

FIRST AID TREATMENT FOR EXCAVATED FINDS

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Impact of excavation

Any object buried in the ground for any length of time will have approached or reached virtual equilibrium with its surrounding environment. From the very moment the object is exposed to air, the processes of decay and corrosion can start. For organic materials this process can be very rapid; without treatment, they can disintegrate within hours while, at the other end of the scale, other materials – well-fired pottery or stone, for example – deteriorate little, if at all. With the majority of materials excavated, however, deterioration will inevitably occur unless positive preventive steps are taken. Such conservation steps are described in the following pages. It should be pointed out, however, that this can only serve as a guide. Every object must be treated individually as no two objects are exactly alike, even though they may be made of the same material and have been buried within inches of each other. If problems arise, do not hesitate to consult with a trained conservator. He or she can give invaluable help and advice, especially for a specific site.

In the following sections, reference is made to a variety of conservation materials. A list of suppliers can be found at the end of this chapter. These materials are cited specifically because they are of good quality and have withstood the test of time and, more important, of reversibility. A primary rule of conservation is that any process applied to an object must be reversible. For example, any consolidant or adhesive applied must be able to be removed whether the following day or within a year or more. It is important, therefore, that the materials cited be used. Do not use something else that looks or sounds the same as what is recommended here. If improper materials are used, even trained conservators may not be able to reverse the process if necessary. If in doubt about suitable material or replacement for something mentioned below, consult a trained conservator.

Pottery: lifting

Do not pry sherds out of the ground. Before lifting them, carefully remove all dirt surrounding them, especially if the dirt is dry and hard. Drops of water applied locally

to hard dirt will help to soften it and facilitate the lifting procedure. Wooden spatulae are good for cleaning around sherds in the ground as metal tools or trowels can scratch and abrade pottery. Freshly uncovered pottery while still damp can be very soft and friable. Do not lift the sherd before ascertaining the condition of its surface. Make sure there is no paint layer or applied decoration that has become or will become detached from the sherd when it is lifted. If this is the case, remove the surrounding dirt so that the sherd sits on a pedestal, cut through the pedestal 2-3 cm below the sherd and lift it along with the sherd making sure that the two do not become dislodged from each other. Wrap them together carefully and firmly; pack the bundle so that it is well cushioned and take it to a conservator. See also the block lifting technique described in the section on bronze.

All sherds from the same pot, including the smallest, most insignificant-looking pieces, should be kept together after removal from the ground. When a large concentration of sherds is found, it is not always possible to tell immediately whether they all belong to the same pot. It is safer, therefore, to collect and keep together all sherds found together. Later, sherds can be returned to the pottery batch if they do not belong to the pot.

When sherds come out of the ground, avoid the temptation to clean them on the spot by scraping, brushing or rubbing. In this way, decoration can be removed (or added) and edges can be abraded, making for bad joins later on.

All sherds showing signs of fugitive paint, badly flaking surfaces or soft fabric should be separated out at this stage and marked for special treatment by a conservator.

When a pot is found intact, it can generally be lifted out after carefully removing all dirt around it. The contents of the pot should be excavated carefully, sieved and possibly sampled. Intact pots can contain the remains of their original contents or faunal remains that might give clues as to what the contents might have been. Objects and burials are also found inside pots.

If an intact pot has major cracks or breaks, leave the dirt inside to provide support, and bandage the pot firmly with strips of gauze or cloth to support it; with long strips of bandage, wrap the pot tightly in a gradual spiral being careful to overlap the strips (see figure 1a). Approximately $\frac{1}{3}$ of the strip should overlap the preceding one and, in turn, be covered by the succeeding one. When one strip ends, fasten it securely with tape or a straight pin if it will not dig into the surface of the pot. Continue wrapping the pot in this manner until it is adequately supported. It may not be necessary to bandage the entire pot. If necessary, for added support, successive layers can be added on the opposite diagonal to the first layer of bandage and also vertically (1b, 1c).

If the pot is broken, but the sherds are still held in place, wrap the pot tightly in bandage leaving the contents inside. If the pot is large, this bandaging may have to be done piecemeal as the dirt is slowly removed from around the pot.

