MEMOIRS

OF

ICHTHYOSAURI

AND

PLESIOSAURI,

EXTINCT MONSTERS

OF THE ANCIENT EARTH

WITH 28 PLATES

COPIED FROM SPECIMENS IN THE AUTHOR'S COLLECTION OF FOSSIL ORGANIC REMAINS

BY

THOMAS HAWKINS, Esq.
F.G.S.

&c. &c. &c.

I believe in, and bear humble testimony to the Scriptures, that they are the "words of everlasting life" and "the wisdom of God." I cannot pretend to understand much of them, for reasons which they themselves offer, much less can I presume upon their explanation; but I owe to myself and the reader to say - to prevent any misconception of the spirit and letter of this book - that I think the Mosaic cosmogony intelligible upon this hypothesis :- our creation is not a principle, but from the fourth day or generation of Time, when the lights in the firmament were made "to give light upon the earth." The antecedent history of the planet, as written by Moses, demonstrable by the soundest physics unshrouds but the gaunt skeleton of the pre-Adamite epoch, to the clearer comprehension of which nothing can so well serve as the accumulation of Fossil Organic Remains.

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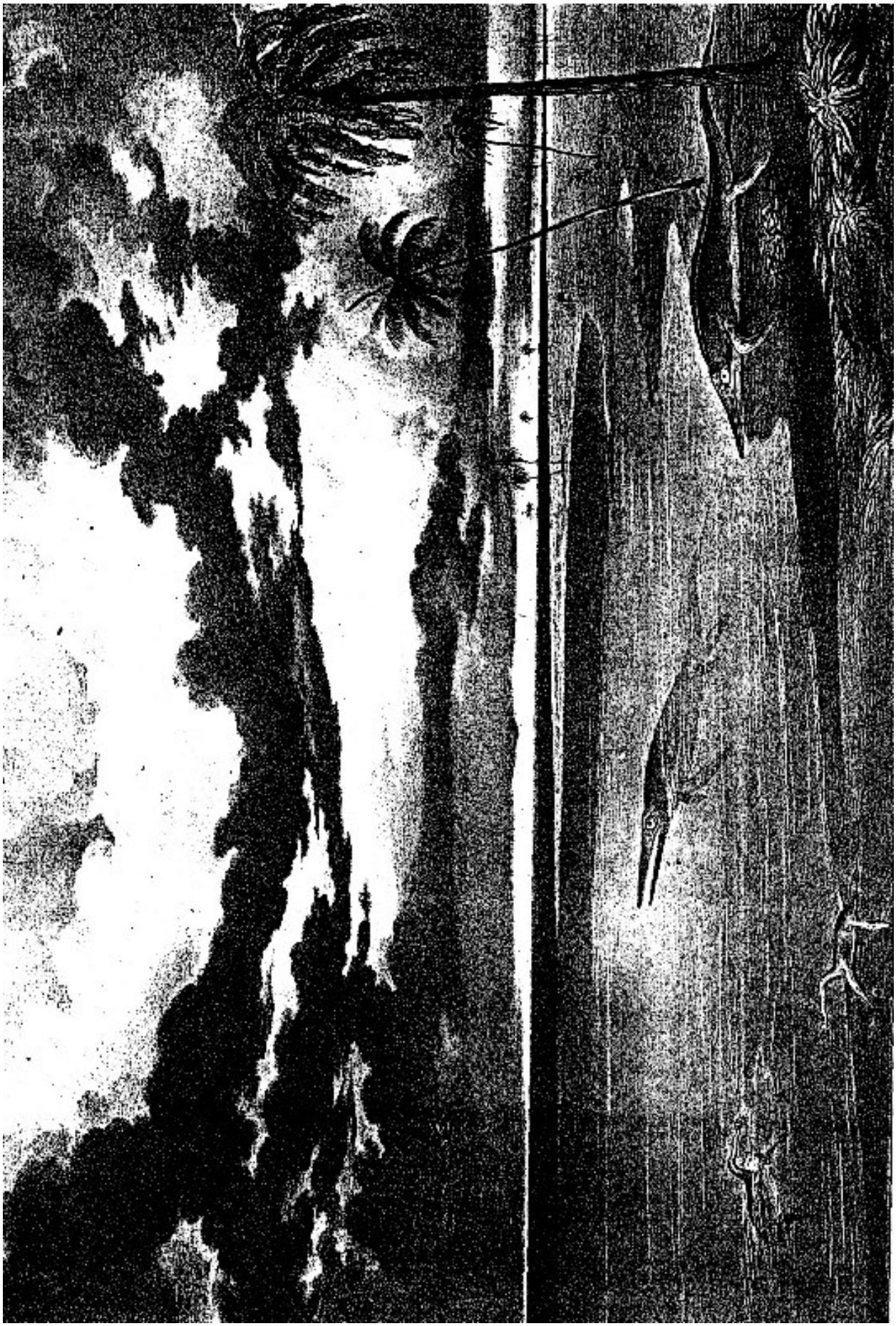

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PREFACE.

EVERY generation of man is born to stare at something, which, as long as eludes their understanding is a very African Fetishe to the many and a Gordian knot to the few. But Chance-the puppet-man of our race-volatile as the trifles it sets in motion, has a fresh miracle for every age: no sooner is the vulgar world a-tired with one spectacle than another rises to excite its wonderment, and thus, by long habit, a disposition to the marvellous is confirmed in the minds of the majority-which takes not the trouble to think-and of scepticism on the part of the philosophizing and melanic-the fraction that does. But there are mysteries which require a thousand years for their solution; grand phenomena that oppose high barrier to the human mind; lessons which teach us our own proper littleness better than the starry language graven on the face of the mighty heaven, or the ten thousand ponderous tomes bequeathed Us by the ancient times, of which they treasure the multifarious experience. Of these-few on account of their vastiness - rare because they require a seraph of our kind for their comprehension-Geology is the most wondrous and sublime. A monument inscribed by the finger of Jehovah to the purpose of men, they have been as ignorant of its nature as the scarabei are of that of the giant pyramid-built a temple to their divinity-around which they wheel. For when the first man, awoke to being and, at the same moment, to wisdom looking around him, expressed thus swelling joy by the adoration of the Creator, no scribe was present who should convey to his posterity the record either of the sensations that it was his peculiar lot to experience, or a transcript of those ideas which to his unique and primal soul were assuredly innate:- no, the fall of Adam was not guarded against, and we inherit its negative as well as positive consequences. Howbiet, there is no doubt that the antediluvians whose bones, ground to powder, any one may find in a gravel-pit-were well acquainted with the primary elements of geology as well as those of tile other practical sciences, for they were cunning artificers in metal, and knew the arts of building; but oral tradition is liable to much accident, and the stories of the primitive ages that survived with Noe, related by him to his family, soon met the doom that every thing of heavenly original underwent when placed at the mercy of a degenerate race:- they were sacrificed upon the altars of the dread Past, of which they were the accusing mementos, or corrupted by such metaphor as an heretical hierarchy-their unholy depositary-found it their interest to forge. Hence it is that in the various cosmogonies of the old kingdoms-of Babylon, China, India and Persia-we find so much palpable absurdity admixed with fact that is undeniable; so much extravagance with truth, that it is no easy matter to separate the antagonist principles so as to render the histories at all available. But of this we are certain, that the early progenitors of our stock were well skilled in the mechanical arts,

that their knowledge of them descended to the post-diluvians-witness the assertions of Moses, Herodotus and all olden writers, whose works survive to our time,-that within the first ten centuries which succeeded the all but universal destruction of man by the flood, were achieved some of the sublimest efforts recorded by history-Babel, Pyramid and a hundred nameless cities now whelmed by the sand of the desert Afric,-that when Alexander diverted, by his astonishing conquests and by his liberal patronage of learning, the lore of India and Persia from the profundities or the Braminical and Perseeian polity into a Grecian channel, much apocryphal matter, gendered by that subtle and vain nation, was amalgamated therewith, and, finally, upon the subjection of Greece by the Romans and the reception in the fourth century by the latter - with the doctrines of Jesus Christ-of the ancient Vedas or Scriptures of the Hebrews, that the Gnostic heresy, having accomplished the ruin of all Cite other Asiatico-European bastard progeny, fell-the last crowned horror of long-since forgotten blasphemies-and with it the concomitants necessary to the evolution of another of that species. For then began the manifestation of a principle which - in the hands of the Roman and Byzantine pontiffs-was destined to enslave Europe many a century: which should reduce all men, save the crafty priest, to impotence and such utter imbecility that nothing short of miracle could effect his redemption. And when the first dawn came upon that horrid literal darkness, ages elapsed ere man could assure himself that he was verily safe-during which he was effectually prevented from a consideration of the more abstract circumstances that it concerned him to know. But France, the pioneer in every thing intellectual, fated to the distinction of mind, of which she brings forth the earliest blossom but the latest and most unsound fruit - less fortunate than England in her struggles for liberty,-dared to anticipate the terrors both of the Romish dominion, that incarnate Antichrist, her archfoe, and the judgment of heaven, by forswearing the state religion of the former and the divine revelation of the latter, by which alone man can hope to succeed to that blessed inheritance of his, the title to which his father Adam forfeited both for himself and heirs. Then, Voltaire, archapostate, was no less the spokesman of general France when he ignorantly pretended that the shells found upon the Apennines, and erroneously attributed by the zealots of the day to the deluge, were dropped there by the million pilgrims that had journeyed to the golden shrines of "the Eternal City" than which he scoffed at the name of God and with the malice of Satan himself called HIM " wretch." And when the terrible revolution smote that unhappy nation with anarchy and deluged it with the blood of her tutelary deities, the high and the best-born, the fierce demons that governed the storm, Marat and Robespiere, Danton and St. Just, were but the familiars of those Titan rebels that sought the destruction of the altar, well knowing that that of the throne must follow their impious success as an inevitable consequence: they acquired just so much of the venom of the latter as added to their natural ferocity sufficed to constitute them the most enormous criminals that ever disgraced and afflicted the earth by their accursed sight, while, the Macchiavals, the real master-demons, chewing in their closets the fatal apple of the tree of knowledge of good and evil which had already cost so much, defied God and man at their leisure and escaped the, oh how well merited! execrations heaped upon their wretched instruments. And France once so redolent of heaven bath been Pandemonium ever since, and to this tremendous declension - the Catholic Priesthood by their wicked and Jesuitical arts and superstitious cheats unconsciously affording them opportunity-nor philosophers heralded her. And one of their most potent artifices wherewith she was and still is blinded to the truth, was drawn from the appearances of this planet, which were impudently said to challenge the veracity or Sacred Writ; and lo! France has no Samson to lift up the standard of truth and to proclaim that she hath believed in a lie. Britain - less confiding than France, and considering the signs of the times wisely so-paused when wild tales militant against the faith were rehearsed in her private ear by the apostles of infidelity, who came from the Continent flushed - with the success that had there attended them. The national genius, essentially suspicious, heard, but refused consent until demonstration should be brought to the assistance of theories which, if incautiously admitted, might lead to irremediable consequences-those in fact which did befall France, and which now imminently threaten Germany also. And then began a few of our philosophers to address themselves to this subject, but, as might have been expected from the novelty of the pursuit, their conceptions of the

science were crude and disorderly. At length, half a century having been thus occupied, it was agreed to found a society, the sole object of which to be the accumulation of geological fact, divested of all hypothesis and self-dependant. This society, the parent of many similar ones founded in several of the provinces, owes its Origin to the exertions of some half-persons and to his late Majesty, and may, yet, redeem the cause of sound principle and assist in the triumph of pure religion. Its income-I speak of the Geological Society of London- its income very considerable and still increasing, its officers genera1ly men of high station in the social and literary world, and with the good wishes - nay. the patronage of government, what should hinder its usefulness? Its "Transactions""- the records of its labours - published to the world and the high example of its members, must have a salutary effect, and when the time arrives for the summing up of the great evidences that it has gathered together, if faithful to its purpose the whole world will abide the issue in silent expectation.

This Society was the remote cause of the book I now commend to my reader's indulgence, and since I am by no means sanguine of his praise I must acquaint him with the disadvantages under which it was written, that if it should unfortunately incur his censure, he may know how to qualify it at the least if not to forego its expression altogether. The Collection of which it treats - of the chief specimens of which my plates are well descriptive - weighs more than twenty tons, occupies a superficies of two hundred feet by twenty, and, in pretension of every sort, transcends all the collections in the world. The suspicion of egotism is contemptible-the reader will understand me when I tell him that the sight of about a tenth part of this Collection, which I brought to London two years ago, surprised and delighted so much the most distinguished geologists of our time that I was encouraged to humour my oryctological hobby until it secured me, the most valuable aggregation of fossil organic remains extant. This stupendous treasure was gathered by me from every part of England arranged, and its multitudinous features elaborated from the hard limestone by my own hands. A tyro in collecting at twelve years of age, I then boasted of all the antiques that were come-at-able in my neighbourhood, but finding that every body beat my cabinet of coins and pottery I addressed myself to worm-eaten books and at last to fossils. And such was the intensity of my pursuit of them and such the carelessness of my natural guardians in respect to my education, that my ardour and a liberal allowance of money secured me a very fine collection before I numbered twenty summers and winters, when I came into possession of my father's household-gods, to which I was a stranger until his demise. From that time to the present my inclinations, following the same channel, have earned me from one mental pleasure and study to another in, such rapid succession that I have had scarce time to think much less to study. Therefore, the volume now before the reader has but modest claim,-indeed, the title anticipates it-memoir signifying a familiar exposition of one's own ideas in a latitudinarian degree,-and is sufficiently descriptive of the thing proposed-the assemblage of facts relative to Ichthyosauri and Plesiosauri, merely. To this end I had but to study their remains as an anatomist, and, if I may boast, that branch of science has not been neglected by me, and to watch vigilantly the progress of my plates, which are, after all that is said, the best interpreters of the original matter, if carefully examined. But the determination of the most remarkable individual difference, by which the species should be known, devolved upon me - a serious responsibility as the genera had their historians but having ascertained their consent to my views upon the subject, for Messrs. Conybeare and De la Beche published their's during the infancy of our acquaintance with these extraordinary creatures, I at once referred it to the extremities.

Naturalists wonder, if they bear not in mind the peculiar difficulties that encounter the sauriologist when he grapples subjects of this kind. The object - excessively rare - comes before him divested of the properties of living animals; he sees but the osseous relics of beings that, without analogue in the present creation, set all common methods of reason at defiance and leave him no choice but the exercise of opinion or its abnegation. Now, mark the consequences of the latter postulate; the question sent a-begging returns with a Babel of answers and is consigned with the good and bad company it has picked up to oblivion, while the mover of it, tacking the name of one of his friends to the generic appellation lays the flattering unction to his own and another's soul at the same moment that he betrays science. This, the records of

extinguished times and things are interpolated with the first fleeting accidents of our own. - in the same spirit as ignorant Monkey painted on his missal the Jewish virgin in the habit of

a nun, and the disciples as shaven and hooded like himself. So critical a dilema must plead for my temerity, and I trust my reader will believe that I should be the first to forego for better distinctions the poor credit of my own, which will, nevertheless, vindicate until such be substantiated.

Further,I beg the reader to bear in mind that I am no adept author; confined, like the Abyssinian prince, to a world of my own making - for I have enjoyed neither the privilege of a Mentor nor leisure necessary to the acquirement of much worldly wisdom, being engaged from my earliest years in the gratification of that acquisitive organ which understands no motive but curiosity - I speak only the language of the heart. It will offend the fastidious taste; it may even militate against some of the conventional forms which the literary world has agreed to respect, but it bears the imprint of truth and be that the honourable badge of my first solicitude - my sacred care. I make no such apologies by way of mask, no more professions than I fulfil; - that my explanations extenuate such mediocre as may chance on my pages I am excusably solicitous, that I acquire the good opinion of my reader, anxious; these are the simple aspirations of my ambition, the latter the only honour that I covet for my reward.

Old Burlington Street, St. Jame's

TO THE

REV. WILLIAM BUCKLAND, D.D.

V.P.R.S. F.G.S. & L.S.

&C. &C. &C.

THIS BOOK,

OF THE

ICHTHYOSAURUS

IS DEDICATED

IN ACKNOWLEDGEMENT OF THE AUTHOR'S SINCERE REGARD

AND MOST FAITHFUL DEVOTION

PRELIMINARY OBSERVATIONS.

In the beautiful and romantic County of Somerset, west of that part of the Mendip chain of mountains, where stands the venerable City of Wells, and about three or four miles from the once famous Town of Glastonbury, are the villages of Street, Walton, Butleigh-Wootton and Kington. These retired hamlets, possessing the most interesting rural population, are founded upon the lias which constitutes the upper stratum of the richest parts of the County; its fertilizing properties, with many other concurring local causes, producing the most luxurious pasture-land in the kingdom. In all these places, pits or quarries are being wrought continually, and the limestones are universally used for buildings, roads and innumerable other purposes.

Street, Walton and Budeigh-Wootton, imbosomed in lofty elm, command from their happy situation the sides of a gently-rising ridge of hills, which sweep gracefully through a considerable portion of Somerset, the softest and most delightful scenery imaginable. This, with the truly unsophisticated manners of their good-looking and hospitable inhabitants, must render them objects of as much pleasurable attention to the intellectual tourist, as to the lover of nature's mysteries.

They were the sites of Roman habitations, for numerous tesser&ælig; and pieces of pottery, with fragments of altars and coins, have been repeatedly ploughed up in the neighbouring fields. Nor can there be any doubt that these invaders availed themselves of the limestone, ,which abounded here , for their villas, and for making mortar. However, it does not appear that they dug pits, but merely collected the rubbly debris which lay scattered over the surface of the country.

To defend their newly-acquired territory from the fierce aborigines and to prosecute the important mines of lapis-calaminaris, lead and manganese - the chief fruits of their conquest - in the bleak, Mendip, was their necessary care during the first years which followed their successful invasion. This constant occupation of their minds and the alluvium and sub-marl, prevented a discovery of the lias treasure: therefore their dwellings were composed for the most part of brick, and some oolite brought from the vicinage of Bath. Even when the natives had entirely submitted to their yoke and they were able to cultivate the higher aims of human ambition in security, we note that the individuals whose wealth

and rank were distinguished, carried their predilection for every thing Roman to an excessive degree; expensive floors for their baths and banqueting rooms with every other

Italan luxury, being extensively imported in return for the invaluable minerals so indefatigably sought after in this hyper-borean region, by these masters of the world.

After the departure of the Romans the arts and sciences, it is well known, rapidly declined, until the religious establishments, most opportunely, afforded them a precarious shelter from the barbarous incursions of the piratical Picts and of other predatory Northern tribes.

In the darkness which envelopes this page of the scant history of the home of the ancient Cangi, one vast solitary monument of "heaven-born lore," advances its dim - and awful outline before us and reveals to our admiring vision the uses to which the generous and superstitious Saxon, now lord of the land, subjected the capacities of his once-adored earth. The magnificent ruilis of Glastonbury Abbey exhibit solid pieces of lias masonry encased with freestone or oolite, which stretch their giant masses forth as if in defiance of ruthless time, whose utmost malignity has had the only effect of arraying them in the ever-green livery of his minion - the ivy, contrasted, here and there, with the modest crimson-and -yellow wall-flower. All the isolate slender pillars of this renowned abbey, were wrought in the lias and carefully polished. Some of these elegant columns remain entire to this day ; and there was brought to light, in the excavations recently made within the abbey precincts, one of the most delicately executed pieces of elaborate Gothic sculpture that we have ever seen, also of lias, which is supposed to be a part of the grand high altar.

But although these artificers of the seventh and the six following ages, devoted this long-enduring limestone to so many ornamental designs, yet they seem to have had no more idea of converting it to the common services of mav than their classical predecessors. The pictured and many-jointed floor of the Roman vanished, and, in their place, green bull-rushes for the rude hall of the thane, and square tiles, of from eight to twelve inches, with legends and rude figures of animals and foliage traced in a differently coloured earth upon them, were substituted in the churches. Instead of the marble urns and cenotaphs which contained the mouldering ashes, or perpetuated the memory of the great amongst the descendants of the wolf-bred Romulus, we perceive, in the still-surviving temples of that holy religion which overturned their idolatrous worship, the Bath-stone placed upon the grave, with the humble cross, perchance, cut deeply in its scarce resisting bosom. At the lower part of the nave of Saint John's Church, at Glastonbury, are some of these memorials, which no innovating hand has yet disturbed, nor the footsteps of thirty generations of man obliterated.

The catholic clergy who commanded, for so many ages, both the moral and physical powers of their country , persisted, in these parts, in applying the Bath and Stoke-under-Hambton stone to almost every ecclesiastical purpose, until their better acquaintance with the Papal States taught them the greater value of marble, in which are carved some effigies that adorn our cathedrals and private chapels.

It is not until the beginning of the sixteenth century that we authenticate the dedication of the lias to the ordinary uses for which it is new deemed so proper a subject. The octagonal building called the "Abbot's kitchen" at Glastonbury, which continues perfect to this day and is likely to, remain so for a thousand years to come, is composed of lias, except the roof and some key-stones to the arches and doorways, which are of oolite. Tradition tells us, that the eighth and last Harry, seeking an excuse for the tyrannical measures wherewith he designed to punish the turbulent hierarchy of the times, intimated to the abbot his disapprobation of the licentious practices of his fraternity and even threatened to burn to the ground his refectory, notorious, probably, for feastings of no very priestly pretension. The highly incensed father, unable to brook such atrocious insult, for the charters of preceding kings had granted such illimitable power to the abbacy that " the crowned head may not tread upon his domain until leave craved and given," swore by the Pope of Rome, that he would erect such a one as neither the monarch- nor satan himself should be able to destroy. He performed his vow, and the result of it is one of the. most curious relics which the expiring spirit of the fallen church bequeathed to future ages, three hundred years ago.

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From this period, the art of stone masonry gradually advanced, and within the last forty years the demand for stone has constantly increased. The lias is now likely to become even a yet mere important subject of speculation, by reason of the making a canal, which commences in the immediate neighbour hood of the quarries, to communicate with the Bristol Channel.

A few years age our youthful attention was directed to the lias quarries in the vicinity of Edgarly, in consequence of some strange reports. It was said that the bones of infants and giants had, at distant intervals of time, been found in them, and upon inquiry we ascertained that this notion was general amongst the workmen.

A Mr. Moon for a long time collected such remains as were found there, but these were of little consideration; and he had not disabused the men of their gross mistake concerning them.

Better aware of their importance, we seized every opportunity to convince the good-natured but unthinking fellows of the value we held them in. By dint of persuasion and bribes some of them were persuaded to respect the bones they chanced to find, but there is reason to apprehend that the hateful Moloch of ignorance had his costly sacrifices despite our most strenuous endeavours.

At last, having endured the folly of these wise-acres a cruel time, a happy accident secured to us in perpetuity both the good-will of the operatives and all their discoveries. Calling one summer day at a quarry in the village of Street, we beheld a man on the point of destroying an inferior jaw of a Plesiosaurus:-there was a moment's time, twas enough, his upraised arm was arrested and the specimen saved. For this fragment we gave him so much money that he generously offered us his hearty services, which effecting the result above mentioned, consummated our ardent wishes.

A few days after, to our unspeakable delight, we dug an Ichthyosaurus from a. quarry at Walton. Since then, good fortune has secured to our cabinets (for the information of the general world we tell it,) every fossil organic remain, that has been found within the range of the lias in, Somerset; moreover, the chief specimens of the other localities of the kingdom, where that rock is developed, have journeyed to them ;-these united are the integral foundation upon which this history is based.

OF THE LIAS

The lias, situated between the red marl of the New Red Sandstone Formation and the inferior oolite of the Oolitic Formation, is an argillo-calcareous deposit, which, although it passes into the rocks both below and above it, presents us with such mineralogical and zoological characters as render it difficult of decision to which (if to either) it belongs. It appears in France, Germany and many other parts of the west of Europe, distinguished in the several places by differences in the aggregation of its components, but presenting to the geologist such a general uniformity of feature as to assure him that the laws productive of its creation, were but little affected throughout their universal operation.

But leaving all consideration of the lias as demonstrated on the Continent (the facts relative to which are however nearly parallel to those we record; thus we learn from the various authors who have

treated the subject,) we attempt a description of it as known in England, and, adopting the advice of "the father of English geology," Mr. William Smith, divide it into five regions.

The first, in the descending order, may be appropriately called the alum shale of the lias series, because of the preponderance of aluminous matter over the other metallic constituents. Indeed, to such a degree is this portion of the deposit impregnated with it, that for a long time many tons have been, year by year, extracted from the schist upon the Whitby Coast; and further, by an ingenious process lately brought to pass, enormous quantities of the sulphate of magnesia are precipitated from the residuum. This shale, which is laminated and usually horizontal, containing above much pyritaceous and sulphureous matter and some

selenite, may average from eighty to a hundred feet in depth. We saw, about five miles from the Borough of Whitby, smoke issuing from a large cliff, which, capped with oolite, had toppled down, overwhelming some of the works and habitations of the manufacturers. This combustion followed the absorption of the sea-water used in the pits for purifying the alum, and the rain which descended through the enormous fissures made by so tremendous a dislocation. Years must elapse ere the fire ceases, and, were we inclined to be curious, we might even contemplate the period when the whole coast, having been ignited by some such causes, will present an active volcanic chain.

Our oryctological researches in this division of the lias, acquainted us with some ammonites, having an infinite number of septæ and concentric rings. We also gathered vertebræ of the Ichthyosaurus, and were inforemd by the labourers there that exuviæ of the crocodile were occasionally found in the inferior portion of the shale. To these add thousands and thousands of belemnites, those most extraordinary of all the ancient mollusca-of many peculiar fashions, and here and there a claw,-head-abdomen and tail,-wrecks of the once much limited class Crustacea.

The presence in the alum schist of crocodilian remains, and we venture to say some fresh-water shells and boulder-stones, clearly prove the embouchure of a lake or river; if we reflect upon the great area occupied by this deposit, the width of which exceeds twenty-eight miles, and bear in mind that these fluviatile or lacustrine relics are distributed throughout, how specious and imposing the ideas present with us of a vast continent, sending forth a mighty stream the solitary haunt of these voracious reptiles. Again, jet, awhile imagined to be of vegetable production, found in the interior beds, though sparely. indicating the sterility of this lonely terrene,-and the presence of ores and petroleum, Plutonian effects, cause us to dream of horrid convulsions in the earths entrails and give the last finish to the ghastly picture we have presumed to draw.

We describe the second division, which may be called the marl-stone of the lias series; here we would remark that so much of it as is developed at Whitby accords precisely with its equivalent of the Tor Hill at Glastonbury, (a distance of more than three hundred miles,) where the whole of it is revealed. And a most interesting fact offers itself, affording other powerful authority For the opinion we express upon the circumstances attending the Formation of the preceding stratum:-this marl-stone of the Tor Hill assimilates with the lowermost part of the arcliaceous deposit which intervenes between it and the inferior oolitc, and the combination occurred so naturally and directly that the trochii, sometime considered of the same epoch with the latter, have been seen by us to occupy individually both rocks; nor has terrestrial or fresh-water monument of animated nature ever been detected in either of them.

Reverting to the description of the marl-stone, we desire the reader to imagine beds of rubbly lias, containing myriads of ammonites, belemnites, gryphæ and terebratulæ, with layers of highly crystallized limestones of great thickness and eccentric fracture, having, with the shells just enumerated, junks of calcareous and spathose wood, scaphites, plagiostoma, ostr&ælig;, and pectens, with traces of pentacrinites and gigantic saurians. Then, seeking at Lyme Regis, as preferable to the foot of the Tor, for the inferior seams of this marl-stone, we find beds of quasi blue marl with here and there a stratum of stone-dull coloured and clayey; also some boulders of a lamellar structure, containing, haply, ammonites and fish. And here is the remarkable pentacrinal family, of which this marl-stone may be said to be the special

charnel-house; and it appears that some of the numerous species, born with it, died there when other accidents fell out; these were young races perhaps, which not having time for colonization, met with a common fate, in consequence of the invasion of their circumscribed territory by mishaps of local character. Fish-that beautiful one called the dapedium politum,-defensive fin-bones, palates, crustacea and echinodemata a few,-and some shells have also been found in it.

The third of the series is blue-marl,-blue, verily; having scarce a type of lime-stone, except indurated clay of an irregular fracture and some concretionary nodules may be so considered. The blue-marl of Lyme-Regis, fifty feet or even more in depth, is strongly impregnated with alumina and other metallic earths. Layers of sulphate of lime of a coniferous construction, from a millimeter to an inch in thickness, are sometimes seen. The novel thing-peculiar to the blue-marl designated Cupid's wing, Briarean pentacrinite and ammonites are generally coated with a brilliant sulphite. Other bodies also of unthought shape, called mushrooms from their exact resemblance to agarici, distinguish it.

The same constitution, mineral and zoological, belongs to the blue-marl both at Glastonbury and Lyme: and it is worthy of remark that at neither place have saurian bones been found in it. We carefully examined vast quantities of this marl in expectation of their discovery but in vain, and Miss Anning adds to our her own accordant testimony. Nevertheless, as the blue-marl is an essential member of the lias series, we doubt not but that Ichthyosauri and Plesiosauri lived where its deposition occurred; they had probably timely warning to escape the troubled waters ere they were charged to a fatal degree with those properties which visited the great zoophital tribe of the hundred-arms pentacrinite with universal destruction: capable of little locomotion the destruction of these was inevitable, but nature-grieved at the premature extinction of such exquisitely-Formed beings-enshrined their remains n a golden pall and so perpetuated them to a later day than any of proud Egypt's Taricheutian memorials are destined to boast.

The nodules spoken of above, have organic reliquæ enclosed in them frequently. Some of them contain a nucleus so like the saurian copros that we ascertain their mineralogical structure but by the most severe scrutiny; These are invariably septarian.

The limestones compose the fourth section: the inestimable treasury of the most splendid epoch in the records ot the planet-ante-human. Deposited in a fathomless occan, the stern universality of which was only marred by the sombrous sand-bank as of yesterday's creation, they perpetuate the characters ol the things that were:-figures so much stranger than those of fiction that man, gazing upon them, doubted their import, and-oh, the monstrous creatures of his vain reverie.

But the immortal mind, progressing to infinity has at length comprehended some of the surviving wrecks of the olden realities, and their admirable constructions reveal,-instead of the unclouth phantasms that bewilderd the inquirer of yore,-the earliest essays of the Ineffable First Cause in the stupendous but all-harmonious chain of effects.

The globe, sweltering with the intense heat that its primitive revolution in space generated, was a fitting habitation for the cold-blooded reptiles, whose day and generation-hid in the AGE before ages- may not computed by us finite. In the crust-the external covering of the mighty frame,-in the lias limestones are exhibited the most fascinating oryctological features. Ichthyosauri, fish-molluscous and vertebrate,-which delighted in the depths of the deep sea; Ferns and banana-like trees that flourished in the slimy marsh or fringed the sunny lagoon and estuary where preyed the wondrous Plesiosauri. The ptero-dactyle too, that paradox which, uniting some of the most specilfic distinctions of the saurian head with a bird-and-bat-like conformation of body and extremities, has given rise to vagaries ef thought as uncertain as the sombre twilight of the ungarnished and desolalte world which echoed to the flapping of its leathern wings. They have ceased from off the face of the earth: inexorable time long since extinguished the last of their race and all that survives of these once grim and omnipetent aborigines are a few crushed bones as unsightly as they are rare.

At Lyme, where the deposition of the lias was more uncertain, it being accelerated or retarded according to circumstances, there are whole strata of stone devoted to the prescervation of one or another

race of animals exclusive of every other. We noticed an irregular layer, about a foot thick, literally full of ammonites:-their ill preservation implies the action of corrosive acids which may have affected the simultaneous death of the creatures that inhabited them. Another bed - marl - contains endless echinal fragments.

