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**OVERWINTERING SITE OF THE SANDHOPPER
TALORCHESTIA DESHAYESII (CRUSTACEA,
 AMPHIPODA) (AUDOUIN, 1826) AND THE STRUCTURE
 OF THE OVERWINTERING POPULATION**

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Abstract

This study on the *Talorchestia deshayesii* population was conducted on the Puck Bay beach in Jurata located on the Hel Peninsula. An attempt was made to locate the overwintering site of this species and also to investigate the composition of the population while in anabiosis. Series of holes were made in the substrate, and the overwintering site of *Talorchestia deshayesii* in the Puck Bay was located. The abundance and size structure of the population was also determined.

Key words: sandhoppers, sandy beach, overwintering, Puck Bay

INTRODUCTION

There is relatively few data regarding the sandhopper in the Polish literature. The first report of the occurrence of *Talorchestia deshayesii* (Audouin 1826) in Poland along the southern shore of the Hel Peninsula was made by Seligo (1899). Studies of the behavior and distribution of this species were conducted by Drzycimski and Nadowzińska (1965a, 1965b) and by Persson et al. (2000) in the Swedish Baltic. Reports regarding the overwintering of *Talorchestia deshayesii* are limited to brief statements regarding the hypothetical location of the population in winter (Guria nowa 1951).

MATERIALS AND METHODS

The current study of the sandhopper *Talorchestia deshayesii* population that overwinters on the beach of the Puck Bay in Jurata were conducted in February 2004.

The primary aim of the study was to locate the site where the sandhoppers overwinter and to study the population structure.

The landscape of the study site is composed of three fundamental elements: the edge of the coastal forest (dominated by the pine *Pinus silvestris*), reeds (*Phragmites australis*), and the sandy beach (Figs. 1 and 2). In winter months shallow waters of the Puck Bay coast usually freeze and the state of the beach remains unchanged until temperatures increase. In winter the sandy beach is approximately 1.5-3.5 m wide, and all that remains of the reeds are dried stumps about 5 to 20 cm in height. The edge of the dead reeds forms a physical barrier where in fall approximately 30 cm of organic debris (primarily sea grass, *Zostera marina*) collects. This material freezes and is well-anchored to the substrate.

Six stations were designated transversely on the beach at the study site (Fig. 1):

- 1 2.5 m from the shoreline (ice)
- 2 3.5 m from the shoreline (ice)
- 3 4 m from the shoreline to the barrier of sea grass at the edge of the reeds
- 4 5 m from the shoreline to the dead reeds
- 5 6 m from the shoreline to the dead reeds
- 6 7 m from the shoreline to the dead reeds

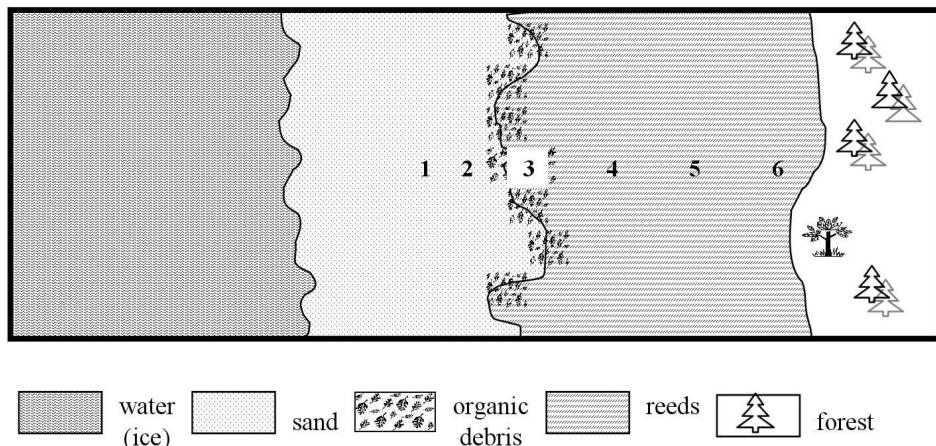


Fig. 1. Diagram of the study site (numbers indicate the stations at which samples were collected in February 2004)

The sand layer was exposed using a shovel and then quantitative samples were collected with a cylindrical metal scooper. On February 21, 2004, the first study day, samples were taken at a depth of approximately 20 and 30 cm. On February 22, the second study day, the sites were deepened to 40 and 50 cm. The temperature on both days was -1°C. Approximately 10 l of the organic debris accumulated at the edge of

the reeds was also collected. This material was taken in marked plastic bags indoors and then rinsed on a sieve with warm water. The *Talorchestia deshayesii* specimens obtained were preserved in an alcohol solution of approximately 70%.

RESULTS

No *Talorchestia deshayesii* specimens were noted at stations 1, 4, 5, and 6 at any of the four depths investigated. Only three specimens were found at site 2. No sandhoppers were found in the sea grass, but there was a small number of nematodes. Study site 3, which was located directly beneath the organic debris barrier, was the most interesting. This site was located 4 m from the shoreline, and the overwintering population here was comprised of both overgrown and small specimens. The illustrations (Figs. 2 and 3) present the distribution and the population abundance at subsequent depths at station 3. The size structure of the population at this station at depths of 20, 30, and 40 cm is illustrated in Fig. 4. It was determined that sandhoppers do not occur at depths of 50 cm.

