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# Occurrence of *Eurycercus* (*Teretifrons*) *glacialis* Lilljeborg, 1887 (Cladocera, Chydoridae) on Sakhalin Island

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Abstract Here we report the first observation of *Eurycercus glacialis* on Sakhalin Island. The abundance of this species in a lake was positively associated with aquatic vegetation. The morphological characteristics of the specimens collected on Sakhalin are described.

Key words: Chydoridae, *Eurycerus*, Sakhalin

## Introduction

*Eurycercus(Teretifrons) glacialis*, one of the largest species of cladocerans, inhabits ponds and pools of arctic and subarctic regions and has also been observed at lower latitudes in Europe and North America (Frey 1971). Its distribution at lower latitudes in Europe includes Germany, the Netherlands, Denmark, Scotland, and Ireland (Frey 1975; Duigan & Frey 1987). In Asia, this species has been reported from the Commander Islands and the Kuril Islands (Lilljeborg 1887; Miyadi 1937; Ueno 1938; Minakawa & Tanaka 2000).

During a biological survey expedition, an international team of American, Russian, and Japanese scientists recorded the first observation of *E. glacialis* on Sakhalin Island. *Eurycercus glacialis* was found in a lake (N 53˚04.556', E 143˚05.622') about 15 km northeast of Neftegorsk and 3 km northwest of Point Matny in Piltun Bay on August 14, 2003. Ninety-six parthenogenetic females were collected by V. V. Bogatov and N. Minakawa, and examined by S. Tanaka. The specimens were deposited at the College of Ocean and Fishery Sciences, University of Washington, Seattle, USA.

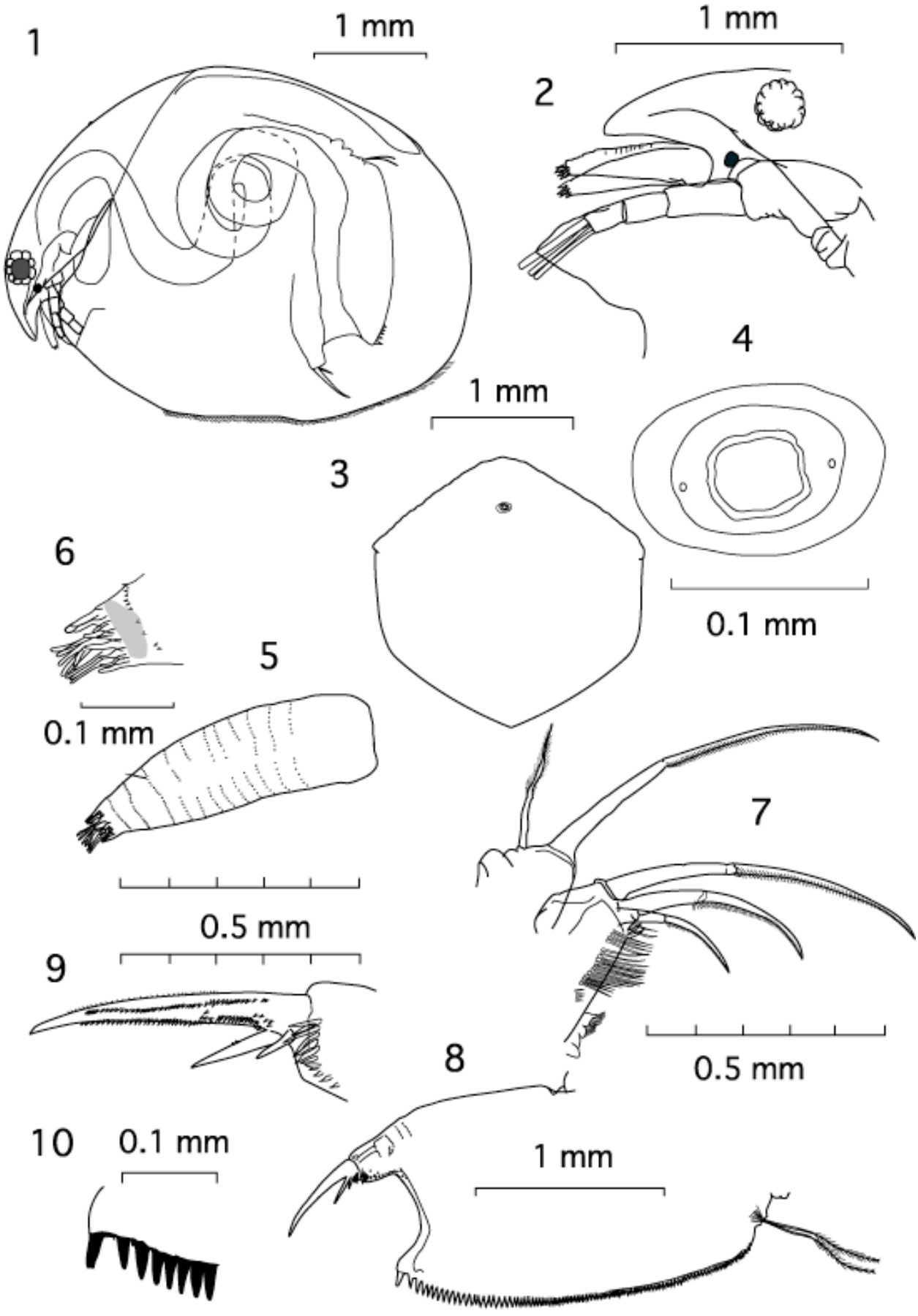
## Habitat characteristics

The habitat of *E. glacialis* was characterized by comparing its relative abundance in different habitat types within the lake. Ten transect lines (average length = 29.1 m) were established from the lake shore. An aquatic net (0.3 x 0.2 x 0.2 m; mesh size = 0.5 mm) was dipped into the water along each transect line at 1-m intervals. Habitat type and water depth were recorded at each sampling site. Habitat types were classified according to presence/absence of three aquatic plant species, *Carex cryptocarpa, Sparganium angustifolium*, and *Eleocharis palustris*, which were common in this lake.

