

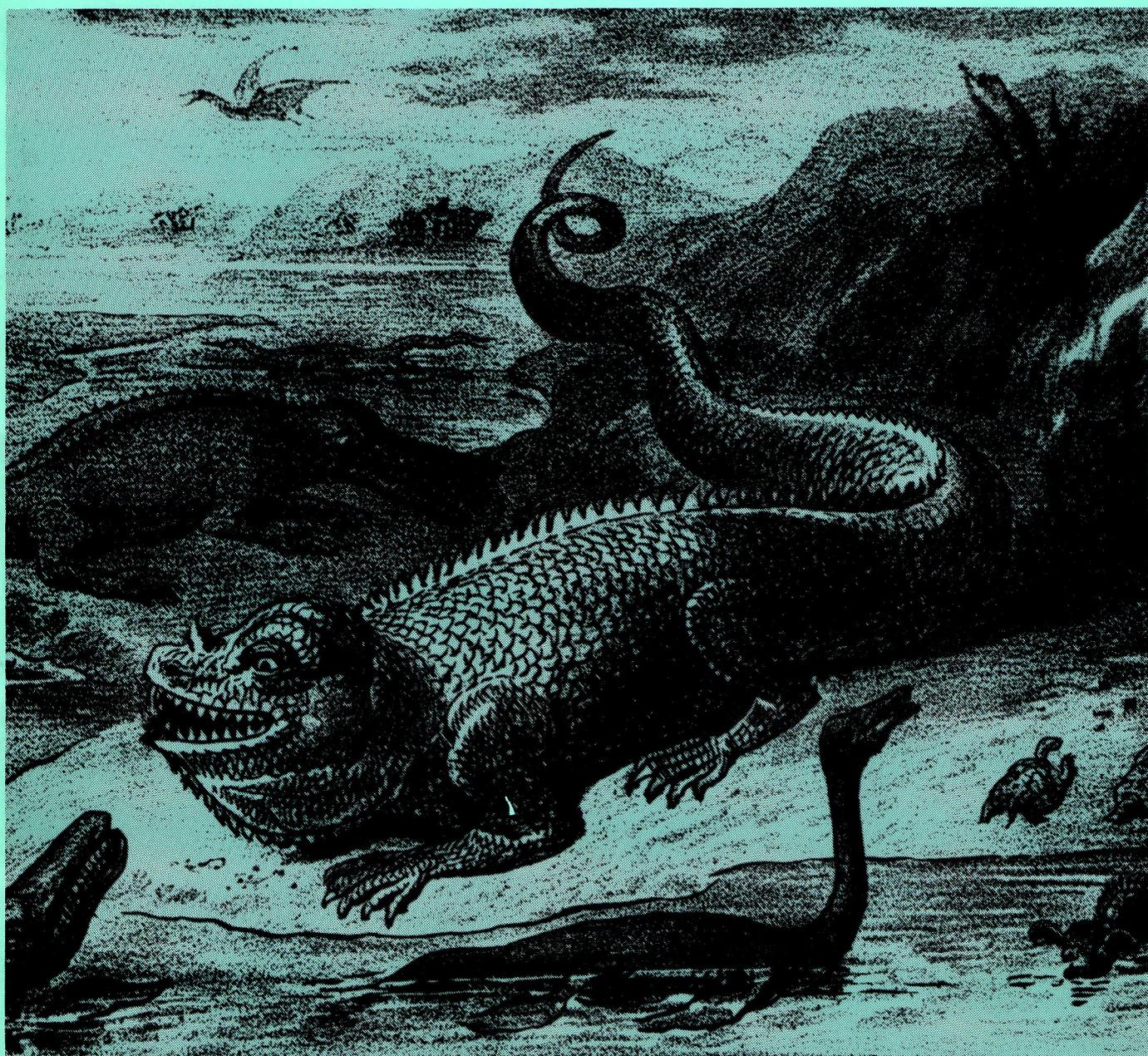
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THE GEOLOGICAL CURATOR

VOLUME 4 No. 5

Issue 2 for 1985



THE ANCIENT WEALD OF SUSSEX.

FRONTISPIECE FROM *SKETCHES IN PROSE AND VERSE...*(1838)
BY GEORGE FLEMING RICHARDSON

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 museums.
- 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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The views expressed by authors in the Geological Curator are entirely their own and do not represent those of either the Geological Curators' Group or the Geological Society of London unless otherwise stated.

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COVER. Part of the frontispiece from Sketches in prose and verse by George Fleming Richardson (1838). The complete frontispiece is reproduced on p.251 as Fig.2 of the story of Richardson's career, as told by Hugh Torrens and John Cooper. Their article launches a major new series entitled 'Uncurated curators'.

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GEOLOGICAL CURATORS' GROUP

February 1986

EDITORIAL

This issue sees the first of a new series, under the general title 'Uncurated curators', which begins with a major biography by Hugh Torrens (Keele University) and John Cooper (Booth Museum, Brighton) of George Fleming Richardson (1796-1848), Mantell's misunderstood curator who tragically took his own life (pp.249-272). Mick Stanley (Derbyshire Museums) has promised the story of Tom Sheppard, Hull Museum's first (and most notorious) curator later this year. Thereafter the field is open to you.

The legal framework which controls specimen collecting at the outstanding Liassic localities around Holzmaden in West Germany is described by Rupert Wild (Stuttgart) on pp.275-280. Its relevance to site conservation in the UK is discussed by Bill Wimbleton of the Nature Conservancy Council's Geological Conservation Review. Still with site conservation, readers of this and other journals will be aware of the mounting concern felt by many geologists in universities and museums about the treatment of geology by NCC. Despite the continuing and constructive dialogue at high level between NCC and the Geological Society (involving its Conservation Committee), concern has again surfaced in the national press over the alleged threat to the longstanding and highly regarded work of NCC's GCR. Some of this correspondence (involving several GCG members) and a reply from NCC appears on pp.305-306.

As I write the 'Thumbs Up' Campaign launch week has recently finished and copies of media coverage from around the country are beginning to arrive on my desk. Nationally the launch was featured on BBC TV's 'Blue Peter' on Thursday 13 February and seen by some 8.2 million viewers. It is too early to estimate regional coverage but a full report will appear in the next Geol. Curator. The first 10,000 copies of the Campaign leaflet 'Rocks, fossils and minerals - how to make the best of your collection' have been distributed, and some 46 of the 54 eligible museums listed are displaying the 'Thumbs-Up' sign. Our sponsors Robertson Research International Ltd have generously agreed to provide another 10,000 leaflets (which gives me the opportunity to make necessary corrections and additions to the address list). So the Campaign - brainchild of Tristram Besterman (Plymouth City Museum and Art Gallery) - is up and running, like its Iguanodon logo!

The growing disquiet of many GCG members about the standard of geological specimen conservation in the UK took a more concrete form last month in the shape of GCG's conference at the British Museum (Natural

History) on 'The conservation of geological materials'. The two days, 23-24 January, were attended by more than one hundred delegates from eight countries, and its success is a tribute to all the hard work put in by Chris Collins (Leicestershire Museums), Conference Secretary (and originator of the idea) and Peter Whybrow (Palaeontology Laboratory, BMNH) who hosted the event so efficiently and made his laboratory available. Chris will be giving a report of the conference in the next issue, while the full proceedings are to be published as a double sized Geol. Curator (vol.4, no.7) late in the summer (thanks to sponsorship by ICCROM). Chris has also agreed to compile a new regular feature - Conservation News - and I hope that publication of the conference proceedings will encourage others to use this journal as a means of disseminating information on current methodology in specimen conservation. Geological conservation in the UK has decades of catching up to do before its status reaches that of other recognised sub-disciplines, such as archaeological and fine art conservation, but a start has been made.

Talking of future issues of the Geological Curator, the next (vol.4, no.6) will have a bit of a theme in that three articles are connected with Lyme Regis: the Philpot Museum by Mike Taylor (AMCSW, Bristol), current issues of local site conservation by John Fowles (Philpot Museum, Lyme Regis), and the history of some Mary Anning specimens by David Price (Sedgwick Museum, Cambridge). Two reviews of GCG's Guidelines for the curation of geological materials, plus a review of the new 'Treasures of the Earth' exhibition at the Geological Museum, London should be of general interest. 'Notes and News' ceases to be under the able control of Tony Cross (Curtis Museum, Alton) from next issue, after seven years - many thanks Tony. Now, does anyone have a burning desire to take the column over? Another new regular feature next time is a product of our Recorder's establishment of his CING network (Collections Information Network: Geology), as announced by Don Steward (Stoke City Museum and Art Gallery) last November in Geol. Curator 4, p.232. The CING column will be compiled by Don from information that comes to him via the network.

Finally, as the lucky recipient editor, I can't resist reminding readers of another debt of thanks they continue to owe one of the founders of GCG. Look at this 60 page issue carefully - I reckon one single author is solely or jointly responsible for about 32 pages of scholarship, humour and sheer contagious enthusiasm for geology. Who is it? Shh, you know Hugh.

Peter R. Crowther
Editor, Geological Curators' Group

21 February 1986

UNCURATED CURATORS

INTRODUCTION TO THE SERIES (by HST)

Seeing the familiar poem The Nautilus and the Ammonite featured in a recent issue of the Geological Curator (Delair 1984) reawakened an idea which has lain dormant for some time: that we should start a series on forgotten or neglected curators.

In my view the single most important cause of the widespread neglect which geological and other natural science collections have suffered in Britain over the years can be put down to a lack of caring curators. Sometimes there was a lack of curators, othertimes they didn't care! The history of curation seems to be an even more neglected subject than the history of collections - a point I tried to

make at the Ashmolean Tercentenary Symposium in Oxford in 1983 (Torrens 1985b). So while we try to document the collections perhaps we should also stop to consider the curators who 'made it all possible'. This point was made specifically by Edwards (1984) about one of the most remarkable of such curators, ex-railway clerk Thomas Sheppard (1876-1945), the Curator of Hull Museums from 1900 to 1941.

What has all this to do with the poem The Nautilus and the Ammonite? Simply that it is not by Ernest Westlake, and was neither written in the 1880s nor hitherto unpublished as claimed by Delair (1984). Instead it is by one of the earliest forgotten curators - George Fleming Richardson (1796-1848).

GEORGE FLEMING RICHARDSON (1796-1848) - MAN OF LETTERS, LECTURER AND GEOLOGICAL CURATOR

BY HUGH S. TORRENS AND JOHN A. COOPER

'The poor fellow had many good qualities and talents of no common order'.

G.A. Mantell to Benjamin Silliman in 1848
(Spokes 1927, p.208)

THE NAUTILUS AND THE AMMONITE'

This poem was inspired by a series of lectures on geology given in Brighton in 1837 at what had been variously called the Mantellian Institution or Museum by its creator Dr Gideon Algernon Mantell (1790-1852). The relation between the extinction of the ammonite and the survival of the Nautilus, which resembled it, inspired the curator of the Museum, George Fleming Richardson, to poetry. The first version was published with the report of the relevant Mantell lecture in the Brighton Herald of 21 October, 1837. This version was of only nine stanzas, nos. 6 and 7 of the version published by Delair (1984) not being included. The poem was first properly published in a rare book Sketches in Prose and Verse (second series) containing visits to the Mantellian Museum descriptive of that collection : Essays, Tales, Poems etc. etc.. This was published for Richardson in 1838 by Mantell's publishers Relfe and Fletcher of London, by subscription. The author describes himself on the title page as 'of the British Museum, late curator of the Mantellian Institution (Fig.1).

By 1838 the famous fossil collections of Mantell, to whom Richardson's book was dedicated, were being removed from Brighton, their home since 1833 (but not then the only palaeontological museum in Britain as claimed

by Dean 1982, p.4), to the British Museum in London; Richardson their curator went with them, as will be seen.

Among the 104 subscribers to Richardson's book were Mantell and a number of other leading figures in the Geological Society of London. Others included Mr G[eorge] B[ax] Holmes (1803-1887) of Horsham, who was to follow Mantell in forming a fine collection of Sussex fossils. Among the 'sketches' are two 'Visits to the Mantellian Museum' which describe the contents of the Museum as it was before its removal to London. The famous Iguanodon discovered by Mantell is described, and it clearly inspired the frontispiece of Richardson's book drawn by George Nibbs (Fig.2).

The Nautilus and The Ammonite poem reappears enlarged in the second of these prose 'visits' (1838, pp.193-195), now in a total of eleven stanzas. The last stanza remained as follows:

Yet the hope how sweet, again to meet,
As we look to a distant strand,
Where heart finds heart, and no more they
part,
Who meet in that better land!

In the text Richardson notes that Gideon Mantell had honoured him by introducing the poem into one of his lectures. Mantell

SKETCHES
IN
PROSE AND VERSE.

(SECOND SERIES.)

CONTAINING
VISITS TO THE MANTELLIAN MUSEUM,

DESCRIPTIVE OF THAT COLLECTION:

ESSAYS, TALES, POEMS, &c. &c.

BY

G. F. RICHARDSON,

OF THE BRITISH MUSEUM,
LATE CURATOR OF THE MANTELLIAN INSTITUTION.

LONDON:

RELFE AND FLETCHER, CORNHILL.

1838.

Fig.1. Title page of Richardson's (1838) Sketches in prose and verse.

subsequently did more than this and reprinted a modified version of the poem in later editions of his book for children Thoughts on a Pebble, or A first lesson in Geology, with a vignette also inspired by the poem on the title page (Fig.3).

Mantell's Thoughts had first appeared anonymously in Leigh Hunt's London Journal in 1834 (Mantell 1834a, b). They were first published in expanded book form in London in 1836 and subsequently further enlarged to reach an eighth edition in 1849. The bibliography of this work is complex and only the first, sixth (1842), seventh (1846) and eighth editions are known (Thackray 1977), so we do not know when Richardson's poem first appeared in it. It is present in the last three editions. In the revised form of the poem (1842, pp.40-42; 1849, pp.57-59) Mantell included only the first ten stanzas of Richardson's full version of 1838, omitting (ironically in view of later developments) the eleventh stanza above. The version transcribed by Westlake (? in the 1880s) differs in both wording, word order and phrasing from that used by Mantell,

suggesting that it had been committed to memory in the meantime. However, the original full Richardson version (recently reprinted by Hazen (1982, pp.59-60), along with two other of Richardson's geological poems, 'The Mantellian Museum' (pp.57-58) and part of 'An olde Englyshe' poem 'A right true story of a walk and talk about geology and history' (pp.61-64) from the 1838 Sketches) shows that the Westlake version is much closer to this original version than to Mantell's and is clearly based on it.

RICHARDSON'S ANCESTRY

Richardson was the son of George Richardson and Martha Fleming spinster who were married at St. Nicholas, Brighthelmston (today's Brighton) 'by licence both of this parish' on 6 April, 1795. His birth is recorded in the same Parish Registers (vol.6, 1791-1799, p.43 at Lewes - East Sussex Record Office) as 'George Fleming, son of Mr George Richardson and Martha his wife, born [on] December 8, baptised December 18 1796'. This family 'filled a highly respectable station for a long period' in Brighton (Brighton Herald, 8 July, 1848).

George Richardson (c.1763-1843), the father, appears in the Brighthelmston [Brighton] Directory for 1800 (Cobby 1800, pp.10, 14-16) in a number of guises. Firstly as a Linen-Draper (one of fifteen then in the town), 12 Castle Square (Cobby 1800, map; Fig.4 hereir). The shop was at the corner of Castle Square and East Street (Bishop 1892, p.320). By 1822 the Brighton Directory listed Richardson senior as a Linen and Woollen Draper. In later directories of 1832 and 1833 he was then at 11 Castle Square, either having moved one along or because the house number changed. It is clear too that Richardson traded in a wider range of fabrics including silk and lace and undertakers' furnishings (Bishop 1892, p.320).

Brighton in 1800 was one huge lodging house with one third of the 1800 houses in the town devoted to the lodging business. Most Brighton tradesmen were also lodging house keepers, with the well-to-do tradesmen owning one or more lodging houses (Cobby 1800, pp.19-20). George Richardson senior owned a lodging house at 23 East Cliffe (Cobby 1800, p.14) and offered other lodgings both at his own home 12 Castle Square and at 1 Black Lion Street (Cobby 1800, pp.15-16; Fig.4 herein).

It is clear from this that Richardson senior was one of the most flourishing tradesmen in Brighton at the time of his son's birth and was clearly at least the social equal of Mantell's father Thomas (1750-1807), a Lewes 'shoe maker in a small line of business but of quick parts' who was also active in Whig politics (Anon.1852). Richardson senior is not listed in the next Brighton directory available (for 1839/40) and must have retired from business by then. He died on 26 July, 1843 at the age of 80 (Brighton Herald, 5 August, 1843).

Mantell was in contact with the Richardson family at least by mid-1819 when he was

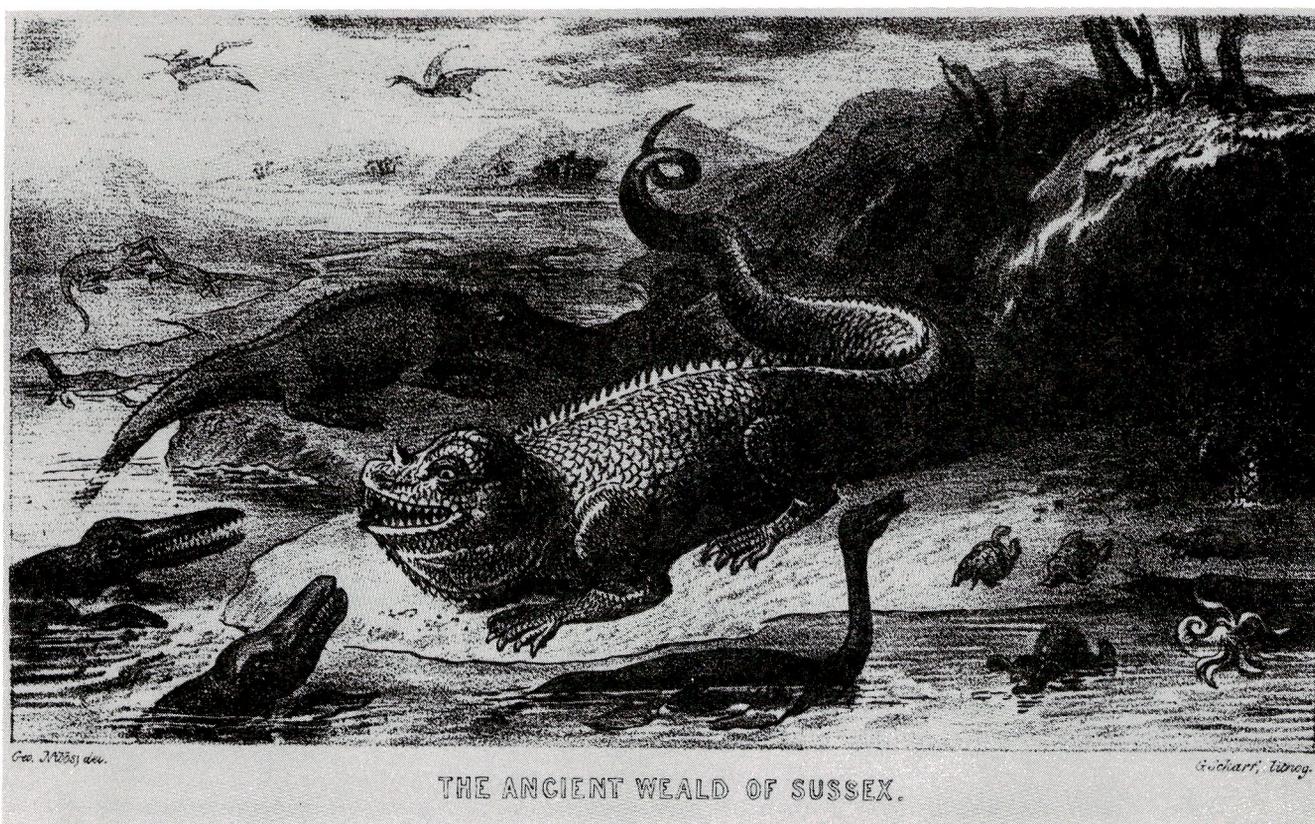


Fig. 2. Frontispiece of Richardson's (1838) Sketches in prose and verse.

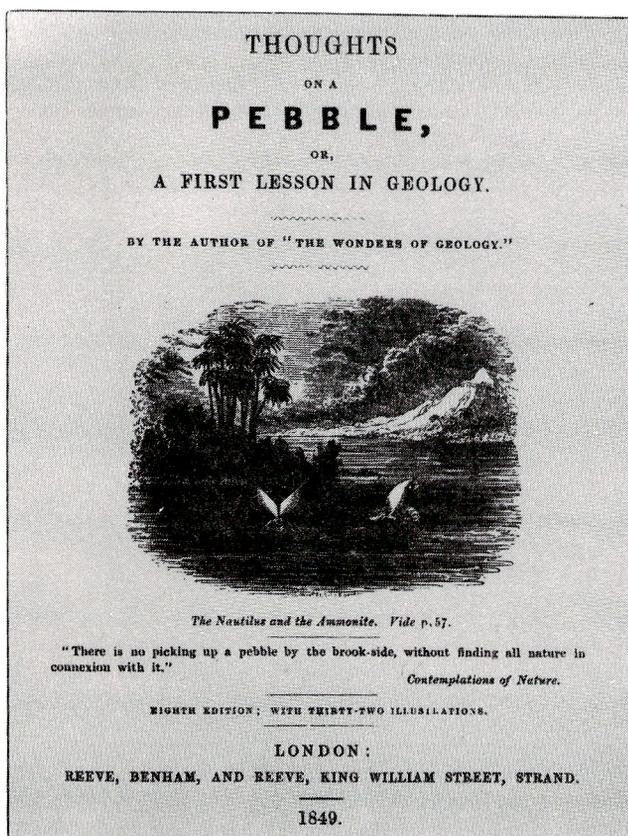


Fig. 3. Title page of Mantell's (1849) Thoughts on a pebble with vignette inspired by Richardson's poem The Nautilus and the Ammonite.

acting as the father's physician. Mantell noted in his diary on 12 August 'Yesterday I wrote to Dr. [William] Babbington [MD - 1756-1833, physician to Guy's Hospital, London, and one of the founder members of the Geological Society of London in 1807] respecting Mr. Richardson - Linen Draper of the Cliff' (Curwen 1940, p.10; see Woodward 1907, p.11 for Babbington).

RICHARDSON'S EARLY LIFE AND WORK (TO 1836)

George Fleming Richardson first followed his father into business as a draper but, as the Brighton Guardian (12 July, 1848) later reported:

'he evinced early in life a decided penchant for literature. He became gradually weaned from business pursuits, but not before he had contracted somewhat expensive habits and that low and false estimate of the value of money which "large returns" never fail to beget in inexperienced persons. He had a powerful intellect and a most retentive memory, and evinced an aptitude in acquiring languages which may fairly be called extraordinary. After he left school and in the intervals of business he completely mastered the French (which he spoke with a pure accent), the German, and the Italian; he had a tolerable acquaintance with the Classics, had picked up a smattering of Hebrew and other oriental languages, and made himself a reputation in the literary world by his clever translation from Körner, in which he displayed, besides a critical knowledge of the German, considerable powers of versification.'

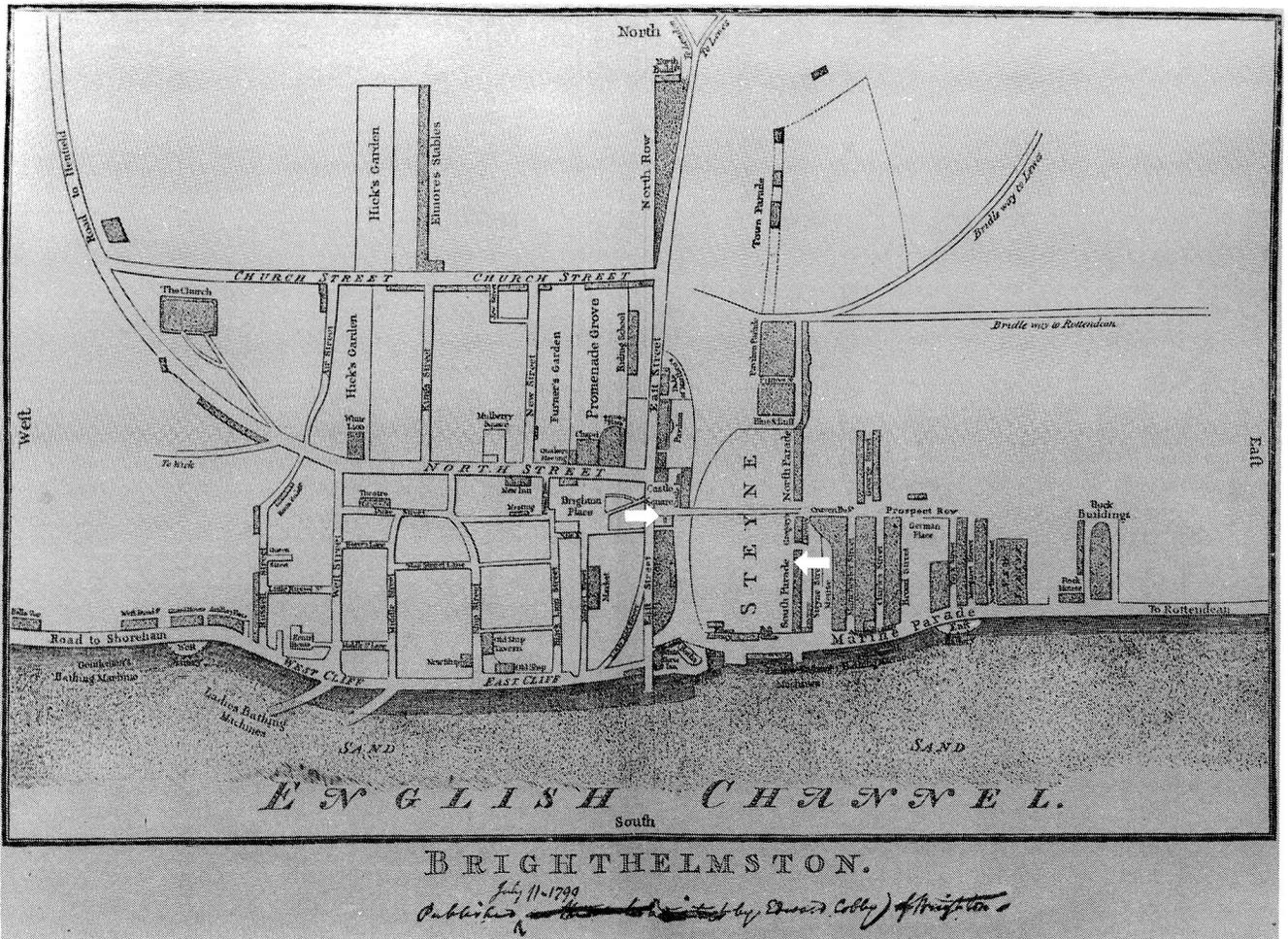


Fig. 4. Edward Cobby's Brighton of 1800 when Richardson was four years old. His father's shop at 11/12 Castle Square and 20 The Steyne, which was to become the Mantellian Museum are arrowed.

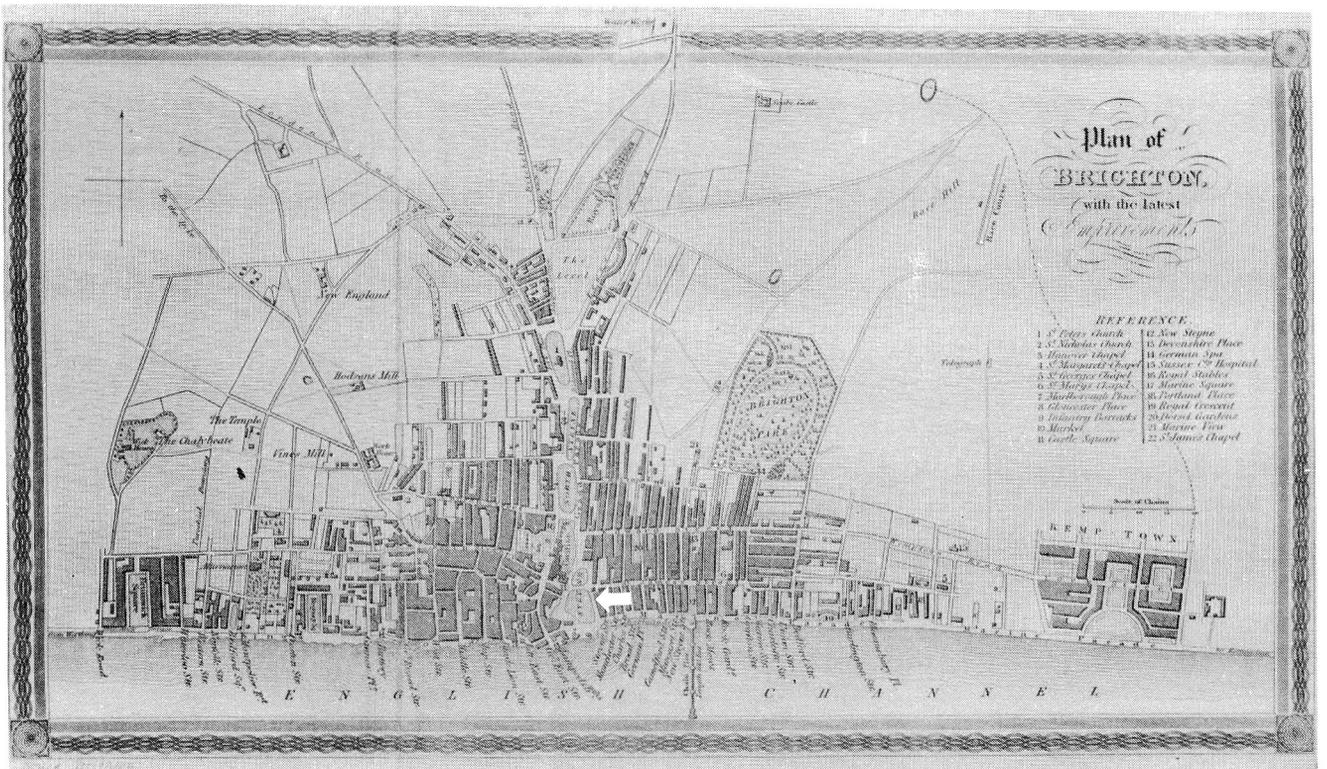


Fig. 5. Brighton in 1834. Mantell took up residence at 20 The Steyne (arrowed) in December 1833. The map illustrates the considerable expansion of the town since 1800.

This translation was published in 1827.

