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 40ºC). A water pump recirculates and cleans it, providing oxygen at the same time. Purified water at 19ºC 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 periphiton were collected in the same site were larvae was obtained. We were not able to rear predators and filters-feeders.

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 90ºC 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♂3P♀ (IV, V, VII, VIII), 3♂ (IV, V)
Ter Basin: T3, T4, T8, T10
Tordera Basin: ToM8, ToM12
Besòs 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 Décamps (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.

This species has been recorded in Pyrenees at higher altitudes (between 600-2500 m — Décamps, 1967) than *Rh. meridionalis* and *Rh. mocsaryi 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).

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 (Décamps, 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, 6P♂ (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, beeing 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*.

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.

Figure 2. 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).

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 Tánago & 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: 8P♂3P♀ (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: 1P♂ (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 redescription 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♂1P♀ (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
Besòs Basin: B35
Llobregat Basin: L56
Noguera Ribagorçana Basin: OUT0m
Segura Basin: SE4
Adra: AD5
Guadalfeo Basin: GU1, GU5, GU11

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

Southern European and Anatolian species. In the Iberian Peninsula it has been only recorded in eastern basins (González *et al.*, 1992).

The species has been recorded in headwater reaches between 300-1200 m of altitude (Décamps, 1967). The male collected in Llobregat basin was found in a small karstic stream located in a protected area (Sant Llorenç del Munt Natural Park).

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: MI5 MI6, MI9
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*.

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 Marinkövic, 1979

MATERIAL STUDIED: 980L, 1P♂ (VII), 2♂ (VII)

Ter Basin: T2, T7, T8, T10, TM2. TM4, TM5
Tordera Basin: ToM15
Llobregat Basin: L56, L54

DISTRIBUTION AND ECOLOGY

West European species. In the Iberian Peninsula is widely distributed but more frequent in central and northern areas. 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 Duföur, 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: MI6, MI3, MI1, MI8
Turia Basin: TU8, TU9, TU10, TU7, TU11, TU6, TU13
Júcar Basin: JU17, JU16, JU15, JU11, JU13, JU12, JU10, JU9, JU19, JU2, JU3, JU4, JU5
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).

32- Hydropsyche fontinalis Zamora-Muñoz *et al.*, 2002

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*).

DISTRIBUTION AND ECOLOGY

H. 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: 14P♂ (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 wit 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
Besòs 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.

Figure 3. Cephalic head from the *Hydropsyche gr instabilis* called *H. sp1*.

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♂ (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

calcareous/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

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: SE2, 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.

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.

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.

Polycentropus Curtis, 1835

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, beeing 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 is 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).

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, 13P♂10P♀ (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.

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.

Family **LIMNEPHILIDAE** Kolenati, 1848

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), Szczęsny (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

Llobregat Basin: L42, L44, L45, L60a, L61, L64a, L77
Mijares Basin: MI1, MI3, MI8, MI10
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 species, 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

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 diapauses (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: ToM7, ToM8
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

Tordera Basin: ToM6, ToM7, ToM8, ToM10, ToM11, ToM12, ToM15
Besòs Basin: B7a, B8a, B32, B35, B36
Llobregat Basin: L44, L56, L68
Mijares Basin: MI7
Turia Basin: TU1, TU2, TU4
Júcar Basin: JU1, JU7, JU8

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 beeing 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 Panzeböck & 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- Stenophylax spanioli 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.

Mesophylax McLachlan, 1882

76- Mesophylax aspersus (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: MI1, MI3, MI7
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 Cachemira). 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), beeing 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 A*llogamus* 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).

Family **UENOIDAE** Iwata, 1927

Subfamily *Thremmatinae* Martynov, 1935

Thremma McLachlan, 1876

79- Thremma gallicum McLachlan, 1880

MATERIAL STUDIED: 9L
Noguera Ribagorçana Basin: OUT0m, OUT200m

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

Larvae have been found in siliceous and pristine mountain reaches at medium and higher altitude (Vieira-Lanero, 2000), what agrees with our records.

