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THE NEW SPECIES *PHILOPONELLA HEREDIAE* AND ITS MODIFIED ORB-WEB (ARANEAE, ULOBORIDAE)

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ABSTRACT

The new Costa Rican species *Philoponella herediae* and its web are described and illustrated. The web consists of a horizontal orb-web beneath which converging, vertical threads are spun.

INTRODUCTION

Most members of the family Uloboridae spin horizontal orb-webs. However, a number of modified webs have been described. These include the reduced webs of *Polenecia* Lehtinen (Wiehle 1931), *Hyptiotes* Walckenaer (Opell 1982, Peters 1938), and *Miagrammopes* O. Pickard-Cambridge (Lubin et al. 1978). Other modified webs are first spun as orb-webs and subsequently altered. Lubin et al. (1982) describe orb-plus-cone-webs constructed by one species of *Conifaber* Opell and five species of *Uloborus* Latreille. This web form is produced when a spider spins a horizontal orb-web, pulls the hub of this web downward to form a cone and then spins a second orb-web over the cone's aperture. Some *Philoponella* Mello-Leitão and *Uloborus* species spin a tangle of non-sticky threads above their webs and occasionally add what appears to be stabilimentum silk to some of these threads (Eberhard 1972, Lubin 1986, Peters 1953). *Lubinella morobensis* Opell and some *Philoponella tingena* (Chamberlin & Ivie) spin orb-webs that have a vacant sector through which a signal line runs (Lubin 1986, Opell 1979). These spiders use the signal line to monitor the web from adjoining vegetation, rather than from the typical hub position. The modified web spun by the new species described below also represents a simple alteration of an orb-web. Here, the orb itself is not altered, but converging vertical threads are spun beneath it.

Philoponella herediae, new species
Figs. 1-5

Types.—Female holotype from the Organization for Tropical Studies' La Selva research station near Puerto Viejo de Sarapiqui, Heredia Province, Costa Rica. Collected 30 June 1985 by B. D. Opell. Three female paratypes from the same locality, collected 14 Jan. 1984 by W. G. Eberhard. Holotype and two paratypes deposited in the Museum of Comparative Zoology; one paratype in the American

Museum of Natural History. The specific epithet is a noun of the genitive case derived from the Costa Rican province where the type specimen was collected.

Diagnosis.—This small species is distinguished from all other known American *Philoponella* species by its anteriorly rather than ventrally directed epigynal crypt (Fig. 4). It is the only species that lacks a precipitous posterior plate and has a centrally rather than posteriorly located "posterior rim." It is also the only known American species to lack an anterior epigynal rim, although in *P. vittata* (Keyserling) this rim is rounded and not as prominent as in most species.

Description.—Males of this species are unknown. Female carapace length 1.02-1.06 mm, sternum length 0.62-0.68 mm, first femur length 1.40-1.54 mm, abdomen length 1.82-2.08 mm. Holotype calamistrum composed of 23 setae, ventral comb of fourth leg composed of four metatarsal and 14 tarsal macrosetae. Clypeus height equal to one anterior median eye diameter. Carapace black with a central, irregular white guanine patch and light posterior lateral margins (Fig. 1). Sternum black, legs light tan with prominent black rings (Figs. 2, 3). Abdomen's dorsum with prominent black and white (guanine) spots (Fig. 1), lower sides black, venter black, without the light paraxial stripes typical of most *Philoponella* species (cf. Opell 1979, figs. 249, 256). Spinnerets and anal tubercle black.

In ventral view, the black epigynum looks like a pocket with its opening agape (Fig. 4). Unlike other new world *Philoponella* species (cf. Opell 1979 figs. 220-222, 287-288), this species lacks a precipitous posterior plate and has an anteriorly rather than a ventrally directed epigynal crypt. The region corresponding to the posterior plate of other species slopes gradually anteriorly and ventrally from the epigastric furrow to a narrow, rounded posterior rim of the crypt located near the center of the epigynum. An anterior epigynal rim is absent (cf. Opell 1979, figs. 250, 266) and the large, round epigynal openings (bursae) are located at the extreme anterior lateral margins of the epigynal crypt. In ventral view (Fig. 4) the ellipsed crypt is four times as wide as deep and in anterior view almost twice as wide as deep. Each long epigynal duct loops thrice before connecting to a round spermatheca located at the posterior of the epigynum (Fig. 5).

