

GCGG

THE GEOLOGICAL CURATOR

VOLUME 5 No. 4

Issue 1 for 1988



**SLABS OF TRIASSIC SANDSTONE BEARING
CHIROTHERIUM AND OTHER FOOTPRINTS
BOOTLE TOWN HALL, 1988**

GEOLOGICAL CURATORS' GROUP

The Group is affiliated to the Geological Society of London. It was founded in 1974 to improve the status of geology in museums and similar institutions, and to improve the standard of geological curation in general by:

- holding meetings to promote the exchange of information.
- providing information and advice on all matters relating to geology in museum.
- the surveillance of collections of geological specimens and information with a view to ensuring their well being.
- the preparation of a code of practice for the curation and deployment of collections.
- the advancement of the documentation and conservation of geological sites.
- initiating and conducting surveys relating to the aims of the Group.

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Printed by Barnes & Humby Ltd., Key Street, Carlton Road, Nottingham NG3 2DR.

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COVER. Four slabs of Triassic sandstone bearing Chirotherium and other footprints; Bootle Town Hall, (formerly Bootle Museum), 1988. This suite of cases was purpose built to house ten slabs purchased by Bootle Council from the Liverpool Royal Institution Museum when the latter closed in 1877. An article by Geoffrey Tresise (pp.135-151) outlines the fascinating history of these footprint slabs and their association with the Liverpool Natural History Society (1836-1844).

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GEOLOGICAL CURATORS GROUP

August 1989

EDITORIAL

The continuing saga of university folk or, the future of Earth Science collections in British universities. I reported last time (Editorial, Geol. Curator, vol.5, no.3), that a Steering Group made up of representatives of the five newly designated 'Collections Centres' (Oxford, Cambridge, Birmingham, Manchester and Glasgow) had been set up to advise the Universities Funding Council on a 'rationalisation' of Earth Science museums and collections, in the wake of the UFC's Earth Sciences Review. Although this group, like its forerunner - the Williams Committee (*ibid.*) - had been expected by outside observers to deal primarily with the problem of what to do with material put at risk through the impending closure or downgrading of some Earth Science departments, they had interpreted their brief in much wider terms. Their deliberations had resulted in a letter going out in April 1989 from the UFC to Vice-Chancellors of every university with an Earth Science department, instructing them to: transfer all status material either to a Collections Centre or the national or certain (unspecified) local authority museums; and to agree, in consultation with curatorial staff of their 'local' Centre, what 'other material' should be similarly transferred.

Now this wholesale 'rationalisation' envisaged by the UFC's April letter applied to every department, including therefore the fifteen or so large 'Type M' departments whose future status and access to major research funding had been assured in the Earth Sciences Review - even to those Type M departments with a strong commitment to palaeobiological research yet not lucky enough to support one of the five Collections Centres. This would appear to bar such Type M departments from any strengthening of their existing provision for collections care which they may have been considering. But surely, since collections are the basic research tool of the palaeobiologist, the upgrading of collection care by a department committed to specimen based research is as legitimate a candidate for major investment as any 'mega-bucks' hardware needed to serve the more equipment-led branches of Earth Science?

There is no doubt that the removal of status and research material from university departments long unable to resource their proper curation is a good move - GCG has been pressing this case for many years. But it does seem to me at least quirky to inflict similar instructions on such places as, for example, Bristol, Leicester and Edinburgh, all Type M departments with an established reputation for palaeobiological research of a high order - and, crucially, with an ongoing commitment to palaeobiology in the post-Review world.

One must also question the assumption that the potential for continuing neglect is necessarily lessened through transfer to some of the Collections Centres. At least three of the five have suffered major staffing and/or

funding crises in recent years that have jeopardised their ability to maintain existing levels of collection care. Substantially more money would have to be found before these Centres could even begin to approach the levels of staffing or environmental control advocated by the GCG (see A Heritage on the Rocks leaflet) for their existing collections. So what is the likelihood that the UFC, in its current financial straits, will be able to fund adequately the Collections Centres for their new role - either during the three-year period when transfers are expected to occur or, more particularly, for the long term care of the transferred material? The rescue by Collections Centres of material at immediate risk because of the Review is one thing, but to suggest that the wholesale removal of all status and 'other' material from, to take one example, Leicester (with its two full-time curators and involvement in teaching curation through links with the Department of Museum Studies) to Birmingham (where, despite stirring efforts by individuals, the museum would not appear to have been given a very high priority in departmental planning in recent years), I find faintly ludicrous.

While the UFC's letter to Vice-Chancellors was being digested by Earth Science departments across the country, the Collections Centres were submitting funding bids to the UFC for new storage and staff, based to some extent on the expected intake of material but also, and inevitably, on a 'realistic' assessment of the available UFC 'cake'. The five bids have been refereed by two eminent palaeontologists from outside the university sector, and we all now 'await further developments' as the saying goes. The UFC must make some important decisions soon.

There is an intriguing sidelight to all this. The Williams Report is referred to by the UFC's April letter in terms which imply that it is now available to all university departments. In particular, the transfer of material 'outside the university sector (e.g. to one of the local authority museums identified in the Williams Report)' is specifically mentioned. Yet to my knowledge the findings of the Williams Committee have never been released by the UFC (following the less than enthusiastic reception given to its Report by the Review's National Committee in summer 1988), so how are departments supposed to identify the local authority museums that merit the UFC's seal of approval?

I am sure that we will find out a lot more at the forthcoming GCG meeting to discuss the future of university collections. The venue of the Hancock Museum is certainly appropriate, since Newcastle University is effectively losing its Earth Science Department through amalgamation with Durham, in Durham.

Peter R. Crowther
15 August 1989

CHIROTHERIUM

THE FIRST FINDS AT STORETON QUARRY, CHESHIRE, AND THE ROLE OF THE LIVERPOOL NATURAL HISTORY SOCIETY

BY GEOFFREY TRESISE

It was in June 1838 that Chirotherium footprints were first discovered in the Storeton quarries near Birkenhead (Fig.1); 1988 therefore marked the sesquicentennial year. A brief account of the history of Storeton Quarry and its footprints (Tresise 1989) has already been published to commemorate the anniversary. The present paper traces the events which immediately followed the discovery, and what subsequently happened to these first finds. That it is still possible to locate and identify so many specimens is largely due to the interest shown in them by the short-lived Liverpool Natural History Society and in particular by one of its members, John Cunningham.

Both the minute book and account book of the Society are preserved in the Record Office of

Liverpool City Library. It is surprising, therefore, that no detailed account of the Society's involvement with the Storeton finds has previously appeared in print. Even Henry Beasley [1836-1919], an almost unflinching source of information on Storeton Quarry in the final years of its working life, seems to have known relatively little about this earlier period of its history.

THE LIVERPOOL NATURAL HISTORY SOCIETY

The Liverpool Natural History Society was founded on 12 September 1836. Its aims were to promote 'the study of zoology, botany, mineralogy, geology, meteorology and any other subject connected with natural history'. There were seven founder members who met initially in their own homes, but by

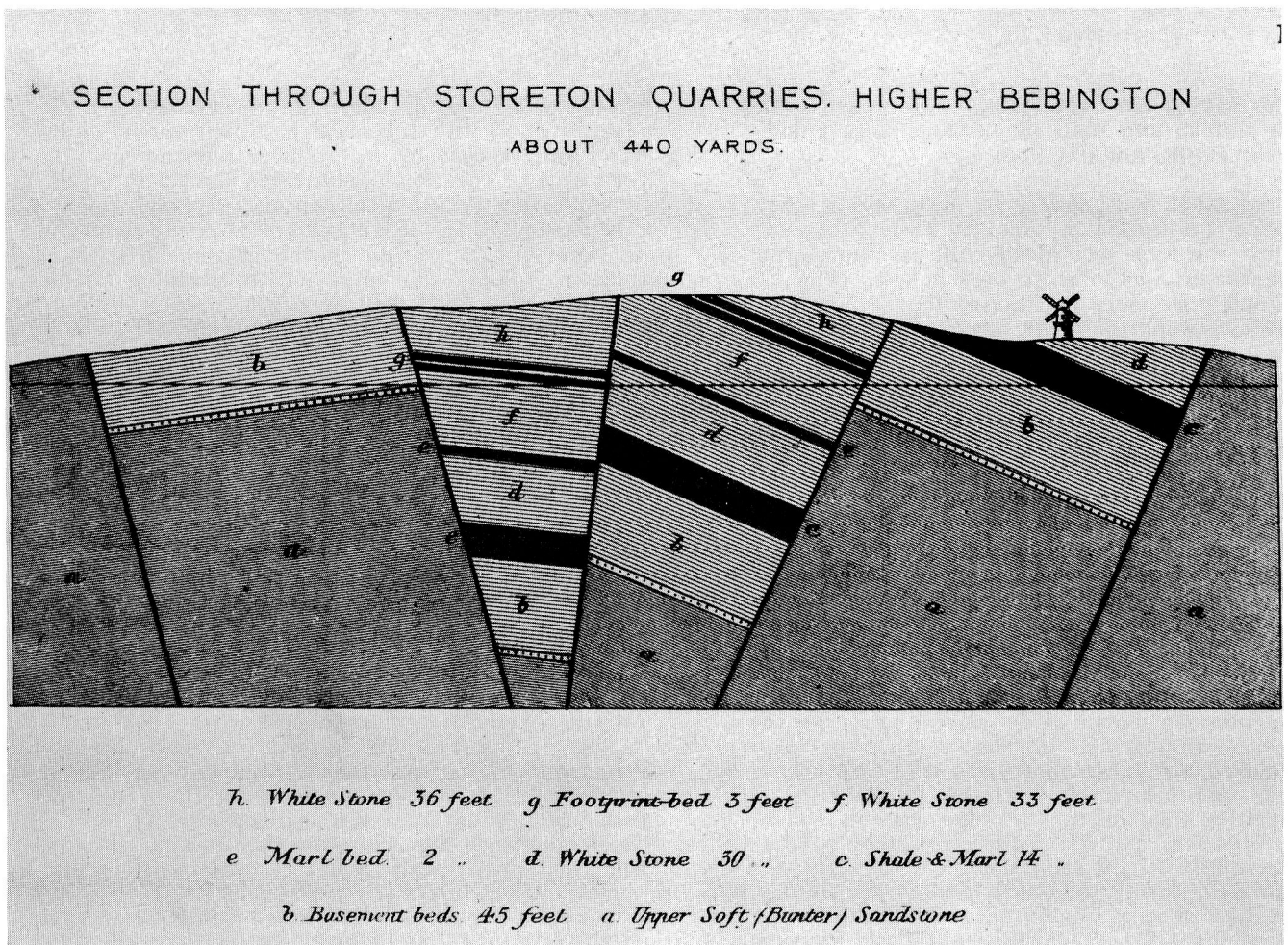


Fig.1. Storeton Quarry in mid nineteenth century. After G. H. Morton.

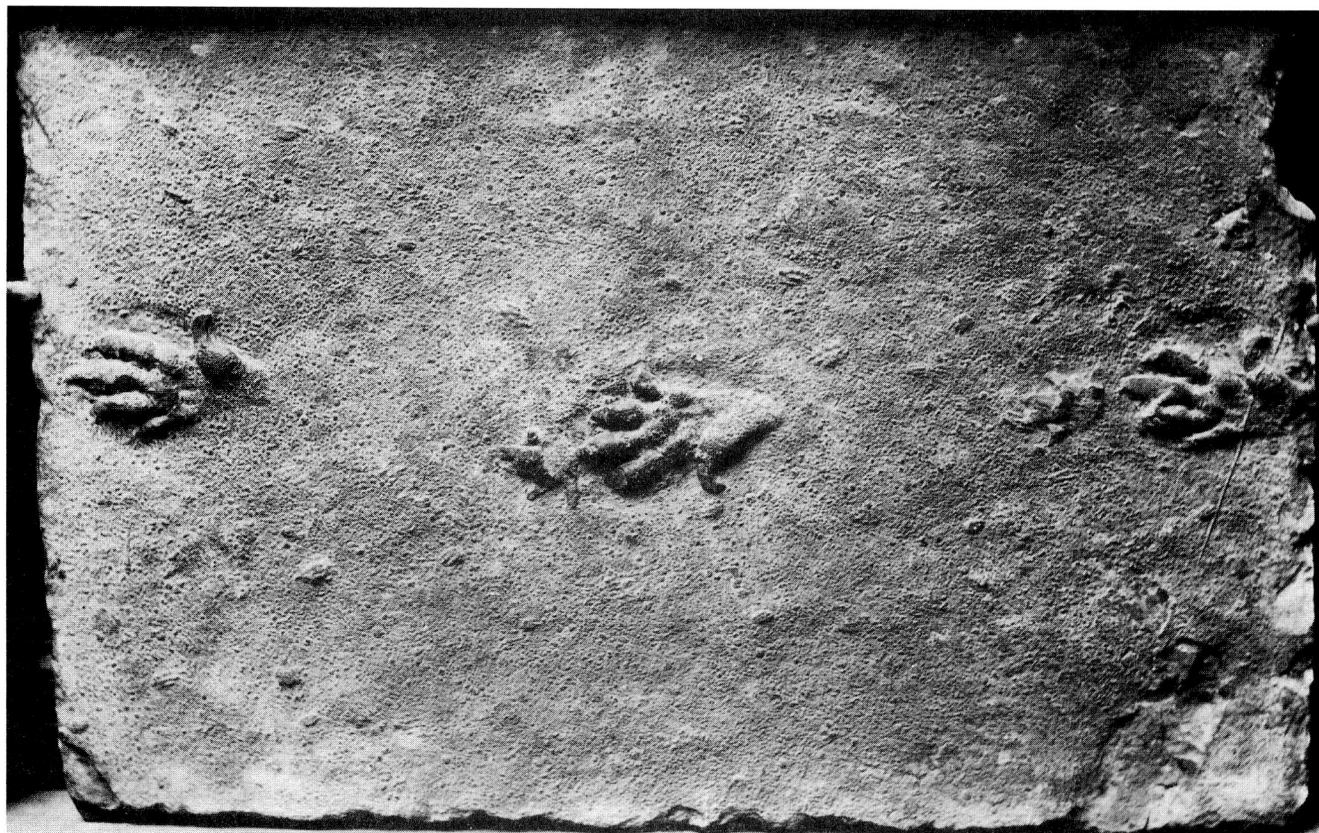


Fig.2. Type specimen of Chirotherium storetonense Morton; Storeton. Bootle Museum specimen No.10.

the end of the year their numbers had grown to sixteen and their discussions were being held at the Adelphi Hotel.

From April 1837, meetings were held at the Royal Institution in Colquitt Street. At first the room was hired, but an interesting agreement was later to be reached. The founder members had hoped that the new Society would have its own museum, but it was eventually decided that it would be more sensible to lend their support to one already in existence. In consequence it was agreed that, in addition to their Society subscription of five shillings, all members should pay the annual sum of one pound to the Royal Institution Museum 'to be exclusively devoted to the purchase of specimens of Natural History'. In return the Society was provided with a meeting room free of charge.

Membership increased to thirty in 1837 and to fifty-five the following year, including John Cunningham who was enrolled at the meeting on 2 January 1838 and thereafter regularly attended Society meetings. As the membership grew, the rules were periodically revised but it was not until 1839 that a new rule stipulated: 'An Annual Meeting shall be held on the first Tuesday in September, and an Ordinary Meeting on the first Tuesday in each month'. The first Annual Meeting was thus held at the Royal Institution on 3 September 1839. The President, Francis Archer, gave an address in which he reviewed the Society's first three years. It also provides an interesting insight into contemporary views of museums:

'It was originally intended to form a museum in connection with the society, which should be of easy access to the public; but the committee of the Royal Institution have left little to wish for in this respect. By their recent regulations, a subscriber of one pound per annum may, during the hours when the museum is open, not only visit it himself, but introduce his family or any of his friends, either personally or by note; it is, moreover, open to the public one day of every month free of any charge whatever. How highly this boon is prized by the class of persons for whom it is intended, the crowds of visitors on a public day will attest ... Since the 1st of January of the present year, upwards of twenty-five thousand persons have been admitted on the public days.' (i.e. over 3,000 a day on average).

Turning to the Society meetings, the President pointed out that forty-five papers had been read: thirteen on Zoology, six on Botany, thirteen on Geology, seven on Meteorology, three on Mineralogy and three 'on subjects indirectly connected with Natural History'. He continued: 'Of the different subjects which have occupied the attention of the society, beyond all comparison in interest is the discovery of the footsteps of the Cheirotherium in the sandstone of Cheshire; and for this we are entirely indebted to the zeal of Mr Cunningham. This gentleman being in the neighbourhood of Stourton, happened to hear that there had been blocks of stone turned up in the quarry with the impressions of men's hands upon them: these had been ascribed, in

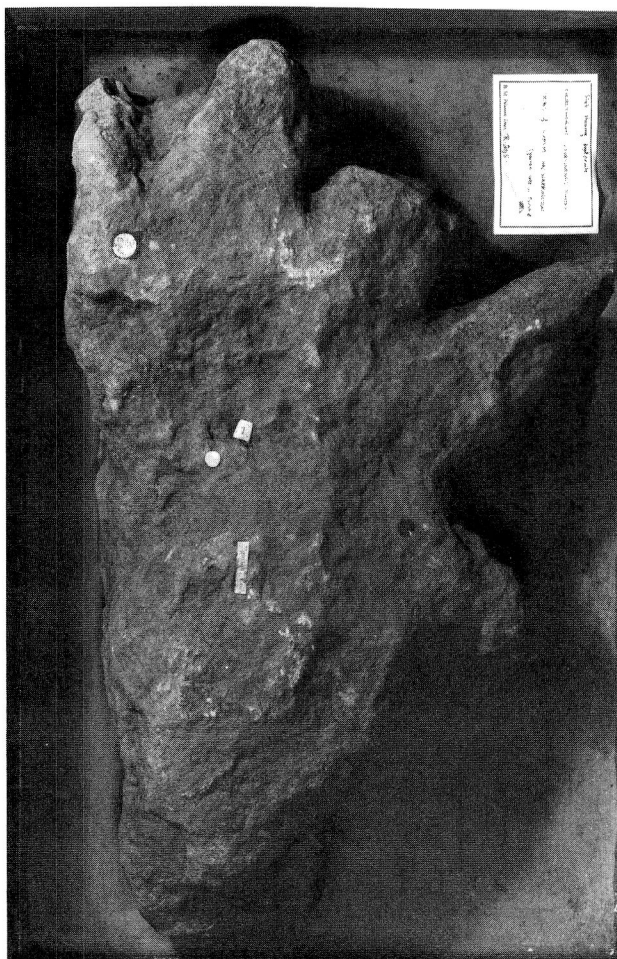


Fig.3. *Isochirotherium herculis* (Egerton), the type specimen. British Museum (Natural History).

the simplicity of the workmen, to some antediluvian members of our race, who, attempting to escape from the influx of the waters, had thus left their track upon the rock; the smaller marks being ascribed to the hands of children.

Mr Cunningham immediately visited the spot, took an impression in clay of one of the most perfect footmarks, and gave such directions as secured the specimens from mutilation. Had it not been for his activity on this occasion, the probability is, that these slabs would have shared the fate of many others which had been previously raised, and which were afterwards found built up in the stone fences of the neighbourhood.'

