

Aspergillus arvii spec. nov., a new animal pathogen?

Aspergillus arvii spec. nov., eine neue tierpathogene Art?

R. Aho¹, Y. Horie², K. Nishimura³ and M. Miyaji³

Key words. *Aspergillus arvii* spec. nova, mycosis, liver, cattle.

Schlüsselwörter. *Aspergillus arvii* spec. nova, Mykose, Leber, Rind.

Summary. *Aspergillus arvii* sp. nov. Aho, Horie, Nishimura & Miyaji isolated from liver lesions of a dairy cow in Finland, is suggested to represent a new species. It differs from the other members of the *Aspergillus fumigatus* group by its stable brown colony colour, the ornamentation of its conidia as well as the shape of the vesicles and length of conidiophores.

Zusammenfassung. Es wird vorgeschlagen, *Aspergillus arvii* sp. nov. Aho, Horie, Nishimura & Miyaji, die von Leberläsionen einer Milchkuh in Finnland isoliert wurde, als neue Spezies anzuerkennen. Er unterscheidet sich von den anderen Vertretern der *Aspergillus fumigatus*-Gruppe durch seine stabile braune Koloniefärbung, in der Anordnung seiner Konidien sowie der Form der Vesikel und der Länge der Konidiophoren.

Introduction

Aspergillus species are well-known pathogens for animals and humans. Gourreau *et al.* [1] published an extensive review of bovine aspergillosis including all earlier known aetiological agents. We describe here a fungal strain belonging to the *Aspergillus fumigatus* group, which was isolated from the liver lesions of a dairy cow in Finland. It is suggested to represent a new species.

Species description

Aspergillus arvii sp. nov. Aho, Horie, Nishimura & Miyaji = *Aspergillus fumigatus* var. *fulvi-ruber* Rai, Tewari & Agarwal, Beiheft Nova Hedwigia 47, 492, [2].

Colonies on Czapek's agar [3] spreading broadly, attaining a diameter of 83 mm within 12 days at both 25 °C and 37 °C, pale orange (5-3-A) [4] to grayish orange (5-3-B), consisting of a thin mycelial felt and thin aerial hyphae, more or less floccose, conidial heads abundantly produced; reverse orange white (5-2-A) to pale yellow (4-3-A).

Colonies on Czapek's agar with yeast extract (CYA) [5] spreading broadly, attaining a diameter of 83 mm within 12 days at both 25 °C and 37 °C, light brown (6-6-D) to brown (6-6-E), consisting of a thick mycelial felt and thin aerial hyphae, floccose conidial heads very abundantly produced; reverse light brown (6-4-D) to brown (6-4-E).

Colonies on malt agar [3] spreading broadly, attaining a diameter of 83 mm within 12 days at both 25 °C and 37 °C, light brown (6-5-D to 6-6-E), consisting of a thin mycelial felt and thin mycelial growth, floccose at the central area, conidial heads very abundantly produced; reverse brownish orange (5-4-C).

Conidial heads reddish brown, columnar, 78–105 × 60–62 µm (Figs 1–3, 6). Conidiophores hyaline to pale yellowish brown, smooth, 110–280 µm long, (4.5–)5–7.5(–10) µm wide at the middle. Vesicles hyaline to pale yellowish brown, flask-shaped, 15–27.5(–32.5) µm long, (12.5)–15–20(–27.5) µm wide, usually fertile on the upper half only, metulae absent, phialides hyaline to pale yellowish brown 7–8(–8.5) × 2.5–3(–3.5) µm. Conidia hyaline to pale yellowish brown, globose to subglobose, nearly smooth to

¹National Veterinary and Food Research Institute, Finland,

²Natural History Museum and Institute, Chiba, Japan and

³Research Center for Pathogenic Fungi and Microbial Toxicoses, Chiba University, Chiba, Japan.

Correspondence: Riitta Aho, Provincial Government of Oulu, Box 293, FIN-90101 Oulu, Finland.

minutely rough, 3–3.5(–4) μm in diameter. (Figs 2, 4, 5).

