

OCURRENCE OF MICROSPORUM GYPSEUM AND KERATINOMYCES AJELLOI IN HUNGARIAN SOIL

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In medical science mycologists suspected long ago that the life cycle of dermatophytes is not restricted to a parasite period, but that they may live a saprophytic life too in the soil. This supposition was based on the experience that the dermatophytes are easily bred in artificial media in laboratories and that their relatives are mostly inhabitants of the soil.

Experiments for their culture remained for a long time unsuccessful because on Sabouraud's agar generally applied for the breeding of the dermatophytes, the moulds of the soil sample of quicker development multiply more intensely and oppress the other fungi, among others also the dermatophytes. It was Szathmáry (1936) who succeeded first to isolate dermatophytes from the soil. From the soil suspension taken from the garden of the Dermatological Clinic of the University at Pécs, he obtained by rubbing it on a guinea pig, two new pathogenic fungi. He named the first *Trichophyton terrestre primum* but later changed this term owing to its wrinkled surface to *Trichophyton terrestre gyratum*. The other fungus was first called *Trichophyton terrestre secundum* and this name was similarly changed to *Trichophyton terrestre radiosulcatum* on account of its radially sulcate colony.

In the past years it was possible, by new methods, to demonstrate dermatophytes from the soil. Thus Gordon—Ajello et al. (1952) isolated from the ground the characteristic macroconidia of *Microsporum gypseum* using membrane filters. In the same year Vanbreuseghem (1952 a) elaborated a more simple method for the recovery of keratinophilic fungi. The essential in this procedure is that autoclaved human hair filament is placed on the surface of the soil sample in a Petri dish, where keratinophilic fungi develop in some weeks. The latter can be easily cultivated on the medium of Sabouraud containing penicillin, streptomycin and cycloheximide (actidione) (Ajello, 1953, 1954; Georg—Ajello et al. 1954).

MATERIALS AND METHODS

Seventy-eight various soil samples from Hungary were studied for dermatophytes, in five reiterations, according to the procedure of Vanbreuseghem (1952 a). The soil samples originated from various places of the country: Budapest, Pestlőrinc, Pestimre, Gyömrő, Órszentmiklós, Vácbotytyán, Vácrátót, Sári, Zebegény, Ócsa, Uza, Lesenceistvánd, Dinnyés, Nagyszentjános, Sárvár, Bánkut, Aggtelek, Jósvafő, Badaacsony, Balatonszemes.

They were gathered partly from natural soil (forest : oak-forest with *Luzula*, *Robinia*-wood, Alder-groves, meadow, moor), but in their greater part from cultivated soil, mainly from places frequented by animals (garden, vineyard, tobacco-field, plough-land, pastures for goats, sheep, cattle, farmyards, village streets, borders of highways, poultry-runs, stables and cow-houses, pigsties, poultry-yards, stalactite cave).

RESULTS

Among the 78 soil samples, it was possible to isolate from six samples *Microsporium gypseum* (Bodin) Guiart et Grigorakis (syn.: *Achorion gypseum* Bodin) and from a single one *Keratinomyces ajelloi* Van Breuseghem.

Microsporium gypseum occurred exclusively in soils taken from sites frequented by domestic animals (horse, horned cattle, pig and poultry) viz. from the soil of stables and farm yards :

1. Órszentmiklós : ground of a pigsty
2. Órszentmiklós : farm yard (in the next street)
3. Pestimre : farm yard
4. Gyömrő : farm yard
5. Gyömrő : cow-house (in the next street)
6. Balatonszemes : farm yard

Microsporium gypseum is a human and animal pathogenic dermatophyte (Fig. 1). It is distributed all over the five continents as a pathogenic organism but is relatively rare. It is most frequent in the United States of North Ame-

