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# **BASIDIOMYCETES OF SOUTH-EAST ASIA**

1. The genus Paraphelaria (Auriculariales)

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The genus Paraphelaria is divided into Paraphelaria s. str. (with pale basidiocarps) and Aphelariopsis (with dark brown basidiocarps). Paraphelaria is restricted to South-east Asia, while Aphelariopsis occurs also in South America.

In a number of previous papers (Jülich, 1976a, b, 1978, 1979, 1980) some new taxa of Basidiomycetes, mainly Aphyllophorales, have been described for South-east Asia. The work has been continued with a study of some auriculariaceous taxa.

The genus *Paraphelaria* was described by Corner (1966), based on a coriaceous, branched fungus originally described as *Thelephora amboinensis* Lév. (1844). Corner could demonstrate that the basidia of this clavarioid species are long, cylindrical and distinctly transversely septate. This was a rather unexpected character which necessitated the description of the new genus *Paraphelaria* and its removal to the Auriculariaceae of the Heterobasidiomycetes.

Clavarioid basidiocarps are rather uncommon in Heterobasidiomycetes where examples can be found in the Dacrymycetales (e.g. *Calocera*), Tremellales (e.g. *Tremellodendron*, *Tremellodendropsis*), and Auriculariales (e.g. *Paraphelaria*). Usually, the basidiocarps of Heterobasidiomycetes have a more or less gelatinous context, which makes it easy for beginners to recognize this group. But many clavarioid genera, with the exception of the clavarioid Dacrymycetales, have an often distinctly coriaceous texture composed of dry, slightly or strongly thick-walled hyphae. Contrary to clavarioid Homobasidiomycetes, some taxa of clavarioid Heterobasidiomycetes lack a well developed hymenium. This is particularly obvious in auriculariaceous taxa, and especially in *Paraphelaria amboinensis*. In that taxon, basidia are loosely produced on hyphae of the outer layer of the basidiocarp, and not in a well definded palisade-like hymenium. Since the basidia are intermingled with and partly covered by the longitudinally arranged hyphae, the surface of the basidiocarp is reached by sterigmata of very variable length. Neither between the hyphae nor on the surface of the basidiocarp is any mucilage produced.

The genus *Paraphelaria* with its Asian species *P. amboinensis* remained monotypic until Welden (1971) described a second species, *P. colombiana*, from South America. A third species, again from South-east Asia, was described by Jülich (1980) under the name *P. borneensis*. The latter species differed from the generic type species mainly in its small, nearly unbranched basidiocarps with brown colour.



Fig. 1. Paraphelaria amboinensis. Borneo, Sarawak, Jülich 78/3168b.

Prof. Welden kindly sent me the type specimen of his species for study. I realized with great surprise that the South American *P. colombiana* and the South-east Asian *P. borneensis* are closely related, both having only slightly (often only apically) branched basidiocarps and a dark brown colour. A detailed study of all three species hitherto described revealed that *Paraphelaria* (with the type species *P. amboinensis*) should remain monotypic, whereas *P. borneensis* and *P. colombiana* should be brought together in a genus of their own.

There are no distinct probasidia recognizable in *P. amboinensis* and *P. colombiana*. The basidia which are formed terminally on main hyphae or lateral hyphae, are narrowly cylindrical and thin- or somewhat thick-walled. In *P. borneensis*, however, basidia originate usually laterally on the generative hyphae. Often a distinct probasidium is formed which is globose or broadly ellipsoid and thin- or mostly somewhat thick-walled, germinating to form a cylindrical or sinuous phragmobasidium.

The differences between the recognized taxa can be keyed out as follows:

- 1b. Basidiocarp dark brown, up to 1-3 cm high, not or only slightly branched (tips of branches then distinctly penicillate). Hyphae dark brown in the context, yellowish-brown in the subhymenial part. Basidia with or without inflated probasidia, 30-36-50 μm long.
- 2a. In South-east Asia. Basidiocarp 1-1,5 cm long, usually unbranched. Probasidia laterally on the generative hyphae, globose to broadly ellipsoid, thin- to somewhat thick-walled. Metabasidia cylindrical of more often sinuous, 30-36 μm long. Spores 12-14 × 4-4.5 μm.

Aphelariopsis borneensis

2b. In South America. Basidiocarp up to 3 cm long, only slightly branched and with penicillate tips. Probasidia not present or not distinct. Basidia terminally on generative hyphae, cylindrical, 30-50 μm long. Spores 11-13-17 × 4.5-5.5-6.5 μm.

## PARAPHELARIA Corner 1966

in Persoonia 4: 346.