If bandaging is not sufficient, a more rigid support can be achieved by putting the pot into a bucket and surrounding it with dirt. It can also be wrapped further with a more rigid material such as plaster bandage. Bandage already impregnated with

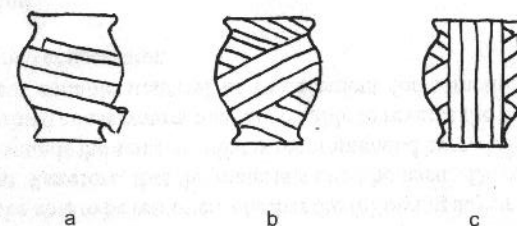


Figure 1

plaster can be obtained at a chemist's. Dip a long strip in water and then wrap it around the pot as outlined above following as tightly as possible the contours of the pot. Allow the plaster to dry thoroughly before lifting the pot.

If ready-made bandage is not available, plaster bandage can be made by mixing up a watery mixture of plaster of Paris, dipping the bandage strip into the plaster and then wrapping it around the pot. If plaster is not available, the same method can be employed using undiluted polyvinyl acetate (PVA) emulsion. Dip the bandage strip into the PVA and then wrap it around the pot. To prevent the surface of the pot from absorbing any of the plaster or PVA, make sure that impregnated bandage is not applied directly to the surface of the pot. Always apply a separating layer of foil or cling film first.

If it looks as though the sherds will move and rub against each other in spite of bandaging or that the pot will collapse, it is better carefully to take the pot apart, keeping the sherds together.

Pottery: consolidation

If a pot or sherd is too fragile to be lifted from the ground without damage, additional support is necessary. If simple bandaging is not sufficient, the pottery should be impregnated with a consolidant. The choice of consolidant depends on the condition of the pot. Whichever consolidant is used, allow it to dry thoroughly before lifting the sherd. A sherd still wet with consolidant is more fragile than it was before the consolidant was applied.

If the pottery is damp, a PVA emulsion should be used. Since the emulsion is water based, good penetration will be achieved easily. Clean the pottery to be consolidated as thoroughly as possible with a soft brush. Dilute the emulsion 1:1 with water and apply it sparingly with a brush allowing it to soak into the sherd. Keep applying more emulsion, waiting a few minutes between applications until it is no longer absorbed by the sherd, but try to avoid surface build-up. Allow the consolidant to dry completely before lifting the sherd.

When the pottery is dry, a solution of *Paraloid B-72* or PVA (resin, not emulsion) in toluene or acetone can be used. After cleaning the sherd, apply the solution by brush starting with a low (3-4%) concentration for the first two coats. Then increase the concentration, ending with a 7-10% solution. The method of application is the same

as above. Allow the solvent to evaporate somewhat in between applications, but do not let it dry completely as this will impede penetration. In arid, hot climates it may be found that acetone is too volatile to be used effectively as a solvent. If available, methyl ethyl ketone or toluene can be used. If only acetone is available, the only alternative is to carry out the consolidation process at a time when the air and sherds are as cool as possible. Covering the pottery with a piece of plastic sheeting after applying the consolidant will also help to slow down the evaporation rate. Make sure, however, that the plastic material is not dissolved by the solvent in the consolidant.

If a large piece of pottery or pot is found badly crushed into a myriad of cracks, breaks, small chips and pieces, do not attempt to lift all the pieces individually. Rather, treat them as a whole and lift them together with the help of bandaging. Use the backing procedure or one of the block lifting techniques outlined in the section on bronze.

After lifting, pack the sherds carefully in well-padded containers. If cotton "wool" is used, keep a layer of tissue between it and the pot, especially if PVA is used as PVA softens when hot and the cotton fibres will stick to the pot. If possible, store consolidated sherds in a cool place.

Excess consolidant will have to be removed in the lab, possibly to the detriment of the pot, so apply the consolidant sparingly. There should never be a thick, glossy layer on the surface of the sherd. Make sure that the kind of consolidant used is recorded and that this information is given to the conservator.

Do not consolidate any sherds to be used for dating or analysis as this will contaminate the sample.

Pottery: cleaning

Not all sherds need to be washed. A gentle brushing is often sufficient to dislodge dirt.

Carefully inspect all sherds to be washed to make sure that they are in fact pottery fragments. It is easy to mistake fragments of tuyères, moulds and crucibles for pottery. This industrial material should not be washed as valuable information can be lost. Pack it carefully and take it to an expert.

