THE PHYSICAL BASIS OF PALAEONTOLOGICAL CURATING

by R. B. RICKARDS

ABSTRACT. The physical tasks related to specimen or collection preparation are often neglected and/or not fully appreciated by many curators or by fund-giving bodies. Three categories of storage are described, and the manner in which they are established, evolve, and, hopefully, improve are discussed. The relationships of such storage to display and to a manual catalogue are outlined. It is maintained that the physical tasks of cleaning, preparing, researching, and arranging specimens naturally precedes any good cataloguing system.

I AM fortunate in being a curator of what research visitors often tell us is one of the best curated museums in the world. That the Sedgwick Museum of Cambridge University is well curated is beyond doubt; a statement I can make without embarrassment since the responsibility for this state of affairs has little to do with me, but is almost entirely the product of Mr. A. G. Brighton (text-fig. 1) who was curator from 1932 to 1968, when he retired after curating about 400 000 specimens. The word curating in this context is a barely adequate term, as most curators will know, for it involved, in effect, researching some 900 000 specimens, and physically arranging them in a retrievable fashion: and then producing a card index, typed catalogue, and other more readily appreciated appurtenances with which curators surround themselves. What seems to me less readily appreciated, certainly by some curators and by financing committees, is the nature and aims of the physical tasks of cleaning, preparing, researching, and arranging of specimens, all of which take place largely prior to any card indexing or cataloguing, and particularly when a curator has inherited turmoil. This paper deals with aspects of these physical tasks and attempts to show how they lead naturally, in the Sedgwick Museum, to a highly efficient manual cataloguing system.

TEXT-FIG. 1. Mr. A. G. Brighton, Curator of the Sedgwick Museum from 1932 to 1968. Photograph by the author, October 1978.

In recent years (1968–1978) we have investigated the possibility of using a computer-based data retrieval system. One of the hopes of this was to have available a set of more flexible, printed indexes in order to search these under the headings of, for example,

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geographical location and stratigraphical horizon. At present, searches under these two headings are made by walking along the Museum bays where the collections are arranged in a stratigraphical and geographical manner: most enquiries take less than five minutes to answer. Other enquiries one could make from a computer-based data bank could concern type, figured, and mentioned specimens, lists of the holdings under particular phyla, drawer contents lists, and so on: in effect, lists which it would be difficult or laborious to produce by any other means. This project has contrived to place the bulk of the Museum's catalogued specimens on to the data bank and has produced the first trial indexes; much of the work has developed from the pilot project of the Information Retrieval Group of the Museums Association, which used the Sedgwick Museum collections as a basis for producing the first computerized system in Britain.

But these matters are far beyond the initial stage of work faced by many curators, namely that of physically getting down to the task of cleaning, sorting, and identifying (the last word covering a multitude of problems). I find it slightly disturbing that some curators talk glibly of using powerful computers for cataloguing when a large part of their museum depository is little more than a rubbish tip of decaying specimens. In some of these instances, which many of us have seen outside Britain as well as within the country, the authorities would have been better advised to employ a well-trained cleaner rather than a curator with his head in the clouds and neither foot on the ground.

In this paper I employ three terms, or headings, which require definition since they are used throughout the text. They are terms specific to the Sedgwick Museum but also apply to many museums, though under different names, and exemplify the processes by which palaeontological material is received and finally stored or exhibited:

1. *The Mill Lane Store.* A store sited some distance from the main Museum building.
2. *The Attic Store.* A store containing an uncurated 'backlog' of specimens which prior decision has deemed to be worthy of retaining. Such a store must at various times house a curators' workshop.
3. *The Oak and Mahogany Wings of the Sedgwick Museum.* This is the refined product of palaeontological curating, the names referring respectively to the wings housing Cambrian to Permian specimens (British and Foreign), and Triassic to Recent specimens (also British and Foreign). Both storage and display are involved (text-fig. 4) and, as implied in the previous sentence, specimens are arranged both stratigraphically and geographically.

FOUNDATION AND DEVELOPMENT OF THE SEDGWICK MUSEUM

In 1727 John Woodward bequeathed his catalogued collections of two cabinets of English Fossils to the University of Cambridge (to which were later added two cabinets of Foreign Fossils purchased for £1000 by the University). From 1731 a lecturer (the Woodwardian Professor of Geology) was provided for and required to attend the collections three days weekly (9 a.m.–11 a.m. and 2 p.m.–4 p.m.) in order to show off the fossils, gratis, to all interested parties, and in addition was supposed to lecture at least four times each year (Hughes 1904*b*).

