NOTES

The first nest description of *Eliurus majori* (Rodentia: Nesomyidae), an endemic Malagasy rodent

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Recent decades have seen important advances in our knowledge of the distribution and taxonomy of Madagascar's endemic rodents (family Nesomyidae, subfamily Nesomyinae). However, few details are available on the ecology of these animals, including their nesting sites (Goodman, 1994; Randrianjafy, 2003). In their review of *Eliurus*, the most speciose genus in the subfamily with 13 currently recognized species, Carleton *et al.* (2022) noted with respect to their breeding ecology, that sites "*where* Eliurus *species place their nests…is so far poorly documented*." Herein we present descriptions of two tree nests of *E. majori* and their contents (vegetation and invertebrates). Our findings represent the first known nesting sites documented for this species.

In researching the sylvatic cycle of bubonic plague in the montane forests of the Central Highlands, specifically the Réserve Spéciale d'Ambohitantely and along the Sentier Botanique at 18°11'45"S, 47°17'14"E, 1600 m and in disturbed and relatively intact montane forest (Ratsirarson & Goodman, 2000; Goodman *et al.*, 2018 for information on the site), it was necessary to find small mammal burrows and arboreal nest sites to obtain ectoparasites and organic material for analysis. The site is known to have a considerable diversity of endemic fleas (Goodman *et al.*, 2015). Small mammals were captured using previously established protocols and with different trapping devices placed on narrow trails within the forest. In order to track captured endemic tenrecs (Tenrecidae), endemic rodents, and introduced rodents (Muridae) back to nests, we employed cotton spools manufactured by Culver Textiles Corporation (West New York, New Jersey), weighing 4.3 g, and attached to the animal's dorsum, a technique often referred to as spool-and-line (Miles *et al.*, 1981; Woolley, 1989); we largely followed the techniques of Boonstra and Craine (1986), and Steinwald *et al.* (2006).

Nest tree 1 (Figure 1)

Age and sex of animal: Adult scrotal male.

Tree setting: *Ficus antandronarum*, about 16 m tall, 54 cm dbh; direct line distance from trap to nest tree 57 m.

Nest characteristics: nest entrance 6.5 m off the ground, entrance hole 5.1 cm in diameter, nest situated 23 cm below entrance, and 13.1 cm in circumference within the hollow tree trunk.

Nest vegetation contents (number of largely intact leaves): *Potameia* aff. *thouarsiana*, Lauraceae (n = 65); *Macaranga*, Euphorbiaceae (n = 30); *Plectaneia*, Apocynaceae (n = 25); *Bembicia axillaris*, Salicaceae (n = 18); and *Erythroxylum sphaeranthum*, Erythroxylaceae (n = 7). The leaves were concentrated within the bottom of the cavity and formed a distinct and partially compressed nest.

Ectoparasites: ticks, 172; adult fleas, 0; and flea larvae, 39.

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Figure 1. (A) Image of the tree where the nest of an *Eliurus majori* was located and the arrow indicates the nest entrance and (B) photo looking down the tree hollow to the nest in the interior of the trunk and 6.5 m off the ground. (Photos by F. E. Rakotoarisoa, 2022).

Nest tree 2 (Figure 2)

Age and sex of animal: the released animal was a subadult male with abdominal testes. A second animal was found in the nest and based on body size was also a subadult.

Tree setting: *Potameia* aff. *thouarsiana*, tree about 12 m tall, 23.6 cm dbh; direct line distance from trap to nest tree 35 m.

Nest characteristics: nest entrance 3.7 m off ground, entrance hole 3.0 cm in diameter, nest 23 cm below entrance, and nest 31 cm in circumference. From the entrance hole to the nest, a distance of 3.5 m, the tree was hollow.

Nest vegetation contents (number of largely intact leaves): *Potameia* aff. *thouarsiana* (n = 75); *Tinas*, Sapindaceae (n = 7); *Ravensara*, Lauraceae (n = 6); *Erythroxylum sphaeranthum* (n = 2); *Podocarpus madagascariensis*, Podocarpaceae (n = 1); and unidentified leaf (n = 1). The leaves were dispersed within the bottom of the cavity without forming a distinct nest.

Ectoparasites: ticks, 104; adult fleas, 0; and flea larvae, 0.

The monophyletic subfamily Nesomyinae, endemic to Madagascar, includes 28 currently recognized extant species representing nine genera, and constitutes a morphologically diverse adaptive radiation (Jansa & Carleton, 2022). *Eliurus* is the most speciose genus and inhabits ecologically diverse settings, including dry deciduous forest and spiny thicket in the west and southwest, as well as lowland and montane moist evergreen forests in the east. The information presented herein adds new details about the natural history of these rodents, notably the location of their nesting sites. In the scansorial species *E. webbi*, a terrestrial nest was found in Andringitra with two burrow openings and a tunnel descending 85 cm below ground to an apparent food chamber (Goodman, 1994). In Ankarafantsika, *E. myoxinus* lives in ground burrows (Randrianjafy, 2003).