Cunningham made his discovery in June 1838 and reported it to the Society at their meeting on Tuesday 3 July. It was Society practice that, following the formal papers at a meeting, members could raise topics of interest or display new specimens for the Museum. On this occasion, papers were read by Mr Hale and Dr Dickinson. The minutes continue:

'Mr Cunningham assisted by Dr Sutherland then proceeded to lay before the meeting an account of the discovery of the traces of



Fig.4. Liverpool Natural History Society's 'Fossil Fucus' lithograph, issued 1837.

footsteps in the sandstone of Storeton Hill Quarry in Cheshire. It was stated that these impressions were identical with those described by Dr Buckland in his Bridgwater Treatise and first noticed by Professor Kaup as occurring in the New Red Sandstone of Hilburghausen in Saxony.

Resolved: That the Society deem it desirable that an account of this discovery be published along with a lithographic drawing of the slabs, and that the Council conduct the publication of it.

It was stated that Mr Tomkinson the proprietor of the quarry had presented the society with the most perfect of the slabs, and had offered to place it free of charge in the museum of the Royal Institution. It was resolved that the best thanks of the Society are due to Mr Tomkinson for this handsome present.

It was also resolved that the Society was deeply indebted to Mr Cunningham for his promptness in securing the slabs from injury and bringing the circumstances of their discovery before the meeting and also that the sum of twenty shillings be placed at his disposal to distribute among the workmen of the quarry.'

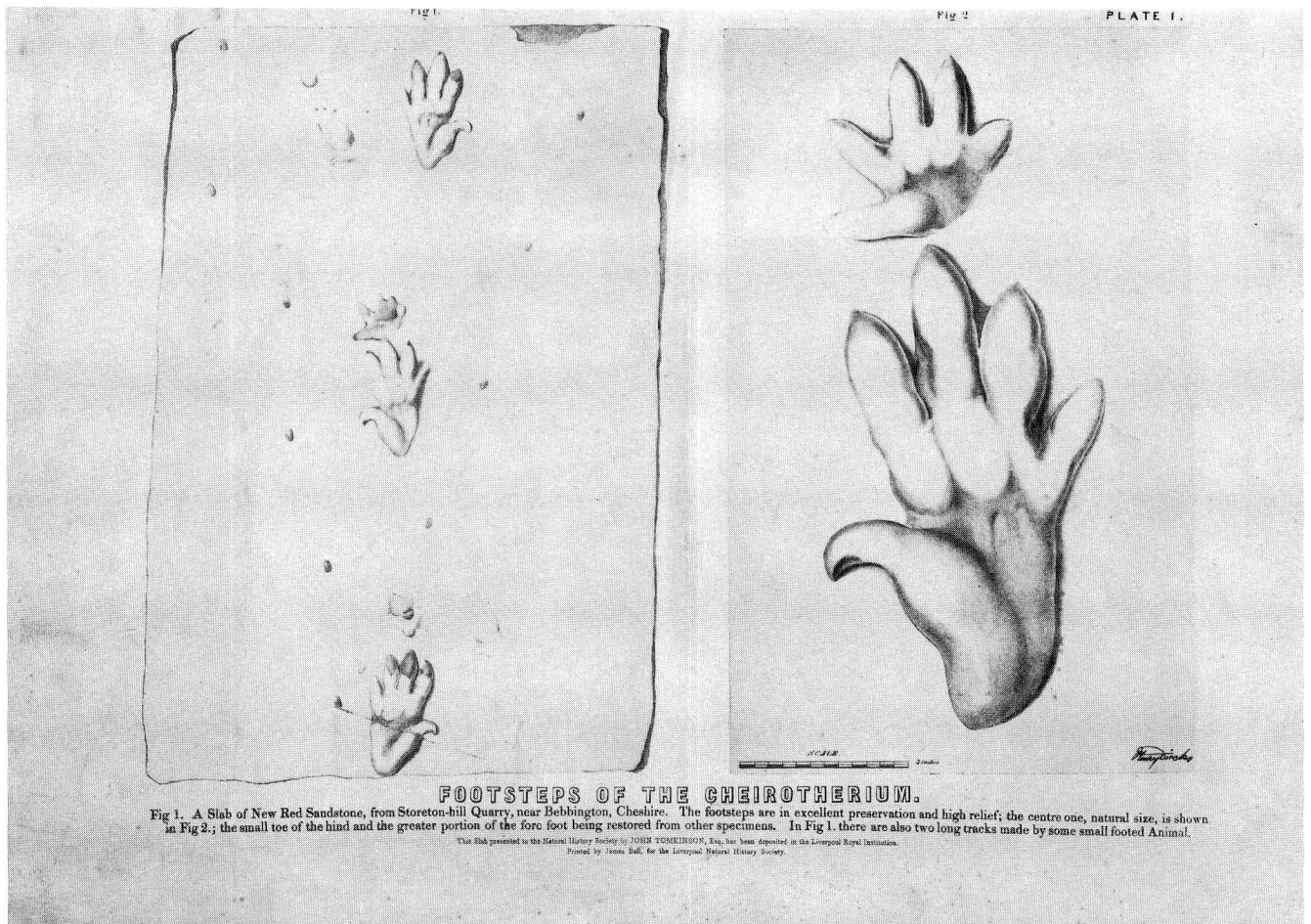


Fig.5. Liverpool Natural History Society's 'plate 1' lithograph, issued 1838.

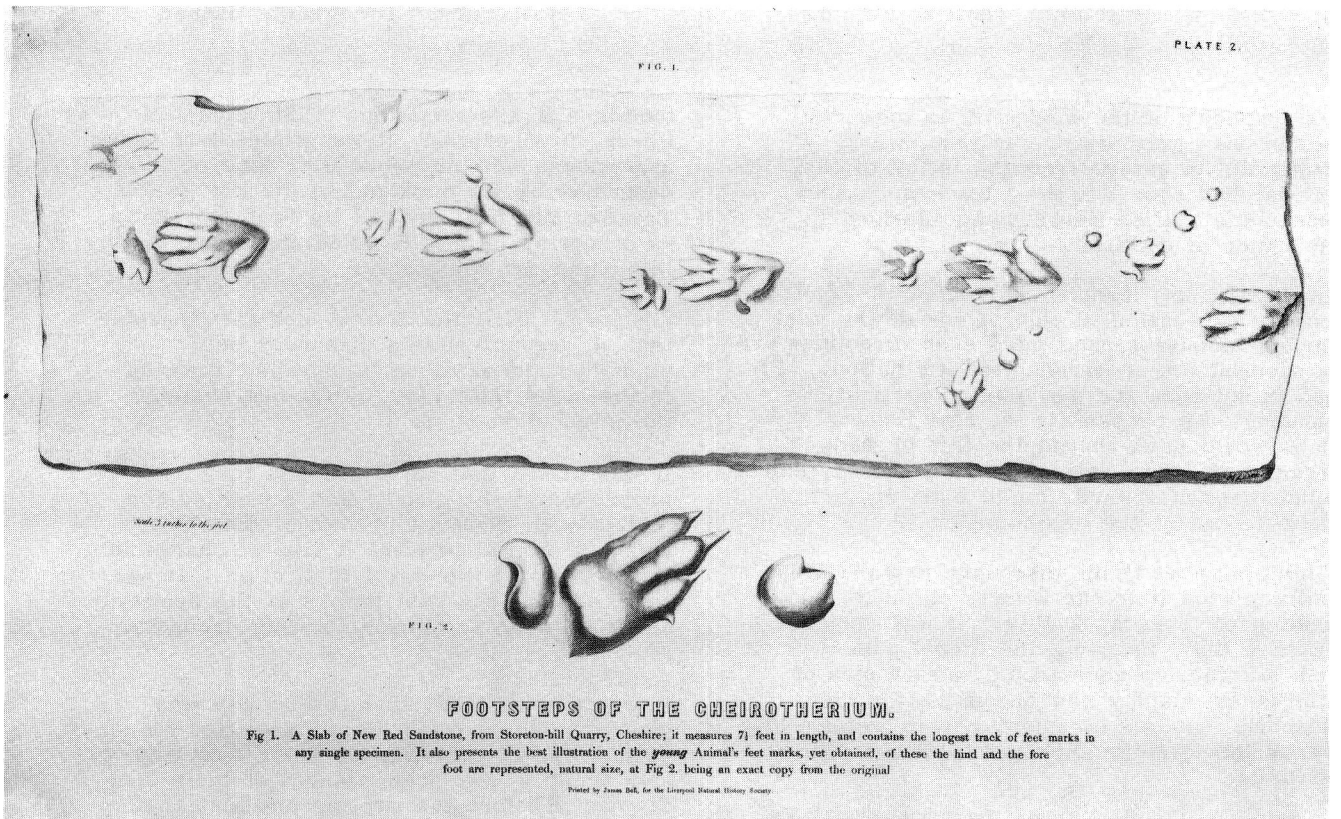


Fig.6. Liverpool Natural History Society's 'plate 2' lithograph, issued 1838.



Fig.7. Slab showing Cheirotherium storetonense track crossed by C. beasleyi; Storeton. British Museum (Natural History) R729.

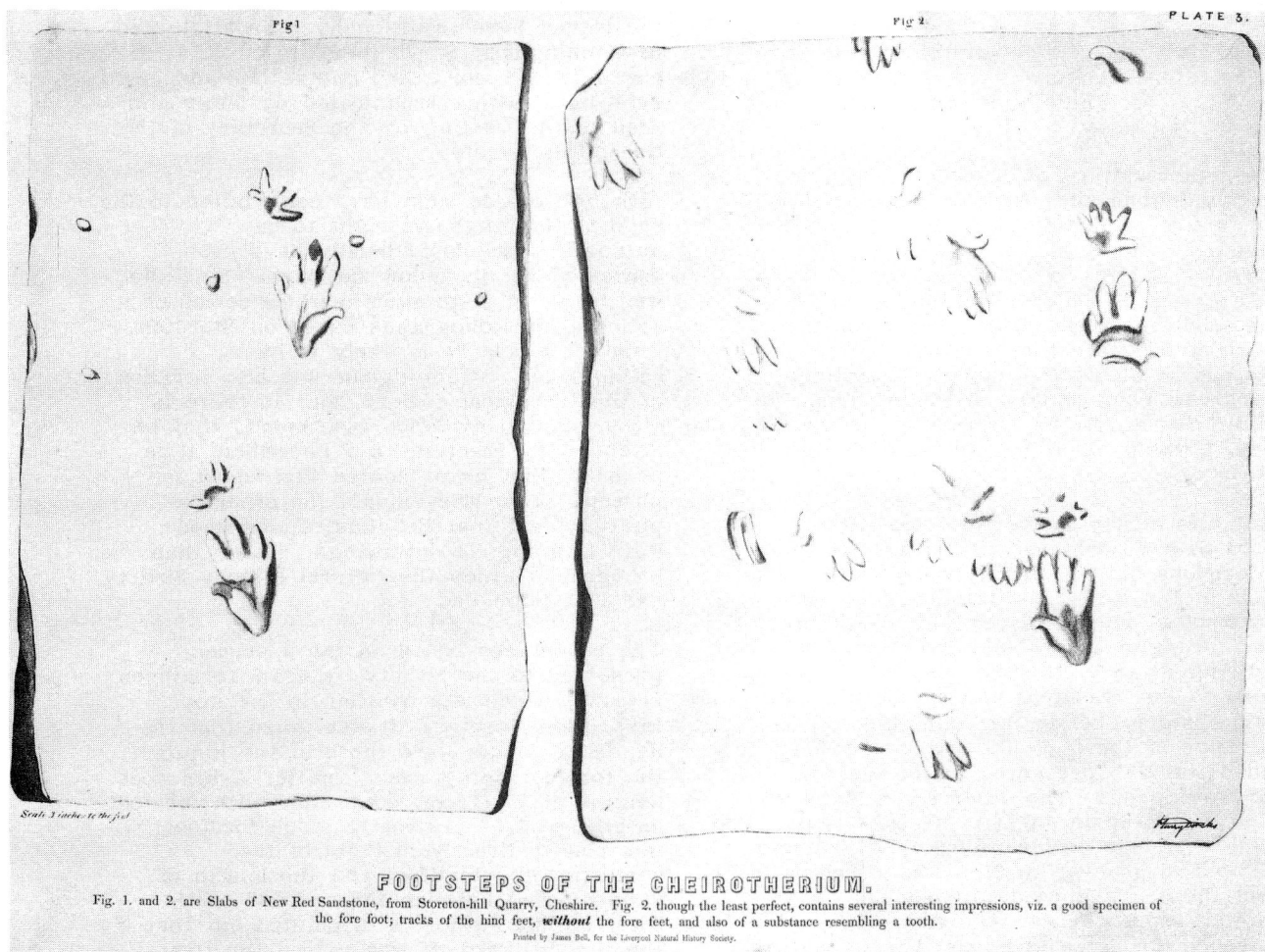


Fig.8. Liverpool Natural History Society's 'plate 3' lithograph, issued 1838.



Fig.9. Slab with *Chirotherium storetonense*; Storeton. Oxford University Museum G55; Buckland Collection.

At the next meeting, on Tuesday 7 August, John Cunningham proposed Mr Tomkinson as the Society's first Honorary Member. It was also resolved:

'That a Committee of observation to consist of the following members be formed for the purpose of watching the progress of excavation at Stourton Quarry and securing any impressions they may think desirable, viz Revd Mr Dwyer, Mr W. Crompton, Mr Cunningham, Dr Jas. Carson, Mr Adie, Mr Higginson and Mr Dirks.'

In fact this rather cumbersome committee appears to have achieved little, most of the key decisions having already been made. The minutes of the Royal Institution's Museums Sub-committee are preserved in the Sydney Jones Library of Liverpool University. On 13 August 1838, the minutes record 'Thanks to the President and members of the Natural History Society for four splendid impressions of the feet of animals'. These included the slab presented to the Society by Mr Tomkinson. The other three slabs must have been chosen in July, since on 30 July the Sub-committee had resolved 'That Johnston be allowed to go over to Stourton tomorrow to inspect the conveyance of three slabs containing impressions'. The cost of conveyance was later to be met by the Natural History Society, the sum of nine shillings

being paid to 'Henry Johnson for expense incurred in removing Storeton slabs'. (Henry Johnson had been sub-curator of the Museum under the previous curator, George Francis. He became acting curator when Francis was dismissed at the end of 1837, but was not formally appointed Curator until March 1839.)

On 10 September 1838, the Museum received two more slabs and a 'fossil Fucus' from Storeton (the latter presumably the *Equisetites* stem figured in the Society's lithographs). This appears to mark the full extent of the committee of observation's activities on the Museum's behalf.

THE REPORT TO THE GEOLOGICAL SOCIETY

Since the Natural History Society did not publish proceedings, the account of the discovery commissioned in July was submitted to the Geological Society in London and read at their meeting on 5 December 1838. It was the first of three papers on Triassic footprints read at this meeting.

Sarjeant (1974, p.285) points out that the Geological Society Proceedings are annoyingly imprecise as to the authorship of the report. Their record begins: 'An account of Footsteps of the Chirotherium ... communicated by the Natural History Society of Liverpool and illustrated with drawings by John Cunningham Esq., was then read.' Although both authorship and presentation of the report have traditionally been attributed to Cunningham, Sarjeant points out that it certainly had more than one author and could even have been communicated by letter and read to the meeting by the Secretary of the Geological Society.

Although others must have contributed to the report, Cunningham's right to be author-in-chief could hardly have been contested by his fellow members. Since he was to go on to produce a whole series of articles and monographs based on Storeton, it is not a role he is likely to have relinquished. Cunningham was also a Fellow of the Geological Society, and as there is circumstantial evidence (see below) that he attended the meeting on 5 December, it is probable that he presented the report in person. This may explain the otherwise puzzling fact that the illustrations used were Cunningham's drawings, rather than the lithographs which the Natural History Society had just published.

The report was based on the specimen presented to the Society by John Tomkinson (Fig.2), which was by then in the Royal Institution Museum. It was noted that the hand-like prints were those of the hindfoot, the forefoot being much smaller - hindfoot lengths of 9" (23cm) contrasted with forefoot lengths of 4.5" (11.5cm). Each forefoot was placed directly in front of the corresponding hindfoot and the length of stride varied between 21" and 22" (53 - 56cm). The authors also pointed out that if the thumb-like digit was indeed the first (i.e. inner) toe, as Kaup had believed, then



Fig.10. Slab with Chirotherium footprints; Storeton. Royal Geological Society of Cornwall specimen.

the animal must have crossed its legs while walking, since the prints of the right feet lay 3" (7.5cm) to the left of those of the left feet. The final point made in the paper is that the Chirotherium footprints were neither the only, nor the most numerous tracks in the sandstone. Many of the slabs were crowded with footprints. 'It was clear' said the authors 'that the clay beds on which they rested must have been traversed by multitudes of animals.'

With regard to the second footprint paper read at this meeting, the Proceedings report: 'A note by Mr James Yates was then read, giving a brief account of sketches of four differently characterised footprints, traced from casts procured at Storeton, each of which is distinct both from the casts of the Chirotherium and the web-footed animal mentioned in the preceding report.' No additional details of this paper were ever published. Brief though it is, the report quoted does suggest that Yates's note was designed to complement the preceding paper, illustrating some of the range of footprints found at Storeton which had only been mentioned in passing by Cunningham's team.

James Yates, FRS, FGS, FLS [1789 - 1871], had lived in London since 1828, but still had family connections with Liverpool where he was born. His elder brother, Joseph Brooks Yates, was one of the founder members of the Liverpool Literary and Philosophical Society, but neither was a member of the Natural History Society.

