

# *Lebetus scorpioides* and *Buenia jeffreysii* (Teleostei: Gobiidae) found north of the Arctic Circle

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Two gobiid species, *Lebetus scorpioides* and *Buenia jeffreysii*, were recorded in northern Norway, for the first time north of the Arctic Circle. While both species were found on the continental shelf west of the Lofoten islands, one of them, *L. scorpioides*, was found north of 70°N off western Finnmark. The records represent a considerable northward extension of the distribution of these species. Being well within the size of reproductive individuals, the specimens appear to belong to resident populations most probably missed by earlier samplings.

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## INTRODUCTION

The gobies (Gobiidae) are a speciose fish family distributed primarily in the tropics and subtropics, chiefly inhabiting marine and brackish waters (Nelson 2006). Most of the species live epibenthic in the littoral zone and are predators on small invertebrates. They spawn in spring and summer, depositing eggs in layers under shells, stones, etc. Eggs are guarded by the males and the young typically occur planktonic above the sea-bed (Miller 1986).

Of the 32 species of the Northeast Atlantic-Mediterranean fauna 11 are regularly found along the Atlantic coast of the Scandinavian Peninsula. While four of these species occur north of the Arctic Circle, the others are known only from the waters along the coast of southern Norway (Miller 1986, Pethon 2005). Two of these, *Lebetus scorpioides* (Collett, 1874) and *Buenia jeffreysii* (Günther, 1867), were recorded off northern Norway in the years 2008-2012. We here report these records and discuss the distribution of the two species in the northern waters.

## MATERIAL AND METHODS

The fishes were obtained by the MAREANO, a project run by the Institute of Marine Research, Bergen, to map benthic organisms off the Norwegian coast ([www.mareano.no](http://www.mareano.no)), five of them as collected specimens and two recorded by video footage. The specimens were caught in a beam trawl (R/V 'G.O. Sars') with an opening of 2x2 m and a mesh width of 4 mm, towed on the bottom for 5 min at a speed of 1 knot. The material was identified to family level, sorted and fixed in formalin on board. The fishes were subsequently transferred to the University Museum of Bergen, and the final species identification was done at the museum as the material was transferred to 75% ethanol for permanent storage. The video footage was taken by the Institute of Marine Research's video platform Campod. This is a tripod equipped with low light CCD, high definition (HD) video cameras and lights. The HD camera has manual zoom and focus and is mounted on a pan-and-tilt device. For the present observations the Campod was used parked on the seabed for detail studies.

## RESULTS

Four specimens of *L. scorpioides* were caught at three stations on the continental shelf west of the Lofoten Islands in May 2012, and one was video-recorded in the same general area in 2008 (Table 1, Figure 1). Yet another was identified from a video recording made in 2010 as far north as LoppHAVet, western Finnmark.

The captured specimens were identified to species from diagnostic characters including lack of anterior membrane of pelvic disc and fin ray counts of 10-11 in  $D_2$  and 8-9 in A, while the video-recorded specimens were identified from dorsal fin colour patterns (as described by Miller 1986), relative height of the dorsal fins, and light-coloured caudal peduncle (Figure 2, Figure 3). The total length of the captured specimens varied from 32.3 to 34.5 mm (Table 1). Both males and females were represented among these specimens, as judged from dorsal fin pigmentation, but two of the specimens had somewhat damaged fins, and a less clear pigmentation pattern probably due to the preservation fluid, causing an uncertain sex identification. Both video-recorded specimens were males.

The fishes were recorded at depths from 169 to 225 m and bottom temperatures from 7.0 to 7.5 °C. The bottom substrate consisted of sand (stations Rst 814-30, Rst 849-29), gravelly sand with coral rubble (station Rst 667-9; Tandberg *et al.* 2012). At the video stations, sand/gravelly sand was noted at Rst 286 (Buhl-Mortensen and Buhl-Mortensen 2009) and bedrock/gravelly sand/depression with muddy sand at Rst 368 (Jørgensen *et al.* 2012).

One specimen of *B. jeffreysii* was caught off Lofoten in 2012 at 146 m depth and a temperature of 7.4 °C. Among diagnostic characters observed were 27 scales along the lateral line; 6 rays in  $D_1$ , the second ray elongated, suborbital papillae row b (Miller 1986) short and situated behind rear border of eye, and no transverse ramifications found between rows b and c. The total length of this specimen was 48.2 mm. The specimen was identified as male from the elongated second ray in  $D_1$ . At this station the bottom consisted of sand (station Rst 809-28; Tandberg *et al.* 2012).

