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## The larvae of the genus *Hydropsyche* (Hydropsychidae; Trichoptera) and key for the identification of species of the Iberian Peninsula

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The larvae of five species in the genus *Hydropsyche* (*H. ambigua*, *H. brevis*, *H. infernalis*, *H. cf. punica* and *H. teruela*) are described for the first time. A key is presented for the identification of described *Hydropsyche* larvae (seventeen species at present) in the Iberian Peninsula.

Keywords: *Hydropsyche*, Trichoptera, larval description, key, Iberian Peninsula.

### INTRODUCTION

The study of the larvae in the family Hydropsychidae, and particularly in the genus *Hydropsyche*, takes always special interest, as this group is common and often abundant in the benthos of running waters. Species of this genus are found in almost all types of lotic environments, and several species may coexist. Studies of rivers often require species identifications because different species of the same genus have different requirements and behaviour, and it is not always possible to rear larvae in the laboratory for an accurate identification. Therefore, the taxonomic discrimination of immature stages may be of great interest.

Keys for this genus exist for several European countries (HICKIN, 1967; SEDLACK, 1971; HILDREW & MORGAN, 1974; SZCZESNY, 1974; VERNEAUX & FAESSEL, 1976; BOON, 1977; EDINGTON & HILDREW, 1981; BOURNAUD *et al.*, 1982; MORETTI, 1983; PITSCH, 1993). Although some of them may be partially valid, serious errors might result from using the keys in a different country from that for which it was intended, due to the great similarity among larval stages of some species.

The larval taxonomy of *Hydropsyche* species in the Iberian Peninsula is incomplete (GARCIA DE JALON, 1981, 1983; MILLET, 1983). Of twenty-five *Hydropsyche* species recorded to date, one must be excluded (*H. guttata* PICTET), three are considered of doubtful validity (*H. pallida* PICTET, *H. stictica* PICTET and *H. volitans* NAVAS), and two need confirmation (*H. fulvipes* (CURTIS) and *H. tenuis* NAVAS) (see GONZALEZ *et al.*, 1992). Of the remaining nineteen species known to be distributed throughout the Iberian Peninsula (BOTOSANEANU & MALICKY, 1978, MALICKY, 1983; MILLET, 1983; GARCIA DE JALON & GONZALEZ DEL TANAGO, 1986; GONZALEZ *et al.*, 1987, 1992, TERRA, 1994), the larvae of seven species (*H. acinoxas* MALICKY, *H. ambigua* SCHMID, *H. brevis* MOSELY, *H. infernalis* SCHMID, *H. cf. punica* MALICKY, *H. teruela* MALICKY and *H. urgorri* GONZALEZ & MALICKY) and one subspecies (*H. angustipennis mallorcana* MALICKY) remain to be described.

In the present study larvae of *H. ambigua*, *H. brevis*, *H. infernalis*, *H. cf. punica*, and *H. teruela* are described. Moreover, a key for the identification of the known larvae of valid species (a total of seventeen) is included.

MATERIAL AND METHODS

The specimens used, both for the description of the larvae and for the key, were captured in several watersheds of the Iberian Peninsula (Appendix 1). The adults and larvae were associated by collecting mature pupae whose cocoons contained the larval sclerites. In addition, when possible, larvae and pupae were reared in the laboratory until their emergence.

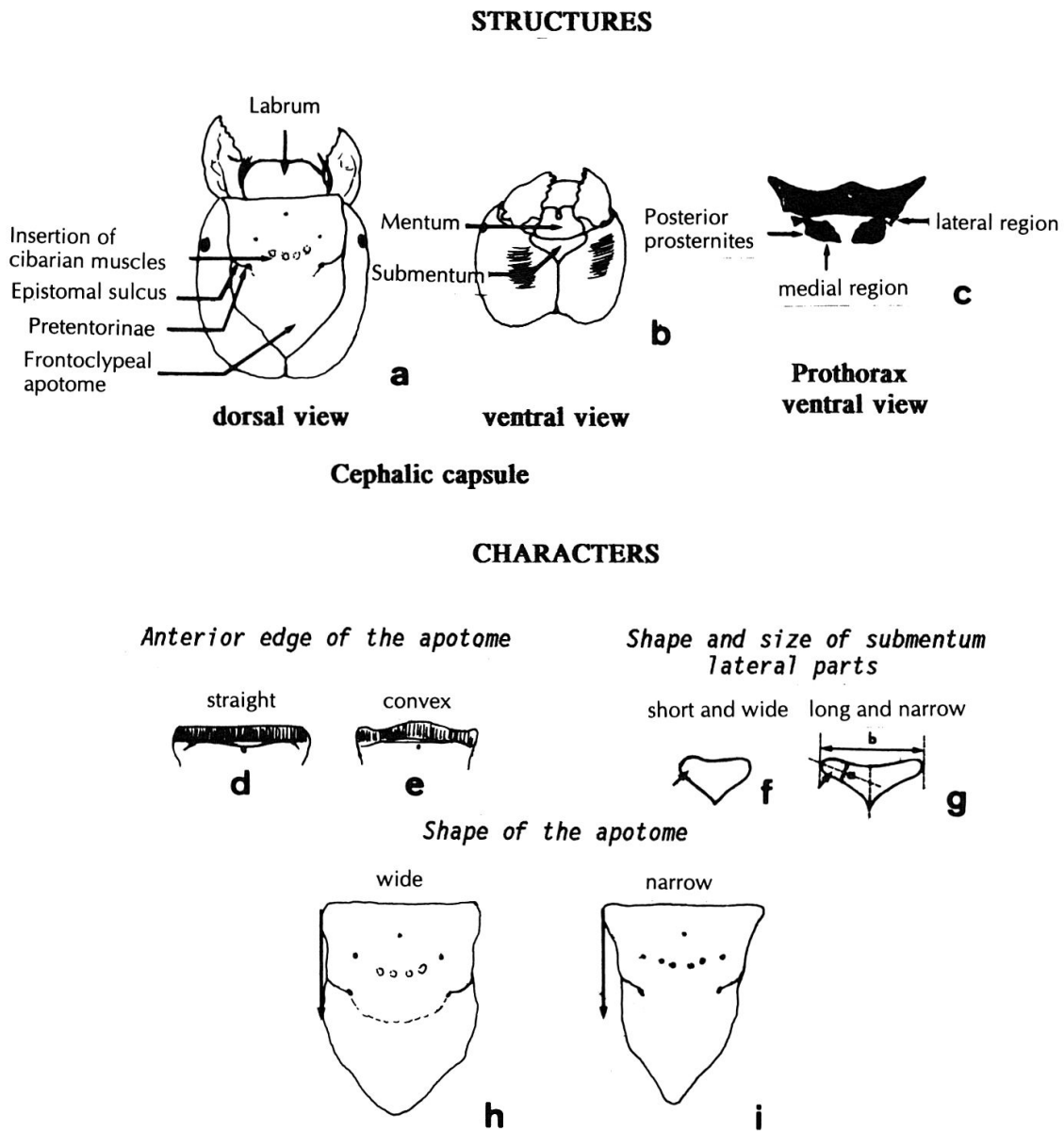


Fig. 1. Structures and morphological characters used for the identification of *Hydropsyche* larvae.

Both the description of the new larvae and the key for the species are based on the presence or absence of gills on the 7th abdominal segment and on morphological characters and colouration of the head and thoracic structures of last instar larvae. The observation of the morphology, patterns, and pigmentation of these structures is the fastest method for the identification of the species, but it is necessary to examine a great number of larvae to appreciate the variations in the colouration among individuals (SEDLACK, 1971). We have used photographs as figures instead of drawings, because we consider that the shape and patterns of the sclerites are better illustrated in this way. Photographs were made using a stereo-microscope (Nikon mod. SMZ-10, with 10-80x) with a built-in camera.

We have used the nomenclature of BOURNAUD *et al.* (1982). The following characters were used (Fig. 1): anterior edge of the frontoclypeal apotome; shape of the apotome; shape and size of the lateral parts of the submentum (length:width ratio, a:b); shape and colouration of posterior prosternites (for this character see also BOON, 1977). The measurements of the head were given as range, mean (X), number of individuals measured (n), and standard deviation (S.D.).

#### DESCRIPTION OF THE NEW LARVAE

##### *Hydropsyche ambigua* SCHMID, 1950

(Fig. 2)

Head: In dorsal view (Fig. 2a), the cephalic capsule is slightly longer (1.5-1.6 mm, X=1.53, n=3, S.D.=0.06) than wide (1.4-1.55 mm, X=1.45, n=3, S.D.=0.09). Although the number of specimens measured is low, the description of the larvae is based on the sclerites of 11 specimens (3 larvae of 5th instars and 8 pupae). Colouration dark-brown. Frontoclypeal apotome (Fig. 2c) wide, pentagonal (width of anterior edge roughly similar to width of the posterior third) and with anterior edge straight or slightly concave. The lateral edges are more or less straight up to the epistomal sulcus, beyond which the edges arch. In the dark colouration of the apotome only two light indistinct lateral spots, on the epistomal sulcus, can be distinguished. The labrum is dark and uniform in colour (Fig. 2a). In ventral view (Fig. 2b) the colouration also dark, and the transverse stridulation lines are faintly marked. Submentum brown and with short, broad lateral lobules; a:b ratio (see Fig. 1g) about 0.23-0.26 (X=0.24, n=3, S.D.=0.02).

Thorax: Notal plates homogeneous chestnut in colour (except black posterior and lateral edges). Pronotum darker than the meso- and metanotum. The medial regions of posterior prosternites light-chestnut in colour and irregularly oblong or elongated, the lateral regions lighter and separated from the medial regions.

Abdomen: Abdominal gills present on the first 7 segments.

