliis *Oxandrae lanceolatae* (Sw.) Baill., Cordillera Septentrional, prov. Puerto Plata, Sosúa, 20. III. 1930, leg. E. L. Ekman, No. 3221; in *Meliola burseraceari* Stev., in foliis *Tetragastridis balsamiferae* (Sw.) O. Kte., Cordillera Central, prov. Santo Domingo, Villa Altigracia, 12. II. 1930, ipse legi, No. 3090; in *Meliola banarae* var. *aculeatae* Cif., Cordillera Septentrional, prov.

Puerto Plata Sosúa, at Jagua-Mocha, 3. IV. 1930, leg. E. L. E k m a n,  
No. 3313.

This fungus — or near allied species — is very frequent on colonies of Perisporiales, Microthyriales, etc., on Neotropical countries, but very rarely it is possible to study colonies sufficiently developed for the specific identification; in most cases only scattered conidia are evident. The conidia are, also, very variable in shape and in size, so that we are not sure that are pertaining to the same species; e. g. in the specimens No. 2736, 3082 and 3295 are very irregularly verrucose, 20—30  $\mu$  diam.; in the No. 3090 are greater (up to 60—80  $\mu$ ) verrucose-incrustated, yellowish to brownish, somewhat with excentric drops simulating a septum; in the No. 3313 the conidia are only 10—20  $\mu$  in diam., with conidiophores of 130—170 by 6  $\mu$ , hyaline-yellowish, at last brownish, without evident double episporium; in the No. 3295 the conidia are also ovoid or ellipsoid, up to 27 by 20  $\mu$ , as a rule with the uppermost end brownish in color, and the lower yellowish to sub-hyaline. When isolated from the conidiophore, as a rule the conidia are aggregated together in tetrads or triads up to an irregular spore-balls (not rarely simulating the composed conidia of the genus *Stephanoma*), probably because the asperity of the episporium.

This species is near, but distinct, from *S. dubium* Sacc. (Bull. Orto Bot. Napoli, Vol. VI, p. 22. 1918) living on an undetermined mycelium on *Limala* sp. leaves in Malaya, but well distinct from ***Sepedonium oidioides***(Speg.) Cif., n. comb. (= *Asterophora oidioides* Speg., Bol. Acad. Nac. Ci. Cordoba, Vol. XXIII, p. 165. 1919) upon *Meliola moelleriana* on leaves of *Abutilon striatum*, Paraguay, and from ***S. meliola*** (Stev.) Cif., n. comb. (= *Acremonium meliola* Stev., Bot. Gazette, Vol. LXV, p. 234. 1918) upon *Meliola paulliniae* on leaves of *Paullinia pinnata*, Puerto Rico, for shape and size of morphological elements. From the description, *Acremonium meliola* on the H a n s f o r d specimen (I. M. I. Myc. Pap., No. 15, p. 205. 1946) may be different from S t e v e n s' species.

It would be necessary to revise also the genera *Sepedonium* Lk. and *Asteroma* Ditm. both fungicolous, in comparison with the species of *Acremonium* having rough conidia and long conidiophores (see above). In our cases, the adoption of the genus *Sepedonium* is justified also by the frequency of the species of the genus *Hypomyces* in the tropical rain forest.



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