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Observations on Sudanese camel nasal myiasis caused by the larvae of *Cephalopina titillator*

MUSA (M. T.), HARRISON (M.), IBRAHIM (A. M.), TAHA (T. O.). Observations sur une myiase nasale des dromadaires du Soudan causée par des larves de *Cephalopina titillator*. *Revue Elev. Méd. vét. Pays trop.*, 1989, 42 (1) : 27-31.

Quarante-quatre dromadaires sacrifiés à l'abattoir de Nyala dans l'Ouest du Soudan ont été examinés pour y rechercher l'infection par les larves de *Cephalopina titillator*. Le taux d'infection constaté a été de 100 p. 100 et la pression parasitaire s'étalait entre 8 et 243 larves par animal. Les parasites ont été récoltés tout au long de l'année. Les larves du premier stade ont été décelées de décembre à mai, ce qui indiquait la saison de reproduction. Elles ont été la cause de lésions visibles du nasopharynx. Les examens histopathologiques ont confirmé ces faits. Quant aux analyses bactériologiques, elles ont montré la présence de *Pasteurella haemolytica* et *Klebsiella ozaenae* comme cause possible de pneumonie ainsi que *Corynebacterium* spp. qui pourrait être l'agent causal d'infections locales pyogènes. Enfin, des organismes appartenant à l'environnement du dromadaire tels que *Bacillus* et *Proteus* spp. ont également été isolés. *Mots clés* : Dromadaire - *Camelus dromedarius* - *Cephalopina titillator* - Myiase - Nasopharynx - Soudan.

INTRODUCTION

Cephalopina titillator is an obligate parasite of the camel. The adult fly deposits larvae in the nasal cavity and these remain parasitizing the animal for a considerable period of time (7). GRUNIN (5) reported that both *Camelus dromedarius* and *Camelus bactrianus* are affected. The nasal myiasis caused by the larvae of this fly is a common problem in camel breeding areas. HUSSEIN *et al.* (8) reviewed the occurrence of the condition in Africa, the Middle East and elsewhere in Asia, and cited that between 47 to 100 p. 100 of camels examined in those areas were found to be infected.

Little importance has been attached to infection in camels in the past, but recently some investigators have found that the larvae of *Cephalopina titillator* can have considerable ill-effects on these animals. BURGEMEISTER *et al.* (2) found that infected camels died from meningitis caused by secondary infections. HUS-

SEIN *et al.* (7) also reported that the condition causes respiratory and neurological disorders, local inflammatory reactions of the pharynx and congestion of the nasal cavity. In addition, infection with the larvae in hot climatic conditions, during the (maximum) drought periods has important nutritional implications, as infected camels may be distracted from feeding in situations where there is competition for food (4, 6, 7).

In the Sudan, camels are normally found to harbour massive numbers of the larvae at *post mortem* examinations. At pasture they are sometimes seen to expel these larvae while sneezing. STEWARD (11) briefly mentioned that most camels in the country were found to be infested. SOLIMAN (10) encountering camel parasites in Egypt, mentioned that 74 p. 100 of the camels from the Sudan were found infected. However, the present work investigates into the problem in more detail and studies the bacterial population in association with the parasitic infection.

MATERIALS AND METHODS

At Nyala slaughterhouse, in western Sudan, 44 dromedary camels of both sexes and different ages ranging between 2-13 years approximately, were examined during the period from December 1982 to November 1983, at the rate of 3-4 camels per month. Soon after slaughter, the heads of these animals were dissected exposing the nasal, pharyngeal and related cranial cavities. Thorough examinations of the cavities were made for the presence of larvae of *C. titillator* and the recovered larvae were counted and collected in plastic bags using forceps. All of the burden selected at random from representative camels were taken to the laboratory to be weighed. Notes were also made on the sites of the larval attachment, visible pathological lesions and the larval stages. Swabs were also collected from the lesions of six camels selected randomly for bacteriological examination. The swabs were cultured on blood agar plates, incubated aerobically and the bacteria recovered were identified according to COWAN and STEEL (3). Specimens were also taken from the visible lesions and transferred into 10 p. 100 formol saline for histopathological examination. They were processed, embedded in paraffin wax, sectioned

