

**SHORE FLIES (DIPTERA, EPHYDRIDAE) SPECIES OF A
JUNIPERUS THURIFERA L. FOREST OF LOS MONEGROS REGION
(ZARAGOZA, SPAIN)**

Tadeusz ZATWARNICKI¹
Javier BLASCO-ZUMETA²

ABSTRACT.— A survey of the Ephydriidae of a *Juniperus thurifera* L. forest of Los Monegros region (Zaragoza, Spain) was carried out between 1989 and 1994. In total, 684 specimens belonging to 37 species and 20 genera were collected. Some facts are given on the ecology of the family in the area and traps efficiency. The first record of *Psilopa marginella* (Fallén, 1823), *Psilopa roederi* Girschner, 1889, *Ptilomya angustigenis* Becker, 1926, *Hydrellia albifrons* (Fallén, 1813), *H. fascitibia* von Roser, 1840, *Brachydeutera ibari* Ninomyia, 1929, *Scatella tenuicosta* Collin, 1930 and *Scatophila noctula* (Meigen, 1830) for Spain are included.

RESUMEN.— *Especies de Diptera, Ephydriidae en un bosque de Juniperus thurifera L. de la comarca de Los Monegros (Zaragoza, España)*. Entre los años 1989 a 1994 se ha realizado un muestreo de la familia Ephydriidae en un bosque de *Juniperus thurifera* L. en la comarca de Los Monegros (Zaragoza, España), colectándose un total de 684 ejemplares pertenecientes a 37 especies y 20 géneros diferentes. Se proporcionan datos sobre la ecología de la familia en la zona, así como de efectividad de trapeo. Se cita por primera vez para España *Psilopa marginella* (Fallén, 1823), *Psilopa roederi* Girschner, 1889, *Ptilomya angustigenis* Becker, 1926, *Hydrellia albifrons*

¹ Museum and Institute of Zoology. Polish Academy of Sciences. Ul. Wilcza, 64. PL-00-679 WARSAW. zatwar@robal.miiz.waw.pl

² javier(at)blascozumeta.com, blaszu@arrakis.es

(Fallén, 1813), *H. fascitibia* von Roser, 1840, *Brachydeutera ibari* Ninomyia, 1929, *Scatella tenuicosta* Collin, 1930 y *Scatophila noctula* (Meigen, 1830).

KEY WORDS.— Diptera, Ephydridae, phenology, traps efficiency, faunistic records, Los Monegros, Spain.

INTRODUCTION

Flies of the family Ephydridae are usually small and darkish, but can be easily recognized by dorsally pectinate arista (with a few exceptions) and by specific wing venation: costa with two distinct breaks (humeral and subcostal), discal and second basal cells not separated by a crossvein, anal cell and anal vein absent. Adults are usually found on shores, marshes and wet meadows and many of them feed on yeast, various algae and bacteria. Most larvae are aquatic or semiaquatic, they are grazers or filter-feeders of organic material, some develop in decomposing matter as scavengers or are leaf miners.

The shore-fly fauna of Spain has distinct influences from Africa, as some genera were not recorded in Europe outside the region —it treats to both Iberian peninsula with *Scoliocephalus* (ZATWARNICKI, 1991) or Balears with *Actocetor* (CARLES-TORLA, 1995), *Zeros* (CANZONERI & RALLO, 1996) and *Brachydeutera* (REMMERT, 1953). Despite of this original fauna no actual list of Spanish Ephydridae is available since catalogue of ARIAS ENCOBET (1912). His list of 79 actually valid species of Spanish shore flies was based on three papers, those of STROBL (1900; 1905) and CZERNY (1909). Further records in various faunistic or taxonomic papers began to appear sixty years after the date, but the papers are not focused on Spanish fauna, therefore they are easily to overlook. CANZONERI (1993); CANZONERI & MENEGHINI (1975); HOLLMANN-SCHIRRMACHER (1998a, 1998b), KRIVOSHEINA (1998); MATHIS (1984a; 1984b); WIRTH (1975), and ZATWARNICKI (1988; 1991; 1996) provided additional 22 species, which makes a total amount of 101 species known from Iberian peninsula hitherto. In several other publications the presence of a few species already known from Spain was confirmed.

STUDY AREA

Los Monegros region lies in the central part of the Ebro valley, east of Zaragoza. This area's extreme climatic conditions have produced a vegeta-

tion similar to that of the North-African steppes (BRAUN-BLANQUET & BOLÒS, 1957). OCHOA (1982) summarizes its climate as follows: large annual range of minimum and maximum temperatures, which go from -10°C to above 40°C ; frequent Spring frosts; prevailing winds from the NW and the SE (cold and warm, respectively), both with great desiccating power; low annual rainfall (200-400 mm); water deficit over 300 mm. Soils (QUIRANTES, 1978) are mostly gypsum, with some marl and clay.

