Winwood (Capt. Tyler having recently died), and that the new members of Council be the Rev. R. A. Bullen, Rev. A. Fuller, Dr. W. Hind, and Mr. J. E. Marr, F.R.S. (The Report was adopted *nem. con.*)

Referring to the past publications issued by the Society, it appears that they give to the annual subscriber more than an average of 280 pages of quarto letterpress, accompanied by an average of 38 quarto plates, with 700 figures in the plates and text, and yield an *average* of 134 described species to each volume. This is far and away beyond what has yet been accomplished by any Continental Palæontographical Society for a subscription of one guinea annually.

If anyone desires to know how so much valuable scientific matter can be obtained for so small a sum, we will reveal to the anxious inquirer and would-be annual subscriber the secret.

(1) The Authors of monographs are not paid for their contributions.

(2) The Officers cheerfully give their services, so that the cost of management is reduced to a mere bagatelle.

(3) The Geological Society of London most generously gives to the Palæontographical Society room for their stock in its apartments at Burlington House *free of charge*, and also allows them to hold their meetings in its rooms.

(4) So that almost the entire cost of the volumes issued is confined to the drawing and printing of plates, to the setting up and correcting the letterpress, and the printing, paper, and binding of the annual volumes.

We sincerely trust that, with the new volume, will also come many new members, who will eagerly desire to obtain, not only the newly printed "annual" as it appears, but ask for and secure the back volumes, some of which may still be had (with a liberal allowance for taking a series) on application to the Honorary Secretary, the Rev. Prof. Wiltshire, M.A., F.G.S., 25, Granville Park, Lewisham, near London, S.E.

The accompanying Plate XIII, from a photograph taken at Mr. Frederick Edwards' house, Hampstead, about 1856, represents four of the original members of the Society, namely: Sir Joseph Prestwich, M.A., D.C.L., F.R.S., F.G.S.,; Prof. John Morris, F.G.S.; F. E. Edwards, Esq., F.G.S.; and Searles V. Wood, Esq., F.G.S.[1]

II.—Classification of Dinosaurs.[2]

By Professor O. C. Marsh, M.A., Ph.D., LL.D., F.G.S.;
of Yale College, New Haven, U.S.A.

In the present review of the Dinosaurs, I have confined myself mainly to the type specimens which I have described, but have included with them other important remains where these were

[1] Professor Morris, Mr. F. E. Edwards, and Mr. S. V. Wood also contributed monographs.

[2] From the American Journal of Science, vol. L, pp. 491–8.

https://doi.org/10.1017/S0016756800131826

available for investigation. The extensive collections in the museum of Yale University contain so many of the important type specimens now known from America, that they alone furnish an admirable basis for classification, and it was upon these mainly that I first established the present system, which has since been found to hold equally good for the Dinosaurs discovered elsewhere. In the further study of these reptiles, it was also necessary to examine both the European forms and those from other parts of the world, and I have now studied nearly every known specimen of importance. These investigations have enabled me to make this classification more complete, and to bring it down to the present time.

Many attempts have been made to classify the Dinosaurs, the first being that of Hermann von Meyer, in 1830. The name Dinosauria, proposed for the group by Owen, in 1839, has been generally accepted, although not without opposition. Hæckel, Cope, and Huxley followed, the last in 1869 proposing the name Ornithoscelida for the order, and giving an admirable synopsis of what was then known of these strange reptiles and their affinities. Since then, Hulke, Seeley, and Lydekker, Gaudry, Dollo, Baur, and many others, have added much to our knowledge of these interesting animals. The remarkable discoveries in North America, however, have changed the whole subject, and in place of fragmentary specimens, many entire skeletons of Dinosaurian reptiles have been brought to light, and thus definite information has replaced uncertainty, and rendered a comprehensive classification for the first time possible.

The system of classification I first proposed in 1881 has been very generally approved, but a few modifications have been suggested by others that will doubtless be adopted. This will hardly be the case with several radical changes recently advocated, based mainly upon certain theories of the origin of Dinosaurs. At present these theories are not supported by a sufficient number of facts to entitle them to the serious consideration of those who have made a careful study of these reptiles, especially the wonderful variety of forms recently made known from America.

Further discoveries may in time solve the problem of the origin of all the reptiles now called Dinosaurs, but the arguments hitherto advanced against their being a natural group are far from conclusive. The idea that the Dinosauria belong to two or more distinct groups, each of independent origin, can at present claim equal probability only with a similar suggestion recently made in regard to mammals. This subject of the origin of the Dinosaurs and the relation of their divisions to each other will be more fully treated by me elsewhere.

