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Antarctic necrophagous lysianassoids from a stranded fur seal carcass

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Abstract: A large sample of more than 1500 individuals of scavenging Amphipoda from fur seal carcass was studied. Six species have been identified. The two most abundant species, *Abyssorchomene plebs* and *Waldeckia obesa*, are sublittoral, necrophagous amphipods that could attack the carcass when submerged in the sea. After stranding on the beach they became an attractive food source for birds eating not only the seal tissues but also the scavenging amphipods. The species composition of the present sample as well as earlier data on Antarctic tern stomach content and baited traps taken in the same area and at the same time agreed quite well. These observations confirm the expectation that Antarctic tern feeds on necrophagous amphipods picked out from carcasses stranding on the sea shore.

Key words: Antarctica, King George Island, Amphipoda, scavengers.

Introduction

Amphipod crustaceans belong to the most diverse groups of invertebrates in the Southern Ocean. More than 800 species have been recorded south of the Subtropical Front (De Broyer *et al*. 2007). Most of the species are benthic dwellers but there are also some pelagic ones. Amphipods comprise different trophic groups – herbivores, predators, omnivores as well as scavengers (Dauby *et al*. 2001). On the other hand, amphipods constitute a food source for many other invertebrates as well as vertebrate animals – fishes, birds and mammals (Dauby *et al*. 2003). Amphipod crustaceans were reported from the diet of different penguin species (*Aptenodytes forsteri, Eudyptes chrysolophus*, *Pygoscelis adeliae*, *Pygoscelis antarctica*, *Pygoscelis papua*), blue petrel (*Halobaena caerulea*), Antarctic and Arctic tern (*Sterna vittata*, *Sterna macrura*), Antarctic prion (*Pachyptila crassirostris*), fulmar prion (*Pachyptila desolata*) and diving-petrels (*Pelecanoides georgica*, *P. urinatrix*) (Ealey 1954; Payne and Prince 1979; Croxall and Furse

1980; Croxall and Prince 1980; Prince 1980; Jażdżewski 1981; Hindell 1988; Cherel and Kooyman 1998; Jażdżewski and Konopacka 1999; Lescroël *et al*. 2004; Lynnes *et al*. 2004; Rombolá *et al*. 2006; Casaux *et al*. 2008). In most cases preyed crustaceans were pelagic species and were caught during shallow diving of birds. However, among food items, some benthic amphipods were also observed. While studying the diet of Antarctic tern (*Sterna vittata*) it appeared that all Amphipoda found in its stomach content were benthic scavengers (Jabłoński 1995; Jażdżewski and Konopacka 1999). These authors were of the opinion that this was a result of birds feeding on amphipods eating tissues of dead seals or other animals stranded on the shore. However, no sample of these crustaceans collected directly from the carcass was available to prove this expectation. The aim of the present study was to examine the species composition of necrophagous amphipods found on a fur seal carcass.

Study area, material, methods

The material was collected by Dr B. Jabłoński, member of the IVth Polish Antarctic Expedition, on 6th January1980 from a fur seal carcass (*Arctocephalus gazella*). The animal was lying at the water line at Turret Point (62°04'59"S 57°57'00"W), King George Island, South Shetland Islands. Turret Point is located at the eastern limit of King George Bay, west of Three Sisters Point. It is a cobble beach on the southern coast and melt pools inland. The beach opens to the Bransfield Strait waters and inlandward gently slopes to an extensive, heavily crevassed glacier. The amphipods were preserved in 4% formaldehyde and later transferred to 75% ethyl alcohol. Nearly all specimens were identified to species level and sexed.

Results

Among 1562 individuals 6 species were found, all belonging to the superfamily Lysianassoidea: Lysianassidae s.s and Uristidae. Two species: *Abyssorchomene plebs* and *Waldeckia obesa* constituted more than 90% of all individuals in the sample. 1.3% of the sample were juveniles, that were too small to be identified with certainty. Details of the identified material is given in Table 1. Sex ratio in the two most abundant species is shown in Fig. 1. In *Abyssorchomene plebs* a relatively high share of juveniles (*ca*. 40%) was observed; males and females constituted respectively *ca*. 30% and *ca*. 25% of all individuals. Some ovigerous females were also found but their share was comparatively low. In *Waldeckia obesa* males and females each constituted *ca*. 45% of all animals, whereas the share of juveniles was only 10%. No ovigerous females have been found.

