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The genus *Arpinia* (Pyronemataceae, Pezizales)

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Summary: The genus *Arpinia* Berthet, a member of the *Otidea*, *Pyronemataceae*, includes a group of pale coloured and stalked operculate discomycetes which resemble *Tarsetta* species in some respect. However, there are two features which separate *Arpinia* and *Tarsetta* at the generic level: In *Arpinia*, the nuclei cannot be stained with acetocarmine and the asci are pleurorhynchous. In this monographic study, five species have been accepted: *A. inops*, *A. luteola* (including the new variety *A. luteola* var. *pallidorosea*), *A. rahmii*, *A. microspora* (a new combination), and a new species from Europe, *A. fuispora*. So far, only 15 collections from Eurasia are known of which 12 are studied here.

Résumé: Le genre *Arpinia* Berthet, (tribu *Otidea*, famille *Pyronemataceae*) contient un groupe de discomycètes operculés stipités et de couleur claire qui ressemblent à certains égards aux espèces de *Tarsetta*. Mais il existe deux caractéristiques qui séparent les *Arpinia* des *Tarsetta*: Dans le genre *Arpinia* les noyaux ne peuvent pas être colorés par le carmin acétique et les ascus sont pleurorhynques. L'étude monographique présentée ci-dessous réunit 5 espèces sous le genre: *A. inops*, *A. luteola* (avec la variété nouvelle *A. luteola* var. *pallidorosea*) et *A. rahmii*; *A. microspora* est une combinaison nouvelle; une espèce nouvelle pour l'Europe est décrite sous *A. fuispora*. Jusqu'à ce jour, 15 collections seulement de ces espèces d'*Arpinia* sont connues de l'Eurasie, dont 12 ont été examinées dans la présente publication.

Zusammenfassung: Die Gattung *Arpinia* Berthet (Tribus *Otidea*, Familie *Pyronemataceae*), umfaßt eine Gruppe hell gefärbter und gestielter operculater Discomyceten, die in mancher Hinsicht an *Tarsetta*-Arten erinnern. Es gibt aber zwei Merkmale, die *Arpinia* von *Tarsetta* unterscheiden: Bei der Gattung *Arpinia* lassen sich die Kerne nicht mit Karminessigsäure anfärben, und die Asci sind pleurorhynch. In der vorliegenden monographischen Bearbeitung sind 5 Arten der Gattung zugeordnet worden: *A. inops*, *A. luteola* (mit der neuen Varietät *A. luteola* var. *pallidorosea*) und *A. rahmii*; *A. microspora* ist eine neue Kombination; eine neue Art aus Europa wird unter dem Namen *A. fuispora* beschrieben. Bis jetzt sind nur 15 Kollektionen von *Arpinia*-Arten aus Eurasien bekannt, von denen 12 hier untersucht worden sind.

Introduction

In 1974, Berthet erected the genus *Arpinia* and described a new species, i.e. *Arpinia inops*, based on a collection from the French Alps. Since then another collection of this species has been reported from the GDR (Benkert, 1980). A second species has been described for this genus by Geesink (1982), i.e. *Arpinia luteola*. A discomycete, first reported by Rahm (1950) but unnamed since then, has recently been designated to *Arpinia* (see Hohmeyer, Ludwig & Schmid-Heckel, 1989), i.e. *A. rahmii*.

Arpinia species seem to be very rare, although the apothecia are not inconspicuous. In this study, only 12 collections from Eurasia have been identified belonging to the genus *Arpinia*. Three more collections reported by Rahm (1950) have not been examined. Five taxa (*A. fusispora*, *A. inops*, *A. luteola*, *A. luteola* var. *pallidorozea* and *A. rahmii*) were found in Europe, and *A. microspora* is so far only known from the type locality in Asia. Despite the very few collections identified so far, there might be more material in the herbaria, probably labelled as "*Pustularia*", "*Pustulina*", "*Tarzetta*", "*Pseudotis*" or even "*Geopyxis*".

