

## TICKS FOUND AMONG THE WILD RINGTAILED LEMURS AT THE BERENTY RESERVE, MADAGASCAR

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**ABSTRACT** From the facial skins of the 22 ringtailed lemurs (*Lemur catta*), 184 ticks (*Haemaphysalis (Rhipistoma) lemuris* Hoogstraal, 1953) were collected at the Berenty Reserve, Madagascar. Male ticks occupied 93% of the specimen, and the females only 5%. Among the age-sex classes of lemurs, there was no significant difference in the number of ticks. In a group, the rank order among adult males and adult females was not correlated with the number of ticks found around the facial skin.

**Key Words:** *Lemur catta*; *Haemaphysalis lemuris*; Ectoparasite; Primates.

### INTRODUCTION

Many species of ectoparasites (e.g., lice, tick, etc.) live on the body of primates (e.g., Rijksen, 1978 for orang-utan; Goodall, 1986 for chimpanzee; Tanaka & Takefushi, 1993 for Japanese macaque). Primatologists have discussed the hygienic function of grooming to remove such ectoparasites (Silk, 1986).

It has been reported that a species of tick (*Haemaphysalis lemuris*) live on at least nine species/subspecies of lemurs living in Madagascar (Uilenberg, et al., 1979). In 1997, we captured 24 ringtailed lemurs (*Lemur catta*) to collect blood samples to analyze their genetic variability at the Berenty Reserve, Madagascar. We collected 184 ticks from the facial skins of 22 individuals. Here, we briefly report on the relationship between this species and lemurs.

### STUDY PLACE AND SUBJECTS

A population of ringtailed lemurs has been observed at the Berenty Reserve, Madagascar since the 1960's (Jolly, 1966, 1972). The lemurs of C troop (lately fissioned into C1, C2A, C2B, and Cx troops) and T troop (also fissioned into T1, T2

**Table 1.** Sex and number of ticks on facial skins of captured lemurs.

| Troop | Name         | Age/<br>sex<br>class | Rank<br>among<br>class | Number of ticks |        |   |       |
|-------|--------------|----------------------|------------------------|-----------------|--------|---|-------|
|       |              |                      |                        | Male            | Female | ? | Total |
| Cx    | CW90         | Adult female         | 1                      | 8               | —      | — | 8     |
| Cx    | CW9094       | Adult female         | 2                      | 6               | —      | — | 6     |
| Cx    | MW911        | Adult female         | 3                      | 4               | —      | — | 4     |
| Cx    | SH92         | Adult female         | 4                      | 14              | 3      | — | 17    |
| Cx    | MW91195      | Subadult female      | —                      | 10              | —      | — | 10    |
| Cx    | SH9296       | Juvenile female      | —                      | 19              | 1      | — | 20    |
| Cx    | CW9096       | Juvenile male        | —                      | 6               | 1      | — | 7     |
| Cx    | CW9097       | Infant male          | —                      | 5               | —      | — | 5     |
| Cx    | KI92         | Adult male           | 1                      | 12              | 2      | — | 14    |
| Cx    | HAS          | Adult male           | 2                      | 2               | —      | — | 2     |
| Cx    | KUR          | Adult male           | 3                      | 16              | —      | — | 16    |
| Cx    | Peripheral 1 | Adult male           | 4                      | 2               | —      | 1 | 3     |
| Cx    | Peripheral 2 | Adult male           | 4                      | 15              | —      | — | 15    |
| C1    | ME8994       | Adult female         | 3                      | 2               | —      | — | 2     |
| C1    | MW           | Adult female         | 4                      | 2               | —      | — | 2     |
| C1    | MK92         | Adult female         | 5                      | 5               | 1      | 1 | 7     |
| C1    | HI           | Adult female         | 6                      | 8               | —      | — | 8     |
| C1    | TJ           | Adult male           | 1                      | 2               | —      | — | 2     |
| C1    | DS           | Adult male           | 2                      | 9               | —      | 1 | 10    |
| C1    | KOU          | Adult male           | 3                      | 11              | —      | — | 11    |
| C1    | MAY91        | Adult male           | 4                      | 2               | —      | — | 2     |
| ?     | Unknown      | —                    | —                      | 11              | 2      | — | 13    |
| Total |              |                      |                        | 171             | 10     | 3 | 184   |