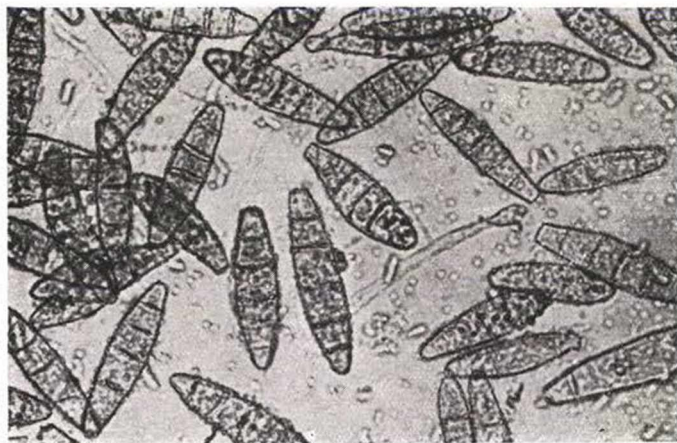


Fig. 1. Macroconidia of *Microsporium gypseum* (450 \times)

rica. Ajello (1953) enumerates on the basis of literary data 270 human and 61 animal diseases caused by it. Among these data 4 come from Hungary (Ballagi, 1925 ; Neuber, 1926). According to a verbal communication of Szathmáry (unpublished) he succeeded in isolating this fungus

in Karcag during the years 1946 to 1955 in a single case, in Gyula from 1931 to 1944 in two cases and in Pécs between 1925 and 1930 similarly in two cases.

From soil it was first isolated in the USA (Mandel—Stahl et al. 1948). In the latest years it was reported from the soil of various states of the USA (Cooke, 1952; Gordon—Ajello et al. 1952; Gordon, 1953; Ajello, 1953; 1956; Zeidberg—Ajello, 1954). It was also encountered in Panama (Ajello, 1954), Canada (Ajello, 1954), Cuba (Fuentes—Bosch et al. 1955), Nigeria (Ajello, 1956), South Africa (Lurie—Borok, 1955; Lurie—Way, 1957), and from Australia (Durie—Frey, 1955; Frey—Durie, 1956).

Confronted with the data from abroad, the occurrence of *Microsporium gypseum* in Hungarian soil is rather rare. It may be contributed partly to the fact that in Hungary more soil samples were investigated from places not being in frequent contact with animals.

The frequency of *Microsporium gypseum* in soil according to the hitherto known data:

Name of the country	Number of the investigated soils	Microsporium gypseum isolated in cases	%
USA: Tennessee (Ajello, 1953)	74	26	35,1
USA: Georgia (Ajello, 1953)	42	11	26,2
USA: Tennessee (Zeidberg—Ajello, 1954)	71	27	38
USA: W. Virginia (Ajello, 1954, 1956)	16	2	12,5
USA: Hawaii (Allison, 1955, Ajello, 1956)	100	23	23
USA: Alabama (Ajello, 1956)	10	3	30
USA: Michigan (Ajello, 1956)	44	5	11,3
Canada (Ajello, 1954, 1956).....	12	2	16,6
Panama (Ajello, 1954)	100	36	36
Cuba (Fuentes-Bosch et al. 1955)	13	7	53,8
Nigeria (Ajello, 1956)	76	6	7,8
Australia (Durie—Frey, 1955)	66	5	7,5
Australia (Frey—Durie, 1956)	96	12	12,5
Hungary	78	6	7,7

The other dermatophyte isolated from Hungarian soil is *Keratinomyces ajelloi* Vanbreuseghem. We succeeded in isolating it only from a single soil sample, viz. from the soil of the stalactite cave of Aggtelek, saturated with the manure of bats. The soil sample was gathered from a place situated at ca. 300 m from the entrance of the cave, from a branch not visited by the public. In this branch of the cave a great number of bats is dwelling.