Between 1731 and 1818 six gentlemen occupied the chair: Conyers Middleton (1731–1734); Charles Mason (1734–1762); John Mitchell (1762–1764); Samuel

Ogden (1764–1778); Thomas Green (1778–1788); and John Hailstone (1788–1818). Ogden was a good curator who tidied unfinished work by Woodward and Mason and prepared a single catalogue to replace Woodward's original, perplexing, documents. Thomas Green's books formed the very beginning of the present Sedgwick Museum Library, and he made small but valuable additions to the collections.

But it was, of course, left to Adam Sedgwick, appointed in 1818, to raise the status of the collections to those of other great museums. By enormous endeavour he greatly increased the collections and taught extensively both in the classroom and in the field. His collecting zeal and skill resulted in his College rooms being turned into a store house (the first 'Attic Store' of the Sedgwick Museum). In 1837 a new library, with museum below it on two floors, was begun, and his collections were moved from College and more or less fully displayed, with the assistance of other natural scientists in the University, when the building was opened in 1842 (later the Law Library). Much of the teaching with the help of the collections was done, in Sedgwick's later years, by his assistant H. G. Seeley and by T. G. Bonney. On Sedgwick's death the latter lost the election to the Woodwardian Chair to T. McKenny Hughes, who not only collected widely for the Museum but also began the first real organization of the Department of Geology (Hughes 1904*a*) and attracted many outstanding teachers.

Two months after Sedgwick's death in January 1873 the University Senate had resolved to build a new museum, the Sedgwick Museum, and to couple this with the Woodwardian Chair of Geology. Thus the two main contributors to the science of geology in Cambridge were suitably honoured and formed an association in more than name which continues today. McKenny Hughes was to a large extent responsible for the Museum, finding an excellent site, and from its official opening by Edward VII in March 1904 (Hughes 1904*b*) he made sure that, in addition to the fossil collection, it was filled to capacity with large boulders and coffins so that would-be space gatherers were discouraged. The large boulders and coffins have been gradually moved outside to make room for the expanding palaeontological and departmental requirements.

Responsibility for curating the collections, prior to the appointment of A. G. Brighton as first full-time curator in 1932, was variously achieved, although nominally that of the Woodwardian Professor. For example, Sedgwick employed a technician, Henry Keeping, who had been a geological guide and collector on the Isle of Wight. McKenny Hughes on the other hand had a professional assistant (F. R. Cowper Reed) as had his successor J. E. Marr (W. B. R. King), these positions being of academic as opposed to technical status. At different times members of the academic staff tackled different tasks. Thus Cowper Reed was responsible for a good deal of accurate identification and labelling of specimens, whereas H. Woods produced a catalogue of types in the Woodwardian Collection (Woods 1891) and remounted many specimens in the main collection. Miss G. L. Elles was solely responsible for the extensive graptolite collections.

Many of these early tasks were related to the physical preparation of the specimens and making available the collections; and cataloguing as such, not the main topic of this paper, took place in fits and starts: J. W. Salter's catalogue (1873); Cowper

Reed's manuscript catalogue; Elles's and W. B. R. King's catalogue of the tablets and slabs of Cambrian age; Elles's graptolite catalogue. A. G. Brighton devised and put into operation a system which superseded all earlier systems and still operates smoothly today. He catalogued the *specimens* as opposed to the piece of rock or tablet, and attention was paid, for the first time, to described and mentioned specimens which were not figured. But even in this period the crucial work revolved around the unpacking of hundreds of trunks and boxes of uncurated material and the cleaning, preparation, identification, arrangement, and display of many tens of thousands of palaeontological specimens.

From the beginning the Sedgwick Museum has been a research and teaching museum (Woods 1893; Reed 1903). It is a university museum, yet is unusual in that the museum itself preceded the Department of Geology, of which it is now a part, and in fact early teaching stemmed from the collections themselves (see above). More modern university palaeontological museums or collections usually evolve from expanded teaching collections and reflect the zeal of the teaching staff. It should be remembered, however, that the objectives of a university museum *are* different from those of a city, regional, or national museum, notably with reference to aspects of display and public participation (see also Strachan, this volume). In the case of the Sedgwick Museum, although funds have been available in the past for the preparation, storage, and cataloguing of collections, finance has never been available for displays suitable to a varying public, or indeed for the provision of attendants and other necessities of a thoroughly active public museum.