#### Discussion

*H. ambigua* belongs to the *instabilis*-group, and the larva described here is easily distinguishable from known larvae of the other iberian species of the group. There could be some confusion between *H. ambigua* and very dark individuals of *H. instabilis* CURTIS. However, the frontoclypeal apotome of *H. instabilis* always has a light U-shaped aboral spot and two very bright lateral spots on the epistomal sulcus (Fig. 14).



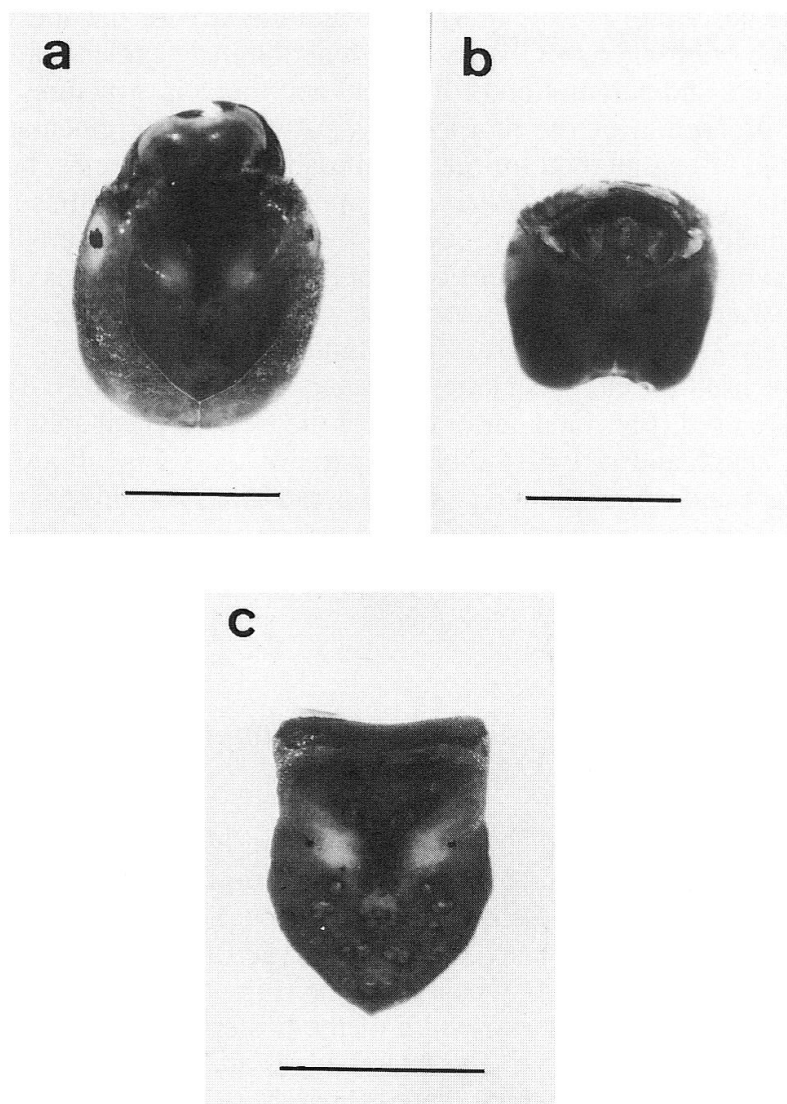


Fig. 2. *H. ambigua* (a: cephalic capsule, dorsal; b: cephalic capsule, ventral; c: apotome). Scales=1 mm.

In GARCIA DE JALON (1986) the larval specimens of *H. ambigua* are grouped with those of *H. dinarica* MARINKÖVIC, 1979 (described by GARCIA DE JALON (1983) as *H. cf. dinarica*), but the larvae can easily be separated by the following characteristics:

- *H. dinarica* has darker colouration and greater body size (see measurements in Figs 2 and 7).

- In the postero-lateral region of the head, *H. dinarica* has light triangular markings (arrows in Fig. 7a) which are blurred in *H. ambigua*.

- The apotome of *H. dinarica* has two light, round spots on the epistomal sulcus (Fig. 7). In *H. ambigua* the spots are somewhat elongated and indistinct (Fig. 2a and 2c). Also, in *H. dinarica* two other light marks occur on the apotome, one in the aboral area and the other one in the oral (Fig. 7). This latter stands out well when the apotome is isolated (Fig. 7b).

- In *H. dinarica*, as opposed to *H. ambigua* (Fig. 2b), the submentum has long, narrow lobes.

*Hydropsyche brevis* MOSELY, 1930

(Fig. 3)

Head: In dorsal view (Fig. 3a), the cephalic capsule is slightly wider (1.18-1.63 mm,  $\bar{X}$ =1.46,  $n$ =79, S.D.=0.08) than long (1.20-1.63 mm,  $\bar{X}$ =1.44,  $n$ =79, S.D.=0.09). Colouration dark-brown, with two very light marks in the postero-lateral parts of the head. Frontoclypeal apotome (Fig. 3d) wide, more or less pentagonal (width of anterior edge roughly similar to width of the posterior third), the anterior edge straight and the posterior vertex rounded. A light oral spot stands out, joining the two lateral ones on the epistomal sulcus. Below, separate from the others, there are three light rounded spots, two lateral and one in the aboral region, which may be fused into a V-shaped. Labrum with uniform dark colouration (Fig. 3a). In ventral view (Fig. 3c) two dark longitudinal bands stand out over the transverse stridulation lines. Submentum dark-brown with short, wide lateral lobules; a:b ratio (see Fig. 1g) about 0.19-0.21 ( $\bar{X}$ =0.20,  $n$ =9, S.D.=0.01).

Thorax: Pronotum and mesonotum (Fig. 3e) with a rather wide, very dark central longitudinal band (Fig. 3e:1), which in the pronotum may join with a transversal band on the anterior (Fig. 3e:2) and even the posterior edge (Fig. 3e:3), in the case of highly pigmented individuals. Also in this case, a faint longitudinal band may appear in the metanotum, although generally this sclerite is much lighter in colour. The medial regions of the posterior prosternites are strongly pigmented and irregularly oblong, the lateral regions lighter in colour and fused with the medial regions (Fig. 3f).

Abdomen: Gills present on the 7th abdominal segment.

Exceptions to this general pattern: rare individuals, morphologically similar to those described but lighter in colour, have been found in some sites (in a proportion lesser than 3%). In this case the light spots of the apotome were completely fused, and the dark area of the head was limited to the edges of the apotome (Fig. 3b). Also the dark longitudinal bands of the pronotum and mesonotum were narrower.

*Discussion*

The pattern of the frontoclypeal apotome of *H. brevis* larvae is very characteristic and thus easily distinguishable from other known iberian larvae of the *gut-tata*-group. However, it could be confused with the larvae of *H. infernalis* SCHMID (described later; Fig. 4), from the *instabilis*-group. Nevertheless, clear differences exist between these two species:

- Head dimensions; smaller in *H. brevis*.
- Form of the head; cephalic capsule as wide as long or wider than long in *H. brevis*, longer than wide in *H. infernalis*.
- Number of gills; *H. infernalis* lacks gills on the 7th abdominal segment. These are present in *H. brevis*.

- Markings; dark longitudinal bands present on the notal plates in *H. brevis*, absent in *H. infernalis*.

Although the larvae of other *Hydropsyche* species have dark bands on the notal plates, either longitudinal, as in some forms of *H. lobata* MCLACHLAN (DAKKI & TACHET, 1987: Fig. 2c) and of *H. pellucidula* (CURTIS) (Fig. 9e) or transversal, as in *H. contubernalis* MCLACHLAN (BOURNAUD *et al.*, 1982: Fig. 8a; DAKKI & TACHET, 1987: Fig. 5d; and Fig. 8a) and *H. teruela* MALICKY (Fig. 5d), there is no possible confusion between these species and *H. brevis*. They can be separated from it by comparing the pattern and shape of the cephalic capsule.

