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AN IMPROVED METHOD FOR CAPTURING CAVITY-NESTING BIRDS TESTED WITH THE RUFOUS HORNERO (*FURNARIUS RUFUS*)

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Resumo. – Um método aprimorado para capturar espécies que nidificam em cavidade testado com o João-de-barro (*Furnarius rufus*). – Existem diversos métodos para capturar espécies de aves que nidificam em cavidades, mas nem todos são fáceis de usar. Neste trabalho, propomos um método aprimorado, em que usamos um covo modificado que é colocado sobre a entrada do ninho usando uma haste extensível. Assim, quando a ave entra na armadilha, uma linha é puxada para que a porta da armadilha se feche e seja mantida fechada com velcro. Esse método foi usado para capturar o João-de-barro (*Furnarius rufus*), uma ave Neotropical que constrói um ninho de barro em formato de forno. O João-de-barro, assim como outras espécies de habitats abertos, geralmente são difíceis de serem capturadas com redes de neblina, provavelmente porque as redes se tornam fáceis de enxergar e evitar devido as condições de vento e luz. Em 2010, foram capturados 29 indivíduos com essa armadilha, e nenhum deles abandonou o ninho. Enquanto essa armadilha possui similaridades com outras, ela ainda é mais leve, fácil de montar e carregar no campo. Adicionalmente, a porta garante que a ave capturada não escape e é impossível que essa armadilha se emaranhe nas plantas próximas ao ninho. Essa armadilha pode ser adaptada para capturar uma variedade de espécies, tais como os furnarídeos Neotropicais, que constroem ninhos fechados, e aves que nidificam em cavidades, como pica-paus, arapaçus e papagaios.

Abstract. – Several methods are available to capture cavity-nesting birds but not all are equally easy to use. Here we propose an improved method, in which we use a modified fish basket placed over the opening to the nest using an extendible pole. When a bird enters the basket trap, the entrance to the trap is closed by pulling on a string that shuts the door securely with velcro. We used this method to capture the Rufous Hornero (*Furnarius rufus*), a Neotropical ovenbird that builds enclosed mud nests. Rufous Horneros, as other birds of open habitats, are often very difficult to capture with mist nets, apparently because in such habitats mist nets are relatively easy to recognize and avoided due to the windy and light conditions. In 2010, we captured 29 birds, none of which abandoned their nests. While similar to some traps, this trap is light-weight and easier to carry and mount in the field. Additionally, the trap door assures that the bird cannot escape once in the trap and it is impossible for the trap to entangle in nearby plants. It can be adapted for capturing a variety of species, such as Neotropical ovenbirds, that build enclosed nests, and cavity-nesting birds, such as woodpeckers, woodcreepers, and parrots. *Accepted 7 November 2014.*

Key words: Rufous Hornero, *Furnarius rufus*, Brazil, capture technique, Furnariidae, hole-nesting birds, Picidae, trapping method.

INTRODUCTION

Mist nets are commonly used to capture birds (Bookhout 1996), but some birds are able to avoid mist nets because nets may be visible in windy and under certain lighting conditions (Martin 1969, Bookhout 1996). Also, with mist nets, non-target species may be captured increasing time spent removing these birds from the nets. Some methods for capturing birds at nest sites do not require the use of mist nets and can be used to capture open-nesting birds (Putnam 1949, Nolan 1961, Mock *et al.* 1999, Stutchbury *et al.* 2007, Newbrey & Reed 2008, Sousa & Stewart 2011), birds in nest boxes (Fischer 1944, Lombardo & Kemly 1983, Cohen & Hayes 1984, Stutchbury & Robertson 1986, Pribil 1997, Mock *et al.* 1999, Plice & Balgooyen 1999, Friedman *et al.* 2008, Lambrechts *et al.* 2010, te Marvelde *et al.* 2011) or cavity-nesting birds (Fischer 1944, Bull & Pedersen 1978, Renken & Wiggers 1989, Ingold 1991, Jackson & Parris 1991, Bull & Cooper 1996, Hansen 1999, Mazgajski 2002).

