SOME NOTES ON COLLECTING AND PRESERVING FOSSILS

by

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Summary

Collection and preservation techniques for macrofossils are described in a form suitable for use by amateur geologists who have no access to laboratory equipment and for whom there is no fully comprehensible literature available. Details of a bulk sampling technique for use in obtaining fossils from unconsolidated sediments are given, together with details of methods for the preservation of fragile and pyritized specimens.

Introduction

This article is designed to explain some of the simpler, cheaper and more widely used methods of preserving fossils which can be easily carried out by non-specialists. Only a little practice and improvisation is required to become proficient in these techniques. Micropalaeontological techniques are ignored as they are generally of little interest to non-specialists. If interested in this aspect, many useful methods are adequately described in Kummel and Raup (1965).

Collecting Techniques

Little can be said about field collecting in a short article as methods differ from locality to locality. It is worth noting, however, that it is usually rewarding to search horizons or lithologies ignored by other collectors. For example, on expeditions most people disregard the unconsolidated sediments in preference to hard beds or conretions. These less popular rocks often yield better specimens than those found elsewhere.

When collecting from an unconsolidated deposit it is usually worth removing a bulk sample and processing this at home. A description of the technique used by the author in dealing with such a sample is given here as so few British geologists use bulk methods, mainly because they are too time consuming. This is a great pity as so many smaller fossils must remain undiscovered because of this.

Whatever the nature of the sediment, sand or clay, it must first be left until thoroughly dry. If laid out on newspaper samples will dry quickly. Non-argillaceous samples are simply sieved when dry prior to sorting. Any remaining pebbles which were not removed in the field are picked out at this stage. An eighth inch mesh sieve is used to separate fine and coarse fractions of the sample. A sieve of this sort can be readily made at very little cost as shown in Text-figure 1 of the author's sieve. The tray dimensions can be altered to suit the individual collector but it is not recommended that sieves larger than the one figured be made as the zinc gauze incorporated is not particularly strong.

The coarse fraction remaining in the sieve is ready to be sorted. This is best done on a white tray (or black if preferred) about the same size as the sieve but with lower walls. A small quantity of the sample is placed on the tray and is spread over it by gentle shaking to and fro. Once the tray has been scanned and

the required specimens removed the material is redistributed by further shaking and the sample scanned once more. This is repeated until no further worthwhile specimens are found.

The material passing through the coarse sieve is sieved through a mesh of about a thirty-second of a inch. Suitable sieves of this mesh are the hemispherical fine metal flour sieves that can be readily purchased at little cost. The material retained in this sieve is sorted as above but preferably on a smaller tray and in smaller quantities at a time. All that passes through this sieve is discarded unless one is interested in microfossils.

If the sediment is a clay or a silt or contains too much clay or silt to pass through a sieve on its own accord it has to be broken down. The dry sediment is soaked in hot water whereupon it generally readily disintigrates. The resulting mud is then sieved in water through the fine sieve by half filling the sieve with sediment, half immersing it in a bowl of water and gently shaking to and fro, care being taken not to lose any of the sample over the rim of the sieve. If any lumps of clay remain the sample is thoroughly redried and the process repeated until no clay remains.

If this fails to work, however, and there is still a great deal of clay which cannot be handpicked out without losing too much material there are several alternative methods that can be used. Firstly, the sample can be boiled in dilute washing soda solution until no clay pellets remain. A more expensive, but often more efficient and quicker method is to soak the partly processed sample in 50vol. hydrogen peroxide until effervescence ceases. Extreme care must be taken, especially of the face, when using this chemical as it causes very painful burns. It is best to place the sample in a large container and add the peroxide a little at a time otherwise it will foam over the edge of the container.

After treatment the sample is wet sieved as above through the fine sieve. The sample is then allowed to dry and may then be graded using the coarse sieve if necessary and sorted as above.

