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GCG

NEWSLETTER OF THE GEOLOGICAL CURATORS GROUP

VOLUME 2 No.2

APRIL 1978

TEMPEST ANDERSON AND COLLEAGUES

FRONT COVER

Entitled "When shall we three meet again" the photograph on the front cover shows Tempest Anderson (centre) with (?) A. Lacroix, the French vulcanologist (right) at the crater of La Soufrière, St. Vincent in 1902.

Backnumbers of Newsletters are still available at £1.00 each (including postage). Remuneration must accompany all orders, which should be sent to John Martin, Leicestershire Museums, 96 New Walk, Leicester, LE1 6TD (0533 539111).

Submission of MSS

Three Newsletters are published annually. The last dates for submission of MSS for publication are:

March 1st for April issue

August 1st for September issue

November 1st for December issue

MSS should be sent to the editor typed and double-spaced, please.

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GEOLOGICAL CURATORS GROUP

(AFFILIATED TO THE GEOLOGICAL SOCIETY OF LONDON)

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COLLECTIONS INFORMATION TO - Dr. Hugh S. Torrens. (Chairman)

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VOLUME 2 No.2

ACQUISITION POLICY

On the inside of one of the folding doors of the cabinet there is pasted a cutting from an old newspaper. It is here copied - another example of the Canon's sense of the humourous:-

"On a certain eminent Connoisseur's method of adding to his own rich Museum, out of a very poor one which he lately honoured with a visit.

"Squire Curious invited to see my collection,
Showed what pleased him the best by a masterly action,
For, seeing a beautiful fossil,he took it,
And, without asking leave, put it into his pocket.

"My amazement at this, which I could not conceal,
Was increased by his saying, "Observe, I don't steal";
Such a speech and exploit made me blush, I must say,
But he carried his prize without blushing away,

"Different people see things in a different view,
What seems thieving to me, with the Squire is Vertu.

"C———y, Aug. 3rd, 1759."

Taken from Note on Canon Jacksons Bequest of Fossils [to Devizes Museum] Wiltshire Archaeological Magazine 26 p. 171 1892

4TH ANNUAL GENERAL MEETING 1977

Held at 16.30 on Friday, 16 December 1977 at Bath City Museum & Art Gallery and attended by 27 members of the Group, and a greater number of visitors.

1. Apologies had been received from R. Croucher; P. Doughty; B. Pyrah.

2. Minutes. The minutes of the 1976 A.G.M. had appeared in Newsletter 9. These were taken as read and approved.

3. Chairman's Report. M. Bassett, R. Croucher & B. Pyrah were retiring from the Committee. The Chairman thanked them for their support over the past two years and expressed the hope that the Group would be able to call upon their services again in future years.

The meeting at Bath had highlighted the problems which could arise with partly uncurated collections. Any members with personal knowledge of collections at risk were urged to inform the Committee immediately.

4. Secretary's Report. The year under review had been one of some success for the Group since several projects initiated in earlier years had either reached fruition or been established as permanent ventures.

a) National Plan for Museums. Following the written submission of May 1976, the Standing Commission had invited further evidence from the Group. A panel of assessors (including representatives of the Geol. Soc., Min. Soc., Pal. Ass., and G.C.G.) was formed to draw up a second submission. This report, which was reproduced in full in Newsletter 10, was submitted to the Commission in July.

b) Site Documentation Scheme. The Committee for Geological Site Documentation had formally assumed responsibility for the scheme in July and the Chairman would be reporting on the new Committee's work later in the meeting.

c) Geological Society. The Specialist Groups Committee of the Geol. Soc. met on 26 May to co-ordinate meetings programmes for 1977/78. Facilities for the publication of papers, reports & proceedings, and the provision of grants (particularly from the Royal Society) were also discussed.

d) Museums Association. In February and May, the Chairman and Secretary attended meetings to discuss the formation of a Professional Services Committee to liaise with specialist groups and to deal with matters of disciplinary interest. This proposal was ratified at the Association A.G.M. in July. The first meeting of the new Committee, attended by M. Stanley on behalf of the G.C.G., took place on 19 October.

e) Meetings Programme. On 4 February a joint meeting with the Geological Information Group on 'Geological Information Services & Sources in Museums' was held at Liverpool Museum. Liverpool was again the venue for the two-day Conference in September on 'The Function of Local Natural History Collections' held jointly with the Systematics Association and the Biology Curators Group. Bristol and Bath Museums had been chosen as the joint venue for the A.G.M.

The Committee now feels that it is time to direct more effort towards collections documentation and rescue. Over the next few months the evidence arising from the collections survey would be appraised and a plan of action formulated.

5. Treasurer's Report. The audited accounts had been distributed before the meeting. The current account stood at £95.89 with £40 in advertising revenue still to come. The balance in hand should more than cover the costs of Newsletter 11 which had still to be published. In addition £150 had been transferred to a deposit account.

Membership was as follows:

Personal members	176	(161)
Overseas members	9	(5)
Subscription members	60	(45)
Overseas Sub. members	7	(5)
TOTAL:	252	(216 in 1976)

It seemed likely that from now on the main increase would be in Subscription Membership.

6. Editor's Report. Newsletter 9 had cost £106.83 (less £40 advertising revenue). Newsletter 10 cost £151.80 (£40 revenue). Newsletter 11 would be published in January and would contain a major article on the Manchester Museum collections.

In recent issues a problem had been caused by the watermark on the paper showing through the illustrations. This would be overcome in future issues by using a more expensive paper for the illustrated pages.

In discussion the Chairman suggested that the time might now have come for the Group to consider commissioning articles on particular topics. This did not preclude the need for members to continue to submit unsolicited articles to the Editor.

7. Recorder's Report. Work on the report on geological collections in U.K. museums was now near completion. During the year some 52,000 items of information relating to collections, documentation, storage and staffing had been processed and the findings written into a basic report. The second draft of this report was now well advanced; one major index was complete and a second was in process of compilation. When complete the draft would be circulated to committee members for approval before a decision was made on the method of publication.

The report had taken almost three years to plan and prepare. If further surveys of this kind were contemplated by the Group, it might be better to seek grant aid to employ a full-time researcher who might reasonably be expected to complete the survey within a year.

The Chairman pointed out that the Pal. Soc.U.S.A. had produced a report on Invertebrate fossil collections in North American museums which might help to stimulate finance from outside sources to publish our report. The B.M. (Nat. Hist.) were also taking an increased interest in collection recording, thanks largely to the efforts of R. Cleevely.

8. Geological Site Documentation Scheme. R. Clements (Chairman of the Site Documentation Committee) reported on the inauguration of the scheme. A constitution had been drawn up by an ad hoc working party consisting of himself, J. Cooper, M. Jones and M. Stanley. The scheme would be run by an Executive of four, nominated by the G.C.G. committee, plus a legislative committee consisting of the Executive and nominees of various groups and societies. Three members of the Executive (J. Cooper, P. Phillips, M. Stanley) had been appointed to date and committee mem bers were: Dr. R. Clements (Chairman & G.C.G. nominee); Prof. D. Dineley (Geol. Soc.); Dr. R. King (Min. Soc.); Dr. E. Robinson (Geol. Ass.); D. Scott (A.T.G.); Dr. P. Toghill (Pal. Ass.). Nominations from other groups were still being sought.

Recording cards were being produced with the copyright held jointly by G.C.G. and M.D.A. A two-tier recording system was proposed:

1) Record Centres would be responsible for the storage and dissemination of data;
2) Recording Units would collect data in association with a designated Centre.

21 centres had been designated to date and applications from a number of others were pending. Guidelines were now being drafted and would shortly be circulated to all designated centres. A publicity drive would be launched to stimulate the input of information and a newsletter would also be produced.

In view of the workload involved, it might eventually be necessary to

appoint a full-time officer to administer the scheme but this would only be possible if additional financial backing was forthcoming.

Finally Dr. Clements recorded the Committee's gratitude to M. Jones who had done an immense amount of work to get the scheme successfully launched.

9. Election of Officers and Committee. In the absence of alternative nominations, the following were declared elected:

Chairman :	Dr. H. Torrens (Keele University)	
Secretary :	Mike Jones (Leicestershire Museums)	
Treasurer :	John Cooper (Leicestershire Museums)	
Editor:	Brian Page (Keele University)	
Recorder :	Phil Doughty (Ulster Museum)	
Minutes Secretary :	Geoff Tresise (Merseyside Museum)	
Committee :	Mick Stanley (Derby Museum)	- continuing member
	Ron Cleevely (B.M. (Nat.Hist.))	- new member
	Alan Howell (Bolton Museum)	- new member
	Ian Rolfe (Hunterian Museum)	- new member
Co-opted member :	Mike Bassett (National Museum of Wales)	

10. A.O.B. The Chairman thanked R. Pickford for his help in arranging the meeting and expressed the hope that it might have helped to bring home the importance of the Bath collections.

The meeting closed at 17.20

Geoffrey Tresise

4 January 1977.

COMMITTEE NOTES DEC. 1977 - FEB. 1978

The fourth A.G.M., the Minutes of which are reproduced in full in this issue, was held at Bath Reference Library on 16th December in conjunction with a general meeting at both Bristol and Bath Museums. Three committee members, namely Barbara Pyrah, Ron Croucher and Mike Bassett retired, having completed their period in office and our thanks are due for their support and their various contributions to the Groups work. Mike Bassett will continue his valuable work on 'collections rescue' and will be co-opted onto committee accordingly. In addition we welcome three new committee members; Ron Cleevely (B.M., N.H.), Ian Rolfe (Hunterian Museum) and Alan Howell (Bolton Museum).

Of the several contributions to the Bristol/Bath meeting those by Hugh Torrens and Charles Copp on the history of the Bath Geological Museum and its collections were largely based on their previously published accounts in the G.C.G. Newsletter. An article by Chris Duffin arising from his talk on some of the vertebrate material in the Charles Moore collection appears in this number (pp. 59-67) and articles on the new geology gallery at Bristol, and the museums educational services there are expected to be published in due course. All who attended the meeting at Bristol must have been impressed with the high standards of storage and organisation of the geology collections, with the geology displays and the variety and extent of educational services in geology provided by the schools department. At Bath in the afternoon the group may have succeeded in drawing local press and political attention to the problems facing this museum and tried to underline the responsibility which the city has for these highly important collections.

With regard to the National Scheme for Geological Site Documentation, the first Information Bulletin (No. 1 Feb. 1978) has now been published and distributed to those involved in the Scheme. All designated Geological Locality Record Centres have received batches of Record Cards and Summary Records and are establishing, if they have not already done so, appropriate site record filing and indexing systems. The Executive is currently working on the production of Handbooks for Centres and Recorders whilst the C.G.S.D. has been concerned with policy, confidentiality, priorities for local funding and the budget for 1978/9. Members may have noticed several reports in the national press relating to the Scheme, a measure of the attention it is commanding.

Work is still continuing on the preparation of a report based on the returns from the questionnaire survey of geology collections and resources undertaken by Ulster Museum on behalf of the Group. Most of the report is now in second draft and several appendixes have been completed or are in an advanced state of preparation. Over 52,000 items of information have been processed and a report of approximately 200 pages is envisaged. Your Committee is anxious to ensure that the final report is of the highest standard attainable, accordingly grant aid is being sought for publication.

At the invitation of the Association of Teachers of Geology the Group is contributing to a special issue of the Associations Journal on geological education resources in museums. Andrew Mathieson of Bristol Museum is acting as 'guest Editor' on behalf of the Group and any offers of articles, information, etc. for this special issue should be made direct to him. Members in any institution which has not returned the questionnaire, relating to its educational facilities, distributed with Newsletter No. 1 of Vol. 2 are requested to make a special effort to do so as soon as possible.

As indicated in the Committee Notes for July-Dec. 1977, increasing emphasis is now being placed on attempts to improve the lot of collections at risk. As well as maintaining our interests in the important collections at Bath and Northampton committee is also keeping in touch with developments at Dudley and Hull, amongst many others.

4. THE BATH GEOLOGICAL COLLECTIONS

f, THE IMPORTANCE OF CERTAIN VERTEBRATE FOSSILS COLLECTED BY CHARLES MOORE : AN ATTEMPT AT SCIENTIFIC PERSPECTIVE.

Charles Moore (1815 - 1881) was a very accomplished amateur palaeontologist enjoying considerable respect from many of his historically more auspicious contemporaries, characters now regarded as more significant in the development of geology. A man of private means, Moore was well able to indulge his intellectual passion, and to exercise his considerable ability as a collector. Moore lived in Bath for the greater part of his geologically productive life, and at his death, the City purchased his vast collection by appeal fund. Further biographical notes on Charles Moore and the history of his collections are given by Winwood (1892), Pickford (1971, 1975) and Copp (1975). Suffice it to say here that the scientific importance of the material collected by this man has been little realised in recent years due to the embarrassing lack of attention paid to it by its various custodians. The collection has lapsed into relative scientific obscurity, and has been saved from falling into complete disrepair by the singular and valiant efforts of Ron Pickford.

Unease about the collections has resulted in them coming under the scrutiny of specialists in the history of geology, and in vertebrate and invertebrate palaeontology which has awakened interest and concern for the fate of the entire Bath Geology Museum collections in recent years (cf. G.C.G. Newsletter No. 3, April 1975). The collections have thus received more attention and publicity than they have known since Moore's death, and their importance to the geological world is just beginning to be realised.

The object of this article is to place certain of the vertebrate fossils collected by Charles Moore into the scientific perspective of both his own time, and the present. It should be realised at the outset that only a small part of the Moore Collection is considered here, but that the conclusions regarding the extreme importance of the material applies to the entire collections of the Bath Geology Museum, of which the Moore collection is itself only a part. For instance, the Museum also houses the collections made by Wm. Lonsdale in the earlier part of the nineteenth century.

The vertebrate fossils considered below will be dealt with in order of their stratigraphic occurrence, rather than in the order of their collection.

TRIASSIC

1. Keuper

In 1867, Moore reported on a section in the Keuper at Ruishton, Somerset. The sandstones yielded teeth of *Acrodus keuperinus*, found and described from the Midlands some 20 years earlier by Murchison and Strickland, teeth of a labyrinthodont amphibian, and teeth of *Belodon* ?, a phytosaur.

