Graellsia, 64(2): 189-208 (2008)

NEW RECORDS OF TRICHOPTERA IN REFERENCE MEDITERRANEAN-CLIMATE RIVERS OF THE IBERIAN PENINSULA AND NORTH OF AFRICA: TAXONOMICAL, FAUNISTICAL AND ECOLOGICAL ASPECTS

N. Bonada*, C. Zamora-Muñoz**, M. El Alami***,
C. Múrria* & N. Prat*

ABSTRACT

Trichoptera is a very rich order in the Western Mediterranean, but knowledge of caddisflies in the Iberian Peninsula and northern Africa is still not complete. We present records of caddisflies collected in 114 sites of the Mediterranean climate region of the Iberian Peninsula and the western Rif. We also provide notes on ecological aspects and taxonomical remarks on some species. A total of 86 species were identified and 8 species extended their distribution range. Considering the four differentiated geological regions in the western Mediterranean Basin during the Tertiary, 60 species were collected in the Iberian plate region, 29 in the Transition, 30 in the Betic and 18 in the Rif. Local richness was not significantly different between the four regions but significant differences were found among several river ecotypes within regions. Temporary sites had lower local richness than other ecotypes in all regions except in the Rif, whereas headwaters had similar richness in any region regardless of their geology. The Rif region had the lowest Trichoptera richness, which is not only the result of the scarcity of faunistic studies in the area but also of the high frequency of temporary rivers and the isolation of the area. Our results suggest that conservation measures addressed to preserve the biodiversity of the Western Mediterranean should be enforced, especially in the Rif region.

Key words: Trichoptera, Mediterranean rivers, Iberian Peninsula, Morocco, Faunistic, Taxonomy, Ecology.

RESUMEN

Nuevos datos de tricópteros en ríos de referencia de clima mediterráneo en la Península Ibérica y norte de África: aspectos taxonómicos, faunísticos y ecológicos

El orden Trichoptera es rico en especies en la zona del Mediterráneo Occidental, pero el conocimiento de este grupo en la Península Ibérica y el norte de África resta aún de ser completo. Presentamos datos de tricópteros recolectados en 114 localidades de la región Mediterránea de la Península Ibérica y del Rif occidental. Además, proporcionamos datos sobre la ecología de algunas especies así como notas taxonómicas. Se identificaron un total de 86 especies y el rango de distribución aumentó para 8 de ellas.

* Department of Ecology, University of Barcelona, Diagonal, 645. E-08028 Barcelona (Spain)
** Department of Animal Biology, University of Granada, Faculty of Science, Campus Universitario de Fuentenueva. E-18071 Granada (Spain)
*** Department of Biology, University Abdelmalek Essâadi, Faculty of Science Tétouan B.P. 2121. Tétouan (Morocco)

Sesenta especies se recolectaron en la región de la placa Ibérica, 29 en la de Transición, 30 en la Bética y 18 en el Rif, las cuatro regiones geológicas diferenciadas durante el Terciario en el Mediterráneo Occidental. La riqueza local no fue significativamente diferente entre regiones geológicas, pero sí entre varios ecotipos fluviales. Los tramos temporales presentaron una riqueza local menor que los demás ecotipos, excepto en el Rif, mientras que las cabeceras presentaban una riqueza similar en cada región independientemente de su geología. Globalmente el Rif presentó una menor riqueza de tricópteros, lo que se explica no sólo por la escasez de estudios faunísticos en la zona sino también por la elevada frecuencia de ríos temporales y su aislamiento geográfico. Nuestros resultados sugieren que en la zona del Mediterráneo Occidental se deben de llevar a cabo medidas de conservación urgentes para preservar su biodiversidad, especialmente en la región del Rif.

Palabras clave: Trichoptera, ríos Mediterráneos, Península Ibérica, Marruecos, Faunística, Taxonomía, Ecología.

Introduction

The Mediterranean Basin has been considered a hotspot of biodiversity, at least when looking at plants and vertebrates (Myers *et al.,* 2000). Insects are also diverse in the area especially when considering the reduced dimensions of the emerged land (Balleto & Casale, 1989). In particular, the western Mediterranean, and specially the south of the Iberian Peninsula and the north of Morocco (i.e. Betic-Rif ranges), is one of the two main centres of biodiversity within the Mediterranean Basin (Médail & Quézel, 1997). Likewise, Trichoptera is a very rich order in the Western Mediterranean, with about 390 species in the Iberian Peninsula (González, 2007) and 72 in Morocco (Dakki, 1980). In spite of having a high caddisfly richness, the knowledge of caddisflies in the Iberian Peninsula and north of Africa is still incomplete, new species are still recorded and many larval stages are not yet described (e.g. González & Ruiz, 2001; Zamora-Muñoz *et al.,* 2002, 2006). Consequently, general studies providing information about caddisflies are required in both areas to have a consistent taxonomy of the group which will help to carry out proper ecological studies or to promote specific conservation measures.

Thus, our main aim was to complement the existing information (e.g. Dakki, 1980; González *et al.,* 1992; Vieira-Lanero, 2000; Ruiz *et al.,* 2001; Bonada *et al.,* 2004b) with new records. The study area broadly corresponds to that studied in Bonada *et al.* (2004b) but with new sites and basins, including those found in the western Rif. The caddisfly records presented follow the taxonomical classification described in Wiggins (1996) and are updated using Fauna Iberica (www.fauna-iberica.mncn.csic.es) and Fauna Europaea (www.faunaeur.org) web services. In addition, we follow the traditional species terminology and escape from recent synonyms without a consistent study of the species implied (Botosaneanu, in letter to C. Zamora-Muñoz, 2005). In some cases, we also provide taxonomical notes. Notes on ecological aspects of the species not already included in Bonada *et al.* (2004b) are given by using information compiled by the Guadalmed project (see www.ecostrimed.net) or by using references provided in Table 1.

Several authors have suggested that a mixture of complex past historical processes occurring during the Tertiary and Quaternary with current heterogeneous environmental conditions are responsible for the high biodiversity found in the Mediterranean Basin (Balleto & Casale, 1989; Hewitt, 2004; Bonada *et al.,* 2005). Among historical factors, those that occurred during the Tertiary in the western Mediterranean Basin resulted in four differentiated geological regions: Iberian Plate, Transition, Betic and Rif. Among ecological factors, basin geology, river zonation and seasonal variability are the most relevant to understand caddisfly distribution (Bonada *et al.,* 2005). Both groups of factors have implications on regional richness which in turn influences local richness (Vinson & Hawkins, 2003). We will analyze Trichoptera from these geological regions in terms of regional (i.e. richness in each geological region) and local richness (i.e. richness in each site). Given that basin geology and river zonation are the main environmental factors constraining caddisflies

(Bonada *et al.,* 2005), we will analyze local caddisfly richness between five river ecotypes based on these factors and described by Sánchez-Montoya *et al.* (2007) within geological regions: (1) temporary streams, (2) evaporite calcareous streams at medium altitude, (3) siliceous headwaters at high altitude, (4) calcareous headwaters at medium and high altitude and (5) large watercourses. By examining this, we will explore how main historical and environmental factors constrain local richness at two nested spatial scales (i.e. geological region and ecotype).

Material and methods

We collected Trichoptera specimens from 114 sites belonging to 28 basins. All sites were considered as reference regarding their ecological quality (Bonada *et al.,* 2004a) and located in different river sections (i.e. headwaters, midstreams and lowland reaches) with different basin geology (i.e. calcareous, siliceous or sedimentary) and at different altitudes (from 20 to 1940 m.a.s.l., Appendix). Our study was focused within the limits of the Mediterranean climate established by Köppen (1931) and covered a sampled area of 70854.12 km^2, from the northeast of the Iberian Peninsula to the western Rif zone in Morocco (Fig. 1). The sampled area was divided into 4 different geological regions: the Iberian Plate (42 sites), the Transition zone (9 sites), the Betic (43 sites) and the Rif zones (20 sites). The Iberian Plate comprises the area of the Iberian Peninsula which includes the Hesperic Massif (west of the Iberian Peninsula which originated in the hercinic orogeny during the Carboniferous), the Iberian Ranges (east of the Hesperic Massif with a hercinic base and a sedimentary cover) and the Catalan Ranges (northeast of the Hesperic Massif with a hercinic and alpine orogeny origin and a sedimentary cover). The Transition zone is equivalent to the Prebetic area, located in the external zone of the Betic Ranges and originated, before the collision of the Betic-Rif microplate, by marine deposits or terrestrial sediments from the Iberian Plate. The Betic zone encloses the Internal Zone of the Betic Ranges (also called Betic *s.s.*), which was part of the Betic-Rif microplate, and the flychs deposits, coming from eastern areas and reached the Strait of Gibraltar with the migration of the Betic-Rif microplate (Sanz de Galdeano & Vera, 1991). Likewise, the Rif zone comprises the Internal zone and the flychs deposits of the Rif Ranges (Fig. 1).

In each site, we sampled all available habitats with a kick net of 250-300 µm mesh size depending on the survey, until no new caddisfly families were observed in the field. Samples were preserved in formalin (4%) or alcohol (96%) and identified to the species level in the laboratory. In addition, last-instar larvae and pupa were collected in the field and reared in the laboratory to obtain adults for ensuring larval identifications (for the method used see Bonada *et al.,* 2004b). When possible, adults were also obtained in the field by sweeping riparian vegetation with an entomological net or by using a UV-light trap.

Local richness referred to the number of species collected at each site. In order to check local richness of caddisflies between ecotypes within geological regions we performed a nested ANOVA. Residuals were checked for normality and homogeneity of variances using Shapiro-Wilk and Bartlett tests, respectively. The nested design included 2 fixed factors nested as follows: ecotype nested to geological region. Although nested ANOVA designs usually use random nested factors, fixed factors can also be used (Quinn & Keough, 2002). As mentioned, the geological region factor includes: Iberian Plate, Transition, Betic and Rif. Regarding ecotypes, we used those developed for Mediterranean Basin rivers in Sánchez-Montoya *et al*. (2007): (1) temporary streams, (2) evaporite calcareous streams at medium altitude, (3) siliceous headwaters at high altitude, (4) calcareous headwaters at medium and high altitude and (5) large watercourses (Appendix). These statistical analyses were performed using the R freeware (http://www.r-project.org/).

Results

A total of 4041 larvae, 25 pupae and 131 adults were collected in the sampled area. Most of them were identified at species level, resulting in 86 different species. For each species, information of number of larva (L), pupae (P) and adults (♂ and ♀) collected are provided. For mature pupae and adults, the months of capture are presented in brackets after the locality. When the identity of the identification was not clear, a question mark (?) is added before some sampling sites or number of specimens. Sites are arranged by latitude of the whole basin (Fig. 1) and information about geographical position and general environmental characteristics of each locality is found in the Appendix.

