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Ecological Distribution and Significance of *Metadiaptomus asiaticus* Uljanirs, a Copepod Recently Found on the Qinghai-Tibetan Plateau

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1 Introduction

In 2006, plankton investigation was carried out in the lakes in Ali district, Tibet. 7 planktonic crustaceans were identified and reported. *Metadiaptomus asiaticus* Uljanirs was reported for the first time on the QTP (Yuan et al., 2007). However, detailed data on this species, especially its ecological significance, were not mentioned. In this

paper, we provide detailed information on the features of *M. asiaticus*, and discuss its ecological distribution and significance based on hydrochemistry data, as well as the biogeographical region belonging.

2 Material and Methods

Please refer to Yuan et al. (2007) for the detailed

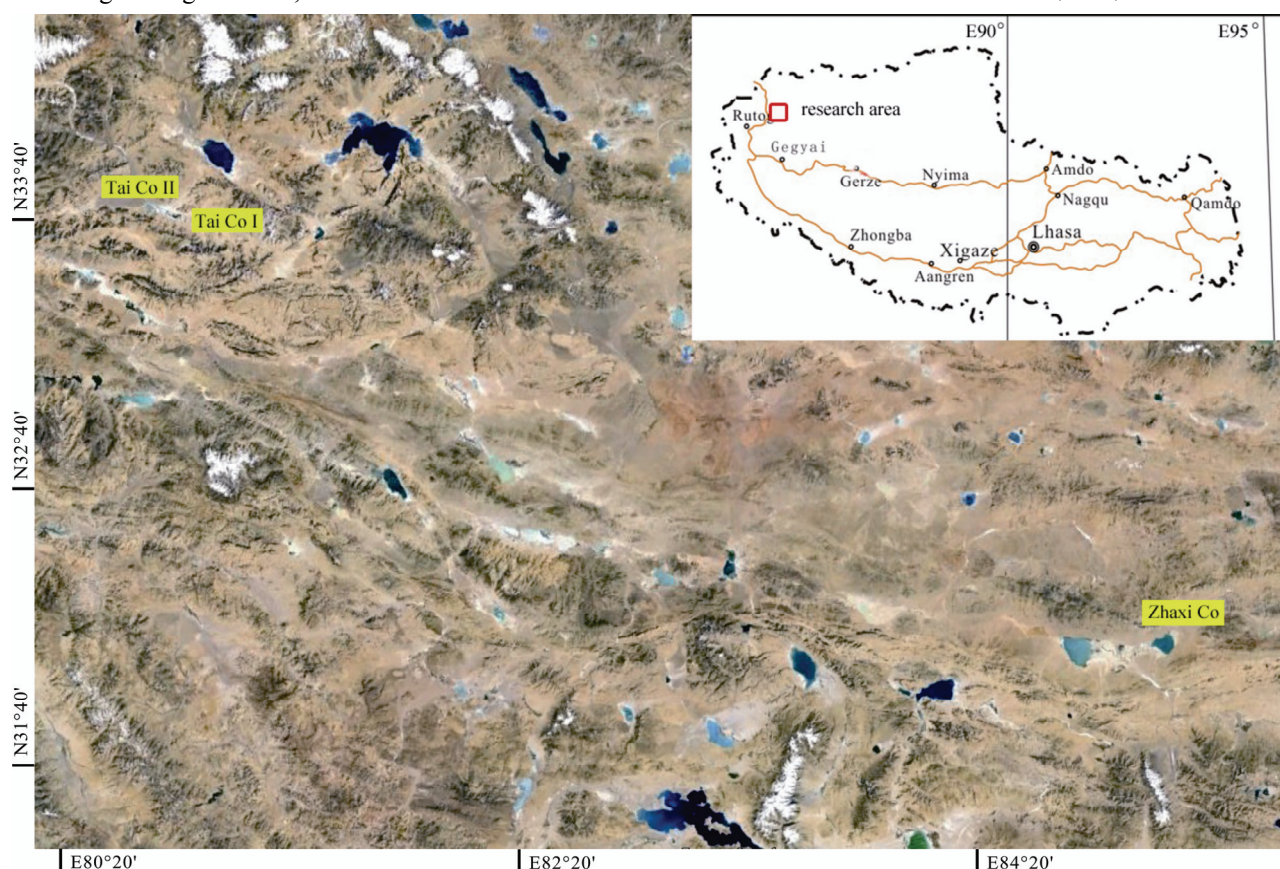


Fig. 1. Map showing the lakes sampled.

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methods of sample collection and treatment.

