energy to get their usual amount of grass. Old Joe had even refused his grain for about half the time.

It should be remembered that our horses had but a small amount of the grass. The ranchmen told us that other travelers coming into the country had been obliged to camp for a week while their horses slept off the effect of a good feed of it, and while its effects usually lasted for a week or ten days, it did no more serious damage than to leave the animals thin from fasting. Stories were told of horses being lost in the mountains and found several days later in the bushes near camp fast asleep.

I have offered no real proof that this particular species of grass is what affected our horses. They undoubtedly ate a dozen other species of grass, as well as some other plants, every day while we were in the mountains. But after our experience I am inclined to give credit to the uniform statements of the ranchmen in regard to it. All agree on the species, on its effects, and to the fact that after one good dose of sleepy grass, horses will never touch it again. This latter statement has ample proof. Horses and cattle are ranging in many of the valleys where it grows in abundance, untouched and full of ripe seed, while the other grasses are cropped close all around it. I did not see horses or cattle touch it except in the case of our own animals and the team of another traveler from the valley, all of which ate it eagerly. They ate both the base leaves and the heads that were full of ripe seeds. I shelled out and ate a handful of the seeds, but without noticeable effect. The ranchmen generally agree that it is the leaves which produce the sleepiness.

I did not hear that cattle were affected by it, but they certainly avoid it, as many were grazing near where it stood untouched.

While this experience was new to me, I find that sleepy grass has long been known to botanists as such, or technically as *Stipa vaseyi*. Something has been known of its effects on horses, but apparently its chemical properties have not yet been determined.

VERNON BAILEY.

THE VERTEBRAL COLUMN OF BRONTOSAURUS.

ALTHOUGH the genus *Brontosaurus* Marsh has been known from the greater part of the skeleton for more than twenty years, many points of interest concerning its structure remain undetermined. The Field Columbian Museum Expedition of 1900 was fortunate in securing a large part of a skeleton of one of these great reptiles in such a state of preservation that the bones of the torso and base of the tail were scarcely disturbed from their relative positions. This splendid specimen, which is now almost ready for exhibition, makes it possible to determine the vertebral formula of the thoracic and anterior caudal regions, as well as many other minor features.

The specimen consists of eleven presacral vertebræ, five coalesced sacral, and twenty-three caudal vertebræ, with pelvis, ribs and chevrons almost intact. The eleventh presacral was exposed and partially broken away when found. From that point backward the thoracic, sacral and caudal vertebræ, as far as caudal XIII., were lying in a close series, with their centra nowhere displaced more than two or three inches. Most of the ribs and many of the chevrons were also found in position.

The specimen throughout agrees very closely, both in size and in character, with Marsh's type, *Brontosaurus excelsus*. However, it shows that with regard to the thoracic region his final restoration was considerably at fault. In fact his first figure* shows the thorax much more nearly correct. Counting the five coalesced vertebræ as sacral, the thoracic series in this specimen is made up of ten rib-bearing vertebræ. The eleventh, as before stated, has been partially lost, but enough remains to show that the transverse process is replaced by a cervical rib. A noticeable reduction in size of the rib facets on presacral X together with the much-reduced neural spines on presacral XI., bears out the conclusion that the latter is the posterior cervical. We may, therefore, conclude that the number of thoracic vertebræ in this genus is ten instead of fourteen as estimated by Marsh.

The crest of the dorsal arch was evidently

* *Am. Jour. Sci.*, Vol. XXVI., pt. I.

just in front of the sacrum, where the dorsal spines reach their greatest length. From this point they rapidly fall away in both the caudal and the thoracic series. In the fourth presacral the first evidence of bifurcation appears in a slight concavity on the posterior margin of the spine. In the eighth, bifurcation is complete, the median spine being replaced by two slender and laterally directed processes. In the eleventh presacral, or posterior cervical, these lateral spines are reduced to mere rudiments.

The anterior caudal series departs less widely from that represented in Marsh's restoration. Indeed, the gradual reduction of the series posteriorly offers no reliable basis of comparison. The first caudal may be readily recognized by the semi-concave, semi-convex anterior surface of the centrum. It is also but little excavated laterally. The four succeeding caudals are more or less excavated at the base of the transverse processes. In one or two instances these fossæ descend deeply into the centra, but as they are sometimes present on one side and absent on the other they can not be regarded as constant characters. However, as Marsh has estimated the first caudal having a solid centrum, as caudal IV., it is quite probable that three vertebræ, instead of one, were missing in his specimen from the anterior end of the series. On the other hand, Dr. Osborn has probably erred on the side of estimating the number of anterior caudals as too great, if indeed the specimen described by him * as *Camarasaurus* syn. *Brontosaurus* may be regarded as belonging to this genus at all.

The centra of the anterior caudals are markedly procœlous in form, but as they diminish in size and complexity this character disappears, so that in the region of the fifteenth they become irregularly amphiplatyan. The transverse processes are rapidly reduced in size, from broad flattened plates to peg-like processes, and disappear entirely with the twelfth.

As has been pointed out by Osborn and by Hatcher with regard to *Diplodocus,* the three types of chevrons (viz., the closed arch, the open arch and the double arch types) are all found in *Brontosaurus,* ranging in the order named from the anterior end of the series backward. The presence of a short, stout, closed chevron imbedded in the matrix below the first caudal suggests that the whole series may have been chevron-bearing. As the double arch pattern is also known to occur in *Morosaurus,* the three types may be regarded as characteristic of the Sauropoda.

A complete description of this splendid specimen will be given in an early issue of the museum publications.

E. S. Riggs.

Field Columbian Museum,
January 10, 1903.

* *Bull. Amer. Mus. Nat. Hist.,* Vol. X., p. 219.

AMERICAN MUSEUM OF NATURAL HISTORY.

At the annual meeting of the Board of Trustees of the American Museum of Natural History, New York, on Monday evening, February 9, announcement was made in the President's report of many notable accessions to the collections of the Museum during the year 1902. Among the most important accessions are the following:

The Cope collection of fossil reptiles, amphibians and fishes, and the Robinson collection of archeological copper inplements, the two collections being gifts of the President.

Many rare and superb specimens have been added to the J. Pierpont Morgan collections of gems and gem minerals, and the Museum is indebted to the same donor, Mr. Morgan, for a type collection of gold and silver coins of the United States Mint.

The Duke of Loubat has presented a collection of ancient jadeite ornaments from Mexico and a valuable ethnological collection from Brazil.

The material received through the expeditions, supported by the Museum and through special gifts, has yielded gratifying results. Among the noteworthy expeditions are:

The William C. Whitney expedition in search of fossil horses.

The researches carried on in Mexico through the contributions of B. T. Babbitt Hyde and Frederick E. Hyde, Jr.

The archeological research carried on in the