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KOSTERMANSINDA RIFAI GENUS NOVUM HYPHOMYCETARUM

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SUMMARY

The conidial development of *Sclerographium magnum* Boedijn is described and illustrated; based on this species the new aleuriosporous genus *Kostermansinda* Rifai is proposed.

The morphology of the conidiophores and conidia of *Sclerographium aterrimum* Berk., the type species of the stilbaceous genus *Sclerographium* Berk., was described and illustrated in details by Hughes (1951). The muriform conidia of this species are radulaspores because they arise blastogenously and produced on numerous small denticles on the somewhat dilated apices of the fasciculated conidiophores, which during the process of the conidial development elongate slightly by subapical proliferations. Therefore this genus has been correctly included in the section II of Hughes' (1953a) experimental system of classification of Hyphomycetes or in the Radulasporae of Tubaki (1963), Nilsson (1964) and Rifai & Cooke (1966).

In 1960 Boedijn described *Sclerographium, magnum* Boedijn, based on a collection of a fungus which he found growing on the decaying petiole of a palm species in Bogor Botanic Garden, Java. From Boedijn's description and illustration, as well as from the results of my own observations on more recent collections of this species which were made from decaying petioles of several palm species cultivated in Bogor Botanic Garden, it is evident that *Sclerographium magnum* has murogenous conidia produced by simple conidiophores, so that it is an aleuriosporous species which consequently should be referred to the Aleuriosporae or to the section III of Hughes' system of classification. Although Boedijn (1960) was fully aware that this species was not at all related to *Sclerographium aterrimum,* he nevertheless preferred to place it in the genus *Sclerographium* because of the superficial similarity between the two species, and also because of the artificial nature of the classification of Deuteromycetes; in recent years, however, substantial evidence are available to show that the system of classification proposed by Hughes (1953a), which is based on the methods

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of the developments of conidiophores and conidia, has great value in indicating the natural affinities of related genera or species of both the Hyphomycetes and the Coelomycetes.

Sclerographium magnum appears to have an affinity with *Acrodictys bambusicola* M. B. Ellis, the type species of the mononematous and muriform spored genus *Acrodictys* M. B. Ellis (Ellis, 1961). It seems advisable, however, to assign the present species to a genus other than *Acrodictys*, because of the absence of intermediate forms between the synnematous and mononematous habit of their respective colonies; furthermore the development of the spore septation of *Sclerographium magnum* (vide infra) is somewhat unusual. It must be admitted that in recent years there has been some doubts on the validity of synnemata to serve as a taxonomic evidence for separating genera of Hyphomycetes. The genus *Endophragmia* Duvernoy & Maire (= *Phragmocephala* Mason & Hughes), for example, now contains both mononematous and synnematous species (Mason & Hughes, 1951; Hughes 1953, 1953a; Ellis, 1959), but in this case there are intermediate forms such as *Endophragmia atra* (Cooke) M. B. Ellis. On the other hand Barnett (1960) preferred to reserve the genera *Endophragmia* and *Phragmocephala* for the reception of the mononematous and synnematous species respectively; according to Morgan-Jones & Cole (1964) it might be necessary in the future to rearrange species of *Endophragmia* in some smaller genera, but these should be mainly based on characters other than the habit of the colony. Morton & Smith (1963) maintained that for practical and other purposes it was best to keep the mononematous genus *Scopulariopsis* Maire and the synnematous genus *Doratomyces* Corda (= *Stysanus* Corda) as two distinct genera, despite the fact that in culture the habit of the colony of some species of both genera may integrade from one to another; the separation of these two genera has always been widely accepted.

In the following, therefore, a new genus based on *Sclerographium magnum* is proposed and a detailed illustrated description of its morphology and its conidial development is given. It gives me a distinct pleasure to name this new genus in honour of Prof. A. J. G. H. Kostermans, D. Sc, my teacher and foster father, who — although not a mycologist himself — has deliberately spent a prodigous amount of his most valuable time and energy helping and supervising my first attempt to study fungi.