Family **GOERIDAE** Ulmer, 1903

Subfamily *Goerinae* Ulmer, 1903

Silo Curtis, 1830

80- Silo graellsii Pictet, 1865

MATERIAL STUDIED: 25L
Ter Basin: T1, T8, T11, T12, TM2, TM4, TM5
Tordera Basin: ToM7

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

S. graellsii is present in pristine mountain reaches at medium and high altitudes (Vieira-Lanero, 2000), which is coincident with our records.

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: MI5

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

84- 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 preset 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, 200), 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).

TRIBU Triaenodini Morse, 1981

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

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: 3P♂ (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).

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 maurus (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. maurus 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 mades 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*).

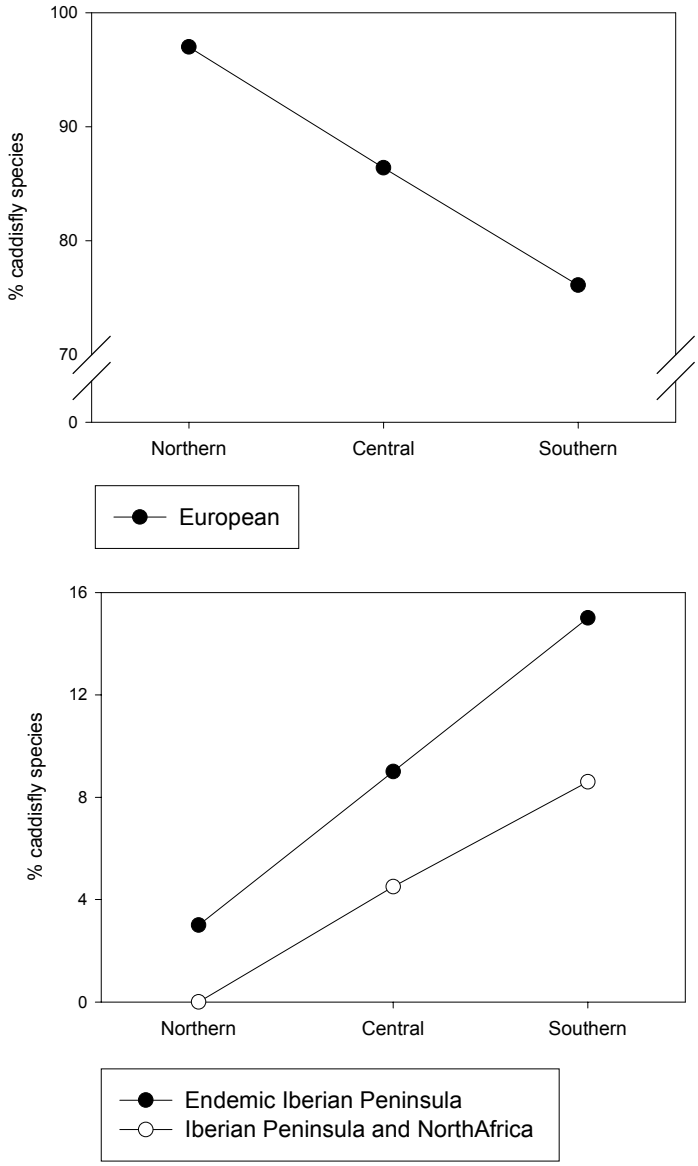

Figure 4. Proportion of European, Iberian-North African and endemic species for each group of basins. Northern basins include Ter, Tordera, Besòs, Llobregat, Foix and Noguera Ribagorçana. Central basins include Mijares, Turia and Júcar basins. Southern basins include Segura, Almanzora, Aguas, Adra, Guadalfeo and Guadalquivir.

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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.