*Eurycercus glacialis* was found primarily in shallow water (10–30 cm deep) with a sandy substrate. The abundance of *E. glacialis* was significantly associated with habitat type (ANOVA: $F = 48.48$, $df = 3$, $P < 0.01$), supporting its positive association with aquatic vegetation; in particular, *E. glacialis* was abundant among *S. angustifolium* (Table 1). *Eurycercus glacialis* probably uses vegetation as shelter from predators. Another cladoceran, *Sida crystalline*, also inhabited in this lake.

## Description of parthenogenetic female

Size 2.2–5.9 mm (mean = 4.2; SD = 0.88; n = 96)); ratio of height to length 1.43; shell rounded (Fig.1) with reticulate pattern of irregular hexagonal cells, and golden in color; headshield widest at the fornics with indentation of dorsal margin (Fig. 3); rostrum longer, bluntly pointed in lateral view (Figs. 1 and 2); antennules projecting beyond tip of rostrum, but not reaching tip of labrum (Fig. 2); antennules with sensory seta (Fig. 5) and 9 terminal aesthetascs (Fig.6); antennae shorter than antennules (Fig. 2); labrum triangular, anterior margin slightly convex, posterior margin slightly concave (Fig.2); median headpore large with thickened rim (Fig. 4); 2 lateral pores closely adjacent to rim, separated from one another by approximately 1.5 median pore diameter (Fig. 4); outer distal lobe (ODL) of trunk limb I with 2 setae, one long , 2-segmented, with finely spaced setules along concave margin of distal segment, with no setule distally (Fig. 7); inner distal lobe (IDL) with 3 crasping hooks decreasing in size toward endite; outermost hook longest; innermost hook shortest, approximately equal in length to proximal segment of largest hook (Fig.7); postabdomen broad, flattened plate, subparallel margins, with a row of




Figures. Morphological characteristics of *Eurycercus glacialis* found in Sakhalin. 1. Lateral view of parthenogenetic female, 2. Anterior portion of head, 3. Headshield and headpores, 4. Headpore, 5. Antennule, 6. Trunk limb I, 7. Postabdomen, 8. Postabdominal claw, 9. Frontal part of postabdominal teeth, 10. xxxxxxxxx.

Table 1. Abundance (individuals/dip) of *Eurycercus glacialis* associated with three aquatic plant species.

| Plant species | Mean | SE | N |
|---|---|---|---|
| *Sparganium angustifolium* | 2.8 | 0.20 | 26 |
| *Eleocharis palustris* | 0.8 | 0.09 | 116 |
| *Carex cryptocarpa* | 0.5 | 0.13 | 60 |
| No vegetation | 0.1 | 0.11 | 89 |

teeth in darkly pigmented, grey or black, along dorsal margin (Figs. 8 and 10); number of teeth about 100; distalmost tooth only slightly larger than others; teeth gradually decrease in length proximally; distal anal embayment deep, U-shaped (Fig. 8); postabdominal claws robust, gradually tapering to the tip with 2 basal spines; 2 rows of teeth irregularly arranged, one along concave margin, second on medial surface of claw (Fig. 9).

## Discussion

The subgenus *Teretifrons* in the genus *Eurycercus* includes two species, *E. glacialis* and *E. nigracanthus*. Although *E. glacialis* broadly occurs in arctic and subarctic regions, *E. nigracanthus* has been recorded only from Newfoundland (Hann 1990). Based on the morphological differences between these two species summarized by Hann (1990), the specimens from Sakhalin and *E. glacialis* have several characteristics in common. In particular, the shape of the teeth on the dorsal margin of the postabdomen is similar between the Sakhalin specimens and *E. glacialis,* but differs between the Sakhalin specimens and *E. nigracanthus*. The shape of the teeth is a good characteristic by which to differentiate *E. glacialis* from *E. nigracanthus,* because it is a stable characteristic among populations. However, the Sakhalin specimens have a golden shell and darkly pigmented teeth on the dorsal margin of the postabdomen (Figs. 8 and 10), which are characteristic of *E. nigracanthus*. Hann (1990) noted that the pigmentation of the teeth on the dorsal margin of the postabdomen varies among populations.

The known distribution of *E. glacialis* in Far East Asia is restricted to the Commander Islands (Frey 1971), the northern Kuril Islands (Minakawa & Tanaka 2000), and northern Sakhalin (this study). This species has not yet been reported from the Asian continent, including the Kamchatka Peninsula. In contrast, *Eurycercus (Eurycercus) lamellatus* and *Eurycercus (Bullatifrons) macracanthus* have not been observed on the islands of Far East Asia. *Eurycercus lamellatus* has been observed in the Ussuri district in Russia (Ueno 1937), Tibet, and northern China (Chian & Du 1979), while *E. macracanthus* has been recorded from the Amur River near Khabarovsk (Frey 1973) and from the Ussuri district (Tanaka unpublished data).

Inoue (1968) reported *E. glacialis* in Hokkaido (see also Flößner 2000), although we believe that this was a misidentification (Frey 1971). On the other hand, an undescribed species belonging to the subgenus *Bullatifrons* occurs in some lakes on Hokkaido and Honshu (Tanaka 1987), but whether the animal reported by Inoue (1968) is the same undescribed species has not been confirmed.

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