

be, in all probability, most closely associated in future. He thoroughly endorsed Faraday's rejection of the theory of electrical action at a distance, and sought, with him, to explain all electrical and magnetic phenomena as the results of local strains and motions in a medium whose contiguous parts only act on one another by pressure and tension. Though many of Maxwell's results are contained in his great Treatise on Electricity and Magnetism, the student will not willingly pass over his papers on Molecular Vortices, in vols. xxi and xxiii of the Philosophical Magazine, or his Dynamical Theory of the Electromagnetic Field, in the Proceedings of the Royal Society in 1864. Such luminous imagination together with originality of conception is shown in these speculations that the reader feels Professor Maxwell's genius no less in his own inability to follow them out to their conclusion than in his certainty that the guide we have lost could have knit them together into a magnificent induction if only the full term of life had been allotted to him.

This is the regret that the world of science at large feels. Those only whose privilege it was to study under Professor Maxwell's direction can rightly estimate that genial kindness and sympathy which, no less than his genuine enthusiasm, so inspirited them that they know not whether they labored more from love for their science or from regard for their master.—*Athenæum*, Nov. 15.

APPENDIX.

ART. LIX.—*Notice of New Jurassic Reptiles*; by Professor
O. C. MARSH. With Plate III.

NUMEROUS remains of Reptiles from the Jurassic deposits of the Rocky Mountains have recently been received at the Yale Museum, and some of the more interesting Dinosaurs are here briefly described. These pertain to several distinct groups, and throw considerable light on the forms already described from the same horizon.*

Camptonotus dispar, gen. et sp. nov.

The present genus is most nearly allied to *Laosaurus*, but differs in several points. The cervical vertebræ are all opisthocœlous, while those known in *Laosaurus* are nearly plane. The pubis, moreover, is broad and thin in front of the acetabulum, and directed well forward. It has a deep, well marked articular face for the support of the femur. The ischium is expanded at its distal end, and has an extensive surface for union with its fellow. The femur is longer than the tibia.

This genus agrees with *Laosaurus* in one important character, namely, the sacral vertebræ are not coössified. That this is not merely a character of immaturity is shown by some of the other vertebræ in the type specimen, which have their neural arches so completely united to the centra that the suture is nearly or quite obliterated. To this character of the sacral vertebræ, the name of the present genus refers. With *Laosaurus*, this genus forms a distinct family, which may be called *Laosauridae*.

The teeth in *Camptonotus* resemble those of *Laosaurus*, and are in a single row in close-set sockets. The rami of the lower jaws were united in front only by cartilage. There are nine cervical vertebræ, all of which bear short ribs, as in the Crocodiles. The dorsal vertebræ have their articular faces nearly plane. The sacral vertebræ in all the known specimens are separate, and their transverse processes are each supported by two centra. (Plate III, figure 3). The chevrons have their articular faces joined together.

The fore limb is much reduced in size. There are five digits in the manus, supported by nine carpal bones, three of which are united in one on the radial side. The number of phalanges, beginning with the first digit, was 2, 3, 3, 3, 2. The

* This Journal, vol. xvi, p. 411; and vol. xvii, pp. 85 and 181.

1879

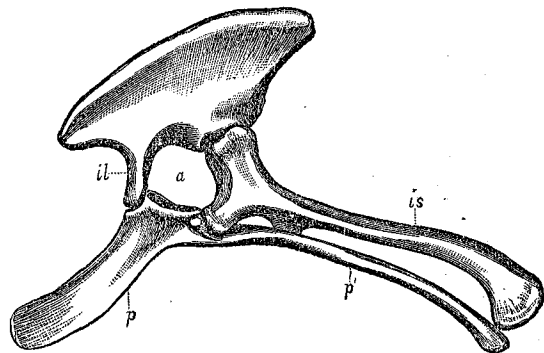
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form and proportions of the various elements of the fore limb are shown in Plate III, figure 1.

The pelvic arch is quite unlike any hitherto described. In its general form the ilium resembles that of *Morosaurus*, but the proportions are reversed. The massive portion in the present genus is not in front, but behind, as the ischium is larger than the pubis. The relative position and form of the elements of the pelvic arch are shown in the figure below.



Pelvic arch of *Camptonotus dispar*, Marsh; side view, one twelfth natural size.
a. acetabulum; il. ilium; is. ischium; p. pubis; p'. postpubis.

