

## MYRIANGIALES FROM INDONESIA

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(With three Text-figures)

A systematic account of the Myriangiales known to occur in Indonesia is given. The order is represented by 9 genera containing together 15 species distributed over 5 families. The genus *Micularia* Boedijn and two species (*Micularia merremiae* Boedijn, *Elsinoë fici* Boedijn) are described as new. Additional collections are cited for most of the other species. *Agyrona calami* (Rac.) Boedijn is a new combination.

Representatives of the Myriangiales are especially abundant in tropical regions. In Indonesia I was able to collect specimens of all the families distinguishable in the order. The number of species is far inferior to that of other orders of Ascomycetes.

The chief character of the Myriangiales is to be found in the form and the arrangement of the asci, which are more or less globose, thick-walled, and distributed singly in cavities of the ascostroma, being separated from each other by persistent stromatic pseudoparenchyma.

### ATICHIACEAE

Mycelium lacking. Ascomata pulvinate or star-shaped, composed of threads embedded in a gelatinous matrix. Propagulae many-celled, formed on outside, or in cavities, of thallus. Asci thick-walled, in monascous locules, either within the ascoma proper or in special swellings of it. Ascospores 1-septate, pale coloured. Saprophytes on insect secretions on leaves of vascular plants.

#### PHYCOPSIS Mangin & Pat.

*Phycopsis* Mangin & Pat. in C.R. Acad. Sci., Paris 154: 1480. 1912.

Ascomata more or less semiglobose, brown, consisting of toruloid hyphae embedded in a gelatinous matrix which turns blue with J; cells on outside encrusted with brown granules. Propagulae formed on outside of thallus, globose, many-celled. Asci thick-walled, especially so near the apex, originating near the periphery, separated from each other by the tissue of the thallus. Ascospores 1-septate, pale coloured.

#### PHYCOPSIS TREUBII (Höhn.) Boedijn

*Phycopsis Treubii* (Höhn.) Boedijn in Bull. Jard. bot. Buitenzorg, 3e Sér., 11: 228. 1931.  
*Atichia Treubii* Höhn. in Ann. Jard. bot. Buitenzorg, 2e Sér., Suppl. 3: 27. 1909.  
*Phycopsis Dennisii* Batista & Peres in Nova Hedwigia 2: 467. 1960.

Ascomata subglobose, cylindrical, conical or subclavate, often arranged in rows, or forming lobed masses in which the outlines of the constituent thalli are more or

less visible, in the fresh state gelatinous and translucent, olive brown, when dry brittle and black, 72  $\mu$  to 2 mm long, 100–150  $\mu$  high, internally subhyaline, composed of parallel cell chains which are often connected with each other and embedded in a hyaline mucus which stains deeply blue with iodine; cells of chains globose to ellipsoid, 3–6  $\mu$ , gradually increasing in size toward the periphery and there up to 14  $\mu$  long; cells on outside of thallus globose, 4–8  $\mu$  in diam., provided with numerous brown granules. Propagulae originating in outer layer of thallus, protruding as globose bodies 15–35  $\mu$  in diam., build up of globose cells 3–8  $\mu$  in diam., the peripheral ones incrustated with brown granules. Asci originating near top of thallus, more or less in a single layer, the individual asci isolated within the tissue, mostly formed after the majority of the propagulae has disappeared, globose to egg-shaped, 8-spored, the wall thickened at the apex, 24–35  $\times$  18–28  $\mu$ . Ascospores conglobate, broadly ellipsoid, 2-celled, slightly constricted at the cross-wall, the apical cell mostly slightly broader than the basal one, 9.5–22  $\times$  7–9.5  $\mu$ , hyaline, at last pale brown.

KRAKATAU, Nov. 1932, *Boedijn*, on *Calophyllum inophyllum*.

JAVA, Bogor, Dec. 1948, *van Wiersum*, on *Citrus* sp.; Bogor, Dec. 1957, *Boedijn*, on *Citrus* spec.; Hortus Bogoriensis, Oct. 1949, *Boedijn*, on *Eugenia aromatica*, June 1950, *Boedijn*, on *Psychotria malayana*, June 1953, *Boedijn*, on *Ficus* sp., Jan. 1954, *Boedijn*, on *Strychnos Horsfieldiana*; Tjibodas, June 1953, *Boedijn*, on *Grevillea* sp.; Gunung Salak, Tjiapus, Sept. 1953, *Boedijn*, on *Eugenia aromatica*.

#### ATICHIA Flotow

*Atichia* Flotow in *Linnaea* 23: 149. 1850.

*Heterobotrys* Sacc. in *Michelia* 2: 21. 1880.