This was not James Yates's only involvement with Merseyside footprints. In 1839, prints were discovered at a second site: a stone quarry in Rathbone Street, Liverpool. These footprints were similar to some of the smaller ones from Storeton, although Chirotherium itself was not found. Reports of the discovery are included in the Natural History Society minutes for June 1839 and September 1840, but it was again James Yates who gave an account to a wider audience. On this occasion he was addressing the meeting of the British Association held in Glasgow in 1840. Yates explained: 'On my way to the Meeting of the British Association, I had occasion to stay a short time at Liverpool, and was informed by Mr Higginson, a surgeon in that town, that he had found in this quarry footsteps of the same kind which were

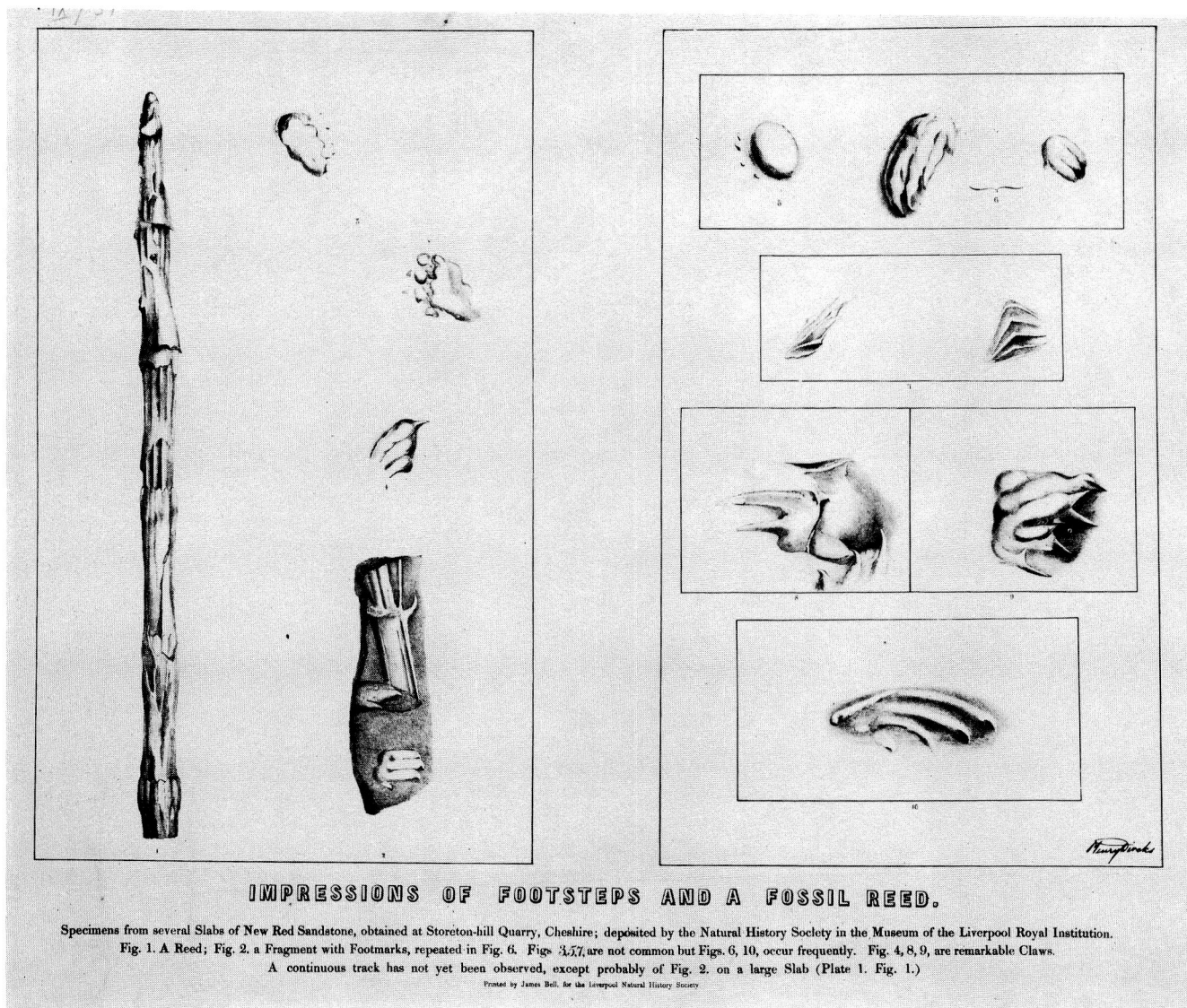


Fig.11. Liverpool Natural History Society's 'plate 4' lithograph, issued 1838.

discovered about two years ago at Stourton, in Cheshire.' A link between Yates and one prominent member of the Liverpool Natural History Society is thus established. Alfred Higginson, one of the seven founder members of the Society, was also its Secretary and one of the members of the 'committee of observation' set up in August 1838. In addition, it was Higginson who prepared the plaster casts of the footprints which were distributed with the Society's lithographs.

It is likely, therefore, that the 'casts procured at Storeton' cited by Yates in 1838, were those which had been acquired in August for the Royal Institution Museum. Since the Society's Plate 4 lithograph was largely based on these same slabs, it is also likely that some or all of Yates's four types of footprint were there depicted. This, however, is purely conjectural.

The third report on Triassic footprints given at the 1838 meeting of the Geological Society was 'On two Casts in Sandstone of the impressions of the Hind Foot of a gigantic *Chirotherium*, from the Red Sandstone of

Cheshire' by Sir Philip Grey Egerton, Bart. These had been found about 1824 and were thus the first fossil footprints discovered in Britain. Egerton warned: 'The exact locality, at which the specimens were discovered, is not known; but it is probable, that they were obtained from the neighbourhood of Colonel Egerton's residence, near Tarporley.' (The Egerton family's country seat was Oulton Park, Tarporley, Cheshire.) Sir Philip had added the casts to his geological collection in 1836, but his main interest was fossil fish and he did not at first realise what they were: 'It was not until the recent discovery of the *Chirotherium*, at Storeton, that their true nature was suspected.'

The Tarporley prints were much larger than those from Storeton - 15" (38cm) in length compared with about 9" (23cm) - and the proportions were also different (Fig.3). For these reasons, Egerton suggested that the animal must be a different species from those responsible for the prints from Germany and Storeton. In view of their giant size, he gave them the name *Chirotherium herculis*. The fossil footprints from Egerton's



LIVERPOOL MUSEUM - 1969.131
 Name: Equisetites
 Number: 1969.131
 Location: Storeton, Cheshire
 Date: 1969.131
 Type: Specimen
 Species/Number: LIVCM/ 8,75 - 170
 Date: 1969

Fig.12. Equisetites keuperina Morton, the type specimen; Storeton. Liverpool Museum 1969.131.

collection, including the two casts of what is now Isochirotherium herculis (Egerton), are in the collections of the British Museum (Natural History). Beasley (1901) pointed out that the herculis footprints are catalogued as being from Lymm, near

Warrington. Against this, must be set Egerton's hesitant suggestion that they were obtained near Tarporley (some twenty miles to the south). It thus seems prudent to regard both locations as doubtful.

SUBSEQUENT EVENTS

After this momentous meeting in London, the Liverpool Natural History Society next met on Tuesday 8 January 1839. Unusually, no papers were read at this meeting; instead the evening was left free for John Cunningham to report on reactions to his Geological Society paper. He began by reading extracts from a letter received from Dr Buckland who had visited Storeton Quarry soon after Cunningham first announced his discovery (see Delair and Sarjeant 1985, p.128). In his letter, Buckland suggested that the projecting digit (which Kaup believed was the 'thumb') was, in fact, the outer toe. There was therefore no need to assume that the animal had crossed its legs while walking. He also suggested that the feet resembled those of Iguanas. The minutes continue: 'Mr C. mentioned that he had when in London examined the feet of an Iguana in the College of Surgeons, along with Dr Buckland and Mr Owen, but he could not see that they had any resemblance whatsoever to the impression of the Cheirotherium'. Cunningham had therefore been in London at about the time of the Geological Society meeting, and Buckland's presence tends to confirm that it was indeed that meeting which had brought them both to the capital.

A new paper by John Cunningham on 'Fossil Shower Marks' in the Storeton rocks was read to the Natural History Society on 5 February 1839, and to the Geological Society on 27 February. Again it is not clear from the latter's Proceedings whether Cunningham read it in person. This was the first paper on Storeton that Cunningham published under his own name, and Francis Archer, speaking at the General meeting in September, said it 'had

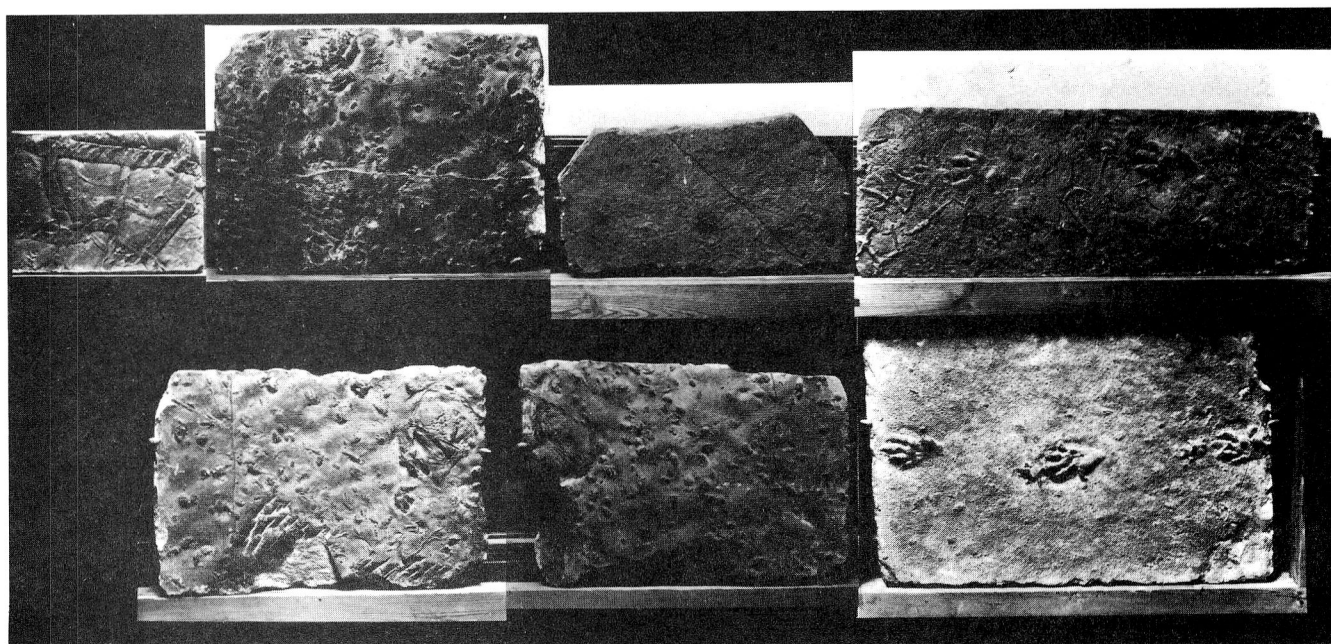


Fig.13. Footprint slabs as displayed at Bootle Museum in 1887. Composite reconstruction from F. Anyon's photographs.

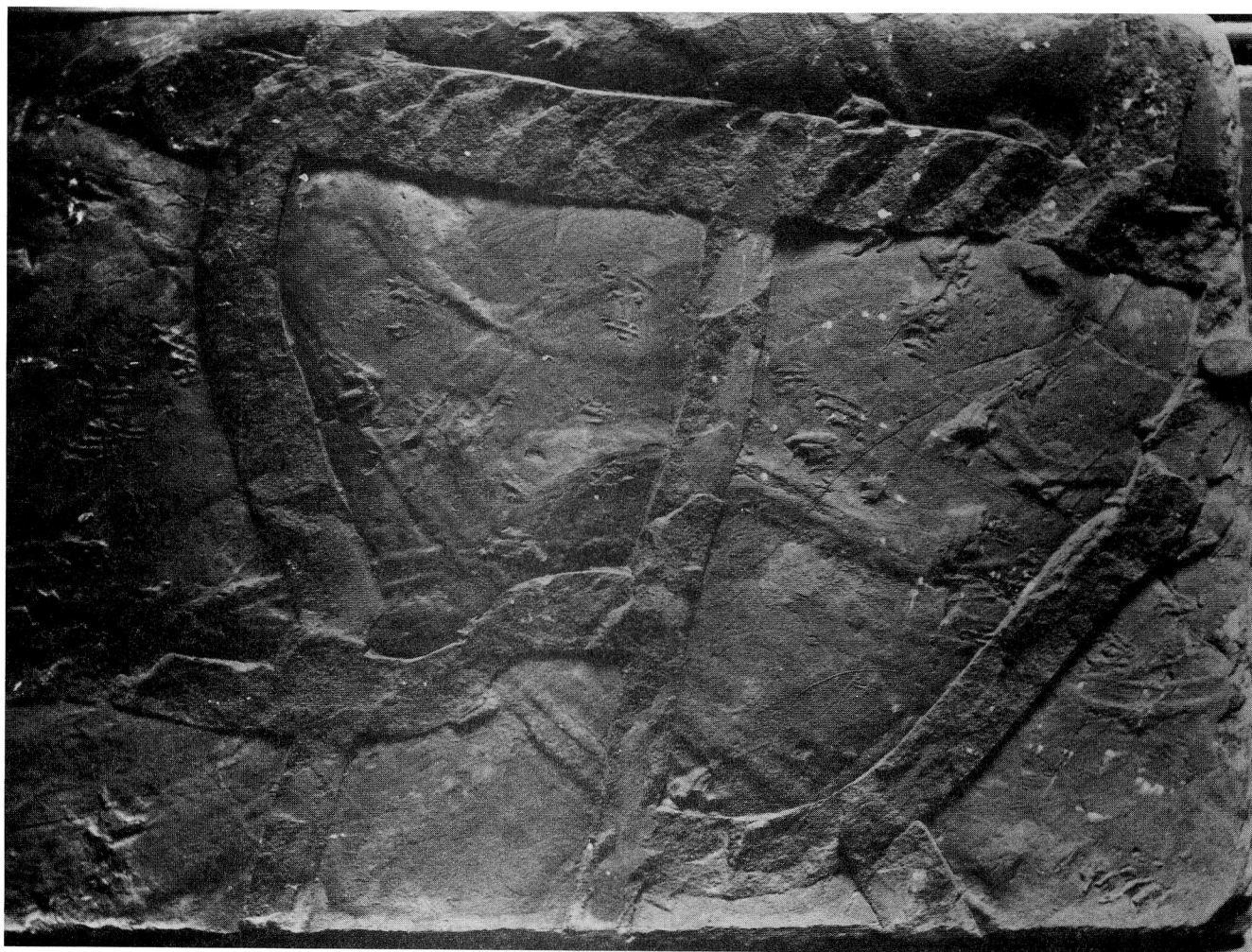


Fig.14. Slab with suncracks and footprints; locality unknown. Bootle Museum specimen No.3.

excited much interest among geologists'. Dr Buckland pointed out that it was the first time that rain pitting had been recognised in a sedimentary rock.

It was also in February 1839 that the Natural History Society began to distribute its plaster casts and lithographs to other societies. Two years earlier, the Society had issued its first lithograph of a supposed 'Gigantic fossil Fucus in the New Red Sandstone at Woodside on the River Mersey' (Fig.4). The lithograph, which is signed 'H. Dircks 1837', shows a vaguely arborescent shape, but the scale given is 1 inch to a foot making the structure over 12 feet (3.7 m) in length. It seems likely, therefore, that it was of inorganic origin.

The decision to produce 'a lithographic drawing' of the Storeton finds was taken at the meeting in July 1838. The following month, twenty-six members subscribed one guinea each towards the cost of what proved to be a set of four lithographs. Plates 1, 3 and 4 are signed 'Henry Dircks'; Sarjeant (1974, p.288) reproduced parts of plate 4, which he attributed to 'Murray Dicks' due to a misreading of the signature. All four plates are inscribed 'Printed by James Bell, for the Liverpool Natural History Society'. They are undated but must have been printed in the autumn of 1838, since the Society

account book records payments of £25-8-0 to 'Jas Bell (lithographs)' and of £6-5-6 to Henry Dircks. Both these payments were made between items of expenditure dated 1 August and 26 October 1838.

Plates 1-3 are headed 'Footsteps of the Cheirotherium' and plate 4 'Impressions of Footsteps and a Fossil Reed'. Their subject matter is discussed in more detail below. It was decided that thirty copies of each lithograph should be set aside for distribution to public institutions and eminent scientists. The remainder would be sold, whole sets (including the 'fossil Fucus' lithograph) for five shillings, individual plates for a shilling. Profits would be used for the purchase of geological maps and books.

On February 1839, the Society Secretary wrote to the Secretary of the Natural History Society of Belfast, one of the chosen recipients. The inclusion of the 'fossil Fucus' lithograph meant that he had to choose the words of his covering letter (preserved in the archives of Ulster Museum) with both care and caution:

'Dear Sir,
I have the pleasure of informing you that the Natural History Society of Liverpool request the Belfast Natural History Society's



Fig.15. Slab with Chirotherium and other footprints; Storeton. Bootle Museum specimen No.4.

acceptance of a pair of casts and a set of Lithographic Drawings, illustrative of some curious impressions in the new red sandstone of this neighbourhood ...

Our Society, I need hardly say, would receive with great interest a report of any opinions which the sight of these curious marks may elicit amongst you.

I have the honor to be, Sir, yours most obediently,
Alfred Higginson'

One of the plaster casts referred to replicates the Chirotherium prints of plate 1. The minutes of 4 September 1838 record 'The thanks of the Society to Mr Higginson and Mr Johnson for the trouble they have taken in making casts of the impressions of the Cheirotherium. It was also resolved that these moulds be preserved by the Society, and that the council be empowered to take as many casts as they think necessary.'

The second cast shows the Equisetites stem and some of the smaller footprints of plate 4 and its production appears to have presented more problems. Moulds had to be made from a number of different slabs, the resulting casts trimmed, cemented together and then recast as a composite 12" x 8" (30 x 20 cm) slab. The cast sent to the Warrington

Natural History Society in February 1840, and now in Warrington Museum, shows that much of the fine detail was lost in the process. No doubt it was for this reason that prints shown on the lithograph but of low relief (e.g. Nos. 7 and 10) were omitted from the cast, and more prominent prints, not depicted on the lithograph, were substituted.

Higginson received £7-2-11 towards the cost of the casts, in three payments made between November 1838 and August 1839.

At a special meeting held on Friday 22 March 1839, the Secretary reported that all the plates and casts voted as donations to other Societies had been sent out. Letters of acknowledgement had been received from six institutions. Professor Henslow of the Cambridge Philosophical Society had identified the fossil reed as an equisetum, while Dr Scouler of the Dublin Royal Society thought that the Chirotherium prints belonged 'without doubt to some Mammiferous animal'. No opinions on the 'fossil Fucus' are recorded.

When Francis Archer gave his presidential address to the September General Meeting, he stated: 'Our casts and drawings have been sent to all the principal museums in the three kingdoms, as well as to the continents of Europe and America, and the discovery has

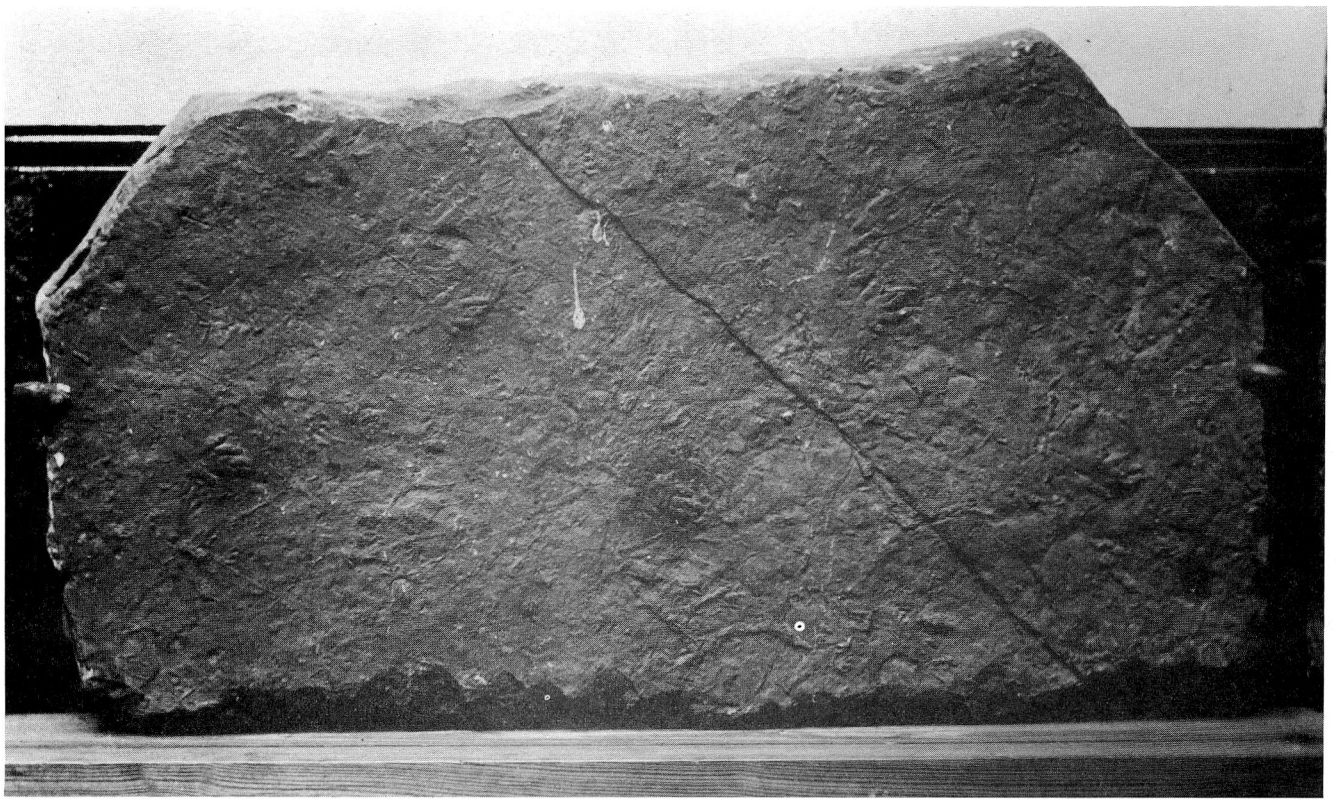


Fig.16. Slab with small Chirotherium footprints; Flaybrick Hill, Birkenhead. Bootle Museum specimen No.5.

