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We are insisting that we have the name of each specimen on a label close to the specimen but we will be grouping individual captions together for tidiness though we are anxious that in the largest cases, some of the captions may be rather far from the specimens. In the 'cliff' case and other models, names will not be written near the specimens but a keyed diagram will be used. In some cases notably the 'rocky shore' there will be a large number of species displayed and here we have decided to provide a continuous text with key words in bold type and with few, if any references, to individual species. However basic information about their mode of life, feeding habits and position on the shore will be given in coded form with a series of symbols which have been devised with the help of the design staff. These symbols have been made up commercially as transfers which can be rubbed onto the art work for the graphics. Whether visitors will find these too laborious to decipher remains to be seen.

Perhaps inevitably the gallery is turning out a little differently from what we envisaged when the brief was written. We think that there is a pleasant and appropriate feeling of space which is right and proper for displays dealing with 'outdoor' subjects. (It will be interesting to see if we lose any of this when the canopies of the partial false ceiling are up). Our large cases contribute to the feeling of spaciousness and will also be easy for children of all sizes to look at but they do not lend themselves to the display of smaller specimens. These will mostly be mounted on panels within the cases but we wonder whether they will be sufficiently near the glass for details to be appreciated. We also intended to mix specimens from different taxonomic groups in each or most of the cases but we found that in this gallery, birds with mammals are best displayed separately from invertebrates; this necessitated the shuffling round of specimens on our lists and the renaming of some of our display areas. We had also hoped to display numerous photographs of local examples of habitats dealt with in general in the actual displays but it has not been able to accommodate these in the positions and numbers which we had hoped.

Finally I might add that when I have said 'we think' in this article I have been implying that my opinions are shared absolutely by the other Natural Historians in my section, namely Charlie Copp and Sue Swansborough and until this year Don Stewart; no doubt they will be explaining to me shortly that that is not strictly true.

Anne Hollowell
Bristol City Museums

STORAGE FACILITIES FOR THE NATURAL HISTORY COLLECTIONS AT BRISTOL CITY MUSEUM.

From 1972 to 1974, Bristol City Museum and Gallery undertook a major reorganisation and re-fitting of the basement storage areas in the main Queens Road building. The project has been described in general terms by Paul Elkin in the Museums Journal, Vol. 75, September 1975, but what follows may give some idea of the advantages and problems we have experienced since then with storage of the reserve collections in Natural History.

Our Natural History section has one large store 18.5m x 23m (75' x 60'). It is a working area as well as a store and has a run of benches, a sink and filing cabinets. It is a fumigated area and since its initial fumigation with methyl bromide in 1974, any specimens coming in from elsewhere are always fumigated first in our fumigation chamber attached to our laboratories. This means that we have to have a smaller storage area elsewhere for incoming material awaiting fumigation. At the moment this doubles as the curators office. The floor of the store, originally rough concrete, is now covered with vinyl tiles which has greatly decreased the dust problem which was previously a severe one. The original rough stone walls on two sides have been lined to eliminate surfaces on which dust used to lodge and the heating pipes running through the store have been lagged not only conserving heat but mitigating fluctuations in air temperature. The ends of one of the rows of cupboards envelope these pipes - a situation not ideal and which was not foreseen at the planning stage (the pipes were not marked on the floor plans used for the various initial proposals for the layout of the racking) therefore ventilation remains a problem. We have a single extractor fan ducted to the outside but the air drawn in from elsewhere in the basement is far from fresh. Recently after complaints of headaches and malaise the fluorescent tubes over the working area were replaced by Osram Lifeguard Daylight tubes with a spectrum more nearly approaching daylight. The tubes they replaced were found to have a much reduced light output after being in use for several years and this must have added to the problem. For the benefit of the specimens, a Rotaire Dehumidifier (air flow 300 m³/hr) has been installed. The setting of the humid; stat has given a little trouble and a gradient in humidity occurs across the store. This may be partly due to the fact that one of the rows of cupboarding runs right up to the far wall at one end, and must impede the air circulation. It is probably better both for our circulation and for escape in case of fire, if none of the rows extends quite to the walls. We hope in due course to have emergency lighting as our store could be difficult to get out of in total darkness. We have two statutory fire escape doors one to the front of the building and one to the back. These are both on one wall which is a disadvantage though there is a third 'unofficial' exit in another wall. Our working area (and water supply) is sited in the corner adjacent to the ventilation but for security purposes it would have been better by the entrance to the store. All in all, our stores are good for the specimens but still not so good for the people working in them.

The layout of the store consists of a main gangway running along one side from the entrance to the working area with some storage in alcoves to the right but the main rows of storage fittings running away at right angles to the left. The main storage fittings are made up from Dexion shelving. Our largest items are stored on open shelving of Dexion heavy duty, speedlock racking with metal panel shelves, giving long (3.2m, 10'6") uninterrupted spans. The items we store here include mounted skeletons, large disarticulated bones and large mounted mammals and reptiles. We now feel we would prefer to have this shelving enclosed to exclude dust and provide security. However, cladding would eliminate the flexibility of the shelf area arrangements and would make it difficult to get large items onto or off the shelving. The other large items, are the mounted heads and horns and these are stored on both sides of fixed weldmesh screens and are supported on the mesh by meat hooks with their sharp ends filed down.