Material and methods

All species but *A. fusispora* were studied from herbarium specimens. A portion of a dry apothecium was soaked in distilled water containing 0.5 % (v/v) detergent. The rehydrated apothecium was sectioned with a freezing microtome cutting from the base towards the hymenium. Examinations were carried out in water, lactic acid or lactophenol cotton blue (0.5 g cotton blue, 20 g phenol, 20 ml lactic acid, 40 ml glycerol, 20 ml dist. water). Rehydrated material for acetocarmine staining was heated 1-2 min in the reagent and then examined in water.

The macroscopical descriptions are based in part on information communicated by Dr. D. Benkert (Berlin), Prof. Dr. P. Berthet (Lyon), Dr. J. Geesink (Herween), E. Rahm (Arosa), Dr. A. Raitviir (Tartu) and E.C. Vellinga (Heemstede).

The thickness of the ectal excipulum excludes the pustules. The spore size was calculated after measuring 50 spores in each collection. There are three sets of data on the spore size:

1. The size calculated from standard deviation and rounded up or down to the nearest 0.5 μm with the extremes in parantheses.
2. First set in square brackets: Arithmetic mean (underlined) and limits calculated from standard deviation.
3. Second set in square brackets: K is the length : width ratio measured in each single spore and given as arithmetic mean with standard deviation.

Generic diagnosis

Arpinia Berthet, Bull. Soc. Linn. Lyon, no. spec. [Trav. myc. déd. à R. KÜHNER]: 36 (1974)

Apothecia gregarious to fasciculate; cupulate, discoid to flat; conspicuously stipitate or (in case of *A. microspora*) substipitate to centrally attached, young apothecia often tubaeform; medium to large sized (5 - 40 µm diam.); maintaining shape and size almost completely after drying. **Hymenium** pale; whitish, dull whitish, cream, pale ochraceous, dull ochraceous, yellowish ochraceous or vitelline; becoming dull ochraceous to brownish orange when dried. **Margin** scurfy to irregularly crenulate. **Receptacle** concolourous or paler, usually scurfy, but almost smooth in *A. luteola*.

Ectal excipulum much thinner than medullary excipulum, two-layered: inner layer of textura angularis, cells hyaline or pale honey-coloured; outer layer of textura angularis, cells hyaline; aggregated spherical cells are forming the pustules. **Medullary excipulum** of textura intricata, being the major portion of the excipulum; hyphae hyaline, interwoven, without regular orientation. **Asci** eu-operculate, 8-spored, J- in Melzer's reagent, pleurorhynchous. **Ascospores** broad to normal ellipsoid, cylindrical or fusiform, sometimes slightly asymmetrical; relatively small compared with most *Pezizales* species (10-16 µm long); hyaline; smooth; usually biguttulate, but also (in case of *Arpinia inops*) uniguttulate, fairly thick-walled (0.5-2 µm), uniseriate. **Paraphyses** simple, filiform, straight, subclavate at the apex, hyaline. **Nuclei** not staining with acetocarmine.

Habitat: On soil or in litter of conifers.

Typus generis: *Arpinia inops* Berthet, Bull. Soc. Linn. Lyon, no. spéc. [Trav. myc. déd. à R. KÜHNER]: 37 (1974)

Generic relationship

The genus *Arpinia* Berthet belongs to the family *Pyronemataceae*, tribus *Otideae* Seav. emend. Korf (1972). The genus *Tarzetta* resembles it in some respect, i.e. general habit, smooth biguttulate spores and excipular structure. There are however two important features separating these genera: a) the asci of *Arpinia* species are pleurorhynchous, whereas croziers at the ascus base are absent in *Tarzetta*; b) the nuclei - particularly of the spores - can be easily stained with acetocarmine in *Tarzetta*, and this reaction cannot be observed in *Arpinia*.

The closest relative of *Arpinia* within the tribus *Otideae* is the genus *Otidea*, which differs in having apothecia either deeply cup-shaped and split down one side or auriculate. The paraphyses in *Otidea* are usually bent or hooked, whereas they are straight in *Arpinia*. Moreover, in *Otidea* the ectal excipulum is not two-layered as it is characteristic for *Arpinia*.