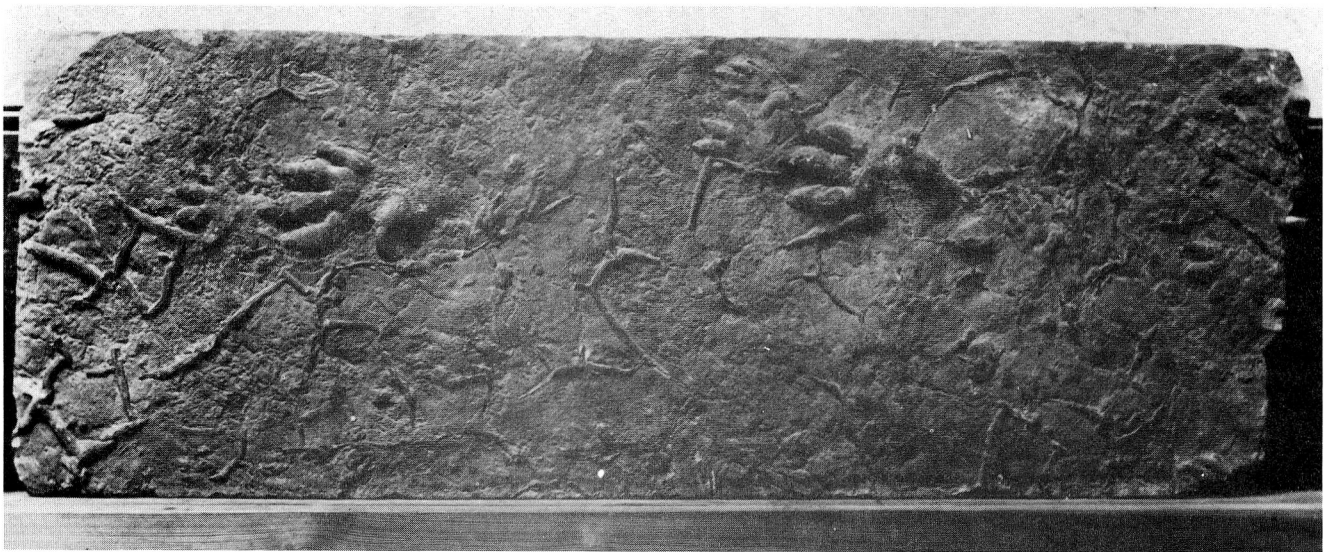


Fig.17. Slab with Chirotherium barthii Kaup; Germany. Bootle Museum specimen No.6.

given a notoriety and rank to our Society which it might otherwise have been long in attaining.'

THE FINAL YEARS

Archer's belief that the Chirotherium discoveries marked the highspot in the Society's history was to prove prophetic. The Society would continue in existence for another five years, but in slow decline from the peaks of 1838-1839.

The Society's interest in Storeton was maintained: in September 1841, John Cunningham reported the discovery of a giant 'fossil Fucus' at Storeton Quarry.

A lithograph depicting the new find was produced in October, and a large specimen was displayed at the November meeting. This specimen was not given to the Royal Institution Museum, although Cunningham had previously presented 'A fossil Fucus in sandstone' on 29 October 1838. It is possible that the latter may survive as Bootle Museum's specimen 7.

Overall, however, the 1840s were not harmonious years for the Society; there were endless disputes over financial matters. The lithographs were one source of friction - should the profits from their sale be kept for the purchase of maps and books as the subscribers had agreed, or should they be



Fig.18. Slab with casts of water courses; locality unknown. Bootle Museum specimen No.7.

merged with the general fund? In October 1841 it was resolved that all remaining copies of the Chirotherium prints should be kept by the Secretary either for donation by the Society or for purchase by members. By 1844, the stock must have been exhausted; at the meeting on 4 September it was agreed that lithographs of the 'Fucus' and Chirotherium 'should be obtained, if possible, and presented to the Natural History Association and to Mr Mott of New York'.

The annual levy of one pound per member to purchase specimens for the Royal Institution Museum was repeatedly challenged and, in February 1840, was voted down. Five members resigned in protest. In June of the same year, a new arrangement was agreed: henceforward a sum 'at present not exceeding one pound per month' would be deducted from the Society's funds and used by the Council to purchase specimens for the Museum. The propriety of this arrangement was also questioned: a motion to discontinue it, put to the meeting in October 1843, was lost by a single vote. The following month the rebels returned to the attack, this time with more success - it was agreed that purchases for the Museum should no longer be decided by the Council alone, but must be approved by the membership at an open meeting.

The end came at the Annual General Meeting on Tuesday 4 September 1844, when it was agreed that the Society should merge with the Liverpool Literary and Philosophical

Society. There was one poignant reminder of past glories: the Society's last President, who officiated at this meeting, was John Cunningham, FGS.

The Liverpool Natural History Society was thus in existence for exactly eight years, from September 1836 to September 1844. Although relatively short-lived, it proved to be in the right place at the right time. It left an important legacy: not just the casts and lithographs of the first finds from Storeton but, much more significantly, the specimens on which these were based.

THE LITHOGRAPHS

The importance of the lithographs is that they were published in the autumn of 1838 and thus provide irrefutable evidence of the nature and identity of those first finds from Storeton. Thackray (1985) found sets at four institutions: British Museum (Natural History), Geological Society of London, Warwickshire Museum and Yorkshire Museum. Sadly, there appear to be none in Liverpool.

Four plates were produced and those numbered 1, 2 and 3 illustrate four slabs showing Chirotherium footprints. They are headed 'Footsteps of the Cheirotherium' and the text to plate 1 (Fig.5) concludes: 'This slab, presented to the Natural History Society by John Tomkinson Esq., has been deposited in the Liverpool Royal Institute'. It later became specimen 10 in the Bootle Museum collections.



Fig.19. Slab with Chirotherium and other footprints; Storeton. Bootle Museum specimen No.8.

Plates 2 and 3 by contrast make no mention of the Royal Institution, and indeed the three slabs depicted all went elsewhere. Plate 2 (Fig.6) was identified by Thackray (1985) as representing specimen R729 in the British Museum (Natural History) (Fig.7). The Chirotherium storetonense Morton track running from left to right is crossed obliquely by the four-toed form now classed as Chirotherium beasleyi Nopcsa but which the caption to the plate describes as 'the best example of the young animal's feet marks yet obtained'.

The two slabs depicted in plate 3 (Fig.8) were less immediately identifiable. Dr Buckland seemed the most likely recipient and Philip Powell of Oxford University (pers. comm. 1988) confirms this: 'The original of the Chirotherium drawing you sent [i.e. plate 3i] is undoubtedly the specimen leaning against the wall outside the door to my room, OUM no. G55 ... The only information with the specimen is that it is Buckland collection and comes from Storeton' (Fig.9). The second slab in plate 3 has been identified by comparison with the photographs in the Henry Beasley archive, owned by the Liverpool Geological Society but housed at Liverpool Museum. Photograph no.247, taken in the early years of the present century, shows this slab in the collections of the Royal Geological Society of Cornwall at Penzance Museum. It is captioned 'From near Warrington, given by Mr J. Cunningham'. 'Near Warrington' suggests the quarries at

Lymm (where fossil footprints were first discovered in 1841) and Beasley does not appear to have recognised this as a Storeton specimen. The Hon. Curator, Ivor Moyle, informs me that the slab (Fig.10) is still in the Penzance Museum collections. It was donated in 1843.

In passing, it may be noted that these plates appear to mark the first appearance in print of the spelling Chirotherium. Kaup (1835), Buckland (1836), and Cunningham, Yates and Egerton in their Geological Society papers of 1838, all use Chirotherium. The revised spelling is first seen in the Natural History Society minutes of 4 September 1838, so it may have been a pedantically minded member of this Society who first suggested that 'Cheir' was a more accurate rendering of the Greek root. No doubt the Society's zeal in distributing its lithographs to all interested parties helped to ensure that the 'corrected' spelling was almost universally used in Britain throughout the nineteenth century.

The fourth plate (Fig.11) is not in fact numbered, although it was printed at the same time as the other three. It is headed 'Impressions of Footsteps and a Fossil Reed' and the text reads: 'Specimens from several Slabs of New Red Sandstone, obtained at Storeton-hill Quarry, Cheshire; deposited by the Natural History Society in the museum of the Liverpool Royal Institution. Fig.1. A Reed; Fig.2. A Fragment with Footmarks,

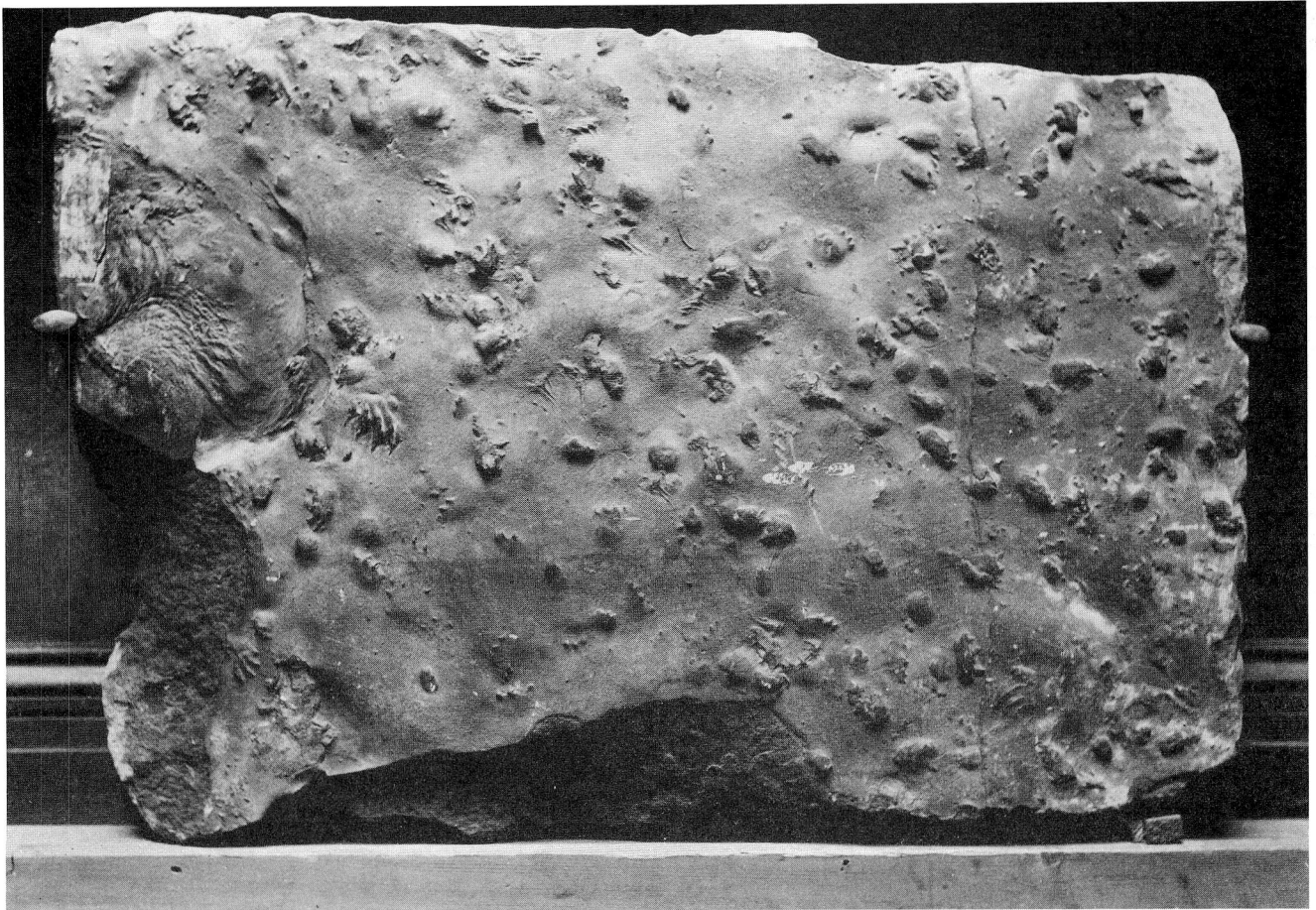


Fig.20. Slab with small footprints; Storeton. Bootle Museum specimen No.9.

repeated in Fig.6. Figs. 3, 5, 7, are not common but Figs. 6, 10 occur frequently. Fig.4, 8, 9, are remarkable Claws. A continuous track has not been observed, except probably of Fig.2 on a large Slab (Plate 1, Fig.1)'.

The reed is the holotype of Equisetum keuperina G. H. Morton, 1863, which was presented to Liverpool Museum by the Royal Institution in 1889 - the only one of these early finds to come to this museum. By a happy chance it was one of the very few geological specimens to survive the bombing of 1941 and is still in the Liverpool collections (Fig.12).

Some of the footprints figured can be identified on the Bootle Museum slabs: nos. 8 and 10 are seen on slab 8, nos. 7 and 9 on slab 9. Others may have been taken from the now-missing slab 4 (Anyon's photograph of this slab suggests that no.5 was based on a print near the top right, but footprints of this kind are also common on slab 9).

I have not been able to identify the originals of nos.3 and 4, nor trace the fragment on which no.2 was based. The meaning of 'Fig.2 a Fragment with Footmarks, repeated in Fig.6' is not wholly clear but a likely explanation is that Fig.6 is an 'idealized' illustration of this type of footprint based mainly on the Fig.2 specimen, but with additional details taken from other examples. (Compilation illustrations of this kind are also included on plates 1 and 2.)

THE ROYAL INSTITUTION SPECIMENS

As the captions make clear, plates 1 and 3 were based on specimens presented to the Royal Institution Museum. When this museum closed in 1877, ten large Triassic slabs were bought by Bootle Council for their civic museum. These included the four large specimens from Storeton acquired in August 1838 via the Natural History Society.

At Bootle Museum, a suite of cases was built for the slabs on the landing of the staircase which directly faced the main entrance. The slabs were mounted in two rows and numbered from top left to bottom right, slabs 1-6 forming the top row, 7-10 the bottom row (Fig.13). For some reason, the cases were not glazed but were fitted with wooden panels, which had to be removed whenever they specimens were examined.

After they had been mounted in position but before the construction of the cases was completed, the seven slabs that showed footprint casts were photographed by F. Anyon of Bootle. Anyon's photographs are prints 1-7 in the photographic archive built up by Henry Beasley. These photographs, with Beasley's annotations, have been utilised in producing the following notes.

The slabs, in the order in which they were displayed, were:

Nos.1 and 2. The smallest and least interesting specimens. Although both are



Fig.21. Slabs in the former Bootle Museum building, 1988. Compare with Fig.13.

labelled 'Footprints and tail tracks. Storeton?' neither shows casts of footprints. Slab 1, indeed, appears to have been fixed to the wall with the wrong surface exposed - the grooves and marks shown being those of the quarrymen's tools. The rock is a red sandstone and is unlikely to be from Storeton where the white and yellow Keuper Sandstone was quarried. Slab 2 shows cross-cutting grooves, some of which may represent decayed plant remains; none appear to be of vertebrate origin. (Both specimens remain in the original cases in Bootle Town Hall.)

No.3 (Fig.14). A slab with infilled suncracks, showing Rhynchosaurus and small Chirotherium footprints. Unlikely to have originated from Storeton. (Specimen missing.)

No.4 (Fig.14). A slab with one Chirotherium footprint and a wide variety of small prints. Beasley notes: 'Was obtained from Storeton at the expense of the Natural History Society'. (Specimen missing.)

No.5 (Fig.16). A slab with small Chirotherium footprints, from Flaybrick Hill, to the east of Bidston Hill (about three miles north of Storeton). The footprint to the centre left was illustrated in the Literary and Philosophical Society Proceedings for 1848 with a descriptive note by John Cunningham. (Specimen missing.)

No.6 (Fig.17). A slab showing Chirotherium barthii Kaup prints from Germany. Beasley records it as being from Hessburg, Saxony and notes: 'Was obtained in exchange for casts (of) others'. In October 1845, the Literary and Philosophical Society Proceedings record: 'A slab, presented the the Natural History Society, was exhibited showing very fine impressions of the footmarks of the

Labyrinthodon or Chirotherium. It was found in the red sandstone formation at Bremen in Mulhausen'. There is no mention of an exchange of specimens and it is uncertain if this refers to slab 6, but no other German specimen appears to have been received by either Society. (Specimen in store in Botanic Gardens Museum, Southport.)

No.7 (Fig.18). A slab showing marks of the type that Cunningham called 'fossil Fucus'. Photographed by Beasley (print 207) and identified by him as 'Natural casts of stream courses in sandstone'. (Beasley photographed very similar structures between the tide marks on the beaches of the Wirral coast.) No locality data (but see note above, page 146). (Specimen in Bootle Town Hall.)

No.8 (Fig.19). Slab with poorly defined Chirotherium prints and a variety of smaller prints. Beasley notes: 'Was obtained from Storeton at the expense of the Natural History Society'. (Specimen in Bootle Town Hall.)

No.9 (Fig.20). Slab showing a range of small footprints. Beasley notes: 'Was obtained at the expense of the Natural History Society'. (Specimen in Bootle Town Hall.)

No.10 (Fig.2). The slab presented to the Natural History Society in July 1838. Nominated by Morton (1863) as the type specimen of Chirotherium storetonense, and illustrated in the Society's plate 1 lithograph. (Specimen in Bootle Town Hall.)

After more than a century, therefore, specimens 1, 2 and 7-10 still remain in their original cases in Bootle Town Hall. Slabs 3-6 were subsequently removed and replaced by a large glazed display case (see Fig.21). During this intervening period, the Museum

closed and the building is now occupied by the offices of the local Education Department. Under the local government reorganisation of 1974, Bootle became part of the Sefton Metropolitan District with a museum service based at Southport. Tony Wray, the present curator of the Botanic Gardens Museum, rescued the Bootle Museum collections which had been dumped in the basement of the building. They included one footprint slab, the former no.6, which is now in store at Southport. Specimens 3, 4 and 5 have not been traced and it is feared that they may have been destroyed.

SUMMARY

Footprints were first found at Storeton Quarry in the summer of 1838. The lithographs printed in the autumn of that year were based on nine specimens: four large slabs with Chirotherium footprints, three large slabs with other types of footprint and two smaller specimens (plate 4, figures 1 and 2). Of these first finds, all four Chirotherium-bearing slabs are still preserved in Bootle, London, Oxford and Penzance; two of the other large slabs are in Bootle; one of the small specimens is in Liverpool. Thus of the nine illustrated specimens only two have not been traced to date. Despite the closure of two museums in which the majority were housed, they have survived to a surprising and encouraging extent. One hundred and fifty years ago, the members of the Liverpool Natural History Society had the enterprise to sponsor the collection and illustration of the first finds from Storeton Quarry, and happily the results of their initiative are still in existence.

