

Luca Mizzan

## NEW DATA ON THE PRESENCE AND DIFFUSION OF THE EXOTIC SEA-SPIDER *AMMOTHEA HILGENDORFI* (BÖHM, 1879) IN THE LAGOON OF VENICE (ITALY)

**Riassunto.** Ulteriori informazioni relative alla presenza e diffusione del Pycnogonide *Ammothea hilgendorfi* (Böhm, 1879) nella laguna di Venezia.

*Ammothea hilgendorfi* (Böhm, 1879) viene segnalata per la prima volta in Mediterraneo nel 1983 sulla base di undici esemplari raccolti in una singola stazione nella laguna di Venezia nei pressi del Portocanale di S. Nicolò. Da quella data non ci sono state più segnalazioni di questa specie né in laguna di Venezia né in altri luoghi del Mediterraneo. Tuttavia la specie è effettivamente ancora presente e piuttosto abbondante in laguna di Venezia, come evidenziato da una serie di catture avvenute fra il 1991 e il 2017 con un totale di 29 esemplari raccolti. Viene inoltre riportata la prima segnalazione per la laguna di Venezia di *Anoplodactylus pygmaeus* (Hodge, 1864).

**Summary.** *Ammothea hilgendorfi* (Böhm, 1879) was first reported in the Mediterranean in 1983, with eleven specimens caught in a single site of the Lagoon of Venice, near the S. Nicolò harbour mouth. Since then, the presence of this species has no longer been reported neither in the Venice lagoon nor in other sites of the Mediterranean sea. However this species is actually present and quite widespread in the Venice lagoon, as indicated by a number of individuals we caught between 1991 and 2017, totalling 29 specimens. The first report of the presence of *Anoplodactylus pygmaeus* (Hodge, 1864) for the Venice lagoon is also provided.

**Keywords:** Pycnogonida, sea-spider, North Adriatic, Lagoon of Venice, new records, Non-Indigenous Species.

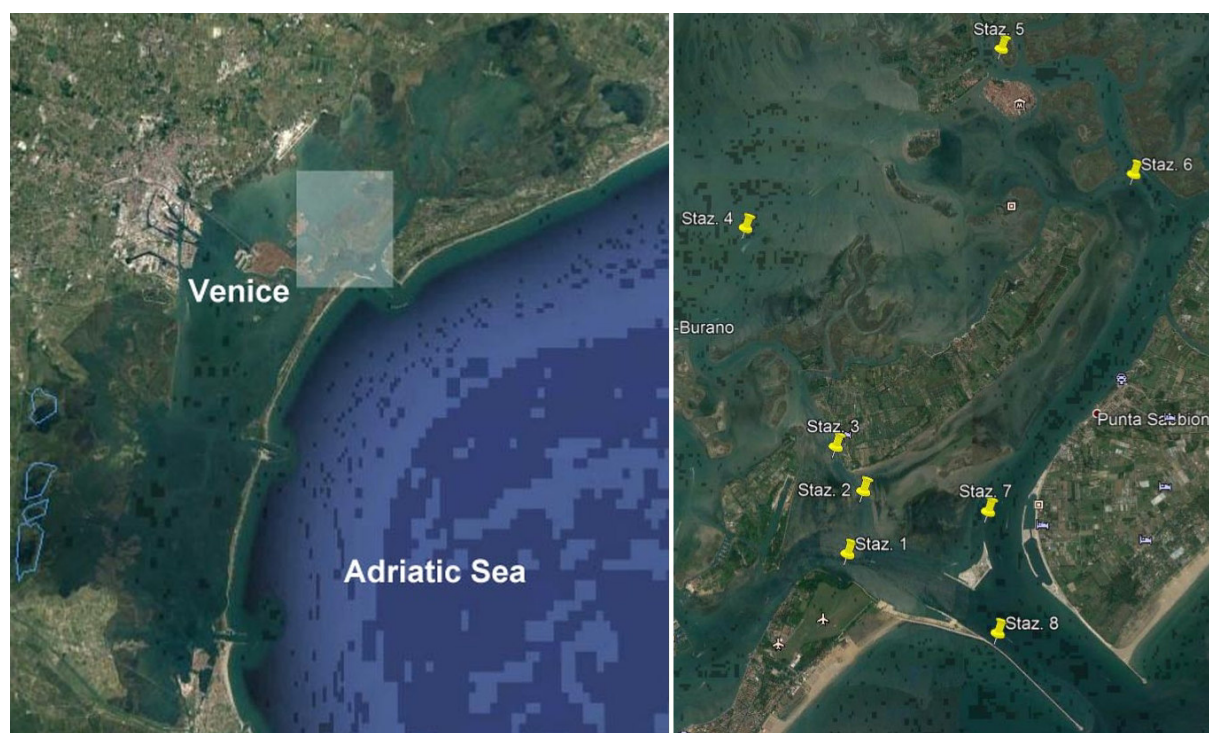
**Reference:** Mizzan L., 2018. New data on the presence and diffusion of the exotic sea-spider *Ammothea hilgendorfi* (Böhm, 1879) in the Lagoon of Venice (Italy). *Bollettino del Museo di Storia Naturale di Venezia*, 69: 43-46.