In a later paper (Moore 1880), teeth of *Thecodontosaurus* and *Palaeosaurus* (theropod dinosaurs previously found in the Triassic Dolomitic Conglomerate of Durdham Down), *Batrachia*, *Sphenonchus* (now realised to be cephalic spines located just behind the orbit on the heads of male hybodont sharks), *Diplodus* and '*Triplodus*' were added to the list. The latter teeth were undescribed, making the generic name a *nomen nudum*.

Woodward (1889) later described the selachian teeth *Diplodus moorei* Woodward from the collection (see Fig. 1). These teeth are now regarded as forming the latest recorded occurrence of the xenacanths, a group of freshwater sharks. The genus was previously considered more typical of the Permian of the U.S.A., and this record is the first from Europe (Seilacher later described *D. moorei* from the German Keuper).

The Ruishton Keuper fauna is important in that it provides a reference aquatic fauna from what is usually a rather unproductive series of deposits with regard to vertebrate remains; it is the only fauna of this age to have been found in the West Country; it forms the only English record, and the major of two European records, of D. moorei; amongst the previously unsorted material collected by Moore from this locality, a new hybodont species has been identified (Duffin, in preparation).

2. Rhaetian

Probably the most famous of Moore's vertebrate collections is that from the fissure filling in the Carboniferous Limestone Quarry at Holwell, near Frome, Somerset. Moore had 3 tons of matrix from the fissure transported to his home, where, over a period of 3 years, he sorted and picked it through by hand. Indeed, McKenna (1965) remarks that Moore may have been the first palaeontologist to screen material on a large scale. The result of his perseverance was an astounding collection of small, disarticulated remains of aquatic and terrestrial vertebrates probably largely, if not all, of Rhaetian age. Moore published several faunal lists in a series of short papers, and in his 1867 paper promised that he would write a longer paper on Holwell and its fissure faunas as a whole. This was never done by Moore, but he did send valuable and important specimens to other specialists of the day for description. Since Moore's time, Holwell has been briefly discussed in papers by Richardson (1911), Kühne (1946) and Savage and Waldman (1966). An extended account as only promised by Moore is now in preparation (Copp and Duffin).

Owen described the cream of the fissure in his monumental review of Mesozoic mammals, published in 1871, even though Moore sent him the collection of mammalian teeth in 1858, the year of discovery of the fissure. These teeth formed the most complete collection of Upper Triassic mammals known at the time, and were actually discovered and recognised for their importance before the now lost, single tooth of Hypsiprymnopsis rhaeticus (Dawkins 1864) found in the Sully Beds, or infra-basal bone bed of ?Rhaetian age at Blue Anchor Point, Somerset, but after the 'Microlestes' teeth described by Plieninger (1847) from the German bone beds of Rhaeto-Jurassic age. Owen described the Holwell teeth as being generically identical to those from Germany, but the generic name coined by Plieninger was later shown to be preoccupied, and the genus Thomasia was erected for the German teeth (Poche 1908, Krausse 1919, Simpson 1928). Simpson (1928) respected the generic construction of Plieninger, and, noting the similarity of the Holwell teeth to the German specimens, erected the genus 'Microcleptes' for the bulk of the English teeth (3 species). It later transpired, however, that 'Microcleptes' was a name itself preoccupied (by a beetle). Simpson (1947) accordingly took the meaning of the generic name he had so carefully constructed as close to Plieninger's original as possible, and translated it with an Arabic root in erecting the new genus Haramiya totally replacing 'Microcleptes'. Haramiya has stood the test of time and is retained in current literature (cf. Hahn 1973).

The Holwell mammal teeth, 29 in all, are not completely accounted for. The British Museum (Natural History) houses the three existing teeth of H. fissurae Simpson, having obtained them by exchange with the Bath Institution in 1884.

A letter amongst the collection of Marsh papers in the Peabody Museum, New Haven, U.S.A., reveals that Moore sent this eminent American palaeontologist a collection of 9 mammal teeth from Holwell on September 27th 1881. Two of these, molars of H. moorei (Owen) and Thomasia anglica Simpson, survive. The remaining 7 are lost, not having been permanently incorporated into the Yale University collections.

Fifteen teeth survive in the Bath Geology Museum, although one of these is definitely a grinding tooth of the holostean Sargodon tomicus Plieninger (Parrington 1947, Savage and Waldman 1966). The remainder of the teeth are

Fig.1. *Diplodus moorei* Woodward, tooth in occlusal view, x22.

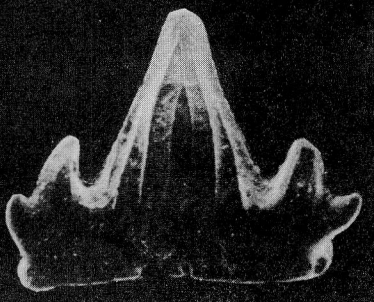

Fig.2. *Hybodus minor* Ag., labial view, x13.

Fig.3. *Hybodus* sp., fin spine, x2.

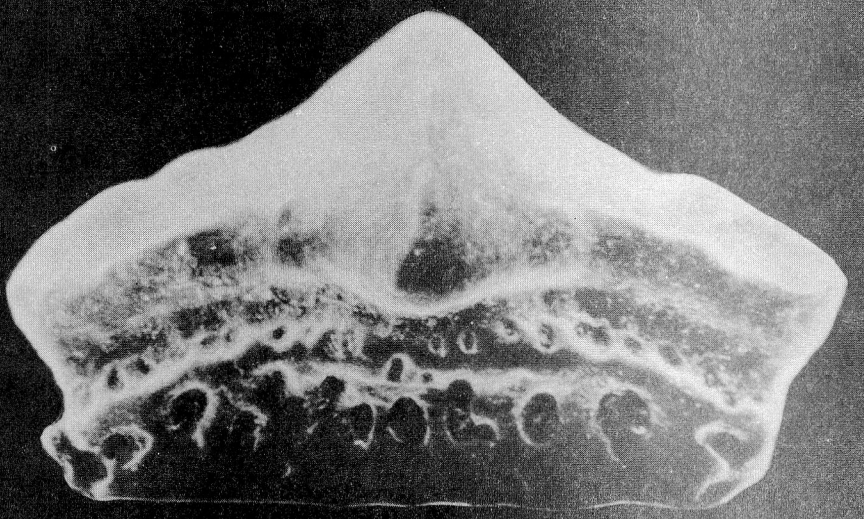

Fig.4. *Acrodus minimus* Ag., tooth in labial view, x15.

lost. The specimens surviving in Bath are by far the most important since they include Owen's type material. These teeth still form one of the most important collections of early Mesozoic mammal teeth, and figure largely in discussions of early mammalian evolution. Their discovery led other palaeontologists to search in deposits of similar age, with rich rewards (Fraas 1866, E. von Huene 1933, Parrington 1941, 1947, Peyer 1956, Russell and Wouters 1976). The fact of Moore's finding such excellently preserved and rare specimens in fissure deposits filling clefts in the Carboniferous Limestone also made its mark on subsequent collecting. Kühne conducted extensive fieldwork in the Mendips and South Wales, and was rewarded by finding mammalian teeth in further fissures at Holwell (Kühne 1946) and Glamorganshire (Kühne 1949a, b, 1950, 1958), and also by discovering the tritylodontid Oligokyphus at Windsor Hill Quarry, Somerset (Kühne 1956). The hunt was now on, and the staff at University College, London took over the prospecting. Kermack et al. continued examining the South Wales Quarries, discovering rich hauls of the triconodont mammal Morganucodon (cf. Kermack, Mussett and Rigney 1973), and very productive further fissures. Robinson (1957, 1962, 1973) prospected in the Gloucestershire and Mendip areas, and was to uncover rich faunas containing a wealth of lepidosaur remains in both areas. Thus, it can be seen that the collecting perspicacity shown by Charles Moore was to set the scene for the collection of rich terrestrial faunas after his death, as evidenced by the large volume of literature presently encountered, and ever increasing, in the fields of early mammalian and lepidosaurian history. Many new fissures have been encountered in Carboniferous Limestone Quarries over the years, and the description of their faunas forms a task for present and future researchers, wide in both scope and potential implications.

Returning to the Holwell fauna specifically, Owen (1860) described further material sent to him by Moore. He described 3 very small vertebrae as being arguably mammalian in affinity, primarily on the basis of their association with the demonstrably mammalian teeth dealt with above. At least one of these vertebrae is definitely of lepidosaur affinity, and as such represents some of the earliest described lepidosaur remains.

Amongst the previously unsorted remains from the fissure are other post-cranial fragments of lepidosaurian and mammalian affinity (see Fig. 7). Jaw fragments of undescribed acrodont and pleurodont lepidosaurs are also present.

Moore sent some scutes found in the fissure to Hermann von Meyer, Owen's equivalent in Frankfurt. He described them (Meyer 1864, 1867) as belonging to the dermal armour of a placodont reptile (a Triassic group showing similar adaptations to turtles), Psephoderma anglicum von Meyer. Psephoderma is a genus based upon dermal armour only. This record, together with other finds in the Rhaetian of the Alps (Meyer, 1858) formed the latest record of this group at the time of discovery, and remain such.

Moore makes only passing mention of these scutes (Moore 1860), and the actual specimens have long been considered lost (F. Westphal pers. comm.), since they could not be traced in von Meyer's collections. A plastic bag full of scutes was found in the Moore collection and amongst these, the type specimens could be distinguished by comparison of the actual specimens with von Meyer's figures. This material is important in being the only described placodont remains from Britain.

Moore (1858, 1860) also mentions teeth belonging to 'Placodus' in his Holwell collection. These teeth have also been located, and their placodont affinity verified. Many years later, Kühne (1946) mentions teeth of a placodont being found in the fissure "Holwell 2", and states that they are, to his knowledge the first record of this reptile group in Britain. The teeth mentioned by Moore, and the scutes described by von Meyer form this first record, and together with the teeth mentioned by Kühne are extremely important in forming the only record of the subclass Placodontomorpha Kuhn 1968 from Britain.

A series of larger vertebrae (2 to 3 cm. long) was also recovered from the Holwell fissure by Moore. Erica von Huene (1933) briefly described some of these specimens, and together with other specimens from the Rhaetic bone beds of various localities, later (E. von Huene 1935) erected the rhynchocephalian genus Pachystropheus rhaeticus von Huene. However, Owen (1841), some 94 years earlier in his classic article on fossil reptiles, described 'a small anterior dorsal vertebra' from the bone bed of Aust Cliff, Avon, as Rysosteus. The vertebra was in the collection of a Mr. Johnson[1] of Bristol, and is now believed to be lost. Owen's description accords exactly with those vertebrae found at Holwell (see Fig. 6), and this means that Pachystropheus falls as a junior synonym of Rysosteus. Furthermore, the vertebrae are definitely of archosaurian affinity, and are not related to the Rhynchocephalia.

The selachian fauna of the Holwell fissure filling is of considerable importance, but some explanation of the current state of shark taxonomy is needed in order to appreciate this. Fossil sharks were divided into grades of evolutionary organisation by Schaeffer (1967) as a result of the lack of confidently determined evolutionary lineages so far obtained from the fossil record. This grade concept was formalised by Maisey (1975) in erecting the selachian orders Ctenacanthiformes (primitive sharks including the cladodonts), Hybodontiformes (including the more familiar Upper Palaeozoic and early to middle Mesozoic genera Hybodus, Acrodus etc.) and the Euselachiformes (the "modern level" sharks, comprising all extant and related fossil forms). Maisey based his divisions on a number of skeletal characters, the most prominent of which was fin spine morphology and histology. Work conducted by Reif (1973 etc.) on the crystalline nature of shark tooth enamel, as viewed under the stereoscan microscope, added another, and possibly more reliable diagnostic criterion in the delimitation of selachian orders. Particular attention has been paid in recent years to the early history of the euselachian sharks. With regard to this area of study, the Holwell fauna collected by Moore has much to offer.

For many years, Palaeospinax Egerton 1872 from the Sinemurian-Toarcian of Lyme Regis and Holzmaden, has formed the earliest record of a euselachian shark. Sykes (1971) then published on the teeth of a very peculiar form from the Rhaetic bone bed of Barnstone, Nottinghamshire, and later from the British Rhaetic in general (Sykes 1974a). These teeth, 'Dalatias barnstonensis' Sykes, are blade-like and triangular in the lower jaw, armed with a series of serrations along the lateral cutting edges (see Fig. 5). The upper teeth are smaller, needle-like, and backwardly pointing, forming an effective mechanism for food retention in the mouth. These teeth apparently formed the lowest record of the euselachiform sharks, but recent evidence from the enamel structure (Reif 1978) suggests that the teeth of this form are unique. Reif proves that the teeth of Pseudodalatias are not related in any way to those of extant dalatiid sharks on the basis of histological and gross morphological evidence. The tooth enamel of hybodont and more primitive sharks is simple, comprising single apatite crystallites. In the euselachiform sharks, a triple-layered enamel is present, comprising shiny layer, parallel fibred enameloid and tangled fibred enameloid layers.

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1. FOOTNOTE
Mr. Johnson of Bristol is James Johnson (c.1764-1844) F.S.A. of 12 Dowry Parade, Hotwells, Bristol. He was a famous and active collector of fossils in this area in the early part of the 19th century who provided material to the Sowerby's. After his death on August 14 1844 his fine collections of fossils and minerals were sold at his house over April 15-19, 21-23 1845. Copies of the sale catalogue survive at the Geological Society, London and British Museum (Natural History) A. S. Woodward 1904 History of the Collections ... Nat. Hist. Brit. Mus. 1 p.301 and C. D. Sherborn 1940 Where is the——— Collection p.77 both completely confuse him with his eldest son Dr. James Rawlins Johnson (c.1789-1841) F.R.S., F.L.S. who was also much interested in fossils and comparative anatomy.

