

## *Hydrellia bicarina*, n.sp. (Diptera: Ephydriidae), a leafminer in southern watergrass

**D. L. Deonier**

c/o U.S.D.A. Biocontrol Laboratory  
P. O. Box 147100  
Gainesville, FL 32614-7100

**ABSTRACT:** The species *Hydrellia bicarina*, n.sp. originally misidentified and described as *Hydrellia spinicornis* Cresson by Deonier (1971) is redescribed and illustrated. This species was first collected on and reared from Southern Water Grass *Luziola fluitans* (Michaux) growing in shallow baytree swamps of southern Mississippi by Deonier (1971). Based on the male and female genitalia and its natural history, this species is a member of the *Hydrellia griseola* species group.

### Introduction

In 1962 while working at the Gulf Coast Research Laboratory, Ocean Springs, Mississippi, I collected adult *Hydrellia* which superficially looked like small specimens of *H. griseola* (Fallén) from Southern Water Grass (*Luziola fluitans* (Michaux) in small bay-tree swamps around Hattiesburg, Mississippi. The water grass was growing in extensive dense mats of very uniform short height (about 10 cm) in depths of 0.10 to 1.5 m in the scattered shade of bay trees. Due to a progressive drought, many of these areas nearly dried up before I was able to collect sufficient infested plants to gain much bionomical data.

### Methods

The methods and materials used in this study were described in updated fashion in Deonier (1993). Depositories for type material are: National Museum of Natural History (USNM), Florida State Collection of Arthropods (FSCA), and the Deonier Collection. All scales are parts of 1 mm.

### *Hydrellia bicarina*, new species

(Figures 1-11)

*Hydrellia spinicornis* Cresson; misident. Deonier, 1971, pp.96-97.

**Diagnosis:** Maxillary palpus light to moderate yellow, somewhat roundly spatulate and with usually 2 dark setae 0.3-0.6 palpus length; antenna mostly brown, with antennomere 1 dark brown but silvery pruinose medially and antennomere 2 some-

what velvety dark brown dorsally and bearing 1-2 prominent dorsoapical spinoid setae; antennomere 3 light grayish-brown to dark brown, with dense, short and sparse, long pale dorsomedial micropubescence, 5-8 (6-7 usual) dorsal arisal rays; face, in profile, varying from nearly vertical with only slightly distinct upper median elevation and indistinct antennal foveae to moderately convex with distinct, but rounded median elevation (sometimes distinct carina) on upper 0.5 and slightly distinct antennal foveae; face, in anterior view, usually dull to subshining sericeous silvery pruinose, sometimes with golden reflections near sides and epistoma; lunule concolorous with face; parafaciale narrow, indistinct above midfacial height, light yellowish-brown pruinose and widening ventrally into light-gray pruinose gena; 5-7 primary facial setae, sometimes with minute declinate upper secondary facial setula; epistoma, in anterior view, shallowly concave (sometimes squarely recessed); parafrontale often dark brown or black contrasting with light yellowish-brown pruinose (often bronzed or with greenish reflections) frontal vitta and light yellowish-brown pruinose fronto-orbital area; postocellar seta usually 3+ times length of ocellar seta; mesofacial index 2.6-3.4; body length: wing length 0.9-1.0; 3-4 (0 macrochaetous) antesutural and 2 (1 macrochaetous) postsutural dorsocentral setae; postpronotum (and notopleuron in most females) light bluish-gray pruinose in contrast to light reddish-brown pruinose mesoscutum; pleuron and sides of abdomen light-gray or light bluish-gray pruinose; costal section II/I 3.0-3.7; profemur with distinct black stout

anteroventral spines or spinoid setae on distal 0.5; trochanters, femoro-tibial joints, and most of meso- and metatarsomeres light to dark yellow; fused surstyli (male) with central median pinniform (fin-like) carina and posterior median serraculose (rudderlike) carina. Male length 1.53-1.75 mm; female length 1.70-1.87 mm. Male postabdomen as in Figures 1-2; female postabdomen as in Figures 3.

