XI. *Memoir on a Portion of the Lower Jaw of the Iguanodon, and on the Remains of the Hylæosaurus and other Saurians, discovered in the Strata of Tilgate Forest, in Sussex.*

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When in the year 1825 I had the honour to lay before the Royal Society a notice on the teeth of an herbivorous reptile found in the limestone of Tilgate Forest, in Sussex, I entertained the hope and expectation that the discovery of the jaws, or a portion of the jaw with the teeth attached, would reward my labours, and enable me either to confirm or modify the inferences I had ventured to deduce from an examination of the teeth alone. And I was encouraged in this anticipation by the remarks of Baron Cuvier, who, in the correspondence upon this subject with which he honoured me, thus expressed himself:—"N'aurions-nous pas ici les dents d'un animal nouveau, d'un reptile herbivore? Le temps confirmera ou infirmera cette idée, puisqu'il est impossible qu'on ne trouve pas un jour une partie du squelette, réunie à des portions de mâchoire portant des dents." But after unremitting research, and the collection of several hundred teeth, and bones of various parts of the skeletons of many individuals, even including the *tympanic* bone with the auditory cells, I found myself, at the expiration of twelve years, without any additional information respecting the maxillary organs of this colossal reptile, no trace of the jaws having come under my observation.

I have, however, at length had the good fortune to discover what appears to be a portion of the lower jaw of a young Iguanodon, in which the fangs of many teeth, and the position of the germs of several of the successional teeth are preserved.

I therefore transmit to the Royal Society a description of this interesting relic; and as the Saurian remains collected by me from the Wealden strata of the South-east of England are now admirably arranged in the Gallery of Natural History of the British Museum, a notice of some of the most remarkable specimens is subjoined, in the hope of preserving a record of a few important particulars respecting their osteological characters and relations.

Portion of the Lower Jaw of the Iguanodon. Plate V. figs. 1. 2. 5. 6. 8. and 9. *Natural size.*

This fossil was imbedded in sandstone, and its characters were so much concealed by the surrounding matrix, that it almost escaped my observation in the last visit which I paid in 1837 to a quarry near Cuckfield, that had often proved a rich mine of fossil treasures. The sandstone adhered very firmly to the bone, but I succeeded in completely developing the specimen, which is now deposited in the British Museum with the other bones of the Iguanodon. The annexed drawings (Plate V.) represent the fossil of the natural size. It is a portion of the right side of the lower jaw, three inches in length, and $1\frac{6}{10}$ths of an inch in width at the proximal extremity. It bears the fangs of fifteen teeth, and the impressions of three others, with indications of the position of four successional teeth. None of the crowns of the teeth remain, and this must have been the case when the jaw became imbedded in the sand, for there were no traces of any portions of teeth in the surrounding stone. The absence of these essential characters renders it necessary to enter upon some anatomical details to prove the correctness of the conclusion which I propose to establish. To assist the comparison, representations are annexed (Plate V. figs. 3. 4. 7.) of the right ramus of the lower jaw of an Iguana, belonging to an individual three feet and a half in length.

It is well known that the lower jaw in the Mammalia, even in a fœtal state, is composed of but one bone on each side; but in the Lizards, Turtles, Crocodiles, and most reptiles, it is formed of six. These bones, as seen in the Iguana (Plate V. figs. 3. 7.) consist of the *dentary* (*a*) which supports the teeth; the *opercular* (*b*); the *complementary* (*c*); the *surangular* or *coronoid* (*d*); the *angular* (*e*); and the *articular* (*f*). The modifications of form and arrangement of these bones in the Iguana and other true Lizards, differ very materially from those observable in the Crocodile; particularly in the circumstance that the dentary bone does not carry the teeth in distinct alveoli or sockets, but forms a parapet or wall, composed of a strong simple plate of bone, to the inner surface of which the teeth adhere without any osseous partitions between them. In the Iguanas, the inner border of the dentary bone is therefore but little developed, and the teeth are not protected mesially by a process of bone, but are only covered by the gum, as is shown in Plate V. fig. 3. The *opercular* bone in the Iguana is small, and of a rhomboidal form, and does not extend to more than one-third the length of the dentary (see fig. 3. *b*). A large foramen, for the entrance of the blood-vessels and nerves, is situated on the mesial plane of the jaw, behind the coronoid process, and between the complementary, the surangular, and the articular bones (see fig. 3*.). On the external surface of the dentary there are three or four perforations for the passage of nerves (fig. 7. *a*); and on the mesial surface of the jaw there are two similar foramina in the opercular bone (fig. 3. *b*). Such are the maxillary elements of the Iguana; but before applying these data to the examination of the fossil, it will be necessary to offer some remarks on the development of the teeth in the recent Lizard. The pointed, compressed, lanceolate form of the crown of the tooth of the Iguana, its deeply serrated margins, and the shape of the fang, are so well expressed in figs. 3 and 7, and in the magnified view, fig. 4, as to render any description unnecessary. There are fifty-four teeth in the lower jaw, and the same number in the upper; twenty-seven teeth occupy a length of $1\frac{2}{10}$ths of an inch. The teeth are arranged in a linear series, having a slight inclination towards the anterior part of the jaw, and they diminish in size as they approach the symphysis. The germs of the new or successional dental organs are situated at the base of the fangs of the old teeth, as shown in fig. 4. *h*.

On examining the inner or mesial surface of the fossil (Plate V. fig. 1.), it will be found to present the essential elements of the corresponding portion of the jaw of the Iguana. It consists of the proximal termination of the *dentary* bone (*a a*), and of the distal portion of the *opercular* (*b b*), which, as above remarked, is of a rhomboidal form in the Iguana, and extends but a short distance over the dentary. The *opercular* has two vascular perforations (fig. 1. *k k*), as in the corresponding bone of the Iguana. A large canal for the passage of the inferior maxillary vessels and nerves is seen at the fractured proximal extremity (figs. 1 and 2. *i i*); but, anteriorly, the bone is solid (fig. 9.).

The *dentary* bone forms a strong parapet (figs. 1. 2. 5. 6. *g g g*), to the mesial surface of which the shanks or fangs of the teeth are anchylosed, in the same manner as in the recent Iguana; and the position of the germs of the successional teeth at the base of the old ones, is shown in four instances (see figs. 1. 5. and *h. h*).

There appear to be indications of a thin, inner, alveolar process (figs. 1. and 5. *o o*), but its nature cannot be accurately determined; and from a careful examination of the specimen, I am led to conclude that the fangs of the teeth had no osseous protection on their mesial aspect, but were only covered by the integuments of the gum, as in the Iguana.

This comparison appears to me to furnish conclusive proof that the fossil is a portion of the lower jaw of a reptile of the Lacertian family, allied to the Iguana. That it is reptilian, its complicated structure affords decisive evidence; the absence of alveoli, and the anchylosis of the teeth to the mesial surface of the dental parapet, are characters peculiar to the Lizards; while the relative situation, form, and size of the opercular bone, are alike confirmatory of its analogy to the Iguana; with which, above all, its mode of dentition corresponds, as is evinced by the position of the successional teeth.

But although this fragment possesses characters which supply a clue to the general relations of the original animal, it does not present the elements necessary for a restoration of the lower jaw. The peculiar form of the teeth, as shown in my previous memoir*, indicates in the Iguanodon a very different masticatory apparatus from that possessed by any living reptile, and the jaws must necessarily have presented a corresponding osteological modification. None of the existing reptiles perform mastication; their food or prey is taken by the teeth or tongue, so that a moveable covering to the jaws, similar to the lips or cheeks of Mammalia, is not required either for confining substances subjected to the action of teeth as organs of mastication, or for

* Philosophical Transactions, 1825, p. 186.

the purpose of seizing food. The herbivorous reptiles gnaw off the vegetable productions on which they feed, but do not chew them. This character is so constant, that the discrepancy presented by the teeth of the Iguanodon, led even Baron CUVIER at first to suppose that they belonged to a Mammifer. "Ce qui leur donne un caractère unique, c'est d'user leurs points transversalement comme les quadrupèdes herbivores, et tellement que la première qui me fut présentée s'étant trouvée dans cet état de détrition je ne doutai nullement qu'elle ne vint d'un Mammifère ; il me sembloit même qu'elle ressembloit beaucoup à une mâchelière de rhinocéros. Ce n'est que depuis que M. MANTELL m'en a envoyé une série d'entières et de plus ou moins usées que je me suis entièrement convainçu de mon erreur*." In the Iguana, the teeth that have been much used present a chipped or fractured appearance, as if the points had been broken or splintered off; in the Iguanodon, on the contrary (as seen in Plate VI. figs. 1. 5. 6.), the most perfect teeth have a ground and even surface at the summit of the crown; for it is not correct (as some have surmised), that in any stage they acted as pincers or wire-nippers, nor do any of the specimens possess "cutting edges with points of enlargement and contraction." The enamel is traversed by numerous undulated transverse lines, but these have been produced by the mode of growth; and the worn margin of enamel that borders the crown of the tooth invariably exhibits a smooth entire edge. The Iguanodon, therefore, must have been furnished with powerful maxillary muscles, to enable it to effect the trituration of the hard and tough vegetable substances, which, from the worn condition of the teeth, we are warranted in assuming to have been its food; and the articular, surangular, and complementary bones of the lower jaw, must have been developed accordingly, to have given attachment and support to the muscular apparatus by which mastication was effected. The external surface of the small portion of the dentary bone in the specimen (see Plate V. fig. 8.), appears to indicate the attachment of powerful muscles; it is very different from the smooth corresponding part in the Iguana. The discovery of the entire jaw, or of some part of its articular extremity, will therefore be fraught with great interest.