### INTRODUCTION

*Ammothea hilgendorfi* (Böhm, 1879) is a pycnogonid species typical of the tropical and temperate North Pacific littoral zone of south-east Asia (MOLNAR et al., 2008). Although it is known as an invasive species and some aspects of its biology have been recently studied (BARRETO & AVISE, 2008), its ecology is not well-known (BAIN, 1991).

In 1979 *A. hilgendorfi* was discovered in a

limited area of the Lagoon of Venice (Italy) in the S. Nicolò harbour mouth zone by KRAPP & SCONFIETTI (1983). This was the first record of this Pacific species for the Mediterranean sea. So far, no other reports of this species have been made for the Venice lagoon or other areas of the Mediterranean basin. In their research, between 1979 and 1981, KRAPP & SCONFIETTI (1983) collected 11 specimens, all in the same area. Despite no males were present in that group, many females carried a high number of eggs



**Fig. 1.** Sampling area (left) and sampling sites (right).

in their dilated femora (KRAPP & SCONFIETTI, 1983). This and the presence of the species spanning at least three years in the same place persuaded the Authors of the establishment of *A. hilgendorfi* in the Venice lagoon.

*A. hilgendorfi* was reported for the first time in northeast Atlantic (south England) in 1978 (BAMBER, 1985) and then collected in the same area, near Southampton, in 1988 (BAMBER, 1988). Later on, the species was recorded along the Dutch coasts of the North Sea in 2010 (BAMBER, 2012). This represents the first record of this species for the European continental coasts. The spreading process was confirmed by further records of *A. hilgendorfi* on the Atlantic coast of the Netherlands in 2013 (FAASSE, 2013).

So far, no other reports of this species are known for the Mediterranean Sea, Italian coast or the Venice lagoon (GUSSO, 2000; LEHMANN et al., 2014). In this paper we confirm the presence and wide spread of *A. hilgendorfi* in the Lagoon of Venice.

#### MATERIALS AND METHODS

The specimens were collected on various sites of the Venice lagoon between 1991 and 2017. The first samples were obtained with a small, one-meter-wide, trawling net locally used for oysterfishing, towed by a small motorboat during general surveys of benthic organisms from August 1991 to May 2017. During this research, it was possible to detect the presence and possible spread of this species in the lagoon. Therefore, to verify the current presence and abundance of this species, a specific survey was carried out in August 2017 using a more suitable method. Since *A. hilgendorfi* is a species particularly widespread in the intertidal zone (BAIN, 1991; BARRETO & AVISE, 2008), in order to optimize the results, the samples were carried out with a manual clam rake on the “bricole” (the wooden poles that indicate navigable canals in the shallow waters of the lagoon), at -0.5/-2.0 m depth, collecting small mussels banks. The sorting activity was made directly on board, and the specimens immediately separated, refrigerated in marine water and carried alive to the laboratory.

A dissecting stereomicroscope was used for

observation and study. Photographs were taken with a Canon Eos 600D camera and Canon MP-E 65mm f/2.8 1-5x Macro and Sigma 105mm f/2.8 Macro DG OS HSM lenses, using software Combine ZP for the stacking of figure 2.

Specimens were identified according to BAMBER (2010).

#### RESULTS

As is shown in table 1, in the period 1991-2017 we collected, during different surveys, 29 specimens of *A. hilgendorfi*.

