Notes on the Life and Work of Thomas Hawkins, F.G.S.

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THOMAS HAWKINS (Plate III) was the son of John and Edith Hawkins and was born at Glastonbury on 22 July 1810. John Hawkins (his father) was a cattle dealer and resided in Northload Street. Edith Hawkins (his mother) was a Baker of Meare, and like many of her day was illiterate. She is never mentioned by her son ; we therefore assume for this and other reasons that she died during his infancy and that he had no recollection of her. The exact date of her death must be left for the time being unsettled, for neither of the two church registers at Glastonbury, nor the register at Meare, record her burial. Relatives cared for the child and removed him to his octogenarian grandparent Baker, a farmer at Westhay, a hamlet in the parish of Meare, which Hawkins says was ' an out of the way place where nothing but roast beef and plum pudding, ghosts, and guns were dreamed of at Christmas '. Hawkins had two aunts living in this locality, Mrs. Tincknell at Westhay, and Mrs. Giblett at the Manor Farm at Meare, both married to farmers. Thomas's grandmother Hawkins lived in the High Street at Glastonbury, and he mentions that his great-grandmother Lawrence, whose maiden name was Gilbert, resided in the same street, and tells us that this lady was straight and active in her eighty-ninth year, and looked majestic when for the boy's amusement she put on one of her satin dresses with accessories kept in an oak chest. Thomas Hawkins was apparently a delicate and sensitive child and developed a fondness for natural history at an early age, being specially interested in birds, fish and flowers. He says ' in our orchards the birds were excellent company ', and relates how he found a cuttie's (wren) nest and got into trouble for taking one of the ten pearl-like eggs. This act ' raised so much censure in Westhay ' that he was prohibited from going into the woods. It is rather a mystery why the taking of one egg

was considered a disgrace by Westhay folk, when for generations the bird had been hunted and killed by so-called Wrenboys about St. Stephen's day. Hawkins, however, employed his time in other ways, and ' visited the river Brue to see the fish '. He also collected and preserved wild flowers with enthusiasm. He does not tell us how long this collecting went on, but relates how one ' yearly routing ' (spring-cleaning) his Aunt Tincknell threw his collection away. This tactless and inconsiderate act so upset the boy that he dashed out of the house and ran to the Manor Farm at Meare, where his Aunt Giblett received him ' way worn ' and crying. This lady was evidently much distressed at the boy's condition and trouble, assuaged his grief and kept him with her. The Manor Farm at Meare was a manorial residence of the Abbot of Glastonbury, and adjoins Meare Church. It now consists of only a portion of the original dwelling, and when Hawkins stayed there in 1818 ' the crypts were used for a dairy '. This year, following a very wet winter, the summer was unprecedently dry ; day after day the ' sun blazed out ' and rain was wanted badly. The river Brue ' fell lower and lower ' until it was little more than a ' trickle '. Fevers were common and burials frequent. Hawkins remembered the anxious looks of people and that there was much talking about wills, and superstitious gossip by the farm hands. Some people said there was a ' dragon in the sun, then added to that there was the wandering Jew—Farmer Patch had seen him at Wells, a bearded man and dreadful to look at. What in the nature of things must happen, the end of the world was nigh at hand, and everybody would be burnt to ashes. When therefore the day dawned which was promised to end things, instead of waiting at Meare for the fire ' the child thought he would ' rather drown in the river at Westhay '. So he fled from Meare along the white dusty road to the river. On arriving at Westhay he found the peat moor actually on fire and while he stood on the river-bank watching it he swooned and fell into the water, for he was found with half his body lying in the river by Joan, a dairy-maid, who brought him back to his grandfather's at Westhay. Some time after this episode the child developed severe nose-bleeding ; the attacks had been so frequent and severe that a doctor was summoned from Glastonbury. The doctor advised the boy's removal to his

father's house at Glastonbury, so that he could be attended to quickly should the bleeding recur. Although the boy was weak he was removed on horse-back. On arriving at his father's house he had anything but a cordial reception from a step-mother. John Hawkins had married a second time, about which the boy knew nothing. There were several children and the whole family was antagonistic. Thomas Hawkins mentions the house as having gables and mullioned windows and a large door ; this was probably the old Manor House which has long since disappeared. He also says that the day of his arrival was Michaelmas fair-day, and the market-place was full of people. John Hawkins was often away from home on business and the boy seldom saw his father. Thomas apparently regained his health and strength at Glastonbury, for he tells us he was soon helping Cox in the garden and receiving some schooling. Up to this time the boy's education had been neglected. He was far from happy ' in a house so hostile ' and life became unbearable.