A classification of any series of extinct animals is of necessity, as I have previously said, merely a temporary convenience, like the bookshelves in a library, for the arrangement of present knowledge. In view of this fact and of the very limited information we now have in regard to so many Dinosaurs known only from fragmentary remains, it will suffice for the present, or until further evidence is forthcoming, to still consider the Dinosauria as a sub-class of the great group of Reptilia.

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Regarding, then, the Dinosaurs as a sub-class of the Reptilia, the forms best known at present may be classified as follows :—

Sub-class DINOSAURIA, Owen.

Premaxillary bones separate; upper and lower temporal arches; no teeth on palate; rami of lower jaw united in front by cartilage only. Neural arches of vertebræ joined to centra by suture; cervical and thoracic ribs double-headed; ribs without uncinate processes; sacral vertebræ united; caudal vertebræ numerous; chevrons articulated intervertebrally. Scapula elongate; no precoracoid; clavicles wanting. Ilium prolonged in front of the acetabulum; acetabulum formed in part by pubis; ischia meet distally on median line. Fore and hind limbs present, the latter ambulatory and larger than those in front. Head of femur at right angles to condyles; tibia with procnemial crest; fibula complete; first row of tarsals composed of astragalus and calcaneum only, which together form the upper portion of ankle joint; reduction in number of digits begins with the fifth.

Order THEROPODA (Beast foot). Carnivorous.

Skull with external narial openings lateral; large antorbital vacuity; brain case incompletely ossified; no pineal foramen; premaxillaries with teeth; no predentary bone; dentary without coronoid process; teeth with smooth compressed crowns and crenulated edges. Vertebræ more or less cavernous; posterior trunk vertebræ united by diplosphenal articulation. Each sacral rib supported by two vertebræ; diapophyses distinct from sacral ribs; sternum unossified. Pubes projecting downward and united distally; no postpubis. Fore limbs small; limb bones hollow; astragalus closely applied to tibia; feet digitigrade; digits with prehensile claws; locomotion mainly bipedal.

(1) Family *Megalosauridæ*. Lower jaws with teeth in front. Anterior vertebræ convexo-concave; remaining vertebræ biconcave; five sacral vertebræ. Abdominal ribs. Ilium expanded in front of acetabulum; pubes slender. Femur longer than tibia; astragalus with ascending process; five digits in manus and four in pes.

Genus *Megalosaurus* (*Poikilopleuron*). Jurassic and Cretaceous. Known forms European.

(2) Family *Dryptosauridæ*. Lower jaws with teeth in front. Cervical vertebræ opisthocœlian; remaining vertebræ biconcave; sacral vertebræ less than five. Ilium expanded in front of acetabulum; distal ends of pubes coössified and much expanded; an interpubic bone. Femur longer than tibia; astragalus with ascending process; fore limbs very small, with compressed prehensile claws.

Genera *Dryptosaurus* (*Lælaps*), *Allosaurus*, *Cœlosaurus*, *Creosaurus*. Jurassic and Cretaceous. All from North America.

(3) Family *Labrosauridæ*. Lower jaws edentulous in front. Cervical and dorsal vertebræ convexo-concave; centra cavernous

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or hollow. Pubes slender, with anterior margins united; an interpubic bone. Femur longer than tibia; astragalus with ascending process.

Genus *Labrosaurus*. Jurassic, North America.

(4) Family *Plateosauridæ* (*Zanclodontidæ*). Vertebræ biconcave; two sacral vertebræ. Ilium expanded behind acetabulum; pubes broad, elongate plates, with anterior margins united; no interpubic bone; ischia expanded at distal ends. Femur longer than tibia; astragalus without ascending process. Five digits in manus and pes.

Genera *Plateosaurus* (*Zanclodon*), ? *Teratosaurus*, *Dimodosaurus*. Triassic. Known forms European.

(5) Family *Anchisauridæ*. Skull light in structure, with recurved cutting teeth. Vertebræ biconcave. Bones hollow. Ilium expanded behind acetabulum; pubes rod-like and not coössified distally; no interpubic bone. Fore limbs well developed; femur longer than tibia; astragalus without ascending process; five digits in manus and four in pes. (Figure 1.)

