

Faunistic notes on some mayflies of Spain (Insecta: Ephemeroptera)

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Summary: In this note we present faunistic data for 145 Ephemeroptera specimens (23 taxa), collected during several sampling campaigns from 2010 to 2021 in some provinces of Spain. A total of 16 new records and finding of one partial gynandromorph are reported.

Key words: Faunistic records, mayflies, Ephemeroptera, gynandromorph, Spain.

Notas faunísticas sobre algunas efémeras de España (Insecta: Ephemeroptera)

Resumen: En este trabajo presentamos una serie de datos faunísticos de 145 ejemplares de efémeras (23 taxones), recolectados durante varias campañas durante el periodo 2010-2021 en varias provincias españolas. Se presenta 16 nuevas citas y un ginandromorfo.

Palabras clave: registros faunísticos, efémeras, Ephemeroptera, ginandromorfo, España.

Introduction

Faunistic checklists are an important tool to approach several biological questions, but only those countries or regions that have a long tradition of this type of study have sufficiently complete inventories to allow more in-depth studies on ecology or distribution patterns and dispersion. The Iberian Peninsula is a large area and there are still regions whose Ephemeroptera fauna is but poorly known despite the great work of researchers during the last 50 years (Alba-Tercedor, 1981; Alba-Tercedor *et al.*, 1992; Alba-Tercedor & Jáimez-Cuéllar, 2003; González Del Tánago, 1984). Between 2010 and 2021, during several sampling campaigns centred on Trichoptera, a total of 145 Ephemeroptera specimens (23 taxa) was obtained as bycatch in provinces La Rioja, Cáceres, Salamanca, Córdoba, Ciudad Real, Toledo and Teruel.

Methodology

All specimens were captured by J. Martínez and collaborators (see appendix I) using UVA light traps or beating with an entomological net on the riparian vegetation. The material has been preserved in 70% ethanol and deposited in the E. Bauernfeind collection at the Natural History Museum in Vienna (Austria).

Abbreviations: ♂ (male imago), ♀ (female imago), SI (subimago / subimagines), cf. (confer: compare), I-XII (months), La Rioja (LR), Cáceres (CC), Salamanca (S), Córdoba (CO), Ciudad Real (CR), Toledo (TO) and Teruel (TE).

Nomenclature follows Bauernfeind & Soldán (2012), for different taxonomic opinions see the detailed discussion there and in Kluge (2024).

Results

Below we present the results obtained using a faunal list in which we have annotated new faunistic records along with some biogeographic observations where necessary.

Faunistic Checklist

Fam. BAETIDAE Leach, 1815

Genus *Baetis* Leach, 1815

Baetis (Baetis) fuscatus (Linnaeus 1761)

MATERIAL STUDIED: Villaharta (CO), 15/VI/2011, 3 ♂♂.

Baetis (Baetis) cf. vernus Curtis, 1834

MATERIAL STUDIED: Posadas (LR), 1/VII/2015, 1♂. Viniegra de Abajo (LR), 5/VII/2015, 1♂.

OBSERVATIONS: Imagines of *B. vernus* show considerable variation

and in the absence of aquatic stages in our sample identification must remain provisional.

Baetis (Nigrobaetis) cf. niger (Linnaeus, 1761)

MATERIAL STUDIED: Guadalupe (CC), 14/VI/2011, 1 ♀.

OBSERVATIONS: So far not recorded from Cáceres. Several similar taxa of the species-group occur in the Mediterranean region and in the absence of aquatic stages in our sample identification must remain provisional.

Baetis (Rhodobaetis) cf. rhodani (Pictet, 1843)

MATERIAL STUDIED: Urdanta (LR), 1/VII/2015, 1 ♂. Camino a

Puente Rá (LR), 6/VII/2015, numerous ♂♂, ♀, SI. Monte Guirindolla (LR), 2/VII/2015, 1 ♂+ 1 ♀. Camarena de la Sierra (TE), 2/VII/2016, 1 ♀ (partial gynandromorph); the latter represents a predominantly female specimen (fore legs, abdomen filled with eggs) with phenotypically developed male eyes (turbinate eyes), similar to the specimen figured in Soldán & Landa (1981: fig. 13). Gynandromorphism in mayflies has first been reported by Lestage (1922), for more detailed information see Fusco & Minelli (2023). El Batán (TE), 13/X/2016, 1 ♀SI. Several similar taxa of the *B. rhodani* species-group occur in the Mediterranean region and in the absence of aquatic stages in our sample identification must remain provisional.

