

# New records of Trichoceridae (Diptera) from the island of Mallorca

Andrius Petrašiūnas<sup>‡</sup>, Gunnar Mikalsen Kvitte<sup>§</sup>

<sup>‡</sup> Vilnius university, Vilnius, Lithuania

<sup>§</sup> University Museum of Bergen, Bergen, Norway

Corresponding author:

Academic editor: Jukka Salmela

## Abstract

## Background

The Trichoceridae are a small family distributed mainly in the Holarctic Region, most of which are associated with cold seasons and even snow. From the Iberian peninsula, 5 species have been recorded; however only a single previous occurrence record exists from the Balearic islands.

## New information

In this paper we present new records of two species from Mallorca, of which *Trichocera* (*Saltrichocera*) *saltator* (Harris, 1776) has not previously been recorded from the Balearic islands. *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818 is recorded for the first time from Mallorca. We furthermore discuss the species' distributions within the Mediterranean region and report new morphological data for the Mallorca island form of *T. saltator*.

## Keywords

Trichoceridae, faunistics, new records, Mallorca, Majorca, Balearic Islands, winter gnats

## Introduction

Winter gnats (Diptera: Trichoceridae) are a small family that includes approximately 160 recent species, 110 of which are classified in the widespread genus *Trichocera* Meigen, 1803. Species of this genus are mainly distributed in the Holarctic region and prefer lower temperatures, so are mostly observed during the colder season and even on snow.

In the catalogue of Diptera of Spain, Portugal and Andorra, Dahl et al. (2002) listed 5 species of Trichoceridae known from Spain with two of those – *Trichocera (Saltrichocera) annulata* Meigen, 1818 and *Trichocera (Saltrichocera) maculipennis* Meigen, 1818 – recorded from the Canary islands. There were no records of Trichoceridae from Balearic islands until 2009, when one male of *Trichocera (S.) annulata* was found on Menorca island (Carles-Tolrá and Ventura 2009).

Here we present further data on winter gnats of Balearic islands, with new records of this family from the island of Mallorca.

## Materials and methods

Specimens were collected by sweeping at various localities in Mallorca during February 2015, and preserved in 70–100% alcohol. Voucher specimens are retained in Museum of Zoology of Vilnius University (MZVU), Vilnius, Lithuania. Localities visited are given in Fig. 1 and the map was produced using the SimpleMappr online tool (Shorthouse 2010). Temperatures given in Table 1 are taken from the closest meteorological measuring stations presented by Meteo de Mallorca (2016); and are given as the minimum and the maximum measured temperature on the day of sampling.

## Taxon treatments

### *Trichocera (Saltrichocera) annulata* Meigen, 1818

#### Materials

- a. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Son Tria recreational area; verbatimLocality: Spain, Mallorca, Esporles, Son Tria recreational area; verbatimLatitude: 39.663051; verbatimLongitude: 2.573698; decimalLatitude: 39.663051; decimalLongitude: 2.573698; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 9; habitat: streambank and fountain in recreational area; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 6DADC126-9C29-5895-AA82-5E2EE0AA2482
- b. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Torrent de Son Vic; verbatimLocality: Spain, Mallorca, Esporles, Torrent de Son Vic; verbatimLatitude: 39.670459; verbatimLongitude: 2.569193; decimalLatitude: 39.670459; decimalLongitude: 2.569193; georeferenceProtocol: label; georeferenceSources: Google

- Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 10; habitat: vegetation on stream banks; individualCount: 2; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 1A93EFBB-89CB-57B2-A888-4080B424F8F5
- c. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Torrent de Son Vic; verbatimLocality: Spain, Mallorca, Esporles, Torrent de Son Vic; verbatimLatitude: 39.670459; verbatimLongitude: 2.569193; decimalLatitude: 39.670459; decimalLongitude: 2.569193; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 10; habitat: vegetation on stream banks; individualCount: 1; sex: female; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: AE1C4346-B53E-57EB-A572-73C3C171B0D6
- d. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Banyalbufera; verbatimLocality: Spain, Mallorca, Banyalbufera; verbatimLatitude: 39.690612; verbatimLongitude: 2.525107; decimalLatitude: 39.690612; decimalLongitude: 2.525107; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 9; habitat: seashore cliffs; individualCount: 2; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 009010A3-49D9-552F-A767-2FD005C284E4
- e. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Deiá, Tributary to Torrent Major; verbatimLocality: Spain, Mallorca, Deiá, Tributary to Torrent Major; verbatimLatitude: 39.752634; verbatimLongitude: 2.642415; decimalLatitude: 39.752634; decimalLongitude: 2.642415; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 8; habitat: rocky stream bed with bryophytes; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 6B0A7674-3953-5EBC-BEC2-8C557D2EEBA0
- f. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Cala Figuera; verbatimLocality: Spain, Mallorca, Cala Figuera; verbatimLatitude: 39.330871; verbatimLongitude: 3.165476; decimalLatitude: 39.330871; decimalLongitude: 3.165476; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 11; habitat: open forest glade in town; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas;

- dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 31C2C5D1-EF7F-5198-827B-DE86C7CC5BBC
- g. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Cala Figuera; verbatimLocality: Spain, Mallorca, Cala Figuera; verbatimLatitude: 39.332245; verbatimLongitude: 3.166440; decimalLatitude: 39.332245; decimalLongitude: 3.166440; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 11; habitat: vegetation in canyon near port; individualCount: 2; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 7093C24D-2C4D-5E8D-8CE8-5E5A599D7CC7
- h. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Cala Figuera; verbatimLocality: Spain, Mallorca, Cala Figuera; verbatimLatitude: 39.332245; verbatimLongitude: 3.166440; decimalLatitude: 39.332245; decimalLongitude: 3.166440; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 11; habitat: vegetation in canyon near port; individualCount: 3; sex: female; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: A5039AF6-3FA5-593A-B763-6B56D3E34AEE
- i. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Son Serralta; verbatimLocality: Spain, Mallorca, Son Serralta; verbatimLatitude: 39.614133; verbatimLongitude: 2.553593; decimalLatitude: 39.614133; decimalLongitude: 2.553593; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 12; habitat: stream bank near bridge and waterfall; individualCount: 4; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 1030EB12-7753-5492-8752-3F55781BF152
- j. scientificName: *Trichocera (Saltrichocera) annulata* Meigen, 1818; scientificNameID: Trichocera (Saltrichocera) annulata Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: Trichocera; subgenus: Saltrichocera; specificEpithet: annulata; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Son Serralta; verbatimLocality: Spain, Mallorca, Son Serralta; verbatimLatitude: 39.614133; verbatimLongitude: 2.553593; decimalLatitude: 39.614133; decimalLongitude: 2.553593; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 12; habitat: stream bank near bridge and waterfall; individualCount: 4; sex: female; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 7FAF937F-3254-516C-B4C0-AD43CB01C3DF

## Notes

First records for Mallorca and second from the Balearic Islands (Fig. 2).

*Trichocera annulata* is widespread in the Mediterranean region, with records from Algeria (Edwards 1923), Asia Minor and Ethiopia (Dahl and Alexander 1976), Malta (Ebejer 2015), Morocco (Driauach et al. 2015) and Sardinia (Petrašūnas 2009). Along with our data from Mallorca, these records suggests that this species has an unusually high tolerance to warm temperatures within the genus *Trichocera*.