These climatic conditions are connected with a climax vegetation of *Juniperus thurifera* L. forests of the *Juniperetum phoeniceo-thuriferae* (Br.-Bl. & O. Bolòs) Rivas-Martínez community (RIVAS-MARTÍNEZ, 1987), a species-poor plant community characterized by the presence of *Juniperus thurifera* L., *Rhamnus lycioides* L., *Ephedra nebrodensis* Tineo ex Guss. and *Asparagus acutifolius* L. It is a clear forest or a steppe with trees, associated with various shrub layers whose composition depends on microclimatic (altitude, exposure, and soil) conditions (BRAUN-BLANQUET & BOLÒS, 1957). Taking into account their relative importance in the area, these main plant communities are: *Agropyro-Lygeion* Br.-Bl. & O. Bolòs, steppe grasslands with perennial species on the deep soils found on hillsides being not very steep, and the foot of the hills; *Ononidetum tridentatae* Br.-Bl. & O. Bolòs, dense, vigorous shrub mostly found on gentle sunny hillsides, which indicates the presence of a deep layer of gypsum; *Salsolo vermiculatae-Peganetum harmalae* Br.-Bl. & O. Bolòs, a community of nitrophilous species found in abandoned fields and places where organic matter accumulates (mainly as a result of the presence of sheep); *Helianthemetum squamati* Br.-Bl. & O. Bolòs, a community of low, stunted shrubs and a very important lichen component which is found on very eroded hill-tops; *Suaedetum verae* Br.-Bl. & O. Bolòs, dense aggregations of halophilous species which occur in places that have become saline owing to poor draining; *Roemerio violaceae-Hypecoetum penduli* Br.-Bl. & O. Bolòs and *Carduo pycnocephali-Hordeetum leporini* Br.-Bl., plant communities associated with cereal crops and waysides, respectively.

MATERIAL AND METHODS

Specimens have been collected from 1989 to 1994 in an area near the locality Pina de Ebro (Zaragoza province) called «Retuerta de Pina» (UTM

grid square 30T YL29). The mean altitude is 360 m. It is the last well-preserved *Juniperus thurifera* L. forest in Los Monegros region.

The following collecting methods have been used:

Moericke trap. A metal container, yellow inside and green outside, sized 60 x 60 x 10 cm, on a 70 cm high stand, filled with slightly soapy water. Both samples and water were removed once a week and grouped by fortnights. It was working from May 1990 to December 1991, with two breaks, August-September 1990 and July-September 1991.

Coloured dishes. 25 plastic trays (9 yellow, 8 blue, 8 white), sized 26 x 16 x 4 cm, were used, filled with soapy water. They were in use from February 1990 to December 1991, set once in a fortnight in 1991, and left in operation for 24 hours on each occasion. The specimens were grouped by fortnights.

Malaise trap. Two traps 180 cm long, 121 cm wide and 206 cm to 183 cm high were used. The collecting liquid was 70% alcohol. They were in use from September 1990 till December 1991, emptied once a week; the material was grouped by fortnights.

Light trap. It consists of two 20W/10S lamps (a blacklight and a daylight lamp) operating on a 12V battery. The specimens were taken off the lamps by means of a pooter. It was used regularly from January to December in 1993: and the collected material was grouped by fortnights. More samples were taken previously to 1993: but they were not sampled regularly.

Pitfall trap. 12 plastic bottles, 14 cm high and 8 cm wide, with a 5 cm wide opening were used, containing beer (1991) or vinegar (1992) as bait, and buried just below the surface, with the lids off. They were placed 10 m apart from each other.

Sweeping from plants. An insect net was swept once by fortnight during 1992 and from January to December 1993 on 21 plant species: the *Agropyro-Lygeion* Br.-Bl. & Bolòs (a vegetal community composed mainly by perennial steppic grasses), *Artemisia herba-alba* Asso, *Atriplex halimus* L., *Ephedra nebrodensis* Tineo ex Guss., *Genista scorpius* (L.) DC., *Gypsophila struthium* L. ssp. *hispanica* (Willk.) G. López, *Helianthemum squamatum* (L.) Pers., *Juniperus phoenicea* L., *Juniperus thurifera* L., *Lithodora fruticosa* (L.) Griseb (from April to September only), *Ononis tridentata* L., *Osyris alba* L., *Pinus halepensis* Miller, *Quercus coccifera* L., *Retama sphaerocarpa* (L.) Boiss, *Rhamnus lycioides* L., *Rosmarinus officinalis* L., *Salsola vermiculata* L., *Santolina chamaecyparissus* L., *Suaeda vera* J. F. Gmelin y *Tamarix canariensis* Willd. During 1994, the following plants were swept with the same frequency: *Asparagus acutifolius* L., *Frankenia thymifolia* Desf., *Lepidium subulatum* L., *Peganum harmala* L., *Salvia lavandulifolia* Vahl. and *Thymus vulgaris* L. More samples were taken before and

after those years but without regularity on the same and other plant species like *Carduus bourgeanus* Boiss. et Reut., the *Carduo pycnocephali-Hordeetum leporini* Br.-Bl. community, *Medicago sativa* L., *Onopordum corymbosum* Willk and *Reseda lutea* L.

Wilkening trap. Four traps built according the model of WILKENING *et al.* (1981) were used, sized 32 cm high and 11 cm wide. They were placed into the branches of *J. phoenicea*, *J. thurifera* and *P. halepensis*, between brushes of *R. officinalis*, and inside an old building for sheeps. They were working from January to December 1992. Samples were removed once a week and grouped by fortnights.

Other trapping methods like carrion trap, Berlese funnels or traps inside rabbit's burrows were unsuccessful in collecting shore flies.

