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**SECONDARY USE OF THE REMOVED ORB WEB BY
MECYNOGEA LEMNISCATA (WALCKENAER)
(ARANEAE, ARANEIDAE)**

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ABSTRACT

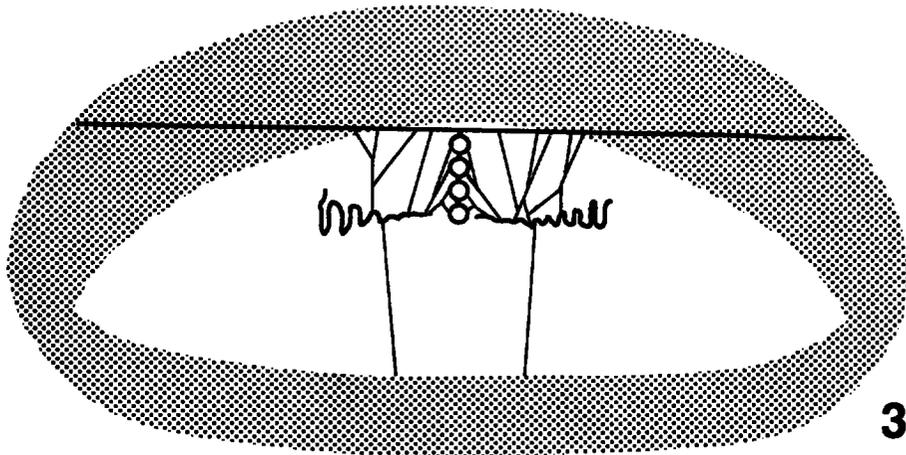
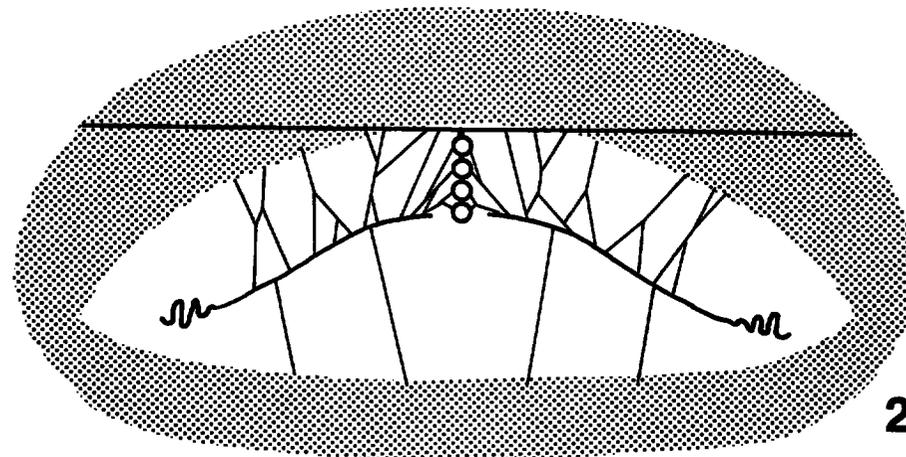
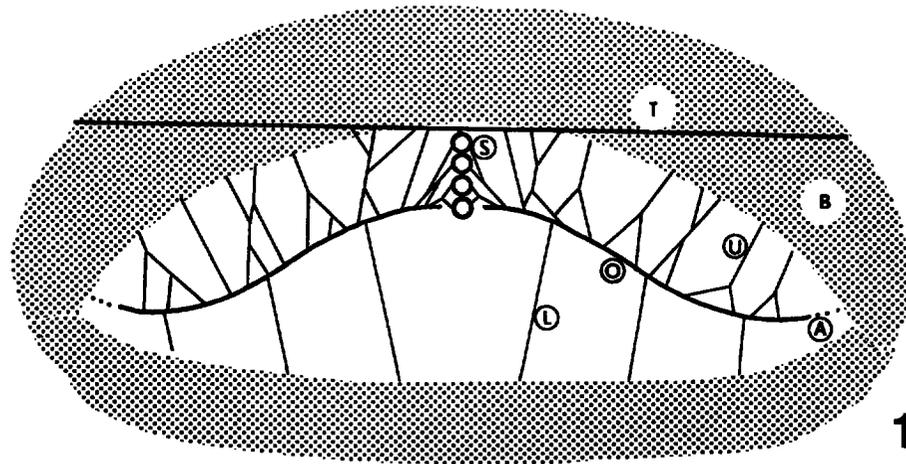
A *Mecynogea lemniscata* (Walck.) female with egg sacs removes her orb web by breaking the peripheral anchoring threads and the upper and lower guying threads attached to the surrounding labyrinth. The collapsed web then loosely surrounds the egg sac string which hangs above the open hub of the formerly intact web. Repeated trips by the spider around this fluffy mass tightly wraps it around the egg sac string. The collapsed orb then becomes an additional layer of silk added to the covering of the egg sacs and thus contributes to the survival success of the eggs and young in their exposed position. This previously unknown secondary use of the destroyed orb is a third alternative to two well-known fates, i.e. whether it is ingested or discarded.