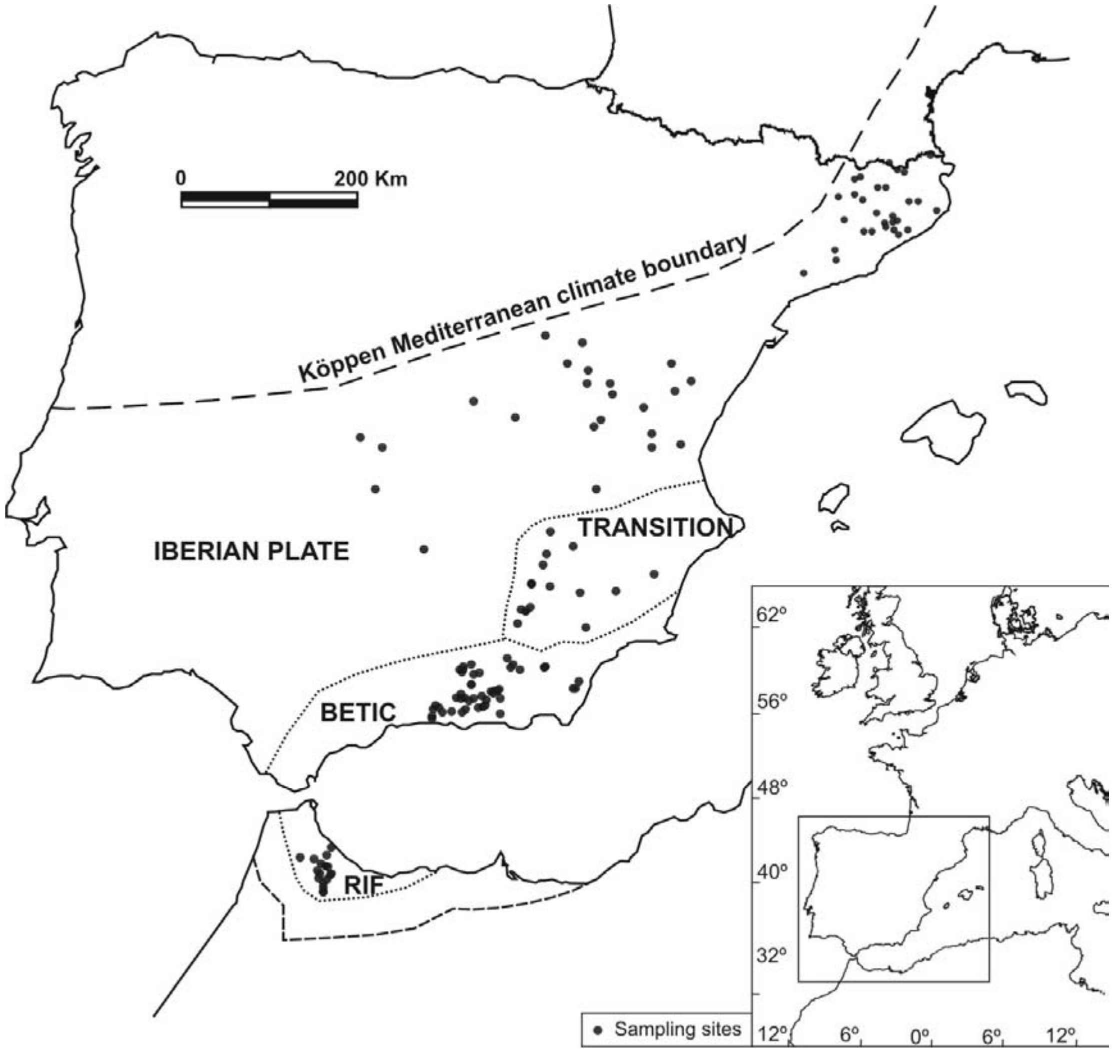

Fig. 1.— Site location and sampling area grouped by geological regions: Iberian Plate, Transitional, Betic and Rif zones. The boundary of the Mediterranean climate according to Köppen (1931) is also shown. See Appendix for detailed information on site location.

Fig. 1.— Localización de las estaciones de muestreo y de la zona muestreada agrupadas por regiones geológicas: Placa Ibérica, Transición, Béticas y Rif. Se muestra también el límite del clima Mediterráneo según Köppen (1931). Ver el Apéndice para obtener información detallada sobre la localización de las estaciones.

Faunistic list

Suborder SPICIPALPIA

Family RHYACOPHILIDAE Stephens, 1836

Subfamily Rhyacophilinae Stephens, 1836

Rhyacophila Pictet, 1834

Rhyacophila dorsalis (Curtis, 1834)

MATERIAL STUDIED: 18L. Fluvià: H18; Ter: H27, H29; Llobregat: H22, H32; Tajo: H9, H12

Rhyacophila evoluta McLachlan, 1879

MATERIAL STUDIED: 16L. Ter: H24, H25

Rhyacophila fasciata Hagen, 1859

MATERIAL STUDIED: ?3L. Fluvià: H18, H19

Larvae found corresponded to this species but there is controversy about the presence of this species in the Iberian Peninsula (see Bonada *et al.,* 2004b).

Rhyacophila fonticola Giudicelli & Dakki, 1984

MATERIAL STUDIED: 10L. Martil: R14; Laou: R3, R4, R8

See comments for *Rhyacophila munda*.

Rhyacophila meridionalis E. Pictet, 1865

MATERIAL STUDIED: 30L. Tordera: H14; Tajo: H5; Júcar: H4; Guadiana: H11; Segura: T1; Guadiana Menor: T5; Adra: B1, B2, B3

Rhyacophila munda McLachlan, 1862

MATERIAL STUDIED: 56L, 1P. Tajo: H8; Júcar: H4, H13, T3; Guadiana: H1; Segura: T4; Guadalquivir: H6; Guadiana Menor: ?B27, ?B31, ?B32, T6, ?T8; Genil: B10, ?B12, ?B15, B19, ?B19; Guadalfeo: B24; Chillar: B7; Verde: B35; Laou: R1, R2, R7, R8 (1P♂: V-2005); R13; Sebou: R18; Adelmane: R15

Larvae found in some sampled sites of Genil and Guadiana Menor basins, marked with "?", were provisionally assigned to this species, but they presented an atypical dark coloration in the head. The recent description of the larva of *R. fonticola* (Vieira-Lanero *et al.,* 2008) make us think that they could belong to this species. Adult material should be collected to clarify the identity of these specimens.

Rhyacophila nevada Schmid, 1952

MATERIAL STUDIED: 19L, 22A. Guadiana Menor: T9; Genil: B9, B11 (15♂♂, 7♀♀: VIII-2007); Guadalfeo: B22, B26

Although Malicky (2002; 2005b) considered this species as a subspecies of *R. dorsalis*, we believe that it should be kept as a distinct species because of larval morphology and ecological requirements (see more details in Bonada *et al.,* 2004b).

Rhyacophila occidentalis McLachlan, 1879

MATERIAL STUDIED: 12L, 1A. Genil: B9, B11 (1♂: VIII-2007); Guadalfeo: B20, B23

With the adults collected in the Genil Basin, specimens from other sites in Sierra Nevada mountains (from Adra and Guadalfeo basins), identified as *R.* cf. *occidentalis* in Bonada *et al.* (2004b), correspond, probably, to this species.

Rhyacophila rupta McLachlan, 1879

MATERIAL STUDIED: 1L. Llobregat: H32

Rhyacophila* cf. *tristis Pictet, 1834

MATERIAL STUDIED: 9L. Ter: H24, H25, H26; Llobregat: H23

See Bonada *et al.* (2004b) for comments on the difficulty of identifying the *tristis* group.

Family GLOSSOSOMATIDAE Wallengren, 1891

Subfamily Agapetinae Martynov, 1913

Agapetus Curtis, 1834

As reported before (Bonada *et al.* 2004b) this genus contains one species with undescribed larvae present in our sampled area (*Agapetus theischingeri* Malicky, 1980). In addition, most of the morphological characters used to distinguish species use lateral and ventral abdominal setae patterns (e.g. see Pitsch, 1993). This may yield misidentifications because these setae may be broken or not clearly visible. For example, two specimens found in Tajo Basin (H5) had only one lateral seta in the first abdominal segment and very few dorsal setae in the ninth abdominal sclerite. Given this difficulty, here we only present specimens with larvae that fit in the known species and from sites where pupae or adults have been collected previously (Bonada *et al.,* 2004b).

Agapetus fuscipes Curtis, 1834

MATERIAL STUDIED: 114L, 2P. Ter: H25; Guadiana: H1; Guadiana Menor: B28 (1P♂: IV-2003); Genil: B14 (1P♀: I-2004); Adra: B2, B4

Agapetus delicatulus McLachlan, 1884

MATERIAL STUDIED: 2L. Ter: H25

Agapetus beredensis Dakki & Malicky, 1980

MATERIAL STUDIED: 16L, 1P. Laou: R13; Adelmane: R15 (1P♂: VI-2003), R16

Agapetus incertulus McLachlan, 1884

MATERIAL STUDIED: 33L, 1P. Laou: R13 (1P♂: V-2005). Genil: B10, B12, B13, B15, B18, B19; Verde: B35; Martil: R14; Adelmane: R15, R16

Ruiz *et al*. (2004) reported that larva of *A. incertulus* does not have ventral setae in the sixth and seventh segments. Although most of our specimens followed this character (as well as the others characteristics of this species), some specimens in B13 and B15 had ventral setae in at least one of these segments.

Agapetus nimbulus McLachlan, 1879

MATERIAL STUDIED: 29L, 3P, 1A. Guadiana Menor: B29, T8 (1P♂, 1P♀: IV-2003; 1P♂, 1♂: X-2005)

This species was recently cited from the Iberian Peninsula (Zamora-Muñoz *et al.,* 2006). The larvae are similar to those of *Agapetus segovicus* Schmid, 1952. Thus, the intention of building a key with the described species of the Iberian Peninsula was resulted unsuccessful, at least with the characters used until now for the step-keys.

Synagapetus McLachlan, 1879

Nineteen larvae of this genus have been found in Ter (H17 and H25), Tordera (H14) and Segura (T2 and T4) basins. Given the difficulties in the larva taxonomy we did not reach to species level for this genus.

Subfamily Glossosomatinae Wallengren, 1891

Glossosoma Curtis, 1834

Glossosoma boltoni Curtis, 1834

MATERIAL STUDIED: 28L, 1P. Ter: ?H24, ?H25; Genil: B9, B26 (1 P♂: XI-2005)

By distribution (northern basins of the Iberian Peninsula), specimens from the Ter Basin could also belong to *Glossosoma spoliatum* McLachlan, 1897, whose larva has not been described yet (Bonada *et al.,* 2004b).

Family HYDROPTILIDAE Stephens, 1836

Subfamily Hydroptilinae Stephens, 1836

Tribe Hydroptilini Stephens, 1836

Allotrichia McLachlan, 1880

Allotrichia pallicornis (Eaton, 1873)

MATERIAL STUDIED: 6L. Fluvià: H20; Guadiana: H3

Hydroptila Dalman, 1819

We collected 178 larva specimens belonging to this genus but because many immature forms of Iberian species remain undescribed, we only present here results from sites where pupa or adults of the species were found.

