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Diatoms (Bacillariophyceae) from the Valley of the Great Lakes in Western Mongolia

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Abstract

The Valley of the Great Lakes (VOGL) in western Mongolia is dominated by two main (Uvs, Khyargas) and many minor closed basin lake systems. In 2004 and 2005, we sampled diatom communities from the surficial sediment of 64 lakes in the western Mongolian provinces of Uvs, Khovd, Zavkhan, and Bayan-Ulgii. Lakes ranged in water chemistry from fresh to hypersaline, oligotrophic to hypertrophic, and from low elevation VOGL lakes to high elevation lakes in the Altai Mountains. Over 300 diatom species were identified in the sediment samples including a diverse flora limited to saline lakes, many widespread taxa, many new reports for the Mongolian diatom flora, and several new and possibly endemic species. We also review recent diatom literature from Mongolia including floristic surveys, paleo-ecology, and water quality studies.

Key words: diatoms, Bacillariophyceae, Valley of Great Lakes, paleoecology, taxonomy

Introduction

Researchers have been studying the Mongolian diatom flora for over 100 years. The first published investigation of diatom distribution was a report on species found in Lake Hővsgől by Dorogostaïsky in 1904 (Edlund *et al*., 2001). Diatom studies by Russian, Mongolian and international scientists have proceeded through the last century (e.g., Skvortzow, 1937; Morales & Edlund, 2003; Edlund *et al*., 2003; Metzeltin *et al*., 2009); however, work has been largely focused on occurrence and distribution with little ecological or applied focus. In recent decades, interest has been building in Mongolia and surrounding regions to use diatoms in paleo-climatological (Tarasov *et al*., 2000; Peck *et al*., 2002; Soninkhishig *et al*., 2003; Fedotov *et al*., 2000, 2004; Rudaya *et al*., 2008; Shinneman *et al*., 2009b, c), paleo-ecological (Shinneman *et al*., 2009a, b; Mackay *et al*., in press), and ecosystem health assessments (Soninkhishig *et al*., 1999, Soninkhishig and Edlund, 2001); making an understanding of the distribution and taxonomy of diatoms in Mongolia an important line of study for applied research.

Here we expand on the known diversity and distribution of diatoms in Mongolia with a checklist of over 300 diatom taxa identified from 64 surficial sediment samples from western Mongolian lakes. Mongolia, and much of Central Asia, have not been well surveyed and continued exploration has yielded many new species, new reports, and broader distributions in the Mongolian diatom flora. The importance of Mongolian diatom studies is also being realized with recent large-scale research programs using diatoms in biogeography, taxonomy, bioassessment, and paleolimnology studies.

Material and Methods

Study region - The Valley of the Great Lakes lies in the far west of Mongolia, bounded by the Mongol Altai Mountains to the west, the Khangai Mountains to the east, and the Gobi Desert to the south (Fig. 1). The Great Lakes region is part of the endorheic Central Asian Basin and includes several smaller closed drainage basins with lakes ranging from fresh to hypersaline (Dulmaa, 1979; Shinneman *et al*., 2009a). Many of the large terminal basins in the valley are believed to be