*Actinomma* Sacc., *Misc. mycol.* 1: 28. 1884.

*Seuratia* Pat. in *Bull. Soc. myc. France* 20: 136. 1904.

*Euthrypton* Theiss. in *Verh. zool.-bot. Ges. Wien* 66: 325. 1916.\*

Ascomata star-shaped, consisting of threads embedded in a gelatinous matrix, not reacting with iodine; cells on outside brown. Propagulae formed in cavities of the thallus, triangular, many-celled. Asci thick-walled at the apex, originating in special swellings of the thallus, separated from each other by the tissue of the thallus. Ascospores 1-septate, pale coloured.

#### ATICHIA MILLARDETHI Rac.

*Atichia Millardetii* Rac., *Par. Alg. u. Pilze Java's* 3: 41. 1900.

*Seuratia coffeicola* Pat. in *Bull. Soc. myc. France* 20: 136. 1904.

*Atichia dominicana* Cotton in *Kew Bull.* 1914: 59.

Ascomata irregularly star-shaped, dark-coloured, usually black, with 3–8 rays which in old specimens are irregularly pinnately or sometimes even bipinnately branched; 0.5–10 mm in diam., gelatinous, build up of more or less ovoid cells 4–7  $\mu$  long, forming winding, toruloid hyphae embedded in a subhyaline mucus which does not stain with iodine, the cells near the periphery brown, the others subhyaline; pockets formed in the rays, either globose 50–70  $\mu$  in diam. or more often elongated 100–600  $\times$  50–100  $\mu$ , these cavities typically dark-coloured by the presence of the propagulae. Propagulae more or less triangular in outline, flattened, build up of brown, ovoid to ellipsoid cells 3–5  $\mu$  long, the whole structure measuring 18–22  $\mu$  along one of the sides; on the corners mostly 2–3 projecting, colourless threads, 8–10  $\times$  1–2  $\mu$ . Fertile portions also formed on the rays as round to oval, pulvinate, projecting parts 78–130  $\mu$  in diam. or 85–153  $\times$  61–112  $\mu$  and

50–80  $\mu$  high. Asci formed in these cushions in a more or less single layer, the individual asci isolated within the tissue, ovoid, 8-spored, thick-walled at the apex, 34–48  $\times$  25–28  $\mu$ . Ascospores conglobate, ovoid, 2-celled, constricted at the septum, with rounded poles, 16–19  $\times$  6–9  $\mu$ , pale brown.

JAVA, Bogor, on *Anacardium occidentale*, *Cinnamomeum zeylanicum*, *Coffea arabica*, *Styrax benzoin*, *Syzygium jambolanum*, according to Raciborski; March 1935, Boedijn, on *Eugenia aromatica*; Jan. 1950, Boedijn, on *Phaeomeria speciosa*; May 1956, Boedijn, on *Eugenia* sp.; Hortus Bogoriensis, Nov. 1949, van der Laan, on leaves of undetermined plant; Jan. 1954, Boedijn, on *Memecylon floribundum*.

### PIEDRAIACEAE

Mycelium hardly developed, represented only by small plates of pseudoparenchyma in the host. Ascomata pulvinate, pseudoparenchymatous, not gelatinous. Asci thin-walled, in monascous locules in a single layer. Ascospores 1-celled, cylindrical, with an appendage at each pole, hyaline. Parasites on the human hair.

#### PIEDRAIA Fonseca & Leão

*Piedraia* Fonseca & Leão in Mem. Inst. Oswaldo Cruz, Suppl. 4: 124–127. 1928.

Mycelium much reduced. Ascomata superficial, black, pulvinate to elongated, of a pseudoparenchymatous structure, pale brown with a dark-coloured outer layer. Asci thin-walled, in monascous locules within the ascoma. Ascospores 1-celled, more or less cylindrical, with an appendage at each pole, hyaline.

#### PIEDRAIA JAVANICA Boedijn & Verbunt

*Piedraia javanica* Boedijn & Verbunt in Mycopathologia 1: 196. 1938.

Ascomata black, at first more or less pulvinate, then elongated and up to 0.75 mm long, 130–187  $\mu$  high, on section pseudoparenchymatous, consisting of dull brown cells 4–8  $\times$  3–4  $\mu$ , chiefly arranged in regular vertical rows; near the periphery with a darker coloured layer; locules in pseudoparenchyma 50–100  $\mu$  in diam., arranged in a single layer, each locule containing 1 ascus, rarely 2. Asci broadly ellipsoid, short-stalked, 8-spored, thin-walled. Ascospores at first irregularly arranged, 2–3-seriate, soon parallel in a fascicle, sometimes provided with a few oil-drops, long cylindrical, with rounded tips, sometimes unequal-sided or more or less curved, seldom crescent-shaped, thick-walled, with a straight or curved appendage at each pole, 20–60  $\times$  4–12  $\mu$ , usually 40–44  $\times$  8–10  $\mu$ ; appendages 2–28  $\times$  1.5–3.5  $\mu$ ; when mature very pale greenish to hyaline.

