

## ATYPICAL MYCOSIS IN WILD BOARS

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### ABSTRACT

From skin of wild boars with signs of dermatitis were isolated fungi of species *Penicillium verrucosum* (Dierckx, 1901), and *Aspergillus fumigatus* (Fresen, 1863). Pathologically were established hepatitis and nephritis. *A. fumigatus* was isolated from the liver, but from the kidneys were not isolated microorganisms. The results indicate that *A. fumigatus* can be fungal pathogen in wild pigs with localization in the liver and, in combination with *P. verrucosum* - of dermatomycosis. Both types of fungi are not typical causes of skin mycoses and this is the first case of isolation in such disease.

**Key words:** *Penicillium verrucosum*, *Aspergillus fumigatus*, dermatomycosis, wild boar.

### Introduction

Fungi are widespread microorganisms due to unpretentiousness to the environmental conditions as well as due to the abundant production of spores surviving in adverse physical and chemical impacts. Some of the most common filamentous fungi are those of the genera *Aspergillus* and *Penicillium*, whose representatives often produce mycotoxins. For those of genus *Penicillium* there are data that they are mostly found in regions with cold climate, while *Aspergillus* species develop better in warm countries (Kozakiewicz, 1995; Kozakiewicz, 2003; Pitt, 1994). In the region of our country, however, aspergillomycoses and aspergilloses are common (Popova, 2016), unlike mycoses with participation of *Penicillium* spp. The most often isolated are *Aspergillus fumigatus*, *A. niger* and *A. flavus*, whose strains are in many cases toxic. One of the main prerequisites for the pathogenicity of the fungi of the genera *Aspergillus* and *Penicillium* is their ability to develop well at the body temperature of warm-blooded animals. In *Aspergillus fumigatus*, another cause of the frequent contamination of the respiratory system of animals and humans is the small spore size (Pitt, 1994).

Dermatomycoses are common in domestic animals. However, there are not enough studies for these diseases in game, especially in our country. That is why in the present work we have set ourselves the purpose to conduct research on skin materials from wild boars with signs of dermatomycosis.

### Materials and Methods

**Animals.** Two wild pigs were investigated, which were shot at the end of autumn near the village of Zaborudo in the region of town Chepelare because of a disease with signs of weight loss and skin changes (Figure 1). Samples of part of the skin from the area of the head and neck were taken. Parts of internal organs (liver, kidneys and spleen) were also examined.



Figure 1: Wild pigs with signs of weight loss and skin changes.

### Microbiological studies.

*Microscope investigations* of skin preparations were performed under immersion after staining by Gram and Phyffer.

*Nutrient media.* Agars of Sabouraud and Mueller-Hinton (Antisel – Scharlau Chemie S. A., Spain) were used.

*Cultural studies* of the materials were performed after incubation of the seedings at 24–25° C for 2 weeks (on Sabouraud agar) and at 37°C for 24–48 hours (on Mueller-Hinton agar) followed by reading of morphology of the colonies and conidia. Isolation and identification of the fungi was performed according to the Dictionary of the Fungi (Hawksworth et al., 1983).

### Results

*Microscope investigations.* The results of the microscopic examinations of preparations made from material directly from the skin indicated the presence of oval-shaped conidia of fungi.

*Pathological-anatomical* research. At the pathological-anatomical investigations dermatitis was established, most pronounced in the head and neck, but also in the body and extremities. As can be seen from Figure 1, hind limbs were most heavily affected. Signs of hepatitis and nephritis were also observed.

*Cultural studies.* The results of the cultural studies are presented in Fig. 2 and 3. As can be seen from the figures, the established colonies of the fungi, isolated from the skin samples on Sabouraud agar, were of two different species. According to the cultural features, the morphology and color of the colonies, as well as the morphology of the conidia, the isolated fungi correspond to the species *Penicillium verrucosum* Dierckx, 1901 and *Aspergillus fumigatus* Fresen, 1863.



Figure 2: *Penicillium verrucosum* Dierckx, 1901, isolated from wild boar skin - growth on Sabouraud agar.