Kostermanssinda Rifai, *gen. nov.*

Fungi imperfecti, hyphomycetes, aleuriospori. Synnemata erecta, recta, ex hyphis septatis, non-ramosis, brunneis composita. Conidiophora simpli-

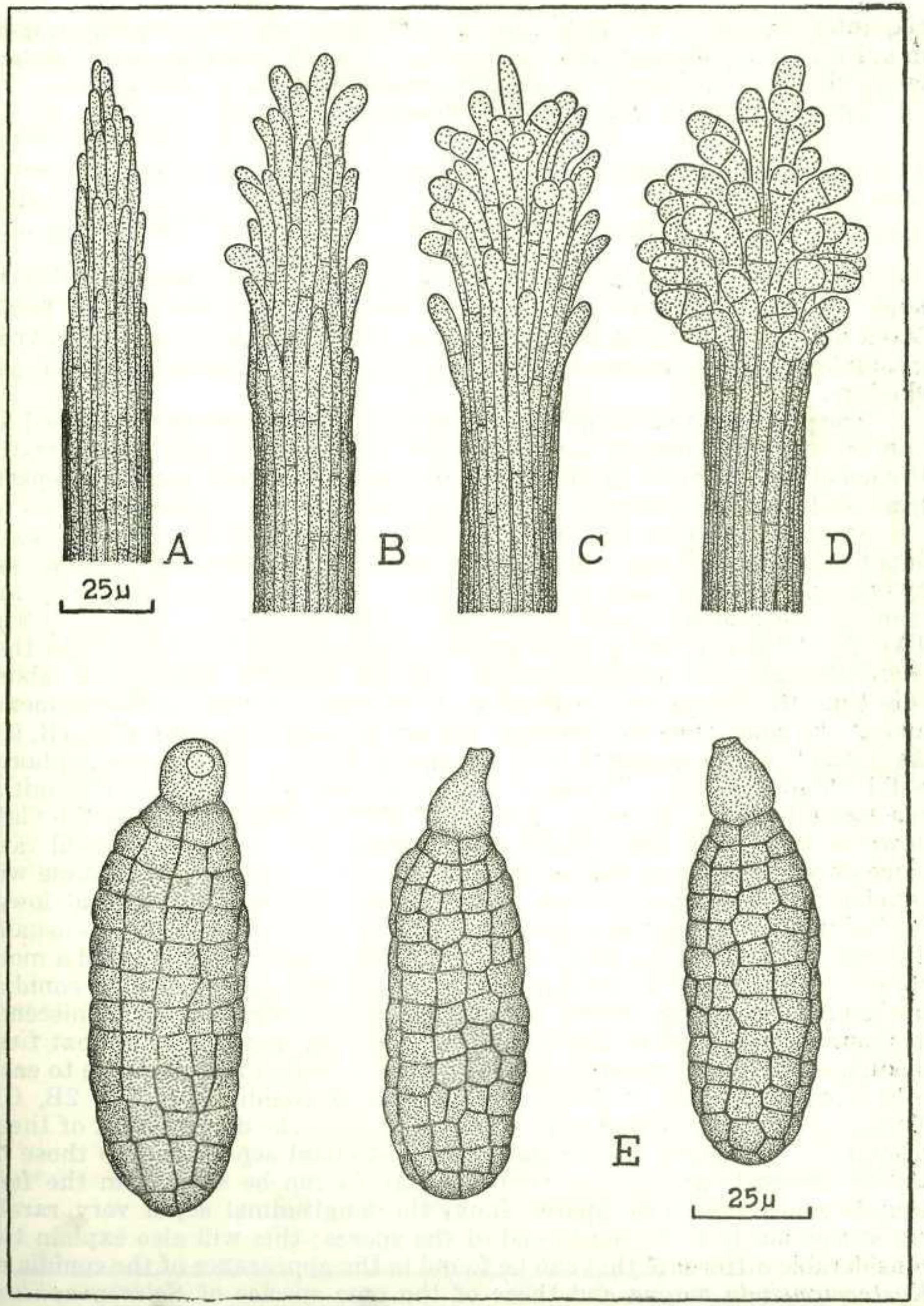

Fig. 1. *Kostermansiyida magna:* A—D, stages of the developments of conidiophores, **conidial initials and young- conidia; E, mature conidia (from *Rifai* 351).**

cia, interdum per proliferationes apicales elongascentia. Conidia singula in apice conidiophori oriunda, murogena, ellipsoidea, muriformes, brunnea, levia, sicca; vesicula pallide brunnea, subglobosa vel obconica.