JAVA, Purbalingga, Kal; Purwokerto, *Oosterveen*; Djakarta, 1948, *Rijkbusch*.

### SACCARDIACEAE

Mycelium only in hairs of host, very small. Ascomata pulvinate, pseudoparenchymatous, sometimes with bundles of small hairs at apex. Asci thick-walled, in monascous locules within the ascostroma in an irregular layer. Ascospores with 1 or 3 cross-walls, hyaline. Parasites in hairs and glandular scales of vascular plants.

#### MOLLERIELLA Winter

*Mollerietta* Winter in Bol. Soc. broter. 4: 199. 1886.

Mycelium very much reduced. Ascumata superficial, pulvinate, pseudoparenchymatous, with an outer layer of brown cells. Asci thick-walled, irregular distributed in the pseudoparenchyma but more or less in a single layer, one in each locule. Ascospores 3-septate, hyaline.

MOLLERIELLA MIRABILIS Winter — FIG. 1

*Molleriella mirabilis* Winter in *Hedwigia* 25: 102. 1886.

Ascumata more or less kidney-shaped, dark-coloured, 35–86  $\mu$  across, 20–50  $\mu$  high, on section showing an indistinct sybhyaline pseudoparenchyma with the asci in a single though irregular layer near the surface, with one ascus in each cavity; on the outside a layer of dark angular cells 2–6  $\mu$  in diam. which in older specimens separate so that the asci can be seen shining through. Asci globose to subglobose, 8-spored, the wall thickened at the apex where it is up to 3  $\mu$  thick, 20–25  $\times$  17–19  $\mu$ . Ascospores conglobate to fasciculate, cylindrical, straight or curved with rounded poles, 2–3-septate, 11–14  $\times$  3.5–5  $\mu$ , hyaline.

JAVA, Hortus Bogoriensis, July 1953, *Boedijn*, on the glandular scales on both sides of the leaves of *Ipomoea pes-caprae*.

Typically the ascumata are laterally attached to the scales and up to three of them may develop on a single scale. It is curious that von Höhnel (11), who studied Winter's type material, interprets the scales as the eggs of a mite. The scales are yellowish and the mycelium of the fungus forms dark, radially arranged bands within the cells, which, however, remain still discernable. Von Höhnel states that the eggs are 44  $\mu$  long and 36  $\mu$  broad. In my material the scales are 36–48  $\mu$  across. The leaves of the host plant are apparently perfectly healthy and the fungus can only be detected with the aid of a hand-lens.

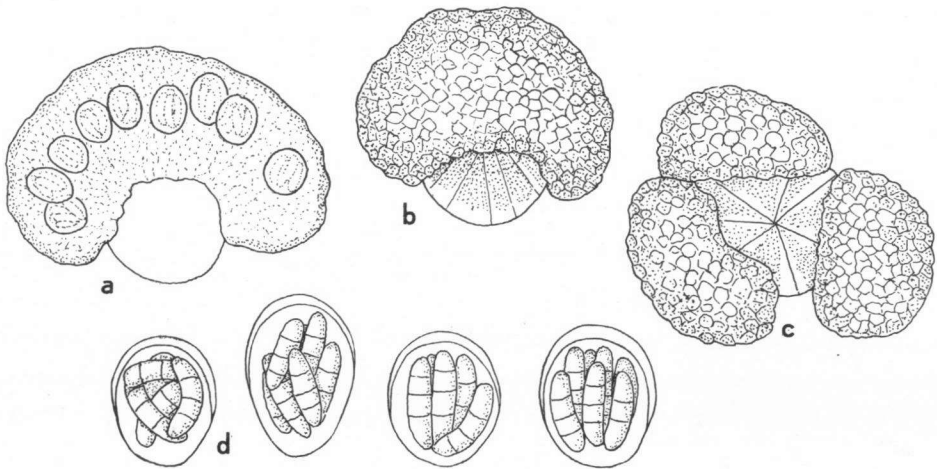


FIG. 1. *Molleriella mirabilis* Winter. — a. Ascoma in section. b. Ascoma on a glandular scale. c. Three ascumata on a glandular scale. d. Asci with ascospores.

