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New record of Lithodidae (Crustacea Decapoda, Anomura) from the Antarctic (Bellingshausen Sea)

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Abstract During the Bentart-2003 Cruise, carried out during austral summer 2003 in the Bellingshausen Sea, three species of Lithodidae, *Paralomis birsteini*, *Lithodes murrayi* and *Neolithodes capensis*, were caught from 218 m to 1947 m. With these captures the presence of *L. murrayi* in Peter I Island is confirmed, the distribution area of *N. capensis* is greatly increased and the captures of *N. capensis* and *P. birsteini* represent the first lithodid record known from the Antarctic continental slope. Also, these records show large and discontinuous distributions, which illustrate that many distribution patterns of Antarctic species are more an artefact of limited studies than representing actual distribution.

Introduction

In Antarctic waters, true crabs have never been found (Yaldwyn 1965; Zarenkov 1968) and within the Reptantia the Lithodidae family is the only resident. However, four species belonging to other families have been cited: one specimen of the crab *Halicarcinus planatus*, from Mcdouglal Bay, South Orkneys (Stebbing 1914) and larvae of species belonging to the genera *Pinnotheres* and *Emerita* (Thatje and Fuentes 2003) and the Eryoneicus stage of the lobster *Stereomastis suhmi* Bate 1881 (Tiefenbacher 1994). But, on these records, the first needs confirmation (Yaldwyn 1965) and the others were larvae, never adults, probably imported by sub-Antarctic water masses (Thatje and Fuentes 2003).

The Lithodidae species found in the West Antarctic region are *Paralomis birsteini* Macpherson, 1988 (= *P. spectabilis* Birstein and Vinogradov, 1967; no Hansen, 1908); *Paralomis spinosissima* Birstein and Vinogradov, 1972; *Paralomis formosa* Henderson, 1888 (also as *P. spectabilis*, Birstein and Vinogradov, 1972); *Lithodes murrayi* Henderson, 1888; *Lithodes turkayi* Macpherson, 1988 and *Neolithodes diomedeae* (Benedict, 1895) (see Birstein and Vinogradov 1967; Zarenkov 1968; Arnaud and Miquel 1985; Macpherson 1988; López-Abellán and Balguerías 1994; Klages et al. 1995; Arana and Retamal 1999; Macpherson 2004).

Gorny (1999) in his analysis on the biogeography and ecology of the Southern Ocean decapod fauna, including lithodid crabs, considered that the northern boundary of the Antarctic region lies on the southern tip of the South America shelf (50°30′S). If that was accepted the following species may be included: *Lithodes santolla* Molina, 1972 (= *L. antarcticus* Jacquinot, 1844); *Paralomis aculeata* Henderson, 1888; *Paralomis anamerae* Macpherson, 1988; *Paralomis granulosa* (Jacquinot, 1852) (= *P. verrucosa* (Dana, 1852). In addition, Macpherson (1988) described *Lithodes confundens* Macpherson, 1988, species closely related to *L. santolla* (some previous reports of this latter and also of *L. antarcticus* (Vinuesa et al. 1999) must be reassigned to *L. confundens*).

Boschi and Gavio (2003) in a recent zoogeographical analysis on the decapod crustaceans from the Magellanic Province and Antarctic Region, related the Antarctic fauna only to the South Georgia and Kerguelen Islands fauna, while the South American tip fauna is associated with the Magellanic faunas (Atlantic and Pacific).

Thatje and Arntz (2004) in a bibliographic review mention *Paralomis spectabilis* (data taken from Birstein and Vinogradov 1972; Macpherson 1988 and Zaklan

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2002), but according to Macpherson (1988) the records of this species in the Antarctic waters belong to *P. birsteini* or *P. formosa*.

Finally, on the genus *Neolithodes*, Macpherson (2004) recently described the occurrence of *N. capensis* Stebbing, 1905 and *N. duhameli* Macpherson, 2004 from Crozet and Kerguelen Islands and, more recently, Thatje and Lörz (2005) *Neolithodes brodiei* Jawson and Yaldwyn, 1970 off the Balleny Islands.

