

estate of the late Levi M. Stewart, of Minneapolis. Mr. Stewart in the last year has given away \$630,000, practically half of the estate that was left him. About \$400,000 went to churches, colleges and charitable institutions in Maine.

By the action of a New Haven court Yale University is adjudged not entitled to a legacy of \$700,000. The money was devised by Mrs. Henry O. Hotchkiss, who died last year. The court rules that the will is void because Mrs. Hotchkiss did not get for herself complete and ultimate control of the money.

DR. JOHN HUSTON FINLEY was installed president of the University of the State of New York and commissioner of education on January 2. The inaugural address by Dr. Finley was given in the afternoon session. Other speakers included St. Clair McKelway, chancellor of the university; Nicholas Murray Butler, president of Columbia University, and Calvin N. Kendall, commissioner of education of New Jersey. The program for the evening included addresses by Governor Glynn, Franklin K. Lane, secretary of the interior; Charles W. Eliot, president emeritus of Harvard University, and Jean J. Jusserand, ambassador from France.

THE American Political Science Association at its Washington meeting last week adopted a resolution providing for the appointment of a committee of three "to examine and report upon the present situation in American educational institutions as to liberty of thought, freedom of speech and security of tenure for teachers of political science." The committee was authorized to cooperate with similar bodies of other societies of the social sciences.

THE examiners for the Shaw Fellowship open to graduates in philosophy of the four Scottish universities have recommended that it be awarded to Mr. G. A. Johnston, of Glasgow. It is of the annual value of about £160, and is tenable for five years.

MR. A. E. MORTIMER-WOOLF has been appointed demonstrator in the department of anatomy at King's College, London.

MR. GEORGE SENTER, D.Sc. (Lond.), Ph.D. (Leipzig), reader in chemistry in the University of London and lecturer in chemistry at St. Mary's Medical School, has been appointed head of the department of chemistry at Birkbeck College, London, in succession to Dr. Alexander McKenzie, who has been elected to the chair of chemistry at University College, Dundee (University of St. Andrews).

DISCUSSION AND CORRESPONDENCE

A MODERN TEXT-BOOK OF GEOLOGY—AND EVOLUTION

TIME, after all, is a matter of relativity for most of us. To-day, under circumstances, may really be yesterday. A little scientific book of the time of the middle of last century—a few years, say, after the publication of Darwin's "Origin"—has just come under my eyes. But it could not have come much before because its title page bears the imprint, "Quebec, 1913."

It is a little text-book (in French) of geology: "Abrégé de Géologie, par L'Abbe V.-A. Huard, A.M., Directeur du Naturaliste Canadien, Conservateur du Musée de l'Instruction Publique, et Entomologiste officiel de la Province de Quebec."

It is one of a series of similar books by the same author (zoology, botany, mineralogy, geology) which form a "Cours abrégé d'histoire naturelle, à l'usage des maisons d'éducation." It is, in other words, an introduction and guide to science for the rising generation of French Canadians.

It comprises six chapters about the earth's crust, the agents that modify it and the fossils that lie in it; and a seventh divided into two articles: "Art. 1, L'histoire primitive du genre humain; Art. 2, Ce qu'il faut penser du transformisme." It is this last chapter particularly that seizes one's attention.

The first paragraph of the first article concerns the "age of the human species." It is as follows:

"The infallible authority of the Church—[have I neglected to mention that the reverse

of the title-page of this text-book for secondary schools bears the imprint, "*Nihil obstat*," followed by the signature of the "*censor designatus*" and the *imprimatur* of the bishop administrator of Quebec?—the infallible authority of the Church has made no definite determination as to the date when God created man, nor, by consequence, when man commenced to exist upon earth. There is a chronology in the Holy Books written under the inspiration of God, but in addition to the fact that it must be admitted that in the work of the ancient copyists extending over long periods of time the figures of this Biblical chronology may have been considerably altered, we may believe also that the sacred writer has not pretended to any completeness of genealogy of the patriarchs. Thus from the evidence of Revelation there is no absolute statement to be made relative to the existence of man on the earth; moreover, this is a question that interests neither dogma nor morals."

In two succeeding paragraphs the teacher states that geological evidence shows that man did not exist in the Tertiary epoch. The geological indications are that the creation of man dates from the end of the first period of the Quaternary. "One may add that there is to-day a tendency to believe that the human species has existed for 9,000 or 10,000 years; but this is only an opinion more or less probable that each is free to accept or reject for himself."