But the reader needs to be told that the subjects of our plates were acquired from the lias limestones, and we have occasion to add only the following admeasurements of such of them as are wrought in Somerset, and of a section on the coast of Dorset:-

KINGTON . . 4 miles from . . STREET

Quarries

	North		South		Creeses		Simm's	
	f t	I n	F t	I n	F t	i n	f t	i n
Clay	2	6						
Limestone (5 or 6 beds, rubbly)	1	3						
Do. . . . . (do.)	0	1 ½						
Marl	1	6						
Limestone	0	4						

Marl	1	6			3	0	1	0	Alluvium and clay
Alluvial Soil			1	5	0	8	0	8	Limestone (yellow)
Limestone (irregular stratum)			0	5	3	6	3	6	Marl (grey and friable)
Do. (blue color)	0	2 ½	0	2 ½	0	6	0	6	Limestone (blue)
					0	4	0	3	Marl
Do.	0	7	0	7	0	7	0	7	Limestone
					0	6	0	6	Marl
Do. (one or more strata, but occasionally marl)	0	6	0	6	0	5	0	5	Limestone
					0	2	0	3	Marl
					0	4	0	3 ½	Limestone (irregular)
Do. (generally 3 beds)	0	3	0	3	0	6	0	6	Marl
					0	4	0	4	Limestone (whitey color)
Do. (whitey color)	0	4	0	4	0	1	0	1	Marl (blue)
Do. (do.)	0	3	0	3	0	3 ½	0	3 ½	Limestone
Do. (3 or 4 beds occasionally)	0	1 1	0	1 1	0	1 0	0	8	Marl
					0	6	0	6	Limestone
Do (red color, full of pyrites)	0	4 ½	0	4 ½	0	3	0	3	Do. (red color)
Do. (black do.)	0	2	0	2	0	4	0	4	Do. (black do.)
Do. (do.)	0	3	0	3	0	2	0	2	Marl (blue do.)
Marl (do.)	0	1	0	1	0	6	0	6	Limestone (do.)
Limestone (do.)	0	3 ½	0	3 ½	0	2 ½	0	2	Marl (do.)
Do.	0	2 ½	0	2 ½	0	4	0	4	Limestone
Do. (sometimes 2 beds)	0	4	0	4	0	4	0	4	Marl
Marl (occasionally)	0	0 ½	0	0 ½					
Limestone (blue color)	0	6	0	6	0	1 0½	0	1 0½	Limestone (bue color)
					1	0	0	1 0	Marl (do.)
Do. (do.)	0	2	0	2	0	1 0	0	1 0	Limestone
					0	2	0	2	Do. (irregular)
Marl (do.)	0	1 ½	0	1 ½	0	3	0	3	Do.
Limestone (do.)	0	4 ½	0	4 ½	0	4	0	4	Do.
Do.	0	2	0	2	0	4	0	4	Do.
Do.	0	5 ½	0	5 ½	0	3 ½	0	3	Do.
Marl	0	1	0	1	0	3	0	3	Do.
Total Depth	1 3	1 0½	8	7	1 9<	0	1 6	7	

LYME-REGIS, FORTY MILES FROM STREET

SECTION EAST OF THE CHURCH CLIFF

	ft	in
Marl (indurated)	0	6
Limestones	0	4
Marl	0	8
Limestone	1	0
Marl	2	6
Limestone	1	0
Marl	0	8
Limestone	0	6
Marl	8	0
Limestone	0	8
Marl	0	6
Limestone	0	7
Marl	1	2
Limestone	0	4
Marl (with indurated layers)	3	0
Limestone	1	0
Marl	0	2
Limestone	0	3
Marl	3	6
Limestone	0	8
Marl	1	6
Limestone	0	6
Total depth	29	0

Of the last in the series-the black-marl, such colour being occasioned, for the most part, by the bitumen which impregnates it, we have to remark that the organic remains incident to it differ little from those of the limestones. Yet certain vegetable rarities, in the Misses Philpots' collection, obtained from the black-marl, are so unlike those of the other divisions, that they deserve the especial attention of naturalists.

We have now to notice or the]ins a number of limestones and marly seams, called white lias, which are of too uncertain existence and position in reference to the series to have claim of regular relationship with them They lie sometimes upon at other underneath the blue limestones, and are of various sizes. Their appearance at Pinney Cliff, near Lyme, and at Hatch Beauchamp, some twenty miles distant, is singularly opposite. At the former place they are of coarse texture, uneven surface, abounding with perforations uniformly perpendicular, and with pebble-like concretions at the latter of smooth and perfect grain and true level. At Lyme affording turrilites and bivalve shells, - utterly destitute of such and all other organized relics at Hatch. Both, we hesitate not to say, belong to the same time and cause; the first were deposited at the instant of it violent volcanic eruption, - and owe their vacuities to caloric; the last quietly settled in a spot more distant from the seat of action.

CHAPTER I

THE HISTORY OF THE

ICHTHYOSAURI

Dispersed amongst the writings of many an author of ancient time, we have handed down to us singular notices of bones and skeletons, found in " the bowels of the earth," which were referred to that hypothetic era, when giants of huge dimension, " who warred against high heaven," had. existence. Many a passage could we cite, ill which is recorded the fact that, at such a time and place, bones or superhuman size were dug out of the ground.

Moderns, to whom the sciences, of mineralogy and zoology at least, are infinitely better known, can hardly picture to their imagination the seriocomic effects which a discovery of this kind must have produced amongst the natural philosophers who lived in past years. Then the gorgeous fictions of the fabled Titans, or the sublime, though sadly adulterated, traditions of the thunder-stricken seraphim and their angel-host, floating across the excited brain of the astounded pagan and the too credulous christian, bewildered the former and terrified the mind of the other, to a degree which transcends all our experience and calculation.

There can be no doubt that some of these remains were of the pachydermata races, - of the megatherium and elephant; but others, there is reason to believe, belonged to the extinct saurian. That singular creature with a unicorn horn, impenetrable mail and defensive dermal fringe, which Mr. Gideon Mantell, has, by the most Herculean labours, brought to light; or rather, to use his own animated language, - " the gigantic megalosaurus and yet more gigantic iguanodon, to whom the groves of palms and arborescent ferns would be mere beds of reeds,"* and the prodigious Ichthyosaurus, must have conveyed to the minds of the commonalty of those days, when geology and its wonders were undreamt of, a panic sufficient to create all the monstrous and vulgar fables, which tell us of hydra a, griffins and horrid dragons.

But we proceed to speak of the more recent history of the Ichthyosauri, and to describe the slow degrees by which it has been brought to its present authentic page.

About twenty years ago, a few bones of this genus, found on that part of the Dorsetshire coast which

* Vide "The Geology of the South-West of England by Gideon Mantell, F.R. S. G. S. &c. &c. Dedicated to his Most Excellent Majesty William the Fourth."

lies between Charmouth and Lyme, were added to the well-known museum of Bullock; they were taken from the middle division of the lias, which had been undermined and cast down by the encroaching sea. The attention of Sir Everard Home being attracted to them, he soon after published some notices of them, and of a head, in the Philosophical Transactions. The analogy which existed between certain of these bones and those of the crocodile, induced Mr. Konig, the curator of mineralogy at the British Museum, to believe it saurian; but the vertebræ and the position of the nasal foramina, indicating an alliance with, the fish tribe, were characters so contradictory le such supposition, that the choice of a name for this astonishing novelty was involved in much difficulty. At length, the term Ichthyosaurus, from the Greek ixhus, a fish, and gaqrs, lizard, was selected by him.

Mr. Johnson, of Bristol, who had many years collected in that neighbourhood, succeeded in ascertaining some very valuable particulars regarding this remain; but to the Rev. Doctor Buckland the announcement of the sternum, "coracoids", scapulas and the clavicles, is due. These discoveries he communicated to Sir Everard, who, in consequence of them and the suggestions afforded him by the doctor, abandoned many of the conclusions to which he had before arrived.

Mr. de la Beche and Colonel Birch, furnished in 1819, some most important specimens from the same locality to the persevering Sir Everard, who ascertained to his great surprise, that the Ichthyosaurus had four extremities.

Sir Everard Home, by the great attention which he paid to this most interesting subject and the demonstrations that he made, secured to himself the merit, if we may use the term, of having first acquainted the world with the being of this entombed fossil and long since annihilated class of reptiles.

Messrs. Conybeare, Buckland, and De la Beche, have done much towards the elucidation of this branch of natural history, to which all the efforts of Sir Everard Home were inadequate, by reason of the insignificant fragments that were submitted to him. These gentlemen, by their assiduous care were soon able to detail with tolerable correctness, a great part of the cranium and jaw, the articulation of some of the ribs and the nature of the dentition.

But although many obligations are owing to the zealous efforts of these justly eminent personages, yet it must never be forgotten how much the exertions of Miss Anning, of Lyme, contributed to assist them. This lady, devoting herself to science, explored the frowning and precipitous cliffs there, when the furious spring-tide conspired with the howling tempest to overthrow them, and rescued from the gaping ocean, sometimes at the peril of her life, the few specimens which originated all the fact and ingenious theories of those persons, whose names must be ever remembered with sentiments of the liveliest gratitude.

The continental sanvants, having no materiel, could only look on, admiring while our countrymen were engaged in these all-absorbing investigations. But, at length, Cuvier, that cosmopolitan of the intellectual world, endeavoured, by his profound work entitled `` Ossemens Fossiles," to deduce, from the evidence which his learned contemporaries had brought together and his own (almost infallible) observations, a perfect anatomical description of both the Ichthyosaurus and the Plesiosaurus: he also ventured some speculations concerning their physiological characters. But the ability even of Cuvier was insufficient to the positive resolution of all the features relating to this paradoxical fish-lizard, because of the imperfect skeletons and writings from whence he abstracted his data. Nevertheless, he assisted our anatomical and physiological acquaintance with this, so long a sphynx-like riddle, and, until more complete specimens could be brought under investigation, placed it beyond the reach of any person to say more about it.

As before stated, the numerous skeletons and fragments that we have collected, grant us confidence to write upon a subject which the master-mind of the celebrated geologist just mentioned, and the others, his coadjutors, have considered over and over again. Let us then solicit the attention of our readers to the description which we hasten to give of the Ichthyosauri.

CHAPTER II

THE SPECIES OF THE

ICHTHYOSAURIAN GENUS.

How well adapted to his airy sphere the feathery bird!-how admirably fitted to its element the fish!-and the beast of the field-! Bird, fish and brute, alike content in the peculiar modes of being, display in their endless variation of form, the operations of nature in so illimitable a degree, that one unbounded sentiment of amaze and pleasure overpowers the soul, and we are lost in adoration of the unsearchable wisdom that designed and created them.

When we survey the countless families of living things; the unwieldy monsters of the Polar Seas, the ferocious quadruped and terrible serpent of the Lybian deserts, the vampyre in search of his murderous repast, and the gaudy butterfly-native of the same Asian clime; terror and delight possess us and we revel with the excited imagination. There is " another glory of the sun and of the moon and of the stars; of the doings in the clouds-thunder, lightning and tempest:-All inspire some joy-giving chord of the human breast, and lead us to the contemplation of

> **" HIM who inhabits eternity,-sitteth upon the circle of the heavens and rides upon the wings of the wind"**

Oh the powers of the understanding, which dwells at the same moment with equal intensity upon an insect and a world! That considers the universe-worlds upon worlds-until, attempting infinity, its wings failing like those of Icarus, it drowns in the vasty deep of its own comparative nothingness. Then the chastened soul seeks her accustomed channels and pensively attempts objects less calculated to confound her; then the mind's mood disposes it to enquire after more particular things, and to find out the circumstances which belong to them.

This is proven in the history of the sciences;-some lone shepherd, pondering the firmament on the moon-lit banks of the Euphrates, first amused himself by associating the stars with the several constellations,-the fruits of his fertile ideas. Upon this slender frame-work successive ages erected their several experience, derived from a more attentive investigation of the celestial hemisphere, when in the lapse of time, a Gailileo, and then a Newton, appears, by whose divinely instructed labours light springs to life, and we learn the language of the heavenly hosts.

How well does the Celtic Scalder tell of the "times of old, the deeds of days of other years,"

> ----------" As flies the inconstant sun over Zarmon's grassy hill, so pass the tales of old along my soul by night. When bards are removed to their place, when harps are hung in Selma's hall, then comes a voice to Ossian and awakes his soul! it is the voice of years that are gone! They roll before me with all their deeds! I seize the tales as they pass, and pour them forth in song." -
>
> ----------"they seem dim to Ossian's eyes like reflected moonbeams on a distant lake. Here rise the red beams of war! There silent dwells a feeble race."
>
> "Stones with heads of moss are there; a stream with foaming course: and dreadful is the dark-red cloud of Loda."

The spirit of music which strung thy harp, 0 " thou breeze of the valley, Huntress or Lutha," yet lives in the story that accompanied it ; we hear "the squally winds around thee from all their echoing hills and shudder as warriors fall like the thistle-head beneath autumnal winds."

These lines - how glowing - luxuriant - and natural. Place the works of our modern bards by them, - compare those of a Byron with them, and who can conceive more polished and refined verses than his. Hence we lament him as though he were the last of the gifted race.

II Who could have believed that sublime song and the great science of astronomy should have associated themselves so intimately with geology, which a century since was unheard of and is but just welcomed to academic shades. Divine poetry has recorded, with a majesty becoming the subject, that

> "In the beginning GOD created the heavens and the earth; which was without form and void: darkness upon the face of the waters. GOD said, Let there be light and there was light."

These and the numbers which follow in the Book of Genesis, reveal the epochs of creative power, and are sufficient of themselves alone to immortalize the Hebrew seer. So the "sweet singer of Israæl," in reference to the deluge, and the guilty antediluvians which it swept from the face of the earth they polluted

> "The LORD thundered from heaven, and the MOST HIGH uttered His voice. And He sent out arrows and scattered them: lightnings, and discomfited them. And the channels of the sea appeared, the foundations of the world were discovered, at the rebuking of the LORD, at the blast of the breath of his nostrils."

Astronomy, wooed by the Babylonian magi upon the dizzy summit of the towel afterwards dedicated to Bel, -by the Hierophant of the Land of Ham in his mystic cavern, and the remote sages. of Continental India and China; -leads us back through immense cycles-through the silent revolutions around the girdled skies of this mundane orb - and pointing to the imperishable memorials of the past consigned to its trust leaves us to study the glorious language of which they are the roots. They are few and mutilated, and geology is yet too young to explain them.

III. The extensive empire she sways is not only ill-defined but badly governed. Every inch of her territory is contested, and the wordy-war which rages around her person serves to mystify her oracles and lessen her authority. Few or the principles of her government have been professed, still fewer are understood. Even the analogies between by-gone and present causes are disputed, -we hear effects attributed by some to fire, by others to water, and it but now happens that a mean is advocated and insisted upon. Let our geological creed, therefore be limited to the instructions and guidance of sacred history and those traditions which, in their uncurbed range, have met with no opponent save the superficial sceptic, to whose cavils they deign no reply: these - of summit far beyond mortal ken, high above the highest quarry of the haughtiest of Adam's sons - repose in immutable truth sure-footed, and agree in concealing the period of the birth of time; - the interval between it and the exhibition of those laws which govern matter, or render it sentient.

Nor do we attach more importance to the much-debated questions concerning spontaneous generation, monads, stocks - one or more of a kind, - but take it for granted that there are types in the

animal kingdom which, although they may nearly approach unto other types, can never be reconciled or assimilated with them under one head. Hence classes, orders, genera and species. True, the gradation is slow and in many instances hardly perceptible; Yet this implies the consummate skill of the ever-to-be-worshipped Creator's purpose, not the evolution by chance from insensate clay of the least apprehensive of intelligencies, - a doctrine as unphilosophical as it is impious.

IV. The Ichthyosaurus, then, unlike all other animals in the general, unites in its skeleton the peculiarities of two classes, so that at its discovery it was immediately decided to he a new genus. With what inquisitive mind did the learned world address itself to the task of elucidating the divisions! - This not being so easy of accomplishment, as was fondly hoped by the majority of speculators, they retired front the self-imposed task in disgust or chagrin, leaving the eminent naturalists whose names adorn our previous page to the undisturbed cogitations or their better genius. These, of the Baconian philosophy, taking heed to every step in their progress to truth, were satisfied to remain in doubt of them until sucn accumulation of fact was effected as would warrant their conclusion.

Months,-even long years came and went still both the youthful and bearded visage of Janus beheld the same patient endurance of toil, of lxion-like fate, from the paucity of materials, is already related : at last the teeth which varied ad infinitum were made to distinguish one species from another.

The differenices founded hereupon were, it must be confessed, of considerable value during our early antagonism with the genus; beat a ten years study at length put us in possession of its long concealed charm. Rejecing the old specific terms, as of two indefinite pretension, comparing the numerous specimens in our collection with one another, we ascertain that the most unique feature of the ichthyosaurus - the paddle - furnishes the best grounds for the true identification of the species which we enumerate:-

1. ICHTHYOSAURUS CHIROLIGOSTINUS, from χειρ, hand ; ολεγος, few; and οστεν, bone.
2. ICHTHYOSAURUS CHIROPOLYOSTINUS from ;χειρ, hand; πολνσ, many ;and ;οστεν, bone.
3. ICHTHYOSAURUS CHIROSTRONGULOSTINUS, from ;χειρ, hand ; στρογγνλοσ, round; and οστεν, bone.
4. ICHTHYOSAURUS CHIROPARAMEKOSTINUS, from ;χειρ, hand; παραμηκησ, oblong; and οστεν, bone

In the month of July, 1832, Miss Anning obtained from the indurated marl of the lias limestones near the Church at Lyme, part of the head or the Chiroligostinus figured in the third plate. Happening to arrive at Lyme the same day, I was fortunate in averting myself of the specimen. Accompanying Miss Anning the next morning to the beach, she pointed out to me the place whence it was brought. Persuaded that the other portion of the skeleton must be there, I advised its extrication, if it were possible, but Miss Aiming had so little faith in my opinion, that she assured me I was a liberty to examine its propriety or otherwise for myself. Hereupon I waited upon Mr. Edwards, the owner of the land, and requested permission to throw down as much of the cliff as was necessary for such intention, which he very handsomely allowed me to do.

If our reader knows Lyme he will remember that four or five hundred yards of the coast from the Borough eastward has an elevation of from sixty to a hundred feet above high-water mark, and that a bed of diluvial gravel conceals the blue-marl of the lias from observation, except in those places where the rain has ploughed itself a channel towards the sea. At this spot was seen two or three years ago a kind of peninsular rock, which had long defied the fury of the destructive current that a south-wester invariably propelled against it from the cob. There it abutted upon the angry waves, reft of its gravelly covering by the storm, with its grey sides slowly crumbling beneath the frost and saline atmosphere; but its foundations sound and unmoved.

Nature seems to have made this depository of the chef d'oevre of her ancient régime for here was the Chiroligostinus, her especial care, as had not the lias which composed it been more crystalline than is usual with that locality, it must have yielded to the Tidal action, and so have sacrificed the previous charge it bore. But that venerable though tiny promontory is no more. What the warring elements failed in, curiosity achieves: the hand of man came upon it, and it departed like a shadow.

The sun rose bright on the 26th day of July, 32, and the morning mists were hardly rolled from the hill's side ere many men busily engage with spade and pick-axe to humble the doomed summit of this cliff. Progress was also made on the following day, when people from the adjacent country flocked to witness the execution of a purpose which seemed to stagger their faith in our rationality. By next day's noon twenty thousand loads of earth, cast from the crown of the rock, constitute a good road-way to the beach from that part of it to which we had dug, and a few minutes more suffice to demonstrate the wonderful remain I tell of. Who can describe my transport at the sight of the colossus! My eyes the first which beheld it! - who shall ever see them lit up with the same unmitigated enthusiasm again! And I verily believe that the uncultivated bosoms of the working-men were seized with the same contagious feeling for they and the surrounding spectators waved their hats to an hurra, that made hill and mossy dell echoing ring.

And the rippled waters all sparkling and blue
Of the hushed yet stern and mighty sea
The cradle of petrel and stormy curlew
Reflected a bright and more beautiful hue
As with baffled old Time we made holiday.
And the high - high heaven, green ocean and earth
Rejoiced while of Time we made mockery and mirth.

And the dreamy shadows of things that had been
The fondled and petted of Time when young,
That had occupance first of this færy terrene
With the recent race of mankind they convene
And of worshipful Nature murmuring sung.
And of Time we made sport with the spirits of yore
Which flickered and flashed by that sun-shiny shore.

Ah but the tug of war - the bones with the marl in which they lay, broke into small fragments, so that I almost despaired of their re-union; albeit, with the kind assistance of Miss Anning, the whole of them were packed, and by night-fall the last heavy box-full was deposited in a place of safety. So secured, the skeleton and its matrix weighed a ton.

It arrived at my house the 1st of August, at six o'clock in the morning, and the whole of this day was occupied in unpacking and displacing in their proper places as well as I could, the dreadfully numerous pieces. I shall never forget the intense heat of the following fortnight during which time, the Sabbath excepted, I was engaged from day-light to dark-night in developing it. The heat did I say,- yea, the heat of the blessed sun, for by that was dried, against the brick-walls of my work-house the Acacian gum with which l succeeded in reintegrating it. Had not this warm weather fallen out all my pains must have been abortive, as from the angular fractures into which the specimen fell, and many other causes, it could not have been consolidated by common fire.

Having indulged in so much detail respecting this most magnificent organic remain, I cannot but advert to its subsequent history. When my manual labours terminated, it counted almost six hundred pieces, some of which were so brittle that it was dangerous to touch them. These a trusty Lucchese, under my especial directions, fixed in sulphate of lime of which thirty hundred pounds were used, in a case that weighed half a ton.

THE

ICHTHYOSAURUS CHIROLIGOSTINUS.

The number of bones that compose the skeleton of the Ichthyosaurus Chiroligostinus, drawn plate III, is about five hundred and twenty. They are divided into those of the Head, Truck and Extremities. In size these bones differ considerably, and their fibrous reticulated centres are filled with bituminous, siliceous and calcareous matter, that has preserved them for so many lengthened years. Their density was very dissimilar,-the flat, oblong and polygonal bones of the paddles being the most arcolated.

The distance between the posterior extremities and the bones of the pelvis was occupied by a cartilaginous epiphysis; this I note here lo explain that the subject of the plate died when very young.

THE HEAD

The bones which compose the head, otherwise called the superior jaw, cranium and inferior jaw, of the Chiroligostinus, are,

(SUPERIOR JAW.)
Two Maxillary a. plate II
Two Intermaxilliary b. "
Two Nasal c. "
(CRANIUM)
Two Anterior Frontal d. "
Two Median Frontal e. "
Two Posterior Frontal f. "
Two Jugular g. "
Two Lachrymal h. "
Two Temporal i. "
Two Mastoidean j. "
Two Tympanal k. "
Two Parietal l. "
One Superior Occipital m. "
One Inferior Occipital n. "
Two Lateral Occipital o. "
Two External Occipital p. "
One Sphenoid q. "
Two Pterygoid r. "
Two Palatal s. "
The SCLEROTIC PLATES amount to nineteen
(INFERIOR JAW)
Two Dental t. "
Two Opercular u. "
Two Angular v. "
Two Surrangular w. "
Two Complementary x. "
Two Articular y. "

These forty-seven bones are more or less flat and long, and are principally united together by sutures. Their external surfaces have a smooth face, presenting few irregularities for the attachment of muscles, I now speak of them individually.

THE SUPERIOR JAW.

THE MAXILLARY BONES. a.

These two bones have each an external and an internal surface, a body, and anterior and posterior process. The external surface is convex, with a groove in its inferior part; the internal is concave - divided by a ridge in the middle-and is rounded below. The body is situated beneath the nasal foramina and is thick and strong. The anterior process, which forms the posterior groove for the reception of the teeth, is sharpened to a point at the superior part of the intermaxillaries; the posterior is also acute and terminates at the anterior part of the orbits of the eyes in front of the jugular bones.

Connexion. Behind and above with the lacrymals and jugals, and before to the intermaxillary and palatal bones.

THE INTERMAXILLIARIES. b.

These are by far the largest bones which compose the superior jaw of the Ichthyosaurus. They are separated from one another posteriorly by the nasal bones, form the under edge of the nostrils, and have a deep sulcus throughout the internal and inferior surface for the teeth. Posteriorly they are flattened, but, as they advance forward, grow convex and thick until arriving at the upper third, they again become thin and end in a rounded point. They have numerous foramina for the passage of the dental nerves and arteries.

Connexion. Below and posteriorly they are connected with the maxillary, jugal and lachrymal bones, above and behind with the nasal, within to the palatal hones, and before by a suture to one another.

THE NASAL BONES. c.

The nasal bones are situated under the anterior processes of the median frontals, from which they project downward and forward; they are triangular, have their long axis from above and behind to below and before, and offer a base, two edges and a sharp process. The base is very bifid, flattened and wide; the outer edge is above slightly concave to form the roof of the nostril, the inner is rounded and at its posterior extremity very denticulated.

Connexion. Posteriorly they join the median and anterior frontals and the lachrymals; before the intermaxillaries and width one another.

THE CRANIUM

THE ANTERIOR FRONTALS. d.

At the upper anterior part of the orbits are the two anterior frontals. They are small, with an external concave surface, a posterior acute process, and an anterior thin edge. They have below a sharp nasal process.

Connexion. They are united to the posterior frontals and parietals behind; above to the media frontals and before with the nasal and lachrymal bones.

THE MEDIAN FRONTALS. e.

These two bones are very convex. They have an external convex surface and an internal concave one.

Connexion. Behind by a squamose suture to the parietals, above and within to one another, and before to the anterior frontal and nasal bones.

THE POSTERIOR FRONTALS. f.

Nearly all the posterior part of the orbit is closed by these bones; they are externally convex with deep stri&ælig;, within the orbit rather concave. Their extreme anterior processes, which overlap the anterior frontal and the jugal bones, are rounded and sharp. They have behind an attenuated squamose edge.

Connexion. **Posteriorly with the temporal and mastoidan bones, anteriorly with the jugular and anterior frontal bones, and above with The parietals.**

THE JUGULAR BONES. g.

These inconsiderable bones close the orbit at its interior and posterior part; they are rounded in their middle and end behind in a flattened articular apophysis.

Connexion. **Anteriorly they are connected with the maxillaries, intermaxillaries and lachrymal bones; above and within with the posterior frontal, mastoidean and pterygoidean bones.**

THE LACHRYMALIA. h.

These bones, placed in the anterior part of the orbit, have an interior spinous process, an inner concave surface and an upper and an anterior squamose edge.

Connexion. **Behind and below to the jugular, maxillary and intermaxillary bones, above to the nasal and the anterior frontals.**

THE TEMPORAL BONES. i.

The temporal bones, situated at the side of the cranium, are somewhat triangular and have a thin squamose base externally, an apex and an upper and an under side. They present an outside convex,and an internal concave surface thickly marked with inequalities.

Connexion. **Behind with the tympana and parietalia, below with the mastoides, and before with the posterior frontals**

THE MASTOIDES. j.

These are much smaller bones than the preceding; they have an articular end and a thin denticulated edge at their superior part.

Connexion. **Behind and above to the sphenoid and tympanals and without to the temporals. They also articulate with the external occipital.**

THE TYMPANA. k.

Placed within side of the temporals and the mastoideans and outside the external occipitals are the tympanal bones; they are small, and have an articular base, a thin flat body and a superior squamous edge.

Connexion. **To the internal articular edge of the temporals, to the mastoides and external occipitals.**

THE PARIETAL BONES. l.

These two large bones form the vertex of the cranium, They are externally convex and concave internally. Their sagittal suture is plain and smooth, their anterior one serrated and thin, and the posterior Iengthened out and downward to a denticulated spinous apophysis.

Connexion. **Behind with the superior and external occipitals, before to the median and anterior frontals and without to the temporals**

THE SUPERIOR OCCIPITAL. m

This bone is known by its thick globose body; it forms the posterior paries of the cranium, has an upper and a lower part, and two lateral articulatory surfaces. The upper portion of the superior occipital presents externally a slight convex slope, the lower two articular spinous apophyses, and an

intervening semi-lunar edge for the great foramen, through which the spinal marrow with its membranes and nerves were transmitted.

Connexion. Above it is connected with the parietals, below with the lateral occipitals, and without to the external occipitals.

THE INFERIOR OCCIPITAL. n.

This has like the last bone a very globular form; we divide it into an upper and under surface and an anterior and posterior body or process. The upper part of the inferior occipital has two concave articular portions divided by a ridge, which is grooved at its posterior extremity to support the spinal marrow; the under surface is flattened towards its edges and slopes downward and forward to join the thick body of the sphenoid bone. The anterior body is sharp and triangular, and is firmly wedged between the posterior condlyles of the sphenoid; the posterior part is composed of an enormous tubercle for the articulation of the head with the vertebral column.

*Connexion.*Above with the internal occipitals, below and behind with the atlas, and before with the sphenoid bone.

THE LATERAL OCCIPITALS. o.

These bones are exceedingly strong, in character with the two preceding occipitals; they have an upper and an under articulatory apophysis, a posterior condyloid articulation, and an internal semi-lunar edge to assist in forming the foramen magnum.

Connexion. Above and before to the superior occipital and the external occipital, below to the inferior occipital, and behind to the atlas.

THE EXTERNAL OCCIPITALS. p.

The external occipital bones are not so rounded and strong as the preceding; they have a posterior flattened articular base, and an anterior spinous apophysis.

Connexion. Behind with the lateral and superior occipitals, below and before to the mastoides and tympanal bones.

THE SPHENOID BONE. q.

This bone presents inferiorly a flattened surface, superiorly an irregular one with numerous eminences and depressions to receive the under surface of the lobes of the brain, and two sides. The inferior flattened surface is slightly raised in its centre, and has a groove like that of the inferior occipital, posteriorly. The superior irregular surface has a transverse ridge and a deep longitudinal groove for the division of the cerebrum from the cerebellum and the lodgement of the pituitary gland. The two sides are concave apophyses. To these characteristics we must add a long point, which proceeds forwards from the anterior part of the body to form the perpendicular partition betwecn the orbits.

Connexion. Postoriorly it joins the inferior occipital and mastoides, and behind and at its anterior acute spinous process the pterygoid bones.

THE PTERYGOID BONES. r

The pterygoids proceed from the sides of the sphenoid bone and advance forward in a curve to meet the palatals. They are long, thin and flat.

Connexion. By suture to the palatals anteriorly, posteriorly to the sphenoid and externally to the jugular bones.

THE PALATAL BONES. s.

These, like the pterygoids, are long and flat bones, they commence just under the lachrymals and terminate at the symphitic union of the rami of the interior jaw.

Connexion. Behind to the jugulars and pterygoideans; before to the maxillaries, intermaxillaries and to one another.

THE SCLEROTIC PLATES.

Let the reader refer to the fifth plate.-That superb head, found by Mr. Gleed at Lyme in 1827, has every bone in propriâ positione, and the sclerotic plates with a solitary exception continue in their

natural order and situation. The outer wall numbers thirteen bones, The inner one - disposed like the segment of a circle-six. The thirteen plates-which may be called optical-are thinner at their great circumference than at their inner, towards which some striæ, marks of the powerful muscles of that. region are observable. The six rounded plates lap over the external which are slightly curved to meet them. They were all of amphiarthrodial conjunction.

THE INFERIOR JAW

THE DENTAL BONES. l.

These commence just behind the orbit, advance to form the whole anterior portion of the pointed snout and contain the fossæ for the teeth. They have, like the intermaxillaries of the upper jaw, numerous foramina for the nerves and arteries.

Connexion. Behind and without they are overlapped by the angular bones, between which and their posterior squamose edge is inserted the surrangular; within at their entire anterior part is the opercular in close juxtaposition and behind the complementary and sur-angular. At their anterior fifth they are united by arthrodia.

THE OPERCULARY BONES. u.

The internal part of the interior jaw is composed for the most part by the opercularies which, like the dental bones, terminate in a sharp point before.

Connexion. Without, by a squamose suture, they are connected with the dental bones, before to each other and behind and within to the complementaries, and angulars.

THE ANGULAR BONES. v.

These bones have an inferior external convex surface, an internal concave one, a swollen body and a posterior thin edge.

Connexion. Before with the dental and operculary bones, and behind and within with the sur-angulars.

THE SUR-ANGULARS. w.

The sur-angulars are thick and strong and have a coronoidal process upon their superior surface. In their middle third is a large foramen. Their posterior edge is very jagged and thin.

Connexion. Without to the dental and angular bones, and anteriorly and internally with the complementaries, articulars, and opercular bones.

THE COMPLEMENTARY BONES. x.

These small bones are situated in the middle part of the interior jaw internally; they are elevated at their posterior and are flattened anteriorly.

*Connexion.*Before with the dental and opercular bones and behind with the sur-angular bones.

THE ARTICULAR BONES. y.

These are nearly of the same size as the complementary bones; they have a posterior and an anterior spinous process, and a wide flattened body.

Connexion. With the sur-angulars.

THE TEETH.

The maxillaries, intermaxillaries and dental bones compose the four foss&ælig; in which we find the teeth. These fossæ are longitudinal, commence at the point of the snout, end just behind the anterior

edge of the orbit, and are possessed of round concave depressions and well-marked ridges upon their inferior and lateral surfaces to receive-and support the roots of the teeth. These, according to the age of the animal doubtless, varied from forty to fifty on each side of the superior jaw and from thirty-five to forty-five on the inferior. They are conical in the lower two-thirds, which constitute their alveolar body, are divided by five or six prominent ridges into furrows and hollowed. Their upper enamelled third is compressed, angular and sharpened at its sides and extremity and faintly striated. .

We have figured at the bottom of the sixth plate after nature a rough jaw knocked from the most crystallized layer of the lias limestones of Lyme, in order to show the section of the teeth, which were gradually hollowed or undermined by the young teeth destined to succeed them.

THE HYOIDES. z.

This bone is found upon the head, plate XVIII. It was placed between the upper part of the posterior third of the inferior jaw and has a round body superiorly concave, with a ragged rim surrounding its month. The appendices are long, thin and narrow processes with a curved base for attachment to the body.