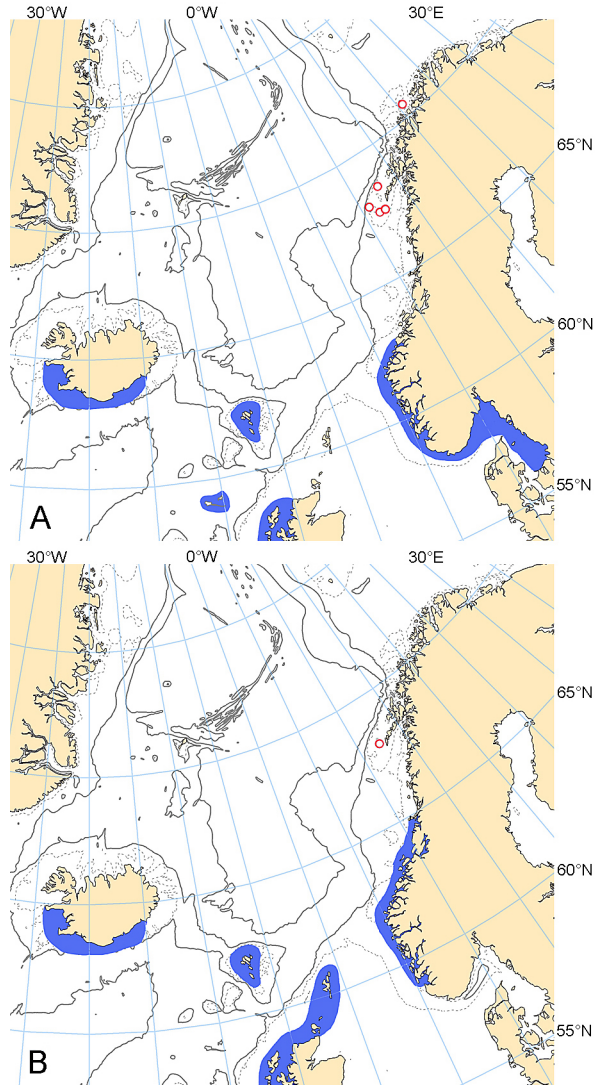


Figure 1. Northernmost part of the ranges of *Lebetus scorpioides* (A) and *Buenia jeffreysii* (B). The new records are indicated by circles; previously known ranges according to Miller (1986), Pethon (2005) and Jónsson & Pálsson (2013).

Table 1. Data on the specimens of *Lebetus scorpioides* and *Buenia jeffreysii* recorded off northern Norway.

Species	Number of specimens	Station	Coordinates	Date (dd.mm.yyyy)	Depth (m)	Bottom temperature (°C)	Total length (mm)	ZMUB catalogue numbers
<i>Lebetus scorpioides</i>	1M <sup>1</sup>	Rst 638	70°34' N – 20°10'E	23.09.2010	169	7.0 <sup>2</sup>		
	1M <sup>3</sup>	Rst 286	68°23' N – 3°01'E	10.10.2008	176			
	1F?	Rst 667-9	67°32' N – 9°37'E	04.05.2012	242	7.3	32.3	23019
	1M?	Rst 814-30	67°24' N – 10°11'E	11.05.2012	225	7.5	34.2	23020
	1M; 1F	Rst 849-29	67°24' N – 10°50'E	11.05.2012	178	7.5	33.4; 33.5	23021
<i>Buenia jeffreysii</i>	1M	Rst 809-28	67°30' N – 11°13'E	11.05.2012	146	7.4	48.2	23022

1. Specimen recorded on video footage, still-picture in Figure 2; 2. From a station 3°N and 3°E away; 3. Specimen recorded on video footage, still-picture in Figure 3.