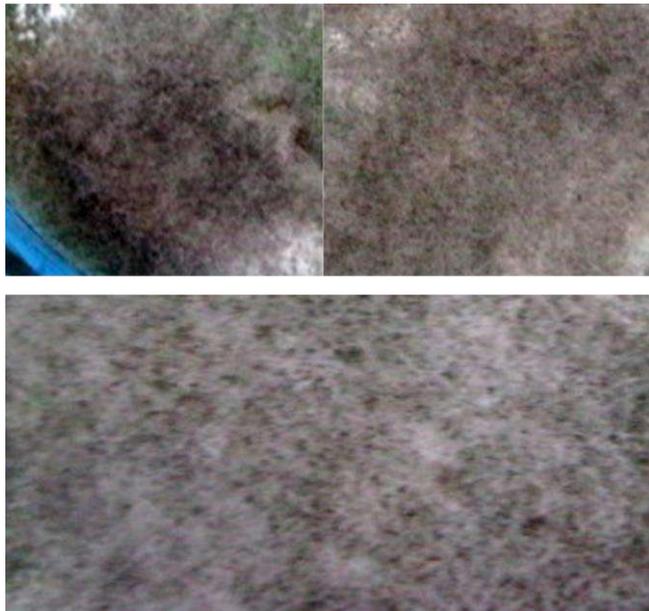


Figure 3: Colonies of *Aspergillus fumigatus* Fresen, 1863 on Sabouraud agar, isolated from wild boar skin.

Microorganisms were not isolated from the spleen materials. However, single colonies of *Aspergillus fumigatus* were isolated from the liver.

### Discussion

Although aspergillomycosis develops more often in the lungs, we did not found changes in them in animals studied, so we did not performed investigations of material from this organ. For aerosol infection, inhalation of a large amount of spores is necessary (Pitt, 1994). In addition to the mechanical damage to the tissues in which they develop, the toxins secreted by them are an important factor of the pathogenicity of the fungi. The strongest mycotoxins, afla and ochratoxins, are characteristic of many *Aspergillus* species. However, excretion of ochratoxin A was reported

also for *Penicillium verrucosum* (Pitt, 1994). This is nephrotoxin, to which is probably due the established nephritis in the animals we studied. It was found that ochratoxin A is the cause of the nephritis that is often observed in pigs in European countries (Pitt, 1994). Our results indirectly confirm this and indicate that wild pigs are also sensitive to the action of that toxin. *Penicillium verrucosum* is widespread in food and feed, especially in cereals in Europe and Canada, as well as in meat products. It is associated with the etiology of Balkan endemic nephropathy in humans, a high-mortality kidney disease in some parts of Bulgaria, Romania and countries of the former Yugoslavia. In animals it causes nephritis, including pigs. It is predominantly spreaded in regions with temperate climates (Kozakiewicz, 2003).

In our opinion, the observed hepatitis in the examined wild boars was a consequence of the action of aflatoxin of *Aspergillus fumigatus*. This species is pathogenic to humans and animals. It is widely distributed in soils, plants, seeds, sludges, composts and others. It causes aspergillosis, predominantly respiratory infection in almost all domestic animals and birds, as the most sensitive being the growing up individuals. An important provoking factor is stress of a different nature. These diseases have autumn-winter seasonality, which is also observed in our case (Kozakiewicz, 1995). In the cold seasons, especially in periods of increased humidity, the animals are prone to the development of mycoses caused by fungi spread in the environment. This is due, on the one hand, to a decrease in general animal resistance due to unfavorable climatic conditions and food shortages and, on the other, to the multiplication of filamentous fungi in substrates used by animals as bed litter and food.

## Conclusions

The filamentous fungi *Aspergillus fumigatus* and *Penicillium verrucosum* may cause dermatomycosis in wild boars. They may be combined with nephritis and hepatitis due to the development of the fungi in internal organs and the action of the toxins they emit. As predisposing factors, cold and wet weather and moldy foods and litter can be determined.

## References

1. Hawksworth, D. L., B. C. Sutton, G. C. Ainsworth. (1983). *Ainsworth & Bisby's Dictionary of the Fungi*. Commonwealth Mycological Institute, Kew.
2. Kozakiewicz, Z. (1995). *Aspergillus fumigatus*. [Descriptions of Fungi and Bacteria]. IMI Descriptions of Fungi and Bacteria, 126, Sheet 1252.
3. Kozakiewicz, Z. (2003). *Penicillium verrucosum*. [Descriptions of Fungi and Bacteria]. IMI Descriptions of Fungi and Bacteria, 155, Sheet 1550
4. Pitt, J. I. (1994). *The current role of Aspergillus and Penicillium in human and animal health*. Journal of Medical and Veterinary Mycology, 32, Suppl., 1, 17–32.
5. Popova, T. (2016). *Microbiology*. Publishing house at FTU. Sofia.