H. S. Torrens

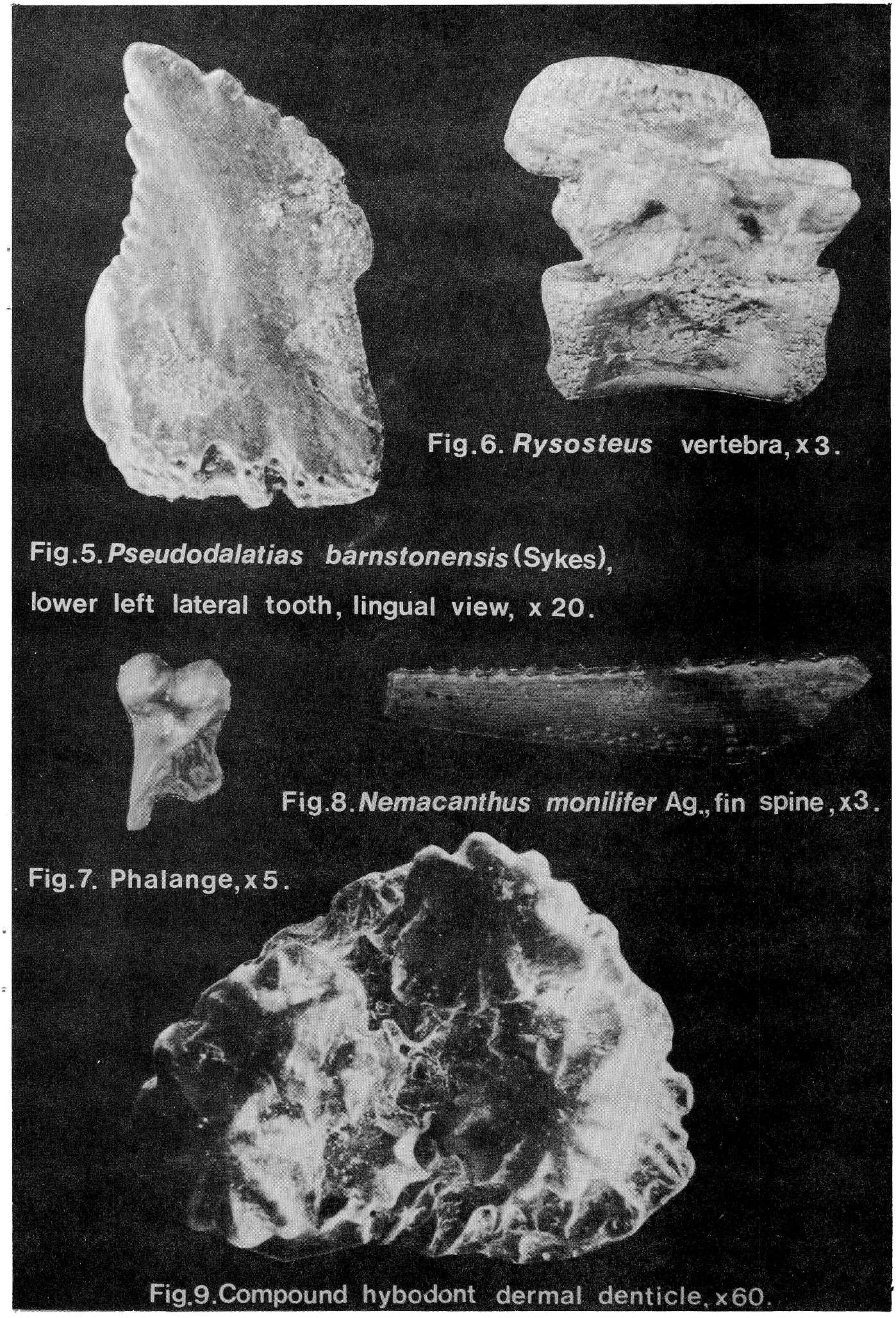

Fig.6. *Rysosteus* vertebra, x3.

Fig.5. *Pseudodalatias barnstonensis* (Sykes), lower left lateral tooth, lingual view, x 20.

Fig.8. *Nemacanthus monilifer* Ag., fin spine, x3.

Fig.7. Phalange, x5.

Fig.9. Compound hybodont dermal denticle, x60.

The enamel of Pseudodalatias comprises single crystallites, with a highly divergent structure. Reif considers that this enamel type is most closely related to that of hybodonts, rather than being euselachiform in affinity. He erects the new Family Pseudodalatiidae for these teeth, which he hesitatingly places with the hybodonts. The fact remains, however, that these are extremely important teeth which show a remarkable degree of convergence with extant dalatiid sharks. The amazing thing is that a number of teeth from both upper and lower dentitions are present in the Holwell fauna, and could have been described some 110 years earlier. With their almost identical morphology to the teeth of D. licha, a modern form, it is hard to imagine how much these few teeth could have affected discussions on shark evolution, and perhaps have laid partial siege to the developing notions of the evolutionary process as evidenced by the fossil record, had they been recognised and described at the time of their collection. As things have worked out, the teeth have come to light during a scientific era in which their true position and importance can be more accurately judged, and in which their enigmatic quality is more precisely defined, and reduced to a minimum.

Two teeth of definite euselachiform origin have been recovered from the Holwell collection of Charles Moore. These teeth belong to a new genus, and form the oldest record of the Euselachii so far known. The teeth most closely resemble those of the orectolobids, amongst extant forms. Once again, these teeth are of inestimable value to our understanding of selachian evolution.

Amongst the hybodonts from Holwell are two new species, which could easily have been distinguished from contemporary shark remains recovered from stratified Rhaetian deposits, had the Holwell fauna been fully examined and described at the time of collection. The remainder of the hybodonts found at Holwell (see, for example, Figs. 2, 3, 4, 8) are all well documented from other sites.

Seven teeth of a new species of Palaeobates are also present amongst the hybodonts from Holwell. Their record in this deposit forms the latest known occurrence of this genus.

Further shark remains from Holwell include several varieties of dermal denticle, some new, and others identical to those recently described by Sykes (1974b) (see Fig. 9). Again, these structures could have been described well over a century ago.

Finally amongst the cartilaginous fishes, the palatal teeth of a chimaeroid have been found in the Holwell material. Assuming that a Rhaetian age for the entire Holwell fissure fauna is correct, these teeth, apart from belonging to a new species, form the earliest record of the Chimaeroidei (the earliest record has previously been Ischyodus from the Bajocian of Germany).

The teeth of bony fish from Holwell mainly comprise beautifully preserved, well established Rhaetian species (cf. Duffin and Gazdzicki 1977). Several new forms are also present within the fauna, however, including ?pharyngeal bones, each carrying large numbers of small teeth (up to 72 on one bone, according to Moore).

In summary, the Holwell fissure fauna collected 120 years ago by Charles Moore is exceptionally diverse, and includes many genera and species of extreme importance to the palaeontological world. The fauna is apparently the most representative of any of Rhaetian age so far known, and samples the early history of both mammals and lepidosaurs, and the most interesting periods of evolutionary change within the Selachii and Actinopterygii. Had the fauna been described just after its collection, many new forms could have been made known to the geological world at least 100 years earlier than has actually been the case.

JURASSIC

Lower Jurassic

In several papers (1852, 1856, 1866), Moore mentions collecting beautiful specimens of fish, ichthyosaurs and 'Teleosaurus' from the Fish and Saurian Bed in the 'Upper Lias' (=Harpoceras falcifer zone of the Lower Toarcian, cf. Dean, Donovan and Howarth 1961) at Ilminster. Woodward (1896) wrote briefly on the fish fauna collected by Charles Moore from these beds, recording the presence of Lepidotus, Dapedius, Caturus and Pachycormus. Of these, he describes very briefly a fine specimen of Caturus, but otherwise, his comments are based almost entirely on previously described specimens from Yorkshire and Germany. The Ilminster specimens are present in the Bath Geology Museum, and bear out both Moore's and Woodward's remarks of being beautifully preserved. Several specimens preserve the skull, or even the entire fish in three dimensions, totally uncrushed. It was this excellence of preservation that led Rayner to study certain of these specimens as part of a project on holostean neurocrania (Rayner 1948). Reports on neurocranial anatomy were sparse in the literature at this time, and the polished sections she made of the Bath Caturus and Dapedius specimens were an important part of her work. The importance of neurocranial features in the study of actinopterygian relationships has more recently been championed by Gardiner, in a series of papers, and Patterson (1975). Apart from these brief reports, the Upper Lias fish fauna from Ilminster has still to be studied in detail, although work is in progress at the present time (Duffin in preparation).

Apart from the few short notes by Moore on the presence of the crocodilian specimens in the creamy limestone nodules from Ilminster, these forms have been very much neglected by British authors (note the glaring omission of these specimens from the review of British Fossil crocodiles written by Woodward in 1885, especially in the light of his, admittedly later, publication on the fish fauna from the same locality). The Frenchman, E. Eudes-Deslongchamps, was the expert of the day like his father before him on fossil crocodiles, having already described a number of forms from deposits of similar Upper Lias age in Normandy. Moore obviously showed Deslongchamps his specimens, and it is noted that the Frenchman described these forms in manuscript in 1876 (Wilson 1892). This manuscript was never published, but it is apparent that Deslongchamps recognised the true generic affinity of the specimens. At present, the specimens of Pelagosaurus in the Moore Collection of the Bath Geology Museum form the first record of this genus in England, the genus having previously recorded from France and Germany (Westphal 1961, 1962 - note that both of these reviews of the English and German Upper Lias crocodiles omit any mention of the Bath specimens). The Bath specimens demonstrate a faunal affinity with continental European rocks of similar age, a conclusion supported by the ichthyosaur fauna from the same beds, also collected by Moore (C. McGowan pers. comm.). The Middle Lias and Upper Lias gastropod and bivalve faunas in the Moore collection show a similar strong affinity to faunas of the same age from Normandy and the Hierlatz (C. Copp pers. comm.). Individuals at different stages of maturity are present in this collection of crocodiles. This ontogenetic series of specimens will thus aid understanding of development in fossil crocodiles (Duffin in preparation).

Thus it can be seen that the Upper Lias vertebrate fauna collected by Charles Moore is important in being an, as yet, undescribed collection of fossils, the beautiful preservation of which makes it unique in faunas of similar age from Britain.

It is hoped that the foregoing discussions emphasise something of the extreme importance and interest to the geological world of certain of the vertebrate fossils collected by Charles Moore. The fact that much new, and undescribed material is present in the collection, alone warrants careful housing and curating of the specimens in the future. The history of neglect which has affected the entire Bath Geology Museum collections has, in the past, deprived research workers and public alike of the wealth of information and interest

available from the beautiful specimens in the Museum's care. The fact that the neglect is being rectified, is a great encouragement, but no cause for complacency. Many people look forward to the thorough and necessary curation of the collections, with a knowledge of the treasures which must still lie undiscovered amongst them.

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15. THE TEMPEST ANDERSON COLLECTION OF PHOTOGRAPHS at YORKSHIRE MUSEUM.

1. INTRODUCTION AND BIOGRAPHICAL NOTES

This article results from a preliminary survey, lasting some seven days, of the Tempest Anderson Collection of photographs in the Yorkshire Museum at York, and deals especially with the photographs of volcanoes and of volcanic structures and phenomena.

Tempest Anderson was born in 1846 in Stonegate, York, the son of a doctor, William C. Anderson. After his education at St. Peter's, York and University College, London, he took his M.D. in 1873 and was later elected a fellow of University College. He took a particular interest in the eye, and became consulting ophthalmic surgeon at York County Hospital, besides publishing articles in medical journals. His professional interest led him to photography, a field in which he excelled. He made his own cameras and lenses, and enthusiastically promoted the use of photography in geology, using "magic lantern" slides to illustrate lectures, and particularly to bring volcanoes and Alpine peaks within reach of his audience. He was a member of a committee of the British Association which arranged the collection and documentation of several thousand photographs of geological interest from the United Kingdom. For details of Anderson's photographic equipment and techniques, the reader is referred to the chapter on "Photographic Methods" in his book "Volcanic Studies" (Anderson, 1903).

From 1883 onwards Tempest Anderson spent much of his leisure time abroad, particularly in active volcanic areas. These travels, outlined in Appendix II, would be the envy of many present day volcanologists. The only major volcanic regions which he does not appear to have visited are those of South America, Japan, Antarctica and parts of the Pacific. It is said that Anderson always kept two bags packed, one for hot climes and one for cold, so that he could leave at very short notice to study a volcanic eruption almost anywhere in the world.

In 1904 he was awarded an honorary D.Sc. by the University of Leeds. He served on the councils of the Royal Geographical Society, the Geological Society, the Linnean Society and the British Association, of which he was elected a vice-president in 1906. In addition, he was Tyndall Lecturer on Volcanoes at the Royal Institution, and in 1910 became president of the Museums Association. He was a well known alpinist and a distinguished member of the Alpine Club, to which he was elected in 1893 (see Anderson, 1901a; Yeld, 1902).

Tempest Anderson was held in high regard in his native city, to which he devoted a great deal of his time. He served as a J.P., and became Sheriff of York in 1894. He had a great interest in town planning, and particularly in the preservation of green spaces within the city, and applied his knowledge of geological processes to the problems of preservation of the city's ancient monuments (Anderson, 1910). Anderson contributed much to the cultural life of York, and served as both secretary and president of the Yorkshire Philosophical Society. In 1912 he presented to the Society the lecture hall which now bears his name. Anderson had a reputation for being honest, friendly, charitable and endowed with a good sense of humour.

In the summer of 1913, whilst sailing through the Red Sea on his voyage home from an expedition to the volcanoes of Indonesia and the Philippines, Tempest Anderson contracted an illness variously described as heat apoplexy or enteric fever. He died on 26th August, at the age of 67, and was buried at Suez. Nine years previously, before his departure for the West Indies, a friend had warned him: "You know, Anderson, you are sure to be killed, but it will be such a very great safisfaction to you afterwards to think that it was in the cause of science."

2. TEMPEST ANDERSON'S CONTRIBUTIONS TO VOLCANOLOGY

Tempest Anderson regarded himself as an amateur geologist, and thought volcanology a suitable pursuit for "an amateur of limited leisure". However, his standing as a volcanologist was shown when, in 1902, together with Dr. (later Sir) John S. Flett of the Geological Survey, he was commissioned by the Royal Society to investigate the recent eruptions of La Soufrière (on St. Vincent) Montagne Pelée (on Martinique) in the West Indies. The work of this expedition was Anderson's most important contribution to the science, and resulted in a 200 page paper published by the Royal Society (Anderson and Flett, 1902a) as well as a number of shorter articles (Anderson, 1903a - c, 1908b, 1909; Anderson and Flett 1902b, 1903). In particular, great progress was made in understanding the type of eruption known as "nuée ardente" or pyroclastic flow, which devastated both these islands in 1902, with great loss of life (Plates 1 - 5).