The present Museum is probably as near fully curated as a museum can become. Even the 'backlog' of technically uncurated specimens in the Attic Store is, in fact, geographically and stratigraphically arranged, is clean, tidy, and sorted so that a staff of six know where everything is, and formal curation of material is taking place at a steady rate. Each year's new aquisitions are, of course, readily and rapidly curated. Parts of the Attic Store function at times as a workshop, in conjunction with the technicians' office, for the rapid processing of collections.

The Mill Lane Store

The Mill Lane type of store originates by different means at different museums, but always they are forced upon a curator during some kind of emergency: a new Professor needs space and therefore certain bulky collections will have to be boxed and moved; or the mammal bones are a little too large and/or numerous for display and/or storage (see also Gentry, this volume). Once established, at a distance from the museum directly proportional to the quantity of goods being off-loaded, they are used as a dump for any collections or acquisitions for which a convenient resting place of quality cannot be found. There is, in fact, an underlying psychology with respect to this kind of storage (usually in an old warehouse/damp basement etc.) of which curators should beware: in contrast to the popularized version of the laws of gravity, anything which goes into a Mill Lane Store rarely comes out again, except during demolition of the said building. The point is this: having decided, with serious curatorial concern, that it would be better to consign a certain collection to the store, the next logical step should be to throw it away. It is, in my opinion, the acid test for the value of a specimen/collection.

There are always, of course, a few 'planners' who cherish the pious hope (at least in public) that such a store can be made clean and tidy (see text-fig. 2) and that material can be retrieved/loaned/studied etc. as and when required, but this never happens in practice. Such places are rarely used even by museum staff and it is equally likely, after a while, to find specimen trays mixed in with old pieces of machinery etc. 'temporarily' abandoned by various people. Of course, the psychology could be worked in reverse; should a curator tell you that he has found a nice home for your collection in the Mill Lane Store then you can reasonably assume that he doesn't want it at all, and that his decision merely enables him to forget the material altogether.

The Mill Lane Store at Cambridge (text-fig. 2) has suffered from all these problems, and more, but by judiciously placing there only non-museum material we have arrived at a position today where it can, more or less with a clear conscience, be disowned as part of the Museum proper. This has involved extensively searching the store at various times for worthwhile collections which may somehow have been overlooked, and then transferring them to the museum assistants' workshop and the Attic Store (see below) for further processing within the main museum building. If an untidy but valuable collection is visible it *will* be processed: if out of sight nobody will touch it, or even less, think about it.

TEXT-FIG. 2. Part of the Mill Lane Store, of essentially unsatisfactory storage.

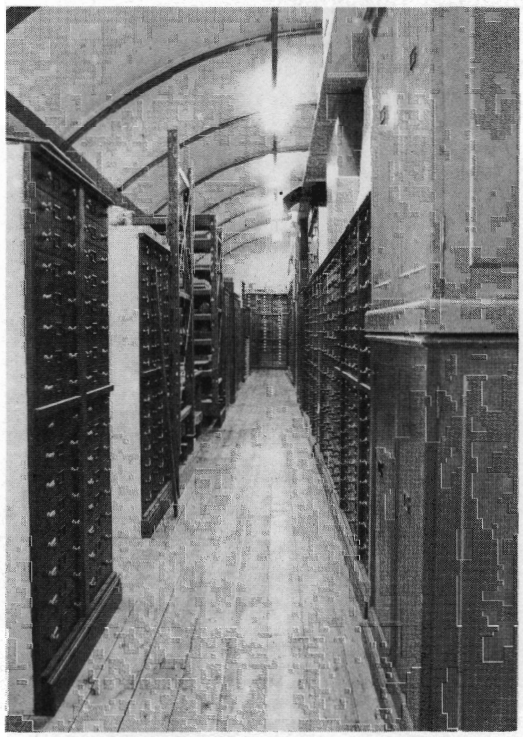
Even in so-called emergencies I cannot recommend that Mill Lane Stores be established for museum material unless the store is within a few minutes walk at most of the main building, and unless the allocated space is fully fitted with cabinets to receive only unpacked, cleaned, and labelled specimens. Naturally, space which is not dust- and damp-proof is useless. If these requirements can be met then almost certainly the space will have already been used for something else. If, as may happen, higher 'authority' insists on moves to a Mill Lane Store, then insufficient attention is being paid to the role of the museum or to the value of its collections.