Genus *Cloeon* Leach, 1815

Cloeon (Cloeon) cognatum Stephens, 1836

MATERIAL STUDIED: Oropesa (TO), 9/V/2021-30/V/2021, 2♂♂.

OBSERVATIONS: the taxon is recorded for the first time from Castilla-La Mancha.

Genus *Procloeon* Bengtsson, 1915

Procloeon (Pseudocentropilum) cf. pennulatum (Eaton, 1870),

MATERIAL STUDIED: Área Recreativa Valvanera (LR), 4/VII/2015, 1♀. In the absence of male imagines and aquatic stages in our sample identification must remain provisional.

Procloeon (Pseudocentropilum) pulchrum (Eaton, 1885)

MATERIAL STUDIED: Obejo (CO), 15/VI/2011, 1♂+3♀♀. Villaharta (CO), 15/VI/2011, 3♂♂, numerous ♀♀.

Procloeon (Procloeon) ornatum Tshernova, 1928

MATERIAL STUDIED: Obejo (CO), 15/VI/2011, 3♂♂+ 2♀♀.

Fam. CAENIDAE Newman, 1853

Genus *Caenis* Stephens, 1836

Caenis luctuosa (Burmeister, 1839)

MATERIAL STUDIED: Puente Cubero (CC), 14/VI/2011, 1♂. Villaharta (CO), 15/VI/2011, numerous ♂♂.

***Caenis macrura* Stephens, 1836**

MATERIAL STUDIED: La Corchuela (TO), 2/VII/2021, 1 ♀. Villaharta (CO), 15/VI/2011, 4 ♂♂.

Fam. EPHEMERELLIDAE Klapálek, 1909

Genus *Ephemerella* Walsh, 1863

***Ephemerella ignita* (Poda, 1761)**

MATERIAL STUDIED: Ventrosa (LR), 5/VII/2015, numerous ♀♀. Viniegra de Abajo (LR), 5/VII/2015, numerous ♀♀. Camino a Puente Rá (LR), 6/VII/2015, 1 ♀. Candelario (S), 20/VII/2010, 1 ♂SI, 1 ♀. Camarena de la Sierra (TE), 2/VII/2016, 2 ♂♂SI 2 ♀♀SI. Calomarde (TE), 1/VII/2016, 2 ♂+2 ♀♀. Ermita de San Roque (TE), 2/VII/2016, 5 ♀♀.

OBSERVATIONS: despite being a species widely distributed throughout of the peninsula, the taxon is recorded for the first time in the provinces of Salamanca and La Rioja.

Fam. EPHEMERIDAE Latreille, 1810

Genus *Ephemera* Linnaeus, 1758

***Ephemera danica* Müller, 1764**

MATERIAL STUDIED: Viniegra de Abajo (LR), 5/VII/2015, 2 ♀♀ (much bleached).

Fam. HEPTAGENIIDAE Needham, 1901

Genus *Epeorus* Eaton, 1881

***Epeorus (Epeorus) torrentium* Eaton, 1881**

MATERIAL STUDIED: Ventrosa (LR), 5/VII/2015, 12 ♂+15 ♀. Camino a Puente Rá (LR), 6/VII/2015, 2♂+1♀. Viniegra de Abajo (LR), 5/VII/2015, 7 ♀. Área Recreativa de Valvanera (LR), 4/VII/2015, 1 ♂+2 ♀SI; 3♀♀. Monte Guirindolla (LR), 2/VII/2015, 1♂+1♀. Monte Rando (LR), 3/VII/2015, 3♂♂+1 ♀.