The number of teeth in the fossil, in a space equal in length to the width of the jaw at the operculo-dental suture, is *eight*; in the Iguana the corresponding space would be occupied by *six* teeth. The same admeasurement in the Iguana is equal to one-fourteenth of the length of the jaw; and if in the fossil animal the same relative proportions were maintained in other parts of the skeleton, the length of the jaw would be ten inches and a half, and of the entire reptile about fourteen feet, which is scarcely equal to one-seventh of the magnitude which some individuals must have attained. Of course these calculations can only be considered as approximative†.

* CUVIER, Oss. Foss., tom. v. p. 351.

† Some years since I discovered in the same quarry a fragment of bone, seven inches long, which appears to be a portion of the alveolar plate of the lower jaw of a gigantic Iguanodon, but it is too imperfect to admit of accurate determination. It is placed in the British Museum with the specimen above described.

Teeth of the Iguanodon.—Since my former memoir on the teeth of the Iguanodon, I have collected upwards of 250 specimens, of which 120 are deposited in the British Museum. They present every variety of condition, from that of a perfect tooth, with the fang extending to a point (as in Plate VII. figs. 1, 2.), to a mere stump, having the crown worn flat by use, and the fang absorbed by the pressure of the successional tooth. The largest tooth is $1\frac{2}{10}$ths of an inch in width at the crown; the smallest is a mere point (Plate VI. figs. 7, 8.), and appears to have been a germ from the base of the fang of an old tooth. In almost every instance the apex of the crown is more or less worn. The specimen which presents the peculiar characters of the teeth in the greatest perfection, is that figured in Plate VI. figs. 1, 2, 3*. The prismatic form of the crown, the serrated lateral margins, and the prominent longitudinal ridges are beautifully preserved. With a powerful lens, even the distribution and ramification of the vessels of the pulp, with the calcigerous tubes, forming a reticulated structure, as in the teeth of certain fishes, and, therefore, differing essentially in this respect from the teeth of the Iguana, may be distinctly seen through the delicate coat of enamel, presenting that peculiar arrangement which Professor Owen first pointed out to me as existing in the tooth of the Iguanodon, and which may be detected in polished sections by the aid of the microscope. On comparing the fang of this tooth, and of that figured, Plate VII. figs. 1, 2, with those of the Iguana (see magnified view, Plate V. fig. 4.), it will be seen that in the fossils the shank gradually tapers from the neck down to its inferior extremity; while in the Iguana it is of a cylindrical form, and enlarges at the base in which the germ of the successional tooth (Plate V. fig. 4. *h*) is lodged. The worn state of the crown of the tooth, even in very young individuals, is well shown in the specimen, Plate VI. figs. 5, 6, in which the absorption of the fang has proceeded with equal rapidity, scarcely any portion of it having remained (Plate VI. figs. 5, 6. *b b*). This condition of the tooth is so frequent, as to render it probable that in the Iguanodon the successional teeth advanced almost to the base of the crown before the attachment of the old teeth to the alveolar parapet was destroyed; in the Iguana, on the contrary, the displaced tooth generally preserves some portion of the shank. In a few examples the crown is rounded, as in Plate VI. fig. 4; a form which may probably be attributable to an oblique position of the tooth in relation to its antagonist in the opposite jaw. But these modifications of form and structure, I leave to be fully elucidated by the accomplished palæontologist (Mr. Owen), whose labours in Odontography are so deservedly appreciated. To convey an idea of the position of the teeth, and the proportionate magnitude of the jaw, a figure of two large teeth of the Iguanodon, in place, is annexed (Plate VII. figs. 6, 7.). The teeth are represented with great fidelity, and are characteristic of the state in which the largest and most perfect examples occur in the limestone of Tilgate Forest. A specimen with the apex unworn is figured in the same Plate, fig. 3.

* This specimen has already been figured in several works, but the published figures are incorrect; the annexed drawings have been executed with scrupulous accuracy.

Tympanic bone.—Of this bone, which in the Iguana and other reptiles is largely developed, and forms the articulation between the skull and the lower jaw, several examples are preserved. One specimen is seven inches in length, exceeding by fourteen times in linear dimensions the corresponding bone of the Iguana; and there are fragments indicating much larger proportions. These bones are figured and described in the 'Geology of the South-East of England*.' The body of the bone constituted a strong vertical pillar, having two unequal lateral processes; its walls are extremely thin, and the auditory cells, with which it is traversed, are very large.

Hyoid apparatus.—A bone resembling a lateral appendage of an os hyoides of the lacertian type, was discovered in a block of stone, associated with bones of the Iguanodon; but it was broken to pieces in the attempt to extricate it from the rock, and its characters could not be determined.

Horn of the Iguanodon (Plate IX. fig. 2.).—Before proceeding to the consideration of the bones of the trunk and extremities, I would call attention to the remarkable osseous appendage which I discovered many years since in a quarry near Cuckfield, imbedded in a mass of stone containing bones of the Iguanodon†. This horn, or nasal tubercle, so closely resembles in form and structure the processes on the front of the *Iguana cornuta* (Plate IX. fig. 3.), that there can be no doubt it occupied a similar position on the skull of some one of the colossal reptiles of the Wealden, most probably of the Iguanodon.

Vertebral column.—About fifty plano-concave vertebræ in the collection in the British Museum may probably be referred to the Iguanodon, so far as separate vertebræ can be identified by comparing them with those in the Maidstone specimen, or with vertebræ which have been found associated with other parts of the skeleton. But the promiscuous manner in which detached parts of the vertebral columns of several genera of Saurians are intermingled in the strata of the Wealden, and the mutilated condition in which they commonly occur, render it necessary to institute a rigorous examination of the entire collection before conclusive identities can be established. In this brief notice I shall refer only to some of the most remarkable specimens, in the hope of directing attention to the subject. The usual characters of the dorsal and caudal vertebræ of the Iguanodon have been pointed out in my former works‡, and a remarkable series of, probably, the first six caudal, with their processes almost entire, supplies us with the elements of that part of the spinal column§, as is shown in the annexed sketch, Plate VIII. figs. 24, 25, and Plate IX. fig. 9.

a a. Body of the vertebra: the anterior surface of the centrum is depressed, and the posterior surface nearly flat.

* Plate ii. fig. 5.

† Geology of the South-East of England, plate iii. fig. 5.

‡ The Fossils of Tilgate Forest, and the Geology of the South-East of England.

§ This specimen, which was collected by R. Trotter, Esq. F.G.S., is figured, 'Wonders of Geology,' vol. i. plate iii. fig. 8. (4th edition.)

b b. The neurapophysis. } fifteen inches in height.
c c. Oblique processes. }
d d. Superior spinous process. }
e e. Transverse processes.
f f. Hæmapophysis or chevron bone.
h. Inferior spinous process of the chevron bone.

The neurapophyses are united to the centrum by suture. The extreme height of the superior spinous process, the shortness of the transverse, and the length of the chevron bones, prove that the tail must have been largely developed in a vertical direction; its height could not have been less than twenty-seven inches. The hæmapophyses are of the same form, and articulated to the body of the vertebræ in like manner, as in the Iguana.

An atlas of a young individual is highly characteristic of the Lacertian type; and in this specimen (Plate IX. fig. 1.) the form of the *medulla oblongata* (*a a*) is preserved in a cast of calcareous spar, which fills up the cavity once occupied by this portion of the medullary column.