As soon as he could, he removed to the home of his Grandmother Hawkins in High Street. ' She received me gladly and there was no end to her kindness.' From this point the whole tenor of his life changed for the better, for he was soon being happily tutored, ' along with the Metford children ',[1] by a Mr. William Seabrook, a minister, whose learning and influence were undoubtedly of the greatest value and assistance to the lad. How many years Hawkins was tutored by this gentleman we are not told, but when he left the town Mr. Seabrook was ' much missed ', and with his departure Thomas Hawkins' education from outside sources terminated. Hawkins was interested in geology and began at an early age to collect fossils.

When he first went to London to visit an aunt he relates : ' I was twelve, and as inquisitive as a boy in his first teens could possibly be. I was ascending the grand staircase of the British Museum (then Montague House) when a sturdy porter grasped my arm and ordered me out, I was too young ' ; but extricating

[1] The Metford family lived at the Old Hall and belonged to the Society of Friends. The Hall at Glastonbury is situated on the north side of the High Street, near St. John's Church. Although the outside appearance of the house looks late eighteenth century, it contained until recently a fine oak staircase inlaid with mahogany and light woods, dated 1726. The staircase is now in the Victoria and Albert Museum, South Kensington.

himself, he ran up the steps into the Museum and saw all there was to be seen. Hawkins says regarding the non-admission of children to the Museum ' that this matter is being mended '. In the preface to his *Memoirs of Ichthyosauri* * he states that at the age of twelve he was ' a tyro in collecting antiquities, coins and pottery come-at-able in my neighbourhood. I then 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 goods to which I was a stranger until his demise.'

John Hawkins died when his son was nineteen years old. On another occasion he says, ' buried my father and the best of grandmothers, and settled the Edgarley business '. What this business was is not explained, but it may be assumed that it had something to do with property. He appears to have had a great liking for his native town and neighbourhood as he writes, ' Never, never, could I tire of Torhill, and was not the Glastonbury Abbey as good as my own ', implying that in those days the townspeople were allowed to enter the Abbey precincts freely at any time. He mentions that one day he found old John Down with pickaxe in hand about to remove stone from the foundation of the dark stairway, and ostensibly saved the N.W. corner-turret of St. Joseph's Chapel from being disturbed. Having read all the books he could get at and his aunt wishing to see him again in London, there was nothing to prevent him taking the coach to town. This visit to London was no idle pleasure-seeking affair, for he adds, ' I learned the uses of paint, design in ornament, what gothic architecture was and sculpture ; how to engrave, and the use of the lathe.'

Having become somewhat deaf he was advised to try sea-bathing. So he went to Charmouth on the Dorset coast. During his stay ' there were big storms, rock ledges were torn up and fossil dragons exposed ' on the beach. About the same time there happened to be discovered ' dragons at Street,

* Some of the information used in this paper was also obtained from Hawkins' book, *My Life and Works*, London, 1887.

the quarries there being as rich as the reefs ' at Charmouth. ' All they found were eagerly bought and added to those previously collected ' at Glastonbury. Hawkins had evidently been considering joining the medical profession, for on 6 October 1831, being twenty-one years of age, he became a surgeon's pupil at Guy's Hospital for a period of twelve months, taking courses of instruction in Materia Medica, Chemistry, Botany, Anatomy Dissections, Physiology and Surgery. It is recorded [2] that previously to this he had been apprenticed to a Mr. R. C. King, a doctor at Saxmundham in Suffolk. At Guy's he says he was instructed in Anatomy by Sir Astley Cooper, and it may be assumed that this included Comparative Anatomy, a subject in which this great surgeon was professor at the Royal College of Surgeons. How long Hawkins studied at Guy's is not recorded, and apparently he never completed the whole curriculum. That may very well have been cut short by an unfortunate love-affair. So upset was he and so intensely did he feel this disappointment that he withdrew from London and settled down at Sharpham,[3] an old mansion near Glastonbury, the birthplace of Fielding.

