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TICK INFESTATION OF BABOONS (*PAPIO URSINUS*) IN THE NAMIB DESERT

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ABSTRACT: Chacma baboons (*Papio ursinus*) living in an arid environment in Namibia were heavily infested with ticks of the genus *Rhipicephalus*. A survey to assess tick numbers and identity was undertaken in the baboons' habitat. It appears that there is a strong correlation between the number of ticks and the amount of time the baboons spend in an area. It is speculated that tick infestations were responsible for more than half ($n = 18$) of recorded infant deaths amongst these baboons.

Key words: Baboons, ticks, *Rhipicephalus* sp., infant mortalities, otitis, time budget.

INTRODUCTION

Previous reports indicate that tick infestations, skin lesions and skin diseases of baboons are rare (McConnel et al., 1974). Findings of a near absence of ticks on baboons (Kuntz and Myers, 1967; McConnell et al., 1974; Strum, 1987) have led to suggestions that mutual grooming may account for this (Seyfarth, 1977; Silk, 1987). Consequently, tick infestations have not previously been implicated as a major cause of mortalities amongst baboons.

Chacma baboons (*Papio ursinus*) living in the annually dry Kuiseb River canyon of the central Namib Desert, Namibia, are heavily infested with ticks. A survey to assess the number and identity of ticks at areas within the baboons' habitat was conducted, the results of which are presented here together with a discussion of the epidemiological background.

MATERIALS AND METHODS

The study group was the "lower troop" originally described by Hamilton (1985). It is one of three baboon troops that occupy partially overlapping linear ranges within the section of the Kuiseb River canyon that passes through the central Namib Desert (24°00'S, 15°00'E). The troops are named according to the relative position of their adjacent ranges; lower, middle and upper troops (Hamilton, 1985), with the lower troop occupying the most downriver range. The baboons are restricted to the canyon confines for food, water, shelter and sleeping cliffs. The lower troop had 15 individuals at the time of this study.

The canyon vegetation consisted mainly of *Acacia albida* and *Acacia erriloba* trees and *Salvadora persica* bushes. Vegetation is abundant and dense in the down-river portions of the lower troops' range but becomes progressively sparse and distantly spaced as one moves up into the middle and upper troops' ranges (Hamilton et al., 1976). Small residual water pools left after the short annual flood are a permanent feature within the middle and upper troops' ranges but there is no permanent water in the lower troops' range. The climate of the study area is moderate for a desert area with little seasonal temperature variation. The mean annual maximum and minimum temperatures measured at Gobabeb, the nearest first order weather station approximately 26 km west of the lower troops' range are 29.5 C (2.3 SD) and 12.8 C (2.7 SD). The mean annual relative humidity is 50% and the mean annual rainfall 27.2 mm (Lancaster et al., 1984).

A tick collection was conducted for three days in June 1990 within the lower troops' approximate 30 km linear range. This included a 7 km overlap zone with the middle troops' range. A 1 m^2 flannel cloth (flag) attached to one end of a 1.8 m wooden stick was dragged over vegetation at a slow walk for tick collection.

Eight areas with similar plant cover, plant species composition and with similar physical features were selected for sampling within the baboons' range. In each area, measuring approximately 500 m by 200 m, ten randomly chosen runs of 20 m each were sampled for ticks using the above mentioned "flag." At the end of a 20 m stretch, ticks were picked off the cloth, counted and preserved in alcohol for later identification. For statistical purposes the mean number (and range) of ticks collected was cal-

FIGURE 1. Ticks attached to the ear of an adult male baboon.

TABLE 1. The location within the baboon troops range (expressed in km upstream from the downriver limit of their range) where tick numbers were sampled, the median number and range (in parentheses) of ticks collected within an area and the number of days the baboons were observed to spend in those areas in the preceding 3 mo.

Km of range	Days in area	Median number and range (in parentheses) of ticks collected
2	2	1 (0–5)
7.6	17	9 (0–53)
9.4	15	3 (0–30)
13.4	2	1 (0–4)
17.2	18	5 (0–57)
22.1	6	1 (0–24)
24.4	4	1 (0–8)
26.4	0	0 (0–1)

culated for each area ($n = 8$) and correlated to the number of days the baboons had spent in that area over the preceding three months using Spearman's Rank Correlation statistical procedure.

Two regularly used baboon sleeping cliffs were searched for engorged ticks. Domestic goats, cattle and horses that occasionally feed in the downriver limits of the lower troops' range also were frequently examined for ticks and any observed morbidity or mortality ascribed to tick infestation was noted. Post mortem examinations and tick collections were carried out on two adult male and one infant baboon immediately following their deaths. All ticks were identified in the laboratory at the Veterinary Research Institute, Onderstepoort, Republic of South Africa, and the Central Veterinary Laboratory, Windhoek, Namibia.