Key to the species of *Arpinia*

- (1 a) Spores narrow cylindrical, narrow ellipsoid subfusiform to fusiform
(K > 1.8) (2)
- (1 b) Spores ellipsoid to broad ellipsoid (K < 1.8) (4)
- (2 a) Spores narrow ellipsoid, subfusiform to fusiform, 14-16 x 6-7 μm .
Hymenium dull ochraceous, yellowish ochraceous to vitelline ochraceous.
A. fuispora
- (2 b) Spores narrow cylindrical, narrow ellipsoid to ellipsoid, up to 13 μm
long (3)
- (3 a) Hymenium yellowish ochraceous to vitelline. Receptacle almost
smooth. Spores 10-13 x 5-6 μm . **A. luteola**
- (3 b) Hymenium whitish to ochraceous, turning rosaceous. Receptacle
furfuraceous. Spores 10-11 x 5-6 μm . **A. luteola var. pallidrosea**
- (4 a) Hymenium light ochraceous to yellowish. Spores 11-13 x 8-9 μm .
A. rahmii
- (4 b) Hymenium whitish (5)
- (5 a) Apothecia centrally attached to substipitate. Spores 10.5-12.5 x
6.5-7.5 μm . **A. microspora**
- (5 b) Apothecia stipitate. Spores 13-16 x 9-10 μm . **A. inops**

Accepted species

Arpinia fuispora Hohmeyer, **sp. nov.**

Diagnosis latina

Apothecia in silva fagorum, in terram nudam, cupuliformes vel discoidea, pedunculata, saepe tubaeformes, in altitudinem ad 30 mm et in diametro 5-40 mm. Stipes ad 8 mm crassus. Disci concavi, rare umbilicati, ochraceo-lutei, vitellino-lutei. Apotheciorum pars exterior ochraceo-furfuracea, primo coloris pallidioris, adulta aut vulnerata salmonis colore maculescens. Excipulum medullarium 1000-2000 μm crassum, e textura intricata, hyphis 6-11 μm latis. Excipulum ectalium inferius 150-200 μm crassum, e textura angulari; excipulum ectalium externum 50-200 μm crassum, e textura globulosa. Furfuratio e cellulis (5-10 μm latis) texturae globulosae. Paraphyses simplices vel filiformes, 3-4 mm lati, apices subclavati, ad 5-6 μm lati. Asci operculati, iodo non caerulescentes, octo sporis instructi. Ascosporae (12.5) 14-16 (17) x 6-7 μm , leves, fusiformes, subcrasse tunicatae, guttulas duas continentes.

Typus: In Berolinense, Glienicke Park, in silva fagorum, 25. VIII. 1982, E. Ludwig et H. H. Hohmeyer legit. Berolini in herbario Musei Botanici adservatur, B!

Description

Apothecia gregarious to fasciculate, discoid to cup-shaped, sometimes umbilicate, stipitate, often tubaeform, up to 30 mm in height. Disc up to 40 mm in diam. Stipe 10-20 mm in height and 5-7 mm in diam. **Hymenium** dull yellowish, yellowish ochraceous to vitelline-ochraceous. **Margin** irregularly crenate, scurfy, involute. **Receptacle** paler concolourous with ochraceous furfuration. Parts of the apothecia turn pinkish to salmon red when mature or damaged.

Medullary excipulum of textura intricata, 1000-2000 μm thick, hyphae hyaline, 6-11 μm in diam., sometimes intermixed with cylindrical cells up to 15 μm in diam., without regular orientation. **Ectal excipulum** two-layered: inner layer of textura angularis, 150-200 μm thick, cells hyaline, 10-40 μm in diam.; outer layer of textura globulosa, 50-200 μm thick, cells hyaline, 5-15 μm in diam. The furfuration consists of aggregated spherical cells, 10-25 μm in diam. **Asci** 8-spored, pleurorhynchous, 190-250 x 9-12 μm . **Ascospores** narrow ellipsoid, subfusiform to fusiform, smooth, biguttulate, fairly thick-walled ($\approx 0.5 \mu\text{m}$), (12.5) 14-16 (17) x (5.5) 6-7 μm [14.2 - 15.0 - 15.8 x 5.9 - 6.4 - 6.9 μm ; $K = 2.3 \pm 0.2$; fig. 1]. **Paraphyses** hyaline, filiform, straight, 3-4 μm in diam., apices subclavate and 5-6 μm in diam, sometimes forked at their bases.