**Description: Head.** Face, in profile, varying from nearly vertical with only slightly distinct upper median elevation and indistinct antennal foveae to moderately convex with distinct, but rounded median elevation (sometimes distinct carina) on upper 0.5 and slightly distinct antennal foveae; face, in anterior view, usually dull to subshining sericeous silvery pruinose, sometimes with golden reflections near sides and epistoma; lunule concolorous with face; parafaciale narrow, indistinct above midfacial height, light yellowish-brown pruinose and widening ventrally into light-gray pruinose gena; epistoma, in anterior view, shallowly concave (sometimes squarely recessed); 5-7 primary facial setae, sometimes with minute declinate upper secondary facial setula; antenna mostly brown, with antennomere 1 dark brown except silvery pruinose medially and antennomere 2 somewhat velvety dark brown dorsally and bearing 1-2 prominent dorsoapical spinoid setae; antennomere 3 light grayish-brown to dark brown, with dense, short and sparse, long dorsomedial micropubescence; 5-8 (6-7 usual) dorsal arisal rays; parafrontale often dark brown or black contrasting with light yellowish-brown pruinose (often bronzed or with greenish reflections) frontal vitta and light yellowish-brown pruinose fronto-orbital area; post-ocellar seta usually 3+ times length of ocellar seta; 13-16 postocular setae in row nearest orbit; maxillary palpus light to moderate yellow, somewhat roundly spatulate and with usually 2 dark setae 0.3-0.6 palpus length. Epistomal index 1.5-1.9; mesofacial index 2.6-3.4; vertex index 8.0+; ocular index 5.8-7.6; subcranial index 1.7-2.3; head width/head height 1.0-1.3.

**Thorax.** Postpronotum ( and notopleuron in most females) light bluish-gray pruinose in contrast to light reddish- or yellowish- brown pruinose mesoscutum; pleuron light-gray or silvery (anterior part of mesanepisternum often light bluish-gray) pruinose; 3-4 (macrochaetous) antesutural and 2 (1 macrochaetous) postsutural dorsocentral setae; 1 mesokatepisternal seta (macrochaetous); legs light-gray or bluish-gray pruinose over dark

grayish-brown except trochanters, femoro-tibial joints, and most of meso- and metatarsomeres light to dark yellow; protarsus, except usually light-brown basitarsomere, dark brown; profemur with distinct black, stout anteroventral spines or spinoid setae on distal 0.5. Wing length 1.53-1.87 mm; veins light yellowish-brown; 6-8 setae on basal end of costa; 5-7 dorsal and 6-10 anterior interfractural costal setae; costal-section indices: I/I 3.0-3.7; III/IV 2-6-3.5; V/IV 3.4-4.2; MI+2 index 1.4-1.7.

**Abdomen:** Terga, in posterodorsal view, semiglossy moderate or discally, reddish-brown pruinose, light-gray, or bluish-gray pruinose laterally and ventrally. Male postabdomen: median 0.3 of posterior margin of sternum 5 convex, with paired, posteriorly directed bispinate processes; anterolateral margin of sternum 5 rounded; copulobus rounded or nearly truncate posteriorly and irregularly setose. Postgonite directed anteromedial, with short, medially incurved uncus; distiphallus uniform in breadth (except preapical constriction) and covered by sternum 5. Anterior margin of fused surstyli deeply cleft medially to central median pinniform (finlike) carina and posterior median serraculose (rudderlike) carina; fused surstyli with acute anterolateral processes; fused surstyli length: cercus length 3.3:1.0. Syntergum 9+10 (epandrium) roundly truncate, similar to that of *H. griseola*. Female postabdomen: sternum 8 about 2.5 times wider than long, about as long as 7, but with narrow lateral extensions; sternum 7 and 8 about 0.15 wider than 6, but only about 0.5 as long as 6 and about 0.3 as long as sternum 5; sternum 5 nearly as long as, but narrower than sternum 2; sternum 8 uniformly, densely microsetulose, with at least 2 long hairlike posteromedial setulae; cercus, in lateral view, quasisemicircular, with ventral side flatter than convex posterodorsal margin; 8-10 long, hairlike submarginal posterodorsal setulae, usually with 1 longer, upcurved marginal posterior setula near tip of intercercal lobe; cercus about 1.2 times wider than long. Ventral receptacle cupuliform, about 1.2 times wider than deep (and slightly larger than lateral size of cercus).