The genus *Keratinomyces* and its only species hitherto known, *K. ajelloi* Vanbreuseghem was described by Vanbreuseghem in 1952 from Belgium from three garden and one orchard soil samples. According to its morphology and serology it is a dermatophyte, but is not pathogenic (Vanbreuseghem, 1952b; Vanbreuseghem—Ghislain et al. 1956). Outside Belgium it is known from the USA (Ajello, 1953), Great Britain (Daniels, 1954) and Australia. (Durie—Frey, 1955; Frey—Durie, 1956). All data come from soil samples. From man it was isolated only in a single case, from the skin lesion of a farmer, but it did not prove pathogenic in this case either (Vanbreuseghem—Ghislain et al. 1956).

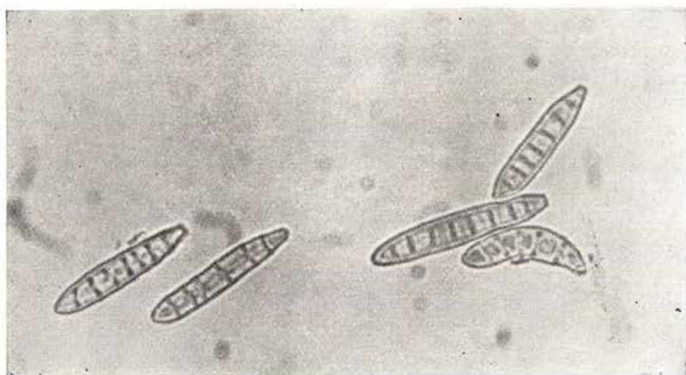


Fig. 2. Macroconidia of *Keratinomyces ajelloi* (450 \times)

The fungus is easily recognised by its brownish-ochre colonies of a powdery surface and by its smooth-walled multiseptate macroconidia (Fig. 2.). The strains isolated by Vanbreuseghem produce a dark red colour on Sabouraud's agar colouring the whole medium dark red. The *K. ajelloi* obtained from Aggtelek did not produce dark red colour even after months and this is the only difference as against the description of Vanbreuseghem. The strain isolated by Vanbreuseghem and his collaborators (1956) from man does not produce pigment either and the strains isolated by Ajello (1953) are colourless too.

SUMMARY

In examining 78 Hungarian soils of different kind according to the procedure of Vanbreuseghem, we were succeeded in isolating from 6 soil samples the human and animal pathogenic dermatophyte *Microsporum gypsum*. *Keratinomyces ajelloi* was obtained from a single soil sample. It

was possible to isolate *Microsporium gypseum* from soil gathered from sites in the neighbourhood of domestic animals, from soil of farm yards, pigsties and cow-houses. *Keratinomyces ajelloi* was isolated from the ground of a side branch of a stalactite cave inhabited by bats, from soil saturated with bat manure. The colony of this *Keratinomyces ajelloi* strain does not produce dark red pigment, in contrast with the original strains of Vanbreuseghem.

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РЕЗЮМЕ

Исследовая 78 различных венгерских почв, методом Vanbreuseghem. Из шести образцов удался выращивать человечески — животной патогенного дерматофитного гриба *Microsporium gypseum*. Из одной почвы вырос *Keratinomyces ajelloi*. А *Microsporium gypseum* (syn: *Achorion gypseum*) из близости домашних животных, хозяйственного двора, из свиного хлева и коровянного стойла выращивался. Автор составил в таблице страны, из почвы которых выявляют *Microsporium gypseum*. Эти: США, Канада, Куба, Панама, Нигерия, Южная-Африка, Австралия. Публикует число человеческих заболеваний от *Microsporium gypseum*.

Keratinomyces ajelloi описал Vanbreuseghem из Белгии, из усадебной почвы в 1952 году. Автор выращивал его из удобренной почвы летучим мышом, в каплянно-каменной пещере Аггтелек. Эта штамма *Keratinomyces ajelloi* не образует темно-красных пигментов, напротив первоначальными штаммами Vanbreuseghem.

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