LEMUR NEWS

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IUCN SSC Species Survival Commission Bristol Conservation & Science Foundation CONSERVATION INTERNATIONAL UHH DPZ WWF morning. During this time, 175 feeding observations were recorded, and no fruit was consumed. During this second study, a focal animal was observed to be chased out of a feeding tree by a female *E. coronatus*. The female *E. coronatus* then began eating the unripe fruits of the tree. It thus seems that during times of fruit abundance *L. ankaranensis* utilize fruits as a food resource along with several other lemur species occurring in the area. However, when food resources were not abundant in the dry season, only leaves were eaten and interspecific competition appears to be higher.

On several occasions during this second study, leaf stems were snapped from trees and white tree exudates were consumed. Latex exudates are thought to be a toxic defence mechanism and therefore usually avoided by primates (Glander, 1994), but latex feeding by *Colobus* spp. has also been observed (Mckey, 1978). Other lemur species, such as *Phaner furcifer* (Petter *et al.*, 1975; Petter, 1978; Thalmann, 2006) and *Mirza coquereli* (Hladik, 1979), are also known to feed on tree exudates. A review of the literature on exudate feeding in primates by Coimbra-Filho and Mittermeier (1977) suggested that tree exudates, in addition to simple sugars, protein, and minerals, may also provide a source of calcium. However, the latter authors also suggested that for most primates exudate feeding was rare and of little nutritional importance. This short report highlighted some behaviors of *Lepilemur ankaranensis*, a relatively poorly studied member of the *Lepilemur* genus. Further field work is required to examine in detail the previously discussed observations and to improve our knowledge of this species.

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Hypotheses on ecological interactions between the aye-aye (*Daubentonia madagascariensis*) and microhylid frogs of the genus *Platypelis* in Tsaratanana bamboo forest

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The aye-aye (*Daubentonia madagascariensis*) is the most distinctive of all lemurs. It is the only known living species of the Daubentoniidae (Simon and Meyer, 2001). The hands of the aye-aye are highly specialised, with long and slender third fingers that are used for precise grooming, mainly at face level, to get food into the mouth with rapid movements, and to tap on the bark of tree trunks to detect insect larvae or other arthropods (Goix, 1993). When an aye-aye locates a cavity, it will anchor the upper incisors into the wood and then gnaw away at the wood with the lower incisors to make a pit (Erickson, 1995a, 1994). This unique manner of foraging for arthropods leaves traces of biting on the wood cover which are often used to ascertain the presence of the species even without an actual sighting (Duckworth, 1993 and own observations of one of us, ER). During a recent herpetological inventory on the Tsaratanana massif in northern Madagascar, we noticed bamboo holes that were possibly caused or enlarged by foraging aye-aye, and we observed frogs living inside these cavities. Here we report these observations and posit a number of hypotheses on the possible ecological interactions among these species, with the goal of stimulating further studies.

During a herpetological inventory in Tsaratanana (the highest mountain massif of Madagascar, which rises up to 2876 m above sea level) one of us (AR) carried out an ecological study on frogs of the genus *Platypelis* (Mycrohylidae: Cophylinae), from the 9th to the 22nd of June 2010. Specifically, we worked in a mountain forest bordering the temporary pond locally called Matsabory Maiky (S 14°09'04.09"- E 48°57' 26.06" – 2,066 m elevation) - corresponding to campsite 2 on the trail from Mangindrano to the Maromokotro peak. The observed *Platypelis* occupy a specific microhabitat: the species live and breed inside the bamboo internodes which contain water and are accessible through small external holes. These frogs have endotrophic development: their non-feeding tadpoles develop inside the water retained in the tree holes and bamboo internodes. Based on a comparison with type material and DNA barcoding, we ascertained that the encountered *Platypelis* belong to two species described from the Tsaratanana massif: *P. tsaratananaensis* (most common) and the much larger *P. alticola* (more rare). Detailed data on the ecology and reproductive biology of these frogs will be published elsewhere. Approximately 754 bamboo trunks, at five different study sites, were inspected around the campsite. These sites each had four plots of 10 x 10 m areas. Out of the 754 trunks, we discovered in 162 of them, a total number of 204 internode segments; small rounded holes that were most probably made by insects like *Dinoderus minutus* (Delobel and Tran, 1993). According to these authors, *Dinoderus minutus* deposit eggs in bamboo internodes in which their larvae develop (Fig. 1d).

At one of the sites (ca. 600 m east of the pond), we discovered some bamboo stems with remarkably different kinds of holes which allowed access to the hollow cavity of the internodes. Parts of the bamboo had been damaged in an irregular way. This appeared similar to what has already been described as typical damage caused by the gnawing activity of the aye-aye, whereby a freshly ripped-back piece is still attached and solid (Duckworth, 1993) (Fig. 1a-b).