## *Trichocera (Saltrichocera) saltator* (Harris, 1776)

### Materials

- a. scientificName: *Trichocera (Saltrichocera) saltator* (Harris, 1776); scientificNameID: *Trichocera (Saltrichocera) saltator* (Harris, 1776); kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *saltator*; scientificNameAuthorship: (Harris, 1776); country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Torrent de Son Vic; verbatimLocality: Spain, Mallorca, Esporles, Torrent de Son Vic; verbatimLatitude: 39.670459; verbatimLongitude: 2.569193; decimalLatitude: 39.670459; decimalLongitude: 2.569193; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 10; habitat: vegetation on stream banks; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: 8A6E63A9-F2D2-541C-870B-610EC1352499
- b. scientificName: *Trichocera (Saltrichocera) saltator* (Harris, 1776); scientificNameID: *Trichocera (Saltrichocera) saltator* (Harris, 1776); kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *saltator*; scientificNameAuthorship: (Harris, 1776); country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Son Serralta; verbatimLocality: Spain, Mallorca, Son Serralta; verbatimLatitude: 39.614133; verbatimLongitude: 2.553593; decimalLatitude: 39.614133; decimalLongitude: 2.553593; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 12; habitat: stream bank near bridge and waterfall; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen; occurrenceID: D0BE6C29-F8AD-5A3D-8873-67F12978ED3B

### Notes

Previous records from the Iberian peninsula are only known from the Biscaya province in Northern Spain (Carles-Tolrá and Saloña 2004).

Specimens of *T. saltator* from Mallorca have around 30 setae on the ventral side of Sc vein, which is a case similarly observed in males of *T. pappi* Krzeminska, 2003 from Morocco (Driauach et al. 2015). However, in other characters the Mallorcan

specimens agree with *T. saltator*, including wing venation not typical for *T. pappi* and the species-specific male gonocoxal bridge and aedeagal complex (Fig. 3 A, B, D).

## Acknowledgements

We are grateful to Morten Stokkan, Cecilia Enriquez García and Pelayo Secades for help in arranging Gunnar M. Kvifte's stay in Mallorca; Morten Stokkan and Cecilia Enriquez García furthermore assisted in fieldwork and Morten Stokkan finally reviewed the localities.

## Author contributions

AP identified the species, curated specimens for permanent storage and produced the images. GMK collected specimens and prepared the manuscript for online submission. AP and GMK wrote the paper in tandem.

## References

- Carles-Tolrá M, Saloña M (2004) Nocturnal and crepuscular dipterans (Insecta: Diptera) collected with Malaise traps and light traps in the province of Vizcaya (Bizkaia, Spain). *Heteropterus Revista Entomología* 4: 41-49.
- Carles-Tolrá M, Ventura D (2009) New dipterans for the Balearic islands. *Heteropterus Revista Entomología* 9 (2): 161-163.
- Dahl C, Alexander CP (1976) A world catalogue of Trichoceridae Kertész, 1902 (Diptera). *Entomologica Scandinavica* 7 (1): 7-18. <https://doi.org/10.1163/187631276x00027>
- Dahl C, Krzemínska E, Baez M (2002) Trichoceridae. In: Carles-Tolrá Hjørt-Andersen M (Ed.) *Catálogo de los Díptera de España, Portugal y Andorra* (Insecta). Monografías de S.E.A. 8, Zaragoza, 82 pp.
- Driauach O, Krzemínska E, Belqat B (2015) Genus *Trichocera* in Morocco: first records from Africa and a new species (Diptera: Trichoceridae). *Zootaxa* 4059 (1): 181-190. <https://doi.org/10.11646/zootaxa.4059.1.10>
- Ebejer M (2015) The Craneflies (Diptera, Tipulidae and Limoniidae) and winter gnats (Diptera, Trichoceridae) of Malta. *Bulletin of the Entomological Society of Malta* 7: 51-55.
- Edwards FW (1923) Notes on the Dipterous family Anisopodidae. *Annals & Magazine of Natural History* 9 (12): 475–493. <https://doi.org/10.1080/00222932308632964>
- Meteo de Mallorca (2016) Meteo de Mallorca. <http://www.meteodemallorca.com/>. Accessed on: 2016-1-14.
- Petrašiūnas A (2009) A new species of *Trichocera* Meigen (Diptera: Trichoceridae) from Sardinia. *Zootaxa* 2108: 62-64.
- Shorthouse DP (2010) SimpleMappr, an online tool to produce publication-quality point maps. <http://www.simplemappr.net>. Accessed on: 2015-12-16.

