

MARINE RECORD

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First record of *Harmothoe aspera* (Hansen, 1879) (Polychaeta: Polynoidae) in the Dutch North Sea

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Abstract

Harmothoe aspera has been recorded in surveys off the Strait of Georgia, the Skagerrak, and the Barents, Mediterranean and Japanese sea. The recorded depth ranged from circa 48 m to circa 1500 m. This is the first report of *H. aspera* in the Dutch Exclusive Economic Zone (EEZ), and the first report in a depth range between 15 and 20 m.

Keywords: Harmothoe, *Harmothoe aspera*, Polynoidae, North Sea, Gas platform, Distribution

Background

Polynoidae (scale worms) is a highly diverse family of polychaetes including more than 700 species (Martin and Britayev 1998). Members of this family are easily recognizable by their dorsal elytra. Polynoidae are mainly considered to be free-living carnivorous-polyphagous (Fauchald and Jumars 1979). Their life strategies and known diets are highly diverse, with more than 20% being symbiotic species. Polynoidae feed on and interact with all kinds of prey including small crustaceans, echinoderms, sponges, gastropods, hydroids and other polychaetes (Fauchald and Jumars 1979).

Harmothoe aspera (Hansen, 1879) is a species of which little is known. Throughout the years, reports of *H. aspera* have been made from the Strait of Georgia, the Skagerrak, and the Barents, Mediterranean and Japanese sea (Table 1). Depths at which *H. aspera* has been found varies in range from circa 50 m (Swedish Agency for Marine and Water Management), to circa 200–270 m (Holte 2014; Hassel 2014) and even circa 1500 m (Nishimura 1966).

The first record of *H. aspera* was made by Hansen (1879) during the Norwegian North-Atlantic Expedition at station 48 (Lat, 64° 36' N. Long 10° 22' W) near the coast of Iceland. The recorded depth was 547 m. The

habitat in which *H. aspera* was found was characterized as dark grey porous clay which contained granite, a few quartz pebbles and a few calcareous shells. The bottom temperature was recorded at -0,3 degrees Celsius (Schmelk, 1882). This article is the first report of *H. aspera* in the Dutch Exclusive Economic Zone (EEZ) and the first report for *H. aspera* in a depth range between 15 and 20 m.

Methods

Two specimens of *Harmothoe aspera* were observed in a mixed macrofauna sample obtained with a surface supplied airlift as described in Coolen et al. (2015) during marine growth sampling for the RECON (Reef effects of structures in the North Sea) project. Marine growth in these samples consisted out of fouling communities on artificial substrates. Samples were taken 11 km from the coast of the island of Vlieland within the Dutch EEZ of the North Sea from an artificial substrate at petroleum platform L15-A (53.3295°N 4.8301°E), at a depth of 15 and 20 m in June 2014 (Fig. 1). Samples were fixed in a borax buffered 6% formaldehyde sea water solution, which was replaced with a mix of 70% ethanol and 3% glycerol before identification. *H. aspera* was identified by classic taxonomy using the following keys: "Identification of scale worms in British and Irish waters" (Barnich 2011) and "Revision of the Mediterranean species of *Harmothoe*" (Barnich and Fiege 2000). Both specimens are stored in the Rijkswaterstaat benthic reference collection.

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Table 1 A sample of locations, year and depth in meters of previous observations of *H. aspera*^a

Location	Year sampled	Depth (m)	Reference
Western Mediterranean	1990's	Unknown	(Barnich and Fiege 2000)
Coast of Iceland	1876–1878	547	(Hansen 1879)
Strait of Georgia	1973	Unknown	(Levings and McDaniel 1974)
West and East Greenland	1895–1896	200–600	(Ditlevsen 1917)
Iceland	1895–1896	Unknown	(Ditlevsen 1917)
Norway	1895–1896	Unknown	(Ditlevsen 1917)
Spitsbergen	1895–1896	Unknown	(Ditlevsen 1917)
Motovskt Bay and the open Southern Barents Sea	2006–2008	Unknown	(Anisimova et al. 2010)
Portuguese and Spanish Exclusive Economic Zone	Unknown	Unknown	(Ramos, 2010)
Trondheimfjord	Unknown	Unknown	(Fiege and Barnich 2009)
Southern Japan Sea, Oki Bank	Unknown	200–1500	(Nishimura 1966)
Skagerrak and Kattegat	Unknown	Unknown	(Nygren and Pleijel 2015)
Barents Sea	2007	266	(Hassel 2014)
Barents Sea	2007	241	(Holte 2014)
Barents Sea	2007	209	(Holte 2014)
Barents Sea	2007	264	(Holte 2014)
Barents Sea	2007	265	(Holte 2014)
Barents Sea	2007	240	(Holte 2014)
Sweden N12	2001	48	(Swedish Agency for Marine and Water Management 2015)

^aThere are several other records of *H. aspera* from North Atlantic waters occurring on a wide range of substrata in 200 to 1000 m depth (Barnich and Fiege 2009)

Results

Systematics

Order: Phyllozoa Dales, 1962.