The majority of well-fired sherds can be washed without special care. If there is any question as to the durability of the sherds, test an insignificant sherd in water first. Do not wash a sherd that needs consolidation or has already been consolidated. Friable pottery and pottery with fugitive paint or ink should go directly to a conservator without washing. If a brush is used, do not scrub too vigorously as edges can be abraded, making for bad joints later. Change the wash water frequently, if possible, as dirty water can be very abrasive. After washing, spread the sherds out and allow them to dry thoroughly before marking and bagging them.

Sherds are sometimes heavily encrusted with insoluble salts or a mixture of dirt and insoluble salts which will not come off in water and require treatment with acid. Before subjecting pottery to this treatment, test an insignificant sherd first to make sure the pottery fabric can withstand contact with acid. Not all pottery can be treated with acid; a calcareous or organic filler in the pottery will be attacked by acid which will

drastically weaken the pottery, if not cause it to disintegrate altogether. If acid does not harm the fabric, soak the sherds for several hours in water to wet thoroughly the fabric. Then immerse them in dilute (5%) hydrochloric acid, checking them frequently, until the encrustation has been dissolved or loosened sufficiently to allow it to be removed mechanically. If the pottery shows any sign of deterioration, remove it immediately and rinse it thoroughly with water. After going through acid, all sherds must be thoroughly soaked in several changes of water, preferably distilled water, until a neutral pH is achieved, that is, until all traces of acid are gone. pH indicator strips can be used to determine when this stage has been reached. The sherds can then be dried. It should be emphasized that this rinsing process is extremely important. If all traces of the acid and the soluble salts it produces when dissolving insoluble salts are not removed from the pot, they can cause considerable damage later on.

It should be noted that acid can be extremely dangerous when handled by inexperienced people and should not be used unless absolutely necessary. Strict safety precautions must be observed at all times. Always add acid to water. Always wear thick rubber gloves when handling acid or sherds in acid. Use the acid in a well-ventilated area and be careful not to inhale fumes from it. Dispose of used acid in a safe place after diluting it with water.

Pottery: soluble salts

If, upon drying out, either from washing or after lifting, a white efflorescence appears on the surface of the pottery, it probably contains soluble salts. The removal of soluble salts from pottery is not generally undertaken in the field and requires considerable space, a plentiful supply of uncontaminated or distilled water and someone to monitor the treatment. It is also difficult in the field to determine which soluble salts are present and when they have been removed.

If pottery is known to contain soluble salts, it should not be allowed to dry out after washing. Wrap it in damp polyurethane, adding a small amount of 0.01% *Panacide* and place it in three well-sealed polyethylene bags and take it to a trained conservator as soon as possible. Do not allow the bags to dry out. If large quantities of pottery are involved, it might be feasible to set up an on-site salt removal treatment. Ask advice from a trained conservator who is familiar with the site, the soil conditions and the pottery.

Pottery: marking and piecing together

To prevent marking ink from soaking into the pottery fabric and becoming irremovable, first coat the area of the sherd/pot to be marked with a thick layer of lacquer. When it is dry, write the number on top of the lacquer and coat it with another layer of lacquer. A fairly viscous solution of PVA resin or *Paraloid B-72* can be used. Clear nail varnish works well and is generally readily available. If it becomes necessary to remove the number, acetone on swabs can be used.

The joining of pottery is best done by a trained conservator. If profiles are needed in the field, join only what is necessary. Joins made by inexperienced people

in the field generally have to be taken down in the lab to the detriment of the pot. Do not join damp pottery. If the adhesive turns milky, the pottery is still too damp.

A re-dissoluble adhesive should be used. *HMG* and *UHU* are suitable and are both soluble in acetone. Avoid white glues as they can become insoluble over time. Also, it is best to avoid any local proprietary glues as they may contain substances harmful to the pottery or become insoluble over time. All pots joined with *UHU* should be kept away from extreme heat and sun or they will sag and/or collapse.

Before applying the adhesive, thoroughly clean the edges to be joined. Apply a sufficient amount of adhesive to achieve good contact, but not enough for excess to squeeze out along the joins. If this happens, do not wipe it off. Allow it to dry until it becomes rubbery and then gently rub it off with a finger or scrape it off with a knife. To facilitate piecing, sherds can be positioned in a tray filled with sand to hold them while the adhesive dries. If a sand tray is used, make sure that the join line is well above the sand to prevent sand from getting into the join. It is also important to make sure that joined pieces are properly aligned. Misalignments are generally cumulative and can completely throw off the assembly of the pot. If the surface of the pot is durable, sherds may be held in position with masking tape while the adhesive dries. Test first to make sure that the tape will not pull off pieces of the surface when removed. It must be stressed that taping joins should only be a temporary measure. As soon as the adhesive has dried, remove the tape. If left on for longer than 24 hours, tape can leave a stain on the sherds which can be difficult, if not impossible, to remove.

