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Ringtail Disorder observed in Cotton Rats (*Sigmodon hispidus*)

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Introduction

The cotton rat *Sigmodon hispidus* belongs to the family Cricetidae in the suborder Myomorpha of the order Rodentia. This animal species is used as an experimental host of *Litomosoides carinii* and other filariids (*Bayer & Wenk* 1988, *Müller-Kehrmann* 1988, *Chatterjee & Sen* 1984, *Pringle & King* 1968), *Leishmania donovani* (*Fulton & Niven* 1951, *Hockerts et al.* 1989), *Echoinococcus spp.* (*Norman & Kagan* 1961, *Sousa & Thatcher* 1969), and paragonimiasis (*Voelker & Sachs* 1977).

Ringtail is a pathological condition observed in various laboratory-bred rodents. Thus far, it has been reported in four species: *Rattus norvegicus* (*Njaa et al.* 1957), *Mus Musculus* (*Nelson* 1960), *Mystromys albicaudatus* (*Stuhlmann & Wagner* 1971) and *Saccostomus campestris* (*Ellison & Westlin-van Aarde* 1990). The condition appears first as marked annular constriction of the tail, which becomes more severe (with increasing oedema) and finally the part distal of the constriction falls off, leaving a stump which heals completely (*Totton* 1958). The skin of the hind legs may sometimes become desquamate. Affected animals show no further discomfort or signs of ill health. During autopsy no pathological lesions were found. The etiology of the condition is not completely understood. However, the incidence is probably correlated with a low relative humidity of below 40 per cent (*Njaa et al.* 1957) and also an association with fatty acid deficiency is discussed as possible additional factor (*Totton* 1958).

Materials and methods

Cotton rats have been bred at the animal facility of the Bernhard Nocht Institute (BNI), Hamburg, FRG, for 12 years. The animals are kept under conventional conditions behind a moderate hygiene barrier (changing of clothing of the staff at the entrance to the facility) and housed in macrolon cages with wooden granula. Couples (brother × sister mating) are caged in macrolon cages Typ IV (55×33×20 cm) and single animals in macrolon cages Typ III (33×27×19 cm). Young rats are weaned when 28 days old. A pelleted diet (Altromin 1324: 19 % protein, 4 % fat, 11.9 kj/g utilizable energy) and tap water from macrolon bottles are available ad libitum. The diet is supplemented with sunflower seeds, peanuts, and canned dog food once per week. Cages are cleaned twice weekly.

Artificial light (6^{00} h–18^{00} h) and room temperature (21 ± 2°C) are regulated automatically. Optimized regulation of the relative humidity (50 %–65 %) was installed in May 1990. Before this date, the uncontrolled relative humidity ranged between 30 % and 70 %.

Results and discussion

Typical lesions of ringtail (Fig. 1) were sporadically observed in the BNI-breeding colony. Lesions at different developmental stages (Fig. 2) were observed in 4 of 32 young animals during a 12 month period. Normally, the disorder was noticed in the first 4 weeks of life and 3–5 weeks later affected animals lost their tails. In addition, further

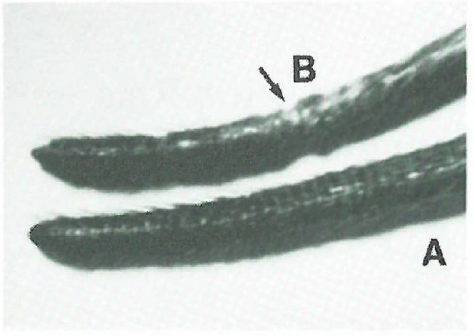

Figure 1. Magnification of normal tail (A) and ringtail lesion at distal end (B).

13 rats lost their tails. The cause of this was uncertain. Occasionally cannibalism exists among cotton rats (*Williams* 1980), a phenomenon, which we have also observed in our colony. Therefore, it is possible that in several of our cases loss of the tail was due to cannibalism.

What ever may have been the cause, after installation of humidity regulation, only 5 of 57 cotton rats (9 %) born during a 14 month period, lost their tails. No typical annular constrictions were noticed in that period. In contrast 53 % of the cotton rats had lost their tails before installing of humidity regulation. Using the Chi-square test, the difference in frequency is highly significant (χ^2 = 21.67; $p \leq 0.001$). It remains uncertain whether the condition can be curtailed completely by regulation of the environmental humidity. Therefore, other possible factors (e.g. diet), must also be considered, and observations will continue.

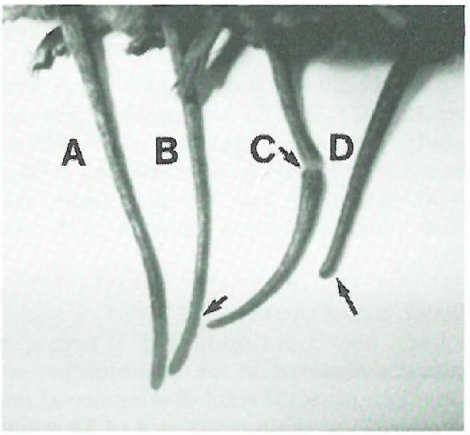

Figure 2. Ringtail in cotton rats. A = Normal tail; B = Ringtail lesion at distal end; C = Ringtail at the middle part, with oedema of distal end; D = Complete healing, after the distal part of tail has fallen off.

None of the Rattus norvegicus and *Mus musculus* of different strains or stocks, kept in the animal facility of the institute under the same environmental conditions, have shown thus far signs of the disorder.

This observation indicates that *Sigmodon hispidus* should be add to the list of susceptible for ringtail, possibly, even more susceptible than *Rattus norvegicus* and *Mus musculus.*

Summary

This is the first description of ringtail syndrome in cotton rats (*Sigmodon hispidus*). The disorder was sporadically observed in a laboratory reared breeding colony. Incidence of tail lesions decreased after standardization of environmental humidity in the laboratory animal facility.

Zusammenfassung

Erstmalig wird das Ring-tail-Syndrom bei Baumwollratten (*Sigmodon hispidus*) beschrieben. Die Erkrankung wurde sporadisch in einer Labortierzucht beobachtet. Nachdem die Luftfeuchtigkeit der Tierräume standardisiert worden war, sank die Inzidenz von Schwanzläsionen.

Yhteenveto / K. Pelkonen

Tämä on ensimmäinen kuvaus kirjallisuudessa ringtailoireyhtymästä puuvillarotassa (*Sigmodon hispidus*). Häiriö esiintyi satunnaisesti laboratoriokasvatetussa tuotantokoloniassa. Häntävammojen esiintyminen väheni koeeläinosaston ilmankosteuden vakiomisen jälkeen.

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