Genus *Ecdyonurus* Eaton, 1868

Ecdyonurus (Ecdyonurus) sp., Posadas (LR), 1/VII/15, 1 ♀SI.

***Ecdyonurus (Ecdyonurus) baeticus* Alba-Tercedor & Derka, 2004**

MATERIAL STUDIED: Leza (LR), 7/VII/2015, 5♂+ 2♀. Viniegra de Abajo (LR), 5/VII/2015, 3♀. Camino a Puente Rá (LR), 6/VII/2015, 2 ♂+1 ♀.

OBSERVATIONS: recorded for the first time in La Rioja. This taxon was recently collected in Asturias (Bauernfeind & Martínez, 2020). The new records extend the distribution notably towards the east of the Peninsula (but always associated with mountain ecosystems).

***Ecdyonurus (Ecdyonurus) codinai* Navás, 1924**

MATERIAL STUDIED: Mohedas de la Jara (TO), 19/V/2021, 1♂, 3♀♀. Villaharta (CO), 15/VI/2011, 10 ♂♂ 5 ♀♀.

OBSERVATIONS: Navás (1924) described the taxon from several specimens collected in Venta de Cárdenas (Ciudad Real). Later, these specimens have been studied and reviewed by Thomas (1968) and Alba-Tercedor & Peters (1985). It seems a rare species whose current distribution was supposed restricted to its type locality along with several localities in the Algarve (Portugal) (Haybach & Thomas, 1999). The above records are the first for the provinces of Toledo and Córdoba, expanding the distribution notably.

***Ecdyonurus (Ecdyonurus) insignis* (Eaton, 1870)**

MATERIAL STUDIED: Leza, río de Leza (LR), 7/VII/2015, 1♂SI

OBSERVATIONS: Reported so far from Orís (Navás, 1923; 1925) and río Besós (Puig, 1981) in Barcelona (Cataluña) (see Alba-Tercedor, 1981). Our capture is the first record for La Rioja.

Genus *Rhithrogena* Eaton 1881

Rhithrogena sp.: 3♂SI+2♀SI. Valvanera (LR), 4/VII/2015. Ventrosa (LR), 5/VII/15, 1♀. Viniegra de Abajo (LR), 5/VII/2015, 1♀.

Rhithrogena sp. (species-group *diaphana*): Guadalupe, La Cereceda (CC), 1 ♂SI.

***Rhithrogena dorieri* Sowa, 1971**

MATERIAL STUDIED: Ventrosa (LR), 5/VII/2015, 3♀♀. Posadas, Monte Mochitia (LR), 1/VII/2015, 1♀SI, Urdanta (LR), 1/VII/2015, 2♂♂+2♀♀.

OBSERVATIONS: captured for the first time in La Rioja. Until now, this species had only been recorded in Lerida (Pyrénées) (Gbif, 2024).

***Rhithrogena diaphana* Navás, 1916**

MATERIAL STUDIED: Posadas, Monte Mochitia (LR), 1/VII/2015, 2♂+3♀+ numerous ♂SI & ♀SI. Urdanta (LR), 1/VII/2015, 1♀SI. A.R. Valvanera (LR), 4/VII/2015, 4 ♂SI+3♀SI+3♀♀. Monte Guirindolla (LR), 2/VII/2015, 10♀SI+1♂+1♀.

OBSERVATIONS: captured for the first time in La Rioja. Until now, this species had only been cited from Lerida (Pyrénées) and Barcelona (Gbif, 2024).

Fam. LEPTOPHLEBIIDAE Banks, 1900

Genus *Choroterpes* Eaton, 1881

***Choroterpes (Choroterpes) salamannai* Gaino & Puig, 1996**

MATERIAL STUDIED: Mohedas de la Jara (TO), 30/V/2021, 1 ♀SI. Valle Ibañazo (CC), 21/VII/2010, numerous ♂♂SI+♀♀SI. Valle del Lóbrego (CO), 15/VI/2011, numerous ♂♂SI+♀♀SI. Obejo (CO), 15/VI/2011, numerous, ♂♂SI+♀♀SI.