The second part of the chapter takes up, as I have already indicated, the subject of evolution. It begins with a recognition and demonstration of the unusually favorable condition of the infants of Quebec as regards science.

"With us," writes the good Abbe, "the little child when it has well learned its catechism is sure of the solution of the most grave problems which can disturb the human mind; it is in possession of the truth on the most important of questions. It knows, for example, the existence of God, that is to say the existence of the eternal Being whose perfectness and power are infinite. It knows that God has created, that is to say produced by an act of His will, the whole visible and invisible universe; and

as regards our earth, it knows that God has created all the kinds, mineral, vegetable and animal that are found on it. The science of this little child is then already immense, and it is certain."

In painful contrast to this, the teacher finds that "in other lands there are unfortunately men who pass for savants, who ignore or refuse to admit and even combat these truths which rest not alone upon revealed religion, but also upon philosophy and upon the natural sciences where they are impartially questioned and legitimately understood. These men attribute all the development of the world, organic and inorganic, solely to the forces of nature, and they do this either to eliminate any necessity of intervention in this development by God or to discredit the Church which He has established." However, our author admits in a footnote¹ that not all evolutionists have such perfidious intentions, these others being engaged in following the chorus-masters of evolution simply by their lack of scientific knowledge and capacity for reflection, or because they wish to be believed to be in the scientific swim, *à la mode*.

M. Huard then proceeds to a brief setting forth of the actual hypothesis—the absurd hypothesis—of transformism, and of the trivial and thoroughly exploded alleged factors of this evolution: namely, natural selection, the influence of the use of organs, and the influence of the environment. "It is necessary to add that these famous principles of the evolutionary hypothesis have no longer many partisans to-day, because the actual facts have proved their unreality. It is well, however, to know them at least by name, because of the historic interest which still attaches to them."

M. Huard then offers a series of scientific criticisms of evolution which are sufficient in themselves to make untenable any belief in it, without making appeal at all to those other

¹ "Il ne manque pas, assurément, d'évolutionnistes qui n'ont pas ces intentions perfides, et qui ne se sont engagés à la suite des coryphées du transformisme que par défaut de science ou de réflexion, ou pour suivre ce qu'ils croient être le courant scientifique du jour."

presumably even more convincing "*motifs tres graves*" that the theologians and philosophers have for disproving the hypothesis of the evolutionists.

These objections to evolution, "drawn exclusively from the domain of science," are as follows (quoted unabridged and unmutated):

"1. The great objection that can be made, *a priori*, to evolution, and one which should make unnecessary all discussion, is that it is impossible to cite in its favor a single fact, well determined and legitimately interpreted, which shows that a single species has certainly evolved into another species. It is evident that a single fact of this kind would be sufficient, if not to establish solidly the hypothesis of evolution, at least to break much of the force and worth of the arguments of the adversaries of the hypothesis.

"2. As regards man himself, one has gone so far as to attribute to him for ancestor, the monkey, which by successive betterments should have finally become the human creature. Only, one can give no proof of this transformation; one knows none of the intermediate beings which should have formed an uninterrupted series between the monkey and man. Let us add that whether we consider the cranial development, or the anatomical structure, there are very great differences between man and even the most perfectly constituted monkey. It is the intellectual faculties, above all, which offer no ground of comparison between man and monkeys. It is necessary then to admit, from the scientific point of view, the direct creation of man by God.

"3. Just as the human being has remained the same from the beginning, so also have the animal and plant kinds remained the same, as proved by the study of fossils of all the geological epochs. There is not the least proof that a single species can, in however long a time, become another species. There have been, without doubt, both with man and with animals and plants, changes due to climate, nutrition, the soil, etc.; these changes have given rise to *varieties* more or less stable, within the species, but never to new species. The trilobites, for example, whose history can

be followed in the geological strata up to their very end, since they did not persist beyond the Tertiary epoch, have offered in only a dozen of their three or four hundred species, no more than slight variations, which were not even completely maintained by their descendants.

"Evolution, *understood in a very restricted sense*, can then show us new varieties that only culture or other causes can produce; but there its power ceases, as experiment has demonstrated.

"4. Paleontology testifies that species have not appeared, from the beginning, as a series of successive, ever better stages, but they have appeared suddenly and without relation to the species existing before. And they have appeared all at once in all their relative perfection.