In such an eruption, a hot mixture of volcanic gas and pyroclastic material, which may include boulders several metres long, moves at hurricane speed down the slopes of the volcano, usually confined to valleys, and destroys everything in its path. Anderson realized that there were two essential parts to these flows - a basal part in which most of the solid material was carried and above this, a rapidly expanding cloud of volcanic gas and dust. The basal part he compared with avalanches he had observed in the Alps: the mechanism and effects are in many ways similar, in spite of the obvious temperature difference, and the name "glowing avalanche" is still commonly used for this type of eruption. In the Alps, Anderson had noticed the effect of a blast of cold air pushed forward by snow avalanches, and uprooting trees in an area extending far beyond that of the avalanche proper. In Martinique, he found the volcanic equivalent of this phenomenon. The hot avalanches left deposits up to two hundred feet thick in the valleys down which they flowed. In areas outside these valleys great devastation also occurred, but the agent of destruction left only thin ash deposits. In particular, Anderson noticed that in the city of St. Pierre (Martinique), which was razed to the ground in two minutes, only a few inches of ash were deposited (plate 5). This he interpreted as the result of a hot blast extending far beyond the hot avalanche from which it originated. Today this is a phenomenon well known to the volcanologist as a "ground surge".

Tempest Anderson observed "nuées ardentes" eruptions in other parts of the world, and these are superbly illustrated by photographs from Vesuvius and from the Philippines (plate 6). During the 1909 eruption of Matavanu, on the island of Savaii in Samoa, he described and photographed explosions occurring when lava flowed into the sea, and made many observations on the different features of lava flows formed during these eruptions (Anderson, 1910b). His plates and descriptions of eruptions of the Italian volcanoes also represent a major contribution to volcanology, and in particular those from the Vesuvius eruptions of 1888, 1898 and 1906 (plate 8) (Anderson 1899a, b, 1907) and the 1888-90 eruption of Vulcano (plate 10b). Volcanic features and phenomena from around the world are illustrated in "Volcanic Studies", published in 1903. A second volume of photographs of volcanological interest was published posthumously in 1917, with a text by T. G. Bonney. It is evident from some photographs in the collection, labelled from "Book Vol. I" to "Book Vol. VII" that many more plates were intended for publication, and it is to be regretted that they and their accompanying descriptions never appeared in print.

In addition to the purely scientific aspects of volcanic eruptions, Anderson's photographs convey a great deal of the accompanying human suffering. The best examples are from the 1902 eruptions in the West Indies, and include plates from the ruined city of St. Pierre and from the devastated sugar factories and plantations (plates 3, 4a, 5). In Savaii he photographed buildings filled and surrounded by lava, and on Vesuvius his photographs show landslides carrying away the railway, and people camping in the streets of their ruined villages (plate 8b).

Anderson's honesty and accuracy as a scientist come across in his writings, and he appreciated the importance of fieldwork and careful, systematic observation in geology - a "clinical or bedside study" as he called it. This may be illustrated by the following quotation in which he justifies the publication of "Volcanic Studies" although many volcanological texts were already in existence: "Much, however, of this literature is old, and some authors appear to have thought more of advancing theories, often of a highly imaginative character, than of accurate observation." He is particularly careful to mention any distortions of perspective produced by the camera.

Tempest Anderson excelled in conveying information in a palatable, and often exciting form to a general audience, without any reduction in his high scientific standards. A description (Anderson and Flett, 1903) of a "nuée ardente" eruption of Mont. Pelée, from which he was lucky to escape alive, provides a good example. Two months earlier, a similar eruption had destroyed the city of St. Pierre and all but two of its thirty thousand inhabitants. "It rushed forward over the waters, directly towards us, boiling and changing its form at every instant. In its face there sparkled innumerable lightnings, short and many of them horizontal. The cloud itself was black as night, dense and solid, and the flickering lightnings gave it an indescribably venomous appearance." Besides his own observations, he collected and published eyewitness accounts of eruptions in the volcanic areas which he visited.

Anderson's sense of humour comes across in his writings, and he was always on the lookout for the humorous and the bizarre. This may be illustrated by two examples from "Volcanic Studies" (1903). In the first, he describes a cave near Naples, in which carbon dioxide of volcanic origin accumulates and fills the lower part of the cave. "A lighted candle put below this level is extinguished....a dog with its head held below it becomes insensible, though on being taken outside the animal quickly recovers. The same dog has been in use for several years for this purpose, and yet seems in good condition." The second excerpt concerns hot springs and geysers in the Yellowstone Park, U.S.A. "It has been found that soap thrown into a geyser will often bring on an eruption but the geyser then takes a longer time to recover, before it again erupts. The use of soap is therefore now prohibited. Its action was discovered accidentally by a Chinaman in the Yellowstone Park, who erected a shed for a laundry over a boiling spring, which had never been known to act as a geyser. He emptied some soap suds into the basin of the spring, and produced an eruption, which blew up his shed."

3. THE TEMPEST ANDERSON COLLECTION

The collection consists of some 5000 black and white photographs, in the form of both negatives and glass lantern slides. Of these, a certain proportion of negatives and positives can be paired, but in many cases a single subject is represented by either but not both. In addition, there is some duplication of positives, particularly of those which appear in Anderson's publications. Taking these factors into account, there are perhaps 3000 different photographs in the collection. Most are of quarter plate size ($4\frac{1}{4}$"x$3\frac{1}{4}$") and the negatives are almost all glass plates, with a few of celluloid. The great majority of the photographs are perfectly preserved, and deterioration of the photographic emulsion is difficult to find. Perhaps 5 to 10 per cent have minor cracks and chips, but the number of irreparably broken photographs is very small.

The collection is housed in about seventy boxes. Of these, over half are purpose-made wooden boxes with tight-fitting dustproof lids. The rest is contained in a variety of wooden, cardboard and tin boxes, particularly Havana cigar boxes, in which the photographs are dusty but unharmed. The plates within a single box are mostly confined to one or two areas of the world, but

are not in any particular order within the box. Some boxes contain photographs from three or more areas, and in a few there is a complete mixture of photographs from many different places. From his publications, and from the way in which many of the photographs are labelled, one gains the impression that Tempest Anderson was a meticulous, systematic man, who would never have allowed his collection to get into this kind of disarray. It is tempting to speculate that the photographs may have been used by other people, after Anderson's death, and then put back in the boxes rather haphazardly. Certainly some of the boxes bear labels with the words "Dr. Tempest Anderson - Volcanoes", regardless of whether the photographs within are of volcanoes or not.

It is often possible to identify unlabelled photographs from the context of other plates in the box, or from Tempest Anderson's publications. Where this is not possible, some pictures of volcanic areas, and more rarely of particular eruptions, have been identified from other sources (Francis, 1976; Judd, 1893; MacDonald, 1972; Shimozoru, 1975). Thus, more than 90 per cent of the photographs can be identified with some degree of certainty. The most difficult are the unlabelled slides from the "mixed" boxes.

Some idea of the geographical scope of the collection may be obtained from Appendix II. From a volcanological viewpoint, the largest and most important group of photographs is from the 1902 eruptions of La Soufrière and Mont Pelée (plates 1 - 5). Some fifty of these were published in various articles, but the several hundred remaining provide a further valuable insight into these violent eruptions. A further group of photographs, taken in 1907, illustrates the post-eruptive changes in these islands.

Eruptions in other parts of the world are well recorded (Appendix I), and the most important, after the Caribbean collection, are from Samoa, Hawaii, the Philippines (plate 6), Mexico and Italy (plates 8 - 10). Besides Anderson's own photographs, the collection contains a number of copies of plates by other volcanologists, notably those by A. Lacroix (France) showing "nuées ardentes" and the famous spine which rose from the crater of Pelée following the 1902 eruptions. A group by T. A. Jaggar (U.S.A.) illustrate the birth and evolution of Bogoslof volcano in the Aleutian Islands in 1907.

Many of the photographs of recent volcanic areas do not show actual eruptions; nevertheless, they illustrate volcanic features of great interest. These are from the areas already mentioned, plus Iceland (plate 7) (Anderson, 1892, 1894a), southern France (Anderson, 1901b), the Eifel area (West Germany), Canary Islands, New Zealand and the western U.S.A. The slides from the Auvergne include several taken with a panoramic camera built by Tempest Anderson. The ancient igneous rocks of the British Isles are also represented (plate 11), particularly the Tertiary lavas of Skye and the Antrim plateau.

The volcanic photographs in the Tempest Anderson collection are potentially of great value to the volcanologist. Having photographs of an eruption is the next best thing to witnessing it in person, and should help considerably in the interpretation of the deposits of that eruption. By comparison of the photographs with the volcanoes as seen today, it should also be possible to determine rates of erosion and deposition in these areas. With the aid of a grant from the Yorkshire Philosophical Society, many of the important volcanological photographs, and some on other subjects, have been copied onto 35mm film, and it is hoped that in this form they may be more accessible to interested research workers. There is also a small collection of volcanic ashes from various eruptions, mostly contained in glass tubes with faded labels, which have not yet been examined in detail.

Shortly before this article was completed, an exciting find was made in the York Public Library: three large books containing press cuttings of volcanic

interest from 1902 to 1909. Of these, two and a half volumes deal with the 1902 eruptions in the West Indies. Miss B. J. Pyrah writes: "Tempest Anderson has obviously attempted to collect every cutting from every English language newspaper ... and also many cuttings from local West Indies papers. There may be around a thousand items in the three books. Many of the items about St. Pierre make harrowing reading, especially the accounts of survivors from the steamship 'Roddam' which escaped from the harbour during the eruption of Mt. Pelée ... The third book ... continues to pick up world-wide information on volcanoes and earthquakes. In addition there are many reports of lectures all over Britain by Tempest Anderson ..."

Other branches of geology are also illustrated in the collection, and of these, several boxes of photographs from the Alps are the most important, particularly showing glaciers and glacial features. These may be of interest to glaciologists studying, for example, the changes in size and shape of Alpine glaciers over the last ninety years.

It might be thought from the above that the Tempest Anderson Collection includes only geological subjects. This is by no means true, and perhaps half the photographs are of people, landscapes, towns and villages from many parts of the world. Time has only allowed a brief glance at these, but it is evident that there is a wealth of information here for the interested anthropologist, historian or archaeologist. Amongst the many cultures represented are the Carib Indians, Negroes and European colonists of the West Indies: we see bearded gentlemen and ladies in long dresses climbing volcanoes, playing cricket on board ship and sipping tea on their verandahs, in contrast with the poverty of the native villages. Farmers, fishermen, craftsmen, townspeople and peasants from the Philippines, Java, Samoa, Hawaii, New Zealand, Mexico, the Canary Islands, southern France, Italy, Germany, Switzerland, Norway and Iceland are all here. Tempest Anderson catches the atmosphere of these places, particularly in his photographs of street scenes, bustling markets and harbours. We see cowboys and Indians in the western United States and Mexico, and the colonists and natives of South Africa.

There are many plates of the Aztec pyramids and temples of Mexico, the temples and other buildings of Java, and exhibits in various museums around the world. Two boxes of plates from Egypt, dated 1903 and 1904, and showing the Pyramids and other archaeological sites, may be by Tempest Anderson. Nearer home, there are a number of photographs of London, and of landscapes and buildings in Yorkshire.

This, then, is a brief summary of the contents of the collection, but it is also possible to speculate about what is missing. Firstly, many of the positive plates are without their original negatives. Secondly, Anderson's 1913 expedition to Indonesia and the Philippines is not as well represented as might be expected, and it is possible that some of the photographs were mislaid following his death. Most important, however, none of Tempest Anderson's note-books or other unpublished writings has yet come to light. Many of the photo-graphs are systematically numbered, and some bear no other information. The numbers evidently refer to notes which Anderson made at the time. It is hoped that these records may eventually be found, as they would greatly increase the scientific value of the collection.

During the limited time which I have spent working on the collection, it has been possible to list roughly the contents of each box, and to estimate the number of photographs. This has been done in more detail for the volcanic areas, and the boxes have been labelled and provisionally numbered. Future work could start by putting the plates into correct sequence as far as possible, and then the long task of labelling and cataloguing could begin. It is evident that there is a great deal of rewarding work here for specialists in several different fields. Anyone wishing to know more about the collection should contact me at the address given, or Miss B. J. Pyrah, Keeper of Geology at the Yorkshire Museum, Museum Gardens, York.

ACKNOWLEDGEMENTS

I thank Barbara Pyrah, Keeper of Geology at the Yorkshire Museum for her help and encouragement. An earlier version of this article appeared in the Annual Report of the Yorkshire Philosophical Society for 1977, and I am grateful to the Society for permission to reproduce it here. A generous grant from the Society made it possible to transfer several hundred photographs onto 35mm film, and the photographic work was undertaken by Eric Lackford of the Yorkshire Museum.

I am grateful to Brian Page of Keele University, who brought the existence of the collection to my attention.

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Note: this is not intended as a comprehensive bibliography of Tempest Anderson

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Science New Series 38, p. 359, 1913

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Geologisk Institutt,
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5014 Bergen-Universitetet,
Norway.

APPENDIX I. VOLCANIC ERUPTIONS REPRESENTED IN THE COLLECTION

1888	Vesuvius
1888 - 90	Vulcano (some photographs by G. S. Eanson, Northampton)
1889	Stromboli
1898	Vesuvius
1902	Soufriere (St. Vincent) and Pelee (Martinique)
1904	Stromboli, Vesuvius
1906	Vesuvius
1906 - 07	Colima (Mexico)
1907	Santa Maria (Guatemala)
1907	Bogoslof (Aleutian Islands - photographs by T. A. Jaggar)
1909	Matavanu (Samoa) and Halemaumau (Hawaii)
1910	Vesuvius (?)
1913	Taal and Mayon (Philippines), Papandajan, Bromo, Tosari and Garoet (Java)

APPENDIX II. PLACES VISITED BY TEMPEST ANDERSON, AND REPRESENTED BY PHOTOGRAPHS IN THE COLLECTION

This list is based on all the presently available information, but should not be considered exhaustive. Within a single year, the places listed are not necessarily in chronological order.