Hydroptila* gr. *sparsa Curtis, 1834

MATERIAL STUDIED: 21L, 1P. Guadalfeo: B25 (1PM: IV-2003)

Hydroptila vectis Curtis, 1834

MATERIAL STUDIED: 14L, 4P, 1A. Guadiana Menor: T9 (1P♂, 1P♀: VII-2003); Genil: B14 (1♀: IV-2003); Guadalfeo: B22 (2P♀♀: VII-2003)

Oxyethira Eaton, 1876

Three specimens from this genus have been found in Francolí (H35), Júcar (T3) and Guadalfeo (B25) basins. Given the difficulties of identifying larvae, we did not reach species level.

Tribe Orthotrichiini Nielsen, 1948

Ithytrichia Eaton, 1873

Three specimens of this genus (not identifiable at species level because of the scarcity of published information on larval morphology, Vieira-Lanero, 2000) were found in the Guadiana Basin (H11).

Orthotrichia Eaton, 1873

Orthotrichia angustella (McLachlan, 1865)

MATERIAL STUDIED: 8L. Fluvià: H20; Calonge: H35; Tordera: H14

Suborder ANNULIPALPIA

Superfamily PHILOPOTAMOIDEA Stephens, 1829

Family PHILOPOTAMIDAE Stephens, 1836

Subfamily Philopotaminae Stephens, 1836

Philopotamus Stephens, 1829

Philopotamus montanus (Donovan. 1813)

MATERIAL STUDIED: 46L, 1P, 10A. Muga: H33; Fluvià: H18; Ter: H17, H24, H25, H26; Tordera: H14, H15, H16; Guadiana Menor: B27 (1♂: IV-2003; 1♂: VII-2003; 2♀♀: X-2005), B29; Genil: B9 (1♂: X-2005), B19 (1♀: VII-2003); Adra: B1 (2♂♂: VII-2003), B3 (1♂: III-2003), B4, B5; Guadalfeo: B23 (1P♂: V-2003; 1♂: XI-2005); Chillar: B6

Wormaldia McLachlan, 1865

We found 115 larvae of this genus in Muga (H33), Ter (H28), Tordera (H14, H15 and H16), Llobregat (H23), Júcar (T3), Guadiana (H1), Guadiana Menor (B30, B33, B35), Genil (B15), Guadalfeo (B25), Chillar (B7) and Laou (R13) basins. Only one female was found in Genil Basin (B19) in July-2003. Given that no males were found, it was not possible to reach the species level.

Subfamily Chimarrinae Rambur, 1842

Chimarra Stephens, 1829

Chimarra marginata (Linnaeus, 1767)

MATERIAL STUDIED: 46L. Muga: H33; Fluvià: H20; Llobregat: H22, H23; Francolí: H35; Ebre: H37; Tajo: H5, H8, H9; Júcar: H7; Segura: T1; Guadalquivir: H38; Jara: B36; Guadalfeo: B37; Martil: R20.

Superfamily HYDROPSYCHOIDEA Curtis, 1835

Family HYDROPSYCHIDAE Curtis, 1835

Hydropsyche Pictet, 1834

Hydropsyche* cf. *angustipennis (Curtis, 1834)

MATERIAL STUDIED: 1L. Ter: H26

Although some larva specimens from northern basins have been recently assigned to this species (Valladolid *et al.,* 2007), adult records in the Iberian Peninsula are not known despite being recorded in the Balearic Islands (González *et al.,* 1992). Our specimen clearly shows the distinctive features of this species (Neu & Tobias, 2003) but adult material should be collected to confirm its presence in the area.

Hydropsyche brevis Mosely, 1930

MATERIAL STUDIED: 4L. Tajo: H5; Júcar: H7; Segura: T4

Hydropsyche bulbifera McLahlan, 1878

MATERIAL STUDIED: 5L. Fluvià: H18, H20

Hydropsyche dinarica Marinkovic-Gospodnetic, 1979

MATERIAL STUDIED: 56L. Ter: H17, H24, H25

Hydropsyche exocellata Dufŏur, 1841

MATERIAL STUDIED: 11L. Fluvià: H20, Tajo: H10; Segura: T1

Hydropsyche fezana Navás, 1935

MATERIAL STUDIED: 314L. Laou: R2, R3, R4, R5, R8, R12, R13; Adelmane: R15, R16; Sebou: R17, R18

Hydropsyche fontinalis Zamora-Muñoz & González, 2002

MATERIAL STUDIED: 1L. Guadiana Menor: T8

Hydropsyche infernalis Schmid, 1952

MATERIAL STUDIED: 110L, 1P, 5A. Guadiana Menor: B28, B29, B32, B33, B40 (1♂: X-1996; 2♂♂: VI-1997); Genil: B10, B13 (1♂: X-1996), B14, B15, B16, B17 (1P♂: IV-2003), B19, B43 (1♂: VIII-2007); Adra: B4, B5; Guadalfeo: B24, B25; Chillar: B6, B7; Verde: B35

Hydropsyche instabilis (Curtis, 1834)

MATERIAL STUDIED: 92L, 58A. Fluvià: H18, H19; Tordera: H14; Llobregat: H22; Francolí: H35; Tajo: H5; Guadiana Menor: B31, B32, T9; Genil: B9, B11 (39♂♂: VIII-2007), ?B16, ?B17, B19, B43 (19♂♂: VIII-2007); Adra: B1, B2, B3, B4; Guadalfeo: B20, B22, B23, B26

Hydropsyche* gr. *instabilis

MATERIAL STUDIED: 71L. Ter: H28; Llobregat: H23, H32; Foix: H31; Francolí: H35

This species corresponds to the same *Hydropsyche* gr. *instabilis* in Bonada *et al.* (2004b), potentially considered as a new species by larval and male pupa morphology. Recently, molecular analysis using portions of COI gene have revealed that individuals with this morphology constitute a single group that is different from other species within the *instabilis* group, supporting the idea that it should be considered as a new species (Múrria, unpubl. data). Adult material is however needed to formally describe this species using morphological characters.

Hydropsyche lobata McLachlan, 1884

MATERIAL STUDIED: 81L. Guadiana: H3; Laou: R6, R7, R9, R10, R11, R12

Hydropsyche maroccana Navás, 1935

MATERIAL STUDIED: 152L, 1A. Laou: R6, R9, R11 (1♂: V-2005), R13

Hydropsyche* gr. *pellucidula

MATERIAL STUDIED: 349L. Fluvià: H18, H19; Llobregat: H22, H32; Francolí: H35; Tajo: H8, H9, H10; Guadiana: H11; Segura: T1; Guadiana Menor: T9; Genil: B18; Guadalfeo: B21; Laou: R1, R6, R7, R9, R10, R11, R12

Given the difficulties of identifying larvae of *Hydropsyche iberomaroccana* González & Malicky, 1999, *Hydropsyche incognita* Pitsch, 1993 and *Hydropsyche punica* Malicky, 1981 (Zamora-Muñoz *et al.,* 1995; González & Malicky, 1999), we have grouped all individuals under the *pellucidula* group. *H. incognita* has a widespread distribution in Central Europe and in the Iberian Peninsula (Bonada *et al.,* 2004b). However, *H. iberomaroccana* has been recorded in southern Iberian basins and in Morocco (e.g. González & Malicky, 1999; Bonada *et al.,* 2004b), whereas *H. punica* has been cited only from northern Africa (Malicky & Lounaci, 1987; Kumanski, 2006).

Hydropsyche siltalai Döhler, 1963

MATERIAL STUDIED: 123L. Muga: H33; Fluvià: H18, H19; Ter: H26, H27, H29; Tordera: H14, H16; Tajo: H12; Júcar: T3; Guadiana: H1; Segura: T2, T4; Guadalquivir: H6

Hydropsyche teruela Malicky, 1980

MATERIAL STUDIED: 2L. Segura: T1

Hydropsyche tibialis McLachlan, 1884

MATERIAL STUDIED: 1L. Adra: B3

Cheumatopsyche Wallengren, 1891

Cheumatopsyche atlantis (Navás, 1930)

MATERIAL STUDIED: 2L. Laou: R7

Malicky (2005b) has considered this species as a synonym of *Cheumatopsyche lepida* (Pictet, 1834). The study of the larvae collected showed some differences with this species: the hairy areas were less conspicuous than in *C. lepida* and mostly limited to the anterior margin of the pronotum. We consider, thus, that *C. atlantis* is different from *C. lepida*, but more individuals need to be collected to ensure that *C. atlantis* is a good species.

Cheumatopsyche lepida (Pictet, 1834)

MATERIAL STUDIED: 79L. Fluvià: H20; Ter: H29; Francolí: H35; Júcar: H7

Family PSYCHOMYIIDAE Walker, 1852

Subfamily Psychomyiinae Walker, 1852

Psychomyia Latreille, 1829

Psychomyia pusilla (Fabricius, 1781)

MATERIAL STUDIED: 45L, 5P. Muga: H33; Fluvià: H18; Ter: H27, H29; Francolí: H35; Tajo: H10; Segura: T1; Laou: R11 (4P♂♂, 1P♀: V-2005), R12

Lype McLachlan, 1878

Lype phaeopa Stephens, 1836

MATERIAL STUDIED: 1L. Muga: H33

Metalype Klapálek, 1898

Metalype fragilis (Pictet, 1834)

MATERIAL STUDIED: 3L. Llobregat: H22; Tajo: H5

This species has been considered as *Psychomyia fragilis* by Malicky (2005b).

Tinodes Curtis, 1834

As pointed out in Bonada *et al.* (2004b) several species of this genus present in the area of study are not described and records presented here should be confirmed, except in cases where adults are found.

Tinodes* cf. *assimilis McLachlan, 1865

MATERIAL STUDIED: 24L. Júcar: T3; Genil: B12, B13, B15, B18; Adra: B4; Verde: B35

The presence of this species in Guadalfeo and Guadiana Menor Basins has been confirmed by adult collection in previous studies (Zamora-Muñoz, unpubl. data).

Tinodes baenai González & Otero, 1984

MATERIAL STUDIED: 1L, 2A. Genil: B14 (2♂♂: VII-2003)

The larva of this species is not described but adults confirmed that this species was collected in the site.

Tinodes* cf. *dives (Pictet, 1834)

MATERIAL STUDIED: 38L. Llobregat: H23; Foix: H31; Tajo: H8

Tinodes* cf. *unicolor Pictet, 1834

MATERIAL STUDIED: 1L. Tordera: H14

Tinodes* cf. *waeneri (Linnaeus, 1758)

MATERIAL STUDIED: 14L. Ter: H29; Llobregat: H32

Family POLYCENTROPODIDAE Ulmer, 1903

Subfamily Polycentropodinae Ulmer, 1903

Plectrocnemia Stephens, 1836

We found 39 larvae of this genus in H26, H28, H6, H8, B1, B3, B4, B5, B9, B10, B20, B23, B27, B28, R17, R19. Specimens found in B1, B3, B4, B5, B9, B20, B27, B28 were similar to *Plectrocnemia conspersa* (Curtis, 1834) whereas 2 in B27 were similar to *Plectrocnemia laetabilis* McLachlan, 1880. However, these two species are the only ones described at larval stage (Vieira-Lanero *et al.,* 2003) out the six species recorded in the studied area (Dakki, 1980; González *et al.,* 1992; Tobias & Tobias, 2007).