The Attic Store

By contrast the attic in the Sedgwick Museum, coupled with the technicians' office/workshop, is a place crucial to the processing of material. It has an interesting history. In the early years of this century it was a huge, open area, rather like an aeroplane hangar, in which research workers and students were loosely separated from each other by bookcases and specimen cabinets. The current surface area is 3008 sq. ft.

Today I doubt if many former occupants would recognize the attic, for it has undergone a transformation during the last ten years thanks largely to the efforts of Michael Dorling and Peter Biddlestone. Not only are the floors polished, but the whole collection, including 'backlog', is housed in new or renovated cabinets of standard sizes and drawer content (text-fig. 3).

In recent decades the collections themselves have been concentrated into one area of the top floor, and the whole has been arranged in a manner not dissimilar to that of the Oak and Mahogany public display wings (see below).



TEXT-FIG. 3. The Attic Store, Sedgwick Museum; a well-ordered assemblage of catalogued and uncatalogued material, and duplicate collections.

An interesting development took place during the decisions on cabinet placement: naturally it is necessary to get the maximum number of cabinets into the minimum space, particularly since this is not a public part of the Museum and research visitors are only occasionally required to study there. The attic is rectangular, approximately 20 ft by 150 ft, and it was assumed at one stage that a linear (along the length) arrangement of cabinets would give maximum storage. However, in checking this, David Price found that provided the rectangle was not too long or too square, in other words a 'normal' rectangle, a *bay*-type of arrangement could actually accommodate more cabinets and at the same time in the case of the Sedgwick Museum it facilitated movement of drawers, specimens, trolleys, and fork-lift trucks. This, in fact, was a great advantage in that it was then possible to arrange the attic store in exactly the same way as the main Museum, beginning with Lower Palaeozoic specimens in the bays to the north and ending with recent mammals in the bays at the southern end. It was subsequently discovered that A. G. Brighton had already deduced such a plan!

In 1969 the attic was an eyesore, even to the most disillusioned of curators. Cataloguing was taking place at the healthy rate of up to 17000 specimens per year, and the researched material placed in the main storage and display system of the Oak and Mahogany Wings. Nevertheless, there were huge piles of rotting mammal and reptile bones and only slightly smaller piles of ammonites in the same state. That which was not rotting was gathering dirt. It was decided that although cataloguing would continue (and did) a major attempt would be made to achieve that big first step which often faces new curators, namely the cleaning, tidying, and arranging of what would otherwise remain a specimen dump. The University had just made a cabinet grant to Professor H. B. Whittington (Director of the

Sedgwick Museum), and coupled with the employment of a new technician a start was made.

The enormity of the task was daunting, yet within three years a position had been reached where the University was willing to consider giving extra support for floor covering, roof insulations, and additional heating and lighting. It was a simple, if laborious process of carefully dusting, washing, sorting, arranging, and identifying (at least provisionally), beginning with the worst material (the reptiles). Within three years many thousands of specimens had been dealt with, yet at no point was formal cataloguing a major feature of the efforts, although finally a catalogue was produced for the whole reptile collection. But, by proceeding methodically, the collections were *sorted* and arranged stratigraphically and to some extent geographically.

The collections are now readily available and cataloguing can proceed at a leisurely pace. Yet the arrangement itself forms its own kind of catalogue in that anyone can find anything easily, or can search in sensible places for likely or possible holdings even if that material is uncatalogued. An improvement to this arrangement could be to have moderately large labels on bays and appropriate parts of bays, although the necessity for the unknowing to find his way about unaided is rare indeed.

Most relatively small private collections of fossils are 'catalogued' in this fashion by their originators, perhaps with a small manuscript catalogue in addition, though the owner rarely uses such a document. Eventually such collections may become the focus of city, regional, or even national collections, yet not until the imminent death of the owner is there any panic to catalogue the collection in a more formal fashion. Formal cataloguing is very necessary, but it is not as necessary as the initial stages described here. I was once shown an admirable collection of fossils at the Leys School, Cambridge, and asked for advice on formal cataloguing, as well as upon other matters. The cabinets themselves were decrepit, yet the arrangement of the material was clear and unambiguous despite the fingering attention of schoolboys over the decades. To catalogue such a collection the first need was space and cabinets, and soap and water.

