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A SIMPLE, INEXPENSIVE METHOD TO CAPTURE ARBOREAL LIZARDS

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***Abstract.*—Sampling arboreal lizards is often problematic due to difficulties subduing and capturing live specimens. We developed a new technique using mosquito netting for sampling populations of an arboreal skink. We describe how this simple, inexpensive 'lizard net' method yields excellent results for capturing arboreal lizards. We caught an arboreal skink, *Emoia sanfordi,* using this technique and we compared our collection success when using the 'lizard net' to our collection success when using other widely utilized methods. The 'lizard net' was highly effective. The number of *E. sanfordi* we collected in one day was doubled when using the 'lizard net' and we observed far fewer injuries to lizards, as compared to other methods.**

Key Words.—arboreal; capture; *Emoia sanfordi*; lizard; mosquito net; skink; Vanuatu

INTRODUCTION

The study of canopy-dwelling organisms is notoriously onerous (Barker and Pinard 2001), and many specialized techniques have been developed to capture canopy-dwelling study organisms (Kays and Allison 2001). Fogging the forest canopy in combination with funnel traps, netting, or canvas placed on the ground underneath the target tree to collect specimens, for example, has greatly improved our ability to sample invertebrate canopy fauna (Barker and Sutton 1997; Basset et al. 1997). Despite advances in the development of sampling methods, sampling vertebrate canopy fauna remains remarkably challenging in part to due to the vagility of many of these vertebrate species. The study of large, diurnal, arboreal lizards is especially difficult as ectothermic lizards are most visible while basking, an activity that also increases their mobility (Hamilton, pers. obs.). We have created a modified version of the net often used in association with invertebrate fogging. This 'lizard net' is helpful in capturing a wide variety of arboreal vertebrate fauna, and is particularly effective for capturing large, arboreal skinks.

Previous researchers have used rubber bands (Simmons 2002), blowguns, slingshots, or firearms (Heatwole and Higgins 1993), or attempted hand capture while climbing trees. Novel methods such as the use of mechanical grabbers (Witz 1996) or sticky poles (Durstsche 1996) have been developed to improve capture success of arboreal species. These methods, however, are not useful for large lizards. Alternatively, nooses are effective for capturing all sizes of both arboreal and terrestrial lizards (Blomberg and Shine 1996). However, it is extremely difficult to control a noose long enough to reach lizards located at the tops of tall trees, including Coconut Palms (*Cocos nucifera*), with heights of up to 22 m (Chan and Elevitch 2006) that are often frequented by *Emoia sanfordi*, our target species.

Another common method is the use of glue traps taped to tree trunks to survey efficiently a wide variety of arboreal lizards (Bauer and Sadlier 1992). Although the use of glue traps are effective for sampling a diversity of arboreal lizard fauna, including rarely observed species, there are several drawbacks to this method that made it unsuitable for our study of *Emoia sanfordi*. The need for multiple visits to set and subsequently check glue traps reduces their utility for rapid surveys of short duration. Glue traps do not allow the researcher to record behavioral or ecological data associated with a particular individual prior to capture, or to focus capture efforts on a single target species, and have been associated with mortality of smaller individuals. Researchers have also used tree felling as a technique for sampling canopy species (Ingram and Lowman 1995); this method has the obvious drawback of being a destructive sampling method, because it removes the tree as a habitat. In summary, we found commonly employed capture methods of limited utility for sampling *E. sanfordi*.

Emoia sanfordi is a scincid lizard endemic to Vanuatu, an archipelago in the southwest Pacific Ocean. *Emoia sanfordi* is relatively large; reproductive females have a mean SVL of 97.5 mm (74.9-116.2 mm, n = 107; Eckstut and Hamilton, unpubl. data) and males are similar in size with SVL reported to range from 78-115 mm (Brown, 1991). This species is diurnal and arboreal, and is readily observed basking up to 8-10 m on trees. To avoid problems that we encountered with previously reported techniques, we developed a method that utilizes an inexpensive mosquito net, which is readily available, easy to transport, and helps drastically decrease the rate of specimen damage and loss.