### Etymology

The specific epithet, *bicarina*, is used to refer to the two median carinae, or keel-like processes, on the fused surstyli (of the male).

**Type**

Holotype male, USNM.

**Type locality**

MS: Lamar Co: Dickinson's Pond, sec 3, T4N,R14W (VII-24-1962, D. L. Deonier, taken on mat of *Luziola fluitans* [*Hydrochloa carolinensis*]). Paratypes FLORIDA: Alachua Co: Santa Fe R. nr. Union Co. line (VI-9-1992, D. L. Deonier, leaves of *Nuphar*), 1 male; L. Alto, NW shore (VII-7-1992, D. L. Deonier, power vacuum from *Nuphar* + *Nymphaea*), 5 males, 2 females; Putnam Co: Rodman Resv. (L. Ocklawaha), N. Ramp (VII-5-1990, D. L. Deonier, on *Hydrochloa*) 1 male, 1 female; Lacochee (IX-18-1930, P. Oman), 4 females; Lake Co: L. George, Juniper Cr. (VII-6-1990, B. C. Deonier, on *Nuphar*), 1 male; Highlands Co: L. Annie, Archbold Bio. Sta. (VII-11-1990, D. L. Deonier, on *Nuphar* + *Nymphoides* in grass + *Myriophyllum*), 2 males, 14 females; (VII-11-1990, B. C. Deonier, on *Nuphar* + *Nymphoides* in grass + *Myriophyllum*), 2 males, 1 female. GEORGIA: Rabun Co: Rabun Bald (VIII-9-1957, W. Richards), 1 male. MISSISSIPPI: Lamar Co: Dickinson's Pond, sec 3, T4 N, R14W (VII-11-1962, D. L. Deonier), 79 males, 58 females; (VII-24-1962, D. L. Deonier) 70 males, 47 females; Lake Shady (VI-29-1962, D. L. Deonier), 2 males, 4 females; (VII-11-1962, D. L. Deonier), 38 males, 24 females; Jackson Co: Vancleave Road (VI-28-1962, D. L. Deonier), 1 female.

**Immature Stages**

**Egg:** Length 0.40-0.55 mm; maximum breadth 0.14-0.15 mm. Chorion (Figure 5), yellowish-gray, corrugate, with the few longitudinal ridges occasionally anastomosing; spaces between ridges regularly micropunctate. Micropylar protuberance infundibulate, exposed in dorsal view.

**First-instar Larva:** Length 0.38-1.20 mm; maximum breadth 0.060.20 mm. Clypeal arch distinctly angular (about 100°); feeding apparatus black; frontoclypeal length 0.14-0.18 mm (Figure 7). Heavily sclerotized supraspiracular spinous processes present.

**Second-instar Larva:** Length 0.90-3.50 mm; maximum breadth 0.200.80 mm. Clypeal arch not so angular. Frontoclypeal length 0.240.28 mm (Figure 8). Spiracular peritreme distinct as in

Figure 6; 2 bispinate asteriform processes and 4-6 smaller spines just anterodorsal to each spiracular peritreme; peritreme extraordinarily long and spicate. Body translucent, yellowish-gray.

**Third-instar Larva:** Length 2.00-4.50 mm; maximum breadth 0.501.00 mm. Frontoclypeal length 0.36-0.42 mm (Figure 9). Ventral frontoclypeal index 3.4-3.6; phragmatal index 0.8-0.9; bifurcation index 3.4-3.8; clypeal-arch index 1.4-1.6. Clypeal arch sloping at 20°-30° in relation to lower frontoclypeal margin. Mouth-hook beak and base indistinct; mouth-hook light spot narrow, triangular, and about 3.0 times longer than wide. Supraspiracular bispinate processes absent or at least indistinct; prothorax densely spinulose, abdominal 8 without ventral, transverse row of setulae, but with 4-5 annuli of spinules. Body opaque, with yellow tinge.