From this onwards until 1840 Hawkins was absorbed in his geological collections and the publishing of his two great books on Ichthyosauri and Plesiosauri. His desired retirement and seclusion at Sharpham seems, however, to have been short lived, for his geological work had the reverse effect and brought him into the limelight. We hear of him dining with the Duke of Buccleuch, of notabilities calling on him, of visits to Longleat,

[2] Guy's Hospital Register, from information kindly supplied by the Secretary.

[3] The Manor House at Sharpham Park was rebuilt by Abbot Bere, 1493–1524, in a splendid manner, with hall, chapel and offices. The Park contained about 382 acres, partly walled with stone, the rest surrounded with wood palings. It was well timbered and had an avenue of trees nearly a mile long; part of this towards the west was called ' the Abbot's ride '. At the dissolution, the King's Commissioners reported when Abbot Whiting was arrested at Sharpham ' that it is the goodliest house of that sort that ever they had seen '. (Phelps' *History of Somerset*, i, 531.)

Sharpham was granted by the Crown to Edward Dyer, subsequently became the property of the Gould family in 1660, and afterwards passed to the Fieldings, and then by marriage to the Earl of Cavan. A large part of the mansion was pulled down in 1799, and the existing farm-house formed from what was left. Phelps states in 1839 that ' the house is now occupied by Thomas Hawkins, Esq., F.G.S., the indefatigable and talented geologist '.

Stourhead and other county seats, including ' the Palace at Wells. But there was no dissipation abroad or at home, no excesses for me ; a scragg of mutton was all the bishop had once on a time, and that enough for him and the guest.' Hawkins was elected a Fellow of the Geological Society in 1832 when he was twenty-two years of age. During 1833 he must have worked hard and spent much time in London arranging details with artist and the publishers for his first volume—*The Memoirs of Ichthyosauri*. In London he met his ' great uncle Richard, a seafaring man, bluff as he was blunt ; for all that we soon got on so well together that we went to see the House of Lords ; that was fortunate, for not long after the old House was burnt down ' in 1834. *The Memoirs of Ichthyosauri and Plesiosauri* were published the same year. *The Great Sea Dragons* volume followed in 1840. Hawkins lived at Sharpham Park until 1845, when he was thirty-five. He then went to London again and stayed there until 1848, when he settled down for a time at ' Woodcote ' in the Isle of Wight. From this date onwards information regarding his life becomes scanty. During the three years he was in town he kept a diary of sorts, but it chiefly consists of simple statements such as ' wrote a letter to the *Times*, a letter to Dr. Buckland ' or ' called on Professor Owen ', and again ' Stewart to clean portrait of Wessing, and see to the Poussin, Hogarth, Cuyp and Vandyke '.

Hawkins was never idle. Among his various activities he devoted a considerable amount of time to public matters, one of these was a scheme for the betterment of London drainage. He was also much employed with writing pamphlets and books of verse. On 20 June 1855 Hawkins presented his poem Prometheus to Charles Keen, asking him to dramatize it, and offering fifty guineas towards the expense, but the offer was declined in a courteous and tactful manner. On 3 February 1856 Hawkins offered a collection of saurians to Cambridge University and it was accepted by the Senate. In 1859 he had removed to the Hermitage and Woodcote was let. He was nominated a candidate for Parliament and issued an election address to the inhabitants of the Isle of Wight. He does not tell us what happened at the election, but after it he says he left the Island and made for Rome as soon as possible.

THOMAS HAWKINS, F.G.S.

In June 1860 we learn he was travelling in France and Italy and after that returned to the Isle of Wight. In May 1865 he was back once more in London. In June 1871 he is writing from Borough Hill, Bracknell, Berks. On 18 February 1874 he gave a further collection of saurians to the University of Oxford. On 15 September 1877 he writes from The Promontory, Ryde. Thomas Hawkins died at Ventnor on 15 October 1889 aged 79 years.