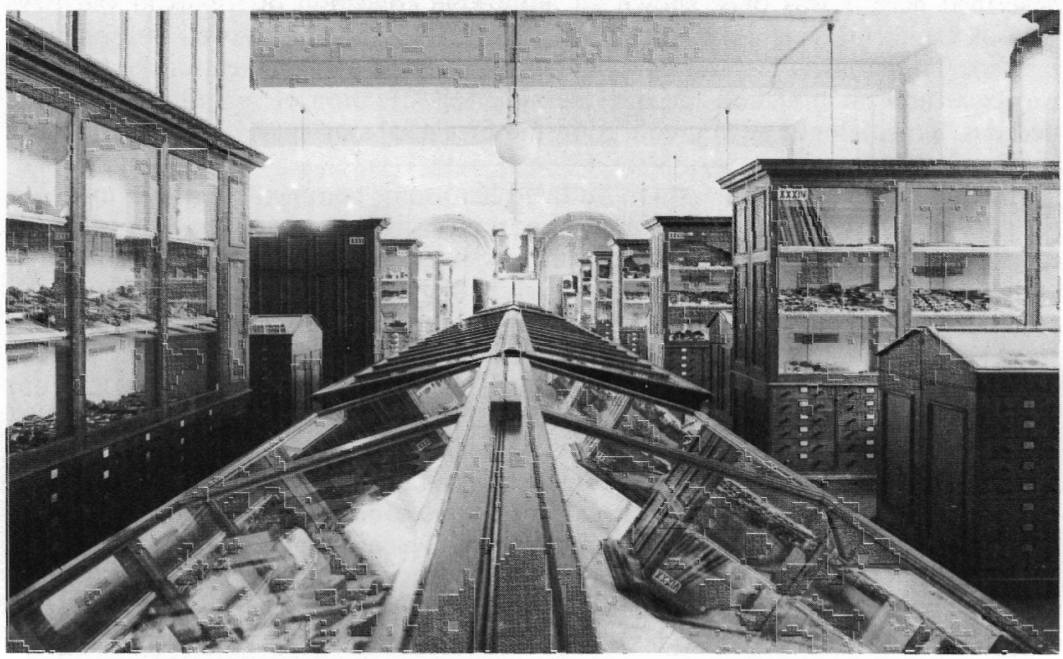
Having proceeded in the fashion outlined here some comments must be made on the cabinets chosen. They are of great importance simply because they are intended for several centuries of use. It is of interest that we chose (historically) oak and mahogany, yet learn from Howie (this volume) that these woods are particularly bad as moisture holders and hence a danger from the point of view of pyritization of specimens. In our attic collections pyritization only affected specimens *not* in cabinets, and both oak and mahogany cause no problems to our treated material (all our pyrite material is treated by the methods used in the early 1950s at the Institute of Geological Sciences, namely successive immersions in an ammonia atmosphere, and polyvinyl acetate dissolved in toluene. Presumably the humidity is below the danger figure given by Howie. We began with wood cabinets (oak and mahogany are relatively fire resistant) and financial circumstances have dictated that we stayed with wood. From the aesthetic standpoint this has been a pleasing event, but it is a situation which must always be under review. In the Attic Store even in its worst days, serious effort was made to use glass-topped drawers in cabinets. With well fitting lids they seem eminently better than cabinets with doors on the front, which we have also tried.

Some of these questions are outside the scope of this paper, but I will summarize by saying that by dint of hard work the Sedgwick Museum Attic Store is in a superbly workable clean condition, and fulfils its function as a processing plant (and increasingly as a repository) for formally curated material.

The Oak and Mahogany Wings

The present arrangement of bays and cabinets, covering 9600 sq. ft, was already established in 1904, although later additions were made in the form of low table cases both within bays and along the centre of the display areas (text-fig. 4), a process not completed until 1956. Bays consist essentially of dense storage below both shallow table cases and large, upright, glass-fronted display cases. Except in certain cases display is what might be called 'traditional' (as opposed to the more derogatory 'old fashioned') in which large numbers of good specimens are displayed more or less in rows. This is partly because of the previously mentioned constraints on display finance; but largely it was, and to some extent is, a preferred method of display in which the local amateur, professional, or schoolchild can readily identify his fossils by quickly homing in on the correct stratigraphical level and geographical locality. These displays, and the number of more sophisticated exhibits (e.g. Pleistocene deposits of the Fens; morphology and classification of graptolites; functional morphology of brachiopods, etc.) are also aimed at advanced undergraduate students and research workers. Future changes may well involve displays catering for particular teaching courses and for less informed members of the public.

