

## Notas / Notes

### First record of *Strigamia maritima* (Leach, 1817) (Chilopoda, Geophilomorpha, Linotaeniidae) in Spain

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#### ABSTRACT

This report describes the first record of *Strigamia maritima* (Leach, 1817) in the Iberian Peninsula, which species was found in the Eo estuary, located in northwestern Asturias (northern Spain). Morphological and ecological features of *S. maritima* are reported and an illustrated identification key of the *Strigamia* Gray, 1843 species present in the Iberian Peninsula is provided.

**Keywords:** Halobiont; Eo estuary; Salías; Castropol; Asturias; Iberian Peninsula; keys of identification.

#### RESUMEN

##### Primera cita de *Strigamia maritima* (Leach, 1817) (Chilopoda, Geophilomorpha, Linotaeniidae) en España

En este informe se describe la primera cita de *Strigamia maritima* (Leach, 1817) en la península ibérica, encontrándose la especie en la ría del Eo localizada en el noroeste de Asturias (norte de España). Se comentan características morfológicas y ecológicas de *S. maritima* y se proporcionan claves de identificación ilustradas de las especies de *Strigamia* Gray, 1843 presentes en la península ibérica.

**Palabras clave:** Halobio; ría del Eo; Salías; Castropol; Asturias; península ibérica; claves de identificación.

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*Strigamia* Gray, 1843 is a genus of soil-dwelling centipedes widely distributed in both the Old and the New World and comprises over 70 species (Bonato *et al.*, 2011) of which at least 32 are considered valid (*sensu* Bonato *et al.*, 2012). In Europe 12 species are known although only half of these are proved to be valid (*sensu* Bonato & Minelli, 2014): *Strigamia acuminata* (Leach, 1816), *Strigamia cottiana* (Verhoeff, 1935), *Strigamia crassipes* (C.L. Koch, 1835), *Strigamia maritima* (Leach, 1817), *Strigamia pusilla* (Sselivanoff, 1884) and *Strigamia transsilvanica* (Verhoeff, 1928). In Spain only two species were known until the present record: *S. acuminata* and

*S. crassipes*, both apparently distributed in northern peripheral areas (Attems, 1952; Matic *et al.*, 1967; Salinas, 1990; Gregory & Lewis, 2015), although distribution of these species in Spain is poorly known. A third *Strigamia* species is now added to the Spanish catalogue of centipedes, *S. maritima*. The main goal of this work is to document this discovery by providing morphological and ecological data and updated keys of identification for the genus *Strigamia* in Spain.

*Strigamia* can be distinguished from other Spanish geophilomorph genera by several characters as the dark brown or reddish colour of the trunk, number of leg pairs, anterior part of the body slightly narrowed

and distally thickened throughout its length, a prominent basal denticle in the forcipular tarsungulum, pore-fields constricted mid-longitudinally in the posterior part of metasternites and many scattered ventral pores in the ultimate coxopleura. *Strigamia maritima* is readily differentiated from *S. acuminata* and *S. crassipes* by having sutural sulci separating pretergite and intercalary pleurites in the ultimate leg bearing segment (Bonato *et al.*, 2012; Iorio & Labroche, 2015). *Strigamia maritima* may also differ in habitat segregation because it is a halobiont species frequently found under stones in intertidal coastal areas or in rock crevices on cliffs (Leach, 1817; Barber, 2009; Racine & Iorio, 2017; Cherpitel *et al.*, 2019) since it can endure immersion in sea water for many hours (Lewis, 1961; Binyon & Lewis, 1963). The species is known from other coastal areas of Europe, specifically Belgium, Denmark, France, Germany,

Great Britain, Ireland, Netherlands, Norway, Poland and Sweden (Bonato *et al.*, 2012, 2016) (Fig. 1A). *Strigamia maritima* is one of the best known chilopod species with numerous biogeographical, development and genomic studies, especially in the past two decades (Kettle & Arthur, 2000; Chipman *et al.*, 2004, 2014; Arthur & Chipman, 2005; Horneland & Meidell, 2009; Simaiakis *et al.*, 2010; Brena & Akam, 2012, 2013; Robertson *et al.*, 2015; Green *et al.*, 2016, *inter alia*).

