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## LEEDS CITY MUSEUM - its Natural History Collections

### Part 2 : The Invertebrates

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#### Abstract

The invertebrate collections held by the Leeds City Museum, in numerical terms, comprise about two thirds of the natural history department's holdings of over 300,000 specimens. The following paper describes some of these collections, the people who assembled them, and some of the staff, researchers, outside specialists and others who subsequently worked on them. The paper also discusses some aspects of their scientific and historical significance, and their importance both to Leeds, and to the charge-payers who finance their existence.

#### The Early Collections

The devastating effect of the bomb which fell on the Leeds City Museum in March 1941, and the resulting aftermath, caused considerable damage to the invertebrate collections. Much of the early material was lost or damaged to such an extent that only small numbers or parts can now be identified back to their specific collections and collectors. Some of the more fragile groups in particular, for example some of the insect collections, totally failed to survive this traumatic event. Included amongst these early collections, now lost, were the insect collections of John Atkinson, the first curator of the museum, and those of William Hey, one of the early presidents of the founding organisation, the Leeds Philosophical and Literary Society.

#### The Post-War Period

The appointment of Mr John Armitage as Keeper of Biology in 1954 proved to be the salvation of the museum's invertebrate collections. Born in 1900, he developed an early passion for both natural history and photography and also

developed artistic skills which enabled him to get a place at the Manchester School of Art. After leaving the School of Art, he joined Oliver's of Manchester as an illuminating artist and worked on many illuminated manuscripts, including one for John W. Taylor of Leeds. This illuminated address was presented by the Conchological Society of Great Britain and Ireland to John W. Taylor on his seventieth birthday in February 1915, the original manuscript now being part of the Leeds City Museum's collections. John had produced the manuscript at the tender age of 15 years and details of it can be found in the Proceedings of the Conchological Society for April 1915. Vol.14 (10) 316-319.

At the age of 21 he became a full time naturalist, earning a living by giving lectures, writing articles for various newspapers, and using his artistic abilities to earn extra income as required. This freedom enabled him to travel widely, and to gain experience over a wide field of knowledge. The main drawback to his appointment in 1954 was his lack of knowledge of museums, and thus he entirely underestimated the importance of good records, and record keeping at that time. It is unfortunate, that he, and his assistant Jean Parkin (nee Mitchell), appear not to have kept any records of the many disposals of dirty and damaged material which took place at that time.

#### The State of the Collections in 1954

The collections proved to be dirty, infested with pest beetles, moth and mites and in need of emergency salvage, restoration and renewal. Jean Parkin undertook the task of cleaning, re-lining as required, re-papering, and the laying out of all the insect collections. This was a formidable task which must have taken many years to complete. The style chosen for the layout of the drawers did, however, restrict the subsequent expansion of the collections. For example, the allocated space given for any group of beetles within the cabinets was the same regardless of the size of the beetle. Thus only one, or at most two, examples of the larger beetles could be stored within the collection. This was repeated throughout the insect collections, with the exception of the lepidoptera, and all species regardless of their rarity or existence within the collection were allocated the same amount of space. This resulted in some drawers being over crowded whilst others remained empty. Jean Parkin, under John Armitage's expert guidance, developed an ability to card-mount insects almost faultlessly, an admirable skill which was put to good use. Over the years, she must have mounted in excess of 10,000 specimens, mostly British beetles.

#### The Present Position

Over the past two decades efforts have been directed to fully documenting the collections, and advertising their scope and size to individuals and outside bodies. The production of registers of natural science collections, and in particular the register for Yorkshire and Humberside, (Hartley, et al 1987), has considerably helped with both aspects of this work. The production of the register made us examine the collections against the registers, and try to establish which of the several hundred received over the years were still extant. The sorting of collections, usually amalgamated in the past without any lists or identification marks, proved difficult and in some cases impossible. The whole exercise did however, produce results as several collections believed to have been lost were eventually re-