Materials and methods

During the Bentart-2003 Cruise (Ramos and Moya 2003), carried out during January–March 2003 on board the *'R/V Hespérides'*, 25 stations were sampled covering the Bellingshausen Sea, Peter I Island and Antarctic Peninsula continental slope, from a depth of 48 m to 2,045 m (Fig. 1).

Sampling was carried out using two different methods: (1) an Agassiz trawl with 2.01 and 1.12 m horizontal and vertical openings, respectively, and 10-mm mesh size, deployed for 5 min at 2.5 knots, and (2) fish traps, which were used for the collection of sessile and motile fauna, demersal fishes and crustaceans. The sediment was obtained using a box corer.

For the morphological comparative study material from the South African Museum collections have been used (*Neolithodes capensis* (Fig. 2), ref. A12784, station A315, 34°42′S, 16°54′E, 3,200 m, 08/XII/1995, coll. A.S.F. RV Africana, det. B. Kensley).

Results

Five specimens of Decapoda Anomura belonging to three species of the Lithodidae (*P. birsteini*, *Lihodes murrayi* and *N. capensis*) were found.

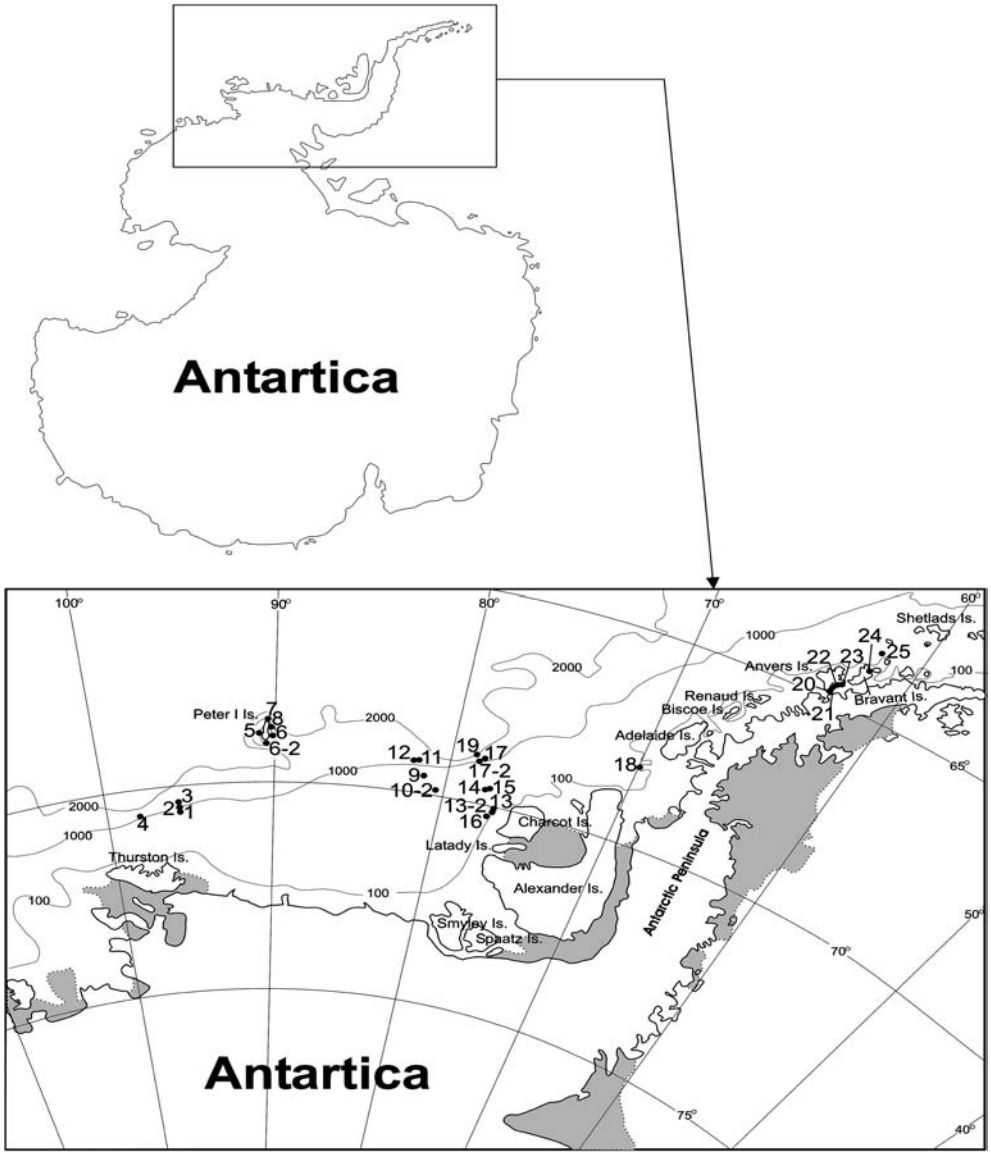