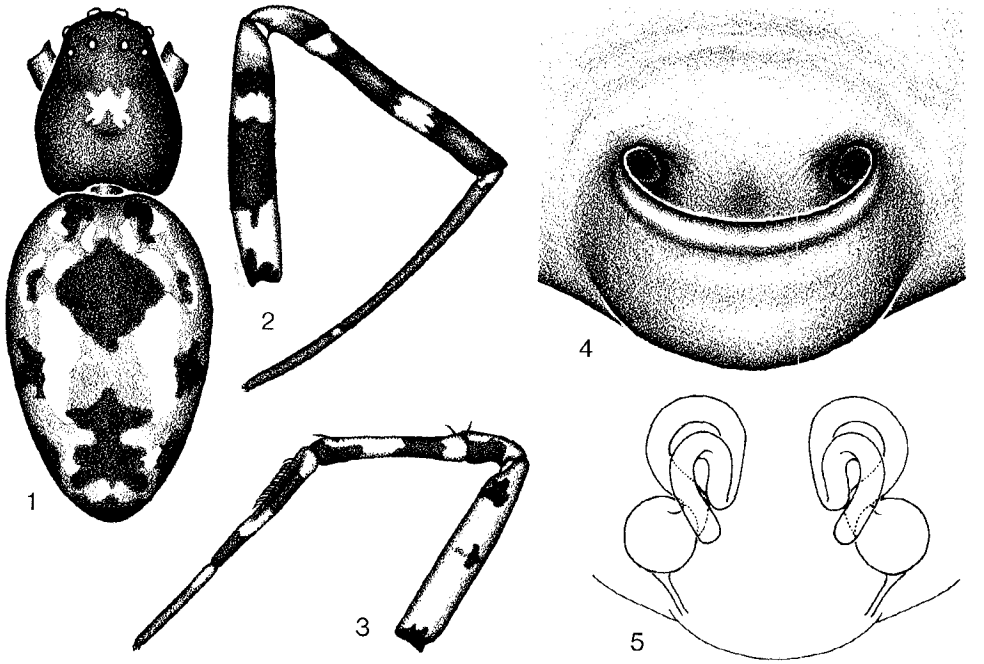
The clypeus height, extreme lateral position of epigynal openings, and looped epigynal ducts place this species in the *Philoponella semiplumosa* species group (Opell 1979). Within this group, it is very distinct, but most similar to *P. vittata* by virtue of the latter's broad, rounded anterior epigynal rim (Opell 1979, fig. 266).

When first observed and photographed, the holotype female was resting beneath the web's dense circular stabilimentum in the tucked posture (posture D, Opell and Eberhard 1984) typical of the genus. However, later photographs, such as Fig. 7, show her first legs extended, probably in response to vibrations produced while I was photographing the web.

Distribution.—Known only from the type locality. The La Selva field station is located in a tropical lowland wet forest (Hartshorn 1983, Holdridge 1967). The holotype was collected from low vegetation along a trail near the laboratory clearing (elevation, ca. 40 m).

WEB STRUCTURE

The female holotype was collected from an orb-web suspended at an angle of 35° from horizontal with its dense, 9 mm diameter, circular hub stabilimentum

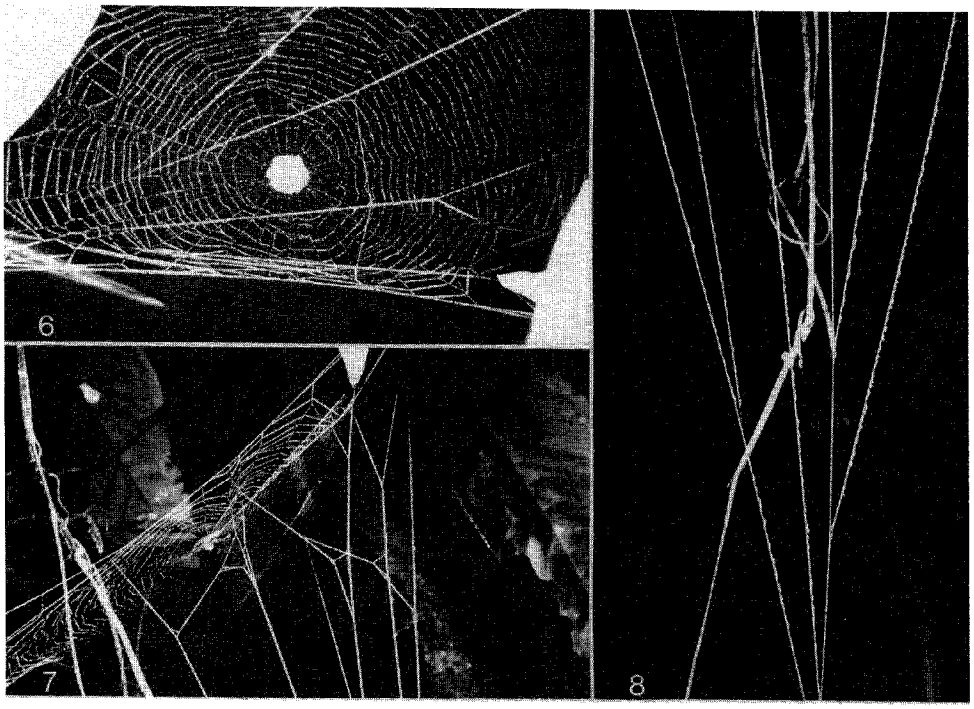


Figs. 1-5.—*Philoponella herediae* n. sp.: 1, dorsal view of female; 2, retrolateral view of right first leg; 3, prolateral view of right fourth leg; 4, ventral view of epigynum; 5, dorsal view of cleared epigynum.