1883	Eifel area (Germany)
1885	Southern France (Auvergne, Ardeche, Cantal)
1888	Italy (Naples, Vesuvius, Etna, Vulcano)
1889	Italy (Sicily, Vulcano, Stromboli), the Alps, western Norway
1890	Iceland
1891	Canary Islands and Madeira
1893	Iceland
1894	Southern France
1895	French Alps
1896	Swiss and French Alps
1898	Swiss and French Alps, Italy (Naples, Vesuvius)
1899	Swiss Alps
1900	Western U.S.A., eastern U.S.A.
1901	Southern France, the Alps
1902	The West Indies: 28th May: left London 8th June: arrived Barbados and proceeded to St. Vincent 29th June: went to Grenada and returned to St. Vincent a few days later 6th July: arrived in Martinique 12th July: left Martinique for Dominica 17th July: left Dominica for Barbados and England Also visited southern France in this year
1903	Egypt (?)
1904	Egypt (?), Italy (Vesuvius, Vulcano, Stromboli)
1905	Southern Africa (with the British Assocation)
1906	Italy (Vesuvius)
1906 - 07	Nine months in Central America and the West Indies, including the 10th International Geological Congress in Mexico (1906) and then on to Guatemala and the West Indies (St. Vincent, Martinique, Jamaica and Barbados)
1909	Matavanu (Samoa), Hawaii, New Zealand, Canadian Rockies, Winnipeg (for the British Association Meeting)
1910	Italy (?)
1911	Southern France
1913	Left England in January for Indonesia (Java, Krakatoa) and the Philippines; dies in August, during the return voyage

PLATE CAPTIONS I

1.A. The Wallibu Valley, St. Vincent, filled by the thick deposits of hot avalanches from La Soufrière. The stean explosions are caused by contact of the hot ash with river or ground water. 1902.

1.B. Chief Street, St. Pierre. 1902. (Phil. Trans. Roy. Soc. 200, Plate 36).

2.A. First stage of secondary eruption, Walliba. 30 May, 1902.

2.B. Site of Richmond Village, St. Vincent. 30 May, 1902.
Both positive plates 2.A. and 2.B. bear a label stating that negatives were made for the Am. Mus. Nat. Hist. by E.Q.H.

3.A. Mud lake in a tributary valley of the Rabaka Dry River, St. Vincent. The ash is being reworked by braided streams. Note devastated forest on the valley sides. (Phil. Trans. Roy. Soc. 200, Plate 34.2).

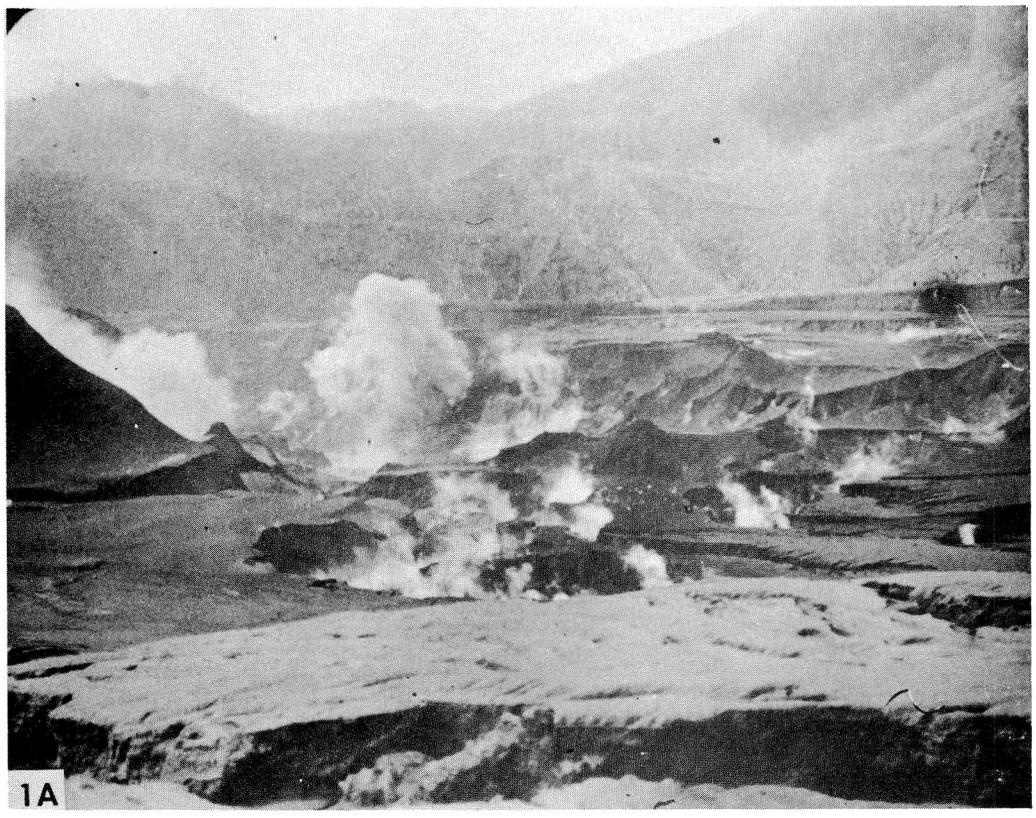
3.B. Lot 14, St. Vincent - plantation and factory destroyed by a hot avalanche from La Soufrière. Many people died here. 1902. (Geog. Jour. March 1903, Plate 10).

4.A. The windward ascent of La Soufrière showing devastated forest. Tempest Anderson at left; the gentleman in the pith helmet may be the French volcanologist Lacroix.

4.B. The Upper Wallibu Valley, St. Vincent, filled with hot ash, which is being rapidly eroded. 1902. (Phil. Trans. Roy. Soc. 200, Plate 29).

5.A. Part of the ruined city of St. Pierre, Martinique. 1902.

5.B. St. Pierre on 8th July, 1902.



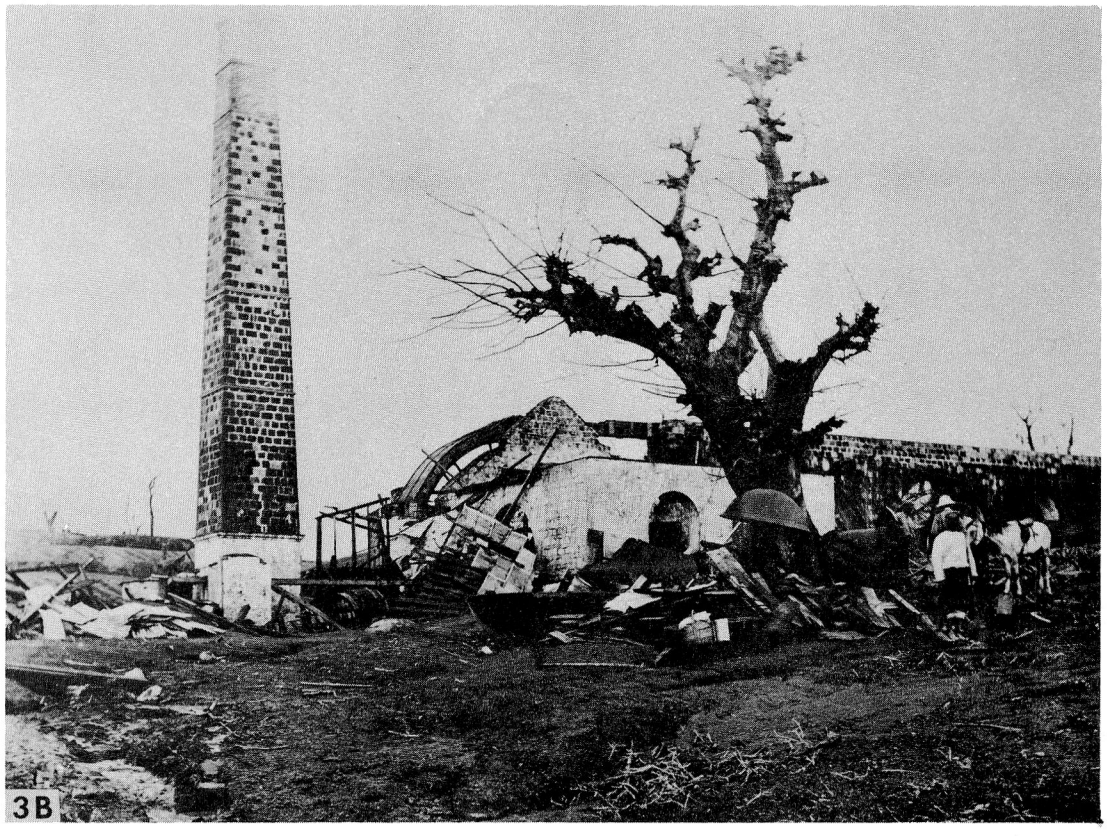
1A

1B

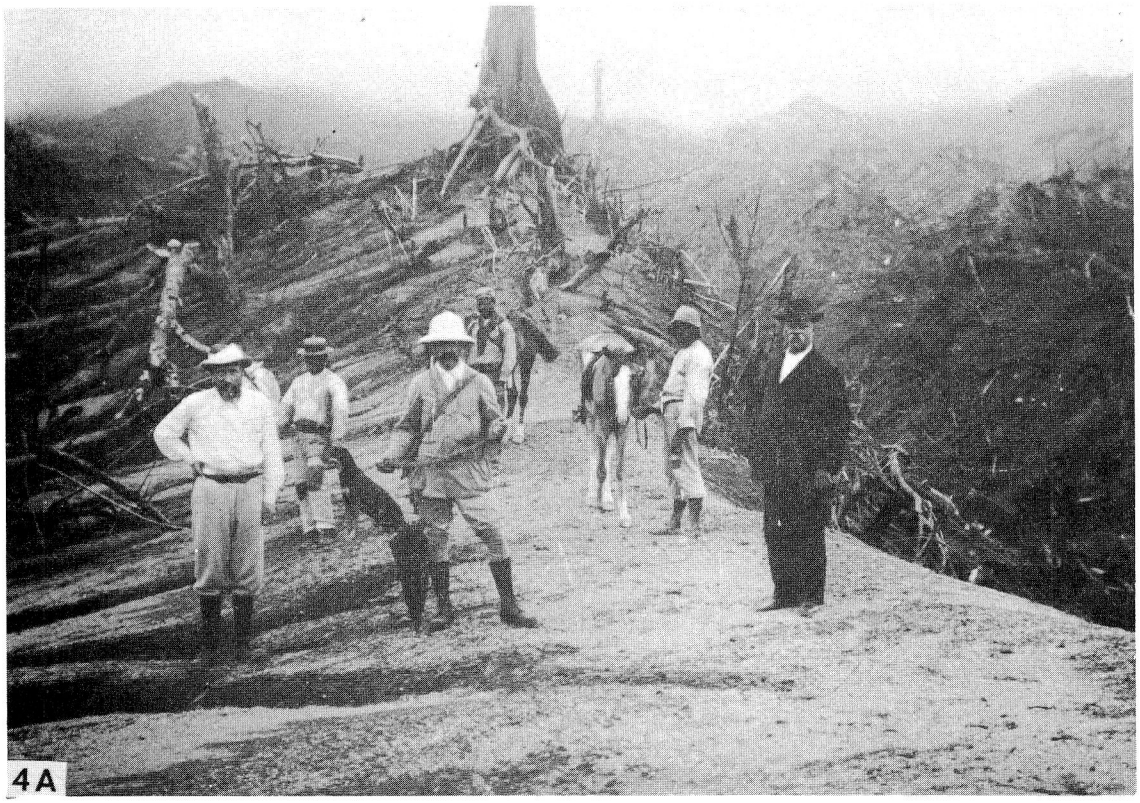
2A

2B

3A



3B



4A

4B

5A

5B

PLATE CAPTIONS II

6.A. The perfect symmetrical cone of the 2400m high Mayon volcano, Philippines. Are these nuees ardentes, or just clouds? 1913.

6.B. A superb example of a nuee ardente, flowing towards the camera. Behind, the eruption column is being carried downwind to the left. 1913 eruption of Taal Volcano, Philippines.

7.A. Columnar jointed basalt necks in Iceland. 1890 or 1893.

7.B. Two Icelanders. 1890 or 1893.

8.A. Eruption of Vesuvius, 26th April 1906, seen from the Eremo Hotel.

8.B. Building filled by a lava flow from the 1906 eruption of Vesuvius.

