

A new hummingbird trap

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ABSTRACT: New capturing methods are constantly developed to optimize field work efforts in scientific research. This paper describes the design and construction of a new hummingbird trap, called the Ruschi net trap. It consists of a circular screen lid attached to a frame and a cylindrical screen bag that is manually pulled to trap the hummingbird while it is feeding. The success of this new trap is attributed to fast shut and absence of frame through which the hummingbirds enter, making the trap much more alluring to them. Such attributes give this trap an excellent capture rate, with efficiency and practicality, requiring no previous time of habituation.

Key words: bird monitoring, trapping method, Trochilidae.

RESUMO: **Uma nova armadilha para beija-flores.** Novos métodos de captura são desenvolvidos constantemente a fim de se otimizar os esforços de campo na pesquisa científica. Este artigo descreve o projeto e a construção de uma nova armadilha para beija-flores, denominada “Ruschi net trap” (armadilha de rede Ruschi). Ela consiste em uma tela circular atada a um aro e uma bolsa de tela cilíndrica que é manualmente puxada para capturar o beija-flor enquanto ele se alimenta. O êxito dessa nova armadilha é atribuído ao seu fechamento rápido e à ausência de aro pelo qual os beija-flores entram, tornando a armadilha mais atrativa a eles. Esses atributos dão à armadilha uma excelente resposta nas capturas, com eficiência e praticidade, não requerendo tempo prévio de adaptação dos beija-flores.

Palavras chave: monitoramento de aves, método de captura, Trochilidae.

Introduction

The development of new capturing techniques has enhanced access to new data about birds compared to the typical ornithological methods, which are based mainly on shot specimens and observations *in situ* (Rocha, 1973;

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Sick, 1997; Tavassos, 1944, 1945), becoming an important tool used in many areas of research, such as taxonomy, biogeography and ecology. Examples of hummingbird specific capturing techniques include bird-lace (a stick with a lace made out of horse hair on the tip), bird-lime (a long stick with lime on the tip that glues perching birds), cage and butterfly net (A. Ruschi, 1949). However, some of these require special efforts and their use has been discontinued. For example, when solvent is used to wipe off bird lime from the bird's plumage, any contact with the hummingbird's skin may be harmful, and the bird-lace can strangle the hummingbird if not removed or loosened fast enough. Other methods continue to be used despite their shortcomings. This is the case of the butterfly net, which relies on luck, as the bird necessarily has to perch on a reachable branch and cannot be alarmed by the presence of either the researcher or the net.

There has been recent progress in trap design, mainly involving cages with modifications in structural mechanisms. Nevertheless, despite the development of several hummingbird traps, some problems still remain unresolved. Regarding hummingbirds, using unselective methods, especially nets such as standard mist net or the Russell net trap (Keyes & Grue, 1982), is disadvantageous compared to other traps like collapsible netting trap or drop-door trap, resulting in the capture of undesirable birds (Low, 1957; Russell & Russell, 2001).

I have noticed that hummingbird capturing can take longer than necessary in drop-door traps because the birds have to find the entrance. This behavior is called detour problem (Ramsey, 1978) and it requires a period of adaptation for the birds to the traps (Russell & Russell, 2001), causing trapping delays and making feeder usage by less aggressive species difficult, where territorial species occur together. Additionally, if the feeder is not the only nectar source, hummingbirds may prefer other sources. More wary species will move to other nectar sources for feeding before entering the trap even once. This also happens with migrant species as they become cautious during migration and are targeted by territorial species at the feeding sources (A. Ruschi, 1973). It is also difficult to remove birds from drop-door traps because it must be done through the same door used to close the trap. The Sargent collapsible cage-wire trap has the disadvantages of the drop-door trap, but it has one side widely open (door side) and there is a smaller door for removing birds.

Although collapsible netting trap has a considerable distance from the bottom to the lid, this trap also causes some detour problem to hummingbirds until they become habituated. This happens because the sides might be pulled up halfway to the feeder's height and the feeder might be hung 2.5 cm from the bottom (Russell & Russell, 2001). However, this detail may be worthwhile to

ensure a fast shut, so the hummingbirds do not escape when it is closing. This escaping situation, also noted in Sargent collapsible cage-wire traps (Russell & Russell, 2001), occurs because all current hummingbird traps rely on gravity for shutting.

Given the problems associated with current methods for capturing hummingbirds, and after some failure on solving them, I developed the Ruschi net trap (Figure 1), honoring Brazilian naturalist Augusto Ruschi (1915–1986). This trap is sturdy, stable, and has an efficient shutting system, using a simple, but strong frame. It consists of a baited trap that involves the use of a manual pulley system (instead of gravity) that gives the user total control of the shutting speed, providing practicality and efficiency to the captures.