Ribs, or costal processes.—Fragments of ribs occur in great abundance, and a few well-marked specimens have been preserved; these are bilobed or bifurcated at the proximal or spinal extremity. One example is four feet in length, and yet it is evidently not more than one-half of the bone; the width across the arch is four inches near the spinal termination. From numerous slender bones in the Maidstone specimen, there appears reason to conclude that the distal extremities of the ribs were connected together in the abdominal region by a series of elongated processes.

Pectoral arch.—Several bones, evidently referable to a complicated sternal apparatus, approximating to that of the Lizard family, were discovered many years since, and one of these, of a very extraordinary form, was figured and described in the 'Fossils of Tilgate Forest,' and in the 'Geology of the South-East of England*,' under the provisional name of *clavicle*†. This bone (see Plate VIII. figs. 18, 19.) is long, slender, and slightly arched; of a prismatic form in the middle, and enlarged and flat at both ends. At the distance of not quite one third from the widest extremity, a small apophysis (Plate VIII. figs. 18, 19. *c c*) is sent off; the bone then enlarges, and terminates in two unequal flat processes (Plate VIII. figs. 18, 19. *a*, *b*). A perfect specimen in the British Museum is twenty-eight inches long; and there are portions in-

* Geology of the South-East of England, plate iv. figs. 1, 2.

† The sternal apparatus of the Lizards is very peculiar, and much more complicated than that of the Crocodiles. The sternum is a long narrow depressed bone, which gives out two lateral branches, and between which its point sometimes passes and proceeds more in front under the neck. There is also a still greater difference in the development of the *coracoid*, and in the constant presence of a *clavicle*. The coracoid furnishes nearly one-half of the glenoid cavity, and gives out one or more apophyses to support a large cartilaginous arch which passes over the narrow bone in front of the sternum, and crosses with that of the coracoid on the other side. There is always a foramen for the vessels, pierced in the neck of the bone, between its apophyses and the glenoid facet. The omoplate forms the other portion of the glenoid cavity; in the middle, or at about one-third of its length, the osseous part suddenly terminates, and is continued by a cartilaginous portion; this frequently becomes ossified, and then the omoplate is constantly divided into two bones.—Cuvier, *Règne Animal.*

dicating a total length of *three feet*. In the Maidstone Iguanodon there are two bones of this kind in a broken state. In none of the skeletons of reptiles, or indeed of any other animals, to which I have had access, are there any bones with which these fossil osseous remains can be identified. In a very small Lizard in the Hunterian Museum, Mr. Owen pointed out to me a bone attached to the coracoid and omoplate, that bore some analogy to the one in question: and I have no doubt that a more extended anatomical research will ere long afford a solution to this problem. As the position and connexion of this bone with the other sternal elements cannot at present be accurately determined, and the term *clavicle* is manifestly inappropriate, and may lead to misconception, I propose to distinguish it by the term *Os Cuvieri*, or the Cuvierian element of the pectoral arch of the Iguanodon, as an humble tribute of respect to the memory of the illustrious author of 'Recherches sur les Ossemens Fossiles.' It is satisfactory to find that the correctness of my first appropriation of this bone to the Iguanodon, many years before it was found in conjunction with any other part of the skeleton, has been confirmed by subsequent discoveries.

A coracoid, ten inches wide (Plate IX. fig. 11.), was found imbedded in the same block of stone with several bones of the Iguanodon. It resembles, in its hatchet-like form, the corresponding bone of the Lizards, and, as in that family, it furnishes one-half of the glenoid cavity (*a*) for the reception of the head of the humerus; but its margin (*d*) is entire, and not produced into one or more apophyses, as in the Monitors, Iguanas, &c.; and instead of a perforation in the neck of the bone for the passage of vessels, there is a deep notch (Plate IX. fig. 2. *c*) separating the glenoidal cavity from the scapular facet.

A *scapula* or *omoplate* (Plate IX. fig. 10.), eighteen inches long, associated with bones and teeth of the Iguanodon, and probably referable to that animal, presents, like the coracoid, some important modifications of the usual Lacertian type. This bone is of an elongated form, and differs considerably from the omoplate of the Monitors and Iguanas. It somewhat resembles the scapula of the *Scink*, and it throws off a long tripartite (fig. 10. *b, c, d*) apophysis (which is imperfect in the only specimen hitherto discovered); this process probably afforded support to a cartilaginous arch, as in the recent Lizards.

But although, from circumstances which it is unnecessary here to detail, I entertain but little doubt that the coracoid and omoplate above described belong to the Iguanodon, it is so hazardous, in palæontological inquiries, to affirm as certain what is merely probable, and so many impediments to accurate inductions have been occasioned by hasty and positive determinations of a tooth or bone from imperfect analogies, that I deem it necessary to repeat, that these specimens were not found in connexion with other parts of the skeleton of the Iguanodon, but were merely imbedded in the same mass of rock*.

* A very small symmetrical bone, resembling in form the sternum of a young Iguana, is described (Geology of the South-East of England, plate iii. fig. 4.) as the sternum of the Iguanodon; but the correctness of this inference is doubtful.

Pectoral or anterior extremity.—No *certain* indications of the humerus, radius, or ulna, have been obtained. A large imperfect humerus, and portions of antebrachial bones of the Lacertian type are in my collection; but there are no data to show that these may not have belonged to the Megalosaurus, or other Saurians, whose remains are intermingled with those of the Iguanodon in the Wealden strata. There is one large subcylindrical bone (Plate VIII. fig. 5.) in the Maidstone fossil that probably belongs to the upper extremity, but I have not been able to develope its characters satisfactorily. Of the carpal bones nothing is known, but there are several perfect examples of the metacarpal, digital, and ungueal (Plate VIII. figs. 14. 17. 23. 26.). A series of five metacarpals proves that the anterior extremity possessed the normal character of the Lizards. The metacarpals (figs. 14. 23. 26.) are long and slender, as in the Iguana.

Pelvic arch.—Fragments of enormous bones, evidently belonging to the pelvis, are the only certain remains of this part of the skeleton hitherto known; for the two large hatchet-shape bones (Plate VIII. fig. 28.) in the Maidstone specimen, and which I referred provisionally to the pelvis*, have not been examined with sufficient accuracy to warrant any positive conclusions; it is even possible that they may be found to belong to the pectoral arch. It is, indeed, difficult, from the small bones and processes of the existing Lizards, to detect analogies under the modifications they assume when enlarged perhaps more than twenty times, in the colossal skeletons of the extinct genera, and presenting corresponding deviations from the typical structure of the recent reptiles; and I must acknowledge the disappointment it has often been my lot to experience, when, after hours of close examination and comparison of some of the fossils with apparently analogous recent bones, I have found myself unable to establish their relation.

Pelvic, or posterior extremities.—The osteology of the thigh, leg, and foot of the Iguanodon, presents important peculiarities, and with the exception of the tarsus, is well elucidated by numerous perfect specimens of the *femur, tibia, fibula, metatarsal, digital,* and *ungueal* bones, of several individuals of different ages. The thigh bone (Plate VIII. fig. 1.) offers remarkable deviations from the corresponding bone of the Iguana, and of the other recent Lizards. The shaft of the bone is irregularly quadrangular, and has near the middle an apophysis, or trochanter (Plate VIII. fig. 1. *b*) on its tibial aspect; it terminates proximally in a bold round head†, with a distinct compressed trochanter on its fibular aspect, and distally in two largely-developed condyles, separated, anteriorly as well as posteriorly, by a deep groove or furrow. The outline of this bone in the figure (Plate VIII. fig. 1.) displays its essential characters. The enormous magnitude of the Iguanodon is strikingly shown in the colossal proportions of the femur. The largest thigh-bone in my collection is twenty-four inches

* Wonders of Geology, vol. i. p. 396.

† I have not detected any depression in the head of the bone for the insertion of a *ligamentum teres*.

in circumference at the shaft, and thirty-five inches at the distal or condyloid extremity; and I have seen fragments in the rock much larger*. The femur of the Iguanodon, unlike that of the Crocodile and of the fossil marine reptiles, has a medullary canal from one inch to an inch and a half in diameter in the largest examples (Plate VIII. fig. 27.); and the cavity is generally filled with calcareous spar. The *tibia* and *fibula*, though presenting deviations from the structure of the Iguana, manifest a close affinity to the Lacertian type. The head of the tibia (Plate VIII. figs. 3, 4. *a a*) is subtriangular, and the shaft, which has a large medullary canal (fig. 21.), is cylindrical and very strong; the distal extremity is transversely oblong, and forms a powerful process on the inner aspect. The *fibula* (Plate VIII. fig. 2.) is of a subcylindrical form, flattened on its tibial aspect, and expanding at its distal termination.