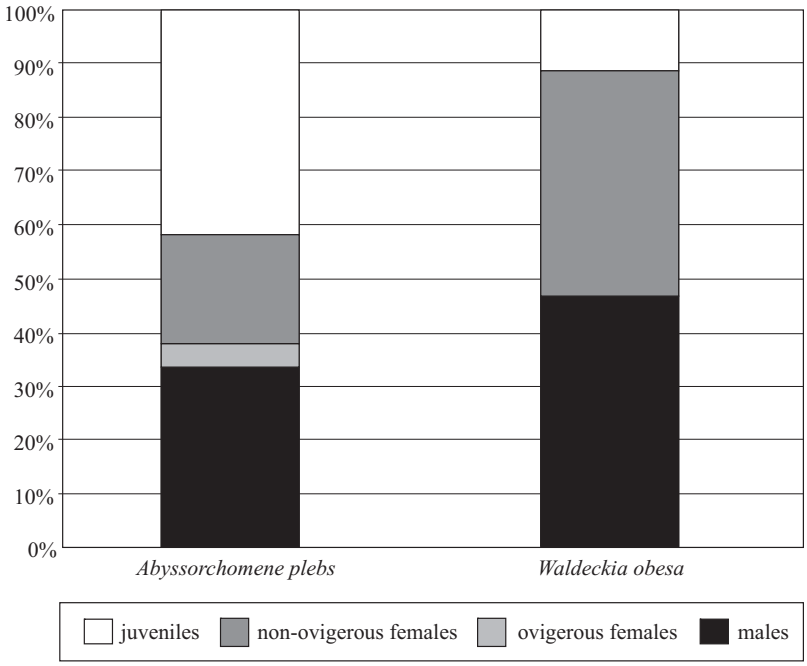

Fig 1. Sex frequency in two most abundant species.

Table 1

Amphipods found in the sample

Species	Abundance [N of ind.]	%
Abyssorchomene plebs	1323	85
Waldeckia obesa	118	7.3
Cheirimedon femoratus	60	4
Pseudorchomene coatsi	16	1
Hippomedon kergueleni	15	0.9
Orchomenella rotundifrons	9	0.5
Lysianassidae indet.	21	1.3
total	1562	100

Discussion

The composition of amphipod species is almost the same as observed by Jażdżewski and Konopacka (1999) in the stomach content of *Sterna vittata* caught at King George Island, on shores of Admiralty Bay. The proportions of different amphipods differed but the dominance of *Abyssorchomene plebs* in both cases could be seen (see Fig. 2).

All the species found in the present sample are known for their scavenging habits (Walker 1907; Bregazzi 1972, 1973; Arnaud 1974; Rakusa-Suszczewski