"5. If evolution had, as it is claimed, produced the perfecting of species, the last come among organisms would be the most perfect. Now, the study of fossils proves that the contrary is often true. For example, the most ancient fishes, the first sea-urchins, the oldest plants, the Carboniferous amphibia, were more perfect than the fishes, sea-urchins, amphibia and plants of to-day.

"6. It is not superfluous to add to what has preceded that since the beginning of historic time there has been recorded no sign of the passing of one species into another, neither among the plants nor animals.

"The conclusions to draw from all this are: (1) that the fixity of species is a scientific truth clearly and solidly established; (2) that God himself, author of all that exists outside of himself, has directly created man and all the animal and plant species."

To add anything to this is to produce the anti-climax. Yet it must be noted that Abbe Huard's text-book has not gone wholly without criticism in French Canada. In *Le Pays*, of Montreal, a writer took some exception to the Abbe's position on evolution. *Le Pays* was reprimanded by the Archbishops of Montreal and Quebec and the reading of the journal interdicted. In *Le Naturaliste Canadien* (October, 1913) (his own paper) the Abbe Huard refers appreciatively to the incident, and mentions

that the single one of the pro-transformism arguments of the writer in *Le Pays* which remains in his memory is, that the best geologists of the United States believe in evolution. The Abbe justly remarks that the argument does not seem to him overwhelming. For, he adds, they and even most geologists of the English language and protestant faith are partisans of evolution because of their lack of philosophic and religious instruction.

V. L. K.

STANFORD UNIVERSITY, CAL.

A SIMPLE APPARATUS FOR ILLUSTRATING PHOTOSYNTHESIS

THE use of experiments, illustrating the various physiological processes in plants, are coming more and more into use in connection with the teaching of elementary botany in the secondary schools. Unfortunately the funds available for the purchase of apparatus are so limited in many of these schools that the teacher has to resort to the method of making the various experiments before the class, while the students make notes on the results, etc., to be written up in their laboratory notebooks later. Such a method as this is very good if nothing better is available, but of course the best results are obtained by the students themselves making as many of the experiments as possible. I devised the following simple apparatus for illustrating the necessity of carbon dioxide and light in photosynthesis. Since it has worked with success, I thought that a short account of it might be justified.

Ordinary bottle corks, about 2 cm. in diameter, and 1 cm. thick, should each have a hole cut through the flat side with a large cork borer. The holes should be about 1.5 cm. in diameter. Through one side of each of the cork rings thus formed, a small hole should be made for ventilating purposes. The large hole in each ring should now be covered on one side by cementing on a small piece of mica, or, if mica is not available, small round cover glasses will do, but will require more careful handling subsequently as the glass breaks more easily than the mica. A sufficient number of these discs should be made to provide

each student with six of them, two of which should be blackened to exclude the light.

In order to perform the experiment successfully a bright day should be selected, and only such plants should be used as have the stomata on the lower sides of the leaves. Plants with the stomata on both surfaces can be used, however, provided that the upper surfaces of the leaves used in the experiment are greased with cocoa butter or vaseline. The plant should be left in the dark long enough for the starch to be removed from the leaves before the experiment is started.

The cork discs, which have just been described, should be pinned to the leaves in pairs, one on the upper surface, and another on the lower surface opposite it so as to form small enclosed chambers in each instance. The blackened discs should constitute one pair so as to form a dark chamber. In order to exclude carbon dioxide the lower chamber of one of the other pairs of discs should contain small lumps of soda-lime, while the third pair will serve as a control to show that the presence of the discs themselves does not interfere with starch formation.

After the plant has stood in the sunlight for a few hours the leaves upon which the experiment is made should be removed, boiled in water, left in alcohol for a time and tested for starch in the usual way. If the experiment has been properly conducted, no starch will be present where carbon dioxide and light have been excluded, but it will be present in abundance under the discs used as a control. Groups of from two to four students can work together if the class is large and the number of discs limited.

It has been found that rather large-leaved plants with stiff petioles are better for use, in which case one leaf is sufficient for the three sets of discs. If plants with delicate leaves are used the discs can be supported by bending short lengths of soft iron wire at right angles near one end of each, and inserting the bent end in the side of one of the discs in each pair, while the other end of the wire is stuck into the soil below.

ALBAN STEWART

UNIVERSITY OF WISCONSIN