The metacarpal and digital bones have but little resemblance to the corresponding elements in the Iguana; they approach more nearly to those of the large herbivorous Mammalia. M. CUVIER remarked on some specimens which I transmitted to the Mus. d'Hist. Nat., "les fragmens d'os du métacarpe, ou du métatarse, sont si gros, qu'au premier coup d'œil je les avais pris pour ceux d'un grand hippopotame†." The annexed outline (Plate VIII. figs. 6, 7, 8, 9, 29; Plate IX. figs. 12, 14.) of some of the most characteristic examples, exhibit the usual type. The ungueal bones (Plate VIII. figs. 10, 11, 12.) of the hind-feet differ considerably from those which I suppose to have belonged to the anterior extremities; instead of being curved, as in the Iguana, they are depressed, and closely resemble the ungueals of a gigantic land Tortoise.

Although the tarsal bones are wanting, yet we have here the elements for a restoration of the pelvic extremity of the Iguanodon. I shall not, however, presume to intrude on the indulgence of the Society with any calculations as to the probable magnitude and proportions of the original, further than to state, that the largest femur, if clothed with muscles and integuments, would form a thigh seven feet in circumference. From the shortness of the caudal vertebræ, and the length of the spinous processes of the neura and hæmapophyses, indicating, as before remarked, a great vertical development of the tail, it seems probable that this organ was not long and slender, as in the Iguana, but that it approximated more nearly to the caudal process of the *Doryphorus*.

From the structure and condition of the teeth, it appears evident that the Iguanodon was herbivorous; and from the nature of the bones of the extremities, we may presume that, with its long slender prehensile fore-feet, it was enabled, while supported by its enormous hinder limbs, to pull down and feed on the foliage and trunks of the *Clathrariæ*, *Dracænæ*, *Yuccæ*, and arborescent ferns, which constituted the flora of

* No *femur* of the *Megalosaurus* discovered in Tilgate Forest exceeds twelve inches in the circumference of the shaft of the bone.

† Ossemens Fossiles, tom. v. part ii. p. 350.

the country of which this colossal reptile appears to have been the principal inhabitant.

If, from the fossils hitherto discovered in the Wealden formation, any conclusions may be drawn as to the relative numerical proportion of the different genera of Reptiles that once existed in the country from whence these strata were derived, the Iguanodon must have largely predominated. From a careful calculation, I may venture to state, that not less than seventy individuals, varying in age and magnitude, from the reptile just burst from the egg, and but a few inches in length, to the possessor of the gigantic femur above described, have come under my examination during the last twenty years; and more than thrice that number have, in all probability, been destroyed by the workmen, and altogether eluded the observation of the palæontologist.

Saurian vertebræ: undetermined.—Although it is my intention to restrict this notice to the remains of the Iguanodon and Hylæosaurus, I cannot refrain from briefly alluding to some vertebræ which differ from any I have elsewhere observed. The first (Plate IX. fig. 6.) is a biconcave caudal vertebra, which, instead of having a depression, as in the Iguanodon, for articulation with the hæmapophysis, has two tubercles (*f f*). The second is a caudal vertebra (Plate IX. fig. 7.), in which the hæmapophysis consists of two distinct processes, which are anchylosed to the body of the vertebra, as in some of the caudal of the Mosæsaurus.

A few vertebræ of the lacertian type, from five to six inches in length, have also been found; these have the body convex posteriorly, and concave anteriorly (Plate IX. fig. 4.); and are *wider than high*, as in the Iguana and Monitor, and not in the reverse proportion, as in the Crocodile. One sacral vertebra (Plate IX. fig. 5.) closely resembles that of the Monitor.

Hylæosaurus, or *Wealden Lizard.*—I have discovered the remains of three individuals of this genus in different localities in Tilgate Forest; and these specimens, with the exception of a few detached bones found associated with relics of the Iguanodon, comprise all that is at present known of the osteology of this most extraordinary reptile.

If the common observer be struck with astonishment at the colossal size and imposing aspect of the bones of the Iguanodon, the comparative anatomist, who for the first time inspects the remains of the Hylæosaurus, will not fail to experience equal surprise in the strange modifications of structure, and the blended osteological characters, which these invaluable relics present to his notice. In the pectoral arch he will find an omoplate of the Crocodilian type united to a Lacertian coracoid; in the ribs, the bilobed head of the Crocodile associated with the arched and rounded process of the Lizard, and an expansion of the bone at its spinal curvature so great, as to remind him of the peculiar condition of the costal apophyses of the Testudinata; while enormous osseous spines and plates demonstrate a dermal development, to which the existing reptiles afford but a slight analogy. The remark of Baron Cuvier on the Iguanodon, applies with greater force to the Hylæosaurus; it is indeed "un Saurien encore plus extraordinaire que tous ceux dont nous avons connaissance*."

In the strata of Tilgate Forest I had found associated with the remains of the Iguanodon, the bones of several other reptiles, namely, the Megalosaurus, one or more species of Plesiosaurus, of Gavial or Steneosaurus†, and Pterodactylus, and several species of Chelonia, Emys, and Trionyx, besides many fishes, and one or more species of a bird allied to the Heron. The first specimen which led me to suspect the existence of a reptile belonging to a new genus, was discovered in 1832, and described in a memoir read before the Geological Society of London, and subsequently published in the 'Geology of the South-East of England;' to this notice I beg to refer for a figure and detailed description of the original‡. It will suffice for my present purpose to remark, that this specimen consists of part of the spinal column composed of seven dorsal and three or four cervical vertebræ; eleven ribs (Plate X. fig. 6.); two coracoids and omoplates; with numerous dermal bones and spines. From the appearance of the block of stone in which the bones are imbedded, there can be no doubt that a considerable portion of the skeleton extended into the surrounding rock and was destroyed by the workmen. This extraordinary fossil displays osteological characters so peculiar, as at once to establish the propriety of referring it to a new genus. I shall not dwell on the forms of the vertebræ, ribs, &c., but only direct attention to the structure of the pulmonary arch, in which a coracoid of the Lacertian type (Plate X. fig. 7.) is united to an omoplate resembling that of the Crocodile (Plate X. fig. 10.), and the presence of dermal bones and spines (Plate X. figs. 1, 2, 3, 4.) of enormous magnitude§.

The second specimen of the Hylæosaurus was found imbedded in a layer of blue clay near Bolney in Sussex; and, like the former, was unfortunately mutilated, and in a great measure destroyed, by the labourers by whom it was discovered. It appeared from the statement of the most intelligent of the workmen, that after removing a stratum of paving stone (a calciferous grit, much covered by ripple-marks), they perceived imbedded in the clay a great number of ribs, vertebræ, and large bones, into which they immediately drove their pickaxes, destroying the connexion of the bones, breaking many, and preserving only some of the largest and most perfect. Although on

* Ossemens Fossiles, tom. v. p. 351.

† A splendid specimen of a Crocodilian reptile, with large osseous dermal scuta, probably referable to the *Steneosaurus* of Geoffroy St. Hilaire, was discovered in the Wealden strata at Swanage, by Mr. Trotter, and is figured and described in the 'Wonders of Geology,' vol. i. (Fourth Edition) p. 402. plate iv. These remains are imbedded in two slabs of limestone (each four feet by three), which now occupy a case near to that of the Hylæosaurus in the British Museum.

‡ Memoir on the Hylæosaurus, a newly-discovered fossil reptile from the strata of Tilgate Forest. Geology of the South-East of England, p. 289.

§ I cannot but express my regret that this unique and most interesting fossil is, from want of space, placed in the Gallery of the British Museum in a situation very ill adapted to display its peculiar characters; the framework of the case containing it intersects, and obscures many essential particulars.

receiving intelligence of the discovery I immediately repaired to the spot, it was too late to obtain any certain information of the manner and position in which the bones had been deposited. From several bushels of fragments of bones, I was enabled to determine that there were two omoplates identical in character, but one-third larger than the corresponding bones of the individual above described; and these alone were sufficient to prove that the remains in question belonged to the Hylæosaurus. From the fragments, the following bones were restored.

Two omoplates (Plate X. fig. 10.), one perfect, and exhibiting the glenoidal facet, and the surface to unite with the coracoid. These bones are nineteen inches long.

One humerus (Plate X. fig. 5.); this bone is entire, and the *radio-ulnar* articulating facets are well shown.

A phalangeal bone (Plate X. fig. 9.).

Ribs or costal processes: of these a great number occur, but none are perfect, although many exhibit the bilobed head (Plate X. fig. 12.) and the great external expansion of the arch; this modification in all probability bears a relation to the enormous development of the dermal spines.