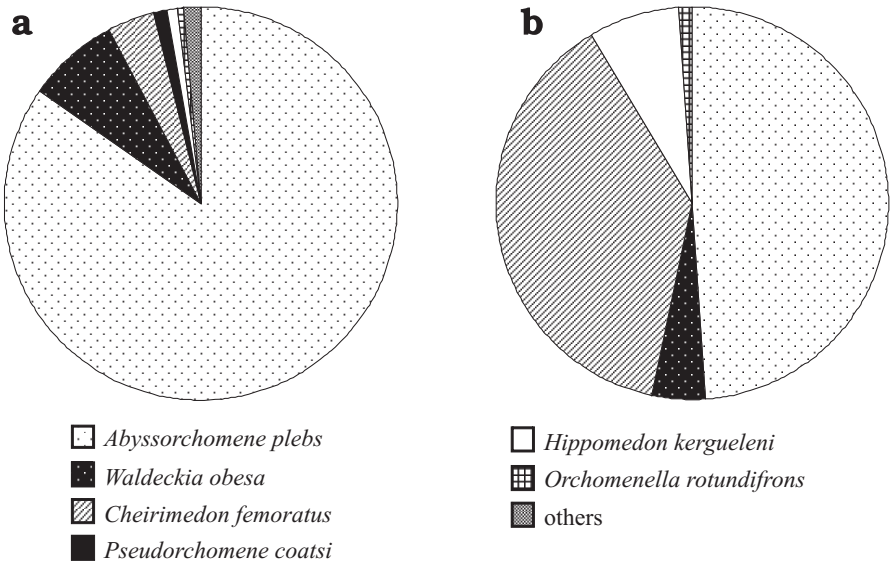

Fig. 2. The share of different species in the abundance in the present material (a) and Antarctic tern stomach content (b). Fig. 2b – according to Jażdżewski and Konopacka 1999.

1982; Arnaud *et al*. 1986; Presler 1986; Slattery and Oliver 1986; Dauby *et al*. 2001). Necrophagous amphipods are able to locate the food source from a distance of up to 200 m and may appear at the bait even 5–20 minutes after setting down (Hessler *et al*. 1978; Sainte-Marie and Hargrave 1987).

Abyssorchomene plebs is a circumantarctic and infrequently sub-Antarctic species that has been reported from a wide range of depths, namely from 7 to 1000 m (De Broyer *et al*. 2004; De Broyer *et al*. 2007). Detailed studies on this species in Admiralty Bay (Presler 1986) showed its preference to mid-sublittoral waters, with the highest abundance in baited traps observed at the depths of 30–60 m. This species is a very active scavenger (Slattery and Oliver 1986), however Dauby *et al.* (2001) treated it as an opportunistic feeder, taking into account its predatory habit in the water column. The sex ratio of this species was similar in the currently analyzed sample, in bird stomach (Jażdżewski and Konopacka 1999) and in baited traps set by Presler (1986) in Admiralty Bay (Fig. 3). Comparatively low proportion of ovigerous females (5% of all individuals) in the material agrees with the observations of Slattery and Oliver (1986).

The second most abundant species in the present collection was *Waldeckia obesa.* It is also a circumantarctic species, occurring down to the depth of 1030 m (De Broyer *et al*. 2007). It prefers deep waters; records in shallow places are rare. Presler (1986) reported its highest abundance in baited traps in Admiralty Bay from the depths of 60–90 m and it was observed in numbers at depths of *ca*. 100 m when taking pictures of the Admiralty Bay bottoms in 2007 (own observation).