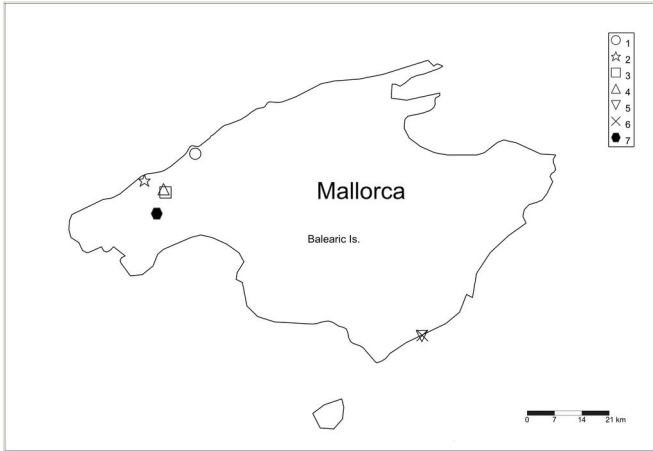


Figure 1.  
Map of localities for Mallorcan *Trichocera* (see Table 1 for locality details).



Figure 2.  
*Trichocera annulata* Meigen, 1818 female from Mallorca.



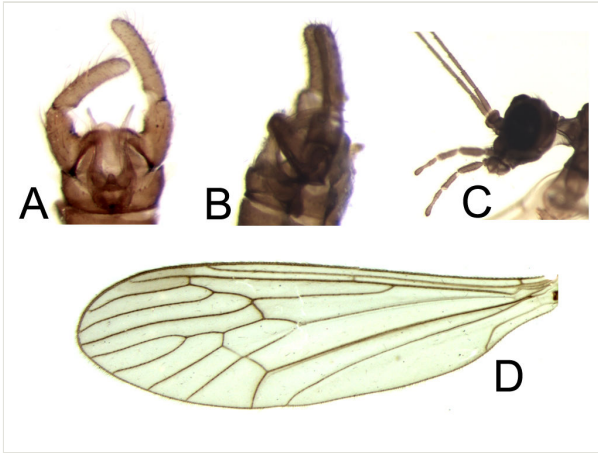


Figure 3.

*Trichocera saltator* (Harris, 1766), morphological characters. A, Male genitalia, ventral view; B, Male genitalia, lateral view; C, Head with basal antennal segments, lateral view; D, Wing

Table 1.

## Localities of Mallorcan Trichoceridae

Locality number	North	East	Locality name	Habitat	Sampling date	Temperature range in centigrades	Collectors
1	39.670459	2.569193	Esportes, Torrent de Son Vic	vegetation on stream banks	10.02.2015	3–15	G.Kvifte
2	39.752634	2.642415	Deia, Tributary to Torrent Major	rocky stream bed with bryophytes	08.02.2015	3–10	G.Kvifte, M. Stokkan & C.Garcia
3	39.663051	2.573698	Esportes, Son Tria recreational area	Vegetation near stream bank and fountain	09.02.2015	3–13	G.Kvifte & C.Garcia
4	39.690612	2.525107	Banyalbufera	Seaside cliffs	09.02.2015	3–13	G.Kvifte
5	39.332245	3.166440	Cala Figuera	vegetation in canyon near port	11.02.2015	5–16	G.Kvifte
6	39.330871	3.165476	Cala Figuera	open forest glade in town	11.02.2015	5–16	G.Kvifte
7	39.614133	2.553593	Son Serralta	stream bank near bridge and waterfall	12.02.2015	5–13	G.Kvifte