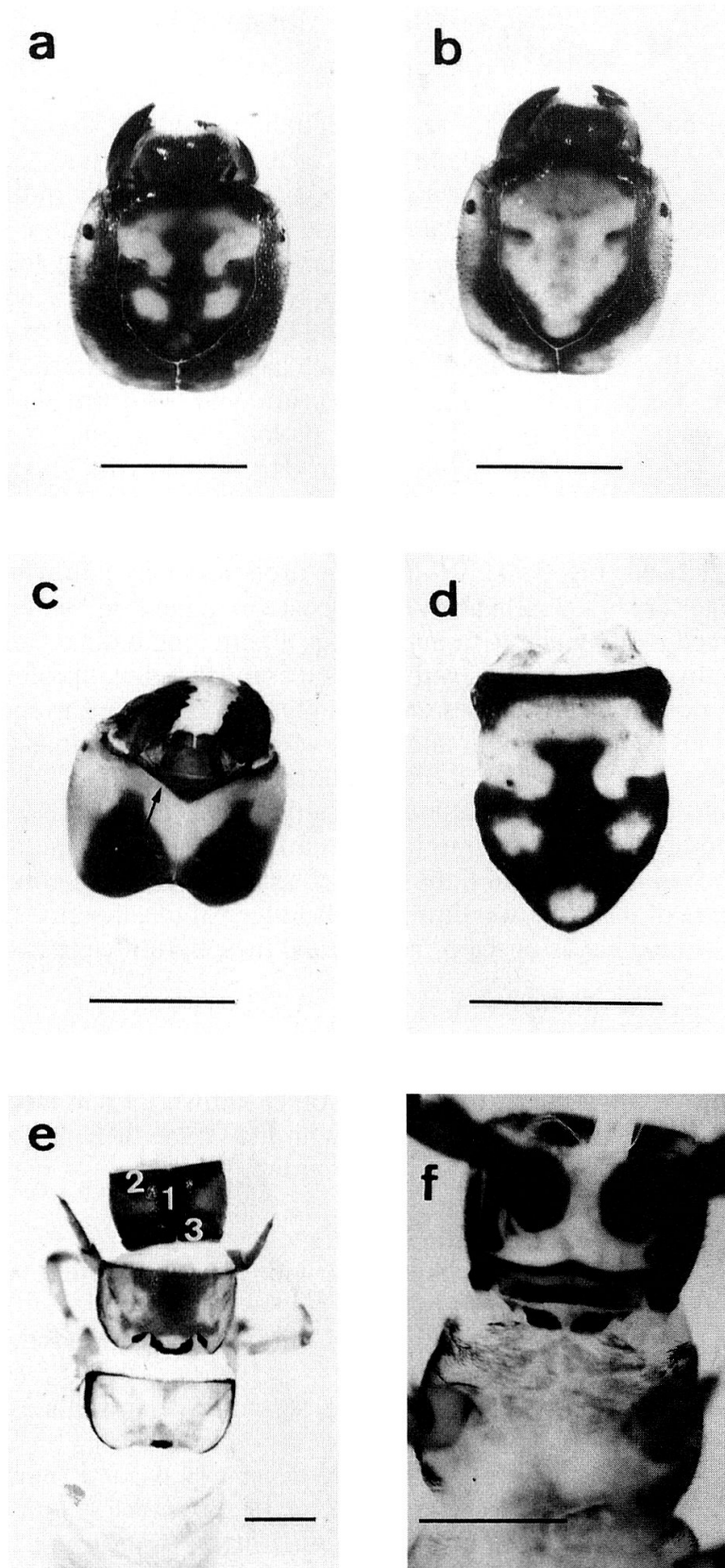


Fig. 3. *H. brevis* (a, b: cephalic capsule, dorsal; c: cephalic capsule, ventral; d: apotome; e: thorax, dorsal; f: posterior prosternites). Scales=1 mm.

*Hydropsyche infernalis* SCHMID, 1952

(Fig. 4)

Head: In dorsal view (Fig. 4a) rectangular, being longer (1.40-1.95 mm,  $X=1.69$ ,  $n=97$ ,  $S.D.=0.01$ ) than wide (1.35-1.85 mm,  $X=1.64$ ,  $n=97$ ,  $S.D.=0.01$ ). Cephalic capsule light-brown in colour (caramel), with occasionally light marks in the postero-lateral parts of the head (arrows in Fig. 4a). Frontoclypeal apotome (Fig. 4c) wide, pentagonal (width of anterior edge roughly similar to width of the posterior third), with anterior edge straight and the posterior vertex more or less triangular. In the most typical and constant pattern, the light oral spots, both lateral (on and under the epistomal sulcus) and aboral, are joined, leaving a dark and elongated patch in the central area of the apotome (Figs 4a: 1 and 4c). The light oral spot is occasionally missing, and the lateral spots are sometimes not fused. Nevertheless,

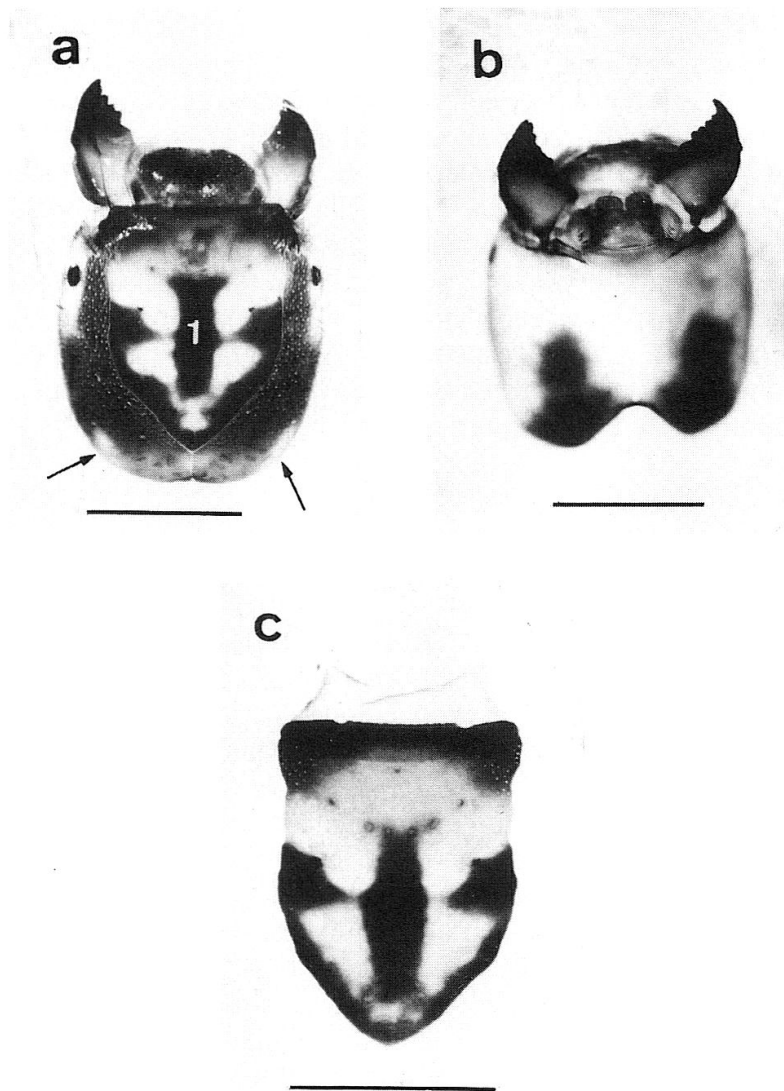


Fig. 4. *H. infernalis* (a: cephalic capsule, dorsal; b: cephalic capsule, ventral; c: apotome). Scales=1 mm.

in all the specimens studied, the light lateral spots under the epistomal sulcus, and the aboral spot form an open V or a Y figure with the lower arm very short. The labrum is generally lighter in colour than the head, with the anterior edge and central area darker. In ventral view two dark longitudinal bands stand out, more or less extending over the stridulation lines (Fig. 4b). Submentum with same caramel colour as head, with lateral lobules short and wide; a:b ratio (see Fig. 1g) about 0.20-0.25 ( $X=0.23$ ,  $n=8$ ,  $S.D.=0.02$ ).

Thorax: Colouration of pronotum lighter than the meso- and metanotum, except in very highly pigmented specimens, in which this difference is not noticeable. The median regions of posterior prosternites dark-brown and irregularly oblong or elongated, the lateral regions similar in colour to the median and may or may not be separated from them by light areas.

Abdomen: Abdominal gills absent on the 7th segment.

### Discussion

The description of the larva of *H. infernalis* enlarges the group of Palearctic species lacking gills on the 7th abdominal segment. Until now, this group included only *H. siltalai* DÖHLER in Europe, and *H. morla* MALICKY & LOUNACI, *H. obscura* NAVAS and *H. fezana* NAVAS in North Africa. All four belong to the *instabilis*-group.

The principal difference between *H. infernalis* and *H. siltalai*, *H. obscura* and *H. fezana* is in the pattern of the frontoclypeal apotome, especially in the shape of the light spots under the epistomal sulcus. In *H. infernalis* the light lateral and aboral spots join to form a distinct, open V or Y shaped figure with a very short lower arm (Figs 4a and 4c); in the three other species the spots form a U. See Figs 10a and 10b for *H. siltalai* and DAKKI & TACHET (1987) for *H. obscura* and *H. fezana*; the larvae of these two species, according to the above authors, resemble the European *H. instabilis* and *H. siltalai*, respectively. A brief description of the larva of *H. morla* is contained in MALICKY & LOUNACI (1987) but, with the characters given (shape of the apotome and of its anterior edge), it is impossible to find differences with *H. infernalis*.

### *Hydropsyche teruela* MALICKY, 1980

(Fig. 5)

Head: In dorsal view (Figs 5a-c), the cephalic capsule rectangular, being longer (1.60-2.12 mm,  $X=1.84$ ,  $n=31$ ,  $S.D.=0.14$ ) than wide (1.50-1.85 mm,  $X=1.63$ ,  $n=31$ ,  $S.D.=0.12$ ). Cephalic capsule light, yellow coloured, with dark patches on the edges of the apotome and more or less extended on the head depending on the pigmentation degree of the individuals. At the same sites, we have found individuals with intense, intermediate or weak degree of pigmentation (Figs 5a, 5b and 5c, respectively). Frontoclypeal apotome (Figs 5a-c) narrow, more or less triangular, with the anterior edge deeply convex and the posterior vertex pointed. In intense and intermediate pigmented individuals the dark design is extended on the edges, overall on the anterior edge and behind the epistomal sulcus (Figs 5a and 5b). Moreover, in the darkest specimens, the light patch in the central area of the apotome is interrupted by a dark transversal spot on the insertion of the cibarian muscles (Fig. 5a:1). In the weak pigmented individuals no dark colouration on the apotome or, in any case, at pretentorinae level only (Fig. 5c). Labrum is light in colour in the weak pigmented individuals, but with the anterior edge darker (Fig. 5b), and even the central area