MATERIALS AND METHODS

We employed a canopy-style (round) mosquito net as a screen over the underbrush. The field crew, composed of as few as three people, wrapped the opening of the net tautly around the trunk of the tree (Fig. 1). We positioned the opening of the net flush against the tree to prevent the lizard from escaping the net while running down the trunk. We knocked down lizards from arboreal perches with a blowgun, or by climbing the tree and tossing the lizard into the netting if local field assistants were able to climb the tree. The sides of the net were held directly out from the tree (Fig. 1) so that the lizard was caught as it jumped from the trunk of the tree or was knocked from the tree. Once the lizard hit the mesh of the net, we closed the net over the lizard, encapsulating it within the net (Fig. 2). If the lizard climbed down the tree along the trunk, we pulled the net up over the lizard trapping it against the tree, and serving as a barrier to prevent the lizard from ascending or descending the trunk of the tree and escaping.

This secondary application of the 'lizard net' is similar to the bridal veil method described by Paterson (1998); however, her method was designed to capture trunk dwelling species that are observed low on the trunk of the tree and run up the tree trunk to escape capture. The 'lizard net' is useful for extremely arboreal lizards and prevents the escape of lizards as they climb down the tree.

FIGURE 1. The opening of the lizard net is wrapped tightly around the base of the tree and the ends of the net are held out under the tree canopy. (Photographed by Alison Hamilton).

RESULTS

When we used a blowgun or a rubber band to collect these relatively large skinks, we encountered several common problems. The lizard might be hit by the rubber band or the plastic pellet from the blowgun and: (1) not respond; (2) climb further up the tree as a result of being hit; (3) fall from the tree but quickly escape in the grass or other ground cover; and (4) sustain injuries as a result of being hit and/or falling from the tree. Lizards are often very difficult to locate once they land in the grass, brush, or other ground cover and will often escape if not caught in mid-air. In our case, this was especially problematic as *E. sanfordi* are green, and thus well camouflaged by green groundcover. Capture methods that cause injuries to the lizard as a result of being hit and/or falling from a tree are less than ideal for studies where the researcher intends to release the animal. Additionally, the tails of lizards broke frequently or the lizards were otherwise injured as a result of many commonly employed capture methods. We successfully captured 42 *E. sanfordi* over 15 collecting days (mean = 2.8 skinks/day) prior to the implementation of the 'lizard net.' When we used the 'lizard net,' our success rate nearly doubled, and we captured 109 *E. sanfordi* over 20 collecting days (mean = 5.5 skinks/day). Only one lizard we attempted to collect escaped capture after the implementation of the 'lizard net.' The increased capture success rate of the 'lizard net' was due to the reduced probability of escape subsequent to the lizard being removed from the tree. Additionally, lizards captured with the 'lizard net' made better specimens; fewer than 7% of the lizards collected this way sustained broken tails or had other injuries; whereas, close to 25% of the skinks collected before the implementation of this method lost their tails or sustained injuries during capture.

FIGURE 2. When the lizard falls from the tree into the net, the net is quickly wrapped around the lizard, preventing escape. Should the lizard climb down the trunk of the tree, the side of the net can be lifted over the lizard, trapping the lizard between the net and the trunk, thus allowing capture and preventing damage to the lizard. (Photographed by Alison Hamilton).

DISCUSSION

This method is simple, inexpensive, easily transportable and exceptionally effective for sampling large arboreal lizard species. In addition to causing less damage to the lizards during capture, the 'lizard net' is generally quick to use, decreasing the amount of time necessary to collect specimens. We found one main drawback to this method: the need for multiple assistants to hold the net taut. However, if personnel are available, this technique is effective for capturing a wide range of arboreal lizards. In addition to *E. sanfordi*, we caught other species of skinks (including *Emoia erronan, E. cyanogaster*, *E. nigromarginata*, and *Lipinia noctua*) and several species of geckos (i.e., *Gehyra oceanica*, *Gehyra vorax, Gekko vitattus*, and *Lepidodactylus lugubris*) using the lizard net. Because the 'lizard net' design eliminates the standard escape routes of many types of highly mobile, but non-volant small animals, we suggest that the 'lizard net' would also be useful in capturing a variety of canopy-dwelling vertebrates, including small mammals and amphibians.

This technique is especially easy to use in habitats that are relatively open at the understory level. We did, however, also use this technique in habitats with a significant amount of understory vegetation with success by either clearing some vegetation away from the base of the tree or holding the net over thick, low vegetation. This makes the 'lizard net' applicable to a variety of habitats and target taxa.

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