Our medium sized specimens include most of our mounted mammals, birds and reptiles. The birds were most of them originally in glass-fronted 'drawing room' display boxes and were taken out by the temporary assistants recruited for the storage reorganisation projects. These specimens were then fixed onto plain chipboard bases. We store these animals on Dexion Impex adjustable shelf units arranged to make four of the double-sided rows mentioned earlier. The units in two of the rows reach from the floor to a height of 8'6", a standard size for the shelf units. The remainder 3'6" high are mounted on Dexion Heavy Duty Speedlock beams leaving a space below which accommodates insect cabinets up to 4'6" high. The fronts of the shelf units were given a timber cladding by outside contractors and this supported aluminium track for sliding glass doors. Unfortunately the timber began to warp when the central heating came on in the following autumn causing trouble with the glass doors which then wouldn't slide smoothly; the glazing firm made repeated calls to ease the tracking. We have also had two instances where doors cracked without warning and 'daggers' of glass fell to the floor. We think the trouble occurred in doors which had been made too large in the first place and then, unknown to us, had simply been chipped away at the top to make them fit. These rough edges have since been rubbed down by the glaziers to try to eliminate angles where cracks might start. We wondered whether the glass could be tested for strain by the use of polarised light but apparently the results one gets by using such methods are difficult to interpret. We also recently had quotes for the fixing of protective film to the glass (such as is used for protection against bomb explosions), however the quotes ranged from £2,000 to over £3,000 to deal with all our glass and we abandoned the idea - at least for the time being. The film would have had the added advantage of giving appreciable protection against ultra-violet radiation. However, the problem could probably have been avoided if the doors had been made with a metal frame along the top as well as the bottom. The locks are in these bottom frames and are of the type used in some patio doors. They are locked simply by pushing in a pin. These have worked very well and it is an advantage to be able to see at a glance whether they are locked or not. We did have trouble with the locks initially but that was only because the warping of the timber frames meant that some of the pins were not opposite the holes in the doors behind which they were meant to engage! Because of the fact that the shelves are fixed with simple clips hung from holes inside the shelf units, the timber cladding does not interfere with adjustments to the shelves, except that the glass doors are in upper and lower sections and the shelf at their junctions are at a fixed height. The shelves are 3' in width and there are vertical partitions at 3' intervals in two of the rows. These partitions were optional. We chose to have them as we felt they would help to prevent the spread of any infestation which might occur. We now feel that it would be adequate to have had the partitions at 6' intervals as animals have an annoying tendency to have tails which are just too long for the space you want to put them in.

Our study skins of mammals and birds, and our shells are mostly housed in our co-called 'Smithsonian Units' which were designed well before the storage reorganisation project was envisaged. (They are used by other sections of the Museum as well). The carcasses are of robust, weight bearing construction very suitable for heavy items such as shells or archaeological or geological specimens (though our geology section uses a different system).

These units have been described in the Museums Association Information Sheet No. 10 ('The Storage of Museum Collections' by Geoff Stansfield, 1976, 2nd ed.). Our basic unit has a strong wooden carcass with hardwood runners closely spaced over the entire height of the sidewalls inside. The drawers are essentially sheets of 5 ply which fit between the runners and have sides set back from the edges except at the front and back. We find sides which are 50mm high are quite adequate for our material. The drawers have inside dimensions of 510mm (width) x 610mm (depth). The inside free height of 850mm in the carcass allows an average of 8 drawers in each unit if they contain such items as bird skins which often project slightly above the sides of the drawers. There is a single door which lifts off. Its lower edge is rebated and fits into a groove at the front of the unit. This and the other edges of the carcass are fitted with a plastic foam strip against which the lid is pressed when closed. The pressure is applied by the closing of two sash window catches at the top of the unit. There is 25mm diameter hole in the door covered in fine, brass mesh to allow the passage of air in and out, when the door is opened or closed. The mesh is intended to exclude pests of any but the smallest size and also helps to support a plug of cotton wool which helps to filter out dust. The lids are lifted by two metal 'D' handles placed vertically and parallel near the top. These units have been made by two different joinery firms, and since, some have been made by our corporation Engineer's Department. We experienced trouble once we switched from one firm to another because the drawers, although meant to be freely interchangeable within and between units, were of course not made to the original templates by the new firm, but from an arbitrarily selected sample drawer.