Fig. 1 Study area and sampling stations. The samples with lithodid crabs are 6, 7, 15 and 17–2

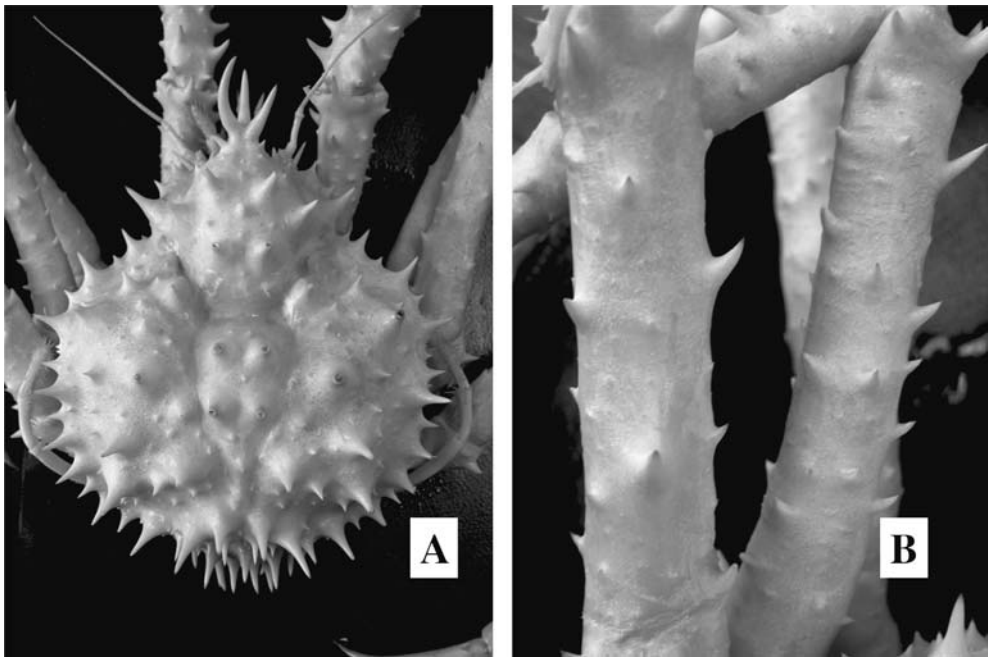

Fig. 2 *Neolithodes capensis* Stebbing, 1905, male from Bellingshausen Sea. **a** carapace in dorsal view; **b** merus of right legs in dorsal view

The number of specimens, sex, weight, carapace length, characteristics of sampling stations (geographical zones, coordinates, depth and substratum) as well as the used gears are indicated in Table 1.

The records of *N. capensis* and *P. birsteini* represent the first lithodid record known from the Antarctic continental slope.

Discussion

General considerations

The capture of three specimens of *L. murrayi* represents the second record of this taxon for this locality (Peter I Island) (Klages et al. 1995) and confirms its presence. *L. turkayi* and *L. uncicornis* Macpherson, 1984, are closely related species, but the first could be differentiated from *L. murrayi* by the shape and spinulation of the walking legs (Macpherson 1988) and the second because it has a single rostrum, no bifid (Macpherson 1984).