Capturing cavity-nesting birds is often a challenge (Bull & Cooper 1996), especially for species that nest well above the ground. Some nest box traps can be used at natural closed nests (Fischer 1944, Mock *et al.* 1999, Plice & Balgooyen 1999, Friedman *et al.* 2008, te Marvelde *et al.* 2011). However, installing these and other traps developed to capture cavity-nesting birds can be difficult because researchers must climb to nests to fix the trap at the entrance to the nest (Bull & Pedersen 1978, Renken & Wiggers 1989, Bull & Cooper 1996). Attaching a net to the end of an extendible pole to reach nests may overcome those difficulties (Renken & Wiggers 1989, Ingold 1991, Jackson & Parris 1991, Hansen 1999, Mazgajski 2002).

Also important for capturing cavity-nesting birds is that the capture takes place outside of, rather than within, the nest, and thus avoid disturbing the nest and its contents (Renken & Wiggers 1989, Ingold 1991, Jackson & Parris 1991, Hansen 1999, Mazgajski 2002, te Marvelde *et al.* 2011). Thus, a net held over the cavity opening and with a pole that reaches the nest height, might work well for enclosed nest with a lateral opening, such as woodpeckers or the mud nest of the Rufous Hornero (*Furnarius rufus*). However, a loose net, either a butterfly net or a modified mist net, at the end of an extendible pole, raised and held over the nest hole can easily tangle in branches or around the nest opening and may move around with the captured bird trying to escape and entangle even more (Renken & Wiggers 1989, Ingold 1991, Jackson & Parris 1991, Hansen 1999, Mazgajski 2002). Also, the opening must not allow the captured bird to escape.

We propose an improved model for capturing cavity-nesting birds that resolves these problems. We tested this method with the Rufous Hornero, a Neotropical ovenbird that is found in the savannas of south-central South America (Vaurie 1980), and nest in closed, oven-shaped, mud nests (Daguerre 1921, Fraga 1980, Skutch 1996, Rodriguez & Roper 2011).

METHODS

Study site. We used the improved model for capturing cavity-nesting birds to capture and mark Rufous Horneros during the breeding season of 2010 (September–November) on the campus of the Polytechnic Center of the Federal University of Paraná (25º26'59"S, 49º13'55"W), in the city of Curitiba, state of Paraná, southern Brazil. The campus resembles a savanna (open habitat) and the Rufous Horneros nests were common.

Bird captures. We tried to capture most Rufous Horneros during incubation because both sexes incubate (Fraga 1980, Massoni *et al.*

2012, Braga *et al.* in review). All individuals captured were uniquely color-banded with colored plastic bands and a uniquely numbered metal band (Centro de Pesquisa e Conservação de Aves Silvestres – CEMAVE). The captures were part of a larger study of nesting success, all nests were checked at or near (plus or minus one day) the time of capture.

Improved model for capturing cavity-nesting birds. Our trap (Fig. 1) is a modified fish basket, or fish-holding net (hereafter, trap), variable in size and available at most fishing-supply stores. The trap consists of a round (ours is 30 cm in diameter), tubular net with circular wire rings built into it to give it a tube shape, with a smaller, circular spring-loaded door (also supported by a wire ring, 22 cm diameter) that opens to the inside and when closed, shuts against a slightly smaller opening (15 cm diameter) to keep the door closed. These nets have various, smaller mesh sizes (< 1 cm; ours is 1 x 5 mm) and, unlike mist nets, are firmer, and do not entangle neither birds nor plants.

