Teaching, are entirely made up of physicians and fully represent the medical profession. Meanwhile, no one is better acquainted with the needs of the people in regard to the prevention and cure of disease and the preservation of health and healthful conditions than the medical profession itself. And that the medical profession may be even more capable of caring for these needs, nothing is more important than the continued improvement of medical education.—*Journal of the American Medical Association.*

SCIENTIFIC JOURNALS AND ARTICLES

THE contents of the *Journal* of the Washington Academy of Sciences for August are as follows:

Physics.—"Melting Temperatures of Sodium and Lithium Metasilicates," F. M. Jaeger.

"A Method for Determining the Density of certain Solids by means of Rohrbach's Solution having a Standard Refractive Index," H. E. Merwin.

Electricity.—"A Study of the Current Transformer with Particular Reference to Iron Loss," P. G. Agnew.

Geochemistry.—"Minerals and Rocks of the Composition $MgSiO_3$—$CaSiO_3$—$FeSiO_3$," Robert B. Sosman.

Mineralogy.—"Crystallized Turquoise from Virginia," Waldemar T. Schaller.

"Quartz and Fluorite as Standards of Density and Refractive Index," H. E. Merwin.

"The Temperature Stability Ranges, Density, Chemical Composition and Optical and Crystallographic Properties of the Alkali Feldspars," H. E. Merwin.

Petrology.—"A Micrometer Ocular with Coordinate Scale," Fred Eugene Wright.

"The Lavas of Hawaii and their Relations," Whitman Cross.

Paleontology.—"Remarks on the Fossil Turtles Accredited to the Judith River Formation," F. H. Knowlton.

Zoology.—"Remarks on the Nervous System and Symmetry of the Crinoids," Austin H. Clark.

Chemical Statistics.—"The Consumption of the Commoner Acids in the United States," Charles E. Munroe.

Abstracts.—Geodesy; Meteorology; Terrestrial Magnetism; Electricity; Radio-telegraphy; Chemistry; Electrochemistry; Agricultural Chemistry; Mineralogy; Geology; Botany; Forestry; Zoology; Conchology; Fisheries; Pharmacology; Bacteriology; Sanitation; Engineering.

Proceedings.—Washington Academy of Sciences.

SPECIAL ARTICLES

WHERE ARE THE LARAMIE DINOSAURS?[1]

THE Ceratopsidæ or horned dinosaurs have so long been regarded by paleontologists and others as belonging to the Laramie formation, and also that this "Laramie formation" containing them is of Cretaceous age, that facts which seem to oppose this view make but slow headway. That the true Laramie *is* of Cretaceous age no one is likely to question at this stage of the discussion, but the mistake lies in presuming that the dinosaur-bearing beds belong to the Laramie. At the Baltimore meeting of the Geological Society of America (December, 1908) I ventured to say, in a public discussion of one of the correlation papers, that there was no known locality in North America where dinosaurs (Ceratoposidæ) occur in true, undoubted Laramie. To the best of my knowledge and belief that statement still holds good.

In June, 1909, I published a paper[2] in which the following is given as the thesis: "The present paper deals with the extensive series of fresh-water deposits of the northwest (*i. e.*, broadly, the region east of the Rocky Mountains and between Wyoming and the valley of the Mackenzie River) comprising what is here considered as the Fort Union formation. It is shown that the Fort Union embraces more than has been commonly assigned to it. Conformably below the beds by some geologists considered as the true Fort Union occur dark-colored sandstones, clays and shales, which have often been incorrectly referred to the Laramie, or its equivalents, but which are stratigraphically and paleontologically dis-

[1] Published with the permission of the director of the U. S. Geological Survey.