His first publication (Richardson 1825a) was an earlier volume of poems Poetic hours, and he also contributed to a volume of Tales of all Nations published in 1827. In this early literary career he was an occasional contributor to the local papers and was employed for some time by the Brighton Guardian (12 July, 1848). His skills in German were put to added use as a teacher of the language (Richardson 1838, p.93), and it is clear from his later lecturing activities that he had acquired a considerable familiarity with Germany itself at some stage. The Brighton Herald (8 July, 1848) reported that:

'in the early part of his life he was a frequent contributor to the columns of the Herald. These contributions and other compositions were afterwards collected in a volume called "Sketches in Prose and Verse", many of which, particularly the poetical pieces, displayed decided talent, though rather of an imitative than original turn.'

The first series of these Sketches was published in 1835, the second in 1838.

Richardson's first contact with the intelligentsia of Brighton came with the formation of the Brighton Mechanics' Institution in 1825. This was an early example of the influential education movement reactivated in London in 1823 (Inkster 1976). At the formal opening in Brighton in August 1825, which was attended and addressed by the founder of the new movement Dr George Birkbeck (1776-1841), 'Mr. Richardson junior' also spoke (Brighton Herald, 20 August, 1825). From his comments it is clear that Richardson was one of the leading instigators of the Institution in Brighton, and seems to have been its first Treasurer. It is clear too that Richardson was already interested in the promotion of science - 'the noblest employment of man' - as well as literature. Brighton Reference Library holds a printed lecture he gave to the Institution later in 1825 on 'The Rise and Progress of knowledge amongst the most celebrated nations ancient and modern' (Richardson 1825b).

The idea of an institution for the educational needs of working people was soon taken over by a more middle class 'Literary Society' in Brighton (Bishop 1892, p.155) which maintained a library and reading room. This was a widespread fate of such institutions (Cardwell 1972, p.72) throughout England. But geological activity in Brighton became focussed instead around a rival concern which was based on the fine collections of fossils removed from Lewes by Mantell in December 1833 to the house he had leased on Old Steine (now no.20), Brighton (Figs.5, 6). He had been 'in some measure persuaded' to move by the patronage of the third Earl of Egremont, Sir George O'Brien Wyndham (1751-1837) of nearby Petworth, who gave Mantell £1,000 towards his removal expenses (Spokes 1927, p.62). Here the Mantellian Museum was opened to the public and occasional evening meetings held, at

which Mantell and others lectured. By May 1834 the Museum had been visited by nearly one thousand people (Curwen 1940, pp.121-122). At the end of 1835 Mantell announced that his museum was being forced to close to visitors because of their increasing numbers (6,000 since it was opened!) but that arrangements were being made for it to form the basis for a County Scientific and Literary Institution (Brighton Gazette, 31 December, 1835; Brighton Herald, 16 January, 1836).

CURATOR OF THE MANTELLIAN MUSEUM (1836-1838)

These arrangements progressed sufficiently for a proposal, to rent the collection from Mantell and charge the public for admission to the new 'Sussex Scientific and Literary Institution', to be made by a group of Mantell's friends in January 1836 (Vallance 1984); the Institution and Mantellian Museum opened in May 1836 (Curwen 1940, pp.130-131; Brighton Gazette, 19 May, 1836). Richardson was Librarian of the Institution and Curator of the Museum from the beginning and was to reside on the museum premises (Brighton Herald, 12 March, 1836). As the Brighton Herald (8 July, 1848) later reported:

'On the establishment of the Mantellian Museum in Brighton, Mr. Richardson gave up business, - for which indeed his tastes and pursuits but little qualified him, - and offered his services to Dr. Mantell as Curator to the Museum;'

It is now clear that Mantell was not initially in favour of Richardson's appointment, as his address to the first Anniversary Meeting of the Institution, reported in the Brighton Patriot (19 December, 1837) reveals:

'....In allusion to Mr. Richardson, the Curator, Dr. Mantell said "when that person was first proposed for the situation, he (Dr. M.) was opposed to him, and objected to his appointment, because he was a person not possessed of scientific knowledge, but," Dr. Mantell added, "I am bound to state that Mr. Richardson has displayed an industry and intelligence which have won my entire approbation. Though originally destitute of scientific knowledge, he is beginning to acquire a scientific reputation;'

In August, 1836, Richardson 'the Curator and Librarian' delivered his first address to the Institution 'on the language and literature of the Germans, illustrated by translations of extracts from many of the early German poets' in two parts (Brighton Gazette, 11 and 25 August, 1836; Brighton Herald, 10, 24 and 27 August, 1836). Mantell followed the conclusion of the first part by congratulating the membership 'on possessing so valuable an officer as their curator'. Richardson's whole essay was published in the Brighton Herald of 24 August and reprinted in the second volume of Sketches (1838, pp.90-123). Richardson spoke again on German poets in October (Brighton Gazette, 27 October, 1836) and on the Norman pavements in Lewes Priory the following month (ibid. 10



Fig. 6. The Old Steine, Brighton c.1850. The Mantellian Museum at No.20 is arrowed and appears exactly as it does today. This is the only roughly contemporary print that we have found which shows No.20; it has not been published in this context before. Mantell and Richardson would not have enjoyed quite the same view in the late 1830s - the Victoria Fountain was a later addition. Reproduced from M.A. Lowes's (1870) History of Sussex, Vol.1, by permission of East Sussex County Library.

November, 1836). This last was also printed (Brighton Herald, 12 November, 1836). At the Anniversary Meeting in December the Vice-President, Rev. Thomas Cooke (1791-1874) and perpetual curate of St. Peter's, Brighton, spoke:

'[to do] justice to one who would call himself an humble individual, whom the society had the great good fortune to enrol amongst its subordinate officers, one who has contributed in no small degree to the success and popularity to which the Institution had already arrived. He meant Mr. Richardson, the Curator and Librarian. When he (Mr. C.) could state that Mr. R. was invariably at his post, that his evenings were devoted to the business of the Society, and his days spent in shewing the Museum, with a courtesy of manner and a power of interpretation, without which the mighty works of the master spirit would be a sealed book to many of our countrymen, who, though competent to other subjects, here stood in need of some

intelligent guide; when also it was well known that the museum had been visited by many foreigners of various ranks and conditions, and that Mr. R. had such an extensive acquaintance with the languages of modern Europe, as to be able to communicate with them in their native idioms, thus holding out an enviable prospect of reward to the labours of the student, and, like Wolsey, but without his pride, to have converse with princes; and when many present had heard Mr. R. contribute to the information and delight of the conversazioni, by reading papers replete with taste and talent; no one could wonder that he (Mr. C.) was unwilling to accept the thanks offered to the Secretaries, without mentioning the assistance they had received from one, who to no common industry, to no common acquirements, united so ardent and enlightened a zeal to give effect to the attraction, the influence and the endeavours of those who form the pride and strength of an Institution' (Brighton Gazette, 22 December, 1836)

Three editions of a Descriptive catalogue of the collection illustrative of geology and fossil comparative anatomy of Gideon Mantell were published in 1834 (first, 38pp.; second, not seen; third, 30 pp.). With the fourth edition (1836, 44pp.) the title became Descriptive catalogue of the objects of geology, natural history and antiquity ... in the Museum, attached to the Sussex Scientific and Literary Institution at Brighton by Gideon Mantell; this was merely reissued for the fifth and sixth editions also of 1836. A supplementary Brief Description of the new arrangement of the Mantellian Museum (3pp.; copy in Brighton Reference Library Erredge's History volume 10) appeared subsequently. The Dictionary of National Biography suggests that Richardson may have written the enlarged version of the catalogue which comprised the fourth, fifth and sixth editions. This seems probable but we have found no proof and further investigation is needed. The supplement certainly shows that the collection had been considerably rearranged whilst in Richardson's charge.

In the following year, 1837, Richardson's lecturing activities continued to include a lecture on printing to the Institution (Brighton Herald, 4 February, 1837). At the first annual general meeting in March, Richardson was reappointed curator and given a donation to supplement his presumed salary (Brighton Gazette, 9 March, 1837). In April Richardson discoursed to the by now Royal Institution on the study of languages (Brighton Gazette, 13 April, 1837) and in June gave the lecture he had delivered to the Mechanics' Institution in 1825 (Richardson 1825b; Brighton Herald, 10 June, 1837). In the same month appeared his translation of an essay by Hermann von Meyer (1801-1869) 'On the structure of the Fossil Saurians' (Richardson 1837). Clearly Richardson was helping Mantell as well as the reverse. Later in the same year Richardson contributed four poems to the Tribute edited by Lord Northampton (Compton 1837; Brighton Herald, 9 September, 1837).

In September the first details of plans to have the Mantellian collections purchased for Brighton, by £25 shares, were announced (Brighton Herald, 9 September, 1837). The agreement with the Sussex Institution was to expire in the autumn of 1838 (Spokes 1927, p.87) and other arrangements had to be made for it (Brighton Herald, 21 October, 1837). The Earl of Egremont agreed to purchase £500 of shares but his death on 11 November, 1837 threw the whole plan into jeopardy. Alison McCann (assistant archivist at West Sussex Record Office) has kindly investigated the Petworth archives for us in case they shed further light on the Mantellian Museum or Richardson but reports (in lit. 6 July, 1985):

'I can find nothing at all there relating to Richardson. The third Earl was very much involved with Mantell, but the only surviving evidence for this at Petworth is the surviving presentation copies of some of Mantell's books once more we must I think curse the third Earl's executors, who burnt his correspondence.'

Also in September Mantell had started to deliver his course of lectures on geology which were well reported in the local press from Richardson's notes, and in the third of these he quoted Richardson's new poem The Nautilus and the Ammonite. In December, at a public meeting called to replace the anniversary meeting because of Lord Egremont's death, Mantell eulogised the talents and assiduity of the Curator; but it was also reported that hopes of perpetuating any Scientific Institution with the Mantellian Museum in Brighton were likely to be frustrated (Brighton Gazette, 21 and 28 December, 1837). On 30 December the Museum was reported to be for disposal (Brighton Herald, 30 December, 1837).

With such problems on the near horizon, the new year of 1838 must have posed problems for both Mantell as owner of the collections (Spokes 1927 pp.94-95) and Richardson as Curator whose future now depended on them. Nevertheless, their collaboration remained both happy and fruitful as Mantell himself witnessed in his first Anniversary address to the Institution (Brighton Patriot, 19 December, 1837) by saying of Richardson:

'... his name ... will shortly be associated with mine in a forthcoming work, and proud am I of being associated with one who unites so much ability with so much energy.'

Mantell was referring to The Wonders of Geology published early in 1838. This, as the title pages record, was the substance of the course of lectures Mantell had delivered 'from notes taken by G.F. Richardson, Curator of the Mantellian Museum etc.', who had also acted as editor of the work and signed the editorial introduction. It is clear that but for Richardson these lectures would not have been published (Brighton Gazette, 5 April, 1838).

By July 1838 the sale of Mantell's entire collection to the British Museum for £4,000 had been agreed (Vallance 1984, p.97). The costs of its removal to London were met by the Trustees (Mantell 1851, p.490). The news was reported in early August (Brighton Gazette, 9 August, 1838). Richardson was included in the deal, presumably at Mantell's instigation, and took part in cataloguing the collection for the move (Spokes 1927, p.98). This involved the intercession of the Marquis of Northampton, one of the Museum's trustees, to whom

'on the purchase of Dr. Mantell's geological collection by the British Museum [Richardson] was indebted for the office of Sub-Curator to the geological section of that institution.' (Brighton Herald, 8 July, 1848).

Richardson had developed this important friendship with Spencer J.A. Compton (1790-1851) (Fig. 7), second Marquis of Northampton and soon to be President of the Royal Society (1838-1848), from the early days of the Sussex Institution and Mantellian Museum (Brighton Herald, 8 July, 1848) to which Compton had been a frequent visitor. Compton was also an avid collector of geological specimens (Torrens 1974, p.47).



Fig. 7. S.J.A. Compton (1790-1851), 2nd Marquis of Northampton. Reproduced from N.H. Robinson's (1980) The Royal Society catalogue of portraits, p. 231.

Richardson became an assistant in the Mineralogical and Geology Branch of the Department of Natural History, founded in 1837 (Stearn 1981, pp. 228-229), from 1 June, 1838 (Standing Committee Minutes of the Museum Trustees - hereafter SCMMT - p. 4782, 9 June, 1838) at a wage of seven shillings for every day worked in the first year (Gunther 1980, p. 86; Anon. 1840). Assuming a six day week and four weeks holiday, this totalled only £100 a year. This is about the same wage as the curator of a small provincial museum, with much less living expense, could then expect (Torrens, in press, citing examples at Liverpool 1834, Shrewsbury 1835 and Birmingham 1840). The Keeper was Charles König (1774-1851) (Smith 1969), in whose letters to Mantell many of the details of the transfer are set out (Vallance 1984). König was another subscriber to the 1838 Sketches.

ASSISTANT AT THE BRITISH MUSEUM (1838-1848)

Richardson's duties were to assist in making the necessary catalogues of the collections and to arrange those collections both in store and on display.

'In 1837 the system of registering every incoming specimen was introduced and old collections were registered in retrospect. As there were probably one to two hundred

specimens acquired each year, this probably took a lot of his time. Also, in 1838 the Mineral collections were moved into the North Wing of the new Smirke building. Apparently this rearranging of the collections took almost ten years as most of the specimens were labelled and put on display.' (Dorothy Norman, Assistant Archivist, British Museum (Nat. Hist.) in lit. 25.6.1985).

He got four weeks unpaid leave every year (D. Norman in lit. 12.6.1985) but was clearly expected to work on Saturdays since in September 1838 he was permitted, on his own application, to absent himself from the Museum on four successive Saturdays in September and October (SCMMT, p. 4851, 8 September, 1838). These absences can be connected with a significant new departure in Richardson's career, the giving of itinerant professional lectures to supplement his British Museum wages.

Richardson's first course of lectures (with which Mantell had clearly helped; Spokes 1927, p. 109) was announced in his home town, Brighton as 'A short course of Four Popular lectures on Geology ... delivered by Mr G.F. Richardson of the British Museum, late curator to the Sussex Royal Institution, at the Town Hall' (Brighton Gazette, 20 September, 1838). The four lectures were to be on four successive Saturdays: 22 September - on the epoch of the large Mammalia; 29 September - on the Tertiary; 6 October - on the Chalk; and 13 October - on the Wealden formation. Tickets to the course were 2s. 6d. each or by a family ticket, admitting five persons, at 10s. each. The Brighton Gazette referred to these lectures in its columns but reported no further than to say (11 October, 1838) that Richardson's third lecture was given 'to a highly respectable company'.

Luckily Richardson himself reported in some detail on his first professional lecture to his mentor Mantell in the first of six surviving letters (preserved in the Mantell archive, MSS papers 83, folder 83, Alexander Turnbull Library, Wellington, New Zealand) all addressed to Mantell. On 24 September he reported his safe return to London from Brighton and that the talk of the town was of a new Society to replace the Sussex Royal Institution, but Richardson did not think it was likely to happen. He then reported on his lecture to an audience of about 70-80 people which was very good considering there was only one member and his family from the old Institution present. 'Rely on it', Richardson added, 'they had done all in their power to blight my prospects, for one or two of them quite evaded me when I met them [in Brighton] as if ashamed'. One attendee at the lecture whom Richardson specifically notes as present was Mantell's friend the surgeon and anatomist Sir Astley Cooper (1768-1841), who was highly complimentary (Brighton Herald, 29 September, 1838).

The ill-feeling which the closure of the Mantellian Museum left among the 'philosophers of Brighton' is clear in this letter. As Richardson notes, 'they acted by

me as they did by your Museum and would not have me as a gift, they refused to sanction my lectures and not one came to hear me.' Of his own lecturing style Richardson reported of this first professional engagement 'my faults were that I had as usual too much matter and was forced to skip and I cannot extemporize as you can but am obliged to read. An unlucky incident unnerved me at the beginning. I had delivered what I intended to be a very brilliant eulogium on yourself, it was highly applauded when my eye fell on a lady who unlike those around her dropt her head and wept! I all but lost my self possession and could have wept myself.' Clearly Mantell's Museum and its move to London had aroused some passion in Brighton!

Richardson concluded of the lecture that he 'did very well: the audience were most attentive, they applauded me, very frequently and very warmly'. He ended his letter to Mantell 'God bless you my best and most revered friend', showing how close the two men then were; united no doubt by the problems of transferring the Mantellian Museum to London, which they faced together.

Inspired by the success of the Brighton lectures, Richardson then applied in October 1838 to deliver a further course on 'The Geology of the South East of England' to the Russell Institution in London, using Mantell's specimens, soon to arrive at the British Museum (Challinor 1964, p.77). The Russell Institution, founded in 1808 (Hays 1983, p.94), was one of the few formal institutions then in London at which lectures were delivered. Richardson approached another longer established institution, the Royal Institution, founded in 1799, in December 1838, with another proposal to deliver two lectures on the 'Language and Literature of Germany' (Greenaway 1975, 9, p.67). Whether either of these two proposals was successful is not known.

On 5 December, 1838 Richardson wrote the second surviving letter to Mantell (Mantell archive, Turnbull Library). In this he reported the receipt by the British Museum of two deliveries of Mantellian treasures and that he 'was delighted to see an old friend the Maidstone Iguanodon safely brought to hand'. The last portion of the collection was expected to reach the Museum on 10 December. In this letter Richardson also reported on his lecturing activities since Brighton. G.R. Gray (1808-1872), who was a fellow assistant in the Museum (of Zoology), had recommended Richardson at Hampstead where he had given one lecture. Richardson had also arranged to give a gratuitous introductory lecture at the London Mechanics Institution on 12 December. He was busy supplementing his income further by translating a German book for Sir Nicholas Carlisle (1771-1847), former Assistant Librarian to the Royal Library, who had moved to the British Museum when the Library was transferred there between 1823 and 1828. Richardson's work for Carlisle's Account of the Foreign Orders of Knighthood, published in 1839, kept him up 'till 2 or 3 o'clock in the morning for many nights'.

On 3 April, 1839 Richardson reported to Mantell that he was busy preparing 'some papers for a Society of Architects'. He was also permitted to absent himself from the British Museum for a fortnight in April and May 1839 (SCMMT, p.5016, 9 March, 1839), perhaps for a further lecturing assignment. This might have been the occasion when he was lecturing at Northampton in 1838. During this visit he rightly advised on geological grounds against the ruinous search for coal at Kingsthorpe near Northampton which had been commenced in 1836; lignite-bearing clays in the Middle Jurassic had completely misled the local prospectors (Holdsworth 1866, pp.52, 86; Richardson 1843, pp.14-15, 99). He took the opportunity to collect Gryphaea, belemnites and other fossils from the Liassic strata penetrated in the sinkings. These he donated to the Dudley and Midland Geological Society Museum (one of their first gifts), probably while also lecturing there (Murchison 1842, pp.32, 42) or soon after. These lecturing activities would have brought valuable extra income to his meagre Museum wage. In the same year Richardson was elected a Fellow of the Geological Society of London on 22 May, with its ten guinea entrance fee and additional annual subscription.

On 20 August, 1839 Richardson addressed a letter to the Lancet (Richardson 1839) correcting 'misstatements respecting Dr Mantell' which had just been published anonymously by F.B. Winslow (1839). Winslow made a number of claims: about Mantell's having been apprenticed to a chemist, about the patronage needed to establish his museum in Brighton (see p.253) and about his domestic trials which Richardson unconvincingly here tried to refute. Richardson placed most emphasis however on his denial of the claim made by Winslow that Mantell's 'geological pursuits were incompatible with the practice of medicine' and were the cause of Mantell's failure as a medical man in Sussex.

It seems clear that Richardson was here acting merely as a mouthpiece for Mantell's own denial. Proof of the depth of local feeling on this subject and some confirmation of Winslow's last claim is provided by a note at the end of Richardson's own letter to Mantell of the previous year, dated 24 September, 1838, describing Richardson's first professional lecture in Brighton. This reported that Sir M[atthew John] Tierney (1776-1845) had sent for Richardson on the morning of his lecture (22 September) to reminisce about Mantell's days in Brighton, where Sir Matthew had been in very successful medical practice from 1802 and had been royal physician to both George IV (1762-1830) and William IV (1765-1837). Richardson reported to Mantell that Tierney had said 'you must now succeed [in medical practice in London] if only you would give up the old bones.' Richardson's reported reply, 'I told him you had sold your bones and burnt your books and we agreed you must now prosper' is quite at variance with his later published denial of any such link, and sheds an interesting light on Mantell's probable manipulation of his former associate.

On 1 June, 1840, after two years service, Richardson's regulated increase in salary to 9 shillings a day was approved (General Meeting Minutes of the Museum Trustees - hereafter GMMMT - pp.1683-1684, 13 February, 1841). This brought his potential salary, if a full forty-eight weeks were worked, to nearly £130 a year. He celebrated by attending the meeting of the British Association for the Advancement of Science held that year in Glasgow from 17 to 23 September. On 5 September, 1840 he had written seeking details of the meeting from one of the officers of the Geological Section (letter in MSS collections, McGill University Library, Canada).

On 18 September Richardson reported to Mantell of his impressions of Glasgow, and of the opening of the meeting at which R.I. Murchison in his presidential address had paid Mantell's researches 'a very handsome tribute'. On 20 September Richardson wrote to Mantell a second, longer report on the meeting and the field excursion to the Isle of Arran on 19 September. Richardson reported that Murchison had given him one of the tickets reserved for the 'elite', by which he 'had the best of the excursion and nothing to pay for it.' From this letter it emerges that Richardson was busy reporting the meeting for the Morning Advertiser newspaper based in London. This confirms that he was continuing the journalistic work commenced at Brighton, work which caused Mantell to view Richardson as an early irritant (Spokes 1927, p.109).

One of the savants who Richardson had met on the Arran excursion was J. Louis R. Agassiz (1807-1873), the Swiss naturalist and glaciologist. Agassiz had reached Glasgow (Davies 1968) just in time to join this excursion. In a third letter to Mantell dated 11 October, 1840 (the last of the correspondence to survive) Richardson reported that he had then reached Stratford-on-Avon on his homeward journey where he gave another series of lectures. He mentioned further details of his meeting with Agassiz and asked if he could join the party for Agassiz's planned visit to Mantell in London in November. Richardson and Agassiz had clearly got on well together, helped by Richardson's fluency in German - Agassiz's native tongue.

Also in this third letter Richardson reported that on one of the railway journeys to or from Liverpool and London he had stopped to see the Carboniferous fossil trees uncovered in 1837 during excavations for the Bolton railway (Williamson 1896, pp.184-185; Bowman 1840); here he met the resident engineer John Hawkshaw (1811-1891) who had described these discoveries (Hawkshaw 1841) (Fig. 8).

Soon after his return to the British Museum in November 1840 Richardson again offered his services as a lecturer, this time on geology, to the London Royal Institution (Greenaway 1975, vol.9, p.142). His lecturing was then clearly becoming almost as central an activity as his work at the British Museum.

In 1841 Richardson moved into a further field (in clear hopes of increasing his income) with the issue of the Prospectus for his first publication devoted entirely to geology, a Geology for Beginners (Richardson 1842). Mantell's unexpected reaction to the Prospectus alone was violent and extreme, as his journal entry for November 1841 (Curwen 1940, p.150; and see Spokes 1927, p.133) makes clear:

'Mr Richardson, who was formerly attendant at my Museum, and for whom I have ever since exerted myself to the utmost; a man without the slightest pretensions to scientific knowledge of any kind until I took him as my Curator, to my great loss and inconvenience - this man who professed the deepest gratitude for what I had done - owing to me as he did - his situation in the Brit. Mus. - his introduction to men of science - having even introduced his name into the title page of my Wonders, that I might assist him - this man, to whom I communicated all my scientific plans for my works - knowing that through the misconduct of my publishers, I had been prevented from bringing out my First Lessons, so early as I intended, and that my illness rendered me incapable of doing so now - has issued a prospectus of 'Geology for beginners' precisely upon the same plan as mine, and without the slightest allusion to my works - am I never to find gratitude or honorable conduct in those I oblige? Of all the villainy I have experienced, this man's is the basest!'

Richardson's book of 530 pages (Richardson 1842) was intended as a 'familiar explanation of Geology ... including directions for forming collections and generally cultivating the science'. It was published by Hippolyte Bailliere (c.1809-1867), a publisher of French origin based in London (Boase 1965, vol.1, p.129), at a price of 12s 6d. It received mixed reviews. That in The Geologist (Moxon 1842) noted that it was the lack of any such book, which Richardson had noticed during his widespread lecturing on Geology, which had inspired its production; it then applauded the exercises for students at the end of each chapter, as well as the notes referring to the best collections and publications to use when dealing with each group of rocks. The reviewer concluded that Richardson 'had produced a work which can be safely recommended to the student of geology, both for general clearness in arrangement and completeness'.

Many similar and often effusive reviews greeted the book and were proudly reprinted by Richardson in the next edition (1843, pp.617-624). The late review in the Athenaeum (Anon. 1844) was however less complimentary, applauding the idea but not its execution and adding 'to give a brief summary of ... Geology demands a more intimate acquaintance with [it] than Mr. Richardson appears to possess. Geology, after all, is not a science for beginners!' The use of woodcuts in the volume, taken without due acknowledgement from other works, was also criticised. This review seems

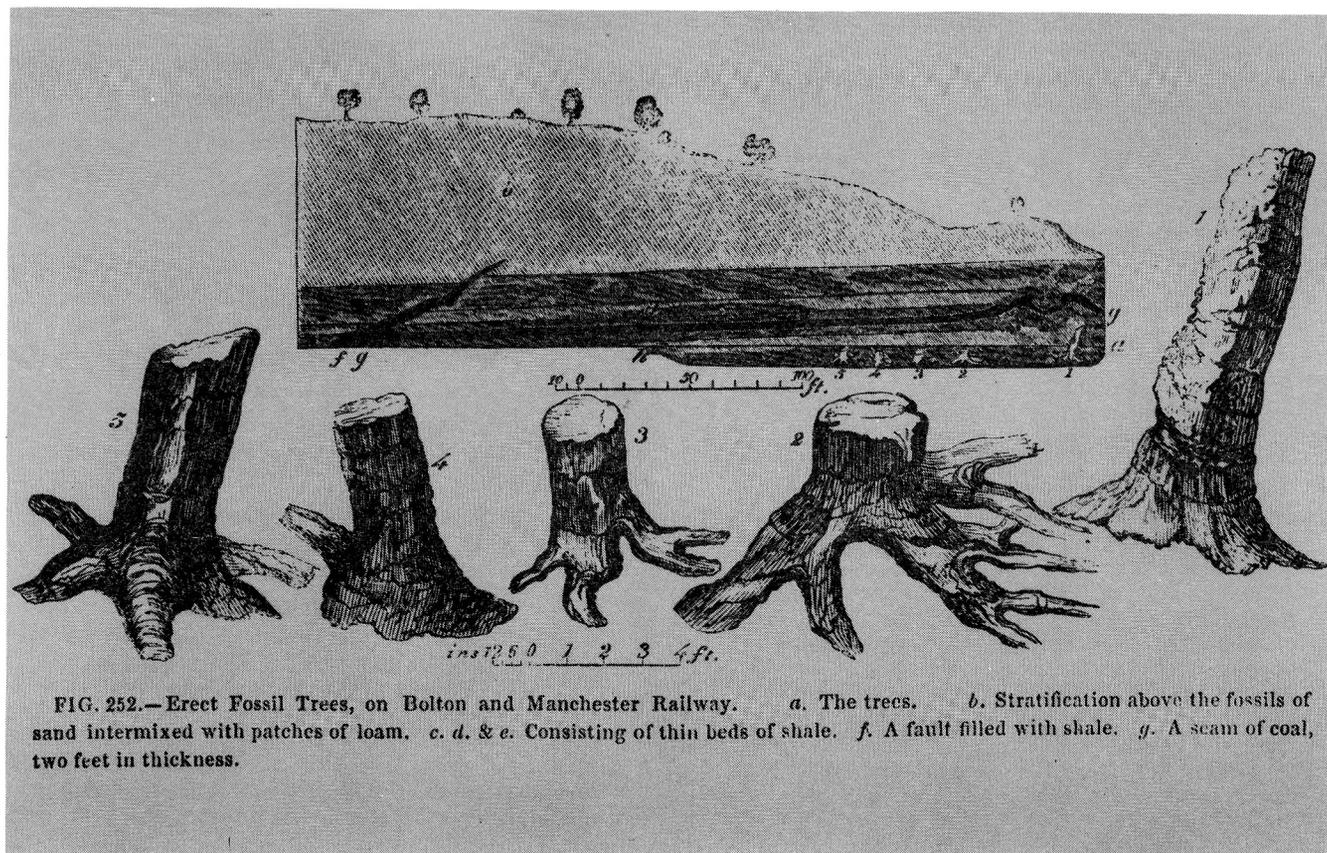


FIG. 252.—Erect Fossil Trees, on Bolton and Manchester Railway. *a.* The trees. *b.* Stratification above the fossils of sand intermixed with patches of loam. *c. d. & e.* Consisting of thin beds of shale. *f.* A fault filled with shale. *g.* A seam of coal, two feet in thickness.

Fig. 8. An engraving from Richardson's (1846, p. 539) Geology for beginners (third edition), copied from Hawkshaw's illustrations of the erect fossil trees on the Bolton and Manchester Railway which Richardson had visited in 1840.

likely to have emanated from the Mantellian camp.

As for Mantell's reaction to the book, this was also expressed to his friend Benjamin Silliman in 1842:

'...Richardson's 'Geology for Beginners' is out; so far as he was able he has followed my plan for my intended 'First Lessons.' He has copied nearly forty illustrations from my 'Wonders' without acknowledgement; and numerous paragraphs - see the part which treats on comparative anatomy - in short he has pillaged most largely from me, but also from Lyell, Fitton, Lindley, &c., without the slightest acknowledgement; and to cover his sins has lavished the most fulsome adulation on all. To me, to whom he owes his situation and his introduction to the scientific world, his conduct has been ungrateful and base in the extreme, and it is very annoying to see one's ideas, and language, hackneyed about by every pretender, usque ad nauseam' (Spokes 1927, p.137).

Mantell's opinion had not changed by the time the second edition appeared in 1843, for he then wrote again to Silliman on 6 September:

'Richardson's second edition bears the imprint of Wiley and Putnam, New York. The illustrations are very good, but the scandalous piracy from the works of every writer without acknowledgement, Lyell, Whewell, Griffin, Lindley, and Mantell, is most shameful.' (Spokes 1927, p.154).

Not all agreed with this last charge however; the reviewer in the Geologist (Moxon 1842) instead noted:

'we only think that the author has eulogised the researches of too great a number of geologists; - but he is an F.G.S. and we can excuse this error!'

Clearly Richardson could not win.