**Puparium:** Length 3.00-4.00 mm; maximum breadth 0.75-0.90 mm; fusiform (Figure 10). Puparial length: minimum breadth 18.0-20.0; maximum breadth: minimum breadth 3.5-4.5; anal-plate index 2.6-3.2. Prothoracic end semicircular in ventral view; head-lobe scar triangular or obovoid; maximum puparial breadth 1.5-1.7 times maximum prothoracic breadth; anal plate reniform, with anterior margin convex. Empty puparium translucent, light yellowish-brown.

**Immature Specimens Examined**

26 from 2 localities: MISSISSIPPI: Lamar Co: Dickinson's Pond and Lake Shady (collected and reared by D. L. Deonier).

**Remarks**

This species is so similar to *H. griseola* that examination of body length: wing length and postabdomen is necessary to distinguish the females of each. The males of *H. bicarina*, of course, exhibit the double keels on the fused surstyli and are readily distinguished. This species is a cryptic member of the *H. griseola* species group and is very closely related to *H. philippina* Ferino, a major pest of *Oryza sativa* (domestic rice) in the Oriental Region.

**Adult:** Habitats recorded: leaves of *Luziola fluitans* (Michaux) Terrell and Robbins, *Nymphaea odorata*

Ait., and *Nelumbo lutea* (Willd.) Pers. Several observations yielded no information on adult behavior.

**Egg and Larva:** I collected a few eggs from leaves of *L. fluitans*, but did not obtain data on the incubation period. The larvae left evidence that they initially enter the mesophyll of the leaf sheath in most cases and then mine into the exceedingly thin leaf blade. I had too few larvae to allow them to develop sufficiently to measure the stadia.

**Puparium:** Most of the puparia I collected contained late pupae. Mines in stems and stolons containing puparia had an escape slit either lateral to or slightly anterior to the operculum of the puparium, while those in leaves usually had none. The larvae apparently made these slits before they pupariated.

**Host plants:** I found larvae and puparia only in *Luziola fluitans*, or Southern Water Grass, growing in vast mats in bay-tree swamps and small ponds bordering lakes in southern Mississippi. Infestation ranged from sparse to moderate in the three localities examined. Plants collected from isolated pools during a late summer drought in September had a lower percent infestation. The drought may have indirectly decreased the local population of *H. bicarina* by causing numerous larvae to become trapped in drying mats of the water grass.

I examined samples of the following additional plant species for immatures of *H. bicarina*: *Juncus repens* Michx., *Potamogeton diversifolius* Raf., *Polygonum hydropiperoides* Michx., *Xyris* and *Hypericum punctatum* Lam.

