Distribution of *Boeckella poppei* (Mrázek, 1901) (Copepoda: Calanoida) on the Livingston Island, Antarctica

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Introduction

Currently, there are 49 valid species of genus *Boeckella* Guerne & Richard, 1889[1] (Calanoida) with most species occurring mainly in the Southern Hemisphere. *Boeckella poppei* (Mrázek, 1901) is the only species that is common in both Maritime and Continental Antarctica.

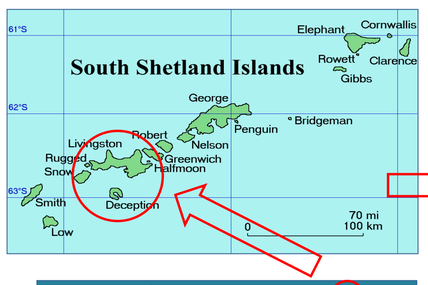
The environment in Antarctica has been dynamically changing over the past decades, significantly affecting snow and ice regimes. Future climate changes are expected to be among the largest and most rapid in the Polar Regions[2].

Livingston Island is part of the South Shetland Archipelago in Maritime Antarctica. Its invertebrate aquatic fauna is still insufficiently studied. *Boeckella poppei* is presently known from a glacial lake on the Hurd Peninsula[3] and the Byers Peninsula[4]. The accelerated retreat of permanent ice or snow cover is a premise for the formation of pools and ponds on Livingston Island. Such newly formed habitats are suitable for colonisation by copepods, adapted to the harsh environmental conditions of Antarctica.

Aim: to study the expansion of the areal of *B. poppei* on Livingston Island, Maritime Antarctica.

Maps: *South Shetland Islands:* https://en.wikipedia.org/wiki/South_Shetland_Islands
Livingston Island: Ivanov L.L. 2017. Antarctica: Livingston Island and Smith Island. Scale 1:100000 topographic map. *Manfred Wörner Foundation,* ISBN 978-619-90008-3-0

Fig. 1. Bulgarian Antarctic Base, Livingston Island.



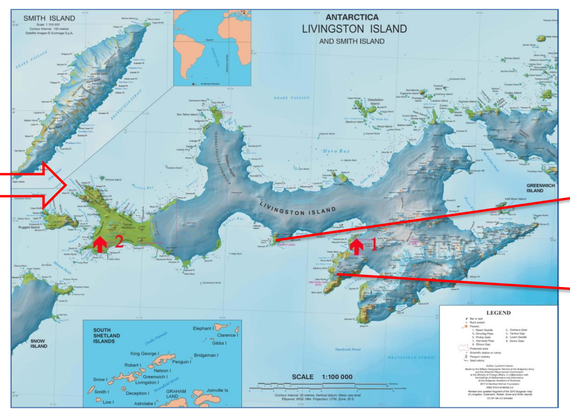


Fig. 2. Livingston Island with previous records of *Boeckella poppei* marked with red ↑s: **1.** Hurd Peninsula and **2.** Byers Peninsula.

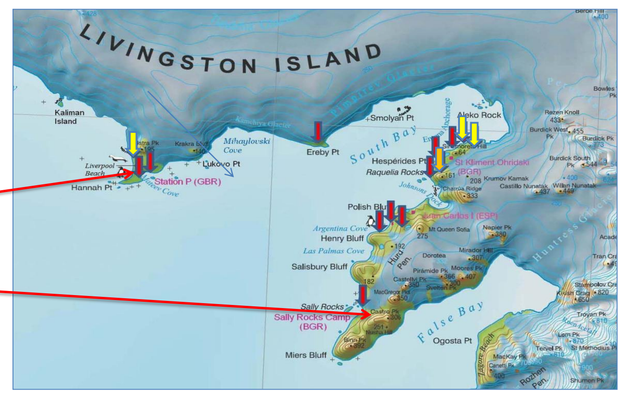


Fig. 3. Hannah and Ereby Points and Hurd Peninsula, Livingston Island. Red ↓s denote sampling sites; yellow ↓s - new and orange ↓ confirmation of previous records of *Boeckella poppei.*

Fig. 4. Males and a female of *Boeckella poppei.*

Fig. 5 *Boeckella poppei* was abundant at all stations where it was recorded.

Material and methods

Where and when:

- Livingston Island (Figs 1 & 2), 2nd largest island of the South Shetland Archipelago, Maritime Antarctica
- Hurd Peninsula, Ereby Point and Hannah Point (Fig. 3: 14 sites marked with arrows)
- during the 28th Bulgarian Antarctic Expedition, Jan-Feb 2020
- within the area of competence of the Bulgarian Antarctic Base.

Sampling:

- Aquatic invertebrates from pools, ponds and lakes
- collected with handheld net (50 μm), after intensive mixing.

Results to date

Boeckella poppei (Fig. 4) was recorded at four localities (Fig. 3):

- three new localities (Fig. 3: yellow arrows):
  - ✓ Hurd Peninsula: 2 adjacent sites, 62.63622 S & 60.35117 W
  - ✓ Hanna Point: 1 site, 62.645195 S & 60.595700 W
- one confirmation of a previous record (Fig. 3: orange arrow):
  - ✓ Todorina buza Lake (62.642488 S, 60.363505 W)

The species was abundant at all stations where it was recorded (Fig. 5).

Discussion

The calanoid *Boeckella poppei* was firstly recorded from the Livingston Island in the 1990s, from the Todorina buza Lake[3]. More recently, the species was also recorded form freshwater lakes on the Byers Peninsula, Western Livingston Island[4].

During the 28th Bulgarian Antarctic Expedition, we confirmed the presence of *B. poppei* in the Todorina buza Lake. In addition, we recorded the calanoid in temporary pools situated on the permafrost and formed after the retreat of the Perunika Glacier and at Hannah Point. In the newly established habitats the species was very abundant.

Our results suggest a substantial expansion in the distribution of *B. poppei* on the Livingston Island, likely owing to recent climate change and the resulting freeing of additional territories of permanent ice or snow during the austral summer.

References

[1]Walter & Boxshall 2021. World of copepods database. *Boeckella* Guerne & Richard, 1889. WoRMS, accessed on 2021-03-20 at http://marinespecies.org/aphia.php?p=taxdetails&id=346853
[2]Meredith et al. 2019: Polar Regions. In: Pörtner H.-O. et al. *(eds) IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*
[3]Pandourski & Chipev. 1999. Morphological variability in a *Boeckella poppei* Mrazek, 1901 (Crustacea: Copepoda) population from a glacial lake on Livingston Island (the Antarctic). *Bulgarian Antarctic Research: Life Sciences* 2:83-92.
[4]Toro et al. 2007. Limnological characteristics of the freshwater ecosystems of Byers Peninsula, Livingston Island, in maritime Antarctica. *Polar Biology* 30, 635

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