Sampling was carried out on 15<sup>th</sup> August 2019 in a location near the village of Salías (29T 660344 4821020), in the council of Castropol in the province of Asturias (northern Spain, near the border with Galicia) (Fig. 1B). The specimen was found under pebbles in the Eo estuary (Fig. 1C) at low tide at a distance of a few metres from the estuary shore. It was hand collected and then fixed in ethanol 70%

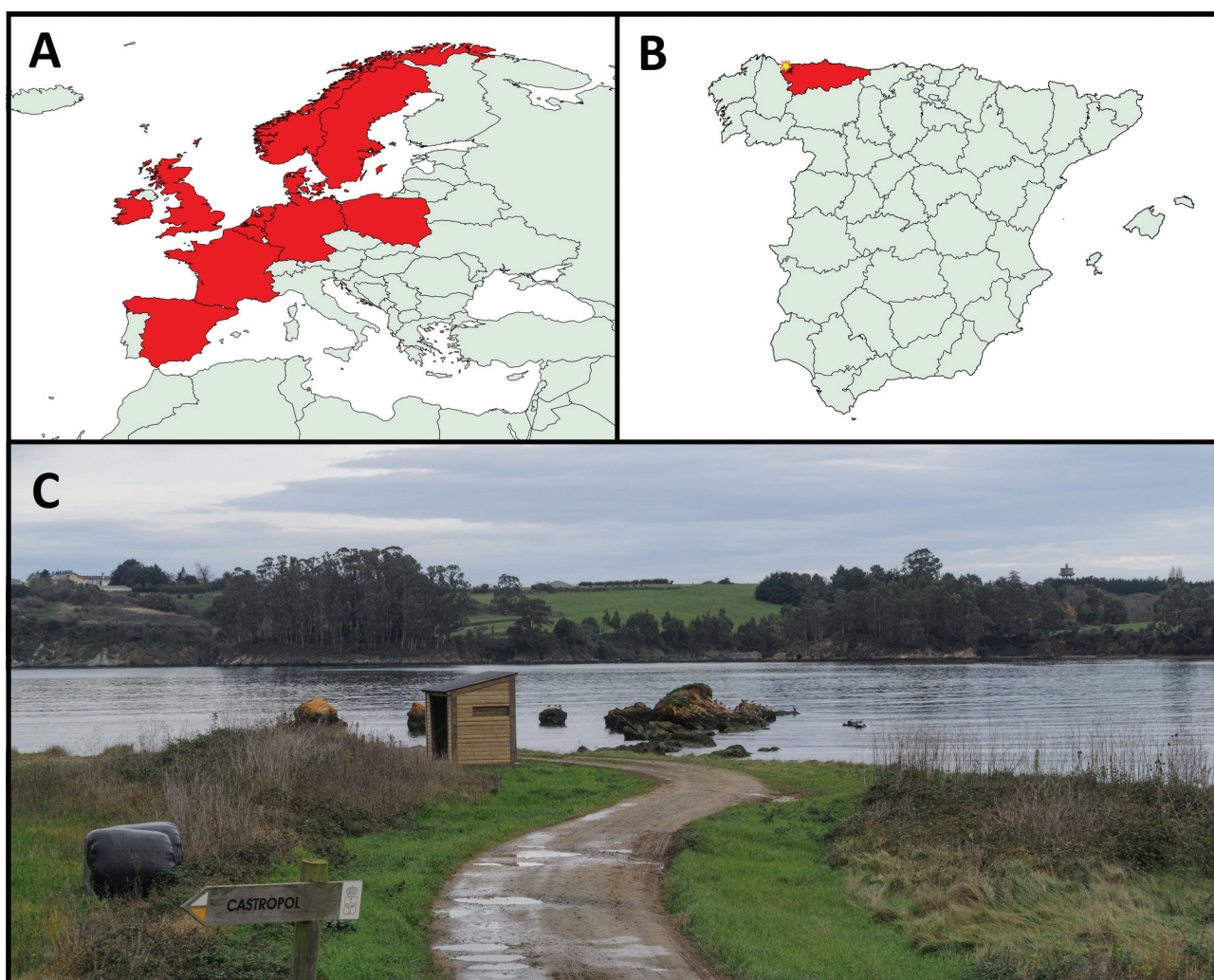


Fig. 1.— Location of *Strigamia maritima*. A. European countries where the species has been reported. B. Spanish distribution (red: province of Asturias, star: location of the specimen). C. Eo estuary, village of Salías (the specimen was found near the bird observatory).

Fig. 1.— Localización de *Strigamia maritima*. A. Países europeos donde la especie ha sido registrada. B. Distribución en España (rojo: provincia de Asturias, estrella: localización del ejemplar). C. Estuario del Eo, aldea de Salías (el ejemplar se encontró cerca del observatorio de aves).

to be later identified using a binocular stereo microscope model NOVEX AP-2 (10-60x). Maps of distribution were generated with QGIS Desktop 3.4.4 with GRASS 7.4.4. *Habitus in vivo* was photographed with a Panasonic Lumix DMC-FZ200 camera equipped with a Raynox DCR-250 macro lens. The habitat picture was provided by G. Sánchez Jardón and photographs of the morphology of specimens were taken by A. J. Narro Martín with a Nikon D810 camera equipped with a Cnscope 4X Achromatic Microscope Objective Lens with extension tube.