THE LARGE CAVITIES IN THE SUPERIOR JAW AND CRANIUM.

THE NASAL FORAMINA.

Seven bones enter into the formation of the cavities of the nose and are placed in the following relative order. The anterior part is formed by the denticulated base of the intermaxillaries, the roof by the upper border of the intermaxillaries and the anterior lower portion of the nasal bones. The floor is produced by the inferior process .it the base of the intermaxillaries, and the posterior border by the squamose edge of the lacrymals. The septum is caused by the spinous process of the pterygoid bones.

The jaw, drawn in the sixth plate-from the village of Walton-preserves the exact shape or the nasal foramen.

THE ORBITS.

These large circular cavities are formed by the lacrymals and the interior frontals before, the anterior and superior spinous process of the posterior frontals above, by the posterior frontals behind, and the jugals below, To these ten bones the sphenoid may be added, the spinous apophysis of which served to divide one orbit front another.

THE FRONTAL FORAMEN.

The median frontals, at their posterior squamose central suture, and the parietals at their median front, compose the frontal cavity, which is large and round.

THE TEMPORAL CAVITIES.

These large foramina are situated behind the orbits. Six bones produce them. The parietals behind, above, and before, and before and below the posterior frontals and temporals.

THE OCCIPITAL FORAMEN.

This hole for the passage of the spinal marrow and its accessories is formed by the semi-lunar base of the superior occipital above, the central ridge on the upper surface of the inferior occipital below, and sideway by the internal edges of the lateral occipitals.

THE TRUNK.

The second division of the skeleton is subdivided into the spinal column, the sternum, the ribs and the pelvis.

THE SPINAL COLUMN.

In the Ichthyosaurus Chiroligostinus the spinal column is composed of about one hundred and fifty vertebræ. Except a few bones of the tail, each vertebra has a body, which constitutes the principal part of the bone, with a rounded anterior and posterior circumference; an arch formed by two processes for the spinal marrow, and articulatory processes with notches above and below them for the passage of nerves from the medullary chord. These are common characteristics, but as they differ very much from one another in detail, we divide the spinal column into the dorsal and caudal regions.

THE D0RSAL VERTEBRAE.

The atlas, the first dorsal vertebra, differs from the rest in the manner of its articulation with the inferior occipital bone or the cranium, the shape of its spinous process and non-possession of artictulatory stiffness, for it lias no ribs. Our readers win remember that the tubercle of the inferior occipital is large and round; this is received into the anterior concave surface of the atlas - the posterior paries of which, unlike those of in the other vertebræ, is flat for synarthrodial attachment with the dentatus The superior and inferior surfaces of its body are flattened, as are its sides also, the spinous process has two scarcely visible articulatory surfaces to meet those of the lateral occipitals, and its arch for the spinal chord is exceedingly large; its extremity is tubercular.

The other dorsal vertebræ, distinguished by their articular surfaces for the attachment of ribs, are forty-four; they constitute the superior boundary or the thoracic and abdominal cavities. Of these the first ten have upper and lower flattened surfaces to their bodies, as has the atlas, the next twenty are very concave both without and beneath after which they become more and more flat.

The anterior dorsal vertebræ to the number of twenty-two, exclusive of the atlas, may be known from the others by two articular fossæ for the ribs on each of their sides; the remaining vertebræ having but one which, instead of being rounded in a perfect circle as in the former, is degenerated into a mere grove passing from before to behind.

The spinous processes have two anterior and posterior transverse apophyses for articulation with one another. The median spine is oblong and thin with acute edges and a flattened head. In height they are nearly equal to the long axis of the body of the vertebra to which they individually belong, and in breadth equal to their transverse diameter.

THE CAUDAL VERTEBRAE

These, which amount to about one hundred and twelve, have larger bodies in their sacral province than the dorsal vertebræ. The first ninety of these caudal vertebræ have transverse apophyses instead of ribs, which articulate in concave fossæ. These spines have round heads, long, slender, and narrow bodies, and flat, wide and thin extremities convexly curved. They grow less and less with the bodies to which they belong as the tail approaches to a point. The other twenty-two vertebræ are more square than their predecessors; the lateral processes, which commenced with the pelvic portion, -and the spinous apophyses distinguish ,about two-thirds of their number. Those that remain have a simple body with flattened sides and a slightly concave surface superiorly.

THE STERNUM. a a.

The sternum is composed of a median bone, with a thick rounded body, two lateral processes anteriorly, each ending in a thin point, and an ensiform base, and another bone which, spreading on both paries of the thoracic region, rests its attenuated portion upon the anterior edge of the clavicles.

THE RIBS.

The forty-our ribs on each side of the abdomen are attached superiorly to the dorsal vertebræ. The anterior twenty-two have a thicker and stronger head than the others and two convex articular surfaces for the concave tubercles of the vertebræ to which they belong; they are grooved in the upper two-thirds of their long diameter and have rounded anterior and posterior edges.

The remaining ribs articulate by one hollow tubercle to the vertebræ and have flattened head and a sharpened termination .

THE STERNO-COSTAL ARCS OR INTER-ARTICULAR RIBS.

These are twenty-two in number. Each arc is composed of five bones. The central rib is round and strong at its median portion and declines on either side until it ends in a point, which slides upon a groove formed by the two external bones:- these again support the interior extremities of the anterior twenty-two ribs which, as in the former instance, slide upon the groove at their superior part, The most anterior arc rests occasionally against the posterior edge of the scapular bones.

THE PELVIS.

The bones which constitute the pelvis are six - the ilia, ischia and pubes. They form the cavity for the acetabulum in which the femur articulates.

THE ILIA. b.

The ilia are the largest and highest in situation of the bones that form the pelvis. They have a body and an expanded portion . The body is the lower part of the ilia, and ends in an articular surface ; from this portion or the bone its expanded surface passes upwards and terminates in a semi-lunar edge, which presents an external convex and an internal concave surface. The ilia are striated longitudinally in their upper half .

***Connexion.*With the pubes and ischia at their articular body, and with the sacral vertebræ by ligament.**

THE ISCHIA. c.

These bones are situated at the posterior and inferior region or the pelvis; they have a body , and a descending expanded portion . The body is furnished above with an articular surface which constitutes the back part of the acetabulum. The descending expanded portion ends in a convex ridge.

***Connexion.*Above with the ilia and pubes, below with each other and the pubes.**

THE PUBES. d.

These are also divided into a body and a descending expanded portion. The body is the thickest part of the bone, and is furnished with an articular extremity at its femoral part; this constitutes the interior, and inner part of the acetabulum. The interior convex edges of the descending expanded portion compose, with those of the ilia, the anterior brim of the pelvis.

***Connexion.*The pubes are attached superiorly to the ilia and ischia, and inferiorly and anteriorly to the ischia, and one another.**

THE EXTREMITIES.

The extremities form the third great division of the skeleton, and are called anterior and posterior. The upper and anterior extremities are attached to the trunk by the clavicles and scapulæ. For distinctness sake we call the bones that enter into their composition the shoulder, arm, forearm and paddle

THE SHOULDER.

Two bones compose the shoulder, namely, the scapula and clavicle.

THE SCAPULA.e .

This bone is flat and somewhat triangular; it is situated at the exterior edge of the body of the median sternal bone and has a head, neck, and an inferior flattened surface. The head has concave articular surfaces presenting within them deep fossæ for the reception of tendons; it is ovular and stronger above than below. The neck is rounded and gradually swells out into the flattened inferior surface of the bone, which offers at its inner edge all articular surface to that of the other scapula; at its interior surface is a groove for the insertion of the lateral apophysis of the central sternal bone.

***Connexion.*Behind and above with the humerus and clavicle, within to its fellow, before to the sternum, and below with the anterior sternal arc occasionally.**

Plate the fourth, representing a noble fragment of the Chiroligostinus discovered by Miss Anning in 32, which I transferred to the collection of my friend Henry Thomas Maire Witham, Esquire, &c. &c. of Bough Hall and Edinboro', demonstrates the scapulæ nearly in their proper places.

THE CLAVICLE. f

The clavicle is a long cylindrical bone, situated at the upper part of the thoracic cavity. It is divided into a body, a sternal , and a scapular extremity. The body enlarges as it extends upwards, and is slightly convex externally, within concave. The sternal extremity is the thinnest part of the bone and has an articular surface ; the scapular has its long axis from before to behind, and two articular concavities.

***Connexion.* Behind and below with the humerus, before with the scapula and above and anteriorly with the sternal arch**

THE ARM. g.

The arm or humerus is the largest and strongest bone in Ichthyosauri, and is divided into a body, and two extremities . The upper part of the body is rough and rounded, on its superior surface is a groove for the insertion of muscle; at its sides and towards its lower extremity it is flattened. The superior. extremity fills the glenoid cavity formed by the scapula and clavicle; it is greatly tuberculated at its circumference. The posterior extremity offers two articular fossæ for the bones of the fore-arm.

***Connexion.* Anteriorly with the scapula and clavicle, posteriorly with the radius and ulna.**

THE FORE-ARM

The fore arm is composed of the radius (h) and the ulna (n . The radius is a flat bone of four edges, three of which are articular. Its external and non-articular edge is thin, concave and irregular.

***Connexion.* Without and anteriorly to the humerus, within to the cuneiformis and below to the scaphoides.**

The ulna is equally flattened with the radius, and has also three articular edges, and a semi- lunar non-articular one.

***Connexion.* Within and before to the humerus, without to the cuneiformis and below to the pisiform bone. The radius and ulna likewise articulate with one another.**

THE PADDLE.

The last division of the anterior extremity is formed by the bones of the paddle. These compose the the carpus, the meta-carpus and the phalangeal rows

THE CARPUS.

The carpus is formed by six flat bones disposed in two rows, the upper and cubital, containing the scaphoid, cuneiform and pisiform bones; the lower or digital the trapezium, trapezoid and unciform.

The scaphoid bone (j) is the most external of the cubital row; it is rounded and articulates above with the radius, below with the trapezium and within to the cuneiformis.

The cuneiform bone is placed like a wedge between the radius and ulna, with both of which it articulates. Its other four articulatory surfaces attach it outwardly to the scaphoid and trapezium, within to the pisiform and ulna and below to the trapezoid.

The pisiform, which is like the ulna but smaller, is situated below it; it presents an articular edge to it and to the cuneiform, and articulates inferiorly and without to the cuneiform and trapezoid bones.

On the radial side is placed the trapezium, the first bone of the digital row, which is larger than the scaphoides and of a flattened oval shape. It articulates with the scaphoides and cuneiform above, to the trapezoid within and to the carpal extremity of the external meta-carpal bone inferiorly.

The trapezoid, as well as the trapezium and unciform bones, is not so angular as those of the cubital row. Above it presents an articular surface to the cuneiform, without to the trapezium, within to the unciform and pisiform and below to the bases of the first and second meta-carpal bones.

The last bone of the digital row of the carpus, which we have to describe, is the unciform. Like those of the ulna and pisiform, its external edge is semi-lunar. It is situated beneath the pisiform, within the trapezoid, and above the second and third meta-carpals, to all of which it presents articular edges.

THE META-CARPUS.

This division, which contains three bones supports the first phalangal row. They are more circular than the carpal bones, and much resemble one another.

The first meta-carpal articulates above with the trapezium and trapezoid, within and below to the second metacarpal and the outer bone of the first phalangal row.

The second is larger than the preceding, and presents articular surfaces above to the trapezoid, within to the unciform and third meta-carpal, without to the outer phalangal row, and below to the base or the first bone or the second phalangal row.

The third metacarpal bone is rounder than the preceding bones, and articulates above with the unciform, within to the second metacarpal bone, and below to the second phalangal row.

THE PHALANGES.

The phalanges are composed of four rows, containing thirty-seven bones, in the following order:-

The first and radial phalangal row	11	
The second		12
The third	11	
The fourth and ulnar		3

All the phalanges grow less and less toward their termination, and wider apart. Cartilaginous bodies doubtless, interposed between them.

THE POSTERIOR EXTREMITIES.

The posterior extremities are divided into the femur, leg, and posterior paddle.

THE FEMUR. k.

This bone resembles the humerus in shape, but is rather smaller. The head , forming its pelvic articulatory surface, is strongly marked with depressions for ligaments. A large fossa is seen upon its inner and upper surface for the attachment of the ligamentum teres. Commencing at the posterior part of the head is seen a groove , which runs the whole length of the bone. It is rough and striated for the

attachment of muscles and the passage of nutritive vessels. The two processes which distinguish its inferior extremity present concave surfaces for the bases of the tibia and fibula.

THE LEG.

The leg is composed of the fibula (l) and tibia (m). The fibula is a round flat bone, articulated above with the femur, within to the second or middle bone of the first row of the tarsus, and below to the calcis. Its outer non-articular edge is grooved like that of the radius.

The tibia presents articular edges to the femur above, below to the scaphoid bone, and without to the cuboid. Anteriorly its edge is semi-lunated.

THE POSTERIOR PADDLE.

The posterior paddle is divided into the tarsal, metatarsal, and phalangal bones.

THE TARSUS.

Six bones, placed in two rows, compose the tarsals; they are the calcis, cuboid, scaphoid; an external, a middle, and an internal cuneiform bone.

The calcis articulates with the fibula above, within to the cuboid and middle cuneiform bone, and beneath to the external cuneiform bone.

The cuboid has a wedge-like process, which presents articular edges to the fibula and tibia above, within it articulates to the scaphoid, beneath to the middle cuneiform bone, and without to the calcis.

The scaphoid has like the pisiform bone, an internal concave edge ; it articulates above and without to the tibia, the cuboid, and the middle cuneiform bones, ,and below to the internal cuneiform.

The rounded external cuneiform bone articulates above with the calcis, within to the middle cuneiform and third meta-tarsal.

The middle cuneiform divides by two articular surfaces the calcis and external cuneiform bones posteriorly, above it joins the cuboid, within the scaphoid and internal cuneiform bones, and beneath the third meta-tarsal.

The internal cuneiform bone articulates above with the scaphoid, without to the middle cuneiform and third meta-tarsal bone, and beneath to the fourth meta-tarsal.

THE META-TARSUS.

The meta-tarsus contains four bones.

The outermost is by far the smallest; it is round, and at a considerable distance from the others; its edges are articular.

The second meta-tarsal bone is oblong; it articulates above to the external cuneiform, within to the third meta-tarsal and the first bone of the third phalangal row, and below to the second phalangal row.

The third is a larger bone than the others, articulating above to the external cuneiform, within to the base of the third phalangal row, within to the fourth meta-tarsal and fourth phalangal row, and without to the first tarsal of the second row or external cuneiform bone, and the second phalangal row.

The inner meta-tarsal articulates above to the internal cuneiform bone, below to the fourth phalangal row, and without to the third meta-tarsal and third phalangal row.

THE PHALANGES.

There are four rows of phalanges belonging to the foot as also to the hand of the lchthyosaurus Chiroligostinus. The outer and posterior is removed from the other rows, and the bones which compose it are much smaller, and have high raised rims. We enumerate them:

The first and fibular row	7
The second	8
The third	8
The fourth or tibial	6

As these phalanges approach their end they grow small and remove farther one from the other.

THE

ICHTHYOSAURUS CHIROPOLYOSTINUS

The Chiropolyostinus in the seventh plate - the vulgaris of the old nomenclature, nevertheless the most uncommon of the Ichthyosaurian family-was discovered at Lyme. Five long years did I strive to obtain if it were even but the smallest portion of the many-bone fish-lizard-for five years my efforts avail nothing.

"Forsan et hæc olim meminisse juvabit," the exclamation of the pious Trojan, recurred to me: I know there was such a species-from the venerable Mr. Johnson who possessed himself of the primary Ichthyosaurian pat I learned this-but the hard experience of five years substantiated its extreme rarity and I could but feel chagrin.

II.Every body remembers the wet wearisome summer of last year:- deluges of rain-deluge upon deluge-floods by land, tempest at sea,-to both strange to tell is due the acquisition or the all perfect saurus I treat of and thus it came about.

"Have ye sid my animal sir," said the fossilist Jonas Wishcombe of Charmouth as I called at his house in August to enquire if he had anything worth buying;-" I should like vor yet honor sir to see 'un." My heart leaped to my lips-" animal! animal! Where!"

"Can't Be sid to day sir-tfe tide's in."

"What-nonsence! I must instantly - come, come along."

"Can't see 'un now yer honor-the tide's rollin- atop o' 'un fifty feet high."

"In marl or stone?"

"Why in beautiful ma-arl-and-"

"Washed to death"-and I threw myself in despair upon a chair. How often have I reflected upon the very-Bedlam-impetuosity of my passions at that moment: -the chaffed sea rolling over an Ichthyosaurus and remorselessly tearing it to a thousand atoms-a superb skeleton of untold value triturated to sand by a million pebbles, such was the Promethean idea-torture of my rebel imagination.

Wishcombe could not persuade me that it was at all possible for a fragile delicate saurian remain to continue unharmed beneath the tremendous breakers which I all too well knew were at that moment wildly careering over the spot where lie said it was situated. My vexation had no limits until I half persuaded myself that the fellow was making jest of me, but he assured me that all he said was identical fact and insisted so much upon the visionary nature of my apprehensions that I was beguiled to, hope.

We determine therefore to be on the beach next day at the hour of low-water, if by hap we might then snatch a glance at the buried saurus. All we could expect was but a glance as it lay upon the very verge of the lowest low-water mark and was left dry only when a stiff off-land breeze assisted the equinoctial title.

III.The weather-cock; looked the right way as we descended the execrable path by which the good people of Lyme are content to wade to the sea-shore between their delightful town and the pleasant village of Charmouth. Far away to the sunny plains of Normandy and Bretagne sped the thunder-

cloud as we waited the receding waves, into which my impatience impelled me more than once - could I look through those foaming waters-I tried to look through them.

"Do ye see that tuff o' sea-weed just tipping up there yer honor; he's there abour"

"'There, there, don't ye see the weed sir in the hollow o' them there waves."

Jonas, who thus addressed me, in his anxiety to point me out the spot had advanced shoe deep - in a moment the returning brine drenches him to the knees.

Those algæ, which had so long flourished unconsciously by the grave of the wondrous creature we were watching, float upon their chainless element a few moments and are then left as if to rest themselves upon the sand.

The surges fail from the sloping shore-they are fainter-fainter-Wishcombe rushes amongst the shallows, laves them with a furze-bush provided for the occasion-" Here, here yer honor" - the object of my Egyptian-like idolatry, the adored lizard is at my feer

Let every naturalist make pilgrimage to the beeding craggs mid-way of the rivers Char and Lim. A waterfall issuing from a placid lake in their lone bosom bounds from ledge to stony ledge and is swallowed up of the thirsty shingle at their base:-in a right line with that glittering cascade-at the brink of the ocean when furthest ebbed-a group of five or six sandstone rocks repose upon a bed of lias shale: there, by those rocks clad with russet algæ, lay the Chiropolyostinus the mark of the vertebral column of which was scarcely perceptible through the selenitic layer that had preserved it from the rearing waters-they come-they come,-from ebb to flow of the tide less time elapses than you have consumed reader in scanning this paragraph.

Jonas gladly sells me the right to the skeleton, of which I have heard he had known many months, while no opportunity presented him for its extrication. He chuckled when I gave him a guinea earnest-money, convinced that he had made brave of a discovery that no one could render useful-that his ill-fortune must be mine too.

Yer honor, sir, 'ill he here to-morrow at low-tide." " Aye, and Jonas-bring as many men and tools to help as you think proper."

"You will never get that animal," said Miss Anning, is we made our devious way towards Lyme through the mist and flashing spray. " or if you do, perchance , it cannot be saved."

My eyes glance upon the intellectual countenance before me - the words of those lips were I knew oracular as those of a Pythoness and my heart fainted within me.

She saw my change of blood and stopped- "because the marl, full of pyrites, falls to pieces is soon as dry."

I revive" that I can prevent"

"Can you."

V.I lay upon a thorny pillow listening the livelong night to the rumbling gale,-or if slumber came over my weary eye-lids sad and frightful visions disturb me:-but the day breaks and-the wind's the wrong way, southwest.

The best street of Lyme-Regis is disfigured-but all the world knows this-by an ugly marketplace, which has an ugly tower surmounted by an ugly fish to tell the way of the wind. To this most ungainly place and puppet of a tower were my eyes directed with the first sunbeam and to the weathercock my orisons wend thrice seven days-in vain:- there it stuck with its mouth agape as if to bugbear the violent wind and storm which blew all the time from the south west.

Everyday, for three weeks, I sought with a kind of forlorn hope the lofty cliffs-the sandstone rocks.

The once silvery water-fall, swoln by the incessant rain, dashes from on high and its turbid stream bespeckles all around it with filthy mud.

The white sea-gull swims over the deeply submerged weed and the black lobster and perverse crab brave their haunt there by the thing of ten thousand ages.

The angry waters of the channel are pent up by contrary - winds and the relic of an incalculably remote generation sleeps on in his oozy bed secure beneath the main.

One day I arose in such imperturbable mood as disappointment like this may be supposed to occasion and gaped to see the brazen fish turn tail as much as he himself did at the hollow tempest that flitted by from the rugged north. The weather had veered to the right quarter at last and if it continued a few hours I might accomplish my long deferred hope;-all my friends congratulate me.

"Make haste; the tides going east fast" said Miss Anning. as I passed her on the way to the Chiropolyostinus. I seize this opportunity of thanking her for the brief exhortation; it secured me the saurus that same day. Really the tide seemed to gallop away!

Half a dozen of us-all lusty and eager for the occasion - meet: we arrange the mode of exhumation, dispose our instruments and wait the crisis when the retreating waves shall desert the remain.

It arrives. "Let no one invade this"-a square marked around the skeleton in the marl, six feet and a half by three feet and a half.

"What d'ye think zir to dig 'un out a whool," exclaimed the Atlæan Blue - the best tempered but unhappily Baccanal fellow that ever lived.

"Yes."

The tide goes back - back - back - our square is cut ten inches thick: I lessen its length and breadth a foot: " the crow-bars and pick-axes to loosen it from its bed: -now my boys - now - now; does it come in one piece?" Eas."

The spectators say the tide flows-it does: we attempt to raise the heavy mass upon its side but our strength fails us, 'tis more than we can accomplish.

To Sir Henry Baker, the reverend Benjamin Jones,. Mr. Edwards, Waugh and other gentlemen who came to our help and by whose additional exertions we at length effected it, my thanks have been already made. I thank them again; their condescension can never be sufficiently estimated.

The tide flows fast-We try to lift it into the vehicle prepared for its transport from the reach of danger-we cannot " You must break 'tin in half sir." "No." the waters approach us - they make a breach in the rude bank cast up by us against them-another, and another - another, they are at our heels: "one more trial my boys, your own reward if successful-ye-o;"- the saurus is safe.

VII.Let me ponder awhile - solace myself with the uneraseable memory of that one short hour.

Ere the sun arose on the third of September I proceed to unpack the Chiropolyostinus. The saw-dust removed, I consider or the mode of developing it-as irregular layers of selenite interpose between the laminæ of the marl and are of such stubborn texture that they threaten the disruption with them of the bones themselves. But ascertaining their perpendicular fracture I succeed in removing them without injury to the skeleton by a decisive yet careful blow of the mallet:- these formidable cones of selenite fly one after the other, leaving the Chiropolyostinus unscathed by the terrible ordeal.

A happy accident conduced to this most happy result -the decomposed animal matter of the creature somewhat neutralized the process of mineralisation in the instant vicinity of the bone-it preserved it from the touch of the sulphite. No art could detach bone and selenite in close relation.

And here I must again note the assistance that I derived from the warm-weather that closed the remarkable summer and autumn of 33. For with all my pains, some of the thin apophyses of the tail yielded to the force necessary for their extrication front the dense matrix-the which secures them in their original order.

IX.When that beautiful thing of which our beautiful plate is but a faint type, came forth at the magic touch of my chisel such a feeling possessed the as few realize. All my other specimens, the huge Chiroligostinus, the beautiful Chiroparamekostitinus were unique so that oryctologists looked at them but to despair, - but this -the Chiropolyostinus-that I had sought for with a miser mind for five years, lay like a new creation before me-and I was the creator. I worshiped it for hours in my mad intoxication of spirit.

X.As Miss Anning anticipated, the marl-.as soon as it dried - cracked, but by the assistance of some clever carpenters we secured it in a tight case with plaster of Paris so that no power call now disturb it.

THE HEAD.

The head of the Chiropolyostinus is shorter comparatively than that of the Chiroligostinus and the bones which compose it are generally thicker, stronger and better compacted together. In the specimen, plate eight-a splendid head discoverer at Street-the synarthrodial union of the anterior third or the inferior jaw is well shown: the perfect conjunction or the several sutures, the condition of the teeth and the solidity of the bones prove that it belonged to an Ichthyosaurus that died in its prime.

Plate nine, descriptive of a slab from the village or Nembnett near Bristol, and the eleventh plate show the thick, clumsy teeth

Plate the tenth-an invaluable relic of a patriarchal Chiropolyostinus found in Somerset-presents us with teeth in a singular stage or decay and reproduction and demonstrates the perfect dimensions of the species to be about ten feet maximum length.

The orbits are large and the central point for the visual organ-surrounded by twelve sclerotic plates-is enormous, but we have not detected the median foramen of the Chiroligostinus.

Eighty teeth in the superior jaw, seventy in the lower one-following each other in close succession, with smooth alveolar bodies, numerous well-marked striæ in their middle third and obtuse extremities distinguish the Chiropolyostinus.

THE TRUNK.

One hundred and ten vertebræ compose the spine - forty dorsal, seventy caudal. The anterior thirty dorsal vertebræ receive the ribs into a ball-and-socket joint while the remaining ten have two concavities for articulation with them. A tubercle for the chevron bone marks the succeeding twenty-five caudal vertebræ, all of which -save the last thirteen-have spinous apophyses for the nervous chord.

The sternum found upon the twelfth plate - a limestone slab from Street-is thick: the long bone that completes the sternum, or rather the sternal arch, was united at its middle by synarthrosis. Whether this be a peculiarity of the species or a character of the genus we cannot determine though we incline to the latter opinion.

The thirty-nine ribs are long and thin, but of true bony structure throughout. The twenty intercostals-so beautifully shown in plate seven - demand our special admiration. Accident swept them to the spot which the anatomist himself would have selected if possible: mark their exquisite form-that yielding median articulation designed to obviate the weakness of the long ribs - those delicate bones, fibres, which finished the groove into which the whole costal apparatus was knit.

The bones of the pelvis are very small, - the ilium is particularly thin, but the pubes and ischium have an immoveable articulation at their femoral end.

THE EXTREMITIES.

No words can express my sense of the beauty of those two paddles in the seventh plate: what a multitude or pentameters belong to those ossicular strings every one of them worth a necklace of oriental pearls. Those paddles are exquisitely beautiful-they are natures own mosaic.

That short strong humerus is succeeded by the equally massive radius and ulna. A row of three bones and another of five claim the name of carpus. The meta-carpus has eight bones; the nine fingers-which thin off towards their posterior region-contain no less than two hundred and twelve.

So strong a resemblance exists between the anterior and posterior extremities that we shall only observe of the latter that seven bones succeed the tibia and fibula, which are followed by four meta-tarsals. There are seven phalanges having seventy bones.

The paddles of the Chiropolyostinus-unlike those of the other species-are sharp at their termination.

THE ICHTHYOSAURUS CHIROSTRONGULOSTINUS.

Naturalists have a conviction constantly thrust upon them of the utter impotence of earthly things to satisfy the cravings of an infinitely progressive faculty-the soul. But although the ambitious man may obtain the object of his aspiration-the ne plus ultra of his most sanguine hopes-while the other plods his quiet path as far from his ultimatum as ever; nature, as if to recompense toils that have no end, reveals to her votary so many beauties-at every turn of his footsteps such unexpected novelties- that like the fabled Antaeus he gathers strength in every rencontre and fans a flame which purifies the grosser elements of his constitution and exalts him to the condition of a god.

No mistake is more general in this country than that the investigation of science indisposes to piety, that much musing upon matters difficult to find out deadens the apprehension of spiritual things and inclines a man to dangerous scepticism. Egregious error! Science-but another name for truth- dazzles the sincere neophyte with revelations that awaken the holiest feelings of his heart and points out to him the high-way that conducts to unfading joys. The giddy mortal who approaches capriciously her effulgent throne is victim to his own folly when he becomes the admonitor of the wise.

The earliest people in record, of simple and therefore innocent usages, have been distinguished as the most virtuous and happy. The Great Father blessed his children of the Golden Age ; their unaffected devotions, their offerings of flower and fruit were accepted in the sight of heaven. With the canopy of cloud for a temple and a ritual that nature taught, the primæval Adamites cherished the virtues that minister to the well-being of man.

But we inherit with the advantages of civilization a host of prejudices-the offspring of many incongruous ages. These, probably wholesome at their original, grow antiquated with time and become even pernicious by aggregation. Yet other strange combinations of them are brought forth of the national genius until an unshapely idol-like the cold stalagmite formed by infinitessimal drops of water from the roof of an ante-diluvian cavern-is set up, before which every knee must bend and lip confess. But a Daniel belongs to every age-one whose bosom nurses so heavenly a fire that mankind acknowledges-a Titan confest. These, not squared to the dimensions of ordinary mortals, spurning-the yoke which chains them to their cabined self, wander the earth exiles forbid the charities that make it habitable and descend to the tomb shriven by no friendly hand, unmourned and desolate. Oh fatal error! as though the man were the mind's inhuman Frankenstein.

Nature has no temple but the blue heaven, no other shrine than the heart; the most fervid worshippers are those who love truth the most, and that man is a sincere disciple who offers the invaluable productions of an exalted intellect or the useful fruits of a well-regulated disposition.

May legislators, who command the destinies of unborn generations, understand this and let the Vandal Spirit-the Dragon to which so many human sacrifices are being continually made, be cast out:- Tophet is the place of Dagon, why troubleth he us ?

II. The way to accomplish the correction of the public taste is by affording the people every opportunity for improvement. Repeated appeals, to their better passions, urged with than- kindliness which is over clue to necessary unlearnedncess, must lead to some effect: one advance in knowledge begets

another, and the lesson of lessons-that the trim interests of man are ensured only by the umlcvialing love of wisdom and virtue-is insensibly acquired.

Let us haste then to found sumptuous museums, which shall be as sanctuaries for the arts-the divine arts-until ignorance, driven to herd with bats and owls and every unclean thing, ceases to persecute them:-and let us raise noble galleries to receive the spoils of invincible science. Be temple and lower too devoted to their legitimate use, the Majesty on High should be worshipped of his creatures in the face of that spotless heaven which lie made to be a figure of his incomprehensible glory ami endless perfection.

III. The British Museum-to our confusion be it acknowledged-the sole national repository for the arts and sciences, has been a disgrace to the empire. I speak not invidiously but of the place as a national object, deserving of praise or censure either as worthy or unworthy the nation itself.

Designed (professedly) for the improvement of the many, it has been the mischievous instrument of retardation-" the tub thrown to satisfy the whale." The last generation of men went thither, admired the painted ceilings and solaced themselves because something had been done. They were content to submit to the exclusion of their children; to have the light barred from their eyes was of little present moment-they would grow up and then they could gaze upon the nothings there as their lfathers had.

As " coming events cast their shadows before," so past systems-like the mammoths of the old world-leave gigantic images behind them: spectra understood by few, terrible to all. Thus the sprite of the eighteenth century-the doting age of a philosophy of very much precious material but like Nebuchadneddar's image of clay feet-scared the vigorous spirit that animated the nineteenth. Born in the year 11, I just remember the iron aspect of that defunct but unburied era, for I lived in an out-of-the-way hamlet in a remote province with an octogenarian grandfather, where nothing but roast-beef and plum-pudding, ghost and guns were ever dreamed of at Christmas. As to the rest of the year, what was that? Ah, the ghosts!!

And when I came to London-like Whittington expecting to find the streets paved with gold-that forbidding phantom still pursued me and drove me even from the British Museum: I was ascending the grand stair-case when a surly Cerberus grasped my arm and ordered me out instanter - I was too young:- twelve, reader, and as inquisitive as a boy in his first "teen" could possibly be.

But matters are being mended-unwashen artisans with their spouses and half-grown children saunter about there now.

That superb library of the last George how nobly entertained!

And did not the Elgin marbles cost us £20 or £30,000.

I shall not conceal my gratification at the improvements which have been recently made in the administration of (he Museum, nor trouble myself to enquire what influence the example of the institutions .found in almost every large town may have had on that "Sleeping Beauty." But claim not meed which is alone due to the British Augustus, nor boast of the works of Praxiteles for which the Acropolis was desecrated and Greece shorn of the few remaining- glories that made her lovely even in captivity and disgrace.

This great nation - the El Dorado of modern times - grudges nothing for the maintenance of its dignity and wills that the public good be the leading principle of its legislation:- yet every petty Power on the Continent prides himself upon his regard for the arts of civilization when he talks about England.

And shall England - Queen of Nations - endure the name of barbarian still. Does the Mistress of the Seas wield a more powerful sceptre than the Cæsars and own a dominion mightier than the Roman that the kingdoms crouching at her feet may laugh her to scorn.

