APPENDIX.

ART. LIX.—*Notice of New Fossil Reptiles;* by Professor O. C. MARSH.

THE United States Survey of the Fortieth Parallel, in charge of Mr. Clarence King, has made known the fact that a well marked Permian horizon can be distinguished in the Rocky Mountain region; and deposits considered of this age are represented on the geological maps of that survey. This adds much interest to the vertebrate fauna known from near this horizon, and probably belonging to it, as hitherto no Permian vertebrates have been identified in this country, although not uncommon in Europe.

The Museum of Yale College contains an extensive series of Reptilian remains belonging to a peculiar lacustrine fauna, which includes also Amphibians and Fishes. These fossils are from several localities in the West, but mainly from New Mexico, and the geological horizon appears to be in the upper portion of the Permian. These Reptilian remains are in excellent preservation, and among them are several genera, having the more important characters of the *Rhynchocephala*, of which the genus *Hatteria*, of New Zealand, is the living type. The principal points of agreement are the separate premaxillaries; the immovable quadrate; and the biconcave vertebræ. Another character of much interest is the presence of certain hypaxial elements of the vertebræ, first observed by Von Meyer in the Triassic genus *Sphenosaurus*, and called by him intercentral bones, ("*Zwichenwirbelbein*"). These wedge-shaped bones are apparently the homologues of the cervical hypapophyses in the *Mosasauria*, and of the sub-caudal attachments in the *Odontornithes*, and a few recent birds. These intercentral ossifications apparently exist in all the Reptilia yet found in this new fauna, and hence serve to distinguish it. With this character is another of hardly less interest. The anterior rib-bearing vertebræ preserved have three separate articular facets for the ribs; one on the anterior part of the centrum for the head, and a double one above for the bifid tubercle. In the implantation of the teeth and their successional development, these Reptiles resemble the Mosasuria.

These characters, with others mentioned below, indicate two distinct families, which may be called *Nothodontidæ* and *Sphenacodontidæ*, from the typical genera here described.

Nothodon lentus, gen. et sp. nov.

This genus of Reptiles may readily be distinguished by the dentition. In each separate premaxillary there are two slender pointed teeth. In front of the maxillary there are one or two similar teeth, followed by a number with narrow transverse crowns, resembling in form the premolars of some carnivorous mammals. These crowns, when unworn, have a central cusp, and on each side a tubercle, somewhat like that on the premolars of the genus *Canis*. In the present species the first and last of the transverse teeth are smaller than the middle ones. The limbs were short, the long bones had their extremities covered with cartilage, but the carpals and tarsals were well ossified. The centra were very deeply concave, and the tail was long.

The following measurements are taken from the type specimen of this species:

Length of maxillary bone	65.mm
Space occupied by ten maxillary teeth	55.
Height of crown of second maxillary tooth	14.
Height of crown of third maxillary tooth	9.
Antero-posterior diameter	3.
Transverse diameter	8.
Antero-posterior diameter of eighth tooth	5.
Transverse diameter	15.

The present species was about five or six feet in length, and herbivorous in habit. It was apparently slow in movement, and probably more or less aquatic. The remains at present known are from New Mexico.

Sphenacodon ferox, gen. et sp. nov.

In the present genus the anterior teeth are somewhat like those of the reptile described above, but the posterior, or more characteristic ones, are totally different. The crowns are much compressed, and have very sharp cutting edges, without crenulations. In the present species the carnivorous teeth are crowded together, and the crowns placed slightly oblique, and twisted. The jaws were comparatively short and massive. The rami of the lower jaws were apparently united by cartilage only, and the symphysis was short. The vertebræ are deeply biconcave.

Measurements from the type of this species are as follows:

Length of dentary bone	150.mm
Space occupied by teeth	130.
Extent of four anterior caniniform teeth	25.
Extent of twenty compressed teeth	105.

Height above jaw of second lower tooth	15·mm
Depth of dentary bone at symphysis	26·
Height of crown of compressed tooth	8·
Transverse diameter	4·

This reptile was about six feet in length, and carnivorous in habit. Its remains are from the same locality in New Mexico that yielded those of *Nothodon*.

Ophiacodon mirus, gen. et sp. nov.

A third genus of Reptiles allied to the last described is indicated by various well preserved remains from the same locality. The teeth are all carnivorous in type, conical in form, and all are similar. Those in the anterior part of the jaws are recurved, and in general shape resemble those of Serpents. The rami of the lower jaws were united only by cartilage. The vertebræ are very deeply biconcave, and even perforate, and the intra-central bones large. In the present species the teeth are nearly smooth, and somewhat compressed.

The following measurements indicate the size of this reptile:

Extent of anterior sixteen teeth in dentary	75·mm
Extent of anterior five lower teeth	20·
Height of crown of fourth lower tooth	10·
Depth of lower jaw at symphysis	15·
Extent of seven anterior maxillary teeth	33·
Height of crown of first maxillary tooth	9·
Antero-posterior diameter of crown	3·

This species was about as large as those described above, and is from the same geological horizon in New Mexico.

Ophiacodon grandis, sp. nov.

A second larger species of apparently the same genus is represented by portions of the jaws, and teeth, and various parts of the skeleton. In this species the dentary bone is angular at its anterior extremity, and triangular in section. Its external surface is rugose, as in the Crocodiles. The crowns of the teeth are striate at the base, and the latter is furrowed vertically. The teeth are not so thickly set as in the smaller species, and the bases of the crowns are somewhat transverse.

Measurements.

Space occupied by ten anterior lower teeth	140·mm
Depth of lower jaw at symphysis	129·
Antero-posterior extent of symphysis	25·
Depth of dentary bone below seventh tooth	30·
Width of dentary at this point	20·

The present species was about ten feet in length, and the largest reptile yet found in this fauna. The remains are from New Mexico.

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