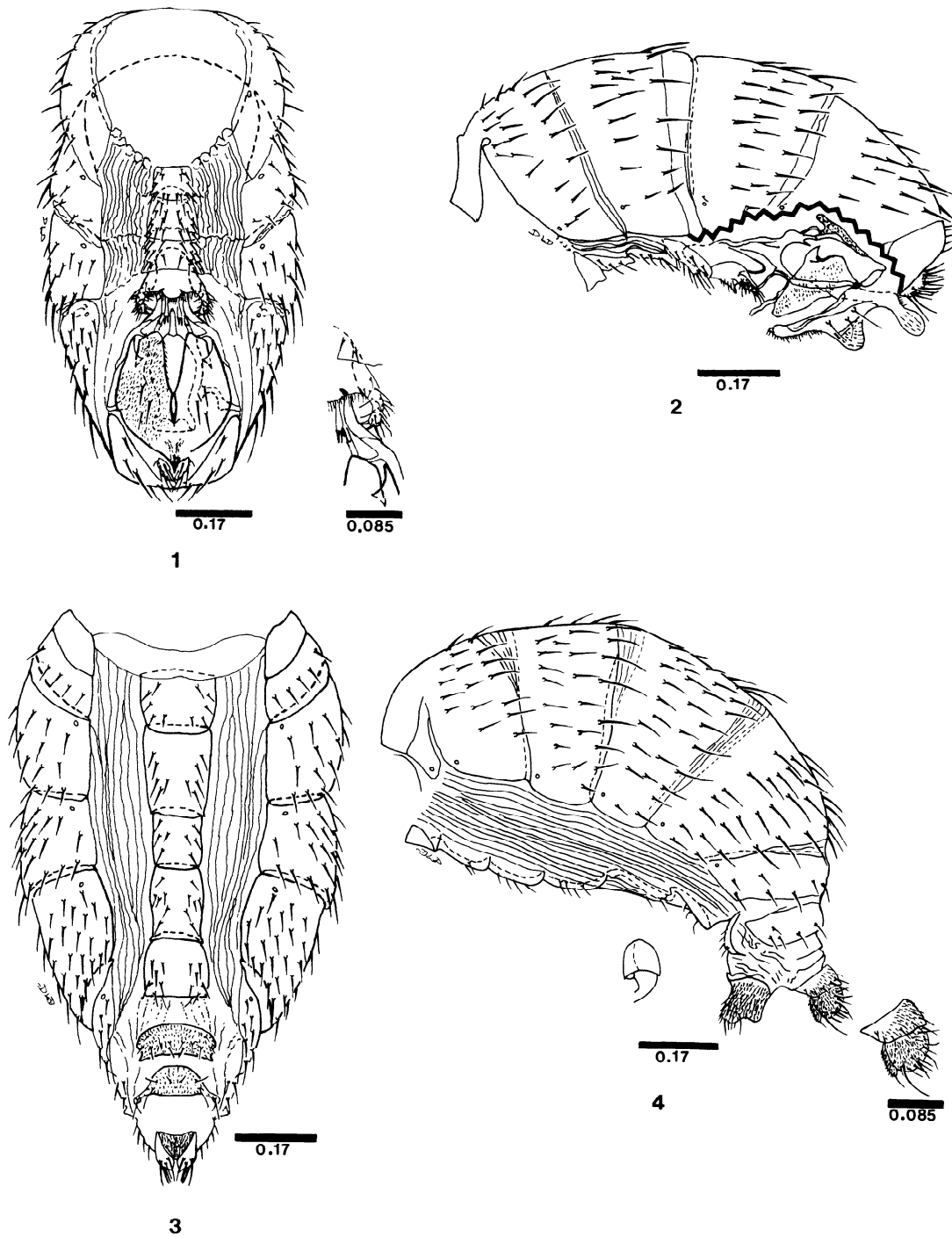
**Parasites:** One undetermined hymenopteron emerged through the posterior end of a puparium. An early-stage larva of a probable opine species was discovered in a second-instar larva (Figure 11).