SPECIES GENERIS TYPICA: *Sclerographium magnum* Boedijn.

Kostermansinda magna (Boedijn) Rifai, *comb. nov.*

Sclerographium, magnum Boedijn *in* Persoonia 1: 319. 1960 (basionym).

The *synnemata* arise singly and gregariously and stand at a right angle to the surface of the substrate; they are mostly straight, 225r-500 [j. long by up to GO ,u diameter at the slightly enlarged base, and then gradually attenuate to 20—30*μ*, diameter immediately beneath the conidial clusters.

The shining and dark blackish brown synnemata are composed of bundles of strictly parallel running *hyphae* which are compactly aggregated to each other, unbranched, brown coloured, smooth walled, sparingly septate (each cell measure about 35 *μ* long) and have 3—4.5 μ diameter.

Prior to the conidial formation the synnema usually appears as a small, subulate and paler-tipped pillar; the ultimate cells of its hyphae ara cylindrical or tubular and rounded distally, and these cells ultimately are transformed into the simple *conidiophores* of *Kostermansinda magna* (fig. 1A). At the beginning of the conidial formation it can often be seen that these ultimate cells usually attenuate slightly towards their apices; aboiut this time the apices will bend away from the long axis of the synnema and at the same time the enlargement process will also begin (fig. IB, G). As a result of the latter process the apical portions of the conidicphores will be blown out into ellipsoidal conidial initials. When this conidial initial reaches a diameter of about 8 μ or more, a transversal septum will be laid down in its middle (fig. ID, 2A). The subsesuent development will take place only in the upper half of the conidial initial which in due course will develop into the characteristic muriform conidium; the obconical lower half of the c:nidial initial — termed "vesicle" by Boedijn (1980) — usually does not develop any further except for a slight increase in size and a more round outline. Since all hyphae that make up the synnema form conidial initials almost simultaneously, at this time the synnema has a reminiscence of a bundle or golf clubs (fig. ID). Soon after the appearance of that first median septum, two longitudinal septa which stand at a right angle to each other crusiately will be formed in the young conidia (fig. ID; 2B, G). Though it is not restricted to the present species, the development of these primary — especially the crusiate — longitudinal septa prior to those of the transversal ones is somewhat unusual, as can be seen from the fact that in many muriform spored fungi the longitudinal septa very rarely run continuously from end to end of the spores; this will also explain the considerable difference that can be found in the appearance of the conidia .of *Kostermansinda magna* and those of the true species of *Sclerographium* (cf. the illustrations of the latter given by Hughes, 1951; Barnett, 1960; Deighton, 1960; Morris, 1963). A rapid development will follow the formation of these primary longitudinal septa; while the young conidia increase in size, transversal septa will be laid down successively in acropetal sequence (fig. 2D, E, F), similar to the sequence of the septum formation in species of *Endophragmia* (Hughes, 1953; Morgan-Jones & Cole, 1964) ; later on secondary longitudinal septa will be formed, also in a succesive acropetal sequence. At this stage the young conidia are mostly pear shaped; their lower parts are composed of small cubical cells, while their upper parts are still undivided except by the primary longitudinal septa (fig. 2G). When viewed singly under the microscope these young conidia are pale brown below, much paler towards their apical portion; when stained with cotton-blue in lactic acid the cells of the apical part will stain much more intensively than those of the lower part. All these seem to indicate that the growing point of these developing conidia lies in their apices. When