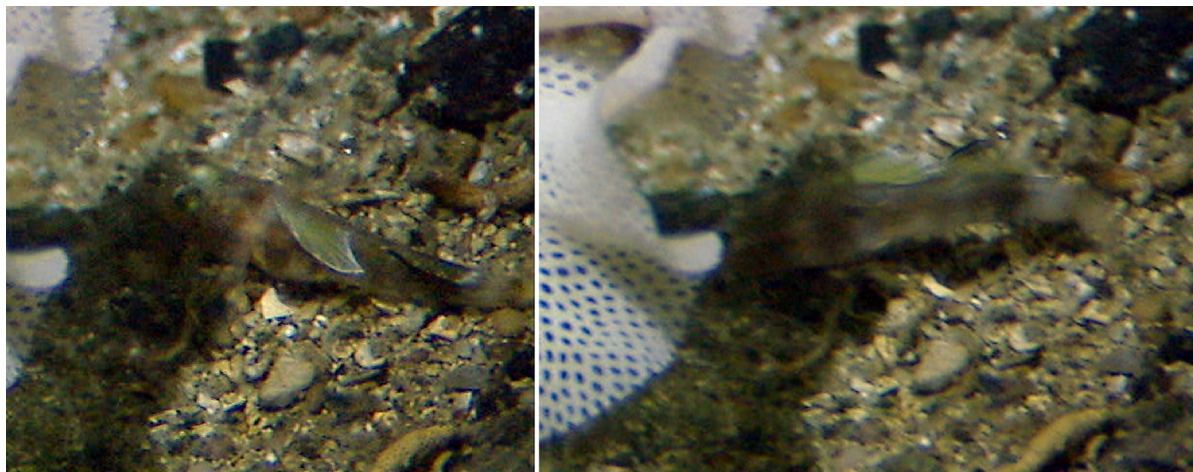


Figure 2. Male *Lebetus scorpioides* recorded on video footage at MAREANO station Rst 638. The fish was filmed while dashing from right to left, to take cover under a *Reteporella* sp. (Bryozoa). The characteristic first dorsal fin is clearly visible on the left image and the pale-coloured caudal peduncle on the right.



Figure 3. Male *Lebetus scorpioides* recorded on video footage at MAREANO station Rst 286.

## DISCUSSION

These records extend the range of *L. scorpioides* approximately 1000 km (1850 NM), and that of *B. jeffreysii* about 300 km (550 NM) north of their known Norwegian distribution (Miller 1986, Pethon 2005), and for the first time the two species are found north of the Arctic Circle. The records were in the deeper part of the depth range for both species (e.g. Pethon 2005) but still on the continental shelf and in predominantly coastal waters with a fairly high temperature (Blindheim 2004).

Fisheries cruises are routinely carried out in Norwegian waters, but for bottom fish sampling almost exclusively shrimp trawls of type Campelen 1800 are used, with a mesh width of 80 mm in the front and 16-18 mm in the codend (e.g. Michalsen *et al.* 2013). This gear may easily be too coarse to sample fishes as small as these, and generally they are often

missed in fish surveys for such reason (Ellis and Rogers 2015); moreover, small Gobiidae are not commercially interesting fishes targeted by fisheries cruises. Also Pethon (2005) pointed out that the small size of *L. scorpioides* might make it less often caught, and he assumed the species could be more common in Norwegian waters than previously thought. Both species may be characterized partly as cryptobenthic (Zander 2011, Baldock and Kay 2012), living in cavities and other dark places (*L. scorpioides*), or lying buried in sandy bottom substrate (*B. jeffreysii*). This would add to the difficulties of discovering these species, whether by camera recording technique like the one used by the MAREANO project, or by sampling with more traditional fishing gear.

The oceanographic conditions along the coast of northern Norway are characterized by a flow of warm coastal and Atlantic water continuing into the southern part of the Barents



Sea (Blindheim 2004, Ozhigin *et al.* 2011). Conditions suitable for the two goby species may have existed for long, and considering the previous use of less suitable gear for such small non-targeted fish species, we find it most probable that the records represent previously unknown populations, rather than recent colonizations. It is reasonable to assume that both species are distributed along the coast of Norway north to the present localities, and at least the northernmost of the two species, *L. scorpioides*, might even be expected to occur along much of the coast of Finnmark.

Apart from the pelagic *Crystallogobius linearis* (Düben, 1845) three bottom-living species of Gobiidae are found northwards along the coast of northern Norway, beyond the Arctic Circle. These are *Gobiusculus flavescens* (Fabricius, 1779), *Pomatoschistus minutus* (Pallas, 1770), and *Pomatoschistus norvegicus* (Collett, 1902). Only the latter is known to occur at similar depths as *L. scorpioides* and *B. jeffreysii* (Miller 1986, Pethon 2005), and earlier confusion with this species cannot be ruled out (cf. Baldock and Kay 2012). The specimens reported by us were within the size of reproductively mature individuals, and this might indicate that they belonged to a resident population in these waters.

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