Hawkins was a collector of fossils, and cannot be considered a geologist in the strict sense. He was looked upon by his contemporaries as eccentric, and his two works on the *Great Sea Dragons* have had little or no influence on the progress of palæontology, and may be placed among the curiosities of scientific literature. The fossil animal remains he managed to collect are undoubtedly of considerable importance, and had Hawkins not rescued them they would have been irretrievably lost.

The magnitude of Hawkins' geological work and the time and energy he devoted to it before he was twenty-four years of age, will be realized in the following notes taken from the preface and text of his *Memoirs of Ichthyosauri and Plesiosauri*, published by Ralfe and Fletcher, 17, Cornhill, London, in 1834. He writes : ' The Geological Society of London was the remote cause of the book I now commend to my readers' 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 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 pretensions 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 (1832) 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. Further, I beg the reader to bear in mind that I am no adept author, confined 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.'

Then he goes on to say, 'A few years ago our youthful attention was directed to the lias quarries in the vicinity of Edgarley near Glastonbury, in consequence of some strange reports. It was said that the bones of infants and giants had been found in them. For a long time such remains as were found there had been treated with scant consideration. Better aware of their importance and by dint of persuasion and bribes, some of the men were induced to respect the bones they chanced to find.' Further he writes: 'At a quarry in the village of Street, we saw a man on the point of destroying an inferior jaw of a Plesiosaurus, his upraised arm was arrested and the specimen saved. A few days later we dug an Ichthyosaurus from the quarry at Walton. Since then, good fortune has secured every fossil organic remain that has been found within the range of the lias in Somerset. In 1830 I made the acquaintance of George Moon, a labourer at the quarry of Mr. Somers, in the parish of Walton. He was the first quarryman that I could persuade into my views; George Moon discovered the Ichthyosaurus (*chiroparamekostinus*, Hawkins), the radical of my collection.'

Hawkins then describes the beauty of the country when walking with his schoolmaster of old through Glastonbury, then by way of Wearyall Hill to Street, and thence to Walton, where they called on George Moon who had found part of an Ichthyosaurus the day before. They visit the quarry in the gloaming, and begin digging out further remains of the animal by candlelight well into the night. Such was the enthusiasm of Hawkins that he allowed his friend the schoolmaster to tramp back to Glastonbury by himself. Hawkins followed later 'to seek my couch weary and sad'. George Moon had to protect this fossil the rest of the night at the quarry and bring it to Glastonbury in the morning. Hawkins says he had been at work on the animal's head and tail the same day for

two hours when 'John Clark [4] called upon me, one of the few really gifted and clever men that it has been my lot to know. 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 about the extraordinary machine he was constructing, one that makes Latin verses, no two alike for ever, all of them quite grammatical and of pure sense.' Hawkins tells us that a month's hard work relieves the skeleton of its matrix and leaves it the admirable original of the really excellent plate which the reader will find at No. 17 (*Memoirs of Ichthyosauri and Plesiosauri*).

It will be realized how energetically Hawkins worked to obtain specimens when it is known that besides the quarries at Glastonbury, Street and Walton, he visited Marshall's Elm, Long Sutton, Keinton Mandeville and Nempnett in Somerset, Lyme Regis and Charmouth in Dorset, and districts in Yorkshire.[5] Travelling in Early Victorian days was no easy matter, neither was the packing and cartage of heavy specimens. 'In July 1832 Miss Mary Anning [6] obtained near the church at Lyme Regis part of the head of an Ichthyosaurus (*chiroligostinus*, Hawkins). Happening to arrive at Lyme the same day, I was fortunate in availing myself of the specimen.' Hawkins relates how, accompanying Miss Anning to the beach the next morning, 'she pointed out the place where it was found. Persuaded that the other portion of the skeleton must be there, I advised its extrication. Miss Anning assured me I was at liberty to do so. Mr. Edwards, the owner of the land, very handsomely allowed me to throw down so much of the cliff as was necessary. On 26 July 1832, some men were engaged with pick and spade; the following day considerable progress was made, and by the next day several thousand loads

[4] John Clark was a member of the Society of Friends, born at Greinton in 1785, and died at Bridgwater in 1853. He was a son of Thomas and Mary Clark (*née* Metford).