Specimen examined: FEDERAL REPUBLIC OF GERMANY: On ground among *Urtica* in beech forest, Glienicke Park, Berlin-Zehlendorf, 25. VIII. 1982, E. Ludwig & H.H. Hohmeyer (BI, holotype).

Notes: *Arpinia fusispora* can be distinguished from all other species of the genus by the characteristic shape of the spores. A very conspicuous feature is the occurrence of salmon-red patches on the apothecium when mature or damaged. This changing in colour has also been observed in *A. rahmii* (see Rahm, 1958) and *A. luteola* var. *pallidorosea*.

A. fusispora represents one of the few specimens not collected in coniferous woods. Unfortunately, this species has been found only once at the type locality. However, the apothecia could be studied for several weeks in their habitat. Since the spore shape is very characteristic and a substantial type collection could be deposited in the herbarium of the Botanical Museum Berlin-Dahlem, I felt obliged to describe a new species in this study.

Arpinia inops Berthet, Bull. Soc. Linn. Lyon, no. spec. [Trav. myc. d'éd. à R. KÜHNER]: 37 (1974)

Description

Apothecia gregarious to fasciculate, cup-shaped to discoid, stipitate. Disc 10-40 mm in diam., 10-20 mm in height. Stipe rooting, up to 20 mm in height and 4-8 mm in diam. **Hymenium** whitish to pale cream coloured. **Margin** delicately crenulate. **Receptacle** concolourous, whitish-furfuraceous.

Medullary excipulum of textura intricata, 700-1500 μm thick, hyphae hyaline, 6-14 μm in diam., without regular orientation. **Ectal excipulum** two-layered: inner layer of textura angularis, 60-100 μm thick, cells hyaline to honey-coloured, 10-25 μm in diam.; outer layer of textura globulosa, cells hyaline. Outside covered with short moniliform cell chains, and - particularly

near the substrate - with long flexuous, hyaline hyphae. Furfuration consists of aggregated spherical cells, 10-25 μm in diam. **Asci** 8-spored, pleurorhynchous, 170-220 x 11-15 μm . **Ascospores** broad ellipsoid, smooth, biguttulate or (more often) uniguttulate, fairly thick-walled (1-1.5 μm), (12) 13-16 (17) x (8.5) 9-10 (10.5) μm [13.8 -14.6 -15.4 x 9 -9.4 -9.8 μm ; $K = 1.55 \pm 0.1$; fig. 2]. **Paraphyses** hyaline, filiform, straight, 2.5-3.5 μm in diam., apices subclavate and 3.5-5 μm in diam.

On the ground and in litter of spruce needles.

Specimens examined: FRANCE: On wet ground and in litter of spruce needles, 1250 m, Les Gets, Haute-Savoie, N. Arpin, 18. IX. 1967 (LY!, holotype). GERMAN DEMOCRATIC REPUBLIC: On the ground in spruce forest, in litter of spruce needles, Veßraer Heide near Hildburghausen, E., Th. & D. Benkert, 25 VII. 1974 (BHU!)

Notes: *Arpinia inops* can be distinguished from all other species of the genus by its broad ellipsoid and comparably large spores. Berthet (1974) stated that the spores are mainly uniguttulate, and considered this to be an important feature for the generic delimitation against *Otidea*. However, the type material and, particularly, Benkert's collection also contained biguttulate spores. At the generic level the presence of oildrops of any kind is the only significant feature, and uniguttulate spores can now be considered as an exception in the genus *Arpinia*.

Arpinia luteola Geesink, *Persoonia* 11: 509 (1982)

Description

Apothecia gregarious, cup-shaped to discoid, stipitate. Disc up to 25 mm in diam., but rather thin (≈ 1 mm) and brittle. Stipe 10-12 mm in height and 4-6 mm in diam. **Hymenium** yellowish-ochraceous to vitelline. **Margin** crenate. **Receptacle** paler concolourous, almost smooth.

