# SAMPLING LAKE DEPOSITS

by

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Work by the Freshwater Biological Association during the past year has directed attention to the importance of the deposits at the bottom of lakes as a means of interpreting their history since the Ice Age (1) ; and similar work on both freshwater and marine deposits has been progressing in other parts of the world (2). Cores from the floor of lakes or the sea have usually been taken with a sampler consisting of an open-ended pipe driven vertically into the deposit by its own weight (for example, Bigelow tube), by a hammering device, by exploding a charge at its upper end (3), or by screwing it into the deposits by means of connecting rods operated from a pontoon. (4) Such methods have the disadvantage that the deposits tend to be compressed and distorted by the pipe, so that the resulting core fails to give an accurate picture of the original stratification. The apparatus described in this communication was designed by one of us (B.M.J.) to avoid these difficulties ; it has been tested successfully on Windermere, and should have application to similar problems elsewhere.

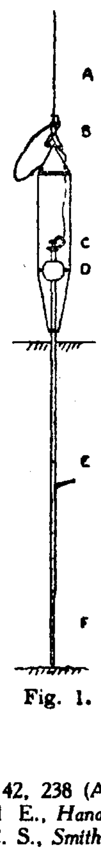


Fig. 1.

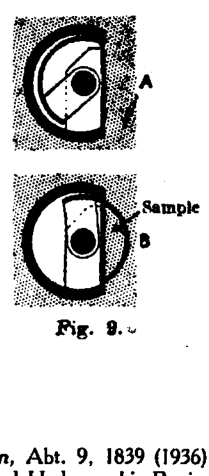


Fig. 2.

(1) *Nature*, 142, 238 (Aug. 6, 1938).
(2) Wasmund E., *Handbuch d. Biol. Arbeitsmethoden*, Abt. 9, 1839 (1936).
(3) Piggot, C. S., *Smithsonian Report for 1936*, 207 and Hydrographic Review, Vol. XV, N° 2, page 69.
(4) Reissinger, A., *Intern. Review d. Hydrobriol.*, 33, 1 (1936).

Fig. 1 shows the whole apparatus with the sampler proper (F) at the bottom, extension tubes (E) above it, of sufficient length to penetrate the deepest deposit to be sampled, and above these a length of guide tube on which slides a driving weight (D). The gear (C) for closing the sampler is carried on a flange at the upper end of the guide tube. A bridle of cable supports the whole apparatus and works the driving weight. The top of the bridle is hooked to a trip release (B) on the end of the main cable (A).

The sampler proper is shown in cross-section in Fig. 2, in the open position (A) and closed position (B). It consists of an outer tube, of 2 1/2 inch bore, of which one third of the circumference is cut away, and an inner half-tube. The cut side of the outer tube is closed, except for a small longitudinal opening, by a face-plate. The inner half-tube is carried by radial arms on a shaft, which passes upwards to the closing gear, so that, when the shaft is rotated, the inner half-tube projects through the longitudinal opening, passes through an arc of a circle, and closes against the face-plate. The top and bottom ends of the inner half-tube are closed by thin diaphragms, for the passage of which cross slots are left in the face-plate. The bottom end of the outer tube is closed by a solid steel point which slides on its attachment to act as a valve.

In use, the whole apparatus is lowered by a single cable from a pontoon, with the sampler in the open position. Its own weight is sufficient to penetrate the upper soft layers of the deposit, and it can be driven down to the required level by raising and dropping the sliding weight. A messenger-weight sent down the cable then releases the trip, which disconnects the main cable from the driving weight and allows a fine by-pass cable to be tightened by hauling up the main cable. Tension on this fine by-pass cable, transmitted through a pulley and skew-gears (C), revolves the central shaft, and with it the inner half-tube, thereby enclosing a core of the bottom deposit in the sampler (Fig. 2, B).

Loss of any part of the sample is prevented by the diaphragms mentioned above. As the fine by-pass cable completes the closure, a second strong by-pass cable (to the left of B, Fig. 1) becomes tight and takes the weight of the whole apparatus as it is hauled out of the deposit. The latter process is made easy by the valve at the bottom of the sampler allowing water to pass down the tube to fill the hole left in the deposit. On reaching the surface, the apparatus is laid horizontally and the closing gear is turned backwards to expose the core, which is then transferred to a trough in which it is stored for examination.

The experimental sampler was made to collect cores only 4 feet long, but deeper deposits were explored by using extension tubes (E, Fig. 1) to take successive, but overlapping, cores at increasing depths. In this way cores of 9 feet in length were obtained in Windermere. There seems, however, no reason why a longer and better constructed apparatus on the same plan should not be capable of extracting undisturbed cores from considerably greater depths of deposit and under many fathoms of water.

The advantages of this apparatus over others previously used for similar purposes are that: (1) it is worked from a pontoon with only a single cable and is therefore applicable to almost any depth of water ; (2) there is no need for connecting rods to the surface ; (3) for obtaining cores at successive depths in the deposit there is no need for devices to ensure that the sampler enters the same hole again ; (4) there is no compression or appreciable distortion of the core, at any depth, because the inner half tube cuts laterally along the arc of a circle into undisturbed deposit.

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