Chapter 6

TRICHOPTERA (INSECTA) FROM IBERIAN MEDITERRANEAN RIVER BASINS: taxonomic notes and ecological requirements.

INTRODUCTION

Studies on caddisfly in the Iberian Peninsula date from the middle of the nineteen-century; although the major part of the works have been performed more recently (see González et al., 1992). Most of the taxonomic studies performed are located in northern and central areas (García de Jalón, 1982; González et al., 1987), but recent contributions from southern areas are increasing, with some faunistic studies (e.g., Ruiz et al., 2001) and new species findings (e.g., Zamora-Muñoz et al., 2002). Along the Mediterranean coast, caddisfly species are known by specimens gathered by several authors (e.g., see examples in González et al., 1992; Malicky, 2002) or by species list obtained by ecological studies (e.g., Puig et al., 1981; Herranz & García de Jalón, 1984; Gallardo-Mayenco, 1993; Gallardo-Mayenco et al., 1998).

Mediterranean fauna have been described as highly diverse, with a considerable level of endemicity and complexity as the result of the interaction of complex historical and ecological factors (Balletto & Casale, 1989). In the Iberian Peninsula the Trichoptera order comprises numerous species with up to 331 records known (Vieira-Lanero, 2000 revision updated with posterior descriptions by González & Ruiz, 2001; and Zamora-Muñoz et al., 2002) including a
high number of endemic species (González et al., 1987). It represents a higher number of
caddisfly species than other European regions as England, with 207 species (Edington &
Hildrew, 1995; Wallace et al., 1990), but similar to other Mediterranean countries in Italy (with
381 species —Cianficconi, 2002).

Here, we present a list of 91 caddisfly species obtained of identify 12499 larvae, 177 pupae and
261 adults, collected in Mediterranean climate rivers. For each species we include several
taxonomic and ecological notes. Most of the data were obtained from the GUADALMED Project,
although many other records from other Mediterranean rivers have been also included.

METHODOLOGY

Sampling area
Trichoptera were collected mainly from 10 Iberian basins situated along the Mediterranean
coast and selected under the Guadalmed project: Besòs, Llobregat, Mijares, Turia, Júcar,
Segura, Almanzora, Aguas, Adra and Guadalfeo (an extensive description of sampled basins can be
found in Robles et al., in press). Moreover, data obtained from Foix, Tordera, Ter, Noguera
Ribagorçana and Guadalquivir basins have also been included (information about these basins can be
found in Prat et al., 1999, 2000 and 2001; Rieradevall & Prat, 2000; Solà, 2001). Overall,
the studied area is subjected to a mediterranean climate (Köppen, 1923), with annual
precipitation going from less than 300 mm in the more arid basins in the southeast to over 800
mm in northern basins or in some other areas. Limestone and sedimentary materials mainly
compose geology, although some siliceous areas are also present as in Sierra Nevada, Pyrenees
and Montseny ranges. Sclerophyllous and evergreen trees and shrubs mainly compose basin
vegetation, although in some areas deciduous and coniferous forests are present. As in other
mediterranean regions, sampled basins have been largely affected by human activities (Trabaud,
1981) as agriculture, cattle, urbanization, salinization, water abstraction and regulation...
(Conacher & Sala, 1998). All these factors have contributed to the river alteration in a direct or
indirect way (Prat, 1993).

Sampling procedure
Caddisfly arvae and pupae were obtained sampling all available habitats with a kick net of 250
µm mesh size. They were preserved in formalin (4%) or alcohol (70%) before beeing identified in
the lab until the maximum taxonomic level possible. When it was possible, some larvae or
pupae were collected in the field, transported in the lab and reared to obtain pupae and adults,
using a similar method as in Vieira-Lanero (1996) (see Figure 1a). This system consists in tank
with controlled water temperature (-10 to 40°C). A water pump recirculates and cleans it, providing oxygen at the same time. Purified water at 19°C was used in the circuit, and the system was exposed to natural light. Larvae from last instars were located in cages separately by sampling sites or rivers (Figure 1b). Each cage had a substrate composed by clean gravels. For shredders, food was supplied using leaf-litter taken from riverbeds. For grazers, stones with periphyton were collected in the same site where larvae was obtained. We were not able to rear predators and filters-feeders.

![Figure 1](image1.png)

**Figure 1.** 1a. Rearing system.
1b. Cages to rear caddisfly larvae. Larvae were grouped in cages by sites.
1c. Pupae collected in the field and ready to emerge.
1d. Light trap working in the field.

On the other hand, adults were also obtained in the field catching them among riparian vegetation with a net or using a light trap with an UV-light connected to a car battery (Figure 1c). To identify adults and pupae specimens, genitalia were digested in a 10% KOH solution, at 90°C constant temperature. Once digested, genitalia was observed and identified under the stereoscope or microscope in a glycerin solution (M. A. González, pers. comm.).
Checklist structure and taxonomical and ecological notes

Trichoptera species are presented following the taxonomical classification according to Wiggins (1998). However, we have omitted subgenera because they are not widely used by tricopteroLOGISTS (Vieira-Lanero, 2000). For each species, the number of larvae (L), pupae (P) and adults are presented. In general only identifications from males specimens are presented. Females were only identified where they appear jointly with several males (e.g., in Agapetus), or they belong to families where females are quite well known (e.g., Limnephilidae). For pupae and adults, the months where they were collected are shown in brackets.

Sites where the species were found are classified by basins and coded by a letter and a number. In Annex 1, the exact location of each site is presented. In some cases, a question mark (?) is added before sampling localities because the identity of the larvae found was not sure.

For some species, taxonomic remarks are presented including information about subspecies or morphological characteristics. Most of the distributions and ecological notes for each species were obtained from the recent review of caddisfly made by Vieira-Lanero (2000) and the faunistic list from González et al. (1992). Moreover, for each species we have compared the general ecology and distribution with the data obtained in this study (Bonada et al., Chapter 7 and 8) and the general Data Base from GUADALMED Project.
TRICHOPTERA SPECIES IN THE IBERIAN MEDITERRANEAN BASINS

Suborder SPICIPALPIA

Family RHYACOPHILIDAE Stephens, 1836

Subfamily Rhyacophilinae Stephens, 1836

Rhyacophila Pictet, 1834

1- Rhyacophila dorsalis (Curtis, 1834)

MATERIAL STUDIED: 324L, 10P♂3♀ [IV, V, VII, VIII], 3♂ [IV, V]
- Ter Basin: T3, T4, T8, T10
- Tordera Basin: ToM8, ToM12
- Besós Basin: B25, B32
- Llobregat Basin: L38, L42, L54, L56, L57, L60a, L60c, L61, L68, L77
- Mijares Basin: MI4
- Turia Basin: TU1, TU2, TU4, TU6, TU9
- Júcar Basin: JU8

TAXONOMIC REMARKS
The males collected in Llobregat River correspond to the “Pyrenees form” (H. Malicky, pers. comm.) but more information is still necessary to consider them as the subspecies Rh. dorsalis obtusidens (Malicky, 2002).

DISTRIBUTION AND ECOLOGY
Species widely distributed from central to southern Europe. In the Iberian Peninsula it has been found in central and northern Spanish areas (González et al., 1992).

According to Décaps (1967), Rh. dorsalis is found mostly in rivers at medium or low altitudes under 500 m. In the Iberian Peninsula it has been recorded in calcareous areas (García de Jalón, 1982). In the sampled Mediterranean area it is frequent both in calcareous and siliceous headwaters and middle parts from 220 m to 1200 m. Larvae can tolerate a wide range of environmental conditions (Moretti & Mearelli, 1981; Bonada et al., Chapter 8), although it has been considered as an intolerant species in rivers of central Spain (González del Tánago & García de Jalón, 1984).

2- Rhyacophila evoluta McLachlan, 1879

MATERIAL STUDIED: 43L, 1P♂ [V], 3♀ [VII]
- Ter basin: T1, T2, T8, T9, T10, T11

DISTRIBUTION AND ECOLOGY
Central and southwestern European species. In the Iberian Peninsula it has been only recorded in northwestern basins.
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This species has been recorded in Pyrenees at higher altitudes (between 600-2500 m — Décamp, 1967) than Rh. meridionalis and Rh. moesanji tredonensis (Bautista, 1980). Larvae presented here have been found only in the siliceous and pristine headwaters from Pyrenees, over 1200 m. Rh. evoluta was extensively recorded in the middle reaches of the Llobregat River (Puig et al., 1981). In the same sampling sites where Puig et al. (1981) recorded Rh. evoluta, we have now identified all specimens as mainly Rh. dorsalis (with some Rh. relicta and Rh. fasciata). Reviewing the original material identified by Puig et al. (1981), we found only Rh. dorsalis. Therefore, all old records of Rh. evoluta from Llobregat river belong to Rh. dorsalis and the data from Puig et al. (1981) has to be referred to this species.

3- Rhyacophila fasciata Hagen, 1859

MATERIAL STUDIED: ?3L, 2P♂ (IV, VII)
Ter Basin: T10
Llobregat Basin: L43, L60a

TAXONOMIC REMARKS
The pupae found in Llobregat River (L60a) are identified as Rh. fasciata denticulata. Although the presence of Rh. fasciata in the Iberia Peninsula should be confirmed (González et al., 1992), Malicky & Sipahiler (1993) concluded that the Iberian Rh. denticulata is a subspecies from Rh. fasciata, even though larvae are very distinct (Vieira-Lanero, 2000) with different length of the sword process. The sclerites found in the cocoon in our specimens present a long sword process, what does not correspond to the larval description of Rh. denticulata (Despax, 1928). Moreover, some larvae collected in Ter and Llobregat rivers present morphology similar to Rh. fasciata, with a long sword process and an apotome with a black posterior patch with black muscle insertions (according to Buholzer, 1978 and Waringer & Graf, 1997). Consequently, more larvae and pupae should be analyzed to ensure with certainty the presence of Rh. fasciata in the Iberian Peninsula.

DISTRIBUTION AND ECOLOGY
European and southwestern Asian species.

In our sampled basins, the individuals collected have been found in middle reaches of calcareous streams, coexisting with Rh. dorsalis and Rh. relicta.

4- Rhyacophila intermedia McLachlan, 1868

MATERIAL STUDIED: 2L, 1♂ (VII)
Noguera Ribagorçana Basin: OUT0m, INLET

DISTRIBUTION AND ECOLOGY
Central and southwestern European species. In the Iberian Peninsula is found in northern basins.

It has found in pristine headwaters at high altitudes by several authors (see Vieira-Lanero, 2000). In our study it has been found over 2000m in pristine headwaters.
5- *Rhyacophila laevis* Pictet, 1834

MATERIAL STUDIED: 2L
- Noguera Ribagorçana Basin: OUT200m, INLET

DISTRIBUTION AND ECOLOGY
Central and southwestern European species. In the Iberian Peninsula it is found only in the north-east area.

Larvae are typical from headwaters of high mountain pristine rivers at high altitudes (Décamps, 1967).

6- *Rhyacophila meridionalis* Pictet, 1865

MATERIAL STUDIED: 150L, 2P♂ (VIII), 1♂ (X)
- Ter Basin: T9, T10, T12, TM2, TM5
- Tordera Basin: ToM5, ToM6, ToM8, ToM10, ToM12, ToM13, ToM15
- Besòs Basin: B32
- Llobregat Basin: L54, L56
- Segura Basin: SE01
- Almanzora Basin: AL6
- Adra Basin: AD5
- Guadalfeo Basin: GU1, GU5, GU11, GU15

TAXONOMIC REMARKS
Most of the specimens collected in Mediterranean northern basins (i.e., Ter, Tordera, Besòs and Llobregat) present a head colour pattern as in the Décamps original description and the northwest larvae (Vieira-Lanero, 2000), whereas larvae found in southern basins (Segura, Almanzora, Adra and Guadalfeo) are similar to the ones described in Zamora-Muñoz et al. (1997).

