

Notas / Notes

On the larva of the Iberian allochthonous endemic firefly *Photinus immigrans* Zaragoza-Caballero & Viñolas, 2018 (Coleoptera, Lampyridae)

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ABSTRACT

The firefly species *Photinus immigrans* is currently known only from the Iberian Peninsula, although it is likely an introduced species that originated from somewhere in North America. Its last larval stage is here newly recorded and illustrated. The larvae can be easily distinguished from the larvae of Iberian native species by having several longitudinal light brown to reddish stripes on each segment on a black to dark brown background. They were found living in the soil, in the upper 10–15 cm. *P. immigrans* lives in sympatry with at least three other native lampyrid species: *Lampyris iberica*, *Nyctophila reichii* and *Lamprohiza mulsantii*, although it was not observed in strict syntopy, at least during larval phases, in our surveys. Larvae of *Photinus immigrans* probably use at least partly different alimentary resources, and adult communication signals are different to those of native species living in sympatry, although a detailed study of interspecific competition and the potential effect of the species on the native fireflies is pending.

Keywords: alien species, identification, sympatry, interspecific competition, larval stage.

RESUMEN

Sobre la larva de la luciérnaga ibérica endémica *Photinus immigrans* Zaragoza-Caballero & Viñolas, 2018 (Coleoptera, Lampyridae)

La luciérnaga *Photinus immigrans* se conoce únicamente en la península ibérica, aunque probablemente es una especie originaria de Norteamérica. En esta nota presentamos el primer registro e ilustración de su larva. Ésta puede ser fácilmente identificada gracias a su patrón de coloración, formado en cada segmento por varias líneas longitudinales marrón claro o rojizas sobre fondo negro o marrón oscuro. Se han encontrado viviendo enterradas en capas superficiales del suelo, hasta 10–15 cm de profundidad. *P. immigrans* vive en simpatria con al menos otras tres especies de luciérnaga nativas de la península ibérica: *Lampyris iberica*, *Nyctophila reichii* and *Lamprohiza mulsantii*, aunque aparentemente no hay sintopía estricta al menos durante las fases larvarias. Las larvas de *P. immigrans* probablemente utilizan recursos tróficos parcialmente diferentes a los de las especies nativas, y su señalización luminosa es también muy diferente a aquellas de otras especies simpátricas, aunque es necesario un estudio en profundidad sobre competencia interespecífica y el posible efecto de esta especie exótica sobre las luciérnagas nativas.

Palabras clave: especie introducida, identificación, simpatria, competencia interespecífica, estado larvario.

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Fireflies of the American genus *Photinus* Laporte, 1833 are widely distributed through North America, and particularly diverse in Mexico (Green, 1956; Zaragoza-Caballero, 1996; Zaragoza-Caballero & Viñolas, 2018; Zaragoza-Caballero *et al.*, 2020). Recently, a new species of *Photinus* was described from the Iberian Peninsula, representing the first record of the genus for the European continent (Viñolas *et al.*, 2018; Zaragoza-Caballero & Viñolas, 2018). The species is considered an alien in Europe that most likely comes from Mexico or the USA. It has been recorded in several localities throughout Girona province, Northeastern Iberian Peninsula (Zaragoza-Caballero & Viñolas, 2018), where its range might be expanding. Here we present the first record of the larvae of *P. immigrans* and some notes on their natural history.

During a summer field trip hundreds of adult male *P. immigrans* (Fig. 1a) were observed in the locality of Fonolleres, Girona (42.0201°N, 3.0542°E, 14m, August 19th, 2020), flying and flashing over corn fields just by the village soon after dark, in proximity with female specimens of the native *Lampyrus iberica* Geisthardt, Figueira, Day & De Cock, 2008 (Fig. 1e). We visited the same locality in autumn (November 16th, 2020) trying to locate and photograph *P. immigrans* larvae, but we could only find larvae of *Lamprohiza mulsantii* (Kiesenwetter, 1850) (Fig. 1c) and *Lampyrus iberica*. In the nearby locality of Ullastret, Girona (42.0089°N, 3.0778°E, 20m), in an area with wheat crops and small patches of natural vegetation dominated by *Quercus ilex* L., we also located larvae of *L. mulsantii* and *Nyctophila reichii* (Jacquelin Du Val, 1859) (Fig. 1d). In a new survey, during late winter at the same spot in Fonolleres (February 24th, 2021), we found 11 larvae of *P. immigrans* (Fig. 1b), superficially buried in a recently ploughed (less than a week) corn field.