FIG. 1.—ANCHISAURUS COLURUS, Marsh. $\frac{1}{24}$. Triassic, Connecticut.

Genera *Anchisaurus* (*Megadactylus*), *Ammosaurus*, ? *Arctosaurus*, *Bathygnathus*, and *Clepsysaurus*, in North America; and in Europe, *Palæosaurus*, *Thecodontosaurus*. All known forms Triassic.

Sub-order CŒLURIA (Hollow tail).

(6) Family *Cœluridæ*. Teeth much compressed. Vertebræ and bones of skeleton very hollow or pneumatic; neural canal much expanded; anterior cervical vertebræ convexo-concave; remaining vertebræ biconcave; cervical ribs coössified with vertebræ. An interpubic bone. Femur shorter than tibia; metatarsals very long and slender.

Genera *Cœlurus*, in North America; and *Aristosuchus*, in Europe Jurassic.

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Sub-order COMPSOGNATHA.

(7) Family *Compsognathidæ.* Skull elongate, with slender jaws and pointed teeth. Cervical vertebræ convexo-concave; remaining vertebræ biconcave. Ischia with long symphysis on median line. Bones very hollow. Femur shorter than tibia; astragalus with long ascending process; three functional digits in manus and pes.

Genus *Compsognathus.* Jurassic. Only known specimen European. (Figure 2.)

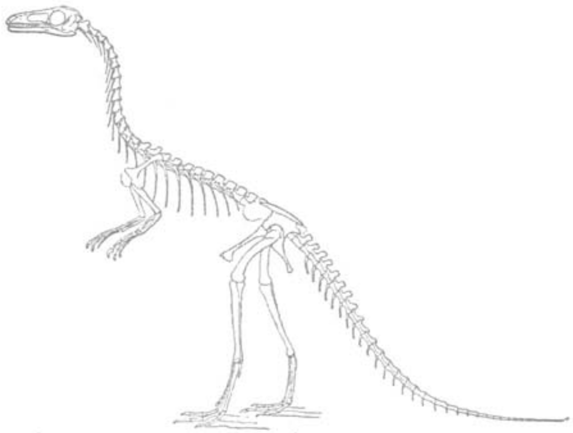

FIG. 2.—COMPSOGNATHUS LONGIPES, Wagner. $\frac{1}{8}$. Jurassic, Bavaria.

Sub-order CERATOSAURIA (Horned saurians).

(8) Family *Ceratosauridæ.* Horn on skull; teeth large and trenchant. Cervical vertebræ plano-concave; remaining vertebræ

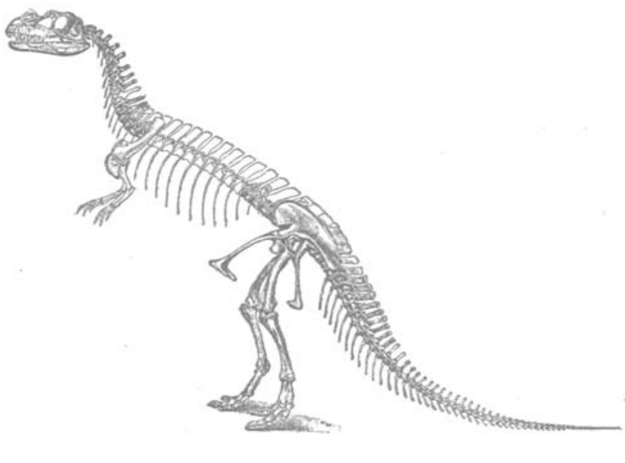

FIG. 3.—CERATOSAURUS NASICORNIS, Marsh. $\frac{1}{60}$. Jurassic, Colorado.

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biconcave. Pelvic bones coössified; ilium expanded in front of acetabulum; pubes slender; an interpubic bone; ischia slender, with distal ends coössified. Limb bones hollow; manus with four digits; femur longer than tibia; astragalus with ascending process; metatarsals coössified; three digits only in pes. Osseous dermal plates. (Figure 3.)

Genus *Ceratosaurus*. Jurassic, North America.

(9) Family *Ornithomimidæ*. Pelvic bones coössified with each other and with sacrum; ilium expanded in front of acetabulum. Limb bones very hollow; fore limbs very small; digits with very long, pointed claws; hind limbs of true avian type; femur longer than tibia; feet digitigrade and unguiculate.

Genus *Ornithomimus*. Cretaceous, North America.

Sub-order Hallopoda (Leaping foot).