Keep a record of the adhesive used and make sure the conservator is given this information.

No restoration of missing areas should be attempted in the field without a conservator present.

Sherds can be packed in polyethylene or cloth bags, but make sure the bags are not too heavy when filled as sherds can be crushed by their own weight. If using polyethylene, make sure they are thoroughly dry first. Pack partially pieced pots in rigid containers using wadded paper if necessary to support them.

Pottery: unbaked clay

Objects made of unbaked clay range tremendously in strength depending on the nature of the clay, its density and to what extent it was sunbaked. Often unbaked clay objects are quite strong and can be handled easily. Do not wash them in water as they are likely to disintegrate. Dry brushing should be sufficient to clean them. If there are hard lumps of dirt or encrustation, they can be softened with drops of water or alcohol applied locally. If a brush does not then remove them, gently cut them off with a knife or scalpel, being careful not to damage the clay surface. If consolidation is necessary, follow the instructions for consolidating pottery. For joining, packing and storing, the normal procedures for pottery apply.

Pottery: glazed

Although glazed pottery is covered with a vitreous layer, it can generally be treated in the same manner as unglazed pottery. Glazed pottery only gives serious problems when the attachment of the glaze to the clay body is weak. The glaze layer is likely then to flake off in large pieces. Such pieces can be reattached with *HMG* or *UHU* after the pottery and the glaze have been thoroughly cleaned. The glaze, if sound, can be cleaned by gently swabbing it with water. If the glaze is still in place but loose, run a dilute solution of *Paraloid* along the edge of the glaze with a knife or fine brush. Only do this if the pottery is clean. If it is not possible to clean the pot, it is better to wrap it carefully to prevent any abrasion to the glazed surface and take it to a conservator.

The detachment of glaze can also be caused by the movement of soluble salts within the sherd. In such a case, small white crystals are generally evident on the clay body, on the glaze and in the cracks of the glaze. Reattaching the glaze with an adhesive in this instance can cause problems later on if it is not noted that the pot contains soluble salts. It is better not to reattach the pieces, but rather pack them carefully in tissue in a box and keep them with the sherds.

If the sherds are already dry, keep them as dry as possible and take them to a conservator. If the sherds are damp, keep them damp following the instructions given above for treating unglazed pottery with soluble salts.

Faience

Faience is a material similar to both glass and pottery. When fired, it becomes a porous, gritty material with a vitreous coating which is sometimes very thick and almost always coloured.

If found in good condition with its glaze intact, it can be treated like glazed pottery. Do not immerse it in water, but rather clean it with a swab of water. If the glaze surface is cracked or crizzled, avoid letting water seep down into the cracks.

More often, however, the outer vitreous layer is gone leaving only the porous inner core. Although this is difficult to clean as the pores are filled with dirt, do not attempt to wash it. Use only a dry brush to remove dirt, although drops of water can be used to soften hard lumps of dirt. Any further cleaning should be done only by a conservator.

Faience pieces can be joined with *HMG* or *UHU* following the general instructions for joining pottery. If the fabric is very gritty and powdery, it may be difficult to obtain a good bond. If this is the case, it is better to leave the joining to a conservator.

Glass

The condition of excavated Roman glass varies considerably depending on its composition, date and place of manufacture and burial conditions. Roman glass is generally very stable while medieval European glass is considerably less so.

If glass is found dry, keep it dry. A gentle brushing should be sufficient to clean it. Drops of alcohol or water applied locally can be used to soften hard lumps of dirt. If absolutely necessary, sound glass can be washed, using a soft brush to dislodge dirt, but generally it is wiser to clean without water. Allow the pieces to dry thoroughly before packing. Pack the pieces in layers separated by acid-free tissue, padding and supporting shaped pieces with tissue if necessary. Pad out the container to prevent the pieces from moving.

Do not remove or attempt to consolidate the thin skins on glass as they are the original surface. Pack such glass carefully in rigid containers and take it to a conservator.