De visu description: the larval sizes were ca. 10–15 mm length, with elongate vermiform body (Fig. 1a); observed larvae had 3 thoracic segments and 8 abdominal segments, all tergites were divided by a sagittal line in dorsal view; coloration was dorsally black to dark brown, each tergite had 2 longitudinal light-brown to reddish stripes laterally oriented and widened at posterior part. All specimens had pink lateral pleura and were ventrally lighter than dorsally. The specimens did not show bioluminescence at any point, when found or when disturbed.

The larvae of this species were found buried in the removed soil of a ploughed field, in the first 10–15 cm. By comparison, the native firefly larvae were found in all cases under rocks and debris, and they were not observed in strict syntopy during our surveys. According to the bibliographic records, other species of *Photinus* overwinter for 1–2 years as subterranean larvae, and feed mainly on earthworms and soft-bodied insects before pupating during early

summer (Williams, 1917; Hess, 1920). This different trophic niche exploitation may account for low trophic competition between *P. immigrans* and the native species. De Cock & Guzmán-Álvarez (2013) reported that some Iberian fireflies occasionally might feed on earthworms, but they preferentially feed on snails and slugs (Haddon, 1915; Symondson, 2004; De Cock & Guzmán-Álvarez, 2013). Mating behavior is also quite dissimilar among *P. immigrans* and most native Iberian species. In *Photinus* fireflies, males produce courtship flashes while flying and females reply to the preferred male with their own flashes (Cratsley & Lewis, 2003), whereas males of sympatric native species do not flash during flight and they are usually found flying looking for the continuous cold light produced by apterous females (Geisthardt *et al.*, 2008; De Cock, 2009; Novák, 2017, 2018). We hypothesize that interaction should be low between the alien *P. immigrans* and the sympatric native species. However, the species might potentially interfere with species with comparable mating behavior, like *Luciola lusitanica* (Charpentier, 1825), which was recorded historically in the Pyrenees, although its presence is not confirmed in this area (De la Fuente, 1931; De Cock & Guzmán-Álvarez, 2013; Constantin, 2014). A detailed study of interspecific competition and the putative effect of *P. immigrans* on the native firefly species and their prey is pending.

With this contribution we hope to facilitate the identification in the field of larval stages of this exotic species. A detailed description of all stages and larval instars is still needed, for which it is necessary to have access to abundant material including all larval stages. However, the information and images provided in this article will help to identify new populations of *P. immigrans* and track the colonization of new geographic areas during all seasons, as adults are only active in the summer months.