Make haste to re-institute the licentious Saturnalia - if we are to be less than the least let us wear the silver chains with a grace becoming Britons,- Englishmen may bear to be mocked by their hirelings for a season but the badges of slavery they will not suffer for ever.

IV. The British Museum - the misnomer which my sense of public duty would not permit me to dismiss without comment - has a fragment more descriptive of the Chirostrongulostinus than any one of that species in my Collection; it comprehends the superior and inferior jaws, some thirty vertebræ, pieces of ribs and two much mutilated and imperfect paddles.

The Bristol Philosophical Institution - well-ordered and most deserving - has also a fragment which claims the upper and lower jaws, the spinal column and ribs and an apology for the anterior paddles. Both won; procured at Lymo and owe their preservation to Miss Anning.

These and the specimens we figure are the solitary relics of this circumscribed family of this most circumscribed race. Our readers will be content therefore with the scant outline that we present them of the Chirostrongulostinus - a sketch fashioned into something like a whole from the exuviæ of five individuals.

Perhaps these live round-bone-paddle Ichthyosauri number the alpha and omega of millinean ages- the first that dived the deep sea where we now find the village of Street-the last whose bones that restless waste of waters forsook to the imperishable shroud it had moodily spread over them.

THE HEAD.

Turn, reader to the thirteenth plate; I am sure you will understand how my heart fluttered when that gem of price was placed before my Hashing eyes. Vowles of Street found in it Mogs quarry there.

That head-with the much elongated intermaxillaries-so like the head and bill of a snipe-possesses two hundred and sixty long sharp teeth: one hundred and forty in the upper jaw, a hundred and twenty in the inferior. The immense orbits are partly formed by the median frontals, which have no foramen. The sclerotic plates are too dislocated to allow their being numbered-some of them we destroyed to show the articular region of the lower jaw which is much shorter than the superior. The temporal foramina are produced in all their anterior and upper region by the parietals, below by the posterior frontals and behind by the temporal bones which have a large mastoidean process.

Plate fourteen represents a head from Street and a snout from Walton: their teeth-rather than the intermaxillaries-attach them to the species, of which I shall be inclined to call them a sub-division in a future work that I am contemplating.

The hyoides is a solid globe.

THE TRUNK.

We know not the number of bones of the spinal column, of which plate fifteen affords the best idea that we have obtained. The continuous chain there reckons fifty-five vertebrae-not half of the real number probably-sunk and so firmly embedded in the matrix that we found their better development in alto relievo impossible. Some few scattered on the ground exhibit the real primary, divergent character to be thin and round. Those vertebræ in the sixteenth plate, belonging to the sacral region are particularly strong though the spinous processes attached to them are not so large as those of the other species.

The ribs shown upon the former plate-which represents a specimen from Kington-are remarkably long and thin; their articulation was by a ball-and-socket joint as in the Chiropolyostinus.

The bones of the pelvis, found upon that plate, are large and thick.

THE EXTREMITIES.

The humerus in the fifteenth plate is marked by its neck and inferior expanded portion. The ulna has a semi-lunar edge like that of the Chiroligostinus. Six round bones compose the carpus which is succeeded by three rows of phalanges.

The posterior extremity seen in plate sixteen, has a femur much like the humerus just mentioned, a tibia and fibula perfectly round, a tarsus of six bones and three digital rows containing twelve bones. They are all exceedingly thick.

A singular deviation from the general rule is seen in the fifteenth plate. Three bones occupy the place of tibia and fibula, two of which remain undisturbed in their natural order.

THE

ICHTHYOSAURUS CHIROPARAMEKOSTINUS.

In the year 1830 I made acquaintance with one George Moon, a labourer at the quarry of Mr. Somers of the village of Walton.

I was so young-so much of a boy at that time-that had not Moon possessed more shrewdness than the generality of his class, the history of Ichthyosauri and Plesiosauri would have had another chronicler:-George Moon, the first quarry-man that I could persuade into my views, discovered the Chiroparamekostinus-the radicle of my Collection.

Diogenes had more hope of finding an honest man when he went abroad with his lantern in the day-' glare, than I had of conquering the brute ignorance which so long prevented a hundred men seeing an inch beyond their noses. I wasted years in the apparently Utopian pursuit of " the philosopher's stone," and submitted every description of mind save the right one to my crucible, but no art could conquer the intractible principle of prejudice and I was about to abandon my visions and dreams to the light air of which they seened but an illusive incarnation.

But the Mussclman is right, fate-mysterious power-disposes all things. Man is the fly caught in the strong meshes of destiny-to weal or woe-good or evil-he is fore-doomed, and his struggles to avoid fate are futile. Ask the lover-his soul withered for ever by the word of one frailer even than himself-ah, he lives but to curse his destiny for 'tis bitter as wormwood and he must fulfil it. Enquire of the aged-the ruined lover and the rueful old are the only persons that can answer thee-"all is vanity and vexation; the day of death is better than the day of one's birth." Verily, as Solomon says " the lot is cast into the lap but the disposing thereof is of the Lord."

I was a rock at the brink of a precipice;-I looked down into an abyss without a bottom and in the dizziness of my brain longed to sound it though an eternity would barely suffice it: my eyes wandered in search of some hand to tumble me over the edge-but they looked in vain. Again I looked into that gulf and again my brain twirled at the bare thought of the descent-yet no one drew near and I had almost relapsed into that lethargy which lulls the spirit of general mankind throughout all generations, when fate-directing a poor man to a wreck of the wrecked old world, that she had stored for this end myriads of ages before the appearance of our race-hurled me over the giddy height; then commenced the cycle of my real existence.

Deep after deep-darker and darker-meets my gaze:-faint sickly shadows that the everlasting future casts across the gulf-the Pierian stream and Avernus sacred to the infernal deities - are the only figures that confront me; behind I see nothing but a gigantic image of fate whose inexorable visage fills me with dismay, for every glance that I steal thereof consummates another weft of my chequered incomprehensible destiny and ushers me into a new sign of that moral zodiac which I am destined to accomplish.

I sometimes muse on the seeming accident-the chance - that cast me upon the irreversible thence-the moon-the limbo where matter and mind incessantly clash-the, in fact, literary world where the living famish upon the scant marrow of the bleached carcases of the dead and scoop out with Mephistophilian claws the very souls of one another for want of better garbage upon which to prey. As the circumstance specially belongs to the science we discuss perhaps the reader will have patience while we relate it.

Twas July-the day had been sultry hot-cool the delicious eve; and in a retired cottage that may he well called Virgilian-so agreeable its situation on the woody hills that overlook the wide moors of Glaston-discoursing many pleasant things with my schoolmaster of old I sat. And our ranging thoughts alight upon geology-the new science-and I tell of the more than Arabian wonders of the neighbouring villages. And elevated with my story we agree to ramble the landscape that leads towards them.

Adown But-Close into Church-Lane-through the Lower Town of Glastonbury and the road to Weary-all-Hill we saunter:-that hill where the fainting Joseph of Arimathea stuck his staff eighteen hundred winters ago, which Monkish legend affirms to be the original of the "Holy thorn," that to this day braves the severest winter and puts forth its pale blossoms in the chilly snow and hoary frost.

And our ravished eyes behold an expanse fairer than the fair plains of Arcady-brown moors and corn-fields unnumbered, and the Mendips far-stretched to the North and. East. Burnham and the Bristol Channel burnished with light and the blue coasts of Wales. And to the South-across the rich Black-moor - Butleigh and Kington and the spires of many churches upon the elm-clad hills. And Saint Michæl's Tower on the cloud-aspiring Tor, with the indescribably beautiful town of Glastonbury reposing at its feet in the slant beams of the sinking sun.

And the sweet-smelling new-made hay and the happy peasant; the sunny maiden returning from the kine with pail brimful of milk. And floating the ambient air-gossamer-like came the bleating of sheep, the drone of the blind-beetle and the mellow tones of a distant fife.

Why seek we upon other shores, in the clime of the stranger, that nature which our own fatherland offers us in so charming a guise: besides, England has her Thermopylæ and Pharsalia, her Eternal City, and the tombs of her Homer and the Thespian, and a long line of heroes-Brutus and Cæsar-and of monarchs, potent as a Julius, imperial as Augustus.

Through Street and by many a green hedge-row we wend our way, exchanging kind words with the kindly rustics: and by the black-smith's sounding forge, where the lime-trees overshadow the briar-girt turf which sanctifies the ashes of the forefathers of the hamlet, we pause:-that white-washed cot is the humble abode of George Moon.

George's wife-for Moon had not returned from his work-brings me the caudal extremity of the Chiroparamekostinus, which her husband had found the day before. " I must see Moon my good woman."

We meet him on our road to the quarry.

" Show me whence you got those pieces of marl, Moon."

In a quarry of the lias limestones, in the wall of it, twelve feet from the surface, I saw the section of a rib and just by it that of a vertebra.

" We must dig it out to night, hearties."

" We can't zir, 'tis too leate." " We will."

Hark to the sledge-hammer as it falls upon the ear of drowsy Eve, disturbing the birds that are at roost thereabout. List to that jocund laugh-'tis at my expense, those happy fellows think me half-witted.

My friend-apprehensive of the dews that begin to rise-addresses his steps home-ward, alone.

Soon Night, quenching the last beam of day, wraps us in her sable shroud;-are those dancing-things Wills o' the Wisp? No-candles. But the heart of the workmen-worn by a long day's labour- begins to fail them.

" George, you will stay here all night to see that no mischief is done," for I feared the rude curiosity of the simple villagers.

" Good-night boys-good-night."

" Good-night zir." Oh that sincere good-night, what palace ever echoed a like-one.

Give me the country in summer, country folk both summer and winter and all the rest of the year: yea, and of those folk let me have for my friends-my bosom friends-those who have never travelled ten miles from the place of their nativity:-of all men they are the least sophisticated and these of whom I write especially so-they are the Tom Jones' and Joseph Andrews' of Fielding, who has walked many a morn from his house at Sharpham Park to that village of Walton before breakfast,

II. The solemn bat beat the air with membranous wing as I journeyed lazily to Glastonbury so- meditating-methought I glided adown the stream of time into the oblivious profound where flit the unreal shadows of extinguished generations. And amid the horrible darkness I beheld monstrous and dire skeletons that came from nature's untutored hand ere the Divinity called order from chaos forth. And shapes big as leviathan and more terrible, and ghosts of unfinished existencies. Of Saturn and his moon's icy phantasies-and of the planets strange beings that have no name nor shall they have. And of distant suns mighty monuments-gaunt-unutterable were they. And I come-to the quiet

streets, the tabernacles of our mortal race, and I sorrowed because of the breaking of that vision-I seek my couch weary and sad.

III. " Dear me what hast here friend ?" said John Clark-one of the few really gifted and clever men that it has been my lot to know-who called upon me at Glastonbury the next day.

" An Ichthyosaurus."

" So 'tis-dear me-how long hast had this?" " Two hours."

" And hast thou developed this tail and that snout in so short a time?"

I cannot pass friend John a better compliment than to inform my readers that I laid aside my chisels and dressing-gown to talk with him over our tea of the extraordinary machine which he was constructing:-one that makes latin verses-no two alike-for ever, all of them quite grammatical and of pure sense.

As to the Chiroparamekostinus, to that I apply myself on the morrow: a month's hard work relieves it of its matrix and leaves it the admirable original of the really excellent plate which the reader will find at No. 17. We hasten to describe it.

THE HEAD.

The head of the Chiroparamekostinus is a mean between the Chirostrongulostinus and the Chiropolyostinus. Even the teeth-of such inconstant configuration generally-assume a character so positive that they alone would justify the instant recognition of the species itself: they amount to a hundred and ten in the upper-jaw, one hundred in the lower. The two jaws are of the same length. The number of the sclerotic plates we are unable to ascertain, as a pyritaceous mass adheres so firmly to them that we have found their extrication impossible.

Plate eighteen, a drawing from a specimen found near Street, is descriptive of the top and bottom of the head. Discovered in a soft argillaceous seam, we effected its entire deliverance from the lias that enveloped it. We were in doubt of the pretension of the osseous disc and the two styloid processes accompanying it until we found them at the posterior third of the inferior jaws-their situation identifies them as the hyoides.

Those two pieces of heads figured in the nineteenth plate, belong to an adult Chiroparamekostinus and to a young one. The former, with those fine symmetrical teeth, was discovered at Long Sutton; the latter, which shows the inferior occipital and sphenoid - in situ, at Street.

THE TRUNK.

The trunk of the Chiroparamekostinus is composed of one hundred and eleven vertebrae, forty of which are dorsal. The twenty anterior dorsal articulate with the ribs by a single socket but they have traces of a tubercle for the inferior part of the head of the rib. The other vertebrae have a longitudinal groove for the insertion of ribs. The first twenty-eight caudals have the chevron or lateral apophyses, and all the bones of the tail but five claim the spinous apophysis for the medullary chord.

The same number of ribs-thirty-nine-that distinguishes the Chiropolyostinus belongs to this species; the inter-costals-hid beneath the true ribs-we cannot count.

The pelvic region is neither so strong as that of the Chirostrongulostinus nor so weak as that of the Chiropolyostinus, which latter it resembles in the union of ischium and pubes.

THE EXTREMITIES.

The anterior paddle contains ninety-five bones:-a humerus, radius and ulna, a carpus of seven bones and seven phalanges numbering eighty-five.

The posterior paddle claims the femur, tibia and fibula, three bones to the tarsus and five digital series containing thirty-three bones.

The twentieth plate, represents a mass of bones jumbled together, with one of the hind paddles nearly perfect-it was found at Marsh's Elm.

That slab of limestone with a tail and paddle drawn in plate twenty-one came from Walton.

The beautiful paddle figured in plate twenty-two-found at Street in Mr. Sims' quarry-is singular as having a foramen in the centre of each bone of the pat.

CHAPTER IV

THE COMPARITIVE ANATOMY, PHYSIOLOGY AND HABITAT OF

ICHTHYOSAURI

"Ichthyosauri have the snout of a dolphin, the teeth of a crocodile, head and sternum of a lizard, the paddles of cetacea and the vertebræ of fish." A skeleton constructed of such heterogeneous characters needed no other pretension to uniquity, yet another remains to be added -the bones are solid.

I quote the words of the illustrious Cuvier as a text to those illustrations which a better acquaintance with lchthyosauri puts me in possession of. The detail of that wonderful fossil organic remain which has evaded the research or the most learned men in Europe for a quarter of a century I hasten to record.

II.The long dolphin like snout then is composed of the intermaxillary bones with which as to length those of crocodiles will bear no comparison: this is occasioned by the situation of the nostrils which are immediately under the orbit in Ichthyosauri, in crocodiles at the very anterior muzzle-of the bill. Now this difference of situation of the nose in so nearly akin implies a difference also of circumstance if not of organisation: let its enquire after it.

Crocodiles lie for hours under water with their snout raised just above it, by which they ensure both respiration and security. Change the place of their nasal organ - put it where that of lchthyosauri is found - and crocodiles, deprived of the power of self-concealment so necessary to carnivorous animals in our day, would die out in two or three generations. Man - enemy to every creature but especially hostile to the universal reptilian family-lived not to wage warfare with the pro-Adamite fish-lizard, nor was there a single animal found upon the face of the planet of which it had aught to fear:-necessity for concealment was not therefore imposed upon lchthyosauri as upon crocodiles: besides the latter prey much upon land animals-some of them have been seen to seize even a tiger and there call be no doubt that many less formidable beasts are victim to their excessive cunning:- as to a difference of structure, there is no question but that Ichthyosauri were lower in the scale of organization crocodiles - their fish-like body, so ill suited for land prove this-we have right then to say that their circulatory apparatus was less complicated - that they had nearer approximation with the fish-tribe-,and consequently that they had less frequent occasion than crocodiles for coming to the surface of the water to breathe.

IIIThe teeth of Ichthyosauri resemble those of crocodiles in shape and power of reproduction; they differ from them in number, situation and mode of regeneration. Those of the former are sharp or obtuse superiorly and are often refurnished; so those of the latter:-but Ichthyosauri have but the promise of alveoli - slight indentation in the maxilliaries for the root of the tooth, in this they agree with lizards, - nor do their teeth follow at such distances as those of crocodiles, neither is the old-tooth done with until the bodily apparition of its successor, externally, compels its exit.

IV. The sharpness of the snout, the immense length of the inter-maxilliaries and the situation of the nostril; the ,attenuated form and posterior determination of the jugal bones - which impart so antipodal a character to the eye of Ichthyosauri when compared with that of the crocodile; the

construction and - in some measure - office or the mastoidean and temporal bones; the position of the tympanals, and the median frontal foramen-which was closed probably by a horny nipple like that of other fossil reptiles and of some recent ones:-are characters peculiar to the head of Ichthyosauri.

But the jaws are furnished with teeth like crocodiles and the under one has like the subject of comparison, dental foramina at its posterior external paries:-which six bones identify the Ichthyosaurian jaw with that of lacerta and thus it is impossible to say whether its tongue was inextensible as the crocodile's or motive like those or chameleons and other lizards

Moreover, the skull has the temporal cavities of crocodiles, parietal bones like those of the iguana, and the eye sclerotic plates as the tortoise, chameleon and iguana: the ear was simple and closed (probably) by fleshy lips like that of crocodiles. To these observations and comparisons I have to add that squamous sutures mark every bone reminding us of the sliding cartilages of some fish: - scarcely a jagged edge - a dove-tail conjunction is found throughout the skeleton of Ichthyosauri.

V. The toad, ornythorynchus and Ichthyosaurus have a three-boned breast and the sternal mechanism of some birds is referrable to the same observation, but taken altogether the sternum of Ichthyosauri is as much sui generis as the paddles, which we proceed to examine.

VI. The paddles distinguish Ichthyosaui particularly; they resemble those of cetacea but in one particular - that of being whole externally: their better rotation with chelonia is established by their number - but they are without claws. The anterior paddies are incredibly long in proportion to the size of the animal: their extraordinary length renders the hinder ones unnecessary except as rudders to the tail - these are diminutive therefore and comparatively powerless as progressors.

VII.The vertebræ of Ichthyosauri much resemble those of the shark and were exquisitely adapted to assist in the pursuit of prey: their inverted cones filled with synovia, and annulated articulations seconded the true swimming apparatus most effectvely and secured the utmost freedom of motion.

Thus much then for the anatomical analogies and self-possessed organic principles that render lchthyosauri a subject of such intense interest and curiosity.

VIII As the many great analogies between the Ichthyosaurus, and crocodiles, lacerta and fish, establish its physiology: -so its situation in the lias determines its habitat.

But crocodiles have scales, are palmate and armed with claws, and some of them exist a great deal upon land ; iguanas are wholly terrestrial, and tortoises - with a head and body totally unlike those of Ichthyosauri - have scarcely a tail. As for ornythorhynchi - which lay eggs like birds and suckle their young like mammifers - you would not solve a riddle by putting it in apposition with another:- and then the batractia and fish have such a diversity of structure and of habits that comparisons with them afford but little instruction.

True: but look at the Ichthyosaurus in the aggregate and these difficulties vanish. With such teeth it must have been carnivorous: with that body and those immense oars an inhabitant of water; those slender ris indicate how little it was fitted for the land: and the fæcal remains, drawn in plate twenty-seven and twenty-eight, are full of the indigestible scales of fish, their food. Ammonites and pentacrinites, creatures that had their haunt in the deepest oceanic abysses, found in the same bed, prove them to have been marine.

But why not fluvial: do we not find at Whitby bones of crocodiles, freshwater mollusc's and boulders with Ichthyosauri?

The lias at Whitby sets all geological ratiocination at defiance: even the simple view I have taken of its general character is liable to objection - one celebrated geologist told me that he would sooner believe that those freshwater remains came there by miracle than that there were lands sufficiently elevated at that period to support such a large current as they imply. But if our notion of a disembogued river be incorrect these crocodiles and mollusc's lived in salt water or else the ammonites and plagiostoma and ostræ, pectens and pentacrinites - found with them - lived in fresh! Thus geologist and oryctologist flounder upon the Lamarkian heresy-for what? to disprove a physical universality!!

The lias of Central Somerset decides the question: that deposit contains no organic remain that has reference to the green earth or meandering stream save a junk or two of wood. The myriad generations of the former sea that reposed its broad bosom there upon that blood-colored plain of the red-marl, lived-like the posterity of Ham - secure in their own element, basking in the beams of a more than Arabian sun:- their briny wilderness charnels not the bones of a stranger - the inhospitable waste of world and water there was sacred to the uncouth and savage aborigines, and to them alone.

TO THE

REV. WILLIAM DANIEL CONYBEARE, M. A.

F.R.S. & G.S.

INSTIT. REG. SOC. PARIS. CORRESP

&c. &c. &c.

THIS BOOK

OF THE

P L E S I O S A U R U S

is inscribed

WITH THE AUTHOR'S PROFOUND RESPECT,
AND MOST GRATEFUL ATTACHMENT.

THE

PLESIOSAURIAN GENUS AND SPECIES

This most extraordinary fossil organic remain was first announced by the Rev. W. D. Conybeare.

The lias in the neighbourhood of Bristol having yielded him some saurian bones, those of the Plesiosaurus, from πλησιον, near to, and σαυρς a lizard, were detected amongst them.

Shortly after this my very respected friend Mr. Clarke, Jun. of Street, caused a piece of a head, which he had found upon his father's estate in that village, to be submitted to the critical inspection of Mr. Conybeare.

With these imperfect but important materials and by the assistance or some fragments which were found in the late Col. Birch's collection, the Rev. W. D. Conybeare constructed an imaginary skeleton which, with the exception of the neck, the vast length of which could not be thought of, was exceedingly like the true one soon after found.

The Rev. W. D. Conybeare having thus excited the attention of geologists to this novel subject, they had soon an opportunity of congratulating him upon the happy penetration by which he had elaborated so many facts relating to this fossil organic wonder. For in January, 1824, Miss Mary Anning, to the due expression of whose public and private worth all language is insufficient, discovered a most splendid Plesiosaurus in the lias shale at Lyme-Regis: to the delight of the learned ascertained the most paradoxical animal ever known.

This superb fossil having been purchased by the Duke of Buckingham, with that condescending liberality which distinguishes his Grace, was placed at the command of the " GEOLOGICAL SOCIETY OF LONDON," and Mr. Conybeare had the satisfaction of publishing in the "TRANSACTIONS" the confirmation which it afforded him of many of his truly enlightened ideas.

Cuvier, assisted by the generous attentions of Mr. Conybeare, applied his giant mind to a description of "this inhabitant of the ancient world perhaps the most heterogeneous and that of all that appears to merit most the name of monster." To the luminous paper which the talented founder of this genus had given the admiring world, he added a few particulars which some specimens from Honfleur and the Interior of France acquainted him with.

As all the elucidation which deep research and stupendous talent could abstract from the subjects of his enquiry was of course embodied in the chapters devoted to it at the end or the fifth volume of his "OSSEMENS FOSSILES," no individual has been able to add new facts. But now the acquisition of an entirely perfect skeleton in propriâ sitû of the Plesiosaurus - and several highly interesting fragments, allow me to determine the species and to detail the osteology of one of them with an accuracy that can be subject to no objection.

II.And the first of the species: Mr.Conybeare naturally struck with the great length of the neck, fixed upon it - as the most unique feature of the skeleton-for the specific appellation, and the term Dolichodeirus-a favorite Homeric compound -signifying a long and graceful neck, was given it.

Since then two fine fragments of this remain have been acquired by the British Museum and Lord Cole: they differ materially from that of his Grace the Duke's. As I too have been so fortunate to find a fourth specimen - by which many of Mr. Conybeare's opinions that the former three were too imperfect or dislocated to test have been satisfactorily solved - there can be no obstacle to the instant recognition of the distinctions founded thereupon. I add a brief synopsis of the major differences between these four Plesioauri that the reader may be assured of their several relative characters.

COMPARATIVE SCALE AND NUMBER OF BONES

	Head	NECK.	TRUNK .	TAIL .	ANTERIOR EXTREMITY.	POSTERIOR EXTREMITY.
The Duke of Buckingham's	small .	dislocated & uncertain.	dislocated & uncertain.	imperfect.	Humerus, radius and ulna, 6 carpal bones; digital series imperfect.	Femur, tibia & fibula, 6 tarsal bones; longest finger 10 joints.
That at British Museum	small.	dislocated & uncertain.	20 vertebræ.	ímperfect.	Humerus, radius and ulna, 6 carpal bones; digital series imperfect.	Femur, tibia & fibula, 5 tarsal bones; longest finger 9 joints
Lord Cole's specimen	large.	30 vertebræ.	19 verebræ.	4 vertebræ, rest lost.	Humerus, radius and ulna. 8 carpal bones; longest finger 10 joints.	Femur, tibia, & fibula, 6 tarsal bones, longest finger 9 joints.
The Author's; Plate XXIV	large: 43 bones.	32 vertebræ	20 vert. 18 ribs, 8 arcs.	33 vertebræ	Humerus, radius and ulna, ulna, 6 carpal bones and two rows of digital series, the others lost.	Femur, tibia & fibula, 3 tarsal bones ; longest finger 8 joints.
The Author's other Plate XXV	lost.	imperfect.	24 vertebra. 22 ribs.	imperfect.	imperfect.	imperfect.

Now these specimens present great and imposing variations in the shape of the several bones, each one of them deserving - seemingly to be marked down as though distinctive of species; but they are for the most part unquestionably referable in some degree to the various ages of the animals and therefore deserve no such claim. It is not in the relative characters of a few dislocated bones of an extinct family that we look for the differences that identify species, but in some great deviation from the general rule as betrayed in the teeth of quadrupeds and in the limbs of oviparous reptiles: here, in the posterior extremity - in the tairsus - it is discovered. We establish four species therefore - the same number that belongs to the fish-lizard genus-the

1. PLESIOSAURUS TRIATARSOSTINUS, from *τρια* three; *ταρσυς* tarsus; and *οσεον* bone
2. P---------- TESSARESTARSOSTINUS, from *τεσσαρες* four; *ταρσυς* tarsus; and *οσεον* bone
3. P---------- PENTETARSOSTINUS, from *πεντε* five; *ταρσυς* tarsus; and *οσεον* bone
4. P---------- EXARSOSTINUS, from *εζ* six; *ταρσυς* tarsus; and *οσεον* bone

III.There is an oasis in the North of our Isle which has a temple-like the Ephesian - beautiful, high-priests venerable, and sons rich in the wisdom that cures the maladies of the soul. The northern town Scarbro' - the second Bath - has founded this building-modelled after the temple of Theseus at Athens-and directed the public energies to the cause of natural philosophy, of which it is the worthy storehouse. If my reader has taken the palmer habit that he may travel to the heavenly countries of the Phanes, Zeus and Eros, let him visit that classic place and pay his vows at its Theseuian altars - one of them is a fragment of the fifth Plesiosaurus and the Goliath of the race. I went seven hundred miles to see it - worshipped it - and purpose it yet another pilgrimage.

THE

PLESIOSAURUS TRIATARSOSTINUS

I was spending the winter of 1831 as usual in London :-the Pestilence came just in time to drive me thence into Somerset for the salvation of the Triatarsostinus.

Listen reader.

December gave up the ghost amidst a thousand frightful rumours of the coining cholera: if I remember right, the 1st of January, 32, is mournfully distinguished as the day in which one of the morning papers announced " the Scourge" present in Southwark: who will ever forgot the panic that followed; London was comparatively deserted within twenty-four hours. Tuesday six cases were bulletined as having occurred since its breaking out-a distinguished physician assured me that six hundred were nearer the truth: along the Borough bank of the Thames-in those crowded lanes, where so many Irish people herd, pent up as in a lazar-house; where is Defoe ?-what havoc and death!

Wednesday fatal cases trebled-about twenty publicly acknowledged-at least a hundred and twenty known to the observant few. Ah! I was smoking cigars on the box of the Bath mail all the night and at ten o'clock Thursday galloping over the Mendips-the British Alps-on the Exeter.

The first thing that I ever do when I come to Glastonbury is to call on my friend-my Pythias- there: the second to drink a clip of coffee as sedative after my hundred-and-forty-mile journey: the third is to dash over to the lias quarries at a neck-hazard tangent.

Now it happened that a person of Street by name Creese-a quarrier-a worthy man enow - came across the Triatarsostinus a few days before, and as I had given him no inconsiderable monies for the bones that he had met with in the course of his business, he was at the pains of taking it home in hopes of getting more.

The Philistines from Dan to Beersheba know what a vile tendency to mischief every beautiful object that he can set his paw upon, disgraces John Bull. Oh! that the pillory should hayc been sent a packing before the last brute that is fond of marring the sacred works of nature and art had his Esquimaux thing-of-a-soul tamed by it and the eggs and yellow cucumbers its excellent adjuncts. I blush for the truth that points my pen, but I will tell one of my many chapters of accident-'tis characteristic.

A COLLOQUY BETWEEN TWO QUARRY-MEN, OVER THE TRIATARSOSTINUS

"I wonder what tes."

"O a viery dragern a-maa-be."

"One that stinged Moses a-maa-be: hæ."

"Here's at 'un" A tremendous blow with the mallet.

"How he do zound: I wonder of the stwoone be holler." Another tremendous blow.

"Tes vire-stwoone-vire stwoone is terrible hard-hit un agean Jack."

Oh my Triatarsostinus! broke in half.

"There's bes baak-bwoone."

"An ther's hes ribs."

"Have her got a head?" A blow follows the question that breaks the head and neck - or rather the slab as the skeleton was buried in the centre of the Stone-to eleven pieces.

"No-norè bet o' a hed-noo zinc o' one o' hes iys."

"Dosten het un in the right pleaze."

"Hang the twood." Another miserable blow which separates the tail part.

"What ell Measter Haakins zay ?"

"Oh we can tell un that we did'nt know what 'twere and waanted to zee a bit."

May heaven forgive me-" Magna componere parvis," - I have never forgiven the Goths that sacked "the Eternal City," the infamous caliph that destroyed the Alexandrian library, nor these men: when I came to Street so opportunely, they bad thrown away nearly the whole of the two anterior paddles and the whole of the posterior right one - they had reduced the fine flag-stone to nearly thirty pitiful pieces and stabbed the bones as a Spanish mata-dore does a bull-all over. But I should congratulate myself upon such fortune as fell to my lot and thank the stars and Cholera that it was no worse as (- had I not arrived at that very four of the clock in the afternoon, how unhappy-) Bruin had resolved to chisel away the surface of the stone, never dreaming that the process would have swept away the bone too!

Creese paid a severe penalty for his temerity: instead of giving him as much as my conscience told me was the worth of it-a rule that I have never departed from but in this deserving instance-I was content to pay him liberally for the trouble that he had been at in noticing it: the rest of the chapter is short.

Some parts of the three ruined paddles are recovered
I forgot the pestilence.

Sat up at work all day and all night over and over,
And in about two months,
The Triatarsostinus,
My hewn-god,
Was finished.

II. We now proceed to explain the anatomy of the Plesiosaurus Triatarsostinus, keeping the same divisions as were adopted for the ichthyosaurus Chiroligostinus.

THE HEAD

(SUPERIOR JAW.)

Two Maxillary a. plate XXIII.
Two Intermaxillary b. "
Two Nasal c. "

(CRANIUM.)

Two Median Frontals d. "
Two Posterior Frontals e. "
Two Jugals f. "
Two Temporals g. "
Two Mastoidean h. "
Two Tympanals i. "
Two Parietalia j. "
One Superior Occipital k. "
One Inferior Occipital l. "
Two Lateral Occipitals m. "
Two External Occipitals n. "
One Sphenoid o. "
Two Pterygoid p. "
Two Palatals q. "

(INFERIOR JAW.)

Two Dental r. Plate XXIII
Two Opercular s. "
Two Angular. t. "
Two Sur-rangular u. "
Two Coronoid v. "
Two Articular w. "

These forty-three bones, which are generally short, thick and firmly conjoined together by the strongest sutures, have numerous irregularities and formina marked upon them and require that separate description which follows.

THE SUPERIOR JAW.

THE MAXILLIARIES. a. The form of the maxillaries, which are situated at the anterior and inferior part of the orbit, is that of a triangle with an outer convex and an orbital surface and an inner region hollowed. They have also a base, two lateral edges and an apex. The two lateral edges constitute, above, the anterior and inferior ciliary ridge, which is very sharp and prominent; below, the external boundary of the dental fossæ which occupy nearly a half of their inferior and anterior part.

***Connexion.*Anteriorly at their base they connect themselves by serrated suture with the intermaxillaries, at their posterior extremity to the jugals in like manner and within and below to the palatals.**

THE INTERMAXILLARY BONES. b. Of the bones that have relation with the upper jaw and cranium these aic the largest. They present us with many grooves and foramina especially at their anterior border, for the passage of the dental nerves. They are convex externally and within concave. Their processes are the orbital, nasal, frontal and dental. The inferior portion of the orbitar process is concave; the superior denticulated and squamose to overlap the anterior orbital apophysis of the posterior frontal. The dental process is deepened more at the anterior portion than at the posterior and is divided into numerous compartments by cross ridges; before, it stretches lies itself outwards and assu mes a duck-billed shape.