All the individuals show fully segmented body, chelifores reduced to two rounded tubercles, fused with the anterior margin of the cephalon. Each palp has nine articles, the second and fourth longest. Ovipiger ten-articled, longer in males, with the seventh article dorsally enlarged (fig. 3). Walking legs slender, tibia 1 as long as femur, tibia 2 longer than tibia 1 (fig. 2); propodus slender with four or five longer proximal sole spines and four to six smaller distal sole spines; main claw about half as long as propodus, two auxiliary claws two-third the length of the main claw (BAMBER, 2010).

The trunk of adults measure on average 2 mm in length (from the anterior margin of the cephalon to the posterior margin of the last lateral process).

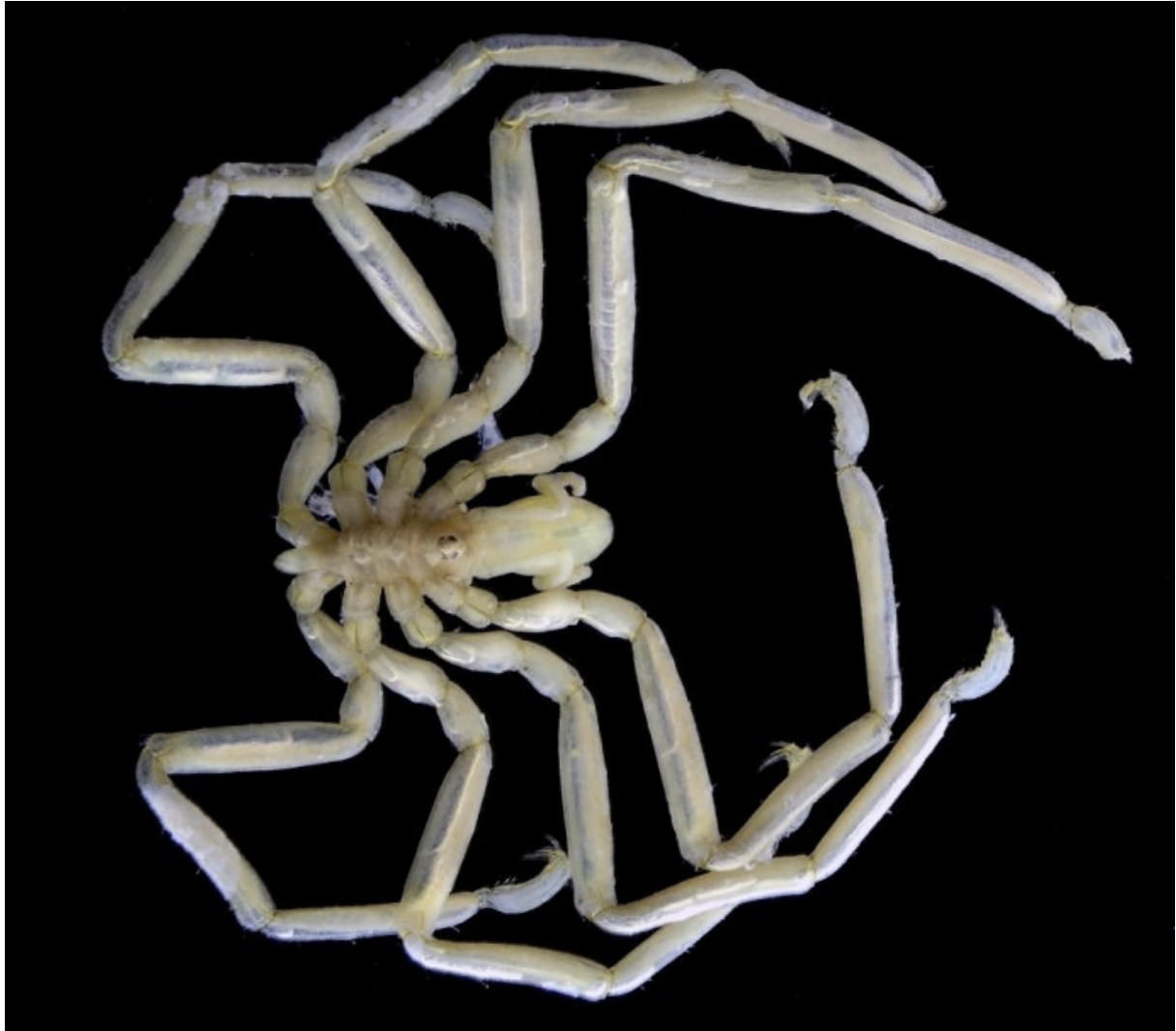
#### DISCUSSION

Although several species of Pycnogonida are known for the Venice lagoon, in all our samples we virtually found only *A. hilgendorfi*. No other species of Pycnogonida have been collected during our research, with the only exception of a single, very small specimen of *Anoplodactylus pygmaeus* (Hodge, 1864) on a sample from sampling site n. 4.