The femur has a long pendant third trochanter, and a prominent ridge to play between the tibia and fibula. The tibia is stout, and somewhat shorter than the femur. The fibula is slender, and shorter than the tibia. The astragalus and calcaneum are distinct. The second row of tarsals contains but two bones. The first digit in the pes was rudimentary, and did not reach the ground. The second, third and fourth were well developed. The fifth was entirely wanting. The number of phalanges, beginning with the first digit, was 2, 3, 4, 5. The structure of the hind limb and foot is well shown in Plate III, figure 2, which is taken from the same skeleton as figure 1.

Some of the principal measurements of the present species are as follows:

United length of the nine cervical vertebræ.....	565 ^{mm}
Length of axis.....	54
Transverse diameter of posterior articular face...	41
Length of ninth cervical vertebra.....	64
Transverse diameter of posterior articular face...	63
Length of humerus.....	337
Length of radius.....	245
Length of ulna.....	260
Length of femur.....	565
Length of tibia.....	555

The known remains of this species indicate an animal about eight or ten feet in height, and herbivorous in habit. All the specimens discovered are from the *Atlantosaurus* beds of the Upper Jurassic.

Camptonotus amplus, sp. nov.

A second species of this genus, about three times as large as the one just described, is represented by various remains, among which is a left hind foot nearly entire. There were three functional digits in this foot, the first being rudimentary, and the fifth entirely wanting. The metatarsal of the first digit is a splint, much curved, and with the apex above. The terminal phalanx of this digit is much compressed, not round as in the smaller species. The second metatarsal is of much greater length. The terminal phalanx of this digit is longer in proportion than that of the preceding species. The third and fourth digits were large and powerful. The main dimensions of this foot are as follows:

Length of second metatarsal.....	295 ^{mm}
Greatest diameter of proximal end.....	113
Length of third metatarsal.....	345
Greatest diameter of proximal end.....	150
Transverse diameter of distal end.....	102
Length of fourth metatarsal.....	305
Length of first phalanx of third digit.....	140
Length of first phalanx of second digit.....	120

The remains of the present species are from a lower horizon in the Jurassic than those described above, but within the limits of the *Atlantosaurus* beds.

Brontosaurus excelsus, gen. et sp. nov.

One of the largest reptiles yet discovered has been recently brought to light, and a portion of the remains are now in the Yale collection. This monster apparently belongs in the *Sauropoda*, but differs from any of the known genera in the sacrum, which is composed of five thoroughly coössified vertebræ. In some other respects it resembles *Morosaurus*. The ilium is of that type, and could hardly be distinguished from that of *M. robustus*, excepting by its larger size. One striking peculiarity of the sacrum in the present genus is its comparative lightness, owing to the extensive cavities in the vertebræ, the walls of which are very thin.

The lumbar vertebræ have their centra constricted, and also contain large cavities. The caudals are nearly or quite solid. The chevrons have their articular heads separate. The sacrum of this animal is, approximately, 50 inches (1.27^m) in length. The last sacral vertebra is 292^{mm} in length, and 330^{mm} in transverse diameter across the articular face.

A detailed description of these remains will be given in a subsequent communication. They are from the *Atlantosaurus* beds of Wyoming. The animal was probably seventy or eighty feet in length.

Stegosaurus unguatus, sp. nov.

Additional specimens of *Stegosaurus* have been recently secured from several localities, and much new information in regard to the group has thus been obtained. These reptiles belong to the Dinosauria, but differ widely from any of the known suborders. The most striking character, to which the name refers, is the huge dermal plates which protected the animal. A number of these, from two to three feet in diameter, and others of smaller size, were found with the remains of the present species.

The skull is very small, and more lacertilian than in the typical Dinosaurs. The brain cavity is remarkably small.

The vertebræ known are all solid, and have nearly plane or slightly concave articular extremities. The fore limbs are shorter than those behind. In the present species, the humerus is very short, and the ulna has a very large olecranon process. The terminal phalanges preserved are short, broad, and obtuse, as in some ungulate mammals. The femur is long, entirely without a third trochanter, and the ridge between the tibia and fibula is only faintly indicated. The tibia is of moderate length, and the astragalus is firmly coössified with it. The fibula is slender, and united firmly with the calcaneum and lower end of the tibia. The present species may prove to be generically distinct from the type species, *Stegosaurus armatus*,* described by the writer from a different locality.

In one specimen of the present species, some of the more important dimensions are as follows:—

Transverse diameter of occipital condyle	44·mm
Vertical diameter	25·
Transverse diameter of foramen magnum	31·
Greatest transverse diameter of brain cavity	33·
Length of third cervical vertebra	85·
Length of humerus	590·
Length of tibia with astragalus	750·
Length of terminal phalanx	85·
Greatest width	70·

Coelurus fragilis, gen. et sp. nov.