OBSERVATIONS: The taxon was originally described from Jaraicejo (Cáceres) and also cited for Huelva (Gaino & Puig, 1996). Our captures expand the distribution into the provinces of Toledo and Córdoba.

***Choroterpes (Choroterpes) picteti* (Eaton, 1871)**

MATERIAL STUDIED: Piedrabuena (CR), 22/VII/2010, 3 ♂SI.

OBSERVATIONS: The taxon is widely distributed in the peninsula (Alba-Tercedor, 1981), but had so far not been recorded from Ciudad Real. However, it cannot be excluded that some older records (before 1996) in fact represent taxa closely related to *C. picteti* and not recognized at that time (e.g., *C. prati* Puig & Gaino 1996, *C. salamannai* Gaino & Puig, 1996).

Genus *Habroleptoides* Schoenemund, 1929

***Habroleptoides nervulosa* (Eaton, 1884)**

MATERIAL STUDIED: Posadas, Monte Mochitia (LR), 1/VII/2015, 5♂+13♀. Monte Guirindolla (LR), 2/VII/2015, 2 ♂+ 14♀. Camino a Puente Rá (LR), 6/VII/2015, 1 ♂.

OBSERVATIONS: the taxon is recorded for the first time in La Rioja.

***Habroleptoides umbratilis* (Eaton, 1884)**

MATERIAL STUDIED: Guadalupe (CC), 14/VI/2011, 1♀.

OBSERVATIONS: the taxon is recorded for the first time in Cáceres.

Fam. POLYMITARCYIDAE Banks, 1900

Genus *Ephoron* Williamson, 1802

***Ephoron virgo* (Olivier, 1791)**

MATERIAL STUDIED: Piedrabuena (CR), 22/VII/2010, 1 ♂. Luciana (CR), 22/VII/2010, 1 ♀.

OBSERVATIONS: The taxon is widely distributed in the peninsula (Alba-Tercedor, 1981; Gonzales Del Tánago, 1984).

Bibliography

- ALBA-TERCEDOR, J. 1981 (publ. 1982). *Recopilación de citas de Efemeropteros en la Península Ibérica e islas Baleares*. Trabajos y Monografías del Departamento de Zoología Departamento de Zoología, Universidad de Granada (1981) (N.S.) 4(2): 41–81.
- ALBA-TERCEDOR, J & P. JÁIMEZ-CUÉLLAR 2003. Checklist and historical evolution of the knowledge of Ephemeroptera in the Iberian Peninsula, Balearic and Canary Islands. In: Gaino E. (ed). *Research Update on Ephemeroptera & Plecoptera*. Università di Perugia, Italy. Proceedings of the 2001 International Joint Meeting, X International Conference on Ephemeroptera, XIV International Symposium on Plecoptera held August 5-11, 2001 in Perugia, Università di Perugia - Italy: 91–97.
- ALBA-TERCEDOR, J., G. GONZÁLEZ & M.A. PUIG 1992. Present level of knowledge regarding fluvial macroinvertebrate communities in Spain. *Limnetica*, 8: 231-241.
- ALBA-TERCEDOR, J. & W.L. PETERS 1985. Types and additional specimens of Ephemeroptera studied by Longinos Navás in the Museo

de Zoología del Ayuntamiento, Barcelona, Spain. *Aquatic Insects* 7: 215-227.