DISTRIBUTION AND ECOLOGY
Southwestern European species. In the Iberian Peninsula it is distributed preferently in northern areas, although records from southern areas are found (Zamora-Muñoz et al., 1997).

*Rh. meridionalis* is present in a wide range of altitudes (Vieira-Lanero, 2000). It appears intolerant to high discharge what can constrain its downstream distribution (Zamora-Muñoz et al., 1997). In the sampled rivers it has been found in riffles of siliceous and calcareous pristine headwaters. González del Tánago & García de Jalón, (1984) considered that this species is intolerant to pollution. According to the results found in Bonada et al. (Chapter 8), it is very sensitive species to conductivity, suspended solids and ammonium, but may tolerate some phosphorous.

7- *Rhyacophila mocsaryi* Klapálek, 1898

MATERIAL STUDIED: 37L
- Ter basin: T3, T4, T7, T8, T10, TM4, TM5

TAXONOMIC REMARKS
In the Iberian Peninsula all specimens belong to the subspecies *tredosensis* (González et al., 1992).
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DISTRIBUTION AND ECOLOGY
This species has been recorded in the Iberian Peninsula, Pyrenees, Caucasian and Balkans.

*R. mocsaryi tredosensis* has been collected in mountain headwaters rivers (Décaps, 1967; Bautista, 1980; García de Jalón, 1982) with a pristine water quality (González del Tánago & García de Jalón, 1984), as in our case.

8- Rhyacophila munda McLachlan, 1862

MATERIAL STUDIED: 141L, 4P♂3P♀ (I, IV, VII), 1♀ (V)

Mijares Basin: MI7
Turia Basin: TU12
Júcar Basin: JU5, JU9, JU12, JU13, JU19
Segura Basin: SE1, SE3, SE4, SE5, SE7, SE16
Almanzora Basin: AL2, AL6, AL10, AL11
Aguas Basin: AG1
Adra Basin: AD2, AD3, AD4
Guadalfeo Basin: GU4, GU5, GU6, GU7, GU8, GU9, GU10, GU11, GU12, GU13, GU14, GU15, GU16

TAXONOMIC REMARKS
Larvae from *Rh. munda* have been traditionally distinguished from *Rh. lusitanica* by a different length of the sword process (Viedma & García de Jalón, 1980). However, Zamora-Muñoz (pers. comm.) found specimens of *Rh. munda* with a longer process than the expected. Most of the specimens collected in Mijares, Turia, Júcar, Segura, Almanzora and Aguas present a long sword process, and head and pronotum patterns are similar to *Rh. lusitanica*. Although some difficulties have been found when identifying our specimens, we have provisionally named them as *Rh. munda*, because *Rh. lusitanica* is more constrained to central and northwest Spanish areas (Vieira-Lanero, 2000), whereas *Rh. munda* is widely distributed and very abundant in south Spain. More pupae and adults of all these basins are needed to ensure larvae identifications.

This species shows a strong similarity with the undescribed *Rh. fonticola* present in southern Spain, both species coexisting in some sites (Ruiz et al., 2001). When *Rh. munda* and a specimen of *Rh. fonticola* (loan from R. Vieira-Lanero) are compared some differences are observed in head patterns. Our specimens of *Rh. munda* do not present conspicuous brown dots in the head ventrally, contrarily to the specimen of *Rh. fonticola*. Moreover, an aboral V-shape brown spot is present in the apotome of *Rh. fonticola* but is not as clear in *Rh. munda*.

DISTRIBUTION AND ECOLOGY
Southwestern European and north African species. In the Iberian Peninsula is widely distributed (Vieira-Lanero, 2000). However, we did not find *Rh. munda* in northern Mediterranean basins.

Contrary to *Rh. fonticola* associated to siliceous springs (Ruiz et al., 2001), *Rh. munda* species is associated with midstream reaches (Vieira-Lanero, 2000; Bonada et al., Chapter 7) in permanent and temporary streams (García de Jalón & González del Tánago, 1986). It appears able to tolerate a wide range of conditions and it is very abundant in sedimentary substrates within marl basins in the southeast Spain (Bonada et al., Chapter 8). It has been identified as tolerant species (González del Tánago & García de Jalón, 1984), and in our case it is even present at high suspended solids concentration and low riparian and biological indexes (Bonada et al., Chapter 8).
9- *Rhyacophila nevada* Schmid, 1952

MATERIAL STUDIED: 160L, 6♂ (II, IV, VII, X), 1♀ (VII)

**Almanzora Basin:** AL6, AL7
**Segura Basin:** SE1, SE3, SE4, SE8
**Adra Basin:** AD4
**Guadalfeo Basin:** GU1, GU2, GU3, GU4, GU5, GU6, GU7, GU9, GU10, GU11, GU12, GU13, GU14, GU15

TAXONOMIC REMARKS
Recently, after analyzing few individuals, Malicky (2002) has considered *Rh. nevada* as sub-species of *Rh. dorsalis*. According to Zamora-Muñoz & Alba-Tercedor (1992) both species have distinct larvae, differentiated by larval size and colour patterns of head and pronotum. Except in few larvae, head patterns of all specimens collected in northern basins, where only *Rh. dorsalis* is present, correspond well to *Rh. dorsalis* in the Zamora-Muñoz's key. On the other hand, in southern basins most of the individuals fit under *Rh. nevada*, and few have features more typical of *Rh. dorsalis*. Therefore, in general we can accept that larvae of *Rh. dorsalis* and *Rh. nevada* are distinct along the Spanish Mediterranean coast.

DISTRIBUTION AND ECOLOGY
Endemic species from the Iberian Peninsula where has been recorded exclusively in southern areas, replacing *Rh. dorsalis* which is present in central and northern basins (Bonada *et al.*, Chapter 8).

It prefers mountain headwaters at high altitudes. In the sampled basins *Rh. nevada* display an ecological profile very different from *Rh. dorsalis*. *Rh. nevada* is restricted to pristine headwaters with predominant siliceous basins, being more sensitive to water quality than *Rh. dorsalis* (Bonada *et al.*, Chapter 8). Consequently, because the observed differences in larval morphology and ecology of both species, and because the few specimens analyzed by Malicky, we have considered them as different species. More studies based in morphological, ecological and genetic features should be performed to confirm the identity of *Rh. nevada*.

10- *Rhyacophila cf. occidentalis* McLachlan, 1879

MATERIAL STUDIED: 24L

**Adra Basin:** AD5
**Guadalfeo Basin:** GU1, GU11, GU15

TAXONOMIC REMARKS
Larvae from Adra and Guadalfeo are similar to *Rh. occidentalis* but no mature pupae or adults were available.

DISTRIBUTION AND ECOLOGY
Southwestern European species. In the Iberian Peninsula it is found in northern basins although it has been also recorded in some southern areas (see González *et al.*, 1992).

*Rh. occidentalis* prefers mountain headwaters at higher altitudes (see Vieira-Lanero, 2000). In our basins it has been found in siliceous areas until 1860m. Although González del Tánago & García de Jalón (1984) considered *Rh. occidentalis* a pollution-tolerant species we have found it in pristine rivers with high biological and riparian quality (Bonada *et al.*, Chapter 8).
11- **Rhyacophila pascoei** McLachlan, 1879

MATERIAL STUDIED: 1L
   Guadalfeo Basin: GU16

DISTRIBUTION AND ECOLOGY
Central and southern European species. In the Iberian Peninsula it has been recorded in central and southern basins (González et al., 1992).

This species has been found in rivers with high contents of sulphates and carbonates concentrations in southern basins (García de Jalón & González del Tánago, 1986). In our sampled basins, larvae of *Rh. pascoei* was found in a middle reach of a siliceous basin with a fair biological quality.

12- **Rhyacophila relicta** McLachlan, 1879

MATERIAL STUDIED: 39L
   Ter Basin: T10, T12
   Tordera Basin: ToM9
   Llobregat Basin: L42, L54, L64, L68, L60a, L67

DISTRIBUTION AND ECOLOGY
Endemic species from the Iberian Peninsula and Pyrenees.

This species has been found very abundant in middle rivers (see Vieira-Lanero, 2000). We also have recorded it in headwaters but infrequent. According to González del Tánago & García de Jalón (1984) *Rh. relicta* is an intolerant species to pollution.

13- **Rhyacophila gr. tristis** Pictet, 1834

MATERIAL STUDIED: 102L, 6♂ (V, VII, VIII)
   Ter Basin: T2, T3, T5, T8, T10, T11, TM4, TM5
   Tordera Basin: ToM13
   Besòs Basin: B32
   Llobregat Basin: L44, L45, L54, L56, L60a
   Noguera Ribagorçana Basin: OUT0m, OUT200m, INLET
   Júcar Basin: JU7

TAXONOMIC REMARKS
The imago found in Mongrony River (Oriental Pyrenees) has several taxonomic features similar to *Rh. aquitanica* cited by Navás in closer areas (see González et al., 1992). However, this specimen has been considered as *Rh. gr. tristis* because the absence of key characters to differentiate both species with certainty and the high variability known in *Rh. tristis* males (M. A. González, pers. comm.). In the same way, there are difficulties to distinguish larvae of *Rh. tristis* and *Rh. aquitanica*. Buholzer (1978) observed that Rh. tristis does not present ventral transversal stripes in the cephalic capsule, whereas *Rh. aquitanica* does. In the northwest of Spain, where only *Rh. tristis* has been found, larvae present transversal stripes (R. Vieira-Lanero, pers comm.), as in our specimens. Consequently, we have included all specimens into the *Rh. gr. tristis*. 

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DISTRIBUTION AND ECOLOGY

Central and southern European species and Anatolia. In the Iberian Peninsula is restricted to northern and central basins.

Is a common species from headwaters with a wide altitudinal range (Vieira-Lanero, 2000). We have found larvae in calcareous and siliceous rivers, reaching the 2000 m in the Pyrenees. Rh. tristis is a species considered very sensitive to pollution. Jointly with Rh. nevada, is the member of the family more sensitive to environmental quality variables (Bonada et al., Chapter 8).

14- Other RHYACOPHILIDAE

In Segura Bain (site SE3) it has been found (A. Mellado pers. comm.) one larvae of a Rhyacophilidae with lateral abdominal gills composed by 3 filaments, which do not correspond to any Rhyacophilidae group (Figure 2). The rarity of this specimen suggests that further specific studies of adults and larvae of should be done in the area.

![General view and detail of abdominal gills from the Rhyacophilid collected in Segura basins, with 3 gills in each side of abdominal segments (picture from A. Mellado).](image)

Family **GLOSSOSOMATIDAE** Wallengren, 1891

**Subfamily Agapetinae** Martynov, 1913

**Agapetus** Curtis, 1834

Although highly abundant, the larvae of several species of *Agapetus*, widely distributed in the Mediterranean region, are not described (e.g., *A. incertulus* and *A. theichingeri*). Therefore, we only present here the species obtained from pupae or adults. It is interesting to point out that *Agapetus* sp. specimens found in the southern Mediterranean Basins appear to be more pollution tolerant that was expected from literature (González del Yáñago & García de Jalón,
1984), specially to suspended solids, conductivity, nitrites and ammonium what could indicate that a mix of species is present (Bonada et al., Chapter 8).

15- *Agapetus fuscipes* Curtis, 1834

MATERIAL STUDIED: 8♂3♀♀ (II, IV, V, VII), 1♂ (V)
- **Ter Basin:** T3, T10
- **Besòs Basin:** B12, B35
- **Llobregat Basin:** L82
- **Foix Basin:** F24

**TAXONOMIC REMARKS**
Vieira-Lanero (2000) found that most of the larvae of *A. fuscipes* collected in northwest of Spain lacked of setae in lateral position in the third abdominal segment. In our case, larvae collected where *A. fuscipes* pupae were found, present the typical seta pattern of *A. fuscipes* of 2-1-1 (first, second and third lateral setae of abdominal segments).

**DISTRIBUTION AND ECOLOGY**
Central and western European species. In the Iberian Peninsula *A. fuscipes* is widely distributed.