Site code	X_UTM	Y_UTM	Stream/River	Altitude (m.)
TER BASIN				
T1	4416	46940	Ter	1440
T2	4425	46934	Ter/Carboners	1380
T3	4428	46874	Ter	1080
T4	4448	46862	Ter	1000
T5	4234	46790	Garfull	1020
T7	4499	46926	Ritort	1220
T8	4506	46919	Ritort	1200
T9	4508	46910	Ritort	1160
T10	4513	46908	Fabert	1180
T11	4517	46888	Torrent de la Ginestosa	1080
T12	4484	46853	Ritort	960
T14	4476	46927	Torrent de la Casassa	1420
T15	4463	46869	Feitús	920
T16	4388	46703	La Tolosa	920
T17	4266	46851	Rigart	1060
T18	4295	46918	Fontalba	2060
T19	4303	46945	Torrent de Finestrelles	1980
T20	4419	46900	Ter	1180
T21	4515	46887	Ritort	1060
SO	4355	46648	Riera de la Solana	640
TM1	4428	46300	Torrent de Valldoriola	740
TM2	4466	46333	Riera de la Sala	680
TM3	4477	46336	Riera Major	700
TM4	4493	46320	Torrent de Collpregon	800
TM5	4522	46341	Riera d'Espinelves	760
TORDERA BASIN				
ToM6	4552	46306	Riera d'Arbúcies	480
ToM7	4575	46293	Sot del Clot	460
ToM8	4582	46299	Riera d'Arbúcies	360
ToM9	4631	46270	Riera d'Arbúcies	200
ToM10	4481	46249	Riera de la Castanya	480
ToM11	4484	46248	Riera de Sant Marçal	460
ToM12	4512	46265	Riera de Sant Marçal	780
ToM13	4529	46229	Sot de l'Infern	720
ToM14	4545	46258	Riera de Santa Fe	1220
ToM15	4555	46251	Riera de Santa Fe	1140
RIBERA RIBAGORÇANA BASIN				
INLET	3183	47234	Inlet to Lac Redon	2240
OUT0m	3179	47232	Barranc de Lac Redon	2220
OUT200m	3170	47231	Barranc de Lac Redon	2200

Site code	X_UTM	Y_UTM	Stream/River	Altitude (m.)
BESÒS BASIN				
B8a	4458	46178	Riera de Cànoves	320
B10	4400	46145	Congost	220
B12	4296	46109	Riera de Caldes	240
B16	4373	46044	Tenes	100
B17a	4315	46063	Caldes	240
B22	4211	46132	Ripoll	340
B24-R	4253	46165	Gallifa	560
B25	4327	46174	Tenes	250
B28	4308	46196	Tenes	570
B29	4422	46293	Avencó	1000
B30	4362	46293	Congost	530
B32-R	4397	46248	Avencó	340
B35-R	4403	46199	Vallcàrquera	380
B7a-R	4490	46161	Vilamajor	320
B7-R	4540	46102	Riera de les Arenes	320
LLOBREGAT BASIN				
SC1	3999	46458	Riera de Sant Cugat	760
L100	4039	46151	Cardener	165
L101	4049	46135	Llobregat	150
L102	4061	46179	Llobregat	180
L38	4007	46232	Cardener	220
L39	3974	46300	Cardener	250
L42	3931	46373	Cardener	386
L44-R	3942	46322	Negre	630
L45-R	4158	46166	Riera de les Nespres	540
L54	4009	46769	Llobregat	720
L56-R	4164	46796	Llobregat	1360
L57	4138	46770	Llobregat	840
L60a-R	4074	46601	Llobregat	487
L60c	4073	46550	Llobregat	460
L61-R	4167	46531	Merlès	550
L64a	4117	46283	Gavarresa	320
L67	4078	46395	Llobregat	320
L68	4071	46350	Llobregat	285
L77	3813	46049	Anoia	310
L82	3760	46121	Veciana	465
L90	4175	45848	Llobregat	20
L91	4137	45917	Llobregat	45
L94	4104	45953	Llobregat	60
L95	4068	46026	Llobregat	80
FOIX BASIN				
F24	3753	45865	Pontons	660
F25	3765	45861	Pontons	580

