

Rapid Communication

First record of the invasive species *Ianiropsis serricaudis* Gurjanova, 1936 (Crustacea: Isopoda) in Arcachon Bay, Bay of Biscay (NE Atlantic)

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Abstract

The invasive isopod *Ianiropsis serricaudis* Gurjanova, 1936, originally described from the North-West Pacific Ocean, is herein reported for the first time on the French Atlantic coast. Its presence is probably due to oyster import activity, and the sampling of many brooding females in Arcachon Bay since 2013 suggests a well-established species. Its current European distribution is summarised and some morphological characters are discussed.

Key words: *Ianiropsis serricaudis*, non-indigenous species, oyster import, French Atlantic coast

Introduction

Non-indigenous species are recorded regularly in European waters. The main pathways of introduction are shipping, aquaculture and via human infrastructure such as the Suez Canal. On the French coast, introductions are mainly due to aquaculture (51%) and shipping (39%) (Nunes et al. 2014). In the case of Arcachon Bay, the absence of a commercial port and the intensive oyster trading suggest the vector of introduction of non-indigenous species is aquaculture. This hypothesis is confirmed by the fact that all the introduced species reported from Arcachon Bay in recent years (*Arcuatula senhousia* (Benson, 1842), *Ampithoe valida* Smith, 1873, *Aoroides* Walker, 1898, *Grandidierella japonica* Stephensen, 1938, *Melita nitida* Smith, 1873, *Paranthura japonica* Richardson, 1909) are native to areas from where cupped oysters were imported to France: British Columbia and Japan. Furthermore, the oysters transfer among regions has caused the spread of numerous alien species in northern Europe (Gouilletquer et al. 2002).

The present paper deals with the first record of the isopod *Ianiropsis serricaudis* Gurjanova, 1936 in Arcachon Bay, Bay of Biscay, which represents the first record on the French Atlantic coast.

Material and methods

Study area

Arcachon Bay (44°40'N; 1°12'W) is a 180 km² macrotidal coastal lagoon, connected to the Atlantic Ocean by a narrow channel and it receives freshwater inputs Leyre River in its south-eastern part (Figure 1). This lagoon is characterized by large intertidal flats (115 km²) covered by *Zostera* (*Zosterella*) *noltei* Hornemann seagrass bed (70 km²) (Plus et al. 2010). The lower parts of tidal flats are mainly occupied by oyster farms (10 km²) [Japanese oysters, *Magallana gigas* (Thunberg, 1793)]. In the inner lagoon, tidal channels represent 71 km², with 1.02 km² occupied by eelgrass beds [*Zostera marina* Linnaeus, 1753] (Plus et al. 2010).

Material examined

Ianiropsis serricaudis was collected in Arcachon Bay between 2013 and 2017 on an intertidal oyster reef (Grand banc) and on floating pontoons (Port) where *Styela clava* Herdman, 1881 and *Ciona intestinalis* (Linnaeus, 1767) were present (Figure 1; Table 1). “Grand banc” was sampled by recovering wild-type oyster clusters growing on the sediment and “Port”