Although we have collected *A. fuscipes* in headwaters, it has also been found in other reaches, always with a high water quality (González del Tánago & García de Jalón, 1984; Wallace et al., 1990). Therefore, it may be possible that *Agapetus* sp. found in southern basins belong to another species more tolerant to pollution. In some localities it has been found coexisting with *Synagapetus* sp.

16- *Agapetus incertulus* McLachlan, 1884

MATERIAL STUDIED: 1♂ (VII), 3♂ (V, VII)
- **Segura Basin:** SE16
- **Adra Basin:** AD3, AD1

**TAXONOMIC REMARKS**
Larvae from this species remain undescribed. Larvae found where pupae were collected have a similar morphology to *A. fuscipes*, with an abdominal setae pattern of 2-1-1.

**DISTRIBUTION AND ECOLOGY**
This species is present in the Iberian Peninsula and North of Africa (González et al., 1992). In the Iberian Peninsula is has been recorded mainly in southern basins.

It has been found in low altitude reaches (80-200 m) with a sedimentary and calcareous geology. It is able to tolerate high salinity and quite polluted waters, what would indicate that most of the *Agapetus* specimens found in southern areas may likely belong to *A. incertulus*.

*Synagapetus* McLachlan, 1879

This genus has been found in Ter, Tordera and Besòs basins coexisting with *Agapetus* sp. However, because a high number of larvae remain still undescribed and pupae or adults were unavailable in our samples, we were unable to identify larvae at species level.
Subfamily Glossosomatinae Wallengren, 1891

Glossosoma Curtis, 1834

17- Glossosoma cf. boltoni Curtis, 1834

MATERIAL STUDIED: 22L
   Ter Basin: T1, T2, T7, T8, T9, T10, T11

TAXONOMIC REMARKS
   From the species of the Glossosoma genus, larvae of G. spoliatum McLachlan, 1879 remains undescribed. It has been cited in north and northeast Spain (González et al., 1992), where G. boltoni is also present. Our larvae look like G. boltoni, but we did not collect mature pupae to ensure our larval identifications.

DISTRIBUTION AND ECOLOGY
   European species. In the Iberian Peninsula it has been found in northeastern basins.

   In the Mediterranean sampled basins this species is confined to pristine headwaters in high-mountain rivers, but in some other European areas it has been collected in large rivers (Wallace et al., 1990).

Family HYDROPTILIDAE Stephens, 1836

Subfamily Hydroptilinae Stephens, 1836

TRIBU Hydroptilini Stephens, 1836

Allotrichia McLachlan, 1880

18- Allotrichia pallicornis (Eaton, 1873)

MATERIAL STUDIED: 36L
   Besòs Basin: B35
   Mijares: MI8
   Júcar Basin: JU11

TAXONOMIC REMARKS
   Although no pupae or adults have been collected, our larvae fit under this species according to the redescripion done by Vieira-Lanero (2000), with the presence of a dorsal sclerite in the IX abdominal segment.

DISTRIBUTION AND ECOLOGY
   A. pallicornis is widely distributed in central and southern Europe, North of Africa and southwestern Asia (González et al., 1992). In the Iberia Peninsula is widely distributed, although we only have collected it in northern and central basins.
This species can be found in different river reaches, preferring headwaters (see Vieira-Lanero, 2000). Accordingly, our larvae were found in headwaters and midstream reaches with different biological and riparian quality.

**Hydroptila** Dalman, 1819

Because in the Iberian Peninsula larvae of several species distributed in the Mediterranean coast remain undescribed (see González et al., 1992), and the difficulties to distinguish the already described, we only present here results from pupae and adults collected.

**19- Hydroptila gr. sparsa** Curtis, 1834

**MATERIAL STUDIED:** 1P♂ (VIII)

**Llobregat Basin:** L68

**TAXONOMIC REMARKS**

The *sparsa*-group is highly variable (see Malicky, 1997). Our specimen is close to *H. angustata*.

**DISTRIBUTION AND ECOLOGY**

Species from *gr sparsa* have been found in Europe, North of Africa and southwestern Asia.

**20- Hydroptila vectis** Curtis, 1834

**MATERIAL STUDIED:** 8P♂, 2P♀ (II, IV, V, VIII, IX), 26♂, 10♀ (II, VIII, XI)

**Tordera Basin:** ToM9

**Llobregat Basin:** L60a, L61, L68

**Foix Basin:** F25

**Almanzora Basin:** AL4

**Adra Basin:** AD1, AD4

**Guadalfeo Basin:** GU6, GU7, GU9

**DISTRIBUTION AND ECOLOGY**

*H. vectis* is widely distributed around Europe, North of Africa and southwest Asia (see González et al., 1992) as is in the Iberian Peninsula.

It is commonly present in different river reaches (Vieira-Lanero, 2000). In our basins *H. vectis* have been found mainly in midstream and lowland reaches under a wide range of environmental conditions, and very abundant when dense *Cladophora* masses were present (Stroot, 1984).

**Oxyethira** Eaton, 1873

This genus comprises 5 species in the Iberian Peninsula, and many difficulties are found to identify their larvae (see Vieira-Lanero, 2000). Specimens from this genus have found in reaches from Segura, Aguas and Almanzora basins with an altitude of 210-920m.
TRIBU Orthotrichiini Nielsen, 1948

**Ithytrichia** Eaton, 1873

Larva from this genus have been found in middle reaches from Turia, Júcar and Segura basins, but the lack of pupae or adults and the few information from larval stages (with some species undescribed or difficult to differentiate —Vieira-Lanero, 2000), does not allow us to achieve the species level with the material obtained.

**Orthotrichia** Eaton, 1873

21- **Orthotrichia angustella** (McLachlan, 1865)

MATERIAL STUDIED: 30L
- **Júcar Basin:** JU2, JU6, JU8, JU9, JU13
- **Segura Basin:** SE18

DISTRIBUTION AND ECOLOGY

European and North African species. In the Iberian Peninsula it is widely distributed, although we only have collected it in central-southern basins.

In rivers it has been found in midstream reaches at lower altitude (Décamps, 1967). In the Mediterranean area *O. angustella* has been found typically from calcareous/sedimentary middle reaches with a wide altitudinal range (160-1120 m).

**Suborder** ANNULIPALPIA

**Superfamily** PHILOPOTAMOIDEA Stephens, 1829

**Family** PHILOPOTAMIDAE Stephens, 1829

**Subfamily** Philopotaminae Stephens, 1829

**Philopotamus** Stephens, 1829

22- **Philopotamus montanus** (Donovan, 1813)

MATERIAL STUDIED: 344L, 3P; 31P; (IV, VII, VIII) 25; (III, IV, V)
- **Ter Basin:** T1, T2, T4, T7, T10, T14, T15, T16, TM2, TM5
- **Tordera Basin:** ToM12, ToM13, Tom14, Tom15
- **Besós Basin:** B35
- **Llobregat Basin:** L56
- **Noguera Ribagorçana Basin:** OUT0m
- **Segura Basin:** SE4
- **Adra:** AD5
- **Guadalfeo Basin:** GU1, GU5, GU11

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DISTRIBUTION AND ECOLOGY
European species. In the Iberian Peninsula it is widely distributed.

Accordingly to the literature (see Vieira-Lanero, 2000), as was the case in our samples, this species has been found mainly in headwaters with pristine conditions (see Bonada et al., Chapter 8 and 9).

23- Philopotamus variegatus (Scopoli, 1763)

MATERIAL STUDIED: 2♂ (V, VI)
Ter Basin: T3, T17

DISTRIBUTION AND ECOLOGY
Central and southern European species. In the Iberian Peninsula it has been recorded in northern basins.

This species prefers headwaters of pristine rivers, similarly with P. montanus (see Vieira-Lanero, 2000).

Wormaldia McLachlan, 1865

The difficulty to distinguish larvae, and even adults, from this genus is notable. Therefore, only the adults found in the sampled areas (in Llobregat basin) are presented here, although larval specimens from the same genus were found in Tordera, Besòs, Turia and Júcar Basins.

24- Wormaldia triangulifera McLachlan, 1878

MATERIAL STUDIED: 1♂ (IV)
Llobregat Basin: L45

TAXONOMIC REMARKS
The specimen found belongs to the triangulifera sub-species.

DISTRIBUTION AND ECOLOGY
This species is endemic from the Pyrenees.

25- Wormaldia saldetica Botosaneanu & González, 1984

MATERIAL STUDIED: 1P,♂ (II)
Llobregat Basin: SC1

DISTRIBUTION AND ECOLOGY
This species is endemic from the Pyrenees.
Pupae from Llobregat basin were found in a small calcareous stream tributary of the Llobregat River, which has a good biological quality. The sampling site is not in the Pyrenees region itself but very close.

**Subfamily Chimarrinae** Rambur, 1842

**Chimarra** Stephens, 1829

### 26- Chimarra marginata (Linnaeus, 1767)

**MATERIAL STUDIED:** 786L, 1P♂ (X), 2♂ (V, VIII)

- **Llobregat Basin:** L42, L44, L45, L60a, L61
- **Mijares Basin:** MIS M16, M19
- **Turia Basin:** TU10, TU12
- **Júcar Basin:** JU2, JU3, JU4, JU8, JU13, JU15, JU17, JU19
- **Segura Basin:** SE5
- **Almanzora Basin:** AL14, AL15
- **Aguas Basin:** AG1, AG2, AG7
- **Adra Basin:** AD3
- **Guadalfeo Basin:** GU7, GU9

**DISTRIBUTION AND ECOLOGY**

Western European and North African species. In the Iberian Peninsula is widely distributed.

In sampled Mediterranean basins *C. marginata* were found in middle and lower parts of rivers with a calcareous/sedimentary geology, which is in accordance with records of many authors (see Vieira-Lanero, 2000). It is a species tolerant to conductivity, suspended solids and phosphates but sensitive to high values of ammonia (Bonada et al., Chapter 8).

**Superfamily HYDROPSYCHOIDEA** Curtis, 1835

**Family HYDROPSYCHIDAE** Curtis, 1835

**Subfamily Hydropsychinae** Curtis, 1835

**Hydropsyche** Pictet, 1834

### 27- Hydropsyche cf. acinoxas Malicky, 1981

**MATERIAL STUDIED:** 4P♂ (IV, VIII)

- **Tordera Basin:** ToM7, ToM8, ToM12
- **Besòs Basin:** B8a

**TAXONOMIC REMARKS**

The pupae found fit quite well under *H. acinoxas*, although there are slight differences in the X segment difficult to evaluate because only the holotype is known (M.A. González pers. comm.). Larvae collected in these sampling sites and sclerites found from pupae, were very similar to *H. dinarica* and *H. instabilis*. The apotome is less quadrangular than *H. dinarica* but not as rounded as in *H. instabilis*. In the apotome a light posterior area V-shaped can be distinguish, more conspicuous than in *H. dinarica.*
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DISTRIBUTION AND ECOLOGY
This species is endemic from the Iberian Peninsula. The holotype was found in Ter basin at 1000 m of altitude by Malicky (1981), and has been recorded in Montseny ranges also by Filbà (1986).

Pupae were found in small rivers at altitudes between 320-780 m. Sites from Tordera and Besòs basins had a very good biological and water quality, with high oxygen concentrations and low conductivity (≈100µS/cm).

28- *Hydropsyche brevis* Mosely, 1930

MATERIAL STUDIED: 58L
- **Mijares Basin**: MI5, MI6, MI9
- **Turia Basin**: TU9, TU10
- **Júcar Basin**: JU2, JU4, JU5, JU12, JU13, JU17
- **Segura Basin**: SE5, SE8, SE18

DISTRIBUTION AND ECOLOGY
Species confined to Iberian Peninsula and Pyrenees.

In the Mediterranean area we have found larvae mainly in central Spanish region in calcareous/sedimentary middle reaches. It is very sensitive to phosphates and ammonia compared with other Hydropsychids, but can tolerate a wide range of dissolved salts (Bonada et al., Chapter 8).