The work was, however, very popular; the second edition was considerably enlarged to 624 pages (Richardson 1843) and was also published in New York that same year (Hazen and Hazen 1980, p.315); a third edition, unchanged from the second, appeared in 1846 and was re-issued in 1848 (Richardson 1846). After Richardson's death several later 'editions' were revised by Dr Thomas Wright (1809-1884) of Cheltenham and issued in 1851, 1855 and 1869. All editions up to the third also included the poem The Nautilus and the Ammonite as Appendix C. Appendix A - Directions for Collecting Specimens of Geology and Mineralogy (pp.571-583 of the second and third editions) - were acknowledged in these later editions to be by Charles König, Keeper of Minerals at the British Museum and Richardson's superior; these directions are reproduced here as one of the earliest sets of such instructions to be issued (see Appendix). Richardson's curatorial experience is evident elsewhere in the book where, for example, he wrote (1843, p.44) that:

'Persons connected with museums and public collections are often subjected to very considerable importunity, and occasionally to very ill-judged censure, in consequence of their declining to accept or to purchase objects so familiar as ammonites, elephants' teeth, &c.; respecting which the mistaken proprietors have conceived the most extravagant notions, and of which it is impossible to dispossess them, they considering these well-known specimens to be in the one instance fossil snakes, and in the other fossil cauliflowers, or other plants.'

Richardson also included useful notes on the collectors and dealers in fossils then known to him (1843, p.119):

'There are numerous collectors and dealers in fossils in various parts of the country, in all the great fossiliferous districts, as the crag, the chalk, the oolite, lias, coal, silurian, and old red sandstone formations. Among others known to the writer, Mr. Taylor, of Blakeney, has obtained some admirable specimens from the crag; Mr. Deck, of Cambridge, has formed a general collection; Mr. Thatcher, of Brighton, procures specimens from the chalk; Mr. Rose, of Denton, near Grantham has collected extensively from the oolite, and discovered two specimens of plesiosaurus from the lias, one of which is in the British Museum; Mr. Dudfield, of Tewksbury, has also discovered some valuable lias specimens, and has recently obtained a splendid specimen of ichthyosaurus; The Messrs. Ripley, of Whitby, have published an extensive list of fossils from the lower oolite and lias; Mr. Read has procured some admirable samples of coal-plants from Gristhorpe Bay and the vicinity of Scarborough; Mr. Gray, of Dudley, has collected largely from the Wenlock or Dudley limestone of that neighbourhood; Mr. Needham, of Castleton, has an assemblage of the minerals of the carboniferous limestone of the Peak; and Mr. Vallance, of Matlock, an extensive collection of similar objects.'

Some of the engravings in the book were from the author's own collection, showing that he too was busy in this field.

Some of the author's curatorial work at the British Museum is clearly reflected in the second edition, which includes details of the specimen of *Plesiosaurus rugosus* Owen donated to the Museum in 1841 by the Duke of Rutland (Richardson 1843, p.507), to whom the second edition was dedicated. Richardson noted that this specimen had been 'skilfully relieved from clay and stone etc. under the assiduous care and superintendance of C. König, Esq.' - perhaps by Richardson himself?

In September 1842 Richardson had given the first of two lecture courses he was to deliver to the Cheltenham Literary and Philosophical Institution in 1842 and 1843. These courses enabled him to make contact with active local geologists including James Buckman (1814-1884), after whom Richardson named in his second edition a new species of Liassic *Arca* (Fig. 9) which Buckman had dis-

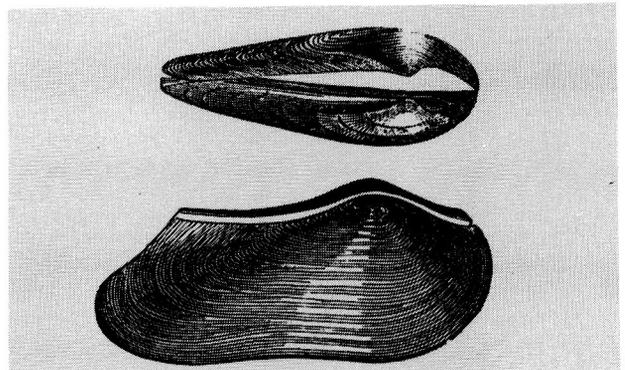


FIG. 243.—*Arca Buckmanni*.

The following are the specific distinctions of this shell, the genus never having been previously discovered in this formation.

Shell gibbouse, transversely sulcated, (lines of growth,) and finely striated longitudinally, three times as wide as long, anterior end somewhat pointed towards the base, beaks remote, yellow lias of Cheltenham.

Fig. 9. Richardson's (1843, p.504) original description of his new species of bivalve *Arca Buckmanni*.

covered among a number of new Liassic forms (Richardson 1843, pp.503-504). (Another of these new forms *Spirifer punctatus* Buckman, 1844 was named and illustrated by Richardson (Richardson 1843, p.504) before its publication by Buckman and should thus be credited to Richardson as author.)

It was later reported that Richardson's *Geology for Beginners* had had:

'a considerable sale; but the business transactions connected with which led, we believe, in a great degree to those embarrassments which overwhelmed him' (*Brighton Herald*, 8 July, 1848).

The relevant entry for the second edition (Richardson 1843) in the publishers' ledger sheds a little additional light and shows that they had sold 124 copies by May 1844 (Longman Commission Ledger 7C folio 481, Longman Archives, University of Reading library). It is annotated:

'Tyler and Reed Printers [of the book of 5 Bolt Court, London] hold the stock and take the proceeds see Mr. R[ichardson]'s letter June 17 1843'.

This suggests that Richardson had sold the copyright to his printers for some undisclosed, but clearly financial, reason.

How Richardson found time to write this book and its subsequent revisions amidst his duties at the British Museum is difficult to envisage. Details of these duties are hard to come by but in May 1842 Charles König, his superior in the Mineralogical and Geological branch, was ordered to assign to Richardson the duty of making an inventory of the mineral collection, starting by filling in deficiencies in the Register from 1837 onwards (SCMNT p.5921, 21 May, 1842).

Richardson's attempts to supplement his Museum pay are clearly in evidence again later in 1842. His allowed vacation of four weeks was taken from 8 September to early October but he extended it until 14 October without giving reason. On his return the Museum Trustees instructed Sir Henry Ellis (1777-1869), the Principal Librarian, to obtain an explanation (SCMMT p.6040, 12 November, 1842). In December Richardson's letter of explanation for his absence was laid before the Trustees who directed Ellis to admonish him to be more careful about regulations (SCMMT p.6072, 10 December, 1842).

Richardson's letter of explanation has not been found (Miss Janet Wallace in lit. 19.8.1985) but other sources allow us to fill much of the gap. During the first week of his vacation (8-15 September) 'Mr Richardson of the British Museum and the well-known geologist' visited an artesian well which was then being sunk and bored (from July 1838) to improve the supply of water to Southampton (Morning Chronicle, 17 September, 1842; Southampton Directory for 1843). This had always been notoriously bad and the Town Commissioners determined to try and sink an artesian well. Experimental borings from 1835 had reached water from the Chalk at 530 ft so an Act of Parliament was obtained to provide the funds needed for a well. The planned sinking of a well 13 ft in diameter to a depth of 160 ft, and thereafter boring at diameters of 20-20 ins to a depth of 400 ft, was a considerable engineering achievement. For £10,000 the contractor undertook to supply 40,000 ft³ of water per day but ran into many engineering difficulties; these caused changes in the planned well which was in the end continued by a shaft always over 7 ft in diameter, details of which are given by Matthews (1887, p.39, pl.1, fig.13). After many difficulties the Chalk was reached and finally, after nearly four years work, the shaft was terminated in March 1842, having reached 562 ft. Only half the expected flow of water was forthcoming, however; from March 1842 to March 1844 further boring with a 7.5 ins auger reached the incredible depth of 1260 ft, but the expected supply was never forthcoming (Keele 1847). Various experts were called in at various times, including Richardson who is reported to have pronounced the failure 'incomprehensible' because no work had ever been conducted more consistently with geological principles (Morning Chronicle, 17 September, 1842). Of Richardson's opinion Robert Bakewell (1767-1843), the pioneer geologist, very unkindly wrote to his friend Gideon Mantell on 19 September, 1842:

'I dare say [the failure of the well] was as incomprehensible to him as it would have been to any metropolitan police man - their knowledge of practical stratification being I suppose equal'.

It seems certain Mantell had communicated his own opinion of Richardson to Bakewell, who concluded:

'what a pity such a humbug [Richardson] should not be exposed'. (Mantell archive

folder 7, Alexander Turnbull Library, Wellington, New Zealand.

Clearly not all agreed with Mantell and Bakewell, otherwise Richardson's geological opinion would not have been sought at all. The episode of the Southampton well clearly demonstrates that Richardson was also becoming known and active as a consultant geologist, both with water and coal (see p.257) prospecting. The full story of the Southampton well deserves to be written up, but boring continued to February 1851 and Whitaker (1910, pp.127-129) recorded that the depth totalled 1,317 ft, some 57 ft deeper than in 1844. If there was no major benefit to the town's water supply (at a cost of £20,000!), at least the well supplied important stratigraphic and palaeontological information on the Tertiary beds of the Hampshire Basin which was published by Joseph Prestwich (1847a, p.367; 1847b, p.388); it was these papers which inspired the formation of the Palaeontographical Society (Prestwich 1899, pp.59-64).

From Southampton Richardson seems to have gone direct to Cheltenham to give his first course of lectures before the town's Literary and Philosophical Institution. The Secretary was then James Buckman (see Taylor and Torrens, in prep.) and his letter of 10 September, 1842 about the arrangements for Richardson's visit survives (British Geological Survey, Buckman archives IGS 1/1183/3). The course of six lectures on the Principles of Geology was to continue daily from 19 to 24 September, alternately afternoon and evening. Non-members of the Institution were admitted on payment of 10s. for the course or 2s. for each lecture (Cheltenham Looker-On, 17 September, 1842, p.593). Richardson was paid £10 for the course (Anon 1843, pp.15, 23), again a significant increase to his Museum pay. Members of the Institution were allowed to attend the lectures as part of their annual payment but the Institution accounts (MSS covering 1841-1845, Cheltenham Public Library) show the proceeds from non-members amounted to £2 9s. 0d. A report on the course (Cheltenham Looker-On, 24 September, 1842, p.621) called it most satisfactory and of a most instructive character, noting that it was:

'illustrated by a series of very striking and well-executed drawings and numerous fossil remains.'

It was also reported that Richardson's lecturing style had improved as:

'if occasionally Mr. Richardson's manner displays less of philosophical severity than we are accustomed to expect, and delights in a redundancy of anecdote, he succeeds withal in an extraordinary degree in arresting the attention of his auditory'.

The course was accompanied by a printed Syllabus of which no copy seems to have survived. It is worth recording here that his lecturing activities earlier in 1842 had included a course in Stamford, Lincolnshire (Richardson 1843, p.622).

In June 1843 Richardson's wage was increased again by a regulated amount, probably to 11s. a day (Gunther 1980, p.86) or £160 a year, on completion of five years service at the Museum (GMMMT, p.1739, 13 May, 1843). He was given leave to attend his father's funeral on 31 July (GMMMT, p.1752, 29 July, 1843). As in the previous year his annual holiday was spent lecturing, and a further course of six lectures was given in Cheltenham on 2-7 October (J. Buckman to Richardson, letter of 16 September, 1843 - British Geological Survey, Buckman archives IGS 1/1183/22).

This course was of six lectures and avoided repeating that of the previous year. One, given twice, was a narrative description of the scenery of the Rhine with anecdotes, all illustrated with a series of

'exceedingly beautiful dissolving views of the most remarkable and picturesque scenes' (Cheltenham Looker-On, 7 October, 1843, pp.629-630).

Two general lectures on geology (again illustrated) were followed by two on astronomy, showing that Richardson was by then prepared to talk on a range of subjects. Richardson seems to have stayed in Cheltenham after his course finished for, on 17 October he was involved in an animated discussion of a paper by Rev. P.B. Brodie (1815-1897) on the geology of the Vale of Wardour in Wiltshire, given at the first *Conversazione* of the Cheltenham Institution for that session (Cheltenham Looker-On, 21 October, 1843, pp.662-663).

On his return from vacation to the British Museum Richardson would have become closely involved with the new junior assistant in the Mineralogical and Geology Branch of the Department of Natural History, George Robert Waterhouse (1810-1888) who was appointed in November 1843 (Boase 1965, vol.3, p.1217; Gunther 1980, pp.109-111).

In 1844 Richardson's 96 page An introduction to geology; being a companion to Betts' Geological Map of England and Wales was published by John Betts, London (copy at Brown University library, Providence, USA; not seen). Both text and map (94x83cm - scale 10 miles to the inch - copies at British Library and Brown University) are quite forgotten today and the map's main selling point appears to have been its low price (Richardson 1843, p.118)!

Attempts to organise lecturing engagements for Richardson's 1844 vacation seem to have been less successful. All that has been discovered so far is a letter of application to the Secretary of the Mechanics Institute, Shrewsbury (autumn 1844) offering a course of lectures on geology for 12 or 15 guineas. This Mechanics Institute was then in grave financial difficulties, as their report dated 30 October, 1843, for the previous year, points out: 'owing to the pressure of the times ... the indifference of the great bulk of the public to the claims of this and similar establishments'. At a committee meeting of 26 August, 1844 it was decided

that the Institute's Secretary should 'write to Mr George Cocking, the Secretary of the Ludlow Mechanics Institution, to enquire respecting Mr G.F. Richardson's proposed lectures'. At the next meeting on 2 September the Secretary 'produced a letter he had received from Mr John Smith of Corve Street, Ludlow one of the lecture Committee of the Ludlow Mechanics Institution respecting Mr Richardson'. This report was clearly satisfactory as the Committee then agreed that enquiries should be made of the 'inclinations of the Ironbridge and Oswestry Societies as to co-operating [with the Shrewsbury Institute] in the engagement of any professional Lecturer'. This is the last Shrewsbury meeting to be minuted, so no more is heard of Richardson's proposal before the Shrewsbury Institute ground to a complete halt (see Minutes of the Proceedings of the Shropshire Mechanics Institute established 1825: Shrewsbury Public Library MSS 120).

The suspicion must be that Richardson had previously given before this a lecture or course of lectures to the Mechanics Institution in Ludlow, but nothing further has been discovered (John Norton in lit. 1.10.1985). George Cocking (1808-1888), the Ludlow Secretary, was a local chemist and keen geological collector (Cleevely 1983, p.85). The Shrewsbury Mechanics Institute then passed Richardson's proposal for a local course of lectures to the Council of the Shropshire and North Wales Natural History and Antiquarian Society (Torrens 1985a) who, at their council meeting on 18 September, 1844, for the same reason 'resolved on account of the low state of the funds of this Society the proposal ... be respectfully declined'. (Minute Book of the Society, Shrewsbury Public Library, MSS 180).

Many other of the Mechanics Institutes and Literary and Philosophical Societies founded in the 1820s and 1830s were suffering similar financial troubles and this fact must have greatly reduced the audiences for itinerant lecturers like Richardson later in the 1840s (Cardwell 1972, p.71).

In 1844 Mantell's popular book Medals of Creation appeared: the work which Mantell claimed had been usurped by Richardson's Geology for Beginners of 1842. The preface acidly noted of Richardson's book that it was:

'a volume by a writer, whom a sense of honour, if not of gratitude, should have deterred from interfering, in any manner, with the literary labours of the individual to whom he was mainly indebted for whatever acquaintance with Geology he may possess; and who, in the unrestricted and unsuspecting confidence of personal intercourse, was made fully acquainted with the plan and scope of the intended publication of the Author.' (Mantell 1844, pp.vii-viii).

Mantell's book of 1838 The Wonders of Geology was also proving very popular, outselling all other such books for a while (Richardson 1846, p.116), including no doubt Richardson's own! It reached an eighth edition in 1864-1866 in Britain alone. All editions up

to the fourth of 1839 or 1840 (both states exist) carry in their preface an announcement of Richardson's important part in the first edition's gestation (1839, p.vii):

'whose ability as a reporter enabled him to furnish me with copious notes of the lectures' etc.

Later editions, after the rift with Richardson in 1841, have any such reference removed. The sixth edition of 1848 is the first for which this can be proved but it is highly likely to be true of the fifth edition of Wonders as well, if that was ever published. (No copy of this edition has been located; it is not present in the National Union Catalogue or the libraries of the Bodleian, British Library, or Natural History Museum, which is surprising. An advertisement in the back of Mantell (1844), however, speaks of the fifth edition as uniform with the Medals of Creation and was presumably also issued in 1844; it also confirms that the first American edition (1839) is equivalent to the third and fourth London editions.)

Any reference to Richardson's ingratitude was also removed in the later editions of Medals. Instead Mantell claimed that his intention to publish such a sequel to the Wonders of Geology had already been publicly expressed in the first edition (1838) of Wonders (Mantell 1854, p.ix). This seems to be quite untrue, as a perusal of this edition shows. However, in the third edition of Wonders (1839), Mantell's preface dated 1 May, 1839, does include the following paragraph:

'Should Providence allot me life and health, I purpose adding another volume to this Work, under the title "FIRST LESSONS, or an Introduction to THE WONDERS OF GEOLOGY;" being the substance of a series of Lectures, designed for persons wholly unacquainted with the nature of geological investigations.'

This is the first reference to the sequel we have found. Then between March and May of 1841 Mantell announced to Richard Owen and Benjamin Silliman (Spokes 1927, pp.121-129) that he had been preparing an Introduction to the Wonders, but that his publishers had declined to publish it! This and the very serious carriage accident in which Mantell was involved on 11 October, 1841, together with the ensuing serious illness which followed (Morris 1972) may put a wholly different perspective on Richardson's supposed 'piracy'. The prospectus for Geology for Beginners, vilified by Mantell in his diary for November, might well have been published by Richardson whilst justifiably under the impression that Mantell's sequel could never appear. For Mantell had written in November 1841 (and see p. 258):

'Everything of a literary nature with me is, therefore, in a state of abeyance' (Spokes 1927, p.130).

The next we hear of Richardson, however, provides further evidence of his financial

problems. On 25 March 1845 he wrote to the Geological Society of London acknowledging that he was in arrears with his subscription to the tune of 6 guineas and offering to pay 3 guineas now and the rest on 1 May (Geological Society of London archives, LR 9/70). The second instalment was duly paid in April (letters of 9 and 15 April, 1845; *ibid.* LR 9/86, 88).

Relations with his former mentor Dr Mantell remained impossible as Mantell's diary entry for 3 December, 1845 reveals (Curwen 1940, p.199), with continued evidence of Richardson's activity in the field of literature:

'Received a note and a copy in 2 vols. of a new edition of a life of Korner by Mr. Richardson formerly Curator of my Museum and now an assistant in the British Museum: a man who has behaved in the most ungrateful manner towards me. I returned the books without any letter, or other notice. I suppose like the rest of the ingrates I have been injured by he supposes I am ready to forgive and forget every ill I have received from persons who owe everything to me; but no! that weakness is over; the scoundrel shall never again have it in his power to annoy me as he once did.'

In 1846 Richardson issued anonymously an ephemeral 'Copy of a letter in verse from a member of the [British] Association [for the Advancement] of Science to a friend' which the British Library Catalogue of Printed Books (vol.65, p.3132, 1961) credits to Richardson. Unfortunately the British Library copy, which seems to be unique, was missing on a recent visit (as it had been for nearly eighty years) and no other copy has been located.

The 1847 British Museum printed staff list (Anon. 1847) quotes Richardson as now earning 14s. a day. If forty-eight six-day weeks were worked, this would total £202 a year. He was then the Senior Assistant, second in seniority to the Keeper of his Branch, Charles König. The estimate for expenditure for this next year's pay to 1848 was £215, or 15s. a day.

Richardson's lecturing career clearly continued although we have little information about it. In his diary entry for 10 March, 1848, Mantell (who was himself a skilled exponent of geological lecturing, if of markedly differing style) reacted in an abusive manner to a Richardson lecture he had attended in London (Curwen 1940, p.220):

'10. - Went to the Mechanics' Institution in Chancery Lane, to hear Richardson lecture on Geology:- it was really monstrous! I did not think it possible the man could have degenerated into such an Ass!'

In the same month, however, Richardson became involved in what may perhaps be his most important legacy as a geological curator. On 23 March, 1848 a letter from Richardson was laid before the Trustees of the British Museum about a collection of 5000 fossils at Pappenheim in Germany, which was then valued

by their proprietor Karl Haeberlin at £1,600. At the same time a letter from Haeberlin dated 18 May, 1847 describing the collection was also laid before the Trustees. Richardson's letter and his translation of Haeberlin's survive (British Museum Central Archives, Original papers); they are mainly concerned with the price of the collection, but also describe it as 'having been seen by both Sir Roderick Murchison and the Marquis of Northampton', who would 'doubtless be able to form an opinion as to the importance and value of the collection'. Haeberlin's letter notes too that it would be very desirable if the visitor he requests to come to see his collection 'were acquainted with the German language with a view to a better understanding'.

How Richardson came to be concerned is not yet clear but we should note he was both fluent in German and well acquainted with that country and may indeed have been to Pappenheim on a previous visit. On the other hand, his Keeper Charles König was a native of Brunswick in Germany who had come to England in 1800 (Smith 1969, p.240) so it is equally possible that he too was involved in first making contact with Haeberlin.

Richardson was directed to go to Pappenheim in person to examine the specimens, draw up a descriptive list and ascertain the lowest price possible, but not to enter into negotiations with the proprietor. He was advanced a sum not exceeding £30 for his travelling expenses (SCMMT, p.7491, 23 March, 1848). Exactly what transpired on Richardson's visit is not yet known and the only further reference found so far is a note of 15 April, 1848 recording the Trustees' decision to take no action on the Pappenheim collection for the present (SCMMT, p.7502), probably because of the high price asked.

The significance of the transaction is that Friedrich Karl Haeberlin (1787-1871), born at Solenhofen in Bavaria, was the country physician at Pappenheim where the Upper Jurassic lithographic limestone was (and still is) intensively quarried. He was the doctor to the quarrymen who repaid him for his services by giving him fossils found in the famous quarries. It was he who acquired the first Archaeopteryx fossil in 1861, which was sold with supposedly the whole of his collection of 1704 specimens to the British Museum for £700 in 1862-1863 (Lambrecht and Quenstedt 1938, p.182; British Museum (Natural History) 1904, vol.1, pp.294-295). The negotiations for the purchase of this fossil, today 'probably the most valuable fossil in the World' (Charig 1979, p.133), were carried out by G.R. Waterhouse (then keeper of the Geological Department) who visited the collection, as had a number of other famous palaeontologists (De Beer 1954, pp.1-3). Waterhouse was able eventually to secure supposedly the entire collection then available (though the discrepancy in numbers of specimens between 1848 and 1862 shows some must have been disposed of before 1862). Richardson's small but significant part in securing for a British museum this priceless

German fossil should not be forgotten. The specimen in question is still providing much food for thought! (Howgate 1985).

Only two and a half months after the decision not to proceed with the Pappenheim purchase Richardson committed suicide. The Gentleman's Magazine reported inaccurately on this as follows (1849, New Series, vol.31, p.550):

DEATHS.

London and its Vicinity.

July 5, 1848. In Somers Town, aged 52, Mr. Geo. Frederick Richardson, assistant in the mineral department of the British Museum, and author of some manuals on geology. Being greatly embarrassed in his circumstances, and passing through the Insolvent Court, he committed suicide, dreading, it is supposed the loss of his situation. Verdict "Insanity"

Richardson's christian name and date of death are both wrong. The British Museum records give his date of death as 1 July, 1848 (GMMMT, p.2049, 8 July, 1848); word spread fast in the scientific community, for the man who replaced Richardson as Assistant at the British Museum, Samuel Pickworth Woodward (1821-1865), was informed of the vacancy that same day! (Woodward 1884, p.289). Mantell was also soon informed of the death by the Principal Librarian of the British Museum on 3 July, 1848, as he noted in his diary (Curwen 1940, p.224):

'3. MONDAY. - Received a letter from Sir Henry Ellis of the British Museum, informing me that G.F. Richardson was found dead in his bed on Saturday morning, having committed suicide. This is very sad indeed! Alas! poor human nature! ...'

Richardson must therefore have died on the night of 30 June - 1 July, 1848. The date given by the Gentleman's Magazine in fact refers to the date of the inquest, as is clear from the report of it in the Brighton Herald (8 July, 1848):

'On Wednesday last [5 July] an inquest was held at the Marquis of Hastings, Ossulston-street, Somers-town, upon George Fleming Richardson, assistant in the mineral department of the British Museum, aged 52. Maria Obery stated that she found deceased lying under his bed with his head nearly severed from his body by a razor, which lay near him. A few days previously, he told her that he fell down the Museum stairs and severely injured his head against the spikes that were at the bottom. Dr. Wakefield was called in to attend deceased, but he said that deceased had been several hours dead. Mr. Edward Clark, Solicitor, Feather-stone-buildings, said that deceased had been his client, and was so desponding that witness was not surprised at him having committed suicide. He was greatly embarrassed and was endeavouring to pass through the Insolvent Court. The deceased was the author of several books. Further evidence proved that deceased had deliberately sat before the looking-glass and cut his throat. The glass, chair and razor were covered with blood.'

His death was of course widely reported even in The Athenaeum (8 July, 1848, p.681; 15 July, p.704), the journal whose hostile opinion of Geology for Beginners was not even modified by the appearance of the second edition (27 April, 1844, p.380), although their charge of plagiarism was recanted. The Athenaeum also reported that, at his death, Richardson had a further translation from the German ready for the press, Bouterwek's History of German Literature for which he had not been able to find a publisher. The significant point is, however, that Richardson was then still busy in this field and had by no means restricted himself to geology.

CONCLUSIONS

Mantell, despite his paranoia about Richardson, seems to have been genuinely and deeply shocked by Richardson's death (Spokes 1927, pp.208-209). It is clear that Richardson had continued unsuccessfully to try and restore relations with Mantell right up to his death. Mantell put Richardson's insolvency and resulting fear of dismissal from his post at the British Museum down to 'reckless extravagance and assuming a station and consequence his income did not warrant'. Yet, if the Brighton Guardian is correct (12 July, 1848), the true cause of death was 'depression of spirits', as the jury recognised with its verdict of temporary insanity. The Brighton Guardian also noted that Richardson's situation at the British Museum only yielded him a 'scanty pittance' and if, as we have suggested, it became more and more difficult as time passed to supplement this by lecturing and writing, we have some of the reasons for Richardson's financial problems. There can be no doubt either that, in Mantellian circles, the sale of Richardson's geology books would have been seriously affected by Mantell's attitude towards him, both in Britain and America (Spokes 1927, pp.139, 209).

The real problem seems to be the early Victorian perception of the price to be paid for the pursuit of science and the maintenance of museum collections. This is a subject which Porter quite rightly points out (1978, p.823) has been completely ignored by historians. Many other near contemporaries of Richardson had similar problems, like Thomas Henry Huxley (1825-1895) who in 1851 wrote:

'to attempt to live by any scientific pursuit is a farce: nothing but what is absolutely practical will go down in England. A man of science may earn great distinction but not bread' (Huxley 1908, p.96).

Huxley further noted in the same year:

'my opportunities for seeing the scientific world in England force upon me every day a stronger and stronger conviction. It is that there is no chance of living by science. I have been loth to believe it, but it is so. There are not more than four or five offices in London which a Zoologist or Comparative Anatomist can hold and live by. Owen, who has a European reputation, second only to

that of Cuvier, gets as Hunterian Professor £300 a year! which is less than the salary of many a bank clerk. My friend Forbes, who is a highly distinguished and a very able man, gets the same from his office of Palaeontologist to the Geological Survey of Great Britain. Now, these are first-rate men - men who have been at work for years laboriously toiling upward - men whose abilities, had they turned them into the many channels of money-making, must have made large fortunes. But the beauty of Nature and the pursuit of Truth allured them into a nobler life - and this is the result In literature a man may write for magazines and reviews, and so support himself; but not so in science' (op. cit. pp.99-100).

John William Salter (1820-1869) was the above mentioned Forbes' palaeontological assistant at the Geological Survey of Great Britain from 1846 to 1854, at a salary of 10s. a day at the age of 26. This is what Richardson had been earning in about 1842 when he was 45! Salter was promoted to Chief Palaeontologist and a salary of £250 a year in 1854 but after resigning in 1863 faced his mental illness and financial problems, just as Richardson had, by committing suicide in 1869 (Secord 1985).

Things were no better on the specifically curatorial front. Allen (1985, p.6) notes of the custodians of the State's natural history collections at the same period:

'that these would be highly-qualified scholars, however, not all of whom would have the mainstay of private means, does not seem to have been realised: for the salaries were pitched at a level with barely educated clerks or even caretakers evidently in mind'.

The point is even more true of assistant-level personnel like Richardson who were wage earning. Some of the problems which arose between Mantell and Richardson could indeed be related to the then low social status of the curator where the wages paid were merely compounded by the career prospects.

Mantell's animus towards Richardson also deserves more analysis than his only biographer Spokes was able to give it. Mantell was a clearly complex and unhappy character of an extremely easily persecuted nature, as is abundantly clear from those parts of his journal which have been published (Curwen 1940). His controversies and relations with Richard Owen between 1845 and 1852 (whom he also accused of piracy) have been examined recently by Benton (1983), who concluded that Mantell's daily writing in his Journal of his frustrations and poor treatment by other scientists is 'often in a rather distorted and paranoiac fashion' (p.128).

Mantell's main complaints against Richardson were of plagiarism and of his issuing a work without the slightest allusion to Mantell's works (see p.258). The second charge is not so far from the complaint a recent writer has made of Mantell's own first book (1822), with its lack of allusion to the discoveries of William Smith (Hancock 1977, p.5).

Of the charge of plagiarism against Richardson, it is now impossible to judge from the one-sided survival of evidence especially as no correspondence from Richardson to Mantell dated later than 1840 have survived. But this charge against Richardson's book was not the first; in his first public series of lectures as a professional, Richardson was forced to make a full apology for 'unintentional plagiarism from Dr Mantell' made in his initial lecture (Brighton Patriot, 9 October, 1838). Mantell was clearly never able to recognize and come to terms with the fact that his relationship with Richardson had been essentially symbiotic. He instead wrongly regarded it as a parasitic one. It is, for example, quite wrong for Mantell to have put down Richardson's post at the Mantellian Museum as that of a mere attendant (as his diary for November 1841 claims, see p. 258).

