

## ***Habrophlebia antoninoi* sp.n., a New Species from Spain, with an Account of the European Species of *Habrophlebia* Eaton, 1881 (Ephemeroptera: Leptophlebiidae, Habrophlebiinae)**

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### ABSTRACT

The adults and egg of *Habrophlebia antoninoi* sp. n. are described and illustrated from material collected in southern Spain. Although the genitalia of the new species is characteristic of *Habrophlebia*, the chorionic sculpturing of the egg and the shape and venation of hind wings are unique among European members of the genus. A discussion of its relationships with other European species of *Habrophlebia* is included and a key to male imagines of European species of *Habrophlebia* is provided.

KEYWORDS: Adults, egg, key, Ephemeroptera, *Habrophlebia antoninoi* sp.n.

### INTRODUCTION

The winged stages of the subfamily Habrophlebiinae, established by Kluge (1994), are characterised by: (a) dissimilar claws, one apically hooked, the other obtuse, pad-like, (b) hind wings with distinct costal projection, with a cross vein running from the base of the costal projection and crossing the subcostal vein, (c) male imagines with 6-sided ommatidia in the dorsal eyes, (d) male imagines with cleft styliger plate and with dorsal surface of the plate partially fused, and (e) ninth abdominal sternum of females deeply cleft. The subfamily includes the genera: *Habroleptoides* Schönemund, 1929 and *Habrophlebia* Eaton, 1881. The imagines of *Habroleptoides* can be distinguished from those of *Habrophlebia* in the male by the presence of a pointed or blunt projection on the inner margin of the genital forceps and, in the female, by the absence of a well developed ovipositor or egg guide (Peters & Edmunds, 1970; Peters, 1979).

Specific revisions of *Habroleptoides* were published by Sartori and Thomas (1986), Sartori and Jacob (1986), and Sartori (1986), and recently two new species from the Caucasus were described (Kluge 1994). The genus *Habrophlebia* was divided by Peters (1979) into two subgenera: *Habrophlebia* s. str. (males with basal segment of forceps broad and inner margin forming an angular bend; fe-

males with a well-developed ovipositor or egg guide extended to the middle of abdominal segment (8), and *Hesperaphlebia* (inner margin of basal segment of forceps smoothly tapered to apex; females without ovipositor or egg guide). The subgenus *Hesperaphlebia* contains the single Nearctic species *H. (H.) vibrans* Needham. The subgenus *Habrophlebia* s. str. includes five Western Palaearctic species, of which *H. (H.) vaillantorum* Thomas and Bouzidi (found in Morocco) is only known from the nymphal stage. A general account of the European species was published by Jacob and Sartori (1984).

Some years ago Dr. Antonino Sánchez-Ortega collected winged stages of a new species from Southern Spain. This species is described herein as *Habrophlebia (Habrophlebia) antoninoi* sp. n.

