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4. FIELD AND LABORATORY METHODS

4.1. SAMPLING TECHNIQUES

4.1.1. PISTON CORING

Kazimierz Więckowski

The sediment cores from Lake Gościąż were collected by means of the piston corer of K. Więckowski's own construction, its functioning principles similar to those of Livingstone corer. The first version of this corer was produced in 1958 at the Limnological Station of Geographical Institute, Polish Academy of Sciences, located at Mikołajki, and since then several improved types of the corer have been constructed (Więckowski 1961, 1970, 1989). The corer in its last version can take cores 50–70 mm in diameter in 1 m or 2 m segments, and it can be operated in lakes with water depth up to 30 m and sediment depth 30–40 m. It can also be used to core mires and mud deposits, etc. It is reliable and easy to operate.

The core collection from Lake Gościąż and neighbouring lakes proceeded during the winters 1985, 1986, 1987, and 1991 from the ice surface and in the summers of 1990–91 from a platform supported by two military pontoons. The cores in 2-m segments were collected in plastic tubes with inner size of 58 mm placed inside the corer steel tube. After the coring the plastic tubes filled with sediment were pulled out and their ends closed tightly.

During the last field expeditions the cores were taken directly in plastic tubes of 70-mm inner size, accelerating the field work and increasing the volume of sediment obtained. The collection of cores in plastic tubes makes them safe during transport; they can be stored fresh in a cold room for a long time without any damage. For sampling, the tubes are cut along the axis on both sides, the half of the tube is taken away and the core exposed.

During the field work the position for getting particular cores was fixed with help of an old Lencewicz's (1929) bathymetric plan (the new survey was made much later, see Fig. 3.2 in Chapter 3), first in places of maximum water depth, and then distributed properly to get the image of depth differentiation in particular parts and zones of lake (see Fig. 5.2 in Chapter 5.1). In that way the preliminary data about the infilling of the lake basin and the configuration of its original mineral bottom were obtained.

4.1.2. SEDIMENT FREEZING *IN SITU*

*Adam Walanus**

The uppermost metres of sediment are not compacted because of lack of overlaying mass. Its density is extremely low, i.e. almost equal to that of water. Lake Gościąż in its deepest place is 24 m deep. This means that pressure at the bottom is three times higher than the normal atmospheric pressure. The gas dissolved in water, which is the main constituent of the sediment, is liberated and makes bubbles when the sample of sediment is lifted. Rising bubbles mix the sediment and disturb the laminations. The best way to avoid such disturbances is to make sediment absolutely rigid *in situ*, before lifting. It is performed by means of dry ice (carbon dioxide below -70ºC) with addition of alcohol; cooling mixture fills a metal tube or box, which is inserted into the sediment (Saarnisto 1986). As a result, after 10–30 min., layers of frozen sediment 1–3 cm thick are attached to the device. The solid sediment is lifted and kept frozen (well below 0ºC) during transport to the laboratory, where many different scenarios of further processing are possible.

During the Lake Gościąż explorations two types of samplers were used: the flat wedge sampler and the tubes of 6 cm external diameter (Fig. 4.1). The former is used for taking samples from the sediment/water transition (Renberg 1981). By increasing its weight up to 50 kg, sediment from a depth of 2 m may be reached.

To get deeper sediment, tubes were used. Especially the longest (5 m) and heaviest steel tube was useful. Because of the large amount of cooling medium which the tube may contain, a continuous sample may be obtained up to 1.6 m long. Kinetic energy is the agent forcing the tube to penetrate the sediment down to 4 m. The tube, filled with cooler and lead weights, falls freely through water and plunges into the sediment. No significant increase of sample disturbance is visible as compared with the rope-controlled tube.

About 20 frozen short cores have been taken from the deepest part of the lake. Their relative vertical positions

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