Our results, based on two individuals released with cotton spools, document that *E. majori* makes its nest in hollow tree trunks. In both cases, once the animals were released, they climbed directly up into sub-canopy vegetation until they reached the

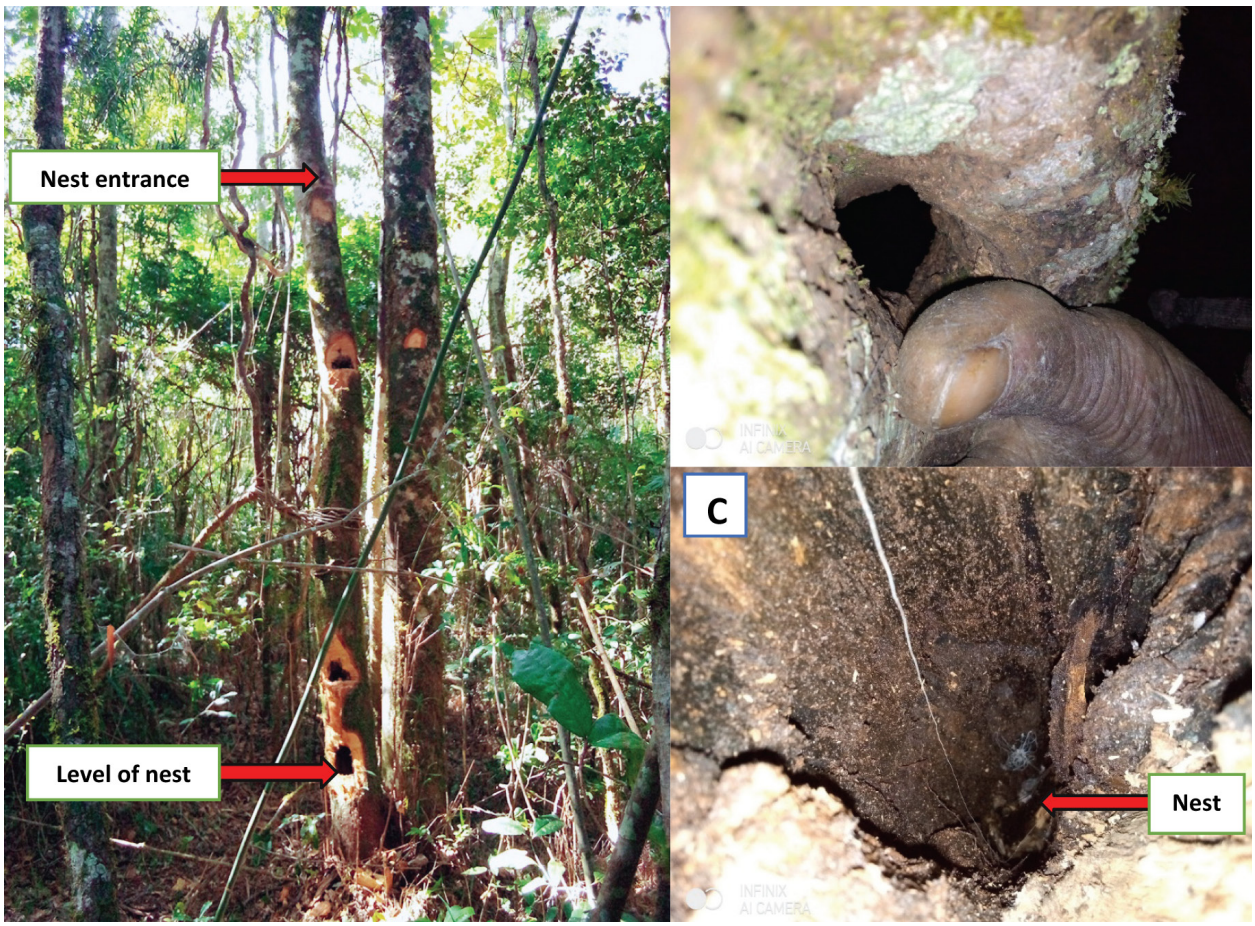

Figure 2. (A) Image of the tree where a nest of an *Eliurus majori* was located, and with a series of holes cut into the tree indicating the different steps to find the nest; (B) the entrance hole to the nest, which was 3.7 m off the ground; and (C) the nest at the bottom of the hollow, about 23 cm off the ground, the bobbin thread from the spool-and-line clearly visible and demonstrating the capacity of this species to climb up and down vertical wood surfaces. (Photos by Fanasina E. Rakotoarisoa, 2022.)

nest site, never returning to the ground. We found no evidence (chew marks) for either nest that the rodents excavated or enlarged the nest entrance or the nest tree hollow. A considerable number of intact leaves were found in both nests, with no signs of being consumed, and we assume that this vegetation comprises material used to line the nest. In nest tree 2, the thread from the spool-and-line attached to the released animal was found in the vertical portion of the hollow tree (Figure 2C), which indicates that this species ably negotiates vertical surfaces of relatively large circumference. Although somewhat laborious to follow the reeled-out thread from the attached bobbin, the spool-and-line technique provides a reliable system both to locate burrows and nests of trapped and released animals and to obtain their nesting material and ectoparasites for zoonotic studies.

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