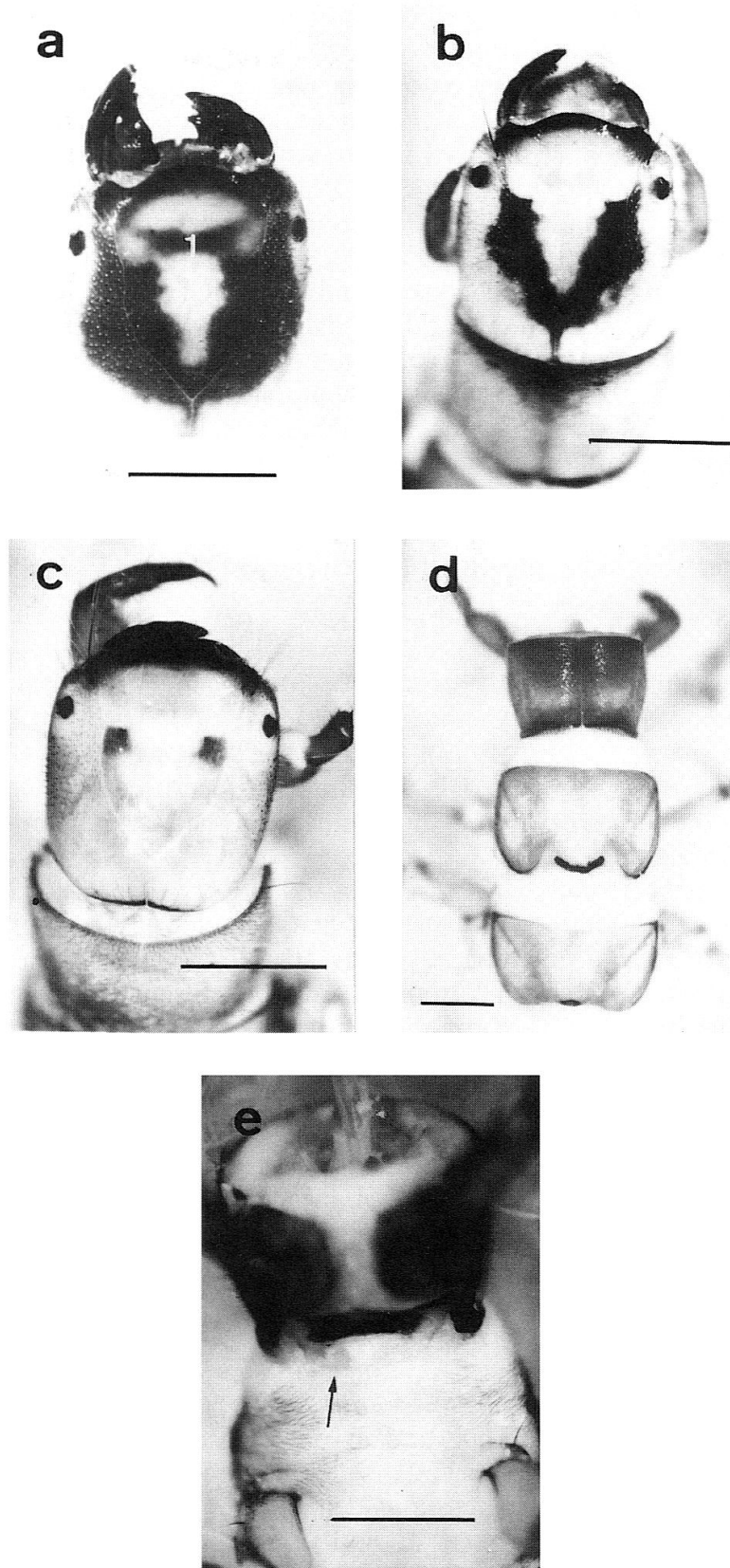


Fig. 5. *H. teruela* (a-c: cephalic capsule, dorsal; d: thorax, dorsal; e: posterior prosternites). Scales=1 mm.

dark, in the highly pigmented specimens. In ventral view the colouration also yellowish and the transverse stridulation lines faintly marked, only in individuals with intense or intermediate degree of pigmentation two dark longitudinal bands appear over the transverse stridulation lines in the posterior part of the head, but never in the upper half. Submentum caramel colour, with long and narrow lateral lobules; a:b ratio (see Fig. 1g) about 0.17-0.21 ( $X=0.19$ ,  $n=14$ ,  $S.D.=0.02$ ).

Thorax: Pronotum darker than the meso- and metanotum, in the case of highly pigmented individuals (Fig. 5d). Also in this case, anterior edge of the pronotum with a very dark transversal band (Figs 5a and 5d) which may join with a transversal band on the posterior edge (Fig. 5d). A dark anterior transversal band may be also present on the mesonotum and metanotum, but always lighter than that of the pronotum. Weak pigmented specimens without dark transversal band on the notal plates (Fig. 5c), the colouration being even lighter than that of the head. The medial regions of posterior prosternites are very pale, indistinct and irregularly oblong or elongated, the lateral regions similar in colour to the medial and fused with them (Fig. 5e).

Abdomen: Abdominal gills inserted ventrally in the first 7 segments.

### Discussion

Until now, this species had been collected only for the type locality in the Northeastern part of the Iberian Peninsula (MALICKY, 1980; HERRANZ & GARCIA DE JALON, 1984; GONZALEZ *et al.*, 1992). HERRANZ & GARCIA DE JALON (1984) captured this species in the Alto Tajo river basin, but misidentified as *H. contubernalis*. Our records extend its distribution to the Southeast of the Iberian Peninsula as well, where it is an uncommon species (Appendix 1).

*H. teruela* belongs to the *guttata*-group, and the larva shows some similarities with that of *H. contubernalis*: both species have the anterior edge of frontoclypeal apotome convex (Figs 5a-b and 8a, respectively), although it is more deeply convex in *H. teruela*; the posterior prosternites are uniformly pale and indistinct (Fig. 5e), and the anterior edge of the pronotum has a dark transversal band (Figs 5d and 8a, respectively). After the comparison of *H. contubernalis* and *H. teruela* larvae, and reviewing the literature on *H. contubernalis* (HILDREW & MORGAN, 1974; SZCZESNY, 1974; VERNEAUX & FAESSEL, 1976; BOURNAUD *et al.*, 1982) to know the variability of the latter species, an easy character to separate *H. contubernalis* from *H. teruela* is the presence, in *H. teruela*, of a light continuous patch in the central area of the apotome (Figs 5b and 5c) or interrupted by a dark transversal spot on the insertion of the cibarian muscles (Fig. 5a:1). *H. contubernalis* has always a dark spot in the central area of the apotome, but never on the cibarian muscles (Fig. 8a:1; SZCZESNY, 1974: Figs 1A and 6; BOURNAUD *et al.*, 1982: Figs 8b, 8c and 8d).

However, PITSCH (1993: Fig. 142) illustrates a larva of *H. contubernalis* quite similar to *H. teruela*. *H. contubernalis* is included in the catalogue of the Iberian species (GONZALEZ *et al.*, 1992) but, to date, only larvae of this species have been collected, opening the possibility that all the identifications of *H. contubernalis* done until now in the Iberian Peninsula are misidentifications of *H. teruela*, and that *H. contubernalis* actually does not occur in the Iberian Peninsula.

The larval characteristics of highly pigmented individuals are identical to the larva of *H. resmineda* MALICKY, 1977 (DAKKI & TACHET, 1987: Fig. 5), that also belongs to the *guttata*-group but is distributed in North Africa (Morocco) (MALICKY, 1977, 1983; DAKKI, 1978; DAKKI & TACHET, 1987; MALICKY & LOUNACI, 1987).



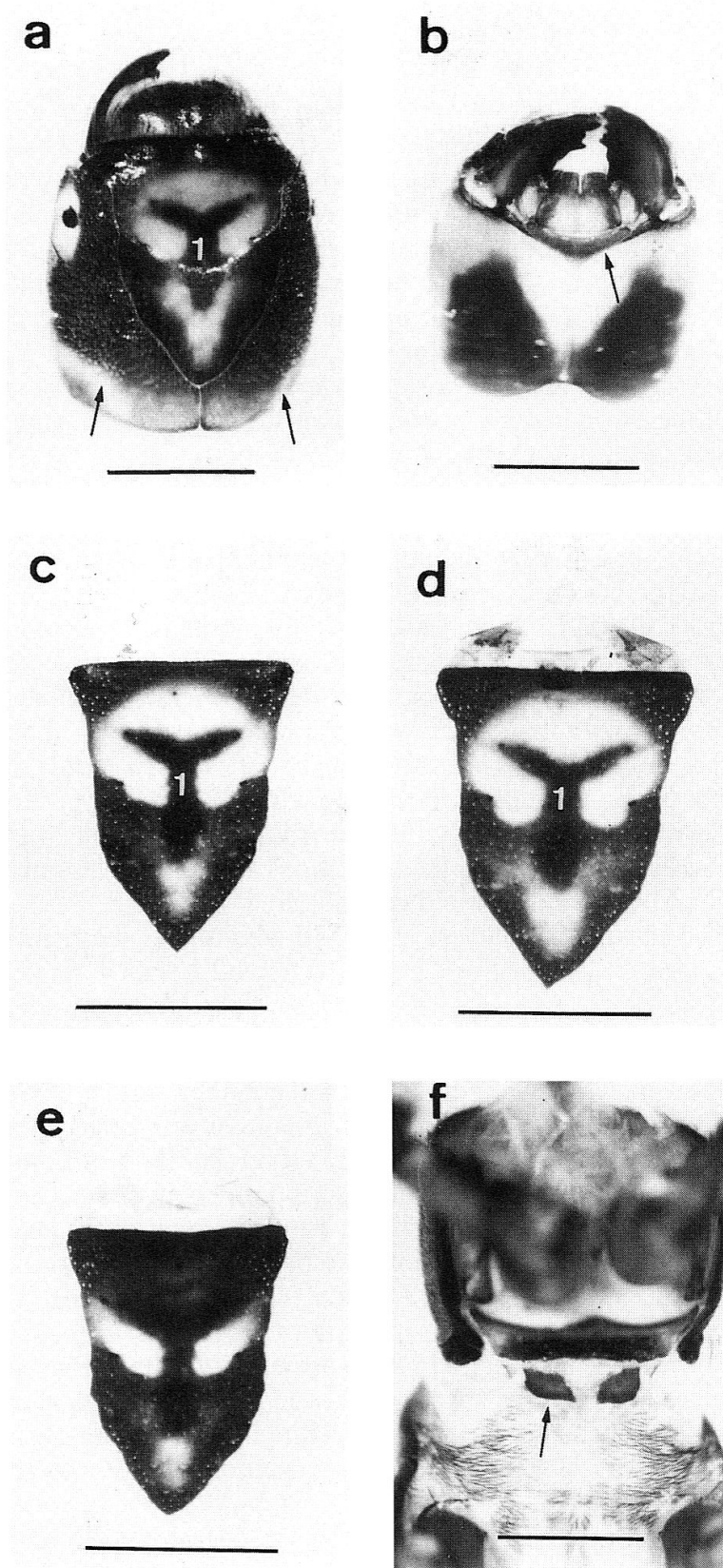


Fig. 6. *H. cf. punica* (a: cephalic capsule, dorsal; b: cephalic capsule, ventral; c-e: apotome; f: posterior prosternites). Scales=1 mm.