The first prototypes

The construction of the Ruschi net trap started with a challenge: creating a new trap that solves the problems of current traps, making captures more practical and efficient. The first trap consisted of two rectangular wooden frames linked by four nylon lines at the vertices that bared the inferior frame and also worked as a rail to a third wooden frame linked to the upper frame by a net (Figure 2). The frame with the net fell when the nylon string was released, catching the hummingbirds inside the trap with the feeder. It was constructed to catch as many hummingbirds as possible simultaneously due to its very large size (200 × 80 × 60 cm). But the first test revealed a speed problem, as the netted frame fell slowly and allowed the birds to escape. In addition, portability problems discouraged the use of this trap, as the dismountable version was not strong enough to support its own weight. I then constructed a smaller version (Figure 3), which worked like a Hall trap, but with four rails. This version was more portable and easier to set than the previous one, but the closing speed was still inadequate. I even installed some rubber strings parallel to the rail to increase speed, but it created a guillotine effect that led me to abandon this idea before even testing it with birds. At this point, I realized that the lack of sides would solve the detour problem, common in cages, and a controllable speed system of closure would increase efficiency and safety. I then used this same trap upside down, so the line had to be pulled instead of released to close the trap. It gave the user total control of the trap even after it was closed. The complementary improvement of a clear visual effect was based on conventional butterfly nets, which I used to capture hummingbirds on feeders (Figure 4). This final work remained undeveloped until the Ruschi net trap was first built (Figure 1).

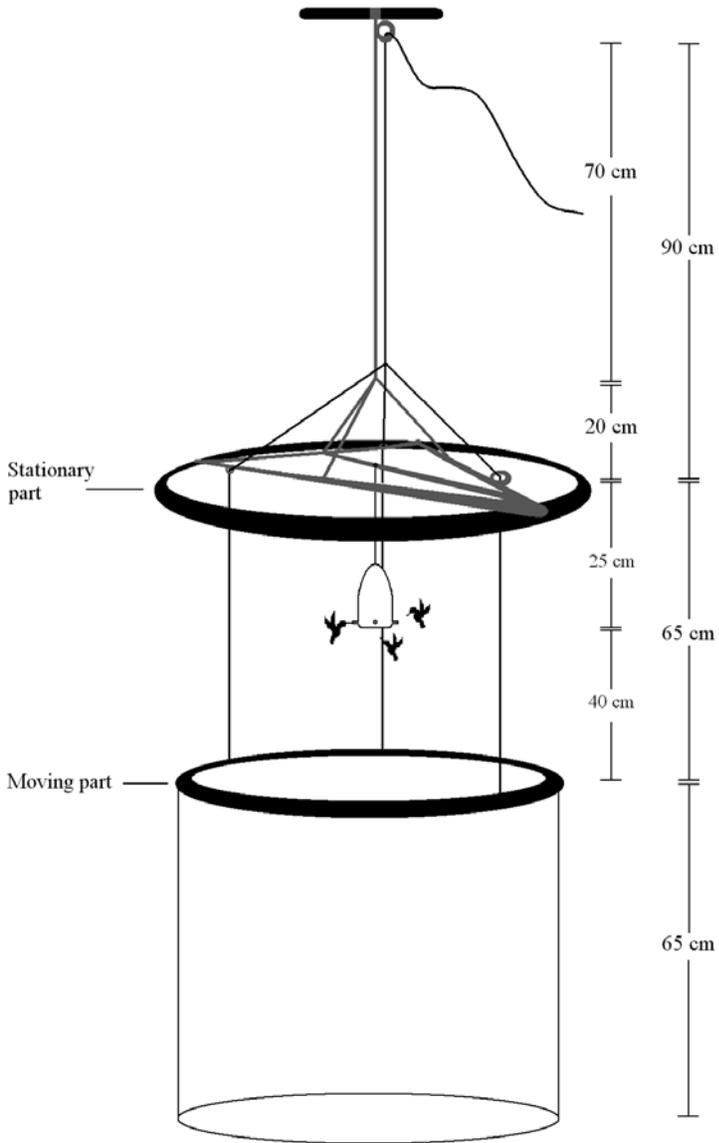


Figure 1. Details of the Ruschi net trap, designed for hummingbirds.

