

often roughened with ungraded ledges or half barred with the fans of lateral torrents, and the fall rises to sixteen feet a mile. All these features point to a relatively recent deformation of the country, in consequence of which the river has aggraded the depressed basins and trenched the uplifted ranges. It is noted that only the smaller side streams cascade into the cañon; the larger ones have cut down their lateral ravines to grade with the main river. The analogy of the Euphrates and the Colorado in this respect is pointed out. The stationary condition of the native population is remarkable; the navigation of the river is still in the most primitive condition; an altar was seen 'covered with the gore of the scores of sheep and goats, which are brought as sacrifices by both Christians and Mohammedans'; irrigation is very poorly developed. The people could not understand the motive of the 'men with hats' in making so venturesome a journey down the river. A characteristic comment was: "They say they are not paid for making this journey, but we know better. * * * They know everything; they see a stone or a plant, a brook or a mountain, and they know it. * * * They write everything." A more general article by the same author, on 'The Valley of the Upper Euphrates River and its People,' has lately appeared in the *Bulletin of the American Geographical Society*.

W. M. DAVIS.

RECENT ZOOPALEONTOLOGY.

AGE OF THE TYPICAL JUDITH RIVER BEDS.

REFERRING to the recent communication of Mr. J. B. Hatcher and Professor S. W. Williston, on the subject of the age of the Judith River Beds, Mr. Hatcher remarks: 'I do not know upon what authority Professor Osborn makes this unqualified statement as to the deposits underlying the Judith River Beds.' I would say that the authorities for the Upper Cretaceous (and hence overlying) position of the Judith River Beds are partly cited in my recent memoir on 'The Vertebrata of the Mid-Cretaceous of the Northwest Territory,' namely, Cope ('Geology of the Judith River Basin,' 1876-7) and Cross ('Geology of the

Denver Basin'). In his Cretaceous Correlation papers (U. S. Geol. Surv., 1891) C. A. White clearly refers the Judith River Beds to the Upper Cretaceous (pp. 145, 147); furthermore, the references which he makes to the Mid-Cretaceous Belly River deposits do not include any allusion to the typical Judith River, and distinctly state (p. 166) that the equivalent of these Belly River is not recognized in Montana. I thought I had, therefore, abundant authority for the statement, 'among geologists of the United States there has never been any question as to the Laramie or Upper Cretaceous age of the typical Judith River Beds.' I had received from Mr. Hatcher, but unfortunately had quite overlooked, his paper in which the Mid-Cretaceous age of the Judith River was first suggested. Otherwise due acknowledgment would have been made. In the last edition of his 'Geology,' published in 1895, and after complete review of the literature, Dana refers to the Judith River Beds as Upper Cretaceous, equivalent to the Laramie. It would be difficult to find higher authorities than these, and it is impossible, in the preparation of a memoir, to trace back every single statement to its original source; we must accept some authority, otherwise every statement requires a prolonged piece of original investigation.

Mr. Hatcher has done decided service in calling attention to the fact that in the original description of the *typical locality* Meek and Hayden left the actual relation of the Judith River Beds undetermined. Naturally it is this typical locality to which we must turn. It is, therefore, in view also of Professor Williston's communication, of the utmost importance that the vertebrate horizons of the Cretaceous should be thoroughly restudied. All critical notices and observations on this important geological problem are most welcome.

The following communication of this nature has been received from Mr. Sternberg, under date of December 11:

"I have been reading in SCIENCE Mr. J. B. Hatcher's correction of your statement in regard to the Fort Pierre and Fox Hills Groups, underlying the 'true Judith River Beds,' and

asking where you get the authority to make such a statement. I suppose Mr. Hatcher has never visited Dog Creek near the mouth of the Judith River, or read Professor Cope's paper on the Judith River region, with a cut illustrating this valley of Dog Creek. I was with the Professor when he made the sketch from which the illustration was made. I also know that the great bed of black shale filled with beds of soft coal was called Fort Pierre by Professor Cope, and that I found several bones of Mosasaurs in it resembling *Platecarpus*, that the buff-colored sandstone on top was called Fox Hills by Professor Cope. On top of these formations were the Judith River Beds, in which we found great numbers of the cast-off teeth of Dinosaurs. I there found the new ray *Myledaphus bipartitus* Cope, and many fragmentary shells of *Trionyx*, etc. On top of all was a bed of oysters. We got no complete bones, I believe, here of Dinosaurs. The two new species I found of *Monoclonius* were near Cow Island, about fifty miles down the river. I write for information. Is not Mr. Hatcher wrong in his correction? We found no Mosasaur bones in the vicinity of Cow Island. Would not the finding of these animals at Dog Creek prove the Fort Pierre age? We have similar deposits on top of the Niobrara in western Kansas that contain many Mosasaurs."

HENRY F. OSBORN.

A NEW DIVISION OF THE UNITED STATES GEOLOGICAL SURVEY.

A NEW division, to be known as the Division of Hydrology, has recently been organized by the Hydrographic Branch of the United States Geological Survey. The work of the division will include the gathering and filing of well records of all kinds, the study of artesian and other problems relating to underground waters, and to the investigation of the stratigraphy of the water-bearing and associated rocks. In addition to the gathering of statistics relating to the flow, cost, etc., of the wells, it is hoped in the future to give especial attention to the geological features

which govern, or which are related in any way to, the supply of water.

The division will be subdivided into two sections, the eastern and the western, the first embracing the Gulf and Mississippi River states and the states to the east, and the second embracing the remaining ('reclamation') states and territories, or those having public lands. The charge of each section has been assigned to a geologist, the western section to Mr. N. H. Darton and the eastern section to Mr. M. L. Fuller. The office details are in charge of Mr. Fuller.

The sections will be still further subdivided, each state, or group of adjacent states, constituting a district, in which the work of collecting data and of the investigation of the problems relating to underground water will be in charge of a geologist employed for the purpose.

In the western section it is expected that the study of the geological structure will be followed by the sinking of wells by the survey, the aim being to test such of the arid or semi-arid regions as appear to present conditions favorable for artesian water, with a view to their ultimate development for agricultural purposes.

SCIENTIFIC NOTES AND NEWS.

DR. L. EMMETT HOLT, secretary of the board of directors of the Rockefeller Institute for Medical Research, has made a statement in regard to its plans. In addition to the \$200,000 given by Mr. J. D. Rockefeller in 1901 for current uses, he has now given \$1,000,000 for land and buildings, and it is understood that he is prepared to contribute such additional means as the needs of the institution demand. Dr. Simon Flexner, professor of pathology at the University of Pennsylvania has been elected director of the laboratory.

It is reported in the daily papers that Mr. Marshall Field has offered to erect a museum on the Lake Front Park, Chicago, which may cost as much as \$10,000,000.

A BILL has been introduced at Albany at the request of the State Commissioner of Lunacy, appropriating \$300,000 for the con-