It is important to judge the two principals from separate viewpoints. Mantell was essentially a research scientist with a significant number of discoveries and research publications to his credit. Richardson was a quite different animal; a fine example of the English 'man of letters' of the early Victorian period, one whose activities ranged right across journalism, literature, languages and science. Although a curator, lecturer, and populariser of science, he was by no means ever a scientist himself. Heyck (1980), in an important article, has discussed such men of letters and shown how they were indeed set quite apart from the scientists. Richardson was unusual in his aspirations and in his abilities to understand and popularise science but was still a 'man of letters'. Heyck makes the important points that all such 'men of letters' wrote for commercial publication and that their success as writers was determined by the sales of their work. They had close links with journalists and they were expected to communicate knowledge not do research, and they were connected with the general public only by a market system. In the normal world of the 1830s Mantell and Richardson should have happily collaborated but the boundaries between men of letters and scientists were being broken down. Richardson had aspirations towards science and Mantell had aspirations as a 'man of scientific letters', but their approaches were still different and especially so perhaps in their lecturing styles. Many of the accounts we have traced of Richardson's lectures mention his ability to amuse by quoting light-hearted accounts; of how he 'enlivened some of the details with appropriate anecdotes of a humorous character' etc. All this is quite a contrast to Mantell's more scientific approach. But with the man of letters venturing into the territory of the scientist, through popular scientific writing, consulting and curatorial work, and with the scientist venturing into the territory of the man of letters by popular writing, the seeds of their discord grew. We can best think of them as representatives of different biological groups of related animals, just like the ammonite and the Nautilus, who ended up in

unusual ecological competition. Did Mantell have the analogy of himself as the surviving Nautilus and his former curator as the extinct ammonite in mind when he removed the soon-to-be-poignant last stanza of Richardson's poem from his reprinted version?

Yet the hope how sweet, again to meet,
As we look to a distant strand,
Where heart finds heart and no more they part,
Who meet in that better land!

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APPENDIX

Appendix A to Richardson's Geology for beginners is entitled 'Directions for collecting specimens of geology and mineralogy, for the British Museum. By C. König, Esq., Keeper of Minerals'. (Richardson 1843, pp.571-583; 1846, pp.571-583). As one of the earliest sets of such published instructions, it is worth reproducing in facsimile (reduced) here.

APPENDIX. (A.)

DIRECTIONS

FOR

COLLECTING SPECIMENS OF GEOLOGY AND MINERALOGY,

FOR THE BRITISH MUSEUM.

BY C. KONIG, ESQ., KEEPER OF THE MINERALS.

THE following short directions being intended for the use of such persons as are supposed to be entirely unpractised in geology and mineralogy, all technical terms, the understanding of which pre-supposes an acquaintance with those sciences, have been carefully avoided; as likewise, all references to the relative order or superposition of rocks, and the succession in which many of the materials to be collected are known to be disposed with respect to each other.

1. Common boulders, rolled pieces of rocks, or their fragments, pebbles, &c., picked up at random, in situations of no peculiar interest, are very seldom of any scientific utility; they had much better be left where they are, than made the source of embarrassment to those who are expected to arrange and incorporate them

with objects of systematic geological or mineralogical collections. But boulders, rolled pieces, rubble-stones, and even gravel, sand, silt, and other loose materials, may prove objects of real scientific importance to the intelligent, although unscientific observer, in proportion as the nature and mode of their occurrence are ascertained, or appear to him to be connected with interesting circumstances and questions; such as their probable origin, and whether they may be considered as gradually washed down from higher levels by rains, rivers, &c.; or as remnants of broken-up beds of lakes or seas, (for both kinds have often been indiscriminately called alluvial,) &c. He will often find them to contain well-preserved remains, such as teeth and bones of the elephant, hippopotamus, rhinoceros, petrified wood, &c. Also, interesting mineral substances, such as particles of metallic ores, gems, &c., are frequently found imbedded in those deposits of loose materials; let him carefully collect, label, and preserve such objects. With regard to loose blocks, specimens should in general be detached from such only, as, from the situation in which they are found, and from other circumstances, have evidently not formed part of neighbouring masses, and which are, therefore, called erratic blocks. Masses of cliffs and rocks precipitated from above, at recent periods, may, however, often supply the collector with good specimens of strata not easily accessible to him.

Materials for roads, thrown out in heaps, may furnish specimens for collections; but the places from whence they are obtained should be previously ascertained. Road-stones are frequently brought from very distant quarries.

2. Upon the whole, rock-specimens should be taken fresh from the masses in their native places. Among localities most favourable for this purpose, the following may be specified:—cliffs on the sea-shore—they frequently afford very perfect sections of the masses and strata of rocks; precipitous sides of rivers, and their beds, and of mountain-streams, which often lay open strata and beds at depths otherwise difficult to discover; ravines and deep valleys transversely crossing the strata, and the naked sides of which, especially when long operated upon by rivers and mountain torrents, often present instructive profiles of stratification; artificial sections of ground, such as are produced by quarries, gravel-pits, and excavations, of every description, for roads, canals, tunnels, wells, &c.

3. Where mines are worked, the collector will generally find some well-informed person or other to assist him in his pursuits; but he should use circumspection in making purchases of specimens from the common miners.

4. Not unfrequently, one and the same mass of rock exhibits great diversity of aspect, through the variation which takes place in the mixture and proportion of its component ingredients, their colour, &c. Also the texture, such as the crystalline-granular, the slaty, the compact, &c., are subject to variation, and gradual changes have often taken place through atmospheric influence, sometimes to a considerable depth into the mass. Accidental admixtures, not essential to the rock, are likewise frequently observable. As in such cases a few specimens would convey but an imperfect idea of the true character of the stratum, or other mass

of rocks, suites of specimens should be formed, illustrative of most of the varieties which it affords.

5. The thickness of each stratum or bed, and other circumstances connected with them, such as their horizontality or inclination, and the angle under which, and toward what part of the compass they incline, should be regularly noted. Slight sketches of the stratification of a coast or cliff, marked with numbers corresponding to those on the labels of the specimens obtained from those strata, will be found greatly to abbreviate the trouble of writing descriptions on the spot.

6. Examine all places where coal-pits are sunk through different strata; procure specimens from these, and likewise of the different varieties of coal, paying particular attention to specimens of vegetable impressions which they, or any of the accompanying rocks, such as sandstone, &c., may afford.

7. No opportunity should be neglected to procure secondary fossils of every description, accompanied by specimens of the masses in which they are imbedded, and which are not seldom chiefly characterized by them. Interest should, therefore, everywhere be made with quarry-men, and persons engaged in all sorts of works of excavation, to preserve whatever may be found by them in the way of petrifications, especially osseous remains; and those persons should be particularly cautioned against breaking to pieces whole skeletons, or large portions of them. If possible, the collector should in person superintend the excavation. The following suggestions, taken from Sir H. De la Beche's excellent treatise, "How to observe in Geology," particularly apply to osseous remains of an extremely delicate

structure. Instead of endeavouring to extract these on the spot, the observer should detach so much of the rock as shall, to the best of his judgment, envelope the organic remain in a protecting case suitable for the purpose of transport. Organic remains are generally in better condition, according to the little that is done to them prior to their final deposit in the Museum. If a fossil proves brittle to such a degree that the vibrations produced by blows to its matrix cause it to splinter up, the splinters, if sufficiently large, may be re-adjusted; but it is most advisable, on seeing a fossil begin to splinter, to take some stiff clay, if such can be procured, and press it down upon it. Wax, or similar materials, might advantageously be employed for this purpose, with small specimens. With regard to objects of great rarity and importance, and which rest exposed in a very friable rock, it may even be desirable to prepare plaster of Paris on the spot, and cover the fossil (such as the skeleton of a saurian, &c.) with a thick coating of it. By this process the exposed part of a skeleton is set, as it were, in a block of plaster, from which, after carefully working beneath it and the fossil in a friable rock, it may afterwards be freed, or in which it may be allowed to remain, as may be desired. When the scattered, yet well-preserved fossil bones of animals are found, it often happens that a large portion of the entire skeleton may be eventually obtained by diligent search. The accidental discovery of a small portion of bone rising through the rock may lead to that of entire skeletons, if sufficient care be employed.

In many slaty rocks fishes, plants, and other organic remains abundantly occur among the laminæ, pressed

down to so thin a substance as not readily to be seen in a cross fracture of the rock. When, therefore, such organic remains are suspected to exist in a schistose rock, detached portions of it should be struck so as to lay open the stones in the direction of the laminæ. In this way multitudes of fossil plants may be obtained, of which there were few traces in the cross-fracture of the rock.

8. Wherever deposits of secondary fossils are observed, it is of importance to note any striking circumstances relative to their mode of occurring; the proportion, for instance, in which the several species are distributed; whether they are more abundant in one bed of the rock than in another; whether they are dispersed in a confused manner through the mass, or arranged parallel to the general stratification, or confined to the surface of any particular stratum; or, with regard to their individual position, whether shells, for instance, are found all exhibiting the same view; or if fishes affect a general uniform position or parallelism of their sides to the stratification; and such other peculiarities as cannot generally be exemplified even by whole suites of specimens.

9. Uncommonly interesting are the osseous remains of caverns and grottos which frequently occur in limestone rocks; these should be diligently sought after and visited, even where report may represent them as not being ossiferous. The collector, in his examination, should proceed systematically by cutting through the layers of the incrustations which he may find at the bottom of them, and which are formed by the dripping down of water impregnated with calcareous particles;

let him form a series of specimens from the layers of this stalagmitic deposit; as likewise of the alluvial matter beneath it, of the gravel, sand, and mud, which usually envelop the osseous remains. Of these latter he should form a complete series, not only as regards the natural difference he may observe in the several bones, but likewise the accidental changes observable in them, such as appearances of being gnawed, fractured, &c. Also other objects which may be found near to, or accompanying the bones, such as rounded concretions, fragments of stones different from the rock of the cave should be collected, and their manner of occurring noted on the labels. In the same manner the collector should not neglect recording every circumstance which the specimens alone are not calculated to illustrate, such as the distribution of the various bones in the caverns, their relative abundance, &c. He should also make memoranda relative to the nature and situation of the cavern itself, its direction, its dimensions, the presence or absence of water in it;—or whether it be furnished with fissures, particularly vertical ones; and if so, whether these be partly open, or filled with bones and rubble cemented together; whether parts of the sides near the opening exhibit a polish as if produced by rubbing against; together with other appearances which are likely to strike an attentive observer.

If fissures in limestone rocks should, on examination, prove to be filled with osseous remains, cemented together by calcareous and other matter, it will be desirable, for the purpose of ascertaining whether bones of different animals are found at different depths, to extract them from the lower as well as the higher portions of the

fissure, and carefully to note the succession of the several specimens thus obtained.

10. Where petrifying sources, as they are called, occur, or waters impregnated with calcareous and other matter, thrown down and consolidated into masses enveloping branches and other parts of vegetables, &c., the collector should, together with specimens, obtain any information within his reach, relative to the condition under which such deposits have been, or continue to be formed. In general it is also desirable chemically to examine such, and other waters remarkable for any striking peculiarity. They may readily be transmitted in clean, strong bottles tightly closed, sealed, and labelled.

11. In tracts of country where volcanos are in action, especially if still unexplored by geologists, not specimens only should be collected, but likewise all the historical data that can be obtained relative to the different eruptions and other phenomena connected with them; and all such circumstances should be noted as in any manner relate to the nature and appearance of those volcanos—their situation, form, craters, &c.; together with every particular concerning the lava-currents, their heat before consolidation, their direction, &c., and perfect suites should be formed of the various volcanic ejections. In endeavouring to detach specimens from a current of lava, the collector should not confine himself to the upper crust of scoriæ; but should likewise obtain fragments from the middle and lower beds. Ashes and other pulverulent volcanic matter are best preserved in strong bottles. Where they are found to enclose organic or other objects, these should be particularly attended to.

12. With regard to certain other rocks, to which the term trappean is applied, and which are now likewise generally considered as igneous, or as having been propelled, when in a state of fusion, through various rocks which they overlie, the collector, under the supposition that he is not altogether unacquainted with some of these rocks, such as basalt and porphyry, is desired to direct his attention to any alteration that may be observable in the condition of the strata in immediate contact with them. These conditions relate to change of colour, lustre, texture, partial fusion or vitrification, &c., and many of them may be illustrated by suites of specimens carefully and judiciously selected.

13. An enumeration of the several instruments required by the geological traveller, for determining the direction and inclination of the strata, for measuring heights, &c., as likewise those for mineralogical investigation, would be superfluous to the proficient in geology and mineralogy, and of no avail to the less scientific collector, who, if he wish for information, is necessarily referred to treatises on those sciences. It is, however, otherwise as regards that indispensable implement, the hammer. Two of these, at least, are required; one weighing from two to four pounds and a half, for breaking the masses; the other of smaller dimensions, for trimming and fashioning the specimens. Common hammers are not fit for the purpose; they should be of well tempered steel, the handles of very tough wood, and most firmly inserted in the heads. The diagrams here given represent those more commonly used, and which may be had of Messrs. R. and G. Knight, Fosterlane, London. Figs. 1 and 2 are of the forms recommended by the late Dr. M'Culloch; fig. 3, is known.

2 c 2

by the name of Sedgwick's, and fig. 4 by that of De la Beche's geological hammer. The remaining figures (ex-

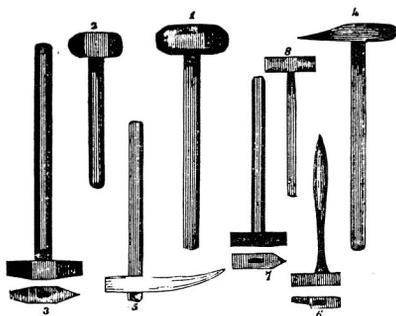


FIG. 251.—Models of Hammers.

cept No. 5) are those of *mineralogical* hammers of various forms and dimensions.

A few mason's tools or chisels, and a small miner's pick, fig. 5, may likewise be occasionally found useful. A glove of thick leather for the left hand, on which the specimens are trimmed; and for their conveyance, a bag (likewise of leather), thin and cartridge paper for packing, small pieces of paper ready cut for labels, and paste or thick gum-water to affix the numbers to the specimens, constitute, together with wool and cotton for delicate secondary fossils, minerals, &c., all the apparatus that is needful to those who undertake the task of collecting.

14. No particular rules can be given for the operation of breaking, trimming, and fashioning rock-specimens; but the skilful management of the hammer, though some

patience and practice be required, is by no means of difficult acquisition.

Specimens intended for public collections, generally speaking, should be of rather large dimensions; some masses, especially compound rocks such as conglomerates, &c., cannot, in all their characteristic parts, be studied from diminutive fragments. A convenient size is four, to four and half, by three inches, and three quarters of an inch to one inch in thickness. Regularity of shape considerably facilitates the proper and safe packing of the specimens. Trim and fashion them on the spot, where there is abundance of materials; what you intend to be the finishing blow with your hammer will sometimes spoil a specimen. All the surfaces must exhibit a fresh fracture, except where it is desirable to illustrate disintegration through atmospheric and other influences; in which case more than one specimen should be obtained.

15. Each object should have its number affixed by means of thick gum-water or paste, and be accompanied by a ticket on which the exact locality is given, together with such information relative to the nature of the masses from which it is taken as the specimen alone is not calculated to convey:—whether they occur in distinct concretions, columnar, &c.; or, if stratified, what is the thickness of the stratum, its inclination to the horizon, &c. The numbers on the specimens may, at the same time, correspond with those of the notes of his road-book, if such be kept by the collector.

16. Great care should be bestowed on the proper packing of the objects. Each specimen is to be wrapped up in two papers; the inner soft, and less substantial than the outer. Put at the bottom of the packing-case

a layer of hay, chaff, moss, or other soft substance, perfectly dry. Place on it the specimens edgewise and in close contact with each other, so that nothing can displace them. Fill up the interstices with moss or tow, and place the other specimens in the same manner, layer upon layer, until the box is nearly full, when the remaining vacuities are to be closely filled up with the same moss, &c., before the lid is fastened. The use of saw-dust for this purpose is not to be recommended. Loose fragile shells and other small delicate objects are best packed by putting them, enveloped in cotton, in rows, and rolling these up in sheets of stiff paper.

17. Still greater care is to be bestowed on such mineralogical specimens as present delicate crystallizations. These, after being wrapped up loosely in silk paper, should be put up separately in a chip-box each, and the empty space filled up with cotton. The chip-boxes are to be placed at the bottom of the packing-case. Minerals, not soft or brittle, may be wrapped up and packed nearly in the same manner as geological specimens. They are to be placed upright in rows one above the other, and with their principal surfaces parallel to two opposite sides of the packing-case. The weight of such case for land-carriage, or shipping, should not exceed one hundred weight.

18. As the geological collector cannot be expected to discover, in his excursions, many specimens of simple minerals desirable to be placed in the national collection, he will do well if he fall in with persons acquainted with, and in the habit of procuring such, to secure their services, with a view to obtain all mineral substances that are peculiar to any particular colony or tract of country; or that claim attention on the score of their

superior beauty and perfection of crystallization. This latter character should be particularly attended to; it is, however, to be observed, that minerals not presenting it, may nevertheless prove highly interesting in other respects, and that a remarkable locality alone may often lend importance to a mineral which is abundantly met with at home.

THE PROTECTION OF FOSSILS - COMMENTS ON THE HOLZMADEN MODEL

BY WILLIAM A. WIMBLEDON

To most people concerned with conservation in Great Britain the idea of a geological monument is perhaps foreign. Such categories are a familiar feature overseas, and they were included in the original Nature Reserves Investigation Committee site list for England and Wales (1945). Since then, 'monuments' have played no part in British earth science conservation for they were displaced by early legislation (National Parks and Access to Countryside Act 1949), which established the existing dual system of Sites of Special Scientific Interest and National Nature Reserves. In Britain, 'nature conservation' legislation covers both biological and geological conservation and, for better or worse, rules which were primarily designed to protect the former are applied to both kinds of site. Rupert Wild's paper 'The protection of fossils as cultural monuments in West Germany' (below) gives us an account of a very different system, which distinguishes geological phenomena as separate from other natural (i.e. biological) features, and regards fossils as 'antiquities of the soil', to be placed under the protection of cultural legislation rather than any nature conservation law.

The kinds of controls described by Wild, and the presumption that important specimens collected become the property of provincial (State) museums, might appear to be the answer to many a museum curator's prayer. However, the German system relies on the ability of states (Lands), and thus their museums, to provide adequate funds and infrastructure to turn a legal mechanism into a working reality. Few local museums in this country (if they have a geologist at all) would have the staff, skills, finance or time to assess, collect and prepare specimens on the scale of Holzmaden, whose legal protection Wild describes in detail. National museums, although better endowed with funds, suffer from a lack of field orientated geologists to perform the task, and are often too far away from the site.

Holzmaden is a special case for a number of reasons. The site is actively quarried, but the Cultural Monument Act makes it possible to undertake a rescue operation in the face of what might otherwise be the bodily removal, destruction or sale of a valuable specimen. In Britain, one is hard-pressed to think of sites where the interest is as rare, special or fragile and in danger of removal by quarrying. If Christian Malford was still extant as a locality, and it was being commercially exploited, we might possess such an example. Most of our sites are in private ownership and it is difficult to see where an application of the Holzmaden

model in Britain would be appropriate. For instance, how could one undertake excavations of the type seen at Foulden, Bearsden or Chicksgrove under the supervision of a local (or national) bureaucracy with minute by minute monitoring of the innumerable finds?

What strikes me about the rules applied to Holzmaden is that they seem only to reflect current knowledge of the biota (admittedly based on many years of collecting). Judgements rely primarily on visual evidence, and the list of 'proscribed species' (i.e. those on which there are restrictions) is skewed towards unusual specimens and is not a reflection of the total fossilized biota. One is immediately reminded of an archaeological analogue - the pre-war excavations at Sutton Hoo, where valuable and visually obvious artefacts were removed with indecent but understandable haste while equally important, non-visual, organic evidence was destroyed. Certainly for sites less well known than Holzmaden much more account would have to be taken of the possibility of new finds, unpredicted preservational states, or anything else out of the ordinary. What I am saying is that the bureaucratic rigidity of the German system does not appeal to the fun-loving, fossil-hunting palaeontologist in me!

How could one conduct such a seemingly standardized process at a site like, say, Bearsden, where practically everything found was new? The thought of holding up the dig every time a find is made, while a non-specialist tries to assess the importance of the material, or each find is carted off to a museum for appraisal doesn't bear thinking of. Who is to know what may turn up at a site? Such predictions would require a blend of bureaucracy, scientific skill and clairvoyance rarely found in one individual. Clearly, every site is different and requires different treatment.

The British system of research on sites is based on tolerance and co-operation between owner and user. Our governmental conservation organisation, the NCC, has in recent years been involved in fostering, initiating and participating in collecting and research excavation through its Geological Conservation Review Unit. The function of the Unit, besides selecting and documenting geological sites, has been to foster co-operation in the sensible scientific exploitation of sites; the attitude in general has been that there is no one kind of person who has an exclusive or unquestioned right to use a site. This tolerant, 'laissez faire' attitude contrasts with Holzmaden where, although private

collecting is not ruled out entirely, the presumption is that only 'qualified persons' are to be allowed to collect special finds. In the USA the generally held view is that such vertebrate sites should be the sole preserve of professional researchers and that 'hobbyist collectors', as they are called, should be excluded, having little or nothing to contribute in terms of collecting, discovering sites, making new finds etc. At sites on Federal Land, professionals will automatically (eventually) be given permits to collect, without any questions being asked concerning their scientific or (perhaps more important) collecting competence, or the aims or necessity of the dig. Amateurs, who may be just as seriously motivated (and possibly better collectors) will be denied a permit. The system which the Bureau of Land Management is currently trying to introduce is massively bureaucratic with extensive arrays of paperwork, regardless of a locality's interest, sensitivity or its comparative grading. Holzmaden is, in a sense, an example in miniature of this brand of institutionalized conservation - albeit on an exceptional site (and without the bumf). The bonus in the Holzmaden system, and something that would be a healthy innovation in Britain, is the element of compensation which is payable to collectors.

In Britain there will be more than 2700 Geological Conservation Review sites, the vast majority of which still have yet to be scheduled under the Wildlife and Countryside Act. It is difficult to see the relevance for Britain of a system such as that employed at Holzmaden, or to make comparisons with the German experience. Their conserved sites are few in number and the cultural monument law is much more specific to geology (and palaeontology in particular) than our own 'nature conservation' legislation. The capability to impose lists of proscribed activities on site owners (Wildlife and Countryside Act 1981) is the only remotely analagous piece of British statute. Standardized lists of prohibited 'potentially damaging operations' may be used as a brake on the owners' activities (e.g. building, earth-moving or extraction of rock) but they have little relevance to the activities of others, such as the palaeontologist, at a site. This Act is concerned with the action of owners on sites. The niceties of which palaeontologist collects what, where and how, are of course not dealt with by the Wildlife and Countryside Act or any other statute. The complex reasoning that goes into judgements over who should collect what, and where, are best left outside the

rigid framework of legislation (see Fowles, in press). For some years, there has been the capability to take a more positive role in the management of key sites (Countryside Act 1968). The GCR Unit initially tried to make use of this method to favourably influence the use and condition of sites, and place geological interests at least on a par with other land uses. The general acceptance that at some sites the earth science interest must take precedence over other interests and uses is still a long way off. (I don't count, for the purposes of this discussion, the handful of 'Geological' Nature Reserves for they contain no areas of the highest palaeontological interest, having limited or exceptional fossil content.) Subsequently, management agreements with owners under the Wildlife and Countryside Act have been more a means to prevent damaging operations (by payments to owners) than a positive means of promoting desirable research (or other uses).

In Britain during the last few years resistance to institutionalized conservation has grown amongst geologists, and palaeontologists have revolted against conservation bureaucracy - the 'thou shalt collect but two fish' mentality (see Wood 1985). The lack of scientific understanding behind such distortions of the conservation ethic proves the need for liberal injections of scientific know-how into conservation, and for more co-operation and dialogue between specialists outside conservation bodies and those very few geological specialists who exist within. This has been the aim in recent years and it has worked well; a number of instances have been cited on the vertebrate front by Benton et al. (1985). This is the way forward, and it is hoped that in the future we shall see a move towards science and co-operation and a diminishing role for bureaucracy. Although I have said that I believe the Holzmaden model has little relevance to British sites, I think we have much to learn from the obvious spirit of co-operation which characterizes relationships between palaeontologists, quarrymen, collectors and museum workers in Baden-Württemberg.

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THE PROTECTION OF FOSSILS AS CULTURAL MONUMENTS IN WEST GERMANY

BY RUPERT WILD

INTRODUCTION

The term 'cultural monument' - Kulturdenkmal in German - is usually at once associated with structures worthy of preservation, for example a half-timbered house or a Celtic hillfort. These are, however, only part of the range of items protected by the Law for the Protection of Cultural Monuments (Gesetz zum Schutz der Kulturdenkmale), passed by the Land (i.e. region in the Federal Republic of Germany) of Baden-Württemberg on 25 May, 1971. This law, the Monument Protection Law (Denkmalschutzgesetz) for short, became effective on 1 January, 1972, and includes fossils.

THE PROTECTION OF FOSSILS AS MONUMENTS

Each Federal German Land has a monument protection law, and indeed nearly all countries in the world have one. Nevertheless the wording of the laws and the range of objects protected can vary greatly. For example, fossils are specifically protected as cultural monuments in Hessen and North-Rhine-Westphalia, but not in Bavaria. Although the Monument Protection Law of Baden-Württemberg also protects fossils, it does not mention them by name, calling them instead 'moveable monuments of the soil' (bewegliche Bodendenkmale). As such they come under the Monument Protection Law, not the Nature Protection Law (Naturschutz) as is often wrongly assumed.

Let us now examine the legal foundations and the most important statutes which led up to the present Monument Protection Law of Baden-Württemberg; in particular the Reich Nature Protection Law (Reichsnaturschutzgesetz) of 26 June, 1935, which the Federal German Länder have adopted as a model for nature and monument protection laws. The Reich Nature Protection Law did not protect fossil finds as such, or only partly so, but instead for the most part merely their occurrence as 'natural monuments of the Earth's history' (paragraph 3). Fossils are natural products but they were nevertheless counted as monuments of the earth for the purposes of preservation and this is still the case today. When a fossil is found it is separated from its natural surroundings and therefore loses its original natural bond with the locality, especially if it is destined for scientific research or museum purposes. The fossil therefore loses its original connection with nature as a whole, as Weber and Schoenichen (1936) stated, and is no longer regarded as a natural monument (except in a few cases, for example when it is left in situ). The Monument Protection Laws of nearly all the Federal German Länder, including Baden-

Württemberg, declare in their wording that fossils are items to be protected as monuments, as does Baden-Württemberg's Nature Protection Law (Naturschutzgesetz) of 21 October, 1975, in which fossils are not actually mentioned at all since the legislators drafting it clearly understood that fossils were included as cultural monuments in the Monument Protection Law, a point also evident from the latter's drafting. A Prussian Law regarding Excavations (Ausgrabungsgesetz) of 26 March, 1914, which applied to the former Hohenzollern parts of Baden-Württemberg, stated that fossils were specifically protected as 'antiquities of the soil' (Bodenaltertümer); this law provided the basis for the designation of protected excavation areas in the Monument Protection Law of Baden-Württemberg.

The joint decree of the Ministry of Education and the Ministry for the Interior of 31 October, 1972 concerning the enforcement of the Monument Protection Law stated that: 'The term 'cultural monument' applies to cultural monuments moveable and immoveable of the earth or of a constructed nature, whereby it is immaterial whether these items are or are not made by the hand of man.' Herter (1972, p.10) commented on the Monument Protection Law that 'it matters little whether such monuments are the product of humans or nature' and further says that 'whereas for example rare fossil plants or animals are likewise included in this term, as perhaps are the remains of the skeleton of a prehistoric animal'. Dauber (1977) and Wagner (1979) made similar comments. The decree of 15 May, 1979 of the Government Praesidium, Stuttgart, concerning the Holzmaden Fossils Protected Excavation Area (Grabungsschutzgebiet Versteinerungen Holzmaden), is based ultimately on the Monument Protection Law and is designed specifically to protect the fossils only.

This introductory discussion on the legal and historical foundations for the protection of fossils was necessary to establish clearly that fossils are covered, as cultural monuments, by the Monument Protection Law.

WHICH FOSSILS ARE PROTECTED?

Obviously not every fossil is a cultural monument, whether in the ground or after recovery or preparation. The Monument Protection Law (paragraph 2) says that 'cultural monuments in the sense of this law are things or groups of things and parts of things whose preservation for scientific ... reasons is in the interest of the public.' Thus the only items protected are scientifically interesting fossils, those

which are for example very rare, considered unique, or otherwise important. This includes many fossil vertebrates as well as their scattered remains, such as reptilian bones or mammalian bones from Ice Age gravels and caves. Even fossil tracks such as the reptilian footprints in the Buntsandstein of the Black Forest can be protected provided that they have special scientific value. Common fossil invertebrates such as ammonites, belemnites, bivalves and corals are seldom protected unless it happens that the specimens are so extraordinarily well preserved that basic new scientific knowledge, which may be of public interest, can be obtained from these specimens. A good example is the fauna of belemnites with fossilized soft parts (including hooklet-armed tentacles and inksacs), recently collected from quarries in the Upper Lias of Holzmaden - although in this particular case some at least have since turned out to be forgeries. Plant fossils can also be classed as cultural monuments if they are rare specimens of special scientific interest.

THE OBLIGATION TO REPORT FOSSIL FINDS

Paragraph 20 of the Monument Protection Law states that 'Whosoever finds things, groups of things, or parts of things whose preservation can be assumed to be in the public interest for scientific reasons will immediately give notice of this to a monument protection authority or the local authority.' It is therefore one's duty to report those fossil finds which by reason of their special preservation or great rarity can at once be classified as cultural monuments. This applies for example to finds connected with prehistoric man as much as to a saurian skeleton. Fossils must certainly be reported if there is a possibility that they might be in some way 'special' and might therefore be cultural monuments. Since laymen are often not able to assess the value of a fossil it is advisable for them to notify without fail every unusual and uncommon find. Incidentally, costs incurred in this notification will be refunded by the representative of the Land Monument Office (Landesdenkmalamt), in the case of Holzmaden by the Staatliches Museum für Naturkunde Stuttgart. Even an experienced fossil collector should also notify a find for expert assessment when in doubt. If the find subsequently proves not to be a cultural monument, the collector can then regard the specimen as his own property with a clear conscience (providing that he has obtained permission from the land owner to collect fossils). Since the passing of the Monument Protection Law, the Land of Baden-Württemberg (in the form of the Staatliches Museum für Naturkunde Stuttgart) has become indebted to both laymen and professional fossil collectors for many fossils of special scientific value.

According to the Monument Protection Law the local authority also has a duty to pass on promptly any notification of a fossil find received by them to the Land Monument Office or to the official responsible. Often,

however, this duty is not carried out because the finder of a rare fossil does not know about the Law or whom to notify. The finder should in fact notify one of the following government institutions: Landesdenkmalamt Baden-Württemberg, Bodendenkmalpflege, Schillerplatz 1, 7000 Stuttgart 1; Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, D-7000 Stuttgart 1; Badische Landessammlungen für Naturkunde, Erbprinzenstrasse 13, 7500 Karlsruhe 1. Notifications of finds can also be received by more senior monument protection officials such as the Government Praesidia (Regierungspräsidien) or by junior monument protection officials in the Rural District Offices (Landratsämter). The notifications are then passed on to those responsible at the Land Monument Protection Office.