***Connexion.*Posteriorly and inferiorly with the maxillaries, superiorly with the median and posterior frontals and the nasal bones; within to the palatals and from behind to before with one another by synarthrosis.**

THE NASAL BONES. c.These bones form the vertex of the superior jaw. Their long axis is from behind to before and they have an outer plain surface and an inner concave one. Upon the anterior two-thirds of the external body of these bones is a groove, which extends itself forwards upon the posterior half of the inter-maxilliaries. That portion of them which supports the back of the nasal is rounded and their superior and inferior edge is serrated and thin.

***Connexion.*Above by harmonia a with one another, behind with the median frontals by true suture, below and before with the intermaxillaries**

THE CRANIUM.

THE MEDIAN FRONTALSd.The median frontals e irregular squares smooth externally, Thier orbitar process is squamose and extended, thei r nasal one sharpened and serrated. In their external middle portion they are slighly hollowed.

***Connexion.*Within to each other by a thick synarthroidal edge, behind to the parietals, below to the posterior frotals and before to the intermaxillaries and nasal bones.**

THE POSTERIOR FRONTALSe. These bones have an external narrow convex surface, a concave orbitar wall, a supercilary ridge and a descending temporal articular process. The convex surface is

bounded before and behind by two sharp lines which offer themselves to the orbital anti temporal fossæ the superciliary ridge is assisted by the squamose orbitar process of the median frontals and throws itself forwards and downwards to meet the orbitar process of the intermaxillaries. The descending temporal articular process is rounded, thick and grooved.

Connexion. **Behind by an exceedingly strong articulation to the temporals, above with the anterior edge of the parietals, before by squamose suture with the median frontals and intermaxillaries and posteriorly and below with the jugals by harmonia.**

THE JUGULAR BONES. f. These, like the maxillaries are triangular but they are not so long. Their base has upon its inner body the concavity for the posterior and inferior portion of the eye. They are rounded externally and terminate in a temporal spinous apophysis behind.

Connexion. **Above and behind with the posterior frontals below with the temporals and before with the maxillaries.**

THE TEMPORAL BONES. g. The temporalia are long, curved and slender. They may be divided into an outer convex surface an upper and inner concave one, an internal irregular surface and a petrous portion situated at the base of the cranium. The outer convex and inner concave surfaces are separated by a sharp ridge, in continuation of that of the posterior frontals, which completes the inferior boundary of tile temporal fossæ

Connexion. **They join the mastoides behind within the tympani, above the parietals and before the posterior frontais and jugals by serrated suture.**

THE MASTOIDES. h. These semi-globular hones compose with the temporals the external articular base of the head. They are convex without and above, slightly flattened within and hollowed around the large tubercle which reposes upon the coronoid bone of the inferior jaw.

Connexion. **Above and anteriorly by serration to the temporals and within to the ossa tympani and external occipitals.**

THE TYMPANAL BONES. i The tympanals are the smallest bones of the cranium. They arc lint and have synarthrodial edges and a semi-lunated surface.

Connexion. **These bones articulate by suture with the temporals, mastoides and external occipitals.**

THE PARIETALIA. j. Commencing at the posterior extremity of the median frontals, the parietal bones extend themselves far backwards to form the roof of the skull and the superior boundary of the temporal fossæ. We observe upon their outer convex surface many depressions; within they are irregularly concave.

Connexion. **They are articulated before with the median and posterior frontals, behind anti below to the temporals and at their base with the superior and external occipitals.**

THE SUPERIOR OCCIPITAL BONE. k. This hone is large and has an external and a posterior convex surface, an upper articular serrated border, an inferior semi-lunar edge, two inferior articular surfaces and two lateral one's.

Connexion. **Above they join the parietal bones by serration, below and without the lateral occipitals and laterally the external occipitals.**

THE INFERIOR OCCIPITAL BONE. l.. The inferior occipital bone, which is much smaller than the preceding one, closes the base of the skull. It has a posterior and an anterior concave body, two articular cavities for lateral occipitals and an upper and under surface. The anterior concave portion receives the body of the sphenoid. The upper surface is smooth and concave in its middle from side to side to support the medula oblongata and its accompanying vessels.

Connexion. **Superiorly with the lateral occipitals, posteriorly and below with the atlas and before with the sphenoid**

THE LATERAL OCCIPITALS. m. The lateral occipitals are thick at their median portion and squamose at their edges. They have two articular ends, an internal semi-lunar edge for the great foramen and an anterior one sharpened and thin. Posteriorly they are convex from within to without, and before internally concave.

Connexion. **Above they join the superior occipital, below the inferior, without the external occipitals and behind the bony arch of the atlas by cartilaginous symphysis.**

THE EXTERNAL OCCIPITALS. n.. These bones are more squamose than the last. and have a posterior rounded termination, an anterior serrated edge, an irregular region internally and an external and inferior flattened one.

***Connexion.* Behind with the mastoidean bones, without and before to the superior and two lateral occipitals, above with the parietalia and anteriorly with the tympani.**

THE SPENOID BONE. o. This azygous bone offers an inferior sharp ridge, an internal flattened surface posteriorly, an anterior spinous apophysis, two flat and considerably deep sides and a posterior articular base. Its inferior sharp ridge commences immediately in front of the median part of the inferior occipital bone and advancing forwards is inserted between the pterygoideans at the commencement of their synarthrodial junction. Its internal flattened surface supported the brain, the quantity of which is proved to have been extremely scant by its circumscribed proportions. Its articular base is pyramidal and has its long diameter from above to below.

***Connexion.* Posteriorly with the inferior occipital and before with the pterygoidean bones.**

THE PTERYGOID BONES. p. The pterygoideans have a posterior thin body which gradually widens as it advances forwards until it meets without the palatals and within, at the anterior part of the hinder third of the upper jaw and cranium, each other. Immediately after this conjunction they converge and end finally in a spinous apophysis at the middle of the anterior third of the head. Their upper portion divides the orbits and nasal foramina by a spine; they are slightly convex at their widest inferior surface.

***Connexion.* Behind to the sphenoid bone, before with one another and the palatals.**

THE PALATLS. The palatal bones are much wider than the pterygoids. They commence behind the jugals and passing forwards occupy nearly the entire part of the anterior roof of the mouth. They are very thin.

***Connexion.* Posteriorly to the jugals and pterygoid bones, anteriorly to one another, the maxillaries and inter-maxillaries.**

THE INFERIOR JAW.

THE DENTAL BONES. r. The dental bones of both jaws of the Plesiosaurus are remarkable for their anterior rostranatal form. Those of the lower jaw compose all that superior portion of it which has relation to the teeth, the alveolar cavities for which diminish in size and depth from before to behind until they disappear at their posterior sharpened and squamose commencement. The dental bones are further distinguished by an elevated ridge which beginning at their hinder spinous apophysis advances onwards and inwards until it meets its fellow, to which it is united by an immoveable articulation. Upon its fore part are two grooves with a direction from before to behind. The dentals are concave superiorly, beneath convex and they have a great number of foramina upon their upper anti under surfaces.

***Connexion.* Behind and externally their spinous process is most firmly wedged between the anterior portion of the angular and operculary bones, below their surface is opposed throughout to those of the opercularies, behind and above they are overlapped by the sur-angulars and anteriorly they unite with one another by synarthrosis.**

THE OPERCULARY BONES. s. The opercular bones are flattened from within to without. They are thickest and strongest at the posterior part of the duck-billed snout and are rounded within. Anteriorly they swell into a large tubercular form which at length ends in a point; posteriorly they diminish in the same manner as the dental bones. Numerous foramina are found upon their anterior tuberculated portion.

***Connexion.* They form the inferior body of the jaw situated beneath the orbits without, at which region they support the posterior process of the dental bones and the anterior part of the angulars. Within they are in juxtaposition with the angulars and sur-angulars, before with one another by synarthroidial suture and behind with the inferior parts of the angulars and sur-angulars.**

THE ANGULAR BONES. t. Beneath and behind the temporal fossæ and in front of the articular bones are placed the angulars, - two bones that have a considerable external surface and an internal spinous process.

***Connexion.* Without, within and inferiorly the angular bones have *Connexion* with the operculary and dental bones, within and behind with the sur-angulars and articulars.**

THE SUR-ANGULARY BONES. u.The sur-angularies are placed at the superior part of he posterior third of the lower jaw and are the thinnest of all that enter into its structure. Their edges are squamose and they have an anterior lengthened apophysis.

Connexion. **Before with angular, opercular, and dental bones, and with the coronoids and articulars behind.**

THE CORONOID BONES. v.These are very strong and have upon their superior part numerous tubercles and depressions for the insertion of articular tendons. They are rounded and thick upon their outer and inner side, hollowed above from behind to before and dwindle into a short spinous apophysis which slopes downwards and forwards anteriorly.

Connexion. **Posteriorly with the articulars and before with the sur-angulars.**

THE ARTICULAR BONES. w. The articulars have a concavity superiorly, an inferior sharp ridge, anti an outer convex and an inner concave side. The superior concavity is divided into two portions, an anterior one with its long axis from side to side and a posterior with its greatest diameter from before to behind The outer convex side is roughened for the attachment of muscles.

Connexion. **Anteriorly and superiorly with the coronoid and below with the angulars both within and without, and the sur-angulars.**

THE TEETH

Upon the anterior half or the maxillaries and the entire dental processes of the inter-maxillaries is situated a deep sulcus for the teeth of the upper jaw which is bounded by an outer and inner edge. The dental bones contain all the teeth which belong to the inferior jaw. These teeth are securely lodged in deep cavities and separated by prominent ridges from one another; they are very long, slender and but faintly striated upon their enamelled portion. Their root is round, smooth and invariably hollow. Like the teeth of Ichthyosauri they were in a perpetual state of decay anti reparation, and the re-institution of them was effected in the same manner, that is, by the forcible extrusion of the old by the young. From the great number of foramina for nutritive vessels which mark the osseous nursery whence the new teeth proceeded presume that their growth and decay was rapid. Nor did the reproductive energy diminish by age as regarded either the Plesiosauri or the Ichthyosauri : in the inferior jaw of the Plesiosaurus plate twenty-six, the reader will perceive the alveolar portions of two old teeth and in several other cavities the young ones which having loosened those they were intended to replace, caused then to fall out of their several sockets as soon after the death of the animal as the decomposition of the soft parts was effected. The teeth varied in number according to the species and the age of the individual: they amounted to nearly seventy in the inferior jaw, and from seventy to ninety in the superior.

THE LARGE CAVITIES IN THE HEAD.

I. The nasal foramina placed just before the orbits are extremely small. They are formed above by the nasal bones and below by the inter-maxillaries. They are rounded and situate at the inferior part of the upper third of the short diameter of the jaw.

II. The maxillaries, inter-maxillaries and anterior process of the posterior frontals compose the upper and the fore part of the orbits. Their hinder region is bounded by the posterior frontals and their inferior by the jugals, the sphenoid assists to divide them one from the other internally. We have not found sclerotic plates as yet but do not doubt but Plesiosauri had them.

III. The temporal fossae are gigantic; they are bounded above by the parietalia, below by the temporals, before by the posterior frontals and behind by the temporalia and parietal bones.

IV.The occipital foramen is very small mid is effected by the superior, inferior and lateral occipital bones.

THE TRUNK

THE SPINAL COLUMN

Eighty-five bones constitute the spinal column, each of which has a body, a bony arch, certain processes and two foramina upon their inferior concave portion. As these characters vary in different places it is necessary to describe the bones under the names cervical, dorsal and caudal.

THE CERVICAL VERTEBRÆ. The atlas and dentatus differ from the other cervical vertebræ in having no hatchet-like processes or small cervical bones for the attachment of muscles and protection to the inter-vertebral arteries. Moreover the atlas has an anterior convex articular face upon which the head rotated and a posterior flat one which was united by a synarthrodial junction to the dentatus, while the other vertebræ have two sides without slightly concave and within slightly convex. The body is the most round of all those of the bones of this truly magnificent neck. Its bony arch is strong and common to it and the dentatus which is a mere flattened piece of bone. The spinous apophysis with its posterior articular body, is smaller than those which follow it.

The hatchet-like processes, so remarkable in long-necked quadrupeds and birds, distinguish the remaining thirty vertebræ of the neck of the Plesiosaurus; they increase in size as they proceed backwards. The seprocesses are firmly fixed into a socket at the middle of each side of the vertebra, from which they proceed forwards and terminate in a point. They are convex inferiorly and their posterior extremity touches the anterior part of the succeeding one. In the Plesiosaurus plate twenty-five, which was discovered at Walton, these processes are metamorphosed into a kind of false rib as they approach the dorsum.

The articular bodies of these cervical vertebræ, joined to the body like those of crocodiles, as are all the articular bodies of the other vertebræ are concave at their external third, within that they become convex. The bony arch for the passage of the spinal chord is large amid the apophysis, which exceeds in length the long diameter of the vertebra to which it is attached, has two advancing articular processes before and two posterior ones which necessarily overlap the next following. Above the spinous apophysis is convex amid grooved for the cervical ligament.

THE DORSAL VERTEBRÆ. These are twenty in number and differ from the cervical in being larger in every particular; in being more concave at their sides and flatter at their articular surfaces and in having on each side of their bony arch a large transverse process for the articulation of the ribs. This transverse process is rounded inferiorly and stretches outwards and backward into a large knobbed extremity with its head concave and toughened. The under surfaces of the dorsal vertebræ are slightly flattened when compared with their sides and their spinous apophyses are longer and wider than those of the neck.

The CAUDAL VERTEBRÆ. The caudal vertebræ commencing immediately behind the pelvis, are known from all the others by their transverse and lateral processes and by their more concave articular extremities. They amount to thirty-three and have transverse apophyses with annular articulations which are straight and independent of each other. Their chevron or lateral processes articulate in a fossæ upon each side of their inferior body, are longer than the transverse and end in a sharp point. The last three or four vertebræ possess neither transverse nor lateral articulars.

THE STERNUM. a.

The sternum is a thin bone, hollowed within from side to side; having an anterior concave portion, two lateral articulatory surfaces for attachment to the clavicles amid a posterior articulation with the scapula's which is raised into a sharp median ridge externally. That gigantic sternum in plate twenty- six was found with the inferior jaw, before noticed, at Marsh's Elm in the parish of Street in 31. It announces an individual more than twenty feet long; but I have part of a humerus from Whitby of a Plesiosaurus that was forty feet.

THE RIBS

The ribs, which articulate with the dorsal vertebræ by means of a transverse process like those of most saurians, are eighteen on each side; the anterior eight are true ribs, as the remaining ones floating. There are besides these eight sterno-costal arc's.

THE TRUE RIBS. The true ribs are known by their articular extremities. They are thick above and have a hollowed articular head, a neck, a tubercle for the attachment of ligament and a body. They proceed downwards to behind and have their anterior portion convex and smooth, their internal and posterior one hollowed and their outer edge rounded and even. The inferior extremity of the true rib is hollowed to receive the superior part of the inter-articular ribs. They are nearly of the same length, gradually decreasing in size from the first.

The floating ribs have, as their name implies, no inter-articulation with one another. Their extremities are lengthened into a point with exceedingly sharp edges; by this character they are known at once from the true ribs.

THE STERNO-COSTAL ARCS. They are eight: -each of them composed of seven bones-a ventral rib and six inter-articular one's. The ventral ribs, the first. of which has *Connexion* with the scapula's, are rounded at the centre and gradually diminish until their superior portion ends in a point. The inter-articulars are much less thick than the ventral ribs and have like them am acute termination inferiorly; their upper portion is hooked, convex and articulates with the inferior part of the true ribs.

THE PELVIS.

As in the Ichthyosauri six bones compose the pelvis: -above the ilii, below and behind the ischii and anteriorly the pubes.

THE ILIIb. The ilii are the smallest bones of the pelvis and somewhat resemble that of the crocodile. They are oblong with a superior articular portion slightly extended, an inferior thickened one, an outer convex and an inner concave surface and two thinned edges. The superior articular portion is connected by cartilage at the transverse processes of the two last dorsals and is roughened, the inferior articular extremity composes nearly a third of the acetabulum and is likewise rough.

***Connexion.* Superiorly by arthrodia with the two last dorsal vertebræ (which may be designated sacral) inferiorly with the ischii.**

THE ISCHIIc.These bones placed at the posterior part of the pelvic region have a superior articular extremity a rounded neck, a descending flattened body and an inferior articular end. The superior articular extremity, which forms the middle part of the femoral concavity, is roughened and triangular upon its anterior and posterior sides. The descending flattened body advances forwards and terminates in a thin articular apophysis; posteriorly it is rounded.

***Connexion.* Below with one another, before with the pubes and above with the ilii and pubes.**

THE PUBES.d.The pubes are large, flat bones having an anterior convex edge, a median symphysis a posterior semi-lunar border which composes with those of the ischii the oval foramina, and an outer articular portion. Their external surface is convex anti smooth, their internal one concave.

***Connexion.*Before with one another, behind with the ischii and without to the articular extremity of the ischii. The pubes complete the cotyloid cavities.**

THE EXTREMITIES.

The extremities were immensely long to obviate the great weight and the solidity of the skeleton, as the Plesiosaurus was too lacertan to have the subcutaneous fat by which the mammalia are buoyed up. the anterior extremities have *Connexion* with the trunk by means of the scapulæ and clavicles. Each of them is composed of the shoulder, arm, fore-arm, and paddle.

THE SHOULDER

The Shoulder consists of two bones, the scapula and clavicle.

THE SCAPULA, e. This large flat bone situated at the median region of the chest has an upper articular portion, a rounded neck, and an anterior and a posterior wide surface. The superior articular portion of the scapula is rounded behind and is joined by synchondrosis to the internal part of the head of the clavicle, from this articular portion the bone proceeds upwards and behind, forming the large curve which distinguishes the superior part of the posterior surface of this bone. In the same manner a curve is produced anteriorly but of a much less extensive sweep. The outer aspect of the scapula is marked in the centre by a considerable uprising, in consequence of which it is rendered irregularly convex and in some places concave and flat.

***Connexion.*In the middle with one another, before with the sternum and clavicles, behind with the anterior ventral rib, and superiorly with the clavicle and humerus.**

We figure in the twenty-sixth plate the scapula of the large individual found at Marsh's Elm, which differs in shape from that of the Triatarsostinus.

THE CLAVICLE, f.The clavicle is a long bone with a thickened articular end posteriorly, a body and a widened and thin anterior portion. Its thickened articular end is flattened without and within and has above a rounded side and below a concave one. The anterior widened portion is curved above and slightly grooved; it supports the two lateral articulatory surfaces of the sternum.

***Connexion.*Before with the sternum and anterior flattened surfaces of the scapula and behind to the articular extremity of the scapula, thus completing the glenoid cavity for the humcrus.**

The clavicles found in plate twenty-five totally differ from those of the Triatarsostinus in shape.

OF THE ARM. g. The humerus is long, curved and strong. It has a head, a body and an inferior extremity. The head of the humerus is large, round and deeply marked with many fossæ and eminences. Around this irregular surface the bone presents a roughened ridge for the capsular ligament. The body is flattened and convex from side to side and upon its upper-third is a tubercle for the attachment of muscles. It is concave and thin behind, before rounded and convex throughout its long diameter. The inferior extremity is wider and flatter than any other part and is divided into an anterior and a posterior portion by a depression in its centre, which stretches forth in a sharp point between the radius and ulna.

***Connexion.* Anteriorly and above with the scapula and clavicle; inferiorly with the radius and ulna.**

OF THE FORE-ARM. The radius (h) has an upper and an under flattened surface, a superior and an inferior articular extremity, an external convex and rounded boundary and an anterior and internal semi-lunar edge.

***Connexion.* Above with the humerus and below with the external and middle bone of the carpus.**

The ulna (i) has a semi-lunar edge posteriorly like the radius but it is not so much curved, it is a rounded bone with its greatest diameter from above to below, and has an anterior convex border and an upper and under articular surface.

***Connexion.*Above to the humerus and below by cartilage to the pisiform bone.**

THE ANTERIOR PADDLE.

THE CARPUS. Two longitudinal rows each containing three bones form the carpus. We call them, as in the Ichthyosaurus, scaphoid, cuneiform and pisiform above; trapezium, trapezoid and unciform below.

The scaphoid bone is nearly circular; its upper and under surfaces are Hat and smooth and its edges plain. It is in close juxta-position with the outer edge of the cuneiform bone and its inferior portion articulates with the trapezium.

The cuneiform bone by chance justifies the name we give it and has, like all the bones of the carpus, a flat upper and under surface and plain edges. Its wedge-like portion is insinuated between the radius and ulna; it articulates with the scaphoid without, below with the trapezium and within to the pisiform bone.

The pisiformis is smaller than the two just described and has its long axis from side to side. It articulates with the ulna above, below to the unciform bone and within to the trapezoid.

The trapezium, the first bone of the digital row, is a round, circular bone, having upon its superior portion an articular junction with the scaphoid and cuneiform bones.

The trapezoid is a smaller bone than the preceeding and has like the pisiform bone its great diameter from side to side. It presents an articular edge to the unciformis.

The unciform bone is of the same size and shape as the last and therefore needs no further notice.

THE META-CARPUS.The meta-carpus consists of five bones, which have a long axis from above to below, and an inferior articular extremity and a narrow body.

THE PHALANGES.These are much like the meta-carpal bones in form, and need no further comment save that their superior or meta-carpal extremity is larger than the inferior one. They amount to twenty-seven and are thus situated :

The first and radial phalangal row	6.
The second	7
The third .	7.
The fourth .	6.
The fifth and ulnar	1.

All the bones of the paddle had inter-articular cartilages, they diminish in size towards their extremity and grow wider apart.

THE POSTERIOR EXTREMITIES.

The posterior extremities, which are longer than the anterior, are composed of the femur, leg and paddle.

THE FEMUR. The Femur (j) as a matter of course is somewhat like the humerus, but is longer, rounder and more slender. Its head which articulates in the cotyloid cavity is as much marked with fossæ as that of the humerus and has like it a rim for the capsular ligament. The body is rounded and smooth and spreads into the flattened surface of the inferior extremity of this bone. It is convex below and marked with striæ from above to without and beneath. Of the two external edges the posterior one is the most concavely curved.

*Connexion.*Superiorly with the ilii. ischii and pubes ; inferiorly with the fibula and tibia. The femur drawn in plate twenty-six was common with the other bones there to one individual.

THE LEG. The fibula and tibia constitute this division. The fibula (k) the most external bone of the two has an upper anteriior and posterior flattened surface, a superior and an inferior articulatory extremity, an internal convex and rounded boundary and an internal semi-lunated edge.

Connexion. Above with the humerus and below with the middle bone of the tarsus.

The tibia (l) has, like the fibula, a semi-lunar border; it articulate with the femur and below with a vast inter-articular cartilaginous mass between it and the meta-tarsal bones.

THE POSTERIOR PADDLE.

THE TARSUS.Three bones constitute the tarsus - an external articular one, a median cuneiform bone larger than the preceding, and a third situated between them inferiorly. As may have been expected, these three bones have their anterior and posterior surfaces flattened and smooth like those of the carpus.

THE META-TARSUS.The five bones which compose the meta-tarsus have an upper and an interior articular surface, a narrow body and a long axis from above to below.

THE PHALANGES.The phalangal bones approximate in shape so much to those of the anterior paddle (as do indeed all the other bones of this division,) that we have only left us to mention their number and position, in order to terminate our anatomical description of the Plesiosaurus Triatarsostinus.

The first and fibular row contains	5.
The second.	7.
The third.	7.
The fourth.	6.
The fifth.	2.

CONCLUSION

". . . Of one departed world
" I see the mighty shadow."

"The revolution and the wrath of Time"

Ichthyosauri and Plesiosauri filled up the measure of their years long ere Eden was planted and the dominion of the man made of the " red earth" acknowledged, over " fish of the sea, fowl of the air, and cattle, and over all the earth and upon every creeping thing."

Theirs was the pre-Adamite-the just emerged from chaos-planet, through periods known only to God-Almighty: theirs an eltrich-world uninhabitate, sunless and moonless, and seared in the angry light of supernal fire;-theirs a fierce anark thing scorched to a horrible shadow: and they were the horrible chimeras-inexplicable and wonderful incarnations of the myriad generations of the after times- which denned that dreadful earth-alone. The sometime terran, sometime oceanic pterodactyles-those more than vampire monsters, which had solitary occupation of the wastes of sand when black night fell down upon them-were an after-thought: they followed at the heels of the former, and when they did come to scare Solitude at the sound of wing and the fish of the sea 'twas the herding together of furies that hunted in a leash.

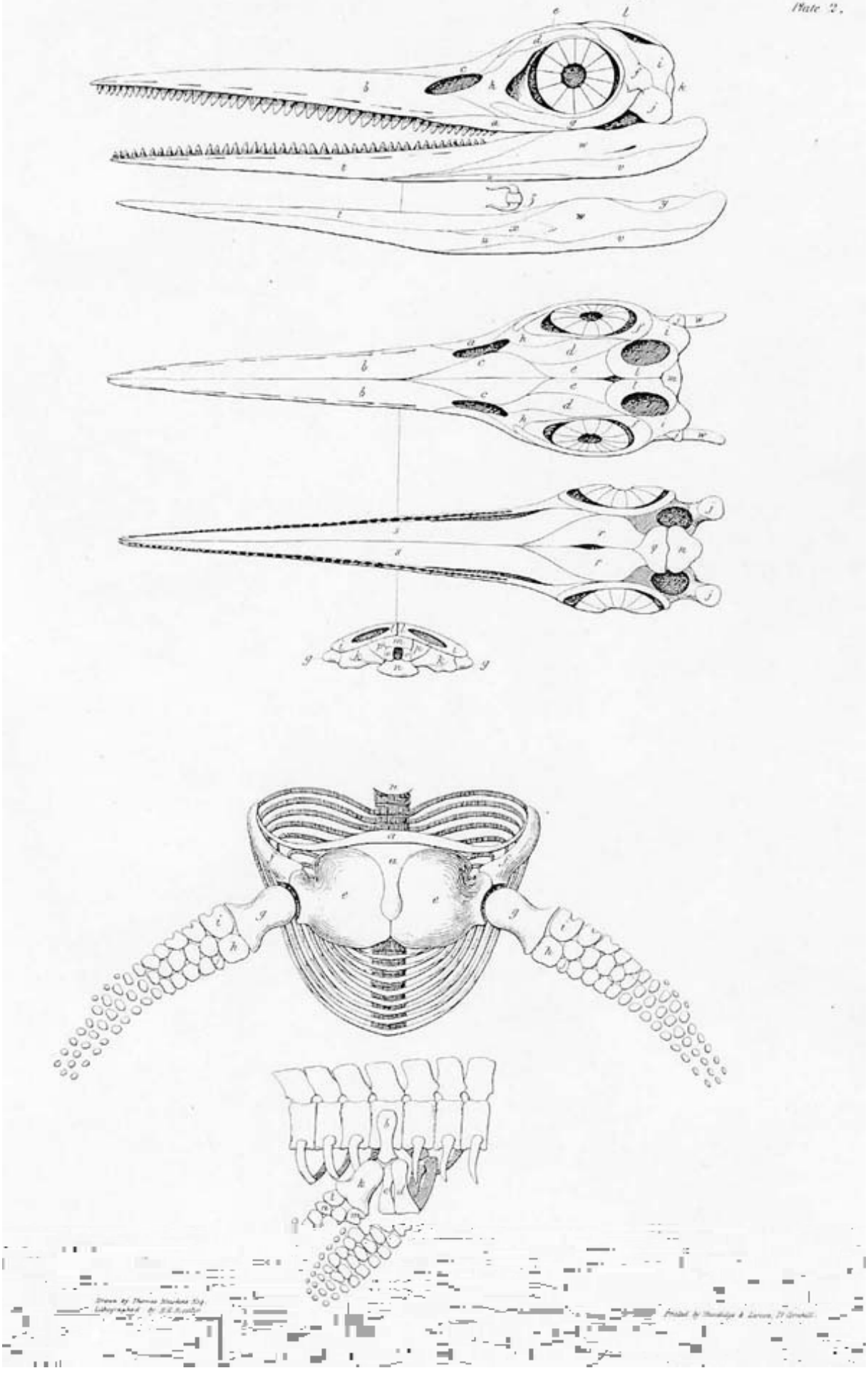
How did they gloat over the million million Medusæ-the boneless zoophites of an element wide as the world, and all their own: innumerable swarmed they, like Milton's cloud of locust angels, and the sauri amongst them as Satan, Molock and Abaddon.

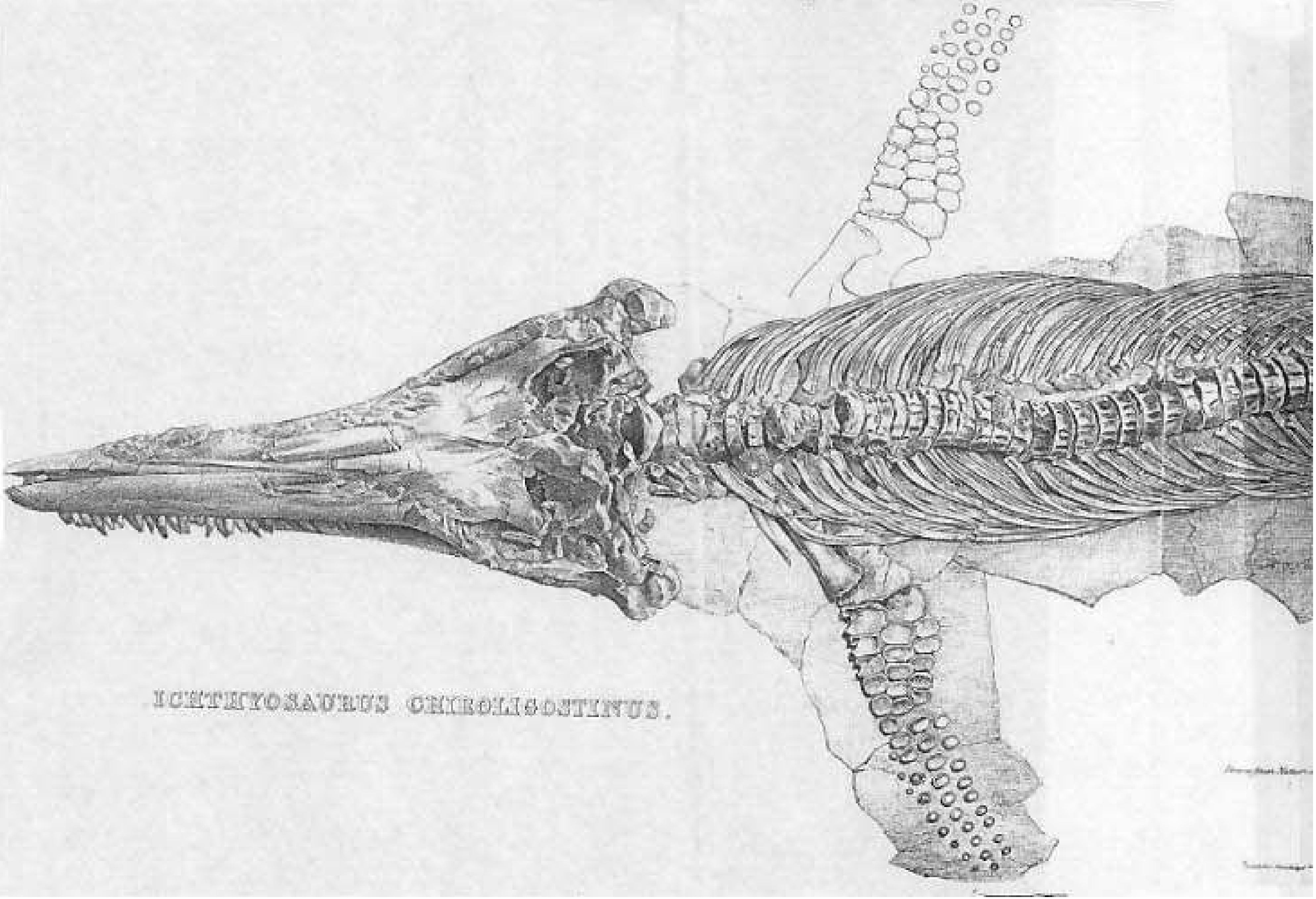
But the adamantine grapples of Time came upon them: he watched the last struggle of the last horrible persons of their frightful race and fore-went, in consideration of the future lord of the creation of which they were the primal carnivora, the execution of the bond that all the living are bound by- " dust to dust."

We have explored the sepulchres of these wondrous tribes; behold! the last mummian shroud yields, and we find the heads, bodies, tails and uncouth extremities of a thousand dissimilar creatures, conjoined together as though Nature were but of apprentice-hand when she ordained the genera-the confused and undreamed of families.