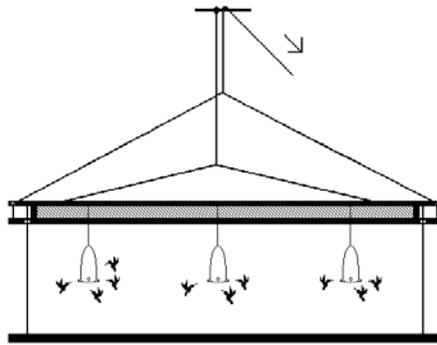


Figure 2. First version of the new hummingbird trap.

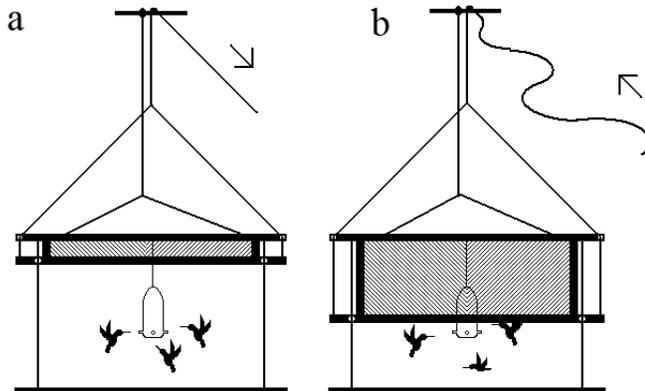


Figure 3. Second version of the new hummingbird trap.

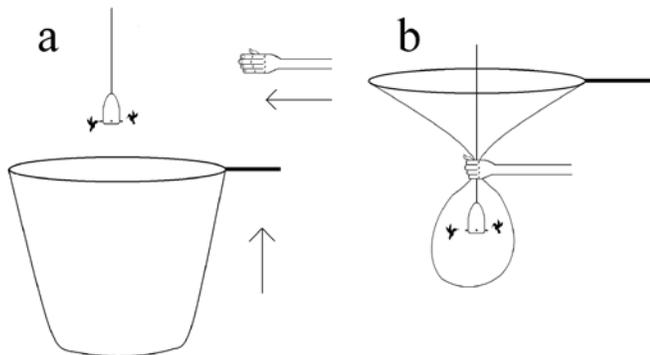


Figure 4. Method for capturing hummingbirds with butterfly net

Constructing the Ruschi net trap

First, bend two iron rods (0.5 mm diameter by 2.7 m and 2.4 m long, respectively) to form 90 cm and 80 cm diameter hoops and weld the ends together, then weld three iron rods (77.94 cm long and 0.5 mm in diameter) together to form a triangle that is then inserted into the larger circular frame (Figure 5). The triangular frame must be on the circular frame to guarantee that the trap closes tightly (Figure 6b). Weld a 67.5 cm iron rod (0.5 mm diameter) to one of the corners of the triangle and to the middle of the opposite side (Figure 5). Place the smaller hoop on the larger one, center it within the larger hoop, and note where the smaller hoop intersects the triangle. Then, weld thick washers (10 mm internal diameter) to the triangle (one per side) at those three points (Figure 6b). This arrangement guarantees that the trap will close tightly (Figure 6a).

A cylindrical bag (80 cm diameter by 65 cm deep) made of black veil mosquito netting goes on the smaller hoop and the top cover (100 cm diameter section of black veil mosquito net) goes under the larger one. I recommend using Velcro or simple needlework to fasten both veils on their frames. Fix a piece of wire (1 mm) to the middle of each side of the triangle, and tie their ends together to form a pyramidal structure not longer than 20 cm (Figure 1). On top of this pyramid, fix another wire longer than 70 cm, with an eye on the 70th centimeter (through which the nylon will be pulled) (Figure 6c). This eye must be internally covered with a hard material (or even another eye) to avoid strangling the nylon line when it is pulled or released. This double function eye allows the entire trap to be hung on a single point (Figure 1). The rest of the wire might be used to hang the trap.

Placing the larger hoop on the smaller one, the former board matches with the rings of the latter. The eyes indicate where a 0.3 mm nylon line may be tied to hold the moving part (Figure 1). After that, pass the lines through their respective rings and tie the ends together outside the holding wire pyramid with dead knots (to avoid slippage) 90 cm from the circular frame. A 1 mm nylon line used in the vortex is used to shut the trap. Installing a zip on the veil bag is recommended for simultaneous captures when working alone with many traps. In such cases, keep the trap closed by fastening the line end and, with both hands free, hold the hummingbird from outside through the net, using the other hand to drive it out through the zip. The feeder should be hung in the centre of the triangle with wire in a way that the hummingbird's bill stays about 25 cm from the hang point of the feeder while feeding (Figure 1). I recommend painting the trap (apart from the black veil and the nylon line) black to give greater contrast to the feeder inside. Finally, one should attention to the power when pulling the line. It has to be fast to guarantee a proper catch.