**MOLLERIELLA SIRIH** Zimm.

*Mollerietta sirih* Zimm. in Cbl. Bakt. (II. Abt.) 7: 140. 1901.

Ascomata small, dark-coloured, semiglobose, with an uneven surface, 80–100  $\mu$  in diam. Asci formed in the pseudoparenchymatous ground tissue in an irregular layer near the periphery, one ascus in each locule, 8-spored, pear-shaped, 18–20  $\times$  12–14  $\mu$ . Spores more or less fasciculate, ellipsoid, often slightly attenuated near the base, 3-septate, straight or somewhat curved, 10–13  $\times$  4  $\mu$ , hyaline.

JAVA, Bogor, on hairs on both sides of the leaves of *Piper betle*.

Description after Zimmerman.

**Micularia** Boedijn, *nov. gen.*

Ascomata hypophylla, pulvinata, copiosissime distributa, atra, superficialia, punctiformia, apicibus breviter setosis, setulis fasciculatis. Asci solitarii, crasse tunicati, octospori in orbem dispositi. Sporidia oblonga, medio 1-septata, hyalina. — Typus: *Micularia merremiae* Boedijn.

Ascomata superficial, pulvinate, black, with bundles of small spreading hairs at the apex. Asci in an irregular ring near the apex, the individual asci separated by pseudoparenchyma, thick-walled, globose, 8-spored. Spores oblong, 1-septate, hyaline.

**Micularia merremiae** Boedijn, *nov. spec.* — FIG. 2

Ascomata hypophylla, per totam folii superficiem copiosissime distributa, atra, pulvinata, 65–122  $\mu$  diam., 65–99  $\mu$  crassa, ad apicem setulis brunneis, septatis, 13–32  $\times$  2.5–7  $\mu$  obsita. Interne pseudoparenchymatica e cellulis 4–8  $\mu$  longis composita. Asci octospori, crasse tunicati, globosi, 17–23  $\mu$  diam. in orbem dispositi. Sporidia oblonga, media parte 1-septata, leniter constricta, intus guttulis minutis repleta, 12–16  $\times$  5–6  $\mu$ , hyalina.

Ascomata pulvinate, black, 65–122  $\mu$  across, 65–99  $\mu$  high; on top provided with a varying number of simple, septate, brown hairs, 13–32  $\times$  2.5–7  $\mu$ , sometimes slightly constricted at the septae, usually in spreading bundles, in old specimens often nearly wanting; on section ascomata consisting of pale coloured pseudo-parenchyma, the angular cells 4–8  $\mu$  long; on the outside a dark coloured layer. Asci in the pseudoparenchyma in an irregular ring near the apex of the ascocarp, thick-walled, 8-spored, globose, 17–23  $\mu$  in diam.; in water the outer wall ruptures and a cylindrical, thin-walled endo-ascus of 45–58  $\times$  10–13  $\mu$  is thrust forward, piercing the pseudoparenchyma and protruding far beyond the ascocarp, the spores then violently shot away. Ascospores oblong to ellipsoid, hyaline, 1-septate, slightly constricted at the septum, filled with numerous minute droplets, 12–16  $\times$  5–6  $\mu$ .

JAVA, Hortus Bogoriensis, June 1953, May 1954, May 1956, *Boedijn*, on the glandular scales on the underside of the leaves of *Merremia* sp.

The ascocarps are always situated singly on top of the scales. When detached they show a circular scar at the base. In this case, too, the leaves are seemingly healthy and the fungus can only be found with the aid of a hand-lens.

## ELSINOACEAE

Mycelium well developed inside the tissues of the host. Ascomata pulvinate, originating in or under the epidermis and protruding at maturity. Asci thick-

