First record of *Buchonomyia thienemanni* Fittkau, 1955 (Diptera, Chironomidae) from the north-eastern Iberian Peninsula (Zaragoza, Spain)

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Abstract: The first record of *Buchonomyia thienemanni* Fittkau, 1955 (Diptera, Chironomidae) from north-eastern Spain is presented (Gállego river at Santa Eulalia de Gállego, Zaragoza province). This interesting species has been previously recorded from Spain in the Ulla river (A Coruña, north-western Spain) and in the upper reaches of the Guadalquivir river (Jaén, south-eastern Spain). Thus, this represents the fourth record of the species from the Iberian Peninsula and considerably extends its current known distribution in the region.
Key words: Diptera, Chironomidae, Buchonomyiinae, *Buchonomyia thienemanni*, Iberian Peninsula, Aragón, Gállego river.

Primer registro de *Buchonomyia thienemanni* Fittkau, 1955 (Diptera, Chironomidae) del noreste de la Península Ibérica (Zaragoza, España)
Resumen: *Buchonomyia thienemanni* Fittkau, 1955 (Diptera, Chironomidae) se cita por primera vez del cuadrante noreste de la península ibérica, en el río Gállego a su paso por Santa Eulalia de Gállego (Zaragoza). Se trata de la cuarta cita para la Península Ibérica de esta interesante especie, tras la del río Ulla (A Coruña, noroeste de España) y las del alto Guadalquivir (Jaén, sureste de España). Con esta cita se amplía considerablemente el rango de distribución conocido de la especie en la Península.
Palabras clave: Diptera, Chironomidae, Buchonomyiinae, *Buchonomyia thienemanni*, Península Ibérica, Aragón, río Gállego.

Introduction

The family Chironomidae can tolerate a wide range of environmental conditions and is the most widely distributed dipteran family being found in terrestrial, marine and fresh-water habitats (Armitage *et al.*, 1995). Buchonomyiinae is among the 11 subfamilies described within Chironomidae (Sæther, 2000) and it is one of the less diversified, with only three living species currently known in the world, all in the genus *Buchonomyia* Fittkau, 1955: *B. thienemanni* Fittkau, 1955 (Western Palaearctic and Iran), *B. burmanica* Brundin and Sæther, 1978 (Northern Myanmar) and *B. brundini* Andersen and Sæther, 1995 (Costa-Rican mountains).

Buchonomyia thienemanni is believed (but still not confirmed) to be an ectoparasite on Psychomyiidae (Trichoptera) with larvae living as parasites and pupating within the caddisfly larval case (Ashe, 1995; Ashe & O´Connor, 2002; Ashe *et al.*, 2015). Other life history traits include summer emergence, flying activity during summer-autumn or univoltinism (Murray & Ashe, 1981). At present, previous distribution data have highlighted a wide temperature range (from Southern Spain to Russia) and a preference for freshwater, in-channel lotic habitats, and low altitudes (<1000 m), while little more is known about its ecology (Murray & Ashe, 1981; Marziali *et al.*, 2004; Ashe *et al.*, 2015; Serra *et al.*, 2016). The conservation interest and vulnerability of this species has been also pointed out in France (Moubayed-Breil & Ashe, 2016), identifying habitat alteration and other human activities as the main factors causing the decline and loss of *B. thienemanni* populations.

The objective of the present paper is to provide a new record for this emblematic species, located in NE Spain, thus expanding considerably the known geographical distribution of *B. thienemanni* in the Iberian Peninsula. The main environmental features (biological, physicochemical and habitat variables) of the locality are summarized as well.

Materials and Methods

Benthic invertebrates were collected in summer 2017 (August 31st) along the Gállego River (Ebro River Basin, Spain) as part of routine biomonitoring programs in the Ebro River Basin, following the Spanish national sampling protocols (MAGRAMA, 2013). A hand net (mesh size 500 µm) was used and macroinvertebrates were preserved using ethanol 96%. Common physicochemical parameters were measured in-situ: conductivity, temperature, pH and dissolved oxygen concentration. Stream site average width and depth and other habitat features such as substrate size were estimated visually.

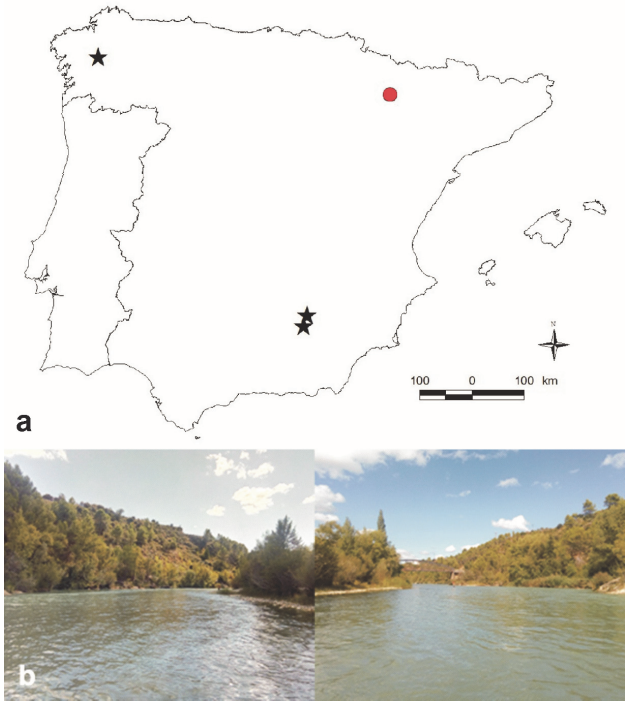

Fig. 1. Study area and sampling site. **a**) Map showing the three known localities (★) for *Buchonomyia thienemanni* in the Iberian Peninsula. The point ● represents the new locality, the Gállego river at Santa Eulalia de Gállego, Zaragoza. **b**) Panoramic view of the sampling site: downstream (left) and upstream (right).