[5] Hawkins does not mention the lias beds along the coast in the neighbourhood of Kilve, West Somerset. The writer when a boy found portions of a large Ichthyosaurus lying partly embedded in the lias shale on the shore.

[6] Mary Anning was the daughter of a carpenter and was born at Lyme Regis in May, 1799. When twelve years old she found the first Ichthyosaurus that was brought to the notice of scientists. In 1821 she discovered the first Plesiosaurus, and later the remains of the first Pterodactyl in England. She died in March, 1847.

of earth had been cast from the crown of the rock before the wonderful remain was exposed. The bones with the marl in which they lay broke into small pieces, but with the kind assistance of Miss Anning the whole of them were packed, and by night-fall the last heavy boxfull was deposited in a place of safety. The skeleton and matrix weighed a ton. It arrived at my house on August 1st, at six in the morning, having travelled more than forty miles. I shall never forget the intense heat of the following fortnight, during which time I was engaged from daylight to dark in developing it, and removing the superfluous matrix from the several hundred pieces of this magnificent organic remain. Three thousand pounds of plaster of Paris were used to embed it in a case that weighed half a ton.

'After waiting five years to obtain a specimen of Ichthyosaurus (*chiropolyostinus*, Hawkins) the opportunity came at last; James Wishcombe and a man named Jones of Charmouth had discovered one in the marl on the shore. Midway between the rivers Char and Lim, a waterfall descends from ledge to ledge and is lost in the shingle lying at the base of the cliff. In a right line with this cascade at low water is a group of five or six sandstone rocks reposing on a bed of lias, and by the side of these the skeleton lay. Jones sold me the right to the skeleton for a guinea, with instructions to bring as many men and tools on the morrow as he may think proper to help. Miss Anning said, you will never get that animal because the marl is full of pyrites and falls to pieces as soon as dry. Every day for three weeks there was a strong south-west gale that prevented any work taking place, but at last the weather veered to the right quarter, and after waiting for the tide to recede, six men set to work to dig it out. A square had been marked round it, and an attempt to raise it in one piece failed at first owing to its great weight. But additional help was forthcoming from Sir Henry Baker, Rev. Benjamin Jeanes, Mr. Francis, Mr. Waugh and other gentlemen, and at last its removal was effected into a vehicle prepared for its transport just as the incoming tide was reaching the spot. It arrived at Glastonbury on 3 September 1833, and after many anxious hours of hard work its extrication from the matrix was accomplished and secured in a case with plaster of Paris.'

In another place Hawkins tells us of one of his geological

disappointments : ' Now it happened that a quarrier of Street, by name of Creese, came across a Plesiosaurus (*triatarsostinus*, Hawkins) a few days before,' but it was ' broken in half, and further mutilated into about thirty pieces '. This was done wantonly by his men, whose intelligence was such that they thought it must be ' the viery dragon that stinged Moses '. Hawkins describes the incident in the vernacular, and then says, ' some parts of the three ruined paddles were recovered ', and after getting the pieces of the skeleton removed to his house he worked day and night putting them together and in about two months the specimen was finished.

The first discovery of the Plesiosaurus was announced by the Rev. W. D. Conybeare from the lias in the neighbourhood of Bristol, and ' shortly after this my very respected friend Joseph Clark, Junr., of Street, found a piece of a head in the lias upon his father's estate in that village '. Some little time after this ' in Jany. 1824, Miss Mary Anning, to the due expression of whose public and private worth all language is insufficient, discovered a splendid Plesiosaurus in the lias shale at Lyme Regis '. The specimen was ' purchased by the Duke of Buckingham and placed at the command of the London Geological Society '.

