

ON ARACHNIOTUS AND RELATED GENERA OF THE
GYMNOASCACEAE

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(With two Plates)

Fungal strains in the culture collection of the CBS under the generic names *Arachniotus* and *Pseudoarachniotus* were studied. The genera *Arachniotus* (including *Pseudoarachniotus*) with 6 species, *Narasimhella* with a single species, and *Amauroascus* with 7 species are accepted. For *Arachniotus glomeratus*, *Arachniotus striatissporus* and *Arachniotus lectardii* the new generic names *Arachnotheca*, *Bysoascus*, and *Eleutherascus* are proposed. A key is given for the genera of the Gymnoascaceae.

In recent publications on Gymnoascaceae the concepts of the generic distinctions are contradictory. Differences of opinion exist especially on the delimitation of *Arachniotus*, *Pseudoarachniotus*, *Amauroascus*, and *Narasimhella*. Some genera have been put into synonymy by one author and are accepted again by another. In a revision of British Gymnoascaceae, Apinis (1964) for instance reduced *Pseudoarachniotus* Kuehn (1957) to the synonymy of *Arachniotus* Schroeter (1893). On the other hand Orr & Kuehn (1971) found the type species of *Narasimhella* Thirum. & Mathur (1965) to be identical with a fungus described by Kuehn & Orr (1963) as *Pseudoarachniotus marginosporus*. Orr & al. (1965) included *Amauroascus* in *Arachniotus*.

To clarify the identity of the above mentioned genera, all cultures present in the CBS-collection under these names were compared. The study has shown that the genus *Arachniotus* sensu Apinis (1964) and sensu Orr & al. (1965) is an unnatural taxon containing a variety of fungi with different relationships. In addition to *Arachniotus* the genera *Narasimhella* and *Amauroascus* must be accepted. Certain species classified as *Arachniotus* belong to other genera of the Gymnoascaceae and the Eurotiaceae.

The strains were compared on YpSs- and hay-infusion agar after an incubation of 3-4 weeks at a temperature of 24° C in diffuse light. Species not developing well on these media were studied on agar-media containing oatmeal, malt or potato-carrot-extract. All of the species discussed in this paper are provided in the existing literature with suitable and complete descriptions. Therefore no new species descriptions are offered.

The following disposition is proposed:

1. ARACHNIOTUS Schroeter

Arachniotus Schroeter in *Krypt.-Fl. Schles.* 3 (2): 210. 1893.

Pseudoarachniotus Kuehn in *Mycologia* 49: 694. 1957.

Waldemaria Batista & al. in *Atas Inst. Micol. (Recife)* 1: 5. 1960.

TYPE SPECIES.—*Arachniotus ruber* (van Tieghem) Schroeter

Colonies on YpSs-agar velvety or lanose, often furrowed, becoming yellow, brownish or cinnamon; initials consisting of two similar gametangia coiling about each other; peridium absent; asci on short ascogenous hyphae, often localized in patches throughout the aerial mycelium, frequently forming short chains, spherical or nearly so, with a thin, rather persistent membrane, 4- or mostly 8-spored; ascospores lenticular or oblate, often with an equatorial rim or furrow, sometimes also with polar thickenings, yellow- or red-brown when mature, with a diameter of 4–8 μ ; conidia mostly absent, but arthro- or aleurioconidia may be present.

1. ARACHNIOTUS RUBER (van Tieghem) Schroeter

Gymnoascus ruber van Tieghem in Bull. Soc. bot. Fr. **24**: 159. 1877. — *Arachniotus ruber* (van Tieghem) Schroeter in Krypt.-Fl. Schles. **3** (2): 211. 1893.

This species is readily recognized by its ascospores which have 2 equatorial rims bounding a furrow. They are reddish brown when mature and measure 5.5–7 \times 4–5 μ . A detailed description of the fungus is given by Kuehn & Orr (1964). Plate 14 Fig. a.

STRAINS EXAMINED.—

- CBS 194.64 = IMI 92.796 (neotype), received from G. F. Orr;
- CBS 351.66 = IMI 100.913 = BDUN 265, received from A. E. Apinis;
- CBS 112.69, isolated from soil, received from K. H. Domsch;
- CBS 592.71, isolated from soil, received from J. H. van Emden.