(10) Family *Hallopidæ*. Vertebræ and limb bones hollow; vertebræ biconcave; two vertebræ in sacrum; acetabulum formed by ilium, pubis, and ischium; pubes rod-like, projecting downward, but not coössified distally; no postpubis; ischia with distal ends expanded, meeting below on median line. Fore limbs very small, with four digits in manus. Femur shorter than tibia; hind limbs very long, with three digits only in pes, and metatarsals greatly elongated; astragalus without ascending process; calcaneum much produced backward; feet digitigrade, unguiculate.

Genus *Hallopus*. Jurassic, North America.

Order Sauropoda (Lizard foot). Herbivorous.

External nares at apex of skull; premaxillary bones with teeth; teeth with rugose crowns more or less spoon-shaped; large antorbital openings; no pineal foramen; alisphenoid bones; brain case ossified; no columellæ; postoccipital bones; no predentary bone; dentary without coronoid process. Cervical ribs coössified with vertebræ; anterior vertebræ opisthocœlian, with neural spines bifid; posterior trunk vertebræ united by diplosphenal articulation; presacral vertebræ hollow; each sacral vertebra supports its own transverse process, or sacral rib; no diapophyses on sacral vertebræ; neural cavity much expanded in sacrum; first caudal vertebra procœlian. Sternal bones parial; sternal ribs ossified. Ilium expanded in front of acetabulum; pubes projecting in front, and united distally by cartilage; no postpubis. Limb bones solid; fore and hind limbs nearly equal; metacarpals longer than metatarsals; femur longer than tibia; astragalus not fitted to end of tibia; feet plantigrade, ungulate; five digits in manus and pes; second row of carpal and tarsal bones unossified; locomotion quadrupedal.

(1) Family *Atlantosauridæ*. A pituitary canal; large fossa for nasal gland. Distal end of scapula not expanded. Sacrum hollow; ischia directed downward, with expanded extremities meeting on median line. Anterior caudal vertebræ with lateral cavities; remaining caudals solid.

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Genera *Atlantosaurus*, *Apatosaurus*, *Barosaurus*, *Brontosaurus*. Include the largest known land animals. Jurassic, North America. (Figure 4.)

(2) Family *Diplodocidæ*. External nares superior; no depression for nasal gland; two antorbital openings; large pituitary fossa; dentition weak, and in front of jaws only; brain inclined backward; dentary bone narrow in front. Ischia with shaft not expanded distally, directed downward and backward, with sides meeting on median line. Sacrum hollow. Caudal vertebræ deeply excavated below; chevrons with both anterior and posterior branches.

Genus *Diplodocus*. Jurassic, North America.

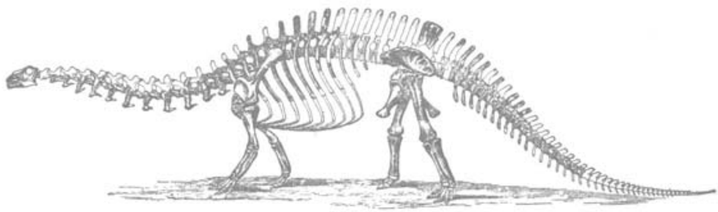

FIG. 4.—BRONTOSAURUS EXCELSUS, Marsh. $\frac{1}{180}$. Jurassic, Wyoming.

(3) Family *Morosauridæ*. External nares lateral; large fossa for nasal gland; small pituitary fossa; dentary bone massive in front. Shaft of scapula expanded at distal end. Sacral vertebræ nearly solid; ischia slender, with twisted shaft directed backward, and sides meeting on median line. Anterior caudals solid.

Genera *Morosaurus*, *? Camarasaurus* (*Amphicœlias*). Jurassic, North America.

(4) Family *Pleurocœlidæ*. Dentition weak; teeth resembling those of *Diplodocus*. Cervical vertebræ elongated; centrum hollow, with large lateral openings; sacral vertebræ solid, with lateral depressions in centra; caudal vertebræ solid; anterior caudals with flat articular faces, and transversely compressed neural spines; middle caudal vertebræ with neural arch on front half of centrum. Ischia with compressed distal ends, meeting on median line.

Genus *Pleurocœlus*. ? Jurassic, North America.

(5) Family *Titanosauridæ*. Fore limbs elongate; coracoid quadrilateral. Presacral vertebræ opisthocœlian; first caudal vertebra biconvex; remaining caudals procœlian; chevrons open above.