A female specimen with 51 leg pairs could be determined as belonging to the *Strigamia* genus but the specimen did not fit any of the morphological descriptions of the species reported in Spain. Several characters as the presence of sutural sulci dividing the pleuropretergite in the ultimate leg bearing segment and the medial sub-circular fossae with adjacent comma-shaped depressions in anterior trunk metasternites were definitive to determine its species, *S. maritima*.

### *Strigamia maritima* (Leach, 1817)

**MATERIAL EXAMINED.** 1♀, Spain: Eo [Ribadeo] estuary, [village of] Salías, [council of] Castropol, [Principality of] Asturias, 29T 660344 4821020, 15/08/2019, 0 m, D. Cabanillas leg. & É. Iorio det. 2019. In the author's collection.

**SHORT DESCRIPTION.** Body size 29 mm and 51 leg pairs, a dark brown trunk and a reddish brown cephalic plate (*in vivo*) (Fig. 2A). Forcipular tergite not distinctly narrowing forwards throughout its length, forcipular tarsungulum not clearly flattened and with a well-marked basal denticle (Fig. 2B). Anterior trunk metasternites with medial sub-circular fossae with adjacent comma-shaped depressions (Fig. 2C). Trunk metasternites with paired pore-fields in the anterior part, a transverse pore-field constricted mid-longitudinally in the posterior part and without sclerotized longitudinal stripe. Ultimate leg bearing segment with sutural sulci between pretergite and intercalary pleurites (Fig. 2D), no dorsal pores in the ultimate leg bearing coxopleura but 10/11 scattered pores in the ventral side (Fig. 2E).

**ECOLOGICAL REMARKS.** Halobiont species frequent in coastal areas. The specimen was found under pebbles near the estuary shore but outside the intertidal area.

**IDENTIFICATION KEY.** Based on previous European keys provided by Bonato *et al.* (2014) and Iorio & Labroche (2015), an illustrated dichotomous key for the *Strigamia* species of the Iberian Peninsula is presented (see Appendix 1 for key in Spanish).