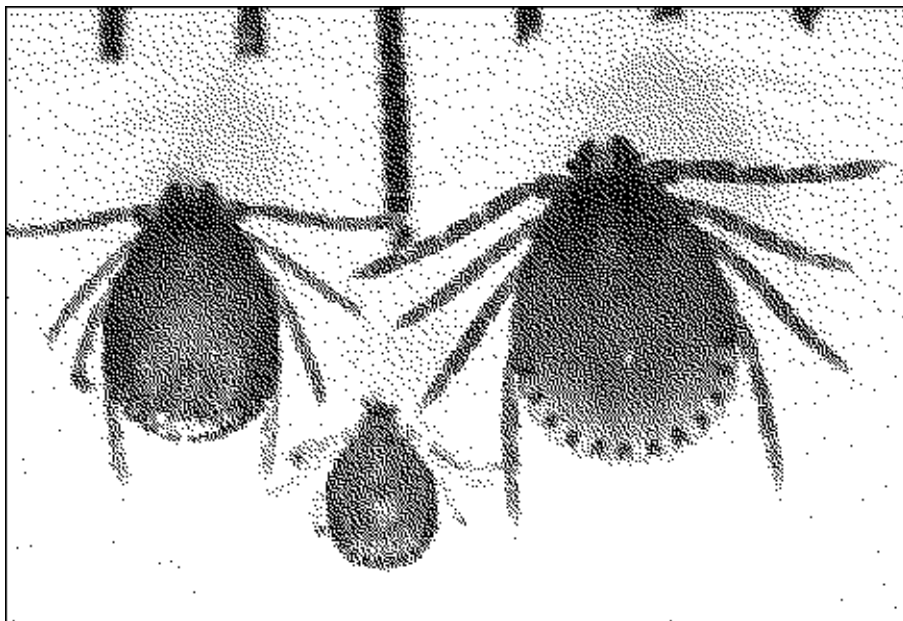
troops, and HSK group) have been identified and observed since 1989 by NK and his colleagues (Koyama, 1991; Oda, 1996; Nakamichi & Koyama, 1997).

From August to October 1997, YT identified the lemurs of Cx and C1 troops, and clarified their dominance order. In November 1997, YK, HH, and NM anesthetized 24 lemurs using blowpipe and darts. We collected ticks from the face skins of the 22 lemurs excluding two newborn infants. Out of these lemurs, 13 individuals belonged to Cx troop, eight individuals to C1 troop, and one individual to an unknown troop (Table 1). The ticks were identified by SK and HS in Japan (Fig. 1).

## RESULTS

### I. TICK SPECIES AND ITS SEX RATIO

Ticks stuck to the naked skins (e.g., face and genital organs) of lemurs (Fig. 2). From 22 lemurs, 184 ticks were found on facial skins in total (Table 1). They were identified as *Haemaphysalis lemuris* Hoogstraal. Male ticks occupied 92.9% of the specimen, and the female ticks 5.4% (Table 1).



**Fig. 1.** Tick images.



**Fig. 2.** The ticks on the facial skin of a lemur.

## II. LEMUR AGE-SEX CLASS, RANK, AND TICKS

There was no significant difference in the number of ticks around face skins among age-sex classes of lemurs (Kruskal-Wallis test,  $H=2.087$ ,  $df=3$ ,  $p=0.555$ ), although more ticks were found on the faces of the subadult/juvenile lemurs (Fig. 3).

Among the Cx troop members, there was no significant correlation between the rank order of adult male lemurs and the number of ticks (Spearman's rank coefficient test,  $r_s=0.205$ ,  $p=0.741$ ), nor between the rank order of adult females and the number of ticks ( $r_s=0.289$ ,  $p=0.800$ ).