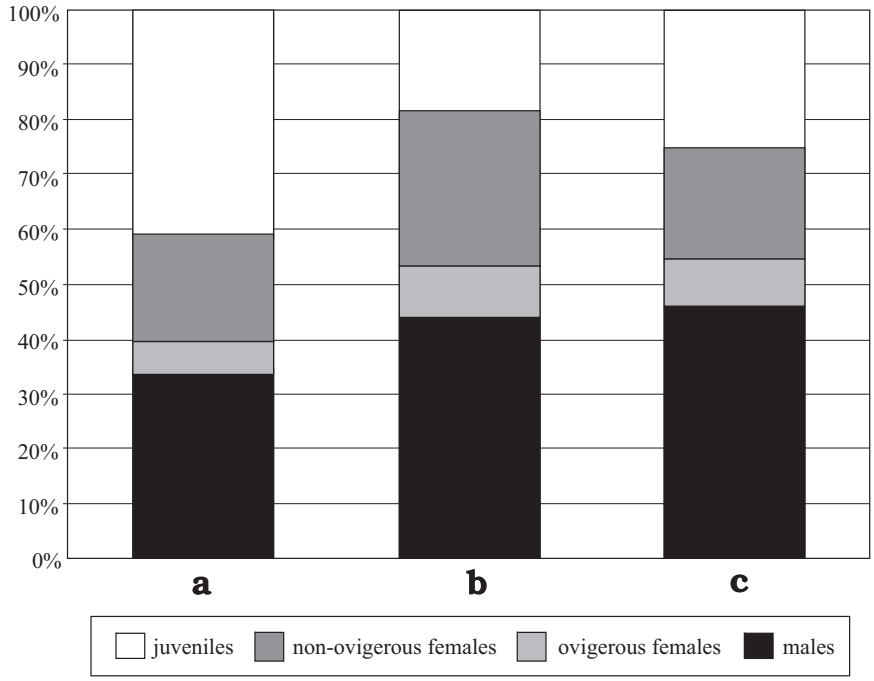

Fig 3. Comparison of sex frequency of *Abyssorchomene plebs* in present material (a), samples from *Sterna vittata* stomach (b) and baited traps (c) all collected in 1980 (b, according to Jażdżewski and Konopacka 1999; c, according to Presler 1986).

Cheirimedon femoratus is a circumantarctic and sub-Antarctic species found from 0 to 310 m with preferred depth of 5–30 m in Admiralty Bay (Presler 1986; Jażdżewski *et al*. 1991a, b; De Broyer *et al.* 2007). Smale *et al.* (2007) noticed in Adelaide Island that this species occurs at the bait only in winter season and supposed that it is an opportunistic feeder in that area.

The next three species constituted less than 10% of the sample. *Pseudorchomene coatsi* is a circumantarctic and sub-Antarctic, deep sub-littoral species found in baited traps at depths over 150 m (De Broyer *et al*. 2004, 2007). The last two species, *Hippomedon kergueleni* and *Orchomenella rotundifrons*, are shallow water dwellers. Their highest abundance in Admiralty Bay was recorded at depths less than 20 m (Presler 1986; Jażdżewski *et al*. 1991a, b).

More than 90% of amphipods found on the fur seal carcass are sub-littoral species. Obviously they attacked the carcass when it was lying on the bottom of the sea. When reaching the food they do not stop eating even when taken out of the water (Jażdżewski pers. comm.). Apparently, the carcass of the seal was thrown away from the sea by the waves but amphipods still persisted in its body. Jabłoński (1995) and Konopacka and Jażdżewski (1999), who have studied the stomach content of *S. vittata* collected at the same island, during three consecutive Antarctic summers, were of the opinion that the necrophagous amphipods found in tern

stomachs were preyed on by birds on the seal bodies. According to those authors that would explain the presence of the comparatively deep sea amphipods in bird stomachs. It is worth noting that *Sterna vittata* is only a contact-dipping and plunge-diving bird, unable to dive even to 1 m depth (Sagar 1991).

The share of particular species in the present collection matches comparatively well the results of the analysis of Antarctic tern stomach content and samples taken from baited traps at the same time in Admiralty Bay (Presler 1986; Jażdżewski and Konopacka 1999). The differences may be related to the locality where the seal carcass was found. Turret Point is influenced by open waters of Bransfield Strait so the composition of benthic amphipod fauna may differ from the communities in fjord-like Admiralty Bay. It is also possible that the results are influenced by the sampling method. The two most abundant species in the present material are larger species than the rest ones so they may be easier to collect.

Nevertheless, the proportions of the species occurring in the sample studied are similar to those observed in baited traps set by Presler (1986) in Admiralty Bay at the depth 30 m and more. This suggests that this very carcass could lie in comparatively deep sublittoral (say >20 m). On the other hand one cannot exclude the possibility that scavenging lyssianassoids arrived to the shallower place since their chemoreceptory abilities to locate the prey are very good.

The present note confirms the suggestions by Jażdżewski and Konopacka (1999), that Antarctic birds, including Antarctic tern, *Sterna vittata*, feed on the necrophagous lysianassoids, pecking them up from the stranding carcasses. It is an interesting food chain link between amphipods and birds. Simultaneously it is difficult to say that lysianassoids are constant element of Antarctic tern diet; only amphipods studied by Jażdżewski and Konopacka (1999) were completely identified to the species level. Casaux *et al.* (2008) also reported gammarids in the diet of *Sterna vittata gaini*, but only two species (*Eurymera monticulosa* and *Bovallia gigantea*) were identified, the majority of the amphipod material was defined as unidentified gammarid amphipods.

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