Family: Polynoidae Kinberg, 1856.

Genus: *Harmothoe* Kinberg, 1856.

Species: *Harmothoe aspera* (Hansen, 1879).

Material examined

The two specimens of *H. aspera* have the following specifications. Both were incomplete and damaged at their posterior end, had no sexual products and had most of their elytra missing. Specimen one measured 3.5 mm long with 19 segments. Segment 18–19 were damaged and only 3 elytra remained (reference collection Rijkswaterstaat). Specimen two measured 2.6 mm long with 15 segments. The left half of segment 14 was missing with 1 elytron left (reference collection Rijkswaterstaat).

Remarks

The two specimens showed ventrally inserted lateral antennae, a bilobed prostomium with cephalic peaks and a digitiform supra-acicular process on the neuropodia. The specimens were identified and confirmed as *H. aspera* by their elytra (Fig. 2). The margin of their elytra had fringing papillae, the microtubercles were pointed (thorn-shaped/triangular) and the macrotubercles near the posterior margin were large and pyramid shaped. All characteristics fit within the normal range of shapes of

H. aspera. The key characteristic used to identify *H. aspera* were the large pyramid shaped macrotubercles.

The presence of large pyramid shaped macrotubercles, as described by Barnich and Fiege (2000), is a clear key characteristic. Nonetheless, *H. aspera* can be confused with three other species: *Harmothoe globifera*, *Harmothoe bellani* and *Harmothoe lagiscoides serrata*. *H. globifera* differs by having much longer marginal papillae on the outer lateral margin of their elytra and the macro- and microtubercles are rounded, globose and covered with small nodular papillae. *H. bellani* differs by having thorn-shaped microtubercles and no macrotubercles. *H. lagiscoides serrata* differs by having slender and thorn-shaped macrotubercles (Barnich and Fiege 2000).

Habitat

The L15-A platform has a steel jacket foundation which is standing in waters 22 m deep with a sandy bottom that is locally covered with rock dump to prevent scouring of the seabed. The two *H. aspera* specimens were found in fouling communities growing on steel in vertical orientation. The community at the sampled depths was dominated by *Metridium senile* and Tubulariidae covered with *Jassa herdmani* turf. In total, 60 benthic species were present in the 8 samples obtained at these depths, with representatives from Annelida (15 spp), Arthropoda (20 spp), Bryozoa (5 spp), Cnidaria (3 spp), Echinodermata (3 spp), Mollusca (10 spp) and Porifera