If the glass is found extremely wet, it should probably be kept wet. Allow a small piece to dry out slowly. If it does not delaminate, crack or become opaque over a period of some weeks, it should be safe to dry the remainder. Allow it to dry slowly. If its condition worsens on drying, however, keep it as wet as when found. Pack the pieces in layers separated with damp polyurethane foam to which several drops of 0.01% *Panacide* have been added. Place the whole bundle in three well-sealed polyethylene bags and store them horizontally in a cool place until they can be taken to a conservator. If it is stored for any length of time, check it frequently to make sure that it does not dry out.

The storage of glass is a very complex problem; the kind of storage needed can depend on the composition of the glass in question. If large quantities of glass are being excavated, consult a trained conservator about the conditions appropriate to the type of glass found.

The joining of glass pieces is best done by a conservator as springing is frequently a problem and partially pieced glass can pose difficult packing problems. If joining in the field is absolutely necessary, *HMG* is a suitable adhesive. Follow the marking and joining procedures for pottery.

Stone

Most excavated stone is in good condition and requires no special handling. It can be cleaned with water and a soft brush. Alabaster, however, is soluble in water and should be cleaned by dry brushing only. Small pieces of sound stone can be joined with *HMG* or *UHU*. If stone objects are to be marked, follow the procedure for marking pottery.

If painted stone or ostraca are likely, examine the stone carefully for traces of paint or ink before washing it. If either is found, do not attempt to wash the stone. Take it to a conservator for treatment.

Stone, especially marble, is often found encrusted with insoluble salts which do not come off in water. Do not use acid as it will attack the stone as well as the encrustations. Gently cut off the encrustations with a scalpel or knife, being careful not to scratch or damage the stone surface. A drop of acetone can help to soften these salts. If the encrustation consists of more than sporadic, thin patches, do not attempt to remove it. Take it to a trained conservator for cleaning.

If a white crystalline efflorescence begins to appear on a drying stone, it probably contains soluble salts. Allow it to dry out slowly and then keep it as dry as possible and take it to a conservator noting the probable soluble salts. If the surface of the stone is painted and/or extremely friable and salts are present, it may be wiser to stop the drying process and keep the stone damp if a conservation lab is nearby. Place the stone in three well-sealed polyethylene bags and take it to a conservator as soon as possible. These salts may be all that is holding the stone together, so do not attempt to remove them without consulting the conservator.

Bronze, copper and copper alloys

Follow the same general lifting procedures as for pottery. If the object needs support before lifting, it should be backed with bandage. Carefully clean the surface of the object, being sure to expose the sides. With a brush, coat a strip of the object with a thick (15-20%) solution of *Paraloid B-72*. Place a strip of bandage slightly longer than the object on the *Paraloid* and gently tamp it down into the *Paraloid*. Add more *Paraloid*, if necessary, to ensure that the bandage is thoroughly saturated and in close contact with the bronze (see figure 2a). Apply additional strips in the same manner, overlapping at least 4 mm on each edge until the entire surface is covered. Be sure to include the sides of the object, pushing the bandage well down along the sides. Apply a second layer of bandage at right angles to the first (2b). Allow the *Paraloid* to dry thoroughly; it is dry when it has lost its milky colour. When it is dry, carefully excavate underneath the object (2c) and invert it so that the bandage is on the bottom. Store it inverted (2d), adding further support if necessary. Do not attempt to remove any adhering dirt or clean the object. Take it to a conservator.

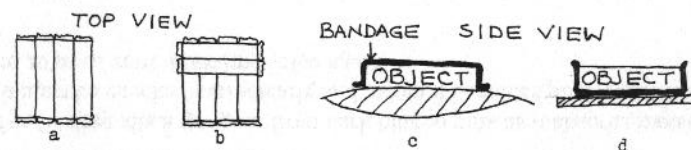


Figure 2

For very fragile objects, it is better to use a block lifting method if the surrounding soil is cohesive. Isolate a block of dirt containing the object with a 2-3 cm margin around the object and surround it tightly with a frame of wood or other rigid material (see figure 3a). Undercut the block and slide it on to a rigid piece of wood or metal (3b). Further support the block if necessary and take it to a conservator.

If the block method is not appropriate, an alternative method can be used. Remove all dirt around the object, leaving it sitting on a pedestal. Cover the object with foil or thin plastic sheeting to conform to the object's contours. Place a thin wooden frame around the object allowing a 2-3 cm margin all around (see figure 4a).