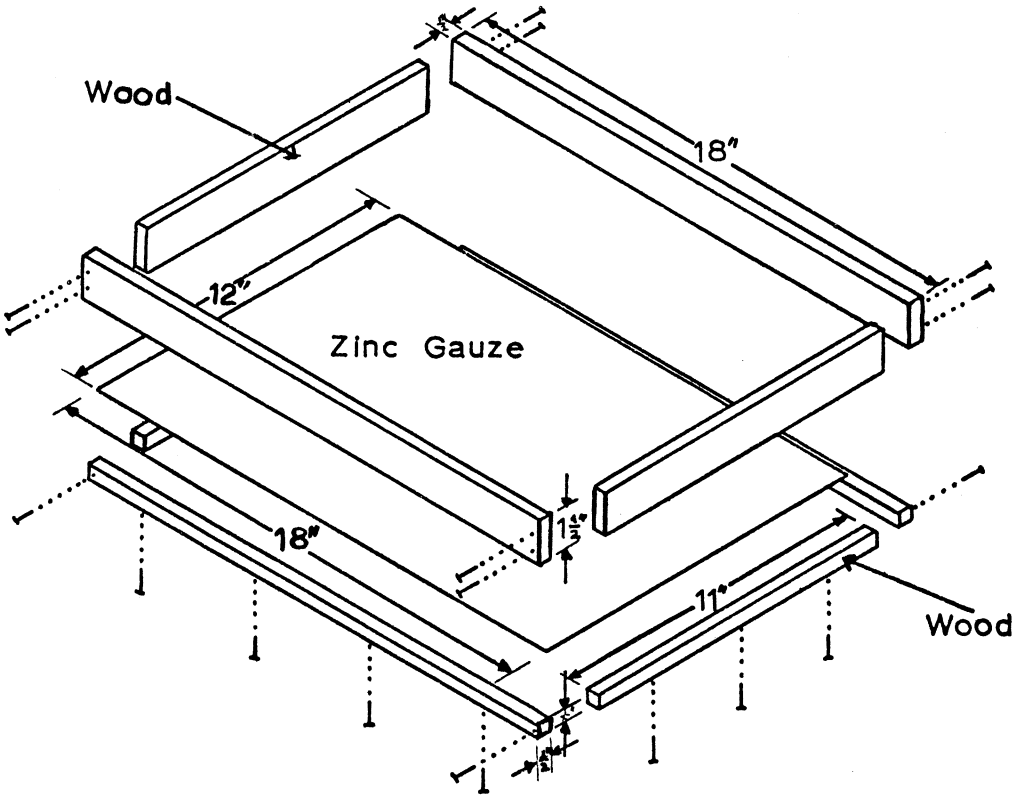
Specimens from different localities and/or horizons should be kept separate and fully labelled whilst still in the field. Ideal containers for field use are polythene bags for the more robust specimens and cheap plastic food containers (as purchased at Woolworths) for fragile material. Fragile specimens can be reinforced in the field by pouring a little alvar solution (see appendix) over them and allowing it to dry. It is best to dissolve the alvar in acetone for this purpose as it penetrates well in porous sediments, even when damp. Fragile specimens can generally be transported safely if placed in a stout container and layered with cotton wool or sand. The container must be completely filled or the contents will shake about.

Preservation Techniques

There are many ways in which a fossil can be cleaned and treated depending on its preservation and the nature of the enclosing matrix. Sediment can usually be removed with careful use of a pen knife, pins mounted in wooden handles and/or fairly stiff brushes (paste brushes purchased from Woolworths and subsequently trimmed are ideal). If the specimen is in a hard block a hammer and chisel should be used instead of just a geological hammer. If the specimen is very soft indeed, as is often the case in sands and clays of Tertiary age, it is best to allow the specimen to thoroughly dry before treatment. As large an area as possible is then cleaned without endangering the specimen too much and a solution of Alvar 1570 (see appendix) is painted on to the cleaned surface until no more is readily absorbed by the specimen. Once dry, the plastic hardens the cleaned area of the specimen enabling further regions to be subsequently cleaned and treated until the entire fossil is exposed.

Alvar is extremely useful for hardening fragile specimens, enabling them to be handled with comparative safety. Small specimens are best immersed in Alvar solution until no further air bubbles are released, carefully lifted from the solution and placed on a folded paper handkerchief for a few moments to remove excess solution and them left on a glass plate to dry. Care must be taken not to allow the specimen

TEXT-FIG. 1.



1 = 3/16 inch brass screws. (x 1/6)

EXPLODED DIAGRAM OF COARSE SIEVE

(1/6 inch mesh)

to stick to the glass. Specimens too large to be immersed in the plastic have the solution painted on until no further plastic is absorbed. If one side is done at a time there is no problem of the specimen sticking to the glass plate by this method, but it has the disadvantage of being less efficient.

Bones, especially elephant teeth (including tusks), from Pleistocene gravels require immediate attention as they rapidly fragment soon after collection owing to loss of water. A special technique for their treatment is adequately described by Rixon (1961) and will not be repeated here. The fragmentation can be delayed by sealing the damp specimens immediately after collection in polythene bags, or if too large in polythene sheeting, until able to treat them.

Specimens preserved wholly or in part by pyrite are a palaeontologists' nightmare owing to the fact that pyrite usually decomposes in air leaving a pile of red powder where there was once a fossil. This process either occurs immediately after collection or suddenly after being in the collection for some time, especially after handling. No method of treatment is a hundred per cent efficient, even after treatment pyritized specimens should be examined regularly for the first signs of decomposition because once it has set in it is very difficult to check.