Medullary excipulum of textura intricata, 450-700 μm thick, hyphae hyaline, 5-12 μm in diam., without regular orientation. **Ectal excipulum** two-layered: inner layer of textura angularis, 30-60 μm thick, cells hyaline, 8-18 μm in diam.; outer layer of textura globulosa, up to 50 μm thick, cell hyaline, 6-20 μm in diam. Outside covered with short moniliform cell chains. Furfuration very inconspicuous consisting of aggregated moniliform cell chains. **Asci** 8-spored, pleurorhynchous, 125-180 x 8-10 μm . **Ascospores** cylindrical to narrow ellipsoid, sometimes slightly asymmetrical, smooth, biguttulate, fairly thick-walled (up to 1 μm), (9.5) 10-12 (13) x (4.5) 5-6 μm [10- 10.5 -11 x 4.8 - 5.3 - 5.8; $K = 2.0 \pm 0.25$; fig. 3] **Paraphyses** hyaline, filiform, straight, 2.5-3.5 μm diam., apices subclavate and up to 5 μm in diam.

On calcareous ground.

Specimens examined: BELGIUM: On calcareous soil in Larix wood, Resteigne, Ardennes, M. Tichelmann, 4. X. 1977 (L!, holotype). On the ground in Larix wood, Resteigne, Ardennes, C.N. Swart-Velthuyzen, 21. VIII. 1985 (collected from the type locality, exsiccatum also containing *Tarzettia* spec., L!). U.S.S.R: On calcareous soil in a mixed spruce forest, Koonga, distr. Haapsalu, Estonian S.S.R., A. Raitviir, 15. VIII. 1960 (TAA!).

Notes: *Arpinia luteola* is characterized by small, more or less cylindrical, sometimes slightly asymmetrical spores. The variety *A. luteola* var. *pallidorosea* shows comparable spore shape and size, but differs in the apothecial colours and the conspicuous furfuration of the receptacle.

***Arpinia luteola* var. *pallidorosea* Benkert, Häffner & Hohmeyer, var. nov.**

Diagnosis latina

Apothecia in terram nudam, sed etiam in aciculas picearum crescentia, cupuliformes et pedunculata, in altitudine ad 10 mm et in diametro ad 22 mm. Stipes ad 5 mm crassus. Disci concavi primum albi vel subalbi, roseascentes, deinde pallide ochraceorosei vel brunneorosei. Apotheciorum pars exterior furfuracea, concolor. Excipulum medullarium 330-400 μm crassum, e textura intricata, hyphis 5.5-16 μm latis. Excipulum ectalium inferius 60-200 μm crassum, e textura angularis; excipulum ectalium externum e textura globulosa. Furfuratio e cellulis sphaeroideis (ad 30 μm latis). Paraphyses simplices vel filiformes, ad apices subclavati (ad 3 μm lati). Asci operculati, iodo non caerulescentes, octo sporis instructi. Ascosporae 10-11 x 5-6 μm , leves, ellipsoideae, subcrasse tunicatae, guttulas duas continentes.

Typus: In Republica Democratica Germanica, prope Freyburg, in terram nudam, 26. IX. 1977, D. Benkert legit. Berolini in herbario universitatis Humboldtii adservatur. BHU!

Adnotatio: A typo differt colore albo vel pallide ochraceo et erubescente.

Description

Apothecia subgregarious, gregarious to fasciculate; discoid, stipitate. Disc up to 22 mm in diam. Stipe rooting, up to 10 mm in height and 5 mm in diam. **Hymenium** young whitish, but soon turning rosaceous, mature pale ochraceous-pinkish, finally pale brown with rosaceous tinge. **Margin** not prominent, more or less smooth. **Receptacle** concolourous, with whitish pustules.

Medullary excipulum of textura intricata, 330-400 μm thick, hyphae hyaline, 5.5-16 μm in diam., intermixed with inflated cells. **Ectal excipulum** two-layered: inner layer of textura angularis, 60-200 μm thick; outer layer textura globulosa with chains of perpendicular orientated more or less prismatic to spherical cells, 14-45 x 15-30 μm . Furfuration consists of aggregated spherical cells, up to 30 μm in diam. **Asci** 8-spored, pleurorhynchous, 100-140 x 7-9.3 μm . **Ascospores** narrow cylindrical, ellipsoid to (rarely) slightly broad ellipsoid, smooth, biguttulate, fairly thick-walled (\approx 1 μm), (9.5) 10-11 (11.5) x (4.5) 5-6 (6.5) μm [9.9 - 10.5 - 11.1 x 4.9 - 5.5 - 6.1 μm ; K = 1.9 \pm 0.3 ; fig. 4]. **Paraphyses** hyaline, filiform, straight, apices subclavate and up to 3 μm in diam., bases often forked.