To make a support insert to attach the trap to the extendible pole (we used a pruning pole), we attached a second wire ring, with two ends bent straight (similar to the ring of a butterfly net), tied to the front-support (or top, if held as a fish basket) wire ring of the trap using fishing line. Although we used fishing line, any kind of waterproof string would work; if fishing line is used, we recommend > 4-lb (1.8-kg) test. The support comes from the two straight ends of the circular wire ring that form the inserts that will fit into the end of the support pole. This wire ring attached to the front-support ring must be stiff enough to support the trap without bending. An additional length of wire connects the top of the first ring to the top of the second ring of the trap to hold the trap perpendicular and to maintain its tube shape, creating a space inside the trap that birds can enter (Fig. 2A). The inserts can be fit into the hollow end of a pole or, in our case, we cut grooves into a short piece of wooden broomstick (Fig. 2B), placed the inserts in the grooves (Fig. 2C), and then inserted this into the metal tube at the end of the pole, thereby securing the trap on the end of the pole. The pole we used (~ 7 m when fully extended) can be collapsed and extended with spring-loaded buttons that secure the pole in position. When raised, the support wire holds the trap horizontal to the nest openings, making an open space into which a bird flies when leaving its nest.

We modified the spring-loaded door of the trap to ensure it remained closed after a bird was captured (Fig. 3). First, the diameter of the door opening is somewhat smaller (ours is ~ 7 cm smaller) than that of the door so that, when closed, the door overlaps the opening on all sides. In the region of overlap, we placed several pieces of velcro on the door and on the facing piece of the trap that aligned with the door. We used velcro to hold the door in an open position in a similar manner. Thus, when the door is open or closed, the velcro holds it in place. To set the trap, the door is opened against the tension of the spring and secured to the velcro, which is strong enough to hold it open, yet weak enough to be easily pulled free. To close the door, a trip-line extends from the door on the side opposite the hinge and passes through the door to the ground. When a bird enters, one simply pulls the line, freeing the door from the velcro that secures the door open, and then the spring pulls the door quickly shut and in contact with the velcro that secures the door in the closed position.

The trap can easily be removed from the pole, which can also be telescoped to its smallest size. Thus, both the pole and the trap can be reduced to their minimum size for easy transport. Also, because of sturdy, but flexible wires, the trap can be folded somewhat by bending the wires that can be easily re-shaped

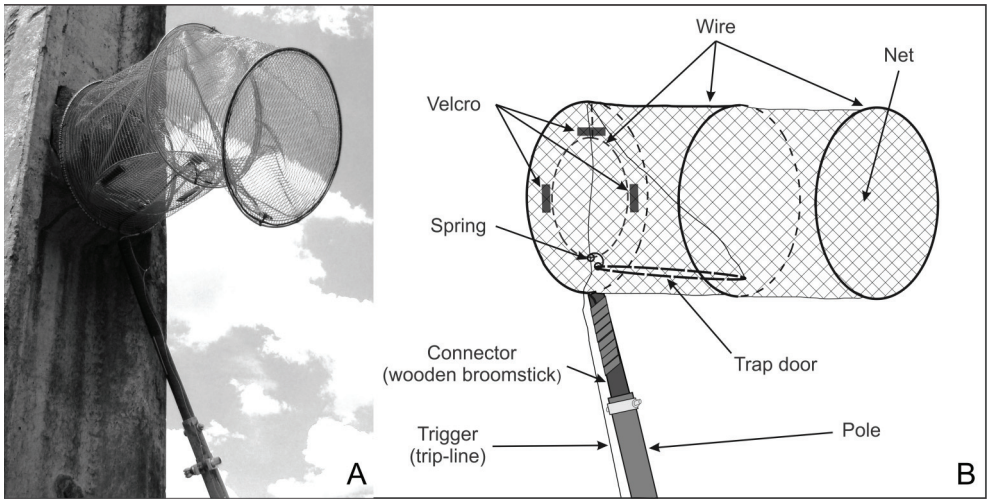

FIG. 1. A) Photograph of trap at the entrance of a Rufous Hornero (*Furnarius rufus*) nest. B) Schematic view of the trap with details and a description of materials used in its construction.