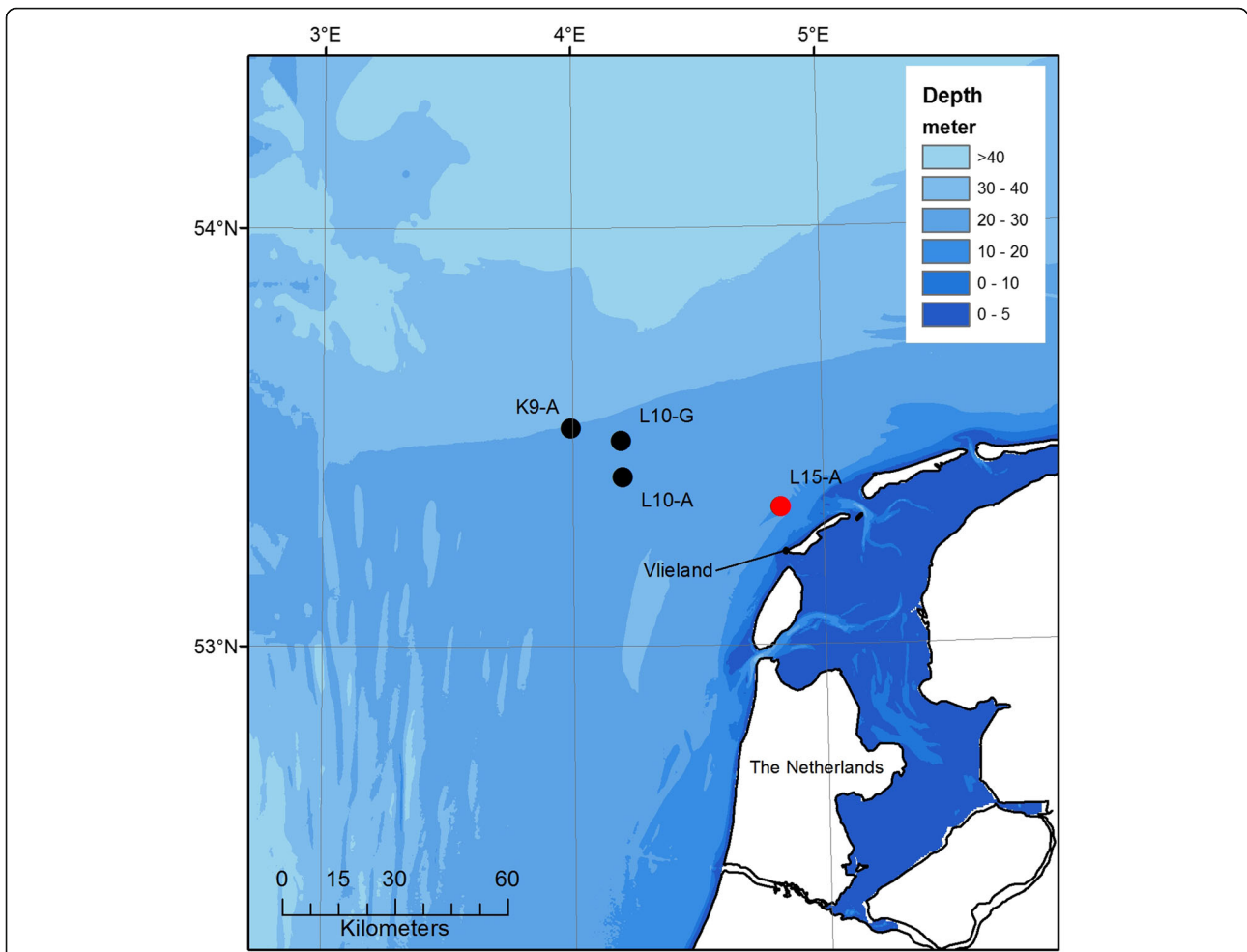


Fig. 1 Locations of the samples platforms for the RECON project (black & red bullets). The two specimens of *H. aspera* were found on platform L15-A (53.3295°N 4.8301°E; red bullet)



Fig. 2 Elytron of *Harmothoe aspera*. Characteristic for *H. aspera* are the large pyramid shaped macrotubercles on the posterior margin of the elytra. The Photo was taken by Martijn Spierings during the discovery of the first *H. aspera* specimen

(4 spp). *H. aspera* was observed close to the seabed, but was not present in samples taken from the rocks at the bottom of the platform.

Discussion

The presence of *H. aspera* of the coast of Vlieland represents its first ever record in the Dutch EEZ. Since its first discovery in 1879 information on *H. aspera* has been scarce with only a few records since the 1970’s.

The original description from Hansen (1879) contains habitat information on bottom materials, depth and temperature. Besides this account no further descriptions can be found within other records that give information about the habitat of *H. aspera*. There are also no recorded descriptions about its lifecycle or reproduction. There are only species records containing a year and sometimes a depth is listed. *Harmothoe aspera* is found in different seas all over the world. In 1876–1878 it has been recorded during the Norwegian North-Atlantic Expedition (Hansen 1879), in 1973 it was recorded in the

Strait of Georgia on a 52 year old telephone cable (Levings and McDaniel 1974), in the 1990's it was found for the first time in the Western Mediterranean (Barnich and Fiege 2000) and around 2006–2008 it was recorded in the Barents Sea (Anisimova et al. 2010). It appears that *H. aspera* is mostly observed at a depth range between 200 and 300 m, although it has also been observed at shallower depths of 48 m in the waters of Sweden. It must be noted that our depth record (15–20 m) is the shallowest depth record for *H. aspera* to date.

H. aspera remains a species of which very little is known. The observation of *H. aspera* on artificial hard substrate in the North Sea emphasizes the importance of investigations of benthic communities on these structures. This finding increases the diversity of Polynoidae found on artificial hard substrates.

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Availability of data and materials

The data that supports the findings of this study is available from Wageningen Marine Research, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data is however available from the authors upon reasonable request and with permission of Wageningen Marine Research. This data may consist of information on samples, species lists and availability of the specimens.

Authors' contributions

MS and IMD carried out the identification of Polynoidae for the 15-A platform and cooperated in writing this article. JWPC did the sampling, designed the study RECON project (Reef effects of structures in the North Sea) and cooperated in writing this article. BvdW and JC assisted with identifying the samples and cooperated in writing this article. All authors read and approved the final manuscript.

Ethics approval and consent to participate

No ethical approval or consent to participate was required.

Consent for publication

Authors gave consent to publish this MS.

Competing interests

The authors declare that they have no competing interests.

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