

Brief Report

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Use of Millipedes by Black Lemurs to Anoint Their Bodies

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Key Words

Anointing behaviour · Black lemur · *Charactopygus* · *Eulemur macaco* ·
Madagascar · Millipede

During a study of seed dispersal by the black lemur (*Eulemur macaco* Linnaeus 1766) in Lokobe Forest, Nosy Be, Madagascar (lat. 13°23'–25' S, long. 48°18'–20' E), black lemur groups were observed for a total of 811 daylight hours spread over 19 months. On two occasions (27 and 29 December 1996) a mature female was seen anointing her body with a millipede (*Charactopygus* sp.; Spirostreptidae). On both occasions she found, apparently by chance, the millipede creeping along an exposed branch as she moved between food sources. She took it in one hand, sat on the branch with her legs forward, her ventral surface exposed and her tail curling upwards between her legs, bit it and rubbed its wounded, saliva-covered body vigorously over her ventral surface and tail. After biting it, she grimaced, half closed her eyes and salivated profusely. These actions were repeated several times before the millipede was dropped. The whole incident lasted between 3 and 4 min and at its conclusion the lemur continued her previous activity, travelling towards her next food source.

The millipede was recovered on one occasion; it was 10 cm long and 0.6 cm wide and smelt strongly. When threatened, millipedes secrete chemicals from lateral glands and presumably it was these secretions which smelt [1, 2]. The chemical composition of millipede secretions varies between species and a wide range of chemicals have been identified including aldehydes, quinones, phenols, chlorine, iodine and hydrogen cyanide [1, 2]. These function to protect the millipede from predation and have been reported to have sedative, repellent, irritant and toxic effects on various predators [2].

Although black lemurs are primarily foliofrugivores they also eat 'easy-to-catch' invertebrates such as cicada (Homoptera: Cicadidae) and frog-hoppers (Homoptera: Cercopidae) [3]. At Lokobe, black lemurs were never seen to eat millipedes, but else-

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where these invertebrates have been reported in the black lemur diet [4]. This behaviour may thus have been an aborted attempt by the lemur to eat a rarely encountered unpalatable millipede species which had been confused with a palatable species. The rubbing of the millipede against the fur could have been an attempt to remove the unpalatable secretion. Such an interpretation would be inconsistent, however, with the observations that a captive lemur, when frequently presented with this species of millipede, continued to express the same anointing behaviour and also showed the same behaviour with a cigarette [pers. observation].

There are several possible alternative explanations for the observed behaviour. These include: control of ectoparasites; treatment of skin disease; enhancement of olfactory communication; production of an agreeable sensation on the skin, and induction of a psychotropic state.

The last of these explanations is considered the least likely, because, following the lemur's interaction with the millipede, its disposition appeared unchanged and it continued its previous activity. It is perhaps significant that, although the observation periods were spread over 19 months and involved at least 10 different animals, the two observations of lemurs using millipedes were in consecutive study periods, 2 days apart, and involved the same individual. This may be because the individual was temporarily in need of the millipede supporting the first three explanations, but the clumping of observations could also be explained by the millipede being relatively easy to obtain at this time (e.g. because of increased abundance or a behavioural change). Similar anointing behaviour with a millipede species has been reported for the wedge-capped capuchin monkey (*Cebus nigrivittatus*) in Venezuela [X. Valderrama, pers. commun.]. Secretions from this millipede are a potent insect deterrent.

Other examples of animals applying externally produced chemicals to their bodies include: the white-nosed coatis (*Nasua narica*) applying resin from *Trattinnickia aspera* [5], spider monkeys (*Ateles geoffroyi*) applying salvia and masticated leaves of *Citrus aurantifolia* [5], and several species of birds which encourage ants to secrete formic acid on their plumage (so-called anting behaviour) [6]. The function of these activities remains unclear, but suggestions include those listed here for the use of millipedes by the black lemur [5, 6].

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