Genera *Titanosaurus* and *Argyrosaurus*. ? Cretaceous, India and Patagonia.

(6) Family *Cardiodontidæ*. Teeth of moderate size. Upper end of scapula expanded; humerus elongate; fore limbs nearly equalling hind limbs in length. Sacrum solid; ischia with wide distal ends meeting on median line. Caudal vertebræ biconcave.

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Genera *Cardiodon* (*Cetiosaurus*), *Bothriospondylus*, *Ornithopsis*, and *Pelorosaurus*. European, and probably all Jurassic.[1]

Order PREDENTATA. Herbivorous.

Narial opening lateral; no antorbital foramen; brain case ossified; supra-orbital bones; teeth with sculptured crowns; maxillary teeth with crowns grooved on outside; lower teeth with grooves on inside of crown; a predentary bone; dentary with coronoid process. *Cervical ribs articulating with vertebræ; each sacral rib supported by two vertebræ.* Ilium elongated in front of acetabulum; prepubic bones free in front; postpubic bones present; ischia slender, directed backward, with distal ends meeting side to side. Astragalus without ascending process.

Sub-order STEGOSAURIA (Plated lizard).

Skull without horns; no teeth in premaxillaries; teeth with distinct compressed crowns and serrated edges. Fore limbs small.

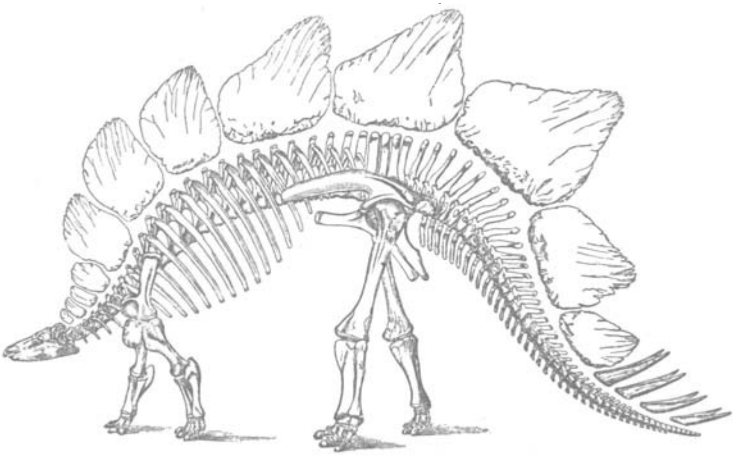

FIG. 5.—STEGOSAURUS UNGULATUS, Marsh. $\frac{1}{60}$. Jurassic, Wyoming.

Vertebræ and limb bones solid. Pubes projecting free in front; postpubis present. Femur longer than tibia; feet plantigrade, ungulate; five digits in manus and four in pes; second row of carpals and tarsals unossified; locomotion mainly quadrupedal. Osseous dermal armour.

(1) Family *Stegosauridæ*. Vertebræ biconcave. Neural canal in sacrum expanded into large chamber; ischia directed backward, with sides meeting on median line. Dorsal ribs T-shaped in cross section. Astragalus coössified with tibia; metapodials very short; five digits in manus; three functional digits in pes. Back surmounted by a crest of vertical plates; tail armed with one or more pairs of large spines. (Figure 5.)

[1] The Wealden is here regarded as Upper Jurassic, and not Cretaceous. See O. C. Marsh, GEOL. MAG., Decade IV, Vol. III, 1896, p. 8; and A. S. Woodward, pp. 69–71, "On the Affinities of the Wealden Fauna and Flora."

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Genera *Stegosaurus* (*Hypsirhophus*), *Diracodon*, *? Dystrophæus*, *Palæoscincus*, *Priconodon*, all from North America; and in Europe, *Omosaurus*, Owen. Jurassic and Cretaceous.

(2) Family *Scelidosauridæ*. Neural canal narrow; diapophysis of dorsal vertebræ supporting head and tubercle of ribs. Astragalus not coössified with tibia; metatarsals elongated; three functional digits in pes.

Genera *Scelidosaurus*, *Acanthopholis*, *Hylæosaurus*, *Polacanthus*. Jurassic and Cretaceous. Known forms all European. (Figure 6.)