On the ground.

Specimens examined: GERMAN DEMOCRATIC REPUBLIC: On calcareous ground in deciduous forest, Kleine Probstei, Freyburg, Bezirk Halle, D. Benkert, 26. IX. 1977 (BHU, holotype). FEDERAL REPUBLIC OF GERMANY: On ground in spruce forest, in litter of spruce needles, Donauwald near Unterfahlheim, Bavaria, E. Vellinga, 7. IX. 1987 (Herbarium J. Häffner).

Notes: *A. luteola* and its variety *A. luteola* var. *pallidorosea* differ mainly in the hymenium colours being yellowish ochraceous in the type and whitish to ochraceous and turning rosaceous in the variety. A reddish tinge has also been observed in *A. fusispora* and *A. rahmii*, but the

apothecia are yellowish ochraceous. They can also be distinguished by spore shape and size.

There is a second feature that separates *A. luteola* from *A. luteola* var. *pallidrosea*. The excipulum of *A. luteola* var. *pallidrosea* is covered with conspicuous pustules consisting of aggregated spherical cells. The outside of *A. luteola* on the other hand is almost smooth, although very inconspicuous aggregations of moniliform cell chains have been observed. However, with the few specimens examined it cannot be decided whether this feature is constant and therefore would justify a separation of the two taxa on the species level.

Arpinia microspora (Dissing & Raitviir) Hohmeyer, **comb. nov.**

= *Pustulina microspora* Dissing & Raitviir in Eesti NSV Tead. Akad. toimet. 23: 104, fig. 2 (1974)

Description

Apothecia gregarious, cup-shaped, centrally attached or short stipitate. Disc 3-5 (7) mm in diam. and 2-3 mm in height when dried. Stipe indistinct, up to 2 mm high, often partially buried in the substrate. **Margin** crenulate. **Hymenium** whitish, dull whitish when fresh (tan caramel to brownish orange when dry). **Receptacle** concolourous, furfuraceous.

Medullary excipulum of textura intricata, 500-800 µm thick, hyphae hyaline, 7-12 µm in diam., without regular orientation. **Ectal excipulum** two-layered: inner layer of textura angularis, 40-150 µm thick, cells hyaline, (10) 15-30 µm in diam.; outer layer of textura globulosa, sometimes only 2-3 cell layers thick. Furfuration of spherical, hyaline cells, 20-35 µm in diam., aggregated to 100-200 µm high conical warts. **Asci** 8-spored, pleurorhynchous, 170-210 x 6.5-10 µm. **Ascospores** normal to slightly broad ellipsoid, smooth, biguttulate, fairly thick-walled (0.5-1.5 µm), 10.5-12.5 (13) x 6.5-7.5 (8) µm [11 - 11.8 - 12.6 x 6.5 - 7.1 - 7.7; K = 1.65 ± 0.1 ; fig. 5]. **Paraphyses** hyaline, filiform, straight, 2-3.5 µm diam., apices subclavate and up to 4.5 µm in diam., bases sometimes forked.

On the ground in litter of spruce needles .

Specimen examined: U.S.S.R.: On the ground, 2400 m, Tchimbulak, Malaya Almaatinka river valley, The Zailiiski Alatau mountains, Tien-Shan range, Kasakh S.S.R., A. Raitviir, 24. VIII. 1963 (TAA!, holotype).

Notes: In the description by Dissing & Raitviir (1974) the habitat has been mentioned only as "ad terram". However, the exsiccatum was found to contain many spruce needles and the species concept has been extended here in this aspect.

Furthermore, Dissing & Raitviir (1974) described this species as being "sessile or with a short stipe". The examination of the type material revealed that all apothecia are at least centrally attached if not shortly stipitate, and this type of habit can be deducted from a stipitate form (or vice versa).

A. microspora is characterized by the whitish substipitate apothecia. It can be distinguished from *A. inops* by the shape and size of the spores. *A. luteola* var. *pallidrosea* differs in conspicuously stipitate apothecia with a rosaceous tinge and in spore shape.

