

**Newly recorded *Acremonium* species from Slovakia:
Acremonium atrogriseum, *A. roseogriseum*, *A. spinosum*,
and *Acremonium* sp. (anamorph of *Neocosmospora*
vasinfecta var. *africana*)**

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Labuda R.: Newly recorded *Acremonium* species from Slovakia: *Acremonium atrogriseum*, *A. roseogriseum*, *A. spinosum*, and *Acremonium* sp. (anamorph of *Neocosmospora vasinfecta* var. *africana*). – Czech Mycol. 57(3-4): 239-248.

Four species of the genus *Acremonium* (Ascomycota, Hypocreales), namely *A. atrogriseum*, *A. roseogriseum*, *A. spinosum*, and *Acremonium* sp. (teleomorph *Neocosmospora vasinfecta* var. *africana*) hitherto not reported from Slovakia, are described and illustrated here. The former one was isolated from turkey litter, while the latter three were recovered from a soil sample. Representative strains of the fungi are deposited in the Microbiology Department Collection, SUA in Nitra.

Key words: fungi, soil, turkey litter, Slovakia

Labuda R.: Novo zaznamenané druhy z rodu *Acremonium* na Slovensku: *Acremonium atrogriseum*, *A. roseogriseum*, *A. spinosum* a *Acremonium* sp. (anamorfa druhu *Neocosmospora vasinfecta* var. *africana*). – Czech Mycol. 57(3-4): 239-248.

Práca predkladá charakteristiku a vyobrazenie štyroch druhov z rodu *Acremonium* (*A. atrogriseum*, *A. roseogriseum*, *A. spinosum* a *Acremonium* sp. (teleomorfa *Neocosmospora vasinfecta* var. *africana*), ktoré neboli doposiaľ z územia Slovenska zaznamenané. Druh *A. atrogriseum* bol izolovaný z podstielky pre morky. Ostatné tri druhy boli izolované z pôdy. Študované kmene sú uchované v Zbierke katedry mikrobiológie, SPU v Nitre.

INTRODUCTION

In the course of mycological investigations of soil and turkey litter samples carried out in March 2005 at the Department of Microbiology, Slovak University of Agriculture (SUA) in Nitra, four interesting *Acremonium* species, namely *A. atrogriseum*, *A. roseogriseum*, *A. spinosum*, and *Acremonium* sp. (teleomorph *Neocosmospora vasinfecta* var. *africana*) were encountered. Referring to the Checklist of non-vascular and vascular plants of Slovakia (Lizoň and Bacigálová 1998), these micromycetes have not previously been reported from Slovakia, and thus represent new fungi to this area.

MATERIAL AND METHODS

The micromycetes were isolated on malt extract agar with chloramphenicol by the dilution plate technique according to Gams et al. (1987). Subsequent cultivation and identification of the fungi was carried out on malt extract agar (MEA) following the species diagnosis given by Gams (1971) and de Hoog et al. (2000). *Neocosmospora vasinfecta* var. *africana* was identified according to Cannon and Hawksworth 1984 and Rossman et al. (1999). Potato dextrose agar (PDA) was used here as an additional medium. To promote perithecium formation in the *Neocosmospora*, the synthetic nutrient agar (SNA) medium was employed. All formulae are those given in de Hoog et al. (2000). The microphotographs and measurements were made by means of a light microscope (Olympus Provis AX 70) equipped with a camera system (Olympus Provis AX 70) and the software Image-Pro Plus (Media Cybernetics, Silver Spring, Maryland, USA). The macrophotographs were made by means of a digital camera (Camedia C 5000 Zoom). The drawings were made by the author.

Scanning electron microscopy (SEM) of ascospores in the *Neocosmospora* strain was performed by means of a SEM microscope (Tesla BS 301) after fixation of a small block of the colony with perithecia in a 5 % aqueous solution of glutaraldehyde (Merck, Germany) overnight (16 hours) at 5 °C, followed by three successive washings with 100, 90 and 60 % acetone (LCHM-Labochem, Bratislava, Slovak Republic) (10 min each). After dehydration was completed, the sample was critical point dried in a critical point apparatus (Bio-Rad Polaron, Herdforshire, UK) in CO₂ and coated with gold using a Bio-Rad Polaron sputter coater. Strains of the fungi are deposited in the Microbiology Department Collection, SUA in Nitra.