A third example of this reptile was discovered in a quarry in Tilgate Forest but a short time before I finally quitted Brighton in the autumn of 1837. This specimen, like the former, fell into the hands of the parish labourers, who had not been apprized of the increased value of the fossils if carefully removed. From the connected state of the vertebræ, even when first seen by me, it is certain that a much larger portion of the skeleton was preserved in the rock, and might by due care have been extricated. This relic, which is about six feet in length, consists of three portions of the spinal column, comprising twenty-five vertebræ, of which fifteen are caudal, and bear three distinct and very peculiar modifications of the hæmapophyses or chevron bones. The transverse processes of the lumbar and dorsal vertebræ are very large and strong. Along the vertebral column, on each side, are several dermal bones of a discoidal form (Plate X. figs. 3, 4.); some circular, others elliptical, and varying from one to three inches in diameter. There are also the bases of several very large, angular, dermal spines (resembling Plate X. fig. 1.), and these correspond in every respect with those of the first specimen. Thus while the omoplate and ribs leave not a doubt of the generic, if not specific, relation of the two first specimens, the dermal bones and vertebral column afford evidence equally satisfactory that this last individual also belongs to the same genus. The three specimens afford the following osteological elements of the Hylæosaurus:—

Spinal column. *Cervical, dorsal, and caudal* vertebræ, with the *hæmapophyseal* appendages.
Ribs or *costal processes.*

Pectoral arch. The *Coracoids and Omoplates.*

Anterior extremity. The *humerus, radius?* and one *phalangeal* bone.

Dermal bones and spines.

Teeth (?), Plate VI. figs. 9, 10, 11.

No certain examples of the skull, jaws, or teeth of the Hylæosaurus have been met with; but in the stratum of sandstone which contained the first specimen, a few teeth, decidedly of a lacertian structure, and of a very peculiar form, were discovered*; fifteen only have been noticed, of which ten are deposited in the British Museum. These teeth are about $1\frac{1}{2}$ inch in length, and commence at the base with a cylindrical fang or shank, which gradually enlarges into a crown of a clavated form, terminating in an obtuse angular apex; the lateral margins of which are more or less worn, as if from attrition with the teeth in the opposite jaw. The surface of the enamel, as shown in the figures, is covered with faint longitudinal striæ. The crown is solid, but the fang is hollow, and in every specimen appears as if broken off close to the jaw. This character may, however, have originated from necrosis, occasioned by the pressure of a successional tooth. The example figured (the only one which remained in my possession,) has unfortunately been destroyed by the lapidary in attempting to make a section for microscopical examination. From the portions preserved, I have, however, been able to ascertain that the tooth possessed the structure which Mr. OWEN describes as characteristic of the teeth of the Monitor and of most reptiles. It has a central medullary canal, with very fine calcigerous tubes radiating from the centre, at right angles to the periphery of the tooth, which has a thin coat of enamel, in which no vessels or tubes can be detected; the extremely dense structure of this fossil presents a striking contrast to the plexus of medullary canals and calcigerous tubes and cells observable in the tooth of the Iguanodon. The reference of this tooth to the Hylæosaurus must not, however, be considered as decisive, till confirmed by the discovery of teeth attached to the jaw in connexion with other parts of the skeleton of this extraordinary reptile.

In this imperfect sketch, I have only attempted a slight outline of the osteological characters of some of the extinct reptiles whose remains I have discovered in the Wealden formation of the South-East of England, and I leave to those who have more leisure and ability for the task, the complete restoration of the Fauna of the country of the Iguanodon and Hylæosaurus. For this purpose I have presented to my distinguished friend, Professor OWEN, drawings by M. DINKEL, of the principal specimens in my collection, which I had employed that eminent artist to execute some years since, with the view of laying before the Royal Society a full description of the originals. Unavoidable circumstances have compelled me to abandon that intention, but which I no longer regret, since the subject will be elucidated by one far more competent to do it justice.

Removed from the field of my former labours, having disposed of my collection, the fruit of twenty-five years assiduous research, and being engaged in the duties of

* Wonders of Geology, vol. i. p. 403. In the Geology of the South-East of England (p. 293.) these teeth, on the authority of M. BOUÉ, were referred to the Phytosaurus or Cylindricodon of Dr. JAGER; an opinion which subsequent observations have proved to be untenable.

an arduous profession, this memoir is, in all probability, the last contribution which it will ever be in my power to offer in this interesting department of palæontology. I therefore conclude these remarks in the spirit and in the language of the illustrious philosopher, whose splendid discoveries and eloquent writings first drew my attention to this branch of natural science, and whose kind and generous assistance so often encouraged me to persevere in my investigations:—"Je termine ici mes travaux, et je laisse à mes successeurs à cultiver un champ que je n'ai fait qu'ouvrir, et qui bien certainement leur donnera encore des moissons plus riches que toutes celles que j'ai pu recueiller*."

Crescent Lodge, Clapham Common,
January, 1841.

Explanation of the Plates.

PLATE V.

Fig. 1. A portion of the right branch of the supposed lower jaw of an Iguanodon, viewed on its mesial plane; of the natural size.
- *a a.* Dentary bone.
- *b b.* Opercular bone.
- *g g.* Alveolar plate or parapet.
- *h h.* Position of successional teeth.
- *i i.* Canal for the inferior maxillary vessels and nerves.
- *k k.* Foramina in the opercular bone.

Fig. 2. Transverse section of the proximal extremity of figure 1.

Fig. 3. The right half of the lower jaw of *Iguana tuberculata*, of the natural size, viewed on its mesial aspect.
- *a.* Dentary bone.
- *b.* Opercular bone.
- *c.* Complementary bone.
- *d.* Surangular bone.
- *e.* Angular bone.
- *f.* Articular bone.
- *w.* Indicates the portion of the jaw which corresponds with the fossil represented figs. 1. 8.

Fig. 4. Magnified view of part of the alveolar parapet of the Iguana, fig. 3, showing three teeth anchylosed to its mesial surface, with the external aspect of the same, from fig. 7.
- *g.* Dental parapet.

* Recherches sur les Oss. Foss., tom. v. p. 526.

h. Germ of a successional tooth.
k. The external aspect of the same.

Fig. 5. Magnified view of a portion of the dental parapet of the fossil, (the space marked *x*, fig. 1,) to exhibit the situation of the germs of the successional teeth, *h h.*

Fig. 6. Oblique fore-shortened view of figure 1, to show the row of vascular foramina (*l*, *l*, *l*, *l*), and the fractured ends of the fangs of the teeth on the alveolar margin of the dentary bone *a a.*

Fig. 7. The external surface of the right ramus of the lower jaw of an Iguana, fig. 3.
a. Dentary bone.
c. Complementary bone.
d. Surangular bone.
e. Angular bone.
f. Articular bone.

Fig. 8. View of the external surface of the fossil, figure 1.
a a. Alveolar plate of the dentary bone.
b. Opercular bone.
i. Canal for the inferior maxillary vessels.
l l. Vascular foramina in the dentary bone.

Fig. 9. Transverse section of the anterior extremity of the fossil, fig. 8.

PLATE VI.

Teeth of the Iguanodon and Hylæosaurus (?), *of the natural size.*

Figs. 1, 2, 3. The most perfect tooth hitherto discovered of a very young Iguanodon, showing the apex slightly worn by use, the serrated lateral margins of the crown, the longitudinal ridges, and the curved and tapering form of the shank, or fang.
1. External surface; 2. mesial aspect; 3. lateral view.

Fig. 4. A tooth of the Iguanodon, with the crown rounded by detrition.

Fig. 5. The mesial aspect, and fig. 6, the external surface of a tooth of a young Iguanodon.
a. Surface worn obliquely smooth by use.
b. Fang almost wholly removed by absorption from the growth of a successional tooth.

Figs. 7, 8. The germ of a successional tooth of an Iguanodon.

Figs. 9, 10, 11. The tooth of an unknown reptile; probably referable to the Hylæosaurus.
9. The external aspect; 10. the mesial or inner surface; 11. lateral view.

PLATE VII.

Teeth of the Iguanodon; natural size.

Figs. 1, 2. Two lateral views of a tooth of the Iguanodon, with the fang terminating in a point.

a a. The crown of the tooth considerably worn by use.

b. (fig. 2.) A cavity in the centre of the tooth filled with calcareous spar.

Fig. 3. Crown of a tooth with the apex (*a*) perfect.

Figs. 4^a, 4^b, 4^c. Three views of a remarkably fine tooth of the Iguanodon, exhibiting the peculiar dentary characters of that reptile.

4^a. Lateral view.

4^b. Section of the fang at the base of the tooth.

4^c. External and mesial aspects.