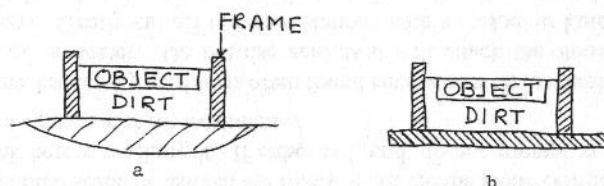


Figure 3

Cover the object and partially fill the surrounding space with plaster of Paris (4b). When it is set, place a layer of bandage or other strengthening material on top of the plaster and pour a final layer of plaster, filling the entire space and making the top as flat as possible (4c). Undercut the pedestal and invert the block and treat as above (4d). Polyurethane foam can also be used when large pieces are to be lifted and a lightweight material is needed (Jones 1980).

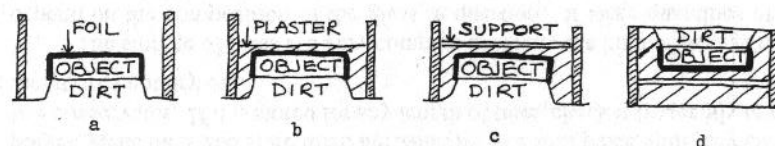


Figure 4

The corrosion of bronze can be extremely tricky and difficult to remove; therefore its removal should only be undertaken by a trained conservator. Injudicious cleaning can destroy not only decorative detail of the object within the corrosion layers, but also organic and environmental evidence preserved by the corrosion. Often this is the only way in which this kind of evidence is preserved. Undertake only superficial cleaning in the field. If the bronze is found wet, allow it to dry out slowly and gently brush off any dirt. If it is found dry, do not wash the object in water as this can initiate the corrosion process. This is especially true in areas where the water naturally contains large amounts of salt or where the water supply has been chlorinated.

Unnecessary handling can cause great damage as corrosion and dirt can hide cracks and splits in the bronze. Do not attempt to join any broken pieces.

Store bronze in the driest possible place and inspect it regularly. If possible, it is best to pack each object in a clear box of plastic padded with acid-free tissue or styrofoam. Place the object in a depression in wadded tissue and cover it with another wad of tissue to hold it firmly in place. Include some self-indicating silica gel in the

bottom of the box if the storeroom is damp. It should be pointed out that silica gel is only effective if used in a sealed container. If boxes of plastic are not available, bronze objects can be stored in unsealed, polyethylene bags. If stored in a damp area, place those bags in a biscuit tin along with silica gel and seal the tin with tape or place them in a box and place the box in several thick polyethylene bags with silica gel and seal them tightly. A polyethylene food container with a snap lid can also be used. If the objects do not go directly to a conservator, check the bronzes frequently for the appearance of bright green spots. This is bronze disease and indicates active corrosion. Pack pieces with bronze disease in sealed containers with silica gel and see that they get to a conservator as soon as possible.

Self-indicating silica gel goes from dark blue to pink as it absorbs moisture. If it is used, it must be checked periodically and, when it becomes pink, regenerated by heating it in an oven until it becomes blue again.

Coins

Avoid the temptation to clean coins in the field. Injudicious cleaning by an inexperienced person can easily result in irreparable damage to the detail of the coin. Often a seemingly sound surface is really only a thin layer on top of a badly deteriorated, powdery bronze surface and can be easily destroyed with the least amount of pressure.

If a good, sound, original surface can be seen, some superficial cleaning can be attempted with a soft brush and alcohol or acetone, being careful not to scratch the surface. Do not attempt to remove any corrosion on the surface as the detail of the original surface may be contained in it.

Unless a good, sound silvery surface is evident, do not attempt to clean a silver coin. If sound, superficial dirt can be removed with a soft brush and alcohol or acetone. Such coins can then be treated like other silver objects.

Gold coins can be cleaned and treated like other gold objects.

Iron

Follow the same lifting procedures as for pottery and bronze.

If iron objects are found wet, it is preferable to dry them rather than store them wet even though some damage may result. Allow them to dry out slowly. If objects are found dry, keep them dry. Do not wash iron objects as water and oxygen cause corrosion. Gently brush the iron to remove dirt. Handle iron objects carefully and as little as possible. Often there is little sound metal present and the corrosion products can be extremely porous and fragile although they may look sound. No further cleaning should be attempted in the field nor should pieces be joined.