*Hydropsyche cf. punica* MALICKY, 1981

(Fig. 6)

Head: In dorsal view (Fig. 6a) rectangular, being longer than wide. Due to the difficulty of distinguishing this species from *H. pellucidula* (see Discussion), measurements for the cephalic capsule are not given. Colouration very dark brown. In the posterior part of the cephalic capsule there is a dark dorso-longitudinal band on either side of the coronal suture, which leaves two narrow, light areas in the postero-lateral parts of the head (arrows); these two areas do not stand out in very highly pigmented specimens. Frontoclypeal apotome (Figs 6c and 6d) narrow, with an isosceles triangle shape (width anterior edge clearly wider than the posterior third), the anterior edge straight and the posterior vertex pointed. A noticeable light oral spot fuses with the two lateral spots on the epistomal sulcus. Under the sulcus, a single aboral spot (Fig. 6c) which can be fused with the lateral spots (more or less evident), forming a V (Figs 6a and 6d). In the central area of the apotome a dark Y-shaped patch clearly evident. In very pigmented specimens, the light oral spot does not appear (Fig. 6e) or is hardly visible; on the other hand, the light lateral spots on the epistomal sulcus do stand out, and the dark Y-shaped central patch remains. Labrum dark and uniform in colour in very highly pigmented specimens; in the others, the anterior edge and the central area are darker (Fig. 6a). In ventral view (Fig. 6b) two dark longitudinal bands appear over the transverse stridulation lines. Submentum dark-brown, with long, narrow lateral lobules; a:b ratio about 0.12-0.16.

Thorax: Thoracic sclerites homogeneously dark-brown. Generally, the pronotum is darker and the pigmentation does not reach the lateral edges, leaving a lighter narrow band. Posterior prosternites with the medial regions strongly pigmented and irregularly squarish or oblong, the lateral regions lighter and less distinct than the medial regions, and may be separated by light areas (Fig. 6f).

Abdomen: Ventral gills present on the 7th abdominal segment.

*Discussion*

The above larval description corresponds to identical larvae reared in the laboratory from which males were emerged and had genitalia similar to *H. punica* MALICKY & LOUNACI (1987) described, although very briefly, the shape of the frontoclypeal apotome of *H. punica*, and they found that larvae of this species have a wide apotome. This disagrees with our description where *H. cf. punica* has a narrow apotome, with isosceles triangle shape, similar to that of *H. pellucidula*. This could indicate that our species might not truly be *H. punica*, but until this species is firmly identified, and following GONZALEZ *et al.* (1992), we will call it *H. cf. punica*.

The larvae of this species show similarities with that of *H. pellucidula*, above all in the highly varied design found in that species (Figs 9a-d). For this reason, and despite a rigorous comparison of specimens (1466 specimens in total of both species including larvae, pupae and adults), precise distinctions could not be made between some forms of *H. pellucidula* and *H. cf. punica*, making it necessary to include both forms in the same key step.

The darkest forms of *H. cf. punica* (Fig. 6e) show similarities with *H. angustipennis* (CURTIS) (see HILDREW & MORGAN, 1974; SZCZESNY, 1974; EDINGTON & HILDREW, 1981). *H. angustipennis* has been recorded in the Iberian Peninsula (BAUTISTA, 1980), but its presence needs to be confirmed (GONZALEZ *et al.*, 1992; see remarks above other species below). *H. angustipennis* and *H. cf. punica*

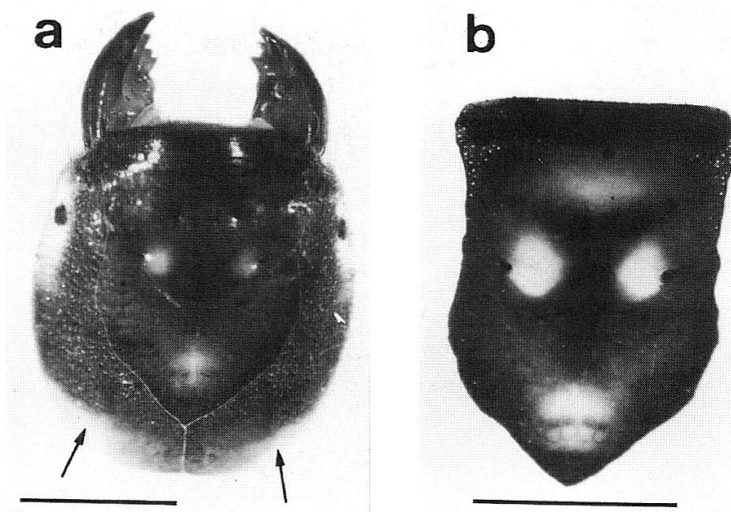


Fig. 7. *H. dinarica* (a: cephalic capsule, dorsal; b: apotome). Scales=1 mm.

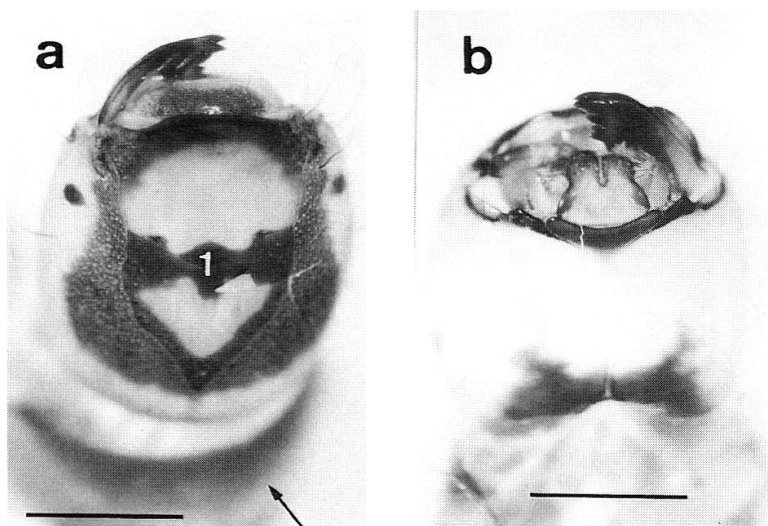


Fig. 8. *H. contubernalis* (a: cephalic capsule, dorsal; b: cephalic capsule, ventral). Scales=1 mm.

may be distinguished as follows: in *H. angustipennis* the lateral regions of posterior prosternites are usually similar in colour to the medial regions and are always joined with them, giving the posterior prosternites an elongated appearance (BOON, 1977; STATZNER, 1976; EDINGTON & HILDREW, 1981); in *H. cf. punica* they are irregularly squarish or oblong, with medial regions much darker than the lateral regions, and separated or not from them by pale areas (Fig. 6f).

#### REMARKS ABOUT OTHER SPECIES

Of the remaining species and subspecies with larvae still unknown, *H. acinoxas* MALICKY, 1981 and *H. angustipennis mallorcana* MALICKY, 1980 are rare and have been collected only from the type locality (GONZALEZ *et al.*, 1992). *H. aci-*