Arpinia rahmii Senn-Irlet & Hohmeyer in Hohmeyer, Ludwig & Schmid-Heckel, *Hoppea* [Denkschrift der Regensburgischen Botanischen Gesellschaft] 1989 (in press)

Description

Apothecia gregarious, discoid to cup-shaped, stipitate, often tubaeform. Disc 5-10 mm in height and 10-35 mm in diam. Stipe 10-30 x 2-10 mm. **Hymenium** light ochraceous to yellowish ochraceous. **Receptacle** whitish to cream-coloured, furfureous. Parts of the apothecia turning salmon coloured when mature or damaged.

Medullary excipulum of textura intricata, 300-500 μm thick, hyphae hyaline, 7-15 μm in diam., without regular orientation. **Ectal excipulum** two-layered: Inner layer of textura angularis, 80-150 μm thick, cells hyaline, 10-30 μm in diam. Outer layer of textura globulosa, 40-60 μm thick (sometimes only 2-3 cell layers), cells hyaline, 10-30 μm in diam. Furfuration consists of aggregated spherical cells, 15-30 μm in diam. **Asci** 8-spored, pleurorhynchous, 190-250 x 12-14 μm . **Ascospores** broad ellipsoid, smooth, biguttulate, fairly thick-walled (up to 1 μm), 11-13 (13.5) x (7.5) 8-9 μm [11.4 - 12.1 - 12.8 x 8.2 - 8.6 - 9.0 μm ; K = 1.4 ± 0.2 ; fig. 6]. **Paraphyses** hyaline, filiform, straight, 2.5-3.5 μm in diam., apices subclavate and up to 4 μm in diam., at their bases often forked.

On the ground in litter of spruce needles, but also on spruce twigs and needles.

Specimens examined: FEDERAL REPUBLIC OF GERMANY: On ground among fallen spruce needles, in subalpine *Picea* forest, 1450 m, R th, National Park Berchtesgaden, Bavaria, H. Schmid-Heckel, 15. VII. 1982 (herbarium Schmid-Heckel). SWITZERLAND: Among and on fallen spruce needles and twigs, in subalpine *Picea* forest, Schulhausanlage, Arosa, E. Rahm, 3. VIII. 1954 (B!, holotype). [? GERMAN DEMOCRATIC REPUBLIC: On clay ground in deciduous forest, Wegestern bei der Georgseiche, near Rudolstadt, Bezirk Gera, D. Benkert, 18. IX. 1984 (BHU!).

Notes: *Arpinia rahmii* is characterized by broad ellipsoid spores and yellow ochraceous apothecia which eventually turn reddish when mature or damaged. *A. inops* and *A. microspora* also have broad ellipsoid spores, but the apothecia are whitish.

Rahm (1950) reported three different collections of this fungus which have not been examined in the present study. The material obtained was collected in 1954, but agrees very well with the excellent descriptions given by Rahm (1950, 1958). The name *Pustularia catinoides* Fuckel has been suggested for the collections (see Rahm 1958). The latter taxon however belongs to the genus *Peziza* and is very likely a synonym of *Peziza cerea* Bull.: Fr. Benkert's collection (Rudolstadt, GDR) has been only tentatively placed here. General appearance and most of the microscopical features (including spore shape) are identical with *A. rahmii*, but the habitat is different and the spore size has been found to be slightly larger: (12) 13-15 x 8-9.5 (10) μm [13.0 - 13.7 - 14.4 x 8.5 - 8.9 - 9.3 μm ; K = 1.55 ± 0.1 ; fig. 7]. However, the material is too scanty to make a definite decision about it.

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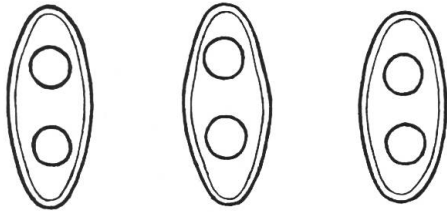