Aspergillus arvii sp.nov. Aho, Horie, Nishimura & Miyaji = *Aspergillus fumigatus* var. *fulvi-ruber* Rai, Tewari & Agarwal, Beiheft Nova Hedwigia 47, 492, [5].

Coloniae in agar Czapek [3] late extendentes et intra duodecim dies in calore 25 atque 37 graduum C diametrum 83 mm attingentes, pallido-luteae (5-3-A) [2] vel luteae colore canescente (5-3-B), constantes ex tenuibus mycelialibus coactis et tenuibus hyphis aeriis plus minusve floccosis, capitulis conidicis abundanter procreatis; pars aversa candida colore luteo (5-2-A) vel pallido-flava (4-3-A).

Coloniae in agar Czapek cum extracto fermenti (CYA) [5] late extendentes et intra duodecim dies in calore 25 atque 37 graduum C diametrum 83 mm attingentes, fulvae colore diluto (6-6-D) vel fulvae (6-6-E), constantes ex crassis mycelialibus coactis et tenuibus hyphis aeriis floccosis, capitulis conidicis admodum abundanter procreatis; pars aversa fulva colore diluto (6-4-D) vel fulva (6-4-E).

Coloniae in agar malti [3] late extendentes et intra duodecim dies in calore 25 atque 37 graduum C diametrum 83 mm attingentes, fulvae colore diluto (6-5-D vel 6-6-E), constantes ex tenuibus mycelialibus coactis et tenui incremento myceliali, in centro floccosis, capitulis conidicis admodum abundanter procreatis; pars aversa lutea colore subfulvo (5-4-C).

Capitula conidica fulva colore subrufo, columnaria, 78–105 $\times$ 60–62 μm (Figs 1–3, 6). Conidiophora hyalina vel pallido-fulva colore subflavo, levia, 110–280 μm longa, (4.5–)5–7.5(–10) μm lata parte media. Vesiculae hyalinae vel pallido-fulvae colore subflavo, ampulliformes, 15–27.5(–32.5) μm longae, (12.5–)15–20(–27.5) μm latae, fertiles plerumque tantummodo in dimidia parte superiore, metulae desunt, phialis hyalina vel pallido-fulva colore subflavo 7–8(–8.5) $\times$ 2.5–3(–3.5) μm . Conidia hyalina vel pallido fulva colore subflavo, globosa vel subglobosa, levia ferme vel minute scabra, diametro 3–3.5(–4) μm . (Figs 2, 4, 5).

Specimen examined: the strain was isolated from liver abscesses of a dairy cow suffering also of mycotic invasive pneumonia.

Etymology: The specific epithet is given in honour of late Arvi Salonen, mycologist in the Department of Dermatology, Helsinki University Central Hospital. He was the first scientist to re-examine this strain and confirmed the identification to the *Aspergillus fumigatus* group.

A lyophilized type culture has been deposited in the Research Center for Pathogenic Fungi and



Figure 1. *Aspergillus arvii*, conidial head (phase contrast microscopy). $\times 800$

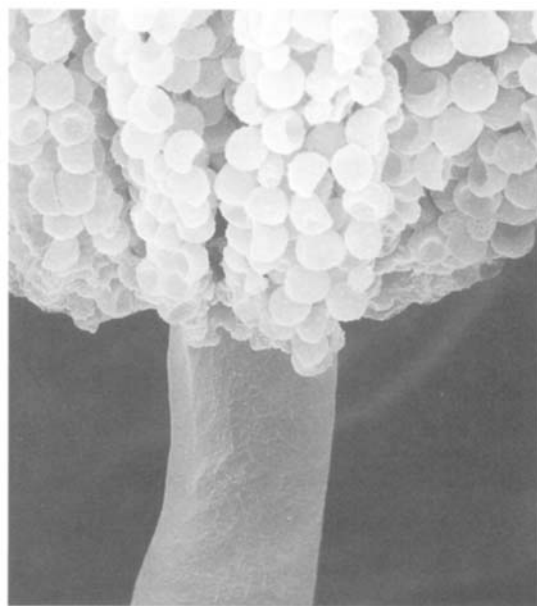


Figure 2. *Aspergillus arvii*, conidiophore and conidia, scanning electron microscopy (SEM). $\times 3000$

Microbial Toxicoses, Chiba University, Chiba, Japan.