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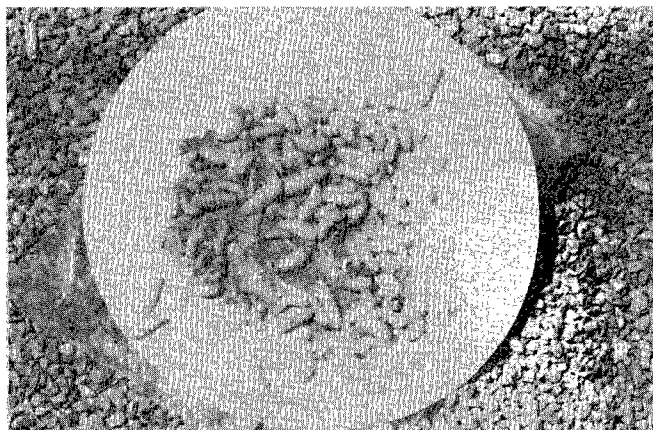
2. Veterinary Research Administration, P.O. Box 8067, El Amarat, Khartoum, Sudan.

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and stained with haematoxylin and eosin (H & E).

RESULTS

All the 44 camels examined were found to be infected with the larvae of *C. titillator*. The number of the parasites ranged between 8-243 per animal. Figure 1 shows the larvae collected from one camel. In most cases, 2nd and 3rd stage larvae were found mixed (Fig. 1) and attached to the pharyngeal mucosa. Cha-



racteristically, these second and third stage larvae have rings of conical spines. They migrate from one place to another in the nasopharynx. Very occasionally some of these larvae were seen between the nasal turbinate bones. The first stage larvae were found in the nasal passages and occasionally between the nasal turbinate bones. These latter were mainly seen in the period from December to May. The maximum number of the 1st stage larvae found was 5. A representative and random samples of the numbers and corresponding weights of larvae per camel are presented in table I.

At the sites where the larvae were attached, profuse mucus was found. Lesions produced by the parasites at their sites of attachment varied according to the nature of the infection. Earlier HUSSEIN *et al.* (7) reported that black spots represent abandoned locations of the parasites. We also observed that recent attacks were represented by haemorrhagic areas. Ulcer-like erosions were also observed and their presence may suggest a concurrent bacterial infection. Glandular and nodular mucosal surfaces were also observed in some cases, as a result of healing processes and/or infection with pyogenic bacteria. Thus some nodules containing pus were observed.

TABLE I Number of larvae per camel and their corresponding weights.

Number of larvae per camel	Weights of larvae in grams per camel
29	6.48
153	42.36
94	25.96
197	68.70
158	54.82
19	4.37
52	14.76
60	14.51
96	34.85
22	3.91
42	19.38
64	16.38
143	50.72
23	6.67

Bacteriological examination

Bacteria isolated in association with the larvae are shown in table II.

TABLE II Bacteria isolated from nasopharyngeal mucosae of camels infested with *C. titillator*.

Camels examined	Bacteria isolated
No. 1	<i>Pasteurella haemolytica</i>
No. 2	<i>Pasteurella haemolytica</i>
No. 3	<i>Pasteurella haemolytica</i>
No. 4	<i>Corynebacterium</i> spp. + <i>Klebsiella ozaenae</i>
No. 5	<i>Bacillus</i> spp.
No. 6	<i>Proteus</i> spp.

Histopathological examinations

The pharyngeal wall showed desquamation, hydropic degeneration and hyperplasia of the surface epithelium of the mucosa. In some areas the mucus membranes of the pharyngeal wall was denuded and irregular (Fig. 2).

The upper part of the submucous tissue was focally or diffusely infiltrated by lymphocytes, reticuloendothelial cells and fibroblasts (Fig. 3).