2. ARACHNIOTUS CITRINUS Masee & Salmon

Arachniotus citrinus Masee & Salmon in Ann. Bot. **16**: 62. 1902. — *Pseudoarachniotus citrinus* (Masee & Salmon) Kuehn in Mycologia **49**: 699. 1957.

Arachniotus confluens (Sartory & Bainier) Apinis in Mycol. Pap. No. 96: 37. 1964.

This species can be recognized by its bright, mostly yellow, mycelial mat. The lenticular ascospores are spherical from above, rhomboidal or elliptical in side view; they have neither a rim nor a furrow and the wall is only slightly thickened in the equatorial region. The size of the ascospores is 6–7 \times 4.5–5.5 μ .

STRAINS EXAMINED.—

- CBS 114.54 = IMI 56.774, isolated from soil, USA, received from L. Ajello;
- CBS 113.61 = IMI 63.905, received from J. Nicot;
- CBS 352.66 = IMI 100.873 = BDUN 375, received from A. E. Apinis as neotype of *Arachniotus confluens*.

3. ARACHNIOTUS DANKALIENSIS (Castellani) van Beyma

Arachniotus dankaliensis (Castellani) van Beyma in Antonie van Leeuwenhoek **8**: 107. 1942.

Pseudoarachniotus roseus Kuehn in Mycologia **49**: 695, 1957.

Waldemaria pernambucensis Batista & al. in Atas Inst. Micol. (Recife) **1**: 6. 1960.

Pseudoarachniotus flavus Thirum. & Mathur in Mycopath. Mycol. appl. **40**: 97. 1970.

Pseudoarachniotus halophilus Pawar & al. in Mycopath. Mycol. appl. **40**: 100. 1970.

Pseudoarachniotus terrestris Thirum. & Mathur in Mycopath. Mycol. appl. **40**: 102. 1970.

Pseudoarachniotus thirumalacharii Mathur in Mycopath. Mycol. appl. **40**: 101. 1970.

In this species the colonies usually become light brownish in age. The oblate ascospores are provided with a fairly broad equatorial rim and also with polar thickenings. In all strains studied the ascospores are bright red-brown, have a diameter of 6–7.5 μ and are 4–5 μ wide. Other measurements given in the literature are erroneous. Plate 14 Fig. b.

STRAINS EXAMINED.—

- CBS 117.38, isolated from a camel, type strain of *A. dankaliensis*;
 CBS 130.60, isolated from a dog, Curaçao;
 CBS 568.69, isolated from soil in Peshawar, Pakistan;
 CBS 323.58 = IMI 76.605, H. H. Kuehn, type strain of *Pseudoarachnietus roseus*;
 CBS 352.68, isolated from man, Curaçao;
 CBS 369.65 = HACC-162, type strain of *Pseudoarachnietus flavus*;
 CBS 382.65 = HACC-168, type strain of *Pseudoarachnietus halophilus*;
 CBS 399.65 = HACC-157, type strain of *Pseudoarachnietus terrestris*;
 CBS 294.66 = HACC-198, type strain of *Pseudoarachnietus thirumalacharii*.

4. *Arachnietus punctatus* (Dutta & Ghosh) von Arx, *comb. nov.*

Pseudoarachnietus punctatus Dutta & Ghosh in *Mycologia* 56: 153. 1964 (basionymum).

This species is very similar to *Arachnietus dankaliensis*, but differs in having smaller ascospores, 5–6 μ in diameter, with a very prominent equatorial rim. The colonies have an orange colour and the agar medium is also coloured orange by an exudate.

STRAIN EXAMINED:

CBS 279.64, type strain, received from G. F. Orr.

5. *ARACHNIOTUS FLAVOLUTEUS* Kuehn & Orr

Arachnietus flavoluteus Kuehn & Orr in *Mycologia* 51: 864. 1959.

This fungus is closely related to *Arachnietus dankaliensis*, but may be distinguished by the light colour and the often lanose appearance of the colonies. The spherical asci have a diameter of 11–15 μ and are often aggregated in dense clusters. The oblate ascospores have an equatorial rim or thickening, are brownish-yellow, and measure 5–6.5 μ .