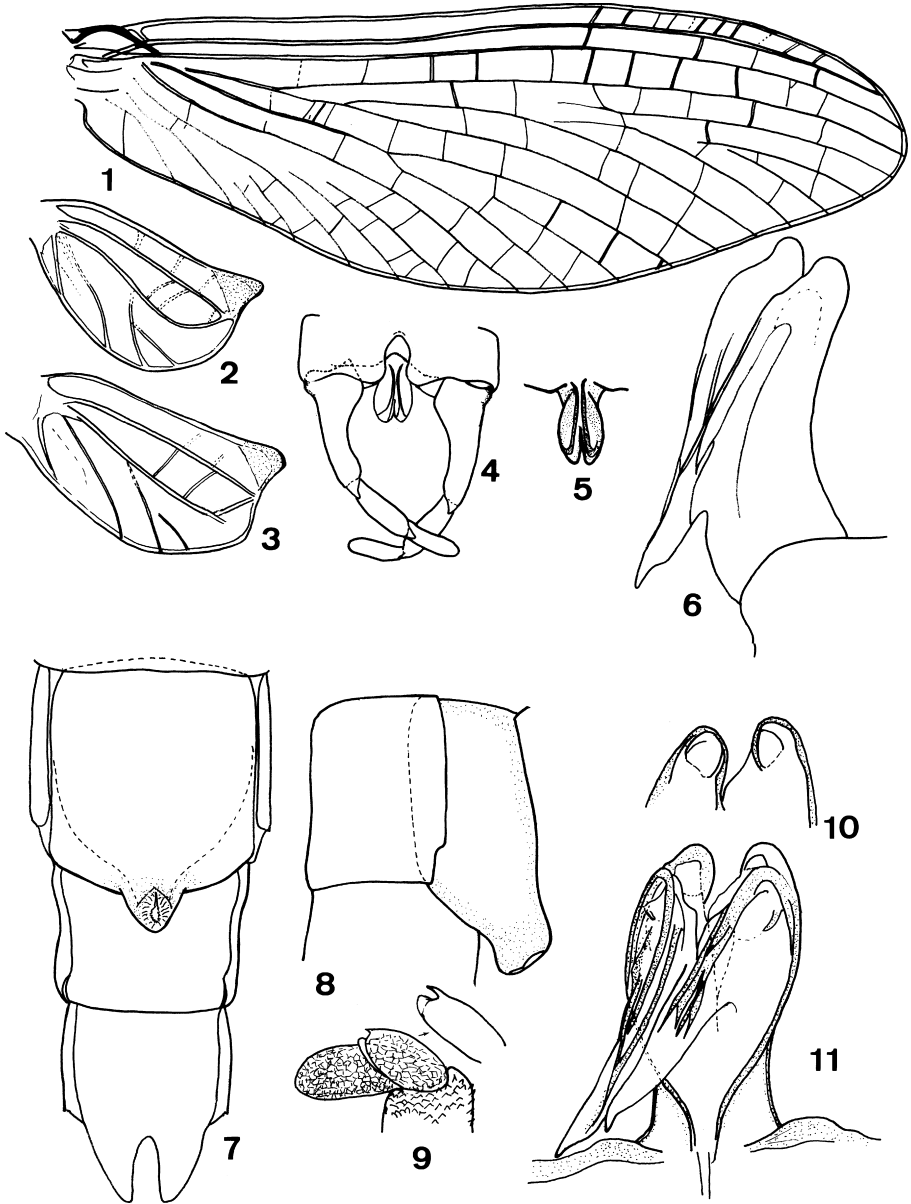
***Habrophlebia (Habrophlebia) antoninoi* sp.n. (Figs. 1–11, 24–25)**

*Material:* Holotype: male imago (partially on slide no. 298), Arroyo de la Mata, 260 m. a.s.l., Andújar, prov. Jaén (Spain), U.T.M.: 30SVH118134, May 1991, A. Sánchez-Ortega leg. Paratypes: 2 males imagines (wings of one in slide no. 299) and 2 females imagines, all from the same locality and date as the holotype. 1 male imago from Arroyo de Doña Rosa, 280 m. Andújar, prov. Jaén (Spain), U.T.M.: 30SVH124270, May 1991, A. Sánchez-Ortega leg. The material is in the author's collection in the Department of Animal Biology and Ecology (Zoology), University of Granada, Spain.

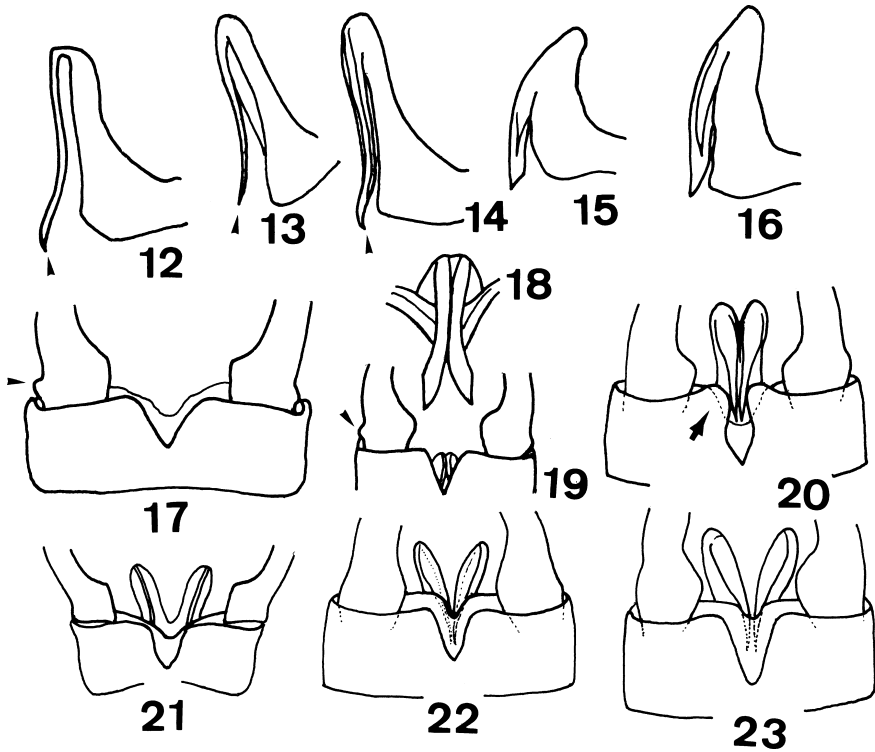
*Etymology:* The new species is named after Dr. Antonino Sánchez-Ortega, friend and collector of the new species.