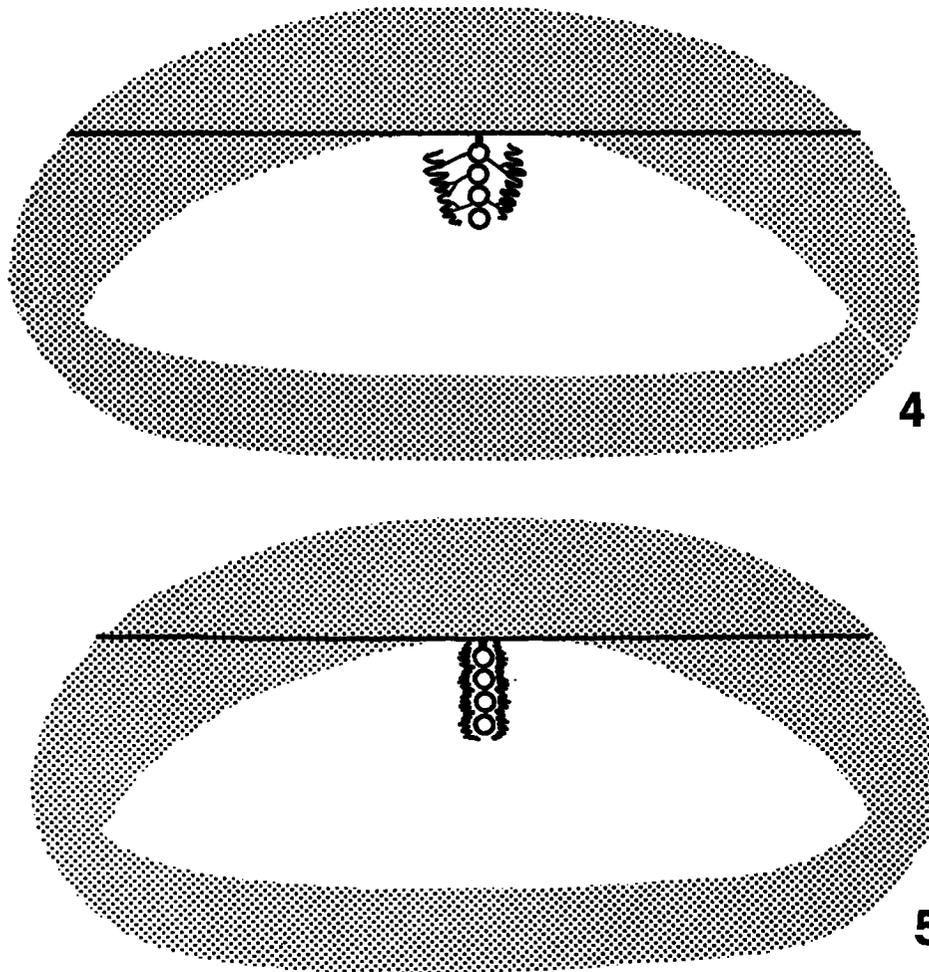
INTRODUCTION

In a recent article (Carico, in press), I emphasized the importance of web removal activity in the overall daily web cycle in orbweavers. During that study I surveyed webs of several species of orbweavers to determine the pattern of web removal used by each. Among the webs studied was the domed horizontal orb of *Mecynogea lemniscata* (Walckenaer), a species distributed from the southeastern USA to South America. I found that the juveniles of this species discard the orb by dropping it to the lower labyrinth. In the present study of adults in Lynchburg, Virginia, I found that eggless females discard their orb in the same manner as the juveniles, but females with egg sacs "wrap" the collapsed web around their egg sac string which is suspended in the characteristic position above the hub. What follows is a general description of this unique type of orb web removal behavior in *M. lemniscata*.