But in essence this storage/display is a pigeon-hole system from which research



TEXT-FIG. 4. View of Oak Wing, Sedgwick Museum, showing upright display cases with storage beneath, and centre case displays which also have storage beneath for catalogued collections.

and teaching specimens can be easily retrieved and loaned. Loans (local, national, and international) tend to total upwards of 2500 per annum. Material processed in the technicians' workshop, Attic Store, or research rooms is then slotted into the appropriate pigeon-hole defined by stratigraphical, geographical, and biological parameters. Simultaneously the card index is supplemented with the new information on a biological basis (searched under major taxa, genus, and species) but with geographical and stratigraphical notes, and Museum locations. Only at a later date (some weeks) is a typed catalogue prepared of all known information pertaining to the specimens: these are the data, plus archived correspondence, etc., which accompany the research worker's loan.

It is clear from this description that the physical arrangement of this processed material is arguably more important than the typed catalogue, in the sense that it precedes the latter and can, from the research worker's standpoint, be used without it. Thus I return to the theme of this paper, that it is highly important that collections are unpacked, cleaned, arranged, and researched *before* attempts at cataloguing are made. The arrangement is itself a catalogue, but any arrangement needs a pre-planned space.

Of course, this raises the question of whether such a physical arrangement as a bay system (or pigeon-hole system) is wasteful of the space compared, for example, with one which depends upon incremental growth. With an incremental-growth system, where new specimens follow the last in the row in the current half-empty drawer, and where heavy reliance is placed on a card index or catalogue-cum-drawer-contents cross-referencing, an initial area still has to be planned for and claimed by the museum's designers. This will depend on the size of any known backlog of work, and acquired collections, and the estimate of acquisitions over as long a period as the financing body will allow. But no incremental-growth system can be open to the elements at one end of the floor area, with bricks and mortar added to keep pace with the specimens added! So it seems to me that the initial space requirements of a planned museum are the same in both cases, and are largely controlled by financial questions.

T. McKenny Hughes accumulated the finance, picked his site and time well, and helped to establish a museum building which could be operated on the pigeon-hole system for not far short of a century; already it has been working well for three-quarters of a century, and careful policies should see its expansion (in terms of specimens) reasonably contained to about the year 2000: unless, of course, very substantial and fundamentally important collections are acquired.

Similar systems are in use in many museums, one of the best I have seen being in Leningrad at the All Union Geological Research Institute (VSEGEI), where well over one million rocks and fossils are arranged in a stratigraphical and geographical order, but with an overriding manual catalogue system (and in recent times a computer-based catalogue). There is, of course, no fundamental reason why rocks and fossils should not be more or less mixed, provided the retrieval system is good enough, and a research worker can quickly find the rock or fossil he needs. It has the additional advantage that displays can encompass palaeobiology, biostratigraphy, and regional geology, as is done in the VSEGEI museum. Such displays link the fossils themselves with the value of fossils, something which is by no means always obvious, it seems, to curators with no training in palaeontology.