The pharyngeal mucus glands showed degenerative atrophy and desquamation of their lining epithelium, lymphocytic infiltration and thickening of the interaci-



Fig. 2 : Pharyngeal wall desquamation, hydropic degeneration and hyperplasia of the surface epithelium, as well as proliferative reactions.



Fig. 4 : Degeneration, atrophy and desquamation of the lining epithelium, lymphocytic infiltration and thickening of interacinar connective tissue.

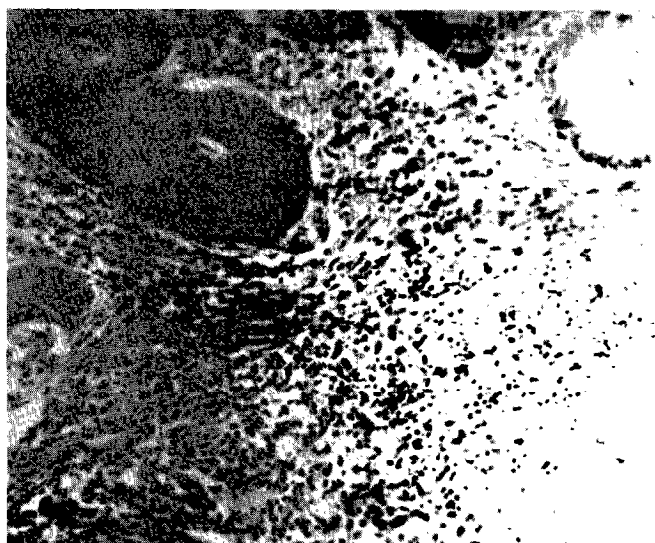


Fig. 3 : Infiltration of the subnucous tissue by lymphocytes, reticuloendothelial cells and fibroblasts.

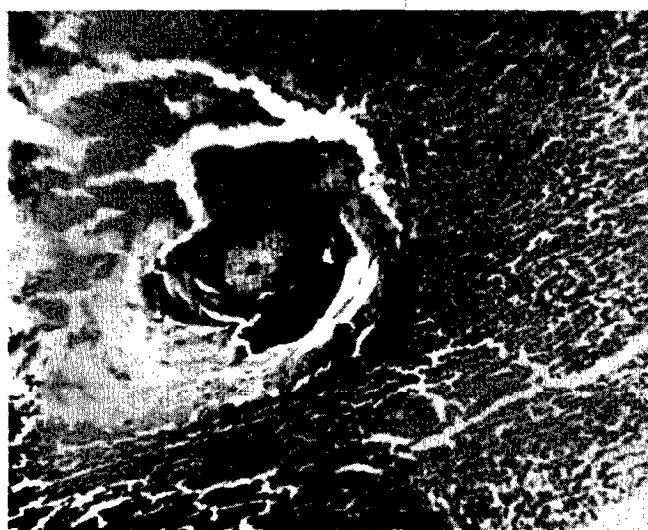


Fig. 5 : Granulomas consisting of round cells.

nar connective tissue (Fig. 4). In some cases small granulomas consisting of round cells with hyperchromatism were seen (Fig. 5).

DISCUSSION

The present study revealed that all of the 44 camels in western Sudan were infected with the larvae of the

camel bot fly *Cephalopina titillator*. These findings are higher than those of the earlier investigators (10, 11). However, the recent drought conditions which hit the country might have influenced this increase as the flies thrive well in maximum drought conditions. The parasitic burden per animal were found to be as high as 243 larvae. These enormous numbers, together with the heavy mucus, found in association with the larvae seem to be the reason for the restlessness and difficult breathing mentioned earlier by some investigators (2, 6, 8).

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It would appear that camels may be found to be infected with *C. titillator* in any month of the year. However, if presence of first stage larvae is taken as an indication of the breeding season, then this would be restricted to the months of December to May, comprising the cool and hot parts of the dry season. Similar observations were recorded by ABDUL HAB and AL AFFASS (1) when they found that the transmission occurs annually during summer and winter months, which are however the dry and humid seasons in Iraq, respectively.

