

Photo 2 : Inflammatory response induced by presence of *O. gutturosa*, massive number of eosinophils cells (arrows) around the worms.

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EL SINNARY (K.A.), HUSSEIN (M.F.), HUSSEIN (S.H.). *Onchocerca gutturosa* infection of the *ligamentum nuchae* in two cows in the Sudan. *Revue Élev. Méd. vét. Pays trop.*, 1994, **47** (2): 183-184

Severe lesions of the *ligamentum nuchae* are described for the first time in two cows in the Sudan. *Post mortem* and histopathological examination of the nodules reveals inflammatory process the causal agent of which is *Onchocerca gutturosa*.

Key words : Cattle - Cow - *Onchocerca gutturosa* - Brain - Ligament - Histopathology - Lesion - The Sudan.

First isolation of *Trichophyton verrucosum* as the aetiology of ringworm in the Sudanese camels (*Camelus dromedarius*)

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FADLELMULA (A.), AGAB (H.), LE HORGNE (J.M.), ABBAS (B.), ABDALLA (A.E.). Premier isolement de *Trichophyton verrucosum* dans l'étiologie de la teigne chez le dromadaire (*Camelus dromedarius*) au Soudan. *Revue Élev. Méd. vét. Pays trop.*, 1994, **47** (2) : 184-187

Une enquête a été menée au Soudan oriental pour étudier la teigne du chameau. La maladie a été diagnostiquée dans 217 cas sur 498 examens de jeunes chamelons de moins de 2 ans suivis pendant une année entière. L'incidence maximale de la maladie a été observée en automne et en hiver. Celle-ci est plus fréquente chez les animaux de 1 à 2 ans en cours de croissance que chez les animaux plus âgés, mais la prévalence est semblable entre les mâles et les femelles. Les lésions ont été principalement observées sur la tête, le cou et les épaules avec une extension fréquente sur les flancs et les membres. *Trichophyton verrucosum* a été isolé en culture pure pour la première fois comme agent causal de la teigne du chameau au Soudan. Les auteurs décrivent les aspects histopathologiques de la maladie naturelle et discutent de son épidémiologie au Soudan oriental.

Mots clés : Dromadaire - *Camelus dromedarius* - Teigne - Prévalence - *Trichophyton verrucosum* - Infection - Epidémiologie - Soudan.

Introduction

There are few reports on camel ringworm in the literature (4). Some dermatophytes were more frequently isolated from cases of camel ringworm, such as *Trichophyton verrucosum* isolated almost exclusively from young camels and *T. mentagrophytes* from an old animal (12). *Microsporum gypseum* and *M. canis* were also reported (5, 6, 7, 15).

Recent interest in studies of the camel has highlighted some of the diseases of this species. Though there are some records of ringworm in camels in the Sudan, no attempt has yet been made to identify the causative dermatophytes. In this country, *T. verrucosum* has so far been isolated from ringworm in cattle, horses, goats and man (1, 2, 8, 9). This paper describes the first systematic

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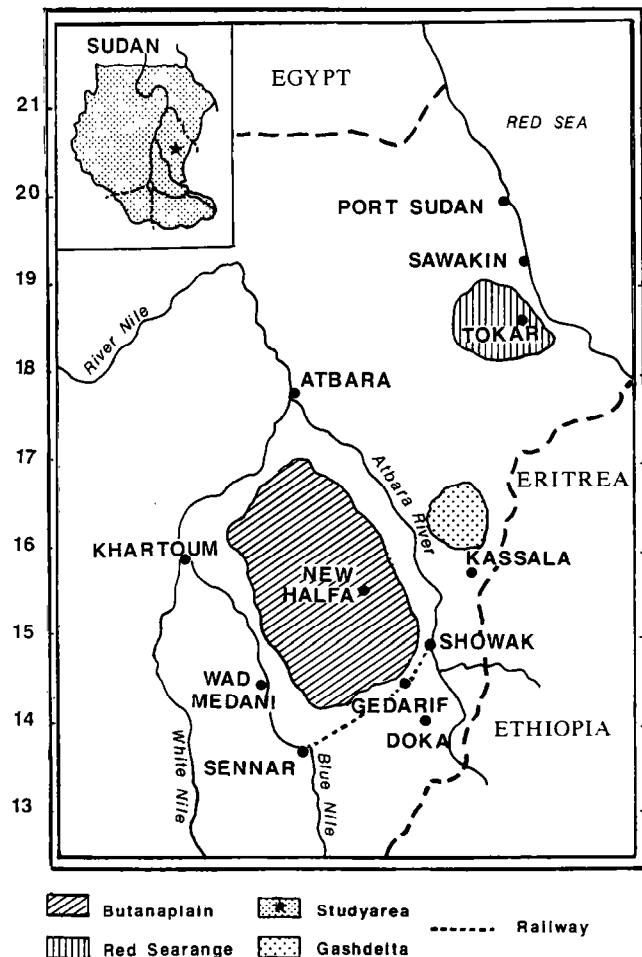
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attempt to isolate and study camel ringworm in this country as no report of isolation of a dermatophyte from the camel has been published before.