EXCAVATION OF FOSSILS

The excavation of fossils at the working face is also to some extent controlled by the Monument Protection Law. Paragraph 20 states that 'The find and the find location are to be retained (in unchanged condition) up to the expiry of the fourth day after the notification unless the Monument Protection Authority or the Land Monument Office agrees to a shortening of this period'. There is a special reason for this paragraph. While the fossil itself can be very valuable to science, equally valuable is any information concerning its site of discovery and its preservational state - whether, for example, a skeleton is articulated or occurs as scattered bones, whether it has been deposited by currents, what its orientation is, in which layer it was found, or which organisms occur near to it. This sort of information, in almost every case, can only be gathered fully and correctly by a specialist, who should then undertake the recovery of the fossil or the digging of an excavation. The Monument Protection Law requires protected fossils to be submitted for scientific evaluation to the authorised official of the Land Monument Office (in this case the Staatliches Museum für Naturkunde Stuttgart). Scientific investigations at the find location must be accepted with tolerance.

The Law allows this holding open of the findspot to be reduced from four days if necessary to avoid excessively high costs or disadvantages for the land owner which cannot be reimbursed by the Monument Protection Authority or its representative. In practice and in the case of fossils, an inspection of the findspot is carried out on the day the find is notified if advance clarification of the situation is not possible by any other means. The inspection involves a judgement of the find on site and the discussion of possible claims for costs (including that for any extraction, searching, or excavation work).

Extraction by suitably qualified persons or firms can be authorised in rare cases, if by this procedure, expenses are reduced; this applies especially to experienced quarrying firms in the Holzmaden Fossils Protected Excavation Area.

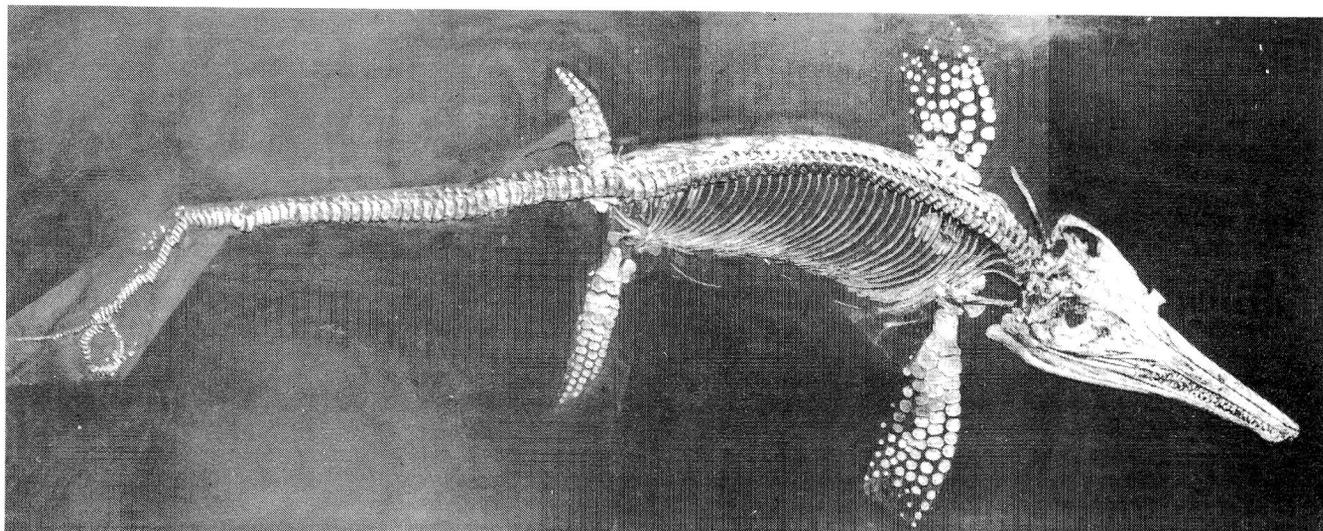


Fig.1. Leptopterygius disinteger Huene. Staatliches Museum für Naturkunde Stuttgart Nr. 15390, type and only specimen, from the Schwarzjura (Lias) EII, 6 at Holzmaden. Photographed after restoration in 1980-1981. The slab had been partly broken during transport in and after the Second World War. Slab length 3.80m.

EXCAVATING PROTECTED FOSSILS

Anyone attempting to obtain protected fossils by deliberately searching (such as by excavation) must, according to paragraph 21 of the Monument Protection Law, obtain the approval of the Land Monument Office before commencing work. Permission is granted only to qualified persons, and proof of specialist knowledge will have to be provided according to the circumstances. Certain conditions are applied, such as the extent and duration of the excavation, the kind of excavation technique employed, the prompt notification of finds, the cessation of excavation work when a find is made, and the surrender of finds (or their later production after preparation) for fresh expert appraisal. Approval of an excavation by the Land Monument Office gives the fossil collector no legal claim, as for example against the land owner for possible damages; nor does approval for the excavation absolve the collector from the observance of trade and industrial relations regulations, building laws, and nature conservation laws (to name only a few). For his excavating activity, the collector alone bears responsibility.

Because fossils as cultural monuments are strictly controlled when found, excavations are usually only carried out by the Land Monument Office or its representatives. Since the Monument Protection Law came into force, the Staatliches Museum für Naturkunde Stuttgart has undertaken numerous fossil excavations to recover outstanding specimens, after notification of their discovery by private collectors. The best known are the excavations in the Tertiary of Langenau near Ulm during the construction of the Ulm-Würzburg autobahn; in the Trias of Kupferzell and also during the construction of the Heilbronn-Nurnberg autobahn; and in the Quaternary Travertine Quarries of Bad Cannstatt, in Stuttgart.

ESTABLISHMENT OF PROTECTED EXCAVATION AREAS

Areas in which the discovery of cultural monuments of especial importance might be expected can be declared Protected Excavation Areas by the Higher Monument Protection Authority in the Government Praesidium (Regierungspräsidium) according to paragraph 22 of the Monument Protection Law. An example is the decree of the Government Praesidium, Stuttgart, concerning the Holzmaden Fossils Protected Excavation Area (Grabungsschutzgebiet Versteinerungen Holzmaden) of 15 May, 1979. In the area of Holzmaden, fossils of outstanding scientific value are protected, especially fishes and reptiles which are completely preserved. The latter include ichthyosaurs, crocodiles, plesiosaurs, pterosaurs, sphenodontians and dinosaurs, especially those which are in unusual positions of fossilisation or show special biological features (such as mothers pregnant or giving birth, embryos born at the death of the mother, skin preservation, stomach contents, injuries, and traces of food). Also protected are crabs, cuttlefishes, crinoids and even plants; these fossils can be very important to scientists in explaining the origin of the Holzmaden fossil deposits and in reconstructing the prehistoric animal and plant world. Works in the Holzmaden Fossils Protected Excavation Area which might uncover or endanger such protected fossils therefore require approval by the Land Monument Office. This applies to house, street, and road construction, and to sewage works. There are supplementary regulations for quarrying in the Holzmaden area, such as restrictions on machine quarrying and blasting operations in fossil-bearing quarry faces, the controlled investigation of those slate beds quarried for fossils, and the application of stricter regulations for notification (see Keller 1985). Agricultural and forestry work does not need approval

provided it avoids interference with the underlying fossiliferous layers. The regulations setting up the Holzmaden Fossils Protected Excavation Area have been of incalculable value to palaeontology by protecting the uniquely preserved Holzmaden fossils.

Specimens exhibited in all the great natural science museums in Germany and elsewhere have made Holzmaden world famous to both specialists and the general public alike. Such displays of Holzmaden fossils fulfil an important educational duty of these museums - to give the 'man in the street' a conception of prehistoric life on Earth.

DISCUSSION OF PROPERTY AND COMPENSATION

Fossils as cultural monuments are in the legal sense 'ownerless goods'. On discovery they become the property of the Land if they are of outstanding scientific value, if they come to light in excavations carried out by Land institutions, or if they are found in Protected Excavation Areas. Legally this title to ownership is held by the Land as laid down in the Monument Protection Law (paragraph 23) where fossils are described as 'Royal Treasure Trove' (Schatzregal). Neither the finder of such a cultural monument, nor the land owner on whose territory the find was made has, or had, any claim whatsoever to ownership of such a fossil. According to the Basic Constitutional Law of the Federal Republic of Germany (Grundgesetz der Bundesrepublik Deutschland), an objection could be made that the Land's claim is an 'inadmissible expropriation'. This, however, is not so because according to Articles 14 and 19 of the Basic Constitutional Law private ownership is 'socially subordinated' and must therefore be restricted where necessary for the welfare of the public. The right of ownership of fossils therefore passes to the Land because the find will then be made available for scientific investigation and for the benefit and education of the general public. A find reward is, however, paid by the Land for the discovery of any fossil of the type described above. The reward is a voluntary payment which, as a rule, can be up to 1000 DM (more in the case of fossils of outstanding scientific importance). The finder of a fossil which is classified as a cultural monument can also be compensated for any expenses which were necessarily incurred during the uncovering of the fossil (such as excavation costs). Naturally the cost of excavations authorised by the Land must be paid; those quarrying firms in the Holzmaden Fossils Protected Excavation Area which have become qualified to excavate fossils through years of experience are paid their excavation expenses. Apart from that, the duty to notify and to keep the find location open is as stated in paragraph 20 of the Monument Protection Law.

Fossils which are not Land property (for example, because they were found before the Monument Protection Law of 1 January, 1972)

can, as stated in paragraphs 24 - 32, in certain circumstances and with appropriate compensation be expropriated. Such fossils can be given additional protection by an entry in the 'Monument List' in accordance with paragraph 12 of the Law. Only complete collections would likely be regarded as of sufficient importance but, to date there has been no test case, since both sides (Land and owner) have naturally been careful to create amicable relations under the law. This policy is followed by the Staatliches Museum für Naturkunde Stuttgart with such finds (as well as those covered by the Monument Protection Law) because, in spite of all the legal regulations and even warnings of penalties for possible contraventions as specified in paragraph 33 of the Monument Protection Law, it is impossible to control all fossil hunting or to compel interested laymen or collectors to co-operate with the Land institutions responsible for the protection of fossils. Without this co-operation from the private sector, such a government agency as a natural history museum, with its many other commitments, can scarcely hope to obtain important new research and teaching material.

CONCLUSIONS

The Staatliches Museum für Naturkunde Stuttgart can justly be proud of the excellent co-operation it has received from collectors and laymen alike. This has led during the last decade to a greatly expanded collection of fossils which are scientifically valuable and internationally famous. An essential prerequisite for the formation of such a collection was the inclusion of fossils as cultural monuments in the Monument Protection Law.

ACKNOWLEDGEMENTS

This paper was translated by Mr A.C. Benton from the original German (Wild 1983) with the assistance of Dr M.J. Benton and the Area Museum Council for the South West.

LIST OF RELEVANT LEGISLATION

1. The Excavation Law of 26 March, 1914 and the Statutes of 30 July, 1920. [Das Ausgrabungsgesetz vom 26 März 1914 und die Ausführungsbestimmungen vom 30 Juli 1920.] Bl. Heimatforsch. heimatl. Leben. 2. F., Sonderheft 1., 1-14. Querfurt 1925.
2. The Baden-Württemberg Monument Protection Law. The legal text with an introductory explanation. [Das Baden-Württembergische Denkmalschutzgesetz. Der Gesetzestext mit einer einführenden Erläuterung.] Denkmalpflege in Baden-Württemberg Nachr. Bl. Landesdenkmalamt; 1, 1-8. Stuttgart 1972.
3. Joint Decrees of the Ministry of Education and the Ministry of the Interior concerning the enforcement of the Monument Protection Law. [Gemeinsamer Erlass des Kultusministeriums und des

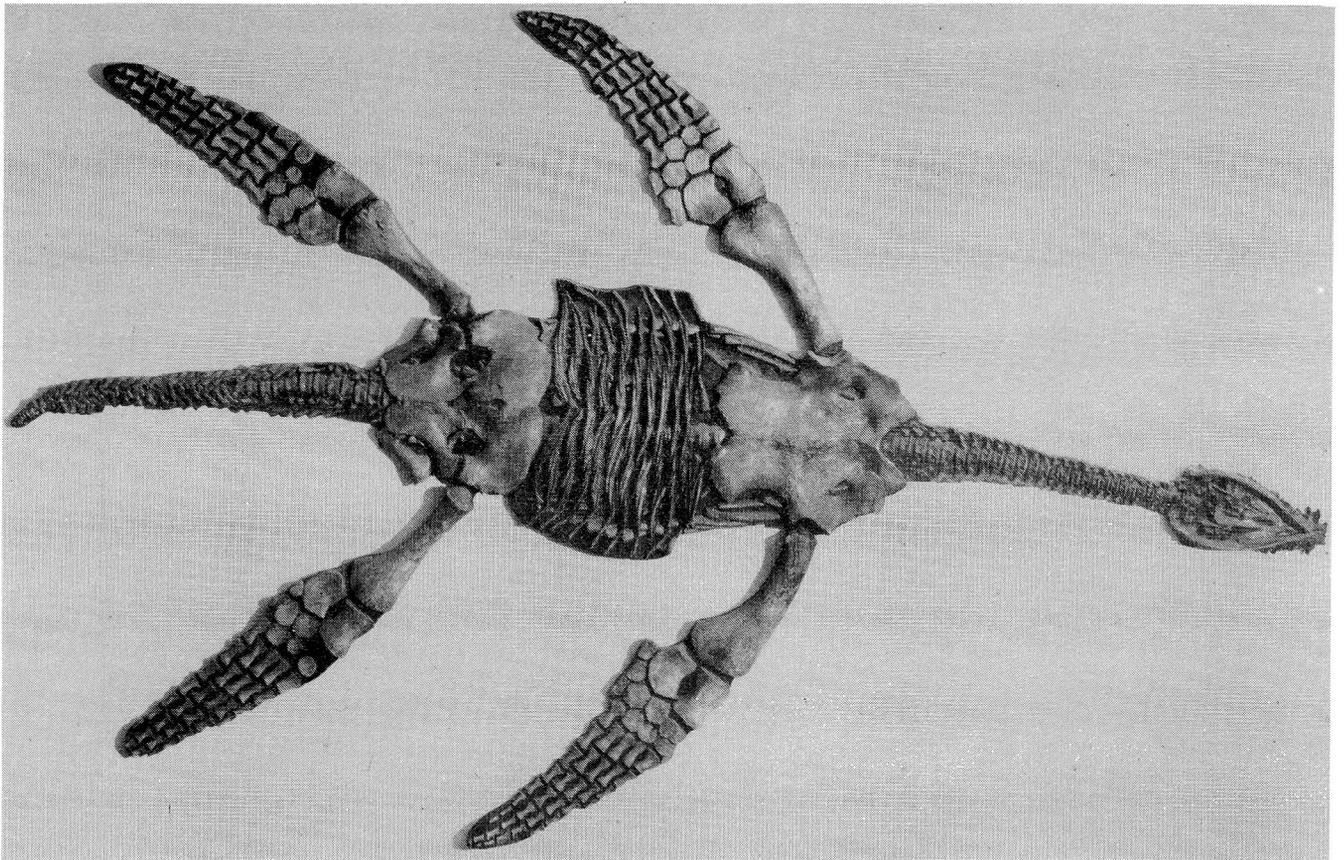


Fig. 2. Thaumatosaurus victor Fraas, an early plesiosaur. Staatliche Museum für Naturkunde Stuttgart Nr. 12478, type, from the Schwarzjura (Lias) EII, 5 at Holzmaden. Photographed after restoration in 1979. The specimen had been mounted on a wall in the old Stuttgart Museum. It was badly damaged by fire during the bombing of Stuttgart in the winter of 1944. Those parts of the skeleton which were completely burnt have been restored using resin casts made from original plaster casts taken before the skeleton was wall mounted.

Innenministeriums zum Vollzug des Denkmalschutzgesetzes (Denkmalschutzgesetz-Vollzugserlass - DSchGVollzErl)] Gemeinsames Amtsbl. Baden-Württemberg, 21, 49-55. Stuttgart 1973.

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5. Decree of the Government Praesidium, Stuttgart concerning the Protected Excavation Law 'Holzmaden Fossils' on the boundaries of the parishes Dettingen below Teck, Holzmaden, Notzingen, and Ohmden, and the towns of Kirchheim below Teck and Weilheim at the Teck in the district of Esslingen, as well as the parishes of Aichelberg, Boll, Dürnau, Hattenhofen, Schlierbach, and Zell below Aichelberg in the district of Göppingen of the 15 May, 1979. [Verordnung des Regierungspräsidiums Stuttgart über das Grabungsschutzgebiet 'Versteinerungen Holzmaden' auf den Gemarkungen der Gemeinden Dettingen unter Teck,

Holzmaden, Notzingen und Ohmden und der Städte Kirchheim unter Teck und Weilheim an der Teck im Landkreis Esslingen sowie der Gemeinden Aichelberg, Boll, Dürnau, Hattenhofen, Schlierbach und Zell unter Aichelberg im Landkreis Göppingen vom 15. Mai 1979.] Ges. Bl. Baden-Württemberg, 1979 (10), 265-267. Stuttgart 1979.

6. Decree of the Württemberg Ministry of Education as higher nature protection authority over the 'Holzmaden Protected Fossil Area' in the districts of Kirchheim below Teck and Göppingen of 24 September, 1938. [Verordnung des Württ. Kultministers als höherer Naturschutzbehörde über das 'Versteinerungsschutzgebiet Holzmaden' in den Kreisen Kirchheim u. T. und Göppingen vom 24. September 1938.] Reg. Bl. Württemberg 18, 241-242. Stuttgart 1938.

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FORTHCOMING MEETINGS

Fri.-Sun. 30 May - 1 June 1986
GCG Cornish Meeting
 Camborne School of Mines, Redruth, Cornwall

Friday:

Morning - introduction to Camborne School of Mines Museum, and tour of School, library and storage facilities.
 Afternoon - Truro Museum and tour of St. Agnes area.

Evening - 'Introduction to Cornish geology' by Alan Bromley
 'Cornish Minerals' by Courtney Smales
 'Mineral exploration in Cornwall' by Keith Atkinson.

Saturday:

Morning - Porthmeor Cove
 Afternoon - Geevor Museum and Mill, and Botallack.

Evening - Extraordinary General Meeting.

Sunday:

Morning - 'Recent developments in mineral conservation' by Bob King
 'The Barstow Mineral Appeal' by Tristram Besterman
 National Trust engine houses
 Afternoon - underground visit to King Edward Mine.

Meeting fee: £13.50 (includes transport and all entrance fees)

Contact: Lesley Atkinson, Camborne School of Mines, Pool, Redruth, Cornwall TR15 3SE (Tel. 0209 714866).

Fri. 5 December 1986
GCG - Geology and the Media and Annual General Meeting
 The Manchester Museum

Programme to be arranged.
 Contact: Dr G. Tresise, Merseyside County Museums, William Brown Street, Liverpool L3 8EN.

1986 Courses at Losehill Hall, Peak National Park Centre

Of interest to geologists will be:

25-27 May - Mines of the Peak District
 26-28 September - Caves of the Peak District
 10-12 October - Minerals, Rocks and Fossils

Contact: Peter Townsend (Principal), Peak National Park Centre, Losehill Hall, Castleton, Derbyshire S30 2WB (Tel. 0433 20373).

SAMUEL CARRINGTON (1798-1870)

BY FREDA ZOETEWIJ

INTRODUCTION (by C. Howard Brunton)

Mr Samuel Carrington of Wetton, Staffordshire, was a careful collector of Carboniferous fossils over many years. In particular, he collected many fine and unusual examples of brachiopods, including several new species described by Thomas Davidson (mostly in 1863); some of these remain unknown from other localities and with insecure classifications. The value of Carrington's material lies in the detailed notes on localities and associated faunas which accompany his fossils, and which Davidson commonly quoted in his publications. Several of these notes remain with Carrington specimens in the collection of material figured by Davidson in his classic *Palaeontographical Society Monographs*, now housed in the British Museum (Natural History).

SAMUEL CARRINGTON (1798-1870)

Samuel Carrington (Fig.1), son of Samuel and Ann Carrington, was baptised in Wetton Parish Church on 25 November, 1798 and buried in the churchyard there on 14 October, 1870. Lewis (1833) described Wetton as follows: 'a parish, in the Southern Division of the hundred of Totmonslow, county of Stafford, 7.1/2 miles (N.W. by N.) from Ashbourn, containing 497 inhabitants. The river Manifold runs through the parish, as far as Wetton-mill, then suddenly disappears through the fissures of its limestone bed, and, continuing a subterranean course for about five miles, emerges within a few yards of the place where the river Hamps re-appears in like manner from its channel underground. At Ecton hill are extensive lead and copper mines, affording employment to numerous men, women, and children. The living is a perpetual curacy, in the archdeaconry of Stafford, and diocese of Lichfield and Coventry, endowed with £800 royal bounty, and £1200 parliamentary grant, and in the patronage of W. Burgoyne, Esq. The church is ancient and much decayed: over the doorway is a piece of rude sculpture. Twelve poor children are instructed for an annuity of £5, the bequest of William Risbridger, in 1754. Within this parish is a remarkable cavern of large dimensions, termed Thor's House, in which the Druids, it is believed, sacrificed to their god Thor.'

Samuel senior worked at the Ecton Copper Mines, then owned by the Duke of Devonshire, as leader of a team of twenty-eight copers. Copers were men who mined ore by striking a bargain with the mine manager or agent, cope being a duty paid so that the miners could sell the ore as they pleased, and not only to the owner of the mineral rights. Each team of copers had its chief who struck the bargain and he in turn made bargains with his own men. If they were good miners, and if the chief were astute, they could make a lot

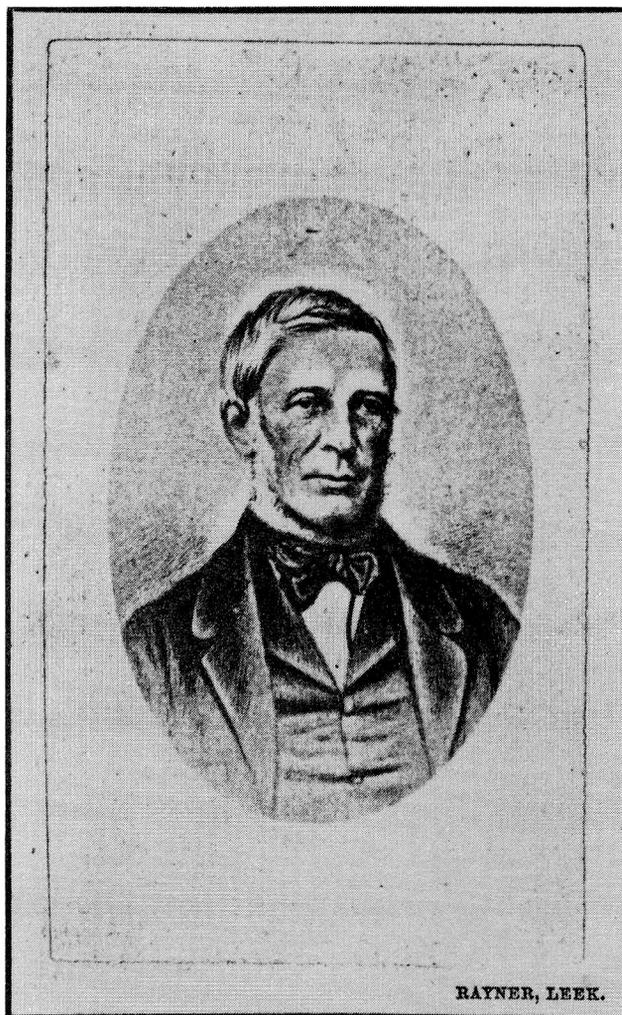


Fig.1. Presumed photograph of Samuel Carrington (1798-1870) reproduced from Anon. (1874?).

of money. At the peak period of the Ecton Mine in 1786, Samuel Carrington (then only thirteen or fourteen years old) and his group were the most successful team and extracted half of the total output of the mine. They produced up to 320 tons of ore per six or seven week period and the men earned an average of £1.25 per week, which was very good for that time (Robey and Porter 1972).

Samuel junior was sent to the village school at an early age and later, when a vacancy occurred, was appointed Master himself. In his twenty-first year Samuel and his father emigrated to America 'but he was dissatisfied with that country and gladly returned home with the intention of never quitting again his native parish' (Briggs 1873). His dissatisfaction must indeed have manifested itself very quickly because the Memoir of Samuel Carrington, written by an unknown friend of over thirty years standing, states that he held the posts of parish clerk and

THE VILLAGE SCHOOLMASTER.

The foregoing inscription is necessarily brief, and one of his old friends would supplement it with a few particulars of his personal history and labours in the common cause of science; though "the even tenour of his way" was pursued too unostentatiously to give scope for any record of a stirring nature, or to justify one with over much of the laudatory.

Mr. Carrington's father held, we believe, a position of trust at the neighbouring copper mine of Ecton—once a source of great wealth to its owner, the Duke of Devonshire. The village of Wetton where our friend resided, and much of the district, owned the same lord, and the present Duke has not shewn a want of liberality to the family. The inscription records Mr. Carrington's birth to have been at the close of the last century, or at least this may be inferred, and he may be considered as an example of how the philosophy generally in favour in England in that century and the first part of this, might influence a well-meaning and intelligent mind. Though ever eager for truth and knowledge, we think he scarcely entered into several of the important enquiries of our times. His mind, probably, was never much agitated with theories of development, or with the opposition to his favourite mode of looking "from nature up to nature's God,"—he was the child of nature, and she was both his instructress and his book. Some of those who peruse these lines may recollect a short discourse, which he gave, spade in hand, in one of the cavernous openings of Wetton valley, in which he discussed the antiquity of the rocks, and valleys, and watercourses around, and shewed how these supposed deformities on the earth's surface were proofs of design, and objects of beauty as well as of utility. He enjoyed an innate spring of revelation, though not unmindful of the Written Word, as befitted his humble position of parish clerk and schoolmaster, which posts he held for fifty years. His end was, as the writer was informed by his village pastor, one of Christian peace.

It must be about thirty-five years since, when the writer of this little memoir became acquainted with Mr. Carrington as the "wise man" of those parts. His studies then

were mostly botanical, and he was accustomed to make drawings of almost every wild plant he met with. They are extremely accurate, and have the natural air, so as to be immediately recognised. He was also observant of insects. His geological and antiquarian researches were only just begun, and his few specimens, some of which were then of the wonderful description, occupied a portion of his pantry. We could hardly foresee that he was to become one of the most assiduous collectors in England, doubtless so of mountain limestone fossils, and the discoverer of many new forms, some of which bear his name. Under the patronage of the late Mr. Bateman, of Youlgreave, he commenced that course of barrow opening which has rendered both of them well known to archæologists. Our friend took a good share of the work; he also made special researches on the sites of ancient British dwellings at the Borough in his own immediate neighbourhood. Under the auspices of the Midland Scientific Institute he extended researches, which had been previously made, in the floor of Thor's Cavern; many remains of a Romano-British character were found, though none of primeval man.

He left several manuscripts behind him, one apparently ready for the press, descriptive of the barrows he had opened, and illustrated with numerous drawings; part of the matter is embodied in Mr. Bateman's two books, but by no means all. There are other writings, as well as poems, the latter, however, principally of local interest, with a vein of the humorous. He took an interest in the topography of his own district, unsurpassed as it is in objects fitted to create it; each rock and tor and cairned hill-summit, each dale, fissure, or cavern, was well known to him, and he took much interest in the derivation of their names.

In all his pursuits one of his daughters (Ann) took an especial interest; she was well up in his books and specimens, and followed him with bag, hammer, and chisel, in his frequent geological rambles. At his death the poor girl drooped, and after a long and trying illness succumbed in the course of this spring of 1874—her end like her father's being happy and peaceful. Her grave will be seen in the photograph by the side of her father's tomb.

Fig. 2. Facsimile reprint (reduced) of the two facing, unnumbered text pages in the Memoir of Samuel Carrington (Anon. 1874?).

schoolmaster for fifty years; if accurate this would mean that he was appointed in 1820 or very soon after (Anon. 1874? Held by Stoke-on-Trent Reference Library, the two pages of text are reproduced in Fig. 2).

It seems that Samuel's father also eventually returned to his home village as he died in Wetton on 17 March, 1840 aged 67; his mother was buried there on 26 January, 1829. A possible explanation for the father's emigration has been suggested to me by Mr Peter Naylor (mining historian of Wirksworth, Derbyshire):

'Now why did he leave Ecton circa 1820? In 1818, John Taylor, the famous mining entrepreneur, took the management over and he always worked on a tribute system; he paid a percentage of the ore got, and not very high either. It is easy to see that copers would not accept this. British mining generally was in the doldrums, the Napoleonic wars were over. It is a reasonable assumption that Samuel decided that he might seek work

elsewhere and California is where they drifted; the mines were just being opened up at that time.'