identified. Perhaps the most surprising was the shell collection of Charles Herbert Moore (1869-1949). This collection was thought to have been destroyed in the 1950s, but it proved to be still in existence, having been amalgamated into the general collection. For a small collection to have been mislaid in this fashion is understandable, but when one realises that the collection contained an estimated 20,000 specimens, it is much harder to believe or understand. The introduction of Museum Documentation Association (M.D.A.) index cards helped in this process, and we soon began to appreciate the size and scope of the collections. At the present time, over 100,000 M.D.A. cards have been filled in across the collection as a whole. The use of M.D.A. cards has also enabled the production of typed catalogues of some of the individual collections where these did not previously exist. Thus, even though the collections had been amalgamated it is now easier to sort material from specific collections for display or research. It is hoped that the introduction of new technology which took place in the late spring of 1993 will help to increase the amount of material documented in the card indexes, and the number of collections thus recorded.

The invertebrate collections can be divided into two equal parts, the molluscan collections, and the rest. The following account divides the collections into these two parts.

### The Molluscan Collections

Since the foundation of the museum in 1819 records show over 150 donations to the molluscan collections. Many of these acquisitions were relatively small, but others contain many thousands of specimens. The selection of specific collections to represent the museum's holdings in the following account was difficult and, therefore, I have selected just a few of the more interesting ones for a fuller account, whilst leaving others to be dealt with in more general text. The largest, and perhaps the most important, collection held by the museum is that of Sylvanus Charles Thorpe Hanley 1819-1899. The Hanley collection was transferred to Leeds from the Tolson Memorial Museum in Huddersfield in 1957. When it arrived the collection was contained in some 13 cabinets, 206 drawers. Little is known about Hanley as a person, but his work on mollusca is fairly well documented although, as yet, much of this information has not been published. The collection was built up over some 60 years mainly as a result of correspondence with many of the major naturalists of the period. This included such great names as Isaac Lea, from whom he acquired many now rare or extinct species of *Unio*. He also acquired syntypic material from many collectors including Adams, Anthony, Benoit, Blanfield, Carpenter, Dall, Guppy, Hinds, Jeffries, Leath, Loven, Montagu, Pease, Philippi and Tryon to list just those identified to date. During his lifetime he published over 40 books and scientific papers and described over 200 new species. He also published the first book on shells using the then new technique of photography, (Hanley, 1863). The collection has had a chequered history. After his death in 1899, the collection became the property of his nephew Mr Crew Hanley. From him, the British Museum purchased about 104 type sets of marine mollusca. Actually, 117 of the 146 specimens registered in the British Museum's collections are types (S.Wybrow pers. comm.) The rest of the collection was sold to H.Harvey a shell dealer of Houndsditch. Harvey presented the British Museum with a

further 1,073 lots of which 248 are at present listed as types. Some time in the early 1920s the remaining collection was placed in storage at the depository of T.R.Roberts Ltd. No information is available to us from this period, and it has not even been possible to trace the site of Roberts' depository. The next time the collection came to light was in August 1932 when Mr J.C.North of Huddersfield donated it to the Tolson Memorial Museum as the Hanley and Harvey Collection. In 1957 the collection was transferred to Leeds under the care of the then Keeper of Biology Mr John Armitage. Due to the lack of information about this collector and his methods and some bad advice and guidance in the late 1950s, a considerable amount of irreparable damage was done to the collection because many of the original labels were lost, and as a result, some of the original type and figured specimens are now untraceable. However, it still contains many identifiable type and figured specimens.

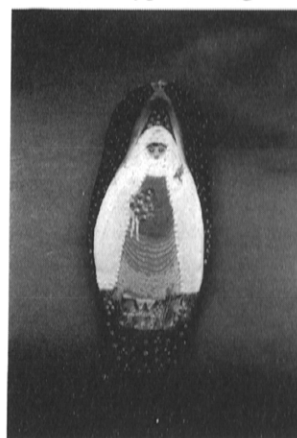


Figure 1. Painted Cuttlefish (*Sepia Officinalis*). By A. G. Stubbs.