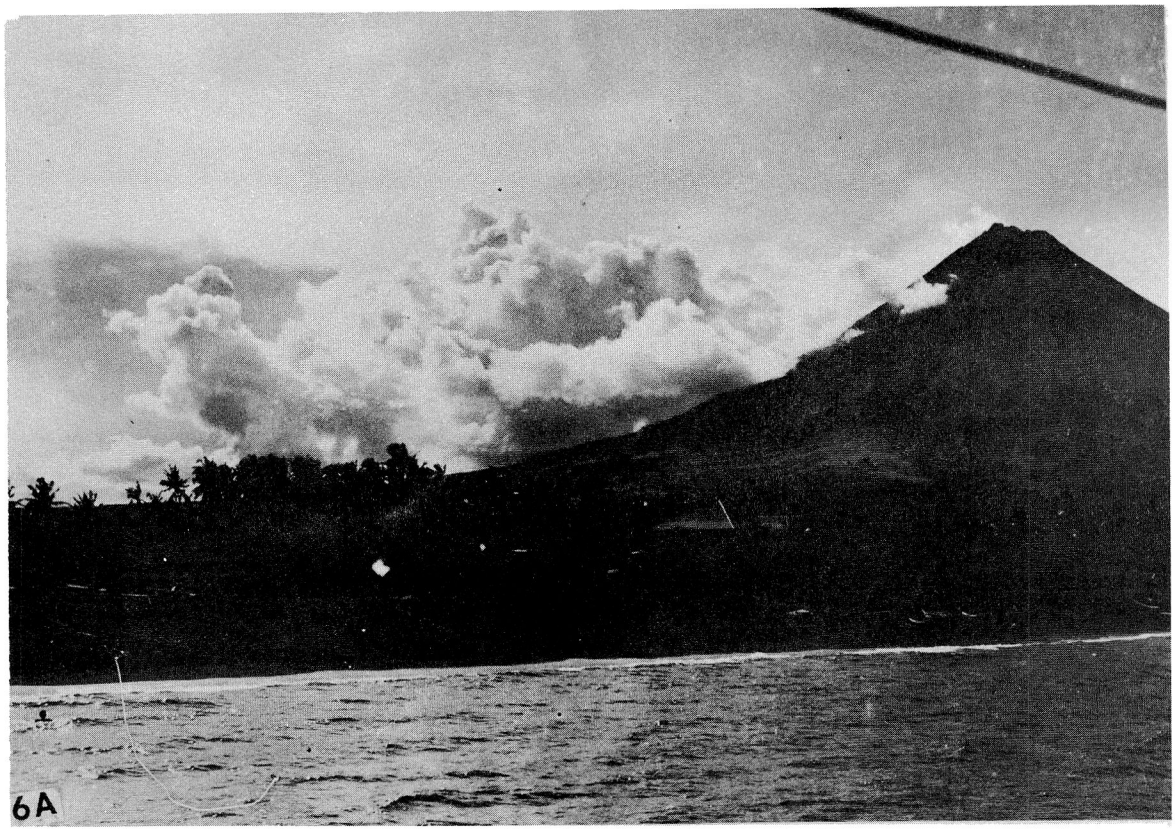
9.A. Stromboli, 1904. The early stage of a Strombolian explosion.

9.B. Stromboli, 1904. Advanced stage of a Strombolian explosion.

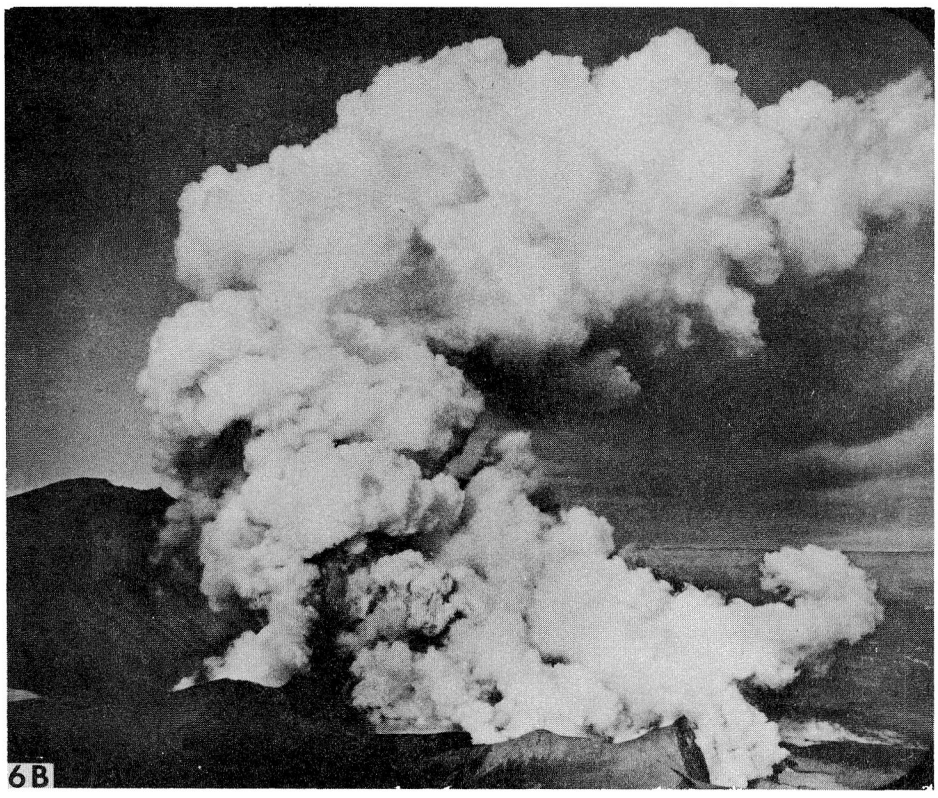
10.A. Peasants on Stromboli, 1888.

10.B. Violent Vulcanian explosion during the 1888 - 90 eruption of Vulcano.

11.A. and 11.B. What the well dressed lady geologist was wearing. Both photographs show dykes, probably in Scotland.



