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SHORT NOTE

M. Klages · J. Gutt · A. Starmans · T. Bruns

Stone crabs close to the Antarctic Continent: *Lithodes murrayi* Henderson, 1888 (Crustacea; Decapoda; Anomura) off Peter I Island (68°51′S, 90°51′W)

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Abstract Live reptant decapod crustaceans have never been collected on the Antarctic continental shelf, although shrimps occur locally in large quantities. Therefore, the collection of four male individuals of the anomuran decapod *Lithodes murrayi* off Peter I Island, close to the Antarctic Continent, between 180 and 260 m water depth in February 1994 is of particular relevance for further studies on the origin and adaptation of Antarctic decapods. Another five specimens were observed *in situ* by a remotely operated vehicle at the same location.

Introduction

This paper is a report of preliminary results on *Lithodes murrayi* collected and observed off Peter I Island at approximately 200 m water depth in the Bellingshausen Sea. The occurrence of anomurans at this location is of particular relevance, since it is the most southern position at which lithodids have been collected so far. The closest northern locality at which stone crabs have been found is that of *Paralomis spectabilis* Hansen, 1908 (Birsthein and Vinogradov 1967) near Scott Island at 67°S 180°W in the Ross Sea, albeit in deeper water, between 500 and 900 m. In general, species richness of decapods is low in the Antarctic, but shrimps such as *Chorismus antarcticus* and *Notocrangon antarcticus* occur locally with maximum densities of > 3 (Arntz and Gorny 1991, bottom trawl samples) and ≥ 50 individuals (Gutt et al. 1994, underwater photographs) per 100 m^2 on the shelf of the eastern Weddell Sea. The reasons for the depauperate decapod fauna of the Antarctic continental shelf are still poorly understood (Kirkwood 1984), especially with the apparent absence of any reptant decapods.

M. Klages (✉) · J. Gutt · A. Starmans · T. Bruns
Alfred-Wegener-Institut für Polar- und Meeresforschung,
Columbusstrasse,
D-27568 Bremerhaven, Germany

Materials and methods

During the German Antarctic Expedition ANT XI/3 with RV "Polarstern" into the Bellingshausen Sea, two stations (68°52,0′S, 90°51,2W; 68°51.4′S, 90°52,6′W) were sampled off Peter I Island at 183 m and 257 m water depth (Fig. 1). The gear used included an Agassiz trawl (mouth opening 3 × 1 m) with 10 mm mesh size in the cod end and an ROV (remotely operated vehicle) equipped with two video cameras and one still camera. The lithodids were measured and the sex of each animal collected was determined. Blood samples were taken from two specimens, which were both deep frozen afterwards at −80°C for future physiological studies. The remaining individuals were kept alive in aquaria for future detailed studies under controlled conditions.

Results

Four male *Lithodes murrayi* were collected with an Agassiz trawl at water depths of 183 m (one specimen) and 257 m (three specimens) off Peter I Island (Fig. 1). Another five specimens were observed in their natural environment using an ROV. The area covered by this video transect was approximately 400 m^2. These observations indicate that the habitat of *L. murrayi* is soft bottom colonised by a sparse epifauna most likely of low diversity. The most conspicuous and abundant elements of the associated fauna were fanshaped sponges, gorgonarians (*Primnoella* sp.), compound ascidians and an apodid holothurian which has not been recorded previously from the Antarctic continental shelf. When compared with the continental shelf, demersal fishes were abundant and dominated by *Lepidonotothen larseni*. Contrary to the results published by Tomo (1973) there were no *Ophionotus victoriae* and *Cnemidocarpa verrucosa* visible on the slides and video tapes analysed. Typical brachyuran escape reaction was observed in two specimens of *L. murrayi*