29- *Hydropsyche bulbifera* McLachlan, 1878

MATERIAL STUDIED: 47L, 1P♂ (VII)
- **Besòs Basin**: B22
- **Llobregat Basin**: L44, L45
- **Mijares Basin**: MI3, MI4, MI10
- **Segura Basin**: SE1, SE2, SE5

DISTRIBUTION AND ECOLOGY
*H. bulbifera* is distributed around central and southern Europe and Anatolia. In the Iberian Peninsula it is widely distributed, but it lacks in the northwestern region. In the sampled Mediterranean basins it has been found mainly in northern and central basins, but reaching some southern areas.

This species has been recorded in permanent and temporary (García de Jalón, 1986) middle and lowland rivers (García de Jalón, 1982) with eutrophic waters (González del Tánago & García de Jalón, 1984). In the sampled Mediterranean area it has been also recorded in sites with a very good to fair biological quality.

30- *Hydropsyche dinarica* Marinkovic, 1979

MATERIAL STUDIED: 980L, 1P♂ (VII), 2♂ (VII)
- **Ter Basin**: T2, T7, T8, T10, TM2, TM4, TM5
- **Tordera Basin**: ToM15
- **Llobregat Basin**: L56, L54

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DISTRIBUTION AND ECOLOGY

West European species. In the Iberian Peninsula it is widely distributed. In the Mediterranean sampled basins this species has been only collected in northern areas. Until now, this species has been found in headwaters located at high altitude (Vieira-Lanero, 2000). In the Mediterranean basins, we found specimens in calcareous/siliceous high-mountain streams over 1200 m. It is a species sensitive to conductivity, suspended solids and ammonia, although it has been found in waters with higher phosphate concentrations than expected from literature (Basaguren & Orive, 1993).

31- *Hydropsyche exocellata* Dufour, 1841

**MATERIAL STUDIED:** 3372L, 3P♂ (IV, VIII), 3♂ (IV)
- Besòs Basin: B16, B12, B10, B17a, B25, B30, B35, B22
- Llobregat Basin: L95, L42, L39, L100, L90, L91, L94, L101, L102, L68, L56, L64a, L60a, L60c, L38
- Mijares Basin: M16, M13, M17, M18
- Turia Basin: TU8, TU9, TU10, TU7, TU11, TU6, TU13
- Segura Basin: SE6, SE10
- Almanzora Basin: AL7
- Adra Basin: AD1
- Guadalfeo Basin: GU9, GU10

DISTRIBUTION AND ECOLOGY

West European species. In the Iberian Peninsula it is widely distributed. It is very abundant in lowland reaches, or small rivers with polluted waters (see Vieira-Lanero, 2000). In the sampled basins, *H. exocellata* appears as the most tolerant hydropsychid to suspended solids, phosphates and ammonium, and it is present in sites with low riparian cover and fair to poor biological quality (Bonada *et al.*, Chapter 8).


**MATERIAL STUDIED:** 2L
- Segura Basin: SE4

DISTRIBUTION AND ECOLOGY

Endemic species from the Iberian Peninsula (Zamora-Muñoz *et al.*, 2002). Larvae are present in small calcareous permanent rivers with a very good water quality (Zamora-Muñoz *et al.*, 2002). The specimens found in Segura basins were located in reaches with these conditions at 1040 m of altitude.

33- *Hydropsyche iberomaroccana* González & Malicky, 1999

**MATERIAL STUDIED:** 13L, 1♂ (IV)
- Adra Basin: AD3
- Guadalfeo Basin: GU7, GU9

TAXONOMIC REMARKS

Larvae identified as *H. iberomaroccana* follow the distinctive head pattern found in Zamora-Muñoz *et al.* (1995) (= *H. cf. punica*).
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DISTRIBUTION AND ECOLOGY

*Hydropsyche iberomaroccana* is distributed in the Iberian Peninsula and North of Africa. In the Iberian Peninsula is has been collected only in southern areas, although difficulties are found to distinguish larvae of *H. incognita* from *H. iberomaroccana*. However, characteristic *H. iberomaroccana* larvae (as the ones discriminated in the step 17 by Zamora-Muñoz et al. —1995) were not found in northern basins.

The specimens found were located in reaches between an altitude of 200-540 m and with fair biological quality.

34- *Hydropsyche incognita* Pitsch, 1993

Because difficulties are found to distinguish larvae of *H. incognita* from *H. iberomaroccana*, both found in the Iberian Mediterranean area (Zamora-Muñoz et al., 1995), only the records of *H. incognita* from pupae or adults are presented here. We have collected 1677 larvae that we have included, together under the category *H. gr pellucidula*.

**MATERIAL STUDIED:** 14♂ (II, IV, VII, VIII, X), 9♂ (II, IV, V, IX)

* Llobregat Basin: L44, L60c
* Foix Basin: F25
* Almanzora Basin: AL14
* Aguas Basin: AG2, AG3, AG5
* Adra Basin: AD2
* Guadalfeo Basin: GU8, GU9

**TAXONOMIC REMARKS**

Recently, all the specimens recorded in the Iberian Peninsula as *H. pellucidula* (Curtis, 1834) have been classified as *H. incognita* because there are no evidences of presence of *H. pellucidula* in the area (Vieira-Lanero, 2000).

DISTRIBUTION AND ECOLOGY

Central and southwestern European species. In the Iberian Peninsula is widely distributed (Vieira-Lanero, 2000).

This species appear to tolerate wide ecological conditions (Vieira-Lanero, 2000). In the Mediterranean sampled rivers it has been found in midstream reaches with fair biological and riparian quality.

35- *Hydropsyche infernalis* Schmid, 1952

**MATERIAL STUDIED:** 115L

* Turia Basin: ?AF1
* Segura Basin: SE3, SE7, SE16
* Almanzora Basin: AL1, AL6, AL14
* Aguas Basin: AG1, AG2
* Adra Basin: AD3, AD4, AD5
* Guadalfeo Basin: GU2, GU4, GU5, GU6, GU12, GU13

**TAXONOMIC REMARKS**

No pupae or adults have been collected in the area, but larvae have the same pattern as in Zamora-Muñoz et al. (1995), with a V-shape aboral spot in the apotome. However, most of the larvae collected in northwest of Spain where only *H. siltalai* is present, have a V-shape aboral spot (Vieira-Lanero, 2000) instead than U-shape. Therefore, in areas were both species have been collected, there may be difficulties in distinguishing both larval
species. For example, because *H. infernalis* has been collected in southern and central Spain (see González et al., 1992 and Zamora-Muñoz et al., 1995), we can not ensure without pupae or adults that larvae collected from Turia Basin are truly *H. infernalis* or a variability of *H. siltalai*.

**DISTRIBUTION AND ECOLOGY**

Endemic species from the Iberian Peninsula, with a southern distribution.

This species has been associated to permanent siliceous (Ruiz et al., 2001), calcareous and sedimentary-marls headwaters (Gallardo-Mayenco, 1994; Gallardo-Mayenco et al., 1998). In the sampled Mediterranean area larvae were found in sedimentary midstream reaches with a wide range of conductivity and fair riparian and biological quality (Bonada et al., Chapter 8 and 9).

**36- Hydropsyche instabilis** (Curtis, 1834)

**MATERIAL STUDIED:** 697L, 5P♂ (VII), 7♂ (II, VII, VIII)
- Ter Basin: T10, T11, T12, TM4
- Besós Basin: B35
- Llobregat Basin: L54, L56
- Mijares Basin: MI4
- Turia Basin: TU4, TU6
- Júcar Basin: JU7, JU8
- Segura Basin: SE1, SE3
- Almanzora Basin: AL2, AL6, AL7
- Adra Basin: AD4, AD5
- Guadalfeo Basin: GU1, GU2, GU3, GU5, GU6, GU7, GU8, GU9, GU11, GU12, GU13, GU14, GU15, GU16

**DISTRIBUTION AND ECOLOGY**

European and Anatolian species. In the Iberian Peninsula is widely distributed.

*H. instabilis* has been found very abundant in clean headwaters (Vieira-Lanero, 2000). Our specimens have been collected in mountain siliceous and calcareous headwaters with a good biological quality. Although it appears to be more tolerant to environmental quality variables than *H. dinarica*, it is slightly more sensitive to phosphates.

**37- Hydropsyche gr. instabilis** (called *H. sp1*)

**MATERIAL STUDIED:** 93L, 2P♂ (VII, VIII)
- Llobregat Basin: L44
- Foix Basin: F25
- Mijares Basin: MI3, MI7
- Júcar Basin: JU1, JU7, JU15, JU17
- Segura Basin: SE1

**TAXONOMIC REMARKS**

The pupa found is close to *H. infernalis* and *H. fontinalis* (M.A. González, pers. comm.). However, comparing our larvae and *H. fontinalis*, some differences can be established. Apotome is not as triangular as in *H. fontinalis*, with the posterior part not very pointed. There is always an oral light spot in the apotome more or less conspicuous and joined to lateral spots (see Figure 3). As in *H. fontinalis* in the center of the apotome a Y-shaped brown patch is distinguished. Ventrally, the brown areas of the head are triangular and smaller than in *H. fontinalis*. Finally, pronotum is not darker than meso and metanotum as happen in *H. fontinalis*. More pupae and adults should be collected to confirm the identity of these specimens.
DISTRIBUTION AND ECOLOGY
It has been found in the northern basins in our sampled area. It is present in very low abundance and coexisting with *H. gr. pellucidula* in calcareous/sedimentary midstream reaches. Therefore, environmental tolerances of *H. sp1* are similar to *H. gr. pellucidula* although *H. gr. instabilis* appears in sites with slightly more riparian cover and biological quality. In the Chapters 8 and 9, *H. gr instabilis* has been coded as *H. sp1*.

**38- Hydropsyche siltalai** Döhler, 1963

**MATERIAL STUDIED:** 1876L, 2P, 3 (VII, VIII)

- **Ter Basin:** TM3
- **Tordera Basin:** ToM8, ToM9, ToM11
- **Besòs Basin:** B25, B7a, B28, B22, B35, B32, B36
- **Llobregat Basin:** L42, L54, L60a
- **Júcar Basin:** JU6, JU8
- **Segura Basin:** SE5, SE18

**TAXONOMIC REMARKS**
In the northwest of Spain *H. siltalai* present a high variability in the head colour pattern with the light aboral spot from V-shape to U-shape (R. Vieira-Lanero, pers. comm.). Our specimens from northern Mediterranean basins have a U-shape spot, similar to other individuals from central Spain (see Zamora-Muñoz et al., 1995).

**DISTRIBUTION AND ECOLOGY**
European and Anatolian species. In the Iberian Peninsula it is widely distributed. However, in the sampled Mediterranean basins has been found only in central and northern basins.

It may appear in all stream reaches although it prefers headwaters sites with mid to high altitudes (see Vieira-Lanero, 2000). In our sampled basins it has been found in
calcereous/siliceous headwaters mountain streams with a well-developed riparian forest. González del Tánago & García de Jalón (1984) suggest that *H. siltalai* can tolerate some pollution what would agree with our results as this species appear to be slightly tolerant to suspended solids, phosphates and ammonium concentrations, but it is very sensitive to conductivity (Bonada *et al.*, Chapter 8).

39- **Hydropsyche tibialis** McLachlan, 1884

MATERIAL STUDIED: 7L
- **Guadalfeo Basin:** GU1 GU11

**DISTRIBUTION AND ECOLOGY**

Endemic species from the Iberian Peninsula where it has found in western and southern areas.

This species has been recorded previously in mountain headwaters and clean reaches (Vieira-Lanero, 2000). In the Guadalfeo basins it has been found over 1500 m.