A very small reptile, apparently a Dinosaur, left its remains in the same locality with *Camptonotus dispar*. The most characteristic specimens obtained are vertebræ, which in the dorsal and lumbar region have their centra so much excavated that

* This Journal, vol. xiv, p. 513, Dec., 1877.

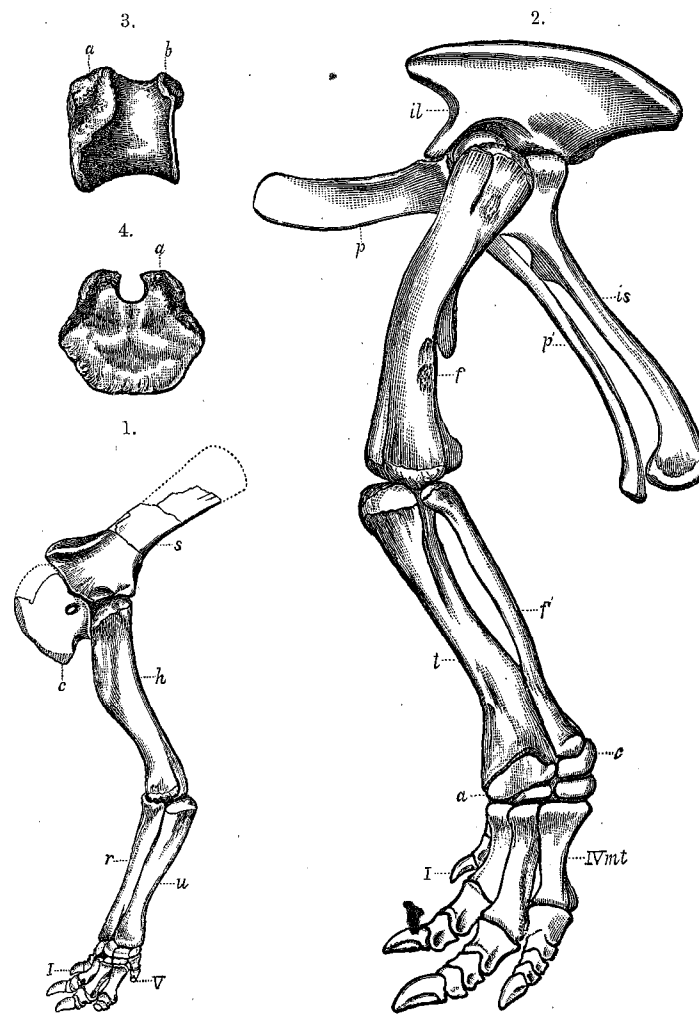


Figure 1.—Bones of left fore leg of *Camptonotus dispar*, Marsh; s. scapula; c. coracoid; h. humerus; r. radius; u. ulna; I. first digit; V. fifth digit.

Figure 2.—Bones of left hind leg of *Camptonotus dispar*; il. ilium; is. ischium; p. pubis; p'. post-pubis; f. femur; t. tibia; f'. fibula; a. astragalus; c. calcaneum; I. first metatarsal; IVmt. fourth metatarsal. Both figures one twelfth natural size.

Figure 3.—Sacral vertebra of same individual, seen from the left. a. anterior face for transverse process; b. posterior face.

Figure 4.—The same vertebra, front view. Both one sixth natural size.

the walls are reduced to a thin shell. There are apparently no partitions across their cavity, and the inner surface of the walls is quite smooth. The anterior caudal vertebræ, at least, have essentially the same character. The trunk vertebræ preserved are elongate, biconcave, with high neural arches, united to the centra by suture. The sides of the vertebræ are somewhat excavated, and the openings into the cavity are all small. The cup at each end of the centra is unusually smooth, and regular. The zygapophyses are near together, and stand nearly vertical.

The following measurements will indicate the size of this animal:

Length of centrum of lumbar vertebra	35 ^{mm}
Transverse diameter of anterior face of centrum	19
Vertical diameter	21
Least transverse diameter of centrum	10
Least thickness of walls of centrum	1
Length of anterior caudal	33
Transverse diameter of anterior face	17
Thickness of walls of centrum, near middle	1
Least transverse diameter of centrum	10

The known remains of this species indicate an animal about as large as a wolf, and probably carnivorous.

Yale College, New Haven, November 13, 1879.