On 29 December 1823 Samuel married Olive Chadwick of Grindon, eldest child of Thomas Chadwick and Mary née Lownds, by whom he had nine children. (To date seventy-four direct descendants of this couple have been identified and there is scope for many more.) Samuel Carrington was evidently a man of many talents, as well as possessing unusual physical and intellectual energy. In addition to his work as schoolmaster, Parish Clerk and farmer (besides, one would hope, helping to bring up his nine children) he was keenly interested in botany, geology and archaeology and became something of an expert in these fields. He also had considerable ability as a draughtsman, as can be seen from his drawings of plants and shells, and he was a member of the old church band and village band. He worked with Thomas Bateman, the Derbyshire archaeologist and fossil-collector, in his barrow-opening

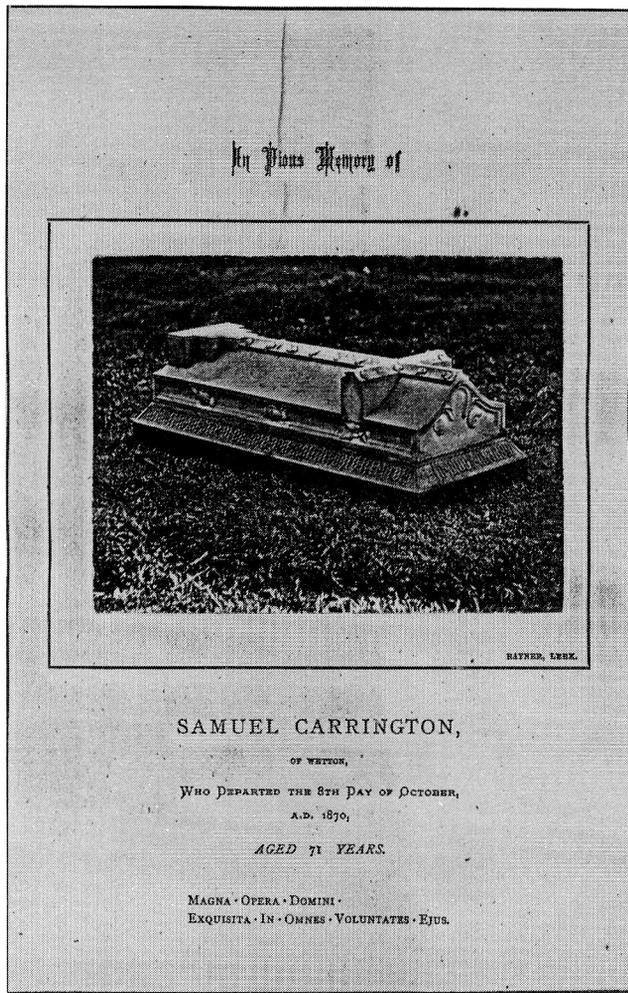


Fig. 3. Tomb (and inscription) of Samuel Carrington, erected in Wetton Churchyard c.1874. Reproduced from Anon. (1874?).

activities and contributed large sections to Bateman's (1861) Ten Years' Diggings; between 1845 and 1861 he explored on his own account 117 tumuli. Following Bateman's death he continued this work with Mr Lucas of Bentley Hall. He collaborated with Thomas Davidson of Brighton, Sussex, and collected thousands of fossils from the Carboniferous Limestone country around his home. He discovered and investigated the site of a Romano-British village at Borough Holes near Wetton and, under the auspices of the Midland Scientific Association, he directed the excavation of Thor's Cave where many Romano-British remains were found.

Samuel wrote up detailed accounts of his activities; in addition to the published writings listed below, Briggs (1873) records that he contributed geological papers to local histories by Sleight (1862) and Garner (1844). According to the Memoir (Fig.2):

he left several manuscripts behind him, one apparently ready for the press, descriptive of the barrows he had opened, and illustrated with numerous drawings; part of the matter

is embodied in Mr Bateman's two books, but by no means all. There are other writings, as well as poems, the latter, however, principally of local interest, with a vein of the humorous.'

He remained as schoolmaster until his death, a few weeks before his seventy-second birthday, and was the first headmaster in the new school building opened in 1866 next to the church. This building still stands but is no longer used as a school; it has been given to the village by the present Duke of Devonshire. The old schoolhouse on the hill, where he lived and worked for most of his life, is also still standing but is now a private residence, having been reduced in height from three to two storeys.

Three or four years after his death an elaborate tombstone (Fig.3) was provided by public subscription organised by Thomas Wardle (later Sir Thomas, President of the North Staffordshire Naturalists Field Club); the subscription list is headed by the Fifth Duke of Devonshire (Fig.4). The tomb was designed by G.G. Scott, Esq., Jun., M.A., who presented the design; the carving and stonework was executed by Mr E. Ash of Buxton. It is decorated with characteristic fossils of the district, including six species which Samuel was the first to discover in the North Staffordshire Limestone (four of these were named after him or his village):

Athyris carringtoniana Davidson, 1863
Rhynchonella carringtoniana Davidson, 1863
Rhynchonella wettonensis Davidson, 1863
Productus carringtoniana Davidson, 1863
Spirifer carluikiensis Davidson, 1859
Retzia ulothrix De Koninck, 1843

The type material is in the British Museum (Natural History).

ACKNOWLEDGEMENTS

Help received from the following is gratefully acknowledged: Ms Pauline Beswick and Mr T. Riley (Sheffield City Museum), Dr M. Bishop (Buxton Museum, Derbyshire Museums), Dr C.H.C. Brunton, Dr A.P. Harvey and Mr A. Rissone (British Museum, Natural History), Mr J. Crossling (Warwickshire Museums, ex Derby City Museum), Dr P.R. Crowther (Leicestershire Museums Service), Mr and Mrs K. Fry of Huddersfield, the late Mr S. Goodfellow of Wetton, Staffordshire, Dr M. Mitchell (British Geological Survey), Mr P. Naylor of Wirksworth, Derbyshire, Mr J.N. Owens (Wollaton Hall, Nottingham City Museums), Mr D.I. Steward (Stoke-on-Trent City Museum and Art Gallery), Mr F.B. Stitt (County Archivist, Stafford), Dr H.S. Torrens (Dept. of Geology, University of Keele), Mrs S. Turvey of Geneva, Switzerland, and Dr G.T. Warwick (Dept. of Geography, University of Birmingham).

Any corrections or further information about Samuel Carrington will be welcomed.

NUMERICAL LIST OF
MOUNTAIN LIMESTONE FOSSILS

FOUND IN
NORTH STAFFORDSHIRE,

By Mr. CARRINGTON, of Wetton, down to the 24th Feb., 1870.

VERTEBRATA.

PISCES Species. 22 Palate teeth and Dorsal spines of 22 species have been identified. Many others, but unknown.

SUB-KINGDOM 2. MOLLUSCA.

CLASS 1.—CEPHALOPODA. Order 2, Tetrabranchiata.

Nautidæ 23
Orthoceratidæ 25 Two of these not identified.
Ammonitidæ 35 Five not known.

— 83
CLASS 2.—GASTEROPODA. Order 1, Prosobranchiata.

Naticidæ 15
Pyramidellidæ 18 One of them not named.
Turritellidæ 4
Littorinidæ 1
Turbinidæ 37
Haliotidæ 52 Several of them not named.
Calyptrodæ 15
Patellidæ 11 Two of them from the cleft at Narrowdale, appear to be new species.

Dentaliæ 4
Atlantidæ 12 Two of them unnamed.

— 169
CLASS 3.—PTEROPODA.

Hyaloidæ 1 The Conularia Quadriscata. *Sowerby.*

— 169
CLASS 4.—BRACHIOPODA.

Terebratulidæ 3 Also *T. virgoides*, *M' Coy*,
T. ficus, *M' Coy*, and other varieties
Spiriferidæ 46 Including 4 not named. The varieties are
many, especially of *Sp. glabra*.
Rhynchonellidæ 17 Varieties are numerous, but some appear to
be entitled to a specific name.
Orthisidæ 12 Some thick beds are almost composed of
Orthis resupinata.
Productidæ 37 Including 4 not named.
Cranidæ 1
Discinidæ 2
Lingulidæ 3

— 121

CLASS 5.—CONCHIFERA.

Astradæ	12	
Aviculidæ	111	This includes 83 aviculo-pectens, many of them not known, i.e. have no specific name
Mytilidæ	23	Not known.
Arcadæ	31	
Trigonidæ	10	Not known.
Cardiæ	6	
Lucinidæ	5	
Ciprinidæ	28	
Veneridæ	2	<i>M' Coy.</i>
Mastridæ	4	
Tellinidæ	1	
Myacidæ	28	
Annalinidæ	1	
Unknown	3	
	— 264	

SUB-KINGDOM 3. ARTICULATA.

Trilobites,
Serpula, &c. — 28

SUB-KINGDOM 4. RADIATA.

Bryozoa 49 Of them 11 unknown.
Anthozoa 59 Some not determined.
Echinodermata 24 Owing to the hardness of our Limestone but few have been found sufficiently perfect for identification.

— 132

Total No. of species 676 of all classes exclusive of varieties.

PLANTÆ.

'Filices Equisetaceæ, and Algæ from the Shale, Wetton. These are accompanied by small bits of pure coal, &c. Other plants are found resting on the Limestone at Narrowdale Hill, where they appear to have been drifted by oceanic currents.

Up to the time of his death Mr. Carrington had subsequently enlarged this list, besides the discovery of a considerable number of species at present undescribed.

The tomb was designed by G. G. Scott, Esq., Jun., M.A., who kindly presented the design. It is a recumbent Cross, enriched with conventionalized forms of the characteristic fossils of the Carboniferous Limestone of the district, those above the plinth being six species which Mr. Carrington was the first to discover in the North Staffordshire Limestone, four being quite new, three of which deservedly bear his name, and one the name of his village. They are

Athyris Carringtoniana
Rhynchonella ditto
Rhynchonella Wettonensis
Productus Carringtoniana
Spirifer Carlukiensis

Besides *Retsia Ulstrix*, which he found at Wetton, and thought was a new species, but which Prof. De Koninck has identified as belonging to the species he named *Ulstrix*. All carving and stonework has been very well executed by Mr. E. Ash, of Buxton.

Fig. 5. Facsimile reprint (reduced) of species list of Carboniferous fossils identified by Samuel Carrington, reproduced from Anon. (1874?). Wardle (1873), in his Presidential Address to the North Staffordshire Naturalists' Field Club, states that 'The late Samuel Carrington ... brought to light no fewer than 676 species of limestone fossils ... A list of these fossils was printed for the Leek meeting of the club in 1870.' This may be the list referred to.

COLLECTIONS AND MANUSCRIPT MATERIAL

British Geological Survey, Keyworth, Notts: BGS records show that 2,200 Carboniferous fossils from Staffordshire (together with the originals of two catalogues that were with the Collection and a hand-written list of the material) were purchased on 15 December, 1870 for £21.

British Museum (Natural History), London: ten brachiopods collected by Carrington came to the BM(NH) with the Thomas Davidson Collection. All are figured and they include primary types for the four new species erected by Davidson (1863) (listed above).

Derby Museums and Art Gallery: archaeological material only.

Derby Central Library: a bound volume containing manuscript works by Carrington (a play, correspondence and poems).

Passmore Edwards Museum, Stratford, London: about fifty accessioned fossils, predominantly bivalves and brachiopods from Derbyshire.

Sheffield City Museum: several hundred Lower Carboniferous fossils with labels in Carrington's own hand from two different sources, i.e. the Bateman Collection from Lomerdale House and the collection of the Rev. Urban Smith of Stoney Middleton, Derbyshire. Correspondence and archaeological material relating to Carrington occur in the Bateman Collection. Labels with many of Smith's specimens refer to their examination by Thomas Davidson.

Stoke-on-Trent City Museum and Art Gallery, Hanley, Stoke-on-Trent: a small notebook containing manuscript notes (presumably for his teaching) on history, geology, botany, astronomy and statistics.

Wollaton Hall, Nottingham City Museums: Samuel Carrington's collection was purchased by the Nottingham Natural History Museum in April 1870. The collection is accompanied by a manuscript catalogue written many years ago by a staff member. The numbering of items in this book is from 1 to 677, a list of species and varieties. The actual number of specimens is not known because there may be 1-10 or more specimens per item listed in the MS catalogue. Carrington specimens were incorporated into the main collections without any distinguishing markings, so it is difficult to match specimens with entries in the MS catalogue.

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MINERAL COLLECTION NEEDS GOOD HOME

The René Gallant Minerals Stoneycombe, Kingskerswell, Devon

The collection was begun by Col. René Gallant under the guidance of the Torbay chemist and mineralogist Edwin J. Beer (now in his 107th year). It has been built up over the last twenty years. The chief sources were mineral dealers, friends in England and abroad, and expeditions by Gallant to sites in Devon, Cornwall, Scotland, Wales and Belgium and France.

Arrangement: the minerals are stored in shallow, labelled, uncovered boxes.
Species: 250, as counted by Mr D. Curry of Plymouth Museum.
Specimens: approx. 1,500.

Origin: worldwide.
Catalogue: as kept by René Gallant.
Labelling: in Gallant's handwriting, consistently detailed and meticulous, including place of origin.
Individual specimens: some have special rarity value, but in general the specimens are significant as part of an ordered and coherent collection.

In addition to the Minerals Collection, there is a small labelled collection of Rock Specimens, and a small labelled collection of Fossils.

A good home for the collection is sought by: Basil Greenslade, 13 Pulteney Gardens, Bath BA2 4HG.

RON PICKFORD - CURATOR EXTRAORDINARY

BY CHARLES J.T. COPP AND HUGH S. TORRENS

By 1979 one of us (HST) had had enough of banging his head against the brick wall of Bath culture and the problems of getting anything done about 'the management' of the Bath Geological Museum, and decided to lay down his pen on the subject! He is delighted to take it up again if only to help write an appreciation of the man but for whom there would not be a Bath Geological Museum - Ron Pickford.

My (HST's) connection with these geological collections goes back to 1963 when, as a thesis-grinder, I was scouring the country looking for Bathonian ammonites (which I discovered were much more common in museums than in nature). My Bath recollections are dimmed by time but I do recall the need to appear in person before the Library Committee to explain what I wanted and why. After their wall of incomprehension on such matters had been broken down, I was allowed to crowbar my way into the wooden crates to see what they contained and how the specimens had survived their twenty-three years sepulture.

It must have been at this time that I first met Ron Pickford. Ron had lived almost all his life in Bath. It was the sight of the Moore collection in its original home in the Royal Literary and Scientific Institution, Terrace Walk during the early 1930s that first aroused Ron's interest in geology. Details of his early life are sparse and so Ron will make an ideal future subject for our 'Uncurated curators' series. These boyhood years saw Ron running off with a travelling circus cum funfair - an episode which continued for several months! During the Second World War he managed to enlist and serve for a few months in the Navy before it was discovered that Ron had a reserved occupation (as a joiner); he deeply regretted being sent back to dry land.

Dry land and joinery, however, was the combination which brought him in 1959, in his late thirties, face to face once more with the geological heritage of Bath and the marvellous collections it had generated. Ron was then employed by the library services in Queen Square as a 'general factotum' cum joiner; it was originally only incidental that the remains of the geological collections then shared the same home as the new library where he worked.

Libraries in Bath are as famous for the treasures they contain (resulting once again from the city's long cultural history) as for the particular obstinacy with which the locals viewed the whole idea of any public library service (Kelly 1973, pp.25, 161). It took fifty years for Bath formally to adopt the Public Libraries Act of 1850. In 1906 they even declined Andrew Carnegie's offer to provide a Public Lending Library building for them!

On April Fool's Day 1959 the assets of the Royal Literary and Scientific Institution (its home and its collections) passed over to Bath City Council. The next five years saw their buildings in Queen Square modified to allow the Reference Library to move in (Pagan 1974). Ron Pickford, as an intelligent and cultured man with a keen interest in collecting (some of his own collection of Japanese prints has been used in an exhibition at the Victoria and Albert Museum), was horrified to see the way the contractors modifying the building for a library treated its contents. With a general knowledge of geology and a crucial awareness of the historic and scientific value of the collections, Ron's became a personal and often lonesome battle, first with the building contractors, then the city fathers (not forgetting the visitors to the collection) to see that the collections survived these collective predations - often at his own expense and in his own time.

By 1968 the Library Committee had agreed that the boxed material returned from Bristol in 1959 should be re-housed in better storage. Ron was asked to do this, in the process wonderfully carpentering old cabinets into new life and into smaller spaces in the basement room at Queen Square. In the same year a small selection of the treasures of the collection were put on public display in the old Moore Room. Ron was also now formally appointed 'curatorial assistant', a title which always implied that there was someone else to help - though no such person ever materialised!

In 1973 the other of us (CJTC) first came into contact with this remarkable one man band. Our visits to Bath were unfunded, and a letter of this year (which HT treasures to this day), signed by a Mr Pagan (Director of the Municipal Libraries and Victoria Art Gallery) expressed the hope that a particular forthcoming visit would 'have results of benefit both to yourself and to this Department' (the underlining original).

In April 1974 the collection passed to the Library Service of Avon County Council, based in Bristol; for a time Ron was in a state of serious uncertainty - even about who his employer was. Despite this he continued his good work on the collection which was admired and applauded by a group from the Palaeontological Association in 1975. By this time the display of the collection had been expanded in the third floor Kimball Room, a move which again put Ron's cabinet-making skills to the test.

At this time local journalist Martin Wainwright also paid a well deserved tribute to Ron's work in the Bath Chronicle (19 March, 1975). In the next month Ron's own somewhat muted account of these sixteen years

was published by the GCG (Pickford 1975). In 1977 the Group tried to become more involved in the collection's welfare; this drew a letter from the Bath Director of Leisure and Tourist Services who wrongly thought he had taken over the care of the collection following local government reorganisation. His letter stated that 'in a city whose museums are regarded as part of the tourist attractions and provide an excellent income, it is not going to be easy to persuade the City Council to spend a considerable amount of money to house and display the collection unless it can provide its own income'. In fact, the City Council no longer owned the collection anyway!

By the late 1970s advice and recommendations for the collection's future had started to flow thick and fast. Throughout it all Ron stuck to his self-imposed task of caring for all the old Royal Scientific and Literary Institution collections (which were by no means all in the field of geology). Knowing Ron's impish sense of humour it has sometimes been difficult to know when all the advice has proved too much for him. The consensus is that at times he has been seriously annoyed by articles about the history of the collections which he felt too often implied that they were still being neglected. Despite this he pressed on, for a while with the help of Gill Huggins (a like minded administrative assistant in the Library Service), unpacking, checking and curating the material as it came to light. Ron has never possessed any formal qualification, but has in abundance the greatest gift any curator could ask for - basic common sense. Using this, the old collections at Bath have been put into good, safe order and documented to a high standard. He has preserved all old labels, stopped any physical deterioration, and carefully recorded all that he and others were able to discover about the specimens which he disgorged from the boxes, the heaps of rubbish in the basement, or wherever.

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Manuscript received 6 December 1985

Perhaps the best proof of Ron's curatorial skills is his unmasking in 1984 of fossil thief John Thomas Whitehouse (Geol. Curator, 4, p.105). From his knowledge of the collections, Ron was able to identify specimens recovered by police as having come from his Bath collections. The police took him out for a drink after the successful conclusion of the case - Ron recalls it as his best night out since the war. He had certainly earned it. The recent advertisement for a 'proper' curator (now appointed) for the Bath Geological Museum (Museums Bulletin, 25, p.162), to replace Ron on his retirement, is a more permanent reminder of his achievement. Without Ron Pickford there would have been no Museum to need another curator. We must ensure that the work is continued to the high standards he set.

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DIDI - A MODEL WITH A DIFFERENCE

BY ARRIL JOHNSON

In July of 1984 I was asked by Aardman Animations in Bristol to construct and animate a life-like model of a flying reptile for the BBC series 'Wildlife on One'. I am a professional film animator with an interest in prehistoric animals and have made several reconstructions for the Geology and Schools departments of Bristol City Museum. It all seemed to make sense. It even seemed exciting. By the end of November the last frame of film was shot. I was exhausted, but I was excited and I had learned much in those five months.

The original subject of the restoration was to have been Rhamphorhynchus and several days were spent researching and sketching various references, but it was finally decided that the proportions and relatively primitive features of Dimorphodon macronyx had more dramatic potential. Conjectural anatomical details, inferred from Rhamphorhynchus and Sordes pilosus by Kevin Padian (Department of Paleontology, University of California), made 'Didi' even more dramatic. She not only had a large head, prominent stabbing teeth, and well developed legs with strange 'spurs' on her feet, but now also had a horny beak, hair, and a rudder-shaped tip to an already stiffened tail (Fig.1).

In order to improve the fluidity of the animation it was intended that each exposure or frame be slightly blurred. In other words, 'Didi' actually had to move during the exposure and not simply be repositioned between frames as in most stop-motion or puppet animation. A prototype mechanism was worked on which could impart limited motion in about seven directions and still fit inside the model's magpie-sized body. It was beginning to work, but needed more time to perfect. Time was limited and so was money. When a self-imposed deadline arrived it was time for the contingency plan. By twanging her dead, manhandling her base, swinging her on nylon thread, and wiring her wing-tips to

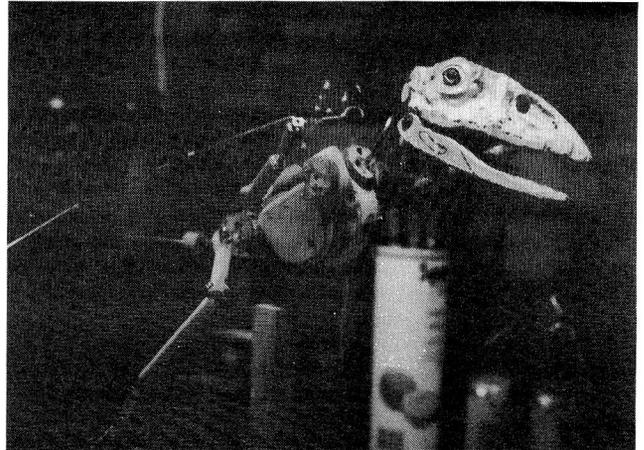


Fig.2. Armature of wood and wire

motorized cams the bigger movements were blurred. The rest was normal (if there is such a thing) animation.

Fig.2 shows the wood and metal armature that made repositioning possible. The wing-fingers and most of the tail were tempered steel wire. The base of the tail, the ankles, hips, wrists, shoulders and neck were soft aluminium wire. This was cheaper and lighter than the usual ball-and-socket joints used at these positions on puppet vertebrates, but did tend to fatigue and require repair during filming. The knees, elbows, wing-fingers and jaw were pivoted on small machine screws which could be tightened. The final form of 'Didi' was sculpted over the armature in Plasticine and made into a six piece plaster mould. The mould and Plasticine were then removed and so was the foil and plastic film that protected the armature from the Plasticene. Liquid latex was applied to the mould and backed with various thicknesses of foam rubber. The cast was then fitted on to the armature. This is a hybrid and, as far as I know,

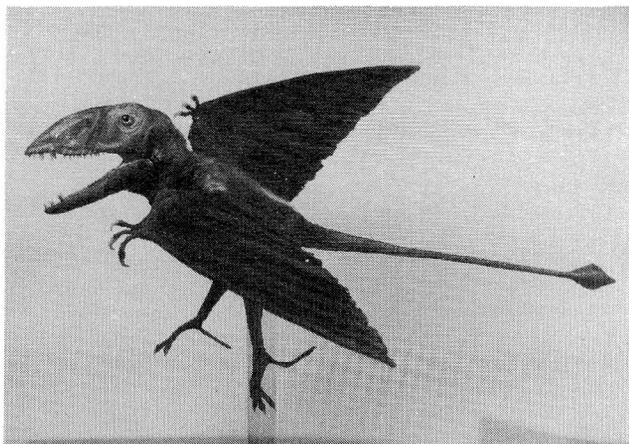


Fig.1. 'Didi' - the finished model

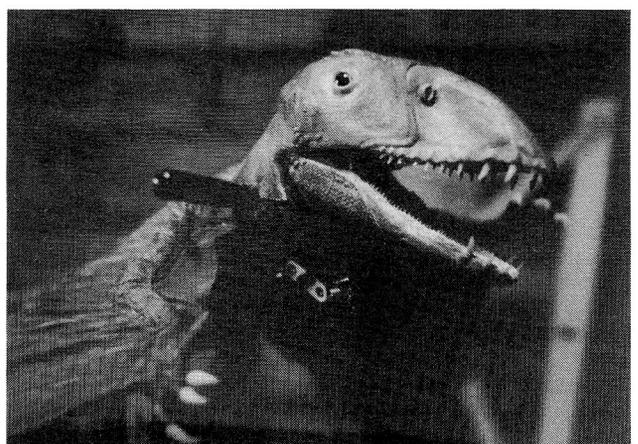


Fig.3. Jaw movement controlled by a screw

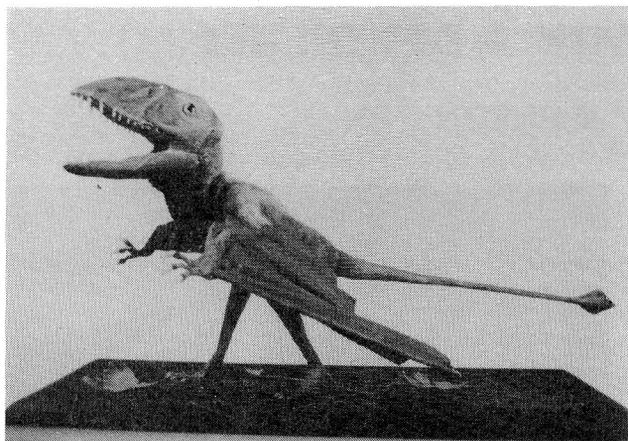


Fig. 4. 'Didi' today in Bristol City Museum

original technique which combines the control of foam casting with the adaptability of the 'build-up' techniques (as used in the original 'King Kong'). Fig.3 shows an alert 'Didi', wired eyelids at full stretch, ready to seize her prey with Fimo teeth, swallow it at the turn of a screwdriver, and fly away on chest-mounted ball-and-socket supports. Fig.4 shows 'Didi' in dynamic repose on a textured base at Bristol City Museum, waiting for small, curious children to come closer...

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Typescript received 6 September 1985

FOSSILS ON THE MOVE

BY BERNARD OWENS

By the end of March 1986 the British Geological Survey's Type and Stratigraphical Collections of British Fossils will have been transferred from its former home in the Geological Museum in South Kensington to its new accommodation on the Survey's campus at Keyworth near Nottingham. Almost a year of intensive work has gone into the preparation for this move which has involved the packing of more than 150 large cabinets containing 6000 drawers and in excess of 250,000 specimens.

The equivalent collections of mainly Carboniferous material are already at Keyworth awaiting the completion of their new accommodation. The 'Survey' Collection from London, a further 7000 trays, are already installed in the new National Geoscience Data Centre store at Keyworth and will be supplemented in the near future by companion material currently held in storage near Leeds.

In the planning phase of the move, two guiding principles were identified which we have tried to apply throughout all aspects of the operation. The prime responsibility was to ensure the successful transfer of the material without causing any damage to individual specimens. The second principle was the need to avoid 'freezing' the collections from study by other workers. Inevitably a move of this magnitude will mean that some inconvenience is caused, but it was our hope that this could be restricted as far as possible to the period around the actual transfer. With these difficulties in mind a letter was circulated in the Spring of 1985 to all palaeontological bodies and university departments informing them of the schedule for the proposed move and asking for their cooperation in limiting the number of consultations and loan requests during the critical transfer period. We are

particularly grateful for their cooperation which has enabled the progress with packing to stay on target. Inevitably some requests were made and some visitors, particularly from overseas, did arrive unexpectedly at the Geological Museum wishing to examine particular parts of the Collections. All of these requests have been met in full and with the minimum of inconvenience to the packing process.

The use of the original drawers and cabinets to provide a secure mode of transfer has avoided the necessity to crate any of the main part of the Collections. An exception will, however, have to be made for the large specimen part of the Collection where some form of crating will be essential. By adopting this approach it is hoped that urgent access to particular items can be achieved at all times (with the exception of the critical period of the actual move). Considerable thought was given to packing materials before reaching the decision to rely on plastic bubble sheeting ('Jiffy' and 'Polycap'). Individual specimens have been wrapped in the fine bubble version and secured with sellotape. Large spaces in drawers have been filled with the large bubble version and a single overlay sheet placed between the specimens and the glass drawer lid. Although expensive we believe this method will afford maximum protection during transit. In the case of delicate specimens (particularly those of Tertiary-Quaternary age), additional precautions have been taken. Individual specimens have been protected by cotton wool or wadding, placed in protective boxes and cushioned with a layer of bubble plastic. The use of polystyrene granules was considered but difficulties were foreseen in the unpacking process which outweighed the possible advantage of this method, that of speedy application.

The main part of the packing operation will be complete early in 1986 and attention will then turn to the different problems posed by the large specimen collection. It is anticipated that much of this will be transported in large wooden or plastic crates with individual specimens again being packed in bubble plastic.

Whilst we are confident that all foreseeable precautions have been taken to avoid damage to the Collections during the transfer, considerable difficulties may be experienced when we come to transfer their cabinets and associated plinths. The cabinets have been in place in Exhibition Road for fifty years and considerable care and carpentry skill will be necessary to successfully relocate them in their new accommodation. Care will be taken to ensure that the atmospheric environment of the new building is suitable for the Collections. The shell of the building is now complete and the drying out process has begun. The nature of the materials employed in packing the Collections will probably serve to protect individual specimens from temporary changes in humidity levels during the first few weeks.

Bernard Owens
Manager
Biostratigraphy Research Group
British Geological Survey
Keyworth
Nottingham NG12 5GG

Typescript received 30 December 1985

By late 1986 it is hoped that the Collections will be re-established and the process of unpacking under way. One member of the Survey's Biostratigraphy Research Group will be responsible for all aspects of curation, arrangements for loans, etc. The new accommodation, in addition to housing the Collections, will also include a curator's room, visiting scientists' room and a small library for all reference books related to the Collections. Although the transfer has involved much work, it has provided the impetus to introduce a new computer based loan system which will allow more accurate control of this important aspect of our responsibilities.

Programme for transfer:

1.1986	Complete packing of all cabinet material
3.1986	Complete packing of large specimen collection
2-3.1986	Transfer temporarily to heated rock store at Keyworth
late 4.1986	Hand over of new building
5-6.1986	Re-establishment of Collections in new accommodation

LETTERS TO THE EDITOR

Dear Editor,

I was very interested to read Jennifer Clack's response (Geol. Curator, 4(4), 198) to our article on the rediscovered Triassic amphibian of Bear Island (Doré and Wandås 1985. Geol. Curator, 4(3), 169-171). I believe that the Norwegian palaeontologists who will be involved were not aware of Panchen's (1959. Phil. Trans. R. Soc. 242, 207-291) reference to the fossil, and I have therefore forwarded this information to them.

I cannot resist a final postscript. Having been buried yet again (deliberately this time), the amphibian was finally collected, a year after its rediscovery, by members of another expedition to the island in August 1985. The fossil was lifted out by helicopter and now resides safely in Oslo's Palaeontological Museum, where it is being developed by curator Aage Jensen. The find caused quite a splash in the Norwegian media, and this will culminate early in the New Year when the Norwegian broadcasting service (NRK) plan to make a TV feature.

The missing pieces of the amphibian collected by the 1948 Cambridge expedition have been located, not in Norway, but in Copenhagen Geological Museum. These pieces, it appears, still fit well with the Bear Island material and include valuable sections of the skull and neck region. The fact that the fossil material, photographs and publications were assembled from diverse sources in such a comparatively short space of time seems to me to be a tribute to the efficiency of the curator network.

Yours sincerely,

Anthony G. Doré

Conoco (U.K.) Ltd
Park House, 116 Park Street
London W1Y 4NN

LOST AND FOUND

COMPILED BY DONALD I. STEWARD AND HUGH S. TORRENS

Abbreviations

- CLEEVELY - Cleevly, R.J. 1983. World palaeontological collections. British Museum (Natural History) and Mansell Publishing Company, London.
- DESMOND - Desmond, R. 1977. Dictionary of British and Irish botanists and horticulturalists. Taylor and Francis, London.
- GCG - Newsletter of the Geological Curators' Group, continued as The Geological Curator.
- KENT and ALLEN - Kent, D.H. and Allen, D.E. 1984. British and Irish Herbaria. Botanical Society of the British Isles, London.
- LF - Lost and Found reference number in GCG.