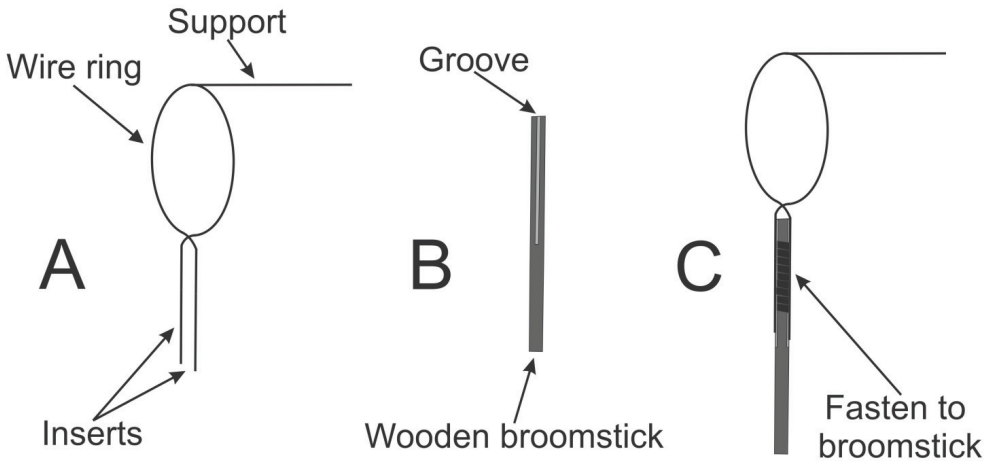

FIG. 2. Schematic view of the front of the trap. A) Wire ring with inserts for connecting to the handle, and additional wire for support to maintain the trap in a horizontal position. B) Grooves made in a short piece of wooden broomstick in which to place the inserts in A. C) View of finished front of the trap, with inserts secured on broomstick with water-resistant tape.

once ready to capture. In the field, the trap is inserted and secured into the extendible pole, the trap is armed by opening the door and securing it to the velcro that holds the door open, and the pole extended to the appropriate length. The trap is then placed over the nest opening and when a bird enters the trap, the user pulls the line, shuts the door, and lowers the trap to the ground to remove the bird. The time interval from the bird entering

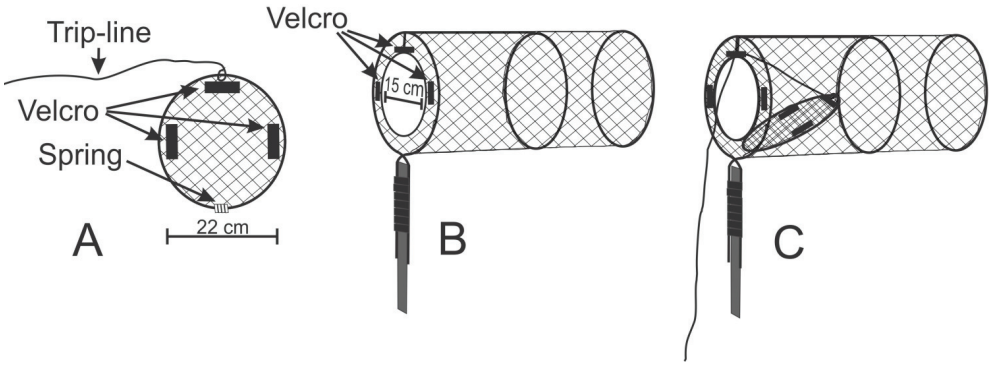

FIG. 3. Schematic view of the trap trigger system. A) Spring-loaded trap door with velcro strips and trip-line to close the door. B) Trap structure with opening and velcro strips aligned with the velcro of the trap door. C) The trip-line in position to be used as the trap trigger.

the trap to being removed from the trap is less than 15 seconds.