It was also confirmed that at higher temperatures (when the samples were rinsed in warm water) the sandhoppers return to their normal activity in approximately 30 seconds.

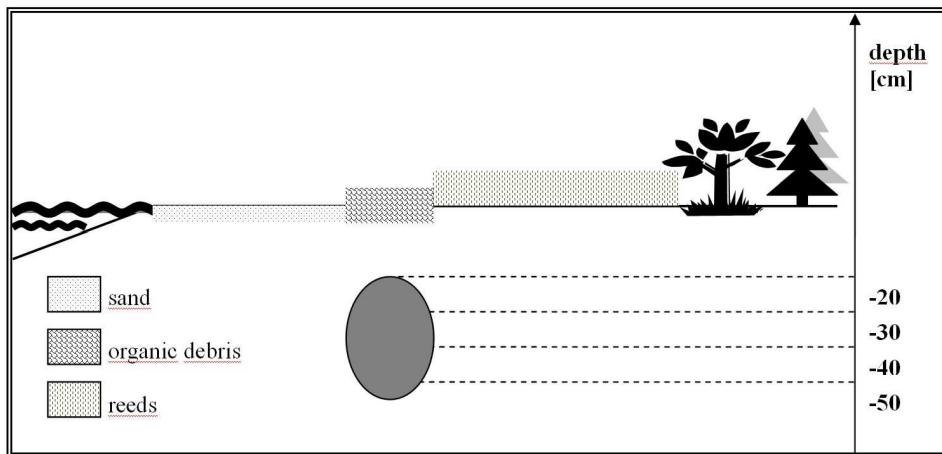


Fig. 2. Cross-section of the Puck Bay shoreline with the approximate distribution of the overwintering population of *Talorchestia deshayesii* in February 2004

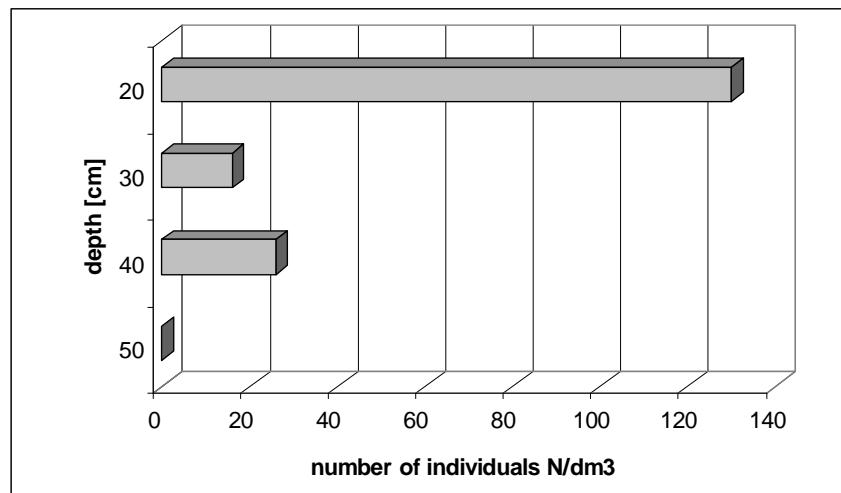


Fig. 3. Population abundance of overwintering *Talorchestia deshayesii* at subsequent depths (4 m from the shoreline at station 3)

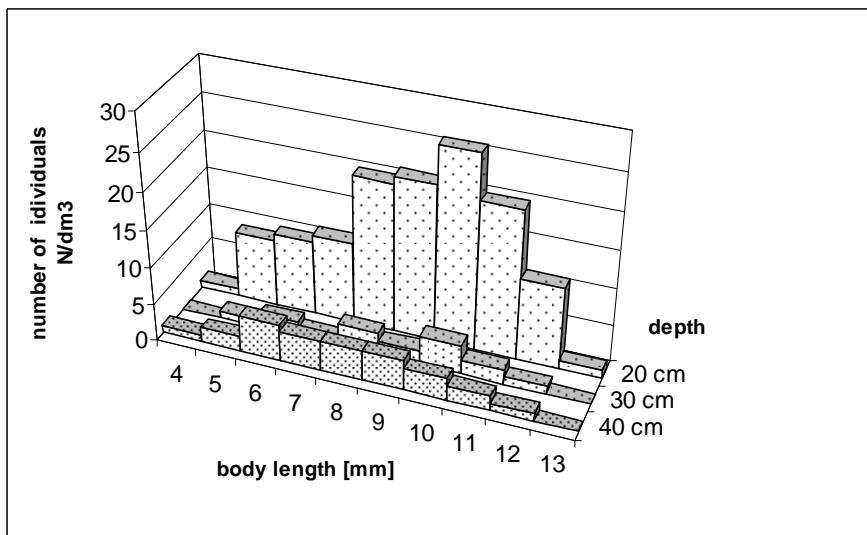


Fig. 4. Size structure of the population of *Talorchestia deshayesii* overwintering at depths of approximately 20, 30, and 40 cm

DISCUSSION

Drzycimski and Nawodzińska (1965a, b) reported that during winter months *Talorchestia deshayesii* on the Hel Peninsula are in a state of anabiosis. Persson et al.