Fig. 5. Magnified view of a portion of the serrated lateral margin of fig. 4.

Fig. 6. The mesial, and fig. 7, the external aspect of a portion of the lower jaw of an Iguanodon, with two teeth attached; and the germs of successional teeth (*a a*). This sketch is intended to convey an idea of the appearance of a fragment of jaw of a magnitude corresponding to that of the teeth here delineated.

PLATE VIII.

The osteological elements of the Iguanodon, so far as at present known. The figures are reduced to a uniform scale; the Maidstone specimen afforded the data by which their relative magnitude was computed.

Fig. 1. The right femur or thigh-bone.

a. Head, or proximal extremity.

b. Trochanter major, on the fibular or external aspect of the femur.

c. Trochanter minor, on the tibial aspect; a transverse section of the shaft of the femur at this place is represented fig. 27.

d. Inner condyle.

e. Anterior furrow, or groove between the condyles.

Fig. 2. The fibula.

a. The proximal extremity.

Fig. 3. The anterior, and fig. 4, the posterior view of the tibia.

a. Proximal extremity, or head of the bone.

b. Fibular plane of the distal extremity.

c. Inner process of the distal extremity.

d. A section of the shaft at this place is shown in fig. 21.

Fig. 5. This bone is probably referable to the brachial extremity; it is imbedded

in the Maidstone specimen near two long metacarpal bones, but its situation in the skeleton has not been accurately determined.

Figs. 6, 7. Metatarsal bones.

a a. Proximal extremities.

Figs. 8, 9. 13. 29. Digital or phalangeal bones of the tarsus. These resemble the corresponding bones in the Hippopotamus and other gigantic herbivorous Mammalia.

Figs. 10, 11. Distal phalangeal, ungueal, or nail-bones of the hind feet.

Fig. 12. Inferior aspect of figure 11.

Fig. 14. Metacarpal bone.

a. Proximal extremity.

b. Transverse section of the shaft.

Figs. 15, 16. Ribs or costal processes.

a a. The bilobed, upper or spinal extremity.

Fig. 17. An *ungueal,* or nail-bone, probably of the fore-foot.

a. The proximal or articulating extremity.

Figs. 18, 19. Anterior and posterior views of one of the *Ossa Cuvieri* of the Maidstone Iguanodon.

Fig. 20. This bone is undetermined.

Fig. 21. Section of the tibia, showing the medullary cavity.

Fig. 22. Tooth imbedded in the Maidstone specimen.

Figs. 23. 26. Metacarpal bones; *a.* proximal extremity.

Figs. 24, 25. Caudal vertebræ.

a. Centrum, or body of the vertebræ.

b. Neurapophysis.

c c. Oblique processes.

d. Superior spinous process.

e. Transverse processes.

f. Hæmapophysis, or chevron bone; *g.* articulating processes; *h.* spinous process.

Fig. 27. Transverse section of the shaft of the femur at the inferior or lesser trochanter; showing the medullary cavity.

Fig. 28. The Maidstone specimen contains two corresponding bones of this form; their proper position in the skeleton has not yet been ascertained.

Fig. 29. Phalangeal bone of the hind-foot.

Fig. 30. This bone lies across the femur in the Maidstone fossil; it is much crushed, and its characters have not been clearly developed.

Figs. 31, 32. Dorsal vertebræ of the Maidstone Iguanodon; the transverse and oblique processes are wanting.

Fig. 33. Chevron bone, or hæmapophysis; *g.* articulating processes; *h.* the inferior spinous process.

Fig. 34. Lumbar vertebra, with the spinous process broken off.

Figs. 35, 36. Dorsal vertebræ.

Fig. 37. Caudal vertebra. The following references apply also to the dorsal and lumbar vertebræ:—

a. Body or centrum.

b. Neurapophysis, united to the centrum by suture.

c c. Oblique processes.

d. Superior spinous process.

e e. Transverse processes.

o. Marks the depression or pit occasioned by the loss of the transverse process, which was united by suture to the body below, and to the medullary arch above: in the adult it is anchylosed to these elements.

w w. The hæmapophyseal surfaces for the attachment of the chevron bone; see *g*, fig. 24.

PLATE IX.

Illustrative of the Osteology of the Iguanodon, and other fossil Saurians from the Wealden.

Fig. 1. Fragment of an *atlas* of a young Iguanodon, in which the form of the *medulla oblongata* is shown in a cast of calcareous spar (*a a*).

Fig. 2. The horn of a Saurian, probably of the Iguanodon.

Fig. 3. The facial portion of the skull of the *Iguana cornuta*, with the nasal tubercles or horns, for comparison with the fossil, fig. 2.

Fig. 4. Two vertebræ, having the body or centrum concavo-convex.

a a. The convex face.

c. The remains of the oblique processes; the other portions of the neurapophysis are wanting.

Fig. 5. A sacral vertebra of a reptile, approximating to that of the *Monitor*.

a. The centrum seen on its visceral aspect.

c. Oblique processes.

e e. Transverse processes.

Fig. 6. A caudal vertebra of a reptile, with two tubercles (*f*) for the attachment of the hæmapophysis.

6^a. Visceral aspect of the bone.

6^b. Distal surface of the centrum (*a*); *f*. the hæmapophyseal tubercles.

6^c. Lateral view of the same vertebra.

Fig. 7. Caudal vertebra of an unknown Saurian from Tilgate Forest; unique.

7^a. Visceral aspect; 7^b. lateral view.

a a. Anterior articulating surface of the centrum.

f f. The hæmapophysis, consisting of two branches which are anchylosed to the body, or rather form continuous processes; they approximate to each other distally, but do not unite and form a chevron bone.

c c. The oblique processes of the neurapophysis; the spinous and transverse processes are not preserved.

Fig. 8. The distal or condyloid extremity of a femur of the Iguanodon.

8^a. Posterior aspect; 8^b. anterior view of the same.

Fig. 9. A series of six caudal vertebræ of an Iguanodon, from Tilgate Forest.

Fig. 10. *Omoplate* of an Iguanodon (?) reduced to one-ninth linear.

a. The head or sternal extremity.

b, c, d. Apophyses, probably for the support of a cartilaginous pectoral arch.

Fig. 11. Coracoid of an Iguanodon (?).

a. The glenoid facet, or articulating surface.

b. The scapular facet.

c. Notch in the neck of the bone for the passage of vessels.

d. Margin of the bone, which is entire.

Fig. 12. Metatarsal bone of an Iguanodon.

a. The proximal; *b.* the distal extremity.

Fig. 13. One of a series of four consecutive vertebræ of a Saurian; probably of the Iguanodon.

a. The centrum, twenty-four inches in circumference.

b, c, d. The neurapophysis.

c, c. The oblique processes.

d. Superior spinous process.

e e. Transverse processes.

m. The medullary canal.

Fig. 14. Metatarsal bone of an Iguanodon.

a. The proximal, and *b.* the distal extremity.

PLATE X.

Illustrative of the Osteology of the Hylæosaurus.

The Figures in this Plate are reduced to one-sixth the size of the originals, in linear dimension.

Fig. 1. Dermal spines of the Hylæosaurus; these probably were situated along the back, and formed a dorsal fringe.

a. The proximal or articulating extremity.

Fig. 2. Portion of a dermal bone fractured in a transverse direction, showing the peculiar structure of these osseous appendages.

Figs. 3 and 4. Dermal bones of a discoidal form; these were disposed in parallel rows on each side the dorsal ridge.

Fig. 5. A thin slice of a dermal bone, viewed by transmitted light, and highly magnified.

Fig. 6. Ribs of the Hylæosaurus. 6^a. The first rib. 6^b. Second rib, *et seq.*, forming a series from the first to the eighth, and exhibiting the modifications of the bilobed extremity.

Fig. 7. The coracoid.

a. The glenoid depression.

b. Scapular facet.

c. Foramen.

Fig. 8. The *coracoid* and *omoplate*, or scapula, articulated to each other, and forming the glenoid cavity or socket for the reception of the head of the *humerus*.

a. Glenoid facet of the *coracoid.*

b. Union of the *coracoid* with the *omoplate.*

c. Foramen for the passage of vessels.

d. Glenoid facet of the *omoplate.*

Fig. 9. Digital or phalangeal bone of the Hylæosaurus, probably one of the antepenultimate phalanges.

Fig. 10. The *Omoplate.*

d. Glenoid cavity.

e. Distal extremity.

Fig. 11. The *Humerus* of the Hylæosaurus.

a. Proximal extremity.

b c. Radio-ulnar articulation.

Fig. 12^a. Proximal portion of a rib, or costal process.

a. The spinal bilobed extremity.