Figure 1: Spores of *Arpinia fusispora*

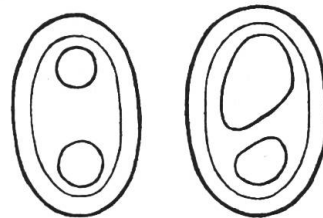
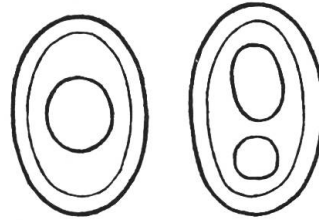
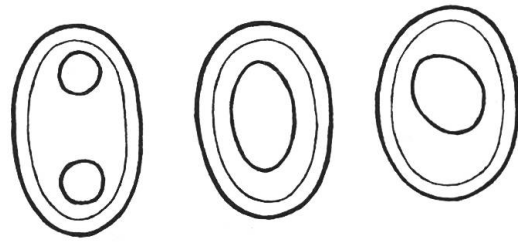


Figure 2: Spores of *Arpinia inops*

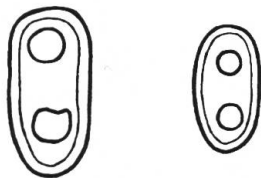
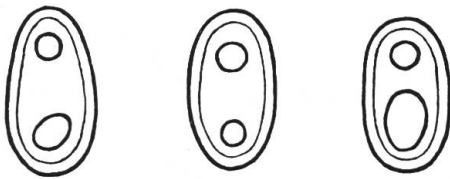
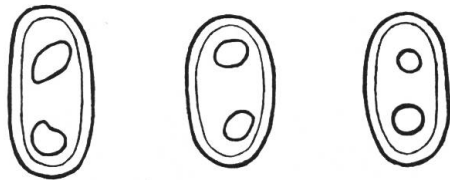
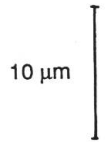


Figure 3: Spores of *Arpinia luteola*

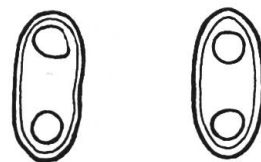
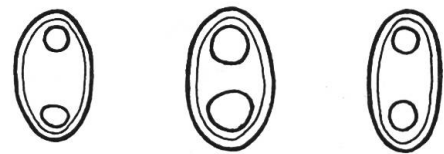
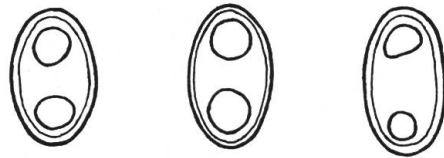


Figure 4: Spores of *A. luteola var. pallidorosea*

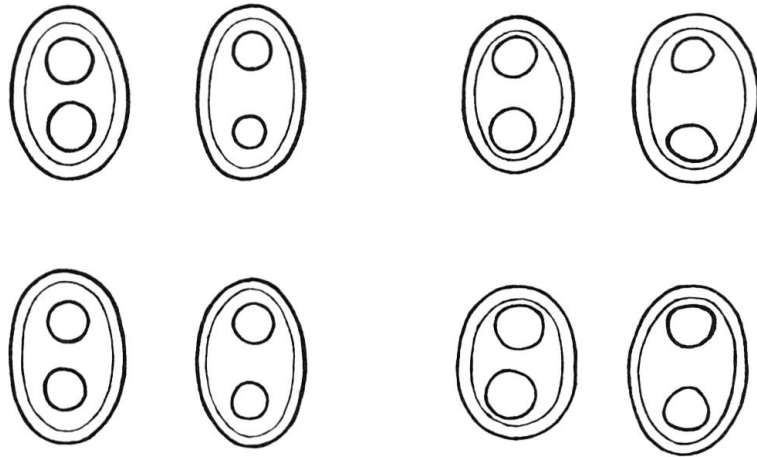


Figure 5. Spores of *Arpinia microspora*

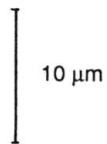


Figure 6. Spores of *Arpinia rahmii*

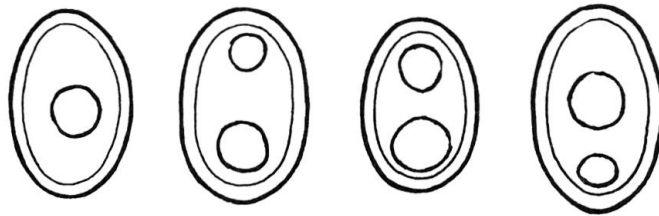


Figure 7. Spores of *Arpinia cf. rahmii* (Rudolstadt, GDR)