Site code	X_UTM	Y_UTM	Stream/River	Altitude (m.)
MIJARES BASIN				
MI1	6840	44770	Mijares	1370
MI10	6861	44561	Valbona	950
MI3	6839	44550	Mijares	920
MI4-R	6987	44445	Mijares	690
MI5	7212	44373	Mijares	310
MI6	7375	44302	Mijares	90
MI7	6900	44415	Albentosa	890
MI8-R	7173	44561	Villahermosa	760
MI9	7263	44380	Villahermosa	300
TURIA BASIN				
TU10	6849	43860	Turia	200
TU11-R	7046	43840	Turia	95
TU12-R	6720	43797	Sot	550
TU13	6535	44212	Turia	605
TU1-R	6943	44766	Alfambra	1470
TU2	6703	44958	Alfambra	1070
TU3	6635	44753	Alfambra	930
TU4-R	6627	44268	Arcos	900
TU6	6317	44737	Turia	1140
TU7	6545	44550	Turia	820
TU8	6489	44259	Turia	650
TU9-R	6717	43965	Turia	340
JÚCAR BASIN				
JU10	5805	43504	Júcar	670
JU11-R	6080	43332	Júcar	620
JU12	6338	43395	Júcar	515
JU13	6907	43489	Júcar	160
JU15	6679	43633	Magro	540
JU16	7081	43562	Magro	125
JU17	6093	44015	Guadazaón	830
JU19	6876	43573	Magro	290
JU1-R	6244	44543	Cabriel	1300
JU2-R	6141	44112	Cabriel	850
JU3	6434	43557	Cabriel	390
JU4	6644	43465	Cabriel	340
JU5	6684	43361	Cantaban	400
JU6	6048	44403	Guadazaón	1120
JU7-R	5987	44684	Júcar	1300
JU8-R	5985	44537	Júcar	1200
JU9	5651	44199	Júcar	840
SEGURA BASIN				
SE10-R	5972	41761	Corneros	650
SE13	6460	41635	Majada	60

Site code	X_UTM	Y_UTM	Stream/River	Altitude (m.)
SE15	6701	41023	Garruchal	100
SE16-R	5901	42151	Argos	780
SE18-R	5488	42302	Zumeta	720
SE1-R	5346	42246	Segura	1020
SE2-R	5345	42258	Madera	1020
SE3-R	5557	42219	Taibilla	950
SE4	5492	42565	Mundo	1040
SE5-R	5815	42675	Mundo	650
SE6	6175	42439	Mundo	330
SE7	5975	42104	Quipar	710
SE8-R	6314	42166	Perea	410
ALMANZORA BASIN				
AL1	5357	41323	Sauco	1000
AL10	5539	41327	Sierro	600
AL11	5533	41306	Sierro	760
AL14	5690	41280	Chercos	560
AL15	5666	41277	Chercos	760
AL17	5919	41342	Almanzora	180
AL2	5357	41323	Sauco	960
AL3	5403	41335	Herrerías	820
AL4	5427	41341	Almanzora	760
AL5	5493	41334	Bacares	690
AL6-R	5500	41310	Bacares	800
AL7-R	5493	41290	Bacares	920
AGUAS BASIN				
AG1-R	5826	41052	Aguas	260
AG2-R	5844	41055	Aguas	210
AG3	5862	41073	Aguas	180
AG5	5950	41115	Aguas	60
AG7-R	5883	41135	Jauto	210
ADRA BASIN				
AD1	5001	40701	Adra	80
AD2	4974	40862	Adra	370
AD3-R	4984	40762	Adra	200
AD4-R	4990	40935	Adra	680
AD5-R	4982	41038	Adra	1820
GUADALFEO BASIN				
GU10-R	4549	40786	Guadalfeo	160
GU11	4690	40943	Poqueira	1540
GU12	4677	40887	Poqueira	1000
GU13	4674	40851	Poqueira	500
GU14-R	4540	40938	Torrente	1100
GU15-R	4774	40967	Trevélez	1540
GU16	4674	40841	Guadalfeo	500

Site code	X_UTM	Y_UTM	Stream/River	Altitude (m.)
GU1-R	4636	40916	Chico	1860
GU2-R	4541	40989	Dúrcal	1300
GU3-R	4489	40949	Dúrcal	760
GU4	4487	40878	Dúrcal	500
GU5-R	4832	40931	Guadalfeo	1350
GU6-R	4814	40856	Guadalfeo	860
GU7-R	4733	40834	Guadalfeo	540
GU8	4657	40828	Guadalfeo	340
GU9	4596	40815	Guadalfeo	220
GUADALQUIVIR BASIN				
GE	2181	41586	Guadiamar	60