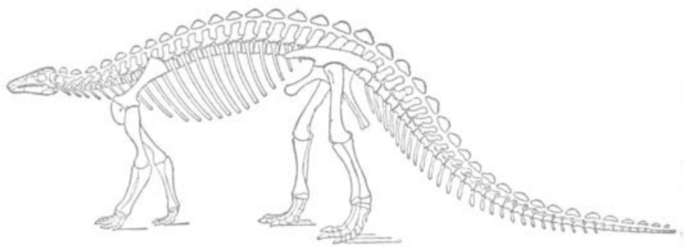

Fig. 6.—Scelidosaurus Harrisoni, Owen. $\frac{1}{36}$. Jurassic, England.

(3) Family *Nodosauridæ*. Heavy dermal armour. Bones solid. Fore limbs large; feet ungulate.

Genus *Nodosaurus*. Cretaceous, North America.

Sub-order Ceratopsia (Horned face).

Premaxillaries edentulous; teeth with two distinct roots; skull surmounted by massive horn-cores; a rostral bone, forming a sharp, cutting beak; expanded parietal crest, with marginal armature; ? a pineal foramen. Vertebræ and limb bones solid; fore limbs large; femur longer than tibia; feet ungulate; locomotion quadrupedal. Dermal armour.

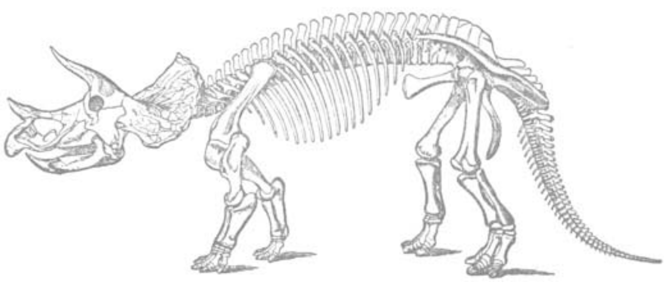

Fig. 7.—Triceratops prorsus, Marsh. $\frac{1}{80}$. Cretaceous, Wyoming.

(4) Family *Ceratopsidæ*. Anterior cervical vertebræ coössified with each other; posterior dorsal vertebræ supporting on the diapophysis both the head and tubercle of the rib; lumbar vertebræ

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wanting; sacral vertebræ with both diapophyses and ribs. Pubes *projecting in front, with distal end expanded; postpubic bone rudimentary or wanting.*

Genera *Ceratops, Agathaumas, Monoclonius, Polyonax, Sterrholophus, Torosaurus, Triceratops,* in North America; and in Europe, *Struthiosaurus* (*Cratæomus*). All are Cretaceous. (Figure 7.)

Sub-order ORNITHOPODA (Bird foot).

Skull without horns; premaxillaries edentulous in front. Vertebræ solid. Pubes projecting free in front; postpubis present. Fore limbs small; astragalus closely fitting to end of tibia; feet digitigrade; three to five functional digits in manus and three to four in pes; locomotion mainly bipedal. No dermal armour.

(5) Family *Camptosauridæ* (*Camptonotidæ*). Premaxillaries edentulous; teeth in single row; a supra-orbital fossa. Anterior

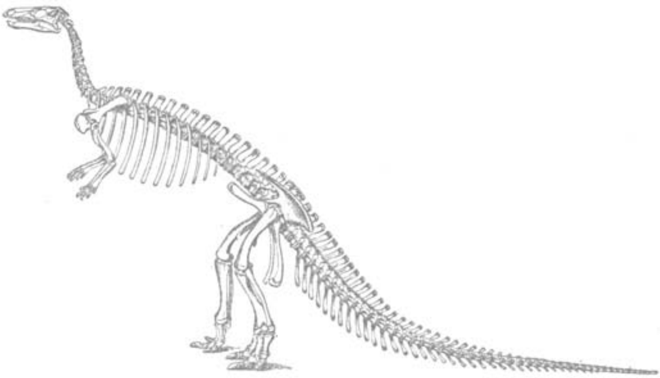

FIG. 8.—CAMPTOSAURUS DISPAR, Marsh. $\frac{1}{60}$. Jurassic, Wyoming.

vertebræ opisthocœlian; sacral vertebræ with peg and notch articulation. Limb bones hollow; fore limbs small; five digits in manus. Postpubis reaching to the distal end of ischium. Femur longer than tibia, and with pendent fourth trochanter; hind feet with four digits. (Figure 8.)

Genus *Camptosaurus* (*Camptonotus*). Jurassic, North America.

