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Chapter 63

THERIDIOSOMATIDAE

1 genus, 2 species

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Common name —

Ray spiders.

Similar families —

Theridiidae (p. 235), Araneidae (p. 68), Linyphiidae (p. 124).

Diagnosis —

This orbicularian family can be distinguished by the ventral prolateral sternal pits (Fig. 63.2), the conformation of the male palp [the topological arrangement of embolus (E), conductor (C), and median apophysis (MA) on the tegulum (Fig. 63.3)], the trajectory of the ejaculatory duct, the medially fused female spermathecae, web architecture (Fig. 63.4) and the extremely long third and fourth tibial dorsal trichobothria (Fig. 63.5) (Wunderlich 1980h, Coddington 1986a). With respect to the North American fauna, theridiosomatids are distinctive in being quite small spiders with extremely stout 1st femora, abundant macrosetae, chelicerae with robust teeth, and very large male genitalia. In the field, theridiosomatids spin modified but recognizable orbwebs with radii that join before reaching the hub, and a “tension” line extending from the hub to the substrate with which the animal distorts the web into a cone when ready to capture prey.

Characters —

body size: males 1.3-1.9 mm; females 1.9-2.4 mm.

color: abdomen dusky with light dorsal chevrons (*Theridiosoma gemmosum*) or a transverse white to silvery lunate band (*Theridiosoma savannum*). Legs uniform tan.

carapace: carapace nearly as high as long with the clypeus about 1.5 x an AME diameter.

sternum: sternum truncate behind, with glandular fossae or pores at junction of sternum and labium.

eyes: eight eyes in two rows, laterals juxtaposed, canoe tapeta in all except anterior medians.

chelicerae: robust with discrete, irregularly arranged teeth.

legs: tarsi 3-clawed; first and to some extent second femora unusually robust. 3rd and 4th tibial trichobothria 2-4 x tibia diameter, and distal 4th tibial trichobothrium especially long. Median tarsal claw elongate with a finely tapering tip. Female palpal tarsus clawless.

abdomen: smoothly globose; as high to higher than long.

spinnerets: six spinnerets with small, fleshy colulus.

respiratory system: paired book lungs and median tracheal spiracle, just anterior to spinnerets.

genitalia: entelegyne; *female* has a relatively large *bursa copulatrix* with ducts leading to medially fused spermathecae, a synapomorphy of the family, epigynum as in Fig. 63.7, posterior view; *male* has very large palpal bulbs with a mesal median apophysis (MA), and a complex embolic division hidden beneath the broad, blade-like conductor (C). The course of the ejaculatory duct is quite complicated, and several switchbacks are also synapomorphic for the family. (Coddington 1986a).

Distribution —

Theridiosomatidae is a world-wide, but mainly tropi-

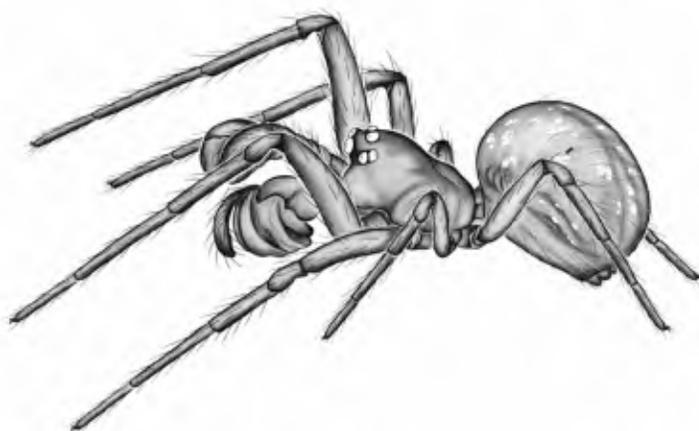


Fig. 63.1 *Theridiosoma gemmosum* (L. KOCH 1877b)

cal family. The two North American species (both *Theridiosoma*) occur, as far as known, only in eastern North America. *Theridiosoma* itself is also global. *Theridiosoma gemmosum* (L. KOCH 1877b) ranges from Michigan, southern Wisconsin, Kansas, and Arkansas in the west to all more eastern states, including southern Ontario in Canada (as well as a large range in northern Europe, where it may be introduced). *Theridiosoma savannum* (CHAMBERLIN & IVIE 1944) is a more southerly species, only common along the gulf coastal plain. The two species are broadly sympatric but prefer different microhabitats.