STRAINS EXAMINED.—

- CBS 627.71 = NRRL 1243, type strain, isolated from soil by C. W. Emmons.
 CBS 519.68, isolated from man, Calcutta, India, received from G. F. Orr.
 CBS 946.69, isolated from man, Curaçao.

6. *Arachnietus aurantiacus* (Kamyschko) von Arx, *comb. nov.*

Pseudoarachnietus aurantiacus Kamyschko in *Nov. Sist. niz. Rast.* 4: 224. 1967 (basionymum).

In this slow-growing species the colonies also have an orange, cinnamon or golden-yellow colour. After 4 weeks coiled initials are developed. The asci are spherical and have a diameter of 8–12 μ . The ascospores are oblate, without a prominent equatorial rim, golden-yellowish when mature, 4–5.5 μ in diameter and 2.5–3.5 μ wide.

STRAINS EXAMINED:

- CBS 603.67 = BKM F-1140, type strain, received from L. A. Beljakova.
 CBS 950.69, as *Arachnietus hebridensis* received from G. F. Orr.

2. *NARASIMHELLA* Thirum. & Mathur

Narasimhella Thirum. & Mathur in *Sydowia* 19: 184. 1966 ("1965").

TYPE SPECIES.—*Narasimhella poonensis* Thirum. & Mathur [= *N. hyalinospora* (Kuehn & al.) v. Arx].

Colonies on YpSs-agar becoming fasciculate or forming synnema- or sporodochium-like structures with yellow, cinnamon or greenish tints; initials of ascomata nearly ring-like, septate, often surrounding a central cell; asci mainly embedded in the upper parts of the sporodochia or synnemata, born in clusters on ascogenous hyphae, broadly clavate or obovate, with a thin membrane, mostly 8-spored; peridium absent; ascospores inequilateral lenticular, with a thin, fringy equatorial edge and with a wall often thicker at one side than at the other, hyaline or pale yellowish. The fringy appearance of the rim often suggests a spiny wall.

Narasimhella hyalinospora* (Kuehn & al.) von Arx, *comb. nov.

Pseudoarachnietus hyalinosporus Kuehn & al. in Mycopath. Mycol. appl. 14: 215. 1961 (basionymum). — *Arachnietus hyalinosporus* (Kuehn & al.) Apinis in Mycol. Pap. No. 96: 41. 1964.

Pseudoarachnietus marginosporus Kuehn & Orr in Mycopath. Mycol. appl. 19: 257. 1963. — *Arachnietus marginosporus* (Kuehn & Orr) Udagawa in Trans. mycol. Soc. Jap. 10: 103. 1970.

Narasimhella poonensis Thirum. & Mathur in Sydowia 19: 184. 1966 ('1965').

The identity of *Narasimhella poonensis* and *Pseudoarachnietus marginosporus* has been recognized by Orr & Kuehn (1971).

The genus *Narasimhella* is related to *Arachnietus*, but differs e.g. in the appearance of the colonies, the clavate asci borne on croziers; the almost hyaline ascospores, with an equatorial frill, measuring 4–5 μ in diameter. Plate 15.

STRAINS EXAMINED.—

CBS 115.54 = ATCC 15314, type strain of *Pseudoarachnietus marginosporus*;

CBS 469.63, CBS 470.63, CBS 471.63, CBS 566.63, all received from G. F. Orr as *Pseudoarachnietus hyalinosporus*;

CBS 393.71 = ATCC 16197 = HACC-171, type strain of *Narasimhella poonensis*, received from M. J. Thirumalachar and from ATCC.

3. **AMAUROASCUS** Schroeter

Amauroascus Schroeter in Krypt.-Fl. Schles. 3 (2): 211, 1893.

TYPE SPECIES.—*Amauroascus verrucosus* (Eidam) Schroeter.

