

MURINE MANGE DUE TO MYOCOPTES MUSCULINUS (ACARINA: LISTROPHORIDAE) IN LABORATORY MICE IN PAPUA

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ABSTRACT.

Murine mange due to M. musculus was recorded from laboratory mice in Papua and New Guinea for the first time. A considerable difference in pathogenicity was reported between two unrelated strains of mice. The condition was controlled by treatment of all animals with .02 per cent. Tetmosol solution.

INTRODUCTION.

Skin mange in laboratory mouse colonies is not uncommon and has been reported in the literature on a number of occasions (Gambles 1952, Cook 1953). The condition is caused by infestation with either of two Listrophorid mites, *Myobia musculi* (Schrank 1781) and *Myocoptes musculus* (Koch 1844).

This paper reports two separate outbreaks of myocoptic mange observed recently at the Veterinary Laboratory, Kila Kila, Port Moresby: two strains of mice were involved. The initial outbreak occurred in laboratory white mice maintained at Kila without introductions for the past ten years. More recently however, myocoptic mange was diagnosed in a newly imported brown strain (C38), originating from the Herston Medical School Colony, Brisbane.

To date, mange due to *Myobia musculi* has not been recorded at Kila Kila. This latter parasite is responsible for a more pathogenic skin condition resulting in scab formation and marked pruritis.

It is considered normal for small mammals to carry Listrophorid mites on their fur, however it would appear that these infestations assume pathogenic proportions under certain adverse physiological conditions, such as advanced age in both sexes and lactation in the female.

HISTORY.

Parasitic mange has never previously been recorded from the colony at Kila Kila, which, up until August, 1967, was housed in a non air-conditioned building. Over the past two years all experimental animals at the Veterinary Laboratory have been accommodated in colony rooms with a constant air temperature of approximately 70 degrees F.

Unfortunately these new buildings are poorly proofed against entry by wild rodents and a continual trapping programme is necessary to reduce the numbers of these animals.

A simultaneous infestation of the laboratory guinea pigs with the tropical rat mite, *Ornithonyssus bacoti* (Hirst 1913) would suggest that the wild rodents acted as a reservoir of infection for the experimental colonies.

The C38 strain of mice were found to be heavily infested approximately four weeks after introduction to the laboratory. These animals were housed in a separate room and there was no contact with the previously infested Kila strain. It would appear that these animals carried the parasite when introduced from Australia, or that transmission of *M. musculus* occurred by agent of contaminated feed cubes.

DIAGNOSIS.

When first seen, the alopecia was attributed to ascorbic acid deficiency; this has been common in the past due to the lack of green feed supplementation available locally. An increase

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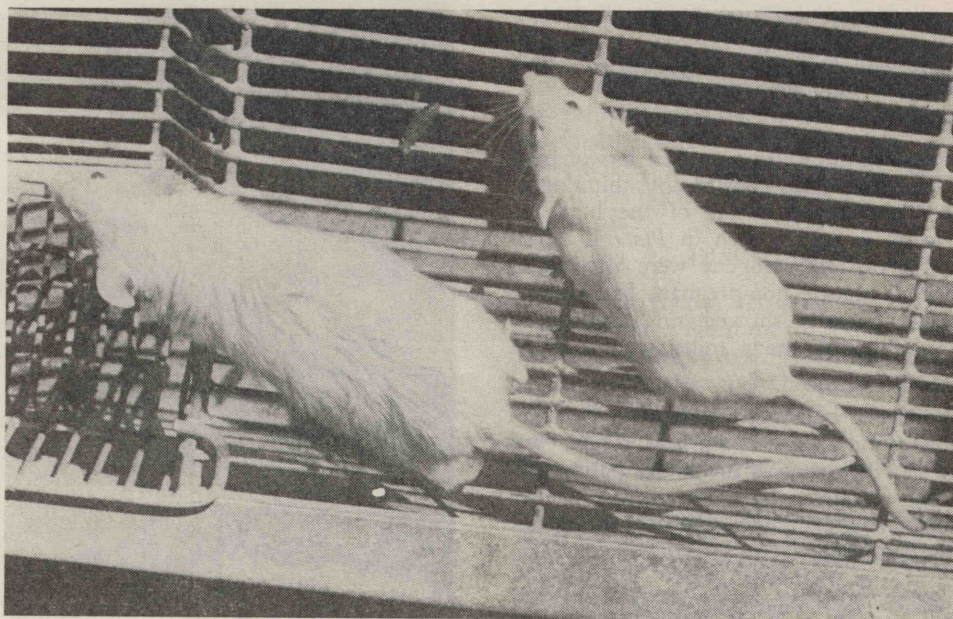


Plate I.—Kila Strain. The coat of the female on the left shows evidence of a parasite infestation while the young male animal has a normal appearance.

in the amount of soluble Vitamin C given in the drinking water however, failed to relieve the disease.