Pack iron in sealed containers with silica gel in the same manner as for bronze. Each container should have an approximately equal weight of silica gel and iron. Do not pack iron in sealed polyethylene bags without silica gel. If no silica gel is available, place the iron in perforated polyethylene bags and store them in as dry a place as possible.

Silver and gold

It can be difficult to recognize excavated silver. Often it is green and easily mistaken for bronze. It can also be a purplish grey or black. Excavated silver is usually extremely fragile and brittle and should be handled very carefully. Follow the general lifting procedures for pottery and bronze, but do not apply any consolidants to the silver. If support is needed before lifting, use one of the block lifting techniques outlined for bronze. Do not attempt to wash or clean the silver. Pack it carefully in well-padded boxes of plastic as for bronze, being careful not to put any undue pressure on the object.

Gold objects can also be difficult to recognize if there are impurities in the gold. Copper corrosion can completely cover a gold object and make it look like bronze. Make sure that the object really is made of gold. What at first may seem to be gold could be a fragile layer of gilding sitting on top of badly corroded bronze or iron. Injudicious rubbing or cleaning can damage or remove this gilding; therefore do not attempt to clean gilded objects. Pack them carefully as for bronze and take them to a conservator.

Gold objects need little treatment. A gentle brushing or washing is usually sufficient to clean them. If there are some light copper or silver corrosion products on the surface, they can be removed with swabs of very dilute nitric acid (ca. 1%). Do not immerse the piece in the acid. If gentle rubbing with a swab of acid is not sufficient to remove the corrosion, do not make further attempts to remove it. Rinse the object thoroughly in water before drying. Do not use the acid if it appears to damage the surface in any way. Also do not attempt to remove a thick covering of corrosion. Pack gold objects carefully as for bronze.

Do not attempt to unfold gold foil. It can be extremely brittle and will break along the folds if not unfolded properly.

Lead and pewter

Excavated lead is covered with greyish-white corrosion products and is generally quite stable. Although stable, it can be extremely weak and malleable, so handle it carefully and as little as possible.

Do not attempt to clean the object as lead is a soft metal and is easily scratched. Moreover, its corrosion products are generally harder than the metal itself. If inscriptions or decoration are present on the surface, they can be damaged inadvertently by brushing or scraping if cleaned.

The vapours from organic materials will cause lead to corrode, so pack lead objects only in polyethylene bags or boxes. Avoid paper, cardboard and wood, especially freshly cut wood. Only acid-free tissue should be used in packing lead. Follow the same packing procedures as for bronze, but it is not necessary to use silica gel. Cotton "wool" can be used for padding if it is sealed in polyethylene; or the padding can be made of synthetic fibres.

Do not attempt to unroll lead strips. This should be done only by a trained conservator.

Pewter is an alloy of lead and tin. Excavated pewter should be treated like lead.

Bone and ivory

For bone, follow the same lifting and consolidating procedures as outlined for pottery. If backing or block lifting is necessary, follow the instructions for the backing and lifting of bronze.

If sound, bone can generally be washed, but test a small piece first to see that it does not crack on drying. Use as little water as possible; do not soak the bone in water. A swab or soft brush can be used to dislodge dirt. Allow the bone to dry slowly and thoroughly before marking and packing, especially if it is to be packed in plastic. Do not wash bone that has been consolidated. If it is friable, attempt only superficial cleaning with a brush and pack it carefully in a well-padded, rigid container. If bone objects are marked, follow the same procedure as for marking pottery.

Bones and fossilized bones are often found cemented together with calcium carbonate. To remove such bones from this matrix and separate them from each other, the use of acid is necessary. Only apply this treatment to seemingly sound, robust bones. Remove as much of the soft, loose encrustation as possible with a scalpel or knife, being careful not to damage the surface of the bone. Then immerse the bone in 15% acetic acid. If only small, isolated amounts of matrix exist, the acid can be applied locally with a brush or dropper. A careful watch should be kept on the immersed bones at all times. Remove the bone after 10-15 minutes or when the fizzing has stopped and rinse it thoroughly in distilled water. Mechanically remove the softened carbonates with a scalpel or knife. As the surface of the bone is exposed, coat it with a layer of 10% polystyrene in toluene to protect it from subsequent immersion in acid. Allow the polystyrene to dry before re-immersing the bone in acid. If polystyrene is not available, a 10-15% solution of *Paraloid B-72* can be used. Alternate the acid treatment with mechanical cleaning until the bone is clean. After the final immersion in acid, thoroughly soak the bone in several changes of distilled water until a neutral pH is achieved. Be sure to follow the safety precautions for the use of acid as outlined in the pottery cleaning section.

