Roly-Uoly Egg Sacs: Isopods Used as Replacement Egg Sacs by the Wolf Spider Pardosa valens (Araneae: Lycosidae)

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Roly-poly egg sacs: isopods used as replacement egg sacs by the wolf spider *Pardosa valens* (Araneae: Lycosidae)

Christopher A. Brown
Department of Biology,
Box 5063, Tennessee Tech University,
Cookeville, TN 38505, USA
email: cabrown@tntech.edu

Abstract

Wolf spider females have the distinctive behaviour of carrying the egg sac attached to the spinnerets. If this egg sac is dislodged, the female will retrieve and reattach it, if possible. However, in some instances, a female may reattach another object of similar size or shape as a replacement for a lost egg sac. Here, I report the first example of an isopod, *Armadillidium vulgare*, being used as a substitute for a missing egg sac in *Pardosa valens* Barnes, 1959 from southeastern Arizona.

Keywords: behaviour • false egg sacs • lycosids

Introduction

Wolf spider females carry egg sacs attached to the spinnerets; in fact, this is one of the defining behaviours of lycosids (e.g. Dondale 2017). As might be expected, females are very protective of their egg sacs and will fight to prevent their removal (Foelix 1996; personal observation). However, since wolf spiders actively forage even while carrying an egg sac, there exists the possibility that the egg sac could become dislodged. This might occur, for example, if the female is attacked by a predator which grasps the egg sac, or if the egg sac becomes snagged on something as the female moves through the habitat. If the egg sac is lost or removed, a female may become agitated and search the surrounding area; if the egg sac is located, she will then reattach it to her spinnerets (personal observation).

If the egg sac cannot be recovered, it appears that some females will replace it with a substitute of similar size or shape. Snail shells have been recorded as egg sac substitutes in several species (O'Connor 1896; Locket & Marsh 1957), while in other cases the female may use small rocks, rabbit droppings, seeds, clumps of soil, or a variety of artificial objects (Fabre 1912; Bristowe 1958; Foelix 1996; Culley, Wiley & Persons 2010). In this short communication, I report on the use of a novel object (a pillbug, or roly-poly, in the crustacean order Isopoda Latreille, 1817) as an apparent replacement for a lost egg sac in the wolf spider *Pardosa valens* Barnes, 1959.

Pardosa valens can be found in the western US states of Colorado, New Mexico, and Arizona, and southward into northern Mexico (Barnes 1959; Vogel 2004). In the Chiricahua Mountains of southeastern Arizona, it occurs near several small streams at mid- to high-elevation. In this area, *P. valens* appears to be restricted to the cobble zone, as individuals are not encountered at distances more than 10 m from the stream edge. Egg sac production likely begins in April (or perhaps late March), as there are large numbers of females carrying egg sacs by early May. Females with egg sacs become uncommon by mid-July, coincident with the beginning of the monsoon season when the cobble zone often becomes inundated following rainfall.

Observations

Both observations described below occurred in the cobble zone of Middle Fork Cave Creek (31°53′01″N 109°12′28″W), which flows through the grounds of the Southwestern Research Station at an altitude of 1620 m a.s.l. On 14 June 2004, while collecting *P. valens* shortly after dusk, I observed a female carrying an isopod belonging to the genus *Armadillidium*. The isopod was partially rolled into a ball, but I did not collect this spider and thus do not know if the isopod was alive or dead. A second observation of a female *P. valens* carrying an isopod was made on 17 May 2017, again at night while searching for marked spiders as part of a separate research project; the temperature was 16°C and relative humidity was 32%. In this case, the spider was collected; the isopod was *Armadillidium vulgare* Latreille, 1804 (family Armadillidiidae) and was dead, although whether it was dead when attached or died afterward is unknown. It was attached to the spinnerets at the anterior end of the dorsum, with the ventral side facing the spider, and was partially rolled into a ball (Fig. 1).

Discussion

Culley, Wiley & Persons (2010) have shown that female *Pardosa milvina* (Hentz, 1844) prefer replacements that are similar to their own egg sac in both size and shape. The isopods used by the two *P. valens* were similar in width and shape to an egg sac, but were taller than a typical egg sac, even if fully rolled up. This would likely require the female to lift her abdomen higher to avoid dragging the isopod along the substrate, which seems likely to negatively affect movement. However, whether carrying an isopod has a demonstrable effect on a female's locomotion is unknown.

Another potentially detrimental outcome of carrying a replacement for the egg sac is that it may inhibit females from producing another egg sac (Wagner 1995; Culley, Wiley & Persons 2010). Culley, Wiley & Persons (2010) found that females could replace an egg sac within two days of removal but, if they replaced the lost sac with another object, no new egg sac was produced. The length of time that *P. valens* is willing to carry the isopod before removing it from the spinnerets is, again, unknown but, if lengthy, could reduce the total number of egg sacs a female would normally produce over the reproductive season.

Acknowledgments

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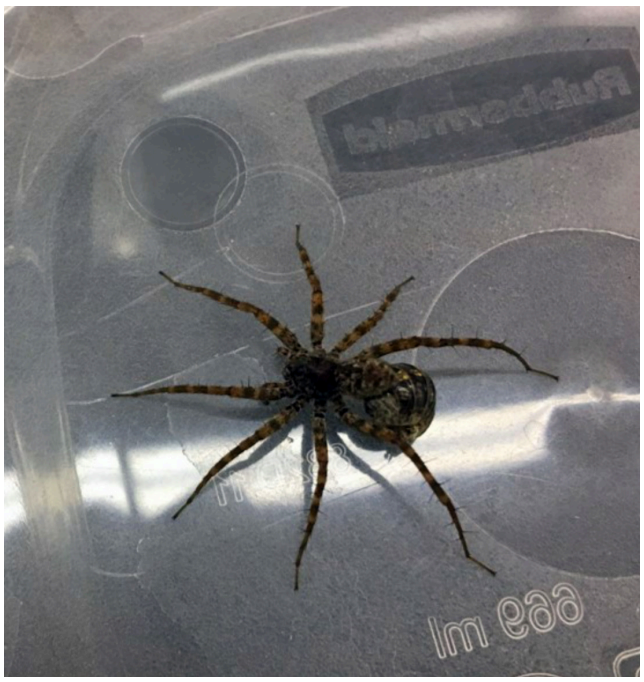

Fig. 1: Female *Pardosa valens* carrying an isopod (*Armadillidium vulgare*) as an apparent replacement for an egg sac.

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