The oldest collection of British land and freshwater mollusca in the City Museum's collections is that of Charles Ashford (1829-1894). Born in Baldock, Hertfordshire, Charles Ashford was sent to the Friends' School at Ackworth at the age of nine and remained there for thirteen years, first as a pupil and then as a teacher. In 1854 he published the Mollusca of Ackworth. He worked closely with W.Dennison Roebuck for many years and was noted for his early studies of the 'darts' of British land snails. His collection of 43 boxes of *Pisidium* was examined by Peter Dance and A.W.Stelfox in 1958; many of them were collected and identified by others. Several of these collections date back to the early 1850's, a time when the *Pisidium* fauna of Britain was very little known, and several of our common species were still awaiting description. The main tropical collection held by the museum is the Atkinson Memorial Collection. This collection is of particular interest to the Leeds City Museum, in that it is associated with the very first honorary curator of the museum, Mr John Atkinson. The collection is made up exclusively of land species, and contains material from most areas of the globe. It was acquired over many years by two generations of Atkinsons - the father, Edward, and his two sons Victor Rupert and Francis E. Atkinson. The collection, however, predates the Atkinsons, dating back to William Hey the 2nd, the grandfather of Edward, who started the collection in Palestine in 1858. The collection was acquired by the Leeds City Museum in 1927 from Francis E. Atkinson L.R.C.P. Lond., M.R.C.S., of Bowerley in memory of his father Edward Atkinson F.L.S., F.Z.S., Hon Surgeon at the Leeds

General Infirmary, Past President and Hon Curator of Zoology of the Leeds Philosophical and Literary Society, and his son Victor Rupert, Sec.Lieut 1st/6th West Riding (Duke of Wellington's) Regt., who was killed in action at Passchendale in November 1917. Most of the material comprising the Atkinson Memorial Collection was purchased from dealers and collectors, and some high prices must have been paid for the rarer material. The collection contains, for example, three sinistral and three dextral specimens of the land snail *Achatina (Lissachatina) fulica* (Bowdich, 1822) acquired from the collection of Sir David William Barkley (1808-1888) and originally from the island of Mauritius. Less than ten sinistral specimens of this species are known (T.Pain pers. comm.).



Figure 2. Arthur Goodwin Stubbs (1871-1950).

Goodwin Stubbs (1871-1950); David Northey Richardson (1929-1992) (grandson of A.G.Stubbs); William Temple (1889-1960); W.Thurgood, plus many smaller collections, and some which remain anonymous. Further collections are still being added to the museum's holdings, not least of which are those of Mr Terry Crowley, parts of whose collections are now being transferred to Leeds. The remaining parts will come in due time. This collection is noted for its scientific standing containing as it does many type, figured and cited specimens.

#### The Insect Collections

The museum's main reference collections have been compiled through the amalgamation of material put together by many different naturalists. This is particularly noticeable when looking at specific collections such as the beetle, diptera or hymenoptera collections.

**The British Beetle Collections.** As described above, the original 6 Hill cabinets of beetles were fully laid out by the museum's natural history assistant, Jean Parkin. Jean also mounted over 10,000 specimens for the collection. She quickly developed a great skill in the mounting of these insects and took pride in the display of the material within the drawers. Each species could only have its allotted number of specimens within the space allocated, the average being six, usually all from the same locality. Any extra material collected was discarded or placed in a separate storage cabinet. It is very fortunate that the bulk of this material is still extant, some of this material having been transferred to other museums, schools and even private collectors. The high standard Jean set for the collections, however, saved the older material as her pride would not allow sub-standard material to be passed on to others. Any specimens in the collection which were below the high standard of mounting she required were also discarded to the storage cabinet. Thus, most of the early material collected and identified by J.R.Dibb and W.D.Hinks was downgraded in this way. A similar fate awaited any other material, sometimes regardless of rarity or local significance, which came into the museum from other entomologists, and which did not reach her high standards. Despite the low esteem, by today's standards, in which historic and some local material was held, local entomologists worked closely with the museum and helped with identifications, and even assisted with the acquisition of material. One of these entomologists to whom the museum owes a great deal is Mr John H. Flint,

