indebted to Prof. A. Lakes and Engineer H. C. Beckwith of the U. S. Navy, who found the first remains in Colorado near the locality of the gigantic *Atlantosaurus montanus*, and in essentially the same horizon.

Yale College, New Haven, Nov. 15th, 1877.

ART. LIII.—*Notice of New Dinosaurian Reptiles from the Jurassic formation;* by Professor O. C. MARSH.

THE gigantic Dinosaur, *Atlantosaurus montanus*, described by the writer in the July number of this Journal,* proves to belong to a lower horizon than at first supposed, and is really from the upper Jurassic. Additional remains of the type specimen, moreover, throw considerable light on the structure of this largest of land animals, and indicate that it is the representative of a distinct family, which may be called *Atlantosauridæ*.

In the type genus, *Atlantosaurus*, one of the most important characters is the pneumaticity of the vertebræ, as mentioned in the original description. Another noteworthy feature is the absence on the femur of a third trochanter. The shaft of the bone is somewhat thickened at the point where this process should be, but the trochanter is wanting. The size of the original specimen of *A. montanus* may be estimated from the femur, which was about seven feet in length. If the animal had the proportions of a Crocodile, it was at least eighty feet long.

Apatosaurus ajax, gen. et sp. nov.†

Another gigantic Dinosaur, allied to the above, and of scarcely less interest, is represented in the Yale Museum by a nearly complete skeleton in excellent preservation. It is from the Jurassic beds in the Eastern foot hills of the Rocky Mountains, but from a somewhat lower horizon than the type of *Atlantosaurus*.

The cervical vertebræ are strongly opisthocœlous, and are rendered comparatively light by large pneumatic cavities in the centra. The anterior dorsals have similar characters. The posterior lumbars have the articular faces very nearly flat, and transverse. The sacral vertebræ are more solid, and have their transverse processes nearer the middle of the centra than in *Atlantosaurus*. The anterior caudals are biconcave, and their

* Vol. xiv, p. 87, 1877. The name *Titanosaurus* was first given, but, being preoccupied, may be replaced by *Atlantosaurus*.

† The principal characters of this genus and its nearest allies were given by the writer in a paper before the National Academy of Science, at the meeting in New York, October 25th, 1877.

interior structure is cancellous. The chevron bones differ from those of most known Dinosaurs in having the superior articular ends of the rami not united, but separated from each other, as in the Mosasauria with free hæmapophyses.

Some of the dimensions of this skeleton are as follows:

Length of centrum of anterior dorsal vertebra	220·mm
Transverse diameter of anterior face	310·
Vertical diameter	200·
Amount of convexity	90·
Length of centrum of lumbar vertebra	240·
Transverse diameter of anterior face	410·
Vertical diameter	270·
Length of median sacral vertebra	250·
Expanse of its transverse processes	760·
Length of centrum of median caudal	190·
Length of posterior caudal	185·

This animal must have been between fifty and sixty feet in length, and more than thirty in height when erect.

Apatosaurus grandis, sp. nov.

Another huge Dinosaur, apparently of the same genus, but of smaller size, is represented in the Yale Museum by the more important parts of a skeleton, in remarkable preservation. In this specimen the cervical vertebræ have the walls of the centra very thin. The caudals preserved are elongated and slender, indicating a long tail. The femur is comparatively short, and without a third trochanter. The great trochanter is much lower than the head of the femur, and continuous with it. The metapodial bones indicate a foot of medium length.

The following measurements indicate the size of the reptile:

Length of femur	1050· mm.
Transverse diameter of proximal end	340·
Transverse diameter of distal end	290·
Length of posterior caudal vertebra	145·
Vertical diameter of anterior articular face	110·
Transverse diameter	115·

The known remains of this species are from the same geological horizon as those above described. They indicate an animal at least thirty feet in length.

Allosaurus fragilis, gen. et sp. nov.

This genus may be distinguished from any known Dinosaurs by the vertebræ, which are peculiarly modified to ensure lightness. Although apparently not pneumatic, they have the weight of the centra greatly reduced by deep excavations in the sides. Some of them have the centra hour-glass in form,

the middle part being so diminished as to greatly reduce the strength. The vertebræ preserved are biconcave, with shallow cavities. The feet bones referred to this species are very slender. A lumbar vertebra has its centrum 105 mm. in length, and 89 in least transverse diameter. An anterior caudal, 85 mm. long, has its centrum so much constricted that its least transverse diameter is 38 mm., while its anterior face is 90 mm. in transverse diameter.

The animal indicated by the remains preserved was from fifteen to twenty feet in length. All the known specimens are from the upper Jurassic of Colorado.

Nanosaurus rex, sp. nov.

A diminutive Dinosaur, about as large as a fox, is indicated by some remains in good preservation, the most characteristic of which is a nearly perfect femur. In this bone, the great trochanter is prominent, and the third trochanter especially so. There is a well developed fibular ridge, directed outward and backward. The cavity in this bone is unusually large, and the walls are smooth. This femur agrees so nearly with that of the type of *Nanosaurus*, that the present species may be provisionally referred to that genus.

The dimensions of this bone are as follows:

Length of femur	100·	mm
Distance from head to middle of third trochanter	30·	
Transverse diameter of distal end	21·	
Greatest antero-posterior diameter	18·	
Least transverse diameter of shaft	11·	
Diameter across third trochanter	15·	

The known remains of this reptile are from the upper Jurassic of Colorado.

The specimens described in the present articles are deposited in the Peabody Museum of Yale College. They are all from essentially the same geological horizon, which I find to be upper Jurassic. The deposits which contained them may be called the Atlantosaurus beds, from their most characteristic fossils, the huge Dinosaurs of that genus.

Yale College, New Haven, November, 1877.

NDEX TO VOLUME XIV.*

* The Index contains the general heads Botany, Geology, Mineralogy, Zoology, and under each the titles of Articles referring thereto are mentioned.