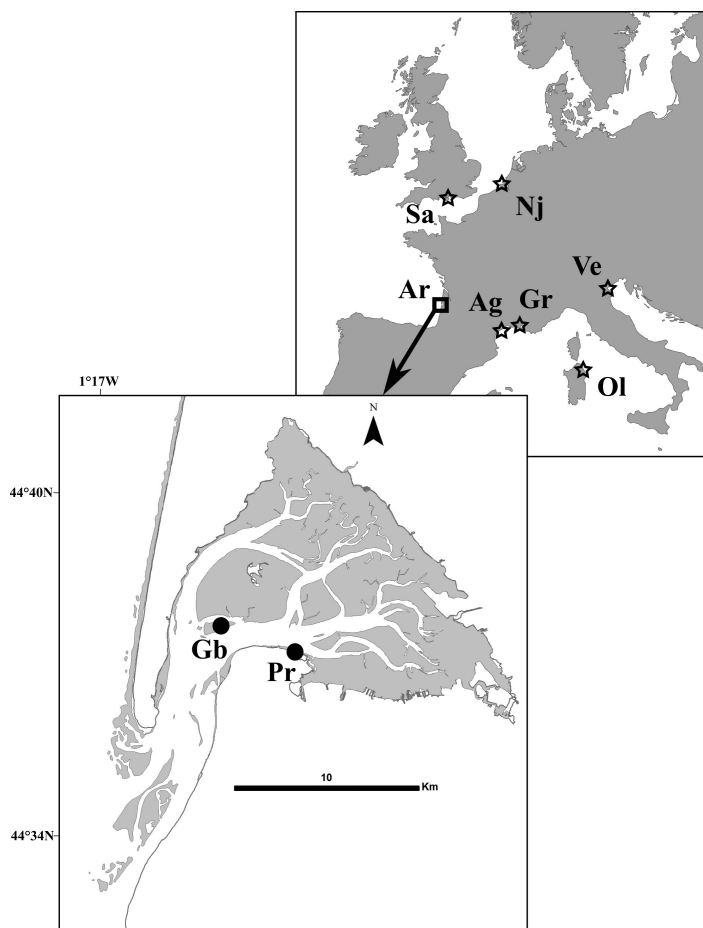


Figure 1. Locations in Europe of first collected specimens of *Ianiropsis serricaudis* Gurjanova, 1936. Nj: Neeltje Jans – The Netherlands (Faasse 2007). Sa: Southampton – England (Hobbs et al. 2015). Ve: Venice – Italy (Marchini et al. 2016a). Ol: Olbia – Italy (Marchini et al. 2016b). Ag: Agde – France (Ulman et al. 2017). Gr: Le Grau-du-Roi – France (Ulman et al. 2017). Ar: Arcachon – France (present study), Gb: Grand banc, Pr: Port.

Table 1. Records of *Ianiropsis serricaudis* in Arcachon Bay. N: number of individuals collected. Stations: see Figure 1.

Date	Station	Tidal level	Habitat	Latitude	Longitude	N	MNHN depository
10/09/2013	Port	Subtidal	Floating pontoons	44°39'N	1°09'W	74	
17/07/2015	Grand Banc	Intertidal	Oyster reef	44°40'N	1°12'W	85	MNHN-IU-2016-3452 15 specimens
27/04/2016	Port	Subtidal	Floating pontoons	44°39'N	1°09'W	2	
27/09/2017	Port	Subtidal	Floating pontoons	44°39'N	1°09'W	133	MNHN-IU-2016-3451 53 specimens

was sampled by scraping the floating pontoons with a hand-held rigid opening net. Samples were only qualitative for personal collection. They were sieved on 1mm mesh sieves and sorted alive. Specimens were conserved in 75% alcohol, observed with a Nikon SMZ 1500 stereomicroscope and a Nikon Eclipse E400 microscope, and photographed with a Nikon DS-Fi2 camera. Drawings were carried out from pictures using Inkscape software (v.0.48). Body length (BL) was measured with NIS-Elements Analysis software from anterior margin of head to posterior end of telson. For SEM studies, specimens

were dehydrated in a graded ethanol series, critical point dried, sputter coated with gold and examined with a Hitachi TM3030Plus scanning electron microscope. Some specimens were deposited in the Muséum National d'Histoire Naturelle (MNHN, Paris) (Table 1).

Results

A total of 294 specimens was collected: 102 males (14 specimens were terminal males) and 192 females including 63 brooding females. Specimens were found