Diagnosis of infestation with ectoparasites was confirmed by examination of fur clippings under a stereomicroscope.

Identification of *M. musculus* was possible only after clearing hair material in a five per cent. Potassium Hydroxide solution; all stages of the life cycle were observed. Examination of the fur of apparently non-affected animals showed the parasite to be present in large numbers.

MORPHOLOGY AND LIFE CYCLE.

The accompanying photomicrographs are included to demonstrate the general morphology of *M. musculus* (Plates III and IV).

These mites spend their entire life cycle on the hair of the host rather than on the skin and may be found on all parts of the body. The eggs measure 200m. x 50m. and are attached to the hair shaft.

A six-legged larva emerges from the egg and after feeding for a time, moults to produce the

eight-legged proto nymph; a further moult gives rise to the pre-adult stage or deutonymph which moults to the sexually mature adult stages. All stages of the life cycle feed at the base of the hair. The adult mites are easily differentiated morphologically by their difference in size and the shape of the posterior abdominal segments.

Female.

The adult female grows to approximately .3 mm. in length. Legs I and II are relatively small and terminate in short stalked flap-like pretarsi, while legs III and IV are highly modified into hair clasping organs (Plate III). The female mite possesses a more elongate body than the male with abdominal cross striations carrying spines.

Male.

The most striking differences in the male are the shorter bilobed posterior abdomen with the presence of small adanal suckers. Leg III is again modified for clasping hair while leg IV is greatly enlarged and ends in sucker-like and claw-like projections.

CLINICAL PICTURE.

In the present outbreaks, each strain of mice demonstrated a different clinical picture.

Kila strain.

These animals showed no marked loss of body hair although there was considerable thinning of the coat. The coarse nature of the hair and lack of lustre is readily seen in *Plate I*. Only lactating females and progeny were affected by the parasite. Mature non-pregnant females and young male animals showed no evidence of infestation although many mites were present.

C38 Herston strain.

All animals of both sexes showed evidence of infestation with *M. musculus*. There was extensive loss of hair on the body, particularly in lactating females. In most animals of this strain there was complete alopecia along the backline (*Plate II*).



Plate II (a).—C38 Strain. These animals showed an increasing reaction to infestation with *M. musculus*.



Plate II (b).—C38 Strain. Female one week after dipping in .02 per cent. Tetmosol solution. Note dark appearance of hair regrowth on back

The mite has been observed to feed at the base of the hair by pushing its feeding apparatus (gnathosoma) down into the follicle beside the hair root and feeding on the soft tissues (Hughes 1959). This causes considerable irritation at the skin surface which results in mechanical loss of hair.

CONTROL.

A number of acaracides have been recommended in the literature for control of mite infestations in laboratory mouse colonies; these have been summarized as follows (Porter and Lane Peter 1962) :—

- (a) Benzene hexachloride ;
- (b) Tetraethylthiuram monosulphide ;*
- (c) Aramite 15W ; and
- (d) D M C (Methylcarbinol).**

* Imperial Chemical Industries.

** Neugatuck Chemical Company, U.S.A.



Plate III.—Female of *M. musculus*. Legs 3 and 4 are adapted for clamping of hair.

While BHC has been used successfully in the past, it is the least desirable due to the rapid build-up of resistance to this chemical by arthropod parasites. The product is not recommended for use in young animals due to its toxicity, and unless complete treatment of the colony is carried out, reinfestation readily occurs.

Methylcarbinol has proven most effective as a miticide and may be used in eradication of *M. musculus* from mouse colonies (Stoner and Hale 1953).

Tetmosol (tetraethylthuriam monosulphide) was used to control the infestations at Kila. This product is used extensively to control sarcoptic mange in man and animals and is relatively non-toxic and easily applied.

A 25 per cent. alcoholic solution of Tetmosol is diluted 1:14 in water and each animal is totally immersed in the solution to ensure com-

plete body coverage. The eggs of the mite are resistant to chemical control and a second application is necessary at least two weeks later.