FAUNISTICAL ACCOUNT

SUBFAMILY DISCOMYZINAE

Clanoneurum cimiciforme (Haliday, 1855)

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1905 – Alicante), CZERNY (1909 – Elche) and ARIAS ENCOBET (1912) (in all cases as *Cyclocephala margininervis* or *Clanoneurum margininerve*).

Examined material: 8 ♂♂ 11 ♀♀. Moericke trap: 11.VII.90: 1 ♀. Coloured dishes: 16.IX.90: 2 ♂♂; 12.I.91: 1 ♂; 25.III.91: 1 ♀; 20.VI.91: 2 ♂♂ 1 ♀. By swept: on *Atriplex halimus*: 22.VIII.92: 1 ♂ 2 ♀♀; on *Gypsophila struthium*: 12.VIII.92: 1 ♂ 1 ♀; on *Reseda lutea*: 18.VI.93: 1 ♀; on *Suaeda vera*: 15.VI.91: 1 ♀; 28.VI.91: 1 ♀; on *Tamarix canariensis*: 12.VIII.92: 1 ♂ 2 ♀♀.

Psilopa compta (Meigen, 1830)

Distribution: Holartic and Afrotropical; already recorded from Iberian peninsula by STROBL (1905 – Alicante, Almería, Algeciras, Monistrol, Malgrat), CZERNY (1909 – Algeciras, Tarifa, San Fernando, Alicante, Elche, Malgrat), ARIAS ENCOBET (1912), and SANTAMARÍA & ROSSI (1998 – Barcelona, Bescanó, Gualba, Gualba de Baix, Gualba river).

Examined material: 3 ♂♂ 2 ♀♀. Malaise trap: 19.II.91: 1 ♂. Light trap: 14.IX.90: 1 ♂. By swept: on *Artemisia herba-alba*: 14.XI.92: 1 ♀; on *Reseda lutea*: 18.VI.93: 1 ♀; on *Salsola vermiculata*: 13.IX.92: 1 ♂.

Psilopa leucostoma (Meigen, 1830)

Distribution: Holarctic; already recorded from Iberian peninsula by STROBL (1905 – Ronda, Alicante), CZERNY (1909 – Algeciras, San Fernando) and ARIAS ENCOBET (1912).

Examined material: 2 ♂♂ 1 ♀. Coloured dishes: 16.IX.90: 1 ♂; 12.I.91: 1 ♂. By swept: on *Suaeda vera*: 9.VI.91: 1 ♀.

Psilopa marginella (Fallén, 1823)

Distribution: Europe. Not previously recorded in Spain.

Examined material: 2 ♀♀. Coloured dishes: 14.IV.90: 1 ♀. By swept: on *Suaeda vera*: 9.VI.91: 1 ♀.

Psilopa nana Loew, 1860

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1900 – Algeciras), STROBL (1905 – Alicante), CZERNY (1909 – Andalucía) and ARIAS ENCOBET (1912).

Examined material: 4 ♂♂ 6 ♀♀. Moericke trap: 20.X.91: 1 ♂. Coloured dishes: 9.III.91: 1 ♀. Malaise trap: 17.X.90: 1 ♂ 3 ♀♀. Light trap: 14.X.90: 1 ♂ 2 ♀♀. Wilkening trap on *Juniperus thurifera*: 10.VI.92: 1 ♂.

Psilopa nitidula (Fallén, 1813)

Distribution: Palaearctic and Afrotropic; already recorded from Iberian peninsula by STROBL (1905 – Algeciras, Alicante, Almería, Ronda, Monistrol, Malgrat), CZERNY (1909 – Algeciras, Tarifa, San Fernando, Alicante, Elche, Malgrat), ARIAS ENCOBET (1912), SANTAMARÍA & ROSSI (1998 – several localities) and ZATWARNICKI (1991 – Santiago de Compostela).

Examined material: 9 ♂♂ 16 ♀♀. Moericke trap: 7.I.91: 2 ♂♂ 1 ♀; 9.II.91: 1 ♂; 20.II.91: 2 ♂♂ 1 ♀; 7.V.91: 1 ♂. Coloured dishes: 12.I.91: 1 ♂ 1 ♀. Malaise trap: 10.IX.90: 1 ♀; 17.X.90: 1 ♂; 11.XI.90: 2 ♀♀; 7.I.91: 2 ♀♀; 21.II.91: 1 ♀. By swept: on the *Agropyro-Lygeion*: 10.XI.91: 1 ♂ 1 ♀; on *Artemisia herba-alba*: 14.X.92: 2 ♀♀; 24.X.92: 1 ♀; on *Juniperus thurifera*: 4.I.91: 1 ♀; 5.XII.92: 1 ♀; on *Suaeda vera*: 11.X.92: 1 ♀.

Psilopa obscuripes Loew, 1860

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1905 – Algeciras, Alicante, Almería, Ronda, Monistrol, Malgrat), CZERNY (1909 – Elche, San Celoni) and ARIAS ENCOBET (1912).

Examined material: 3 ♂♂ 2 ♀♀. Coloured dishes: 12.I.91: 1 ♂; 7.V.91: 1 ♂. By swept: on *Artemisia herba-alba*: 14.X.92: 1 ♀; on *Gypsophila struthium*: 10.IX.92: 1 ♀; on *Suaeda vera*: 21.VI.89: 1 ♂.