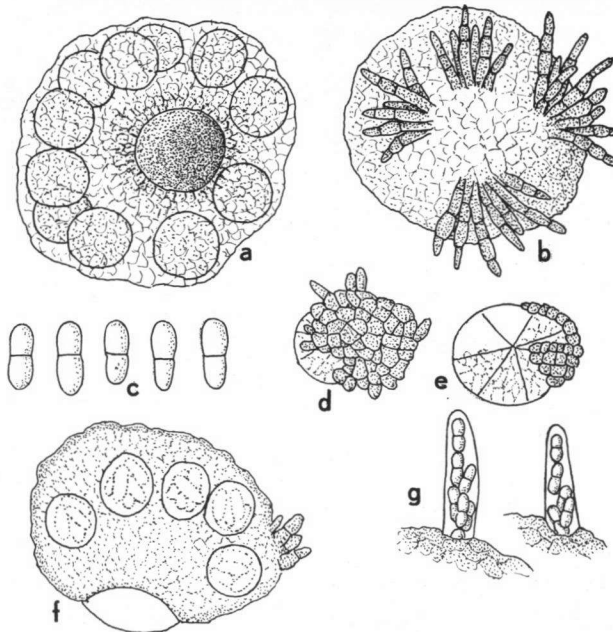


FIG. 2. *Micularia merremiae* Boedijn, *nov. spec.* — a. Ascoma seen from below and made transparent to show the asci and showing the place of attachment to the glandular scale of the host as a circular scar at the centre. b. Ascoma seen from above. c. Ascospores. d, e. Early stages of developing ascomata on glandular scales. f. Ascoma in section. g. Asci protruding through the outer layers of the ascomata.

walled at the apex, distributed in monascous locules at various levels in the pseudoparenchyma of the ascostroma. Ascospores 3-septate, sometimes with a longitudinal wall in one of the middle cells, hyaline. Parasites in the leaves and sometimes also stems and fruits of vascular plants.

#### ELSINOE Rac.

*Elsinoe* Rac., Par. Alg. u. Pilze Java's I: 14. 1900.

*Plectodiscella* Woronichin in Mycol. Cbl. 4: 232. 1914.

Mycelium inside the host. Ascomata developing in or under the epidermis and protruding at maturity, consisting of a hyaline or subhyaline pseudoparenchyma, without definite cortex. Asci thick-walled at the apex, originating at different levels in the pseudoparenchyma, each ascus in a separate cavity, 8-spored. Ascospores hyaline, 3-septate, sometimes also with a longitudinal wall in one of the middle cells. Conidial fructification pertaining to the form-genus *Sphaceloma* Bary.

#### ELSINOE CANAVALIAE Rac.

*Elsinoe canavaliae* Rac., Par. Alg. u. Pilze Java's I: 14. 1900.

Ascomata developing under the epidermis, causing hypertrophy of the underlying tissue which results in the formation of mostly crowded and often confluent blisters, 1–10 mm long, 2–3 mm broad, of a dull reddish colour, about between vinaceous fawn and avellaneous (Ridgway), turning grey when old and dry; between mesophyll and epidermis a subhyaline pseudoparenchyma, 20–48  $\mu$  thick, is formed wherein the asci originate in an irregular arrangement, singly or in groups, but always isolated from one another by the ground tissue. Asci globose to subglobose, 8-spored, 18–20  $\mu$  in diam. or 19–20  $\times$  14–16  $\mu$ , with slightly thickened apex. Ascospores conglobate to parallel, ellipsoid, straight, at one pole often slightly attenuated, 3-septate, 10–12  $\times$  3–4  $\mu$ , hyaline.

JAVA, Bogor, *Raciborski*, on leaves of *Canavalia gladiata*; Jan. 1913, *Smith*, on leaves of *Canavalia obtusifolia*; July 1949, *Boedijn*, on leaves and stems of *Canavalia maritima*; Nov. 1949, *Boedijn*, on leaves and pods of *Canavalia ensiformis*; Jan. 1950, *Boedijn*, on leaves of *Canavalia maritima*.

#### ELSINOE MENISPERMACEARUM Rac.

*Elsinoe menispermacearum* Rac., Par. Alg. u. Pilze Java's 1: 15. 1900.

Ascomata forming dark brown, roundish spots, 1–2 mm in diam. in leaves, but hardly causing any hypertrophy; under the epidermis a narrow layer of pseudoparenchyma is formed wherein the asci originate in an irregular layer, each ascus more or less isolated from the others by interascal tissue. Asci subglobose, rather thick-walled, 8-spored, 18–23  $\times$  14–17  $\mu$ . Ascospores conglobate or more or less parallel, ellipsoid, straight, 3-septate, 10–12  $\times$  2.5–4  $\mu$ , hyaline.

JAVA, Bogor, *Raciborski*, on leaves of *Tinospora crispa* and *T. cordifolia*; Banten, Gunung Sari, May 1931, *Boedijn*, on leaves of *Stephania hernandifolia*.

#### ELSINOE PHASEOLI Jenkins

*Elsinoe phaseoli* Jenkins in J. agr. Res. 47: 788. 1928.

Ascomata in or under the epidermis, causing irregular, roundish, reddish brown spots, 2–5 mm long; pseudoparenchyma with an irregular row of asci. Asci ovoid or subellipsoid, 8-spored, the wall thickened at the apex, 30–40  $\mu$  in diam. Ascospores parallel, oblong, ellipsoid, the basal part sometimes more obtuse than the apical, 3-septate, sometimes with a longitudinal septum in one of the central cells, 13–15  $\times$  5–6  $\mu$ , hyaline.