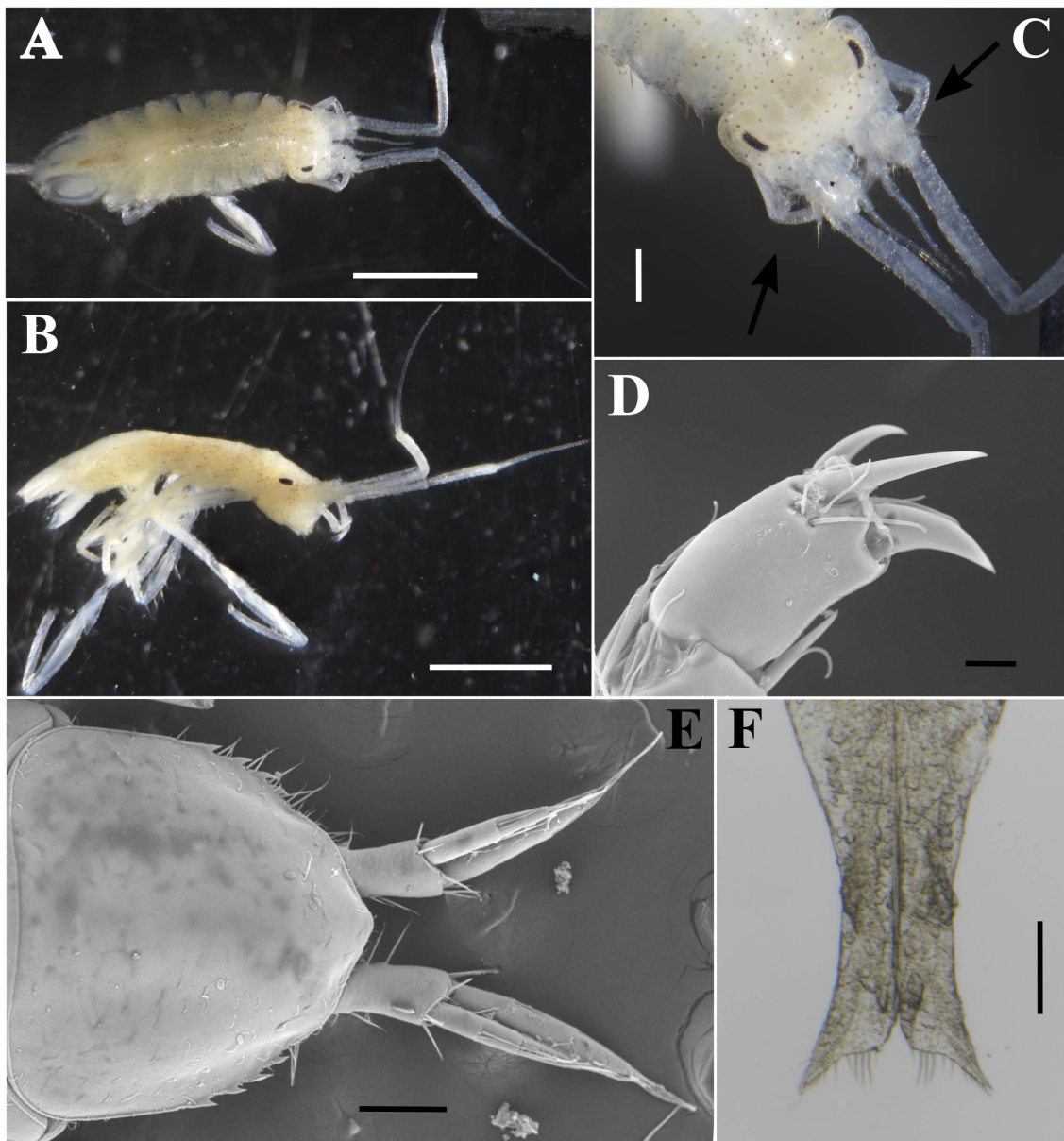


Figure 2. *Ianiropsis serricaudis* Gurjanova, 1936, specimens from Arcachon Bay, SW France. A – C: terminal male, body length: 2.74 mm, D – F: adult males. (A) dorsal view; (B) lateral view; (C) dorsal view of head with maxilliped palps projecting (black arrows); (D) pereopod 7 propodus (in part) and dactylus with claws; (E) pleotelson dorsal view with 4 lateral denticles; (F) pleopod 1. Scale bars: (A), (B): 1 mm; (C): 0.2 mm; (D): 0.01 mm; (E), (F): 0.1 mm. Photos by B. Gouillieux.

in polyhaline water, where salinity and temperature ranged between 27 to 35 PSU and 6 to 24 °C respectively (REPHY 2017).

Morphological identification (Figures 2 and 3)

The genus *Ianiropsis* G.O. Sars, 1897 can be distinguished from *Carpas* Richardson, 1902 and *Janira*

Leach, 1814, two other confamilial genera, by the shape of male pereopod 1: propodus and carpus enlarged in *Carpas*, carpus and propodus not elongate, near length of pereopod 2–7 in *Janira*, carpus elongate and propodus never enlarged in *Ianiropsis* (Wilson and Wägele 1994).

According to Doti and Wilson (2010) and Hobbs et al. (2015), terminal males of *Ianiropsis serricaudis*

