Communications

A new occurrence of the benthic amphipod *Dyopedos monacanthus* (Metzger, 1875) in the southern Baltic Sea – the first record in the Słupsk Furrow

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Abstract

The paper reports on the occurrence of the epibenthic amphipod *Dyopedos monacanthus* (Metzger, 1875) in the Baltic Sea. This species belongs to the family Dulichiidae and is found in the North Atlantic and European coastal waters from northern Norway to the English Channel and the Danish Straits. Some 50 years ago, only a few individuals of *D. monacanthus* were occasionally sighted in the western Baltic (the Arkona and Bornholm Basins). In summer 2006, unusual amphipod specimens were noticed at five deep-water stations over the Słupsk Furrow. This was the first time that *D. monacanthus* was observed in that area, which is currently the easternmost limit of the species' range in the Baltic Sea.

The amphipod *Dyopedos monacanthus* (Metzger, 1875) is now classified in the family Dulichiidae: Myers & Lowry (2003) put forward a new classification of the suborder Corophiidea within the Amphipoda. *D. monacanthus* is therefore no longer a member of the family Podoceridae, in which it had been placed until recently (e.g., Matson & Cedhagen 1989, Thiel 1999a). An earlier synonym of this species is *Dulichia monacantha* Metzger (Stephensen 1929).

D. monacanthus is native to North Atlantic coastal waters, ranging from North America through the Arctic Ocean to northern Norway. It is also found in the English Channel and the Danish Straits (Stephensen 1929, Laubitz 1977, Lincoln 1979, Jażdżewski & Konopacka 1995).

D. monacanthus is a common amphipod on estuarine soft-bottoms along sea coasts (Thiel 1998a). A passive suspension-feeder, it depends entirely on water currents for the delivery of food particles, mainly seston, which it sieves from the current with its richly setose antennae (Mattson & Cedhagen 1989, Thiel 1997). It inhabits flexible mud whips that it constructs from filamentous algae, detritus and sediment particles (Thiel 1998a). The whips are utilized as vantage points for suspension feeding (Moore & Earll 1985). After hatching from the female's brood pouch, small juveniles enjoy extended parental care for several days to several weeks. The offspring cling to the upper parts of their mother's mud whips, where the feeding environment may be optimal for them (Thiel 1999b), and remain there until they have attained sexual maturity (Thiel 1999a). This postemergent active brood care has been described principally in the Caprellidea (Dick et al. 1998). *D. monacanthus* is a good swimmer, which avoids benthic predators such as nemertines, polychaetes and sand shrimps by migrating into the water column (Thiel 1998a,b). There they have been identified as a major prey item of demersal fish species, e.g., dragonet *Callionymus maculatus* Rafinesque-Schmaltz, poor-cod *Trisopterus minutus* (L.) and cod *Gadus morhua* (L.) (Mattson & Cedhagen 1989).

It was Mańkowski (1959) who first recorded this crustacean in the western Baltic Sea in 1952. This author reported two observations of single juvenile *Dulichia* sp. (identification to the generic level). These specimens were caught in plankton samples at stations in the region of the Bornholm Furrow and the Słupsk Sill. Studies of the benthos in the southern Baltic Sea in the 1960s yielded fresh data about this species. The investigations of Żmudziński (1969) confirmed the presence of *Dulichia monacantha* Metzger in the Arkona and Bornholm Basins; it occurred in the zoobenthos community in the eastern part of the Bornholm Furrow. These individuals were observed at 42 m depth on a sandy-mud bottom with a total mean abundance of 30 indiv. m^{-2}. During the next 10 years, data on *D. monacantha* in publications were cited from the previous studies described above. Mańkowski (1975) and Żmudziński (1978) were not sure that *D. monacantha* had adapted to live in the environment of western Baltic: they linked the sparse distribution of this species with the highly saline inflows from the North Sea. The currently accepted name of this species is *Dyopedos monacanthus* (Laubitz 1977). It was first used in the Polish literature by Jażdżewski & Konopacka (1995).

Material for zooplankton studies was collected during cruises of the Sea Fisheries Institute's r/v 'Baltica' to the Gdańsk and Bornholm Basins and the Słupsk Furrow in summer 2006 (14–25 August; 23 September – 6 October). Samples were taken during oblique hauls of a Bongo net (500 μm and 333 μm mesh size). The net was lowered to near the bottom and then raised slowly to the surface. The volume of water filtered was measured with a flowmeter attached to the mouth of the gear. The salinity, temperature and oxygen concentration were recorded at each station.

A new amphipod species was noted in the material from five deep-water stations over the Słupsk Furrow (Fig. 1). These organisms were identified as *D. monacanthus* according to Laubitz (1977), Lincoln (1979) and Kohn & Gosselck (1989). Adult individuals up to 7.5 mm in length are yellow mottled with brown. A diagnostic feature of this species is plate 1 in the male. Coxa 1 is prolonged into a long narrow spine, which curves forwards and inwards ventrally. The female is very similar to the female of *D. porrectus* and is distinguished mainly by its larger gill 5 and by the longer dactylus (more than half the length of the propodus) on gnathopod 2. Gnathopod 2 in the male is extremely large and robust.