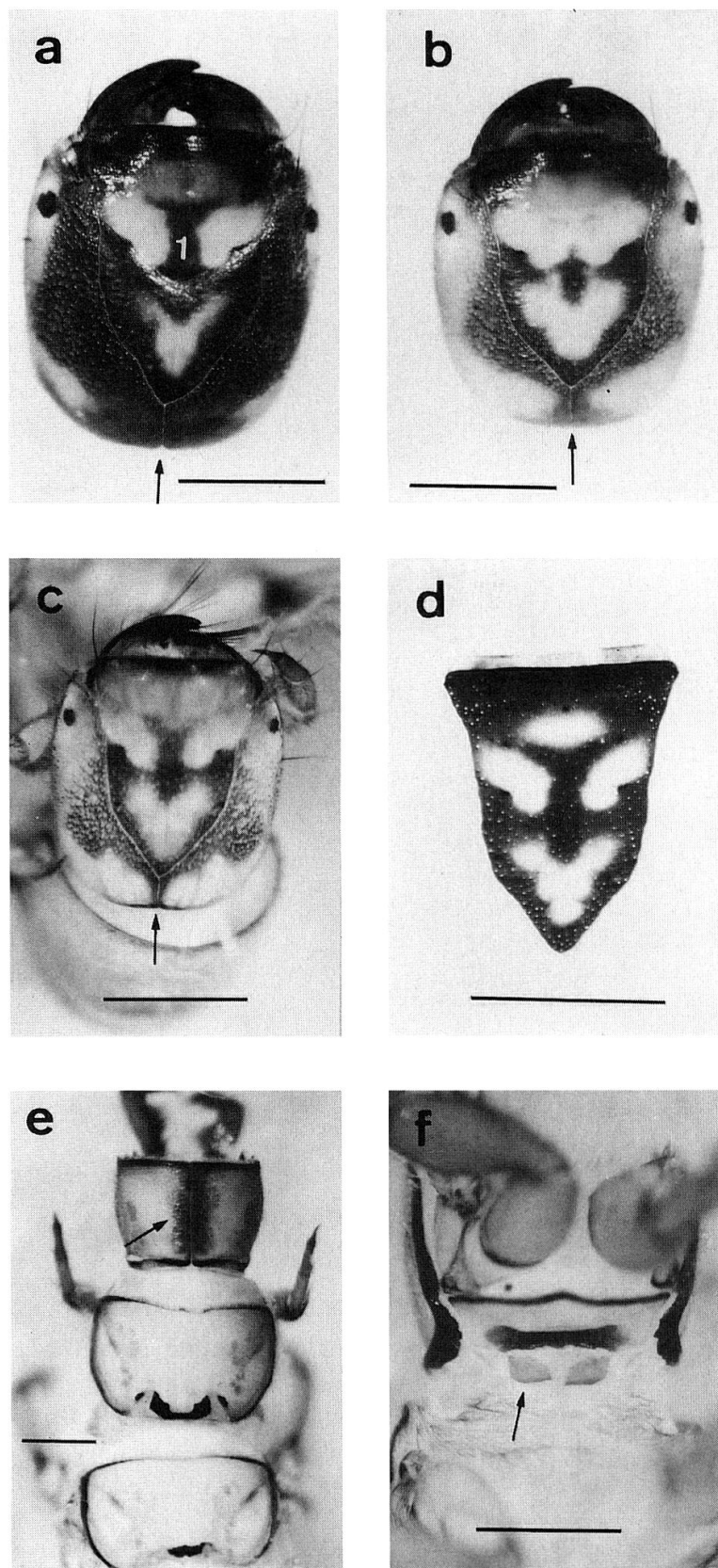


Fig. 9. *H. pellucidula* (a: cephalic capsule, dorsal; d: apotome; b-c: cephalic capsule, dorsal, of "*pictetorum*" form; e: thorax, dorsal, of "*pictetorum*" form; f: posterior prosternites of "*pictetorum*" form). Scales=1 mm.

*noxas* was recorded in the Northeast of the Iberian Peninsula, and *H. angustipennis mallorcana* in Mallorca Isle. *H. urgorri* GONZALEZ & MALICKY, 1980 is more common than the above species, although its distribution is restricted to northwestern Spain and north and centre of Portugal (GONZALEZ *et al.*, 1992; TERRA, 1994). Both species and the subspecies belong to the *guttata*-group.

*Hydropsyche angustipennis* (CURTIS, 1834)

This species has been included in this key though its presence in the Iberian Peninsula needs to be confirmed (GONZALEZ *et al.*, 1992; Dr. TACHET, pers. comm.). Although the subspecies *mallorcana* has been recorded for Mallorca Isle (MALICKY, 1980), we do not know whether the larvae resemble those of *H. angustipennis* s.s. Thus, distinguishing characteristics for this species are based on the literature.

*Hydropsyche pictetorum* BOTOSANEANU & SCHMID, 1973

The larva of this species was described by GARCIA DE JALON (1981) but, based on that description, it is not possible to distinguish it from a lightly pigmented form of *H. pellucidula* (Figs 9b-c and 9e-f). Pupae and larvae reared in the laboratory (10 specimens) always corresponded to *H. pellucidula*, never to *H. pictetorum*.

Due to few captures of *H. pictetorum* males in the Iberian Peninsula (see references for this species in GONZALEZ *et al.*, (1992) where many of the identifications have been based on larvae), and until collecting mature pupae to confirm that the larvae have the same form, we include this species in the key as *H. pellucidula*.

*Hydropsyche modesta* NAVAS, 1925

We have included *H. modesta* in the key in spite of the fact that we have no larval collections of this species. BOTOSANEANU & MALICKY (1978) point out its presence (subnom. *H. dissimulata*, considered by MALICKY (1981) as a synonym of *H. modesta*). In the Iberian Peninsula it has been recorded once only (see GONZALEZ *et al.*, 1992). In the literature *H. modesta* has been named *H. dissimulata* (see MORETTI & SPINELLI-BATTA, 1979; BOURNAUD *et al.*, 1982) and *H. guttata* (see SZCZESNY, 1974, note to the reprint by the author).

KEY FOR FULL-GROWN LARVAE OF THE IBERIAN PENINSULA

- 1 Head with a deep transverse depression at the frontoclypeal apotome and with a careen at eye level (Fig. 11c). Maximum width of apotome at eye level (Figs 11a & 11b)
  - Without these characteristics 2
  - 2 Gills absent on 7th abdominal segment 3
  - Gills present on 7th abdominal segment 4
  - 3 Apotome with a light aboral V- or Y-shaped spot. Oral and aboral light spots of the apotome joined or almost so (Figs 4a & 4c) 5
  - Apotome with a light aboral U-shaped spot. Oral and aboral light spots of the apotome never joined (Fig. 10) 6
  - 4 Anterior edge of the apotome convex (Figs 5a-c, 8a & 12) 7
  - Anterior edge of the apotome straight or slightly concave (Figs 2c, 3a-b, 3d, 6a, 6c-e, 7, 9a-d, 13, 14 & 15) 8
  - 5 Posterior prosternites indistinct and uniformly pale (Fig. 5e) 6
  - Posterior prosternites clearly visible (lightly pigmented but the medial regions darker than the lateral ones; as in Fig. 9f) 7



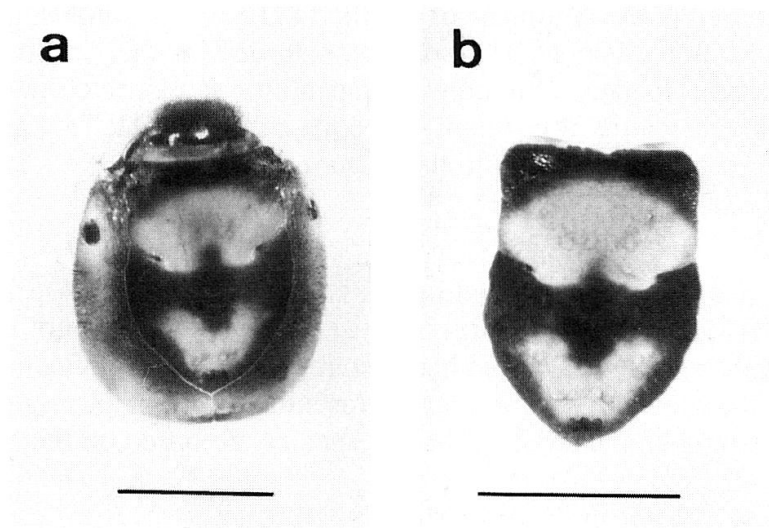


Fig. 10. *H. siltalai* (a: cephalic capsule, dorsal; b: apotome). Scales=1 mm.

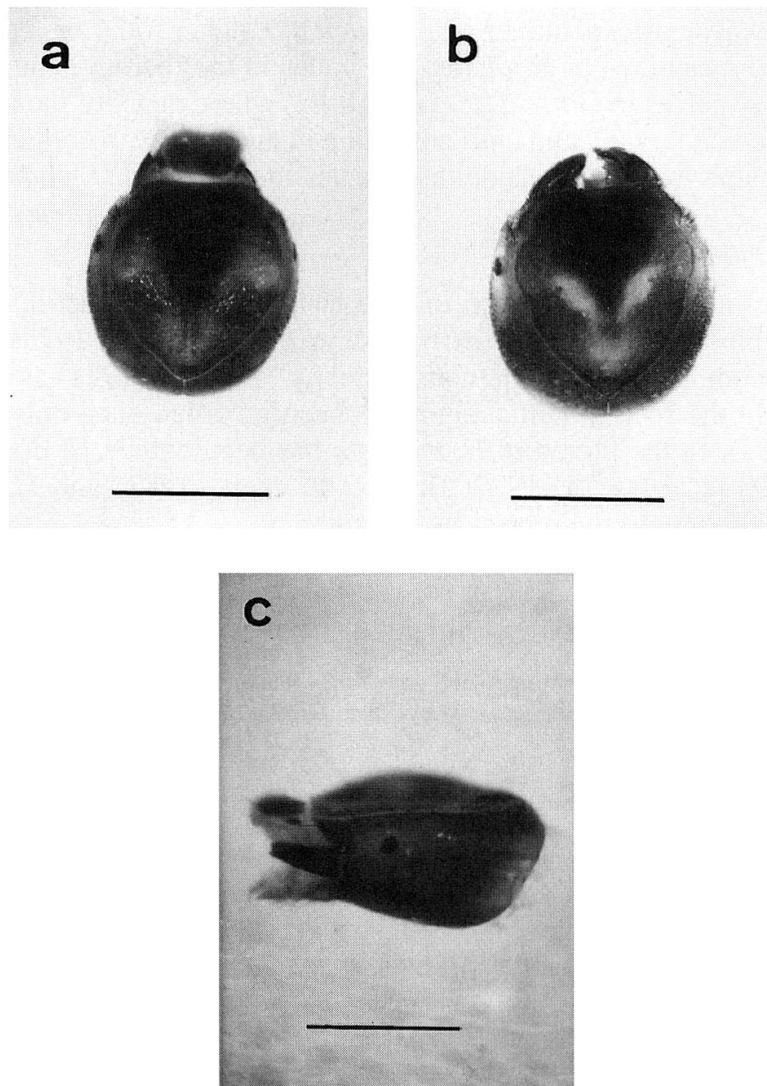


Fig. 11. *H. tibialis* (a-b: cephalic capsule, dorsal; c: cephalic capsule, lateral). Scales=1 mm.