**Cheumatopsyche** Wallengren, 1891

40- **Cheumatopsyche lepida** (Pictet, 1834)

MATERIAL STUDIED: 2L, 1P (X)
- **Llobregat Basin:** L42
- **Júcar Basin:** JU2, JU3, JU4, JU12, JU13
- **Segura Basin:** SE5

**DISTRIBUTION AND ECOLOGY**

Species distributed around Europe and southwestern Asia. In the Iberian Peninsula us widely distributed, although in the sampled Mediterranean basins lacks in the most southern basins, probably because an appropriate habitat was unavailable.

*C. lepida* has been associated to middle and lowland reaches beeing present in clean waters although it can be also tolerant to some pollution (Vieira-Lanero, 2000). In Llobregat, Júcar and Segura rivers *C. lepida* was found in midstream reaches with a fair water quality where it is able to tolerate a wide range of phosphates concentration although it is quite sensitive to suspended solids, conductivity and ammonium.

Family **ECNOMIDAE** Ulmer, 1903

**Ecnomus** McLachlan, 1864

41- **Ecnomus deceptor** McLachlan, 1884

MATERIAL STUDIED: 1L, 1P (VI)
- **Llobregat Basin:** L77
- **Guadalquivir Basin:** GE
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DISTRIBUTION AND ECOLOGY

This species is known in the western Mediterranean area. In the Iberian Peninsula is widely distributed but is not present in northwestern area (Vieira-Lanero, 2000).

Larvae were found in midstream reaches at lower altitudes. It is a species able to tolerate high salinities (Stroot et al., 1988) and it can also be present in quite eutrophic waters (González del Tánago & García de Jalón, 1984).

Family **PSYCHOMYIIDAE** Walker, 1852

Subfamily **Psychomyiinae** Walker, 1852

**Psychomyia** Latreille, 1829

42- **Psychomyia pusilla** (Fabricius, 1781)

**MATERIAL STUDIED:** 10L, 2♂ (VII)

Ter Basin: T21
Llobregat Basin: L42, L68
Júcar Basin: JU3, JU9

DISTRIBUTION AND ECOLOGY

Widely distributed in Europe, North of Africa and southwest Asia. In the Iberian Peninsula is widely distributed. However, in sampled Mediterranean basins this species were not found in southern basins.

This species prefers middle and lowland rivers, although it has been also found in small streams and middle reaches (Vieira-Lanero, 2000) with a calcareous geology (Edington & Alderson, 1973). Several authors observed that *P. pusilla* is able to tolerate some levels of eutrophication (González del Tánago & García de Jalón, 1984; Millet & Prat, 1984), what would agree with our records.

**Lype** McLachlan, 1878

43- **Lype reducta** (Hagen, 1868)

**MATERIAL STUDIED:** 5L, 2♂ (IV)

Besòs Basin: B25, B35
Segura Basin: SE3, SE18

DISTRIBUTION AND ECOLOGY

Species present in Europe, North of Africa and southwestern Asia. In the Iberian Peninsula it has been found in northern basins. We have recorded larvae from the Segura basin, what enlarge its distribution range.

Larvae are present in wide altitudinal range in small and large rivers (Vieira-Lanero, 2000). Specimens found in the Mediterranean basins were collected in rivers with an altitude from 250 m to over 1000 m.
**Metalype** Klapálek, 1898

44- *Metalype fragilis* (Pictet, 1834) (*Psychomyia fragilis*)

**MATERIAL STUDIED**: 8L
- **Segura Basin**: SE1

**DISTRIBUTION AND ECOLOGY**
West European species. In the Iberian Peninsula has been recorded in northern and southern basins.

In the sampled Mediterranean area, *M. fragilis* is associated to calcareous midstream reaches at high altitude, in concordance to Edington & Alderson (1973).

**Tinodes** Curtis, 1834

Three species with undescribed larvae are recorded from south Spain (*T. algiricus* McLachlan, 1880, *T. maroccanus* Mosely, 1938 and *T. baenai*, González & Otero, 1984). This makes difficult the identifications of larvae from the Mediterranean Spanish Rivers, especially from southern basins. Identifications of specimens presented here were obtained from already know larvae and they should be taken with caution.

45- *Tinodes assimilis* McLachlan, 1865

**MATERIAL STUDIED**: 13L, 1♂ (VII)
- **Llobregat Basin**: L56
- **Segura Basin**: SE1
- **Almanzora Basin**: AL6, AL7, AL11, AL14
- **Aguas Basin**: AG2
- **Guadalfeo Basin**: GU1

**DISTRIBUTION AND ECOLOGY**
West European species. In the Iberian Peninsula is widely distributed.

Larvae of the hygropetric *T. assimilis* has found in headwaters (Vieira-Lanero, 2000) reaching the 1800 m of altitude in some of our sampled sites.

46- *Tinodes dives* (Pictet, 1834)

**MATERIAL STUDIED**: 11L
- **Llobregat Basin**: L44, L45, L56
- **Júcar Basin**: JU6

**DISTRIBUTION AND ECOLOGY**
Central and southern European species. In the Iberia Peninsula it has been found in northeast basins. In the sampled Mediterranean area it also appears in more central basins.

This species has been found in mountain rivers at intermediate altitudes (Décamps, 1967). In the sampled basins, larvae we collected in calcareous headwater reaches with a good biological and riparian quality.
47- *Tinodes maclachlani* Kimmins, 1966

**MATERIAL STUDIED:** 2L  
**Llobregat Basin:** L44, L45

**DISTRIBUTION AND ECOLOGY**  
Western European species. In the Iberia Peninsula it has been found in northeast basins.

This hygropetric species (Edington & Alderson, 1973) have been collected in calcareous headwater reaches with a good biological and riparian quality.

48- *Tinodes maculicornis* (Pictet, 1834)

**MATERIAL STUDIED:** 7L  
**Besòs Basin:** B36  
**Almanzora Basin:** AL17

**DISTRIBUTION AND ECOLOGY**  
Western European species. In the Iberia Peninsula it has been found in northern and southern basins.

In the Pyrenees this species has been collected in rivers with intermediate altitude (Décamps, 1967). In the sampled Mediterranean area, larvae were collected in headwater and midstream reaches with a good biological and riparian quality.

49- *Tinodes waeneri* (Linnaeus, 1758)

**MATERIAL STUDIED:** 34L, 1♂ (IV)  
**Besòs Basin:** B28, B32, B35  
**Llobregat Basin:** L60c, L102  
**Segura Basin:** SE7

**DISTRIBUTION AND ECOLOGY**  
European and North African species. In the Iberian Peninsula it is widely distributed. However, in sampled basins have been collected both in northern and southern areas.

This species prefers midstream reaches at medium to low altitudes (Vieira-Lanero, 2000). In the sampled Mediterranean area, *T. waeneri* has been found in stream reaches with very good to fair ecological quality.

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**Family** **POLYCENTROPODIDAE** Ulmer, 1903

**Subfamily** **Polycentropodinae** Ulmer, 1903

**Plectrocnemia** Stephens, 1836

Specimens of *Plectrocnemia* were recorded in Besòs, Llobregat, Turia, Júcar, Segura, Adra and Guadalfeo basins. However, because the difficulty to differentiate larvae specially when they are not full growth (see Vieira-Lanero, 2000), we only present here records from pupae or adults.

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50- *Plectrocnemia geniculata* McLachlan, 1871

**MATERIAL STUDIED:** 1 ♀ (IV)

**Foix Basin:** F7a

**DISTRIBUTION AND ECOLOGY**

*Plectrocnemia geniculata* is found in central and southern Europe and North of Africa. In the Iberian Peninsula is widely distributed but it lacks in northwestern region.

This species has been recorded in a wide range of altitudes (Décamps, 1967). In the Foix basin it has been found in headwaters with a very good ecological status.

51- *Plectrocnemia laetabilis* McLachlan, 1880

**MATERIAL STUDIED:** 1P ♀ (V), 3 ♀ (VII, VIII)

**Foix Basin:** F33

**Noguera Ribagorçana Basin:** OUT0m, INLET

**DISTRIBUTION AND ECOLOGY**

Species present and widely distributed in the Iberian Peninsula, Pyrenees and North of Africa.

This species present a wide altitudinal range in headwaters of mountain rivers (Vieira-Lanero, 2000). The pupae and adults recorded by us were found in the inlet and outlet of a Pyrenean high mountain lake and in a small calcareous stream at middle altitude.

52- *Polycentropus flavomaculatus* (Pictet, 1834)

**MATERIAL STUDIED:** 170L, 2P ♀ (VIII), 8 ♀ (IV, V, VIII)

**Ter Basin:** T3, T10

**Llobregat Basin:** L38, L42, L44, L54, L56, L60a, L60c, L61, L64a, L68

**Besòs Basin:** B10, B22, B32, B35

**DISTRIBUTION AND ECOLOGY**

European and North African. In the Iberian Peninsula present a wide distribution. However, it only has been recorded in northern basins.

*P. flavomaculatus* is recognised to have a wide ecological range, being able to tolerate low oxygen concentration (see Vieira-Lanero, 2000). In the sampled Mediterranean area it has been found in calcareous/sedimentary midstream reaches with a fair water quality.

53- *Polycentropus kingi* McLachlan, 1881

**MATERIAL STUDIED:** 175L

**Besòs Basin:** B32

**Júcar Basin:** JU17

**Segura Basin:** SE1, SE2, SE3, SE4, SE7

**Almanzora Basin:** AL6, AL7, AL8, AL10, AL11

**Aguas Basin:** AG2, AG7

**Guadalfeo Basin:** GU5
DISTRIBUTION AND ECOLOGY
Western European and North African species. In the Iberian Peninsula have a wide distribution.

Some authors observed that *P. kingi* is present in headwaters and midstream reaches with a good water quality (see Vieira-Lanero, 2000), what would agree with our records. However, although it appears in sites with better biological quality than *P. flavomaculatus*, it can tolerate a wider range of suspended solids. Sometimes may coexist with *P. flavomaculatus*, although in few abundances (Edington & Hildrew, 1995).

**Cyrnus** Stephens, 1836

54- **Cyrnus cf. montserrati** González & Otero, 1983

**MATERIAL STUDIED:** 7L
   **Segura Basin:** SE2

**TAXONOMIC REMARKS**
Although no pupae or adults have been found in the area and larvae of *C. montserrati* is not described, specimens found present a different head colour pattern compared with *C. cintranus* (R. Vieira-Lanero pers. comm.). Moreover, in the first abdominal segment, our individuals present 2 setae sa3 instead of 1 in *C. cintranus*. Consequently, we have called these specimens as *C. cf. montserrati*.

DISTRIBUTION AND ECOLOGY
This species is restricted to North of Africa and the Iberian Peninsula, where it has been recorded in southern areas.

The site where larvae were found is a calcareous and pristine headwater over 1000m of altitude.

Suborder **INTEGRIPALPIA**

Superfamily **LIMNEPHILOIDEA** Kolenati, 1848

**Family** **BRACHYCENTRIDAE** Ulmer, 1903

**Brachycentrus** Curtis, 1834

55- **Brachycentrus (O.) maculatum** (Fourcroy, 1785)

**MATERIAL STUDIED:** 8L
   **Llobregat Basin:** L68
   **Guadalfeo Basin:** GU3

DISTRIBUTION AND ECOLOGY
Central and western European species. In the Iberian Peninsula it is widely distributed. However, in the sampled basins it has been found only in two distant sites in the north and south.
This species is associated to mountain headwaters at medium altitudes (Vieira-Lanero, 2000). Our larvae were collected in headwaters and middle reaches with a fair to good water quality.

**Micrasema** McLachlan, 1876

56- **Micrasema longulum** McLachlan, 1876

MATERIAL STUDIED: 27L
- **Adra Basin:** AD5
- **Guadalfeo Basin:** GU1, GU2, GU5, GU15

DISTRIBUTION AND ECOLOGY
Central and western European species. In the Iberian Peninsula it is widely distributed. However, in the sampled Mediterranean basins only has been found in the most southern basins.