Materials and methods

A disease survey was conducted in the Butana area, Eastern Sudan, to study ringworm in camels. This study was performed within the framework of the French-Sudanese Camel Research Project, the aim of which was the study of the husbandry, production parameters and constraints of camel growth (3). In this area camels are commonly raised under nomadic conditions in a geographical zone which lies approximately between latitude 14°-17° N and longitude 33°-36° E (map 1). It holds 20 % of the total camel population of the Sudan in 4 % of the total area of the country. The rainfall is low to moderate (50-200 mm/year) and the vegetation consists of semi-desert grassland in the north and rich savannah with acacia thornland alternating with grass areas to the South.

In the survey, 15 camel herds with a total population of 1,931 heads were examined for the incidence of ringworm infection. Susceptible calves less than two years of age were found to number 498. These herds were visited monthly throughout a whole year (March 1991-February 1992). In each visit, thorough clinical examination was performed. Hair and skin scrapings were removed after cleaning and disinfecting the affected area with 70 % ethyl alcohol. In the laboratory a total of 50 specimens were prepared in 20 % KOH (Potassium hydroxid) solution for direct microscopic examination. From these, 25 samples were cultured onto duplicate slopes of glucose peptone agar containing chloramphenicol (0.05 mg/ml) and actidione "UpJohn" (0.5 mg/ml). The vials were incubated at 26 and 37°C. Subcultures were made on the above medium without antibiotics but enriched with thiamine hydrochloride and inositol (1 mg/100 ml). The slopes were observed daily and needle-mounts from the colonies were stained with lactophenol cotton-blue and studied. Skin biopsies were removed from active lesions, fixed in 10 % formol saline, embedded in wax, cut at 5 µm and stained with Haematoxylin and Eosin (H&E) and periodic acid-Schiff (PAS) for histopathological studies.



Map 1 : The main study area in Butana (Sudan).

Results

Ringworm was diagnosed in 217 out of 498 susceptible camel calves examined throughout the study period (43.5 %). The incidence rate was 43.5 % among calves and 11.2 p. 100 overall. The peak incidence of the disease was found to be in the autumn and winter rather than in summer (figure 1). The disease was observed only among young growing animals with the exception of a single five-year old female dromedary. The prevalence of the disease among male and female animals was about the same (48.3 and 51.7 % respectively). Clinical examination of the 217 affected animals showed the presence of circular scaly and crusty skin lesions with areas of alopecia (photo 1) about 1-3 cm in diameter but sometimes extensive areas were found to be affected. The main parts of the body where lesions were frequently encountered were the head, neck and shoulder with frequent extension to the flanks and limbs. Out of the 217 affected animals, three deaths were reported attributable to this disease.

Direct microscopic examination of the skin and hair scrapings revealed large ectothrix spores (4-7 µm in diameter). Some specimens showed numerous spores distributed all over the area (photo 2). The general picture was one of abundant spores in the crust. All the samples cultured (n = 25) yielded slow growing colonies, white to grey in colour, glabrous and leathery in texture, attaining a diameter of 5-7 mm in three weeks. Enriched media and incubation at 37°C promoted the rate of growth. Microscopic examination of teased portions of the colonies showed numerous chamydiospores and antler-like hyphae. On the basis of descriptions in manuals, the dermatophyte isolated from all the cultured specimens was identified as *T. verrucosum* (14, 16).

Communication

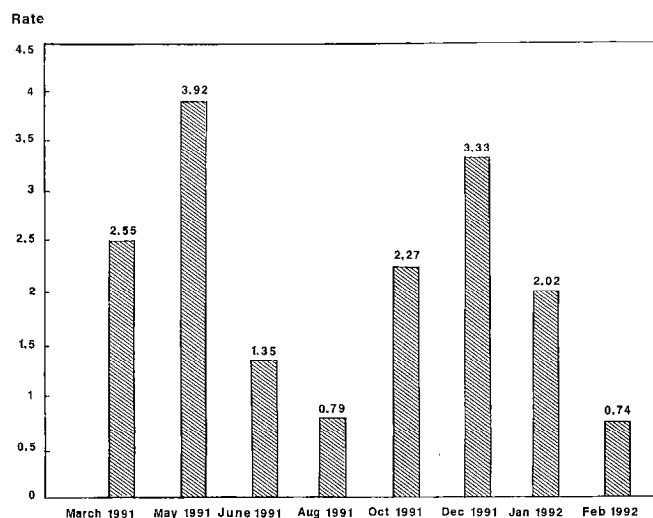


Figure 1 : Monthly incidence of ringworm in the Sudanese camels.