## DISCUSSION

Many species of parasites live on/within the body of primates. For example, 61.4–97.1% of Japanese macaques was infected with one or more species of endoparasites (e.g., nematodes) (Tanaka & Nigi, 1967). From the feces of wild chimpanzees of Mahale, endoparasite species from four genera of nematode, one genus of trematode, and three genera of protozoa were identified (Huffman *et al.*, 1996a).

Recently, the coevolution between hosts and parasites has aroused the attentions of evolutionary biologists (Futuyma, 1986; Huffman *et al.*, 1996b). In particular, behavioral ecologists have discussed the hypothesis that parasites play a crucial role in sexual selection (Zuk *et al.*, 1990), whereas, primatologists have discussed the

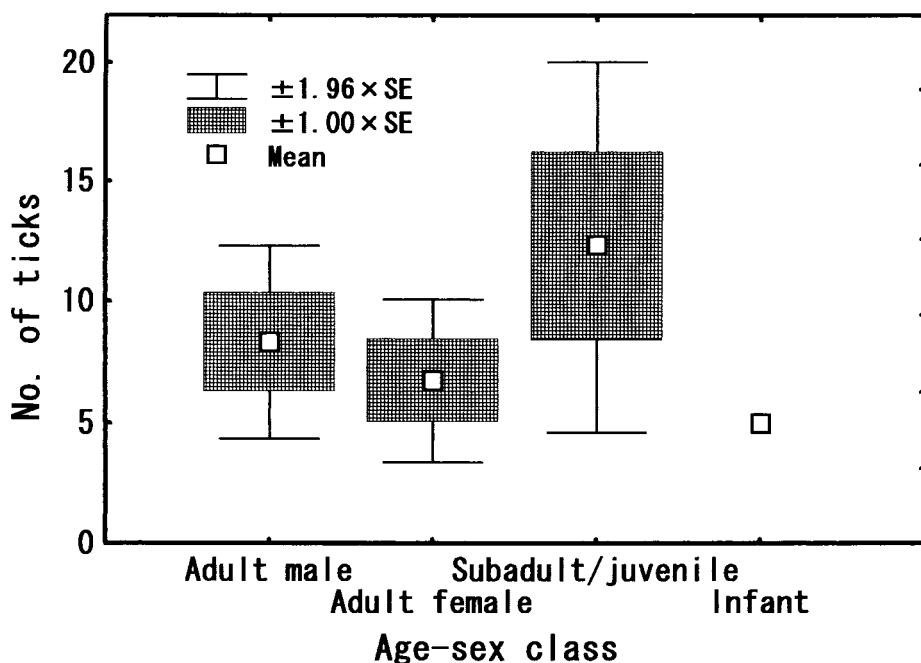


Fig. 3. The mean number of ticks found on the faces of each age/sex class.

hygienic function of grooming to remove ectoparasites (Silk, 1986). For example, Tanaka and Takefushi (1993) found that, while grooming, Japanese macaques picked lice and its eggs and ate them. Tanaka and Takefushi pointed out that social grooming has an altruistic function to eliminate the ectoparasites on others.

At Berenty, Nakamichi and Koyama (1997) reported that social grooming occurred more frequently between closely related females of ringtailed lemurs than between unrelated ones, and that subordinates were likely to groom dominants more frequently than vice versa. Thus, it may be expected that ticks less frequently infest the dominant lemurs than the subordinates. However, the present data exhibited no such significant correlations. The sample size of the present study was too small, and further study is required to analyze the relationship between ringtailed lemurs and the ticks including seasonal changes.

The imbalance between the male and female population of *Haemaphysalis lemuris* on the naked skins of ringtailed lemurs of Berenty may be explained by the fact that female ticks leave the host (=lemurs) to lay eggs several days after copulation and following engorgement, but that male ticks remain on the host in order to mate with multiple females.

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