Detection of a population of Pseudosquillopsis cerisii (Roux, 1828) (Crustacea, Stomatopoda, Parasquillidae) in the northwestern Mediterranean

P. Abelló, F. Maynou


Abstract
Detection of a population of Pseudosquillopsis cerisii (Roux, 1828) (Crustacea, Stomatopoda, Parasquillidae) in the northwestern Mediterranean. A population of the poorly–known stomatopod crustacean, Pseudosquillopsis cerisii, was detected in the NW Mediterranean Sea. To date, in Mediterranean waters, this species was only known from rare reports that were mainly based on the occurrence of single individuals. Analysis of the stomach contents of predators caught in coastal trammel–net artisanal sheries revealed several individuals of this species on a sandy bottom with nearby Posidonia seagrass beds in an area within the vicinity of Vilanova i la Geltrú (Catalonia). This is the first report of the species from Iberian Peninsula waters.

Key words: Pseudosquillopsis cerisii, Biogeography, Mediterranean, Occurrence, Population, Record

Resumen
Detección de una población de Pseudosquillopsis cerisii (Roux, 1828) (Crustacea, Stomatopoda, Parasquillidae) en el Mediterráneo noroccidental. Se ha detectado una población de Pseudosquillopsis cerisii, un crustáceo estomatópodo escasamente conocido en el Mediterráneo noroccidental. En aguas mediterráneas, esta especie era conocida hasta la fecha tan solo por unas cuantas citas principalmente de ejemplares aislados. El análisis del contenido gástrico de peces depredadores capturados utilizando trasmallos en pesca artesanal ha permitido la detección de varios individuos de esta especie en fondos de arena situados en aguas próximas a Vilanova i la Geltrú (Cataluña), en las cercanías de praderas de Posidonia. Este registro constituye la primera observación de la especie en aguas de la península Ibérica.

Palabras clave: Pseudosquillopsis cerisii, Biogeografía, Mediterráneo, Presencia, Población, Registro

Resum
Detecció d’una població de Pseudosquillopsis cerisii (Roux, 1828) (Crustacea, Stomatopoda, Parasquillidae) a la Mediterrània noroccidental. S’ha detectat una població de Pseudosquillopsis cerisii, un crustaci estomatòpode molt poc conegut a la Mediterrània nord–occidental. En
Aigües mediterrànies, aquesta espècie només era coneguda com a esmentada a les quines cites principalment d'exemplars aïllats. L'anàlisi del contingut gàstric de peixos depredadors capturats utilitzant tresmalls en pesca artesanal ha permès la detecció de diversos individus d'aquesta espècie en fons de sorra situats prop de Vilanova i la Geltrú (Catalunya), a la vora d'alguers de Posidonia. Aquesta troballa constitueix la primera observació de l'espècie en aigües de la península Ibèrica.

Paraules clau: Pseudosquillopsis cerisii, Biogeografia, Mediterrània, Presència, Població, Registre

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Introduction

Stomatopods are a group of relatively large crustaceans, most of which are inhabitants of coastal waters and present mainly in warm intertropical seas (Schram et al., 2013). Only a few species are able to colonize colder waters at higher latitudes, or the deep sea.

Twelve species have so far been reported in the Mediterranean Sea (Abelló and Guerao, 2015), three of these being of lessepsian origin, i.e. anthropogenically introduced through the Suez Canal. Two species, the autochthonous Squilla mantis (Linnaeus, 1758), and the lessepsian Erugosquilla massaensis (Kossmann, 1880), have relatively large populations and are of commercial interest. The remaining species are only known from a handful of records, with the exception of Rissoides pallidus (Giesbrecht, 1910), which is often captured in trawl surveys (Abelló et al., 2002; Colloca et al., 2004).

Here we present the detection of a population of the stomatopod Pseudosquillopsis cerisii (Roux, 1828) based on the analysis of stomach contents of fish predators (black scorpionfish, Scorpaena porcus Linnaeus, 1758) caught in coastal artisanal trammel net series.

Material and methods

The study area encompassed sublittoral waters in the vicinity of the coastal town of Vilanova i la Geltrú, about 50 km southwest of Barcelona, in the northwestern Mediterranean (Fig. 1). This study was part of a research project he catching of fish using trammel nets. Special emphasis was given to analysing predator–prey interactions. Trammel nets were deployed in traditional fishing grounds, between 41.17–41.18 latitude N and 1.70–1.85 E. Deployment followed the commercial practice, with nets being set in the evening and collected at dawn in a sandy and scattered Posidonia oceanica meadows. Sampling took place at depths of between 10–20 m between March 2009 and April 2010. The standard ‘one mile’ commercial trammel net used had an 80 mm mesh inner layers, a 200 mm mesh outer layers, and vertical height of 1.6 m.