Over these vestiges of Ichthyos and Plesion-sauri-the fleshless bones of the primitive race of preying monsters; over the wide jaws that first committed murder in obedience to the stern laws of Necessity-we love to dwell. Such countless hosts of associations are connected with these gone-by things-so much of the sublime and mystic, of the eternal and inspiring that we invoke fate to continue them ours for ever:-they are sensations-operations-that concentrate infinity and identifies it, a something that the human understanding can grasp bodily and be satisfied therewith, like the opium-eater, and his drug, for awhile.

FINIS





ICHTHYOSAURUS CHIROLIGOSTINUS.

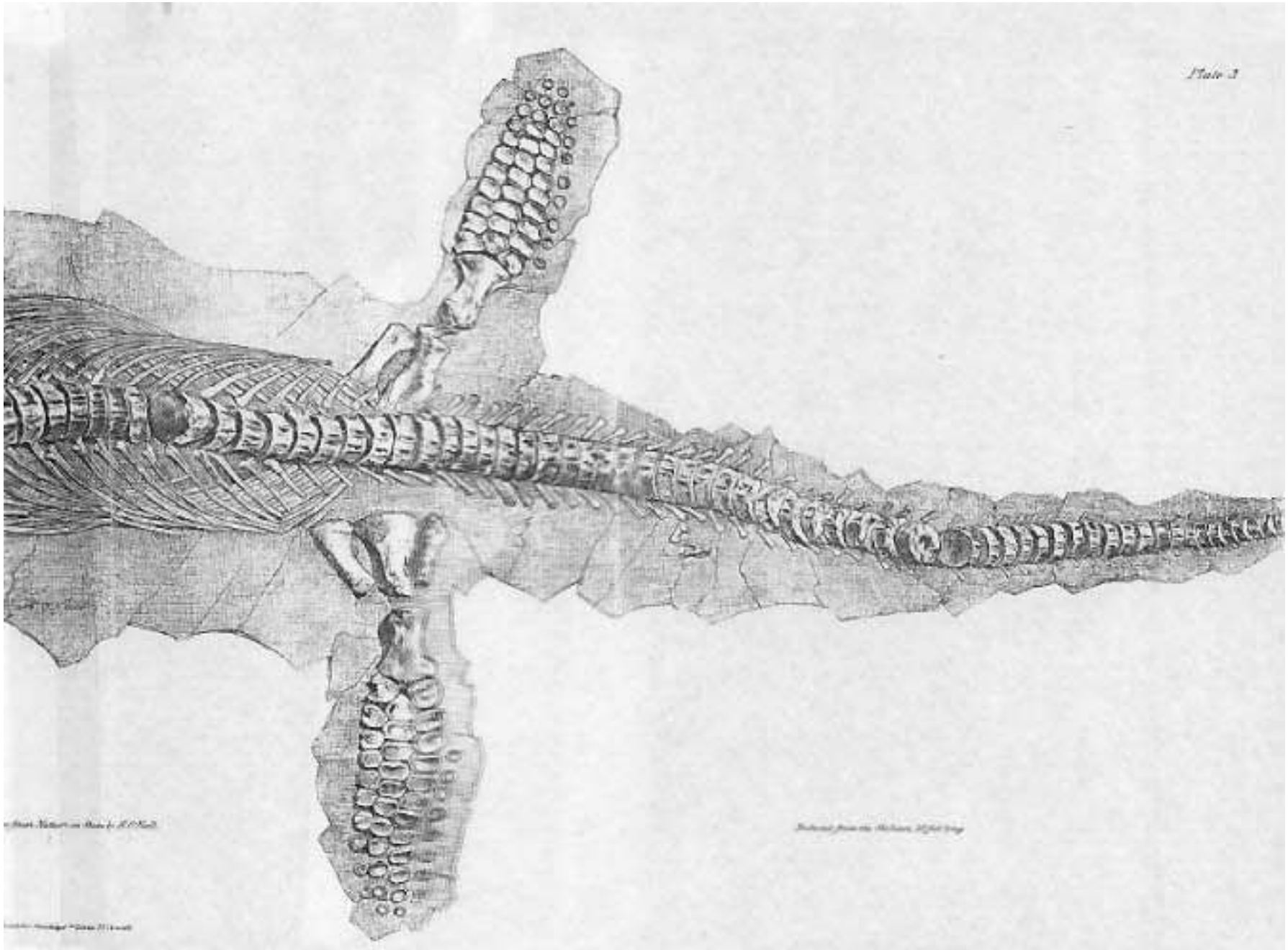
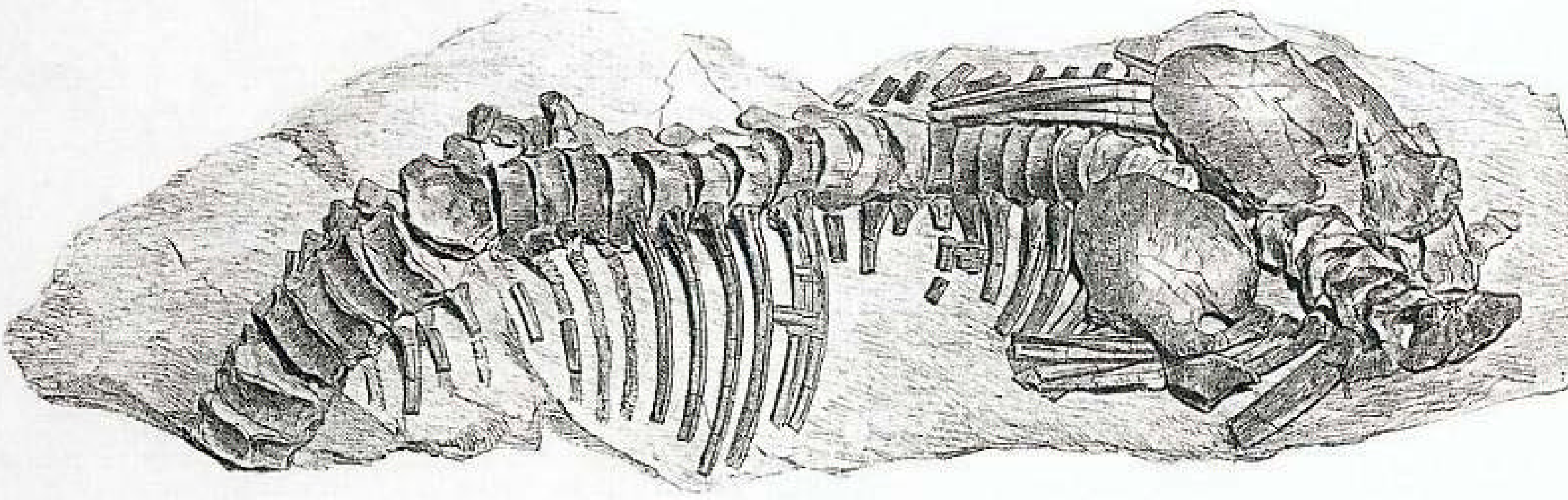


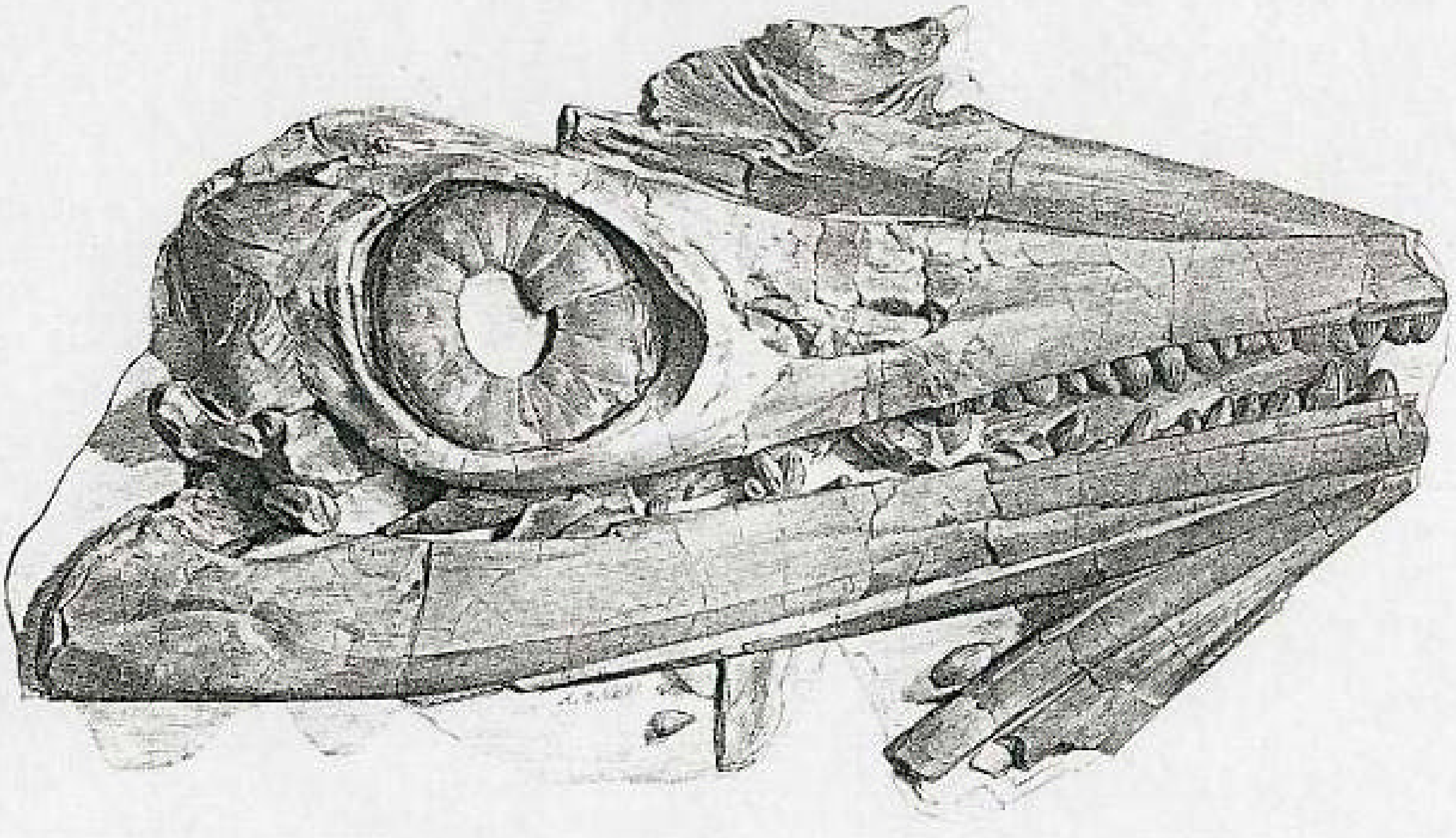
Plate 3

Plate 1



Standidge & Lemon lith. 77 Cornhill

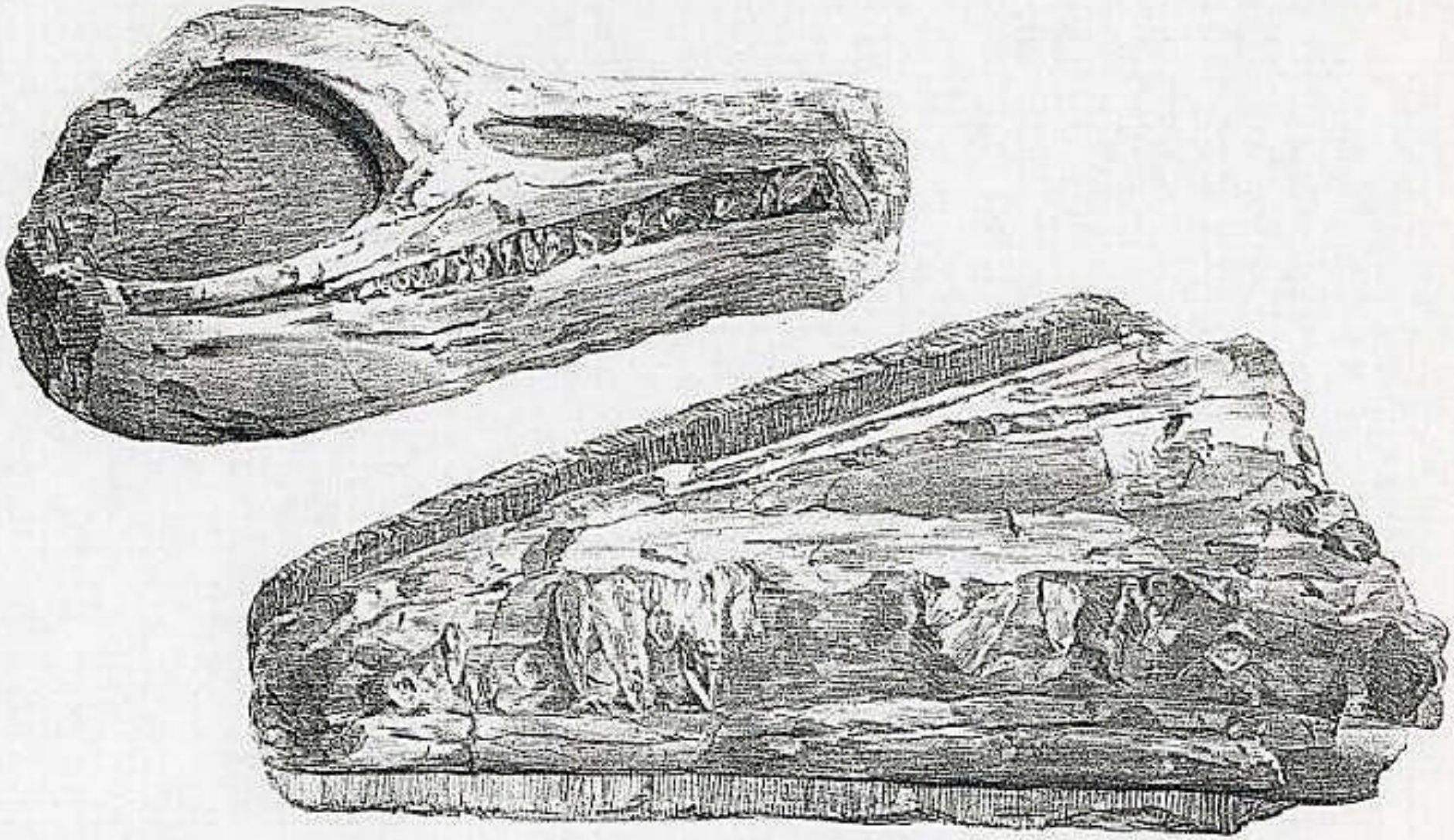
Plate 5

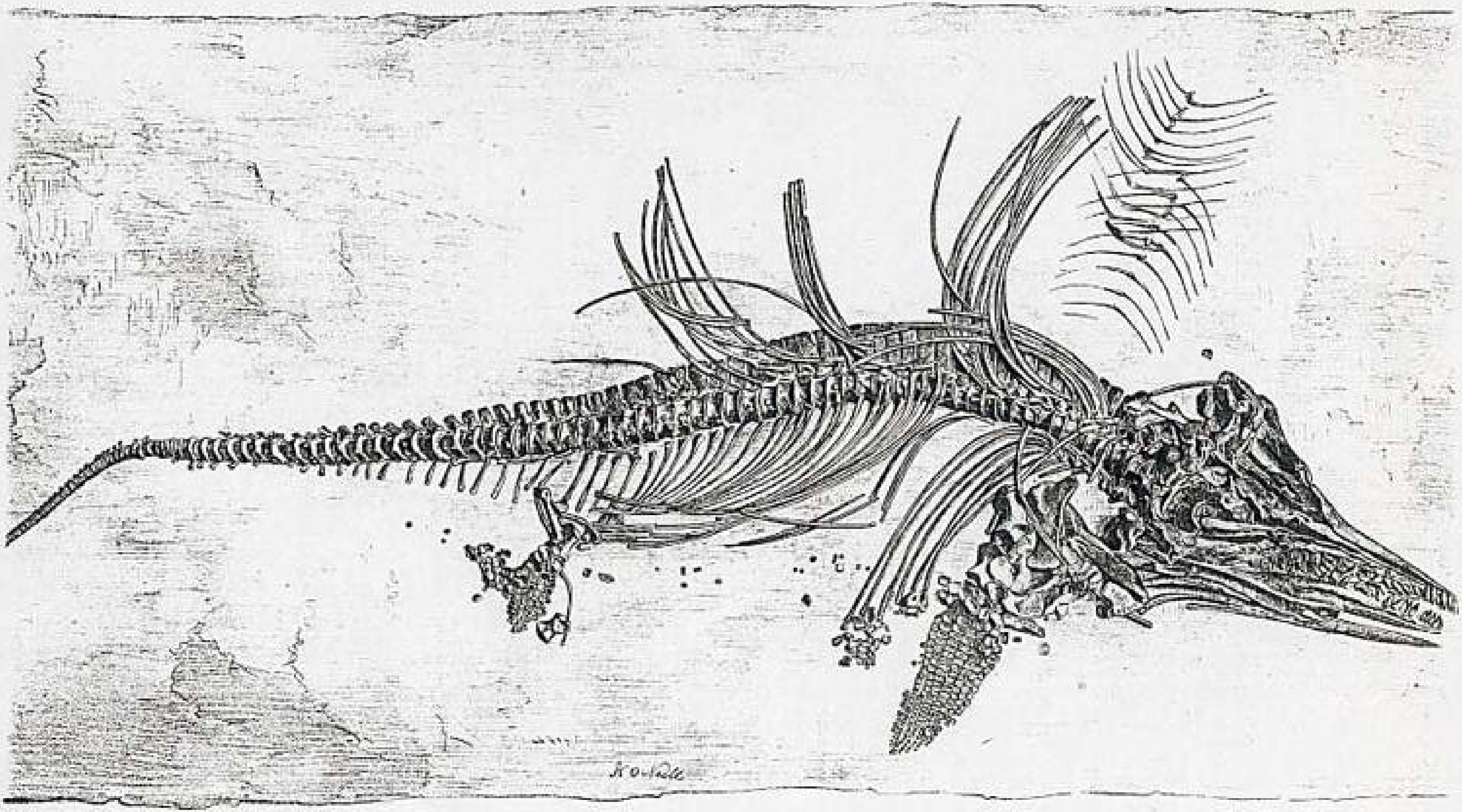


HEAD of CHIROLIGOSTINUS.

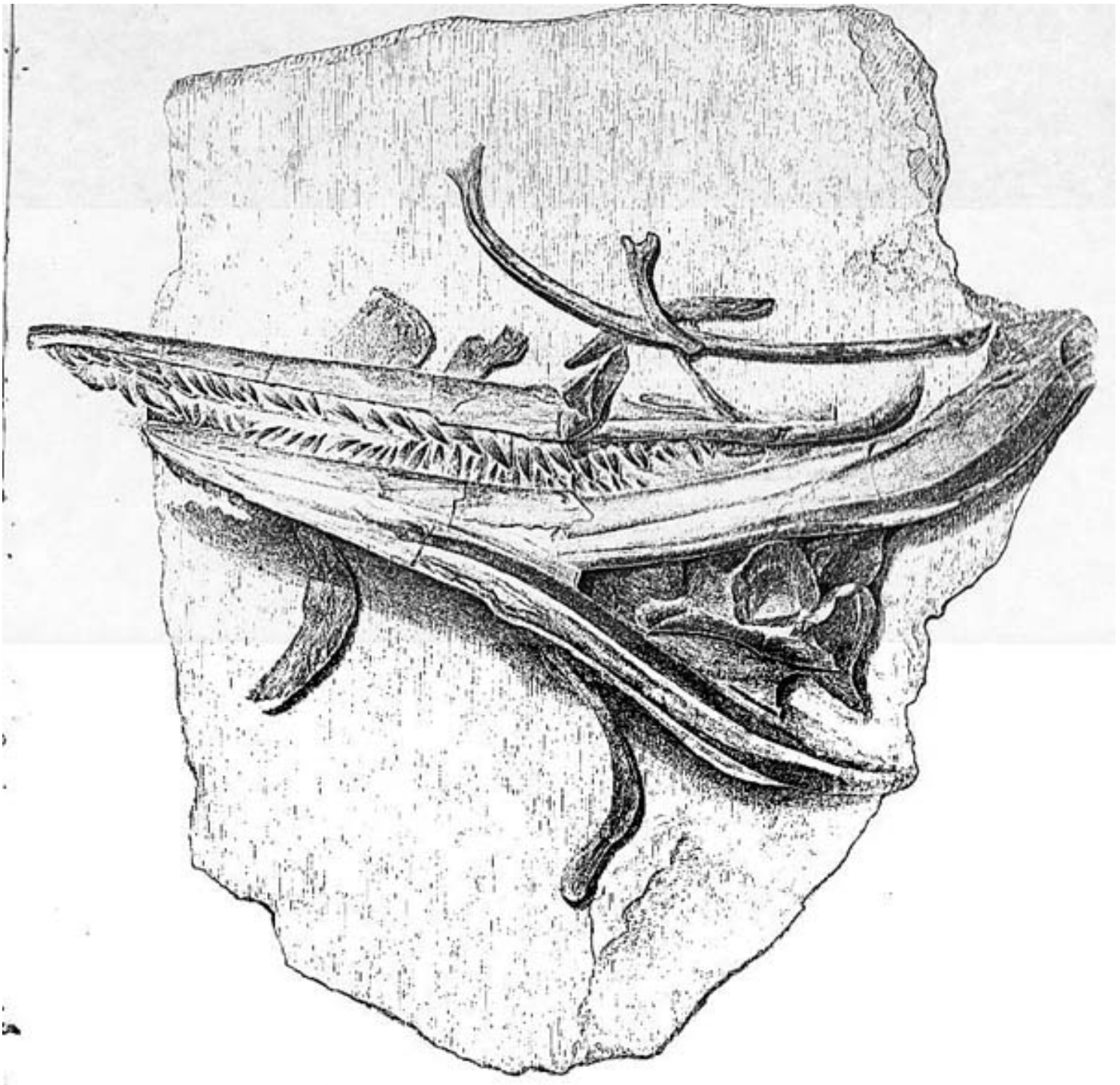
Drawn from Nature on Stone by H. O. Neill

From the Fossil remain of 2 feet

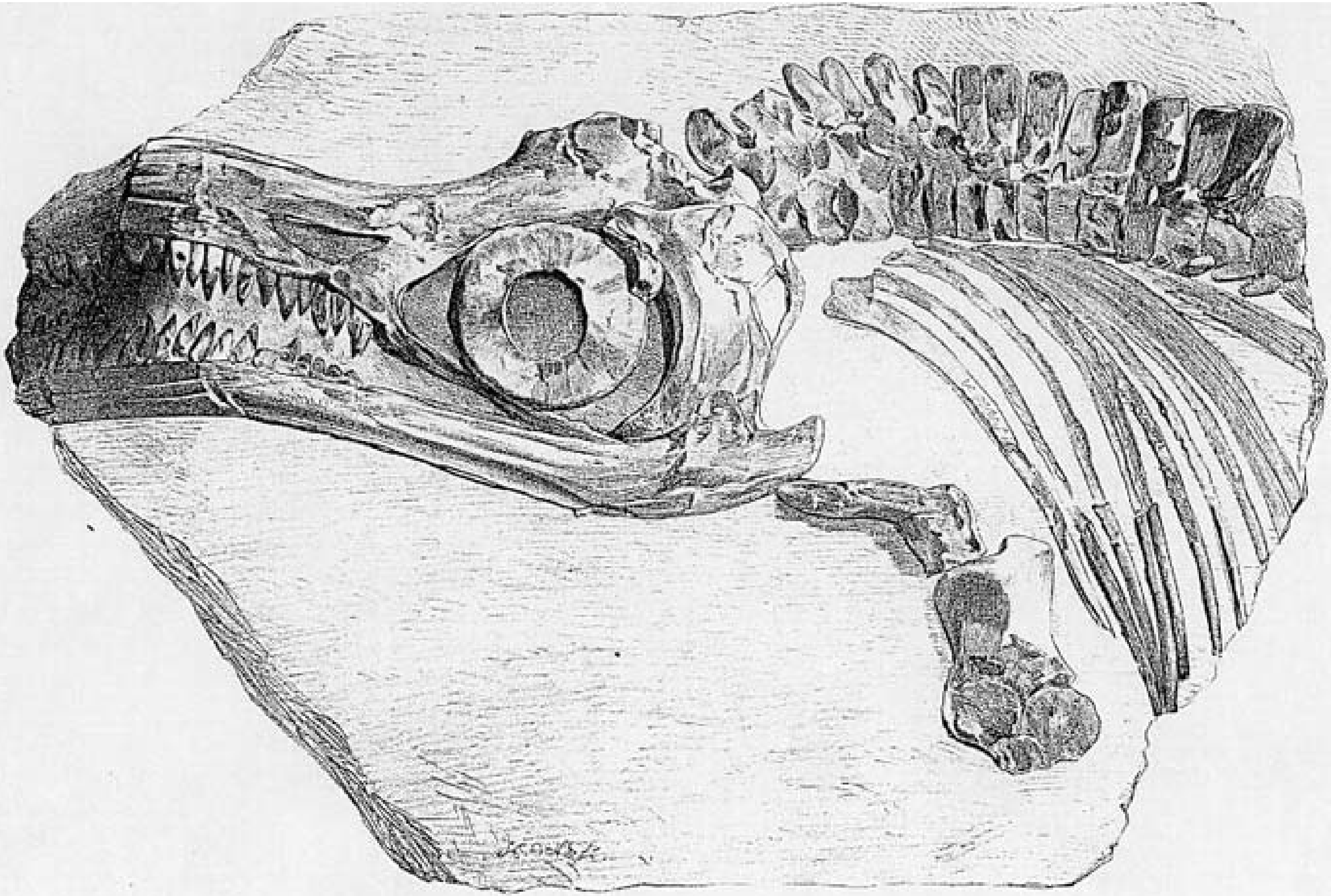




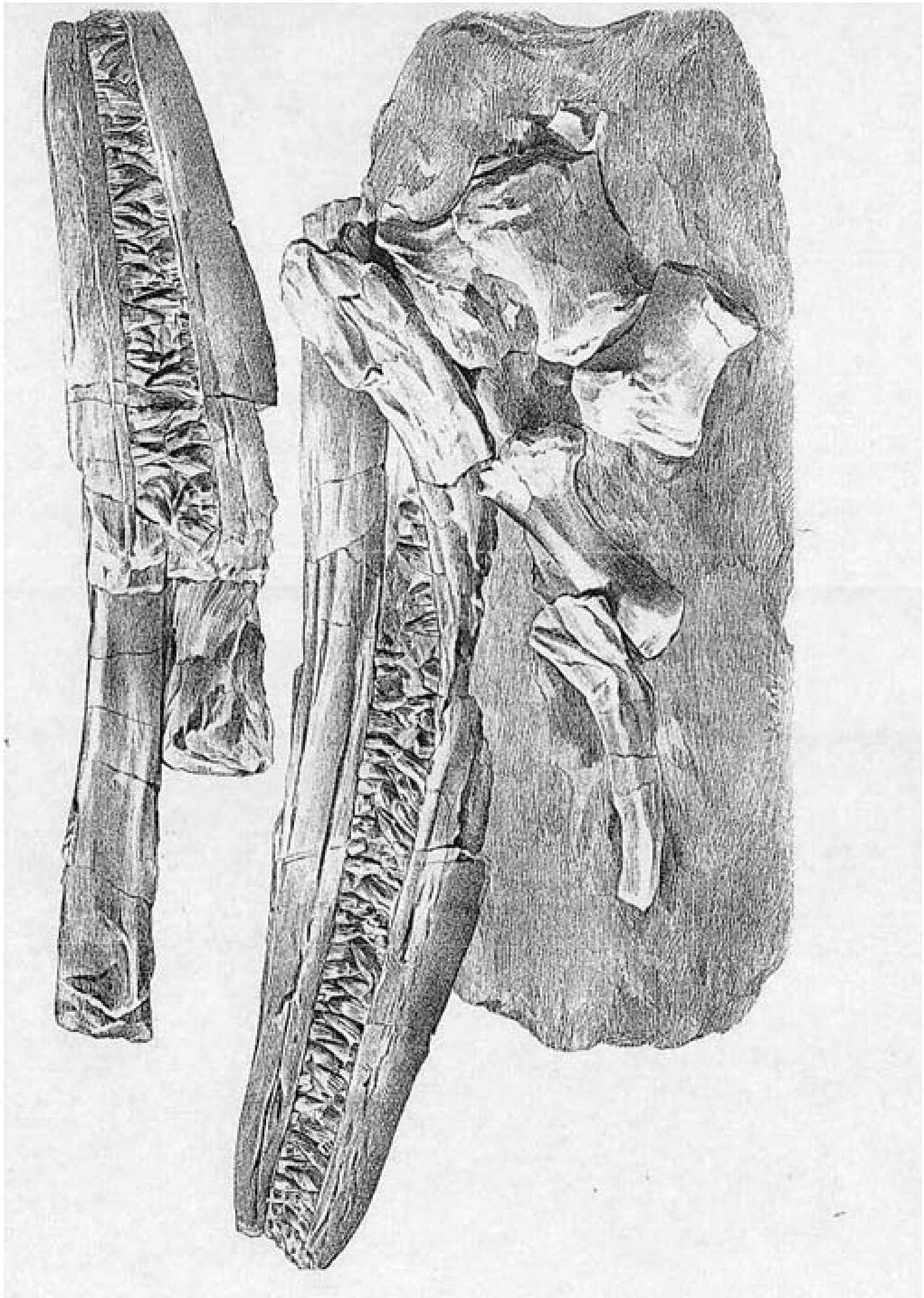
ICHTHYOSAURUS CHIROPOLYOSTINUS

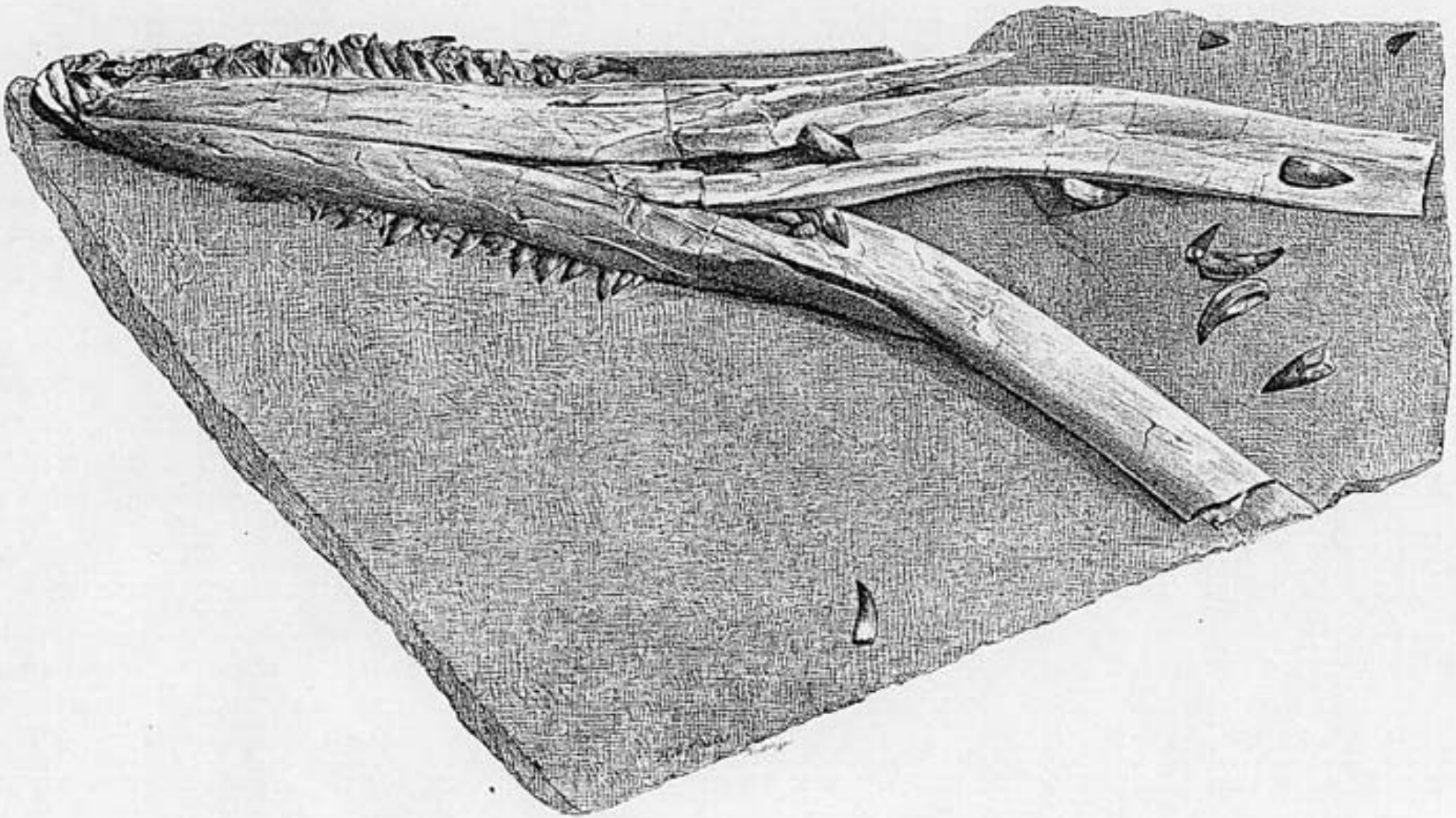


HEAD of CHIROPOLYOSTINUS.