RESULTS AND DISCUSSION

Acremonium atrogriseum (Panassenko) W. Gams 1971
(section *Gliomastix*, series *Murorum*)

Syn.: *Phaeoscopulariopsis atrogrisea* Panassenko 1964

A single isolate, RL Ac-1 0305, was found in litter from a turkey farm in Rišňovce, Nitra, Slovak Republic, in March 2005 by R. Labuda.

Description. Colonies on MEA slow-growing, after 10 days at 25 °C 15 mm in diam., on PDA (Fig. 5) growing somewhat faster, reaching 22 mm in diam., dark greyish brown, velutinous. Reverse dark olivaceous to almost black, on PDA violet in the central areas. Well sporulating. Phialides arising at right angles, singly or in dense groups from dark creeping hyphae, 10–25 × 2.0–3.5 µm, with moderately inflated basal part tapering into a moderately to very long neck c. 1 µm in width (Fig. 1).

Collarettes inconspicuous. Conidia one-celled, hyaline under a light microscope but greyish brown in mass, mostly ellipsoidal and slightly apiculate, $3.5\text{--}5.0 \times 2.5\text{--}3.2 \mu\text{m}$, smooth-walled, formed in false heads. Chlamydo-spores absent.

Outstanding traits. Slow-growing greyish-brown colonies, phialides with moderately swollen bases and long tapering necks, ellipsoidal conidia formed in heads.

Affinities. The species may micro-morphologically resemble *A. inflatum* (C.H. Dickinson) W. Gams (distinguished by subglobose conidia formed in heads only and by phialides with conspicuous collarettes) and *A. roseogriseum* (distinguished by longer awl-shaped phialides and comparatively larger, tear-shaped conidia). In addition, it may also superficially resemble *Scedosporium prolificans* (Hennebert et B.G. Desai) E. Guého et de Hoog, which is however readily distinguishable by its annelidic phialides and generally larger conidia.

Note: In Gams (1971) and de Hoog et al. (2000), the species is described as producing conidia in heads, and also in chains, especially when the cultures are young. However, no conidial chains were observed on both MEA and PDA in the isolate treated here. Chain formation was observed on the isolation medium.

Habitat and distribution. According to Gams (1971), *Acremonium atrogriseum* has been recovered from garden soil, arable soil, from the rhizosphere of an apple tree, from lesions on roots of tomato, from impregnated pine wood, and from moldy pasta. Moreover, the species has been reported as the agent of human systemic infection, from the lung of a human patient, human sputum and bronchial wash, and from infected hair of a man (de Hoog et al. 2000; CBS, 2005). In addition, a human case of keratitis is known (Read et al. 2000).

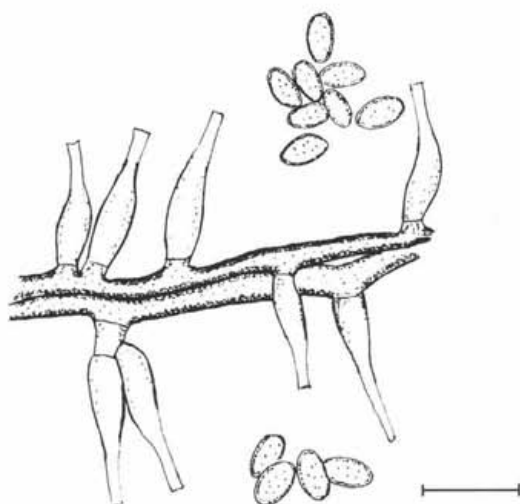


Fig 1. *Acremonium atrogriseum*, conidiophores with conidia (bar = 10 μm).

Acremonium roseogriseum (S. B. Saksena) W. Gams 1971
(section *Gliomastix*, series *Murorum*)

Syn.: *Cephalosporium roseogriseum* S. B. Saksena 1955

Gliomastix murorum var. *felina* pro parte Dickinson 1968

A single isolate, RL Ac-2 0305, was recovered from soil (Chernozem) in Borovce, Piešťany, Slovakia, in March 2005 by R. Labuda.