All captures (commercial and by–catch) were identified to species level, measured (total length, TL, in mm), and weighed. Gut contents of a selection of fish species (Table 1) were also identified to the highest possible taxonomic level, and quantified. Stomatopods found in the stomachs were sexed and measured (carapace length, CL, in mm).

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The collected stomatopod specimens were deposited in the Biological Reference Collections (BRC) of the Institut de Ciències del Mar (ICM–CSIC) in Barcelona (Olivas González, 2018). Additional information and accession codes may be obtained through the Global Biodiversity Information Facility (GBIF) databases or through the ICM–CSIC website. Information on the specimens is available at: GBIF.org (10th October 2018) GBIF Occurrence Download https://doi.org/10.15468/dl.ihu6rk.

**Results**

We identified six individuals of *Pseudosquillopsis cerisii* (Fig. 2). They were readily recognized by the shape of the rostrum and/or telson (Manning, 1977). No large signs of digestion were apparent. The collected *P. cerisii* specimens consisted of three adult males (CL range: 13.8–18.0 mm), one juvenile, and two adult females (CL range: 4.0–15.0 mm). The species was recorded in gut contents of 5 of the 314 scorpionfish *Scorpaena porcus*: the fish ranged from 154 to 246 mm TL. The overall size range of the *S. porcus* captures was 150–311 mm TL. *P. cerisii* was not present in the stomach contents of the other 309 fish species examined (table 1). Specimens of *S. porcus* were captured at depths of between 13 and 18 m (table 2). A single individual of another stomatopod species, *Rissoides desmaresti*, was also found in one *S. porcus*. 

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Fig. 1. Known distribution of *Pseudosquillopsis cerisii* in the Mediterranean Sea. The star shows the location of the study area where the new occurrences reported in the present paper were recorded.

*Fig. 1. Distribución conocida de Pseudosquillopsis cerisii en el mar Mediterráneo. La estrella indica el área donde se efectuaron los nuevos hallazgos registrados en este estudio.*
Table 1. Fish species collected and examined for stomach contents, number of specimens (N), size range (SR: total length, TL, in mm), and total number of stomatopods (NS: *Pseudosquillopsis cerisii* and *Rissoides desmaresti*) occurring in fish gut contents.

Tabla 1. Especies de peces recolectadas y examinadas para estudiar su contenido gástrico. Número de especímenes (N), rango de tamaño (ISR: longitud total, TL, en mm) y número total de estomatópodos (NS: *Pseudosquillopsis cerisii* y *Rissoides desmaresti*) hallados en el estómago de los peces.

<table>
<thead>
<tr>
<th>Fish species</th>
<th>N</th>
<th>SR</th>
<th>NS</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Scorpaena porcus</em></td>
<td>316</td>
<td>150–311</td>
<td>6 + 1</td>
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<tr>
<td><em>Serranus scriba</em></td>
<td>106</td>
<td>138–225</td>
<td>0</td>
</tr>
<tr>
<td><em>Chromis chromis</em></td>
<td>18</td>
<td>102–125</td>
<td>0</td>
</tr>
<tr>
<td><em>Diplodus vulgaris</em></td>
<td>141</td>
<td>98–317</td>
<td>0</td>
</tr>
<tr>
<td><em>Pagrus pagrus</em></td>
<td>113</td>
<td>124–327</td>
<td>0</td>
</tr>
<tr>
<td><em>Pagellus erythrinus</em></td>
<td>444</td>
<td>131–398</td>
<td>0</td>
</tr>
<tr>
<td><em>Scorpaena notata</em></td>
<td>360</td>
<td>88–208</td>
<td>0</td>
</tr>
<tr>
<td><em>Lithognathus mormyrus</em></td>
<td>31</td>
<td>252–351</td>
<td>0</td>
</tr>
<tr>
<td><em>Coris julis</em></td>
<td>12</td>
<td>152–182</td>
<td>0</td>
</tr>
<tr>
<td><em>Symphodus rostratus</em></td>
<td>26</td>
<td>115–136</td>
<td>0</td>
</tr>
<tr>
<td><em>Symphodus tinca</em></td>
<td>11</td>
<td>30–310</td>
<td>0</td>
</tr>
</tbody>
</table>

Fig. 2. *Pseudosquillopsis cerisii* (BRC code: ICMS000025), male, 18.0 mm CL, dorsal view.

