Historical Geology. By RAYMOND C. MOORE. ix + 673 pages, with 413 illustrations, including 52 block diagrams in 16 figures, 42 maps, 32 sections and 22 figures comprising numerous graphic representations of stratigraphic sequences. McGraw-Hill Book Company, Inc., New York. $4.00.

THE writer of a text-book in historical geology must make a choice. An adequate presentation in word, picture, chart and map, of the basic facts, the lines of reasoning and the resulting generalizations, such as is needed for a satisfactory introduction to this phase of geology, would exceed the limits of size and cost of a salable text-book. The writer can devote his pages primarily to generalizations, counting on the lecturer to supply the needed supplementary facts, or he can place the emphasis on the actual record.

In his text-book, Dr. Moore has taken the latter course. For each period, for instance, he gives a number of typical sections showing the actual sequence of strata drawn graphically in a striking manner. He leaves it largely to the lecturer to supply correlation tables. Incidentally, the graphical method has made it possible to place into these sections a large part of the over seven hundred stratigraphic names listed separately in the index, without forcing them to the attention of the non-technical reader. This makes the book valuable as a reference work without harming its appeal as a text-book.

Similarly, he presents maps showing the areas of outcrop and of inferred original distribution for the rocks of every system, but omits hypothetical paleogeographic maps. Such maps are most effective when developed by the lecturer on a blackboard map from the data presented in the book.

Throughout the text, emphasis is placed on the facts of observation and on the reasoning employed in the attempt to correlate them and weld them into a consistent picture, in conscious opposition to the tendency evident in text-books of all sciences to tell the student what "science teaches."

Of the several masterly text-books that are now available in historical geology, Moore's book goes farthest in this effort to cultivate the spirit of critical judgment in inductive reasoning.

On the biologic side, Moore departs from traditional methods by figuring a number of fossils of one taxonomic group on one plate, all drawn to a specified scale. There can be no doubt that this method comes nearer creating adequate mental pictures than the customary one of figuring for each period on one plate random samples of animal forms of diverse groups, generally drawn on vastly different scales. In order to make possible such effective grouping, the forms of life are not discussed separately for every period, but only in four chapters, one devoted to each of the following major units; Early Paleozoic, Late Paleozoic, Mesozoic and Cenozoic time. A brief but effective chapter on the geologic history of man ends the book.

Among the other illustrations effective use is made of block diagrams. The quality of some of the halftones is subject to criticism, but their selection is excellent.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A DEVICE FOR WATER CIRCULATION

A SIMPLE air pump can be easily constructed which will maintain a continuous circulation of clean aerated fresh or salt water through an aquarium. The pump (*p.*, fig. 1) is made from a pyrex glass test-tube, the height of which is 10 cm and the inside diameter is 1.5 cm. A pyrex glass tube (*a.*) with an inside diameter of 5 mm is sealed to the side of the test-tube approximately 2 cm from the mouth and then bent so that the glass tube is parallel with the test-tube. A similar glass tube (*b.*) is sealed to the base of the test-tube. The pump is placed in an inverted position in the reservoir and an exceedingly small air current is permitted to enter the pump through the glass tube (*a.*) at the side. The exact depth at which the pump will give a maximum efficiency may be determined by experimentation; however, the pump should be at least 15 cm below the water level in the reservoir. The air upon entering the pump entrains a small column of water which it pushes out the supply pipe (*b.*) in the manner of a percolator. The amount of air current may be adjusted to give an optimum flow. Although the pump can force the water a distance of some five feet above the reservoir, it works more efficiently if the aquarium (*aq.*) is placed at a lower level.