[2] "The Stratigraphic Relations and Paleontology of the 'Hell Creek Beds' and Equivalents, and their Reference to the Fort Union Formation," *Proc. Wash. Acad. Sci.*, Vol. 11, 1909, pp. 179–238.

tinct from the Laramie, and the contention[3] is here made that these beds, which include the 'Hell Creek beds' and so-called 'somber beds' of Montana, the 'Ceratops beds' or 'Lance Creek beds' of Wyoming, and their stratigraphic and paleontologic equivalents elsewhere, are to be regarded as constituting the lower member of the Fort Union formation and are Eocene in age."

In that paper it was shown that the dinosaur-bearing beds ("Ceratops beds") rest, in some cases unconformably, in others in apparent conformity, on Fox Hills or Pierre, and the conclusion was reached that an erosional interval is indicated during which the Laramie—if ever present—and other Cretaceous and early Tertiary sediments were removed. From this it follows that the beds under consideration, being above an unconformity, can no longer be considered as a part of the "Conformable Cretaceous series," and hence are not Laramie. It was also shown that these beds can not be separated on structural or lithologic grounds from the overlying acknowledged "yellow"-bed Fort Union; in other words, that sedimentation was continuous and uninterrupted.

The results of the work of two field seasons in critical areas have just been published (June, 1911),[3] showing that the results of the first paper are confirmed in every particular. For instance, on the North Platte River, opposite the mouth of the Medicine Bow River, in Carbon County, Wyoming, remains of *Triceratops* were found in beds (typical "Ceratops beds") *above* 6,000 feet of undoubted Laramie, and from which they are separated by an unconformity which, according to Veatch, has involved the removal of over 20,000 feet of strata. This would seem forever to dispose of the contention that the "Ceratops beds" are in any way the equivalent of the Laramie. A short distance to the northeast of this locality, in Converse County, Wyo., the Laramie is entirely absent and the dinosaur-bearing beds rest without observed unconformity on Fox Hills. In adjacent South Dakota and southeastern Montana these same beds rest on Fox Hills of varying thickness, often with obvious erosional unconformity, occasionally also with angular as well as erosional discordance, and, in one instance, apparently on Pierre, the whole of the Fox Hills being cut out.

In 1910 the U. S. Geological Survey formally adopted the name *Lance formation*[4] in place of "Lance Creek beds" or "Ceratops beds." Wherever *Lance formation* is employed it is to be understood as including "Lance Creek beds," "Ceratops beds," "Hell Creek beds," "somber beds," "Lower Fort Union" and dinosaur-bearing beds identified as "Laramie" by many writers.

At first the Lance formation was considered to be of Cretaceous age, though obviously above and distinct from the Laramie. Later, however, when the facts became known as above outlined, and when it became necessary to place the Lance formation officially[5] it has been recorded as "Cretaceous or Tertiary." This concession is regarded by the writer as important, and one the value of which is not to be overlooked.

The vertebrate paleontologists[6] continue to refer to the "Ceratops beds" as the "Laramie," the "Laramie Cretaceous," etc., as though nothing had been ascertained regarding their position since they were named twenty-five years ago! If there *is* valid evidence to show that the Lance formation ("Ceratops beds") is the equivalent of the Laramie in whole or in any part it would be welcome. If there *is* a known locality where dinosaurs (Ceratopsidæ) occur in the true Laramie, information concerning it should not longer be withheld.

F. H. Knowlton

[3] "Further Data on the Stratigraphic Position of the Lance Formation ('Ceratops Beds')," *Jour. Geol.*, Vol. 19, 1911, pp. 358–376.

[4] See first use, *Am. Jour. Sci.*, Vol. 30, September, 1910, p. 172.

[5] Cf. Bull. U. S. Geol. Surv., No. 431 B, 1911, p. 85.

[6] Cf. Lull, *Am. Jour. Sci.*, Vol. 29, 1910, pp. 1–39; Brown, *Bull. Am. Mus. Nat. Hist.*, Vol. 28, 1910, pp. 267–274; Wieland, *Am. Jour. Sci.*, Vol. 31, 1911, pp. 112–124.