This species presents a wide altitudinal range (Vieira-Lanero, 2000). However, in the Mediterranean basins sampled, this species is typical from siliceous headwater over 1300m of altitude, what agree with studies performed in high mountainous areas (Décamps, 1967). It is very sensitive to environmental variables, although it can tolerate some phosphorous and be present in sites with low biological quality indexes.

57- **Micrasema minimum** McLachlan, 1876

MATERIAL STUDIED: 28L
- **Ter Basin:** T3, T8, T10
- **Segura Basin:** SE4

DISTRIBUTION AND ECOLOGY
Western European species. In the Iberian Peninsula it has been recorded only in northern basins. However, in the Mediterranean sampled basins some larvae were found in Segura basin, enlarging its distribution area.

*M. minimum* is characteristic from mountain headwaters at high altitudes (Vieira-Lanero, 2000). In the sampled basins, larvae were found in pristine calcareous and siliceous headwaters over 1000m of altitude.

58- **Micrasema moestum** (Hagen, 1868)

MATERIAL STUDIED: 212L
- **Segura Basin:** SE1
- **Almanzora Basin:** AL6, AL7, AL8
- **Adra Basin:** AD5
- **Guadalfeo Basin:** GU1, GU2, GU3, GU5, GU11, GU12, GU15

TAXONOMIC REMARKS
Some collected larvae display a pattern similar, although less conspicuous, to what Vieira-Lanero (2000) called *M. gr. moestum.*
DISTRIBUTION AND ECOLOGY

This species is distributed in southwestern Europe and North of Africa. In the Iberian Peninsula it has been found widely distributed. In sampled basins it was only collected in southern basins.

*Micrasema moestum* has been found in pristine headwaters (Vieira-Lanero, 2000). In the Mediterranean basins it seems to be highly sensitive to phosphates and ammonium (Bonada *et al.*, Chapter 8).

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**Family LEPIDOSTOMATIDAE** Ulmer, 1903

**Subfamily Lepidostomatinae** Ulmer, 1903

*Lepidostoma* Rambur, 1842

59- *Lepidostoma hirtum* (Fabricius, 1775)

**MATERIAL STUDIED:** 14L
- **Tordera Basin:** ToM6, ToM8, ToM10, ToM11

**DISTRIBUTION AND ECOLOGY**

European and Anatolian species. In the Iberian Peninsula it is widely distributed. In the sampled basins only has been collected in northern basins.

This species has been found in different rivers with high water quality (Vieira-Lanero, 2000). In our sampled basins, larvae were found in headwaters of forested areas.

*Lasiocephala* Costa, 1857

60- *Lasiocephala basalis* (Kolenati, 1848)

**MATERIAL STUDIED:** 417L, 13♂ 10♀ (VII), 12♂ 11♀ (V, VII)
- **Tordera Basin:** ToM10, ToM11
- **Turia Basin:** TU6
- **Júcar Basin:** JU7, JU8
- **Segura Basin:** SE1
- **Adra Basin:** AD5
- **Guadalfeo Basin:** GU1, GU2, GU3, GU5, GU9, GU11, GU12, GU13, GU14, GU15

**DISTRIBUTION AND ECOLOGY**

European species, lacking in Scandinavia. In the Iberian Peninsula it is widely distributed.

*Lasiocephala basalis* is a headwater species mainly located in a wide range of altitudes (Vieira-Lanero, 2000). In our sampled areas it appears associated to siliceous basins. It is a species sensitive to ammonium, phosphates and conductivity although it can tolerate a wide range of suspended solids.

234
**Subfamily Theliopsychinae** Weaver, 1993

**Crunoecia** McLachlan, 1876

**61- Crunoecia irroata** (Curtis, 1834)

MATERIAL STUDIED: 3L  
Besòs Basin: B29

DISTRIBUTION AND ECOLOGY
Central and southern European species. In the Iberian Peninsula it is restricted to northern basins.

This species has been recorded at medium and higher altitudes (Vieira-Lanero, 2000). In sampled areas, it has been found in a mountainous and pristine area from Besòs basin.

<table>
<thead>
<tr>
<th>Family LIMNEPHILIDAE Kolenati, 1848</th>
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</thead>
</table>

**Subfamily Drusinae** Banks, 1916

**Drusus** Stephens, 1837

**62- Drusus bolivari** (McLachlan, 1880)

MATERIAL STUDIED: 17L  
Segura Basin: SE1, SE4

DISTRIBUTION AND ECOLOGY
This species is distributed in the Iberian Peninsula, Pyrenees and France. In the Iberian Peninsula it has been recorded in northern, central and southern basins. In our sampled basins it has been only collected in Segura basin.

Vieira-Lanero (2000) found specimens from *D. bolivari* only in headwater reaches at high altitudes, which is coincident with our records, because the specimens from Segura basins were found in pristine and calcareous headwaters over 1000 m of altitude.

**63- Drusus discolor** (Rambur, 1842)

MATERIAL STUDIED: 5L  
Ter Basin: T10, T18  
Noguera Ribagorçana Basin: OUT200m

DISTRIBUTION AND ECOLOGY
Central and southern European species. In the Iberian Peninsula only has been recorded in the north.

This species prefers cold headwater reaches with high slopes (Vieira-Lanero, 2000). In our sampled basins it appears as a species with a narrow ecological profile and sensitive to pollution, present over 1200m of altitude.
64- Drusus rectus (McLachlan, 1868)

MATERIAL STUDIED: 167L, 1♂5♀ (VII)
   Ter Basin: T10, T19
   Noguera Ribagorçana Basin: OUT0m, OUT200m, INLET

TAXONOMIC REMARKS
   Difficulties are found to distinguish D. rectus from D. annulatus. Both species have been recorded in Pyrenees as adults (see González et al., 1992) but no larval keys are available to differentiate them. Hiley (1970), Szczesny (1978), Wallace et al. (1990) and Waringer & Graf (1997) include only D. annulatus, whereas Décamps & Puyol (1975) only reported D. rectus. Because it was not possible to distinguish both species using literature, and no pupae or adults of D. annulatus were collected we have considered, provisionally, all specimens found as D. rectus.

DISTRIBUTION AND ECOLOGY
   Southwestern European species. In the Iberian Peninsula it has been recorded in northern basins.

   As D. discolor, this species were found in high-mountain pristine streams over 1200m, although it has been collected in lower altitudes in some Pyrenean areas (Décamps, 1967).

Anomalopterygella Fischer, 1966

65- Anomalopterygella chauviniana (Stein, 1874)

MATERIAL STUDIED: 27L, 1♂ (X)
   Ter Basin: T12
   Adra Basin: AD5
   Guadalfeo Basin: GU1, GU15

DISTRIBUTION AND ECOLOGY
   Southwestern Europe. In the Iberian Peninsula it is present mainly in northern basins, although it has been also recorded in some southern regions at high altitude.

   A. chauviniana is a headwater species but may have a wide altitudinal range (Vieira-Lanero, 2000). In our sampled basins it has been mainly collected in siliceous headwaters. It appears as a sensitive species to ammonium and phosphates (Bonada et al., Chapter 8).

Subfamily Limnephilinae Kolenati, 1848

TRIBU Limnephilini Kolenati, 1848

Limnephilus Leach, 1815

66- Limnephilus guadarramicus Schmid, 1955

MATERIAL STUDIED: 103L, 2♀ (IV)
   Besòs Basin: B7, B24, B28
Trichopteran species list

Llobregat Basin: L42, L44, L45, L60a, L61, L64a, L77
Mijares Basin: M1, M13, M18, M10
Turia Basin: TU1, TU5
Júcar Basin: JU6, JU8, JU17
Aguas Basin: AG5

TAXONOMIC REMARKS

This species present a high variability in the case morphology that may be entirely mineral (see original description in Vera, 1979) or made with twigs disposed tangentially (see Vieira-Lanero, 2000). In the sampled basins, we have found both cases types, although the woody one was more frequent.

DISTRIBUTION AND ECOLOGY

*L. guadarramicus* is an endemic species from the Iberian Peninsula, where it has been mainly recorded in northern regions. However, in the Mediterranean area some specimens have been found in central and some southern basins.

Larvae have been associated to wide ecological conditions, from small and big rivers to mountain lakes (Vieira-Lanero, 2000). In our basins it has been associated to headwaters of siliceous/calcareous basins. It is a very sensitive species to phosphates but can tolerate some ammonium and conductivity (Bonada et al., Chapter 8). It was present at a wide range of riparian vegetation cover and fair biological quality.

67- *Limnephilus lunatus* Curtis, 1834

MATERIAL STUDIED: 3L, 2P♂ (IV)

Llobregat Basin: L64a, L77

DISTRIBUTION AND ECOLOGY

This species is distributed around Europe, North of Africa and southwestern Asia. In the Iberian Peninsula only has been recorded in northern basins.

*L. lunatus* has been recorded either in permanent and temporary rivers (Sommerhäuser et al., 1997) under 1000 m of altitude (Décamps, 1967). In our samples, *L. lunatus* has been found in middle parts of rivers with fair water, biological and riparian quality.

**Glyphotaelius** Stephens, 1833

68- *Glyphotaelius pellucidus* (Retzius, 1783)

MATERIAL STUDIED: 20L, 2P♂ 1P♀ (II, IV), 4♂ 1♀ (II)

Ter Basin: SO

Besòs Basin: B7, B7a

TAXONOMIC REMARKS

Prat et al. (1983) recorded larvae of this species in the Besòs basin. Because no pupae or adults have been collected in Spain, Vieira-Lanero (2000), considered that the presence of *G. pellucidus* need to be confirmed. We reared larvae from Besòs basin, and we obtained several pupae and adults of *G. pellucidus* with the characteristic anterior wing morphology (see Schmid, 1952; Malicky, 1983). Moreover, larvae fitted very well according to Vieira-Lanero (2000) and Waringer & Graf (1997) keys, with 2 ventral setae of different colour in the first femur. Most of the specimens collected had the typical case made with round
pieces of litter arranged in the characteristic way, although others used non-rounded pieces disposed longitudinally. On the other hand, some collected *Potamophylax* sp. (see later) had a case similar to the typical *Glyphotaelius*, what also have been observed by other authors (e.g., Wallace *et al*., 1990; Vieira-Lanero, 2000).

**DISTRIBUTION AND ECOLOGY**

European and Siberian species. In the Iberian Peninsula it has been only recorded in northeastern basins.

Some studies in central Europe areas reported that this species is found in rivers with thick layers of organic detritus in permanent and temporary rivers (Wallace *et al*., 1990; Sommerhäuser *et al*., 1997). In our basins, *G. pellucidus* has been found exclusively in headwaters of temporary rivers, having a flight period earlier than in more temperate climates (Sommerhäuser *et al*., 1997). It is associated to a high chemical and biological quality, and a well-developed riparian forest with alders (*Alnus glutinosa*) and hazelnut trees (*Corylus avellana*).

**TRIBU Chaetopterygini Hagen, 1858**

*Chaetopteryx* Stephens, 1829

Larvae of *Chaetopteryx* have been recorded in Ter, Besòs, Llobregat, Turia, Júcar, Segura and Guadalfeo basins. Because the difficulties to identify larvae at species level, and only records from pupae and adults are presented here.

**69- Chaetopteryx villosa** (Fabricius, 1798)

**MATERIAL STUDIED:** 1♀ (X)

*Ter Basin:* T10

**DISTRIBUTION AND ECOLOGY**

European species. In the Iberian Peninsula it is distributed in northern basins.

In our case, the adult were found in a headwater stream with pristine conditions at an altitude over 1100 m.

**TRIBU Stenophylacini Schmid, 1955**

*Potamophylax* Wallengren, 1891

**70- Potamophylax cingulatus** (Stephens, 1837)

**MATERIAL STUDIED:** 194L, 5P, 2P♂ (VIII), 1♂2♀ (VIII)

*Ter Basin:* TM1, TM2, TM3, TM4, T8, T9, T10, T11

*Tordera Basin:* ToM13, ToM15

*Besòs Basin:* B35

*Llobregat Basin:* L54, L56

*Noguera Ribagorçana Basin:* INLET

*Júcar Basin:* JU1

238
DISTRIBUTION AND ECOLOGY

European species. In the Iberian Peninsula it is present in northern basins.