Description. Colonies on MEA moderately fast growing, after 10 days at 25 °C 33 mm in diam., on PDA growing somewhat faster, reaching 39 mm in diam., white at first, then reddish brown, soon becoming olivaceous-black in sporulating areas, with hyphae aggregated into rope-like strands. On PDA (Fig. 6) hyaline exudates droplets and pale reddish pigment diffusing into the substrate were observed. Reverse pale. Well sporulating. Phialides awl-shaped, erect, arising from strands of aerial hyphae, 25–35 × 2.5 µm. Conidia large, tear-shaped, greyish-black, 5.0–7.0 × 3.0–4.0 µm, smooth-walled, formed in slime heads (Fig. 2). Chlamydo-spores absent.

Outstanding traits. Relatively fast growing white to reddish-brown colonies with pronounced fasciculation of the aerial hyphae into rope-like strands and with greyish-black areas due to rich conidium production, awl-shaped phialides bearing slime heads of tear-shaped, dark conidia.

Affinities. The species may resemble *A. murorum* (Corda) W. Gams, which however produces broadly ellipsoidal and mostly coarsely roughened conidia.

Habitat and distribution. According to Gams (1971), *Acremonium roseogriseum* has been recovered only from grassland soil. Other soil sources of

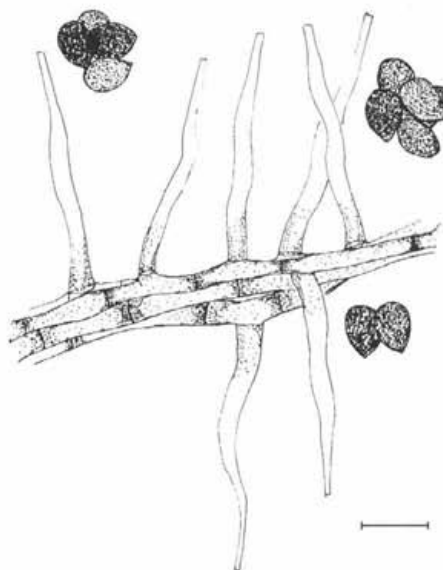


Fig. 2. *Acremonium roseogriseum* conidiophores with conidia (bar = 10 µm).

the taxon are listed in the CBS species database (CBS 2005). In 1961, the species was also reported in a case of arthritis in a knee of a human by Ward and co-workers, but it is uncertain whether that strain was correctly identified (de Hoog et al. 2000).

***Acronium spinosum* (Negroni) W. Gams 1971**

(section *Gliomastix*, series *Persicinum*)

Syn.: *Cephalosporium spinosum* Negroni 1933

Hyalopus spinosus (Negroni) Barbosa 1941

Two isolates, RL Ac-3 0305 and RL Ac-4 0305, were recovered from soil (Chernozem), in Borovce, Piešťany, Slovakia, in March 2005 by R. Labuda.

Description. Colonies on MEA slow-growing, after 10 days at 25 °C 15 mm in diam., on PDA (Fig. 7) growing much faster, reaching 30 mm in diam., white or nearly so, floccose. In one isolate, lemon yellow exudate droplets and diffusing pigment were produced on MEA. Reverse pale, on PDA yellowish brownish with similarly coloured pigment diffusing into the substrate. Well sporulating. Phialides awl-shaped, erect, arising from strands of aerial hyphae, 15.0–35.0 × 2.5 µm. Conidia subglobose and mostly slightly apiculate, hyaline, 3.5–4.4 × 3.0–4.0 µm, finely to distinctly verruculose or spinulose, formed in slime heads (Fig. 3). Chlamydospores absent.

Outstanding traits. Slow-growing white to pale ochre colonies, awl-shaped phialides bearing almost spherical, roughened to finely spinulose conidia cohering in slime heads.

Affinities. The species may resemble *A. persicinum* (Nicot) W. Gams, which however produces conidia in heads and chains. Furthermore, its colonies grow much faster and possess more pronounced coloration.