Fig. 12^b. Transverse section of fig. 12^a. at *w*, to show the great expansion of the external plane of the rib.

A portion of the Lower Jaw of an Iguanodon.

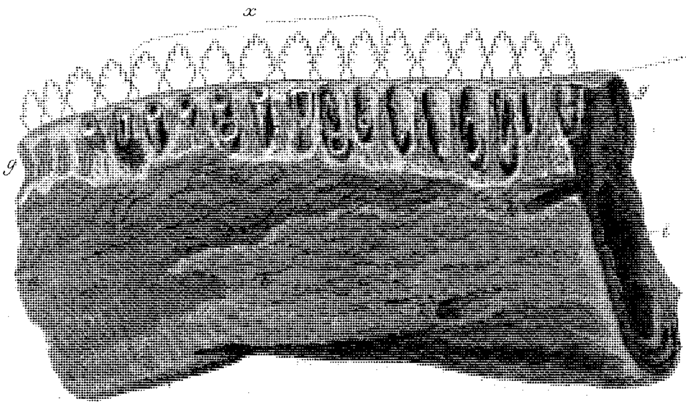


Fig. 1.

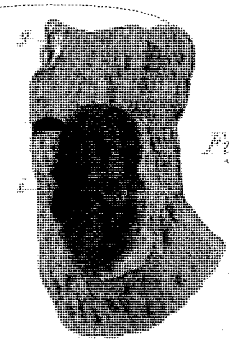
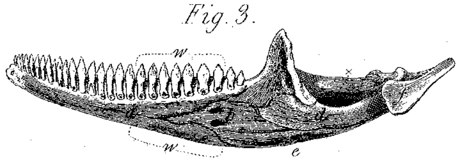


Fig. 2.

Fig. 3.



Iguana tuberculata _ mesial aspect.

Teeth of Iguana Magnified.

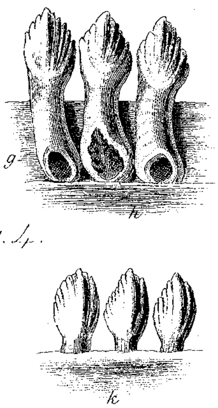


Fig. 4.

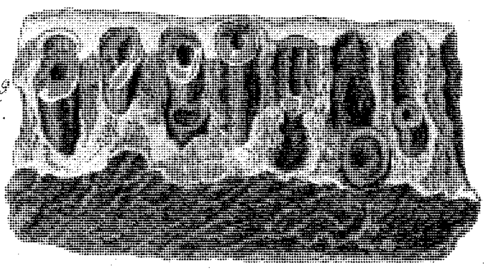


Fig. 5.

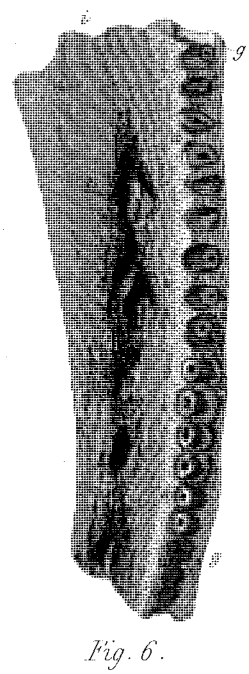
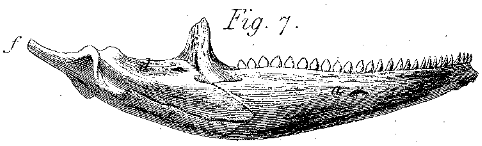


Fig. 6.

Fig. 7.



Iguana tuberculata _ external aspect.

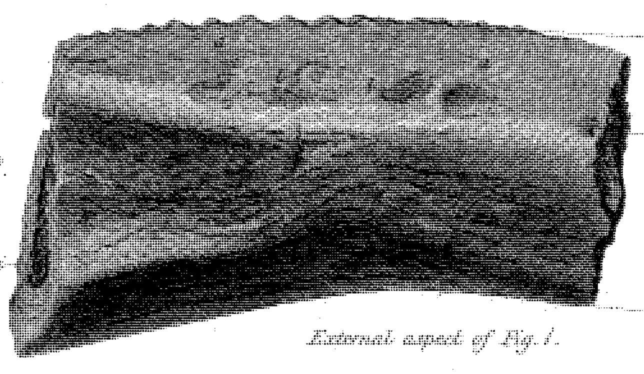


Fig. 8.

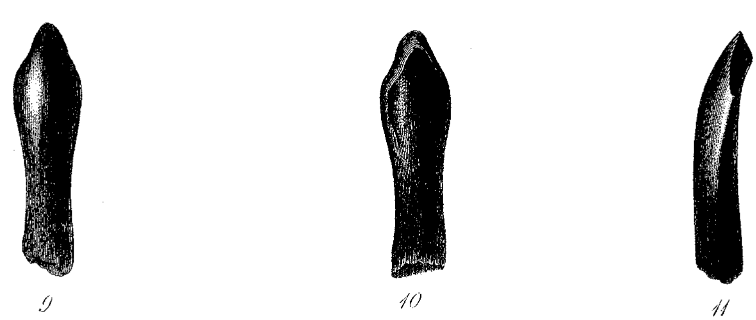
External aspect of Fig. 1.

Fig. 9.

Maxillary elements of the Iguanodon and of the Iguana.

Drawn by G. Scharf. J. Basire, sc.

1_8. Teeth of the Iguanodon.

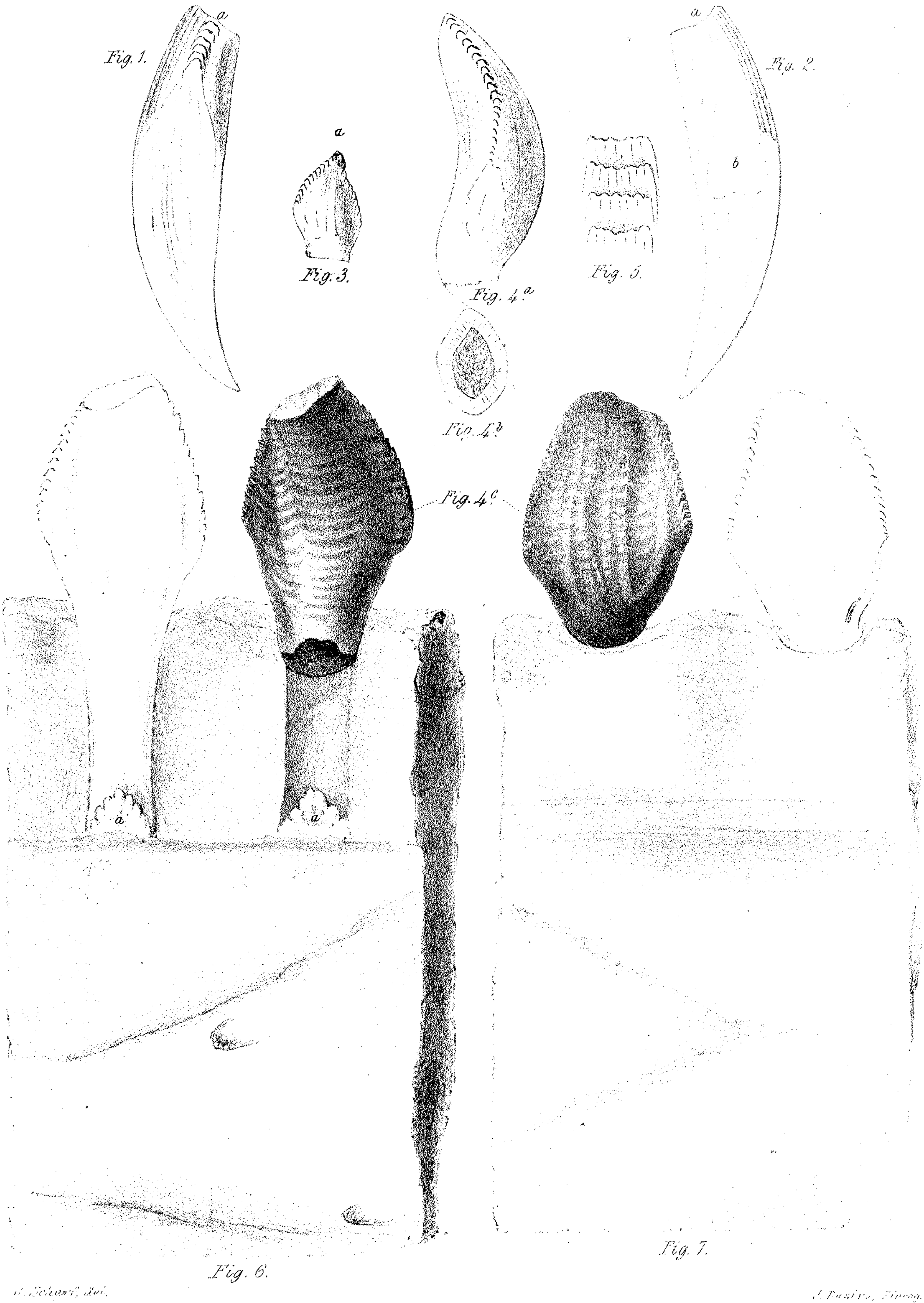


9_11. Tooth of the Hylæosaurus ?