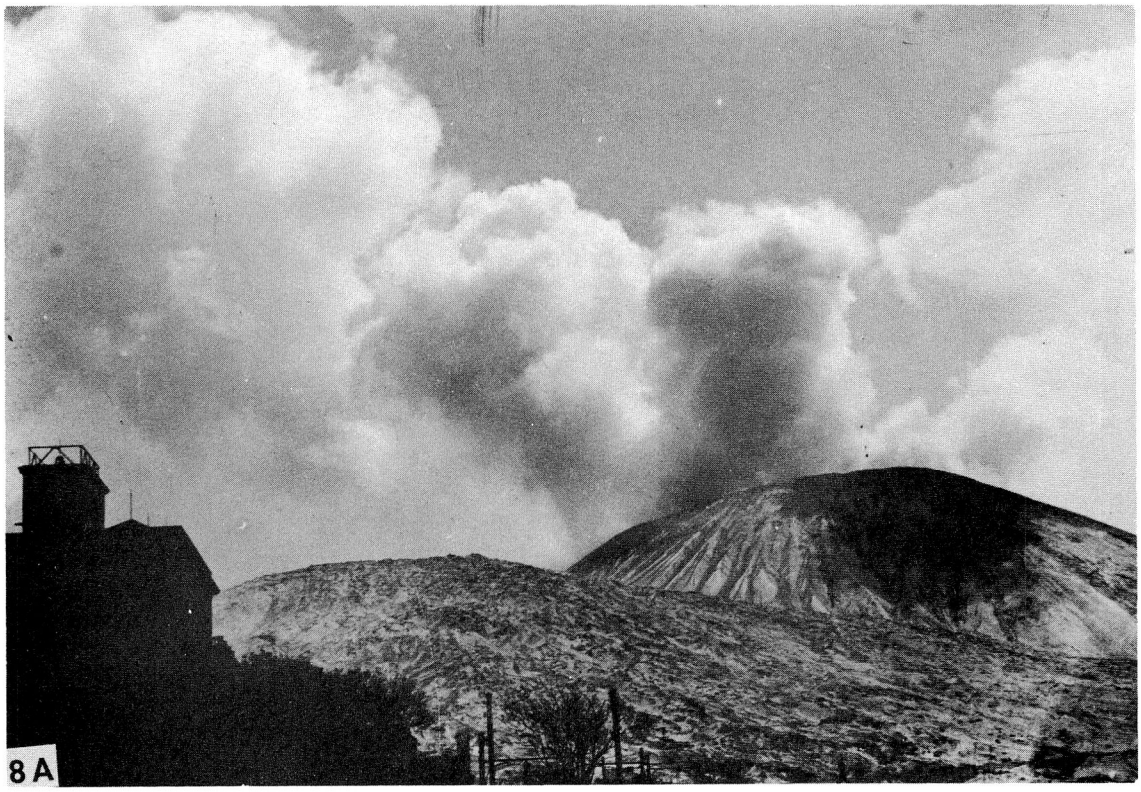
6A



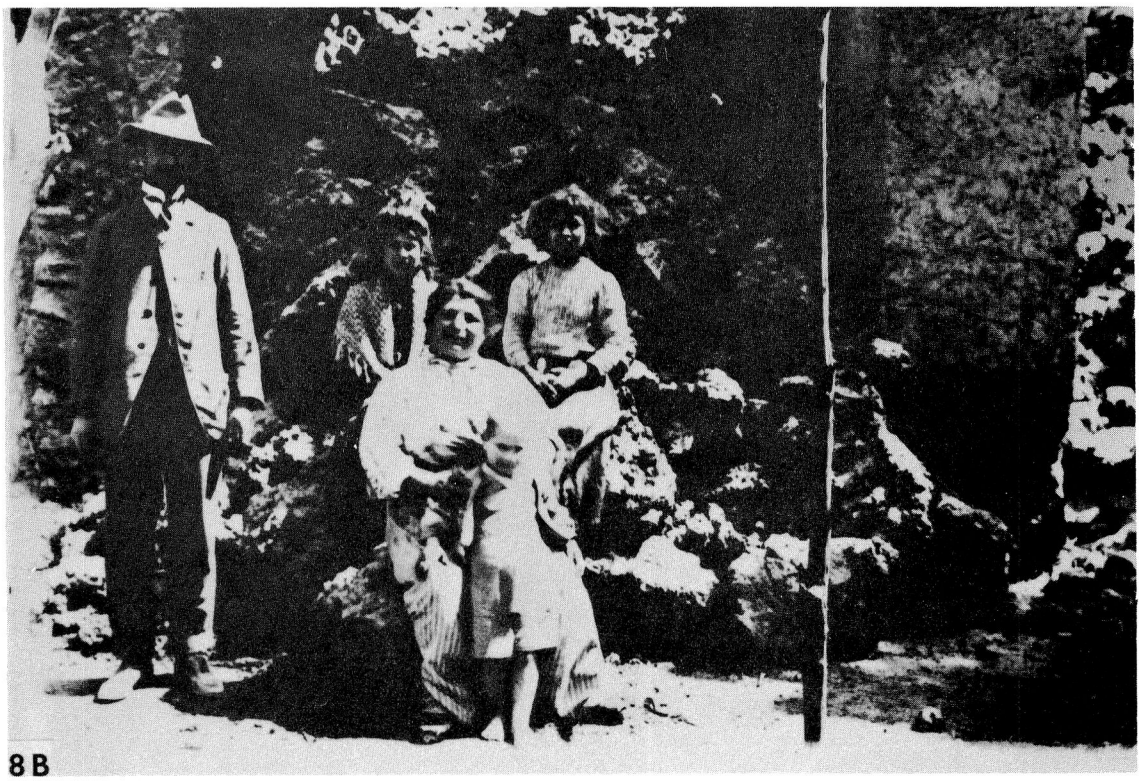
6B

7A

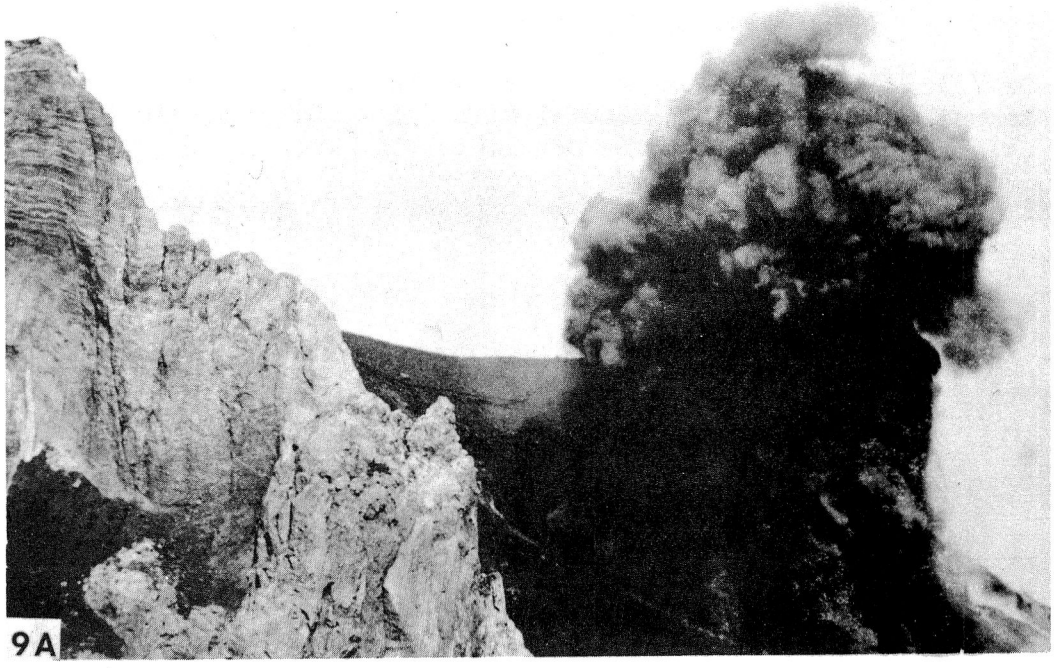
7B



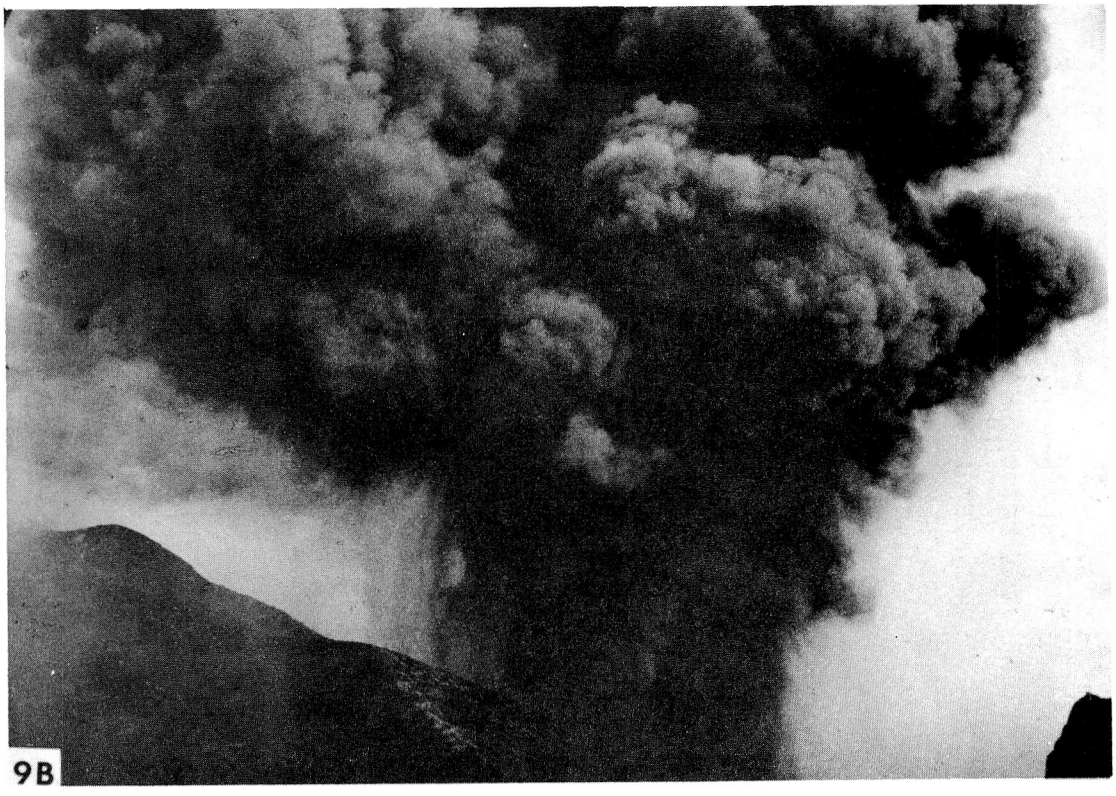
8 A



8 B



9A



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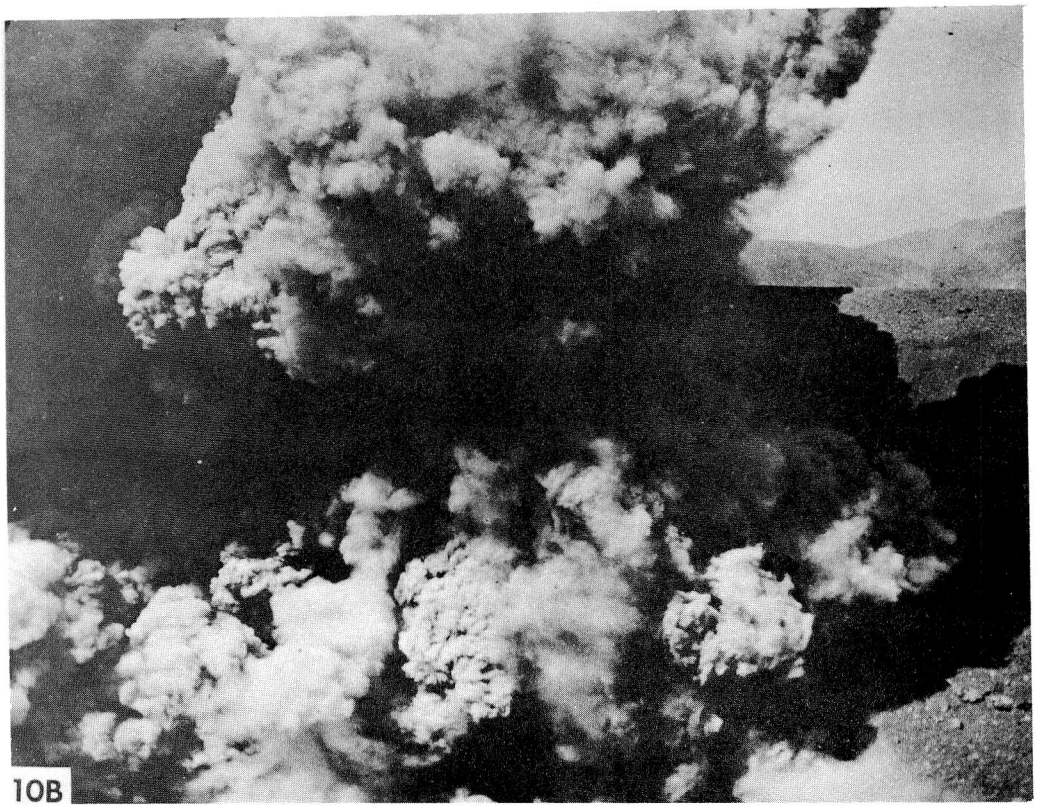
10A



10B

11A

11B

COLLECTIONS AND INFORMATION LOST AND FOUND

COLLECTIONS AND INFORMATION SOUGHT

46. TEMPEST ANDERSON (1846-1913) of York

Dr. Roger Suthren of the Geologisk Institutt, Avd. A, Allegaten 41, University of BERGEN, Norway who contributes the article on Tempest Anderson in this issue (pp. 68-79) writes as follows:

"A collection of some 5000 photographs by Tempest Anderson of York (1846-1913) is in the Yorkshire Museum. Although many photographs have sufficient information to identify them, many others bear only a number, evidently referring to notes made by Anderson at the time. His notes have not, however, come to light, and I would be pleased to receive any information which anyone may have, as this would greatly increase the usefulness of the collection."

See also Found Section p. 84 (no. 46).

47. F. HOLT (dates and biog. unknown)

Dr. Erik N. Kjellesvig-Waering of Waering Exploration Associates, P.O. Box 699, Marco Island, Florida 33937, U.S.A. writes 18.1.1978 as follows:

"For the past few years I have been engaged in writing a monograph of the world's fossil scorpions. I have been able to study all type specimens except the holotype of Eobuthus holti Pocock (1911). This specimen was in the F. Holt Collection, but it is not at the British Mus. or Inst. Geol. Sci. (London) etc. I am very anxious to study this specimen, and if you could kindly search your collections, I would greatly appreciate it. Somehow, it always seems that the lost specimen is the one that has the desired taxonomic information."

The scorpion concerned is one described by R.I. Pocock 1911 A Monograph of the Terrestrial Carboniferous Arachnida of Great Britain. Mon. Palaeontogr. Soc. p. 1, 14-16, pl. 2 fig. 2. The holotype came from the Coal Measures of Sparth near Rochdale, Lancs. This was a locality which yielded material, also described in this monograph, to W.A. Parker and others whose collections are at Manchester Museum.

Dr. E.N. Kjellesvig-Waering seeks information about any other fossil scorpion material preserved in British Museums.

48. RICHARD HILL TIDDEMAN (1842-1917)

Philip W. Phillips (Merseyside County Museums) and D.J.C. Mundy (I.G.S. Leeds) would be grateful for any information relating to Richard Hill Tiddeman (1842-1917). They are particularly interested in his Carboniferous Limestone fossil collection in the Craven Museum, Skipton and they hope to prepare an article on him for a future G.C.G. Newsletter. Known obituaries are:

i) Quart Jl. Geol Soc., London 74 Proc. pp. liv-lvi.
ii) Geol Mag., Lond. dec. VI vol. 4, 1917 pp. 238-239.
iii) Naturalist, April 1917 pp. 142-143.

49. MISS MARY HANNAH FFARINGTON (c. 1815-1888)

She was a member of the well known ffarington family of Worden Hall, Leyland near Preston, Lancs., whose pedigree appears in Burke's Landed Gentry 8th ed. 1894 pp. 651-652.

She made an important collection of Pleistocene shells from Worden described by R.D. Darbishire (1826-1908) [see Journ. Conch 20 p. 249-250 1936 and GCG 2 no. 1 p. 15,39] in Quart Jl. geol. Soc. London 30 38-42, 1874 and by Miss ffarington herself in a privately printed pamphlet. Dr. Nora F. McMillan of Merseyside County Museums, William Brown Street, Liverpool L3 8EN, has been looking for this collection for some considerable time but all her efforts have so far failed.

In an MSS note by A.C. Nicholson dated 1934 and in her possession it is stated that the ffarington collection "was revised by Messrs. A. Bell and F.W. Harmer and extends to 88 species and varieties, (28 species are at the Harris Museum, Preston [but] the whereabouts of the other and rarer specimens are unknown). The collection was formed over a period of 56 years from 1823-1879". Miss ffarington was born circa 1815 so started collecting at a very early age if this note is correct. Miss ffarington's death is noted in the Times of October 31, 1888 page 1, 2 days previously at Worden aged 73.

Any information about the collection would be welcome. C.D. Sherborn 1940 Where is the ———— collection p. 51 says wrongly that the (entire) collection is at the Harris Museum, Preston.

50. JURASSIC (BATHONIAN) STENEOSAUR (MARINE CROCODILE) MATERIAL

Susan Tresman, of the Department of Palaeontology, British Museum (Natural History), South Kensington, is working on British and French material, of these crocodiles.

She has located collections in Museums in Oxford, Glasgow and additional material at Worcester City Museum, but she would welcome information of other collections, and collectors of material of this nature (especially, where matrix is still attached to the specimens).

COLLECTIONS AND INFORMATION FOUND

1. SAMUEL ROWLES PATTISON (1809-1901)

1 no. 1 p. 17, no. 2 p. 66-67.

In the first issue of the Newsletter we sought information about this collector, part of whose collections (which were of considerable importance) had been located in Leicester Museum where they had been accessioned between 1891-1893. The minor mystery of how they came to Leicester has at least now been solved.

S.R. Pattison had a son Ernest Pattison (born c. 1840, died 1916) who was a notable botanist and who contributed botanical records for Leicestershire. He worked in Leicester as an iron-founder and it is obviously this connection which brought his father's material at least in part to Leicester. For biographical information on the son, Ernest, see A.R. Horwood and C.W.F. Noel 1933 The Flora of Leicestershire and Rutland. Oxford Univ. Press. pp. ccxxvii - ccxxviii. He was also an active conchologist.

15. CHARLES CROFT (fl. 1870-1900)
1 no. 6 p. 299, no. 7, p.347.
Following on her recognition of the Charles Croft collection at Cliffe Castle Museum, Keighley Alison Armstrong kindly writes 11.1.1978:

"Some time ago I wrote to you in response to your request for further information on the whereabouts of some of the specimens figured in Davidson's Monograph on Brachiopods, from Charles Croft's collection I replied that part (or all?) of the collection was in one of the Bradford Metropolitan District Council's Museums, at Cliffe Castle, Keighley, and that the specimens sought may well be here.

I have recently found what I believe to be the specimens, and they are labelled Orthis crofti and Strophomena bipartita. I have not yet found Crania crofti, but will contact you again if I come across it."

Conversation since with Dr. Robin Cocks of the British Museum (Nat. Hist.) who originally sought the type and figured brachiopods in Croft's collections confirms that some type and figured material has indeed been discovered at Keighley by Alison Armstrong. However at some stage some transposition of relevant labels has apparently occurred and it is not yet certain exactly what the situation is. News will appear in a future issue.

23. WILLIAM DAVID VARNEY (c. 1893-)
2 no. 1 p. 42.
As surmised in a previous issue 1 no. 9 p. 452, Varney was a student at University College, Nottingham. His paper on Coal Balls in Geol. Mag. 1918 Series 6 vol 6 pp. 471-473 records his B.Sc. degree from Nottingham before this date. Possibly more of his collection may be at Nottingham University - we hope Tony Cross can also investigate this for us.

28. ISAIAH DECK (fl. 1815 d. 1854)
1 no. 9 p. 455, no. 10 p. 487, 2 no. 1, p.43.
Some further information has come to light which seems worth putting on record. J. [recte I] Deck of Harwich who was noted in GCG 1 no. 10 p. 488 as writing to the Monthly Magazine in 1815 is the same man as (or perhaps the father) of Isaiah Deck of Cambridge the mineralogist.

The following articles in the Monthly Magazine have been noted

Vol. 40 1815 p. 130 on Lithography
Vol. 42 1816 p. 317 on Brick Water
Vol. 43 1817 p. 114 on Yeast

all now clearly by Isaiah Deck of Harwich. The Monthly Magazine also records Vol. 42 p. 189 and 285 the marriage of Mr. Isaac Deck of Harwich to Miss Susan Norris presumably at Harwich some time in July or August 1816. This is thought to be the same man as he who died in 1854 (GCG 2 no. 1 p.43).

40. DR. PETER MURRAY (fl. 1828-d.c. 1894)
1 no. 10 p. 492.
Barbara Pyrah of the Yorkshire Museum kindly sends some further information on this collector of Yorkshire Jurassic plant material, which is contained in a letter from Spencer George Perceval (1838-1922) [see GCG 1 no. 9, 453,455] to H.M. Platnauer Curator at the Yorkshire Museum dated 25 July 1892.

It reads "P.S. In 1885 I wrote to Mr. [William] Reed of York [see GCG 1 no. 2, p. 53, 54, 57] about the valuable collection of local [Yorkshire] Fossils formed by the late Dr. Murray of Scarborough and at the time in the possession of Mrs. Hawkridge of Scarborough. Her husband was servant to Dr. Murray, who bequeathed him his valuable collection. I hope you will look after this collection which ought to be in the York Museum. Dr. Murray you may perhaps have heard of ?"

This letter shows how collections can get dispersed without proper record of the dispersal. The material now in Australia was thought to be the major portion of his collection but, since this was acquired in 1864, this letter shows it cannot have been the major part. Whether any of Murray's collection did go to the York Museum is as yet unknown. The original of the letter quoted above is preserved at the Yorkshire Museum.

44. FOLJAMBE collection
1 no. 10, p. 485, 494.
A correction is needed to our notice about the White Watson tablet found in this collection. The tablet and the accompanying descriptive booklet have been retained by the Foljambe family and are not with the remainder of the collection now at the Museum of the Geology Department, University of Leicester.

45. WHITE WATSON (1760-1835) see above (no. 44)

46. TEMPEST ANDERSON (1846-1913)
This issue, p. 81.
Archives of British Men of Science 1971 ed. Roy M. Macleod and James R. Friday record (entry 2/B3) that the Royal Society of London hold a collection of his letters. Further information would be welcomed.

This section is compiled
by H. S. Torrens
to whom all related correspondence
should be sent

RESEARCH IN PROGRESS ON GEOLOGICAL COLLECTIONS IN MUSEUMS

News has been filtering through of several topics for post-graduate degrees currently being undertaken which involve research into the history of particular collections of geological material. Since it is obviously important such research is properly co-ordinated it is hoped in the next issue to have a new if irregular feature with the above heading recording details of current research into Museum geological collections. Will all those who have work of this nature in progress please send in details to the Newsletter for publication.

THE MANUFACTURE OF CHEAP SINGLE-HOLE SLIDES AND PICKING BOARD FOR MICROPALAEONTOLOGY

Professionally manufactured micropalaeontological slides vary in price but are generally quoted in the region of 25 pence each. The cost of properly curating a microfossil collection is therefore prohibitive to even the largest National Museums, and industrial/university institutions.