Note. Conidia were found to be somewhat larger (3.5–4.4 vs. 2.5–3.5 µm) than those described by Gams (1971) and by de Hoog et al. (2000).

Habitat and distribution. The species has originally been described from human onychomycosis in 1933 by Negroni (de Hoog et al. 2000). According to Gams (1971), it has been recovered from air, and in the CBS species database (CBS 2005) it is listed as being isolated from soil as well.

***Neocosmospora vasinfecta* var. *africana* (Arx) P.F. Cannon et D. Hawksw.**
(order *Hypocreales*, family *Nectriaceae*)

Syn.: *Neocosmospora africana* Arx

Neocosmospora vasinfecta forma *conidiifera* Kamyschko

Anamorph: *Acronium* sp.

A single isolate, RL Neo-1 0305, was recovered from soil (Chernozem), in Borovce, Piešťany, Slovakia, in March 2005 by R. Labuda.

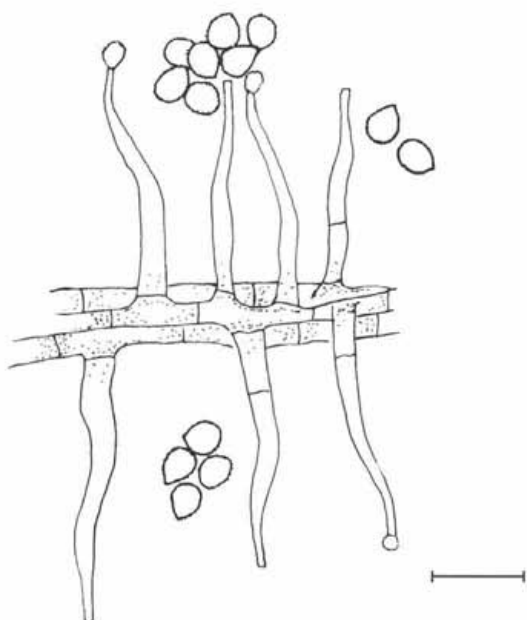


Fig. 3. *Acremonium spinosum*, conidiophores with conidia (bar = 10 μ m).

Description. Colonies on MEA moderately fast growing, after 10 days at 25 °C 30 mm in diam., on PDA (Fig. 8) growing much faster, reaching 55 mm in diam., pinkish-red, floccose, reverse pinkish-red with similarly coloured pigment being diffused into the substrate on MEA. No ascomata observed on this medium. On PDA, white floccose colonies with violet to very dark violet aerial mycelium in the central areas, with numerous immature orange ascomata scattered mainly towards the centre, reverse pale with violet-brown centres. Poorly sporulating. Phialides awl-shaped, erect, 25.0–80.0 \times 2.5–4.0 μ m long, with distinct collarette. Conidia large, 1–2-celled, hyaline, cylindrical to reniform, 5.0–13.0 (17.0) \times 3.0–3.5 μ m, smooth-walled, formed in false heads (Fig. 4). Chlamydospores present.

Colonies on SNA moderately fast growing, after 10 days at 25 °C 35 mm in diam., white, translucent with sparse aerial mycelium and orange perithecia scattered over the entire colony. Perithecia (Fig. 9) almost spherical, orange becoming brownish, with apical pore, 300–500 μ m, peridial walls of a textura angularis. Asci cylindrical, 8-spored, 80.0–100.0 \times 12.0–15.0 μ m. Paraphyses absent. Ascospores 1-celled, pale brown, spherical to broadly ellipsoidal, 15.0–17.8 \times 14.0–16.0 μ m. Ascospore walls with a cerebriform ornamentation under SEM (Fig. 11), appearing nearly smooth under low magnifications (Fig. 10).

Outstanding traits. Poorly sporulating, brightly coloured colonies on MEA and PDA, long and robust phialides forming cylindrical to slightly curved conidia with

0–1 septum. Orange-brown perithecia producing cylindrical, 8-spored asci. Ascospores large, 1-celled, almost spherical and distinctly cerebriform.