Discussion

The first report of a buff-coloured mutant of *A. fumigatus* was published by Yuill in 1939 [6]. His isolate originated from a single light buff-coloured conidial head among the typical blue-green ones of *A. fumigatus*. Yuill named his isolate *A. fumigatus* mut. *helvola*. Since then Rai *et al.* [2]

have described several colour varieties including two brownish ones, which were published as *A. fumigatus* var. *fulvi-ruber* and *A. fumigatus* var. *grisei-brunneus*. The descriptions of these new varieties were not considered satisfactory. Samson [7] rejected the varieties considering them as synonyms of *A. fumigatus*. Varshney & Sarbhoy [8] considered var. *grisei-brunneus* Rai & Singh and mut. *helvola* Yuill synonyms of *A. fumigatus*.

The conidiophores of *Aspergillus arvii* are strictly uniseriate, fertile on the upper half of their vesicles and without metulae. (Figs 1, 2 and 3). These

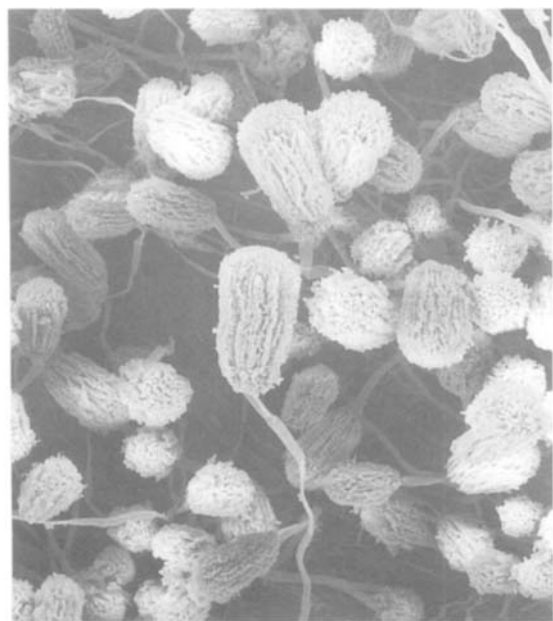


Figure 3. *Aspergillus arvii*, conidial heads (SEM). $\times 100$

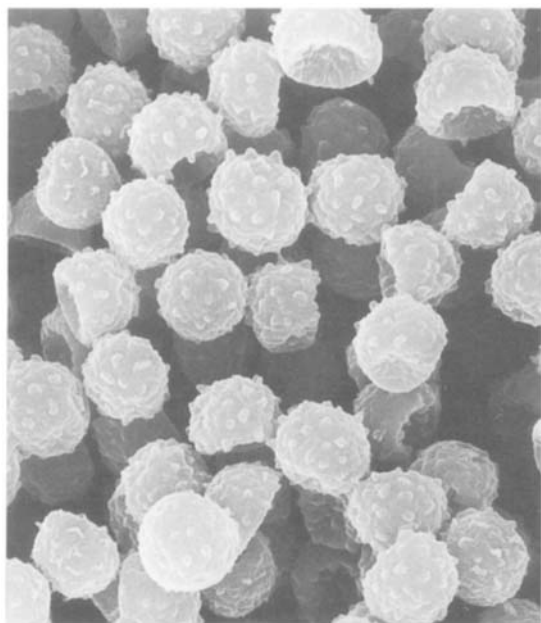


Figure 4. *Aspergillus arvii*, ornamentation of the conidia (SEM). $\times 3500$

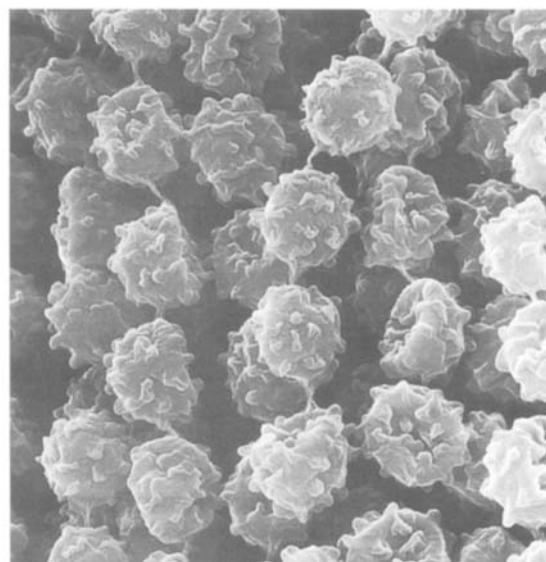


Figure 5. *Aspergillus fumigatus*, ornamentation of the conidia (SEM). $\times 3500$

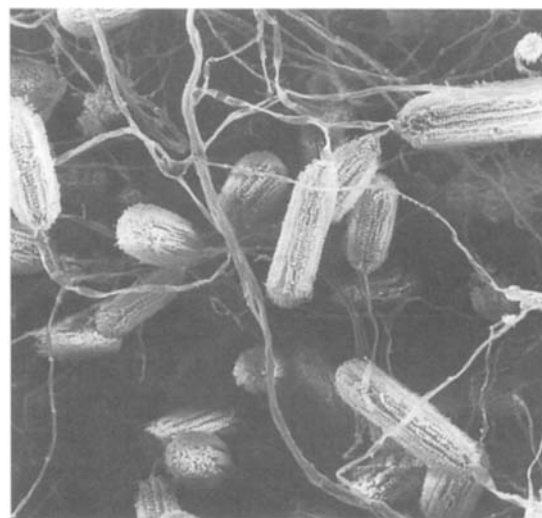


Figure 6. *Aspergillus fumigatus*, conidial heads (SEM). $\times 100$