Colonies on YpSs-agar lanose or felty, bright or white, composed of hyaline, often fasciculate hyphae; ascogenous parts often hemispherical, spherical, sporodochium-like or irregular, sometimes large, sometimes small, without a true peridium, but often covered by hyphae, often becoming dark, especially when the ascospores are pigmented; asci develop on ascogenous hyphae in clusters, they are broadly clavate or obovate, rarely spherical, mostly 8-spored; ascospores spherical or nearly so, wall thick, reticulate, or with spiny thickenings or an ornamented sheath, reddish or brownish when mature or remaining hyaline.

The genus *Amauroascus* can easily be distinguished from *Arachnietus* and *Narasimhella* by the spherical and ornamented ascospores. The development of the asci on croziers indicates a closer relationship with *Narasimhella* than with *Arachnietus*. The latter genus differs in colony appearance and in its spherical asci. *Chrysosporium*-like conidial states with aleurioid- and arthroconidia occur in several species of *Amauroascus*.

1. *AMAUROASCUS VERRUCOSUS* (Eidam) Schroeter

Gymnoascus verrucosus Eidam in Jber. schles. Ges. 64: 162. 1887. — *Amauroascus verrucosus* (Eidam) Schroeter in Krypt.-Fl. Schles. 3 (2): 211. 1893. — *Arachniotus verrucosus* (Eidam) Kuehn & al. in Mycopath. Mycol. appl. 25: 103. 1965.

In this species the hemispherical or sporodochium-like ascomata attain a diameter of 2–6 mm. The ascospores are spherical, thick-walled, verrucose-tuberculate brownish when mature and 6–8 μ in diameter. Plate 14 Fig. c.

STRAINS EXAMINED.—

CBS 227.69, isolated by G. A. de Vries;

CBS 181.70, received from G. F. Orr.

2. *AMAUROASCUS NIGER* Schroeter

Amauroascus niger Schroeter in Krypt.-Fl. Schles. 3 (2): 211. 1893. — *Arachniotus niger* (Schroeter) Kuehn & al. in Mycopath. Mycol. appl. 25: 106. 1965.

On YpSs-agar the fungus produces a white, lanose aerial mycelium and the medium is coloured red by an exudate. The ascomata are irregularly spherical or hemispherical, 0.5–2.5 mm broad and become brownish at maturity. The ascospores are spherical, brown, thick-walled, reticulate-spiny, and 4.5–6 μ in diameter.

STRAIN EXAMINED.—

CBS 144.61, isolated from soil in California, received from G. F. Orr (no. 0-315).

3. *Amauroascus aureus* (Eidam) von Arx, *comb. nov.*

Gymnoascus aureus Eidam in Jber. schles. Ges. 64: 161. 1887 (basionymum). — *Arachniotus aureus* (Eidam) Schroeter in Krypt.-Fl. Schles. 3 (2): 210. 1893.

The asci are borne in sporodochium-like or nearly spherical, lanose, white or yellow ascomata, 0.5–2 mm in diameter. They develop in clusters, are broadly clavate and 15–20 \times 10–13 μ . The ascospores are spherical, thick-walled, bright yellowish, reticulate-spiny and 4–5.5 μ in diameter.

A detailed description is given by Kuehn & al. (1964).

STRAINS STUDIED.—

CBS 107.26, received from A. Nannizzi;

CBS 593.71 = NRRL A-12.184 (neotype), received from G. F. Orr.

4. *Amauroascus echinulatus* (Dutta & Ghosh) von Arx, *comb. nov.*

Pseudoarachniotus echinulatus Dutta & Ghosh in Mycologia 55: 775. 1963 (basionymum).

The asci are formed in small, mostly irregular areas in the lanose or fasciculate mycelial mat. Spherical ascomata or sporodochium-like structures are absent. The ascospores are spherical, light brownish, thick-walled, warty to spiny, 4.5–5.5 μ in diameter. The aerial mycelium is composed of thin-walled, septate, 4–6 μ wide hyphae. Plate 15 Fig. d.

Strain studied.—

CBS 278.64 = ATCC 15317, type strain, received from G. F. Orr.

5. *Amauroascus reticulatus* (Kuehn & Goos) von Arx, *comb. nov.*

Pseudoarachniotus reticulatus Kuehn & Goos in Mycologia 52: 40. 1960 (basionymum).