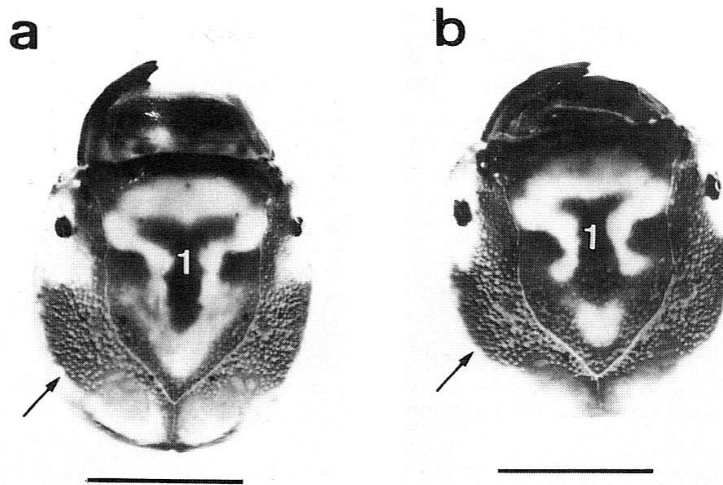


Fig. 12. *H. exocellata* (a-b: cephalic capsule, dorsal). Scales=1 mm.

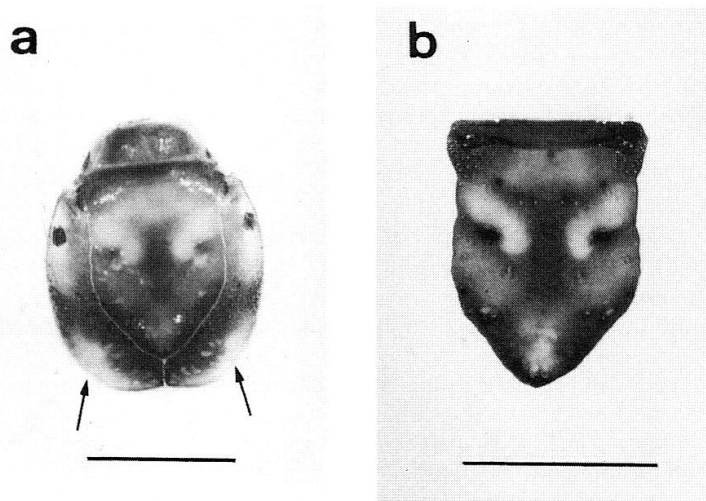


Fig. 13. *H. lobata* (a: cephalic capsule, dorsal; b: apotome). Scales=1 mm.

- 6 Apotome with two light patches more or less developed (one oral and one aboral) and separated by a dark spot never situated on the cibarian muscles (Fig. 8a:1)
  - *H. contubernalis* MCLACHLAN, 1865
  - Apotome with a light continuous patch (Figs 5b-c) or interrupted by a dark transversal spot on the insertion of the cibarian muscles (Fig. 5a:1)
    - *H. teruela* MALICKY, 1980
- 7 Light spots (oral, aboral and laterals) of the apotome completely or almost joined, with a dark T-shaped figure in the centre (Figs 12a-b:1). Lateral sclerites of head, in dorsal view, with a brownish area of granular appearance (arrows in Fig. 12)
  - *H. exocellata* DUFOUR, 1841
  - Light and dark spots of the apotome often indistinct and variable, but always, in centre of apotome, a longitudinal dark spot between two light ones. No brownish area of granular appearance on the head
    - *H. modesta* NAVAS, 1925
- 8 Pronotum and mesonotum with a dark longitudinal band in the centre (Fig. 3e:1); on the pronotum this band usually join with a transversal band on the anterior edge (Fig. 3e:2)
  - Longitudinal bands absent on the pronotum and mesonotum, though in rare cases present only on the pronotum, never joining with a transversal band on the anterior edge of the pronotum (Fig. 9e)
    - 9 Apotome almost entirely light in colour, only edges and pretentorinae dark (Fig. 3b)
      - *H. brevis* MOSELY, 1930



- Apotome dark with only some distinctly lighter spots (Figs 3a, 3d & 13) 10
- 10 Submentum with short, wide lateral lobes (Fig. 3c). Apotome with three separate aboral round spots (Figs 3a & 3d) or, elongated and fused to form a V figure *H. brevis* MOSELY, 1930
- Submentum with relatively long, narrow lobes. Apotome with a light aboral spot and two indistinct lateral ones (Fig. 13) *H. lobata* MCLACHLAN, 1884
- 11 Apotome with a light U-shaped aboral spot (Fig. 14) *H. instabilis* (CURTIS, 1834)
- Light aboral spot of the apotome different in form or absent (Figs 2a, 2c, 6a, 6c-e, 7, 9a-d, 13 & 15) 12
- 12 Lateral parts of the submentum short and wide (Figs 1 & 2b); ratio a:b>0.21 (about 0.22-0.26, see Fig. 1g) 13
- Lateral parts of the submentum longer and narrower (Figs 1 & 6b); ratio a:b<0.21 (about 0.12-0.20) 14
- 13 Head colouration very light; oral area of the apotome bright (Fig. 15) *H. bulbifera* MCLACHLAN, 1878
- Head colouration and oral area of the apotome equally dark (Figs 2a & 2c) *H. ambigua* SCHMID, 1952
- 14 Apotome wide, pentagonal (width of anterior edge roughly similar to width of the posterior third) (Figs 7b & 13b) 15
- Apotome narrow, triangular (width of anterior edge clearly wider than the posterior third) (Figs 6c-e & 9d) 16
- 15 Apotome with two round light spots on the epistomal sulcus (Fig. 7) *H. dinarica* MARINKÖVIC, 1979
- Apotome with two elongated light spots on the epistomal sulcus, which may be fused with a light oral spot, when present (Fig. 13) *H. lobata* MCLACHLAN, 1884
- 16 Medial and lateral regions of posterior prosternites forming a continuous, distinct elongated structure; lateral regions usually similar in colour to the medial regions or slightly lighter *H. angustipennis* (CURTIS, 1834)
- Medial regions of posterior prosternites irregularly squarish or oblong; lateral regions lighter and less distinct than medial regions (Fig. 6f) 17
- 17 Apotome without light oral spot (Fig. 6e) or, if it exists, very faint *H. cf. punica* MALICKY, 1981
- Apotome with a distinct light oral spot which may or not fuse with the lateral spots on the epistomal sulcus (Figs 6a, 6c, 6d & 9a-d) 18
- 18 Light oral and anterior-lateral spots on the epistomal sulcus of the apotome separate (Fig. 9d) *H. pellucidula* (CURTIS, 1834)
- Light oral and anterior-lateral spots on the epistomal sulcus of the apotome fused (Figs 6a, 6c, 6d & 9a-c) 19
- 19 Apotome with a distinct, dark, Y-shaped central figure (Figs 6a:1, 6c-d:1 & 9a:1). Head colouration very dark with or without a longitudinal dark band on either side of the coronal suture (which leaves two narrow, light areas in the postero-lateral regions of the head; Figs 9a & 6a, respectively) *H. cf. punica* MALICKY, 1981 and *H. pellucidula* (CURTIS, 1834)
- Apotome with an indistinct, central, dark, Y-shaped figure, or limited to an elongated spot. Head very light with a dark, narrow fringe on either side of the coronal suture (which leaves two broad, light areas in the postero-lateral parts of the head; Figs 9b & 9c) *H. pellucidula* (CURTIS, 1834) (form of this species matches that described under the name of *H. pictetorum* BOTOSANEANU & SCHMID, 1973 by GARCIA DE JALON, 1983).

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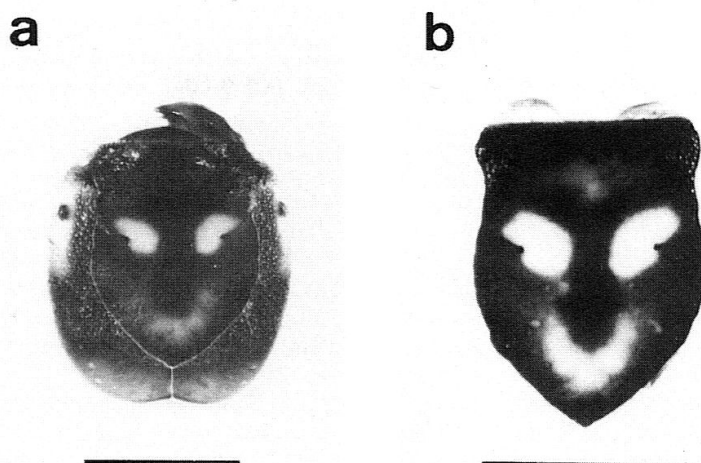


Fig. 14. *H. instabilis* (a: cephalic capsule, dorsal; b: apotome). Scales=1 mm.

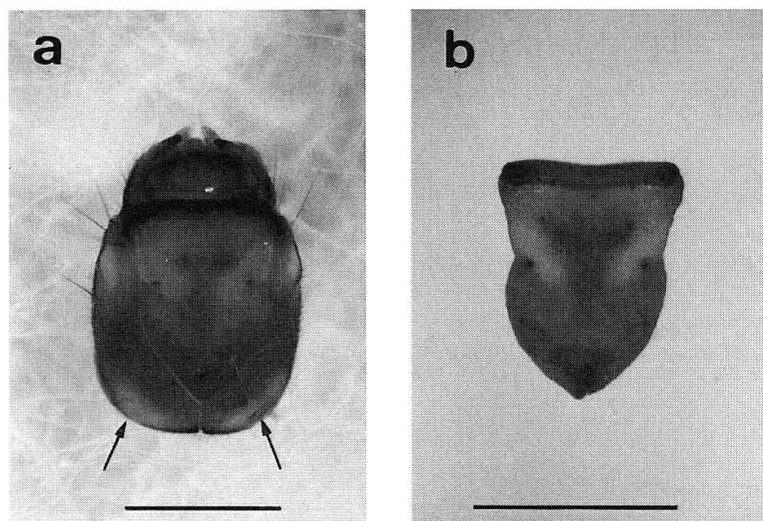


Fig. 15. *H. bulbifera* (a: cephalic capsule, dorsal; b: apotome). Scales=1 mm.