On the genus *Neolithodes*, Arana and Retamal (1999) found in this geographic area of South America *N. diomedeae*. In our study, a male of *Neolithodes* (Fig. 1; Table 1) was caught; it presents the fingers of chelipeds rounded in section, with the dorsal border of fixed finger and the ventral border of movable finger convex (not triangular in section as in *N. diomedeae*) and the carapace and legs surfaces practically smooth (without spinules) bearing only a few granules. Consequently, it belongs to the group in which *N. capensis*, *N. grimaldii* (A. Milne Edwards and Bouvier, 1894) and *N. vinogradovi* (Macpherson 1988) are included. A comparative analysis made with the descriptions and figures given by Macpherson (1988) and with one male of *N. capensis* from South Africa (South African Museum collections, ref. A12784) shows that our specimen belongs to this species. Some slight morphological differences, as the more or less developed spines, have been found but these could be considered within a normal variability within the Lithodidae, which is particularly linked to changes in size/age.

Biogeographical aspects

The capture of *N. capensis* in the Bellingshausen Sea increases the number of lithodid species known from the area. It contributes to a very interesting debate about the

Table 1 Data of Lithodidae: species; number of specimens (No.); sex (M male, Of Ovigerous female); weight in grams and carapace length in millimeters; gear, station number (St no.) and geographical zone; geographic coordinates (Latitude S and Longitude W); depth in meters and subtratum (Subst) (Mu muddy bottoms. Mix mixed bottom, constituted basically by blocks, rocks and gravels with some mud

Species	No.	Sex	Weight/length	Gear	St no./zone	Latitude S	Longitude W	Depth (m)	Subst
L. murrayi	2	M	368, 678/117, 148	Trap	6/Peter I Island	68.83	90.82	218	Mu
L. murrayi	1	Of	390/120	Agassiz	7/Peter I Island	68.70	90.69	375	Mu
N. capensis	1	M	1035/159	Agassiz	15/Bellingshausen	68.95	78.23	1408	Mix
P. birsteini	1	M	83/58	Agassiz	17-2/Bellingshausen	68.92	78.23	1947	Mix

possible relationship of Antarctic and sub-Antartic Lithodidae, particularly between the South Georgia (López-Abellán and Balguerías 1994) and Magellanic region, as well as along the Scotia Arc to the Antarctic peninsula (Thatje and Arntz 2004). It supports the observation made by Arana and Retamal (1999) about the distribution limit of this family and maintains the hypothesis of an origin related to colonization across the deep sea from other regions (Macpherson 2004), relating the sub-Antartic deep-fauna and the fauna from lower latitudes (Thatje 2004).

The catch of *L.murrayi* and *N. capensis*, which are considered species from the South African area and the Indian Ocean, in the Bellingshausen Sea (Pacific Antarctic area), shows the existence of a relationship between the South American and South African faunas. In fact, the 45% of the species of Mollusca from the Ross Sea show a circum-Antarctic distribution (Dell 1990); some of them living in the Kerguelen Island to South America tip areas, in deep bottoms or within a wide bathymetric range. The same happens within groups such as Porifera (Koltum 1969). Regarding Lithodidae, *Paralomis anamerae* is also known from Kerguelen Arc and South America (Falklands) (Gorny 1999) and, recently, Macpherson (2004) has found three specimens of *N. capensis* in the Kerguelen area, in the Banzare Bank (59°24′S, 79°34′E) at a depth of 1,825–2,005 m. These data together with our captures show large and discontinuous distributions illustrating how little we know on the distribution patterns of Southern Ocean species. Many such disjunct species distributions around Antarctica are probably more an artefact of limited studies than the actual distribution or, perhaps, a change in the fauna (new colonization) is happening. For the decapods, lithodid crabs and caridean shrimps, Anger et al. (2003), Thatje et al. (2003) and Thatje (2004) make very interesting considerations on the factors (low water temperature and food availability) and strategies (metabolic and physiological behaviour, reproduction and larval development) for the colonisation of the Antarctic environment.

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