Affinities. The anamorphic state may somewhat resemble poorly differentiated *Fusarium* strains, especially those of *F. solani* (Mart.) Sacc., yet the morphology of the macroconidia as well as distinct teleomorphs set the two genera unambiguously apart.

Note. Two varieties are currently accepted within the species (Rossman et al. 1999), namely *Neocosmospora vasinfecta* var. *vasinfecta* and var. *africana* (Arx) P.F. Cannon et D. Hawksw. They are morphologically distinguishable on account of the ascospore ornamentation. Conspicuously rugose ascospores are formed in var. *vasinfecta*, while those with a cerebriform ornamentation are characteristic of var. *africana* (Cannon and Hawksworth 1984, Rossman et al. 1999). As it can be seen on the scanning electron micrograph (Fig. 11), ascospores of the isolate studied here clearly show an ornamentation pattern identical with that of *Neocosmospora vasinfecta* var. *africana* (strain IMI 172482, page 678, Fig. 11) used in the study of Cannon and Hawksworth (1984).

Habitat and distribution. The fungus is widely distributed throughout the tropics and warm temperate regions. Usually it is isolated from soil, often associated with leguminous crops (Cannon and Hawksworth 1984, Rossman et al. 1999). In the CBS species database (CBS 2005) it is listed, apart from soil, also from a leaf of *Pisum sativum* and dung of cow and burro.

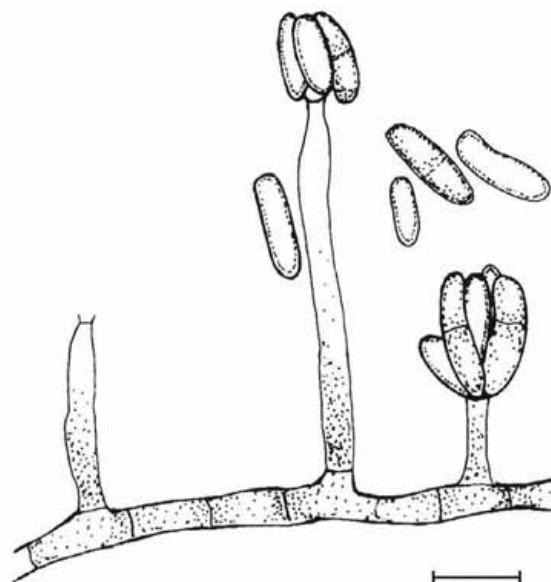
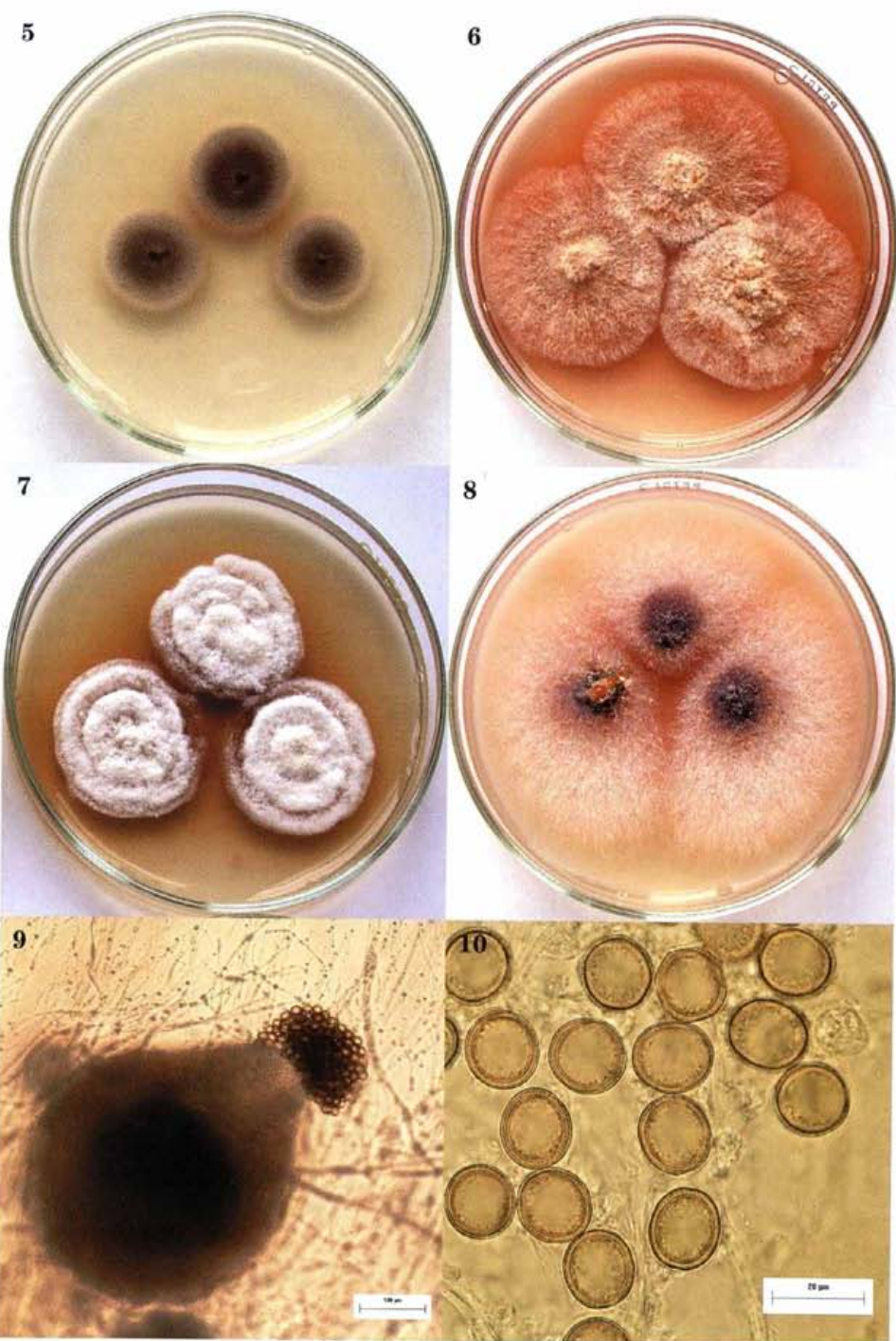