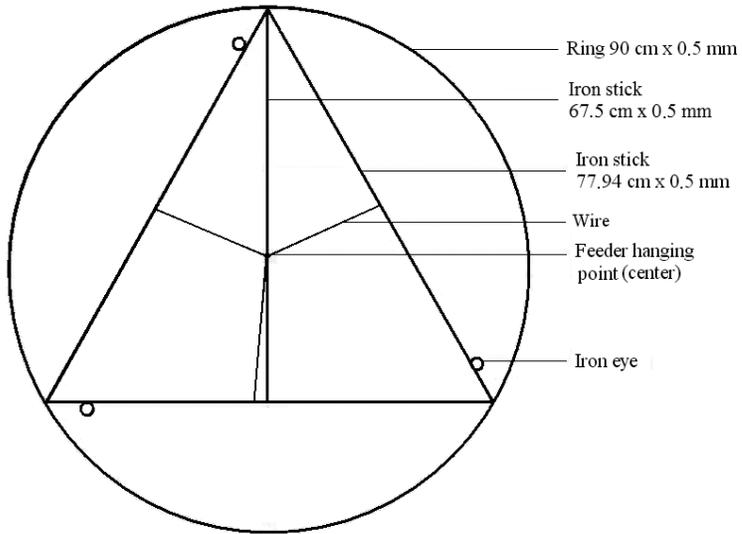


Figure 5. Upper part of the Ruschi net trap seen from above (without the veil)

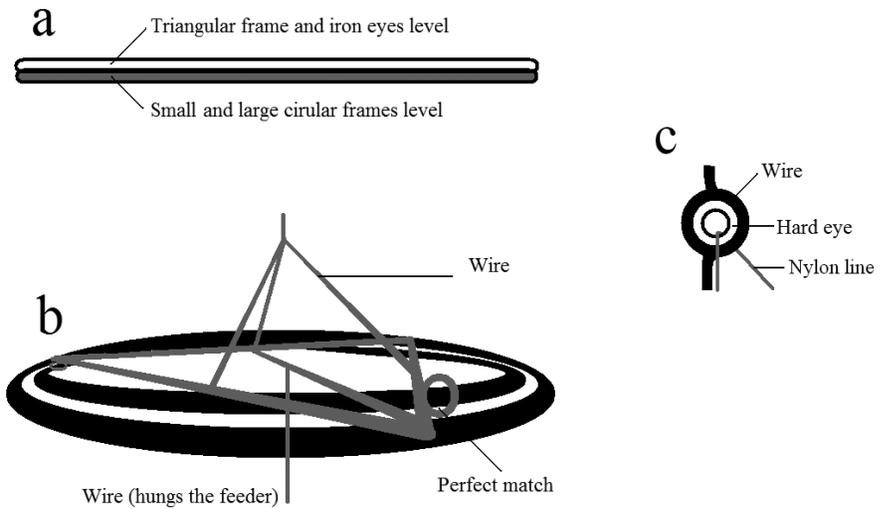


Figure 6. Details of the upper part of the Ruschi net trap.

Remarks

Every time I used the Ruschi net trap, hummingbirds entered it quickly, even in locations where I had never trapped them before. This occurred both in locations with feeders (many individuals) and at forest trees where hummingbirds had been previously seen perched on (a single to a few individuals). Some hummingbirds spent a few seconds observing the lid, but soon used the feeder below. Sometimes the lid was used as a shelter against attacks from above by territorial species, but neither of these situations interfered with the feeder, which was unrestrictedly used.

The absence of sides, except for three thin nylon lines, and the wide distance between the frames, provide hummingbirds with a clear view of the feeder and increase the likelihood that they will enter the trap. The trap's large diameter, the location of feeders (about 25 cm from the lid) and a design that allows rapid shutting action make hummingbird's escapes unlikely. The deep veil bag allows the user to quickly hold the bird from the outside with only one hand, by holding it like a pouch from above the feeder, and retrieve the bird from inside with the other hand after releasing the pushing line. Once the line is released, the trap is ready for the next catch. It is also useful for releasing non-targeted hummingbirds without having to handle them.

The three wires used to hang the lid keep the trap from rotating due to the wind. In addition, the trap is light (1 kg) and easily carried. The speed and timing of closing the trap can be controlled by the user, minimizing the chances that hummingbirds will be struck as the trap is closed. The cylindrical shape of the bag, with the bottom and the frame of the same diameter ensures that hummingbirds can continue to hover inside the trap until handled.

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