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SHORT COMMUNICATION

How *Micrathena duodecimspinosa* (Araneae: Araneidae) uses the elasticity of her dragline to hide her egg sac

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Abstract. A female *Micrathena duodecimspinosa* (O. P. Cambridge, 1890) used the elasticity of her long dragline to repeatedly jerk her newly constructed egg sac up and down as she lowered it into the leaf litter below. Jerking may reduce the chances that the sac will be entangled in vegetation before it reaches the leaf litter or help insert it deeper into the litter, where it is visually camouflaged.

Keywords: Camouflage, oviposition, orb weaver

The eggs of spiders are attacked by a variety of enemies, including other spiders, insects, birds, and mammals (Robinson & Robinson 1976; Austin 1985; Hieber 1992). Spiders' defenses against these dangers include physical protection by covering the eggs with silk (e.g., Gheysens et al. 2005) or with other materials such as leaves or soil (Austin 1985; Moya et al. 2010; Suter et al. 2011). This note describes a hitherto undescribed technique that the araneid *Micrathena duodecimspinosa* (O. P. Cambridge, 1890), used to insert a package containing her eggs into the leaf litter on the forest floor, and that resembles the behavior of the congeneric *Micrathena* sp. (Moya et al. 2010).

At 08:15 on 15 August 2011, I found a female *M. duodecimspinosa* in second growth near San Antonio de Escazu, San José Province, Costa Rica (el. 1325 m) resting on an egg sac that was enclosed in a tightly folded brown leaf and that hung at the end of a single suspension line about 50 cm above the ground. This line was attached about 3–4 m above the ground, and had 3–5 small white accumulations of loose silk attached to it. The folded leaf formed a nearly rectangular package (Fig. 1) that was approximately lenticular when seen from the side. I grasped the suspension line about 2 m above the ground, and carried the line, the spider and the leaf indoors to photograph them, and then taped the suspension line to a leaf outdoors about 2 m above the ground and watched the spider's behavior. The spider spent most of the next 30 min walking over the egg sac, presumably laying additional lines. Then at about 08:50 she climbed about 30 cm up the line above the sac, broke the line and attached her dragline to the line above, and began to descend slowly. Facing downward and holding the line to the sac with her anterior legs, she slowly released additional dragline, descending 30–40 cm in about 30–60 s. The sac descended all the way to the ground without snagging, and came to rest on the upper side of a weakly sloping dead leaf on the ground.

The spider then “snapped” the line 10–20 times, apparently utilizing the elasticity of the line above to reposition her sac. Each snap was apparently produced as follows. The spider gathered in line leading to the egg sac below with her anterior legs while holding the line above her with her legs IV. She moved downward approximately 1–3 cm as she reeled in line, partially lifting the sac from where it rested on the substrate below. Then she suddenly released the loose accumulation of line, and her body suddenly sprang upward about 1–3 cm. This movement of her body generally also caused the egg sac to jerk upward briefly and then fall back; generally the jerk lifted the sac only partially off the substrate. At least two of these jerks caused the sac to slide farther downward, and it finally ended up in small groove in the litter at the lower edge of the leaf where it had originally rested. The spider gradually approached the sac between the snaps, and

finally contacted a curled leaf near the sac when she was only 1–2 cm above the ground. She then cut the line to the sac and decamped, climbing up the line to the leaf above, where she rested immobile.

The elasticity of the suspension line probably provided the force that produced the upward movements of the spider and her sac when she snapped the line. The reeling-in behavior must have increased the tension on the line both above and below the spider. The much longer length of the line above the spider would make it much more extensible than the line below her, so this could explain why her body descended as she reeled in line. When she released the accumulated silk, the line above would then have contracted much more than the line below because of its elasticity, thus causing the spider to be displaced rapidly upward. The upward momentum of the spider's body would in turn tense the line running downward to the sac, and because it was much less extensible, the sac would have been jerked upward.

The line snapping behavior in this species is very similar to behavior described in *Pozonia nigroventris* (Bryant 1936) and *Micrathena* sp. as they lowered their egg sacs (also wrapped in dead leaves) into the leaf litter (Moya et al. 2010). That study speculated that these manipulations of egg sacs serve to insert them deeper into the leaf litter. I propose that another and perhaps the principal function of the manipulations in these species is to avoid the egg sac becoming hung up on objects such as leaves or stems as the spider lowers the sac to the ground. The spider's poor vision (and the fact that some sacs are lowered at night) would make it difficult for her to see whether or not the egg sac had reached the ground. The visual camouflage against predators such as birds that results from being wrapped in a dead leaf would presumably be less effective if the sac were snagged on a leaf or twig above the ground.

The mechanism by which the sac was jerked upward was clearer in *M. duodecimspinosa* than in the other species, probably in part because the spider repeated the snaps so many times, and perhaps also because I anticipated that the spider might manipulate the sac and was ready to observe her behavior carefully. It is not clear whether the “vertical shakes” described for the other species also depended on the elasticity of the suspension line, but the brisk nature of these shakes (W. Eberhard unpub.) makes this seem likely.

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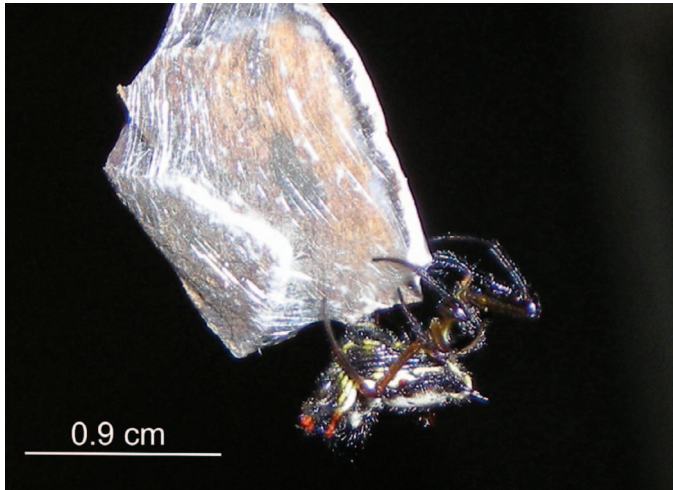


Figure 1.—A depleted female *Micrathena duodecimpinosa* rests under a tightly folded dead leaf which encloses her newly constructed egg sac.

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