Polycentropus Curtis, 1835

Polycentropus* cf. *corniger McLachlan, 1884

MATERIAL STUDIED: 3L. Fluvià: H18; Segura: T2

Records of pupae and adults are needed to confirm the presence of this species in the study sites.

Polycentropus flavomaculatus (Pictet, 1834)

MATERIAL STUDIED: 5L. Ter: H29; Foix: H31

Polycentropus kingi McLachlan, 1881

MATERIAL STUDIED: 99L. Tordera: H14, H16; Tajo: H8; Júcar: H13; Segura: T2; Guadiana Menor: B33, T7, T8; Genil: ?B18, B13, B14; Adra: B4; Guadalfeo: B24, B25; Laou: R3, R4, R8; Adelmane: R15, R16

The presence of this species in T8 is confirmed by adult collection in previous studies (Zamora-Muñoz *et al.,* 2002).

Cyrnus Stephens, 1836

Cyrnus* cf. *montserrati González & Otero, 1963

MATERIAL STUDIED: 2L. Guadiana Menor: H1

Records of pupae and adults are needed to confirm the presence of this species in the studied sites, but these larvae resembled those found in a previous study (Bonada *et al.,* 2004b).

Suborder INTEGRIPALPIA

Superfamily LIMNEPHILOIDEA Kolenati, 1848

Family BRACHYCENTRIDAE Ulmer, 1903

Brachycentrus Curtis, 1834

Brachycentrus (B.)* cf. *montanus Klapálek, 1892

MATERIAL STUDIED: 1L. Júcar: H13

This specimen has a squared section case without silk and the head has a uniform coloration, typical features of this species. However, until now it has only been recorded in northern Portugal and north-western Spain (Vieira-Lanero, 2000).

Brachycentrus (B.) subnubilus Curtis, 1834

MATERIAL STUDIED: 3L. Tajo: H9

Micrasema LacLachlan, 1876

Micrasema longulum McLachlan, 1876

MATERIAL STUDIED: 8L. Genil: B9, B11; Adra: B2, B3; Guadalfeo: B22

Micrasema* cf. *minimum McLachlan, 1876

MATERIAL STUDIED: 5L. Ter: H25

Although specimens fitted well under this species according to Vieira-Lanero (2000), *Micrasema salardum* Schmid, 1952 or *Micrasema vestitum* Navás, 1918, whose larvae are not yet described, have been cited close to site H25 (Estación Valter 2000, in Botosaneanu & González, 2006)

Micrasema moestum (Hagen, 1868)

MATERIAL STUDIED: 283L. Tajo: H9; Guadiana Menor: B27, T5, T8; Genil: B9, B14, B17, B19; Adra: B1, B2, B3, B4, B5; Guadalfeo: B22, B23, B26; Laou: R2

The presence of this species in T8 has been confirmed previously by adult collection (Zamora-Muñoz *et al.,* 2002).

Family LEPIDOSTOMATIDAE Ulmer, 1903

Subfamily Lepidostomatinae Ulmer, 1903

Lepidostoma Rambur, 1842

Lepidostoma hirtum (Fabricius, 1775)

MATERIAL STUDIED: 15L. Muga: H33; Tordera: H15; Júcar: T3; Guadiana: H1; Genil: B10

Lasiocephala Costa, 1857

Lasiocephala basalis (Kolenati, 1848)

MATERIAL STUDIED: 89L, 1P. Júcar: H4; Segura: T2; Guadiana Menor: T5, T8 (1P♂: IV-2003); Genil: B9, B10, B11, B14; Adra: B4; Guadalfeo: B20, B22, B23, B26

This species has been considered as *Lepidostoma basale* by Malicky (2005b).

Family LIMNEPHILIDAE Kolenati, 1848

Subfamily Drusinae Banks, 1916

Drusus Stephens, 1837

Drusus bolivari (McLachlan, 1880)

MATERIAL STUDIED: 8L. Guadiana Menor: T5

Drusus rectus (McLachlan, 1868)

MATERIAL STUDIED: 2L. Ter: ?H25

Given the difficulties of separating *D. rectus* from *Drusus annulatus* (Stephens 1837) using larvae, we provisionally considered these specimens as *D. rectus* because adults have been found in ecologically similar sites of the Ter Basin (Bonada *et al.,* 2004b).

Anomalopterygella Fischer, 1966

Anomalopterygella chauviniana (Stein, 1874)

MATERIAL STUDIED: 16L. Guadiana Menor: B27; Genil: B9; Adra: B2, B3; Guadalfeo: B20, B26

Subfamily Limnephilinae Kolenati, 1848

Tribe Limnephilini Kolenati, 1848

Limnephilus Leach, 1815

Limnephilus guadarramicus Schmid, 1955

MATERIAL STUDIED: 27L. Ter: H28; Llobregat: H23; Tajo: H12; Júcar: H13; Segura: T2

Limnephilus lunatus Curtis, 1834

MATERIAL STUDIED: 8L. Fluvià: H20; Tajo: H9; Júcar: T3; Laou: R2

Glyphotaelius Stephens, 1833

Glyphotaelius pellucidus (Retzius, 1783)

MATERIAL STUDIED: 5L. Ter: H28; Llobregat: H23

Tribe Chaetopterygini Hagen, 1858

Annitella Klapalek 1907

Annitella esparraguera Schmid, 1952

MATERIAL STUDIED: 13L, 1P, 100A. Guadiana Menor: B27 (1P♂, 90♂♂, 10♀♀: X-2005)

Until now, *A. esparraguera*, one of the eight species of this genus present in the Iberian Peninsula, had been recorded only in Sierra Nevada (Schmid, 1952a;b) and Sierra de Cazorla (Sipahiler, 1998). With this record of Sierra de Baza, we extend its distribution to other areas of the Betic Ranges. All *Annitella* species are rare and only the larva of *A. obscurata* (McLachlan, 1876) has been described (e.g. Vieira-Lanero, 2000), thus the genus is seldom included in larval keys. The larvae collected in this site were small (III instar) and fitted with *Halesus* or *Chaetopteryx* following the keys of Vieira-Lanero (2000) and Camargo & García de Jalón (1988).

Chaetopteryx Stephens, 1829

We collected 1 larva of this genus in the Segura Basin (T2). The species level is not provided because of the difficulties at larval level (Vieira-Lanero, 2000).

Tribe Stenophylacini Schmid, 1955

Potamophylax Wallengren, 1891

Potamophylax cingulatus (Stephens, 1837)

MATERIAL STUDIED: 9L. Tordera: H14, H15; Ter: H17, H25, H26

Potamophylax latipennis (Curtis, 1834)

MATERIAL STUDIED: 20L. Ter: H25, H26; Genil: B9, B11; Adra: B1, B2, B3, B4; Guadalfeo: B23

Halesus Stehens, 1836

Halesus radiatus (Curtis, 1834)

MATERIAL STUDIED: 25L. Ter: H24; Tordera: H16; Llobregat: H23

Halesus tesellatus (Curtis, 1834)

MATERIAL STUDIED: 33L. Adra: B1, B2, B3, B4, B5; Guadalfeo: B20, B22, B26

Stenophylax Kolenati, 1848

Larval description of all the species of this genus recorded in the study area (11 species) are not provided in the literature, and species level can only be reached with reliability using pupae or adults. Following the available keys for the described species (Wallace *et al.,* 1990; Waringer & Graf, 1997; Vieira-Lanero, 2000), we have identified 22 larvae from Ter (H28), Llobregat (H23) and Sebou (R19) basins as *Stenophylax sequax* (McLachlan, 1875). However, this species has not been cited in North Africa (Dakki, 1980; Tobias & Tobias, 2007). Six larvae in the Guadiana Menor (T6) and Genil (B8) basins were identified as *Stenophylax nycterobius* (McLachlan, 1875), confirmed in the B8 site by larval rearing in the laboratory. On the other hand, 13 larvae in the Guadiana Menor (B30, B33 and B34) and Genil basins (B8, B10, B12 and B14) may fit with *Stenophylax crossotus* McLachlan, 1884 following the recent description by Ruiz-García & Ferreras-Romero (2007).

Mesophylax McLachlan, 1882

Mesophylax aspersus (Rambur, 1842)

MATERIAL STUDIED: 1L. Llobregat: H23

Allogamus Schmid, 1955

Allogamus auricollis (Pictet, 1834)

MATERIAL STUDIED: 120L. Ter: H24

Allogamus ligonifer (McLachlan, 1876)

MATERIAL STUDIED: 10L. Tajo: H12; Júcar: H4; Segura: T2, T4

Allogamus mortoni (Navás, 1907)

MATERIAL STUDIED: 220L, 31A. Guadiana Menor: B32, B33, B40 (2♀♀: X-1996; 1♂: XI-1996; 2♀♀, 10♂♂: X-2007); Genil: B12, B13 (2♂♂: X-1996; 1♂: XI-1996), B14 (1♂: X-2005), B16, B17 (12♂♂: X-2007), B19; Laou: R2, R4, R5, R13, R15; Sebou: R17; Adelmane: R16

Larvae of this species were identified using the key of Ruiz-García *et al*. (2004) which includes all known *Allogamus* species of the Iberian Peninsula. In addition, some specimens from North Africa and Genil Basin were confirmed by the author of the key (Ruiz, pers. comm.) and in Guadiana Menor (B40) and Genil basins (B13, B14 and B17) we collected adults of this species. Therefore, our records would extend the distribution of this Iberian species to North Africa. The study of the male genitalia of individuals from B17 and B40 revealed certain variability in the number (from 2 to 4) and the length of the spines of the parameres. In each locality we could distinguish three morphotypes in relation to this character and in two of them the length of one of the spines was longer than in the original description of *A. mortoni* (see Malicky, 2004). Nevertheless, after comparing the individuals with specimens of *Allogamus antennatus* McLachlan, 1876 and *Allogamus antennatus ausoniae* (Moretti, 1991), our individuals never had the parameres as long as the aedeagus, like these have. The parameres of *A. mortoni* thus show a high morphological variability as noticed for *A. auricollis* Pictet, 1834 (see Malicky, 2004).

Family GOERIDAE Ulmer, 1903

Subfamily Goerinae Ulmer, 1903

Silo Curtis, 1830

Silo graellsii E. Pictet, 1865

MATERIAL STUDIED: 2L. Ter: H25

Silonella Fischer 1966

Silonella aurata (Hagen, 1864)

MATERIAL STUDIED: 61L. Genil: B19; Laou: R2; Adelmane: R16

Larcasia Navás, 1917

Larcasia partita Navás, 1917

MATERIAL STUDIED: 3L. Guadiana: H1

Superfamily LEPTOCEROIDEA Leach, 1815

Family LEPTOCERIDAE Leach, 1815

Subfamily Leptocerinae Leach, 1815

Tribe Athripsodini Morse & Wallace, 1976

Athripsodes Billberg, 1820

Some species of this genus (e.g. *A. taounate* Dakki & Malicky, 1980) have been recorded in the study area but are not yet described (González *et al.,* 1992). We found 36 larvae of this genus in Fluvià (H18), Ter (H29), Tajo (H5), Júcar (H4), Guadiana Menor (B29, B33), Genil (B10, B11, B12, B16), Guadalfeo (B20, B22, B26), Martil (R14) and Laou (R1) basins. Larvae found in H18 were similar to *Athripsodes albifrons* (Linnaeus, 1758).