RESULTS

We captured 29 Rufous Horneros (16 females and 13 males) using this trap at 19 nests located 3 to 7 m above ground. The process was simple: we prepared the trap, walked up to the nest and put the trap in place and within minutes, captured the targeted bird. When the trap bumped against the nest of the hornero, the bird usually left the nest and entered the trap. Because our interest was in catching the birds, we did not quantify capture rate or capture effort, and so some of our observations here are to describe possible reactions to attempting to capture. Sometimes, the target bird stayed in the nest when we placed the trap over the entrance, in which case we waited at most 30 min. If we did not catch the bird by then, we simply quit and returned later (when we did catch the bird). We captured at least one individual of the breeding pair at all nests where we used this capture method, and both the male and female were captured at 10 nests. We captured six females and five males prior to and during egg laying, eight females and seven males during incubation, and two females and one male after hatching. Four birds (two females and two males) were captured twice on different days, one female after nine days while we attempted to capture its mate, and another three individuals in the second breeding attempt during the season, about 55 days after their first capture. No birds escaped, no birds were injured and no nest was damaged. All nests were observed until the young fledged (from 12 nests) and no nests were abandoned after adults were captured.

DISCUSSION

We captured 29 Rufous Horneros with our trap. Using the trap, we were almost certain to catch a bird if we knew one was in the nest. We suggest that the trap door (that avoids escape) and the tubular, hollow, shape of the trap that the bird can fly into as it leaves the nest, and the net that does not entangle birds nor plants, are very important improvements over similar models for capturing cavity-nesting birds (Renken & Wiggers 1989, Ingold 1991, Jackson & Parris 1991, Hansen 1999, Mazgajski 2002).

Making this trap with a modified mist net would not be recommended because of how

easily the mist net will entangle in plants and birds. While ornithologist may be efficient at removing bird from nets, the awkward nature of trying to reach in through the relatively small entrance to remove a bird from a mist net/trap would merely increase the handling time and difficulty of capture. In our model, the bird does not entangle and so one merely reaches in and takes the bird in hand.

Because one bird may enter the nest soon after the other is caught, both members of a pair may be captured quickly. Also, if a bird remains in the nest when holding the trap in place instead of immediately entering the trap, we found that by using another pole to shake the support branch, the bird often leaves the nest and is captured.

All captured individuals were observed following capture and no nest was abandoned. For other species, the possibility of nest abandonment must always be considered and will be determined by the behavior of target species, as some birds seem to be more sensitive to disturbance than others (te Marvelde *et al.* 2011). We suggest that even for problematic birds, an advantage of this trap is that birds are captured leaving the nest (Renken & Wiggers 1989, Ingold 1991, Jackson & Parris 1991, Hansen 1999, Mazgajski 2002), and so the nest and the contents of the nest remain undisturbed. Thus, when birds return to the nest there is no evidence of disturbance left behind, perhaps reducing the chance of abandonment (te Marvelde *et al.* 2011).

While this trap can only be used when birds are inside the nest, hence during the breeding season (especially from incubation through the early nestling stage), the efficiency gained makes up for this minor inconvenience. Some studies have captured birds with nets placed near nests and using playbacks (Roper 2005, Massoni *et al.* 2012), but we did not capture birds in that way. Also, captures during the non breeding season have used baited live-traps. We used live-traps between May and July 2010 (non breeding season) and captured 12 birds. We used bread as bait, because these particular individuals had territories that included restaurants and they were accustomed to table scraps.

The trap we describe here is light (the heaviest part is the pole, < 1 kg), easy to set in the nest opening for rapid deployment, safe for captured birds, and easily disassembled and carried to and mounted in the field. The design of this trap also allows one person to capture the birds without help (Renken & Wiggers 1989, Ingold 1991, Jackson & Parris 1991, Hansen 1999, Mazgajski 2002). Any similar basket for holding fish should be easily modifiable to work as we described. Because the fish basket comes in many sizes, it may also be adapted for almost any sized bird. The most important considerations are the lightness of the materials used in the trap cage so it can be easily raised to the nest entrance. We suggest that the design described here can be used to capture a variety of ovenbirds that construct enclosed nests as well as cavity-nesting birds such as woodpeckers, Neotropical woodcreepers, and parrots.

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