From Nature by Lens Aldous

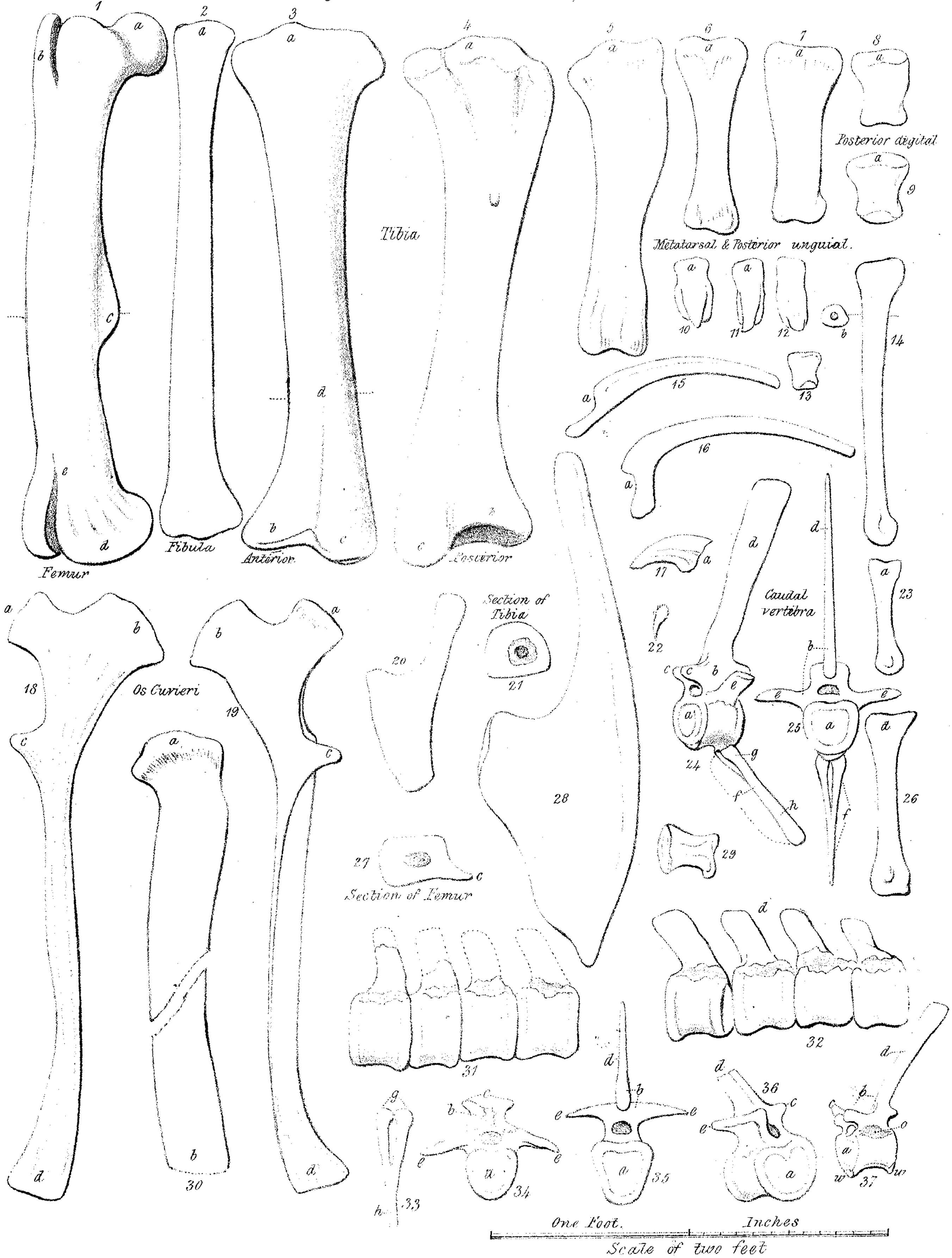
J. Basire sc.

Teeth of the Iguanodon.



G. Scharf, del. J. Basire, Lithog.

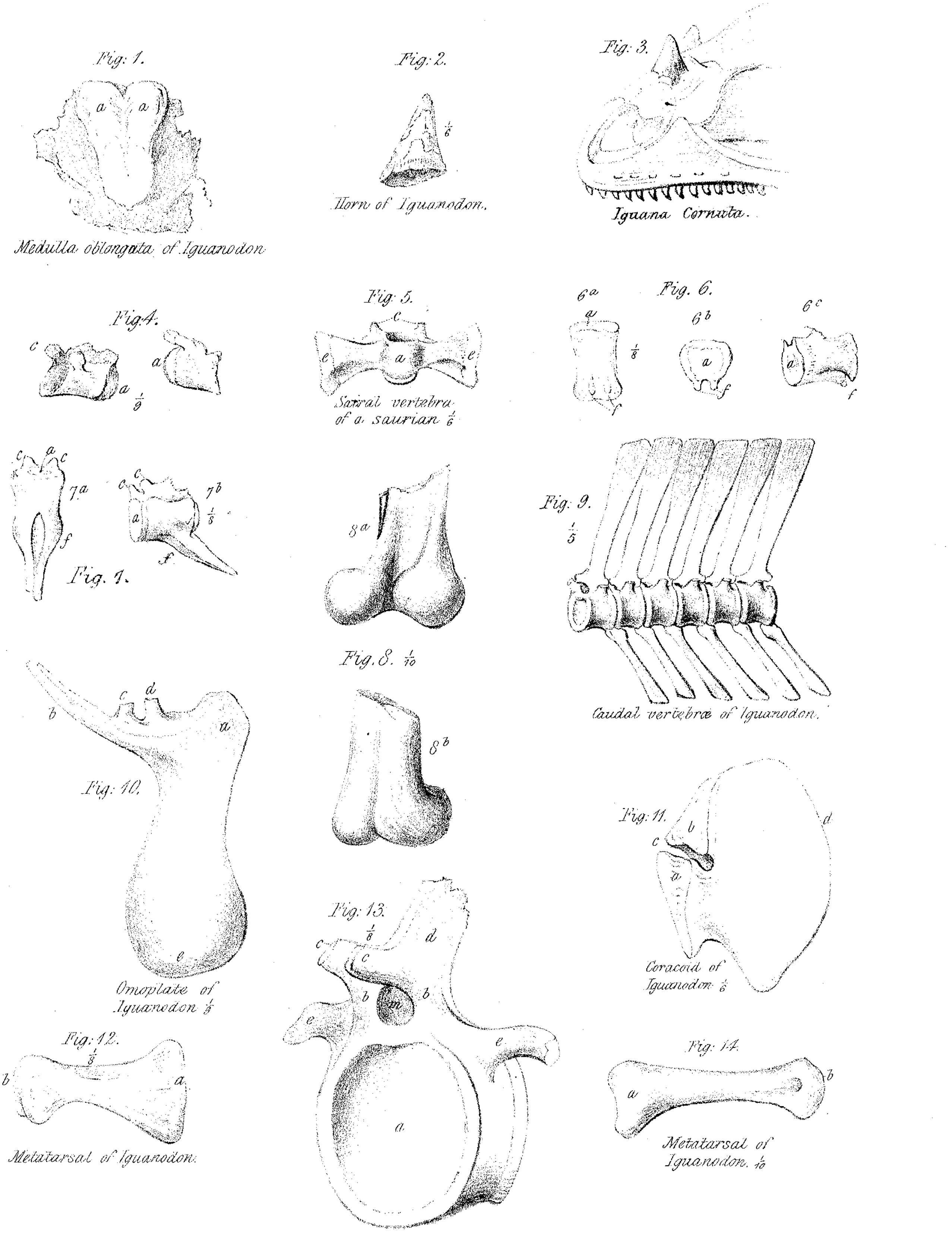
Osteological elements of the Iguanodon.



G. A. Mantell, del.

J. Basire, Zincog.

Iguanodon and other Saurians.



G. A. Mantell, delt 1841. J. Basire, lith.

Hylæosaurus