Tribe Leptocerini Leach, 1815

Leptocerus Leach, 1815

Leptocerus lusitanicus McLachlan, 1884

MATERIAL STUDIED: 1L. Fluvià: H20

Tribe Mystacidini Burmeister, 1839

Mystacides Berthold, 1827

Mystacides azurea (Linnaeus, 1761)

MATERIAL STUDIED: 25L. Muga: H33; Fluvià: H20; Ter: H27, H29; Llobregat: H23; Francolí: H35; Tajo: H10; Segura: T4

Tribe Oecetini Silfvenius, 1905

Oecetis McLachlan, 1877

We found 4 larvae of this genus in Muga (H33), Ter (H27, H29) and Tordera (H16) similar to *Oecetis testacea* Curtis, 1834.

Tribe Setodini Morse, 1981

Setodes Rambur, 1842

Eleven specimens of this genus were found in the Laou Basin (R4, R13) but given that some species remain undescribed (e.g. *Setodes zerroukii* Dakki, 1981), it was not possible to reach the species level.

Setodes argentipunctellus McLachlan, 1877

MATERIAL STUDIED: 47L. Fluvià: H18, H20; Francolí: H35; Tajo: H8, H9; Guadiana: H1; Segura: T2, T4; Guadalquivir: H6; Genil: B18; Guadalfeo: ?B24, ?B25; Chillar: ?B7; Verde: ?B35

Tribe Triaenodini Morse, 1981

Adicella McLachlan, 1877

Adicella reducta (McLachlan, 1865)

MATERIAL STUDIED: 20L, 1A. Tordera: H14, Guadiana Menor: B29, T8; Genil: B10, B14 (1♂: X-2005), B16, B17, B18; Adra: B5; Guadalfeo: B20

The genus has some species with undescribed larvae (e.g. *Adicella melanella* (McLachlan, 1884)) but the presence of *A. reducta* in the study area has been confirmed by adults previously collected in the sites from Tordera, Guadiana Menor and Guadalfeo basins (Zamora-Muñoz, unpubl. data and see also Zamora-Muñoz *et al.,* 2002; Bonada *et al.,* 2004b) and now in the Genil Basin.

Family CALAMOCERATIDAE Ulmer, 1905

Subfamily Calamoceratinae Ulmer, 1905

Calamoceras Brauer, 1865

Calamoceras marsupus Brauer, 1865

MATERIAL STUDIED: 14L. Tordera: H16; Guadiana: H1; Segura: T2, T4; Guadalquivir: H6

Calamoceras* gr. *marsupus Brauer, 1865

MATERIAL STUDIED: 150L, 3P. Martil: R14; Adelmane: R15, R16 (1P♂, 1P♀: VI-2003); Laou: R2, R3, R4, R5, R8, R13 (1P♂: XII-2003); Sebou: R18

In spite of larvae of *C. marsupus* building their cases with vegetable material (García de Jalón *et al*., 1987), some larval specimens in R8 presented a stony case. Adults collected did not fit clearly under the male genitalia description of *C. marsupus* or *Calamoceras illiesi* Malicky & Kumanski, 1974, another species present in the Mediterranean Basin (Malicky, 2005a), and in some features our specimens present intermediate characteristics (González, pers. comm.). In ventral view, the IXth segment is shorter in our specimens than in *C. marsupus*, with the lateral edges more developed, particularly in the distal end. In lateral view, the ventral lobes of Xth segment present a small blunted tooth, as in *C. illiesi*. Gonopods of our specimens resemble those of *C. marsupus*, but they have the basal segment more slender and the distal segment (harpago) longer (about as long as basal segment) than this species. Considering that *C. marsupus* and *C. illiesi* have small differences in the genitalia and there is some morphological variability in the Mediterranean Basin (Malicky, in letter to N. Bonada), we can not ensure the identification of these specimens until more adults are collected.

Family ODONTOCERIDAE Wallengren, 1891

Subfamily Odontocerinae Wallengren, 1891

Odontocerum Leach, 1815

Odontocerum albicorne (Scopoli, 1763)

MATERIAL STUDIED: 37L. Ter: H25, H26; Tordera: H15, H16

Superfamily SERICOSTOMATOIDEA Stephens, 1836

Family SERICOSTOMATIDAE Stephens, 1836

Sericostoma Latreville, 1825

Larvae within this genus are very difficult to identify at species level. We provide specimens of this genus collected in the sampled area.

MATERIAL STUDIED: 68L. Muga: H33; Fluvià: H18; Ter: H17; Tordera: H4; Foix: ?H31; Tajo: H12; Júcar: H4, T3; Segura: T2; Guadiana Menor: B27, B28, B29, B31, B33, T5, T8; Genil: B10, B12, B13, B16, B17, B18; Adra: B3, B4, B5; Guadalfeo: B20, B22, B23; Laou: ?R2, ?R13

Specimens collected in T8 may correspond to *Sericostoma vittatum* Rambur, 1842, a species collected in this site in previous studies (Zamora-Muñoz *et al.,* 2002). Specimens from R2 and R13 were classified as *Sericostoma* according to Vieira-Lanero (2000), but this genus has not been recorded from North Africa (Dakki, 1980; Tobias & Tobias, 2007).

Schizopelex McLachlan, 1876

Schizopelex festiva (Rambur, 1842)

MATERIAL STUDIED: 83L. Martil: R14; Laou: R2, R13; Adelmane: R15, R16

Table 1.— Global and local distribution, ecological characteristics and water quality preferences of the caddisfly species collected in the sampled area and not recorded in Bonada *et al.* (2004b).

Tabla 1.— Distribución global y local, características ecológicas y tolerancia a la calidad del agua de las especies de tricópteros recolectadas en la zona muestreada y no incluidas en Bonada *et al.* (2004b).

	WORLD-WIDE DISTRIBUTION[1]	DISTRIBUTION IBERIAN PENINSULA AND NORTH AFRICA[1]	DISTRIBUTION IN SAMPLED MEDITERRANEAN BASIN[2]	LONGITUDINAL ZONATION[3]	GEOLOGICAL PREFERENCES[3]	WATER QUALITY PREFERENCES[3]
Rhyacophila fonticola Giudicelli & Dakki, 1984	Iberian Peninsula and north of Africa	Southern basins of the IP and the Rif	Rif	Headwaters	Calcareous	Very good
Rhyacophila rupta McLachlan, 1879	Iberian Peninsula and Pyrenees	Northern basins of the IP	Northern basins of the IP	Headwaters	Calcareous	Very good
Agapetus delicatulus McLachlan, 1884	Central and southern Europe and Anatolia	Northern and central basins of the IP except northwest	Northern basins of the IP	Headwaters	Siliceous	Very good
Agapetus nimbulus McLachlan, 1879	Central and southern Europe	Southern basins of the IP	Southern basins of the IP	Headwaters	Siliceous Calcareous	Very good
Agapetus beredensis Dakki & Malicky, 1980	Rif	Rif	Rif	Headwaters	Calcareous	Very good to moderate
Hydropsyche* cf. *angustipennis (Curtis 1834)	Europe and Anatolia	Northern and central basins of the IP	Northern and central basins of the IP*	Headwaters	Calcareous	Very good to good
Hydropsyche fezana Navás, 1935	North of Africa	North Africa	Rif	Headwaters	Calcareous	Very good to good
Hydropsyche lobata McLachlan, 1884	Iberian Peninsula and north Africa	Widespread in the IP except northeast and North of Africa	Southern basins of the IP and the Rif	Headwaters to lowland reaches	Calcareous	Very good to moderate
Hydropsyche maroccana Navás, 1935	North Africa and Canary Islands	North Africa	Rif	Headwaters to lowland reaches	Calcareous	Good to moderate
Cheumatopsyche atlantis (Navás, 1930)	North of Africa	North Africa	Rif	Midstream to lowland reaches	Calcareous	Good to moderate
Lype phaeopa Stephens, 1836	Europe and Iran	Widespread in the IP	Northern basins of the IP	Headwaters	Siliceous	Very good
Tinodes baenai González & Otero, 1984	Iberian Peninsula	Southern basins of the IP	Southern basins of the IP	Headwaters	Calcareous	Very good
Tinodes unicolor Pictet, 1834	Europe	Northern basins of the IP	Northern basins of the IP	Headwaters	Siliceous	Very good
Polycentropus corniger McLachlan, 1884	Iberian Peninsula and Pyrenees	Central and western basins of the IP	Northern and southern basins of the IP*	Headwaters	Calcareous	Very good

Table 1.— *Cont.*

	WORLD-WIDE DISTRIBUTION[1]	DISTRIBUTION IBERIAN PENINSULA AND NORTH AFRICA[1]	DISTRIBUTION IN SAMPLED MEDITERRANEAN BASIN[2]	LONGITUDINAL ZONATION[3]	GEOLOGICAL PREFERENCES[3]	WATER QUALITY PREFERENCES[3]
Brachycentrus (B.) montanus Klapálek, 1892	Central and southern Europe	Northern basins of the IP	Central basins of the IP*	Headwaters	Calcareous	Very good
Brachycentrus (B.) subnubilus Curtis, 1834	Palearctic	Northern and central basins of the IP	Central basins of the IP	Headwaters	Calcareous	Very good
Annitella esparraguera Schmid, 1952	Iberian Peninsula	Southern basins of the IP	Southern basins of the IP	Headwaters	Calcareous	Very good
Allogamus ligonifer (McLachlan, 1876)	Southwestern Europe	Widespread in the IP except in northeast	Central and southern basins of the IP	Headwaters	Calcareous Sedimentary	Very good
Silonella aurata (Hagen, 1864)	Iberian Peninsula, Corse, Sardinia and North of Africa	Southern basins of the IP and North Africa	Southern basins of the IP and the Rif	Headwaters	Calcareous	Very good
Lacarsia partita Navás, 1917	Iberian Peninsula	Widespread in the IP except in northeast	Southern basins of the IP	Headwaters	Siliceous	Very good
Leptocerus lusitanicus McLachlan, 1884	Western Europe	Widespread in the IP	Northern basins of the IP	Headwaters to midstream reaches	Calcareous	Good to moderate
Schizopelex festiva (Rambur, 1842)	Iberian Peninsula and north of Africa	Widespread in the IP except in southern basins and North Africa	Rif	Headwaters	Calcareous	Very good

* Adult material is needed to confirm the presence of this species in the sampled area.

[1] Information was obtained from our records and the following references: Dakki (1980); Dakki & Malicky (1980); El Alami & Dakki (1998); González *et al*. (1992); Tayoub (1989); Vieira-Lanero (2000); Ruiz-García *et al*. (2006); Zamora-Muñoz (2006); Valladolid (2007). "IP" refers to Iberian Peninsula and "North Africa" includes Magreb, Libya and Egypt.

[2] Information in this column was obtained from our records. Northern basins go from Muga to Ebre basins; Central basins go from Mijares to Guadiana basins; Southern basins go from Segura to Guadalquivir basins.

[3] Ecological information was obtained from our records using the same critera of Bonada *et al*. (2004b) and Guadalmed typology (Sánchez-Montoya *et al.* 2007).