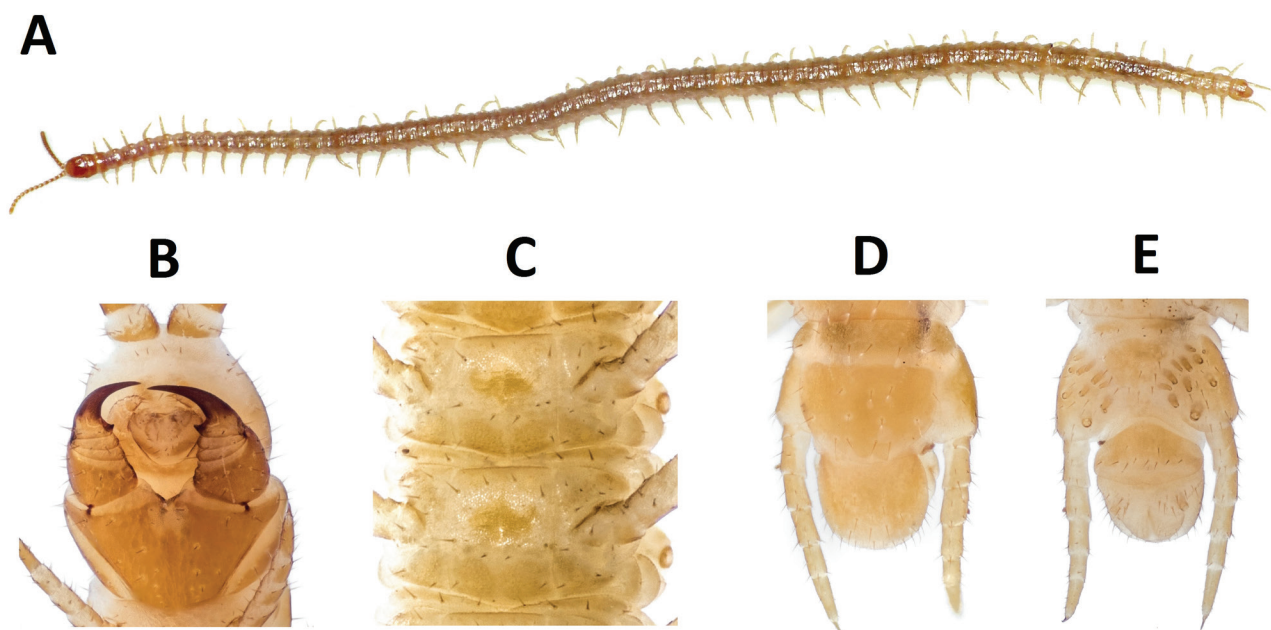


Fig. 2.— Morphology of *Strigamia maritima*. A. *Habitus in vivo* (female). B. Ventral side of head. C. 2<sup>nd</sup> and 3<sup>rd</sup> metasternite showing the medial sub-circular fossae and the adjacent comma-shaped depressions. D. Dorsal side of the ultimate leg bearing segment: divided pleuropretergite. E. Ventral side of the ultimate leg bearing segment: shape of metasternite and coxal pores.

Fig. 2.— Morfología de *Strigamia maritima*. A. *Habitus in vivo* (hembra). B. Visión ventral de la cabeza. C. Fosa sub-circular medial con depresiones adyacentes en forma de coma en el 2<sup>o</sup> y 3<sup>er</sup> metaesternito. D. Visión dorsal del último segmento pedífero: pleuropreterguito dividido. E. Visión ventral del último segmento pedífero: forma del metaesternito y poros coxales.