On 20 of the 281 bamboo trunks at this study site, we found similar damages, with a total of 71 holes which were more or less oval and measured 5.2-29.7 mm vertically and 1.5-8.2 mm horizontally. The diameter measurements of the non-damaged bamboo trunks were 5.3-54.2 mm, and those with holes were 5.3-48.9 mm. On several bamboo trunks we observed such holes in various internodes (1-6 m above the ground), and some internodes had an upper and a lower hole. Most importantly for the hypotheses drawn below, on some of the trunks without holes, we observed clear traces of gnawing that probably represent the upper and lower incisors of the aye-aye (Fig. 1b). According to our observations, 80 % of all the holes found in the study site were caused by the activity of insects, and 20 % by the aye-aye.

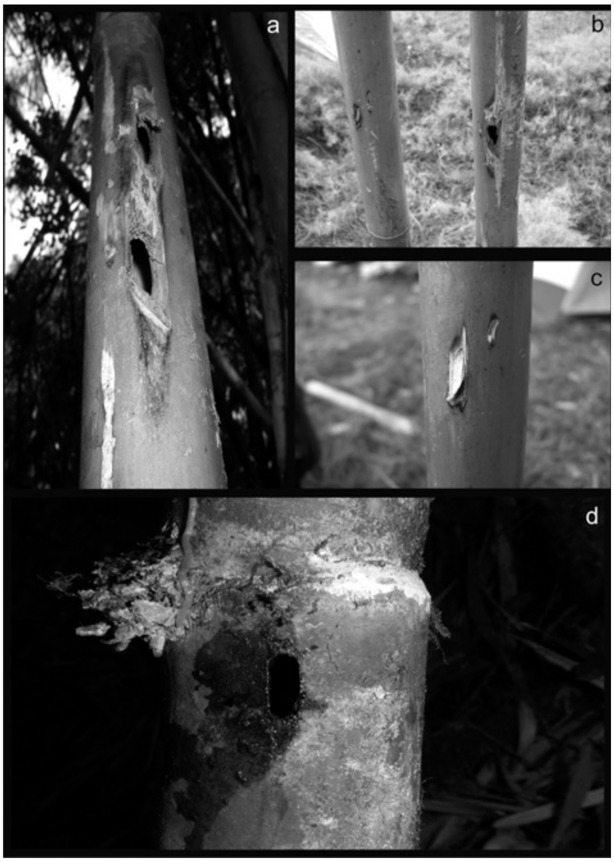

Fig. 1: Traces of animals on the trunks of bamboo at the study site: (a) bamboo internode segment with an upper and a lower node attributed to the aye-aye; (b) segments of two bamboo trunks with a hole attributed to the aye-aye on the right and bite traces on the left; (c) traces attributed to aye-aye upper and lower incisors on a "virgin" bamboo trunk segment; (d) typical regular-shaped hole in a bamboo segment attributed to insects.

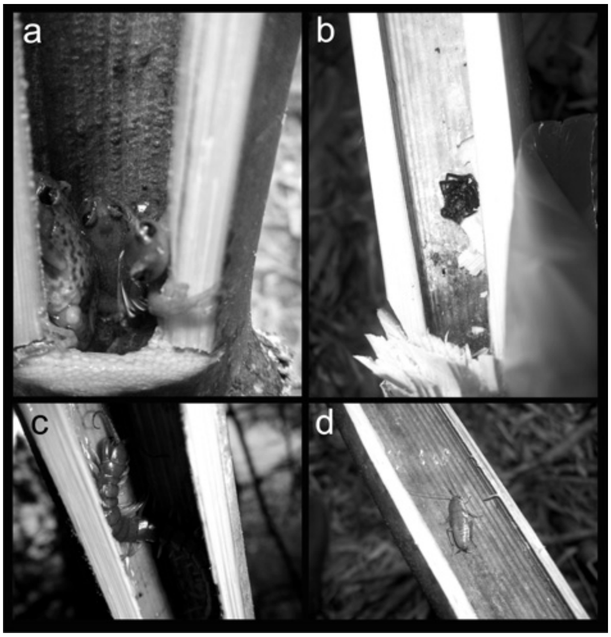

Fig. 2: Animals observed within bamboo segments: (a) frogs: various specimens of *Platypelis tsaratananaensis* in one segment; (b) spider; (c) myriapod; (d) insect (cockroach).

Bamboo internodes accessible by both kinds of holes were populated by *Platypelis* frogs as well as a variety of insects, spiders and centipedes (Fig. 2). At the study site where the bite traces ascribed to the aye-aye were discovered, the altogether 282 holes (putatively made by insects) contained: 61 *Platypelis* distributed in 24 different holes, 12 insects in 8 different holes, and 2 myriapods in 2 holes. In the 71 holes ascribed to the activity of the aye-aye, we observed 30 *Platypelis* in 11 holes, 4 insects in 3 holes, and 0 centipedes.

Based on these observations, we posit the following (partly alternative) hypotheses which require verification and further study:

(1) We are confident that the observed marks at one of our study sites, similar to those noted by Duckworth (1993), are indeed caused by the activity of the aye-aye. Fresh bamboo stems are externally smooth and very strong, and it seems unlikely that any other mammal or even a bird could cause such damage. However, the possibility that these holes may be made by rats (such as *Rattus rattus* (which we collected at Matsobory Maiky), or *Brachytarsomys*) needs to be excluded by direct observations.