KRAKATAU, May 1928, *Docters van Leeuwen* 11,750, on pods of *Phaseolus adenanthus*.

Since the material was immature the description is partly after Jenkins.

#### ELSINOE VITICOLA Rac.

*Elsinoe viticola* Rac., Par. Alg. u. Pilze Java's 2: 4. 1900.

Ascomata especially on the underside of the leaves and on the larger veins where raised, brown spots are produced by hypertrophy of the leaf tissue; pseudoparenchyma is formed between the cells of the gall and in this tissue the asci originate in irregular groups of 2–16, separated from each other by pseudoparenchyma.

Asci globose to egg-shaped, 8-spored, thick-walled, up to  $32\ \mu$  long,  $26\text{--}28\ \mu$  broad. Ascospores long-ellipsoid, 2-3-septate,  $15\text{--}18 \times 4\text{--}4.5\ \mu$ , hyaline.

JAVA, *Raciborski*, on the leaves of *Vitis serrulata*.

Description after *Raciborski* as no additional material could be procured.

ELSINOE ANTIDESMAE Rac.

*Elsinoe antidesmae* Rac., Par. Alg. u. Pilze Java's 1: 15. 1900.

Ascomata on the underside of the leaves, especially on the main ribs, giving rise to more or less elongated, dark grey warts, 1-10 mm long, 0.5-1.5 mm broad; under the epidermis of these structures a layer of pseudoparenchyma is formed containing the asci which are irregularly distributed. Asci thick-walled, subglobose to more or less egg-shaped, 8-spored,  $21\text{--}23 \times 19\text{--}21\ \mu$ . Ascospores ellipsoid, 2-3-septate, up to  $14\ \mu$  long,  $2\text{--}3\ \mu$  broad, hyaline.

JAVA, Bogor, *Raciborski*, on the leaves of *Antidesma heterophylla*.

No additional material was collected. Description after *Raciborski*.

*Elsinoe fici* Boedijn, *nov. spec.* — FIG. 3

Ascomata hypophylla, subepidermalia, pulvinata, minuta, erumpentia,  $250\text{--}500\ \mu$  diam.,  $50\text{--}150\ \mu$  crassa. Stroma pseudoparenchymaticum, subhalinum. Asci solitarii, ovoidei vel piriformes, octospori,  $26\text{--}37.5 \times 17.5\text{--}21.5\ \mu$ . Sporidia conglobata vel fasciculata, hyalina, oblonga, recta, interdum basin versus sensim attenuata, 3-septata,  $19.5\text{--}16 \times 4\text{--}6\ \mu$ .

Ascomata on the underside of leaves, under the epidermis, very inconspicuous, forming minute, flat blisters hardly visible by the unaided eye, 0.25-0.5 mm in diam., then rupturing the epidermis and protruding, up to  $50\text{--}150\ \mu$  high; stromatic tissue

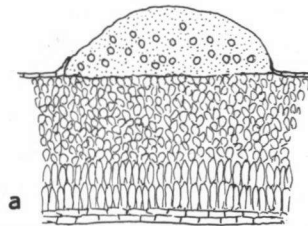
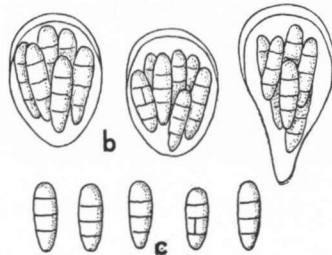


FIG. 3. *Elsinoe fici* Boedijn, *nov. spec.* —

a. Section through ascoma. b. Asci.

c. Ascospores.





indistinctly pseudoparenchymatous, subhyaline. Asci distributed at random in the pseudoparenchyma, ovoid to nearly pear-shaped, thick-walled at the apex, 8-spored,  $26-37.5 \times 17.5-21.5 \mu$ . Spores at first conglobate, then more or less parallel, oblong ellipsoid, sometimes slightly attenuated near the base, 3-septate, sometimes with a longitudinal septum in one of the middle cells,  $12.5-16 \times 4-6 \mu$ , hyaline.

JAVA, Hortus Bogoriensis, July 1953, *Boedijn*, on leaves of *Ficus glomerata*.

## MYRIANGIACEAE

Mycelium inside the host, sometimes poorly developed. Ascomata pulvinate, erumpent or superficial, pseudoparenchymatous. Asci thick-walled, in monascous locules, irregularly distributed throughout the ascomata. Ascospores muriform, hyaline or coloured. Parasites on leaves or on scale insects.