Family BERAEIDAE Wallengren, 1891

Beraea Stephens, 1833

Eight larvae of this genus were found in Tajo (H8), Guadiana (H1) and Guadalquivir (H6) basins, and resembled *Beraea terrai* Malicky, 1975. However, species level was not reached because the larva of *Beraea dira* McLachlan, 1875 is not described and could be present in the area (González *et al.,* 1992).

Beraea maurus (Curtis, 1834)

MATERIAL STUDIED: 1L. Llobregat: H23

Local richness

From the 86 species identified with certainty in this study, 60 species were present in the Iberian plate region, 29 in the Transition, 30 in the Betic and 18 in the Rif. Although Rif showed the lowest regional species richness, local richness was not significantly different between geological regions (F-value = 2.457, p = 0.068). Significant differences were however found between ecotypes within regions (F-value = 4.097, p = 0.004). Residuals did not significantly differ from normality (p = 0.70) and from homogeneity of variances (p > 0.160). Box-plots indicated that temporary sites (Fig. 2) had lower local richness than other ecotypes in all regions except in the Rif. Headwaters, regardless of their geology, had similar richness and, when present, richness in lowland sites was also similar to that present in headwaters.

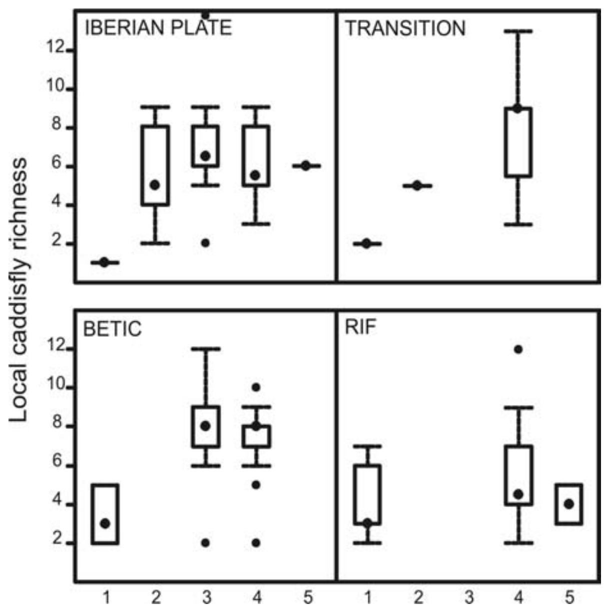

Fig. 2.— Box-plots indicating local species richness in each geological region separated by ecotypes, according to Sánchez-Montoya *et al*. (2007): (1) temporary streams, (2) evaporite calcareous streams at medium altitude, (3) siliceous headwaters at high altitude, (4) calcareous headwaters at medium and high altitude and (5) large watercourses. Each box-plot shows the medians (horizontal bars) and the 25th and 75th percentiles (boxes).

Fig. 2.— Diagramas de cajas indicando la riqueza local de especies en cada región geológica separada por ecotipos, según Sánchez-Montoya *et al*. (2007): (1) ríos temporales, (2) ríos calcáreos y evaporíticos de mediana altitu, (3) cabeceras silíceas de elevada altitud, (4) cabeceras calcáreas de mediana y elevada altitud y (5) grandes cursos de agua. Cada diagrama muestra las medianas (líneas horizontales) y los percentiles 25 y 75 (cajas).

Discussion

Our work complements records reported in previous studies in the Mediterranean climate region of the Iberian Peninsula and north Africa (e.g. Dakki, 1980; Ruiz *et al.,* 2001; Bonada *et al.,* 2004b) with information from several not previously studied sites. We have found 22 species not recorded in Bonada *et al.* (2004b), 4 of them only found in the Rif. Information about the distribution of these species and their ecological requirements is provided in Table 1. In addition, comparing with González *et al.* (1992) and Bonada *et al.* (2004b) we provide records that extend the distribution of several species in the Mediterranean area of the Iberian Peninsula. *Glossosoma boltoni*, *Allogamus ligonifer*, *Lepidostoma hirtum* and *Lacarsia partita* were recorded in the southern basins. *Brachycentrus (B.) montanus*, *Rhyacophila meridionalis* and *Limnephilus lunatus* were also present in central basins. *Calamoceras marsupus* was also collected in northern basins.

Regional species richness differed between geological regions, with Rif having the lowest number. This observation contrasts in part with results on terrestrial plants and mammals which revealed high taxa richness in the southern Iberian Peninsula and North Africa (e.g. see Cheylan, 1991; Médail & Quézel, 1997). This value is partially biased because the geological regions occupy different areas, (i.e. richness increases with the area considered, Gaston & Blackburn, 2000) and because faunistic studies are scarce in the Rif (e.g. for

Coleoptera, Bennás *et al.,* 1992; Ribera, 2000). However, the Rif has been considered an isolated area (Jolly *et al.,* 1998; Cosson *et al.,* 2005), which makes the maintenance of a diverse freshwater fauna more difficult. This is even more problematic for caddisflies, which are not equipped with biological strategies to cope with the frequent summer droughts of the region (Littmann, 2000; Williams, 2006). This observation is in accordance with the lowest local caddisfly richness recorded in the ecotype 1 that we found in all geological regions except in the Rif. All this suggestd that conservation measures have to be enforced in this area to preserve its biodiversity.

Several authors have pointed out the importance of large-scale characteristics on macroinvertebrate distributions (e.g. Sandin & Johnson, 2004). In particular, basin geology and river zonation were considered, among several environmental variables, the most important to explain caddisfly distribution in the Mediterranean climate rivers of the Iberian Peninsula (Bonada *et al.,* 2005). Basin geology determines mineralization of water and river zonation results in changes in the hydraulic forces, the terrestrial influence and the resources available among others (Hawkins & Sedell, 1981; Statzner *et al.,* 1988; Leland & Porter, 2000). However, although these parameters constrain caddisfly distribution, our results show that taxa richness is maintained between ecotypes with permanent flow conditions. This observation contrasts with other studies in temperate Europe using caddisflies that recorded an increase of species with surrogates of river zonation, such as stream width and slope (Wiberg-Larsen *et al.,* 2000). The higher biodiversity of caddisflies in the Western Mediterranean compared to temperate Europe (e.g. around 200 species in Denmark and England, but almost double in the Iberian Peninsula, Wallace *et al.,* 1990; González *et al.,* 1992; Edington & Hildrew, 1995; Wiberg-Larsen *et al.,* 2000) is probably accountable to this observation.

ACKNOWLEDGEMENTS

This study was supported by an international cooperation project between Spain and Morocco administrations (70/04/P/E) financed by the Spanish Agency for International Cooperation (AECI), the European Project EUROLIMPACS (GOCE-CT-2003-505540. 2004-2009), the GUADALMED 2 project (REN2001-3438-C07) financed by the Spanish Ministry of Science and Technology, and a Juan de la Cierva contract from the Spanish Ministery of Education and Science. We are very grateful to Mohammed Dakki and all the MEDA, MEDCOR and GUADALMED project members for data collection, to Fernanda Cianficconi for providing specimens of *Allogamus antennatus* and *A. antennatus ausoniae* from Italy and to Marcos González for taxonomical review of specimens of *Allogamus mortoni* and *Calamoceras* gr. *marsupus*. Special thanks to José Luis Moreno and Cáliz Navarro for providing specimens from central basins, to Marta Sáinz for helping in data collection and identification, and to Marcos González and one anonymous referee for comments on the manuscript.

References

BALLETO, E. & CASALE, A., 1989. Mediterranean insect conservation. In: N.M. Collins & J.A. Thomas (eds.). *The conservation of insects and their habitats.* Academic Press. London: 121-142.

BENNÁS, N., SÁINZ-CANTERO, C. E. & ALBA-TERCEDOR, J., 1992. Datos preliminares para un estudio biogeográfico del macizo Bético-Rifeño basado en coleópteros acuáticos. *Zoologica Baetica*, 3: 167-180.

BONADA, N., PRAT, N., MUNNÉ, A., RIERADEVALL, M., ALBA-TERCEDOR, J., ÁLVAREZ, M., AVILÉS, J., CASAS, J., JAIMEZ-CUÉLLAR, J., MELLADO, A., MOYÁ, G., PARDO, I., ROBLES, S., RAMON, G., SUÁREZ, M. L., TORO, M., VIVAL-ABARCA, M. R., VIVAS, S. & ZAMORA-MUÑOZ, C., 2004a. Criterios para la selección de condiciones de referencia en los ríos mediterráneos. Resultados del proyecto GUADALMED. *Limnetica*, 31(2002): 99-114.

BONADA, N., ZAMORA-MUÑOZ, C., RIERADEVALL, M. & PRAT, N., 2004b. Trichoptera (Insecta) collected in Mediterranean river basins of the Iberian Peninsula: Taxonomic remarks and notes on ecology. *Graellsia*, 60(1): 41-69.

BONADA, N., ZAMORA-MUÑOZ, C., RIERADEVALL, M. & PRAT, N., 2005. Ecological and historical filters constraining spatial caddisfly distribution in Mediterranean rivers. *Freshwater Biology*, 50(5): 781-797.

BOTOSANEANU, L. & GONZÁLEZ, M. A., 2006. Un difficule problème de taxonomie: les *Micrasema* (Trichoptera: Brachycentridae) des eaux courantes de la Péninsule Ibérique et des Pyrénées. *Annales de la Société Entomologique de France*, 42(1): 119-127.

CAMARGO, J. A. & GARCÍA DE JALÓN, D., 1988. Principales características morfológicas de los géneros ibéricos de la familia Limnephilidae (Trichoptera) en sus últimos estadios larvarios. *Boletín de la Asociación Española de Entomología*, 12: 239-258.

CHEYLAN, G., 1991. Patterns of Pleistocene turnover, current distribution and speciation among Mediterranean mammals. *In*: R.H. Groves & F. di Castri (eds.). *Biogeography of Mediterranean Invasions.* Cambridge University Press. Cambridge: 227-262.

COSSON, J.-F., HUTTERER, R., LIBOIS, R., SARÀ, M., TABERLET, P. & VOGEL, P., 2005. Phylogeographical footprints of the Strait of Gibraltar and Quaternary climatic fluctuations in the western Mediterranean: a case study with the greater white-toothed shrew, *Crocidura russula* (Mammalia: Soricidae). *Molecular Ecology*, 14: 1151-1162.

DAKKI, M., 1980. *Étude nationale sur la biodiversité: faune aquatique continentale (invertébrés et poissons).* Royaume du Maroc, Ministere de l'Environnement, Direction de l'Observation, des Études et de la Coordination. Rabat. 70 pp.

DAKKI, M. & MALICKY, H., 1980. Drei neue Köcherfliegen (Trichoptera) aus Marokko. *Zeitschrift der Arbeitsgemeinsehaft Öster Entomologen*, 31(3/4): 103-105.

EDINGTON, J. M. & HILDREW, A. G., 1995. *A Revised Key to the Caseless Caddis Larvae of the British Isles, with Notes on their Ecology.* Freshwater Biological Association Publications. Ambleside. 134 pp.