In this species the colonies have a felt-like appearance and are composed of hyaline, 1.5–2.5 μ broad, often fasciculate hyphae. The asci are borne in irregular, often small areas. The ascospores are spherical, golden-yellow, thick-walled, reticulate and 5–6 μ in diameter. Plate 14 Fig. e.

STRAIN EXAMINED.—

CBS 392.61 = IMI 84.358 = ATCC 14045, type strain, received from H. H. Kuehn.

6. *Amauroascus albicans* (Apinis) von Arx, *comb. nov.*

Arachniotus albicans Apinis in Mycol. Pap. No. 96: 45. 1964 (basionymum).

In this species the asci are formed in sporodochium-like, yellow-brownish, loose, 0.5–1.5 mm broad ascomata in small clusters on ascogenous hyphae. The ascospores are spherical, thick-walled, irregularly echinulate, hyaline and 3–4 μ in diameter.

STRAIN STUDIED.—

CBS 151.63 = IMI 100.875 = BDUN 262, type strain, received from A. E. Apinis.

7. *Amauroascus kuehnii* von Arx, *nom. nov.*

Arachniotus reticulatus Kuehn in Mycologia 49: 57. 1957, non *Amauroascus reticulatus* (Kuehn & Goos) v. Arx.

No ascomata were observed in cultures of the type strain, only arthroconidia of the conidial state developed.

STRAIN EXAMINED.—

CBS 113.58, type strain, received from H. H. Kuehn.

4. *Arachnotheca* von Arx, *gen. nov.*

Ascogonia e cellula recta incrassata saepe clavata et antheridio dense convoluto constant; ascomata globosa, lanosa, fere hyalina, peridio e fere crassis hyphis anastomosantibus composito; asci globosi vel subglobosi, e hyphis ascogenis uncinatis oriuntur, tenui-tunicati, octospori; ascosporae globosae, hyalinae, parvae, fere crassi-tunicatae, strato mucido irregulariter sulcato praeditae. Conidia cylindrica, hyalina, e hypharum ramulis fragmentatis oriuntur modo generis *Geotrichi*.

SPECIES TYPICA *Arachniotus glomeratus* Müller & Pacha-Aue.

Ascogonium composed of a straight, thickened, often clavate cell, surrounded by a densely coiled antheridium; ascomata spherical, lanose, light, with a peridium composed of rather thick, anastomosing hyphal elements; asci spherical or nearly so, borne on croziers, thin-walled, 8-spored; ascospores spherical, hyaline, small, with a rather thick wall surrounded by an irregularly furrowed sheath. Conidia cylindrical, hyaline, born by fragmentation of hyphal branches (form genus *Geotrichum*).

TYPE SPECIES.—*Arachniotus glomeratus* Müller & Pacha-Aue.

Arachnotheca glomerata (Müller & Pacha-Aue) von Arx, *comb. nov.*

Arachniotus glomeratus Müller & Pacha-Aue in Nova Hedwigia 15: 544. 1968 (basionymum).

In this fungus the ascomata are spherical, lanose, brightly greyish, 260–500 μ in diameter, with a peridium composed of hyaline, rather thin-walled, smooth, 15–30 μ long, 2–5 μ wide, often anastomosing hyphal cells. The asci are spherical, 8-spored, thin-walled and 9–12 μ in diameter. The ascospores are spherical, rather thick-

walled, surrounded by an irregularly furrowed sheath; they measure 4–5 μ in diameter, without sheath 3–3.5 μ . Hyaline, 1-celled arthroconidia are formed from aerial hyphae which measure 3–7 \times 2–4 μ .

In this species the large initials with one clavate gametangium surrounded by a dense spiral of the other is noteworthy. Suitable media for cultivation are oatmeal- or cornmeal-agar.

Strain studied.—

CBS 348.71 = ETH-M7292, received from E. Müller.

The genus *Arachnotheca* is related to *Amauroascus*, but is easy to distinguish by the different kinds of ascomata initials, by the thick peridium and by the small ascospores, surrounded by a sheath. *Rollandina vriesii* Apinis (*in* Trans. Br. mycol. Soc. 55: 501. 1970) may be a related species, but differs by having echinulate ascospores.