The most recent addition to the museum's collections is that of Mr John Armitage. This collection includes the bulk of the best and most important material from the collection of Fred Taylor of Oldham. The purchase from John Armitage, with the aid of an M.G.C. Science Museum PRISM Fund grant, of the main elements of the Fred Taylor collection, has resulted in the re-amalgamation of the majority of Fred Taylor's original collection. When Fred Taylor died in February 1949, his shell collection was housed in cabinets at his home in Lanseer Street, Oldham. He wished his collection to be given to John Armitage, a close friend for over thirty-five years. However, due to circumstances prevailing at the time, the collection was split and the cabinets used for other purposes. John was allowed to remove all he could carry in one large suitcase; his knowledge of the collection ensured that he acquired all the most important material. Fred Taylor's daughter retained the remaining elements of the collection. In 1975, and again in 1983, sections of the original collection turned up in the hands of dealers the first at Knaresborough with Edward Milborrow and the second at the Cheshire Taxidermy Studios of Sale, Cheshire. This probably still leaves a section of the collection unaccounted for, but by far the most important elements are now back together. This includes the left handed specimens of *Helix pomatia*, *H. aspersa*, and *Trichia striolata* but I can find no trace of the sinistral specimens of *Cochlicella acuta* & *Oxychilus draparnaldi* which he also had in his collection. Fred Taylor was noted not only for his ability to clean shell immaculately, but also for his generosity.

It was well known that the Leeds City Museum was interested in acquiring material from the original Fred Taylor collection, and a close watch was kept by many colleagues for likely material. This resulted in several finds, perhaps the most interesting being as a result of a telephone call from the molluscan section of the Natural History Museum in London stating that part of the Taylor collection had turned up in Rotherwick, Hampshire. It was with great interest and anticipation that I made contact. However, the collection proved to have belonged to yet another Taylor, this time a school caretaker in Manchester by the name of George H.Taylor. Fred, in his generosity, had given this little known collector some 36 boxes of material all collected between 1897 and 1908, including two boxes of *Catinella (Quickella) arenaria* (Bouchard-Chantreaux 1837) collected at Braunton Burrows.

Other collections at Leeds include those of Charles Allen; Hugh Brooksbank; J.W.Davis(1846-1893); C.Frazer; C.H.Moore (1869-1949); William Nelson (1835-1906); Jack & Vi Saville; L.W.Stratton (1900-1971) (Part); Arthur

one of Yorkshire's leading coleopterists. Over the years he helped John Armitage, Jean Mitchell and myself with the identification of these insects. He also arranged for the collection of the Rev. Thomas Basil Kitchen (1905-1987), Honorary Canon of the Cathedral Church in Gibraltar, to come to Leeds after his death in Scarborough in 1987. The collection reflects his career in the church, having been based both in Yorkshire and in Devon, (Obituary, Flint, 1989) This collection housed in 7 Hill cabinets, contains some 13,497 specimens of at least 2,782 species, with several hundred specimens still awaiting identification.

**The Diptera Collections** The diptera collection is based around those of Christopher Arthington Cheetham and Dr H. Henson. These two dipterists acted as county recorders for the Yorkshire Naturalists' Union for nearly half a century. Amalgamated with this material are the diptera collections of several other entomologists including material collected by C.D. Day and Dr & Mrs Broadhead. The diptera collections are in the process of being reassessed, re-identified, documented and rehoused. Work on three major groups has been completed, the Syrphidae, the Tipulidae and the Brachycera, the last two with financial aid from the Friends of Leeds City Museum and a RECAP grant from the Yorkshire and Humberside Museums Council (RECAP = Reclassification of Collections Access Project, a special grant for natural sciences collections. The hoverfly collection was worked on by a specialist volunteer, Mr Norman R. Frankel, who, with the aid of other specialists, and the author, worked through checking and re-housing the whole collection. The Tipulidae, numbering over 3,000 were checked and re-identified by the national recorder Dr Alan Stubbs, whilst the Brachycera was worked on by Mr Roy Crossley. The group of flies within the Brachycera known as dolichopods proved to be very important, as this part of the collection housed material from continental specialists, including specimens collected by Raddatz and Kowartz principally in Austria between 1864 and 1879 (Crossley, 1992). The material collected and identified by Mr Chris Cheetham has always been difficult to use with any degree of certainty, as he had a reputation amongst dipterists for occasionally doubtful identifications. The work on these three sections did show some weakness in his abilities, but not to the extent expected. Some of the county records which had been dismissed as being incorrect were in fact, found and proved to be correct.