ACKNOWLEDGEMENTS

I am particularly indebted to John Thackray of the Geological Museum, London whose advice in the early stages of research proved of crucial importance. I also received valuable help from Angela Milner and Sandra Chapman of the British Museum (Natural History), Tony Wray (Botanic Garden Museum, Southport), Philip Powell (University Museum, Oxford) and Alan Leigh (Warrington Museum).

Apologies are due to those colleagues, proof-readers and referees who have had to contend with the vagaries of spelling found in the quotations incorporated into the text. Thus both Storton and Stourton occur as variants of Storeton. The acting curator of the Royal Institution Museum is cited in the minute books as either Johnson or Johnston; according to Ormerod (1953) he was Henry Johnson. Latin names are italicised in the printed works of the period but were seldom underlined in minute books. Such variations have been retained, but are too numerous for [sic] to be inserted on each occasion.

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Typescript received 16 December 1988
Revised typescript received 17 April 1989

NOTE ADDED IN PROOF

The Owen correspondence archive in the British Museum (Natural History) library contains a letter written by John Cunningham in December 1858, setting out his recollections of the events of 1838 (John Thackray, pers. comm. 1989). This lengthy letter contains much interesting detail, but it was written

in Cunningham's old age and he admitted that he was unsure of the dates of the events he described. It is clear from the published evidence that his memory was indeed at fault, and many of the dates given are incorrect. A critical evaluation of this letter will form the basis of a future paper.

FORTHCOMING MEETINGS

Thu. 7 September 1989

GCG

University collections - What price the 1990 Orogeny?

The Hancock Museum, Newcastle upon Tyne

The fate of university geology collections following the Earth Science Review by the University Grants Committee (now the University Funding Council).

Contacts: Andrew Newman, The Hancock Museum, The University, Newcastle upon Tyne NE1 7RU (tel. 0632 328511)

Thu. 14 December 1989

GCG

Facets of our Glittering Heritage and Annual General Meeting

Oxford University Museum

Collecting, curating and conserving minerals.

Contact: Monica Price, Mineralogy Dept., University Museum, Parks Road, Oxford OX1 3PW (tel. 0865 272590)

DENOTIFICATION OF SITES OF SPECIAL SCIENTIFIC INTEREST BY THE NATURE CONSERVANCY COUNCIL

Readers will be aware that the main purpose of the Geological Conservation Review is to re-assess the relative significance of Britain's geological and geomorphological sites and to ensure that the coverage of SSSIs adequately represents the most important localities in these subject areas. The most well-known result is that a substantial number of new localities worthy of SSSI status has been identified, and that these are in the process of being notified as SSSIs to ensure their future protection. Perhaps less well-known is the fact that a number of localities, which were notified as SSSIs before the GCR started work in 1977, have been re-assessed as part of the GCR exercise and found not to measure up to the more rigorous selection criteria now being used, and are now being removed from the list of notified SSSIs.

The process of denotification removes such localities from the legal protection afforded by SSSI status, and the NCC, being fully aware of the significance of such a move, is concerned that in each instance the decision to denotify has been carefully weighed in advance by the GCR, and that the underlying logic is understood by the geological community.

Since the inception of the NCC's involvement in geological conservation in 1950, geological SSSIs have always been selected on a national basis, unlike their biological counterparts which are usually selected locally. In this way the national or international significance of earth science SSSIs has been an important selection criterion from the start, and this fact has been most instrumental in the NCC's successful record in defending the sites against development proposals. Over the years, however, the perception of 'national' significance has changed in line with the expansion of geological research in Britain and the rapid development of the science in the last twenty-five years. There has also been the realisation that some of the sites added to the SSSI coverage through ad hoc revisions prior to the GCR did not measure up to the stricter criteria now being used.

In order to ensure that the credibility of both the GCR and the earth science SSSIs as a series of nationally important sites was not undermined, the NCC therefore decided, in 1977, that pre-GCR sites not reaching GCR standard would be denotified.

We are well aware, however, that whilst these sites no longer satisfy GCR standards, they still retain in many instances significant earth science interest on a regional or local basis, and that there is considerable merit

in trying to safeguard and conserve such sites through the use of mechanisms other than SSSI protection. For example, county naturalists trusts can be encouraged to become involved in the conservation of such sites, perhaps with the co-operation of local, regional or national geological societies. Other options could include the establishment of formal or informal adoption schemes, and encouraging local authorities to add the localities to their inventories of locally important conservation sites. The NCC, in fulfilling its commitment to conservation in the wider environment (that is, away from SSSIs and NNRs), can assist in promoting such alternative approaches to conserving particular sites. Denotification does not mean that a site is unimportant, simply that the SSSI mechanism is inappropriate in planning its safeguard.

To help earth scientists and conservation bodies to identify the sites concerned, a full list of all the pre-GCR SSSIs which are now recommended for denotification is set out below. For some of these, the process is well advanced or has been concluded, but for many others no firm action has yet been initiated. Further details of the precise location of a particular site, and the nature of the geological interest are available from the NCC upon request. We hope that anyone with an interest in any of the sites will therefore be able to investigate the possibility of making alternative local conservation arrangements if they feel it is desirable. As indicated above, the NCC will be pleased to offer advice and background assistance as appropriate. We would also be interested to receive any other comments related to the list; these should, in the first instance, be addressed to the Editor, Earth Science Conservation, Nature Conservancy Council, Northminster House, Peterborough PE1 1UA (tel. 0733 40345).

LIST OF GEOLOGICAL AND GEOMORPHOLOGICAL SSSIs RECOMMENDED FOR DENOTIFICATION BY THE GCR

An asterisk (*) after a site name indicates that the site has been formally denotified.

ENGLAND

Avon

Conygar Quarry*
Saltford Railway Cutting*

Bedfordshire

Mundays Hill Pit*
Oakley Railway Junction Pit*
Pinnacle Phosphatic Nodule Bed*

Buckinghamshire

Ivinghoe Hills & Clipper Down
Moorend Common & Gubbins Hole
Purser's Pit
Soulbury Erratic
The Lee

Cambridgeshire

Burwell Chalk Pit*
Underwood Hall Pit*
Weston Colville Chalk Pit*
Wood Ditton Chalk Pit*

Cornwall

Cheesewring Quarry

Cumbria

Bowder Stone, Borrowdale*
Pate Hole & Low Pate Hole*
Rosthwaite Road*
Tilberthwaite Gill*

Derbyshire

Ashover Quarries & Stream Section
(Hockley Quarry, forming part of this
1949 Act SSSI, has yet to be assessed
by the GCR)
Pleasley Vale*
Stoneycroft Quarry (Part of 1949 Act
SSSI Baileycroft & Stoneycroft)

Devon

Bishop's Court Quarry*
Brixton Quarry*
Heavitree Quarry*
Hill Head Quarry*
Hole Lake Farm Quarry*
Holne Chase*
Kenton Hill Road Cutting*
Luxton*
Pocombe Quarry*
Rocknell & Westleigh Quarries*
Solland Quarry*
Tolcis Quarry*
Wembury Point*
Whiteway Farmyard*

Dorset

Bincombe*
Evershot Pit*
Owermoigne Heath Pit*
Parsons Pit*

Durham

Chestergarth Quarry*
East Thickley Quarry*
Hope Level Cavern*
Moking Hurth Cave*

Essex

Bartlow Gravel Pit
Brentwood Brick Works
Foulness
Great Chesterfield Chalk Pit
Hallsford Pit

Orsett Road Section, Grays Thurrock
Ugley Quarry
Wedlock Green Gravel Pit

Gloucestershire

Chedworth Railway Cuttings
Cooper's Hill LNR (including Fiddler's
Elbow Quarry)
Cotswold Commons and Beechwoods
(including Catsbrain Quarry)
Damery Quarry
Frampton Mansell Railway Cutting
Hailey Farm Railway Cutting
Jarvis' New Quarry
New Grounds, The Noose and Hock Cliff
Pen Wood
Randwick Quarry
Rudge Hill (including Scottsquarr
Quarry)
Stratton Road Quarry
Stonehouse Brickpits
Tuffley's Quarry

Greater London

Kenley Station Chalk Pit*
North End Pit*
Riddlesdown (Rose and Crown Quarry)*

Greater Manchester

Goyt River Section*

Hampshire

Candovers Farm Pit*
Farlington Redoubt Pit*
Headley Farm Pit*
Kingsclere Stream Section*
Micheldever Station Cutting*
Paulsgrove Pit*

Hereford and Worcestershire

Black Mountains (Eastern)
Brockhill Quarry
Collin's Green Quarry
Dodford Boulder (Erratic)
Elmley Lovett Track Cutting (The Holloway)
Hergest Ridge (including The Whet Stone)
Lower Wolton Road Cutting
Mere Hill Wood Track Sections
Romsley Hill Boulders (Erratics)
Southstone Rock and Dingle
Todding Lane Sections
Witnells End Quarry

Hertfordshire

Ayot Pit
Barkway Chalk Pit
Chadwell Hill & Line's Quarry Chalk Pit
Gaddesden Row Brick Pit
Hitch Wood (includes detached Hillend
Farm Pit)
Hitchin Railway Cutting
Moor Park Sand Pit
Potterscrouch Section
Reed Chalk Pit
Roughdown and Sheethanger Commons
(includes Boxmoor Chalk Pit)
Royston Erratic
St Michael's Bridge
Wallington Chalk Pit

Humberside

Bessingby Chalk Pit*
Elsham Pit*
Elsham Sandstone Exposures*
Hessle Cement Works Pit*
Kiplingcotes Station Pit*
Middleton on the Wold Chalk Pit*
The Lindholme Stone*
Wold Newton Meteorite Monument*

Isles of Scilly

Garrison Gateway Cottage, St Marys*

Isle of Wight (Hampshire)

Arreton Down
Shide Quarry

Kent

Knockmill Pit
Lime Kiln Wood Chalk Pit
Sayer's Woodyard, Ramsgate

Lancashire

Arbour Quarry*
Foxley Bank Quarry*
Higher Clough*
Little Bowland Knolls*
Lost John Cave* (now in Leck Beck Head
Catchment)
Skellow Clough*

Leicestershire

Groby Slate Works and Alder Spinney
Ives Head
Miller's Quarry, Halstead
Old Dalby Cutting

Lincolnshire

Claxby Chalk Pit
East Keal Clay Pit
Ings Farm Escarpment
Stenigot Road Cutting

Merseyside

Great Crosby Boulder

Norfolk

Billockby Sand Pit
Blackdyke Farm Chalk Pit
Crown Point Pit
Eaton Chalk Pit
Frettenham Chalk Pit
Hillington Chalk Pit
Newton-By-Castle-Acre Chalk Pit
Warham Camp

Northamptonshire

Cranford Quarry*
Tiffield Quarry*
Weldon Stone Quarry*
Westfield Lodge Quarry*
White Lodge Quarry*

Northumberland

Beadnell Shore*
Black Pasture Quarry*
Doddington Quarry*
Haltwhistle Burn*
Irthing Gorge*
Kirkheaton Quarry*
Old Dryburn Quarries*
Snableazes Quarry*
Wards Hill Quarry*
Waterfall Quarry*

North Yorkshire

Draughton Quarry*
Flixton Chalk Pit*
Foxholes Chalk Pit*
Horton in Ribblesdale Cutting*
Kirkham Abbey Gorge*
Semerwater (Carlow Stone)*

Nottinghamshire

Barnstone Railway Cutting*
Red Quarry, Mansfield*

Oxfordshire

Breakspear's Quarry
Childrey Lime Quarry
Chipping Norton Quarry
Fawler Quarry
Friars Hill
North Lodge Pit
Taynton Quarries
Warren Farm Pit

Peak District

Ashford Black Marble Quarry*
Bakestondale*
Bretton Clough*
Calverpeak Quarry*
Chrome and Parkhouse Hills*
Grangemill Quarry*
Hartington Station Quarry*
Lee Farm Quarry*
Monsal Head*
Sparrow Pit*
Stoney Middleton Crag*
Tideswell Dale Quarry*

Shropshire

Chatwell Farm Cutting & Quarry*
Doseley Quarry*
Hazler Quarry
Hudwick Dingle*
Lea Rock*
Llanymynech Hill & Llynllys Hill*
Maddock's Hill Quarry*
Squilver Quarry*
Tasker Quarry*
Tickwood and Benthall Edge*
Wart Hill*
West Caer Caradoc*
Wiresytch Quarry*

Somerset

Cockcroft Quarry*
Warren Hill Road Cutting*

South Yorkshire

Stairfoot Brickworks*

Staffordshire

High Onn

Suffolk

Black Ditches, Cavenham
Coe's Pit, Bramford & Bramford
Brickfield
Foxhall Hall Pit
Hill Farm Pit, Aldham
Little Cornard Brick Pit
Newbourn Pit & Wood
Sudbury Chalk Pit
Virtue's Farm Pit, Hollesley
West Row Chalk Pit
West Stow Brick Pit

Surrey

Badshot Farm Chalk Pit
Chelsham & Woldingham Group (includes
Nore Hill Pinnacle LNR)*
Clandon Traverse
Greyfriars Chalk Pit
Jolly Farmer Pit, Runfold
Leith Hill
Ranmore Common
Thursley, Hankley & Frensham Commons
(includes the Devil's Jumps)
Upper Hale Gravel Pits

Tyne and Wear

Boldon Golf Course Quarry*
Downhill Quarry*

Warwickshire

King's Hill Boulder (Erratic)
Knowle End Tramway Cutting
Parkfield Road Quarry (Victoria Pit, Rugby)
Steppy Lane Section (Purley Park)
Stockton Quarry
Tattle Bank Quarry
Windmill Hill Quarry (Judkins Quarry)*

West Midlands

Dudley Castle Hill Canal basin
Rubery Cutting & Leachgreen Quarries

Wiltshire

Calstone & Cherhill*
Cley Hill*
Devizes Gault Pit*
Docks Clay Pit*
Hursley Bottoms*
Leigh Delamere
Ogbourne Maizey Chalk Pit*
Purton Brick Pit*
Quidhampton Chalk Pit*
West Kington Lane Section*

SCOTLAND

Aberdeen

Balgownie Bridge

Angus

Leysmill Quarry*

Argyll and Bute

Eas Mor Duart, Mull*
Glen Forsa, Mull*
Gruinart Flats*
South Bute Coast*
Staffa*

Banff and Buchan

Aberdour Coast*
Buchan Ness*
Sandford Hill*
Tore of Troup*

Berwickshire

St Helens Church Dry Channel*

Clydesdale

The Bank*

Cumnock and Doon

Ballochmyle Quarries

Cunninghame

Gleann Dubh*
Gurdie Cutting*
Hessilhead Quarry*
Portencross Coast*

Dundee

Duntrune*
Tealing Quarry*

East Lothian

Aikengall*
Bass Rock*
Markle Quarries*
North Berwick Law*

Edinburgh

Corniston Sand Pit*
Craigleith Quarry*
Craiglockhart Hill West*
Dalmeny Quarry*
Morton Hill Quarry*
Torphin Quarry*

Inverclyde

Bogle Stone*
Craigmuschat Quarry*

Kincardine and Deeside

Slack of Birnie*

Kircaldy

Orrock Hill*

Kyle and Carrick

Ballantrae Shingle Beach*
Newlands Quarry*

Lochaber

Acharacle*
Callert East, Loch Leven*
Camas Calltuinn*
Glenmore Plug*
Invergloy*
Loch Nevis*
Mamore Coast*
Ormsaigbeg Shore*

Monklands

Brewsterford*

Moray

Ardwell Inn River Section*
Earth Pillars, Fochabers*
Rosebrae Quarry*

Nairn

Kingsteps Quarry*
Leithen (North Bank of Muckle Burn)*

Nithsdale

Crichope Linn*
Enterkin Burn*

North East Fife

Drumdryan Quarry*
Dura Den*

Orkney

Bookan Quarry*
Dingieshow St Peter's Pool*
Mirkady Point*
Sacquoy Head, Rousay*
Swuarsquoy (Weethick)*

Ross and Cromarty

Cromarty Gullies

Strathkelvin

Lennoxton Essexite*

Skye and Lochalsh

Sron A Bheallain*
Strollamus*

Stirling

Kinbuck Esker*

Sutherland

Cnoc na Beiste*
Dornoch Esker*
Eilean Nan Ron*
Loch Assynt Quarry*

Dyfed

Cil-Yr-Ychen Quarry
Cwm Llyfnant (Llyfnant Valley)
(also in Powys)
Prendergast Place Pit

Gwent

Porth Llong

Gwynedd

Afon Dwyfach Section
Callaway's Knob
Coedydd Aber NNR
Llyn Cororion
Morfa Bychan
Nant Peris
Pennant Dyfi
Porth Yr Ysgaw
Twt Hill

Mid Glamorgan

Longlands Quarry
Merthyr Mawr Warren
Sutton Road Section

Powys

Breidden Hills
Powis Arms Quarry
Tynllidiart Pingos

West Glamorgan

Killay Brickpit
Pont-Rhyd-y-Fen Kame Terrace

Tweeddale

Glen Dean Banks*
Stobo Slate Quarry*

West Lothian

Hill House Quarry*
Linlithgow Loch*

Western Isles

Kirkibost - Baleshare and Eackamish*
Machair and Dunes, North Uist

Wigtown

Lady Bay*

WALES

Clwyd

Ffernant Dingle
Graig Fawr
Graig Fechan Quarry
Graig Quarry
Prestatyn Hillside
Ty'n Llanfair

LOST AND FOUND

COMPILED BY MICHAEL A. TAYLOR

Enquiries and information, please, to Michael Taylor (Leicestershire Museums, 96 New Walk, Leicester LE1 6TD). Please give full personal and institutional names and addresses, full biographical details of any publications mentioned, and credits of any illustrations submitted.

The latest index to 'Lost and Found' was published in the Geological Curator 5(2), pp.79-85.

Abbreviations

CHALMERS-HUNT - Chalmers-Hunt, J. M. 1976. Natural history auctions 1700-1972. Sotheby Parke Bernet, London.

CLEEVELY - Cleevely, R. J. 1983. World palaeontological collections. British Museum (Natural History) and Mansell Publishing Company, London,

GCG - Newsletter of the Geological Curators' Group, continued as the Geological Curator.

LF - 'Lost and Found' reference number in GCG.

202 Orford Castle Crag Fossils, Suffolk

Philip Cambridge (258 Bluebell Road, Norwich, Norfolk NR4 7LW) writes:

'In looking through several old collections in museums, I came across Crag shells labelled 'Orford Castle'. The material was very well preserved but presented a problem. Clearly the shells etc. included some from the Coralline Crag and some Red Crag, but the Castle rests on the 'Rock Bed' facies of the Coralline Crag with no shells and there is no Red Crag in the immediate area. My first ideas were that the printed labels were used by a dealer who was including material from a number of sites under one false label. Careful determination of the species suggested the presence of Coralline Crag shells, many of which are not readily available from present day exposures, and Red Crag material from both the 'Waltonian' and 'Butleyan' stages of F. W. Harmer.