89 ECHALAZ collection

GCG 2(8), 507; 2(9&10), 616; 4(3), 174-175.

Nora F. McMillan (The Nook, Uplands Road, Bromborough, Wirral, Merseyside L62 2BZ) writes:

'I notice that in a recent number of the GCG you enquire about the Echalaz catalogue. I know the book and can assure you that it does not contain anything except the catalogue of the bird collection of Lt. Col. C.T. Echalaz, late of the Indian Army, and a certain amount of autobiography (including the account of a tiger-hunt).'

96 Admiral Sir Edward BELCHER (1799-1877)

GCG 2(9&10), 611; 4(3), 175; also 4(1), 14 (LF 144 - J. Cheetham)

CLEEVELY, pp.52-53

Peter Lingwood (8, Sorrento Way, Darfield, Barnsley, S. Yorkshire S73 9RN) writes:

'The geological collections made during Edward Belcher's extensive voyages on HMS Blossom (1825-1828), HMS Aetna (1830-1833), HMS Sulphur (1836-1842), HMS Samorany (1843-1847) and HMS Assistance (1852-1854) were described by others and presented to a variety of institutions, including: Oxford University Museum; the Geological Society - presumably transferred to the British Museum in 1911 with the rest of the [foreign, HST] collections; Museum of Practical Geology; British Museum - now British Museum (Natural History); Haslar Hospital Museum - see GCG 4(3), 177; and the Museum of the College at Edinburgh. I have viewed only the specimens at Oxford and some presented directly to the British Museum from the voyage of HMS Blossom.

There was a sale of his collections in the 1850s and another on his death in 1877; the former is thought to have been, and the

latter certainly was, composed only of shells. Belcher also collected widely in the fields of zoology and ethnography; these collections are even more widely dispersed.'

If anyone can shed further light on the above donations Peter would be most grateful.

160 Alexander COLLIE R.N (1793-1835)

see previous entry (LF 96 - Admiral Belcher and HMS Blossom); GCG 4(3), 177; 4(4), 222 (LF 152 - Museum of the Haslar Hospital)

Peter Lingwood (8 Sorrento Way, Darfield, Barnsley, S. Yorkshire S73 9RN) writes:

'Alexander Collie was surgeon aboard the Pacific exploratory voyage of HMS Blossom (1825-1828) and it is due primarily to his efforts that much of the botanical, zoological and geological material of this voyage is attributed. Geological specimens were collected and observations made by both Collie and Sir Edward Belcher, and were described by William Buckland between 1831 and 1839.

The rock specimens were presented to the British Museum (Moore 1982); the mammal specimens to the British Museum, the Museum of the College at Edinburgh and the Geological Society of London Museum (Buckland 1831), and Oxford University. Some fossils were apparently also sent to the Museum of Haslar Hospital in Gosport (Buckland 1837). Collie later emigrated to Western Australia where he continued to do biological collecting, and where he subsequently died.'

Any further information would be welcomed.

Buckland, W. 1831. On the occurrence of the remains of elephants, and other quadrupeds, in the cliffs of the frozen mud in Eschscholtz Bay, within Beerings Strait and in other distant parts of the shores of the Arctic Seas. Appendix in Beechey, F.W. Narrative of a voyage to the Pacific and Beerings Strait performed in HMS Blossom. London

Buckland, W. 1837. Geology and mineralogy considered with reference to natural theology. London. (see GCG 4(3), LF 96 and 120).

Buckland, W. 1839. Geology. In Beechey, F.W. The zoology of Captain Beechey's Voyage. London.

Moore, D.T. 1982. An account of those described rock collections in the British Museum (Natural History) made before 1918 with a provisional catalogue arrangement. Bull. Br. Mus. nat. Hist. (Hist.), 10(5).

H.S.T. adds: 'A biographical notice appears in the Australian Dictionary of Biography, 1,

235-236 (1966, Melbourne). This notes that Collie spent some years before his appointment to HMS Blossom (in 1824) studying mineralogy in Europe. The notice also gives further sources including MSS material in the Battye Library, Perth, Australia. His botanical work also earns him a long notice in DESMOND (p.142), a source which may yield more data.'

161 DENSTONE COLLEGE Collection

GCG 4(3), 133-163 - H.C. Beasley photographic collection.

CLEVEVELY, p.51 - H.C. Beasley (d.1919); p.187 - J. Lomas (1860-1908)

Roy Clements (Senior Curator, Department of Geology, The University, Leicester LE1 7RH) writes:

'With reference to W.A.S. Sarjeant's article (GCG 4(3)) on the H.C. Beasley (HCB) photograph collection, I would like to make further comment on the Denstone College collection. The whole of the geological collection had, unbeknown to Sarjeant, been transferred to the Department of Geology, University of Leicester in 1959. Initially this transfer was a rather vague 'loan', but it was formalized as a gift in 1966. Some of HCB's comments recorded in this article refer to a Mr C. Brett in 1913-1914 (see HCB photo numbers 337-341, 349, 350, 362). C[yril] Brett, M.A., O.D., is also prominent in the records we have with the material. He (and his wife) donated much to the collection, and at one stage is described as 'sub-curator'. (There are also mentions of [Professor] A.C.A. Brett, M.A., O.D., and C.A. Brett (and a Mrs A. Brett) in these records, but it is not clear how they relate to one another). This strong connection with the College would suggest that the specimens alluded to in the catalogue may well have been added to the Denstone collection, and thus may well now be at Leicester.

However, this said, I have been unable to match with any of our specimens HCB photo number 362. The Denstone collection is very large, and was in a fairly sad state when it arrived at Leicester. Much has now been accessioned into our Department's collections and I have sorted out most, if not all, of those accessioned specimens which are likely to relate to HCB photographs. The full list of relevant HCB photo numbers in the catalogue is as follows: 290, 304-323, 326, 337-341, 349, 350, 353, 362. The equivalent list of our accession numbers is LEIUG 14113, 14124, 14350-14361, 27699-27712; twenty-eight specimens in all. Of these, five show clear footprint casts, six others possible footprints; six show ctenoid casts; six show groove casts; and a further eight show casts of furrows, channels, flutes, rills and undetermined structures. One specimen (LEIUG 14350) was figured by Cummins (1965, pl.8, fig.c) and is presumably the original to HCB photo number 305 of Sarjeant's catalogue.'

Cummins, W.A. 1965. Sedimentary structures from the Keuper Sandstone of Alton, Staffordshire. Mercian Geologist, 1, 153-160.

H.S.T. and D.I.S. add: 'Denstone College is situated midway between Ashbourne, Derbyshire and Cheadle, Staffordshire and therefore well within the interest area of the North Staffordshire Field Club (NSFC). The annual reports and transactions of the NSFC throw some light on the Beasley - Brett connection, and these can be complemented from other sources.'

Arthur Brett was a solicitor (in 1882 based at Market Harborough, Leicestershire) who had moved to North Staffordshire by 1891 when he became a member of the NSFC with an address given as Huntley House, Cheadle, Staffordshire. By 1896 his address was 'Alton, Staffs.', and remains the same up to the 1916 membership list. His name is not included in the next known full membership list (1924); no obituary has been found. Cyril Brett, his only son, was born in 1882 at Market Harborough but attended Denstone College between 1893 and 1900. After Wadham College, Oxford he was appointed assistant lecturer in English at University College, Cardiff in 1907 and Professor of English there in 1921 where he died on 13 June, 1936. Denstone College Register (Grier and Hibbert 1904, p.106) gives his full name as Arthur Cyril Adair Brett, then of Castle Hill, Alton, Staffs. It thus seems certain that all the references above to A.C.A., C.A. and C. Brett refer to this one Cyril Brett only. The Register adds that Cyril achieved distinctions in Higher Certificate Geology in 1896 and 1897, showing he was a notable schoolboy geologist. His obituarist (Times, 15 June, 1936, p.17) recorded that he was a keen collector of, and recognised authority on, Anglo-Saxon antiquities, mediaeval customs and certain sections of English bibliography; his collecting obviously extended to geology. He was survived by his widow, but no family. Cyril Brett became a member of the NSFC in 1900, his address being 'Alton, Staffs.' By 1927 he is noted as being Prof. C. Brett, M.A. (still of Alton - showing he maintained his North Staffordshire links and home) but in the 1930 and 1933 entries his address is given as '23 Lon-y-dail, Rhiwbina, Cardiff.'

On 14 April, 1906 HCB and Mr J. Lomas (Geology Lecturer at Liverpool University) led a joint NSFC/Liverpool Geological Society excursion to quarries at Hollington and Alton (NSFC 1906/1907) and Cheirotherium footprints were seen. A Club excursion on 26 August, 1916 to Denstone College (NSFC 1916/1917) visited the College's Meynell Museum which had been founded in 1876 and named after the Rev. Henry Meynell (c.1828-1903), curate of Denstone 1866-1881, then vicar 1881-1885, and Provost of the College 1891-1896 (Grier and Hibbert 1904, pp.13-14). In 1904 about 8,000 exhibits were preserved including 300 fossils and 1,550 rock specimens and minerals. By the time of the NSFC visit, the Meynell Museum had some 12,000 exhibits and the NSFC

was conducted around by the curator - Mr A.C.A. Brett! A later listing of 'Keuper' fossils collected by HCB and C. Brett between 1910 and 1918 (NSFC 1918/1919) included the numbered footprint material etc. then in the Meynell Museum, Denstone College; it also noted that some other material collected by the two had been sent to the Geological Museum, Cardiff University College, some to Birmingham University, and some was with HCB's collection at Liverpool Museum. The Cardiff connection is easily explained through Cyril Brett, and the Birmingham connection is almost certainly through Old Denstonian W.W. Watts (1860-1947), the Professor of Geology at Birmingham (1897-1906) who had taught at Denstone and was largely instrumental in founding the Old Denstonian Club.

The Denstone College Museum is described, with a particular emphasis on its archaeological contents, in one of the useful series of 'Notes on Provincial Museums' in the Antiquary (Armstrong 1893).'

- Armstrong, A.A. 1893. Notes on Archaeology in Provincial Museums - 32. Denstone College Museum. Antiquary, 28, 254-261.
- Grier, R.M. and Hibbert, F.A. 1904. The Register of St. Chad's College, Denstone ... from 1873 to 1904. Shrewsbury.
- NSFC 1906/1907. Excursions 1. Hollington and Alton. Rep. Trans. N. Staffs. Fld Club, 41, 120-122, also 91-92.
- NSFC 1916/1917. Excursions 5. Denstone College. Trans. a. Rep. N. Staffs. Fld Club, 51, 139-140.
- NSFC 1918/1919. Fossils from the Keuper of Alton, Great Gate, and Hollington. Ibid. 53, 102-103.

162 Edward JACOB (c.1710-1788)

- CLEEVELY, p.162
 KENT and ALLEN, p.175
 GCG 1(9), issue cover

Geoff Hancock (Department of Natural History, Glasgow Museums and Galleries, Kelvingrove, Glasgow) writes:

'Edward Jacob, surgeon, naturalist and antiquarian, is a fairly well known pre-Linnaean Kentish botanist. He published two major works, Plantae Favershamienses (1777) and the History of the Town and Port of Faversham (1774). In trying to trace his plant specimens it has been noted that Jacob more than dabbled in geology and obviously had the wide interests typical of a gentleman of his day. Ten plant specimens collected by Jacob between 1724 and 1739 are in the Bolton Museum herbarium. These are classified using Ray's Synopsis nomenclature and Jacob persisted in using this system even in his flora of Faversham, although he did give a cross-index to the Linnaean descriptors. The whereabouts of any other specimens of plants collected by Jacob is sought.

A faint possibility that some of the plants followed the route of his geological material prompts this note. This was divided into two

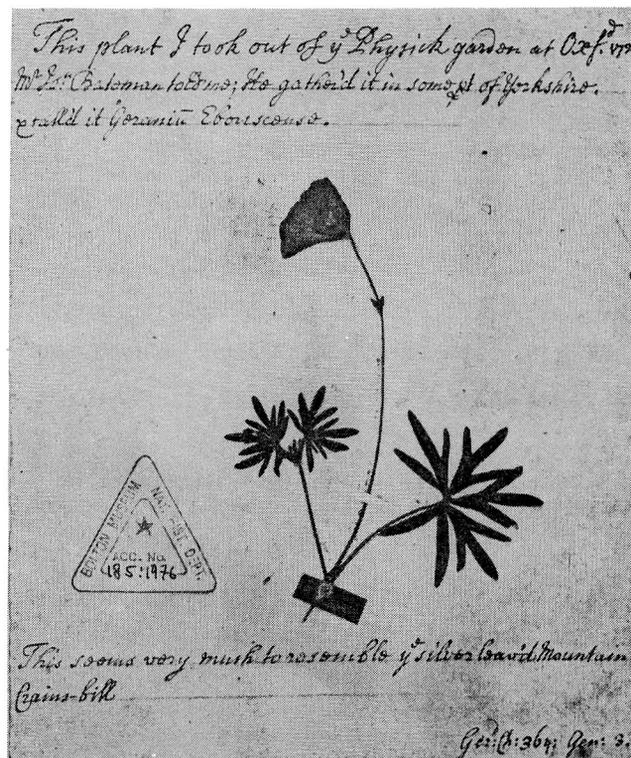


Fig.1 Cranesbill from the herbarium of Edward Jacob and [supposedly, H.S.T.] labelled in his hand. The label refers to Rev. John Bateman in 1724. Bolton Museum Acc. No. 185.1976.

parts. Firstly, his main collections were sold after his death by Gerard (8-11 June, 1789). Fossils, corals, shells, etc. were sold in individual lots whereas his Hortus siccus (- plant collection; literally, dried garden) was sold as one lot. These were all described as from Faversham but the specimens in Bolton Museum are from other parts of Kent. Secondly, an interesting appendix to Plantae Favershamienses entitled Fossilia Shepeiana ('a short view of the Fossil bodies native and extraneous of the Island of Shepey [sic] in the County of Kent') gives details of his disposal of an earlier collection of fossils even before his demise. Jacob describes how the copperas works employed the neighbouring poor to collect pyrites into heaps on the beach from where it was collected. They were paid one shilling per bushel. These collectors were induced by Jacob to 'preserve and carry to him' any unusual items. It is worth quoting again from this short description of his experiences with handling these objects, which was reproduced on the cover of GCG 1(9), April 1977:

'But alas! One disagreeable circumstance attending a considerable part of the fossils here collected is that they are so much impregnated with Pyritical Matter, that after being for some time placed in a Cabinet the salts thereof shoot and entirely destroy them. Happy would it be could some Certain Remedy be discovered whereby this accident might be prevented. The loss of many valuable specimens of this cause, together

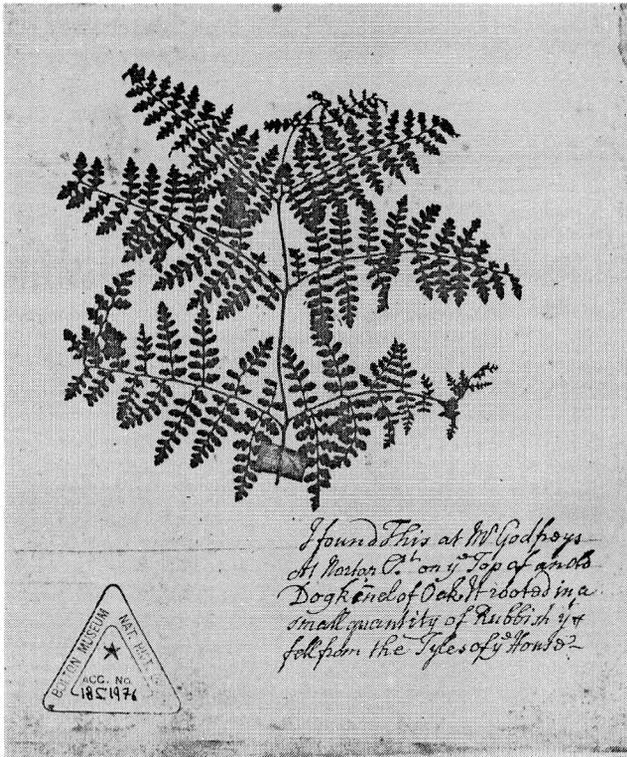


Fig. 2 Another example of Edward Jacob's handwriting. Bolton Museum Acc. No. 185.1976.

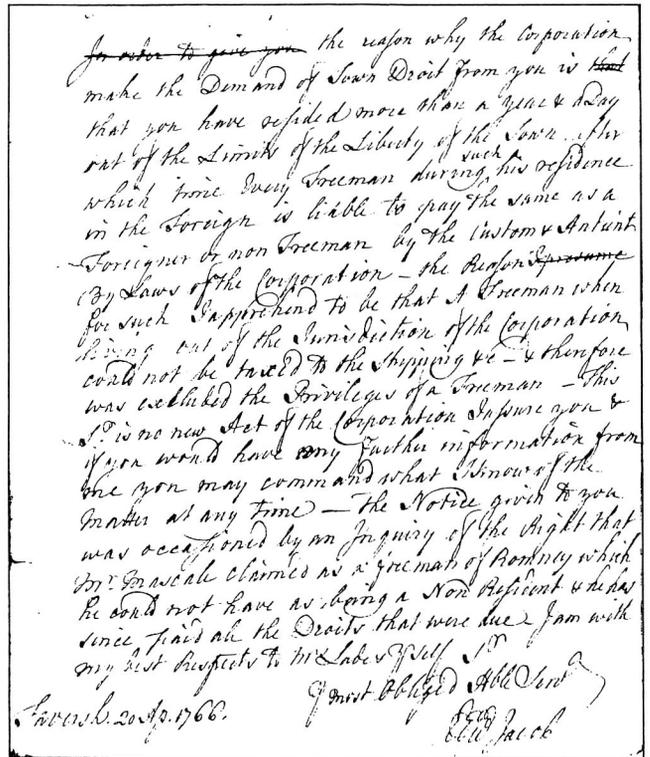


Fig. 3 An autograph copy-letter signed by Jacob for comparison with the labels on the herbarium sheets illustrated in Figs. 1 and 2 (Kent Archives Office).

with his distance from any inquisitive and able naturalists, at last induced the author to dispose of his whole collection to Ingham Foster, esq., Merchant of London where it now forms no inconsiderable part of that gentleman's very valuable cabinet'.

Apart from the interest in this early description of the problem of pyrite decay, this appendix also lists the fossils from the Isle of Sheppey. Ingham Foster's own collections were sold in 1783/1784 according to Chalmers-Hunt's Natural History Auctions 1700-1792. Peter Embrey's introduction on 'Minerals' in his book mentions Foster (1725-1782) though the eventual destiny of this collection is also unknown.

Any items known or thought to be connected with Edward Jacob would be of interest, including manuscripts. Appended are samples of his handwriting from the herbarium sheets and a letter preserved in the Kent Archives Office (Fig. 3); this institution has his manuscripts of transcriptions of the Faversham Wardmote books and others relating to Jacob's historical researches. Both sets of handwriting have been submitted to a forensic handwriting expert who declared them to be in the same hand, despite the fairly large time gap between them (1724-1766).

The fact that Jacob was collecting plants (and, we now know, labelling them in an admirable comprehensive way) at the age of fourteen years has already been commented on by Allen (1966) in his article on John Bateman (see also the label on Fig. 1).

Perhaps this is not as unusual as it seems at first sight. Many naturalists begin collecting younger than this and there is no evidence that Jacob published the results of any researches until well past the age of maturity. Jacob states in the foreword to Plantae Favershamienses that his 'collection of plants was begun many years since upon the basis of the Rev. Mr. Bateman's catalogue, with whom, in the early part of life, the Author made several botanical excursions hereabouts'. The specimens in Bolton Museum are clearly part of these earlier gatherings which may have become separated from the rest of Jacob's collection during his lifetime or at any time since.'

H.S.T. and M.D. Crane comment:

'There were two botanists with the name John Bateman active at this time (see Allen 1966; cf DESMOND). One, whose Hortus siccus is in the museum of the Pharmaceutical Society of Great Britain, is identified as the John Bateman who matriculated at University College, Oxford in 1663; he obtained a doctorate in medicine in 1682, was President of the College of Physicians in 1716-1718, and died in 1728. The other John Bateman, the Kentish botanist with whom we are concerned here, also matriculated from University College, Oxford, but in 1683, at which time he was eighteen years old. He has been reported as dying in 1724, but this date - which has led to difficulties in explaining his collaboration with Jacob - is certainly incorrect. Hasted (1790, p.736) records that 'the Rev John Bateman of University College,

Oxford was a scholar there at his death, though then 80 years of age.' In other words his death would have taken place about 1744. Confirmation is almost certainly given by the London Magazine of 1744, p.49, which records the death of the Rev. John Bateman at Lincoln in January 1744.

Jacob's reference to having botanised with Bateman in the early part of his life (by inference in the Faversham area) must refer to the period from the mid 1730s (Jacob moved to Faversham soon after 1734) until Bateman's death in 1744. There is now no evidence to suggest that they knew each other as early as 1724 or that Jacob was collecting specimens at that early date.

According to DESMOND, Bateman's list of Faversham plants is to be found in the Sloane herbarium. A letter of Jacob's is reported in the Fitzwilliam Museum by Hepworth (1971) and two letters from him to Sir Joseph Banks are recorded at the Royal Botanic Gardens, Kew by Dawson (1958)'.

H.S.T. adds: 'I am not a forensic handwriting expert but, in my opinion, the topline in Fig.1, 'This plant I took out of ye Physick Garden at Oxford 1724' is written by a quite different hand from the five lines below it! Thomas Hearn recorded that he had met Rev. John Bateman in Oxford during June 1724 (Allen 1966, p.227) and I feel sure that Bateman is the man who collected this cranesbill from the Oxford Physick Garden in that year, not Jacob. Although there is now no evidence that Jacob was in contact with Bateman as early as 1724, or then botanising at all, these Bolton specimens do show that parts, at least, of the Bateman herbarium passed to Edward Jacob.'

Any further information about the Jacob collection will be welcome.

Allen, D.E. 1966. The two John Batemans. Proc. Bot. Soc. British Isles, 6, 226-228.

Dawson, W.R. 1958. The Banks Letters. British Museum (Natural History)

Hasted, E. 1790. The history and topographical survey of the County of Kent, 3. Canterbury.

Hepworth, P. 1971. Select biographical sources. The Library Association.

163 Southern England Bajocian (Jurassic) faunas

Jon Radley (Department of Geology, The University, Keele, Staffs. ST5 5BG) writes:

'I have started research on Upper Inferior Oolite (Bajocian, Jurassic) faunas - notably ammonites, brachiopods and bivalves - and would be very grateful for details of accessible relevant material in museums or private collections.'

164 Mary ANNING (1799-1847) of Lyme Regis.

CLEEVELY, p.42

Hugh Torrens (Department of Geology, The University, Keele, Staffs. ST5 5BG) and Sheila Cameron (Pembroke Cottage, Silverton, nr. Exeter, Devon EX5 4JQ) have joined forces to produce a proper, hopefully scholarly, biography of this pioneer fossil collector and commercial dealer in the fossils of the Dorset Coast. They are particularly anxious to locate manuscripts (already over thirty letters have been traced in Britain, Canada and New Zealand), and news of any relevant material would be much appreciated by H.S.T. They are equally interested to learn of surviving Anning specimens which can be traced in present or former museum collections.

NOTES AND NEWS

COMPILED BY TONY CROSS

'ROADSIDE GEOLOGY OF THE RIBBLE VALLEY' EXHIBITION

Neil Turner (Assistant Keeper, Geology, Lancashire County Museum Service) reports that a new exhibition, prepared by Lancashire County Museum Service, opens at Clitheroe Castle Museum this Easter. The museum already features a display on the world famous Salthill Quarry Geology Trail and now presents an exhibition about the interesting geology to be seen by the roadside in the Ribble Valley, Lancashire.

The first part of the exhibition relates the geological history of the Ribble Valley to that of the earth on a large geological time scale; the geology of the Ribble Valley is then explained using examples of fossils and rocks that have been found by the roadside in the area. This first part is divided into six sections that show with colour photographs and reconstructions what the Ribble Valley looked like 350, 320, 240 and 200 million years ago, and 125,000 and 20,000 years ago. The displays include crinoids and a large coral colony; plant and fish fossils from the swampy Coal Forests; and rhinoceras, elephant and hyaena from a warm interglacial, 125,000 years ago.

The second half of the exhibition takes you along a selection of roads through the Ribble Valley and shows you maps of the geology on either side of the roads and photographs of the views to be seen from them. The museum is open from Easter to 31 October from 2.00 - 4.30pm every day of the week. There is a small charge for adults and children are free.

THE ALTERNATIVE STONE CENTRE?

Tristram Besterman (Plymouth Museums and Art Gallery) spotted the following in the Western Morning News for 20 August, 1985:

'Cornish eccentric Eddie Pryn savoured the greatest moment of his stone collecting career yesterday when two crates completed an 8,000-mile journey from the Falkland Islands. Inside each crate was a treasured one-ton piece of quartzite rock blasted off the shoulder of Mount Pleasant at Eddie's special request by the builders of the £250-million airport. Free of charge, the rocks were shipped from the South Atlantic to Kent, transported to the company HQ in the Midlands and then to Cornwall where they were swung by crane into his Stonehenge-style garden at St. Merryn, near Padstow. There they joined a collection of granite monoliths, mainly dedicated to women who have featured in the eventful life of this lovable, virtually blind, illiterate.'

Such a well thought out, rigidly defined collecting policy should make many professionals hang their heads in shame.

NOW FANCY THAT!

Also from the Western Morning News of 20 August, 1985 comes the following which appeared under the headline 'Fossil find on beach':

'Two Plympton teenagers have uncovered a fossilised prehistoric monster at a beach while holidaying in Somerset. Twin brothers Brad and Kevin Gent, 17, both keen archaeological students, found the 180-million-year-old ichthyosaurus at Kilve Beach, near Minehead. The brothers, from Larkham Lane, Plympton, have passed on the ichthyosaurus to researchers at Bristol University.'

FOSSILS FROM BRACKLESHAM TO SELSEY An exhibition at Chichester District Museum 12 October to 30 November, 1985

Since the work of pioneer geologists such as Gideon Mantell and Rev. Osmond Fisher, the foreshore of the Selsey peninsula in West Sussex has been a mecca for geologists, students and fossil collectors. Whilst the fossils feature in national and local museums' displays there never seems to have been a definitive exhibition or book about this locality. This was remedied at Chichester District Museum during October and November 1985 in a temporary exhibition and accompanying book.

Displays of a wide range of fossils from the Tertiary and Quaternary deposits from West Wittering to Pagham Harbour were made possible by generous loans from local private collections, supplemented by items from the British Museum (Natural History). Photographs and graphics interpreted the fossils and demonstrated their use in palaeoecological studies. The use of fossils and sediment-types in defining beds was demonstrated and used in describing the foreshore succession which was shown on maps and aerial photographs.

The accompanying 40 page book, also entitled Fossils from Bracklesham to Selsey, is intended for both the interested layman and the keen geologist. The Bracklesham Beds and Pleistocene deposits are mapped, described and interpreted, while a series of eight plates reproduced from Dixon's (1850) Geology of Sussex illustrate the most common finds (captioned with current specific names). The processes of collecting, preserving, naming and storage of the local fossils are discussed. Museums and reference books which may be of assistance are also suggested. The Geologists' Association has very generously sponsored the book's production. It is priced at £1.00 (75p to G.A. Members) and is available from Chichester District Museum (add 30p p. & p. please).

DINOSAUR MUSEUM FOR COTSWOLDS?

If you missed the South Cotswold Standard for 1 May, 1985 you may not be aware of the proposals for a new dinosaur museum in that area. Local resident, David Gaston-Nash has found parts of Megalosaurus and other Cotswold fossils and is seeking premises to show them all. His most exciting find to date is a premaxilla of Megalosaurus which, although embedded in limestone, has deep sockets for four teeth. Identified at the Oxford University Museum, it is currently with them for safe keeping while the search for premises goes on. If you are interested in dinosaurs or displays of Cotswold fossils I am sure our local correspondent will keep us in touch.

ROYAL OPENING FOR NEW EXHIBITION

Her Royal Highness Princess Margaret, Countess of Snowdon officially opened the new exhibition 'Treasures of the Earth' in the Geological Museum on the afternoon of 10 October, 1985.

The exhibition, which contains 660 objects and specimens, 700 different photographs, 290 diagrams, 19 information retrievable modules and 7 working models has taken several years to prepare and shows how our daily lives depend upon the geological resources of our planet in a host of unseen ways. Exciting new display and information retrieval techniques have been developed to allow the visitor to probe deeply into the subject, or to scan the introductory information. [A review of the exhibition will appear in the next Geological Curator - Ed.]

IMPORTANT PURCHASE OF RARE FOSSILS

Glasgow Art Gallery and Museum has recently purchased a number of exciting new fossils. These include one of the earliest known land amphibians and a collection of rare plants. They were found at Bathgate in Scotland and date from Lower Carboniferous times, about 340 million years ago. The specimens are part of a collection made by Mr Stan Wood, a professional fossil collector. His discovery at Bathgate of many species new to science has aroused great interest.

Glasgow's amphibian consists of the articulated rear portion of the animal, showing well developed, strong, hind legs typical of a land-dwelling animal. Amphibians of this age are rare and this specimen, along with the other Bathgate examples, will help to improve our knowledge of the early evolutionary history of vertebrate animals.

The plant remains are mainly seed-ferns (pteridosperms), an extinct group of plants with fern-like foliage. Plant fossils of this type are well known in the more recent, upper division of Carboniferous rocks, the Coal Measures. However, Lower Carboniferous examples are less common and this acquisition includes rare and probably new species.

Interestingly, many are preserved in three dimensions and have retained their microscopic anatomical structure.

These new acquisitions are awaiting further scientific study and description but in the meantime they are on display at the Museum.

GLASGOW ROCK

The Hunterian Museum, Scotland's Museum of the Year in 1983, has won several national awards recently for new displays. It maintains an international reputation for the quality of its collections and research, whilst its educational service provided activity sessions for over 15,000 pupils last year.

Since 1971, dramatic fossil discoveries have been made in Scotland of great scientific interest and visual appeal. They include 328 million year old sharks from the Glasgow suburb of Bearsden, and the world's oldest complete amphibian, found in Carboniferous Oil-Shale of Bathgate. This latter find, made only last year, alters the whole picture of the evolution of amphibians on land, and is the main reason for developing a new touring exhibition of the actual fossils. To date hardly any of this material has been seen by the public.

New restorations will 'flesh out' the fossils and explain their significance, while the changing environment of 'Scotland' in those remote times will be shown in bird's eye views.