The second and third stage larvae, when migrating from the sites of deposition (the nasal cavities) to the pharynx and from one site to the other in the pharyngeal mucosa and while attaching and detaching, cause considerable damage to the intact mucus membrane by their conical spines. This was revealed by the visual and histopathological examinations. Some of the damaged areas heal by the formation of extensive fibrosis and some become eroded. This damage seems to give an excellent opportunity for secondary bacterial infection. The lymphocytic infiltration seen in some histopathological sections may support this hypothesis. The migrating larvae are also likely to carry micro-organisms from one place to another. Earlier, LEESE (9) mentioned that the mechanical damage may assist the introduction of anthrax spores.

From the bacteriological examinations, organisms recovered from the sites of infestation, like *Pasteurella haemolytica* and *Klebsiella ozaenae*, if disseminated, could be a cause of complications as they are commonly associated with pneumonia.

In one of the camels, small nodules containing pus were seen; this fact supports the view of the occurrence of pyogenic infections by bacteria such as *Corynebacterium*.

CONCLUSION

Since *C. titillator* almost certainly occurs in most camel breeding areas, the present findings together with those of earlier investigators should stimulate studies on the real economic impact of the infestation. Camels are a source of milk and meat for a vast number of people in many countries in Africa and Asia. Control measures may improve the production of camels and also prevent possible losses due to secondary infections.

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MUSA (M. T.), HARRISON (M.), IBRAHIM (A. M.), TAHA (T. O.). Observations on Sudanese camel nasal myiasis caused by the larvae of *Cephalopina titillator*. *Revue Elev. Méd. vét. Pays trop.*, 1989, 42 (1): 27-31.

Forty-four camels slaughtered at Nyala abattoir, western Sudan, were examined for infection with the larvae of *Cephalopina titillator*. The infection rate was found to be 100 p. 100. The parasitic burden ranged between 8-243 per animal. They were recovered throughout the year. The first stage larvae were noticed from December to May, indicating the breeding season of the fly. The larvae were found to cause visible pathological lesions on the nasopharynx. These were also demonstrated histopathologically. Bacteriological examinations revealed the presence of *Pasteurella haemolytica* and *Klebsiella ozaenae* as possible causes of pneumonia, and *Corynebacterium* species which could possibly cause pyogenic infections locally. Organisms from the camel environment like *Bacillus* and *Proteus* species were also isolated. *Key words*: Camel - *Camelus dromedarius* - *Cephalopina titillator* - Myiasis - Nasopharynx - Sudan.

MUSA (M. T.), HARRISON (M.), IBRAHIM (A. M.), TAHA (T. O.). Observaciones sobre una miasis nasal de los dromedarios en el Sudán causada por larvas de *Cephalopina titillator*. *Revue Elev. Méd. vét. Pays trop.*, 1989, 42 (1): 27-31.

Se examinaron 44 dromedarios matados en el matadero de Nyala, en el Oeste del Sudán, para evidenciar la infección por larvas de *Cephalopina titillator*. Fue de 100 p. 100 el porcentaje de infestación y entre 8 y 243 larvas por animal el parasitismo observado. Se recogieron los parásitos durante todo el año: los larvas del primer estado aparecieron de diciembre a mayo, lo que indicaba la estación de reproducción. Provocaron lesiones visibles del nasofaringe que confirmaron exámenes histopatológicos. Análisis bacteriológicas mostraron la presencia de *Pasteurella haemolytica* y *Klebsiella ozaenae* pudiendo causar neumonía y *Corynebacterium* spp. que podría causar infecciones locales piógenas. Se aislaron también organismos perteneciendo al medio ambiente del dromedario como *Bacillus* y *Proteus* spp. *Palabras claves*: Dromedario - *Camelus dromedarius* - *Cephalopina titillator* - Miasis - Nasofaringe - Sudán.

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