Later I was able to see a letter from Charlesworth [i.e. Edward Charlesworth (1813-1893): see Cleevely, p.81] offering for sale material from Orford Castle 'or more properly from Boyton Marshes across the river'. This suggested that the material was from the old 'coprolite' workings, where layers of Red and Coralline Crag were dug in shallow trenches just below the water table, the material sieved for phosphate nodules and mixed in the process. This caused F. W. Harmer to assume that at Boyton there were beds intermediate in age between the Red and Coralline Crags, which contained a mixture of

species typical of both formations. Later he acknowledged his error and deleted his 'Boytonian' stage from subsequent tables. The presence of some species, apparently characteristic Waltonian forms, is of special interest as this stage has been seen in situ only at the type site in Essex. This raises the possibility of two or more ages of Red Crag being present below the Boyton marshes. 'Butleyan' material was to be expected, as the distance is not very great from known exposures, but the presence of Waltonian was quite unexpected. Possibly Newbournian might also be present, which would be even more interesting as Harmer considered that nowhere were two or more of his stages of Red Crag known in superposition. The material seems too well preserved for any to be reworked from earlier beds into later.

The author would also be interested to hear of any museum with a number of species from the Bridlington Crag of Yorkshire and the Bracklesham Pleistocene material from Selsey. Little or no material is available from these deposits at the present day and both faunas deserve study. The exact age of the Bridlington beds has not been established, while the Selsey Beds formerly yielded definite Eemian species, probably the only British site for marine material of this age. It is possible that this came from a limited deposit which no longer exists.

203 William Jerome HARRISON (1845-1908)

Peter James (Birmingham Photographic Heritage Project, 7 School Road, Moseley, Birmingham B13 9ET) is trying to locate any photographic prints, geological or otherwise, taken by William J. Harrison, Curator-in-Chief at the Leicester Museum from 1872 to 1880. He has so far located a collection of about 600 negatives at the Birmingham Central Library and some prints given to Charles Lapworth at the University of Birmingham. This material can only represent a small fraction of the work of Harrison's photographic career, which spanned over 28 years.

204 British Association Collection of Photographs of Geological Interest

Peter James (Birmingham Photographic Heritage Project, 7 School Road, Moseley, Birmingham B13 9ET) is also trying to trace the whereabouts of the Collection of Photographs of Geological Interest amassed by the British Association for the Advancement of Science. This collection was initiated in 1890 (Geikie et al. 1891; see Fig.1 here) and was still growing as late as 1939. A Report and list of accessions appeared in the BA's Annual Report from 1890 to at least 1919, suggesting that the Collection contained at least 9,000 items.

Form A.			No. of Photo.*	
BRITISH ASSOCIATION COMMITTEE ON GEOLOGICAL PHOTOGRAPHS.				
County of		Photographed under the direction of		
Name and position of Locality or Section.		Society.		
Special features shown.				
Details of Section.		Height	Compass Direction.	'In shade' or 'direct light.'
		Length		Time: a.m. p.m.
Sketch, or other particulars, if necessary, may be given here :-				
Name of Photographer			Registered No.	
Address		Date photographed.		

* This Number should also be placed on the back of the Photograph.

Fig.1. Form for recording photographs accessioned to the Collection of Photographs of Geological Interest of the British Association for the Advancement of Science, from Geikie *et al.* (1891).

I would be very interested to hear of any collections bought in this way, and of any correspondence which might survive, and lists of species would also be useful. I would also be prepared to identify any material. Meanwhile, material with these labels should be suspected of including both Coralline and Red Crag material until studied - both can be safely labelled Pliocene.

Mr James is anxious to trace this collection as W. J. Harrison (LF 203, this issue) gave at least 250 prints, and because he has located a large quantity of documentary material relating to the collection. However, enquiries at Leicestershire Museums, the Geological Society, the British Geological Survey, the University of Birmingham and the Birmingham Museum have all failed to turn up any real leads. It appears that the collection was once housed in the Museum of Practical Geology in Jermyn Street (the predecessor of the Geological Museum, London) and may have been moved to Bristol University at one time. Can any GCG members help what would undoubtedly be an important archive for both geologists and historians of photography?

Geikie, A., Adamson, S. A., Bonney, T. G., Boyd Dawkins, W., Gray, W., Reid, A. S. and Jeffs, W. O. 1891. Report of the Committee consisting of ..., to arrange for the collection, preservation and systematic registration of photographs of geological interest in the United Kingdom. *Ann. Rep. Br. Ass. Advmt Sci.* 1890, 429-433.

205 Edward H. ROBERTSON

S. R. Howe (Department of Geology, National Museum of Wales, Cathays Park, Cardiff CF1 3NP) is seeking information on Edward H. Robertson of Woodville, Greenhouse Lane, Sheepscombe, Gloucestershire, and his collection of 'chalk sponge flints' and a manuscript book, which the museum holds.

The collection comprises some 350 sponge flints from the Chalk of Ventnor, Isle of Wight, some of which are cut and polished nodules as well as mounted slides. They were purchased from a Mrs Robertson, Painswick, near Stroud, Gloucestershire in April 1913 according to the Accessions card, although written labels with the same accession number in the drawers say that they were purchased from a Mrs L. F. Robinson, Woodville, Greenhouse, Lancashire. Presumably the Accessions card is correct.

Accompanying the collection is a 200 page, handwritten manuscript by Edward H. Robertson entitled: 'The Pebble-seeker: A popular account of sea-side pebbles. Where, when and how to collect them. Their history and nature of the objects preserved in them. Together with a description of the apparatus required in cutting and polishing them etc.'. The preface is dated Ventnor, March 1880 and one or two later inserted notes are dated 1896. From reading the book, Robertson had been collecting his 'pebbles' since about 1830, initially around Eastbourne and the Isle of Wight. Amongst florid descriptions of some of the places visited and how to keep one's eyes in good shape whilst collecting, he mentions other pebble collectors that he knew, including: Mr H. G. Conant of Sidmouth, Devon (who was also a monumental mason), Colonel C. L. Cox of Bexhill, Mr Richard West, High Street, Ventnor, Isle of Wight. The hand coloured plates to the manuscript illustrate specimens in the author's collection as well as those in the collections of Mr Jacob, Mr Harford and Mr West. As we can find no information relating to who Mr Robertson was and why this collection came to us in the first place, I wonder if anybody else has heard of him or any of his acquaintances who held collections?

The manuscript makes fascinating reading in parts and the following passage illustrates the type of prose used:

'Let me impress upon the amateur pebble-seeker the necessity of giving his eyes an occasional rest - they soon get fatigued with their unusual work, and will need rest long before the limbs. Occasionally, then, break off your delightful pursuit, and turning your eyes from the shingle, look for a few minutes upon the crested waves as they roll towards the shore - or cast them upwards to the lovely blue immensity - or watch the driving clouds and soaring seabirds - or let them rest a while upon the grateful verdure which clothes the cliff slopes, or caps its lofty summits - it will be a pleasant variation of your most pleasant occupation, and you will presently turn to it with renewed zest, and in a much better condition to continue your search.'

His quote about the labelling of specimens implies that he was not Museum orientated: 'If it be desired to label them at all, then labels should be gummed on the back of each stone.' If the drawings accompanying the text were done by him, then he was a superb artist. As well as the hand coloured plates there is a small book of magnificent black ink drawings.'

Section 1.—AGNOSTUS?

AGNOSTUS TRISECTUS.

PLATE I. FIG. 11.

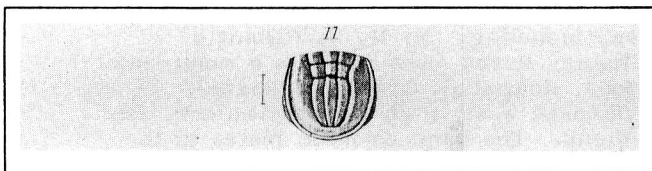
DIAGNOSIS. *A. caudâ subrotundâ inermi, axi longo trilobato, multi-segmentato. Axis fere percurrentis, latus, ad medium constrictus et tuberculatus, sulcisque longitudinalibus binis approximatis exaratus.*

Two specimens only have been sent to Mr. Tennant of this rare species. It is very like *A. princeps*, from which it differs, at first glance, by the central narrow ridge on the axis, running down throughout its whole length. It is, besides, apparently a flatter species, and has no trace of the posterior spines, but in their place a simple swelling of the margin on each side. This character is unusual.

It is a small species, the tail not being above a line and a half in diameter. It is about as broad as it is long, much rounded in outline, very slightly convex, but the flatness may perhaps be due to pressure. The axis is very broad, and the basal lobes—those next the thorax—are broader and longer than usual, and nearly equal and similar to the second lobe of the axis. The large terminal ovate lobe is longer than the other two put together. All three are deeply divided along the middle line by a pair of parallel furrows, which divides the axis into three strong lobes; hence the trivial name.

Locality and Geological Position.—UPPER LINGULA FLAGS. Black Shales of Whiteleaved Oak, Malvern. Probably not uncommon; it is a conspicuous species.

A



B

Fig.2. Original description (A) and figure (B) of one syntype of the trilobite *Lotagnostus trisectus*, from Salter (1864).

206 Cambridge Greensand vertebrate fossils

Dr Nicholas Fraser (University Museum of Zoology, Downing Street, Cambridge CB2 3EJ) is anxious to locate any fossil vertebrates from the Cretaceous Cambridge Greensand. During the late nineteenth century the so-called 'coprolite' mining in Cambridgeshire provided the basic material for the world's first chemical fertiliser. A vertebrate fauna recovered through the operations of this open-cast phosphate mining was described by Prof. Harry Govier Seeley in the 1860s. This remarkable fauna includes several pterosaurs, the earliest recorded hadrosaurian remains, an unusual armoured dinosaur, chelonians, plesiosaurs, ichthyosaurs and early birds.

Since Seeley's original studies, very little work has been done and details of existing material are sparse. The most extensive collection of these Cambridge Greensand vertebrates is held in the Sedgwick Museum, Cambridge, but other specimens have spread far and wide. A re-evaluation of the fauna and localities has been commissioned by the NCC. This is urgently required for fundamental research into this important vertebrate fauna. Any information concerning the geological formation, the constituent fauna and collections will be gratefully received.

207 *Lotagnostus trisectus* (Salter 1864) and the TENNANT collection

Adrian Rushton (British Geological Survey, Keyworth, Notts. NG12 5GG) is seeking the two syntype specimens of the trilobite *Lotagnostus trisectus* (Salter, 1864) from the Upper Lingula Flags of Whiteleaved Oak, Malvern, described as *Agnostus trisectus* by Salter (1864, pl.1, fig.11, p.10; reproduced as Fig.2 here). Salter mentioned two specimens 'sent to Mr Tennant' who lent them to Salter. The Survey have a sealing-wax cast of the figured specimen (GSM 8768), 4.5mm long and 5.0mm wide, and feebly convex, so that the Tennant specimen must be an external mould. 'Mr Tennant' was presumably James Tennant FGS (1808-1881), the well-known dealer and Professor of Mineralogy and Geology at King's College, London (Cleevely p.285).

Salter, J. W. 1864. [*Agnostus trisectus*.] Figures and descriptions illustrative of British organic remains. *Mem. geol. Surv. UK*, Decade 11, pl.1, fig.11, p.10.

208 *Didymograptus v. fractus* Salter, 1863 and the W. WEST collection

Adrian Rushton (British Geological Survey, Keyworth, Notts. NG12 5GG) is seeking a specimen of the graptolite *Didymograptus v. fractus* figured by Salter (1863, Fig.13e, p.137; pp138-139; reproduced as Fig.3 here) in an appendix to Harkness' paper on the Skiddaw Slates. The specimen was said to be in the collection of 'Mr W. West of Wimpole Street' but cannot be traced at the Sedgwick Museum, Cambridge, the British Museum (Natural History), Birmingham, Keyworth, Carlisle (Tully House) or Keswick (Fitz Park). Does anyone have any idea as to the location of the collection or indeed any information on Mr West himself?

Harkness, A. 1863. On the Skiddaw Slate Series. *Q. Jl. geol. Soc. Lond.* 19, 113-140.

209 Holotype of shark *Asterocanthus acutus* Agassiz, 1833-1844 in a former Bedford Museum

Rosemary Brind (Natural History Officer, Bedford Museum, Castle Lane, Bedford MK40 3XD) is seeking the distal half of a dorsal

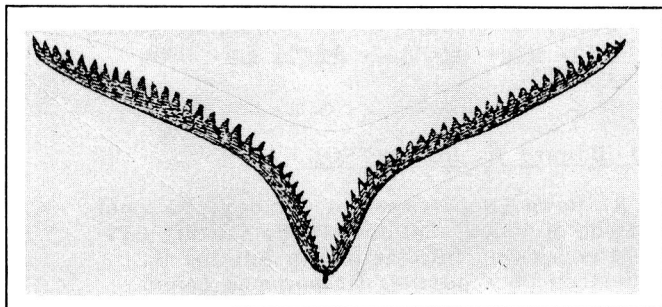


Fig.3. *Didymograptus v. fractus* from Salter in Harkness (1863). Reproduced at

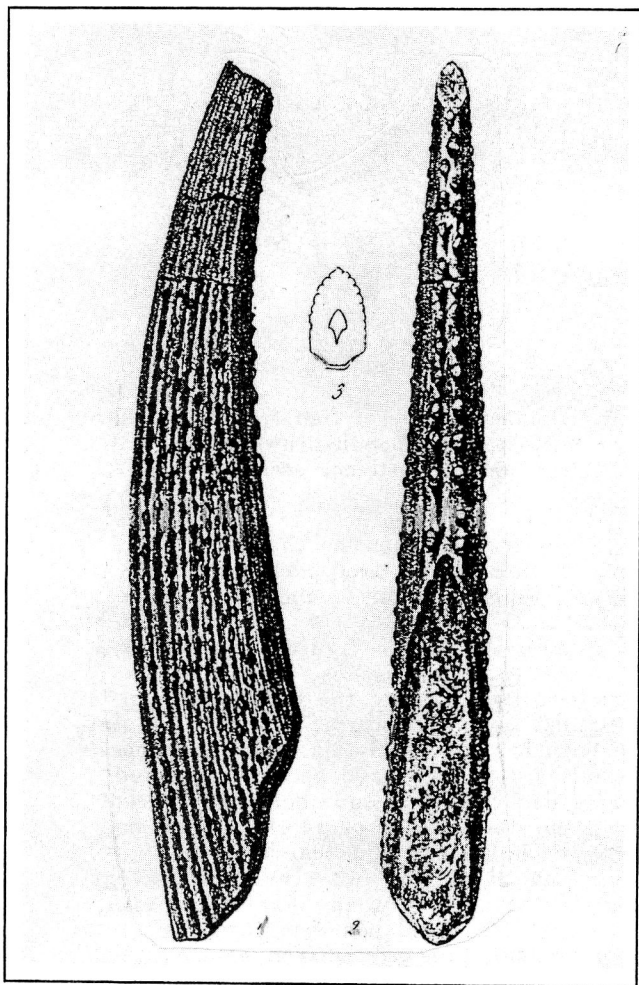


Fig.4. Fin spine and holotype specimen of the shark Asterocanthus acutus from the Cornbrash of Castle Miles, from Agassiz' Poissons fossiles

fin spine, the holotype species of the shark Asterocanthus acutus from the Cornbrash of Castle Miles on the banks of the Ouse near Bedford. It was figured and described by Louis Agassiz in his Poissons Fossiles (L.8, p.33; T.3, tab.8A, fig.1-3; reproduced here as Fig.4) when in a former Bedford Museum (and was drawn to Agassiz' attention by a Mr Goodhall) and it is mentioned by Morris (Catalogue of British Fossils 1854, p.317) and Woodward (Catalogue of fossil fishes in the British Museum (Natural History), part 1, 1884, p.313). However, there is no trace of it in the present collection. The spine (Fig.5) is about 11cm long, laterally compressed, and broken in two places.

Very little is known about any of the earlier Bedford Museums before the Bedford School Museum was founded towards the end of the last century.

210 Iguanodon claw bone and the former Ely Museums

Simon Timberlake (AMSSEE Travelling Geology Curator, Geological Museum, Exhibition Road, London SE7 2DE) is looking for a purported

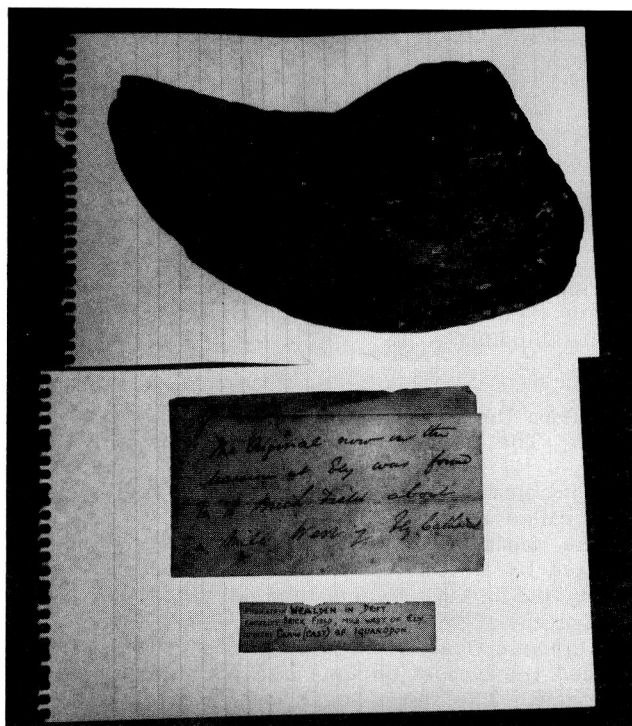


Fig.5. Plaster cast of Iguanodon claw bone at Wisbech and Fenland Museum from an original in a collection at Ely. Photograph by S. Timberlake.

claw bone of the dinosaur Iguanodon. He found the only existing record of this specimen, a cast now at the Wisbech and Fenland Museum with an accompanying label 'Wealden in Drift' and a note reading 'The original now in the museum at Ely was found in a brick field about a mile west of Ely Cathedral' (Fig.5). Whether or not the claimed identification and source horizon are correct, the original cannot now be traced at Ely. This is not surprising as the present Ely Museum is comparatively recent, with little continuity of collections and even less of records with its various precursors stretching back to the nineteenth century, while the presence of the cast at Wisbech suggests that the original could have reached Ely at any time since the late 1830s. The original was presumably disposed of, perhaps to another museum or collector, but has not been located in other Cambridgeshire museums or the BM(NH).

211 Juvenile ichthyosaur cast

Gaynor Boon (City Museum, Weston Park, Sheffield S10 2TP) would like to know the whereabouts of the original specimen of the cast of a young ichthyosaur illustrated here (Fig.6). It is 22 inches long and has no locality or horizon information.

212 Bone of fish Platax at Saffron Walden Museum

A fine pencil drawing in a glass-topped box (Fig.7) is all that remains in Saffron Walden Museum of a problematical bone of the fish

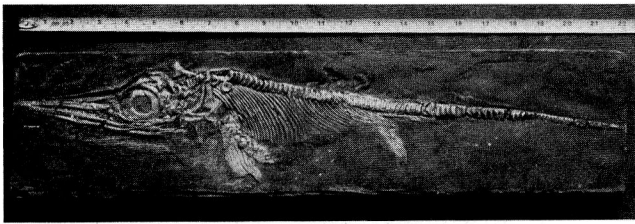


Fig.6. Replica of a juvenile ichthyosaur, original specimen unknown, 22 inches long. Photograph from G. Boon (Sheffield City Museum).

