

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

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Abstract

Detection of a population of Pseudosquillaopsis cerisii (Roux, 1828) (Crustacea, Stomatopoda, Parasquillidae) in the northwestern Mediterranean. A population of the poorly-known stomatopod crustacean, *Pseudosquillaopsis 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 fish predators caught in coastal trammel-net artisanal fisheries 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: *Pseudosquillaopsis cerisii*, Biogeography, Mediterranean, Occurrence, Population, Record

Resumen

Detecció de una població de Pseudosquillaopsis cerisii (Roux, 1828) (Crustacea, Stomatopoda, Parasquillidae) en el Mediterráneo noroccidental. Se ha detectado una población de *Pseudosquillaopsis 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: *Pseudosquillaopsis cerisii*, Biogeografía, Mediterráneo, Presencia, Población, Registro

Resum

Detecció d'una població de Pseudosquillaopsis cerisii (Roux, 1828) (Crustacea, Stomatopoda, Parasquillidae) a la Mediterrània noroccidental. S'ha detectat una població de *Pseudosquillaopsis cerisii*, un crustaci estomatòpode molt poc conegut a la Mediterrània nord-occidental. En

aigües mediterrànies, aquesta espècie només era coneguda fins ara per unes quantes 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: *Pseudosquillaopsis 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 massavensis* (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 *Pseudosquillaopsis 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 fisheries.

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 fisheries research project studying the catches of the artisanal fishing fleet, specifically 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 fishery practice, with nets being set in the evening and collected at dawn in a fine sand area 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 lowest possible taxonomic level, and quantified. Stomatopods found in the stomachs were sexed and measured (carapace length, CL, in mm).

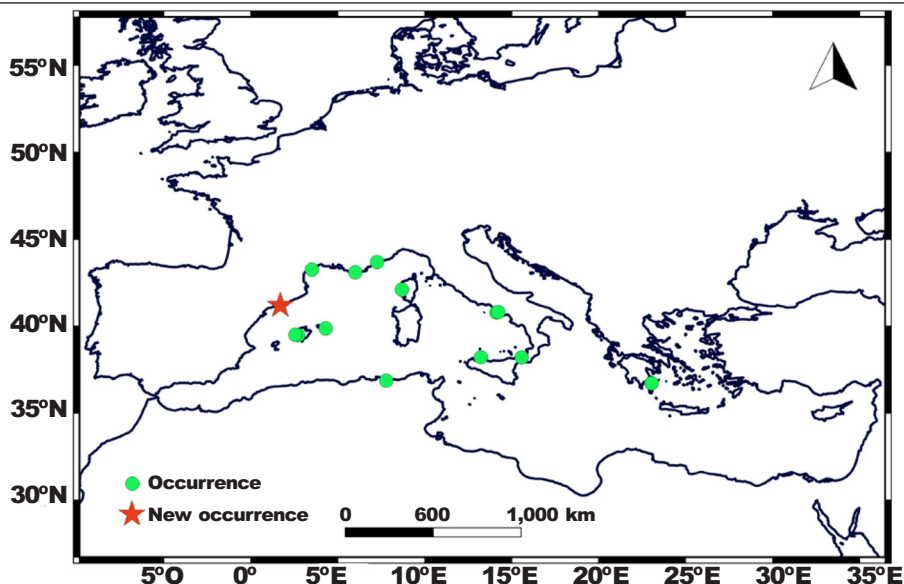


Fig. 1. Known distribution of *Pseudosquillaopsis cerisii* in the Mediterranean Sea. The star shows the location of the study area where the new occurrences reported in the present paper were recorded.

Fig. 1. Distribución conocida de *Pseudosquillaopsis cerisii* en el mar Mediterráneo. La estrella indica el área donde se efectuaron los nuevos hallazgos registrados en este estudio.

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](https://doi.org/10.15468/dl.ihu6rk) (10th October 2018) GBIF Occurrence Download <https://doi.org/10.15468/dl.ihu6rk>.

Results

We identified six individuals of *Pseudosquillaopsis 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 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*.

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: *Pseudosquillaopsis 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: *Pseudosquillaopsis cerisii* y *Rissoides desmaresti*) hallados en el estómago de los peces.

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



Fig. 2. *Pseudosquillaopsis cerisii* (BRC code: ICMS000025), male, 18.0 mm CL, dorsal view.
Fig. 2. *Pseudosquillaopsis cerisii* (código BRC: ICMS000025); macho; 18,0 mm CL; vista dorsal.

Table 2. Characteristics of the stomatopod specimens collected in stomach contents of the scorpionfish *Scorpaena porcus* off Vilanova (Catalonia, NW Mediterranean), and catalogue number (Cat. Num.) at the [Biological Reference Collections of the ICM–CSIC](#): CL, carapace length (in mm); DC, date of capture; D, depth (in m).

Tabla 2. Características de los estomatópodos recolectados en el contenido gástrico de las escorpenas Scorpaena porcus capturadas en aguas de Vilanova (Cataluña, Mediterráneo noroccidental) y número de catálogo (Cat. Num.) en las Colecciones Biológicas de Referencia del ICM–CSIC: CL, longitud del caparazón (en mm); DC, fecha de captura; D, profundidad (en m).

Species	Sex	CL	Cat. Num.	DC	D
<i>Pseudosquillaopsis cerisii</i>	Male	18	ICMS000025	25/03/2009	13.5
<i>Pseudosquillaopsis cerisii</i>	Female	15	ICMS000030	20/04/2009	13
<i>Pseudosquillaopsis cerisii</i>	Male	13.8	ICMS000028	19/05/2009	18
<i>Pseudosquillaopsis cerisii</i>	Male	17.5	ICMS000026	23/07/2009	15
<i>Pseudosquillaopsis cerisii</i>	Female	4	ICMS000027	23/07/2009	15
<i>Pseudosquillaopsis cerisii</i>	Female	15	ICMS000029	19/10/2009	15
<i>Rissoides desmaresti</i>	Female	10.1	ICMS000024	23/07/2009	15

Discussion

Four species of the genus *Pseudosquillaopsis* 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 peninsula waters.

In the Mediterranean, this stomatopod appears to be preferentially distributed in its western and central sectors (fig. 1), having been reported only once in the eastern basin, specifically 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; Frogliola, 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 *Pseudosquillaopsis* 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

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 suggests that scorpionfishes are sound predators of stomatopods. The black scorpionfish is already known to prey on crustaceans (Rafrafi–Nouira et al., 2016; Compaire et al., 2017) but so far not on stomatopods. Other species of *Pseudosquillaopsis*, such as *P. lessoni* in Pacific waters off Chile, are also known to be predated upon by perciform fish (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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