Micropalaeontological slides can be produced, en masse, for as little as 2-3 pence a slide. Only an afternoon need be devoted to the production of the first gross.

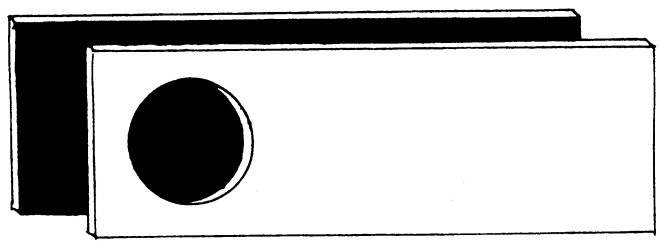
Here is a simple method of slide construction for a single cavity slide (Franke slide) and for a picture frame slide. A method of making a picking board is also given, and though it may tell a few grannies to, as it were, 'suck eggs' it may be of interest to others.

BASE EQUIPMENT AND MATERIALS

Multiples of 2 yard square sheets of thick (at least 2mm) cardboard, one with one side matt black (available at most art studios).
A quantity of glass slides 3" by 1".
A roll of sticky-back brown paper, 1" wide.
Sheets of thin white card.
Draw a grid in a proportion of 3 times length to width onto white paper. The grid can constitute 60 partitions e.g. 4 rows of 15 with every alternate pigeon hole numbered. The grid can be photographed and reduced (keep the negative in case more reproduction of the grids are required) to the 3"/1" size needed for the slide. Finally a rubber based glue (for the bonding of the slide constituents) and an organic glue such as Gum Tragacanth (for spreading in the wells of the completed slides. This glue dries quickly and can be reconstituted with a wet picking brush in any locality on the slide when specimens are ready for attachment/fixing or refixing).
A punch of approximately 5/8" diameter and a large vice.

THE SINGLE CAVITY SLIDE

Take the yard square sheets of thick card and cut to chips of 3" by 1", there should be about 200. With the plain pile punch a 5/8" hole through the card centred about an inch from one end.

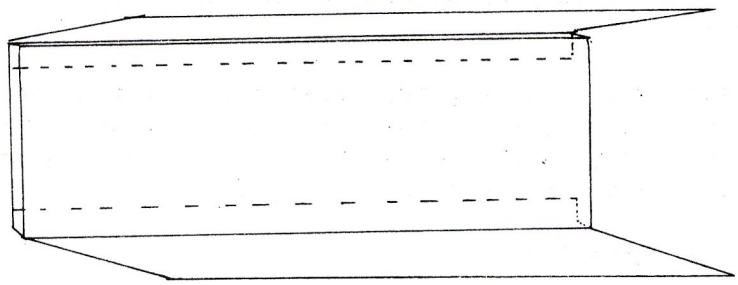


Place an unpunched card chip so that its black side shows through the punch hole of the other card chip. Micro fossils etc., are seen best against a black background. The card thickness of 2mm. provides a thick

enough well to the slide to accommodate most micro fauna.

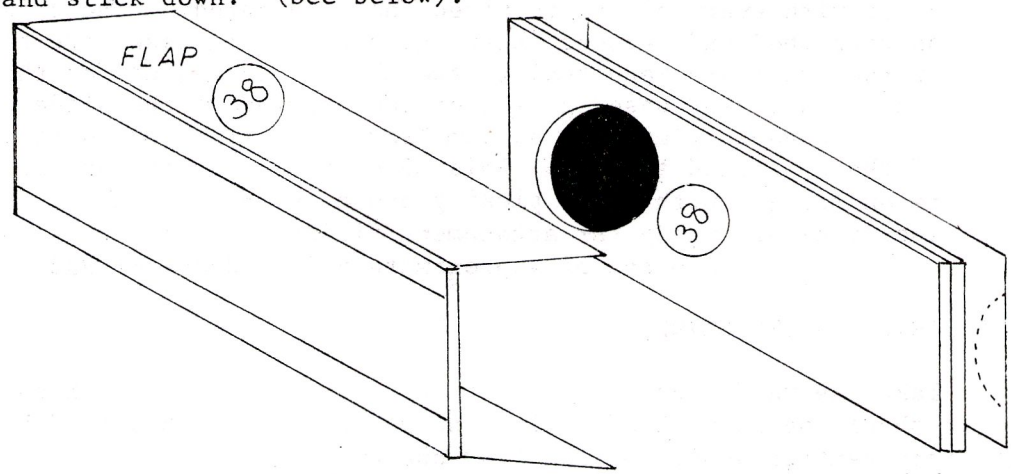
Stick the two card chips together with rubber-based glue, pile up 20-30, put into the vice and pressure bond the slides together. Try to avoid an excess of glue as the cards can slip under pressure. Make sure there is enough glue around the bottom rim of the well.

Cut the sticky-backed brown paper roll into 3" strips and stick along the margins of the glass slide (see below) with an overlap of 3/16".



Take the thin card and similarly cut into strips of 3" by 1".

When the card board slides are dry place one, cavity slide upward to the back of the glass (the slide side that does not have the sticky paper attached to it). Turn the 'sandwich' glass side down and place a strip of thin card on top of what will now be the back facing side of the thick backing card. Pull the brown paper flaps of the glass slide taut over the thin card and stick down. (See below).

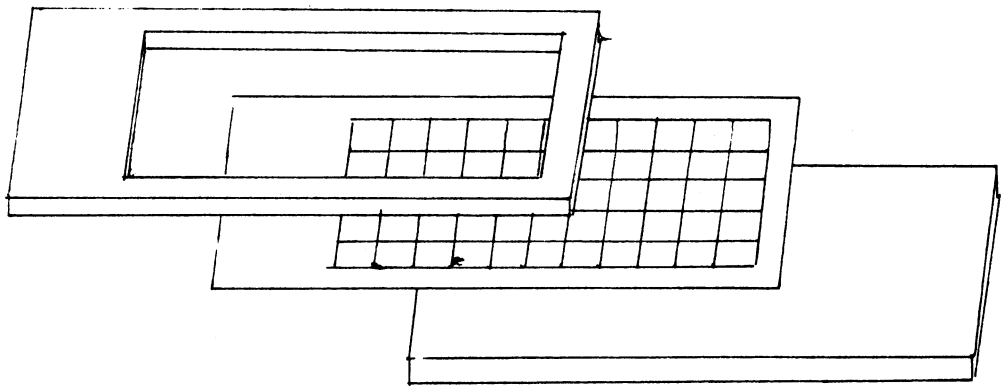


Remember to label the slide and its complementary sleeve. Mixing of the sleeves and card slides results in unsightly mis-matches for length and over-loose and over-tight sleeves. In order to facilitate an easy slide/ sleeve action the card slide edges can be polished on a wooden surface and also a crescentic portion should be cut out of the sleeve backing (the thin card and brown sticky back paper). The 2/3rds of the card slide without the punch hole can be used for record purposes.

THE PICTURE FRAME SLIDE

Again take thick white and black-backed card and cut to 3" by 1" chips. Remove the mid sections of the white card leaving a well with a 5mm rim as a frame to the slide on 3 sides of the rectangle and 15mm. at one end for record purposes.

The photographed grids with the 40-60 partitions should be reduced so

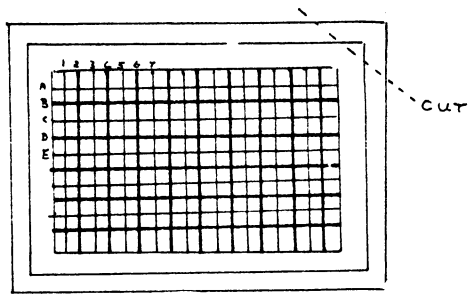


that the entire grid with a small margin is clearly visible through the picture frame card. Stick the grid with the rubber based glue to the backing board card and pressure bond in the vice for an air-free fit. When dry, bond the picture frame card onto the grid and treat similarly. The slide sleeve is made in the same manner as for the single-cavity slide.

The whole surface of the well to the slide is given a coat of gum tragacanth and is then ready for use at any time. Number the slides and sleeves that compliment each other in a similar fashion to that for the single hole cavity slides.

THE PICKING BOARD

Cut thick black backed board to approx. 5" by 3.5" and retain the black surface upward. Cut ½cm. wide strips of the same card and glue to the rims of the large board. (See below).



Cut one corner of the board away so that material can be swept away after a scan. Some workers by pure preference keep the rim to the board entire; round specimens will tend to roll down the rim edges and out of the board.

Do not use too much water when picking, as this will expand the card into undulations. Nothing is more tiring to a micropalaeontologist than having to constantly accommodate a changing focus on specimens when tracking across the board.

It is a help to grid off the board and number the partitions down and across or perhaps use letters one way and numbers the other, in case a reference point needs to be retained. I grid the picking board by preference into cm. squares in one colour and the quadrants of these as ½cm. squares in another colour. Vivid colours last longer on the board and are more easily seen under the higher magnification scanning runs. The smaller grids also keep the scanning runs straight and provide a more accurate reference.

Ian Ralph
Keele University

NOTICES

THE PALAEONTOLOGICAL ASSOCIATION

CONSERVATION FUND FOR 1978

This fund is available for the purchase or long-lease of geological sites of palaeontological importance. Up to £100 annually can be awarded at the discretion of Council. Organisations concerned with conservation are now invited to submit applications for grants from the fund for 1978. Applications should contain all the relevant details of the site and conditions of its purchase or long-lease, and should be addressed to the Secretary of the Palaeontological Association:

Dr. C. T. Scrutton,
Department of Geology,
The University,
NEWCASTLE UPON TYNE,
NE1 7RU.

ADDITION TO INDEX

Many people have said that the index to Volume One in Newsletter No. 10 would have been more useful if the Number of the issue had been incorporated in each case with the page number. To partially rectify this an insert is included in this issue which is intended to be used along with the index. This insert shows the page numbers of each issue.

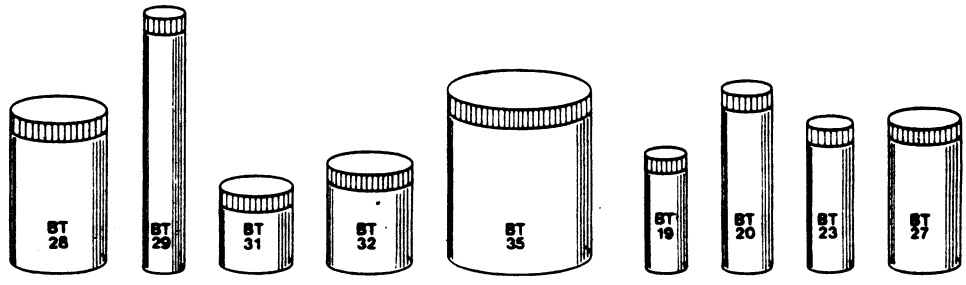
MUTUAL AID

The Geology Department at Keele University has the following specimens for exchange:

1. High Purity Allivalite (Bytownite Troctolite) from the Ben Buie Layered Gabbro of Mull
2. Pegmatitic Nepheline Syenite from Larvik, Norway
3. Cut slabs (off-cuts) of Bushveld Norite with Igneous flow. Some polished.

Contact Mr. B. Page,
Geology Department,
Keele University,
Staffs.
ST5 5BG.

'Alexapack' Specimen Containers

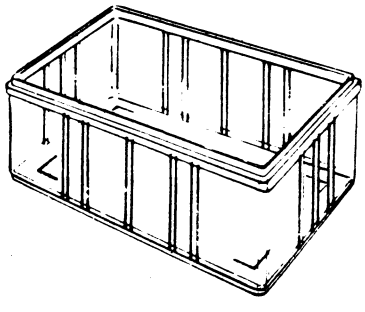


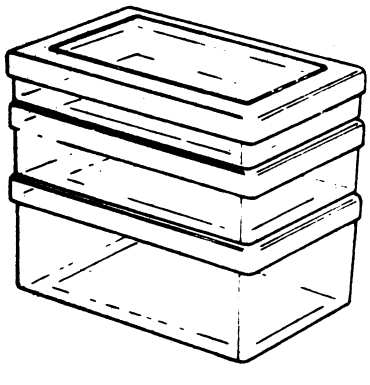
Cat. No.	Approximate Diameter	Height	Capacity
BT-19	15 mm	40 mm	5 ml
BT-20	18 mm	62 mm	13 ml
BT-23	16 mm	50 mm	7 ml
BT-27	26 mm	50 mm	20 ml
BT-28	34 mm	52 mm	40 ml
BT-29	15 mm	89 mm	10 ml
BT-31	26 mm	26 mm	11 ml
BT-32	30 mm	34 mm	15 ml
BT-35	51 mm	57 mm	100 ml

The ALEXAPACK range of containers are produced from inert, virgin, crystal clear polystyrene and are supplied with secure fitting polythene stoppers. Ideal for all types of specimens. They can be supplied with plain white self-adhesive labels applied or, for a minimum quantity of 5,000 they may be supplied with labels printed to your specifications. Also, if required, we are able to supply these containers without the stoppers and will be pleased to quote for your requirements.

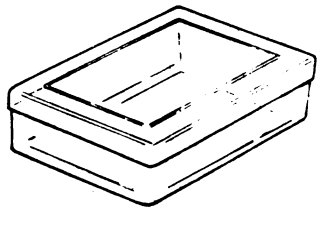
'Dines' Rectangular Boxes

Cat.No. A6-60





Cat.No. 128



Dines Rectangular Boxes are made from clear polystyrene, allowing specimens to be completely visible. They are all stackable, thus enabling the user to store numerous items individually in a limited space.

Cat.No.	Size
* A4-60	315 x 250 x 72 mm
* A5-60	228 x 178 x 72 mm
* A6-60	178 x 117 x 72 mm
* 400	295 x 268 x 64 mm
86-50	80 x 60 x 50 mm
128-20	122 x 82 x 22 mm
128-30	122 x 82 x 32 mm
128-50	122 x 82 x 52 mm

* Available with partititons, if required.

Prices and samples will be sent on application. All Enquiries to:

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