FRAGMENTS of CHIROPOLYOSTINUS.

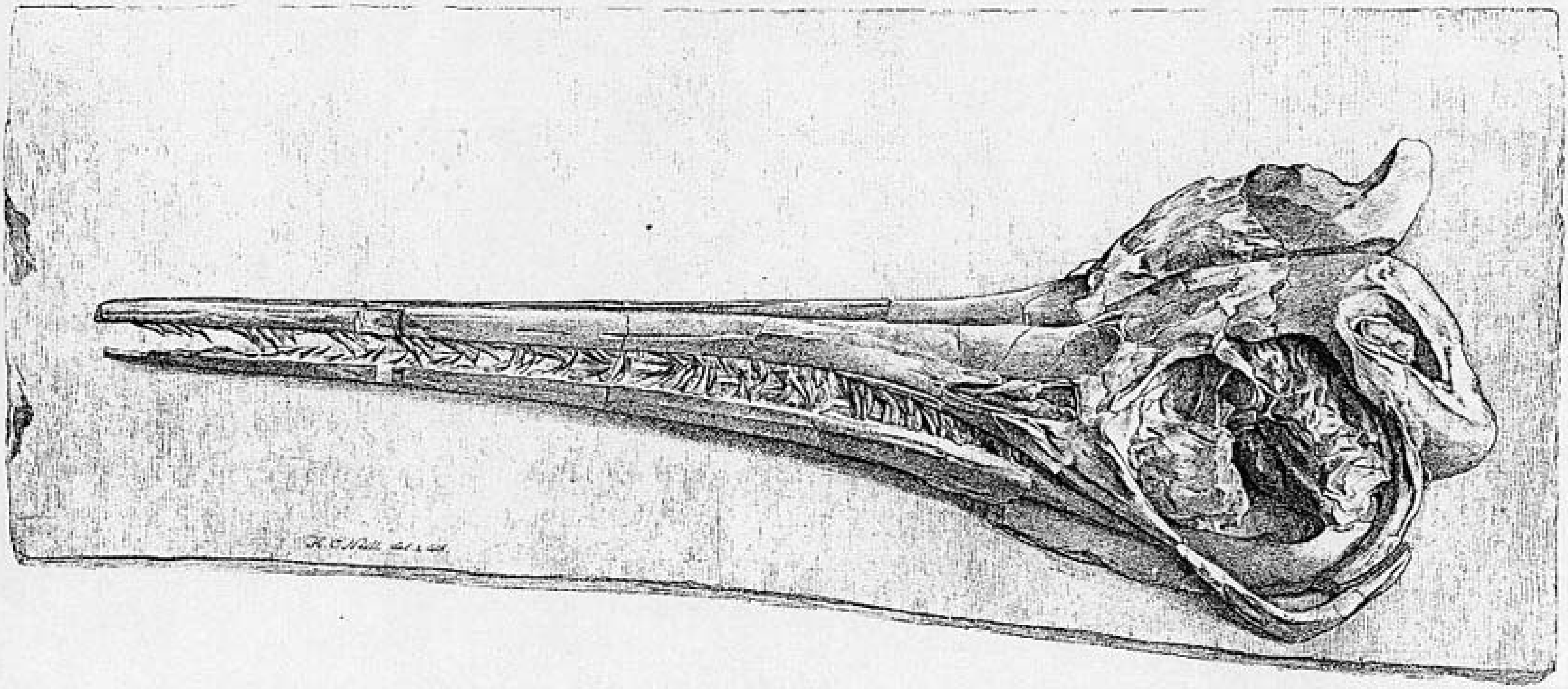




CHIROPOLYOSTINUS in LIMESTONE.

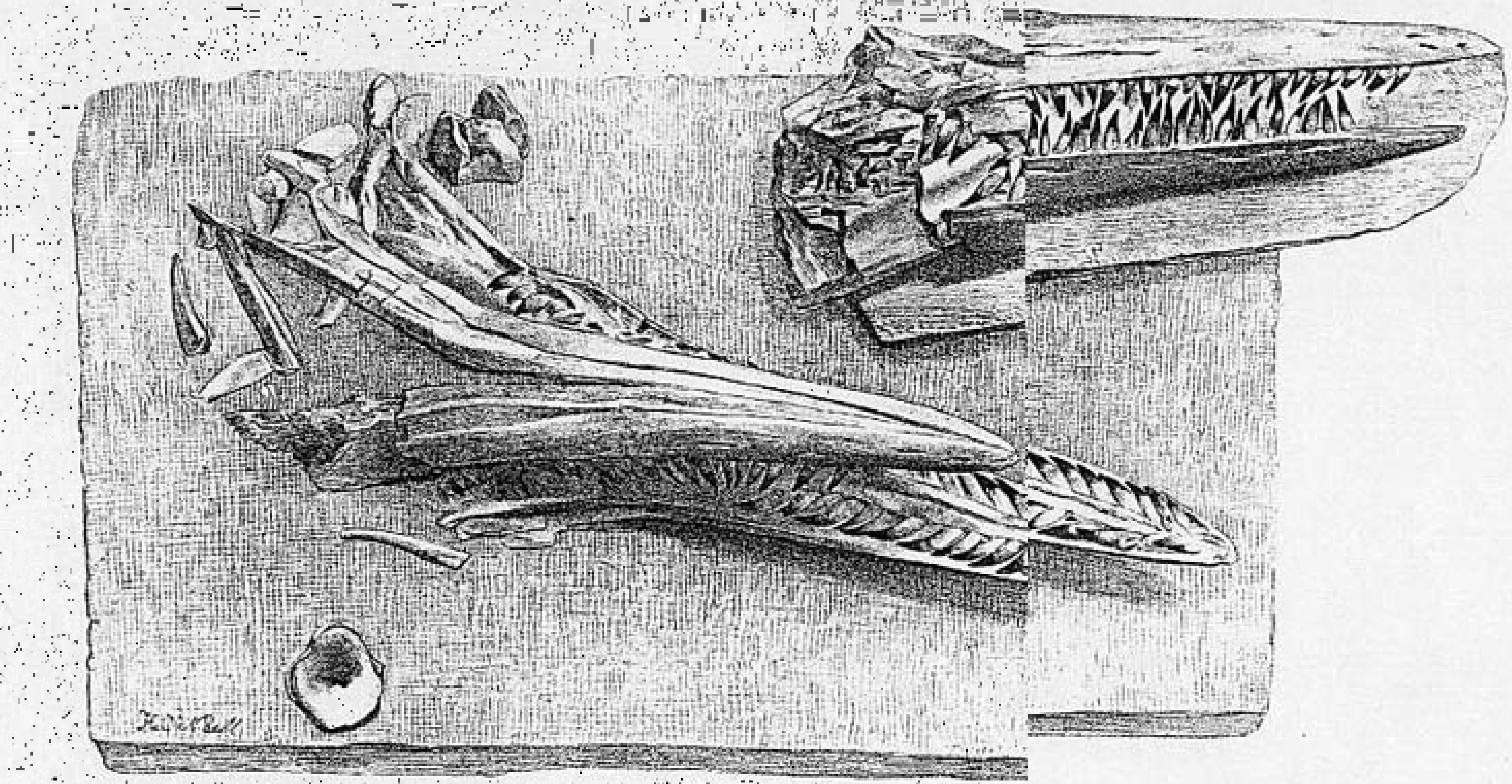
From the Fossil Remains of 3 Feet 6 In.

Printed by Standidge & Hewson, 17 Cornhill.



HEAD OF CHIROSTRONGULOSTINUS.

Plate 16.



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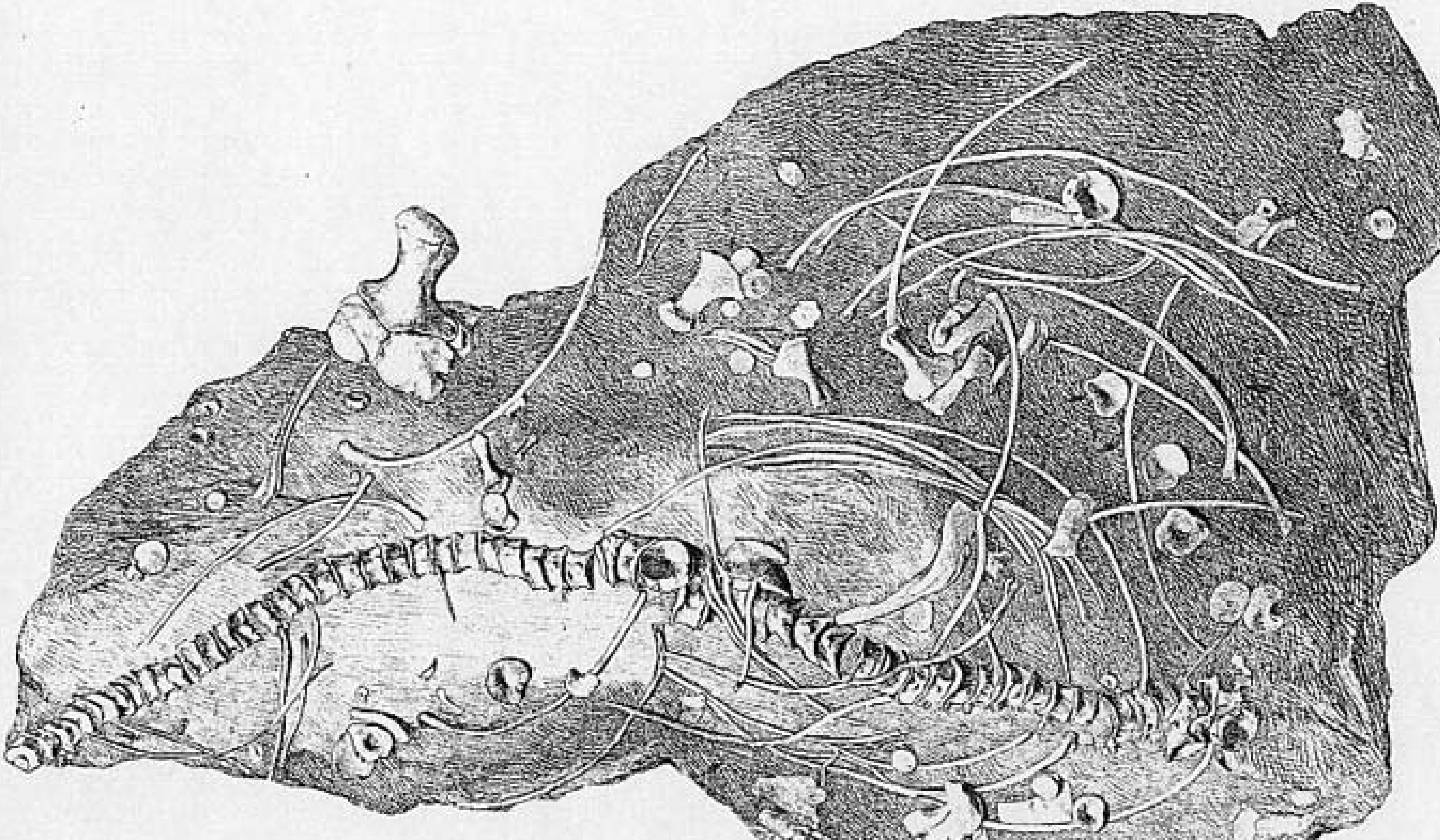
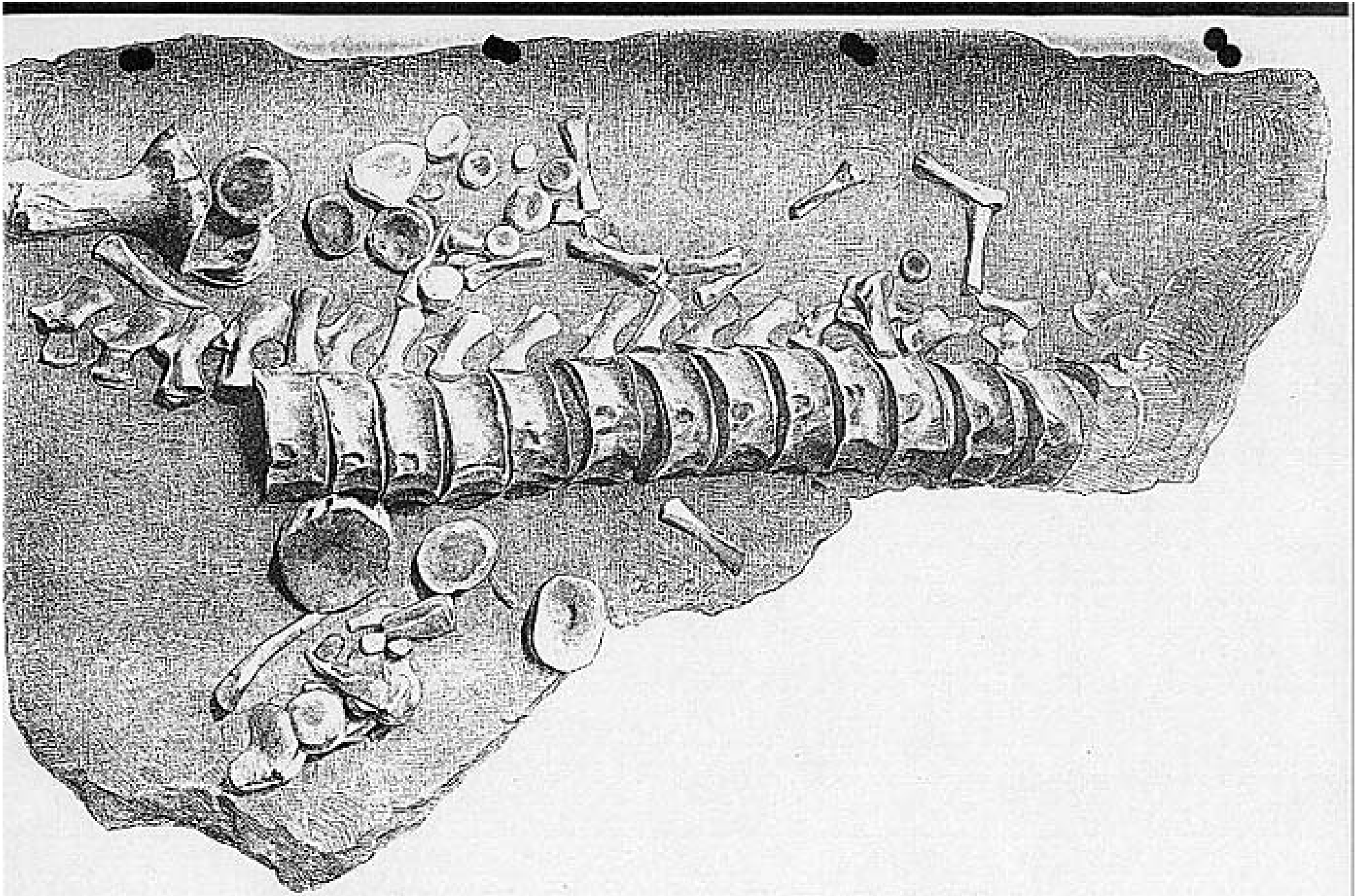


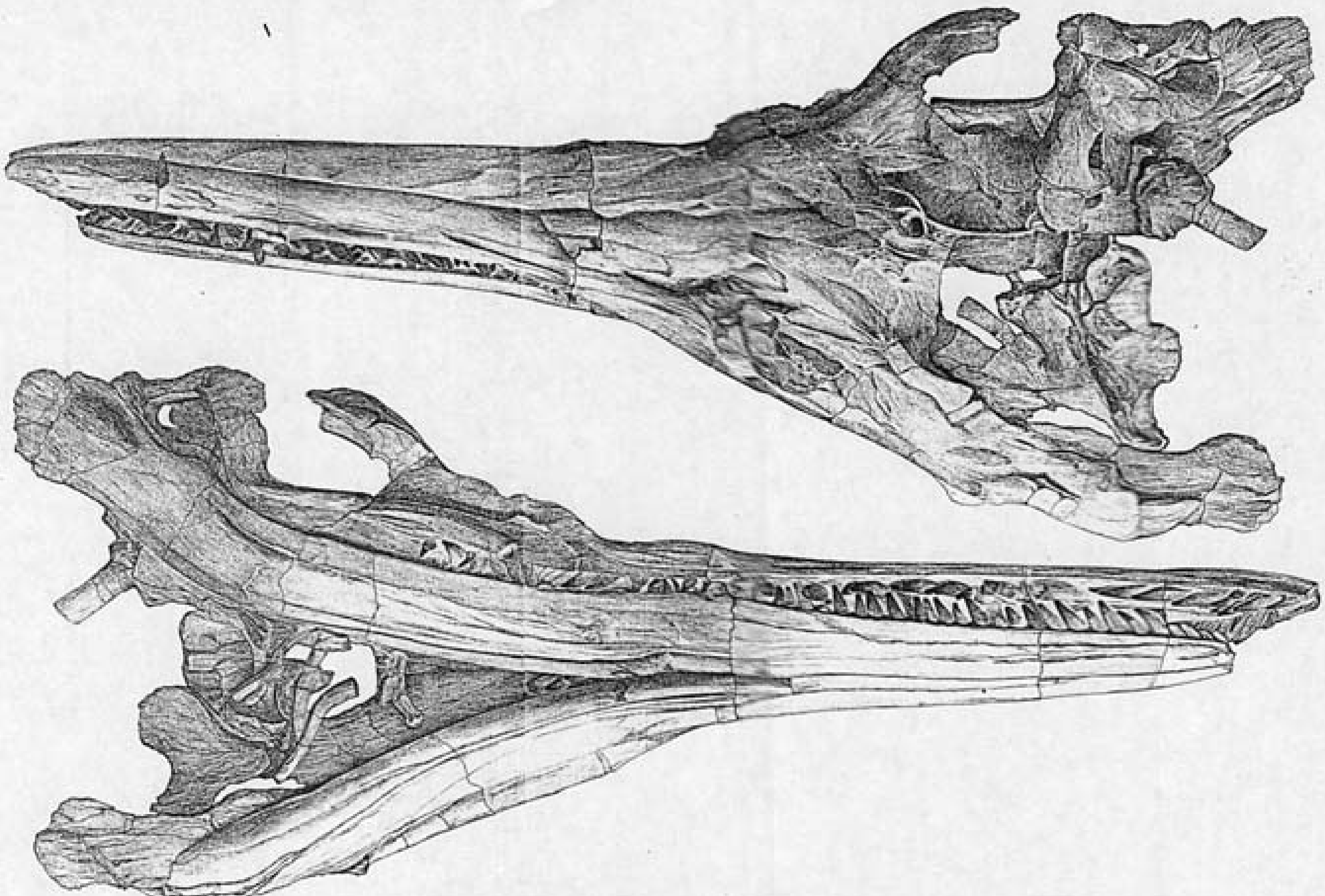
From the Fossil Remains of 3/4 Size, on Stone by H. O'Neill.

Printed by Standidge & Lowes, 17 Cornhill.

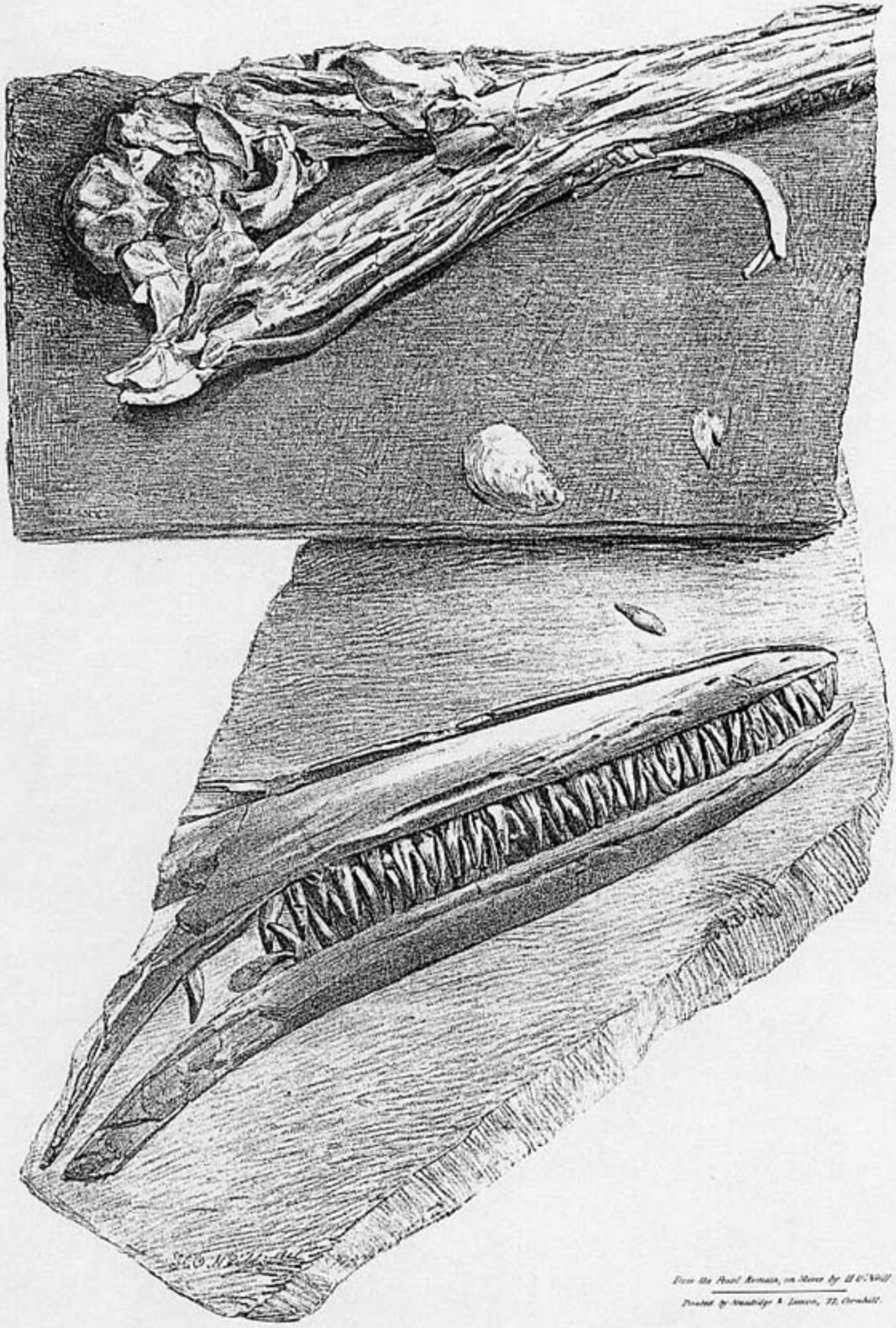
FRAGMENT OF CHEIROSTRONGYLUS.



FRAGMENT OF CHIROSTRONGULOSTINUS.

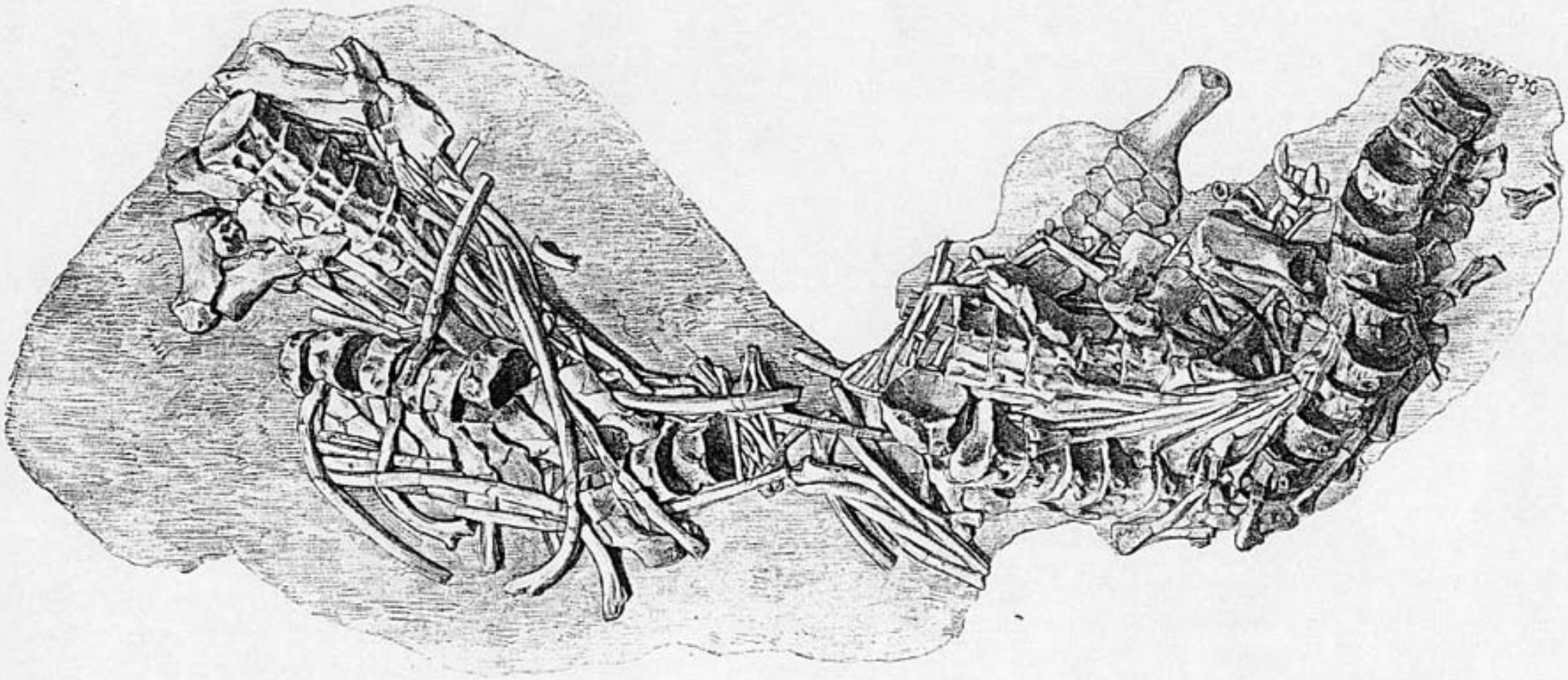


HEAD OF CHIROPARAMEKOSTINUS.



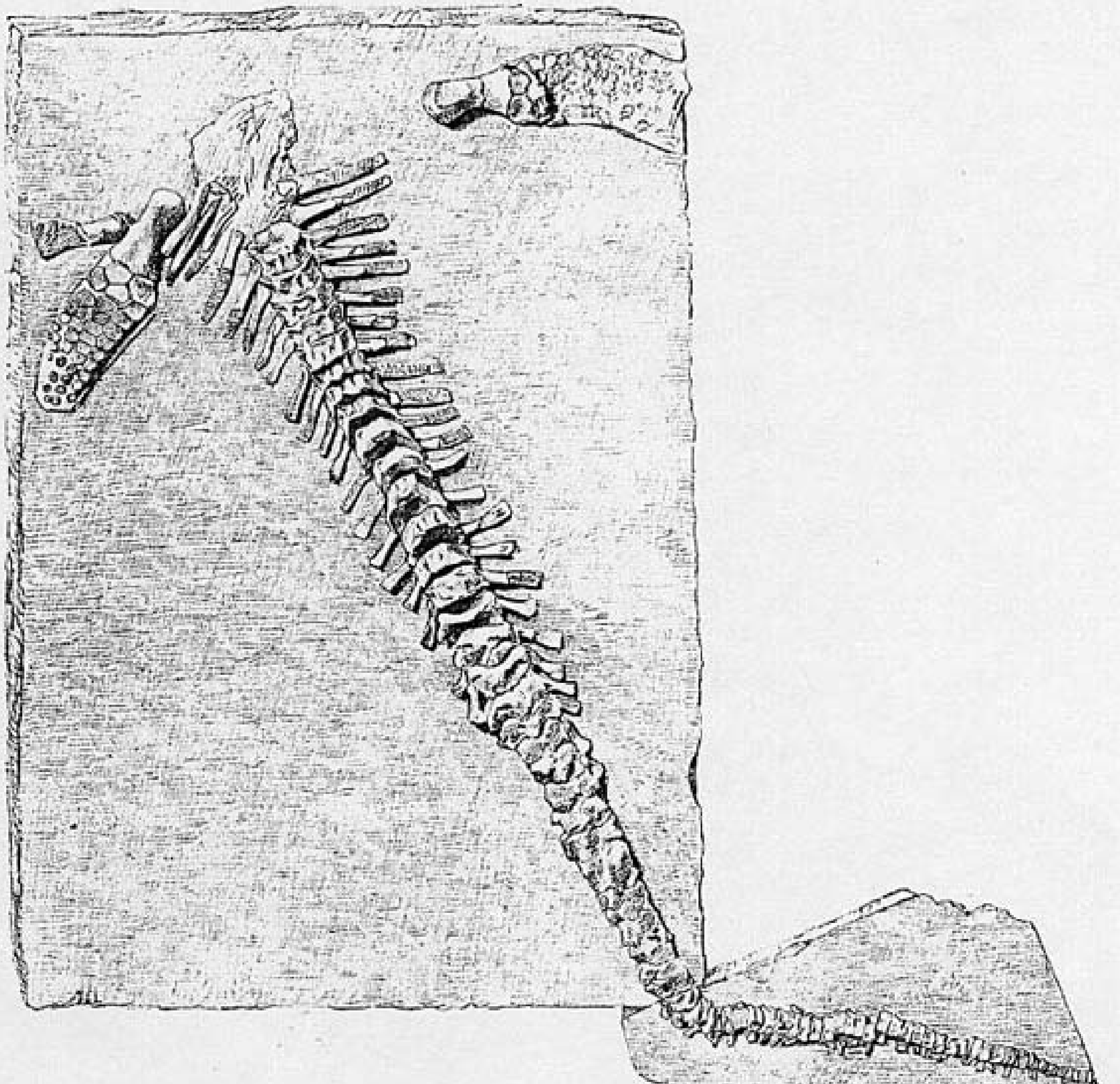
Fossil Skull Remains, on Stone by H. O'Neill

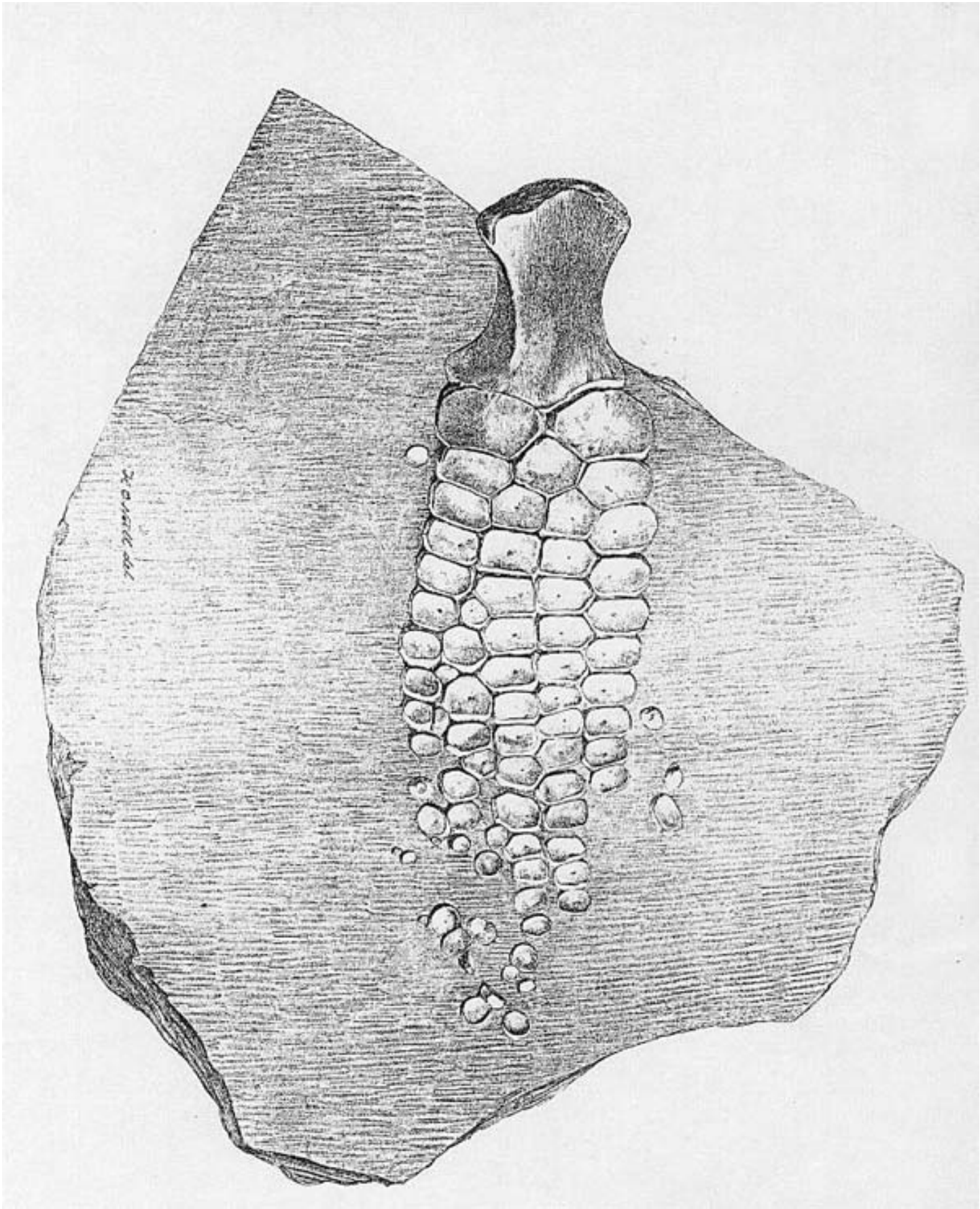
Printed by Standidge & Lowers, 72, Cornhill.