#### RÉSUMÉ

Les larves de cinq espèces du genre *Hydropsyche* (*H. ambigua*, *H. brevis*, *H. infernalis*, *H. cf punica* et *H. teruela*) sont décrites pour la première fois. Une clé pour l'identification des larves des 17 espèces du genre *Hydropsyche* connues jusqu'à présent dans la Péninsule Ibérique est présentée.

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APPENDIX 1: Sites and number of specimens studied are detailed for the newly described larvae; for the rest of the species included in the key, the origin of the specimens reviewed is represented by only the provinces and rivers in the Iberian Peninsula (l=larva; p=pupa; a=adult).

*H. ambigua*

- León: Río Cares (Posada Valdeón), 900 m, 30TUN4479, 13-VII-80 (11, 1 p♂); Río Oville (Remelán), 1,100 m, 30TUN1253, 14-VI-80 (21, 2p).
- Madrid: Río Jarama (Montejo de la Sierra), 1,300 m, 30TVL5752, 12-VI-78 (3p, 2p♂, 2a♂).

*H. brevis*

- Cuenca: Río Escabas (Poyatos), 1,150 m, 30TWK8174, X-82 (41).
- Granada: Río Colomera (Cabecera), 800 m, 30SVG3542, 24-VI-88 (11), 23-IX-88 (61), 24-VI-88 (11), 31-I-89 (31), 16-VI-90 (1a♂); (Colomera), 780 m, 30SVG3639, 23-III-88 (41), 24-VI-88 (61), 23-IX-88 (11), 9-XII-88 (31), 31-I-89 (41), 6-VI-89 (31, 1p♀), 25-IX-89 (21); (Las Torres), 660 m, 30SVG3831, 23-IX-88 (111), 9-XII-88 (51), 31-I-89 (21); Río Cacín (Pte. de la Resinera), 840 m, 30SVF2290, 21-III-88 (51), 26-IX-88 (41), 8-VI-89 (21), 5-II-90 (31), 17-VIII-90 (2p, 1p♂); (El Turro), 580 m, 30SVG1412, 21-III-88 (11), 26-IX-88 (51), 13-XII-88 (21), 8-VI-89 (11), 28-IX-89 (11), 5-II-90 (51), 17-VIII-90 (1p♂, 2p♀); Río Frío (Desembocadura), 440 m, 30SUG9417, 30-IX-88 (11), 14-XII-88 (21), 2-X-89 (11), 2-II-90 (11); Río Velillos (Olivares), 620 m, 30SVG3232, 25-IX-89 (41) Río Alhama (Balneario de Alhama), 780 m, 30SVF1298, 1-II-90 (21).
- Guadalajara: Río Tajo (Peñalén), 1,020 m, 30TWL8303, 1 4-IV-81 (21); (Zaorejas), 885 m, 30TWL6817, 1-V-81 (11), 9-VI-81 (51); Río Gallo (Ventosa), 910 m, 30TWL8721, 5-IV-81 (111).
- Málaga: Río Grande (Tolóx), 200 m, 30SUF3363, 26-X-84 (201, 2p); Río Guadiaro (S. Pablo Buceite), 40 m, 30STF8539, 5-VII-84 (151).

*H. bulbifera*

- Granada: Río Gor.
- Jaén: Río Toya.
- León: Río Torio; Río Bomberos.

*H. contubernalis*

- Palencia: Río Pisuerga.

*H. dinarica*

- León: Río Porma.
- Madrid: Río Lozoya.
- Logroño: Río Iregua; Río Oja.

*H. exocellata*

- Granada: Río Genil; Río Colomera; Río Velillos; Río Cubillas; Río Alhama; Río Frío; Arroyo de Vilano; Río Cacín; Río Aguas Blancas; Arroyo del Salar; Río Genazal; Arroyo Manzaniil; Río Salado.
- Jaén: Río Guadalquivir; Arroyo Bedmar.
- Murcia: Río Segura.
- Zaragoza: Río Gallego.

*H. infernalis*

- Guadalajara: Río Aliendre (Cogolludo), 800 m, 30TVL9531, 23-VI-80 (21, 1 p♀, 1 a♂).
- Granada: Río Aguas Blancas (Antes del embalse de Quéntar), 1,060 m, 30SVG6219, 4-X-89 (21); (Quéntar), 860 m, 30SVG5916, 19-XII-88 (11), 8-II-89 (11), 14-VI-89 (11), 7-II-90 (11); Río Darro (Granada), 720 m, 30SVG4815, 20-XII-88 (11), 15-VI-89 (1p♂), 5-X-89 (41), 9-II-90 (121); Río Cubillas (Deifontes), 840 m, 30SVG5135, 22-III-88 (31), 12-XII-88 (11); (Antes del embalse), 660 m, 30SVG4128, 22-III-88 (11), 31-I-90 (11); Río Colomera (Cabecera), 800 m, 30SVG3542, 30-I-90 (11); (Las Torres), 660 m, 30SVG3831, 23-IX-88 (11), 25-IX-89 (11); Río de las Juntas (Benalúa de las Villas), 800 m, 30SVG3841, 23-III-88 (11), 25-IX-89 (31); Arroyo Noniles (Láchar), 540 m, 30SVG2717, 17-III-88 (451, 2p), 16-VI-88 (251,1p), 27-IX-88 (241, 3p), 16-XII-88 (51), 13-VI-89 (71, 6p♀, 1 p♂), 3-X-89 (61), 6-II-90 (51); Arroyo Manzaniil (Loja), 500 m, 30SVG0013, 16-III-88 (181), 14-VI-88 (71), 30-IX-88 (11, 1p), 14-XII-88 (101), 3-II-89 (91), 12-VI-89 (71), 2-X-89 (101), 2-II-90

(24l, 3p); Río Frío (Riofrío), 500 m, 30SUG9212, 15-III-88 (7l, 2p), 14-VI-88 (26l, 2p, 1p♀), 30-IX-88 (22l, 4p), 14-XII-88 (20l), 3-II-89 (19l), 12-VI-89 (3l), 2-X-89 (13l), 2-II-90 (10l), 29-VI-91 (16a♂); (Desembocadura), 440 m, 30SUG9417, 14-VI-88 (1p♂); Río Salado (Riofrío), 500 m, 30SUG9212, 15-III-88 (8l, 1p♀), 14-VI-88 (3l), 14-XII-88 (3l), 3-II-89 (12l), 12-VI-89 (8l, 1p♀, 1a♀), 2-X-89 (13l), 2-II-90 (8l, 1p, 2p♀); Río de Válor (Válor), 940 m, 30SVF9194, 30-V-90 (2a♂), 8-VI-90 (1a♂, 1a♀), 17-V-91 (5p♂, 6p♀); Río Huéscar (Galera), 840 m, 30SWG3978, 18-VI-91 (1p♂); Río Galera (Cortijo de los Franceses), 840 m, 21-VI-90 (1p♀, 1a♂).

*H. instabilis*

- Granada: Río Genil; Río Monachil; Río Maitena; Río Aguas Blancas; Río Dílar; Río Darro; Río Alhama; Río Válor.
- Guadalajara: Río Tajo.
- Jaén: Río Toya.
- Palencia: Río Pisuerga.

*H. lobata*

- Avila: Río Adaja.
- Salamanca: Río Agueda.

*H. pellucidula* (only those rivers in which male pupae were found are specified).

- Burgos: Río Arlazón.
- Ciudad Real: Río Záncara.
- Granada: Río Genil; Río Cacín; Río Velillos; Río Colomera.
- Soria: Río Jalón.

*H. cf. punica* (only those rivers in which male pupae were found are specified).

- Granada: Río Velillos (Olivares), 620 m, 30SVG3232, 23-III-88 (1a♂), 8-VIII-90 (9p♂, 2p♀); Arroyo Manzanil (Loja), 500 m, 30SVG0013, 2-II-90 (1p♂); Río Colomera (Cabecera), 800 m, 30SVG3542, 16-VI-90 (1a♂), 8-VIII-90 (1p♂); (Las Torres), 660 m, 30SVG3831, 8-VIII-90 (1a♂), 16-VI-90 (1a♂), 4-IX-92 (3p♂, 2p♀).
- Málaga: Arroyo de la Venta (Teba), 420 m, 30SUF3394, 2-V-85 (1p♂); Río Turón (El Burgo), 550 m, 30SUF2773, 11-VII-84 (1l, 3p♂).

*H. siltalai*

- Madrid: Río Lozoya.
- Guadalajara: Río Gallo.
- León: Río Cureño.
- Soria: Río Mazos.

*H. teruela*

- Granada: Río Guadalentín (Cuevas de Gracia), 620 m, 30SWG1263, 21-VI-89 (3l), 19-VI-90 (1l), 23-I-91 (4l), 11-VI-94 (3a♂, 12a♀).
- Guadalajara: Río Tajo, 5-I-81 (3l), 15-IV-81 (1l); 15-II-81 (2l).
- Jaén: Río Guadalquivir, 270 m, 30SVH5101, 14-X-89 (2l); (Villargordo), 250 m, 30SVH3701, 28-I-90 (5l); Río Gadiana Menor (Coto Los Morenos), 520 m, 30SWG9965, 10-XII-88 (3l); (Pte. de la Risa), 460 m, 30SVG9277, 14-XII-88 (3l); (El Posito), 360 m, 30SVG7997, 14-XII-88 (6l); Río Ceal (Ceal), 500 m, 30SVG9675, 14-XII-88 (2l).
- Murcia: Río Segura (Calasparra), 10-XI-81 (6l), 20-XI-81 (7l).

*H. tibialis*

- Cáceres: Río Almonte.
- Granada: Río de Válor; Arroyo Puerto de la Ragua.
- Madrid: Río Lozoya.
- Segovia: Río Riaza.