

Supplementary Material: Quick spreading of populations of an exotic firefly throughout Spain and their recent arrival in the French Pyrenees

Online Search strategy

Photographs of *P. immigrans*/*P. signaticollis* lookalikes were searched on the internet on various platforms. First, we searched google images with the search terms "*Photinus*" & "Uruguay" and "*Photinus*" & "Argentina" and "luciérnaga" (firefly in Spanish) & "Argentina" and "luciérnaga" & "Uruguay", which immediately led us to material on EcoRegistros.org and www.fotosaves.com.ar.

In order to decide whether we were dealing with *P. immigrans*/*P. signaticollis*, the discriminatory features stated in M&M were applied.

EcoRegistros was further searched for photographic specimens by JRGA and RDC by scouring the platform on the search terms "Lampyridae", "luciérnaga" (firefly in Spanish) and "Photinus". RDC searched the online platform iNaturalist.org for specimens throughout South America for "Photinus", "Lampyridae" and "Lampyrinae".

At a later stage we also searched online for "*Photinus signaticollis*" but that did not yield any images or photos.

MALES



Male with typical pronotum coloration, slender; type with tapering elytra. More pale than typical colour, shoulder stripe (vitta) present but vague and blurry, scutellum quite pale overall (usually darker with paler margin)



Figure S1. Three males with less clear or incomplete shoulder stripes (vittae) and darkened elytral tips except of the pale margins. Note the typical tapering body shape of all; broadest at shoulders



Figure S2. Typical male, with shoulder vittae; pink line pronotum somewhat broadened anteriorly.

FEMALES



Figure S3. Four females, one with ventral view, 2 up with very clear pale shoulder stripes (vittae), one below with much less distinct vittae and somewhat darker elytra; all show typical pronotum colouration



Figure S4. Female with pronotal pink markings clearly present with a more marked central thickening on the line shape.



Figure S5. Female with vague almost absent shoulder vittae on quite dark elytra, and quite dark pronotum with very unclear pink pronotum markings.



Figure S6. Female with typical pronotum but very dark almost black instead of smoke grey elytra with only very vague start of shoulder stripes, very distinct pale elytral margins.



Figure S7. Typical female with with vittae



Figure S8. Female with typical coloration with shoulder vittae, but very faint and thin pink pronotal line markings

COUPLES



Figure S9. Male left, female right. Male more greyish elytra, without clear shoulder vittae and less yellowish (more greyish) elytral margins.



Figure S9. Typical 'Photinus' mating positions; first they start with male on female (position 1; ref. see Lynn Faust), to position 2 tail-to-tail (this photo); female up, male below. In *P. immigrans* females typically are always positioned head up on grass leaves; male clear vittae along whole elytra, female with shoulder vittae less clear from halfway elytra.

List of observers South America

Observers from Argentina in www.ecoregistros.org: Marcelo Zanotti, Diego Alfonso Rosa, Eduardo Beltrocco, Eduardo Nadal, Gustavo Peretti, Gustavo Puente, Jorge Iriberry, Lucas Rubio (also co-author), Luis Carlos De Volder, Mariano Kildegaard.

Observers from Argentina in www.fotosaves.com.ar: Alec Earnshaw

Observers from Argentina in www.inaturalist.org: "Emiss", "RAP", Abril Bastons, Candela Escudero, Diego Carús, Diego Emmanuel Oscar Diego Ese Olivera, Eduardo Luis Beltrocco, Emmanuel Zufiaurre, Ezeq DeRegibus, Federico "buddfyede", Gabriel Albelda, Gerónimo Martín Alonso, Gonzalo Roget, Humberto Debat, Inecaatro, Isadora, Isis Ibáñez, jfps, Juan José Bonanno, Juan Manuel Atencio, Leonel Roget, Lorena Zapata, Lucas Rubio (co-author), Luis Martínez Villa, Margarita Cervio, María Belén Dri, Martín Arregui, Michelle Delaloye, Nico Chimento, Pablo Bombín, Raúl Orencio, Ricardo Ernesto Doumecq Milieu, Roberto Battaglia, Roberto Guller, Rodrigo Carrera, Seba, sebinio28, Sebastián Fornés, Sol Quipildor, Verónica André

Observers from Uruguay in www.inaturalist.org: Bert "bert_in_the_skirt", Francisco Liguori, Miguel Latronico, Pablo Balduvino, Santiago Mailhos

List of online data of observations in Argentina and Uruguay used in this paper:

<https://www.inaturalist.org/observations/9092448>
<https://www.inaturalist.org/observations/60103447>
<https://www.inaturalist.org/observations/53426875>
<https://www.inaturalist.org/observations/36066055>
<https://www.inaturalist.org/observations/41019842>
<https://www.inaturalist.org/observations/35325161>
<https://www.inaturalist.org/observations/20787769>
<https://www.inaturalist.org/observations/18805968>
<https://www.inaturalist.org/observations/36166849>
<http://www.ecoregistros.org/site/imagen.php?id=370411>
<http://www.ecoregistros.org/site/registro.php?id=1128786>
<http://www.ecoregistros.org/site/imagen.php?id=299720>
<http://www.ecoregistros.org/site/imagen.php?id=198108>
<http://www.ecoregistros.org/site/imagen.php?id=361344>
<http://www.ecoregistros.org/site/imagen.php?id=320878%20>
<https://www.inaturalist.org/observations/18316136>
<http://www.ecoregistros.org/site/imagen.php?id=187582>
<http://www.ecoregistros.org/site/imagen.php?id=245055>
<http://www.ecoregistros.org/site/imagen.php?id=310238>
<http://www.ecoregistros.org/site/imagen.php?id=327273>
<http://www.ecoregistros.org/site/imagen.php?id=318191>
<http://www.ecoregistros.org/site/registro.php?id=905121>
<http://www.ecoregistros.org/site/registro.php?id=1209748>
<https://www.inaturalist.org/observations/38162436>
<https://www.inaturalist.org/observations/9117905>
<https://www.inaturalist.org/observations/35608451>
<https://www.inaturalist.org/observations/19868490> <https://www.inaturalist.org/observations/18339097>

<https://www.inaturalist.org/observations/36481364>
<https://www.inaturalist.org/observations/36825861>
<https://www.inaturalist.org/observations/47019535>
<https://www.inaturalist.org/observations/18558716>
<https://www.inaturalist.org/observations/50987617>
<https://www.inaturalist.org/observations/63602039>
<https://www.inaturalist.org/observations/36879280>
<https://www.inaturalist.org/observations/63592704>
<https://www.inaturalist.org/observations/19792046>
<https://www.inaturalist.org/observations/62719275>
<https://www.fotosaves.com.ar/FotosInsectos/FotosInsectos.html>
<https://www.inaturalist.org/observations/65631338>
<https://www.inaturalist.org/observations/65584286>
<https://www.inaturalist.org/observations/65269471>
<https://www.inaturalist.org/observations/65241011>
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<https://www.inaturalist.org/observations/75447143>
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<https://www.inaturalist.org/observations/63279869>
<https://www.inaturalist.org/observations/59144904>
<https://www.inaturalist.org/observations/56677379>
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<https://www.inaturalist.org/observations/39798626>
<https://www.inaturalist.org/observations/42035277>
<https://www.inaturalist.org/observations/38488652>
<https://www.inaturalist.org/observations/36122001>
<https://www.inaturalist.org/observations/25925424>
<https://www.inaturalist.org/observations/25264292>
<https://www.inaturalist.org/observations/22166563>