Fig. 4. *Acremonium* sp. (anamorph of *Neocosmospora vasinfecta* var. *africana*) (bar = 10 µm).



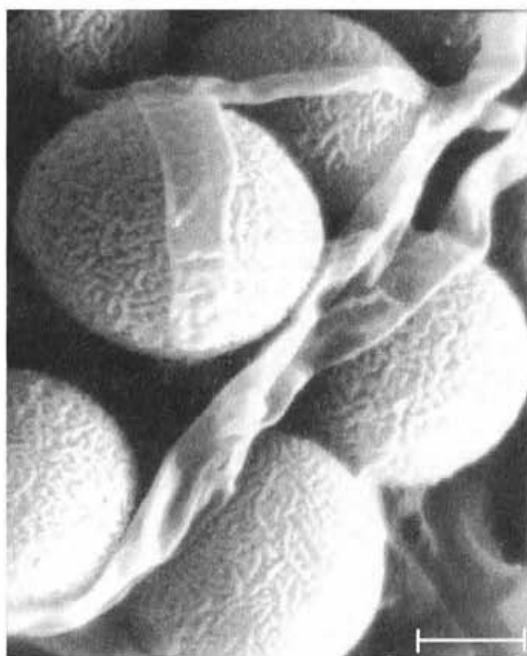


Fig. 11. *Neocosmospora vasinfecta* var. *africana*; scanning electron micrograph showing a cerebriform ornamentation of ascospores (bar = 5µm)

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Fig. 5. *Acremonium atrogriseum*.

Fig. 6. *Acremonium roseogriseum*.

Fig. 7. *Acremonium spinosum*.

Fig. 8. *Acremonium* sp. (anamorph of *Neocosmospora vasinfecta* var. *africana*); colonies on PDA, 25 °C, 10 days, darkness.

Fig. 9. *Neocosmospora vasinfecta* var. *africana*; mature perithecium with ascospores, on SNA, 25 °C, 10 days, darkness.

Fig. 10. *Neocosmospora vasinfecta* var. *africana*; ascospores.

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