Psilopa roederi Girschner, 1889

Distribution: Europe; not previously recorded in Spain.

Examined material: 1 ♂. By swept: on the *Agropyro-Lygeion*: 20.IV.92: 1 ♂.

SUBFAMILY HYDRELLINAE

Atissa limosina Becker, 1896

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1900 – Algeciras), STROBL (1905 – Alicante), and ARIAS ENCOBET (1912).

Examined material: 1 ♂. Coloured dishes: 21.VII.91: 1 ♂.

Atissa pygmaea (Haliday, 1833)

Distribution: Palaearctic and Afrotropic; already recorded from Iberian peninsula by CZERNY (1909 – Algeciras, Elche, Alicante, Játiva) and ARIAS ENCOBET (1912).

Examined material: 5 ♂♂ 3 ♀♀. Moericke trap: 25.III.91: 1 ♀; 9.IV.91: 1 ♀. Coloured dishes: 9.IX.91: 1 ♂. Light trap: 25.VIII.90: 3 ♂♂ 1 ♀; 20.VII.93: 1 ♂.

Ptilomya angustigenis Becker, 1926

Distribution: Western Palaearctic; not previously recorded in Spain.

Examined material: 1 ♂. Light trap: 18.IX.92: 1 ♂.

Schema acrostichale (Becker, 1903)

Distribution: Western Palaearctic; already recorded from Iberian peninsula by CZERNY (1909 – San Fernando, Elche) and ARIAS ENCOBET (1912).

Examined material: 1 ♂ 1 ♀. Coloured dishes: 16.IX.90: 1 ♂; 12.I.91: 1 ♀.

Hydrellia albifrons (Fallén, 1813)

Distribution: Western Palaearctic; not previously recorded in Spain.

Examined material: 2 ♂♂. Moericke trap: 8.IX.90: 1 ♂; 17.X.90: 1 ♂.

Hydrellia argyrogenis Becker, 1896

Distribution: Palaearctic; already recorded from Iberian peninsula by STROBL (1905), CZERNY (1909) (in both cases Alicante, Elche) and ARIAS ENCOBET (1912).

Examined material: 3 ♂♂ 1 ♀. Moericke trap: 17.X.90: 3 ♂♂. Light trap: 20.VII.93: 1 ♀.

Hydrellia fascitibia von Roser, 1840

Distribution: Holarctic; not previously recorded in Spain.

Examined material: 1 ♀. Light trap: 10.IX.93: 1 ♀.

Hydrellia griseola (Fallén, 1813)

Distribution: Cosmopolitan; already recorded from Iberian peninsula by STROBL (1900; 1905 – several localities), CZERNY (1909 – Algeciras, Alicante, Malgrat, San Celoni) and ARIAS ENCOBET (1912).

Examined material: 140 ♂♂ 104 ♀♀. Moericke trap: 28.V.90: 3 ♂♂ 1 ♀; 12.VI.90: 1 ♂; 28.VIII.90: 3 ♀♀; 8.IX.90: 3 ♂♂ 1 ♀; 17.X.90: 5 ♂♂ 7 ♀♀; 29.X.90: 1 ♂ 1 ♀; 11.XI.90: 1 ♂ 1 ♀; 20.II.91: 1 ♂ 1 ♀; 25.III.91: 7 ♂♂ 10 ♀♀; 9.IV.91: 9 ♂♂ 6 ♀♀; 7.V.91: 52 ♂♂ 27 ♀♀; 24.V.91: 22 ♂♂ 17 ♀♀; 20.X.91: 3 ♂♂; 9.XI.91: 2 ♂♂ 4 ♀♀; 20.XI.91: 1 ♂; 20.XII.91: 4 ♂♂ 4 ♀♀. Coloured dishes: 22.VIII.90: 1 ♂; 16.IX.90: 1 ♀; 17.XI.90: 1 ♂; 9.II.91: 1 ♂; 20.II.91: 1 ♂; 25.III.91: 9 ♂♂ 9 ♀♀; 9.IV.91: 1 ♂; 24.IV.91: 1 ♂ 2 ♀♀; 7.V.91: 3 ♂♂ 1 ♀; 18.VI.91: 1 ♂; 8.VII.91: 1 ♀; 9.IX.91: 1 ♀; 9.X.91: 1 ♂; 25.XII.91: 1 ♀. Light trap: 14.IV.92: 1 ♂; 20.VII.93: 2 ♀♀; 10.IX.93: 1 ♂ 1 ♀; 10.XI.93: 1 ♂. By swept: on *Artemisia herba-alba*: 7.XI.92: 1 ♀; on the *Carduo pycnocephali-Hordeetum leporini*: 20.IV.92: 1 ♀; on *Medicago sativa*: 26.VII.92: 2 ♂♂.

Hydrellia maura Meigen, 1838

Distribution: Western Palaearctic; already recorded from Iberian peninsula by (STROBL, 1900 – Lanjarón, Irún), STROBL (1905 – San Celoni), CZERNY (1909 – Algeciras, Tarifa, upper Genil river) and ARIAS ENCOBET (1912) (in all cases as *H. modesta* Loew).

Examined material: 2 ♂♂. By swept: on *Medicago sativa*: 21.VII.92: 1 ♂; on *Retama sphaerocarpa*: 11.VI.92: 1 ♂.