### AGYRONA Höhn.

*Agyrona* Höhn. in S.B. Akad. Wiss. Wien (Math.-nat. Kl., I. Abt.) **118**: 88. 1909.

Mycelium in the host. Ascomata pulvinate, protruding, pseudoparenchymatous, pale coloured with dark outer layer. Asci in a single layer, thick-walled, 8-spored. Ascospores muriform, subhyaline.

#### ***Agyrona calami* (Rac.) Boedijn, *comb. nov.***

*Phymatosphaeria calami* Rac., Par. Alg. u. Pilze Java's **2**: 4. 1900.

*Myriangium calami* (Rac.) Henn. in Hedwigia **39**: 111. 1900.

Spots on the host orange yellow, up to 2 cm broad. Within these spots the ascomata originate; these are pulvinate and up to  $250 \mu$  broad,  $50-74 \mu$  high, protruding through the stomata, pale coloured with dark outer layer. Asci in a single layer, isolated from each other by pseudoparenchyma, thick-walled, ovoid, attenuated near the base, 8-spored,  $26-32 \times 17-19 \mu$ . Ascospores muriform, 8-celled,  $10-12 \times 4-5 \mu$ , subhyaline.

JAVA, Bogor, *Raciborski*, on the leaves of *Calamus* sp.

### ANHELLIA Rac.

*Anhelia* Rac., Par. Alg. u. Pilze Java's **2**: 10. 1900.

Mycelium in the host. Ascomata black, flat with narrow base, originating under the epidermis and protruding at maturity, pseudoparenchymatous. Asci in a layer near the periphery, isolated from each other by pseudoparenchyma, thick-walled. Ascospores oblong, muriform, brown.

The genera *Agyrona* Höhn. and *Anhelia* Rac. are according to the descriptions hardly different. Unfortunately I could not study the types and new collections were not available.

#### ANHELLIA TRISTIS Rac.

*Anhelia tristis* Rac., Par. Alg. u. Pilze Java's **2**: 10. 1900.

Spots on the host pale green with rose coloured centre, up to 5 mm in diam. On the underside of these spots the ascomata originate which are flat with narrow base, black, sharp edged, up to 1.8 mm in diam., consisting of brown pseudoparenchyma with a darker layer at the outside. Asci near upper surface, globose, thick-walled, 8-spored, about 40  $\mu$  in diam. Ascospores oblong, muriform, consisting of 8–16 cells, up to 30  $\mu$  long, 14  $\mu$  broad, brown.

JAVA, Tjibodas, on the leaves of *Vaccinium Teysmannianum*.

#### MYRIANGIUM Mont. & Berk.

*Myriangium* Mont. & Berk. in Lond. J. Bot. **4**: 72. 1845.

*Phymatosphaeria* Pass. in Nuovo G. bot. ital. **7**: 138. 1886.

*Pyrenotheca* Pat. in Bull. Soc. bot. France **33**: 155. 1886.

*Diplotheca* Starb. in Bot. Notiser **1893**: 30.

*Phymatodiscus* Speg. in Bol. Acad. Cordoba **23**: 484. 1919.

Mycelium hardly developed. Ascomata dark-coloured, cushion-shaped, covered by more or less obconical, crowded outgrowths; on section pale coloured, pseudo-parenchymatous. Asci embedded singly in the tissue of the outgrowths, distributed at different levels, thick-walled. Ascospores muriform, hyaline to pale coloured.

#### MYRIANGIUM DURIAEI Mont. & Berk.

*Myriangium Duriaei* Mont. & Berk. in Lond. J. Bot. **4**: 73. 1845.

*Collema glomerulosum* Tayl. (non Ach.) in Mackay, Fl. Hibern. **2**: 108. 1836.

*Phymatosphaeria abyssinica* Pass. in Nuovo G. bot. ital. **7**: 188. 1875.

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*Myriangium yunnanense* (Pat.) Rac., Par. Alg. u. Pilze Java's **3**: 41. 1900.

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Ascomata black, flat cushion-shaped, consisting of a level base 2–4 mm in diam. with a thin, often radially plicate border on which more or less turbinate tubercles with flattened tops are closely packed; these outgrowths up to 0.5 mm high, 200–550  $\mu$  broad; on section the whole ascoma appears pseudoparenchymatous, at first very pale, nearly white, turning brownish in older specimens, the cells 2–7  $\mu$  long and often more or less vertically arranged; on the outside with a darker layer; in the tissue of the tubercles numerous monascous cavities are found irregularly distributed at various levels. Asci wholly filling the cavities, subglobose, 8-spored, 38–51  $\times$  25.5–39  $\mu$ ; wall at the apex 3–9  $\mu$  thick. Ascospores conglobate, oblong-ovoid, the ends rounded, mostly 7-septate, constricted at the medium septum, with one or more longitudinal septa in each locule, 17–30  $\times$  8–10  $\mu$ , colourless, later slightly coloured.