Hawkins' most important collection of fossils was purchased for the British Museum for £3,000. Shortly after this transaction there was some unpleasant talk about the fossils being restorations. Hawkins did undoubtedly restore and sometimes introduced bones belonging to other specimens. Be that as it may, it should be remembered when criticizing his work, that he was a youthful enthusiast labouring with a zest probably unparalleled in those days. If Hawkins sometimes overstepped the mark with repairs in his earlier work it was done with the knowledge he had acquired regarding these fossil remains, and that he thought it was right to utilize his knowledge in making specimens as complete as possible. Mantell remarks in his Journal, 7 December 1832, ' that this gentleman restores specimens too much ; he makes nothing of putting on an arm or a tail, or a rib when this may be wanting ; he does not do this without authority, yet still I think it objectionable when art is allowed to interfere so far '. Dean Buckland also remonstrated and advised him on the same matter. On the other

hand, in the *Geological Journal* of 1846, on page 16, will be found the following reference : ' Thomas Hawkins collected skeletons of Ichthyosaurus and Plesiosaurus from the lower lias of Somerset and Dorset, which his anatomical skill and untiring perseverance and patience enabled him to dissect from the rock in a state of integrity previously thought unattainable. His more important specimens (figured in his two curious books *Memoirs of Ichthyosauri and Plesiosauri* and *Great Sea Dragons*) were purchased by the British Museum on the valuation of Dean Buckland and G. A. Mantell, the latter of whom remarks that they had been obtained with so much labour and expense, and were so admirably put together and chiselled out with so much skill, that the sum awarded for them was scarcely sufficient.'

Hawkins appears to have profited by the advice of Buckland and others, for a memorial was presented to the Chancellor of the Exchequer respecting the purchase for the British Museum of Hawkins' second collection of organic fossil remains. Among the memorialists who advised the purchase were :

The Marquis of Northampton, F.R.S., F.G.S.
The Bishop of Norwich, President of the Linnaean Society.
W. Whewell, President of the Geological Society of London.
C. Darwin, Secretary of the Geological Society of London.
W. Hamilton, Secretary of the Geological Society of London.
W. Clift, Curator of the Hunterian Museum.
R. Owen, Hunterian Professor, Royal College of Surgeons.
W. Buckland, Professor of Geology, Oxford.
A. Sedgwick, Professor of Geology, Cambridge.
I. Phillips, Professor of Geology, King's College, London.

And six more eminent scientists.

When looking at the above list of geologists and men of science, it would be difficult to imagine a more suitable guarantee of the value of Hawkins' work. The second collection of fossils was acquired for the British Museum in 1840.[7]

The book of *Great Sea Dragons* was published the same year,

[7] History of the Collections in the Natural History Department of the British Museum, i, 205.

and in dedicating it to the Rev. William Buckland, D.D., F.R.S., Hawkins remarks : ' At eighteen years old I formed the proud design of obtaining for the country a geological collection of the Organic Remains of the ancient earth, which should rank with the great collections and peradventure excell them. At twenty it was my happy fortune to obtain the honourable sanction of your high name and approbation. In my twenty-third year your alliance helped me to effect the first step towards the end of my ambition, and my early Saurian Remains were deposited in the British Museum.'

In his first book the plates are drawn from nature by H. O'Neill and one by himself. In his 1840 volume, most of the excellent plates are drawn on stone by H. O'Neill, others are by G. Scharf, and two by B. I. Rossiter. The frontispiece is by Martin. The text of these works is written in the florid and extravagant style then in vogue, full of philosophic discussions and allusions concerning the Creation, Jehovah and the Classics.

To replace the already established names of Conybeare, 1822, *Ichthyosaurus tenuirostris*, *platydon*, *intermedius* and *communis*, Hawkins created a number of specific names for his saurians, based on the character of the paddles. These names are *Oligostinus*, *Polyostinus*, *Strongylostinus* and *Paramecostinus*. These he raised to generic rank in his 1840 work, where he gives his kingdom as *Gedolim Taninim*, his subkingdom as *Ichthyosaurus*, and then the four above named genera. He followed the same method with the *Plesiosaurus*, the genera being *Triatarsostinus*, *Pentatarsostinus*, *Hexatarsostinus*. Hawkins' terminology, however, has never been accepted by geologists.

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