(2) We assume that the aye-aye will typically search for bamboo internodes which already have small holes made by insects. This is because in such internodes there is a high likelihood of finding prey. In addition to insect larvae and other arthropods, tree-hole breeding frogs like *Platypelis* may also be consumed. In areas with high bamboo density, these frogs may constitute an import part of the aye-aye diet. If proven, this fact - that aye-ayes may eat frogs in addition to invertebrates - would be an interesting discovery in terms of Primatology.

(3) Alternatively, the aye-aye may also gnaw holes into previously untouched bamboo segments. The bite traces we en-

countered in such "virgin" internodes support this hypothesis. Reasons for this might either be a search for drinking water, or the search and detection of insect larvae which develop inside these internodes and which have not yet made a hole to emerge.
(4) As a fourth and highly speculative hypothesis, the aye-aye may gnaw holes into "virgin" bamboo segments (or increase the size of pre-existing holes) as part of a long-term feeding strategy in which such holes are produced to make the bamboo segment suitable for colonization by arthropods and frogs. This would enable the aye-aye to "harvest" its food during a subsequent visit to the site several days later. Obviously, such a foresighted feeding strategy in a basal primate would be of extreme interest, but we are aware that alternative and more probable explanations exist.
Detailed testing of these hypotheses will require long-term observations in an area of dense growth of large bamboo, probably including the deployment of a large number of camera traps and possibly hair traps to obtain evidence of aye-aye activity. Carrying out such studies at the site in Matsabory Maiky is difficult. It should be noted that the Tsaratanana massif is difficult to access. However, alternative sites, e.g. at Marojejy (Duckworth, 1993) might contain a large population of *Platypelis* (albeit other species) as well, and could be surveyed more systematically.

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Discovery of crowned sifaka (*Propithecus coronatus*) in Dabolava, Miandrivazo, Menabe Region

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The crowned sifaka *Propithecus coronatus* was until recently regarded as one of four subspecies of *P. verreauxi*, family Indridae, which occur throughout western and southern Madagascar (Muller *et al.*, 2000; Mittermeier *et al.*, 1994; Tattersall, 1986; Wilmé and Callmander, 2006). Recent taxonomic revisions (Mittermeier *et al.*, 2008) have promoted all four subspecies to full species status (Mittermeier *et al.*, 2006). However, there is considerable debate about the validity of *P. coronatus*, and especially its relationship with *P. deckeni* (Mittermeier *et al.*, 2008), due to the physical similarities and close geographical distributions of these taxa, including apparent sympatry at some sites (e.g. Tattersall, 1986; Curtis *et al.*, 1998; Muller *et al.*, 2000; Groves, 2001; Thalmann *et al.*, 2002).
P. coronatus was previously assigned to the IUCN conservation rating "Critically Endangered", but has since been moved into the "Endangered" category; nevertheless, the distribution range and the ecology of this species are not yet well understood (IUCN, 2008). Crowned sifakas are diurnal, and their habitat is characterised by dry deciduous forests and mangroves (Petter and Andriatsarafara, 1987). They live in groups of two to eight individuals, with home ranges from 1.2–1.5 ha. They feed mainly on buds, green fruits and mature leaves (Muller, 1997). It is known that they reproduce seasonally, with females giving birth every 2-3 years (Curtis *et al.*, 1998; Mittermeier *et al.*, 2006). Compared to other lemurs, their reproduction rate is very slow, making recovery of small populations even more problematic.
The newly discovered crowned sifaka population is situated at Amboloando (UTM WGS 84, N 7822351 E 580189) in the Commune of Dabolava in central Madagascar, and is the most southerly record of the species. Amboloando lies about 4 km from Dabolava village, and 40 km to the southeast of Miandrivazo. Amboloando comprises 7 ha of dry semi-deciduous, secondary forest that exhibits the characteristics of riverine forests, consisting of deciduous as well as evergreen trees such as *Acacia* sp., *Nastus* sp. and *Macaranga* sp. The altitude is about 600 m above sea level, and the area is characterized by a clearly defined wet and dry season. The sifaka population is composed of a single group, which constituted six adults and one juvenile when first discovered in June 2009 (Razafindramanana, 2009). One of the adult males disappeared later in the year, presumed dead, leaving six individuals remaining. The animals appear to be classic *P. coronatus* (Fig. 1), but some individuals show pelage colour variation, with dark fur on their back and arms (Fig. 2). Behavioural studies of the group are underway, and a preliminary community-based conservation program has been established at the site, involving several organisations including GERP, The Aspinall Foundation, SAHA and Pan-African Mining Madagascar. Forests in Amboloando and the surrounding area are heavily degraded. Different factors threaten the survival of this species in Madagascar: in contrast to the other sites such as Anjamena (Muller, 2000), hunting does not occur in Amboloando, partly due to the sifaka being regarded as holy by the local people. Therefore, other threats such as habitat destruction through slash-and-burn agriculture to make way for pasture for livestock, charcoal production, and mining exploitation affect the sifaka group.
Surveys in the vicinity of Dabolava suggest that this is the only group of *P. coronatus* remaining in that area, despite local people claiming that other groups were present between 5 and 10 years ago. Therefore, it appears that habitat destruc-