Notiphila cinerea Fallén, 1813

Distribution: Palaearctic; already recorded from Iberian peninsula by STROBL (1900; 1905 – Algeciras), CZERNY (1909 – Algeciras, Tarifa, Elche, Malgrat, Orense), ARIAS ENCOBET (1912) and KRIVOSHEINA (1998 – Algeciras, Malgrat).

Examined material: 1 ♂ 1 ♀. Coloured dishes: 14.X.90: 1 ♀; 9.X.91: 1 ♂.

SUBFAMILY GYMNOMYZINAE

Allotrichoma filiforme Becker, 1896

Distribution: Western Palaearctic; already recorded from Iberian peninsula by CZERNY (1909 – Algeciras) and ARIAS ENCOBET (1912).

Examined Material: 93 ♂♂ 95 ♀♀. Moericke trap: 25.V.90: 1 ♂; 11.VII.90: 1 ♂; 28.VIII.90: 1 ♀; 8.IX.90: 1 ♂; 7.X.90: 2 ♂♂ 3 ♀♀; 11.XI.90: 1 ♀; 20.II.91: 1 ♂; 25.IV.91: 1 ♂; 20.X.91: 8 ♂♂ 10 ♀♀. Coloured dishes: 22.VIII.90: 2 ♂♂; 3.IX.90: 1 ♀; 16.IX.90: 1 ♂ 4 ♀♀; 6.X.90: 3 ♂♂ 1 ♀; 14.X.90: 8 ♂♂ 3 ♀♀; 3.XI.90: 1 ♀; 17.XI.90: 1 ♂ 1 ♀; 20.II.91: 1 ♂; 25.III.91: 6 ♂♂ 4 ♀♀; 9.IV.91: 1 ♂; 25.IV.91: 3 ♀♀; 7.V.91: 1 ♂; 8.VII.91: 1 ♀; 9.IX.91: 30 ♂♂ 34 ♀♀; 20.IX.91: 1 ♂; 9.X.91: 12 ♂♂ 10 ♀♀; 26.X.91: 5 ♂♂ 6 ♀♀; 10.XI.91: 1 ♀; 25.XI.91: 1 ♂. Malaise trap: 18.IX.90: 1 ♀; 17.X.90: 1 ♂ 3 ♀♀; 25.VIII.91: 1 ♂; 10.IX.91: 1 ♂; 9.XI.91: 1 ♀. Light trap: 20.IX.93: 1 ♀. By swept: on *Gypsophila struthium*: 2.X.94: 1 ♂ 1 ♀; on *Retama sphaerocarpa*: 11.VI.92: 1 ♂ 1 ♀. Pitfall trap with vinegar: 10.III.92: 1 ♀; 25.III.92: 1 ♀.

Diclasioipa lacteipennis (Loew, 1862)

Distribution: Holarctic and Afrotropic; already recorded from Iberian peninsula by STROBL (1905 – Ebenda, near Monistrol), ARIAS ENCOBET (1912) (in both cases as *Clasiopa xanthocera* Loew) and CANZONERI & MENEGHINI (1975 – Mijares river [Castellón]).

Examined material: 1 ♂ 3 ♀♀. By swept: on *Ephedra nebrodensis*: 20.IV.92: 1 ♀; on *Retama sphaerocarpa*: 11.VI.92: 1 ♂ 2 ♀♀.

Discocerina obscurella (Fallén, 1813)

Distribution: Cosmopolitan; already recorded from Iberian peninsula by CZERNY (1909 – Algeciras, San Pablo, upper Genil river), ARIAS ENCOBET (1912) and CANZONERI & MENEGHINI (1975 – Ebro river near Amposta and Tortosa; Mijares river near Castellón; Pirineos, La Junquera).

Examined material: 1 ♂. Moericke trap: 7.I.94: 1 ♂.

SUBFAMILY ILYTHERINAE

Nostima picta (Fallén, 1813)

Distribution: Holarctic; already recorded from Iberian peninsula by STROBL (1905 – Algeciras, Ronda), CZERNY (1909 – Elche), ARIAS ENCOBET (1912), and HOLLMANN-SCHIRRMACHER (1998a – Las Prescas and San Privat de Bas, near Olot [Gerona]).

Examined material: 2 ♂♂ 4 ♀♀. Moericke trap: 20.II.91: 1 ♂. Coloured dishes: 9.II.91: 1 ♀; 20.II.91: 1 ♀. Malaise trap: 19.II.91: 1 ♀. By swept: on the *Agropyro-Lygeion*: 13.IX.92: 1 ♀; on *Atriplex halimus*, 11.X.92: 1 ♂.

Philygria flavipes (Fallén, 1823)

Distribution: Palaearctic; already recorded from Iberian peninsula by STROBL (1900 – Irún), ARIAS ENCOBET (1912), and HOLLMANN-SCHIRRMACHER (1998a).

Examined material: 8 ♂♂ 5 ♀♀. Moericke trap: 7.V.91: 1 ♀. Coloured dishes: 25.III.91: 1 ♂. Malaise trap: 23.IX.91: 1 ♀. Light trap: 18.IX.92: 2 ♂♂. By swept: on *Artemisia herba-alba*: 24.X.92: 2 ♂♂; on the *Carduo pycnocephali-Hordeetum leporini*: 26.VII.92: 2 ♂♂; on *Medicago sativa*: 21.VII.92: 1 ♂ 1 ♀; on *Rosmarinus officinalis*: 30.IV.89, 1 ♀. Pitfall trap with beer: 10.V.91: 1 ♀.