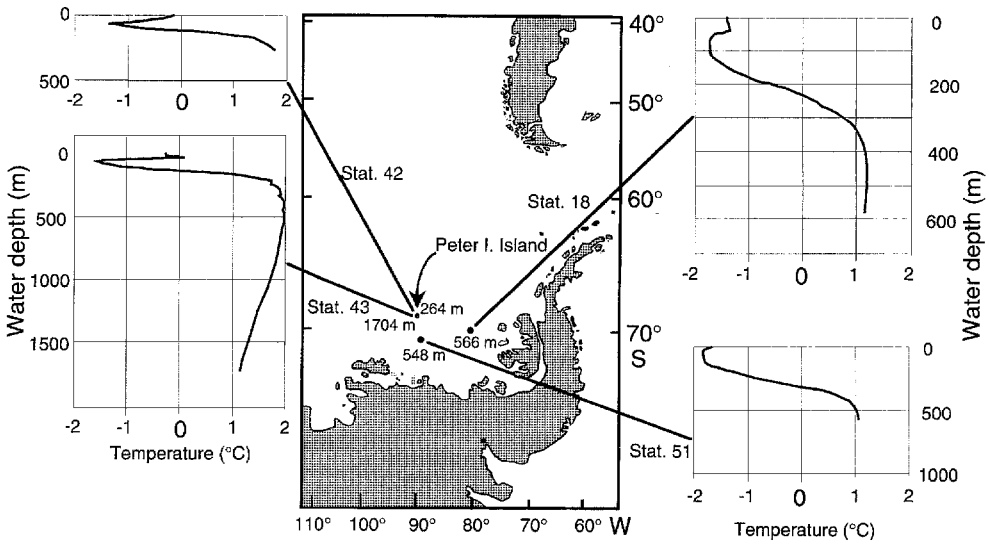

Fig. 1 Water temperature profiles measured at station 18 (70°00.9'S, 80°03.6'W), station 42 (68°51.1'S, 90°52.6'W), station 43 (68°59.3'S, 90°31.3'W) and station 51 (70°56.4'S, 89°19.2'W)

Table 1 Some morphometric characteristics of *Lithodes murrayi* collected and extrapolated from underwater observations (*) off Peter I Island

Sex	Carapace length (mm)	Carapace width (mm)	Distance between end of merus of opposite third pereiopods (mm)
Male	100	99	300
Male	41	28	67
Male	40	27	65
Male	36	25	62
Unknown*	–	–	270
Unknown*	–	–	250
Unknown*	–	–	200
Unknown*	–	–	160
Unknown*	–	–	130

when the ROV came closer than 1 m to the individuals. Carapace length and width and the distance between the end of the merus of opposite third pereiopods were measured to the nearest mm in all individuals collected (Table 1). The size of individuals observed by the ROV was estimated ($\pm$ 1 cm) using a calibrated scale.

The temperature close to the seafloor was + 1.8°C and the salinity approximately 34.6‰. Data on water temperature and salinity at the adjacent shelf of the Bellingshausen Sea indicate similar conditions, e.g. temperature of $\pm$ 1.1°C (Fig. 1) and salinity of 34.7‰.

Discussion

Considering the general distribution of lithodids, *Lithodes murrayi* at Peter I Island is very close to the edge of the Antarctic continental shelf. The distance to the nearest 1,000 m depth contour of the shelf is less than 180 km in the south-east direction. The distance to the South American continent is around 1700 km. According to Arnaud (1985) *L. murrayi* occurs at some sub-Antarctic islands, in the Magellanian region, close to New Zealand and close to south western Africa. Data on the water temperature and salinity at Peter I Island and on the shelf of the Bellingshausen Sea show that these are not significantly different.

This raises the question of whether lithodids are really absent from the Antarctic continental shelf or upper slope, considering the proximity of Peter I Island and the similarity of the environmental conditions. We are convinced that there are no reptant crustaceans on the Weddell Sea continental shelf, because of the large number of bottom stations sampled in the eastern Weddell Sea and where the physical conditions are more extreme, e.g. the water temperature at the bottom may be as low as − 1.9°C (Hain and Melles 1994). Similar levels of sampling have not yet been undertaken in the Bellingshausen or Amundsen Sea, and so the status of reptant crustaceans in these areas will not be decided until more detailed benthic surveys are carried out.

According to the morphometric calculations made by Miquel et al. (1985) on *Lithodes murrayi*, the largest individual collected must be considered to be a mature male and the others as immature juveniles. All specimens observed by the ROV might have been mature. The population of *L. murrayi* at Crozet Islands studied by Arnaud and Miquel (1985) fed on all available prey. Dominant and well-represented prey groups were hydroids, polychaetes, molluscs, crustaceans and bryozoans, groups of which some are also abundant at Peter I Island (Tomo 1973, and own unpublished data). Arnaud and Miquel (1985) concluded that *L. murrayi* occupies a trophic niche similar to that of brachyurans and pagurids in tropical and temperate seas. At Crozet Islands they may compete with the very abundant amphipods and isopods. If so, this may promote the colonisation of the Bellingshausen Sea shelf and upper slope by this species, since our Agassiz trawl samples

indicated that the amphipod and isopod fauna there is poor in species richness and abundance.

Finally, it is our intention to use the material of *Lithodes murrayi* for a case study to elucidate the special ecological requirements and physiological characteristics of high Antarctic decapods. Using this approach, all results can be compared with data on shrimps, amphipods and isopods since these belong to the most abundant and successful faunal elements on the continental shelf.

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