Platax from the Mammaliferous Crag of Suffolk. The manuscript catalogue records:

'61A. Problematical and highly curious fish bones, called by the diggers "Butterflies" from the Mammaliferous Crag, Southwold. Presented by E. Charlesworth [1813-1893; Cleevely, p.8]: says "when engaged in my early investigation of the Crag, a vein of Mammaliferous Crag in the Southwold Cliff produced these most curious and problematical fish bones. The three bones in the natural state are connected, but the attachment is not severed; of these two, one is in the Dover Museum, and the other in the cabinet of Mr McClean F. G. S. Great Yarmouth. The late Professor Agassiz figures these bones in his great work on Fossil Fishes and refers them to the Tropical genus Platax. Now the only bones that I can assign to the skeleton of Platax which affords any grounds for Agassiz' determination are vertical processes which have become severed from the body piece. Agassiz appears not to have known of these at

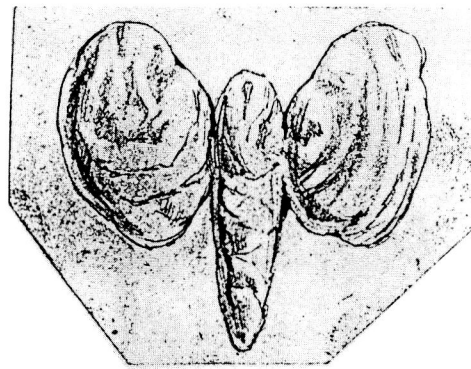


Fig.7. Abnormal bone of fish from the Crag of Suffolk, from pencil drawing in Saffron Walden Museum, scale unknown.

all, for he does not mention them. The supply of these bones from Southwold Cliff have long since come to an end".

The specimen is neither figured nor mentioned in Agassiz' Poissons fossiles, or in A. S. Woodward's Catalogue of the fossil fishes in the British Museum (Natural History). It may have been loaned out in Charlesworth's time. Alternatively, it may have become separated from its documentation and then disappeared during the dispersal of parts of the Saffron Walden collection in the 1960s. Simon Timberlake (AMSSEE Travelling Geology Curator, Geological Museum, Exhibition Road, London SW7 2DE) and Len Pole (Curator, Saffron Walden Museum, Saffron Walden, Suffolk) would like to find the bone.

NOTES AND NEWS

COMPILED BY MICHAEL A. TAYLOR

COLLECTIONS RESEARCH - IS THERE A MARKET?

Tim Riley (Sheffield City Museum) writes:

'The Register of Natural Science Collections in Yorkshire and Humberside was published in August 1987. It represents the culmination of eight years work by the members of the Yorkshire and Humberside Collections Research Unit, and contains 343 pages of catalogue arranged by collector's name, with indices to subject and associated collectors.

Surprisingly, of the 300 printed only a modest number have been sold after fourteen months. Very few have gone outside the Yorkshire and Humberside region, in spite of circulars sent out with BCG and GCG literature. Most of the museums in Britain with natural science curators do not have a copy. Overseas sales are nil.

What is the problem? Are we too parochial in outlook or too poor? Are we too busy or just disinterested? I would like to think that none are true, and that each museum with a practising naturalist would require this and the complimentary registers of the other collections research units.

Please support the collections research initiatives if you are able. The Yorkshire and Humberside Register is available for £19.00, plus postage and packing (£10.00 plus postage and packing to members of the Yorkshire and Humberside Council). Please send orders and enquiries to: Mrs J. Platt, Yorkshire and Humberside Museums Council, Farnley Hall, Hall Lane, Leeds LS12 5HA (tel. 0532 638909).

CHARGES AT THE BM(NH)

The British Museum (Natural History) introduced a new scale of admission charges on 2 November 1988. A major concession is that the ticket will apply to both the Natural History Museum and the Geological Museum, at a full rate of £2 with half rate for children, students, unemployed, registered disabled and members of the Museums Association/ICOM (but not GCG or BCG ...). There is a Family Ticket of £5 for up to two adults and four children, and an annual ticket (including also the Zoological Museum at Tring) has at last been introduced for £6 (£3 half and £15 family rates); nevertheless there is still no organised Friends' society on the model of the American Museum of Natural History, which issues the excellent colour monthly Natural History: an idea for the future, one would like to think?

Admission is free from 1630 till closing at 1800 (1700-1800 at weekends) and for children under five and pre-booked school

groups, while those visiting the Museum shops and the BGS Information Office will not need to pay charges.

Recent advertisements in New Scientist seemed to confirm fears that the BM(NH) was now charging even for public identifications, so Mike Taylor (Leicestershire Museums) wrote in for more details, including whether the BM(NH) also charged for identifications sent in by another museum on behalf of a member of the public. Robin Cocks, Keeper of Palaeontology, replied to the effect that the BM(NH) had always charged for commercial work since before the war, and that personal identifications (and presumably those sent in from other museums?) were still (within reason) free.

A SHELL ON SALE IN SINGAPORE

Many museums in the UK (and presumably elsewhere) will have received a remarkable circular from a Mr Lai Kong Jin of the 'Porya Chai Art and Literary Society (Established 1952) (Director: Mr Lai Kong Jin)' celebrating the Society's 36th anniversary by offering the opportunity of having some rich philanthropist purchase an 'ancient shell fossil', illustrated in colour, locality unspecified, and all of 50,000 years old. This specimen appears to be a tridacnid bivalve, about 12 inches long, and ochreous in colour; although I have heard one valuation at £10, it is up for auction in aid of an unspecified charity, at a price starting at US\$20,000 - and if you are the sale agent you get 10% commission on the net price. The price quoted for the fossil in 1981 was allegedly US\$15,000,000 - one presumes a misprint for 15,000. We doubt very much whether any British museums will put in for it, not least because the 'Society' appears in fact to share the same address as the 'Porya Chai Chinese Arts and Dynasty Crafts Co!

BM(NH) TRUSTEES

It was announced in November 1988 that the Prime Minister appointed Mrs Jennifer d'Abo (Chairman of Levelmill Investments Ltd and Roffey Brothers Ltd), Mr Denys Henderson (Chairman of ICI plc) and Professor Robert May (Royal Society Research Professor in the Department of Zoology, Oxford University and at Imperial College, London) to be Trustees of the British Museum (Natural History) for five years from 1 January 1989. The Prime Minister re-appointed Sir Walter Bodmer for a further period of five years from 1 January 1989 and he will serve as Chairman to the Board of Trustees.



Fig.1. Stan Wood's fossil shop in Cowgatehead, Edinburgh, Copyright Leicestershire Museums Service.

LIZZIE THE LIZARD

The World's oldest fossil reptile, more than 40 million years older than any fossil reptile on record, has been found in Scotland by Scotland's only commercial palaeontologist, Stan Wood.

The tiny reptile, which is approximately eight inches long, was found in March 1988 on a site in Southern Scotland. Dr Tim Smithson (Department of Zoology, University of Newcastle upon Tyne) has studied the fossil and estimated that it is around 340 million years old.

Stan Wood called the fossil 'Lizzie the Lizard' for it has still to be scientifically studied to ascertain its exact classification. Preliminary reconstructions show that it probably looked similar to a modern lizard, but this similarity is purely superficial. Lizzie's backbone, for instance, is different to other known reptiles and it is not yet known to which family it belongs.

Until this discovery, the oldest fossil reptile was dated at around 300 million years ago. The new find places reptiles firmly into the Lower Carboniferous.

The fossil reptile had a public launch at the Natural History Museum in London on 16 November 1988, with guest appearances from Drs Tim Smithson, Mike Benton (Queens University, Belfast) and Neil Chalmers (Director, Natural History Museum). Due to the worldwide interest and scientific value of this unique reptile it is likely to be sold by Stan Wood in early 1989 to a University or Museum somewhere in the world for a substantial sum.

MUSEUMS ALIVE!

Museums Alive!, a regionally based marketing initiative designed to complement the national celebrations of Museums Year in 1989, announced on 29 November 1988 the publication of the first ever Guide to Museums and Art Galleries of Yorkshire and Humberside. Produced with financial backing from the Museums and Galleries Commission, Yorkshire and Humberside Museums Council, English Tourist Board and Yorkshire and Humberside Tourist Board, the new Guide gives details of the 200 museums and art galleries in the region. It is available free from Yorkshire and Humberside Tourist Information Centres, museums, galleries and libraries. There is a short description of each museum with details of opening times and how to get there, and details of facilities for the disabled.

For your free copy of the guide write, enclosing a stamped addressed envelope, to: Delma Tomlin, Co-ordinator, Museums Alive!, c/o Yorkshire and Humberside Museums Council, Farnley Hall, Hall Lane, Leeds LS12 5HA.

BIRTHDAY CELEBRATION FOR COELACANTH

A special exhibition opened at the Natural History Museum on 22 December 1988 to celebrate the discovery of the first living coelacanth on 22 December 1938. The exhibition displays this extraordinary 'living' fossil' along with memorabilia, models and a chronological record from before the discovery of the living fish to our present knowledge. Also included is a section of remarkable film of coelacanths in their natural habitat.

Until the discovery of a living specimen in 1938, coelacanths were thought to have been extinct for more than 80 million years. It was not until fourteen years later that a second coelacanth was found, enabling scientists to study their lifestyle, anatomy and physiology.

Dr Humphry Greenwood of the BM(NH), who has had a lifelong interest in these fishes said: 'The coelacanth is of great interest. It is the only living representative of a group we can trace back 400 million years whose characteristics have hardly changed. Coelacanths were once widespread throughout most of the world but are only found today in one restricted area around the Comoro Islands in the Indian Ocean. Sadly, they are now in

danger of extinction brought about by a combination of modern fishing methods, tourist trade and illegal specimens for museums. Unless concentrated efforts are made to protect them the next fifty years may well see the disappearance of a very ancient lineage.'

A booklet by Dr Greenwood entitled Latimeria chalumnae - a 'living fossil' was published on 22 December 1988 by the BM(NH) (available from the Museum shop, price 95p).

NEWS FROM AYLESBURY

Kate Rowlands (Keeper of Biology and Geology, Buckinghamshire County Museum, Church Street, Aylesbury HP20 2QP) writes:

Much is happening at Buckinghamshire County Museum during 1989. At the end of March we are going to close most of the Museum buildings to the public. This may seem a perverse thing to do during Museums Year, but has really come about through circumstances which made a decision unavoidable.

The County Museum is housed in a group of buildings dating from the fifteenth through to the nineteenth century. It has been known for some time that parts of the buildings badly needed repair, but a survey in 1988 revealed that the situation was becoming dangerous and that urgent extensive structural repairs were needed even to meet the terms of our lease of the buildings from Buckinghamshire Archaeological Society. Accommodating the public galleries, staff, workshops and stores on the premises while very disruptive building work goes on was too problematical. The alternative was to move the Museum and its staff out of the buildings to temporary accommodation, and this is now the preferred option.

The work is expected to take three and a half years, during which time all buildings except the one housing the Aylesbury Gallery and Temporary Exhibition Gallery will be closed to the public. The County Museum Service will still function in its temporary home at Halton, six miles south of Aylesbury, using the closure period as an opportunity to concentrate on curating the collections, preparing new gallery displays, and planning new ventures for when we move back into the renovated buildings.

There is much work to be done. Just how much is highlighted in two reports on the County Museum Service completed in 1988. Over the next few years our efforts to bring the Museum up to rigorous modern standards will largely be directed by the recommendations made in these two reports. One was a comprehensive appraisal conducted by the newly-appointed County Museums Officer, Colin Dawes, and the other a report of a Major Project carried out by AMSSEE (nicknamed 'White Tornado'). AMSSEE contributed £10,000 to this project, the largest single grant

ever given to one museum. During the summer and autumn of 1988 a series of advisory visits, expert assessments and seminars were concentrated on Aylesbury, partly in order to help the Museum overcome its problems and partly as a training exercise for all those involved. One of our advisors was Simon Timberlake, AMSSEE's travelling geology curator, who went through the geology collections very thoroughly and produced a constructive report detailing areas which need attention and advising about conservation techniques. He also provided much appreciated tips for packing up and moving the geological material to our temporary premises.

There is no intention of 'going underground' while the public galleries are closed. Travelling displays will be sent out to locations throughout Buckinghamshire, and we will still organise exhibitions for the Temporary Exhibition Gallery back at the Museum. There will be Museum newsletters and events, and the staff will still answer enquiries, operate the records centre and welcome researchers.

Two other developments during 1988 bode well for geology at Buckinghamshire County Museum. Towards the end of the year the County Council made the appointment of an Environmental Records Assistant high priority for its 1989/90 budget and it now looks very likely that the post will be established. This will free the Keeper of Biology and Geology to devote more time to the geological collections while allowing development of a more efficient Environmental Records Centre (i.e. biological and geological records). It is not the geological curator post we need, but in these days of cash limits it is some progress. It does not mean that we have stopped trying for a geologist for the permanent staff.

The other plus was obtaining grant aid towards a geological sites survey for four and a half months from July to December 1988. In spite of this short time available for the survey work, 128 sites were visited, covering most of the 'permanent' exposures in Buckinghamshire. This was undoubtedly a result of employing a geologist with considerable experience of the local area. A finite project like this raises questions about continuity and eventual interpretation of the records when there is no trained geologist based permanently at the Museum. However, the present Keeper of Biology and Geology does not work in a vacuum! Up-to-date site records ease communication with outside geologists, and certainly help when it comes to answering enquiries. Contacts made during the survey have also enabled us to identify many outside sources of advice and practical help.

Should GCG members or officers have any particular concerns about the developments at the Museum, I (or the County Museums Officer) will be pleased to answer queries.

SPECIMEN CONSERVATION IN SCOTLAND

The Scottish Museums Council launched A conservation survey of museum collections in Scotland on Wednesday 25 January 1989. It is the result of a major two-year survey of conservation in the museums of Scotland.

The project began in 1986 with the aid of a generous grant from the J. Paul Getty Trust. The 124 page report, produced by Project Co-ordinator Brian Ramer, working to a management committee of specialist advisers, is a lucid and informative distillation of a huge amount of data, incorporating a large number of tables and figures to illustrate the most important statistical findings. This study of local museum collections is certainly the first of its kind on this scale to be published in the U. K., and as a nationwide survey of this depth is probably of unique worldwide significance.

The aims of the project were:

1, to assess and quantify the extent of conservation needs of local museum and gallery collections throughout Scotland; 2, to provide an objective basis and recommendations for long-term planning of conservation provision; and 3, to provide information to encourage central and local government and the private sector to make adequate resources available to meet the country's conservation needs. Data used in compiling the report was obtained from questionnaires and 168 collections surveys as well as from existing sources. Chris Collins and Mike Taylor (Leicestershire Museums) carried out the geological side (see Geol. Curator, 5, pp.86-87).

Among the principal findings are: 1, planned programmes of conservation are not well established; 2, a vast amount of remedial conservation work needs to be done, particularly in fields in which there is a dearth of expertise in Scotland; 3, one fifth of museums surveyed have made no inventories of their collections; 4, the use of untrained and inadequately supervised labour to undertake conservation and restoration work on museum collections is widespread; 5, storage conditions for collections are, in general, in serious need of improvement, but are frequently neglected in favour of display areas; 6, inappropriate

environmental conditions, biodeterioration and bad handling are ubiquitous causes of damage; 7, more training in the care of collections is needed for all museum staff to heighten their awareness of conservation; and 8, it is estimated that less than 4% of museums' gross expenditure is allocated to conservation.

Recommendations stemming from these and other more detailed findings are made in the Report. It is hoped these will create the impetus for future development of conservation, both remedial and preventative, on a nationwide basis. The report is being published for the Scottish Museums Council by HMSO.

REVOLUTIONS IN SCIENCE 1789-1989

Professor Stephen Jay Gould, of the Museum of Comparative Zoology, Harvard University, will lecture on 'The basis of Darwin's Revolution in thought', in a special public lecture to mark the exhibition 'Revolutions in Science 1789-1989', organised by the Institute of Advanced Studies in Humanities, University of Edinburgh. The lecture will be held on Wednesday 10 May 1989 in the Royal Museum of Scotland lecture theatre (entry from Lothian Street), at 7.30pm. Dr Euan N. K. Clarkson will lecture in the same series on 'The origin of species, 130 years after Darwin', at 3.30pm on 6 June 1989, same venue.

Futher information can be obtained from Dr W. D. Ian Rolfe, Keeper of Geology, Royal Museum of Scotland, Chambers Street, Edinburgh EH1 1JF (tel. 031 225 7534).

ERRATUM

Michael Taylor (Perth Museum and Art Gallery) points out a correction to 'Festival Times in Edinburgh' (Geol. Curator, 4, p.576).

'Hotbed of Genius' was an Edinburgh University exhibition and nothing to do with the Royal Museum of Scotland which was otherwise engaged with 'The Enterprising Scot'. Unlike 'Hotbed of Genius' which was well received, 'The Enterprising Scot' went down like a lead balloon; no-one in the museum world reviewed it.

BOOK REVIEWS

Association of Teachers of Geology. [no date] Science of the Earth: Unit 2, Earthquakes; Unit 4, Building sedimentary structures; Unit 5, Waste. Association of Teachers of Geology [Sheffield]. Price £1.50 per unit (also available on sale or return at a special trade discount price of £1.00) from Ms Fran Stratton, 'Sandbourne', Clophill Road, Maulden, Beds. MK45 2AA.

These three examples are from a proposed set of complete, self-contained units. Eight have been produced to date, edited by two ATG members (Peter Kennett and Chris King) who are, of course, experienced teachers. Individual units, although anonymous, are apparently also written by teachers, with assistance from academic and industrial geologists.

All the units are written to a common format. Each consists of teachers' sheets, colour coded and numbered student sheets, and supplementary data sheets. As with many publications produced by teachers for teachers, copyright on original material contained in the units is very sensibly waived. If I were a teacher faced with a class of GCSE students I would welcome these booklets. Indeed, they not only fit in well with the syllabus requirements but are interesting enough to be used on their own with non-exam groups or even non-school clubs.

Everything has been thought of and the level of planning is high. For example, each unit begins with a panel listing the time needed (generally four to six 40 minute periods, the intended use (GCSE or 'A' level), the unit's aims and lastly the requirements (including simple, easily obtainable equipment for kitchen table experiments). Some users might find such comprehensiveness of planning a bit restricting, while the markedly informal style of the students' pages does not always match the subject matter. Perhaps it is better for the teacher to make the jokes, leaving the work sheets to speak for themselves as solid information, questions and answers. Also, efforts to formalise the language sometimes leads to imprecise explanation: from Unit 2 for example, 'When rocks in the crust are put under pressure, they accept that pressure until they can hold no more and then break. It is rather like blowing up a balloon until it bursts.'

Unit 4 fulfills a need expressed by teachers for years and is satisfyingly solid, well organised and full of information and project work. It needs three double periods plus homework (for students and teacher, no doubt!) for completion. Unit 5 is visually the best so far, with a higher standard of presentation, typography and illustration. In all the copies seen, unfortunately, the xerographic printing is sometimes uneven and is unable to cope adequately with half-tone illustrations.

At this price, no teacher can really afford not to buy a set, if only to copy pages as invited, to pinch the good ideas and to support the venture. All in all this is a series to be recommended to teachers, museum education staff and to curators with an interest in the educational aspect of our work.

The eight so far published by ATG (with the generous support of the Geologists' Association) are:

- Unit 1: Will my gravestone last?
- Unit 2: Earthquakes - danger beneath our feet
- Unit 3: Fluorite - is it worth mining?
- Unit 4: Building sedimentary structures - in the laboratory and millions of years ago
- Unit 5: Waste - and the hole-in-the-ground problem
- Unit 6: Nuclear waste - the way forward
- Unit 7: Neighbourhood Stone Watch
- Unit 8: Moving ground

Units in course of preparation are:

Astrogeology; Groundwater supplies; Who's for a hot tight squeeze in inner space?; The Water Cycle; Rock Power; Volcanoes; Cool it!; Roadstone; The Earth's patchwork crust; Geological Time; Salt.