Natural history —

The two known North American species occupy distinctly different habitats but are alike and unusual among orbweavers in being primarily diurnal predators. *Theridiosoma gemmosum* (Fig. 63.6) prefers extremely humid microhabitats that are almost always in closed canopy forest. Web sites include the undercut banks above, or the dense vegetation bordering, running streams, or interstices of wet rocks or stumps in swamps or seeps. Web orientation varies, but is most frequently vertical. The orbs are sparse with few (e.g., 6-12) radii and a like number of sticky spirals. Early in web construction, during the exploration of the website, one line is selected to serve as an “out-of-plane” radius, roughly perpendicular to the future plane of the orb. The non-sticky, or temporary, “spiral” is in the form of two concentric closed circles of silk, another behavioral synapomorphy of the family. Although the animal makes a relatively normal, complete orb initially, at the end of construction, it rebuilds the hub area, fusing radii so that only four lines reach the hub. These lines are held by the back four legs; the front four legs grasp the out-of-plane radius, or “tension” line, and by pulling on it distort the web into a cone (Fig. 63.8). The animals typically rest dorsal side up and with the front four legs fully flexed (unlike *Hyptiotes*, see chapter 67) maintain the tension in the web for hours

on end. It is unclear if the radial lines connect to each other. In some cases it seems that they do not, when the body and legs of the spider serve as the hub of the web (like *Hyptiotes*). The slack in the tension line produced by the distortion of the web is piled on top of the cephalothorax, obscuring the eye group. When prey contact the web, the spider releases the tension line and the web, with the spider, “pops,” or springs backward into a planar configuration. By slamming the web against the prey, the velocity and force of impact between sticky lines and the prey is increased. Once the prey is entangled, the spider quickly attaches a new silk line to the unaffected radial lines and, paying out new silk behind itself, relaxes the sector of the web containing the prey. More of the lax sticky lines can thus contact the prey, and they are also harder for the prey to break. Attack behavior is always a bite followed by a wrap, whereupon the spider transports the prey bundle to the hub for feeding. Because the hub of the web tends to fall apart during prey capture, the web architecture degrades relatively quickly over the course of a day. Nematocerous flies (mosquitoes, midges, gnats) and collembola, which are apparently their principal prey, either do not adhere easily to viscid silk or fly slowly with so little momentum that impacting viscid silk does not result in entanglement.

Theridiosoma savannum spins horizontal orb webs on the surface of coarse (i.e. broadleaf) leaf litter in moist, closed-canopy southeastern forests, such as live oaks or gum trees. The web form is peculiar, with few, relatively long radii and a tightly spaced sticky spiral that occupies only about the central fourth of the area enclosed by the radii. The “tension” line extends from the hub more or less vertically down to the leaf litter. As in *Theridiosoma gemmosum*, the spider sits at the hub with the back four legs holding onto radii, and the front four legs grasping the tension line. Prey capture is similar, except that incoming prey are more likely hopping insects or insects attempting to land on the surface of the litter.

Both species make papery brown egg sacs suspended from a forked silk line (Fig. 63.9). The female abandons the egg sac, and, as it is often placed more prominently than the

website, finding the characteristic egg sac is often the first clue that theridiosomatids are present.

Taxonomic history and notes —

Theridiosomatidae was first described as the group Theridiosomatini or Theridiosomateae within the Argiopidae (Simon 1881a, 1895a). It was polyphyletic and included genera since dispersed to six other families. Wunderlich (1980h) was the first to point out the sternal pits, which to date all and only theridiosomatids possess. The current total is 12 genera and 72 species. For most of the 20th century it was most frequently treated as a subfamily of Argiopidae/Araneidae. Vellard (1924a) was the first to rank the group as a family, and various later authors agreed (e.g., Kaston 1948), but none of these opinions were justified phylogenetically. The family was revised worldwide at the generic level by Coddington (1986a), who reviewed its taxonomic history and recognized nine genera in four subfamilies, Platoninae, Epeirotypinae, Ogulninae, and Theridiosomatinae. His phylogenetic analysis placed Theridiosomatidae as sister to an informal group he called the “symphytognathoids” (Mysmenidae (Anapidae, Symphytognathidae)), a placement with which most subsequent analyses (e.g., Griswold *et al.* 1998) have agreed. Subsequently the term symphytognathoids was applied to all four families.

Symphytognathoid synapomorphies are mainly behavioral: all members of the group spin out-of-plane radii and radically remodel the hub region in similar ways after constructing the sticky spiral (Eberhard 1982, 1986, Coddington 1986b). They also “doubly attach” their egg sacs, which is to say the eggs are laid against a silk line attached at both ends to web and/or substrate. Some symphytognathoids subsequently cut one attachment so the egg sac hangs free. Symphytognathoids apart from theridiosomatids all spin at least some accessory radii after sticky spiral construction.

Genus —

Theridiosoma O. PICKARD-CAMBRIDGE 1879e