Reinfestation of the animals occurs easily, and an essential factor in control lies in disposal of waste feed and litter as well as heat sterilization of the cages and utensils.

DISCUSSION.

The observations recorded here are basically in agreement with those of Cook (1953). In the Kila strain, loss of hair was restricted to breeding females and their unweaned litters; although the other animals were observed to carry heavy infestations of *Myocoptes musculus* they remained clinically unaffected.

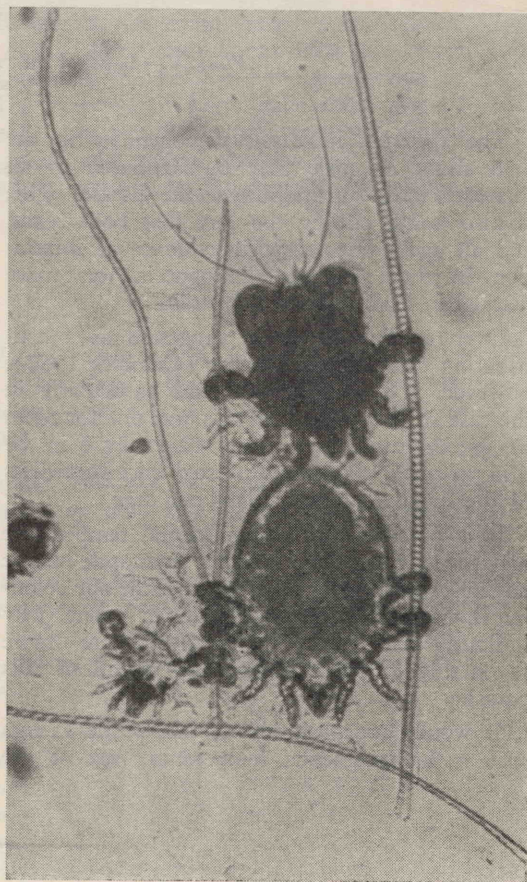


Plate IV.—Adult male and female of *M. musculus*.

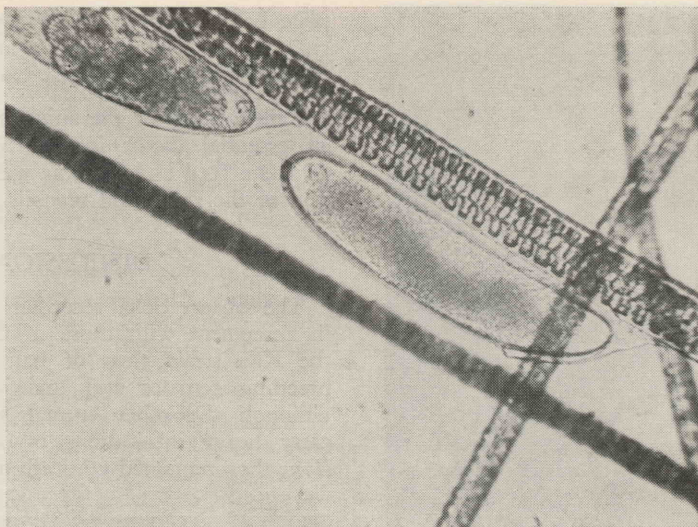


Plate V.—Eggs of *M. musculus* attached to hair shaft.

The apparent increased pathogenicity in the C38 strain of mice may be attributed to an increased strain susceptibility to the disease. This is also borne out by the fact that both sexes, and all age groups showed evidence of infestation in these animals. Alopecia was more marked in male mice of this strain.

Overcrowding has been suggested as a contributing cause of the disease (Gambles 1952), however, in our experience and particularly in the case of the C38 strain this was not found to be so; the cages (a uniform 12 in. by 6 in. by 6 in. in size), all carried infested mice regardless of the number of individuals per cage.

It is possible that environmental temperature may play a role. The fact that myocoptic mange has never previously been recorded in our colonies, housed in non air-conditioned rooms may indicate that cooler temperatures are more favourable to the existence and spread of this parasite.

It would appear however, that while factors such as environmental temperature, sex of the

individual and housing hygiene may contribute to ectoparasitic infestations of mouse colonies, that a considerable strain difference exists in host animals; this fact is more likely to account for the conflicting observations reported in previous outbreaks.

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