

At Princeton University, William Lauder Jones has been appointed professor of organic chemistry. Charles Rogers, of the Museum of Natural History, has been appointed curator of the biological museum. Charles Jones Browne, head of the department of hygiene and physical education at the University of North Carolina, has been appointed to be an assistant professor in that department. James Alexander, on leave of absence for war service, has been made an assistant professor of mathematics. Professor Raymond Smith Dugan was promoted to a professorship of astronomy. Dr. Carl C. Brigham was appointed assistant professor of psychology, and Benjamin F. Howell was raised to the rank of assistant professor of geology.

At the Carnegie Institute of Technology Henry L. Moore, assistant professor of physics at the Mississippi Agricultural College, will be assistant professor of physics, Ruth E. Canfield, instructor of ceramics at Alfred University, instructor of ceramics and weaving. James R. Everett, assistant professor of mathematics at Baker University, and George W. Hess, professor of mathematics at Bethany College, will become instructors in mathematics.

PROFESSOR J. T. WILSON, professor of anatomy in the University of Sydney, has been elected to the chair of anatomy at Cambridge, rendered vacant by the death of Professor Alexander Macalister.

DISCUSSION AND CORRESPONDENCE

THE USE OF THE TERM FOSSIL

THERE is probably no word more widely and loosely used by geologists than *fossil*. Paleontology, the study of ancient life, is literally the study of fossils; and stratigraphy, or the correlation of formations, is principally dependent upon fossils as horizon markers. The broad subject of historical geology, or the evolution of the earth and its organisms, is also largely a study of fossils. All workers in the above mentioned divisions of earth science would define a fossil as the evidence of former life, no mat-

ter how much they might disagree as to the full and exact definition of the term. Unfortunately, however, the term is often used by geologists in general as an adjective to denote age of geologic magnitude; hence: "fossil volcano," "fossil river channel," "fossil sand dunes," etc.; all of which objects are obviously of inorganic origin.

Fossil is derived from the Latin, *fossilis*, "dug up or dug out." The latest edition of the Century Dictionary defines the term as follows:

Any rock or mineral, or any mineral substance, whether of an organic or inorganic nature, dug out of the ground. Specifically, in later geological and mineralogical use, anything that has been buried by natural causes, or geologic agencies, and bears in its form or chemical composition the evidence that it is of organic origin.

In spite of the above, there are literary persons who use the adjective form of the word in the sense of ancient or out-of-date; i. e., "fossil poetry," "fossil statesman." Sometimes the "bad use" of the word is merely ludicrous, as in the case of a paleobotanist who frequently refers in the text to the student of fossil plants as a "fossil botanist."

In the latest text-book of paleontology¹ a fossil is defined thus: "A fossil is the remains of a plant or animal, or the record of its presence, preserved in the rocks of the earth."

A definition more exact than any to be found in the modern text books is proposed as follows: *A fossil is an object which indicates former existence of an organism which has been buried and preserved by geological causes, previous to historic time.* According to this definition the mastodon preserved in the arctic ice is a fossil; the leaf buried in the gutter is not. The remains of an organism may be a true petrification and yet not be a fossil. Fossil and petrification are not synonymous. Simply because a species has become extinct does not make it a fossil, even if its remains are petrified, or the knowledge

¹ "An Introduction to the Study of Fossils," H. W. Shimer, Macmillan Co., 1914.

of its former existence is preserved to us by means of impressions, molds or casts. On the other hand, certain shells preserved in the Pre-Pleistocene formations and which are not only practically unaltered but also have living representatives, are true fossils. The element of time as here applied to the definition may seem to certain biologists and geologists to be unessential. It is necessary, however, to have some term which may be applied to the "medals of creation" to set them apart from the realm of organisms which are living, or have lived within historic time.

Fossils may be briefly classified as follows:
A. Direct evidence.

1. Actual remains (spore cases; Oligocene ants, etc.).
 - (a) Hard and soft parts preserved.
 - (b) Hard parts only preserved.
 - (c) Hard parts minus organic matter.
 - (d) Hard parts plus mineral salts grading into:

2. Minute replacements (coal balls; labyrinthodont, teeth, etc.).

Replacement molecule by molecule of the original organic matter by mineral salts, resulting in petrification which may or may not show structure. Results of metasomatic processes.

3. Coarse replacements (bulk of Paleozoic fossils).
 - (a) Molds of the exterior and interior.
 - (b) Casts of the exterior and intermediate structures.
4. Prints (leaves; jelly fish, etc.). Plus or minus organic matter in the case of plants.

B. Indirect evidence.

1. Coprolites.
 - (a) Whole or part of original substance.
 - (b) Casts of original substance (coprolites of dinosaurs).
2. Artifacts (ant hills; prehistoric flints, etc.).
3. Tracks, trails or burrows (Arthropycus; dinosaur tracks, etc.).

We may smile when the novelist uses the adjective, *fossil*, in a broad way; we may even argue with the petrologist, or physiographer when he uses the term to describe inorganic phenomena, but what are we to do when the paleontologist speaks of "fossil ripple-mark"? Clearly the word is rapidly becoming so used that it will soon be useless in a scientific sense. Since the paleontologist is more interested in fossils than the petrographer, geographer or even the "general" geologist, and since he alone has defined what fossils are, is it too much for him to ask his brother geologists to either adopt his definition or else to coin a new term which will better express the antiquity of inorganic structures. Perhaps it would be well for the paleontologists to set an example in the "good use" of the term, by using it correctly themselves. As they are also vitally interested in the geologic time-table, perhaps it would not be out of place for them to suggest that Paleozoic, Mesozoic, or Tertiary prefixed to "ripple-mark" or volcanoes would be much more descriptive and accurate than the adjective *fossil*.

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THE FIXATION OF ATMOSPHERIC NITROGEN

TO THE EDITOR OF SCIENCE: Allow me through the columns of SCIENCE to give publicity to a most unique experiment related to me by the late Dr. Paul Heroult, the inventor of the electric steel furnace, and simultaneously with Hall of the electrolytic process for the isolation of aluminum.

It serves to show in a simple but striking way the "fixation of atmospheric nitrogen" of which we have heard so much in the past four years.

Although described and shown to many scientific friends it was new to them all, and as it lends itself to lecture demonstration deserves to be better known.

The experiment consists in thoroughly mixing 90 grams of fine aluminum powder with 10 grams of lamp-black. This mixture is