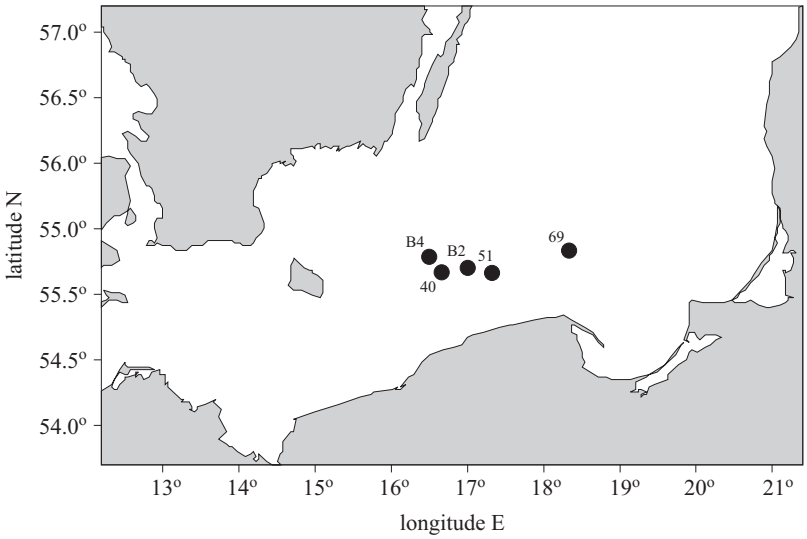

Fig. 1. Location of the new records of *Dyopedos monacanthus* in the Słupsk Furrow

The biological characteristics of this species are given in Table 1. All the specimens were collected at night. Each sample was counted in its entirety, without dilution. The organisms were found in water volumes from 338 to 626 m^3 (detailed data in Table 1). The largest numbers of *D. monacanthus* were recorded at stations 40 and B4, but the values from Table 1 were

Table 1. Population structure of *Dyopedos monacanthus* at five stations in the Baltic Sea

Station	Date	Volume of water filtered at the station [m^3]	Number of individuals in the length class [mm]								Number of unidentified individuals	Total number of individuals in the sample in the volume of water filtered at the station
			female (sampling gear: Bongo 500 μm/ Bongo 333 μm)				male (sampling gear: Bongo 500 μm/ Bongo 333 μm)					
		B 500/ B 333	2	3	4	5	2	3	4	5	B 500/ B 333	B 500/ B 333
B2	17.08. 2006	528/556		1/1	1/-			-/5	-/7	1/-		3/13
69	17.08 2006	623/626			-/1			2/-		1/-		3/1
B4	18.08 2006	338/352	3/7	10/ 7	4/1		1/3	10/ 5	4/2	1/-	6/5	39/30
40	18.08 2006	549/574	5/ 20	8/ 16	6/3		7/ 12	10/ 19	7/ 10	1/1	2/-	46/81
51	26.09. 2006	593/610	-/2	-/1								-/3

not recalculated per cubic metre of filtered water. This calculation was purposely forgone since current knowledge on the pelagic movements of these amphipods is limited. The proportion of the population migrating into the water column is not known, neither does the sampling gear supply any information on whether *D. monacanthus* was caught just a few metres above the bottom or whether it had dispersed into the water column as a whole. If the abundance of amphipods is sufficiently clear-cut, this figure is given as the number of individuals per cubic metre of filtered water. Nevertheless, analysis of data from the same stations suggested that the difference between the number of organisms from Bongo 500 μm and Bongo 333 μm was not significant. The higher numbers of the smallest females and males in the Bongo 333 μm net at station 40 were responsible for the highest total number of individuals at this station. The size of these species ranged from 2 to 5 mm, with females being the most abundant in the 2 mm length class and males in the 3 mm length class. Males reached the largest size of 5 mm in this material. Some females were fecund, but only in two cases were a few eggs present in an external brood pouch (1 female – Bongo 500 μm; 1 female – Bongo 333 μm; station 40). However, the majority of females did have developed brood plates (oostegites). The eggs may well have floated out of the pouch before or during the hauls. A similar situation relates to

Table 2. Hydrological characteristics of the sampling stations

Station	Date	Latitude [°N]	Longitude [°E]	Depth [m]	Bottom temperature [°C]	Bottom salinity [PSU]	Bottom oxygen [%]
B2	17.08.2006	55.1994	17.0082	82	6.4	14	40
69	17.08.2006	55.3327	18.3347	80	5.5	13	60
B4	18.08.2006	55.2851	16.5035	63	6	13.5	59
40	18.08.2006	55.1676	16.6667	71	6.2	13.3	66
51	26.09.2006	55.1634	17.3304	83	6.6	14.3	33

the antennae, which were torn from the body during collection and material analysis. The sex ratio at stations B4 and 40 was not 1:1: at B4 there were somewhat more females than males for both sets of sampling gear, whereas at station 40 males were dominant in the Bongo 333 μm sample. Table 2 lists the hydrological parameters of the near-bottom water.

D. monacanthus is found in the water column when temperatures are higher and benthic predators more abundant; its pelagic movements are less frequent in winter than in summer (Thiel 1998a). It is these behavioural traits that explain the appearance of *D. monacanthus* in the summer 2006 plankton samples. Moreover, it seems probable that this species entered the southern Baltic with water flowing in from the Kattegat-Öresund area. It is not clear whether *D. monacanthus* has settled in the Słupsk Furrow. This region of the southern Baltic is permanently ventilated – anoxic conditions have never been reported there (Meier et al. 2006); even so, *D. monacanthus* has never before been reported in these waters. The latest records of the species' appearance confirm its tendency to expand its Baltic Sea range in an easterly direction.

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