On scale insects.

JAVA, Bogor, April 1929, *Bakhuizen van den Brink* 7028, on stem of *Citrus medica*, March 1949, *Reitsma*, on stem of *Carica papaya*; Hortus Bogoriensis, July 1950, *Boedijn*, on leaves of *Zamia muricata*, June 1953, *Boedijn*, on leaves of *Encephalartos* sp., June 1953, *Boedijn*, on leaves of *Cycas Rumphii*; Pasar Minggu near Djakarta, April 1949, *Reitsma*, on stem of *Citrus* sp.

In specimens growing on scale insects on stems, plates of brown pseudoparenchyma penetrate the cortex, procuring a firm holdfast for the ascocarps.

#### DISCUSSION

The classification of the Myriangiales is at present rather unsatisfactory. Complete developmental studies are lacking, and, hence, only a preliminary arrangement suggesting the relationships of the different families can be attempted. Biological characters like the mode of living, and primitive features such as can be found in the morphology of the ascospores should be taken into account.

The forms that I would place at the base of the order are the representatives of the family Atichiaceae. These fungi do not possess a mycelium, but consist of a compact thallus which serves nutrition as well as propagation. They live as saprophytes on the excretions of insects and are, therefore, often associated with sooty moulds.

The genus *Phycopsis* is perhaps the most primitive since its thallus is a semiglobose body in which the asci are formed near the surface, no trace of a special fruiting structure being found. On the other hand, in *Atichia* the thallus is definitely star-shaped and the asci arise in distinct swellings which thus form the first indications of a fruit-body. In both genera the ascospores are pale coloured and only one-septate.

The family which may be derived from the Atichiaceae is that of the Saccardiaceae. Here a much reduced mycelium can already be distinguished by which the ascomata are attached to hairs of vascular plants, especially to glandular scales, which they parasitize. The representatives of this family have become parasites, but because they only attack trichomes, the host-plant is seemingly not affected. The ascomata are pulvinate, sometimes with some small bundles of hairs at the apex. The ascospores are one-septate in *Micularia*, mostly three-septate in *Mollerella*.

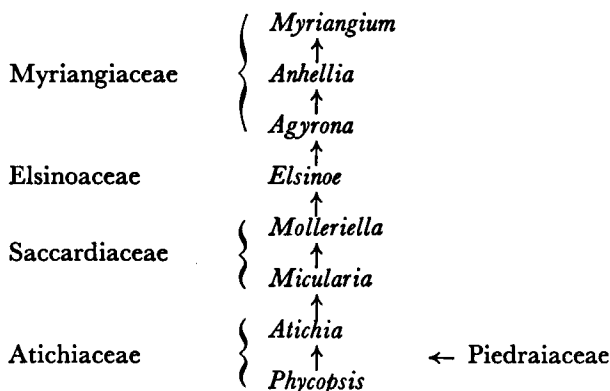
The next family which in its turn may be connected with the Saccardiaceae, is the Elsinoaceae. These are parasites within the leaves of vascular plants; they possess a well developed mycelium growing between the cells of the host. The ascocarps develop in, or more often, under the epidermis and protrude more or less at maturity. The hyaline ascospores show three cross-walls and in some instances a longitudinal septum develops in one of the middle cells.

The family of the Myriangiaceae may be linked with the Elsinoaceae by the genera *Agyrona* and *Anhellia* which are also leaf parasites with a well developed mycelium in the host-plant. The ascomata are erumpent and pulvinate and the ascospores typically muriform, subhyaline in *Agyrona* and brown coloured in *Anhellia*. The genus *Myriangium* which I would place next to these, is somewhat aberrant because its species parasitize scale-insects. Consequently, the mycelium is much reduced. The ascospores are subhyaline or pale coloured and muriform.

Remains the family Piedraiceae with the only genus *Piedraia*, a parasite of the human hair. It can hardly be considered a serious parasite because the damage

its effects is very slight. The mycelium is reduced, the ascocarp pulvinate and the ascospores are one-celled and hyaline. It seems far-fetched to connect *Piedraia* with the Saccardiaceae on account of its parasitism on hairs. Perhaps there is some relation with the Atichiaceae, but without more data at hand no conclusion can be drawn at the moment.

The above suggestions on the relationships of the Myriangiiales may be expressed in the following diagram. As in all other groups of Ascomycetes, such an arrangement can only be considered to be tentative and hypothetical.



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