The units were designed to be strong enough to be stacked one on top of another but it was also thought that they might be used standing directly on the floor to provide, in effect, a bench top. However, in our stores re-fitting three rows of Dexion Heavy Duty Racking (two back to back) was set up with modified roller conveyor fittings to provide a supported second and third horizontal row of units above those resting on the floor, and not supported by them. In practice it has not been found practicable to use the top level, partly because we realised too late, that a run of pipes would restrict the movement of the necessary stacker trolley (which we therefore have not bought). Also after two years in use, the weight of the units caused the racking beams to sag onto the units below and the beams had to be raised. This then left too little clearance between the upper level and the ceiling. Each unit resting on the floor, stands on a Dexion Speedframe platform with castors. Thus the positions of the units on the floor can be changed simply by wheeling them about. For the second row up we have a tall trolley made with Speedframe and with conveyor belt wheels on top onto which any unit can be pulled directly and the unit can then be wheeled to another position and the procedure reversed. Raising or lowering from ground to second level must be done separately by a standard hydraulic lifting device.

As well as standard-sized units originally known as 'quarter units' we have some doubles. A few of these are 'vertical doubles' which do not fit into our racking. They are identical to the 'quarter units' but twice the height and more economical in storage provided for money expended. Incidentally a quarter unit with 8 drawers now costs about £220. The only additional feature of the tall units is the provision of a moveable internal metal tie about half way up which prevents the rather long sides from bowing outwards.

The doors on this size unit are larger and heavier but as they have to be lifted only a little before resting them on the ground, they do not seem unwieldy in use. Our horizontal doubles also have heavy doors which are similarly reasonably manageable. However, the wide drawers are not very convenient for one person to handle but by no means impossible. They are suitable for skins of large British mammals, geese and birds of prey. With these units we usually use only four drawers to a unit. The double units can only be stored at ground level and each rests on two Speedframe platforms with castors.

Similar but much larger platforms each with a chip-board cover are used for supporting insect cabinets off the floor. This prevents dust accumulating on the floor from getting under and between the cabinets, but does not allow for moving any cabinets separately. The platforms vary in length to one extent because in some rows of racking, structural brick columns supporting the ground floor are incorporated so that the span-lengths of the racking supporting the shelving above are not of a uniform length.

The working areas of the store are cleaned once a week. This regime was instituted after there had been anxiety about the level of arsenic which might be present in dust from old mounted specimens. The analysis of dust and hair sample showed the level of arsenic present to be apparently negligible but we are now provided with lab coats which fasten high around the neck and masks and plastic gloves to use when making any major re-arrangement of old specimens. Once every six months the whole store is given a thorough clean with all the moveable units being wheeled aside to allow cleaning of the floor beneath. This demands a systematic approach otherwise a massive 'traffic jam' of displaced units is liable to develop.

After the initial fumigation of the store in 1974, it was intended to re-fumigate every three years but in fact it will not have been done again until this Autumn. Fumigation of a store by methyl bromide is only possible if it can be isolated from other areas. This is so that the right concentration of gas can be built up but nevertheless the rest of the building will almost certainly have to be closed for two to three days until the fumigation process is complete. The other necessity is that there should be adequate means of ducting the gas away to the outside when the gas is evacuated. Preparation before the fumigation is also laborious. This is because all enclosed containers have to be opened including insect cabinet drawers. Not only is the work laborious but containers with their lids ajar take up more space than normal and very often specimens have normally to be tightly packed to accommodate them in the space available. For our store, we found it took us a month with 3 or 4 people working hard. This time we are allowing the same time although we hope the process will be easier because of our previous experience and because some of our specimens are now packed in different containers. Incidentally, the importance of opening containers is not so much so that the methyl bromide can get in (it can penetrate the thinner grades of polythene and through cardboard) but because it may be reluctant to come out again and the time needed for complete evacuation of the gas could be much increased. Besides one just does not like to think even of the possibility of lurking pockets of methyl bromide!

I may add that we do not 'open' our birds eggs - as we are still around, presumably they are sufficiently porous.

Our experience with our efforts to improve our storage appears to be of interest to others. We have had a number of people round to see the stores in the museum including not only museum colleagues but also the public who have come during 'open days' to see our reserve collections in comparative comfort. We know our systems are not perfect, but we are always pleased to see colleagues to discuss the ins and outs. As I have said the specimens are certainly better off and the staff delight in being able to see and get at them even if there are still some difficulties.

Anne Hollowell
Bristol City Museums

Large blue is now extinct

SCIENTISTS in the Nature Conservancy Council and the Institute of Terrestrial Ecology have regretfully concluded that the large blue butterfly, *maculinea arion*, is now probably extinct in Britain; for the surviving butterflies in the last known colony of the species in Devon produced no viable eggs this year despite every possible effort to provide suitable conditions.

For most of this century the large blue has been Britain's rarest resident butterfly, although 30 colonies existed up to 25 years ago in Somerset, Devon, Cornwall and the Cotswolds, by 1965 most had disappeared.

This was due — as is now known — to the intensification of agriculture and the loss of rabbits (through myxomatosis) which maintained a closely grazed sward. Since the mid-1970s the population was reduced to the one colony in Devon.



Large Blue

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