5. *Byussoascus* von Arx, *gen. nov.*

Ascomata globosa vel irregularia, parva, peridio inconspicuo e textura laxa hypharum tenuium composito circumdata. Asci acervati e hyphis ascogenis uncinatis oriuntur, late clavati vel obovati, tenui-tunicati, octospori. Ascosporae fusiformes, sulcis longitudinalibus striatae, maturitate stramineae. Conidia cylindrica, catenulata, e ramulis fragmentatis conidiophorum modo generis *Oidiodendri* oriuntur.

SPECIES TYPICA *Arachniotus striatisporus* Barron & Booth.

Ascomata spherical or irregular, small, with an inconspicuous peridium composed of a loose network of thin hyphae. Asci borne in clusters on ascogenous hyphae with croziers, broadly clavate or obovate, thin-walled, 8-spored. Ascospores fusiform, striate by longitudinal flutes, straw-coloured when mature. Conidia cylindrical, borne in chains by fragmentation of branching conidiophores (form genus *Oidiodendron*).

TYPE SPECIES.—*Arachniotus striatisporus* Barron & Booth.

Byussoascus striatisporus (Barron & Booth) von Arx, *comb. nov.*

Arachniotus striatisporus Barron & Booth *in* Can. J. Bot. 44: 1060. 1966 (basionymum).

The genus *Byussoascus* can easily be distinguished from *Arachniotus*, *Narasimhella*, *Amauroascus* and all other genera of the Gymnoascaceae by its ascospores, which are fusiform and striate and not spherical or oblate. Also characteristic of the genus are the clavate asci borne on croziers and especially the *Oidiodendron* conidial state.

The fungus is not related to other Gymnoascaceae, its position in this family is only based on a superficial resemblance, but other related ascomycetes are unknown to the writer. The fungus does not develop well on YpSs-agar, but a suitable medium is oatmeal-agar.

STRAIN STUDIED.—

CBS 642.66, type strain, isolated from soil, Canada, received from G. L. Barron.

6. *Eleutherascus* von Arx, *gen. nov.*

Ascomata absunt; ascogonia in mycelio aereo, curvata vel contorta, ascos singulos vel paucos proferunt et saepe nonnulla filamenta; asci late clavati, obovati vel subglobosi, pariete

simplici, tenui, plerumque octospori; ascosporae globosae, maturitate dilute brunneae, pariete crasso, spinoso; conidia absunt.

SPECIES TYPICA *Arachniotus lectardii* Nicot.

Ascomata absent; initials borne in the aerial mycelium, curved or coiled, forming a single ascus or a small number of asci and often some filaments; asci broadly clavate, obovate or nearly spherical, with a single, thin membrane, mostly 8-spored; ascospores spherical, light brownish when mature, with a thick, spiny wall, about 12 μ in diameter; conidia absent.

TYPE SPECIES.—*Arachniotus lectardii* Nicot.

Eleutherascus lectardii (Nicot) von Arx, *comb. nov.*

Arachniotus lectardii Nicot *apud* Nicot & Durand in Bull. Soc. mycol. Fr. **85**: 319. 1969 (basionymum).

The development of the fungus has been described in detail by Nicot & Durand (1969) and by Durand (1969). The asci mostly develop in pairs on the ascogonia, dispersed in the aerial mycelium; they measure 38–50 \times 30–40 μ and are provided with a thin, rather persistent membrane. The ascospores are spherical, light brownish, thick-walled, ornamented with 2–2.5 μ long spines and measure 10–13 μ in diameter (without the spines).

STRAIN STUDIED.—

CBS 626.71 = LC 2022, type strain, isolated from salty soil, Château-Salin, Moselle, France, by P. Lectard, 1968, received from J. Nicot.

The genus *Eleutherascus* is not related to *Arachniotus* or to other genera of the Gymnoascaceae. It can rather be regarded as a primitive discomycete without ascocarps; it may be related to *Ascodesmis*. Another probably related, as yet un described fungus is maintained in the CBS-collection as '*Amauroascus verrucosus*' (CBS 109.54).