- BAUERNFEIND, E. & J. MARTÍNEZ 2020. New data on the mayflies of Asturias (northern Spain) (Ephemeroptera). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, 66: 241–242. Available at www.sea-entomologia.org
- BAUERNFEIND, E. & T. SOLDÁN, 2012. *The Mayflies of Europe (Ephemeroptera)*. Apollo Books, Ollerup, Denmark, 1-781.
- FUSCO, G. & A. MINELLI, 2023. Descriptive versus causal morphology: gynandromorphism and intersexuality. *Theory in Biosciences*, 142, 1–11.
- GAINO, E. & M. A. PUIG 1996. *Choroterpes (Choroterpes) salamannai*, a new species of mayfly from central and south west Spain (Ephemeroptera Leptophlebiidae). *Bollettino della Società Entomologica Italiana*, 128: 99–104.
- GBIF, 2024. Secretariat: GBIF Backbone Taxonomy. <https://www.gbif.org/es/species/1225> [accessed 18 May, 2024].
- GONZÁLEZ DEL TÁNAGO, M. 1984. Contribution to the zoogeography of the Spanish Ephemeroptera. In: Landa V., Soldán T. & M. Tonner (eds). *Proceedings of the Fourth International Conference on Ephemeroptera*. Bechyně, September 4-10, 1983. Institute of Entomology, Czechoslovak Academy of Science, České Budějovice: 1135-145.
- HAYBACH, A. & A. THOMAS 1999. Rediscovery of *Ecdyonurus codinai* Navás, 1924 in Portugal (Insecta: Ephemeroptera: Heptageniidae). *Ephemera* 1: 79–84.
- KLUGE, N. 2024. Ephemeroptera of the world. <https://insecta.bio.spbu.ru> (accessed 18-May-2024).
- LESTAGE, J.A. 1922. Deux cas de tératologie: chez une larve de *Perla abdominalis* Burm. (Plécoptère) et chez une femelle adulte de *Baetis rhodani* Pictet (Éphémère). *Annales de Biologie Lacustre* 11(1): 85–87.
- NAVÁS, L. 1923. Excursions entomologiques de l'Istiu de 1922. *Arxius de l'Institut de Ciències Barcelona*, 8: 1-34.
- NAVÁS, L. 1924. Insectes de l'excursió de D. Ascensi Codina a Castella i Andalusia, al juny de 1923. *Trabajos del Museo de Ciencias Naturales de Barcelona*, 4(11): 1–10.
- NAVÁS, L. 1925. Ephemeropteros de la Península Ibérica. Asociación Española para el Progreso de las Ciencias, Congreso de Coimbra 6: 157-161.
- PUIG, M.A. 1981. Introducción al estudio de Los Ephemeropteros (Cl. Insecta) de la cuenca del Río Besós. *Resúmenes de las comunicaciones del I Congreso Español de Hidrobiología*. Barcelona [cited in ALBA-TERCEDOR, 1981: 80].
- PUIG, M.A. & E. GAINO 1996. *Choroterpes (Choroterpes) prati* n.sp., a new species of mayfly from northeast of Spain (Ephemeroptera, Leptophlebiidae). *Annales de Limnologie- International Journal of Limnology*, 32: 229–233.
- SOLDÁN, T. & V. LANDA 1981. Gynandromorphism, intersexuality and teratology of external genitalia in the order Ephemeroptera. *Věstník Československé společnosti zoologické* 45: 189–203.
- THOMAS, A. 1968. Quelques *Ecdyonurus* et *Rhithrogena* européens de la collection Navás (Ephemeroptera). *Annales de Limnologie*, 4: 209-218.

APPENDIX I. List of locations. Datum WGS84

LA RIOJA

- Área Recreativa Valvanera, río Valvanera, 773 m. 42° 13' 39.88" N- 2° 49' 59.22" W. Leg. J. Martínez, L. Martín & M. A. González.
- Camino a Puente Rá, Villoslada de Cameros, arroyo de Puente Rá, 1283m. Sierra Cebollera. 42° 2' 42.9" N- 2° 41' 11.7" W. Leg. J. Martínez, L. Martín & M. A. González.
- Leza de Río Leza, río Leza, 536 m. 42° 19' 36" N- 2° 24' 27.34" W. Leg. J. Martínez, L. Martín & M. A. González.
- Monte Guirindolla, Posadas, Ezcaray, arroyo Ortigal, 1063m. Sierra de la Demanda. 42° 13' 24.17" N- 3° 2' 32.80" W. Leg. J. Martínez, L. Martín & M. A. González.
- Monte Rando, San Millán de la Cogolla, tributary río Cárdenas, 1142 m. Sierra de la Demanda. 42° 15' 19" N- 2° 55' 32" W. Leg. J. Martínez, L. Martín & M. A. González.
- Posadas, Monte Mochitia, Ezcaray, arroyo de Ortigal, 1017 m. Sierra de la Demanda. 42° 13' 47.38" N- 3° 2' 38.79" W. Leg. J. Martínez, L. Martín & M. A. González.
- Urdanta, arroyo Beneguera, 1015 m. Sierra de la Demanda. 42° 16' 42.24" N- 2° 59' 15.77" W. Leg. J. Martínez, L. Martín & M. A. González.
- Ventrosa, río Ventrosa, 896m. 42° 9' 35" N- 2° 52' 31" W. Leg. J. Martínez, L. Martín & M. A. González.
- Viniestra de Abajo, río Urbión, 1021m. 42° 7' 28.05" N 2° 52' 29.99" W. Leg. J. Martínez, L. Martín & M. A. González.