EL ALAMI, M. & DAKKI, M., 1998. Peuplements de Trichoptères et d'Ephéméroptères de l'Oued Laou (Rif Occidentale, Maroc): distribution longitudinale et biotypologie. *Bulletin de l'Institut Scientifique*, 21: 51-70.

GASTON, K. J. & BLACKBURN, J. H., 2000. *Pattern and process in macroecology*. Blackwell Science. Oxford. 377 pp.

GONZÁLEZ, M. A., 2007. *El Reino Animal en la Península Ibérica y las Islas Baleares. Orden Trichoptera*. www.fauna-iberica.mncn.csic.es/faunaib/arthropoda/insecta/Trichoptera/index.php.

GONZÁLEZ, M. A. & MALICKY, H., 1999. Une nouvelle espèce de *Hydropsyche* du groupe *pellucidula* (Trichoptera, Hydropsychidae). *Braueria*, 26: 25-26.

GONZÁLEZ, M. A. & RUIZ, A., 2001. Une nouvelle espèce de Trichoptère du Sud de l'Espagne: *Allogamus gibraltaricus* n. sp. (Trichoptera: Limnephilidae). *Annales de Limnologie*, 37(3): 219-221.

GONZÁLEZ, M. A., TERRA, L. S. W., GARCÍA DE JALÓN, D. & COBO, F., 1992. *Lista faunística y bibliográfica de los Tricópteros (Trichoptera) de la Península Ibérica e Islas Baleares*. Asociación Española de Limnología. Madrid. 200 pp.

HAWKINS, C. P. & SEDELL, J. R., 1981. Longitudinal and seasonal changes in functional organization of macroinvertebrate communities in four Oregon streams. *Ecology*, 62: 387-397.

HEWITT, G. M., 2004. The structure of biodiversity - insights from molecular phylogeography. *Frontiers in Zoology*, 1(4): 1-16.

JOLLY, D., HARRISON, S. P., DAMNATI, B. & BONNEFILLE, R., 1998. Simulated climate and biomes of Africa during the late quaternary: comparison with pollen and lake status data. *Quaternary Science Reviews*, 17(6-7): 629-657.

KÖPPEN, W., 1931. *Grundriss der Klimakunde.* Walter de Gruyter. Berlin. 388 pp.

KUMANSKI, K., 2006. Trichoptera from Tunisia collected by S. Beshkov & B. Schacht, 15-21.IV.2006. *Braueria*, 33: 17-19.

LELAND, H. V. & PORTER, S. D., 2000. Distribution of benthic algae in the upper Illinois River basin in relation to geology and land use. *Freshwater Biology*, 44(2): 279-301.

LITTMANN, T., 2000. An empirical classification of weather types in the Mediterranean Basin and their interrelation with rainfall. *Theoretical and Applied Climatology*, 66: 161-171.

MALICKY, H., 2002. The sub-specific division of *Rhyacophila dorsalis* Curtis, 1834 and its transitions to *R. nubila* Zetterstedt, 1840 (Trichoptera: Rhyacophilidae). *Proceedings of the 10th International Symposium on Trichoptera*, 15: 149-166.

MALICKY, H., 2004. *Atlas of European Trichoptera*. 2nd edn. Springer. Dordrecht. 359 pp.

MALICKY, H., 2005a. *Die Köcherfliegen Griechenlands.* Biologiezentrum. Linz. 240 pp.

MALICKY, H., 2005b. Ein kommentiertes Verzeichnis der Köcherfliegen (Trichoptera) Europas und des Mediterrangebietes. *Linzer biologische Beiträge*, 37(1): 533-596.

MALICKY, H. & LOUNACI, A., 1987. Beitrag zur Taxonomie und Faunistik der Köcherfliegen von Tunesien, Algerien und Marokko (Trichoptera). *Opuscula Zoologica Fluminensia*, 14: 1-20.

MÉDAIL, F. & QUÉZEL, P., 1997. Hot-spots analysis for conservation of plant biodiversity in the Mediterranean Basin. *Annals of the Missouri Botanical Garden*, 84: 112-127.

MYERS, N., MITTERMEIER, R. A., MITTERMEIER, C. G., DA FONSECA, G. A. B. & KENT, J., 2000. Biodiversity hotspots for conservation priorities. *Nature*, 403: 853-558.

NEU, P. J. & TOBIAS, W., 2003. Digitale Schlüssel zur Bestimmung der in Deutschland vorkommenden Hydropsychidae (Insecta: Trichoptera). *CD-Version 200703a*.

PITSCH, T., 1993. Zur Larvaltaxonomie, Faunistik und Ökologie mitteleuropäischer Fliebwasser-Köcherfliegen (Insecta: Trichoptera). *Landschaftsentwicklung und Umweltforschung*, Sorderheft S 8(D 188): 192-214.

QUINN, G. P. & KEOUGH, M. J., 2002. *Experimental design and data analysis for biologists*. Cambridge University Press. Cambridge. 537 pp.

RIBERA, I., 2000. Biogeography and conservation of Iberian water beetles. *Biological Conservation*, 92: 131-150.

RUIZ, A. & FERRERAS-ROMERO, M., 2007. The larva and life history of *Stenophylax crossotus* McLachlan, 1884 (Trichoptera: Limnephilidae) in an intermittent stream from the southwest of the Iberian Peninsula. *Aquatic Insects*, 29(1): 9-16.

RUIZ, A., SALAMANCA-OCAÑA, J. C. & FERRERAS-ROMERO, M., 2001. Fauna de tricópteros (Insecta: Trichoptera) de cursos de agua que drenan canutos del Parque Natural

Los Alcornocales (sur de España). *Boletín de la Asociación Española de Entomología*, 25(3-4): 105-120.

RUIZ, A., SALAMANCA-OCAÑA, J. C. & FERRERAS-ROMERO, M., 2004. The larva of *Agapetus incertulus* McLachlan, 1884 (Trichoptera, Glossosomatidae). *Aquatic Insects*, 26(3/4): 153-159.

RUIZ-GARCÍA, A., HERRERA GRAO, A. F. & FERRERAS-ROMERO, M., 2006. Distribution of Trichoptera communities in the Hozgarganta Catchment (Los Alcornocales Natural Park, SW Spain). *International Review of Hydrobiology*, 91(1): 71-85.

RUIZ-GARCÍA, A., SALAMANCA-OCAÑA, J. C. & FERRERAS-ROMERO, M., 2004. The larvae of *Allogamus gibraltaricus* González & Ruiz, 2001 and *Allogamus mortoni* (Navás, 1907) (Trichoptera, Limnephilidae), two endemic species of the Iberian Peninsula. *Annales de Limnologie*, 40(4): 343-349.

SÁNCHEZ-MONTOYA, M. M., PUNTÍ, T., SUÁREZ, M. L., VIDAL-ABARCA, M. R., RIERADEVALL, M., POQUET, J. M., ZAMORA-MUÑOZ, C., ROBLES, S., ÁLVAREZ, M., ALBA-TERCEDOR, J., TORO, M., PUJANTE, A. M., MUNNÉ, A. & PRAT, N., 2007. Concordance between ecotypes and macroinvertebrate assemblages in Mediterranean streams. *Freshwater Biology*, 52(5): 939-958.

SANDIN, L. & JOHNSON, R. K., 2004. Local, landscape and regional factors structurig benthic macroinvertebrate assemblages in Swedish streams. *Landscape Ecology*, 19: 501-514.

SANZ DE GALDEANO, C. & VERA, J. A., 1991. Una propuesta de clasificación de las cuencas neógenas béticas. *Acta Geologica Hispanica*, 26(3-4): 205-227.

SCHMID, F., 1952a. Contribution a l'étude des Trichoptères d'Espagne. *Pirineos*, 26: 627-695.

SCHMID, F., 1952b. Le groupe de *Chaetopteryx* (Limnophilidae, Trichoptera). *Revue Suisse de Zoologie*, 59: 7-171.

SIPAHILER, F., 1998. Studies on the genus *Annitella* Klapálek (Trichoptera: Limnephilidae: Chaetopterygini) in the Iberian Peninsula. *Aquatic Insects*, 20(3): 149-164.

STATZNER, B., GORE, J. A. & RESH, V. H., 1988. Hydraulic stream ecology: observed patterns and potential applications. *Journal of the North American Benthological Society*, 7(4): 307-360.

TAYOUB, H., 1989. Étude hydrobiologique d'un réseau hydrographique rifain, l'oued Laou: Typologie et Ecologie des Trichoptères. In: *Faculty of Sciences*. University of Mhammed V Agdal, Rabat: 137.

TOBIAS, D. & TOBIAS, W., 2007. Trichoptera Africana: Köcherflieggen der westpaläarktischen und afrotropischen Regionen Afrikas - Arbeitsunterlagen. *http://user.uni-frankfurt.de/~wtobias/*.

VALLADOLID, M., MARTÍNEZ-BASTIDA, J. J. & ARAUZO, M., 2007. Los Hydropsychidae (Insecta: Trichoptera) del río Oja (La Rioja, España). *Limnetica*, 26(1): 199-208.

VIEIRA-LANERO, R., 2000. *Las larvas de los tricópteros de Galicia (Insecta: Trichoptera)*. PhD thesis. Department of Animal Biology, University of Santiago de Compostela. 611 pp.

VIEIRA-LANERO, R., GONZÁLEZ, M. A. & COBO, F., 2003. The larva of *Plectrocnemia laetabilis* McLachlan, 1880 (Trichoptera; Polycentropodidae; Polycentropodinae). *Annales de Limnologie*, 39(2): 135-139.

VIEIRA-LANERO, R., GONZÁLEZ, M. A., RUIZ-GARCÍA, A. & COBO, F., 2008. The larva and female of *Rhyacophila fonticola* Guidicelli & Dakki, 1984 (Trichoptera: Rhyacophilidae), an interesting Betic-Rifean endemic species. *Aquatic Insects*, 30: 21-28.

VINSON, M. R. & HAWKINS, C. P., 2003. Broad-scale geographical patterns in local stream insect genera richness. *Ecography*, 26: 751-767.

WALLACE, I. D., WALLACE, B. & PHILIPSON, G. N., 1990. *A key to the case-bearing caddis larvae of Britain and Ireland*. Freshwater Biological Association Publications. Ambleside. 237 pp.

WARINGER, J. & GRAF, W., 1997. *Atlas der Östrreichischen Köcherfliegenlarven: unter Einschluss der angrenzenden Gebiete.* Facultas-Universitätsverlag. Vienna. 286 pp.

WIBERG-LARSEN, P., BRODERSEN, K. P., BIRKHOLM, S., GRONS, P. N. & SKRIVER, J., 2000. Species richness and assemblage structure of Trichoptera in Danish streams. *Freshwater Biology*, 43: 633-647.

WIGGINS, G. B., 1996. *Larvae of the North American Caddisfly Genera (Trichoptera).* 2nd edn. University of Toronto Press. Toronto. 457 pp.

WILLIAMS, D. D., 2006. *The biology of temporary waters*. Oxford University Press. New York. 337 pp.

ZAMORA-MUÑOZ, C., ALBA-TERCEDOR, J. & GARCÍA DE JALÓN, D., 1995. The larvae of the genus *Hydropsyche* (Hydropsychidae; Trichoptera) and key for the identification of the Iberian Peninsula. *Mitteilungen der Münchner Entomologischen Gesellschaft*, 68: 189-210.