SPECIES DESCRIBED AS ARACHNIOTUS BUT NOT BELONGING TO
THE ABOVE DISCUSSED GENERA

1. *Arachniotus hebridensis* Apinis in Mycol. Pap. No. 96: 41. 1964.

The type strain (CBS 360.66 = BDUN 389), received from A. E. Apinis, was studied. Only aleuriospores of a *Chrysosporium*-like conidial state were observed. The original diagnosis and the figures do not give sufficient information on the relationship of the fungus.

2. *Arachniotus intermedius* Apinis in Mycol. Pap. No. 96: 45. 1964.

The type strain (CBS 152.65 = BDUN 267 = IMI 100.874) was studied. The fungus is quite a typical member of the Eurotiaceae, related to *Talaromyces*. Its phialidic conidial state, however, is more closely related to *Acremonium* or *Torulomyces* than to *Penicillium*.

3. *Arachniotus lanatus* Apinis in Mycol. Pap. No. 96: 39. 1964.

Rollandina lanata (Apinis) Apinis in Trans. Br. mycol. Soc. **55**: 501. 1970.

No cultures of this fungus were available. Its classification in the genus *Rollandina* is also doubtful. The type species of this genus is probably based on a sterile fungus parasitized by another and is unknown in pure culture. Both taxa may belong to *Nannizzia* Stockdale.

4. *Arachnietus purpureus* Müller & Pacha-Aue in *Nova Hedwigia* **15**: 552. 1968.

The type strain (CBS 475.71) was studied. The ascomata are true cleistothecia with a thin peridium composed of hyphae. The conidial state belongs to the Restrictum series of the form genus *Penicillium*. The fungus has to be transferred to *Talaromyces* (see Stolk & Samson, 1971).

5. *Arachnietus trisporus* Hotson in *Mycologia* **28**: 500. 1936.

A study of the type strain (CBS 133.37) confirmed the identity of this fungus with *Byssochlamys nivea* Westling. The genus *Byssochlamys* Westling is related to *Talaromyces* Benjamin and *Hamigera* Stolk & Samson (Eurotiaceae) and is discussed in this context by Stolk & Samson (1971).

KEY TO THE GENERA OF THE GYMNOASCACEAE

1. Ascospores spherical, 10—13 μ in diameter, spiny, asci disoersed, borne singly, in pairs or in a small number on a coil *Eleutherascus*
1. Ascospores smaller 2
2. Ascospores striate, fusiform *Byssosascus*
2. Ascospores not striate, mostly not fusiform 3
3. Ascospores spherical or nearly so, ornamented. 4
3. Ascospores lenticular, oblate, ellipsoidal, fusiform or small and smooth if spherical . . 7
4. Peridial hyphae absent or present, thin-walled, without prominent appendages of chlamydospores. 5
4. Peridial hyphae present, mostly thick-walled, with chlamydospores or appendages. 6
5. Initials consisting of 2 coils, peridium absent or thin, composed of loose, radiating hyphae, ascospores ornamented *Amauroascus*
5. Initials composed of a clavate cell surrounded by a dense coil, peridium thick, composed of dense layers of hyphae, ascospores small, with a sheath *Arachnotheca*
6. Peridial hyphae hyaline, forming coiled appendages and dark chlamydospores. *Apimisia*
6. Peridial hyphae thick-walled, with long appendages. *Auxarthron*
7. Peridial hyphae absent or narrow and similar to those of the aerial mycelium . . . 2
7. Peridial hyphae present, often wide or with appendages, ascomata spherical or nearly so. 9
8. Initials ring-like, asci clavate, borne in clusters, ascospores lenticular, nearly hyaline, sporodochium-like structures often present. *Narasimhella*
8. Initials consisting of 2 coils, asci spherical, often in short rows, ascospores lenticular or oblate, reddish or brownish, often with an equatorial rim or furrow, colonies mostly velvety, sporodochium-like structures absent *Arachnietus*
9. Ascospores fusiform or nearly so, asci often with a short cylindrical stalk. *Pseudogymnoascus*
9. Ascospores not fusiform. 10
10. Ascomata small (15—120 μ in diameter), peridial hyphae provided with coiled or recurved appendages, ascospores small 11
10. Ascomata mostly larger. 12
11. Peridial hyphae with recurved appendages *Spiromastix*
11. Peridial hyphae with closely coiled appendages. *Ajellomyces*