characteristics make it a member of the *A. fumigatus* group. However, this new species is readily distinguished from the other species classified in the *A. fumigatus* group by its different and stable colour on all the standard media used, as well as by its nearly smooth conidia under light microscopy, the shape of its vesicles and shorter conidiophores (110–280 vs. up to 300–500 μm). In scanning electron microscopy the ornamentation of the conidia was found to be less profound than that of *A. fumigatus* (Figs 4, 5).

References

- 1 Gourreau J.-M., Laval, A. & Badinand, F. (1988) Les aspergilloses des bovins. *Point Vet.* **20**, 589–608.
- 2 Rai, J. N., Tewari, J. P. & Agarwal, S. C. (1974) The

- Genus *Aspergillus* in India. In: Lower Plants of the Indian Subcontinent. *Nova Hedwigia*: Beihft. **47**, 487–99.
- 3 Raper, K. B. & Fennell, D. I. (1965) *The genus Aspergillus*. Baltimore: Williams & Wilkins Co., pp. 36, 38.
 - 4 Kornerup, A. & Wanscher, J. H. (1978) *Mathue Handbook of Colour*. 3rd edn. London: Eyre Methuen.
 - 5 Pitt, J. I. (1985) Media and incubation conditions for *Penicillium* and *Aspergillus* taxonomy. In: Samson, R. A., Pitt, J. I. (eds.): *Advances in Penicillium and Aspergillus Systematics*. New York, London: Plenum Press, pp. 93–103.
 - 6 Yuill, E. (1939): Two new *Aspergillus* mutants. *J. Bot. (Lon.)* 174–175.
 - 7 Samson, R. A. (1979) *A compilation of Aspergilli described since 1965*. Centraalbureau voor Schimmelcultures, Baarn: Studies in Mycology. No. 18, 16–18.
 - 8 Varshney, J. L. & Sarbhoy, A. K. (1981) A new species of *Aspergillus fumigatus* group and comments upon its synonymy. *Mycopath.* **73**, 89–92.