Results and discussion

During this sampling, the stream reach presented the following physicochemical conditions: conductivity = 310 µS/cm; pH = 8.38; water temperature = 20.9 ºC and dissolved oxygen saturation = 110.5 %. The sampling site can be characterized by moderate turbulent flow and the substrate of the river bed was basically composed by blocks

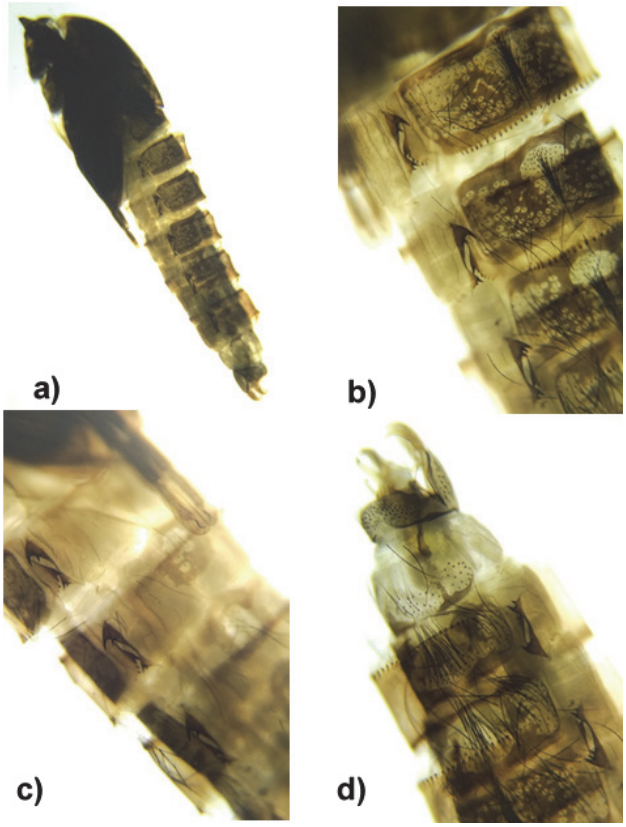

Fig. 2. Details of the studied pupa of *Buchonomyia thienemanni*: **a**) pupa, DL view. Note the lack of the VII-IX segment of the pupal skin; **b**) Tergites III-V showing the specialized lateral spines on the pupal abdomen, DL view; **c**) Sternites III-V, VL view. ; **d**) Last abdominal segments showing the 5th and 6th segment of the pupal skin and the sexual appendages of the pharate (segments VII-IX of the pupal skin missing), DL view.

and boulders. Aquatic macrophytes included *Rivularia* sp., *Groenlandia densa*, *Potamogeton berchtoldii*, etc. The estimated river width was 20 m and average depth was around 0.50-0.70 m (Fig 1). Following the European Water Frame Directive classification system in Spain, the ecological status of the site was classified as "very good" using macroinvertebrates (IBMWP index = 210) (Alba-Tercedor *et al.*, 2002) and as "very good" considering the riparian quality (QBR index= 90) (Munné *et al.*, 2003). Accompanying macroinvertebrate fauna included some larvae of *Psychomyia pusilla* (Fabricius, 1781) (Trichoptera, Psychomyiidae).

A pupa of Buchonomyiinae was detected and identified as *B. thienemanni* in the Gállego river (Zaragoza, Aragón Region, Spain, UTM coordinates GPS WGS84: 30N 685442 4682242, altitude: 425 m.a.s.l.) (Fig. 1). *Buchonomyia thienemanni* was identified by the easily identifiable morphological features of the pupa, specially the distinctive lateral spines on the pupal abdomen (Fig. 2), unique in Chironomidae. We followed pupal exuviae keys in Langton (1991) and confirmed the species following Murray & Ashe (1981) and Sæther (1986).

This species has been previously found in other countries as Germany, UK, France, Belgium, Luxembourg, Austria, Slovakia, Czech Republic, Italy, Russia, Albania, Morocco or Iran (Ashe *et al.*, 2015; Bitušik & Trnková, 2016), with a rapid increase of records based mostly on pupal exuviae and indicating a very broad spectrum of habitat tolerance (Ashe *et al.*, 2015). In Spain, *B. thienemanni* was previously known only from three localities: one in the Ulla river (A Coruña, Galicia, one sampling site near the locality of Santiso; Cobo *et al.*, 1989) and two in the upper Guadalquivir river (Jaén, Andalusia, in two sites, one upstream and one downstream the Tranco de Beas reservoir, in Cazorla; Calle Martinez *et al.*, 1995) (Fig. 1). Thus, this is the fourth record of *B. thienemanni* in the Iberian Peninsula, more than 20 years since the last record, and the first one for NE Spain (and for Zaragoza province and Aragón region, as well). It considerably expands the current known distribution of the species in this region.

Environmental variables of the collecting site are in concordance with previous records, and the co-occurrence of *Psychomyia pusilla* would support the ectoparasitic relationship with this species (Ashe *et al.*, 2015).

Finally, we want to stress the importance of preserving the species typical habitats, middle reaches of rivers, already identified as threatened freshwater ecosystems in the Iberian Peninsula (Sánchez-Fernández *et al.*, 2008; Guareschi *et al.*, 2015).

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