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Hydraulically-operated Thin-layer Sampler for Sampling Heterogeneous Water Columns

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A necessary condition for investigating microbial communities in chemocline zones of stratified waterbodies is high-precision sampling at a depth resolution of several centimeters. We have modified a multi-syringe sampler that is conventionally used by researchers for this purpose. The main distinctive feature of our sampler is that plungers are operated hydraulically rather than pneumatically and, thus, our sampler has the following advantages: (1) the plungers cannot move spontaneously, which ensures sampling adequacy, especially in deep-water sampling; (2) filling of the syringes with the sample can be monitored from a distance; (3) during storage, the internal volume of the syringe and the whole hydraulic system is aseptic (if 70% ethanol is used as a working fluid), which is important if samples are to be used for microbiological tests. (4) the problem of sticking plungers is minimized, even after extended storage. Vertical sampling of the chemocline zones of meromictic lakes in Southern Siberia (Russia, Khakasia) at a depth resolution of 5 cm proves that the sampler is very reliable and simple to use.

Keywords: chemocline, microstratification, thin-layer sampler.

Introduction

In ecosystems of stratified waterbodies, a considerable contribution to material and energy fluxes is made by processes occurring in the zones of sharp physicochemical gradients of the water column, i.e. in the thermocline, the chemocline, and the pycnocline. Much research has been done on planktonic communities and processes in the gradient zones of stratified lakes (e.g. Jorgensen et al., 1975; Overmann, 1997; Tonolla et al., 2003; and many others), but the structure and functions of these communities and

their ecological role in the waterbodies are still underinvestigated. Moreover, stratified lakes are invariably attractive to researchers as “natural laboratories” in which different ecological niches of plankton microorganisms are formed along such physicochemical gradients as temperature, redox conditions, salinity, density, etc. It is well known that an adequate insight into biochemical processes and biota in the gradient zones of small lakes can only be provided by high-precision sampling at a depth resolution of several centimeters. It was reported that use of conventional samplers led to a

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