CEPHALOSPORIUM MADURAE n. sp., CAUSE OF MADURA FOOT IN INDIA 1)

by

A. A. Padhye, R. S. Sukapure & M. J. Thirumalachar

Hindustan Antibiotics Research Centre, Pimpri, near Poona, India.

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(with 3 figs.)

Madura foot, a chronic deforming disease usually of the foot, is of common occurrence in many parts of India. Large number of people are accustomed to walk bare-footed, and hence, it is often considered to be one of the chief conditions predisposing them to infection. There have been several reports in north India, especially from Bengal, Rajasthan and Bihar, where the madura foot is due to infection by Madurella mycetomi (Laveran) Brumpt, and Glenospora semoni Chalmers and Archibald. While there are a large number of cases reported where madura foot is caused by actinomycetes, no fungi other than M. mycetomi (Andleigh 1957) and G. semoni (Kakoti & Dey, 1956, Panja & Chaudhari 1958) have been reported to occur in India associated with maduromycosis.

The characteristic pattern of infection in maduromycosis is so well known that it needs no repetition. The colour of the granules formed by the fungus within the host is often supposed to give a clue to the nature of the causing organism, but this is not true in all cases. The common colour of the granules is black, white or red. Among the “Fungi Imperfecti” known to be associated with maduromycoses, fungi belonging to several genera and species are reported. Due to difficulties to prove the pathogenicity of the organisms isolated from the granules in animal tests, doubt is often expressed about their pathogenic nature and as the true incitants of madura foot. Except Allescheria boydii Shear (conidial stage of Monosporium apiospermum Sacc.) and Madurella mycetomi the other fungi are considered as of minor importance and doubtful pathogens. This, however, is not a true picture of the problem, since in the tropics where the majority of

1) Dedicated to Professor Tibor Benedek, one of our greatest living Medical Mycologists, on the occasion of his 70th birthday.
cases of madura foot occur, there have been very few or no clinical
and mycological studies, with the result, most of the cases are just
referred to *Actinomyces bovis* Harz, if they ever come to the notice
of medical men.

Among the fungi which have been reported with certainty to be
causing madura foot in U. S. and South America, three species of
*Cephalosporium* have been investigated in detail. These are *C. recifeni*
Leão and Lobo, *C. falciforme* Carrion and *C. granulomatis* Weidman
and Kligman. The first reported was *C. recifeni* by Leão & Lobo (1934)
from mycetoma of foot causing development of soft white pustules
and granules. The second case was that of *C. falciforme* Carrion from
Puerto Rico (1940, 1951, Almeida et al. 1948) forming white granules.
The fungus had several distinctive characters in artificial culture by
way of formation of violet coloured soluble pigment. The other one
reported was from the United States by Weidman & Kligman (1945)
who pointed out the morphological differences of their fungus with
the previous two species. In the present study, madura foot incited
by yet another and distinct species was studied clinically and mor-
phologically, and some of the data are presented in this paper.

**Case History**

Mr. W. R. G., a male patient aged 45 years presented himself at the out-patients
department of the division of Dermatology, Sassoon Hospitals, Poona. Chief
complaint on the day of admission was intense pain, swelling and chronic dis-
charging sinuses on the right foot (Fig. 1). There were eight to ten draining sinuses
on the dorsal aspect of the affected foot and similar ones on the ventral aspect.
The sinuses were discharging pus, containing a large number of black granules.
The patient gave the following history, he is a farmer in the village Kawatha,
Taluka — Shirpur in West Khandesh District. He noticed a small swelling ten years
ago, behind the 2nd toe of the right foot, on the dorsal aspect. This swelling gradually
enlarged and ruptured discharging pus with few black granules and the patient
revealed the history of trauma. This was then followed by periods of regressions
and relapses practically involving the whole foot. On examination, the entire right
foot was found to be enlarged and riddled with multiple sinuses discharging pus
containing black granules. There were multiple small deep-seated nodules and
indurated areas. The foot was tender and very painful.

**Radiologist Report**

Characteristic changes in tarsus and metatarsal bones were consistent with the
diagnosis of mycetoma of foot. The picture showed cystic areas of osteolysis with
sclerosis of their margins and large soft tissue swelling of the right foot.

**Mycological Investigation**

The black granules were collected and washed with several changes of sterile saline water. The grains were black in colour and varied in size from 0.2 to 2 mm in diameter. Microscopic examination of the granules in 10 % caustic potash solution revealed the central mass of mycelium and chlamydospores, with branched hyphae at the periphery of the granules (Fig. 2). The hyphae were slender, hyaline,