**The Hymenoptera collections** The Hymenoptera collections comprise material combined from that collected by numerous entomologists. The collection is divided into four parts: bees and wasps, saw-flies, parasitica, and ants. The whole collection of bees and wasps has been checked and re-identified by Dr. Michael Archer, the County Recorder. Parts of the collection of parasitica have also been checked and re-identified by Mr. W.A. Ely who is the County Recorder for this section of the Hymenoptera. The saw-flies have mainly been checked or identified by Mr. & Mrs J.H. Flint. The above collections are almost wholly of British origin.

The ant collection is the only part of the Hymenoptera collection which has an international base. The collection contains examples of nearly the complete European fauna, as well as examples from as far afield as Hong Kong and the U.S.A. This is mainly the result of work undertaken by Dr. C.A. Collingwood, one of the leading authorities on ants in the U.K.

It is hoped that we will be able to re-house the whole of the Hymenoptera collection in new cabinets sometime in the near future.

**The Lepidoptera collections** The Museum has several outstanding lepidoptera collections, which, for the purpose of this paper, are best divided into the British and European collections, and those comprising the tropical Collection. The first of these include the collections of Richard Wilding (1858-1950) and Joseph Norman Thornton (1892-1956), and the latter the collections of F. Benson-Jowett, Wing. C. Mdr. J. M. Maud, and Major Walter Brown Arundel (1854-1927). Recently, the museum has acquired the collection of Mr John Armitage with the aid of an M.G.C. Science Museum PRISM grant. This collection includes long runs of some of the more localised European species, and was a very welcome addition to the collections.

The most outstanding of the British material is the Wilding collection which, amongst other things, contains a series of Large Heath from Simonswood Moss, Lancashire. Richard was familiar with this site as early as 1886 when he gave a talk to the Lancashire & Cheshire Entomological Society entitled 'A Day on Simonswood Moss'. Richard Wilding was well known as a coleopterist, and his collection of some 10,000 beetles can be found in the Liverpool Museum (now part of the National Museums on Merseyside). The collection of British Lepidoptera collected by J.N. Thornton is also outstanding for its long runs of specimens including a large series of pug moths. The tropical collection is mainly based around the collection of Benson-Jowett, but includes material collected by J. & B. Ross from the Sepik River area of New Guinea, and a long series of Raja Brooke's birdwings confiscated by H.M. Customs and Excise at Yeadon Airport in Leeds.

The purchase of John Armitage's collection of British and European lepidoptera has greatly added to the museum's lepidoptera collections. The original cabinets which house John Armitage's collection were purchased by him from a barber in Folkstone, where they had been stored in a cellar prone to periodic flooding. The cabinets originally contained the collection of R.A. Nicholls who left his lepidoptera at the barber's in lieu of an outstanding debt. Nicholls never returned to redeem his collection and nothing is known of what happened to him. Several drawers of Nicholls' material still survive within the collection, although much had to be destroyed.

**Hemiptera - Homoptera** The collection of bugs is still relatively small consisting of only a few thousand British and Continental species. Unfortunately, the Continental material has still not been identified to a satisfactory standard, and therefore its scientific use is still limited. **Dragonflies** The collection of British dragonflies is fairly small but covers most of the species represented in our fauna. The dragonfly collection was originally very extensive and contained large numbers of type specimens from the Amazon basin. (Fraser, 1946) The type specimens were, unfortunately, transferred to the British Museum and much of the remaining material found its way into the Manchester Museum's collections. Only a small amount of papered material now remains in Leeds.

#### **Other Invertebrates**

If one person is to be picked out to represent the other invertebrates, then this person must be Mr Douglas Turnbull Richardson of Skipton. Over the years, he has built up large

collections of invertebrates for the museum, in particular, woodlice, millipedes, and centipedes, as well as spiders, harvestmen, leeches, and several other smaller groups. The bulk of this material is preserved in spirit and it is the basis for the field records for the county of Yorkshire. All Mr Richardson's collections have been presented to the museum fully documented, and they are outstanding both in the form of the documentation and in the detail supplied. Many other people have helped with the acquisition of these collections including Clifford Smith, the County recorder for spiders and Margery Andrews, the caddis-fly recorder. Amongst the smaller collections are a series of British and European brachiopods acquired from Robert Ferris Damon (1845-1929), a dealer based in Weymouth.