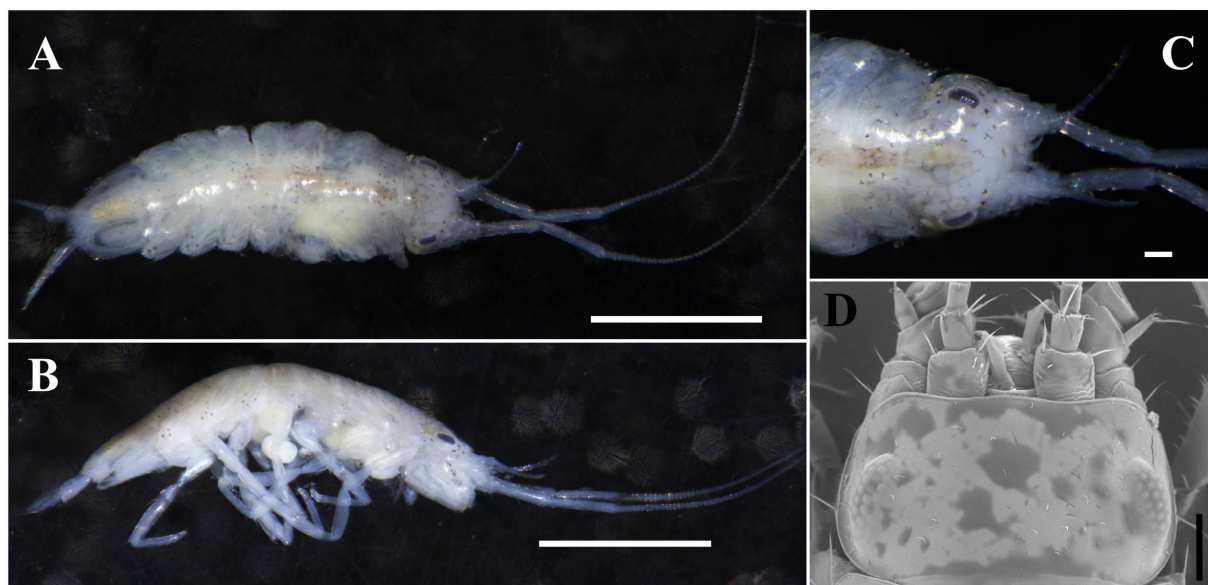


Figure 3. *Ianiropsis serricaudis* Gurjanova, 1936, specimens from Arcachon Bay. (A) adult female, dorsal view, (B) adult female, lateral view, (C)–(D) adult female, dorsal view of head. Scale bars: (A), (B): 1 mm; (C), (D): 0.1 mm. Photos by B. Gouillieux.

can be distinguished from other *Ianiropsis* species by: (1) the length of antennal peduncle article 6 and 7 together as long as or longer than half the body length; (2) maxilliped palp projecting substantially, visible in front of head in dorsal view; (3) pereopod 1 dactylus with 2 claws; (4) pereopod 7 dactylus with 2 or 3 claws; (5) uropod protopod elongate and rectangular; (6) pleotelson lateral margin with 3 or 4 denticles (rarely more). Specimens from Arcachon Bay present head anterior margin in dorsal view linear (slightly convex between antennae), body length of terminal males about 2,7 mm.

Female (sexually dimorphic characters)

Length of antennal peduncle article 6 and 7 together smaller than half the body length; maxilliped palp not projecting, not visible in front of head in dorsal view; pereopod 1 as long as pereopod 2–7, carpus and propodus not particularly elongate.

Variability

Non-terminal males present (1) antennal peduncle article 6 and 7 together about a quarter of the body length; (2) maxilliped palp projecting slightly, not especially visible in front of head in dorsal view; (3) pereopod 1 as long as or slightly longer than those of pereopod 2–7, carpus and propodus not particularly elongate.

Discussion

Ianiropsis serricaudis was originally described from North-West Pacific Ocean in 1936. The species was subsequently recorded in the Eastern Pacific region, in California (1977 – Carlton 1979a, b; Hobbs et al. 2015) and Washington (2010 – Cordell et al. 2013); from the Western Atlantic in Connecticut (1999 – Pederson et al. 2005) and New-Jersey (2012 – Hobbs et al. 2015); from the Eastern Atlantic region and Mediterranean in The Netherlands (2000 – Faasse 2007), England (2004 – Hobbs et al. 2015), Italy (2012 – Marchini et al. 2016a; 2014 – Marchini et al. 2016b) and France (2013 – present paper; 2015 – Ulman et al. 2017).

The main characters to distinguish terminal males of *I. serricaudis* from *I. breviremis* (G.O. Sars, 1883), the only *Ianiropsis* species previously known from European waters, according to Doti and Wilson (2010), are: (1) the head anterior margin in dorsal view broadly concave (versus rounded and projecting anteriorly between antennae in *I. breviremis*) and (2) the maxilliped palp projecting substantially, visible in front of head in dorsal view (versus not projecting substantially, not visible in dorsal view in *I. breviremis*). Specimens from Arcachon Bay present head anterior margin in dorsal view linear, slightly projecting anteriorly between antennae, as in original illustrations of *I. serricaudis* (Gurjanova 1936). This character is therefore doubtful and must be taken with caution for identification (Figure 4 A–C).