*Male imago.* Body length: 5.5–6.5 mm, fore wings: 5.0–5.8 mm. Head light brown with lighter frontoclypeus; eyes very close to each other, but not meeting on meson, separated by a distance slightly less than width of median ocellus; upper portion of eyes yellow-grey or hazel coloured, lower portion black. Thorax light brown with darker sutures; legs light brown without conspicuous features; tibiae of fore legs slightly shorter than tarsi (tibia:tarsus = 0.94); fore claws as in Figure 9. Fore wings (Fig. 1): longitudinal veins of fore wings pale yellow-brown, especially costa, subcosta and radius; cross veins paler; membrane hyaline. Hind wings (Figs. 2–3): costal projection near apex of wing, subcosta and radius ending at base of costal projection; membrane hyaline. Abdomen yellow-brown, segments uniformly coloured; terminal filaments whitish. Genitalia (Figs. 4–6): styliger deeply cleft, with inner distal margins converging to form small lobes; dorsal surface of styliger plate fused with a shallow emargination. First segment of forceps approximately as long as second and third together, and with a basal small knob on external margin (Fig. 4, visible after being mounted on slide). Penis lobes scarcely divergent, not divided beyond middle (Figs. 5–6, 10–11).

*Female imago:* Body length: 6.3–6.5 mm, fore wings: 5.0–5.5 mm. Colour similar to male but darker. Eyes black separated by a distance four times as great as width of an eye. Seventh abdominal sternum with a well developed ovipositor extending to middle of 8th sternum (Figs. 7–8). Ninth sternum deeply cleft (Fig. 7).



Figs. 1–11. *Habrophlebia antoninoi* sp. n.: fore wing (1); hind wings, variability (2–3); male genitalia, ventral view (4); ventral view of the penes before being mounted on slide (5); lateral view of penes, not mounted on slide (6); ventral (11) and dorsal apex (10) of penes mounted on slide in Hoyer's liquid; female abdominal sterna 7-9 (7); lateral view of female ovipositor (8); and male fore claw variability (9).



Figs. 12–23. Penes in lateral view (12–16); ventral view of male genitalia (17–23). *H. fusca* (12, 21, 22). *H. lauta* (13, 20). *H. eldae* (14, 23). *H. consiglioi* (15, 16, 17–19; detail in 18). (Figs 1 and 21 redrawn from Grandi, 1943. Fig. 13 redrawn from Landa, 1969. Figs. 14, 16 and 17 redrawn from Belfiore and Gaino, 1984. Figs. 15, 18 and 19 redrawn from Biancheri, 1959. Figs. 20, 22 and 23 redrawn from Jacob & Sartori, 1986).

*Egg* (Figs. 24 and 25). Long-oval shaped. Length: ca. 25–255  $\mu$ m. Chorionic surface with thin ribs interconnected delimiting polygonal zones.

## DISCUSSION

The new species presents characters that could fit within different genera of Leptophlebiidae. The shape of the hind wings and the position of the costal projection are unique for *Habrophlebia*, and nothing similar was observed in the variability of the hind wings of *Habrophlebia* studied by Biancheri (1953, 1956). The subcostal vein ends in a cross vein at the base of the costal projection as in some genera of all subfamilies of Leptophlebiidae. The short radius, also ending near the base of the costal projection, is derived in such diverse genera of the