CASTILLA LA MANCHA

Toledo province

- La Corchuela, río Tietar, 317 m. 40°05' 32.50" N- 5°12' 44.72" W. Leg. J. Martínez.
- Mohedas de la Jara, arroyo del Cubilar, 594m; 39°35' 42.06" N- 5°5' 30.29" W. Leg. J. Martínez.
- Oropesa, 413m; 39°55' 4.06" N- 5°10' 28.36" W. Leg. J. Martínez

Ciudad Real province

- Luciana, río Bullaque, 533m. 38° 59' 10.18" N- 4°17' 9.92" W. Leg. J. Martínez & M. A. González.
- Piedrabuena, río Bullaque, 533m. 39°2' 51" N- 4°14' 24" W. Leg. J. Martínez & M. A. González.

EXTREMADURA (Cáceres province)

- Guadalupe, arroyo La Cereceda. Sierra de las Villuercas, 696 m. 39°33' 37.93" N- 5°23' 22.03" W. Leg. J. Martínez & M. A. González.
- Puente Cubero, río Pinarejo. Sierra de las Villuercas, 691 m. 39°31' 15.36" N- 5°21' 28.21" W. Leg. J. Martínez.
- Valle Ibañazo, río Ibor, Guadalupe. Sierra de las Villuercas, 680 m. 39°31' 31.48" N- 5°21' 56.19" W. Leg. J. Martínez & M. González.

CASTILLA Y LEÓN (Salamanca province)

- Candelario, río Jarilla, 1181m. Sierra de Candelario, 1181 m. 40°20' 34.62" N- 5°45' 56.03" W. Leg. J. Martínez & M. A. González.

ARAGÓN (Teruel province)

- Camarena de la Sierra, Fuente del Cabrito. Sierra de Javalambre, 1122m. 40°9' 49.80" N- 1°3' 18.87" W. Leg. J. Martínez, L. Martín & M. A. González.
- Calomarde, Molino de las Pisadas, río Fuente del Berro. Sierra de Albarracín, 1307m. 40° 22' 23.32" N- 1° 33' 9.40" W. Leg. J. Martínez, L. Martín & M. A. González.
- El Batán, Tramacastilla, río Guadalaviar. Sierra de Albarracín, 1237m. 40°25' 40.03" N- 1° 33' 37.12" W. Leg. J. Martínez, L. Martín & M. A. González.
- Ermita de San Roque, Camarena de la Sierra, río Camarena. Sierra de Javalambre, 1324m. 40° 8' 7.06" N- 1° 2' 31.72" W. Leg. J. Martínez, L. Martín & M. A. González.

ANDALUCÍA (Córdoba province)

- Obejo, Umbría del Cuzna, río Cuzna. Sierra Morena, 281m. 38° 8' 8.04" N- 4° 44' 24.79" W. Leg. J. Martínez & M. A. González.
- Valle del Lóbrego, Obejo, río Cuzna/ río Gato confluence. Sierra Morena, 275 m. 38° 8' 6.77" N- 4° 43' 58.22" W. Leg. J. Martínez & M. A. González.
- Villaharta, Majada del Perro, río Guadalbarbo. Sierra Morena, 390m. 38° 8' 9.82" N- 4° 51' 17.06" W. Leg. J. Martínez & M. A. González.