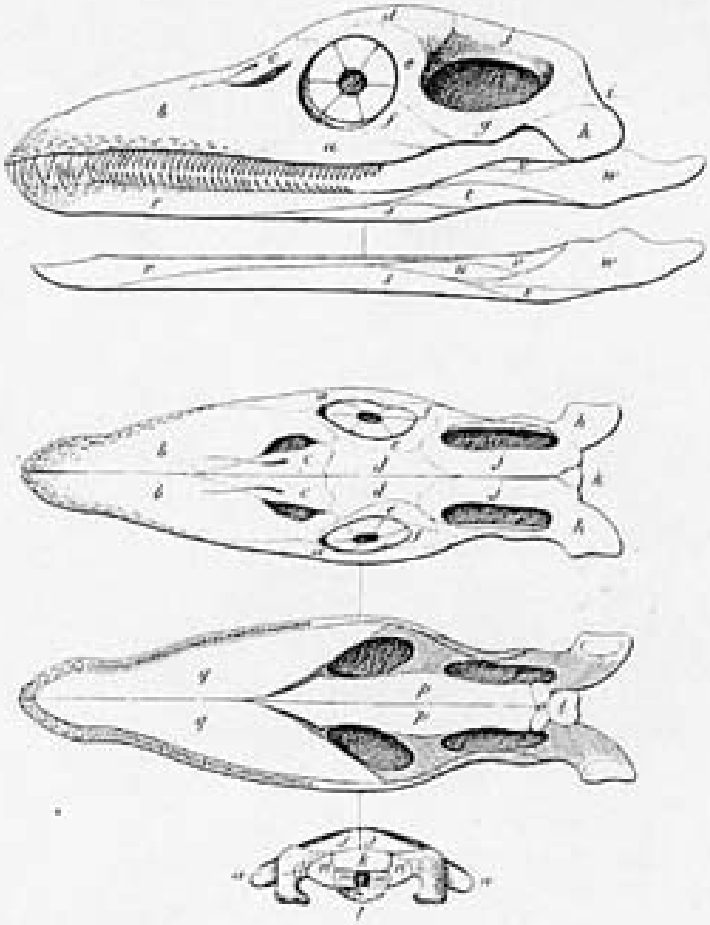


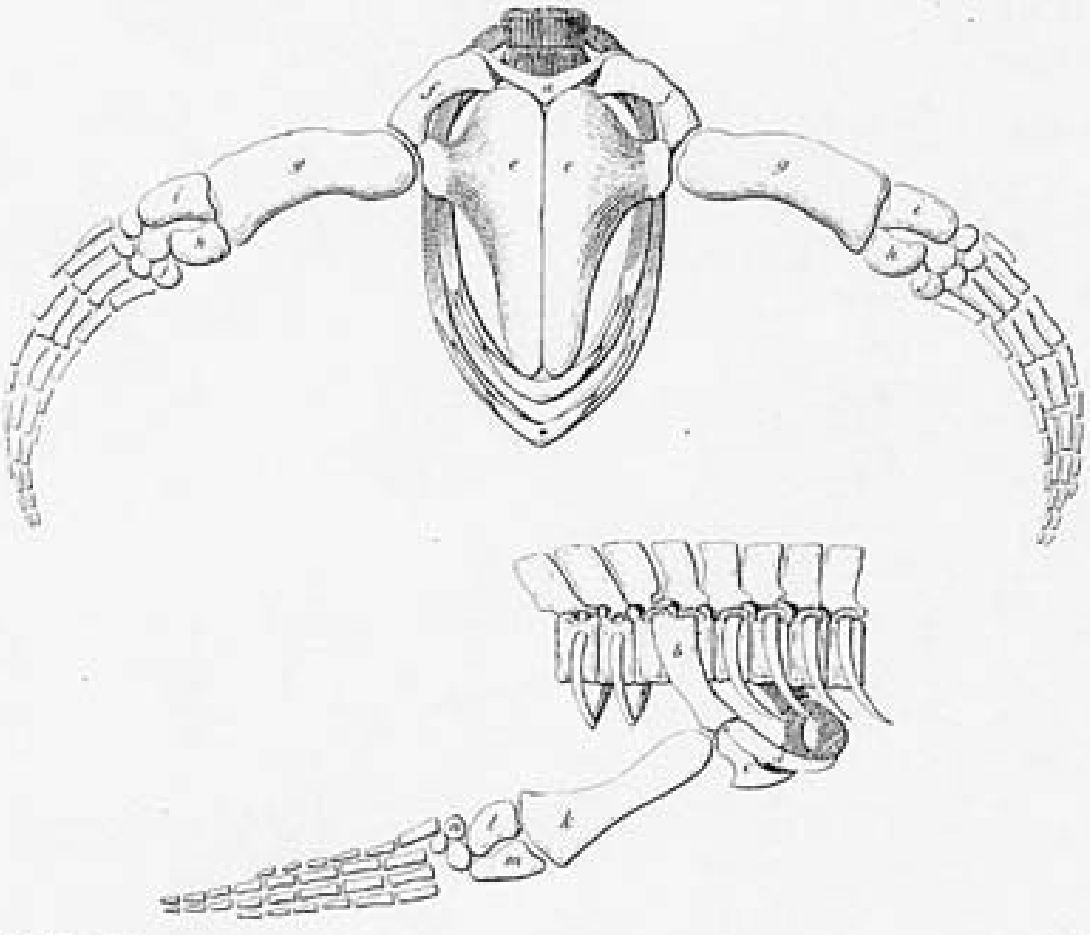
From the Fossil Remains of Tilgate Forest by W. D. Conybeare.

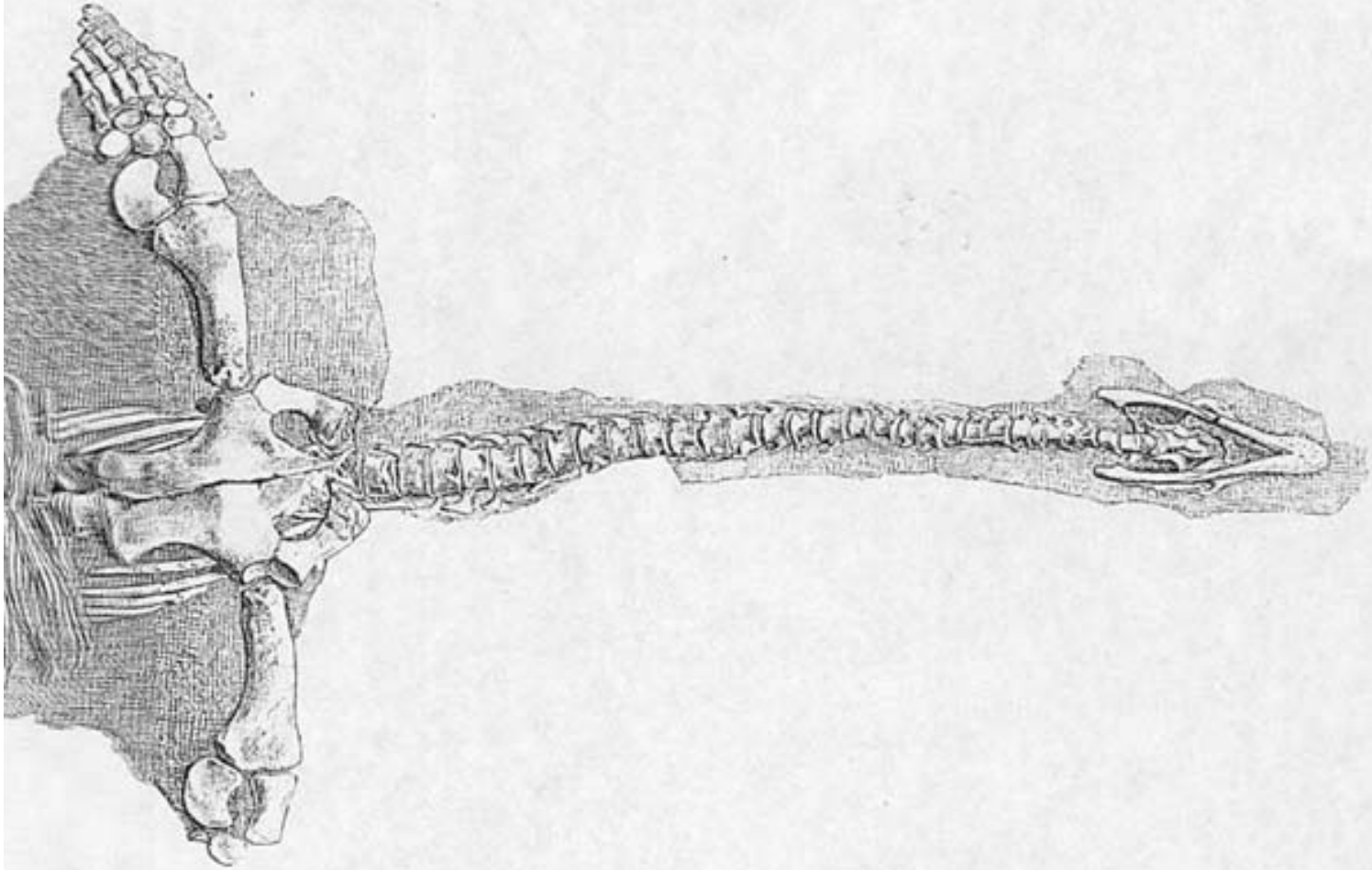
Printed by Standidge & Co. London.





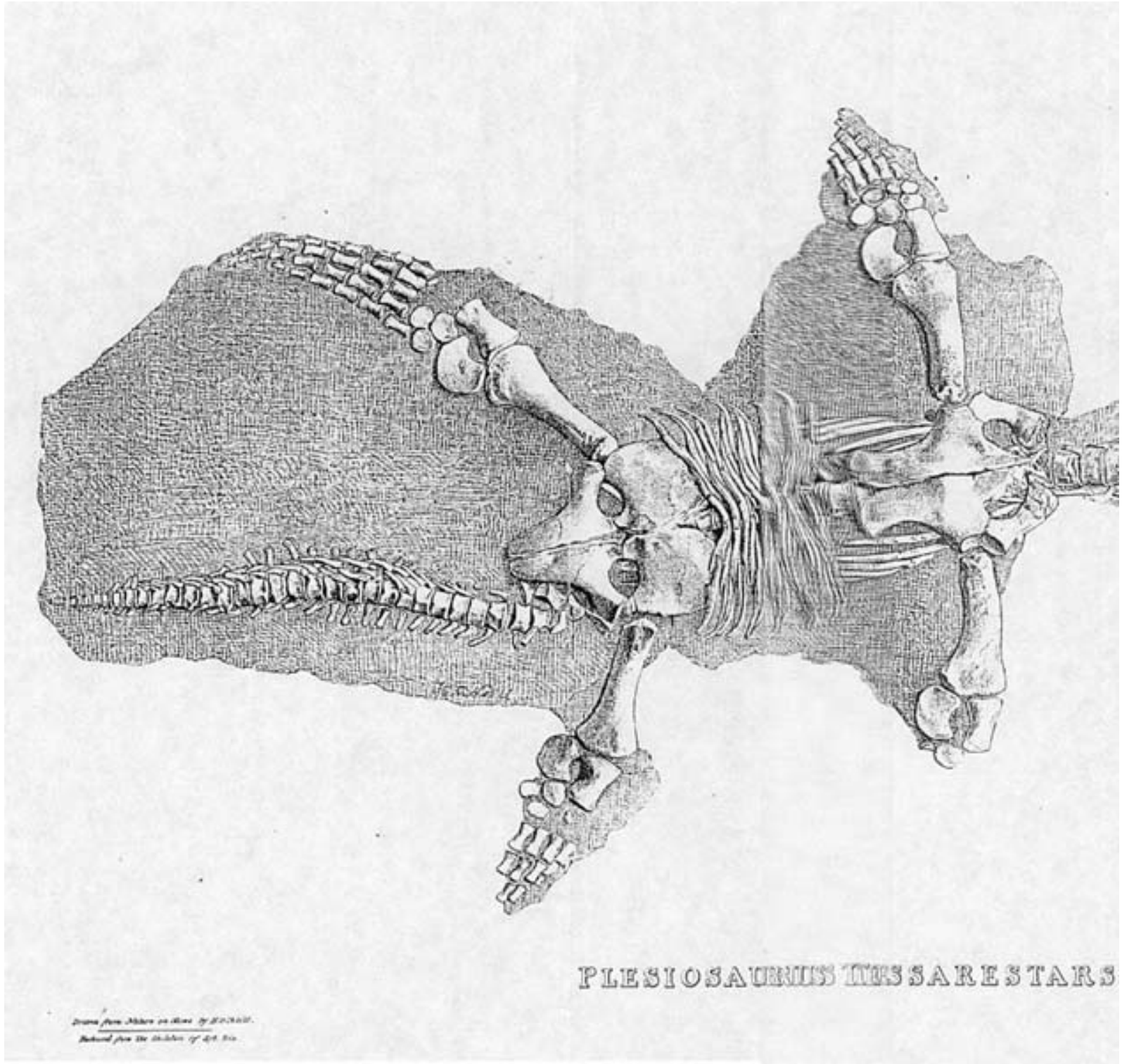






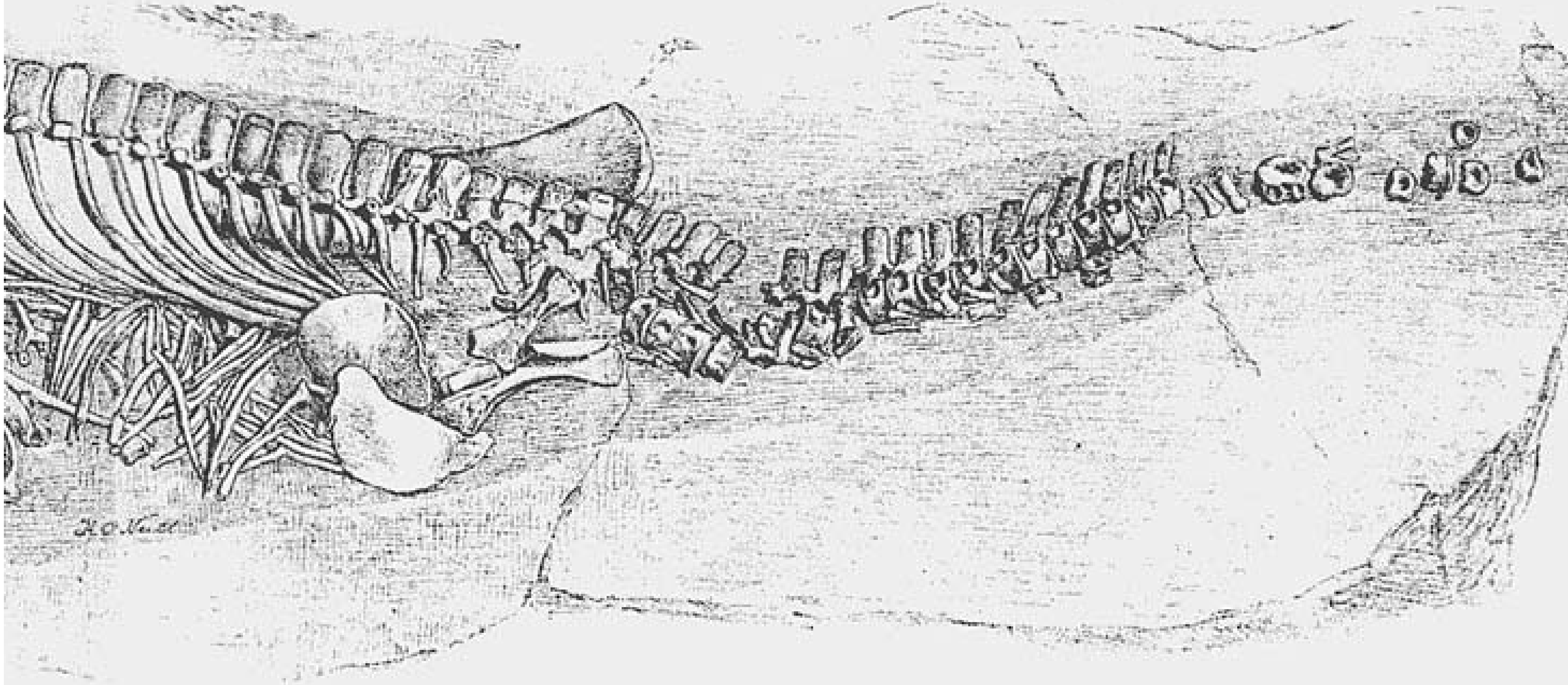
RHIS TIBIS SARES TARSOSTINUS.

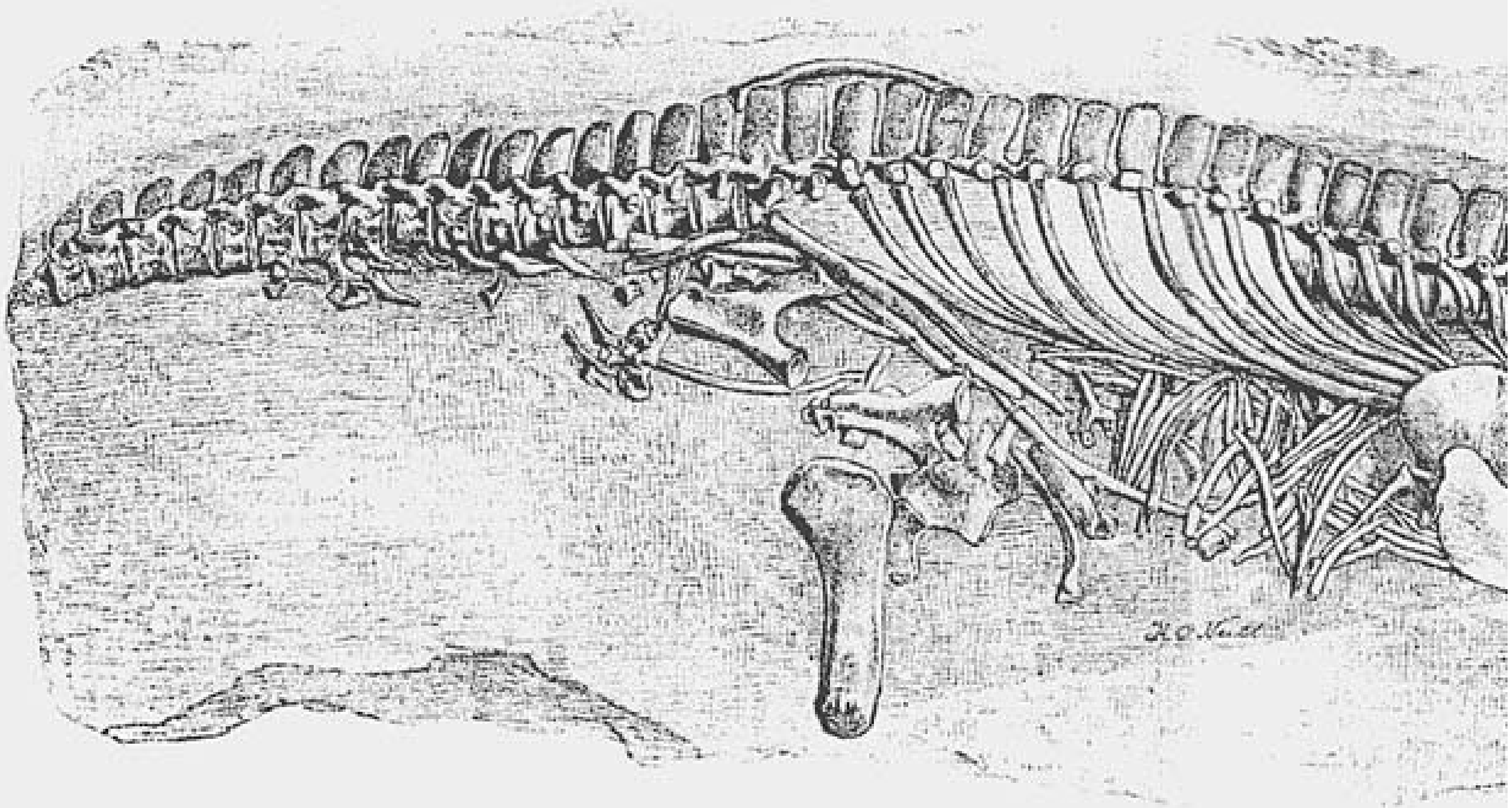
Printed by Standidge & Co. 13, Arundel.

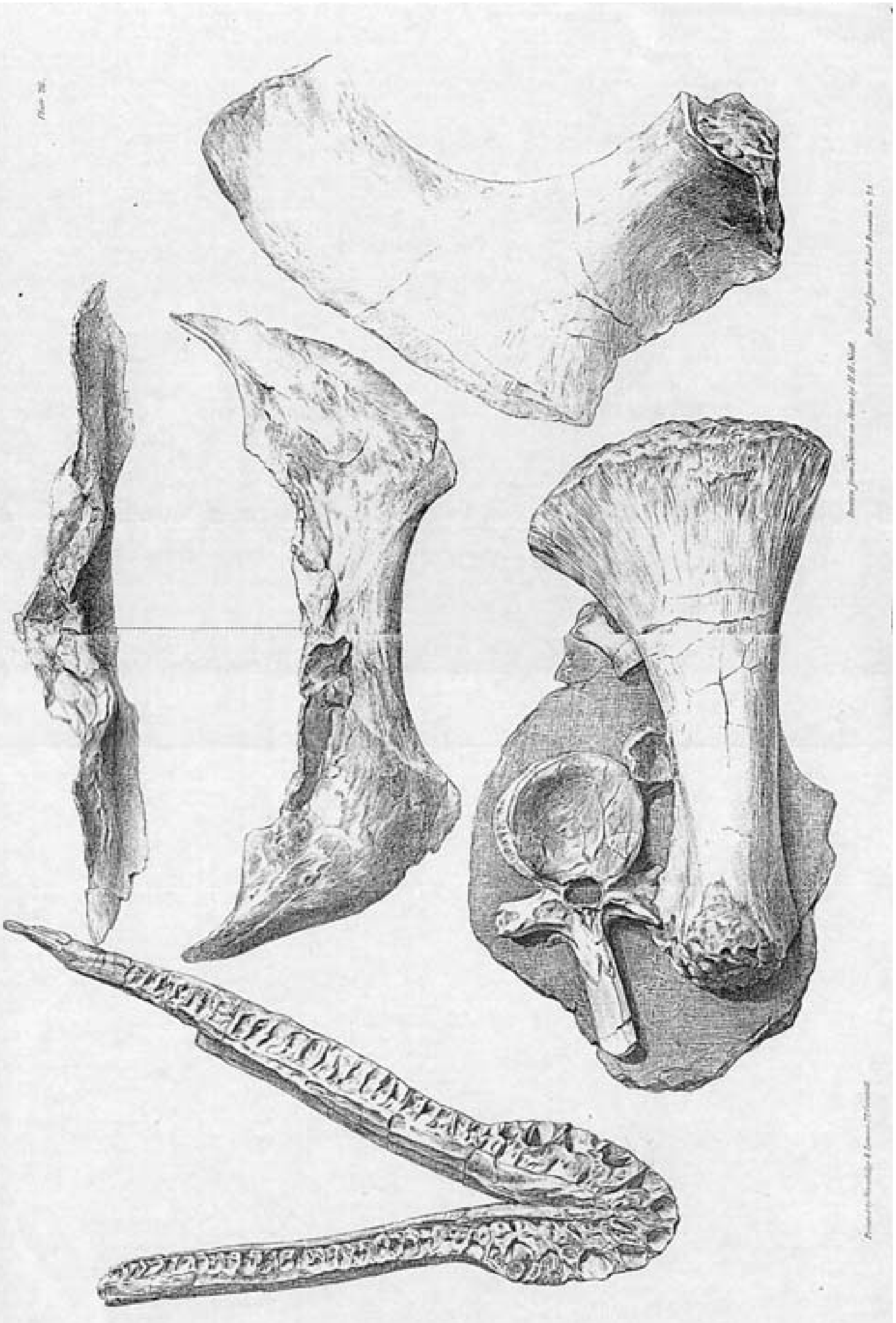


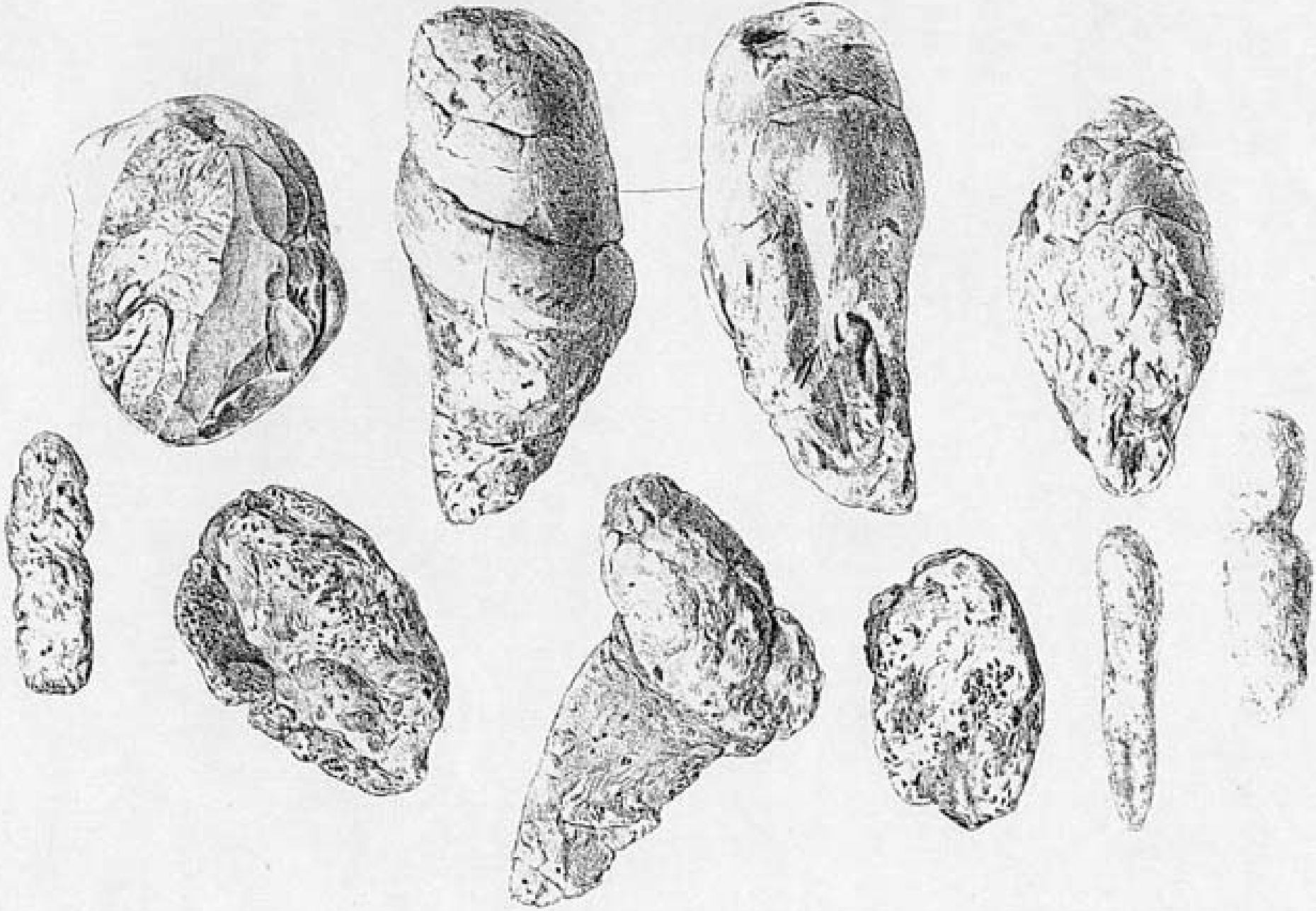
PLESIOSAURUS TIES SARESTARS

Plate 23



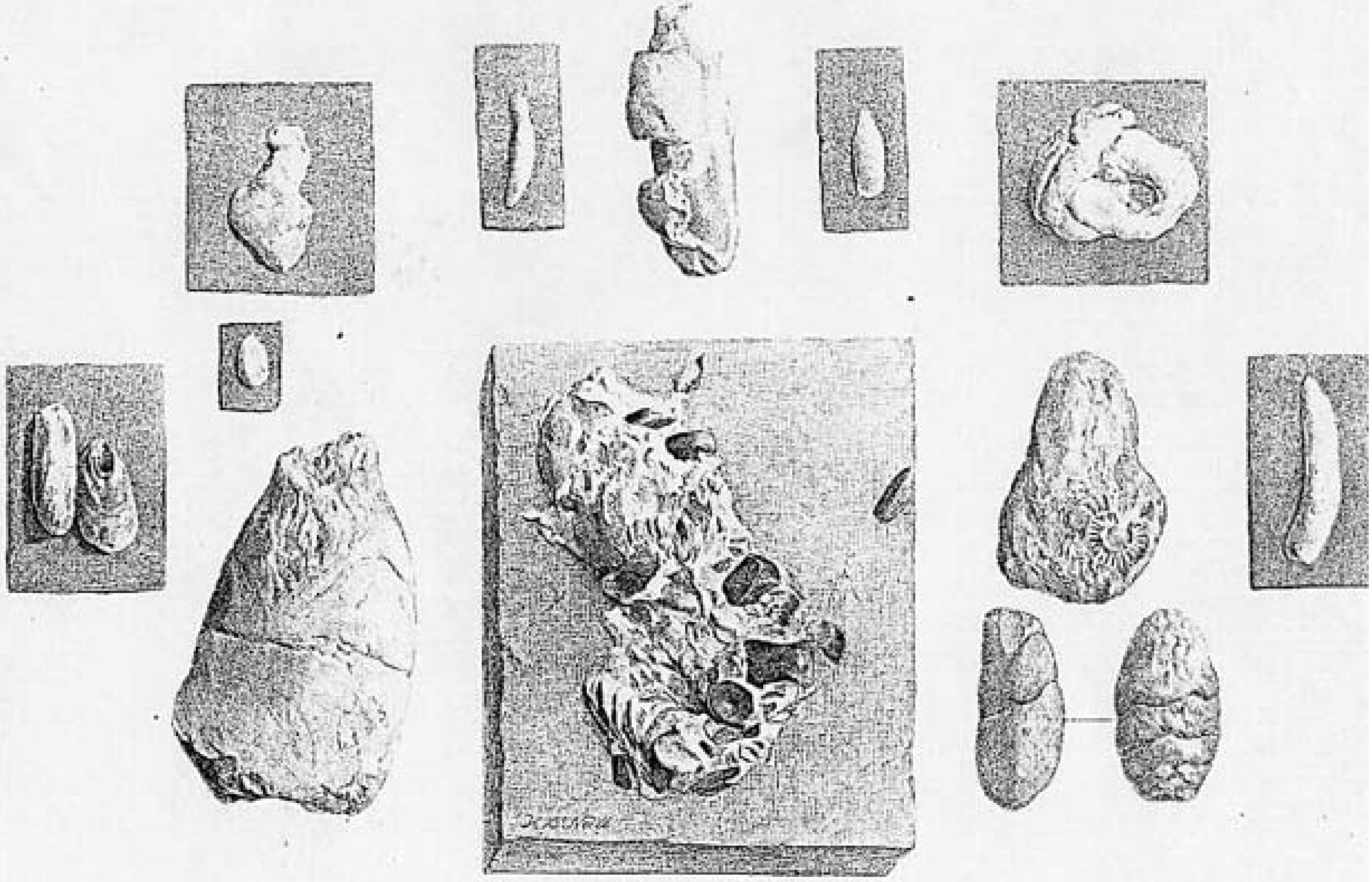






COPROS.

Plate 28



COPROS.