#### Acknowledgements

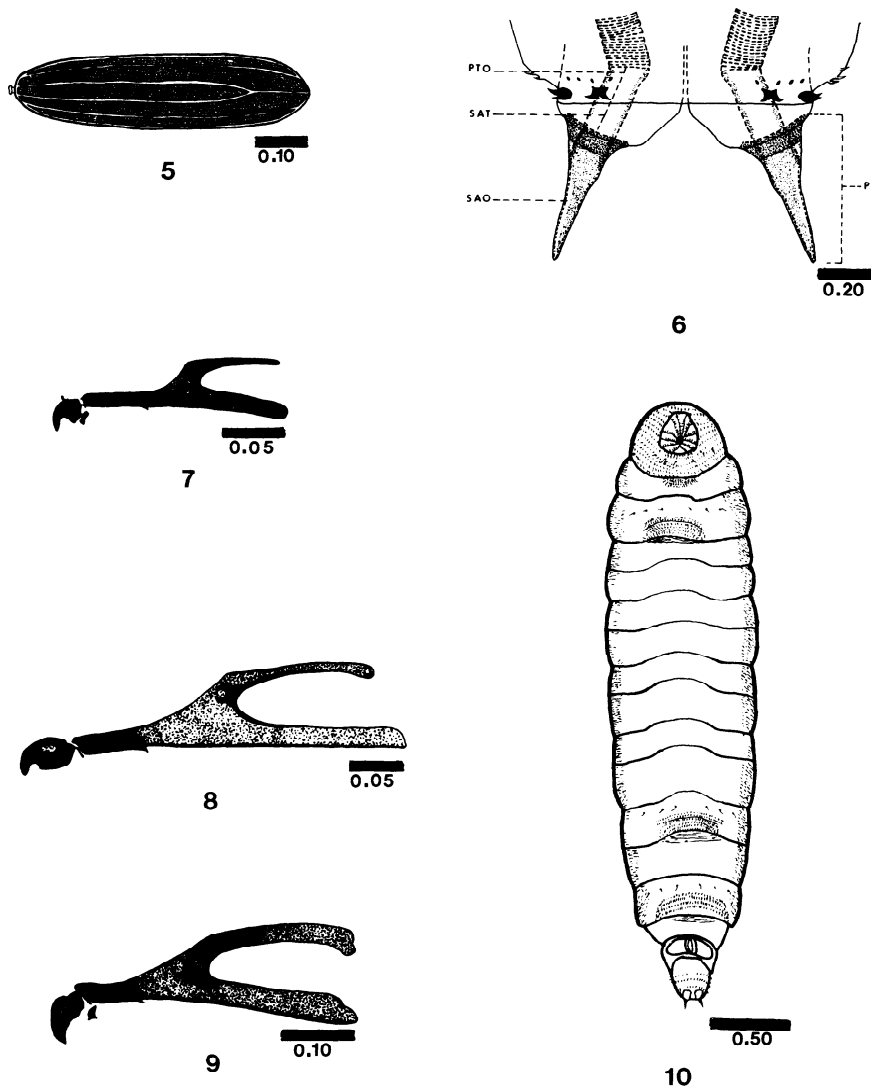
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**Figs. 1-4:** *Hydrellia bicarina*, new species. 1. male postabdomen and partial left lateral enlargement, ventral view. 2. male postabdomen, lateral view. 3. female postabdomen, ventral view. 4. female postabdomen and partial enlargement (cercus), left lateral view.



**Figs. 5-10:** *Hydrellia bicarina*, new species. 5. egg, dorsal view, shading indicates numerous punctures or pits. 6. posterior part of abdominal segment 8 and tracheospiracular siphon of second-instar larva, dorsal view. 7. larval feeding apparatus, first instar, left lateral view. 8. larval feeding apparatus, second instar, left lateral view. 9. larval feeding apparatus, third instar, left lateral view. 10. puparium, ventral view; setae and creeping welts on middle part omitted. Abbr: PT= spiracular peritreme; PTO= primary tracheal orifice; SAT= spiracular atrium.

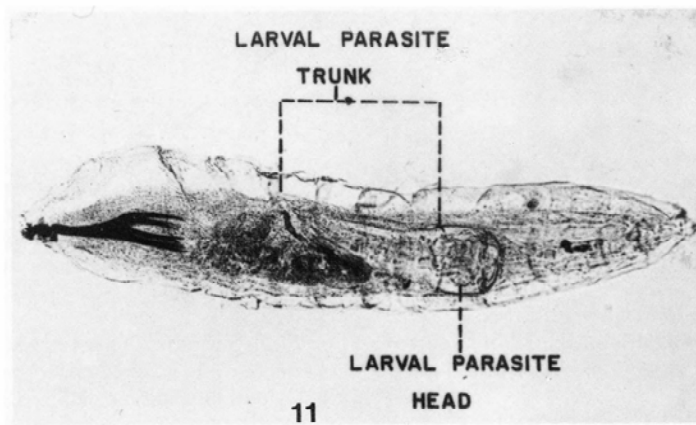


Fig. 11: *Hydrellia bicarina*, new species. late second-instar larva with probable opiine parasite, lateral view (X16).