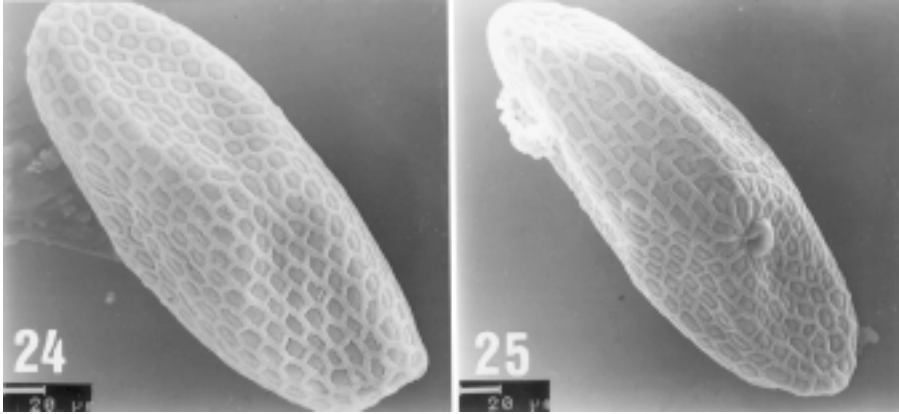
Atalophlebiinae as *Hagenulus* Eaton, 1882 and *Magnilobus* Grant and Peters, 1993 and a shortened radius is found in *Habroleptoides pontica* Kluge within Habrophlebiinae and *Habrophlebiodes brunneipennis* Berner within Leptophlebiinae. However, the genitalia of *H. antoninoi* clearly belongs to *Habrophlebia* s. str. The polygonal chorionic ornamentation of the eggs (Figs. 24–25) is unlike most European *Habrophlebia* s.str, which shows longitudinal chorionic ribs (Gaino & Mazzini 1984; Mazzini & Gaino 1985, 1990), as well the North American species *H. (Hesperaphlebia) vibrans* (see Koss, 1968, figs. 27–29), and the North African species *H. vaillantorum* (Gaino, *personal communication*). The egg is similar to that of *Habroleptoides auberti* Biancheri (Gaino & Mazzini, 1984, figs. 2g–2h, and Gaino et al., 1993, figs. 1A–1B) and resembles the European species *Thraululus bellus* Eaton (Mazzini & Gaino, 1990, figs. 11–12). Because the adults of the new species show some intermediate characteristics and some unique characters, it might be possible to consider it in a separate taxon, either a genus or a subgenus. However, lacking nymphal material, the species is provisionally placed with the subgenus *Habrophlebia* s.str.

*Habrophlebia antoninoi* sp. n. is similar to *H. consigloi* Biancheri (Figs. 18–19) and *H. lauta* Eaton (Fig. 20) in having straight penis lobes and to *H. lauta* (Fig. 20) in the shape of the styliger plate. However, because of the configuration of the penes, *H. antoninoi* sp. n. is most closely related to *H. consigloi* (compare Figs. 4–6, 11 with Figs. 15–16, 18–19). Viewing the penes laterally, two European species groups can be separated: the *fusca*-group with *H. fusca* (Curtis), *H. lauta*, and *H. eldae* Jacob and Sartori (Figs. 12–14) and the *consigloi*-group with *H. consigloi* and *H. antoninoi* sp. n. (Figs. 6, 15–16).

#### KEY TO THE IDENTIFICATION OF MALE IMAGINES OF *HABROPHLEBIA* s.str.

Jacob and Sartori (1984) published a key for the identification of the known species of *Habrophlebia* s. str. Below is a new key to *Habrophlebia* s. str. which includes *H. antoninoi* sp. n.

1. Hind wings with costal projection in a distal position; subcosta and radius ending near base of costal projection (Figs. 2 and 3). (Iberian Peninsula) ..... *H. antoninoi* sp.n
- Hind wings with costal projection near middle of wings; subcosta and radius extending beyond base of costal projection. .... 2
2. Membrane of the wings light brown. A basal small knob on outer margin of basal segment of forceps (Figs. 17 and 19). Penes convex in lateral view (Figs. 15 and 16); ventral appendages of penes relatively broad (Fig. 18). (Italy) ..... *H. consigloi* Biancheri, 1959.
- Membrane of wings hyaline. Forceps without knob. Penes concave in lateral view (Figs. 12–14); ventral appendages of penes narrower than above ..... 3
3. Inner apical margins of styliger plate convergent, forming small lobes (Fig. 20). Penis lobes nearly straight; in lateral view, ventral appendages regularly curved with apex pointing ventrally (Fig. 13). Abdominal terga with median translucent area triangular in shape (Jacob & Sartori, 1984, fig. 12). (Widespread) ..... *H. lauta* Eaton, 1884.
- Styliger plate without lobes. Penis lobes divergent (Figs. 21–23); in lateral view, apex of ventral appendages recurved (Figs. 12, 14) ..... 4.
- 4.– Abdominal terga uniformly shaded with brown, without conspicuous lighter areas. Genitalia as in Figs. 12, 21–22. (Widespread) ..... *H. fusca* (Curtis, 1834).



Figs. 24–25. SEM of the eggs of *Habrophlebia antoninoi* sp.n.

- Abdominal terga with posterior 2/3 an intense red-brown, with conspicuous lighter areas along median longitudinal line and transversely on anterior 1/3 of each tergum (Jacob & Sartori, 1984, fig. 13). Genitalia as in Figs. 14 and 23. (Italy and Iberian Peninsula) . *H. eldae* Jacob and Sartori, 1984.

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