Fig. 2. *Pseudosquillopsis cerisii* (código BRC: ICMS000025); macho; 18,0 mm CL; vista dorsal.
**Discussion**

Four species of the genus *Pseudosquillopsis* are known to date, three of which occur in the Pacific Ocean. *P. cerisii* is the only species of the genus described in the Eastern Atlantic, and is known to occur from the Gulf of Guinea to Mediterranean waters (Manning, 1977). It was first described by Roux (1828) from specimens collected in the NW Mediterranean Sea, on the island of Corsica and off Toulon (France). It is so far known only from very few specimens.

The present report of adult males and females, as well as of juveniles, supports the occurrence of a *P. cerisii* population in the study area and contributes to the knowledge on its habitat and depth range. This constitutes the westernmost record of the species for the Mediterranean, and the first for Iberian waters.

In the Mediterranean, this stomatopod appears to be preferentially distributed in its western and central sectors, having been reported only once in the east of the Mediterranean Sea, on the south coast of the Peloponese (Guérin, 1832). This record was later referenced by Lewinsohn and Manning (1980) and Dounas and Steudel (1994). In the Central and western Mediterranean, *P. cerisii* is known from the Gulf of Lions and southern France (Roux, 1828; Haller, 1879; Pruvot, 1898; Froglia, 1992), Corsica (Roux, 1828), Gulf of Naples (Giesbrecht, 1910), the Balearic Islands, which hold the largest number of records (Barceló y Combis, 1875; Ferrer Aledo, 1906, 1908; Parisi, 1914; De Buen, 1916; Bolívar, 1916; García Raso et al., 2010), Sicily (Carus, 1885; Innocenti, 2006), Algeria (Lucas, 1849), and Catalonia (present report).

The large geographical gap between the Mediterranean populations and western African populations is of note. The known African range of *P. cerisii* occurs between the Gulf of Guinea and Senegal (Manning, 1977), with just one record of occurrence in the Canary Islands (Gran Canaria) (Barquín Díez and Moreno Batet, 1992). According to Manning (1977), the species of the genus *Pseudosquillopsis* shows biogeographically relict distributional patterns, as in the case of the genus *Parasquilla*. Given the apparent scarcity and low density of *P. cerisii* throughout its distribution area, study of its population characteristics merits attention. It would also be of interest to identify its particular microhabitat, which appears to be largely associated

<table>
<thead>
<tr>
<th>Species</th>
<th>Sex</th>
<th>CL</th>
<th>Cat. Num.</th>
<th>DC</th>
<th>D</th>
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<td><em>Pseudosquillopsis cerisii</em></td>
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<td>18</td>
<td>ICMS000025</td>
<td>25/03/2009</td>
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<tr>
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<td>ICMS000030</td>
<td>20/04/2009</td>
<td>13</td>
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<td>ICMS000028</td>
<td>19/05/2009</td>
<td>18</td>
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<tr>
<td><em>Pseudosquillopsis cerisii</em></td>
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<td>ICMS000026</td>
<td>23/07/2009</td>
<td>15</td>
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<td>4</td>
<td>ICMS000027</td>
<td>23/07/2009</td>
<td>15</td>
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<tr>
<td><em>Pseudosquillopsis cerisii</em></td>
<td>Female</td>
<td>15</td>
<td>ICMS000029</td>
<td>19/10/2009</td>
<td>15</td>
</tr>
<tr>
<td><em>Rissoides desmaresti</em></td>
<td>Female</td>
<td>10.1</td>
<td>ICMS000024</td>
<td>23/07/2009</td>
<td>15</td>
</tr>
</tbody>
</table>
with seagrass habitat, such as Posidonia oceanica meadows in Mediterranean populations (Giesbrecht, 1910; Manning, 1977; present records). The possible association of a poorly known species with important protected structural habitats, such as seagrass meadows, would increase their ecological value and relevance.

The lack of digestive deterioration shown by most of the specimens collected suggests their predation occurred mainly at dawn. The presence of an additional species of stomatopod in the stomach of S. porcus and the absence of stomatopods in the gut contents of the remaining examined fish species captured in the same samples suggest that scorpionfishes are sound predators of stomatopods. The black scorpionfish is already known to prey on crustaceans (Rafraîchi–Noura et al., 2016; Compaire et al., 2017) but so far on stomatopods. Other species of Pseudosquillidae, such as P. lessoni in Pacific waters of Chile are also known to be predated upon by perciform fishes (Vargas et al., 1999). Analysis of the stomach contents of sit-and-wait opportunistic predators such as scorpionfishes may provide an additional sampling tool for marine species that are difficult to detect using traditional methods.

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