J. G. Martin
Leicestershire Museums, Arts & Records Service
96 New Walk
Leicester LE1 6TD

11 October 1988

Woodward, C. M. and Harding, R. 1987. Gemstones. British Museum (Natural History), London 60pp. ISBN 0 565 01011 5. Price £4.95.

This excellent little book of only 60 pages sets out to take its readers through an aesthetic and eminently readable factual account of what gemmology is all about - and succeeds. While the purists might have little time for the lapidary aspects of mineralogy, they must admit that gems have a fascination, rooted in history and folklore, and cut stones are a desirable feature in a geological collection. This new publication can only enhance a better understanding of gemstones.

The book is divided into over twenty lavishly illustrated sections, each with accurately coloured plates. The first ten deal with gems in history, their rarity and what constitutes a gemstone. Each specific physical feature, such as colour, is then examined, and finally, how these physical attributes are used by lapidarists.

The text is illustrated with high quality line diagrams, which are models in their own

right. For example, the section on crystal structure represents a breakthrough in the graphics of crystallography, cleverly demonstrating how the atomic structure determines both external symmetry and cleavage. (It is unfortunate that the authors fail to state that Kunzite, a variety of spodumene, obeys monoclinic symmetry.) Similarly, the diagram explaining the cause of the harlequin play of colours in precious opal makes for easier understanding of the phenomenon.

For demonstration purposes, in the lapidary section, the authors illustrate the stages employed by the gem cutter in the production of a brilliant-cut diamond, how each cut is made to produce the maximum 'fire' for which diamond is so highly prized.

The following sixteen sections deal with a selection of minerals commonly used as gemstones, commencing with diamond and ending with the feldspars. Each section is again beautifully illustrated with coloured plates of both natural and cut stones, accompanied by an outline of the history of mining of each species, its principal sources and geological setting. An invaluable complement to each section is a table setting out the essential physical features of each species. The identical format of the tables makes for quick and easy reference.

The above sections are followed by one on materials suitable for carving, including 'Blue John' fluorite, malachite, serpentine and rhodochrosite. Some of the lesser known gemstones, under the title 'Gems for Collectors', are described and illustrated, including the more recently famous ones, taaffeite and tanzanite. It is unfortunate that the authors had to limit the number of specimens described, and so have been unable to describe less competent species which, nevertheless, make superb cabinet gems.

Organic materials used throughout history to produce jewellery are not forgotten and the authors have included amber, jet, coral and pearls, in the final section on species.

The techniques used to produce synthetic gems are then ably described and some of the ways they may (fortunately) be identified, are given. This is followed naturally by a section which examines the inclusions that may occur in natural stones and how they may be used to distinguish the latter from their synthetic equivalents. To complement these last two sections there is one on the identification techniques used by gemmologists, especially in the use of spectrometers and refractometers. Another valuable section is that describing the origin of gemstones and in which environment they are likely to be found. The quality of the composite text figures which accompanies this section is outstanding, as is that illustrating the technique of mining a kimberlite 'pipe'. The atlas showing the distribution of gem deposits worldwide is perhaps the least successful aspect of the book.

The book closes with some beautifully illustrated and historical descriptions of world famous gems, including the Hope Diamond, the Canning Jewell, and five outstanding gems selected from the Gem Collections of the National Museum of Natural History in Washington, D. C.

This remarkable little book, with its wealth of beautiful plates and its easily digestible and accurate facts, may be thoroughly recommended to all curators whatever their specialist interest. It should inspire them to give their own gem collection an airing and enhance their understanding of such a collection. It is a book which warrants a place on every curator's book shelves and, for its cost, an additional copy would grace any coffee table in the common room or at home.

R. J. King
The John Moore Museum
41 Church Street
Tewksbury GL20 5SN

7 March 1988

Battat plastic skeleton models:
Brachiosaurus, Brontosaurus, Stegosaurus and mammoth, £2.00 wholesale; Pterosaur, £2.25 wholesale (no fixed retail price, no constant scale). Imported by Dominion Toys Ltd., Unit 3, Richmar Estate, Butts Pond, Sturminster Newton, Dorset DT10 1AZ.

The Battat range of 'experiments' for children includes, amongst the Junior Microscopes and Sun Energy Turbines, a selection of slot-together wooden skeletons of extinct animals and now several injection-moulded three-dimensional skeleton assembly kits. We recently made up samples for possible sale and display in the Museum shop, Leicestershire Museum, New Walk, Leicester. Our verdict: mostly good, but badly let down by their presentation.

The Brachiosaurus, Brontosaurus and Stegosaurus snap together to give realistic models without glaring errors (Fig.1). The neck of Brachiosaurus is particularly good. We would be a little wary of letting a small child play with the sharp tail spines of the Stegosaurus, and more concerned with the assembly of the Brontosaurus' neck: this involves forcing plastic vertebrae down a metal rod, which could gash a slipped hand. None of them are really suitable for museum display but they could be handy for schools and demonstrations.

The poor mammoth suffers from a badly fitting head which has to be stuck together with the unspecified [actually polystyrene] glue illustrated in the parts list but not provided! Too much carving is needed to get the thing to fit together, which is a shame as it could have been a very pleasing model.

The Pterosaur is actually a rather splendid glider, with a wingspan of almost two feet and realistically flexible wing membranes of

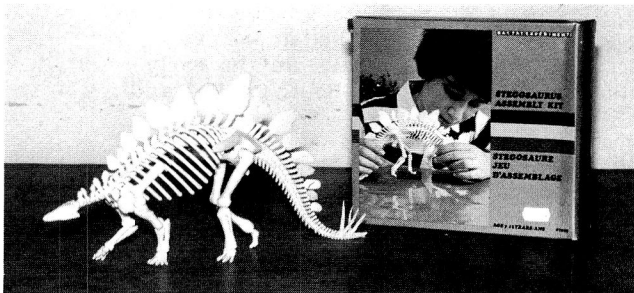


Fig.1. Plastic Stegosaurus skeleton kit from Battat.

printed polythene on a robust plastic skeleton. Like any other model aircraft, the wing and tail have been enlarged above strict scale sizes. This does not detract from the appearance, which drew our Deputy Director to carry out the flight testing on the lawn outside the Museum.

We were not impressed with the instructions. They are poorly drawn, badly translated from (we think) Japanese, and do not always make clear which side is which (partly alleviated by the use of keyed pegs and sockets). As for educational information, we are told the Brachiosaurus 'lived in lakes and swamps' and Brontosaurus 'was a gentle reptile with unstable temperature'. So much for nearly twenty years of research, all very widely popularised, on sauropod palaeoecology and inertial homiothermy. Furthermore, a somewhat androgynous humanoid and a couple of huge ammonites decorate the Brachiosaurus' scenic display base. Bring back Owen's marine Cetiosaurus, Fred Flintstone and Raquel Welch! Fortunately there are enough dinosaur books around to correct any misapprehensions.

Nor did we like the packaging: the blurb obviously applies to every 'experiment' in the range, and the recommended age groups are wildly optimistic. The four ground-living beasts are said to be for those aged from seven to twelve, but the seven-year-old would struggle badly where a twelve-year-old would have little difficulty. We were even more surprised by the Pterosaurus' box, which gives an age range of five to ten. There is no way the average five-year-old would have the dexterity to make up the skeleton, still less cut out and punch holes in the polythene wing membranes.

We now sell them all at Leicester, except the mammoth. They seem to be popular. Nevertheless, the older wooden slot-togethers still go well, presumably because they appeal to different clienteles. One word of warning: don't order too many at once if you are short of space, as the plastic kit boxes take up several times the room of the flat-packed wooden kits.

Kate Pontin, Arthur Cruickshank and Mike Taylor
Leicestershire Museums, Arts and Records Service
96 New Walk
Leicester LE1 6TD

Knell, S. J. 1988. The natural history of the Frodingham Ironstone. Scunthorpe Borough Museum and Art Gallery, Scunthorpe, 24pp. ISBN 0 947777 10 5. Price £1.25.

This book is obviously designed to accompany 'The Ammonite Armada' exhibition which Scunthorpe Museum has mounted. I have seen the exhibition but the following comments refer only to the book, which stands up quite adequately in isolation.

The book itself is A5 size, has a floppy, full-colour cover showing ammonites, belemnites and other organisms swimming about in an artist's rendering of the Jurassic sea. The text is neatly laid out, the line drawings - though sketchy - are clear enough, and the black and white photographs (four of geologists, fifty-seven of fossils) are sharp and well printed. I have not spotted any errors, apart from the two corrected by errata.

The Frodingham Ironstone has been famous since Canon John Cross read his paper on 'The Geology of West Lincolnshire' to the Geological Society of London in 1874. By the end of the century this Lower Jurassic ironstone had been so heavily exploited for iron and steel production that the geologists Samuel Cutts, Alexander Cobban, A. C. Dalton and Harold Dudley were prompted to establish Scunthorpe Museum, to record the threatened species of the area. No doubt many of the fossils figured in this book were collected by these geologists.

The bulk of the book is, naturally enough, an account of the fossils of the Frodingham Ironstone, which are mainly molluscs with some echinoderms, brachiopods, vertebrates and wood. Trace fossils are also abundant. There is a short historical and geological introduction, and a very sensible note on the last page about how to collect responsibly and how to care for your collection, plus a bibliography. I feel sure most people who buy this book will find its main use to be as an identification guide for which purpose I cannot fault it. I especially liked the frank statement that some of the ammonite genera 'look similar and even the experts have difficulty distinguishing between them'.

It is hard for a geologist curator not to be critical of the work of other geological curators. I have no need to chastise myself for nit-picking in the case of this little book, however, because I think it is excellent in all respects and superb value for money. It will be a first class introduction for people new to the fascination of fossils.

Gordon Chancellor
Peterborough Museum and Art Gallery
Priestgate, Peterborough PE1 1LF

30 January 1989

Benton, M. 1988. Dinosaurs, an A-Z guide. Kingfisher, London, 176pp. ISBN 0-86272-385-X. Price £7.95.

There have been so many books written about dinosaurs that any author knowledgeable about the subject must wrack his brains for a different way to present this popular group of animals. An alphabetical guide, from Abelisaurus to Zephyrosaurus, has been chosen by Dr Benton for his latest offering. With its two editors, three illustrators, designer and picture researcher, it gives the impression of being one of an ongoing series, although I gather this is not the case.

The introductory section covers the fossil time chart, classifying dinosaurs, their discovery and some famous collectors, but does not describe or define these animals, or give any information about their biology. (The curious child who picks up on the information, on p.156, that the theropods includes the birds, might feel the lack of basic information to place reptiles, birds and dinosaurs into context.)

Twelve suborders and some 130 dinosaur genera are then introduced alphabetically, with a page or so for each entry. This means that while the text continually stresses the relationships and classification of the dinosaurs, related animals are spread out in a random fashion, so that to read about the sauropods, for instance, means referring to sixteen different pages. The whole book gives the feeling that those concerned realised that this arrangement was not going to work, and lost interest.

If you look up a dinosaur, to read about the group it belongs to you have to identify the colour of a small silhouette and turn back to p.16 to check with a colour code, which will then tell you what suborder to look up back in the main body of the text. This is a clumsy way to cross-reference the entries (made worse by the fact that, in the colour code the Ornithomimosauria has been given the wrong colour).

The standard of the text throughout is very variable. Some of the text is oversimplified until it no longer says what the author meant; for example, the long-tailed Struthiomimus is described as being 'shaped just like an ostrich, but without feathers'.

Of Cetiosaurus we read 'its massive backbone was solid', while 'Hypsilophodon was as common as (sheep and goats) in the early Cretaceous forests of the South of England'.

The many illustrations, by Jim Channell and Kevin Maddison, are pleasing, but several do not correspond with the text. Gallimimus is described as having a 'long snout with a broad flat end' but is shown with a chicken-like pointed beak. The text of Apatosaurus tells us the experts now know that it had a long skull like Diplodocus, yet the illustration has a short head like Camerosaurus. What worries me most, however, is an evolutionary diagram of the Segnosauria which shows quite clearly that this group formed in the Cretaceous by the joining of two lineages, one of which arose in the Triassic from the early Saurischia and the other, at the beginning of the Jurassic, from the Ornithischia.

Only the introduction is actually indexed, most of the entries in the index being merely the list of animals and suborders which are of course already arranged alphabetically in the book. The information on dinosaur biology given under different genera is not indexed, so there are no entries for 'eggs', 'reproduction' or 'baby dinosaurs' although these subjects are included in Hypselosaurus, Maiaasaura, Mussaurus and Protoceratops. Teeth (Indosuchus) and stomach pebbles (Massospondylus) are similarly 'lost' in the text, as are dinosaur common names, such as 'duckbill' or 'bonehead'. Due to the layout, the book cannot be read as a continuing text, so much of the interesting information will only be found by random dipping.

The book is physically well produced, with clear type and good page layout, but seems to have lacked any control by the author and editors beyond the first draft. I ended up with a long list of obvious errors and inconsistencies, and a feeling of sadness that this may be a child's first introduction to the world of science. It may be of use as a picture book for younger children, but it does not justify its cover description as an encyclopaedia.

Barbara J. Pyrah
Dunnington, York

22 February 1989

EXHIBITION REVIEW

[Film sequence with voice over]

PRESENTER : And for our final item, we are visiting the 'Great Sea Dragons' exhibition which is on show at Bristol Museum until 15 October 1989.

At the entrance, panels introduce the visitor to ichthyosaurs, plesiosaurs and pliosaurs and explain that the exhibition is in four sections.

The first section is devoted to *Liopleurodon* - the 'Westbury Pliosaur'. In the main display, sections of the skull are strewn across a simulated quarry floor covered with Kimmeridge Clay debris. The photomural background shows the quarry in 1980 when the skull was being excavated. Alongside the display is a small video-theatre showing an 8-minute film telling the story of the skull's discovery, excavation and preparation for display.

The second section 'The Life of Sea Dragons' contains specimens of both ichthyosaurs and plesiosaurs with text panels on their life styles. A case at the end 'What did they eat?' has models of ammonites and belemnites, together with their fossil equivalents. Here too is a computer game 'So you want to be a fossil' imported from the 'Ammonite Armada' exhibition at Scunthorpe Museum.

The third section 'Dragon People' tells the story of the Bristol Institution, forerunner of the City Museum, and of the scientists who contributed specimens to it. Life-size photographs of two complete plesiosaur skeletons, displayed in the pre-war gallery and destroyed in 1940 during the Bristol blitz, form a background mural.

The Charmouth Ichthyosaur forms the fourth section climax to the exhibition. The 7.5 metre skeleton was excavated from the Dorset cliffs by David Sole, and has been mounted for display on an angled fibreglass base so that the individual bones can be removed for study or treatment.

The exhibition ends with a video unit showing archive colour film of the Museum and the surrounding area immediately after the 1940 blitz. A supporting text panel emphasises the losses which the geological collections suffered.

[End film sequence]

PRESENTER : As usual we have asked both a critic and a curator to review the exhibition. Your reactions, gentlemen. Do you see this as Bristol Museum's answer to Cardiff's Chinese dinosaurs?

CURATOR : Yes, and a very effective one. You could even say that it scores over Cardiff in that both the star exhibits come from Bristol's own collections. The Westbury Pliosaur and Charmouth Ichthyosaur make

stunning centrepieces and have been superbly prepared and mounted for display by David Hill. But apart from these, Peter Crowther and his team have assembled a supporting cast of more than twenty fossil skeletons, including seven of the Bath specimens normally in store at the National Museum of Wales.

The back-up material is almost as impressive. The life-size murals showing complete skeletons in action - swimming, leaping, seizing their prey - are marvellously effective although they must have been a curatorial nightmare to design.

I was also pleased to see that the video film on the Westbury Pliosaur produced by Sue Swansborough stressed the enormous amount of work undertaken between the first discovery of such a fossil and its eventual appearance in a museum display.

The Bristol staff can be proud of their achievement although it is probably fair to say that some sections of the exhibition work better than others.

CRITIC : That's putting it mildly! Surely only the first and fourth sections are unqualified successes. Section 2 is likely to confuse visitors by dealing with both ichthyosaurs and plesiosaurs, and section 3 is simply misconceived.

Looking at the exhibition as it stands, it seems clear that the organisers would have been better advised to deal separately with pliosaurs, plesiosaurs and ichthyosaurs in the three main exhibition areas, and to restrict the historical material to a short final section. Illustrations of the Bristol Institute and the pre-war Museum gallery could serve as an introduction to the wartime film sequence, and bring out the fundamental points which, at the moment, are submerged in a sea of text.



Fig.1. The Westbury Pliosaur skull, one of the 'stars' of 'The Great Sea Dragons' at Bristol City Museum & Art Gallery.

CURATOR : Well of course it is easy to be wise after the event. You are overlooking the crucial fact that the Charmouth Ichthyosaur was only added to the exhibition at a late stage. Indeed it was because the 'Sea Dragons' exhibition was being actively planned, that Bristol Museum was offered first refusal on its purchase in February 1988. It was another four months before Bristol's 'Sea Dragon' Appeal successfully raised the £27,000 asking price. Without the skeleton, the balance of the exhibition would have been very different and the historical section might have assumed much greater importance. And you can hardly blame the staff if they were reluctant to ditch all their carefully researched historical material just a few months before the opening!

CRITIC : No-one is suggesting that it should all have gone, but there are nine text-panels in that section, most of which are expendable. Anyway you are the one who is always rabbiting on about how your illustrious predecessor whose name escapes me ...

CURATOR : Douglas Allan

CRITIC : ... once told you that potted biographies of Victorian scientists are better omitted from gallery displays because length of beard is more apparent than breadth of vision. Surely this is a case in point. Is anyone likely to read a 200-word text on Joseph Channing Pierce when the Charmouth Ichthyosaur is already in sight? And what about the other fossils displayed in this section, how do they fit in?

CURATOR : Obviously they are the specimens which were collected by these eminent scientists in the nineteenth century.

CRITIC : It may have been obvious to you, but would it be so apparent to the public? Could

you find any statement relating the fossils to the collectors?

CURATOR : I'm sure it was there somewhere. There just wasn't enough time to read all the text.

CRITIC : My point exactly. You were there for two hours and didn't manage to read all the text. What chance would a parent trying to answer the kids' questions have?

CURATOR : That problem probably wouldn't arise. Surely you noticed that the exhibition was so laid out that you could go straight from section 2 to section 4, bypassing section 3 completely. Visitors who wanted to concentrate on the large, spectacular exhibits could simply give the historical section a miss.

PRESENTER : Time is running out for us too. Your final thoughts please.

CURATOR : Apart from the star exhibits, the specimen which had the biggest impact was the 3-dimensional ichthyosaur skull loaned by David Sole. I suspect that subconsciously I had always equated ichthyosaurs with dolphins - essentially benign animals unless you had the misfortune to be a fish. This metre-long skull with its ferocious array of teeth showed the ichthyosaur in a very different light.

CRITIC : I agree that the exhibition's good points far outweigh the bad. What a pity then, that such a sure-fire crowd-puller is only scheduled to run for a few months.

PRESENTER : And that concludes this week's programme. Next week we shall be going Clean Round the Bend at the V & A with a visit to the exhibition sponsored jointly by Andrax and Harpic.

[Roll credits]

Geoffrey Tresise
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8 April 1989

GEOLOGICAL CURATOR

PUBLICATION SCHEME

Three issues of the Geological Curator are published each year; a complete volume consists of nine issues (covering three years) and an index. Because of recent delays in publishing, issues will appear approximately quarterly, to make up the deficit to members.

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