about 30 cm from the forest floor. This orb had a length of 19 cm and width of 10 cm and contained 39 radii (Fig. 6). Extending from the more elevated half of the web's perimeter were six thick threads, each wider than the orb's spiral capture elements (Fig. 7). The width and looped appearance of these vertical threads (Fig. 8) suggest that they were framework threads to which stabilimentum silk was added. Eberhard (1973) reports that *Uloborus diversus* Marx (in Banks) occasionally lay stabilimentum silk on lines at the edge of and below their webs. He has also observed *P. herediae* webs similar to the one described here and believes these thicker, vertical threads likewise include stabilimentum silk (personal communication).

All but one of the vertical elements were anchored at two points to the orb's periphery. One was attached to a single radius, two to two radii, two to a radius and framework thread, and one to a radius and adjacent leaf. These vertical elements were under low tension and did not significantly deform the orb (Fig. 7). Stabilimentum silk extended from near their attachment to the orb to their final convergence 20 cm below the orb. The lengths of these vertical elements ranged from 9.2 to 18.4 cm, averaged 12.8 cm, and totaled 76.5 cm. They converged in pairs (Figs. 7, 8) and a single, 6 cm long framework thread connected the point of their final convergence to a grass blade beneath the web.

The vertical elements of this web did not noticeably deform the orb and their varied attachment points indicate that they were added after the orb was completed. These two features indicate that any resemblance of this web to a uloborid cone-web (Lubin et al. 1982) is only superficial. The function of these vertical elements is unclear. They do not seem broad enough to camouflage the spider should it run onto them after being disturbed; although they might serve to distract a searching predator. Stabilimentum silk distinguishes these vertical



Figs. 6-8.—Web of *Philoponella herediae* n. sp.: 6, top view; 7, side view; 8, side view showing vertical elements converging beneath the web.

threads from the many silk strands in understory vegetation and may, thereby, permit a male *P. herediae* to identify and locate a female's web. Until more observations on this species are made, the variability and function of this web form will remain uncertain.

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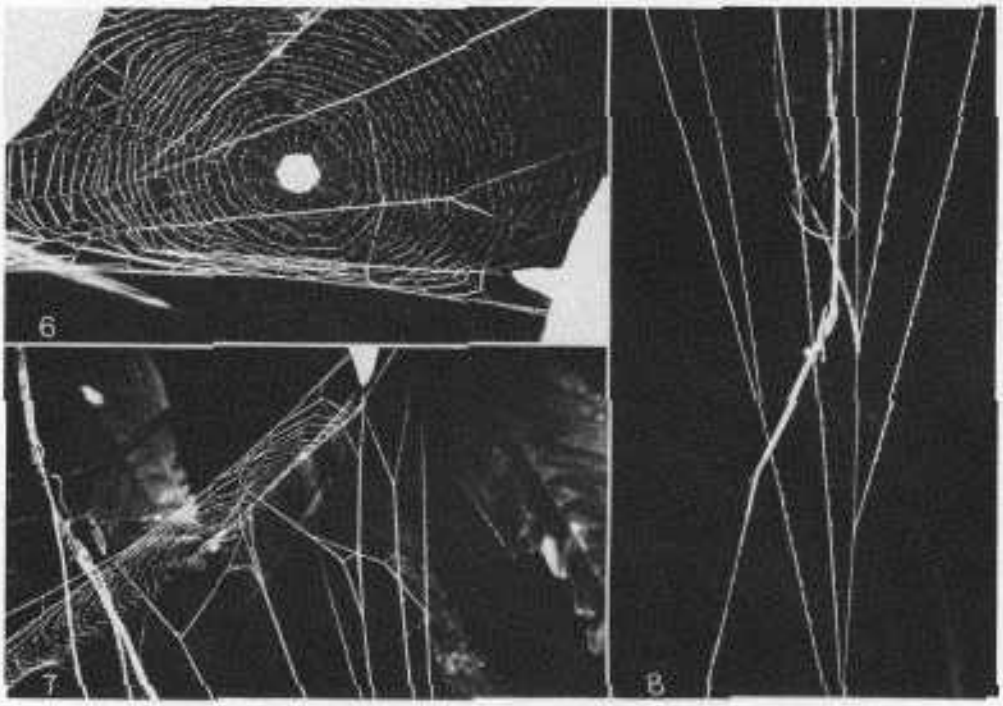

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