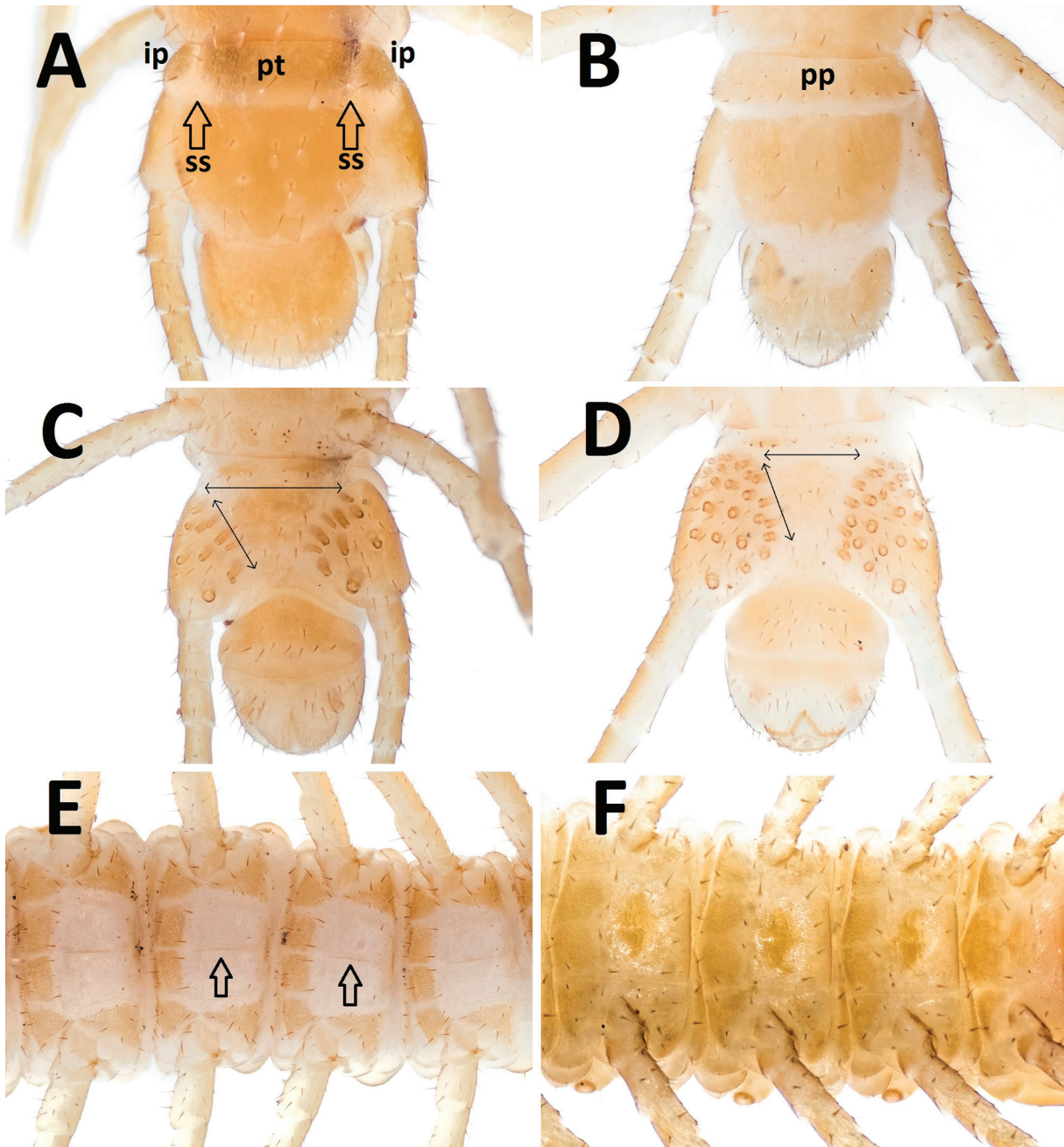


Fig. 3.— Several characters used in the *Strigamia* identification key. A. Pretergite (pt) and intercalary pleurites (ip) divided by sutural sulci (ss). B. Pleuropretergite (pp) entire. C. Ultimate leg bearing metasternite wider than long. D. Ultimate leg bearing metasternite as wide as long. E. Metasternites with mid-longitudinal stripe. F. Stripe lacking on metasternites.