The supply pipe (*b.*) may be led directly to the aquarium (*aq.*) or first to a Wolff bottle (*bo.*) which merely serves to maintain an even flow into the aquarium itself. Leading from the aquarium is an automatic siphon (*s.*) which keeps the water level at a constant height. The overflow through the automatic siphon is carried into the top of the filter (*f.*). This consists of a glass cylinder filled for the lower

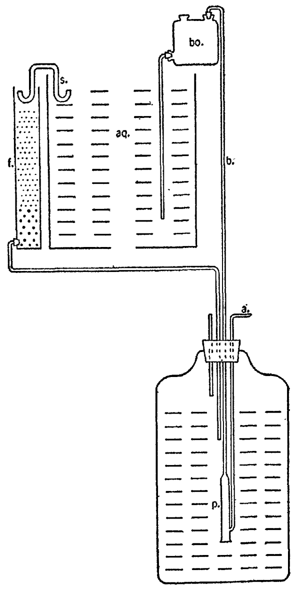

FIG. 1

third with gravel and for the remaining upper two thirds with fine sand. The water filters slowly downward, leaves by way of a glass tube and returns to the reservoir.

The cork stopper of the reservoir should contain four openings: one for the tube returning water from the filter, one for the supply pipe (*b.*) conveying water to the aquarium, one for the air tube (*a.*) and one to equalize the air pressure within the reservoir. A cover may be placed over the top of the aquarium to prevent excessive evaporation, especially if the system is for sea water.

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IMPROVEMENT OF PARAFFIN SECTIONS BY IMMERSION OF EMBEDDED TISSUES IN WATER

IN a recent article in SCIENCE, Slifer and King[1] suggested a modification of Petrunkevitch's[2] technique for softening tissues too brittle for sectioning by the paraffin method. The work of these investigators was carried out on grasshopper eggs and entailed the use of a 4 per cent. solution of phenol in 80 per cent. alcohol and subsequent soaking of the embedded tissues in water. Either of these two processes without the other failed to give satisfactory results.

Difficulties encountered for several years in this laboratory in the sectioning of rats' adrenals led to the investigation of the applicability of the technique described by Slifer and King to adrenal and other tissues. The adrenal glands used in our studies had to be treated by special methods. The glands were fixed in Wislocki's[3] modification of Kohn's fluid containing potassium dichromate and formalin, washed in formalin, and passed through graded solutions of alcohol to 70 per cent. The adrenals were then bleached in hydrogen peroxide and alcohol for several hours. This part of the process frequently rendered the glands extremely brittle. They were next passed through graded solutions of alcohol to absolute alcohol and cleared in a mixture of benzyl benzoate and methyl salicylate. The brittleness of the adrenals increased in proportion to the time the glands remained in the mixture. Some which were left in this fluid for two years or more crumbled when they were sectioned.

In view of these difficulties it seemed advisable to utilize the Slifer and King method in our work. In the case of the adrenals, the glands were exposed to a 4 per cent solution of phenol before or after bleaching in hydrogen peroxide or clearing in the oil mixture. As it would have been impractical to cut the adrenals in half, since the obtaining of serial sections for reconstructions was desired, surfaces of the glands were not exposed to water. It was hoped that the phenol treatment alone would suffice to soften the embedded material. The glands failed to section, but it was observed that if water was applied to the surface of the block before each section was cut, that section came off perfectly. This same effect, however, occurred even though the glands had not been previously treated with phenol. It seemed reasonably certain that if a surface of the embedded glands could be exposed to water, the laborious necessity of moistening the block for each section could be eliminated. The crux of this problem lay in the fact that exposure of a large surface would entail the loss of important sections.

The following method afforded a solution to the problem. Rats' adrenals were prepared by the technique outlined above. These included fresh material and material which had been preserved in the clearing mixture for several years. None of the glands was treated with phenol at any time in the course of preparation. After the glands were embedded, paraffin was shaved off in such a way that one surface of each gland was just scratched. Whatever section would be lost by this procedure could be accounted negligible for accurate reconstructions. Each block was then immersed in water and allowed to soak for varying periods of time. When the allotted time period for each block had elapsed, the

[1] Eleanor H. Slifer and R. L. King, SCIENCE, 78: 366, 1933.

[2] A. Petrunkevitch, SCIENCE, 77: 117, 1933.

[3] G. B. Wislocki, *Bull. Johns Hopkins Hosp.*, 33: 359, 1922.