### Miscellaneous collections

**Glass Sea Anemones** In the Leeds Philosophical and Literary Society Annual Report for the years 1865/6 there is the following statement. 'For the purpose of furthering the study of certain Invertebrate tribes, which, from their minuteness, cannot be examined with the unaided eye, and the beauty of whose structure is imperfectly exhibited in spirits, the Council have obtained from Prague accurate magnified models in plaster of some of the Foraminifera, and a beautiful series of models in glass, showing the natural size and colour of the European Actineae.' The information published in the list of acquisitions (which are now catalogued as LEEDM.C.1865.23) states: 'A Series of 64 accurate Coloured Models of the European Species of Actinea by Wenzel Fric, of Prague: Purchased by the Society.' Time and the bomb has taken its toll on these glass models, 27 of which are still extant, although a number are damaged to some extent. Mr John Armitage salvaged the models and did some restoration work on them in 1959. In April 1991 David Whitehouse, the Deputy Director of the Corning Glass Museum in New York, contacted the Leeds City Museum, as a result of research he was undertaking on the father and son team of lampworkers, Leopold and Rudolf Blaschka. It was soon established that Wenzel Fric was in fact Vaclav Fric, a Czech dealer in natural history specimens, and that our models came from the Blaschka workshops. In October 1991 two members of the museum's Friends photographed the models and copies were forwarded to David Whitehouse at the Corning Museum. The following paragraph is an extract from a letter by David Whitehouse dated September 17th 1991: 'The photographs were a

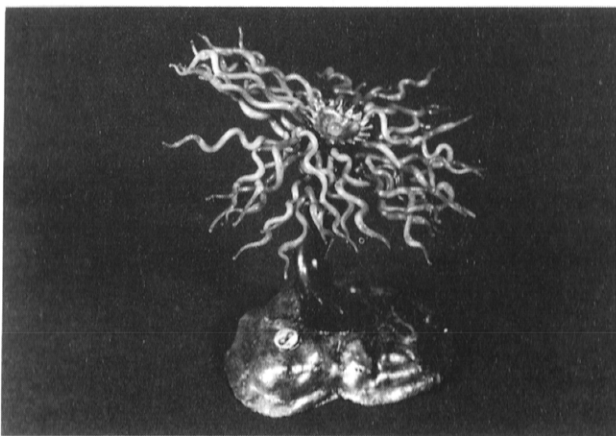


Figure 3. Glass Sea-anemone. (*Aiptasia Couchii*). By Leopold Blaschka c. 1865.

revelation and I am immensely grateful to you for sending them. Leopold made his first models of sea anemones (for the natural history museum in Dresden) in 1863. As far as I am aware, they do not survive. Indeed most of the models I have located were made in the 1870s and 80s, after Leopold had been joined by his son, Rudolf, who eventually did most of the painting. The difference in quality between your very early objects, some of which seem rather crudely modeled and have strident colours, and the later versions (such as the models that Cornell University acquired in 1885) is remarkable. It is the first evidence I have seen that throws light on Leopold Blaschka's development as a scientific modelmaker. Indeed, it may help to explain a curious statement made by Leopold towards the end of his life, when he said that Rudolf was a better craftsman than himself, having greater "tact". The Leeds material has recently been examined by Susan M. Rossi-Wilcox the Administrator of the Glass Flowers at Harvard University, (for details see Schultes & Davis, 1982), who considered the specimens to be 'significant', as very little material is known from this early date.

### ACKNOWLEDGEMENTS

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## **LABELLING SPECIMENS IN THE LIFE SCIENCE DEPARTMENTS AT THE NATURAL HISTORY MUSEUM, LONDON USING COMPUTERS**

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### **INTRODUCTION**

Throughout the Natural History Museum, registering or databasing our collections using computers has become the norm and many of us use computers to generate specimen labels. However, few in Life Sciences use specimen registers or databases to generate specimen labels direct, as is the case in Palaeontology and in many other natural history institutions. To reduce additional keyboarding effort, it obviously makes sense, where possible, to generate any required specimen labels from the specimen registers or databases as we are developing them, rather than continue to regard specimen registration and labelling as totally distinct and unrelated tasks.