RESULTS

The median number of ticks sampled by flagging, the location of those areas and the number of days the baboons had spent in those areas in the preceding three months are shown in Table 1. A strong correlation ($r_s = 0.91$, $n = 8$, $P < 0.05$) exists between days spent in an area and the tick infestation thereof. Few ticks were found on the sleeping cliffs, possibly because we could not access all the sleeping sites used by baboons. The two adult male baboons killed in dominance fights each carried more than 400 adult ticks, the majority being attached to the ears (Fig. 1). Histopathologically the pinnae showed prominant chronic inflammation with epidermal acantosis and exudative crusting. The number of eosinophiles was clearly increased. The infant abandoned by its mother a few hours after its death harboured 70 ticks, most infesting muzzle, hands and feet and showed acute inflammation of the nose and mouth (Fig. 2). Prior to its death this infant was seen to be unable to suckle, a characteristic seen in the other infant deaths. Domestic goats, horses and cattle inspected at no time yielded more than 20 adult ticks per animal.

All ticks collected except one were of the same species and identified as *Rhipicephalus gertrudae* or a very similar species. Further identity on species or subspecies level of these ticks has yet to be determined. The one exception was a specimen of *Hyalomma marginatum rufipes* found in the river bed.

DISCUSSION

Baboons are known to occupy various portions of their range unequally (Altmann and Altmann, 1970; Sigg and Stolba, 1981) and to concentrate activity in specific areas, rather than be completely nomadic. It is suggested that an advantage

FIGURE 2. Tick infestation of an infant's muzzle resulted in acute inflammation of the nose and mouth inhibiting the infant from suckling.

of this is a saving of energy and time to locate key resources (Dunbar, 1988). The lower troop of Kuiseb baboons which for most of each year relies on limited and unpredictable water sources (Brain, 1988) concentrates its time in well demarcated areas of high moisture plant food (Brain, 1988, 1990) where times of between one and 26 days elapse without the animals drinking. In these waterless areas the baboons move less and spend more time resting in the shade when compared to range use elsewhere (Brain, 1990). Although the life cycle and intermediate hosts for this tick are not yet known, the areas of regular and repeated use by baboons appear to have relatively higher tick numbers (Table 1) as determined by the qualitative and semi-quantitative flagging method. The ears of the baboons are most notably affected by ticks and all baboons in the troop show visible raw or bleeding lesions on the pinnae. This was reported by Hamilton (Hamilton et al., 1976) but the cause was then unknown.

Although many other species of mammals, including spotted hyaena (*Crocuta crocuta*), jackal (*Canis mesomelas*), African wildcat (*Felis lybica*), gemsbok (*Oryx gazella*), steenbuck (*Raphicerus campestris*) and klipspringer (*Oreotragus oreotragus*), live in the baboons' range, none show any visible signs of tick infestation as seen on the baboons but none have been closely examined for parasites and their possible role as hosts of *Rhipicephalus gertrudae* is unknown. Similarly, the domestic stock inspected carried relatively few ticks but whether or not these animals can maintain tick populations in the study area is still uncertain. Although *Hyalomma* sp. ticks are generally very well adapted to arid and semi-arid environments (Theiler, 1956, 1962; Knight et al., 1978), only one was collected. All other ticks collected were morphologically similar and closely related to *Rhipicephalus gertrudae*. Although the taxonomic status of many *Rhipicephalus* sp. ticks has caused problems in the past, the situation is becoming clearer (Theiler, 1950; Feldmann-Muhsam, 1960; Biggs and Langenhoven, 1984; Pegram and Walker, 1988). *Rhipicephalus gertrudae*-like ticks were found in parts of the Namib Desert before (J. B. Walker, pers. comm.) but the details of the life-cycle and intermediate hosts are not known for a desert environment.

Grooming activity amongst the baboons of the study group occurs at a comparable rate to baboon populations elsewhere (Altmann and Altmann, 1970) with a rate of between one and four grooming events for each daylight hour. However, to date, a characteristic of grooming amongst these baboons is a near absence of the grooming off or removing of obviously visible engorged female ticks. Male or unfed female ticks are occasionally removed and then bitten by the baboon who, showing signs of obvious distaste, grimaces, quickly spitting out the tick or shaking it off its hand. Furthermore, a small bleeding cutaneous lesion frequently remains at the site of tick attachment following its removal by a baboon and it is speculated that the possible pain involved in removing a tick together with the associated unpleasant taste may be inhibiting the baboons from grooming off more ticks. Over the last 4 yr, 18 of the 21 infants born in the lower troop have died before becoming 6 mo old. The complex interactions of factors resulting in this

abnormally high mortality are to be examined elsewhere, but it is clear that tick infestations are a major contributing factor to neonatal death as to date more than half of the 18 recorded infant deaths appears to be tick related.

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