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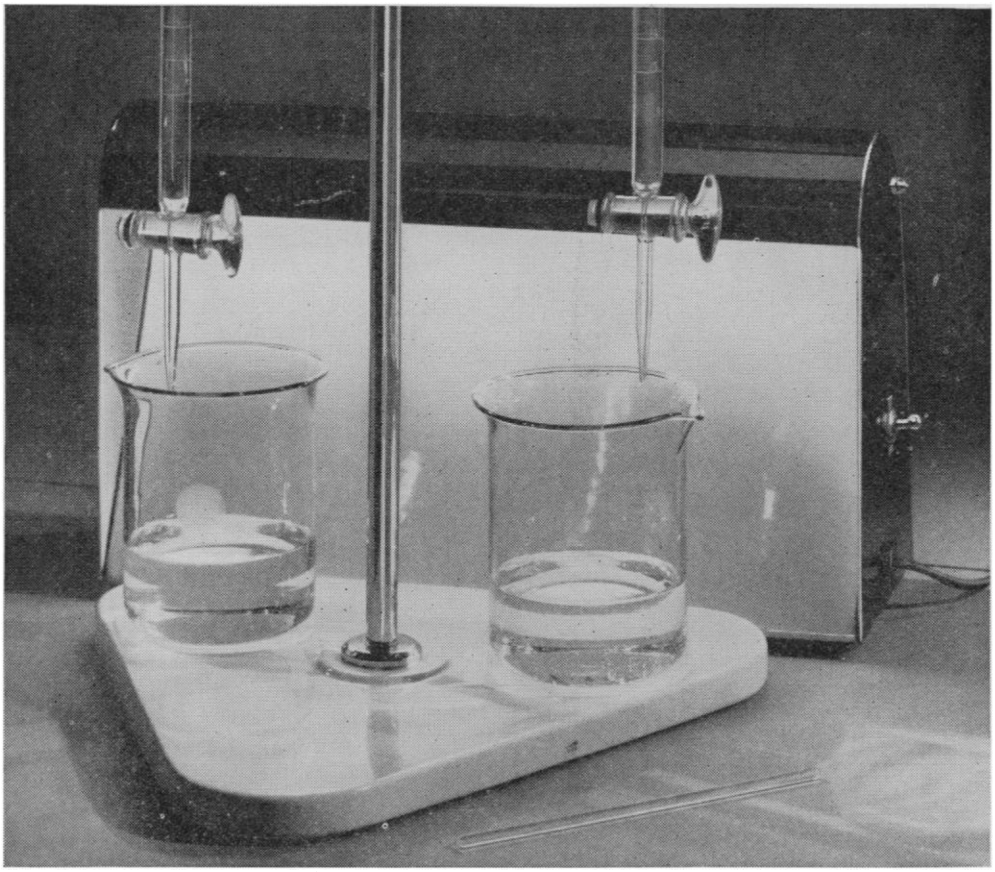

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ELIHU THOMSON[1]
1853–1937

By Dr. KARL T. COMPTON

PRESIDENT OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

FOR one destined to apply his genius largely toward harnessing electricity for the work and comfort of man, the decade beginning with 1850 was a timely period in which to be born. The preceding half century had witnessed the fundamental discoveries which underlie the utilization of electricity, and imaginative minds had begun to direct these discoveries into the broad channels of practical and commercial employment.

In the development of the electrical art this first half of the nineteenth century was a remarkable fifty years, and because it provided the foundation for the practical achievements which came in the second half, a review of it helps to give perspective to this memoir on Elihu Thomson.

The century opened auspiciously with Volta's discovery of the voltaic cell, and with the demonstration by Nicholson and Carlisle of electrolysis. In 1820 Oersted announced his discovery that an electric current has the power to deflect a magnetic needle. In this same year Ampere brilliantly elucidated Oersted's discovery by giving mathematical expression to the forces produced by electric currents. Six years later Ohm announced the formulation of his law that current is proportional to the electromotive force, and

[1] Condensed from a memoir presented to the National Academy of Sciences.

pollen grains and spores. These are customarily concentrated by using hydrofluoric acid, which dissolves out the silica and leaves the plant residue in a great enough concentration to facilitate pollen counts.[4] This concentration can be accomplished more efficiently and with less danger by using bromoform and acetone with a gravity of 2.3. Although pollen grains may be separated by means of a liquid of a lower density, experience has shown that with a high gravity solution there is less chance of loss, because there is less rapid settling of the sediment. Recently V. P. Grichuk[5] described a similar method for recovering pollen from loess deposits. The liquid used was "Toulé" (Thoulet?) solution with a specific gravity of 2.2.

The following is a description of the method that has been employed by the writer in examining various types of sand, silt, clay and till for microfossils. The method can be easily modified and can be used in conjunction with other methods commonly employed, when a greater concentration or a thorough cleaning of the microfossils to be studied is desired.

The unconsolidated sediment must first be completely broken up into its constituent parts and thoroughly deflocculated so that the fossils may be as free as possible from adhering material. With the coarser sediments this can usually be done by shaking the dried sediments in the bromoform to be used for the final separation of the microfossils, until the particles are entirely separated. With finer sediments, such as silt and clay, other methods are usually necessary. Ordinarily these sediments can be easily broken up by soaking small pieces of the material in water or in acetone followed by repeated agitation. If the sediments can not be broken up in this way, it becomes necessary to use alkalies or acids, although such means should not be used unless absolutely necessary because of the danger of destruction of some of the microfossils.

After the material is broken up and washed in acetone, it is thoroughly dried and then placed in a mixture of bromoform and acetone with a specific gravity of 2.3. After thorough mixing with the heavy liquid it is centrifuged. The light portion containing the fossils, which is found floating on the surface of the liquid, is poured off, filtered, washed thoroughly in acetone and dried over a hot plate. In most cases it is desirable to centrifuge the sediments several times in order to get a complete separation, especially when quantitative studies are being made. For preliminary work, however, it is generally necessary to centrifuge them only once. The dried material is then examined for fossils, and if present they are mounted directly or further concentrated and cleaned by methods commonly employed in the study of the different types of microfossils.

The bromoform may be recovered from the acetone washings and used again. This is done by mixing the washings in water and separating the bromoform from the water and acetone by means of a separatory funnel. It should be pointed out that bromoform is somewhat poisonous, but if it is used in a well-ventilated room or under a ventilating hood, there is no danger of unfortunate effects.

The method described above should be of considerable value to those engaged in ecological studies of modern lake sediments and deep-sea deposits as well as in many geological investigations involving the use of microfossils.

ARTHUR S. KNOX

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HARVARD UNIVERSITY

[4] G. Assarsson and E. Granlund, *Geol. Fören. in Stockholm Förhandl.* Bd. 46 H 1–2, pp. 76–82, 1924.

[5] V. P. Grichuk (Gritchouk), *Problems Phys. Geog. Acad. Sci.*, U.S.S.R., Vol. viii, pp. 53–58 (Russian; French summary), 1940.

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The Structure of Protoplasm. Monograph of the American Society of Plant Physiologists. Edited by WILLIAM SEIFRIZ. Pp. vi + 683. Iowa State College Press. $3.00.