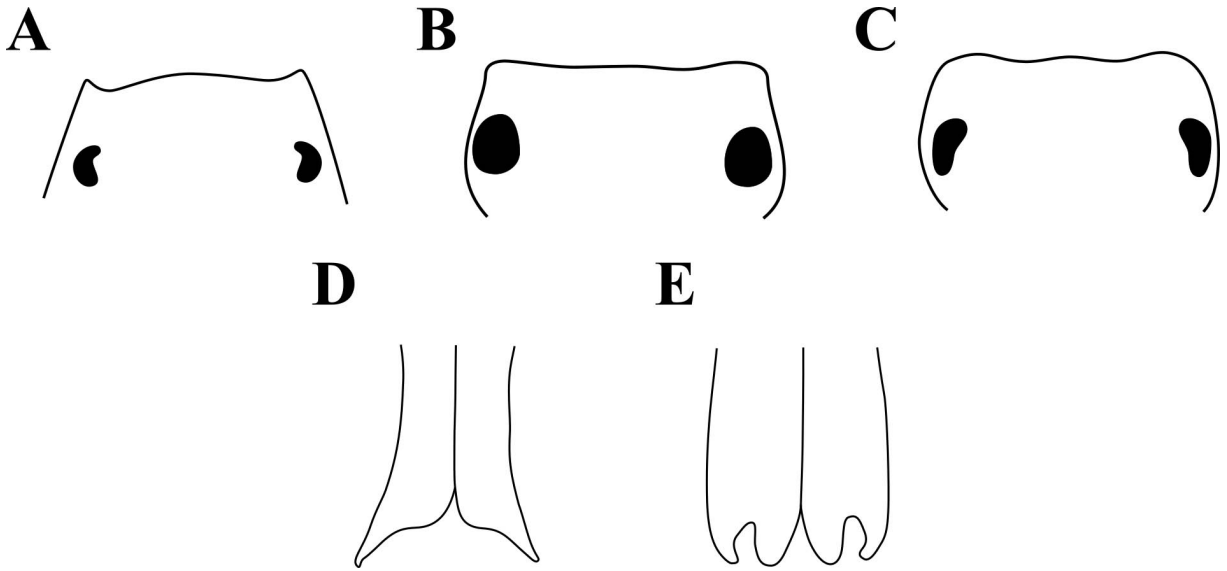


Figure 4. A–C *Ianiropsis* dorsal view of head; D–E adult male, pleopod 1 distal tip, setae not drawn. (A) *Ianiropsis breviremis* (G.O. Sars, 1883), original description; (B) *Ianiropsis serricaudis* Gurjanova, 1936, original description; (C) *Ianiropsis serricaudis* Gurjanova, 1936, specimens from Arcachon Bay; (D) *Ianiropsis serricaudis* Gurjanova, 1936, specimens from Arcachon Bay; (E) *Janira maculosa* Leach 1814 after Sars 1899 and Carvacho 1981.

According to Hobbs et al. (2015) and Marchini et al. (2016a), *I. serricaudis* has probably been occurring for many years in European waters, but previous confusion with *Janira maculosa* and *I. breviremis* could have delayed its reporting. The presence of many brooding females since 2013 in Arcachon Bay confirms a well-established population and therefore suggests that its presence could be prior to 2013. However, the absence of Janiridae in our collections before 2013 (presence of *Janira maculosa* in Blanchet (2004) and Salvo (2010) thesis, specimens used to estimate biomass) prevents confirming this hypothesis. The misidentification is probably due the fact that the available Janiridae and *Ianiropsis* keys (Wilson and Wägele 1994; Doti and Wilson 2010) refer to terminal males only and are based on size of maxilliped palp and pereopod 1 carpus and propodus. These characters are dependent on the maturity of the specimens: non-terminal males can have (1) maxilliped palp not projecting substantially, (2) pereopod 1 carpus and propodus as long as or slightly longer than those of pereopods 2–7 (present observations). According to Doti and Wilson (2010), shape of males pleopod 1 is consistent across the species within the genus, so it can be used to distinguish *Ianiropsis* from *Janira* (Figure 4 D and E).

Due to the absence of a commercial port and the significant oyster import activity, shellfish trade is probably the vector of *I. serricaudis* introduction to

Arcachon Bay. This vector was suggested by Marchini et al. (2016a, b) to explain its introduction in Italy. But coastal vessel traffic, as mentioned by Hobbs et al. (2015) cannot be discarded. Due to its high invasive capability (Hobbs et al. 2015), *I. serricaudis* is probably present in many others areas of the French coast and European waters but has not yet been identified and documented.

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