Equally remarkable is the manner of their discovery, for all were found by a former amateur collector, Mr Stan Wood. After training at Newcastle and Glasgow Universities he established his own small business in 1983 - collecting and preparing rare fossils for sale to museums.

Collecting fossils for profit can pose a conservation problem, but Stan Wood is a responsible collector who collaborates with researchers to collect information as well as specimens. The exhibition will tour a number of venues starting at Glasgow, then proceeding to London, Cardiff, Bristol, York, Manchester, Newcastle-upon-Tyne, Leicester, and Sheffield, followed by a tour in Scotland.

At each venue Stan Wood will demonstrate the skills of preparing out fossils from their rock matrix. Previous experience shows that such demonstrations are popular, both with the Press and with the public. A condensed version of the 1983 BBC-TV film will be shown at each venue, and it is also hoped that an inter-active video disc programme will be made by the British Museum (Natural History). The exhibition will encourage visitors to learn about the significance of amphibians to the origin of life on land, and about their role in the evolution of reptiles, mammals and Man. It is anticipated that appropriate educational activities will also take place at each venue.



Fig.1. The Old Cement Factory, Charmouth. The Heritage Coast Centre will occupy half of the upper floor. In the background are the fossiliferous cliffs of the Lower Lias which form the landslip of Black Ven.

CHARMOUTH HERITAGE COAST CENTRE

A new geological information centre will be opening this summer (1986) at Charmouth on the West Dorset coast. Its main aim is to tell visitors about the fossil-bearing cliffs and to enable them, if they wish, to find fossils safely on the beach. The centre will be housed in a former Victorian cement factory on the seafront, immediately above the beach cafe, where it should attract a large proportion of Charmouth's visitors! Admission will be free, although visitors will be encouraged to support the centre with a donation. Geological and other environmental literature will be on sale.

The project has grown out of local concern about amateur fossil-collecting on the cliffs, which led to a proposal in 1982 to control the activity by means of by-laws and licensing. Fortunately, wiser counsels prevailed, and persuasion was thought preferable to legislation. Three partners are involved in developing the centre: the Charmouth Parish Council, who have undertaken the fund-raising and provided a source of enthusiastic volunteers; and the Dorset Heritage Coast Project, part of the County Planning Department, who are providing the displays and technical help in converting the building.

A charitable trust has been formed and sufficient funds raised (with grant-aid from the Countryside Commission and West Dorset District Council) to prepare the building and the displays. Fund-raising is now focussed on the aim of employing a suitably qualified warden to help run the centre. His or her

main job will be to encourage a wider understanding of fossils and geology, including safe collecting practice, among holidaymakers and visiting schools, by giving talks, leading guided walks and acting as a source of advice for amateur collectors. The information centre will also, it is hoped, act as a general source of information for visitors to Charmouth. It will include displays about the local history and wildlife.

Any advice or comments about the project would be most welcome and should be addressed to Miss Sally Cooke, Honorary Secretary, Charmouth Heritage Coast Centre, Lower Sea Lane, Charmouth, Dorset.

FOSSIL FISH STOLEN

Andrew Newman (Hancock Museum, Newcastle upon Tyne) reports the theft of a Dorypterus hoffmanni Gernar, 1842, from a case in the Hancock's Geology Gallery. The specimen was collected in 1869 from the Permian Magnesian Limestone of Midderidge, County Durham, and figured by Hancock and Howse (1870. Q. J. geol. Soc. Lond. 26, p.623, pl.43, fig.2). It bears the number G26.45. Any information please to Andy (Tel. 0632 322359).

INTERNATIONAL ORGANISATION OF PALAEOBOTANY

GCG members who could not attend the meeting at Bolton (18 September, 1985), but who do have fossil plant material in their collections, may be interested to know of the existence of a group wholly concerned with



Fig. 2.
This remarkable piece of ancient graffiti adorns a corner block at the entrance to St. John's House, Warwick (Warwickshire Museums). Any resemblance to the name of a well known geologist-director of a neighbouring county museum service is, of course, purely coincidental (reincarnation aside). But it makes you wonder [Photograph from John Crossling, Warwickshire Museums]

aspects of palaeobotany. The International Organization of Palaeobotany (IOP) has a worldwide membership which keeps in touch via the columns of its thrice yearly IOP Newsletter. The annual subscription rate is currently £4.00 and the (north Europe) secretary is: Dr M.C. Boulter, North East London Polytechnic, Romford Road, London E15 4LZ.

Topics covered by the IOP Newsletter include: current research; short notes on taxonomy, evolutionary theories, and palaeoecological matters; book reviews; and future group meetings. Set out rather along the lines of the Palaeontological Association Newsletter, each IOP Newsletter contains a fund of valuable information and addresses that could prove useful to the museum geologist.

Conversely the IOP Newsletter is an ideal place to publicise the existence of museum palaeobotanical collections and catalogues, reaching a worldwide audience in this specialised section of geology.

ONE WAY TO DIG A DINOSAUR

The following piece by Mrs Sylvia Standing appeared in the Bulletin of Horsham Museum Society, no.36 (Sept. 1985):

'DINOSAUR. The day before my last gardening class visions of some spare time flashed before me - lolling in my own back garden with a pile of 'Country Life' and a cold drink perhaps? These quickly vanished however after an urgent 'phone call to Miss Kelly [Curator, Horsham Museum] from Morris Zdrzalek. He wanted someone to come and identify a large bone unearthed by a mechanical digger at a local brickworks.

When Miss Kelly and I saw the bone it was obvious that it was part of a dinosaur - probably an iguanodon, there were also some badly damaged bone fragments about 10 feet away so it was unlikely that the skeleton was complete or articulated and the whereabouts of other bones would be difficult to determine.

A return visit by my husband and myself two days later was more fruitful. The digger driver offered to remove another inch of the hard, rock like clay overburden, this exposed nothing but a second inch removal disclosed a large black stain on the grey clay. This was no doubt caused by the animals rotting flesh and I was grateful that the animal had been dead for several million years for it was a very hot day.

Under the black stain we found a few more bones still in situ, they were in the base of the hard grey clay and resting on the underlying soft green clay. Another visit on the following Sunday enabled us to find not only more bones in situ but also small fragments washed out of spoil heaps by rain. A tooth and small scales from the skin and bones which had been disturbed by the digger.

Although several bones had been found they were broken and scattered in antiquity and only a small part of the skeleton was found. Removing the matrix from the bones has disclosed part of the spinal cord and an artery still preserved.

I would like to thank the directors of Rudgwick Brickworks for access to the claypit and Morris, Theresa, Doug, Don, Mick and Tony for help with excavation.'

So where was the specialist expertise? Clearly GCG has some way to go before even those closely associated with museums are aware of their wider responsibilities (Ed.).

BOOK REVIEWS

MacKenzie, W.S. and Guilford, C. 1980 (4th imp. 1984). Atlas of rock forming minerals in thin section, 98pp. Longman, Harlow, Essex. Price £9.95.

There can be no doubt that this Atlas, the first of three, published in 1980 and already in its fourth impression, is a very successful venture. It is so moderately priced at £9.95 as to be within the financial reach of most 'students' of geology, student being used in its widest sense. This is the critical point, however; like its two companion volumes, it is essentially for student use, here meaning principally undergraduate students embarked on geology or related courses. This is, of course, exactly what the authors' intentions were, and they state in the preface that it is 'a laboratory handbook for use in practical classes'. In this role the book cannot be praised too highly; it had been known for a long time that while standard optical mineralogy texts adequately covered the theoretical aspects of the subject, they provided students with little assistance in the practicalities of identifying minerals when viewed under the microscope. This gap is what the authors aimed to fill, and have most successfully done so.

The main feature of the Atlas is the 228 superb colour photomicrographs, each measuring 110x80mm, which illustrate some 87 different mineral species. Accompanying each illustration or set of illustrations is a brief description of the mineral's main optical properties. It could be argued that even more illustrations could have been included as there are sometimes two photomicrographs, in other cases three, per page; when only two are provided there is an obvious blank space on the page. It could also be argued that the authors' coverage of 'common rock-forming mineral' species is sometimes open to question, that some species have been left out at the expense of the more obscure, and that slightly atypical sections of minerals have sometimes been illustrated. This has been said before in other reviews, however, and does not need re-iterating (e.g. Min. Mag. 43, 1075-1076). In any case, such comments most probably reflect the personal experience and hence bias of the reviewer; indeed I would say that the illustration of pumpellyite is not 'typical' and would not be of use to students attempting to identify this notoriously elusive mineral. But I think such minor criticisms do not detract in any way from the overall achievements of the authors.

Now we come to the usefulness of the Atlas to curators. Obviously the first essential tool for use of this and the two companion volumes is a polarizing, transmitted-light microscope, and if a curator does not have access to such equipment then he/she will not be able to make use of this volume. If such a microscope is available, then there is no doubt that the Atlas will be of immense

value; indeed, the inclusion of some of the more obscure rock-forming minerals may well be an advantage. The price is very reasonable, bearing in mind the excellent quality of the photomicrographs, and the volume would represent an important acquisition for museum departments in which microscopy is practised.

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MacKenzie, W.S., Donaldson, C.H. and Guilford, C. 1982 (2nd imp. 1984). Atlas of igneous rocks and their textures. 148pp. Longman, Harlow, Essex. Price £9.95.

This attractive book, a companion to the Atlas of rock forming minerals in thin section (1980), was designed to aid the student of petrology. This it has ably done in its role of a laboratory manual through the medium of excellent quality coloured photomicrographs of igneous rocks and their textures as seen through the petrological microscope.

Part I examines the textures most commonly seen in igneous rocks. Each coloured plate is accompanied by a brief description. Part II examines the textural features shown by a selection of sixty igneous rock types, in most cases illustrated by matched pairs of photomicrographs in plain polarised light and between crossed polars. An appendix sets out the basic procedure for the relatively cheap production of thin sections of igneous rocks without the aid of sophisticated equipment.

This Atlas is not an instructional textbook and makes no pretence of being such. Such knowledge may be attained only by a course of instruction and systematic practical work with the petrological microscope and auxiliary optical-equipment. The Atlas is of great value once the basic knowledge of petrology has been acquired and will then greatly aid the student. Its few shortcomings and many finer qualities have been ably reviewed by Wells (1983, Min. Mag. 47, 569) and need no repetition here. Overall, the Atlas is a welcome addition to the book shelves of a student of petrology, a teacher in earth sciences or the non-professional geologist keen to widen his interests.

Use of the Atlas by the curator in a museum situation must be limited by his possible lack of training in petrology or by the absence of a petrological microscope in his laboratory, or both. The study of petrology is beset with problems based largely on experience of the subtleties of the subject. The non-experienced curator may find himself drawing incorrect conclusions from his study of the plates in the Atlas. For the curator who lacks training in petrology, any time

spent on thin section production (which itself is a highly skilled operation) and the study of the sections made would be better employed on curatorial matters.

From the aesthetic sense, however, the Atlas has a welcome place on any museum bookshelf where the beauty of its coloured plates may inspire technician and artist alike. From this latter point of view alone the Atlas is highly recommended to the museum profession.

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Adams, A.E., MacKenzie, W.S. and Guilford, C. 1984. Atlas of sedimentary rocks under the microscope. 104pp. Longman, Harlow, Essex. Price £9.95.

Very few museums have a systematic policy for collecting rocks, and even fewer have thin-section collections on any scale. From this (probably over-generalised!) statement it will be immediately clear that this book is not exactly aimed at an audience of museum curators. Before turning to its scope and intended use, however, it is worth mentioning that the high-quality colour photographs making up the bulk of the Atlas are striking and in some cases quite aesthetic, emphasising the fact that material of this kind might form a basis for an unusual but visually exciting exhibition.

The 217 illustrations are mostly crossed-polar micrographs of uniform size (110x80mm) arranged three to a page and with accompanying captions alongside; some of the specimens are stained acetate peels. The coverage of rock types is quite good, though it is not clear why some of the few pages with less than a full complement of illustrations could not have been filled as a means of extending the coverage even further. Following a brief introduction the Atlas is arranged in three main sections covering terrigenous clastic rocks, carbonate rocks, and 'other sedimentary rocks', respectively; this third section illustrates various ironstones, cherts, evaporites, phosphorites and coals. Of immediate use to all students of sedimentary rocks, and particularly to the non-specialist, will be the clear tables and text-figures explaining grain-size classification and roundness values for terrigenous sediments, classification and sorting in sandstones, etching and staining characteristics of carbonates, limestone porosity, and limestone classification and textures; both the well-known Folk and Dunham classifications are included, although most of the captions for the carbonates use Folk's terminology.

Three carefully written appendices explain how to prepare a rock thin section, how to stain a limestone section, and how to make a stained acetate peel. Any curators who have to prepare their own material will find these summaries invaluable. As stated on the cover, however, this Atlas is intended mainly

as a guide and laboratory manual for students and teachers of sedimentary petrography. Inevitably it invites comparison with the two separate Memoirs published by the American Association of Petroleum Geologists (No.27, 1978 and No.28, 1979) covering the same fields but in much greater detail. As a summary version this Atlas stands up well in comparison; it is an attractive and worthy addition to the two previous volumes in the series, and at £9.95 can be highly recommended as an introduction to the beauties and analysis of sedimentary rocks under the microscope.

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Department of Library Services, British Museum (Natural History). 1985. Annual bibliography of the history of natural history. Volume 1 : Publications of 1982. British Museum (Natural History), London, iii + 62pp. Price £8.00

By the nature of their work, all taxonomists in the natural sciences have cause to be grateful to bibliographers. Compilations like C.D. Sherborn's Index Animalium 1758-1850 and the Zoological Record, which has appeared regularly since 1864, are measures of the scale of their achievement. Taxonomy is a very historical activity, as Tony Harvey points out in the preface to this most welcome new international bibliography, and it is essentially from the taxonomic research undertaken at the British Museum (Natural History) that this new finding aid has grown, compiled by the staff of the Museum's Department of Library Services. The bibliography aims to provide a 'comprehensive record of literature relating to the history of natural history' and this first volume covers that published in 1982. It is hoped that future issues will follow in the second half of the year following that in which the relevant material appeared.

Natural history is here regarded as comprising the 'earth and life sciences' but the position of geology within natural history has often meant the exclusion of parts of our discipline. This bibliography continues this tradition regarding mining (and oceanography or agriculture) as 'fringe' subjects not here covered comprehensively. I fear few today would agree with the view that the mining and economic aspects of geology are not central to it and that their history is not also central to the history of geology. We should therefore hope the range of this bibliography can be extended in future years to cover such areas and address itself to the interface with technology which geology so clearly straddles. Since the resources of the Science Museum library are already involved in the production of this bibliography, this may not be too difficult to achieve.

Volume 1 reviewed here lists alphabetically by first author 1369 items, including many of

the more ephemeral (but no less useful) items which appear, for example, in programmes of meetings or volumes of abstracts, the Newsletter of the Society for the Bibliography of Natural History, or our own 'Lost and Found' columns. Indices of second and third authors and of 'biographies and persons as subjects', as well as institutions, societies and other bodies as subjects, are also included and arranged alphabetically. The latter arrangement is not followed, as it should have been, in the main subject index which thus takes longer to use. Museums and collections are here separately indexed. Obituaries are specifically excluded (p.ii) yet the Biographical memoirs of the Fellows of the Royal Society are included - begging the question how one can so exactly separate biography from obituary?

The whole 65 A4-page package seems highly priced but clearly the setting of a price for a new bibliography like this is difficult; we should be more concerned that it continues and expands at the present price, than what the price now is. Errors seem few, save some infelicitous renderings in non-English titles. Potentially more serious are errors like the inclusion of the Polish stratigrapher and student of ammonites Josef Siemiradzki as Biemiradzki, under which letter he is also of course indexed. Thankfully such self-defeating errors seem few. The real test of any bibliography is how complete is the coverage of those sources known to have been searched. A list of journals cited is given but I was puzzled to find that, while all the English abstracts of the Tenth INHIGEO (International History of Geology) Symposium (Budapest, 1982) were carefully and individually cited, only four of the twenty-five full versions of those papers presented in Russian, and published in vol.21 of the Russian Essays on the history of geological knowledge, were included. Clearly complete coverage has not been achieved here.

Another problem facing anyone using a bibliography is how well the title of a paper covers and conveys its contents. This seems a particular problem with the growing literature of creationism and I did wonder if a particular article like Wilson's 'Did the Devil make Darwin do it?' was on the 'orthodox' or 'lunatic' fringe of this field! I made a mental note to keep out of this minefield though grateful for the help this bibliography gave in helping me through it. We must wish this new service well and try to help it in two direct ways: firstly, by pleading with the accountants to find the money for our museums and libraries to subscribe to it; and secondly, by informing the compilers about whatever we produce (which they may otherwise miss) so that it can improve and prosper.

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Keele University

Cameron, I.B. and Stephenson, D. 1985. British Regional Geology. 5: The Midland Valley of Scotland. HMSO, London, 172pp. Price £5.

Sitting on my bookshelf as I write is a very well worn copy of British Regional Geology: The Midland Valley of Scotland Second Edition (Revised), the sixth impression of a work published in 1948 and differing from the first edition of 1936 only in some updated references and an amended section on Carboniferous palaeontology. My copy was purchased thirteen years ago for 6s. 6d. (32.5p for younger colleagues!) at a time when such exotic localities as Distinkhorn and Lesmahagow were but strange sounding names thrown at a novice undergraduate who would subsequently dash off to check where these places were. The book earned its keep but even then it was regarded as out of date and difficult to use as there was no index. Gradually I ceased to use it and since moving to Scotland I have always reached first for a copy of G.Y. Craig's Geology of Scotland (revised in 1983), an excellent book.

Rumours of a revised Midland Valley have long abounded but this year it has finally appeared, to the great joy of all who have anything to do with the geology of this part of Scotland. The new edition is a complete contrast to the old. It has been greatly expanded: from 95 to 172 pages, from 8 to 16 plates, and from 16 to 42 text-figures; the Carboniferous section has been expanded from one to four chapters; and sections have been added on the pre-Palaeozoic basement and Quaternary geology. The plates and maps are often in colour and there is an excellent solid geology map in a pocket in the back cover. Most useful of all, the work is now indexed!

The much improved style of the British Regional Geology series is shown to good effect in this volume, the type and the figures are both attractive and clearly printed. There is a vast amount of information packed into this third edition; it is excellent value and a fitting first (?) publication for the 'new' British Geological Survey. If you think that Scotland still produces oil-shale you need a copy of this book!

Michael A. Taylor
Keeper of Natural Sciences
Perth Museum and Art Gallery

Atkinson, R.L. 1985. Tin and tin mining. Shire Album 139, 32pp. Shire Publications, Princes Risborough. Price £1.25.

This booklet by the Curator of the Geological Museum in the Camborne School of Mines is the latest in a long series of comparable booklets. It covers the subject well and is fully illustrated in black and white, with both modern and nineteenth century photos and a few reproductions of earlier drawings. Chapters cover Geology and Exploration,

History, the Cornish Miner, Tin Mining, Processing and Smelting, and Uses of Tin. In fact there is a surprising coverage in such a limited space. Further reading is listed and there are notes on relevant museums, and mining societies. There are two weaknesses: the unnecessary digressions into overseas mining which waste space suitable for more detail on Cornwall; and the paucity of comment on places to visit apart from the museums - six lines of print cover four Mining Areas. Whilst one must appreciate that many old mining areas are dangerous or difficult of access or on private land, surely something a little more informative could have been included. Apart from these quibbles, a good buy at £1.25.

Trevor D. Ford
Department of Geology
University of Leicester

Edgar, A. 1985. The Sarjeant Collection, North Midlands Minerals. Stoke-on-Trent City Museum and Art Gallery, 24pp. Price £1.95.

This is an A4 sized publication bound in a flexible black glossy cover on which is an eye-catching lithograph of 'oakstone' or pseudo-stalactitic baryte. After a simplified Geological Time Scale come short sections describing the collection and the collector. Five pages constitute a short geological history of the Midlands with a simple outline map of the geology and five palaeogeographical maps of the Lower Palaeozoic, Devonian, Carboniferous, Permian and Jurassic. As this section and the others are written at an introductory level, generalisations are common and may annoy a reader with no or some geological knowledge. The palaeogeographical maps add volume to the booklet but do not add sufficiently to the comprehension of the geological framework of the area to be worthy of the two pages they cover.

A county by county description of the mineral exploitation not unexpectedly concentrates on Derbyshire, where the majority of the minerals were obtained, in comparison to

Cheshire, Shropshire and Staffordshire. Information has been collected from various sources and, considering its three page coverage, is satisfactory as an overview.

The remaining sections of the booklet consist of tables and outline location maps. The reader is informed that the collection has, for example, 311 samples of baryte, 91 samples of quartz and 21 samples of amethyst; that baryte is barium sulphate and quartz and amethyst are silicon dioxide. Chemical formulae are not given, nor does it differentiate, for the uninitiated, between quartz and amethyst.

A compilation of the specimen collection sites with sketch location maps (county basis) provides six-figure grid references for specific quarries etc., and four-figure grid references for general areas, e.g. Millers Dale. Why the compilers produced location maps and detailed grid references can only be equated with a general requirement for visual presentation. Data on 'site analysis' provides the reader with the information as to how many minerals were collected from named locations. One sample of andesite, for example, came from Foolow while one quartzite (dreikanter) is located at Hemlock Stone, Nottingham. The final table lists all locations in the Midlands where the minerals, rocks and samples (industrial slag) were collected. The whole is terminated with 'suggested further reading' which gives five general references and Professor Sarjeant's publications from 1956 to 1970 with particular reference to the collection.

Worth buying at £1.95? No, unless you intend to use the collection under the terms specified by the donor, i.e. display, internal and external lecturing and teaching, research and reference. The layout is clear and concise but the print may be difficult to read for a person with poor eye-sight.

P.R. Ineson
Department of Geology
University of Sheffield

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RECENT LETTERS TO THE 'GUARDIAN'

GEOLOGISTS THIN ON THE GROUND

28 January 1986

Sir, - We wish to express our concern over what appears to us as the mistreatment of geology and geologists in the Nature Conservancy Council. Despite a recent £16 million (over 100%) increase in NCC funding, which facilitated a 40% increase in staffing, to 800, only one permanent geologist post has been created in the organisation in the past eleven years. Thus by the end of the financial year 1986/7, 1% of NCC permanent staff (the 8 nominal geologists) will be entrusted with the responsibility of monitoring and conserving 2800 geological sites (i.e. 40% of the total Sites of Special Scientific Interest SSSIs). In recent years most of the geological work of NCC, including all its SSSI selection, has been done by short-term (mostly 6 month) contract staff, working on repeatedly renewed contracts, in some cases for more than seven years. It is difficult to understand NCC's niggardly funding for geology at a time when the government is allocating large sums to the organisation.

When NCC's former Chief Geologist, Dr G.P. Black, resigned 15 months ago, after 25 years battling inside NCC, we hoped the adverse publicity would then bring about reform. However, nothing seems to have changed. Assurances of their good intentions towards geology given recently by NCC to the Geological Society of London, the world's senior geological learned society, appear to have no substance.

Such lack of interest within NCC over its statutory obligations to geology is particularly dangerous at the present time. Centralisation of NCC in Peterborough requires the move of geologists from Newbury. Almost all of these were attracted to Newbury to work on contract, selecting SSSIs. Some of them have now been invited to move to Peterborough at their own expense, or to commute there. If they do neither, they will be sacked. The rest are to be sacked in any case. This treatment comes just 9 months before their completion of a nine year long total reappraisal of geological SSSIs and thus puts at risk hundreds of nationally or internationally significant localities. Failing the selection of these sites, the notification of SSSIs under the 1981 Wildlife and Countryside Act could not be completed. Consequently, the NCC would then fail to fulfil its obligations to Parliament, to complete notification of SSSIs by the end of 1986. We reluctantly conclude that the NCC is more interested in the scheduling of

biological SSSIs than in geology. Bearing in mind the truly international as well as the national scientific importance of many British geological SSSIs we are certain that geologists everywhere must share our concern.

Professor P. Allen FRS (Reading University)
Dr M.J. Benton (Queen's University, Belfast)
Dr J.E. Robinson (University College, London)
Dr H.S. Torrens (University of Keele)

CARRY THE CONSERVATION CAN!

3 February 1986

Sir, - You were kind enough to notice (December 1 and 5) my resignation on policy grounds from the Nature Conservancy Council, and to comment that this single resignation may be "no more than an aberration." That this "aberration" now has a wider currency is shown by the letter of January 28 from four distinguished geologists, on behalf of broad sectors of their science, who protest at the NCC's continued failure to make adequate provision for the discharge of its statutory duties towards geology.

It would now seem that the NCC's long continued policy of understaffing, under-financing, but overlooking geology is about to bear bitter fruit for the conservation movement as a whole. In reply to a question from a ministerial colleague, the Secretary of State for the Environment told the House on January 22 that he had been assured by the NCC's chairman that he hoped that notification of all SSSIs under the Wildlife and Countryside Act would be complete by the end of 1986. This answer, however, must have astonished the many geologists - most of them volunteers and including your four correspondents - whose services will be required to achieve this deadline. Even the most superficial investigation would reveal that the hope on which the Secretary of State's statement relies bears little relation to reality. Rather, through the diversion of the necessary resources, combined with the mismanagement of the NCC's internal and external relationships with the geological profession, completion of the notification of the geological SSSIs, and thus the completion of the whole Wildlife and Countryside Act notification programme, will most probably not be achieved until late in 1987.

With a new line of management installed at NCC's headquarters in Peterborough, there would appear to be no reason why confidence should not be speedily restored, or why the NCC and the geological community should not

rebuild their essential, but now shattered, relationships. - Yours faithfully,

George P. Black
107 Andover Road
Newbury, Berkshire

Sir, - The letter (January 28) from Prof. P. Allen and others of the University of Keele about geologists in the Nature Conservancy Council, contains a number of inaccuracies.

Within its chief scientist's directorate, the NCC employs eight permanent geologists, soon to be increased to 10; a number of geologists on period appointments; and many on short-term contracts. The great majority in the last group are in the employment of universities and other organisations so work only part-time for NCC. Most of our full-time specialist geologists are now working from Peterborough, and the remaining staff will move here in April. Geological staff share the same conditions of service as other NCC staff and will have exactly the same entitlements when they move.

The NCC's programme for geological conservation has been welcomed by the president of the Geological Society. One of its aims is to speed the completion of the geological conservation review which seeks to identify geological SSSI. We expect some 1500 SSSI - not the 2,800 suggested by Prof. Allen - to be so identified.

If Prof. Allen and his colleagues care to contact us, we shall be pleased to provide them with a first-hand account of the NCC's position. - Yours faithfully,

Richard Steele
Nature Conservancy Council
Peterborough

STEADY AS A ROCK IN THE SERVICE
OF CONSERVATION
7 February 1986

Sir, - Professor Allen et al and George Black draw attention to the irresponsibly niggardly attitude within certain ranks of the Nature Conservancy Council towards funding work on geological site conservation.

Richard Steele's response on behalf of the NCC is as bland as it is unconvincing. He conveniently overlooks the NCC's reliance on a national network of professional geologists who provide crucial underpinning for the work of identifying and protecting geological Sites of Special Scientific Interest. These geologists are employed in local and national museums throughout the UK.

The Geological Curators' Group has established a national scheme of 43 regional, museum-based, geological site-recording centres since 1977. The scheme's 20,000 geological site records are used by a wide variety of customers, including significantly, the user with the greatest demand: the NCC itself. The NCC is reliant on the national scheme for two important reasons. First, it has provided the NCC with the raw data on a substantial proportion of new geological sites of national significance to be included on the NCC's "Domesday" listing of prime sites - the Geological Conservation Review. Secondly, by identifying alternative sites for educational use and for collecting, the museum recording centres have been able to direct users away from the prime GCR sites - many of which are as vulnerable as a rare orchid locality - an effective and practical means of conservation.

Commitment and support cut both ways. The NCC has been reliant on geologists in UK museums and other research institutions to discharge its legal obligations under the 1981 Wildlife and Countryside Act. Without the continued support of geological curators and other geologists throughout the UK, the NCC, at its present staffing levels, would be unlikely to meet its long-term statutory obligations. Senior administrators of the NCC would do well to remember that before rushing into print to "correct" the informed criticisms of scientists like Professor Allen. - Yours faithfully,

Tristram Besterman
City of Plymouth Museums and Art Gallery
Drake Circus
Plymouth

THE 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, four issues will be published in both 1985 and 1986 to make up the deficit to members. The following timetable should be noted by those wishing to submit material for publication:

Vol. 4, No. 6 (for 1985) copy date 14th Feb. 1986 for publication Apr. 1986
Vol. 4, No. 7 (for 1986) copy date 16th May 1986 for publication July 1986
Vol. 4, No. 8 (for 1986) copy date 15th Aug. 1986 for publication Oct. 1986
Vol. 4, No. 9 (for 1986) copy date 14th Nov. 1986 for publication Jan. 1987

NOTES TO AUTHORS

Articles should be submitted typed on good quality paper (A4 size) double spaced, with wide margin. Two copies should be sent to the Editor, Dr P.R. Crowther, Leicestershire Museums Service, 96 New Walk, Leicester LE1 6TD. Line drawings should be prepared in black ink at twice desired publication size. Photographs for halftone reproduction should be printed on glossy paper and submitted at final size. Both drawings and photographs should utilise either the full width of one column (85mm) or two (175mm). References in the text follow the Harvard system i.e. name and date '(Jones 1980)' or 'Jones (1980)'. All references are listed alphabetically at the end of the article and journal abbreviations should follow the World List of Scientific Periodicals where appropriate. Authors will normally receive proofs of text for correction. Reprints can be purchased at cost (details from the Editor). Major articles are refereed.

REGULAR FEATURES

LOST AND FOUND enables requests for information concerning collections and collectors to reach a wide audience. It also contains any responses to such requests from the readership, and thereby provides an invaluable medium for information exchange. All items relating to this column should be sent to Don Steward, Department of Natural History, City Museum and Art Gallery, Bethesda Street, Stoke-on-Trent ST1 4HS (Tel. 0782 29611).

NOTES AND NEWS contains short pieces of topical interest. The Editor is pleased to receive items for potential inclusion.

BOOK REVIEWS contains informed opinion on recently published books of particular relevance to geology in museums. The Editor welcomes suggestions of suitable titles for review, and unsolicited reviews can be accepted at his discretion. Publishers should submit books for review to the Editor.

INFORMATION SERIES ON GEOLOGICAL COLLECTION LABELS consists of loose A4 size sheets, issued irregularly, which carry reproductions of specimen labels usually written by a collector of historic importance. The aim of the series is to aid recognition of specimens originating from historically important collections. Contact Ron Cleevely, Department of Palaeontology, British Museum (Natural History), London SW7 5BD

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