The best method of preventing decay is the ammonia-Bedacryl treatment which depends for its action on a non-porous film of plastic preventing air and water, necessary for decomposition, getting to the specimen. The specimen is placed in an airtight container or inflated polythene bag together with an egg cup containing a little strong ammonia solution and left for a day or two. The specimen is then removed from the container and thoroughly dried by heating it at about 100°C for about half an hour (for example, on the lid of a saucepan containing boiling water). If there is any red powder on the specimen after drying this is brushed off and the specimen immersed in a solution of Bedacryl 122X (see appendix) for about fifteen minutes. After removal from the solution excess Bedacryl is drained off and the specimen placed on a glass plate to dry, care again being taken to prevent the specimen sticking to the glass. Specimens too large to be immersed in the solution must have the plastic painted on as before.

The other widely used method, which is mainly of use for specimens too small to be easily treated by the above method and for plant remains which fragment on drying, is to store them in airtight containers containing enough anhydrous glycerine to cover the specimen. As the specimens are usually wet when first placed in the glycerine, this has to be changed a few weeks later. The glycerine should also be changed if it becomes discoloured. The disadvantage of this method is that specimens have to be removed from the glycerine every time they are to be examined.

Specimens preserved in silica, apatite (e.g. fossil bones), pyrite or carbon in a calcareous matrix are easily cleaned by immersion in dilute acetic acid (15%). Care must be taken as specimens are often only partially preserved in the above minerals and may in part dissolve. When collecting from limestone it is worth dissolving a sample in acetic acid to see whether any fossils are minerallized and unaffected by acid treatment. Magnificent specimens, often showing rarely seen structures, can be obtained by this method but are usually very fragile and require hardening. After acid treatment specimens should be soaked in fresh-water to remove salt, as should all specimens found near the coast.

Labelling and Storage

The importance of accurately labelling specimens cannot be over stressed - those not so labelled are of little scientific use. Exact horizon, location (preferably with a national grid reference), date collected, collector and any chemical treatment used should be noted clearly. Final labels should be either typed or legibly written in black indian ink. Great care must be taken not to separate labels from specimens. With larger specimens in matrix this can be avoided if the label is written directly on to the matrix. This is easier and often more legible if written on a rectangular area of matrix previously painted white.

Obtaining suitable storage containers for specimens presents many problems for the amateur. Open trays should be avoided as specimens are liable to get mixed up when drawers are opened and shut. Glass tubes are ideal for the smaller specimens as they can contain both the specimens and their labels. So also are glass-topped or plastic boxes for medium-sized specimens. A very useful range of plastic slide lid containers is supplied by The Plastic Box Co. Ltd., White Hart Court, Market Rasen, Lincolnshire, but although they are reasonably priced the minimum order of 7 gross of any size is likely to be prohibitive to the amateur. However, if resources are pooled there is no reason why these boxes should not be used.

Glass-topped boxes can be made at little cost from strongly made cardboard boxes of the lift lid type. Many products are supplied in such boxes, for example, those used for storing tubes of paint in art shops are ideal. To convert them, a rectangle is cut out of the lid with a razor blade leaving a ledge of about 1/8 inch wide all round the top. A piece of clean glass cut to the same size as the top of the box is then secured in place with gummed tape.

APPENDIX

ALVAR 1570 is a plastic which when dissolved in toluene may be used as a hardener, glue or varnish depending on the concentration of the solution. For hardening purposes the solution should just stream off a glass rod or pencil. The solution is best prepared by overnight soaking of some of the flakes in sufficient toluene to cover them and diluting the solution obtained as required. Acetone is of little use as a solvent for use in hardening specimens at home because it picks up water readily from the atmosphere, forcing the alvar out of solution, and because it evaporates too quickly. Alvar may be obtained in flake form from A. Shawnigan Ltd., Marlow House, Lloyds Avenue, London, E.C.3 at 10/6d. per pound (one pound goes a very long way).

BEDACRYL 122X is a non-porous plastic which can be used as a varnish or to form a protective coat to prevent pyritized specimens decomposing. It is sold by I.C.I. Dyestuffs Division, Blackley, Manchester in the form of a 40% solution in xylene at about 6/- per pound. The solution is diluted with two or three times its volume of xylene for use on pyritized material.

Both toluene and xylene are carcinogenic compounds and care should be taken not to inhale the vapour. Treatments involving these solvents should, therefore, be carried out in a well ventilated room. All solvents used are highly inflammable and must be kept away from naked flames.

Acknowledgements

The author would like to thank Mr. R.D. Hendry, Dr. W.A.S. Sarjeant and Mr. A.M. Honeyman for their advice.

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