Fig. 3.— Algunos caracteres usados en la clave de identificación de *Strigamia*. A. Preterguito (pt) y pleuritos intercalares (ip) divididos por surcos suturales (ss). B. Pleuropreterguito (pp) entero. C. Último segmento pedífero más ancho que largo. D. Último segmento pedífero tan ancho como largo. E. Metaesternitos con una línea longitudinal medial. F. Línea ausente en los metaesternitos.

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|---|---|
| <p>1. Pleuropretergite of the ultimate leg bearing segment divided by sutural sulci which separate pretergite from intercalary pleurites (Fig. 3A). Ultimate leg bearing metasternite wider than long (Fig. 3C). Coastal areas .....<br/> <i>Strigamia maritima</i> (Leach, 1817)</p> <p>– Pleuropretergite of the ultimate leg bearing segment entire, not divided by sutural sulci (Fig. 3B). Ultimate leg bearing metasternite as wide as long (Fig. 3D). Woods, moorlands and less often coastal areas .....<br/>                 ..... 2</p> | <p>2. 43-59 leg pairs. A distinctly sclerotized mid-longitudinal stripe on metasternites (Fig. 3E). Forcipular tarsungulum not distinctly flattened .....<br/>                 ..... <i>Strigamia crassipes</i> (C.L. Koch, 1835)</p> <p>– 37-43 leg pairs. Without mid-longitudinal stripe on metasternites (Fig. 3F). Forcipular tarsungulum distinctly flattened .....<br/>                 ..... <i>Strigamia acuminata</i> (Leach, 1816)</p> |
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Geophilomorpha is a well-known chilopod order but there is a lack of studies focused on its morphology

and ecology in Spain. Only a few authors studied the morphological variations of the Spanish populations and made comparisons with other European specimens (Serra, 1978; García-Ruiz, 1997; Vadell & Pons, 2008, 2009; Gregory & Lewis, 2015). Species corology is generally poorly studied and currently it is difficult to predict the Spanish distribution of many species and what kind of habitats they are capable to exploit. It is assumed that sampling centipedes in Spanish coastal habitats is usually dismissed since it is expected to obtain low diversity values, thus overlooking the presence of halophilous or halobiont species as is the case of *Strigamia maritima*. This species is supposed to exclusively inhabit in European coastal areas of the Atlantic Ocean, from northern to southwestern countries (Bonato *et al.*, 2012, 2016). The nearest record of *S. maritima* from mainland Spain was reported in Saint-Jean-de-Luz in the French Atlantic Pyrenees (Cherpitel *et al.*, 2019), suggesting this species potentially occurs along the Cantabrian Sea coasts of the Iberian Peninsula. Hence the importance of sampling the Spanish coastal areas. So further studies should be focused on characterising the chilopod fauna of estuaries, beaches, cliffs and intertidal areas of northern Spain.

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## Appendix 1.— Identification key in Spanish.

## Apéndice 1.— Claves de identificación en español.

1. Pleuropreterguito del último segmento pedífero dividido por surcos suturales que separan el preterguito de los pleuritos intercalares (Fig. 3A). Metaesternito del último segmento pedífero más ancho que largo (Fig. 3B). Zonas costeras ..... *Strigamia maritima* (Leach, 1817)
- Pleuropreterguito del último segmento pedífero entero, no dividido por surcos suturales (Fig. 3C). Metaesternito del último segmento pedífero tan ancho como largo (Fig. 3D). Bosques, páramos y menos frecuentemente zonas costeras ..... **2**
  
2. 43-59 pares de patas. Una línea logitudinal medial claramente esclerotizada en los metaesternitos (Fig. 3E). Tarsúgulo forcipular no aplanado ..... *Strigamia crassipes* (C.L. Koch, 1835)
- 37-43 pares de patas. Sin línea logitudinal medial en los metaesternitos (Fig. 3F). Tarsúgulo forcipular claramente aplanado ..... *Strigamia acuminata* (Leach, 1816)