Philygria stictica (Meigen, 1830)

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1900 – Játiva; Sierra Nevada; Sierra Morena; Madrid), CZERNY (1909 – El Escorial, sierra de Gredos), ARIAS ENCOBET (1912), and HOLLMANN-SCHIRRMACHER (1998a – prov. de Cáceres: Almonte river, Arroyo de la Vid; Noguera, Santander).

Examined material: 15 ♂♂ 7 ♀♀. Moericke trap: 25.IV.91: 1 ♀; 20.V.91: 1 ♂. Coloured dishes: 14.X.90: 1 ♀. Malaise trap: 18.IX.90: 1 ♀; 19.II.91: 1 ♀; 24.V.91: 1 ♂; 20.XII.91: 1 ♂. Light trap: 18.IX.92: 1 ♂. Wilkening trap on *Juniperus phoenicea*: 20.III.92: 2 ♂♂. By swept: on *Artemisia herba-alba*: 14.X.92: 1 ♂; 20.XII.92: 1 ♂; on *Carduus bourgeanus*: 14.V.91: 1 ♀; 20.V.91: 2 ♂♂ 2 ♀♀; on the *Carduo pycnocephali-Hordeetum leporini*: 20.XII.92: 2 ♂♂; on *Juniperus thurifera*: 20.IV.92: 1 ♂; on *Onopordum corymbosum*: 20.IV.93: 1 ♂; on *Salsola vermiculata*: 20.XII.92: 1 ♂.

SUBFAMILY EPHYDRINAE

Parydra hecate (Haliday, 1833)

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1905 – Alicante), CZERNY (1909 – San Pablo near Algeciras, Elche) and ARIAS ENCOBET (1912) (in all cases as *P. obliqua* Becker).

Examined material: 1 ♀. Coloured dishes: 14.IV.90: 1 ♀.

Parydra littoralis (Meigen, 1830)

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1900 – Irún), STROBL (1905 – Algeciras, Ronda) and ARIAS ENCOBET (1912).

Examined material: 1 ♂. Coloured dishes: 25.III.91: 1 ♂.

Brachydeutera ibari Ninomyia, 1929

Distribution: Oriental and Palaearctic; not previously recorded in Spain.

Examined material: 2 ♀♀. Moericke trap: 17.X.90: 1 ♀; 11.XI.90: 1 ♀.

Ephydra flavipes (Macquart, 1844)

Distribution: Afrotropical and Palaearctic; already recorded from Iberian peninsula by WIRTH (1975) in Calpe (Alicante), Algeciras and Sta. Eulalia, as *Ephydra helvanensis* Steyskal.

Examined material: 3 ♂♂ 2 ♀♀. Light trap: 8.VII.91: 1 ♂; 20.VII.93: 1 ♂ 2 ♀♀; 10.IX.93: 1 ♂.

Ephydra macellaria Egger, 1862

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1900 – Sierra Morena), STROBL (1905 – Alicante, Elche), CZERNY (1909 – Algeciras, San Fernando, Alicante, Elche), ARIAS ENCOBET (1912) and WIRTH (1975 – Alicante; Andalucía, Cádiz).

Examined material: 25 ♂♂ 15 ♀♀. Moericke trap: 17.X.90: 1 ♂. Coloured dishes: 21.VII.91: 1 ♂. Light trap: 8.VII.91: 1 ♀; 18.IX.92: 1 ♀; 25.V.93: 1 ♀; 25.VI.93: 1 ♀; 10.VII.93: 2 ♀♀; 20.VII.93: 8 ♂♂ 3 ♀♀; 10.VIII.93: 5 ♂♂; 10.IX.93: 8 ♂♂ 7 ♀♀; 30.IV.94: 1 ♂.

Halmopota mediterranea Loew, 1860

Distribution: Western Palaearctic; already recorded from Iberian peninsula by CZERNY (1909 – Elche, Algeciras), ARIAS ENCOBET (1912) and GIORDANI SOIKA (1958 – Elche).

Examined material: 2 ♀♀. Moericke trap: 7.V.91: 1 ♀. Coloured dishes: 22.IV.90: 1 ♀.

Haloscatella dictaeta (Loew, 1860)

Distribution: Afrotropical and Palaearctic; already recorded from Iberian peninsula by CZERNY (1909 – Algeciras, Elche) and ARIAS ENCOBET (1912).

Examined material: 1 ♂. Light trap: 20.VII.93: 1 ♂.

Lamproscatella sibilans (Haliday, 1833)

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1900 – Madrid, Brincola), STROBL (1905 – Alicante, Almería), CZERNY (1909 – Bobadilla, Algeciras) and ARIAS ENCOBET (1912).

Examined material: 1 ♂. Coloured dishes: 9.XII.91: 1 ♂.

Scatella lutosa (Haliday, 1833)

Distribution: Western Palaearctic; already recorded from Iberian peninsula by STROBL (1905 – Alicante), CZERNY (1909 – Alicante, Elche) and ARIAS ENCOBET (1912).