12. Peridial hyphae brown, thick-walled or with dark appendages 13
 12. Peridial hyphae light. 15
 13. Cells of the appendages form recurved tooth-like protuberances on one side.
Ctenomyces
 13. Cells of the appendages not so 14
 14. Ascomata light, appendages of one kind *Gymnoascus*
 14. Ascomata dark, peridial hyphae form short, spine-like branches as well as long, mostly
 uncinuate appendages *Myxotrichum*
 15. Peridial hyphae composed of dumb-bell-shaped cells *Arthroderma*
 15. Peridial hyphae composed of a network of filaments. 16
 16. Peridial appendages present (*Dermatophytes*) 17
 16. Peridial appendages absent or scarce. 18
 17. Peridial appendages short, blunt. *Neogymnoomyces*
 17. Peridial appendages coiled or straight, often forming aleurioconidia . . . *Nannizzia*
 18. Peridial hyphae disarticulating. *Shanorella*
 18. Peridial hyphae not disarticulating. Cf. *Arachniotus*

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EXPLANATION OF PLATES 14 AND 15

PLATE 14

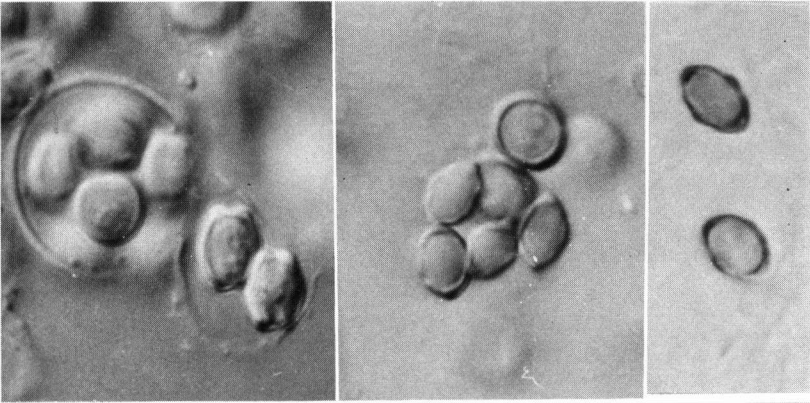
Ascospores of (a) *Arachniotus ruber*, (b) *Arachniotus dankalensis*, (c) *Amauroascus verrucosus*, (d) *Amauroascus echinulatus*, (e) *Amauroascus reticulatus*. — All 1800 ×.

PLATE 15

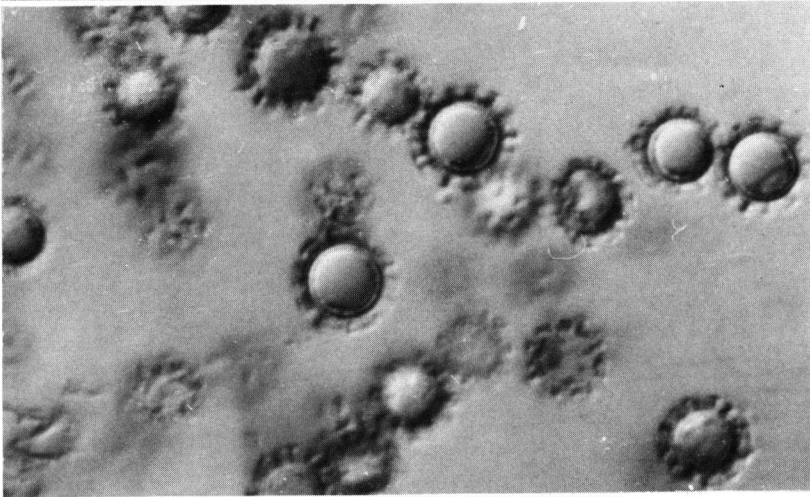
Narasimhella hyalinospora, initials with asci and ascospores. — 1800 ×.

a

b



c



d

e