STRUCTURE OF THE FEMALE WEB WITH EGG SAC

The structure of the entire web of *M. lemniscata* is described in detail elsewhere (McCook 1878, 1889; Exline 1948; Gertsch 1979) and will not be reviewed here in detail. It is very similar to that of species in the genus *Cyrtophora* which is described in even more detail by other authors (Kullmann 1958; Lubin 1973; Elgar, Pope, and Williamson 1983). However, a review of certain features is relevant to this discussion. Basically, the completed orb is a horizontal, inverted bowl with numerous fine guying threads suspending the orb from a labyrinth above and with fewer, scattered, stronger guying threads





Figs. 1-5.—Cross-sectional diagrams of the adult female *Mecynogea lemnicata* (Walck.) web in stages of orb removal and subsequent attachment to the egg sac string. 1, intact web; 2, periperal threads of the orb are broken as well as the outermost guying threads; 3, continued removal of guying threads with resulting loss of tension and retraction of the orb web; 4, “folding up” of the orb web around the egg sac string after removal of tension; 5, “wrapping” of the orb around the egg sac string.

Structure of web: A, anchoring threads of the orb; B, surrounding labyrinth or barrier web; L, lower orb-web guying threads; O, orb web; S, egg sac string; T, egg sac suspension thread; U, upper orb-web guying threads.

attached to a labyrinth below (Fig. 1). The function of these guying threads is to maintain the convex shape of the orb. Characteristically, the egg sac string is suspended into the open hub above from a horizontal, very thick compound thread. There are also a few guying threads connecting the open hub to the egg sac string.

DESTRUCTION AND FATE OF THE ORB WEB

The orb web removal begins soon after sunset and requires 15 minutes to 1.5 hours to complete. Ten females studied throughout their adult life, beginning with the first and

second week in July, were seen to construct 1-3 webs (average 2.25) with a range of 5-30 days intervening between each construction (average 13.3 days). At the beginning of the destructive process, the spider moves to the periphery of the orb and breaks the anchoring threads to the labyrinth (Fig. 2). Frequent excursions are made hubward to break some of the upper and lower guying threads before all the anchoring threads have been detached. As the spider breaks these attachments at or near the periphery, the tension on this area of the orb is gradually reduced. The result is that the diameter of the orb becomes smaller and the loosened edges take on a rolled-up and fluffy appearance. As the process continues, the collapsed web eventually rises higher and closer to the egg sac string because of remaining tension from the few innermost guying threads attaching the hub to the egg sacs (Fig. 3, 4).

After all anchoring threads are broken and all but the few innermost guying threads near the hub remain, the collapsed orb appears as a fluffy mass loosely surrounding the egg sac string (Fig. 4). Exline (1948) observed this cottony mass but attributed it to having been ". . . woven over the entire string. . .". In the final stages, the spider encircles the egg sac string several times with silk, causing the orb "blanket" to be drawn tighter to the surface (Fig. 5). The process of smoothing out the web against the surface requires several nights during which the spider continues to encircle the egg sacs. A new orb is constructed later the same night or the following night, after the previous one is removed. The labyrinth is not notably changed during these activities nor at anytime during life of the adult spider.

Both egg sac construction and web removal events are interspersed throughout the life of the adult female. The earlier egg sacs will therefore have a thicker covering of orb silk than later ones.

DISCUSSION

The fate of the removed webs of various orbweavers has previously been a subject of informal speculation which focused on two possibilities: whether the web is ingested or merely discarded by the spider. Published accounts are typically scattered with no review available on the subject. As a result of the present study a third and new alternative should now be added to the discussion concerning whether the web may be utilized for another function, as in *M. lemniscata*. To my knowledge, this is the first report of a removed orb web being used as a covering for the egg sac or in any other secondary function.

In the case of *M. lemniscata*, the silk added to the egg string has an apparent adaptive significance. The thickened covering probably contributes favorably towards the survival of the eggs and young as they remain suspended in this relatively exposed situation during winter months.

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