Photo 1 : Typical circular and scaly lesions in a young camel with ringworm caused by *Trichophyton verrucosum*. Note the extension of lesions almost all over the body and to the limbs.

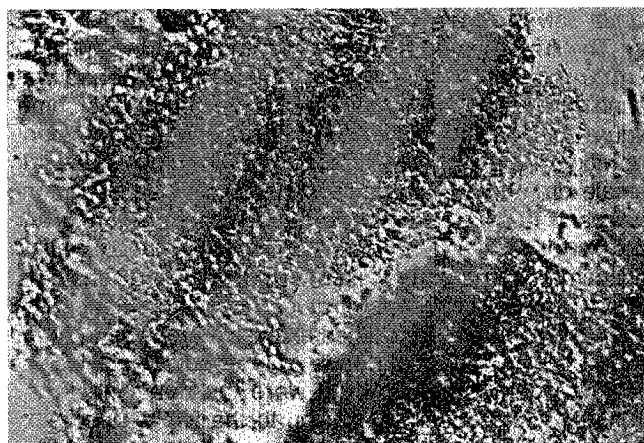


Photo 2 : Direct examination of skin scrapings in 20 % KOH from a camel with ringworm. Note large rounded spores of *T. verrucosum* distributed all over the field (x 225).



Photo 3 : A section of camel skin showing a hair follicle with marked inflammation and abscess formation (H&E x 225).

Histopathological examination revealed hyperkeratosis, parakeratosis and acanthosis in the *stratum corneum*. The epidermis was thickened with rete pegs extending downwards. The crust was observed to consist of tissue fragments, inflammatory cells, dried serum and fungal elements, as demonstrated by the special stain. Fungal fragments could be observed inside hair follicles where there was abscess formation accompanied by marked inflammatory changes (photo 3). Since the disease survey was performed only on camels, other animal species were not investigated for occurrence of ringworm. However, human beings in contact with the affected herds were not observed to contract the disease during the study period.

Discussion

T. verrucosum as an etiologic agent of camel ringworm was isolated for the first time in the Sudan. Species of the genus *Trichophyton* were found to be associated with camel ringworm (12, 13). The present report provides further evidence of the role of *T. verrucosum*, known to infect a wide range of animal hosts and man, as a cause of ringworm in this country (1, 2, 8, 9). Identification of the causative dermatophyte is important for the study of the epidemiology of this zoonotic disease and hence the adoption of appropriate control measures. The incidence

of the disease in the present study was found to be higher in autumn and winter which agrees with the findings of other workers (11). The wet hairs and skins of camels during the rainy season may favour the adherence of the arthroconidia of the dermatophyte and hence establish the infection more frequently than in the dry season. The rain may also aid the spread of the infected material in skin scrapings found in the soil. It is interesting to notice that in direct microscopic examination of the scrapings, some were full of spores and arthroconidia which are highly infective should they come into contact with healthy animals. As reported in cattle ringworm (4), it has been observed that calves were more susceptible to ringworm than older animals. Similar findings have been reported in another survey of camel ringworm in Israel, KUTTIN *et al* (12) isolated *T. verrucosum* from calves and *T. mentagrophytes* from old animals, while the authors of this article managed to isolate *T. verrucosum* from calves and one five-year-old animal. Nevertheless it remains to be investigated in further surveys whether other dermatophytes are involved in camel ringworm in the Sudan. On the other hand, the incidence among both sexes was found to be similar in this study, whereas it was reported to be higher in females than in males by other workers (10).

Treatment of camel ringworm was attempted during this survey by topical application of 5 % salicylic acid followed by application of a mixture of 5 % sulphur in sesame oil (w/v) and it gave fair results. However, chemotherapeutic agents for treatment in general are very expensive, time-consuming, labourious and sometimes not effective. Here it has been stressed the importance of trying to formulate a vaccine for the control of this disease in camels which appears to be feasible.

A research proposal to study camel ringworm and some clinically-related skin diseases in the Sudan with special emphasis on immune responses is in preparation.

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A survey was conducted to study camel ringworm in Eastern Sudan. Ringworm was diagnosed in 217 out of 498 young camel calves under two years old examined during a whole year (43.5 %). The peak incidence of the disease was found to be in Autumn and Winter. The disease was observed more frequently among young growing calves (1-2 years) than older animals but the prevalence among male and female animals was found to be similar. Lesions were observed mainly on the head, neck and shoulder with frequent extension to the flanks and limbs. *Trichophyton verrucosum* was isolated in pure culture for the first time from camel ringworm in the Sudan. Histopathological findings of the natural disease are described. Epidemiology in Eastern Sudan is discussed.

Key words : Dromedary - *Camelus dromedarius* - Ringworm - Prevalence - *Trichophyton verrucosum* - Infection - Epidemiology -The Sudan.