Metadiaptomus asiaticus was selected, and the appendage was separated and photographed under dissecting microscope, based on which the feature structure diagram was drawn using Coreldraw 12.0. Hydrochemistry analysis was conducted in MLR Key Laboratory of Saline Lake Resources and Environment by using conventional methods. The alkalinity was calculated based on hydrochemistry data. O. A. Arliekin's classification was employed for hydrochemical type.

3 Results

Metadiaptomus asiaticus was found both in Tai Co I and Zhaxi Co (Fig. 1). Tai Co I has a pH of 8, a alkalinity of 6.12 mmol/L and a salinity of 2.36 g/L, while Zhaxi Co is 9, 40.39 mmol/L and 21.59 g/L respectively. The water types of the two lakes are both sodium chloride I.

4 Discussion

we add the hemispherical transparent membrane structure on the inside of the first segment of fifth left pereopoda of male body and the mammillary constriction in lateral view of female's gonotome that have not mentioned in the related literatures (i.e., Shen et al., 1965b, 1979; Rayner, 1999). All the morphological characters, however, indicates that the copepod described in this paper is *M. asiaticus*.

In China, the first record on *Metadiaptomus asiaticus* was in Anlin Lake, Hebei and Chahan Lake, Kuerchahan Lake, Inner Mongolia (Shen and Song, 1965b, 1966). After that, this copepod was found in many lakes round China, such as Xiaochi Lake, Yanchi Lake and Beimentan Lake in Shanxi, Sailimu Lake in Xinjiang (He et al., 1989, 1993, 1995; Zhao et al., 1996, 1998). It was summarized that *M. asiaticus* prefers to waters with high Cl⁻ concentration and alkalinity in prairie area. In this paper, however, *M. asiaticus* was found in Tai Co I and Zhaxi Co, both on the Qinghai-Tibetan Plateau (QTP), a high altitude area with cold and dry climate. And it was found not during summer zooplankton investigation but during autumn investigation. In addition, it can compete with *Daphniopsis tibetana*, a cold-resistant brackish water cladocera in Zhaxi Co with low water temperature (10 °C), and becomes the dominant species after the population decline of *Cyclotella*. All these evidences support that *M. asiaticus* is a cold-resistant species.

M. asiaticus is a typical brackish water copepod, widely distributing in almost all kinds of brackish water. This paper found *M. asiaticus* living in brackish water with salinity of 2.36 g/L and 21.59 g/L respectively,

slightly exceeding the former reported salinity range of 2.85-19.5 g/L. Thus, the living range of salinity for *M. asiaticus* is enlarged to 2.36-21.59 g/L. More importantly, the alkalinity of Zhaxi Co, where *M. asiaticus* was found with a large biological density of 17 ind./L, is as high as 40.39 mmol/L, sharply higher than the former reported living range of 2.49-13.17 mmol/L. Therefore, the maximum alkalinity tolerance for *M. asiaticus* is enlarged to 40.39 mmol/L. And the alkalinity of water may not be the limiting factor for the growth and development of *M. asiaticus*.

Shen (1979) stated that some organism's genera usually show regional distribution, such as the distribution of genus *Metadiaptomus* in China is specially restricted in the Palearctic realm. To date, *Metadiaptomus asiaticus* was recorded in Turkey, Iran, Ukraine (along Azov and the Black Sea), Mongolia, the Soviet Union (including Yakubu area in the east of Siberia, the northeast of Baikal Lake, Siberiagrasslands at the east of the Volga River, Pamirs, the Amur River basin) and China (Gurney, 1929; Vasilyeva and Smirnov, 1995; Rayner, 1999, 2000; Sinev et al., 2009; Samchyshyna, 2011), most of which, belong to the Palearctic realm, except for part of China belonging to the Oriental realm. This paper found *M. asiaticus* in Tai Co I and Zhaxi Co, northwest Tibet, which also belong to the Palearctic realm, confirming that *M. asiaticus* is a typical Palearctic realm copepod.

5 Conclusions

(1) *Metadiaptomus asiaticus* has the hemispherical transparent membrane structure on the inside of the first segment of fifth left pereopoda of male body and the mammillary constriction in lateral view of female's gonotome.

(2) *M. asiaticus* is a cold-resistant species (can develop at 10 °C water temperature).

(3) The living range of salinity for *M. asiaticus* is enlarged from former range of 2.85-19.5 g/L to 2.36-21.59 g/L. The maximum alkalinity tolerance for *M. asiaticus* is sharply enlarged from 13.17 mmol/L to 40.39 mmol/L, suggesting that the alkalinity may not be the limiting factor for the growth and development of *M. asiaticus*.

(4) This paper confirms that *M. asiaticus* is a typical palearctic realm species.

Key words: *Metadiaptomus asiaticus* Uljanirs, Feature structures, Ecological distribution, Biogeographical region belonging

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