(2000) also reported similar information. This phenomenon is fully confirmed. It was also determined that the overwintering population is comprised of both adult and juvenile specimens. A similar population structure was observed in overwintering *Orchestia gammarellus* (Talitridae) by Persson (1999).

Gurianowa (1951) reported that sandhoppers of the genera *Talorchestia* and *Talitrus* overwinter in the adjacent forest under the litter and in decomposing tree trunks. Drzycimski and Nawodzińska (1965) did not confirm this in their studies. They only reported that the overwintering site of these organisms is unknown. Węsławski et al. (2000) maintain that the fundamental factor contributing to seasonal sandhopper migrations is atmospheric conditions. Charfi-Cheikhrouhna et al. (2000) describe the migration of *Talitrus saltator* and *Talorchestia brito* towards the dunes in the months preceding lower temperatures.

Utko (1999) reported that the related species, *Talitrus saltator*, which inhabits the beach of the Hel Peninsula on the Baltic Sea side (Węsławski et al. 2000), retreats 8-10 m from the shoreline towards the dunes in the fall and overwinters in sand.

CONCLUSIONS

1. It is probable that all living individuals of *Talorchestia deshayesii* in the fall undergo anabiosis. It was also determined that they are roused from a state of hibernation at higher temperatures and that all of the specimens exhibit a similar activity level. This indicates that they all experience the anabiotic state uniformly regardless of size.
2. The studies conducted in Jurata indicate that the *Talorchestia deshayesii* overwintering site is located approximately 4 m from the shoreline beneath an "insulation pillow" created by the organic debris barrier comprised mainly of sea grass *Zostera marina*.
3. Analogous behavior like in the related species of *Talitrus saltator* was observed in *Talorchestia deshayesii*; however, the distance covered by this species, its migration from the water line, is substantially shorter. Presumably, this is related to the different habitat of this species, which includes, among other factors, the narrower beach.

REFERENCES

- Charfi-Cheikhrouhna F., ElGtari M., Bouslama M. F., 2000. Distribution and reproduction of two sandhoppers, *Talitrus saltator* and *Talorchestia brito* from Zouaraa beach – dune system (Tunisia). *Pol. Arch. Hydrobiol.*, 47, 621-629.
- Drzycimski I., Nawodzińska G., 1965a. Amphipoda plaż polskiego wybrzeża Morza Bałtyckiego. (The beach Amphipoda of the Baltic Sea Polish shores). *Przegl. Zool.*, 3, 264-273, (in Polish).
- Drzycimski I., Nawodzińska G., 1965b. *Talorchestia deshayesii* (Audouin), new among the Puck Bay Amphipoda species, Talitridae family. *Ann. Biol.*, Copenhague, 20, 1963, 102-103.

- Gurianowa F. J., 1951. Amphipods of the seas of the USSR. Nauka, Moskwa, (in Russian).
- Persson L. E., 1999. Growth and reproduction in two brackish water populations of *Orchestia gammarellus* (Amphipoda: Talitridae) in the Baltic Sea. *J. of Crustacean Biol.*, 19, 1, 53-59.
- Persson L. E., Nardi M., Scapini F., 2000. Diel Variation of Visual Response in *Talitrus saltator* and *Talorchestia deshayesii* (Crustacea: Amphipoda) from High Latitude Beaches on Low Tidal Amplitude. *Estuarine, Coastal and Shelf Science*, 50, 333-340.
- Seligo A., 1899. Westpreussische Krebstiere. Schr. Naturf. Ges. Danzig. *N. F.*, 10 (1), 60-63, (in German).
- Utko M., 1999. Dynamika występowania zmieraczka plażowego *Talitrus saltator*. (Dynamics of the population of *Talitrus saltator*). *MSc thesis*, Pomeranian Pedagogical Academy, Szczecin, (in Polish).
- Węsławski J. M., Kupidura T., Żabicki M., 2000. Sandhoppers, *Talitrus saltator* (Montagu, 1808) (Amphipoda, Gammaridea), on the Polish Baltic coast: Seasonal and spatial distribution patterns. *Crustaceana*, 73, 8, 961-969.

**MIEJSCA ZIMOWANIA ZMIERACZKA ZATOKOWEGO *TALORCHESTIA DESHAYESII*
(CRUSTACEA, AMPHIPODA) (AUDOUIN, 1826)
ORAZ SKŁAD POPULACJI ZIMUJĄCEJ**

Streszczenie

Badania nad populacją *Talorchestia deshayesii* prowadzono na Półwyspie Helskim, nad Zatoką Pucką, na plaży w Juracie. Odnaleziono miejsce zimowania gatunku, a także zbadano skład populacji będącej w stanie anabiozy. Po wykonaniu wielu otworów w podłożu, zlokalizowano miejsce zimowania *Talorchestia deshayesii* nad Zatoką Pucką, a także określono liczebność i strukturę wielkościową populacji.