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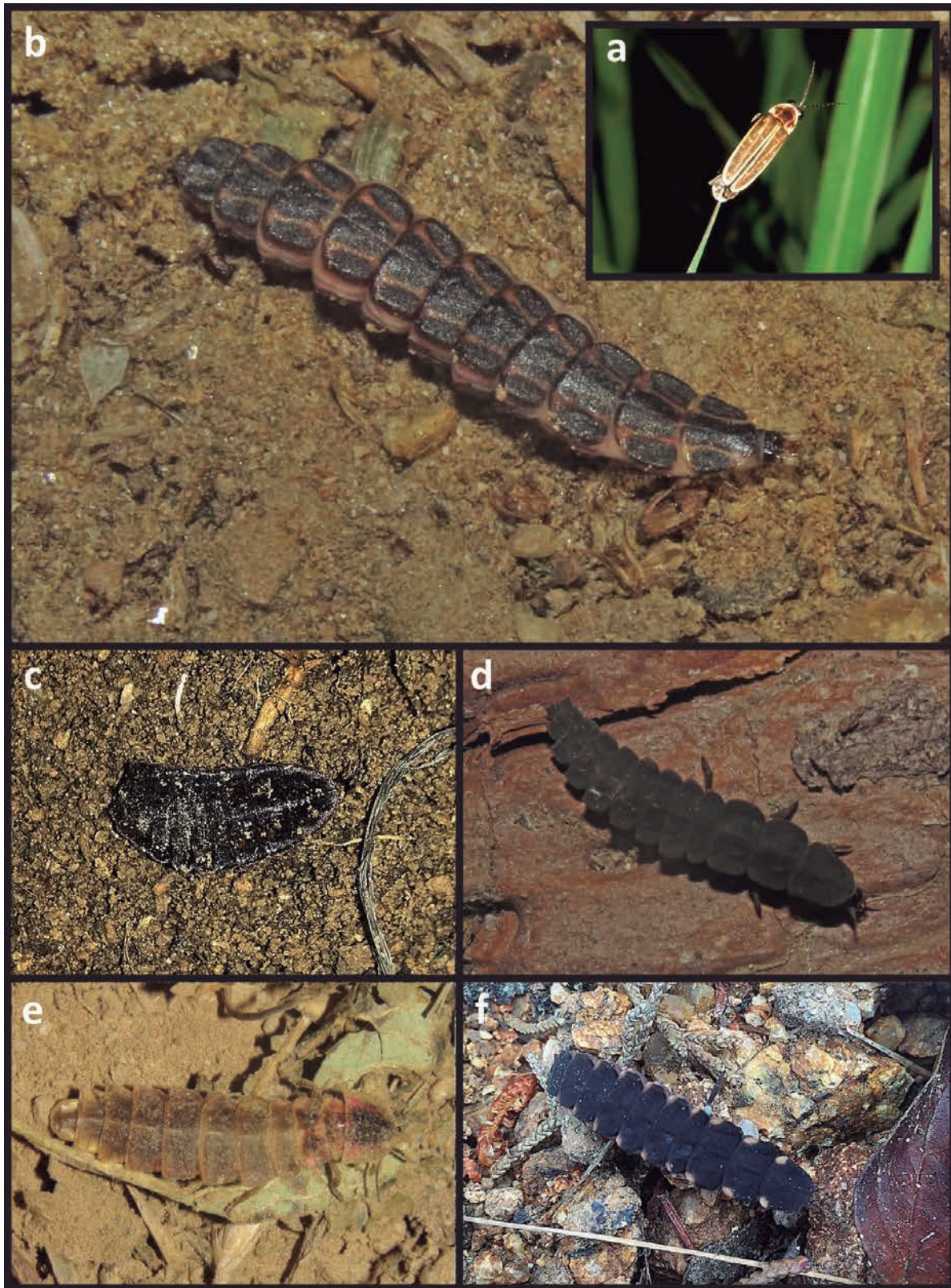


Fig. 1.— Habitus *in vivo*: a) adult male of *Photinus immigrans* from Fonolleres, Girona; b) larva of *Photinus immigrans* from Fonolleres, Girona; c) larva of *Lamprohiza mulsantii* from Fonolleres, Girona; d) larva of *Nyctophila reichii* from Ullastret, Girona; e) Adult female of *Lampyrus iberica* from Fonolleres, Girona; f) Larva of *Lampyrus iberica* from Blanes, Girona. Photo credits: E. Recuero (a, e); Paula C. Rodríguez-Flores (b, c, d, f).

Fig. 1.— Habitus *in vivo*: a) macho adulto de *Photinus immigrans* de Fonolleres, Girona; b) larva de *Photinus immigrans* de Fonolleres, Girona; c) larva de *Lamprohiza mulsantii* de Fonolleres, Girona; d) larva de *Nyctophila reichii* de Ullastret, Girona; e) Hembra adulta de *Lampyrus iberica* de Fonolleres, Girona; f) Larva de *Lampyrus iberica* de Blanes, Girona. Créditos de las fotos: E. Recuero (a, e); Paula C. Rodríguez-Flores (b, c, d, f).

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