This species has been found in permanent headwater reaches (Sommerhäuser et al., 1997) without presenting a summer diapause (Malicky, 1987). *P. cingulatus* has been found coexisting with *P. latipennis* but reaching higher altitudes (Vieira-Lanero, 2000). In sampled area it is an intolerant species, especially to conductivity, suspended solids and phosphates (Bonada et al., Chapter 8).

71- **Potamophylax latipennis** (Curtis, 1834)

MATERIAL STUDIED: 257L, 8P♂ 12P♀ (VIII), 10♂3♀ (II, VII, VIII, X)

Ter Basin: T7, T9, T10, T12, TM1, TM3, TM4, TM5
Tordera Basin: TM7, TM8
Besòs Basin: B8a, B29, B35, B36
Llobregat Basin: L54, L56, L60a
Adra Basin: AD5
Guadalfeo Basin: GU1, GU11, GU15

DISTRIBUTION AND ECOLOGY

This species is distributed around Europe, Siberia and Anatolia. In the Iberian Peninsula it is distributed in northern basins, although it has been recorded in some southern areas (see González et al., 1992).

Similarly to *P. cingulatus*, this species is present in mountain headwater reaches. *P. latipennis* is more intolerant to environmental quality variables than the former species, especially to ammonium concentration.

**Halesus** Stephens, 1836

72- **Halesus digitatus** (Schrank, 1781)

MATERIAL STUDIED: 51L, 2♂ (VII, X)

Ter Basin: T8, T10, T12
Besòs Basin: B35
Llobregat Basin: L44, L54, L68
Noguera Ribagorçana Basin: OUT200m

DISTRIBUTION AND ECOLOGY

This species is distributed around Europe reaching Iran. In the Iberian Peninsula only has been recorded in northeastern basins, as has been in our case.

In other European areas with karstic formations, *H. digitatus* has been found a dominant species in both temporary (Kiss, 1984) and permanent streams (Sommerhäuser et al., 1997). In our sampled streams, specimens were found in calcareous/siliceous headwaters located in a wide altitudinal range.

73- **Halesus radiatus** (Curtis, 1834)

MATERIAL STUDIED: 103L

Ter Basin: T7, TM1, TM4, TM5
**DISTRIBUTION AND ECOLOGY**

European species. In the Iberian Peninsula it is distributed in central and northern basins, as in our samples.

This species has a wide ecological range being able to survive in headwater and middle reaches (Vieira-Lanero, 2000) with a permanent flow (Sommerhäuser et al., 1997). In our samples it has been found in headwaters at high to medium altitude. In these conditions, larvae appear sensitive to phosphates, suspended solids and conductivity but may be present in low ammonium concentrations (Bonada et al., Chapter 8).

**74- Halesus tessellatus** (Curtis, 1834)

**MATERIAL STUDIED:** 142L

**Besòs Basin:** B35

**Turia Basin:** TU1, TU2

**Júcar Basin:** JU7, JU8

**Segura Basin:** SE1, SE3, SE4

**Adra Basin:** AD5

**Guadalfeo Basin:** GU1, GU5, GU11, GU12, GU15

**TAXONOMIC REMARKS**

Although we did not find pupae or adults from *H. tessellatus* in the sampled basins, Zamora-Muñoz & Alba-Tercedor (1995) indicated the presence of this species in the Iberian Peninsula. The larvae examined correspond to this species according to Panzéböck & Waringer (1997), even assuming difficulties found to differentiate *H. tessellatus* from *H. digitatus*. Pupae and adult material should be analyzed to confirm the presence of *H. tessellatus* in northern basins, where we only found larval specimens.

**DISTRIBUTION AND ECOLOGY**

European species with some records in Siberia (Lepneva, 1971). In the Iberian Peninsula it has been recorded until now only in southern areas.

In our sampled basins, *H. tessellatus* has been collected in mountain pristine headwaters with a low conductivity (Zamora-Muñoz & Alba-Tercedor, 1995), but it has been collected in high saline water in central Europe (Botosaneanu & Malicky, 1978). In the Mediterranean sampled basins it appears to be more sensitive to ammonium, phosphates, suspended solids and conductivity than *H. radiatus* (Bonada et al., Chapter 8).

**Stenophylax** Kolenati, 1848

Many difficulties are found to identify *Stenophylax* species in the Iberian Peninsula, because not all the recorded species have described larvae. Therefore, we only include here few pupae or adults collected in the studied area. However, larvae of this genus have been found in several temporary streams in Besòs, Júcar, Segura, Almanzora and Guadalfeo basins.
75- *Stenophylaxspanioli* Schmid, 1957

**MATERIAL STUDIED:** 2P♂ (X), 1♂ (X)

**Ter Basin:** T10

**TAXONOMIC REMARKS**

Larvae from this species remain undescribed. In the sclerites of pupae we found setae insertions in the anterior sides of meso and meta-femora, what would indicate that species is close to *S. permistus* according to Vieira-Lanero (2000).

**DISTRIBUTION AND ECOLOGY**

This species is distributed in the Iberian Peninsula, North of Africa and Pyrenees.

Pupae and adults were found in a siliceous and pristine headwater permanent stream at high altitude.

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76- *Mesophylaxaspersus* (Rambur, 1842)

**MATERIAL STUDIED:** 316L, 11P♂,1P♀ (II, III, IV, V, VII), 48♂,14♀ (II, IV, V, XI)

**Besòs Basin:** B7a, B12, B22, B24, B28, B32

**Llobregat Basin:** L42, L45, L60c

**Foix Basin:** F4, F7, F7a, F16, F28

**Mijares Basin:** M1, M13, M17

**Turia Basin:** TU3, TU7

**Júcar Basin:** JU5

**Segura Basin:** SE3, SE8, SE10, SE13, SE15, SE16

**Almanzora Basin:** AL1, AL2, AL3, AL4, AL5, AL10, AL11, AL14

**Adra Basin:** AD4

**Guadalfeo Basin:** GU5, GU6, GU7

**TAXONOMIC REMARKS**

Although Malicky (1998) considered that all *Mesophylax* species from the Iberian Peninsula are *M. aspersus*, the species *M. impunctatus* has been recorded by other authors (see González et al., 1992). According to Wallace at al. (1990) and Waringer & Graf (1997), both species can be clearly differentiated by the number of ventral setae in the first femur: 2 in *M. impunctatus* and 3 in *M. aspersus*. We have reared several larvae in the lab with 2 ventral setae in the first leg, and adults of only *M. aspersus* were obtained (n=62). All larvae collected in the field that were not reared presented 2 setae in both legs except in three specimens, with 2 setae in one femur and 3 in the other. Therefore, we consider that this character is no useful to distinguish both species in the Iberian Peninsula. It might be possible that differences between larvae of two species are not clear, because taxonomy of adults is not either (M.A. González, pers. comm.).

**DISTRIBUTION AND ECOLOGY**

This species is present in Western Europe, Mediterranean region, Madeira, Canary Islands and southwestern Asia (until Cache mira). In the Iberian Peninsula is widely distributed.
Although *M. aspersus* have been collected in permanent headwaters or midstream reaches, it is more characteristic from temporary rivers. It is well known its ability to survive under a drought period adapting its life-cycle (e.g., Bouvet, 1974; Bournaud, 1971). In that sense, we observed (in lab rearing) that even when a drought period is created suddenly, mature pupae emerge very quick. On the other hand, larvae are able to tolerate a wide range of conductivity, suspended solid and phosphates (and even ammonium), being the Limnephilid less sensitive to pollution (Bonada *et al.*, Chapter 8). It has been found in reaches with good to fair riparian and biological quality.

### Allogamus Schmid, 1955

**77- Allogamus auricollis** (Pictet, 1834)

**MATERIAL STUDIED:** 13L,  
*Ter* Basin: T1, T2, T12  
*Llobregat* Basin: L44

**TAXONOMIC REMARKS**

Some specimens found in *Ter* basins present very long mineral cases, approximately the double of larval size.

**DISTRIBUTION AND ECOLOGY**

Central and western European species. In the Iberian Peninsula only has been found in northeast basins and some western areas.

*A. auricollis* has been recorded mainly in headwaters reaches in calcareous and siliceous alpine regions (Bautista, 1980; Graf *et al.*, 1992). Although it has been considered a species able to tolerate some water pollution (e.g., Bautista, 1980), other studies have associated it with pristine alpine rivers (Graf *et al.*, 1992). Our records are found in headwater reaches with very good biological quality.

**78- Allogamus mortoni** (Navás, 1907)

**MATERIAL STUDIED:** 1P♂ (XI)  
*Almanzora* Basin: AL6

**TAXONOMIC REMARKS**

*Allogamus mortoni* (Navás, 1907) has been recorded by other authors in southern Spain (C. Zamora-Muñoz, pers. comm.) but larvae are still undescribed. From sites were only *A. mortoni* is present (collected by C. Zamora-Muñoz), larvae present also a light band in the anterior part of pronotum as in *A. ligonifer*. In southern basins we have collected 45 larvae of *Allogamus* and most of them present this colour pattern in the pronotum. Therefore, pupae or adults are required to confirm their identity.

**DISTRIBUTION AND ECOLOGY**

Species only present in the Iberian Peninsula where has been found in southern Spain and Portugal.
The collected pupa from *A. mortoni* has been found in a karstic river at medium altitude, but other authors have collected it in siliceous waters of southern Spain (Ruiz et al., 2001).

<table>
<thead>
<tr>
<th>Family</th>
<th>UENOIDAE Iwata, 1927</th>
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</thead>
<tbody>
<tr>
<td><strong>Subfamily Thremmatinae</strong> Martynov, 1935</td>
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<tr>
<td><strong>Thremma</strong> McLachlan, 1876</td>
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<td><strong>79- Thremma gallicum</strong> McLachlan, 1880</td>
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<td>MATERIAL STUDIED: 9L</td>
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<tr>
<td><em>Noguera Ribagorçana Basin</em>: OUT0m, OUT200m</td>
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<tr>
<td>DISTRIBUTION AND ECOLOGY</td>
<td></td>
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<tr>
<td>Southwestern European species. In the Iberian Peninsula it has been found only in the north.</td>
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<tr>
<td>Larvae have been found in siliceous and pristine mountain reaches at medium and higher altitude (Vieira-Lanero, 2000), what agrees with our records.</td>
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<thead>
<tr>
<th>Family</th>
<th>GOERIDAE Ulmer, 1903</th>
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<td><strong>Subfamily Goerinae</strong> Ulmer, 1903</td>
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<tr>
<td><strong>Silo</strong> Curtis, 1830</td>
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<td><strong>80- Silo graellsii</strong> Pictet, 1865</td>
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<td>MATERIAL STUDIED: 25L</td>
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<td><em>Ter Basin</em>: T1, T8, T11, T12, TM2, TM4, TM5</td>
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<td><em>Tordera Basin</em>: ToM7</td>
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<tr>
<td>DISTRIBUTION AND ECOLOGY</td>
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<tr>
<td>Southwestern European species. In the Iberian Peninsula it has been found in northern basins.</td>
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<tr>
<td><em>S. graellsii</em> is present in pristine mountain reaches at medium and high altitudes (Vieira-Lanero, 2000), which is coincident with our records.</td>
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</tbody>
</table>
Superfamily LEPTOCEROIDEA Leach, 1815

Family LEPTOCERIDAE Leach, 1815

Subfamily Leptocerinae Leach, 1815

TRIBU Athripsodini Morse & Wallace, 1976

**Athripsodes** Billberg, 1820

Several species with distribution around Mediterranean area remain undescribed (e.g. *A. taounate*). Therefore, although larvae from this genus have been found in Almanzora, Aguas, Adra and Guadalfeo basins, only pupae or adults collected are presented here.