(6) Family *Laosauridæ*. Premaxillaries edentulous; teeth in single row. Anterior vertebræ with plane articular faces; sacral vertebræ coössified. Sternum unossified. Postpubis reaching to distal end of ischium. Limb and foot bones hollow; fore limbs very small; five digits in manus; femur shorter than tibia; metatarsals elongate; four digits in pes.

Genera *Laosaurus* and *Dryosaurus*. Jurassic, North America. (Figure 9.)

(7) Family *Hypsilophodontidæ*. Premaxillaries with teeth; teeth in single row; sclerotic bony plates. Anterior vertebræ opistho-

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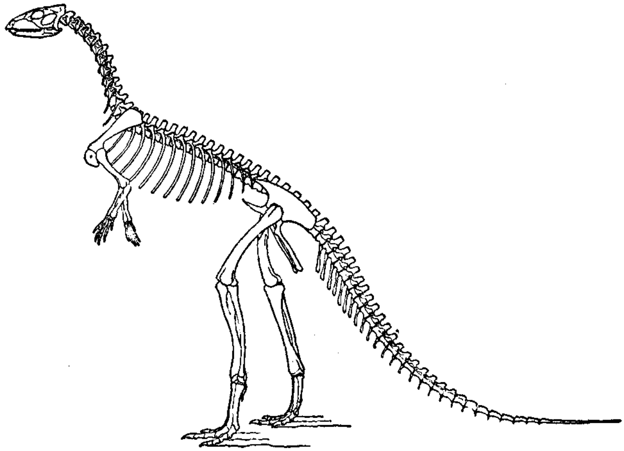

FIG. 9.—LAOSAURUS CONSORS, Marsh. $\frac{1}{20}$. Jurassic, Wyoming.

cœlian; sacral vertebræ coössified. Sternum ossified. Postpubis extending to end of ischium. Limb bones hollow; five digits in manus; femur shorter than tibia; hind feet with four digits.

Genus *Hypsilophodon*. Wealden, England. (Figure 10.)

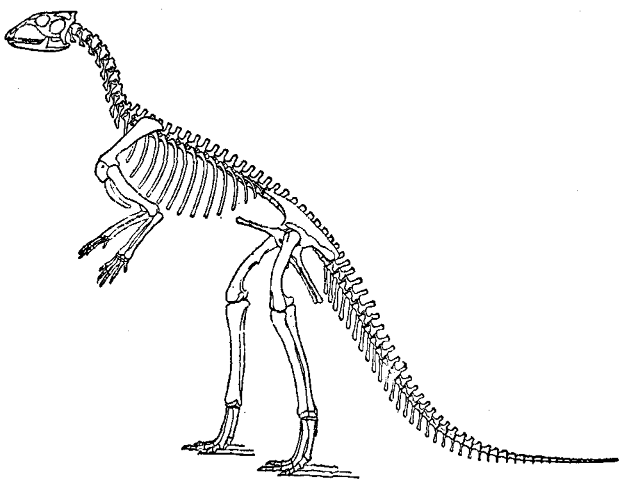

FIG. 10.—HYPSILOPHODON FOXII, Huxley. $\frac{1}{16}$. Cretaceous, England.

(8) Family *Iguanodontidæ*. Premaxillaries edentulous; teeth in single row. Anterior vertebræ opisthocœlian. Manus with five

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digits; pollex spine-like. Sternal bones ossified. Postpubis incomplete. Femur longer than tibia. (Figure 11.)

Genera *Iguanodon, Vectisaurus*. Jurassic and Cretaceous. Known forms all European.

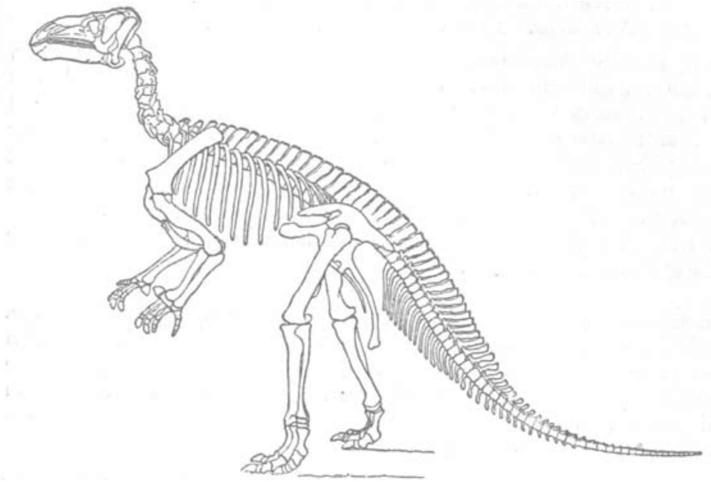

FIG. 11.—IGUANODON BERNISSARTENSIS, Boulenger. $\frac{1}{80}$. Cretaceous, Belgium.