This was unexpected, since STOCK (1952), in his work on the pycnogonids of the Venice lagoon, found seven species, i.e., *Callipallene phantoma* (Dohrn, 1881), *Callipallene brevisrostris* (Johnston, 1837), *Ammothella longipes* (Hodge, 1864), *Achelia simplex* (Giltay, 1934), *Tanystylum orbiculare* Wilson, 1878, *Anoplodactylus angulatus* (Dohrn, 1881), and *Endeis spinosa* (Montagu, 1808).

| sampling date | catalog number | sampling sites |          |            |      |      |                  |                       |        | tot. |
|---------------|----------------|----------------|----------|------------|------|------|------------------|-----------------------|--------|------|
|               |                | 1              | 2        | 3          | 4    | 5    | 6                | 7                     | 8      |      |
| 18.08.1991    | 282            | n.e.           | n.e.     | n.e.       | n.e. | n.e. | n.e.             | n.e.                  | 4♀; 1♂ | 5    |
| 26.05.2016    | 24224          | n.e.           | 1♀; 1♂   | n.e.       | n.e. | n.e. | n.e.             | n.e.                  | n.e.   | 2    |
| 26.05.2017    | 24225          | n.e.           | 1♀; 3♂ov | n.e.       | n.e. | n.e. | n.e.             | n.e.                  | n.e.   | 4    |
| 25.08.2017    | 24720          | 2♀; 1♂ + 1♂ov  | 0        | 1♀; 1 juv. | 1♀   | 0    | 2♀; 2♂ov; 1 juv. | 1♀; 2♂ + 2♂ov; 1 juv. | n.e.   | 18   |

Tab. 1. Summary table of sampling sites and specimens collected.



**Fig. 2.** *Ammothea hilgendorfi*, female specimen from sampling site 2, dorsal view.



**Fig. 3.** *Ammothea hilgendorfi*, ventral view, male specimen from sampling site 2; left oviger in evidence, the right one is truncated at the apex.

In that study, Stock analyzed the samples collected by A. Giordani Soika on some “bricole” from September 1944 to November 1945 and reported the widespread presence of several species in many areas of the southern, central and northern Lagoon of Venice. In one of these sites, specifically the Lido harbour mouth near S. Andrea island, on 13th October 1944 he identified 7 specimens of *Achelias simplex*, 2 males, 4 females, 1 juvenile. Exactly in this same site in 2016 and 2017 we collected most of the specimens of *A. hilgendorfi* here recorded.

On the whole, from 1991 to 2017 we collected 29 individuals of *A. hilgendorfi* in eight sites of the northern Venice lagoon (tab. 1, fig. 1).

In any case, on the basis of our sampling showing a widespread presence of *Ammothea* accompanied by the absence of other species of pycnogonids, we may speculate that this species is now widely established, at least in the north of the Venetian lagoon.

All the surveys were carried out in the summer, or anyway in the warm period, from the end of May to August. This probably determined the high frequency of brood-carrying males observed and perhaps the small number of immature individuals in our set.

The almost complete absence of other species of

pycnogonids in our samples is still to be understood, since the investigated habitats are usually populated by many other species (LEHMANN et al., 2014) and the appearing of *Ammothea* in other areas does not seem to have affected the presence of other pycnogonid species (BAMBER, 2012). Moreover, lagoons are among the most productive aquatic environments (BARNES, 1980) and instances of competition for food or the substrate may be not very likely.

We are currently monitoring the presence of this species in other areas of the lagoon, particularly in the central and southern basins, and investigating the reasons for the absence in our samples of other species of pycnogonids which were very common in the lagoon in the past (STOCK, 1952).

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#### AUTHOR'S ADDRESS

Luca Mizzan - Museo di Storia Naturale di Venezia, Santa Croce 1730, I-30135 Venezia (VE), Italy; luca.mizzan@fmcvenezia.it