ZAMORA-MUÑOZ, C., GONZÁLEZ, M. A., PICAZO-MUÑOZ, J. & ALBA-TERCEDOR, J., 2002. *Hydropsyche fontinalis*, a new species of the instabilis-group from the Iberian Peninsula (Trichoptera, Hydropsychidae). *Aquatic Insects*, 24(3): 189-197.

ZAMORA-MUÑOZ, C., POQUET, J. M., ALBA-TERCEDOR, J. & BONADA, N., 2006. First record of *Agapetus nimbulus* McLachlan, 1879 (Trichoptera: Glossosomatidae) in the Iberian Peninsula. *Boletín de la Asociación Española de Entomología*, 30(3-4): 187-189.

Recibido, 7-III-2008
Aceptado, 29-VII-2008
Publicado, 29-XII-2008

Appendix.— Location of the sampled sites in the Iberian Peninsula and the Rif. For each site the code used in the text, UTM coordinates, altitude, river name, geographical province and ecotype are shown. Ecotype refers to the categories provided by Sánchez-Montoya *et al*. (2007) and corresponds to: (1) temporary streams, (2) evaporite calcareous streams at medium altitude, (3) siliceous headwaters at high altitude, (4) calcareous headwaters at medium and high altitude and (5) large watercourses. Sites are arranged by alphabetical order of “Code”.

Apéndice.— Localización de las estaciones muestreadas en la Península Ibérica y en el Rif. Para cada estación se presenta el código utilizado en el texto, las coordenadas UTM, la altitud, el nombre del río, la provincia geográfica y el ecotipo. El ecotipo incluye las categorías consideradas en Sánchez-Montoya *et al*. (2007) y corresponden a: (1) ríos temporales, (2) ríos calcáreos y evaporíticos de mediana altitud, (3) cabeceras silíceas de elevada altitud, (4) cabeceras calcáreas de mediana y elevada altitud y (5) grandes cursos de agua. Los puntos de muestreo están ordenados por orden alfabético del “Code”.

Code	**Basin**	**LongitudeX_UTM**	**Latitude Y_UTM**	**Altitude** m.a.s.l.	**River/Stream**	**Province**	**Ecotype**
B1	Adra	498290	4103820	1700	Palancón	Granada	3
B10	Genil	468522	4121199	1300	Aguas Blancas	Granada	4
B11	Genil	465699	4109998	1140	Genil	Granada	3
B12	Genil	455172	4123899	1200	Polvorite	Granada	4
B13	Genil	453445	4126399	1200	Bermejo	Granada	4
B14	Genil	454628	4122600	1140	Darro	Granada	4
B15	Genil	429705	4083091	1050	Vacal	Granada	4
B16	Genil	412225	4087293	1060	Cerezal	Granada	4
B17	Genil	420727	4086147	970	Añales	Granada	4
B18	Genil	425692	4086083	920	Cebollón	Granada	4
B19	Genil	422518	4081479	1040	Venta Vicario	Granada	4
B2	Adra	488292	4101823	1940	Mecina	Granada	3
B20	Guadalfeo	463688	4091493	1740	Chico	Granada	3
B21	Guadalfeo	459618	4081602	230	Guadalfeo	Granada	3
B22	Guadalfeo	469060	4094300	1650	Poqueira	Granada	3
B23	Guadalfeo	457451	4095783	1860	Torrente	Granada	3
B24	Guadalfeo	479411	4084328	760	Verdebique	Granada	1
B25	Guadalfeo	443614	4079504	550	Toba	Granada	4
B26	Guadalfeo	477400	4096700	1500	Trevélez	Granada	3
B27	Guadiana Menor	512899	4133686	1750	Gor	Granada	4
B28	Guadiana Menor	510798	4129412	1720	Casas Don Diego	Granada	1
B29	Guadiana Menor	521226	4127424	1520	Moras	Granada	3
B3	Adra	492180	4103027	1820	Nechite	Granada	3
B30	Guadiana Menor	457297	4127800	1350	Perdices	Granada	1
B31	Guadiana Menor	507418	4139482	1280	Baúl	Granada	1
B32	Guadiana Menor	461115	4128569	1240	Fardes	Granada	4
B33	Guadiana Menor	465822	4132961	1300	Sillar	Granada	4
B34	Guadiana Menor	475801	4122564	1160	Rambla Seca	Granada	1
B35	Verde	432919	4078701	850	Verde	Málaga	4
B36	Jara	463550	3998550	54	Jara	Cádiz	2
B37	Guadalfeo	459660	4081550	220	Guadalfeo	Granada	3
B38	Aguas	582630	4105270	260	Aguas	Almería	2
B39	Aguas	584450	4105580	210	Aguas	Almería	2
B40	Guadiana Menor	459100	4130900	1400	Fuente Grande	Granada	4
B4	Adra	495910	4102660	1840	Laroles	Granada	3
B41	Almanzora	550050	4131020	800	Bacares	Almería	3
B42	Almanzora	549350	4129050	920	Bacares	Almería	3

Code	Basin	LongitudeX_UTM	Latitude Y_UTM	Altitude m.a.s.l.	River/Stream	Province	Ecotype
B43	Genil	463242	4111817	1060	Maitena	Granada	3
B5	Adra	491011	4100816	1840	Válor	Granada	3
B6	Chillar	420500	4073500	320	Frigiliana	Málaga	4
B7	Chillar	421323	4072005	150	Chillar	Málaga	4
B8	Genil	456265	4130764	1720	Blanco	Granada	1
B9	Genil	465800	4109088	1390	San Juan	Granada	3
H1	Guadiana	363828	4380419	828	Estena	Toledo	3
H10	Tajo	468100	4433400	510	Tajo	Toledo	4
H11	Guadiana	515688	4414636	792	Gigüela	Cuenca	4
H12	Tajo	593100	4499800	1200	Cabrillas	Cuenca	4
H13	Júcar	606000	4403400	855	Guadazaón	Cuenca	4
H14	Tordera	947953	4638984	660	Tordera	Barcelona	3
H15	Tordera	953190	4639974	1264	Gualba	Barcelona	3
H16	Tordera	964927	4629108	237	Fuirosos	Barcelona	3
H17	Ter	947757	4645608	840	Sant Gesimon	Girona	3
H18	Fluvià	953461	4698798	474	Beget	Girona	4
H19	Fluvià	961308	4695600	338	Llierca	Girona	1
H20	Fluvià	986046	4686692	61	Fluvià	Girona	4
H21	Llobregat	910416	4690484	924	Llobregat	Barcelona	4
H22	Llobregat	885813	4667486	696	Aigua d'Ora	Barcelona	2
H23	Llobregat	923805	4651193	674	Postius	Barcelona	4
H24	Ter	936193	4706897	1517	Ter	Girona	3
H25	Ter	944006	4706387	1271	Ritort	Girona	3
H26	Ter	939892	4678006	1001	Ges	Girona	4
H27	Ter	930440	4677961	617	Ter	Girona	4
H28	Ter	929406	4649002	755	Mèder	Barcelona	4
H29	Ter	966413	4662199	152	Ter	Girona	5
H3	Guadiana	356597	4333266	449	Guadiana	Ciudad Real	2
H30	Ter	976153	4662597	102	Ter	Girona	5
H31	Foix	883914	4595890	488	Albereda	Barcelona	2
H32	Llobregat	881101	4606808	454	Carme	Barcelona	4
H33	Muga	989804	4714975	314	Anyet	Girona	3
H34	Calonge	998498	4652791	157	Calonge	Girona	1
H35	Francolí	846355	4581390	531	Brugent	Tarragona	2
H36	Besòs	924622	4628706	601	Caldes	Barcelona	4
H37	Ebre	269545	4524131	618	Algars	Tarragona	4
H38	Guadalquivir	517300	4306800	278	Guadalquivir	Ciudad Real	5
H4	Júcar	626600	4440300	1156	Cabriel	Cuenca	2
H46	Llobregat	892440	4642224	325	Coaner	Barcelona	2
H47	Llobregat	915118	4628142	586	Mura	Barcelona	4
H48	Llobregat	903820	4687599	875	Llobregat	Barcelona	4
H49	Llobregat	903674	4671032	514	Llobregat	Barcelona	4
H5	Tajo	575800	4476500	936	Escabas	Cuenca	4
H50	Llobregat	913461	4664690	540	Merlès	Barcelona	2
H6	Guadalquivir	412404	4252640	459	Robledillo	Ciudad Real	3
H7	Júcar	643300	4355700	420	Cabriel	Albacete	4
H8	Tajo	339460	4391804	578	Gévalo	Toledo	3
H9	Tajo	550400	4508200	770	Tajo	Guadalajara	4

Code	Basin	LongitudeX_UTM	Latitude Y_UTM	**Altitude** m.a.s.l.	River/Stream	Province	Ecotype
R1	Laou	286042	3910209	560	Boumarouil	Tétouan	1
R10	Laou	291725	3887981	360	Laou	Chefchaouen	4
R11	Laou	306906	3923220	20	Laou	Chefchaouen	5
R12	Laou	300313	3903040	340	Talembote	Chefchaouen	4
R13	Laou	302031	3901801	400	Kelâa	Chefchaouen	4
R14	Martil	271037	3911225	1220	Taida	Larache	1
R15	Adelmane	306148	3893546	1330	Beni M'Hammed	Chefchaouen	1
R16	Adelmane	304607	3893702	1530	Madissouka	Chefchaouen	4
R17	Sebou	305617	3891831	1500	Guiness	Chefchaouen	1
R18	Sebou	297030	3871776	1000	Zebzar	Chefchaouen	4
R19	Sebou	297030	3871776	1000	Zebzar	Chefchaouen	1
R20	Martil	279943	3925927	80	Nakhla	Tétouan	2
R2	Laou	301299	3887273	777	Maggo	Chefchaouen	4
R3	Laou	296827	3882350	680	Ouara	Chefchaouen	4
R4	Laou	296928	3877232	930	Ouara	Chefchaouen	4
R5	Laou	300818	3887868	905	Maggo	Chefchaouen	4
R6	Laou	290210	3897138	280	Laou	Chefchaouen	4
R7	Laou	293923	3905033	235	Laou	Chefchaouen	4
R8	Laou	293417	3893940	457	Ras El Ma	Chefchaouen	4
R9	Laou	301046	3913994	56	Laou	Chefchaouen	5
T1	Segura	593334	4250158	437	Segura	Albacete	4
T2	Segura	551125	4259314	940	Mundo	Albacete	4
T3	Júcar	555400	4289600	990	Arquillo	Albacete	4
T4	Segura	548400	4247100	840	Tus	Albacete	4
T5	Guadiana Menor	522319	4195673	1220	Castril	Granada	2
T6	Guadiana Menor	533413	4198285	1150	Raigadas	Granada	1
T7	Guadiana Menor	528195	4193605	1110	Buitre	Granada	4
T8	Guadiana Menor	528671	4194040	1090	Guardal	Granada	4
T9	Guadiana Menor	519225	4180285	780	Castril	Granada	4