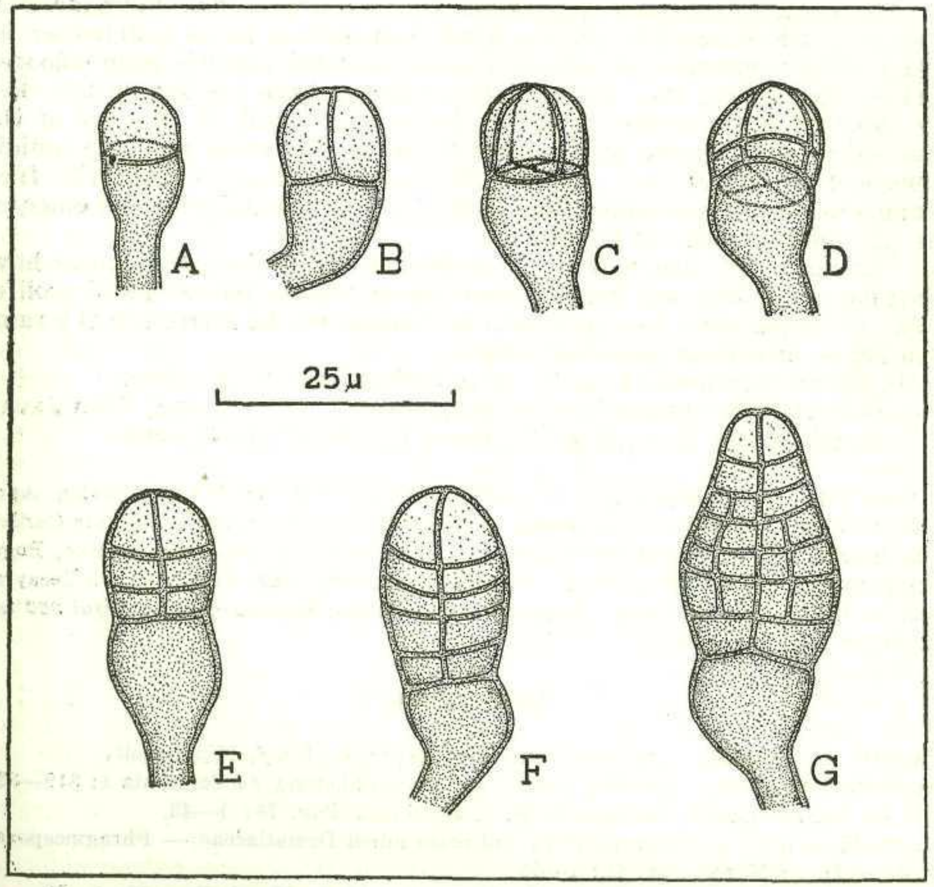

Fig.'2. *Kostermansinda magna:* A—G, stages of the developments of young conidia (from *Rifai 351).*

examined under a low power binocular microscope or with a hand lens about this time fresh synnemata usually appear to carry distinctive pale greenish grey conidial heads which more or less are globose in outline.

Fully mature *conidia* are dark olive brown to dark brown, usually shining under the reflected light, smooth walled, ellipsoidal or oblong ellipsoidal. From side view they can be seen to be almost regularly divided by seven to thirteen transversal septa and by three longitudinal septa, so that on each view the conidia seem to be composed of four rows of mostly cuboidal and regularly arranged cells. Examinations of numerous conidia show that the cells of the conidia next to the vesicles are not divided further by longitudinal septa except by the primary crusiate longitudinal septa, so that each conidium has four basal cells (fig. IE, 2G) ; the arrangement and the number of these basal cells have been wrongly illustrated in Boedijn's (1960) fig. 1 and 2, but a correct interpretation of them is presented in his fig. 3. Excluding the vesicle the conidia measure 50—80 x 25—42 μ. The vesicle itself measure up to 14 µ, diameter by 19 JA long; it is subglobose, hemiglobose or obconical, smooth, paler coloured arid thinner walled than the conidium proper. Since the firmly attached conidium usually becomes detached through the break or fracture of the conidiophore wall immediately beneath the vesicle, when shed the conidia always carry away their vesicles. It has been observed that the first formed germ tube originates from one of the four basal cells and emerges through the scar of the vesicle.

Though very rare, percurrent proliferations of the conidiphores have been observed; through the ruptured conodiophores new cells will proliferate and at their apices a new crop of conidia will be formed in the same manner as has been described above.

HABITAT: on decaying petioles of various species of palms.

DISTRIBUTION: known only from the type locality (Bogor, West Java).

ILLUSTRATION: Boedijn *in* Persoonia 1: 320, fig. 1—3.1960.

JAVA. On decaying petioles of an unknown palm, Bogor Botanic Garden, April 1921, *van Overeem* (BO 639) ; on decaying leafstalks of a palm, Bogor Botanic Garden, March 1950, *Boedijn* (typus, n.v) ; on decaying petioles of *Arenga microsperma,* Bogor Botanic Garden, June 1962, *Rifai S25;* ibid., September 1962, *Rifai 351;* on decaying petioles of *Raphia peduneulata,* Bogor Botanic Garden, September 1962, *Rifai 360* (all in BO). -

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