CONCLUDING REMARKS

The three headings that I have used throughout are in a sense quite artificial in that functions change, hopefully for the better. Thus the Mill Lane Store at Cambridge, a concept which, as I have defined it, I strongly deplore, has evolved from a mere museum dump to a dump used by someone else! What I really mean is that processing of material at Cambridge has reached such a pitch in the last decade that we no longer have any need, under any circumstances, for a Mill Lane Store. This is good: it is symptomatic of an increasingly healthy growth set in motion by A. G. Brighton in 1932. In 1932 the bare bones of an Oak and a Mahogany Wing were visible beneath a mountain of boxed material, figuratively speaking; whereas the Attic Store was virtually unidentifiable beneath a mountain of boxed material *actually* speaking. Whilst one can theoretically envisage a process leading from Mill Lane Store to Attic Store to Oak and Mahogany Wings (or equivalents), it would be better to miss out the first step altogether. Or, to return to one of my introductory points, should a new curator inherit an area filled with junk, and a museum display space at least partially filled with rubbish, nothing is solved at all by creating a third dumping ground. Better to define quickly what can reasonably be claimed as museum display space, and what can be claimed as workshop and store (the Attic Store): then clean the first and begin work on sorting the second. When A. G. Brighton began in 1932 this was more or less the situation facing him, yet the assault he made on the Attic Store resulted in space saving (both in area and in volume) of over 50%. Not only could research rooms be allocated, but the remaining more or less researched collections could be arranged in an increasingly satisfactory manner. Although I have, perhaps, laboured to make the point that all this pre-cataloguing work is critical to the development of a museum, this is not usually so readily appreciated by administrators. In the first place it is the least romantic of the curator's tasks, and for this reason is avoided by many. Most requests for financial support are for aspects of cataloguing, research, or display; and these are the most likely to be successful. Fortunately, at Cambridge, the University has taken both an informed and enlightened policy, as outlined above, and the staff are now in a position to improve the teaching and display aspects of the Museum, whilst continuing in some comfort with curating and cataloguing. I am convinced that many of our museums should be striving to obtain suitable floor space under my two main categories, and then seeking support for the initial processing of collections. The rest (cataloguing) then follows naturally and much more easily than if the work is attempted the other way around, which seems the current vogue.

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DISCUSSION

C. H. C. Brunton. With the current pressure on storage space in almost every museum, can we continue to store specimens in a self-cataloguing fashion or do we have to call a halt at some time and simply add new material by numerical accession, making sure that this is carefully catalogued to allow easy retrieval?

R. B. Rickards. I have considered this alternative, but the problem of 'specimens to space' will always be with us. My one firm view is that I am opposed to the moving out of material to 'Mill Lane Stores', i.e. out of the main collections. A self-cataloguing arrangement should always be just as easy as arranging for numerical growth tray by tray or cabinet by cabinet, since one will inevitably have a finite room/building in the first place and one must always, therefore, plan ahead at least to that extent.

D. L. Bruton. Do you have any qualms about having type specimens on open display?

R. B. Rickards. We are not happy about this arrangement, but it has been the policy for the last two hundred years and concern has arisen only in the last year or so.

V. Burns. Do you consider that in a small museum type and figured specimens should be stored with general specimens or separately?

R. B. Rickards. Even in the biggest museums there is a case for separating type and figured specimens. We have not done it in Cambridge but many other museums have.

H. W. Ball. This is not the practice at the BM(NH); we think it more useful for the total assemblage to be immediately available, especially as the type and figured specimens can be easily distinguished through the use of differently coloured labels and spots, etc. Moreover, because of their size, it is impractical to store the type and figured specimens separately.

R. B. Rickards. I take this point in relation to very large collections. The Sedgwick Museum, with its half million plus catalogued specimens, must be a borderline case, but in all probability we shall retain the present arrangement, which is the same as that in the BM(NH).

E. L. Yochelson. Speaking for the U.S. National Museum of Natural History (though not as a member of its staff), types are kept separate and this has been the arrangement for decades.

C. D. Waterston. Where the size of the collection allows, it may be best to keep types separate since in the event of fire or other hazard it makes it more possible to remove them to safety. For this reason type material is separated in the Royal Scottish Museum.

M. G. Bassett. I do not see any one ideal arrangement since each museum will have its own requirements depending on the use made of the collections. Clear designation of types, proper storage, and accessibility should be the main criteria.

W. D. I. Rolfe. Historically, type specimens became separated from the main reference collections when it became possible to destroy museums by bombing, and hence the need to remove type material rapidly

became paramount. With the atomic threat this may now be irrelevant. However, security of the collections is still of prime importance and segregation may therefore still be desirable. Type specimens are segregated at the Hunterian Museum.

H. W. Ball. With the size of the collections at the BM(NH) we have concluded that it is impracticable to segregate type and figured specimens in flood-, fire-, and bomb-proof accommodation.

S. A. Baldwin. As a user of collections throughout Britain, I find it a good thing to have type and figured specimens in with the main collections. One solution would be to have copies (casts) of type material stored with the main collection, with the specimens themselves housed separately.

N. Heintz. I believe that there is a UNESCO recommendation that type specimens should be stored in separate rooms and/or locked in bomb-proof safes.

S. Turner. In relation to this recommendation, the Louis Leakey Memorial Institute in Nairobi has followed these guide-lines for the storage of type hominid material. Their store is reputed to be H-bomb proof. This may well be the only collection in the world stored in this way.