(9) Family *Trachodontidæ* (*Hadrosauridæ*). Premaxillaries edentulous; teeth in several rows, forming with use a tessellated grinding surface. Cervical vertebræ opisthocœlian. Limb bones hollow; fore limbs small; femur longer than tibia.

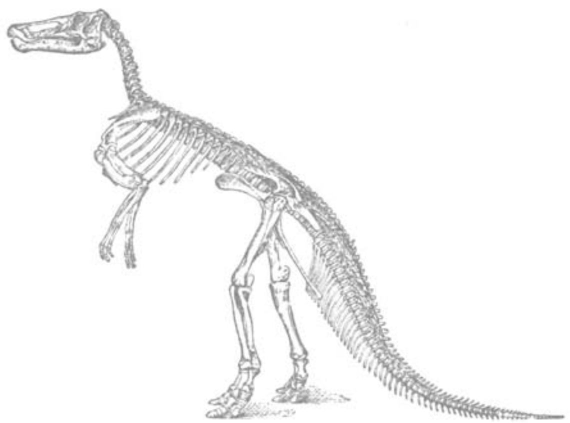

FIG. 12.—CLAOSAURUS ANNECTENS, Marsh. $\frac{1}{80}$. Cretaceous, Wyoming.

Genera *Trachodon* (*Hadrosaurus, Diclonius*), *Cionodon*. Cretaceous, North America.

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(10) Family *Claosauridæ*. Premaxillaries edentulous; teeth in several rows, but a single row only in use. Cervical vertebræ opisthocœlian. Limb bones solid; fore limbs small. Sternal bones parial. Postpubis incomplete. Femur longer than tibia; feet ungulate; three functional digits in manus and pes. (Figure 12.)
Genus *Claosaurus*. Cretaceous, North America.

(11) Family *Nanosauridæ*. Teeth compressed and pointed, and in a single, uniform row. Cervical and dorsal vertebræ short and biconcave; sacral vertebræ three. Ilium with very short pointed front, and narrow posterior end. Limb bones and others very hollow; fore limbs of moderate size; humerus with strong radial crest; femur curved, and shorter than tibia; fibula pointed below; metatarsals very long and slender. Anterior caudals short.
Genus *Nanosaurus*. Jurassic, North America. Includes the smallest known Dinosaurs.

In these restorations of Dinosaurian Reptiles the scientific name, the size, geological formation, and country where found, are given under each of the twelve figures. The skeletons here restored are represented in the same general position, to aid in comparing them with each other.

III.—On a Pebbly Quartz-Schist from the Val d'Anniviers (Pennine Alps).

By Prof. T. G. Bonney, D.Sc., LL.D., F.R.S.

In 1893 I described in this Magazine[1] a group of quartz-schists which may be traced for many miles along the Alps—a group belonging to the series which appear to be the newest among the crystalline schists of that chain. I may refer to this paper for a description of their mode of occurrence, distribution, and structure, both macroscopic and microscopic, merely stating that, while considering them to have had a clastic origin—in other words, to be metamorphosed sandstones—I pointed out that they presented some material differences from ordinary quartzites, and that "original fragments [could not] be distinguished with certainty in any of them," though "here and there a clastic structure," of which I gave instances, "may be suspected."

In 1894 my friend Mr. J. Eccles, F.G.S., informed me, on his return from the Alps, that he had discovered pebbles in this quartz-schist in the Val d'Anniviers (Einfisch-thal),[2] showing me specimens of the rocks. I examined one of these under the microscope, and the results fully confirmed his determination in the field. This pebbly schist, he said, occurred on the western flank of the range between the Val d'Anniviers and the Turtman-thal, in an upland glen of the Tounot, about one-third of a mile ESE. of the

[1] Geol. Mag., Dec. III, Vol. X, pp. 204–210.
[2] It is the second valley to the west of the Vispthal, opening into the Rhône Valley opposite to Sierre.

https://doi.org/10.1017/S0016756800131826