**81- Athripsodes albifrons** (Linnaeus, 1758)

MATERIAL STUDIED: 1P♀ (VII)

| Guadalfeo Basin: GU1 |

DISTRIBUTION AND ECOLOGY

European species. In the Iberian Peninsula it is widely distributed.

Larvae have been found in streams at lower altitudes (Vieira-Lanero, 2000) although our specimen was found at 1860 m of altitude in the Guadalfeo basin.

**Ceraclea** Stephens, 1829

**82- Ceraclea sobradieli** (Navás, 1917)

MATERIAL STUDIED: 2L

| Júcar Basin: JU10 |

DISTRIBUTION AND ECOLOGY

Species only present in the Pyrenees and Iberian Peninsula where it is widely distributed.

In our sampled basins this species was present in a calcareous and sedimentary lowland river, what agrees with other studies (Terra & Molles, 1987). In Júcar basins, larvae are present in reaches with a moderate pollution.

TRIBU Mysacidini Burmeister, 1839

**Mystacides** Berthold, 1827

**83- Mystacides azurea** (Linnaeus, 1761)

MATERIAL STUDIED: 62L

| Tordera Basin: ToM8, ToM9, ToM11, ToM12 |
| Besòs basin: B24, B32, B35 |
| Llobregat Basin: L44, L45, L61, L68 |
| Mijares Basin: MIS |

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Trichopteran species list

**Turia Basin:** TU10  
**Júcar Basin:** JU2, JU10  
**Segura Basin:** SE2, SE18

DISTRIBUTION AND ECOLOGY

European species. In the Iberian Peninsula it is widely distributed.

This species has been found in wide ecological conditions, from lakes to stream reaches at different altitudes (Vieira-Lanero, 2000). In the sampled basins, larvae were found in headwaters and midstream reaches with low conductivity, suspended solids, phosphates and ammonium, and a higher riparian vegetation quality that other Leptoceridae. However, González del Tánago & García de Jalón (1984) considered this species able to tolerate eutrophy.

TRIBU Oecetini Silfvenius, 1905

**Oecetis** McLachlan, 1877

We have found larvae of *Oecetis* in Segura basin, although it was impossible to determine them because larvae of some species recorded near the Mediterranean area remain still undescribed (e.g., *O. grazalemae*).

TRIBU Setodini Morse, 1981

**Setodes** Rambur, 1842

*Setodes argentipunctellus* McLachlan, 1877

**MATERIAL STUDIED:** 112L, 1P♀ (X)

**Turia Basin:** TU12  
**Júcar Basin:** JU2, JU6  
**Segura Basin:** SE2, SE4, SE16  
**Almanzora Basin:** AL2, AL6  
**Aguas Basin:** AG1, AG2  
**Adra Basin:** AD1, AD3  
**Guadalfeo Basin:** GU16

DISTRIBUTION AND ECOLOGY

This species is present in Western Europe and North of Africa. In the Iberian Peninsula it is widely distributed, although we did not find it in sampled northern basins.

Larvae have been collected in midstream and lowland reaches at low altitudes (Vieira-Lanero, 2000), what agree with our records. According to González del Tánago & García de Jalón (1984) larvae is present in eutrophic conditions. However, in the sampled rivers *S. argentipunctellus* appears to be very sensitive to ammonium, phosphates and suspended solids but tolerant to a wide range of conductivity (Bonada et al., Chapter 8).
Adicella McLachlan, 1877

85- Adicella reducta (McLachlan, 1865)

MATERIAL STUDIED: 5L, 1 ♀ (VII)
- Tordera Basin: ToM10, ToM12
- Besòs Basin: B29
- Guadalfeo Basin: GU1, GU1

DISTRIBUTION AND ECOLOGY
European species. In the Iberian Peninsula it is widely distributed. In the sampled basins only has been found in the most northern and southern basins.

Larvae appear in a wide ecological conditions but very sensitive to pollution (Vieira-Lanero, 2000). In our samples it has been found in headwaters reaches in forested and preserved areas.

Family CALAMOCERATIDAE Ulmer, 1905

Subfamily Calamoceratinae Ulmer, 1905

Calamoceras Brauer, 1865

86- Calamoceras marsupus Brauer, 1865

MATERIAL STUDIED: 2L
- Segura Basin: SE1, SE2

DISTRIBUTION AND ECOLOGY
Southwestern European species. In the Iberian Peninsula it is widely distributed.

Larvae have been found in different ecological conditions preferring non-polluted waters (Vieira-Lanero, 2000). In our sampled basins, specimens were found in a stream over 1000m of altitude with a very good biological and riparian quality.

Family ODONTOCERIDAE Wallengren, 1891

Subfamily Odontocerinae Wallengren, 1891

Odontocerum Leach, 1815

87- Odontocerum albicorne (Scopoli, 1763)

MATERIAL STUDIED: 201L, 3P♂ (IV, VI), 11 ♂ (VII, VIII)
- Ter Basin: T4, T7, T8, T10, T11, TM2, TM3, TM4, TM5

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Trichopteran species list

Tordera Basin: ToM6, ToM7, ToM8, ToM11, ToM12, ToM13, ToM14, ToM15
Besòs Basin: B8a, B12, B32, B35
Llobregat Basin: L54, L56, L60a

DISTRIBUTION AND ECOLOGY
European species. In the Iberian Peninsula it has been found only in northern basins (González et al., 1992).

*O. albicorne* has been recorded in headwaters and middle reaches by different authors (see Vieira-Lanero, 2000). In our sampled basins, this species has been found in similar part of rivers but always with a high biological and riparian quality. *O. albicorne* appears sensitive to conductivity and ammonium (Bonada et al., Chapter 8).

Superfamily SERICOSTOMATOIDEA Stephens, 1836

**Family SERICOSTOMATIDAE** Stephens, 1836

*Sericostoma* Latreille, 1825

Difficulties are found to distinguish larvae from *Sericostoma*. Therefore, we only present here identifications from pupae or adults. A revision of the adults found in the Iberian Peninsula is needed because their morphological variability (M. A. González pers. comm.).

**88- Sericostoma pyrenaicum** Pictet, 1865

MATERIAL STUDIED: 3♂ (VII), 2♂ (IV)
Besòs Basin: B32
Llobregat Basin: L54
Foix Basin: F11
Segura Basin: SE1

DISTRIBUTION AND ECOLOGY
Southwestern European species. In the Iberian Peninsula it has been found only in the north.

As in our case, this species has been recorded in headwaters with a wide altitudinal range, sometimes coexisting with *S. vittatum* (Vieira-Lanero, 2000).

**89- Sericostoma vittatum** Rambur, 1842

MATERIAL STUDIED: 1♂ (VII)
Adra Basin: AD5

DISTRIBUTION AND ECOLOGY
This species is endemic from the Iberian Peninsula, where it is widely distributed.

As in our case, *S. vittatum* has been found together with *S. pyrenaicum* in headwater reaches at medium and high altitudes (Vieira-Lanero, 2000).
Chapter 6

**Schizopelex** McLachlan, 1876

Because *S. furcipera* remains still undescribed we only present here identifications from pupae and adult specimens from this genus. No larvae were collected from this genus using the features present in Vieira-Lanero (2000) to distinguish *Schizopelex* from *Sericostoma*.

90- **Schizopelex furcipera** McLachlan, 1880

MATERIAL STUDIED: 1P♀ (VIII), 1♂ (VII)
   Ter Basin: T20
   Tordera Basin: ToM7

DISTRIBUTION AND ECOLOGY

*S. furcipera* is present in Pyrenees and Iberian Peninsula, where has been recorded only in the north.

In the Pyrenees this species has been found under 1560m of altitude (Décamps, 1967). In the sampled areas, pupae and adults were found in pristine headwaters of forested areas at medium and high altitudes.

Family **BERAEIDAE** Wallengren, 1891

**Beraea** Stephens, 1833

91- **Beraea mauros** (Curtis, 1834)

MATERIAL STUDIED: 2L
   Besòs Basin: B29
   Llobregat Basin: L44

DISTRIBUTION AND ECOLOGY

European species. In the Iberian Peninsula is distributed in ther north.

*B. mauros* has been collected in small headwater streams with mosses and leaves (Lepneva, 1971; Wallace *et al.*, 1990) located at high altitudes (Décamps, 1967). In the sampled sites, larvae were found in pristine headwaters at mid altitudes.
DISCUSSION

Mediterranean climate areas have been considered by several authors as regions that shelter high diversity (e.g., Raven 1973; Deacon, 1983), comparing with other more temperate faunas. Reasons for that may be related to the climatic features that provide intermediate levels of disturbance, that according several authors may imply high species richness (e.g., Minshall, 1988; Sousa, 1984). Moreover, besides these climatic features, historical processes have been very important to explain the high plant and animal richness present in the Mediterranean basins area (see Bonada et al., Chapter 3). In fact, some caddisfly species have been evolved in these areas, as those belonging to the Stenophylax group (Malicky, 1987). That is the case of Mesophylax aspersus that was one of the most abundant and frequent species in sampled basins because its ability to avoid dried periods by behavioral adaptations (e.g., Bouvet, 1974; Bournaud, 1971).

However, and according to the known records of the caddisflies in the Iberian Peninsula made by González et al. (1987), the Mediterranean area is poorer in species than other more temperate areas in the north and specially the northwest of Spain. This phenomenon has been related to historical factors but the major number of studies performed in northern areas in the Iberian Peninsula makes this statement not definitive (González et al., 1987). Although not all the Mediterranean basins were sampled in the present study and even though not all the specimens were able to be identified using larvae (e.g., Hydroptila, Stenophylax …), we collected a total of 91 species. This represents around 27% of the species recorded in the Iberian Peninsula. The maximum diversity of caddisflies in the sampled area was found in areas with high-mountain influences (e.g., rivers from Pyrenees, Montseny and Sierra Nevada ranges) or regions where a mixing of northern and southern species distributions occurs (e.g., in Segura basin). Besides this, Mediterranean rivers from central and some southeastern areas (e.g., rivers from Almería) present a depauperate caddisfly fauna (see Bonada et al., Chapter 8) what can be related to the lack of more extensive studies in the area (González et al., 1987), but specially to the harshness of the climatic features specially in the arid southern areas where the human alteration present all along the Mediterranean coast is even higher.

A representation of groups of species according to their distribution areas are presented in Figure 4. The sampling sites have been divided in three groups, the northern, central and southern basins. According to the information obtained from literature species have been grouped as European (including species present in Pyrenees and Iberian Peninsula), Iberian-North African and endemic species. Overall, most of the recorded caddisflies collected here
present a European distribution, what has been pointed out by González et al. (1987). European species are dominant in northern and central basins and in contrast, southern basins present a higher number of species distributed also in North Africa. Southern basins present the highest proportion of endemic species, with a mix of species widely distributed around the Iberian Peninsula and those exclusive from the Baetic-Rift area. Our results emphasized the importance of southern basins as a speciation area for several groups of invertebrates (Ruiz et al., 2001), which was independent from those that took place in the northwestern areas of the Hesperic Massif (González et al., 1987).

A total of 12499 larvae, 177 pupae and 261 adults from 169 sites have been identified in our study. From the records presented here we extend the distribution areas of some species, confirm the presence of some others and point out several relevant taxonomic information for further studies. However, more investigations should be performed to ensure the identity of several species (e.g., H. gr. instabilis called H. sp1) and to describe larvae specimens of some species (e.g., H. acinoxas, A. incertulus, A. mortoni).
Figure 4. Proportion of European, Iberian-North African and endemic species for each group of basins. Northern basins include Ter, Tordera, Besòs, Llobregat, Foix and Noguera Ribagorçana. Central basins include Mijares, Turia and Júcar basins. Southern basins include Segura, Almanzora, Aguas, Adra, Guadalfeo and Guadalquivir.
REFERENCES


Trichopteran species list


### Annex 1

Sampling sites where Trichoptera has been found. The code used in the text, UTM coordinates, the river name and the altitude are shown.

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