The Life Science Departments at the Natural History Museum have functioned as autonomous units for most of their existence. It is perhaps not surprising, therefore, that each of the Departments has developed its own methods of labelling specimens. Indeed, there is considerably diversity even within Departments, such that different groups of organisms are labelled using different qualities of paper or card, different inks and different fields of data. Some of these differences undoubtedly arose and continue to exist as a result of the different methods of preservation demanded by the material (dry, fluid or slide-mounted) and the differing needs for different groups of organisms.

However, this review of labelling across the Life Science Departments has identified the possibility of unifying some of the labelling methodology to facilitate computer generation of labels and incidentally, but perhaps just as importantly, standardising on more permanent materials.

### **MATERIALS**

Whatever the state of preservation, the primary requirements are that the media used are as permanent as possible.

Although suitable printers, papers and inks have been identified for printing permanent data labels for dry, fluid-preserved and slide-mounted natural history specimens using computer technology, it may be necessary to continue labelling single specimens or small numbers of specimens

with identical data using traditional methods until sufficient hardware is available to all to make these methods no more practical than using a computer. But it should be remembered that specimens so labelled will still need to be databased on a computer! For practical reasons other labels which do not carry primary data, such as maps and those used to cross reference material in the herbarium, would continue to be preprinted and/or be printed using traditional methods.

### **Papers**

All specimens preserved in fluid (alcohol or formalin) require an immersible label printed in permanent ink on 100% rag paper (Wiggins Teape WT HWS 550), Goatskin Parchment Paper (Wiggins Teape) or Resistall (Byron Weston Paper Company; supplied by Preservation Equipment Ltd (UK) and University Products (USA)). Some curators also use a non-immersible label printed on Archive Quality Paper (Conservation Resources (UK) Ltd) or Pancake Particle gummed paper 80 gms/metre (Smith & McLaurin via H.M.S.O.) (identical with respect to data to the immersible label) which is glued to the outside of the glass container in which the specimen is preserved using either the gummed label's adhesive or UHU glue.

All specimens mounted on glass microscope slides require one or two square/oblong labels printed either on Pancake particle gummed paper 80 gms/metre (Smith & McLaurin via H.M.S.O.), or foil back microscope labels (Preservation Equipment Ltd or University Products Inc.) or Archive Quality Paper to be gummed directly onto the glass slide or existing card label (4-sheet Bristol board) using either the gummed label's adhesive, UHU glue or PVA. In addition to labelling each microscope slide with a printed label it is good practice to scratch a unique identifying number onto the glass slide using a diamond point, so that even if the label does become detach the mounted specimen can be associated with its data.

Blick self-adhesive labels do not adhere to glass very permanently and should be avoided.

All specimens preserved dry need a label printed on acid-free archive quality paper (e.g. herbarium sheet labels), 100% rag paper, Goatskin Parchment or thin card (e.g. insect specimens - Mellotex Smooth Ultra White 135 gsm card from Tullis Russell via HMSO).

Herbarium sheet labels are generally glued on to the herbarium sheets with latex glue (J. Hewitt & Sons Ltd) by the plant mounters. Latex glue, however, has recently been tested and shown to severely discolour when subjected to accelerated aging at 50% Relative Humidity and 90°C for 12 days (Annemarie Wierda, Amsterdam).

Tie-on labels, each with a hole punched in it (the hole reinforced with a brass eyelet) are used extensively in Zoology. These eyelets may disintegrate in fluid over time (pers. comm. Oliver Crimmen). Moreover, these labels present a problem for computer generation. In such cases printing onto an adhesive label which is subsequently stuck onto a tie-on label might overcome this difficulty for dry specimens. Alternatively labels could be printed onto a standard label with a wide left hand margin. After printing the left hand edge of the label is folded over and then a hole punched through the double thickness of card to accept a tie.

### **Inks**

Several types of ink are available. Water-based ink such as that used in standard Deskjet printers is not suitable for