Examined material: 2 ♂♂ 3 ♀♀. Moericke trap: 17.X.90: 1 ♀; 11.XI.90: 1 ♂ 1 ♀; 25.IV.91: 1 ♂ 1 ♀.

Scatella paludum (Meigen, 1830)

Distribution: Afrotropical and Holartic; already recorded from Iberian peninsula by STROBL (1900 – Irún, Sierra Morena), STROBL (1905 – Alicante, Monistrol, Malgrat), CZERNY (1909 – Algeciras, Tarifa, Elche, upper Genil river) and ARIAS ENCOBET (1912) (as *S. sorbillans* Haliday).

Examined material: 3 ♂♂ 3 ♀♀. Moericke trap: 25.IV.91: 1 ♂ 1 ♀. Light trap: 8.VII.91: 1 ♀; 25.V.93: 1 ♂ 1 ♀; 20.VII.93: 1 ♂.

Scatella tenuicosta Collin, 1930

Distribution: Holartic. Not previously recorded in Spain.

Examined material: 17 ♂♂ 30 ♀♀. Moericke trap: 17.X.90: 3 ♀♀; 7.I.91: 1 ♂; 20.II.91: 1 ♂ 3 ♀♀; 9.III.91: 2 ♀♀; 25.III.91: 3 ♀♀; 25.IV.91: 5 ♂♂ 2 ♀♀; 7.V.91: 3 ♀♀; 20.V.91: 1 ♀; 20.X.91: 3 ♂♂ 1 ♀; 9.XI.91: 1 ♂ 1 ♀; 20.XII.91: 1 ♂. Coloured dishes: 22.VIII.90: 1 ♂; 17.XI.90: 1 ♀; 12.I.91: 1 ♀; 18.VI.91: 1 ♂ 1 ♀. Malaise trap: 17.X.90: 1 ♀; 9.IV.91: 1 ♀; 20.VI.91: 1 ♀; 20.X.91: 1 ♀. Light trap: 8.VII.91: 1 ♂; 20.VII.93: 2 ♂♂ 4 ♀♀.

Scatophila noctula (Meigen, 1830)

Distribution: Europe; not previously recorded in Spain.

Examined material: 1 ♀. Light trap: 25.VIII.90: 1 ♀.

Scatophila unicornis Czerny, 1900

Distribution: Holartic; already recorded from Iberian peninsula by CZERNY (1909 – upper Genil river) and ARIAS ENCOBET (1912).

Examined material: 1 ♀. Coloured dishes: 16.XII.89: 1 ♀.

RESULTS

In the Iberian Peninsula shore flies have never been studied, up till now, in a systematic way, with the use of multiple sampling techniques. This has permitted comparisons to be drawn between the relative effectiveness of the various techniques, with coloured traps (Moericke traps and dishes) proving

the most effective (Table I) both from a qualitative and a quantitative point of view, since most of the species have been collected with these techniques. Light traps and sweeping on plants are also interesting techniques to inventory the shore flies of a region. Incidentally, interception techniques have proved less effective, since they do not attract specimens in an active way.

Table I. Number of flies collected by different methods. Abbreviations: MR, Moericke trap; DS, coloured dishes; ML, Malaise trap; LT, light trap; PT, pitfall trap; SW, swept on plants; WK, Wilkening trap.

Tabla I. Número de ejemplares colectados mediante diferentes métodos. Abreviaturas: MR, trampa Moericke; DS, platos de colores; ML, trampa Malaise; LT, trampa luminosa; PT, trampa de caída; SW, barrido sobre plantas; WK, trampa Wilkening.

	MR	DS	ML	LT	PT	SW	WK	Total
<i>C. cimiciforme</i>	8	0	0	0	0	11	0	19
<i>P. compta</i>	0	0	1	1	0	3	0	5
<i>P. leucostoma</i>	0	2	0	0	0	1	0	3
<i>P. marginella</i>	0	1	0	0	0	1	0	2
<i>P. nana</i>	1	1	4	3	0	0	1	10
<i>P. nitidula</i>	8	2	7	0	0	8	0	25
<i>P. obscuripes</i>	0	2	0	0	0	3	0	5
<i>P. roederi</i>	0	0	0	0	0	1	0	1
<i>A. limosina</i>	0	1	0	0	0	0	0	1
<i>A. pygmaea</i>	2	1	0	5	0	0	0	8
<i>P. angustigenis</i>	0	0	0	1	0	0	0	1
<i>S. acrostichale</i>	0	2	0	0	0	0	0	2
<i>H. albifrons</i>	2	0	0	0	0	0	0	2
<i>H. argyrogonis</i>	3	0	0	1	0	0	0	4
<i>H. fascitibia</i>	0	0	0	1	0	0	0	1
<i>H. griseola</i>	198	36	0	6	0	4	0	244
<i>H. maura</i>	0	0	0	0	0	2	0	2
<i>N. cinerea</i>	0	2	0	0	0	0	0	2
<i>A. filiforme</i>	30	143	8	1	2	4	0	188
<i>D. lacteipennis</i>	0	0	0	0	0	4	0	4
<i>D. obscurella</i>	1	0	0	0	0	0	0	1
<i>N. picta</i>	1	2	1	0	0	2	0	6
<i>P. flavipes</i>	1	1	1	2	1	7	0	13
<i>P. stictica</i>	2	1	4	1	0	12	2	22
<i>P. hecate</i>	0	1	0	0	0	0	0	1
<i>P. littoralis</i>	0	1	0	0	0	0	0	1
<i>B. ibari</i>	2	0	0	0	0	0	0	2

