Human infection due to the hedgehog fungus, *Trichophyton mentagrophytes* var. *erinacei*

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**SYNOPSIS** Three human cases of skin infection caused by *Trichophyton mentagrophytes* var. *erinacei* are recorded. A review of work on the incidence and ecology in hedgehogs and as a source of human infection is given. It is suggested that a true increase in human infections is occurring. A description of the colonial and microscopical appearance of the fungus and their variance with other *T. mentagrophytes* varieties is discussed. The name *Trichophyton erinacei* is proposed as being taxonomically more correct.

*Trichophyton mentagrophytes* var. *erinacei*, first described by Marples and Smith in 1960, has been isolated in this laboratory during the past six months from three human cases of skin infection.

Work in the United Kingdom and New Zealand by Marples and Smith (1960), English, Evans, Hewitt, and Warin (1962), La Touche and Forster (1963), Smith and Marples (1963), English, Smith, and Rush-Munro (1964), and English (1964) has established the incidence and ecology of *T. mentagrophytes* var. *erinacei* in hedgehogs and as a source of human infections. English *et al.* (1962) recorded ringworm of man caused by a variety of *Trichophyton mentagrophytes* which was associated with the handling of hedgehogs in the Bristol area. Only one previous record from Britain exists in which a dermatophyte infection was directly linked with the handling of hedgehogs (Eddowes, 1898), but the organism was not cultivated.

Smith and Marples (1963) state that in the Dunedin area of New Zealand since *T. mentagrophytes* var. *erinacei* was first recognized, it has been more frequently isolated from human infections than either *T. mentagrophytes* var. *granulare* or *Trichophyton verrucosum* which are the two other zoophilic *Trichophyton* species regularly isolated in the area. Dr. I. G. Murray (verbal report) quotes six human cases in 1964 and three in the first half of 1965 in the United Kingdom from which cultures were sent to the Mycological Reference Laboratory, three of these being recorded in this report. Though the recognition of the fungus as a human pathogen may account for some of the increase in reported isolations, it is suggested that there may also be a true increase. In all three cases in this report, direct microscopical examination showed the presence of fungus, and all six inoculations of skin scrapings on Sabouraud's medium, with and without added chloramphenicol and cycloheximide, produced from each case a bright yellow or yellow-orange pigmented colony with finely granular surface and microscopically showing *Trichophyton* type macroconidia and large numbers of microconidia. Had this occurred previously, an atypical *Trichophyton mentagrophytes* type fungus would have been considered, as indeed the first isolated strain was initially designated.

**SOURCES OF INFECTION**

English (1964) states that there are two sources of infection in man, and her description follows.

'DIRECT INFECTION' That clinically normal hedgehogs can harbour *T. mentagrophytes* var. *erinacei* is clear from this survey. It should therefore be emphasized to the public, and especially to children, that the handling of any hedgehog, even if apparently perfectly healthy, brings a risk of contracting hedgehog ringworm. Though it has been shown that *Microsporum distortum* and the granular form of *T. mentagrophytes* can both survive on the hedgehog, survey results indicate that there is virtually no risk to man of contracting such infections from this source.

'INDIRECT INFECTION' The results of the soil inoculation experiments seem to eliminate as a probability the soil-borne infection of man by *T. mentagrophytes*
var. *erinacei* due to active growth of the fungus in the soil but passive transfer by contact with recently shed skin scales remains possible. The hedgehog population of New Zealand is very high... the animals are well known to have a predilection for gardens, and the average incidence of ringworm among them is 48% (English et al., 1964). The chances that children, especially, might contract the infection from this source are probably not inconsiderable.

La Touche and Forster (1963) give special attention to the presence of mycelium in the quills of infected hedgehogs from the point of view of the facility with which infection could be transmitted to human beings handling these animals. Smith and Marples (1963) show the isolation of the fungus from quills and also discuss in a preliminary report the possible role of the hedgehog mite, *Caparinia tripilis*, in the transmission of the fungus from animal to animal. They note that hedgehogs in New Zealand do not harbour the flea *Achraeopsylla erinacei* which, though so conspicuous on animals living in Europe, was lost on its journey from this country to New Zealand, and is therefore not considered as a vector.

Though other authors have specifically mentioned the hazard of infection in children, of the three cases recorded here, only one is a child.

**CASE REPORTS**

**CASE 1** A woman, aged 57 years, had an infection on the right hand, left side of the neck, and left axilla. She gave no history of contact with hedgehogs but handled a variety of animals including mice, cats, and dogs. A mouse and cat were examined and found not to be infected but the dog was not examined (dogs may be infected by their natural curiosity or antagonism to hedgehogs).

**CASE 2** A woman, aged 51, had blistering and peeling of the skin of the left hand. There was no history of contact with hedgehogs but she had contact with a dog with 'bad' ears. The dog was not made available for examination.

**CASE 3** A boy, aged 6 years, had a plaque of healing erythema with a spreading edge on the left calf with satellite plaques. There was no history of contact with hedgehogs and only a vague contact with dogs.

In view of the suggested increase of infection by this fungus which may or may not be localized, a description of the colonial and microscopical picture is given.

**TRICHOPTYON MENTAGROPHYTES VAR. ERINACEI**

On Sabouraud agar, with or without added chloramphenicol and cycloheximide, the colony grows rapidly with a central umbo, finely granular surface and fringed sub-surface border. A brilliant yellow or yellow-orange pigment is produced. Though the growth is rapid at 26°C, optimum temperature is quoted as 35°C and growth is inhibited at pH 4-0 (Smith and Marples, 1963); this is at variance with other *T. mentagrophytes* varieties.

Microscopically, microconidia are numerous, macroconidia are often formed, and intermediate forms are prominent. Spiral hyphae are rarely produced (La Touche, 1965).

Our observations have shown the macroconidia to be elongated and borne individually along the hyphae, not *en grappe*, and the hyphae show a marked tendency to be straight or angular.

Murray (1964), doubted whether the organism should be classified as a variety of *T. mentagrophytes* owing to the many differences observed, particularly mentioning the lack of spiral hyphae, later recognized as only rarely produced. The variation of optimum temperature for growth, and growth inhibition at pH 4-0, quoted by Smith and Marples (1963), and the observation of the shape of the macroconidia and attachment to the hyphae and the marked tendency of the hyphae to be straight or angular, together with other differences, including the pigment, supports this fact. The name *Trichophyton erinacei* is proposed as being taxonomically more correct.

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