Basidiocarp clavarioid, strongly branched when mature, light coloured, tips of branches not penicillate, consistency coriaceous, not gelatinous, without typical hymenium. Monomitic. Hyphae hyaline to pale yellowish, cylindrical or partly slightly inflated, thick-walled, without clamps. Cystidia absent. Basidia (phragmobasidia) cylindrical, thin- to slightly thick-walled, transversely septate, with four rather long sterigmata. Spores hyaline, cylindrical or slightly curved, smooth, thin-walled, inamyloid. — Monotypic.

PARAPHELARIA AMBOINENSIS (Lév.) Corner 1966, in Persoonia 4: 346

Syn.: Thelephora amboinensis Lév. 1844, in Annls Sci. nat. (Bot.), sér. III, 2: 207. Thelephora funalis Lév. 1844, loc. cit., p. 208. Thelephora scoparia Lév. 1844, loc. cit., p. 207.

Basidiocarp erect, single or in small groups, somewhat or usually much branched, at first whitish, later (and when dry) pale yellowish brownish, up to 15 cm high, with a basal at first glabrous, later strigose trunk  $1-6 \text{ cm} \times 2-15 \text{ mm}$ . Branches 1-2.5(-8) mm wide, fertile on all sides, but without a distinct hymenium. Rhizomorphs lacking. Hyphal system monomitic.



Fig. 2. Aphelariopsis borneensis. Borneo, Sarawak, Jülich 78/2541 (type).



Fig. 3. Aphelariopsis colombiana. Colombia, Welden (type).

Hyphae hyaline when fresh, pale yellowish when dry, distinct, cylindrical with occasional subterminal or intercalar swelling, densely interwoven, branching often near the septa, anastomoses present, slightly to strongly thick-walled  $(0.3-2.5 \,\mu\text{m})$ ,  $3-8 \,\mu\text{m}$  wide, at some places inflated up to  $15 \,\mu\text{m}$ , sidebranches often constricted at the point of origin, with smooth surface, clamps absent from all septa, contents homogeneous (except for the slightly guttulate hyphal tip); changing to a brilliant yellow colour in Melzer's, slightly cyanophilous when still thinwalled and hyaline, but not so when thick-walled and yellowish. Cystidia absent. Basidia (phragmobasidia) scattered in the outer parts of the context, not in a typical hymenium, hyaline, sinuous-cylindrical when mature, young basidia cylindrical (probasidia lacking),  $100-130 \times 6-8 \,\mu\text{m}$ , at least the basal part slightly thick-walled, smooth, a basal clamp always lacking, contents slightly navicular, often somewhat curved, thin-walled, smooth,  $20-25 \times 6-7.5 \,\mu\text{m}$ , with rather large apiculus, contents guttulate to oleaginous, neither amyloid, dextrinoid, nor cyanophilous.

SUBSTRATE: on the ground (or on strongly decayed wood?).

DISTRIBUTION: South-east Asia: Java, Ambon, Aru Islands, Solomon Islands, Borneo (Sarawak).

MATERIAL STUDIED: B O R N E O, Sarawak, Gunong Mulu National Park, Melinau Gorge, path to Long Berar, 5.111.1978, W. Jülich 78/1350b (L). — Gunong Mulu National Park, along path from base camp to camp 1, alt. c. 60 m, 28.111.1978, W. Jülich 78/3168b (L).

## Aphelariopsis Jülich, gen. nov.

Carposomata erecta, thelephoroidea, haud vel parum ramosa, fusca, coriacea, hymenio  $\pm$  typico. Systema hypharum monomiticum. Hyphae brunneae, cylindraceae, haud inflatae, paulo incrassate tunicatae. Cystidia desunt. Probasidia adsunt vel desunt, late ellipsoidea aut globosa, tenuiter vel paulo incrassate tunicatae. Metabasidia (phragmobasidia) hyalina aut lutea, cylindracea vel sinuosa, tenuiter vel paulo incrassate tunicata, transverse septata, 3-4 sterigmatibus. Sporae hyalinae, cylindraceae vel paulo arcuatae, laeves, tenuiter tunicatae, inamyloideae.

Typus: Paraphelaria borneensis Jülich 1980, in Persoonia 10: 539.

Basidiocarp erect, thelephoroid, not or only slightly branched, dark brown, coriaceous, with more or less typical hymenium. Hyphal system monomitic. Hyphae brown, cylindrical, not inflated, somewhat thick-walled. Cystidia absent. Probasidia present or absent, broadly ellipsoid or globose, thin- or slightly thick-walled. Metabasidia (phragmobasidia) hyaline or yellowish, cylindrical or sinuous, thin- or slightly thick-walled, transversely septate, with 3–4 sterigmata. Spores hyaline, cylindrical or slightly curved, smooth, thin-walled, inamyloid.