Table I. (Continued). *Tabla I.* (Continuación)

	MR	DS	ML	LT	PT	SW	WK	Total
<i>E. flavipes</i>	0	0	0	5	0	0	0	5
<i>E. macellaria</i>	1	1	0	38	0	0	0	40
<i>H. mediterranea</i>	1	1	0	0	0	0	0	2
<i>H. dictaeta</i>	0	0	0	1	0	0	0	1
<i>L. sibilans</i>	0	1	0	0	0	0	0	1
<i>S. lutosa</i>	5	0	0	0	0	0	0	5
<i>S. paludum</i>	2	0	0	4	0	0	0	6
<i>S. tenuicosta</i>	31	5	4	7	0	0	0	47
<i>S. noctula</i>	0	0	0	1	0	0	0	1
<i>S. unicornis</i>	0	1	0	0	0	0	0	1
Total flies	299	208	30	78	3	63	3	684
Total species	18	21	8	16	2	14	2	37

As was to be expected, the number of collected flies was at its minimum during the Winter (Table II), and peaked in Spring and Autumn, both seasons with humid air and higher temperatures and the best for flowers. *H. griseola* and *S. tenuicosta* were common all year round. Most of the species are actually seasonal in their activity, and are active mainly in Autumn, Winter and early Spring, when water can be found in the area.

Table II. Number of flies collected during the four seasons. Spring: March to May; Summer: June to August; Autumn: September to November; Winter: December to February. *Tabla II.* Número de ejemplares colectados durante las cuatro estaciones. Primavera: de marzo a mayo; verano: de junio a agosto; otoño: de septiembre a noviembre; invierno: de diciembre a febrero.

	Spring	Summer	Autumn	Winter	Total
<i>C. camiciforme</i>	1	15	2	1	19
<i>P. compta</i>	0	1	3	1	5
<i>P. leucostoma</i>	0	1	1	1	3
<i>P. marginella</i>	1	1	0	0	2
<i>P. nana</i>	1	1	8	0	10
<i>P. nitidula</i>	1	0	10	14	25
<i>P. obscuripes</i>	1	1	2	1	5
<i>P. roederi</i>	1	0	0	0	1
<i>A. limosina</i>	0	1	0	0	1

Table II. (Continued). *Tabla II.* (Continuación)

	Spring	Summer	Autumn	Winter	Total
<i>A. pygmaea</i>	2	5	1	0	8
<i>P. angustigenis</i>	0	0	1	0	1
<i>S. acrostichale</i>	0	0	1	1	2
<i>H. albifrons</i>	0	0	2	0	2
<i>H. argyrogenis</i>	0	1	3	0	4
<i>H. fascitibia</i>	0	0	1	0	1
<i>H. griseola</i>	182	11	38	13	244
<i>H. maura</i>	0	2	0	0	2
<i>N. cinerea</i>	0	0	2	0	2
<i>A. filiforme</i>	19	8	141	20	188
<i>D. lacteipennis</i>	1	3	0	0	4
<i>D. obscurella</i>	0	0	0	1	1
<i>N. picta</i>	0	0	2	4	6
<i>P. flavipes</i>	4	4	5	0	13
<i>P. stictica</i>	7	5	4	6	22
<i>P. hecate</i>	1	0	0	0	1
<i>P. littoralis</i>	1	0	0	0	1
<i>B. ibari</i>	0	0	2	0	2
<i>E. flavipes</i>	0	4	1	0	5
<i>E. macellaria</i>	2	21	17	0	40
<i>H. mediterranea</i>	2	0	0	0	2
<i>H. dictya</i>	0	1	0	0	1
<i>L. sibilans</i>	0	0	0	1	1
<i>S. lutosa</i>	2	0	3	0	5
<i>S. paludum</i>	4	2	0	0	6
<i>S. tenuicosta</i>	17	11	12	7	47
<i>S. noctula</i>	0	1	0	0	1
<i>S. unicornis</i>	0	0	0	1	1
Total flies	250	100	262	72	684
Total species	19	21	23	14	37

As for the chorology, it is remarkable that all the species have wide ranges (Table III). Comparing these data with those of other insect groups, only the Drosophilidae seem to be similar, with 22,2% of the species West-Palaeartic and 38,8% cosmopolitan (BÄCHLI & BLASCO-ZUMETA, 1995). The other groups whose chorology has been analysed are mainly Medite-

rranean; they include the plants (70%) (MOLERO, 1988), the Thysanoptera (45%) (ZUR STRASSEN *et al.*, 1997) and the Heteroptera (67,4%) (RIBES *et al.*, 1997).

Table III. Chorology of shore flies of the forest of Retuerta de Pina.
Table III. Corología de los efídridos del sabinar de Retuerta de Pina.

Chorology	Number of species	Percentage
West-palaeartic	16	43,2
Palaeartic	8	21,6
Holarctic	8	21,6
Europe	3	8,1
Cosmopolitan	2	5,4

As a conclusion, the shore flies collected in Los Monegros region must be poorly specialised, and so they can live anywhere.

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