#### Aphelariopsis borneensis (Jülich) comb. nov.

### Basionym: Paraphelaria borneensis Jülich 1980, in Persoonia 10: 539.

Basidiocarp erect, dark brown, cylindrical, usually unbranched with subulate tips, sometimes apically penicillate with very short sidebranches, gregarious or connected at the base by a small, sterile subiculum, 10-15 mm long, 1-2 mm thick, coriaceous, with homogeneous context, rhizomorphs lacking. Hymenium not well developed, even, dark brown when dry, not cracked. Hyphal system monomitic. Hyphae dark brown in the context, more yellowish brown in the subhymenium, cylindrical, not inflated, densely arranged in subhymenium and trama, branching from all parts of the hyphae, somewhat thick-walled, 2.5-3.5  $\mu$ m wide in the subhymenium, 3.5-4.5  $\mu$ m wide in the context, with smooth surface, clamps absent from all septa, contents homogeneous. Cystidia absent. Probasidia present, at first globose, then broadly



Fig. 4. Paraphelaria amboinensis. Borneo, Sarawak. — a. Jülich 78/3168b (× .1.1). — b. Jülich 78/1350b (× 1.6).

ellipsoid,  $10-16 \times 5.5-8 \ \mu$ m, hyaline or often pale yellowish, slightly thick-walled, at first with homogenous contents, later granular to slightly guttulate, sessile or with an up to  $10 \times 2 \ \mu$ m large stalk, originating laterally from generative hyphae. Metabasidia (phragmobasidia) scattered in the outer part of the context or arranged in a more or less well developed hymenium, hyaline, sinuous-cylindrical when mature,  $30-36 \times 4-5 \ \mu$ m, thin-walled, guttulate, without a basal clamp, with four large cylindrical to subulate sterigmata. Spores hyaline, curved-cylindrical, thinwalled, smooth,  $12-14 \times 4-4.5 \ \mu$ m, with small apiculus, contents more or less guttulate, neither amyloid, dextrinoid, nor cyanophilous.

SUBSTRATE: saprophytic on very rotten wood on the ground.

DISTRIBUTION: Borneo (Sarawak).

MATERIAL STUDIED: B O R N E O, Sarawak, Gunong Mulu National Park, around Camp 1, 19.111.1978, W. Jülich 78/2541 (L).

Aphelariopsis colombiana (Welden) Jülich, comb. nov.

Basionym: Paraphelaria colombiana Welden 1971, in Tulane Stud. Zool. Bot. 17: 19.

Basidiocarp erect, up to 3 cm long, less than 1 mm thick, growing in groups from a thin hyphal mat, dark brown, only slightly branched with few main branches, the tips penicillate, multifid, lighter than branches, pale ochraceous when dry, almost hyaline when fresh; basal trunk c.  $5 \times 0.6$  mm; branches flattened, often anastomosing with other branches, inconspicuously hairy. Hymenium developed, light coloured, pulverulent. Hyphal system monomitic. Hyphae distinct, rather dark brown in the context, more yellowish brown in the subhymenium, cylindrical, not inflated, densely longitudinally arranged, branching often near the septa, somewhat thick-walled  $(0.3-0.6 \mu m)$ ,  $3-4 \mu m$  wide, with smooth surface, contents homogeneous. Cystidia absent. Probasidia not distinct or cylindrical, yellowish elsewhere, broadly cylindrical when mature,  $30-50 \times 6.5-8.5 \mu m$ , often slightly thick-walled, without a basal clamp, contents granular, more rarely gutulate, transversely septate with three or four lateral subulate sterigmata. Spores hyaline, ellipsoid, cylindrical or slightly curved, thin-walled, smooth,  $11-13-17 \times 4.5-5.5-6.5 \mu m$ , with small but distinct apiculus, contents granular or slightly guttulate, neither amyloid, dextrinoid, nor cyanophilous.

SUBSTRATE: saprophytic on bamboo.

DISTRIBUTION: South America (Colombia).

MATERIAL STUDIED: COLOMBIA, Valle State at La Palestina, 17.6.1968, A. L. Welden (herb. Tulane 7257).

The new genus *Aphelariopsis* can be placed together with *Paraphelaria* in the Paraphelariaceae, one of the families of the Auriculariales (Jülich, 1981). The family deviates from other families of that order in its clavarioid basidiocarps with dry, coriaceous context.

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Fig. 5a. Aphelariopsis borneensis. Borneo, Sarawak, Jülich 78/3168b (type) (×1.6). — b. Aphelariopsis colombiana. Colombia, Welden (type) (×1.6).

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