If a soluble salt efflorescence appears on a drying bone object, follow the same procedure for this problem with stone. If it is absolutely necessary to keep the bone damp, a small amount of 0.01% *Panacide* should be included in the bag.

If sound, broken bone objects can be joined with *HMG* or *UHU*. Follow the procedure for joining pottery.

Ivory is often difficult to distinguish from bone when excavated. It is whiter, smoother and denser than bone and has a laminated structure. Often distinctive intersecting arcs can be seen on the end grain. Ivory is much more sensitive to moisture

than bone and must be handled carefully. If it is found very wet, keep it as found. Do not attempt to clean or consolidate it. Wrap it carefully in damp acid-free tissue to which some 0.01% *Panacide* has been added, pack it in three well-sealed polyethylene bags and take it to a conservator as soon as possible. If found slightly damp, allow it to dry out slowly in the shade. If found dry, do not wash it; clean only by gentle dry brushing. Pack it carefully following the instructions for packing bronze, but do not use silica gel.

Shell

Shell is usually found in good condition. If sound, it can be washed in water with gentle brushing, if necessary, to dislodge dirt. If extremely friable, it can be consolidated by brushing on a dilute (2%) solution of *Paraloid* in acetone or toluene. If the shell is still damp, PVA emulsion should be used. Follow the procedure outlined for consolidating pottery.

On some sites, complete shells are found containing paint or that have themselves been painted. Do not wash these shells. Clean them only with gentle dry brushing. If the paint comes off to the touch, do not attempt any further cleaning or consolidation and take them to a conservator.

Cylinder seals are often made of shell. If at all doubtful about the condition of the shell, do not make a rolling as the entire surface can be pulled off if the shell is friable. The seal must be treated by a conservator first.

Leather

In general, leather does not survive unless unusual burial conditions exist. Although rare, it is possible for leather to be found dry. Never wash dry leather. Clean it only by dry brushing. If pieces are folded over or bent, do not attempt to relax or flatten them as this can result in cracking and tearing. Pack the leather in acid-free tissue and keep it in a dry place.

It is more common for leather to be found in a waterlogged state. Such leather has more than likely lost much of its internal strength so it should be handled extremely carefully and as little as possible. If waterlogged leather is allowed to dry out it will shrivel, warp and crack, possibly even disintegrate altogether. If it seems reasonably sound, it can be washed carefully in water using a soft brush to dislodge dirt. Often gentle streams of water can be useful in removing dirt. After cleaning, place the leather in three well-sealed polyethylene bags with some excess water to which 0.01% *Panacide* has been added. Store these bags, in turn, in a sealed container half-filled with water and some *Panacide*. Keep the container in a cool place until it can be treated by a conservator.

If the leather is extremely weak and cannot withstand even the gentlest cleaning, take it from the ground and put it directly into three well-sealed polyethylene bags along with some mud and *Panacide*; pack and store as above.

Wood

Wood is similar to leather in that it does not usually survive unless unusual burial conditions exist. Wood is rarely found dry. If it is found, however, keep it dry and clean it only with gentle dry brushing, making sure the brush does not damage the surface. If extremely fragile, it can be consolidated with *Paraloid* following the instructions for consolidating pottery. After applying the consolidant, be sure to cover the wood with a sheet of plastic to slow down the evaporation rate. This will serve to minimize stress on the structure of the wood as the resin dries, thereby preventing warping.

Waterlogged wood is not uncommon. Keep such wood wet. Drying out even for a few minutes can cause irreparable damage. If it cannot be taken out of the ground immediately after uncovering, keep it continuously wet by spraying and/or covering with damp cloth and/or plastic.

Some waterlogged objects are so degraded and fragile they require support before lifting. Due to the wet conditions, consolidation rarely proves successful, so it is generally better to attempt one of the two block-lifting techniques described under bronze. When the blocks are lifted, support them carefully and prevent them from drying out by wrapping them tightly in plastic. It is best to attempt such lifting procedures only when a conservation lab is near so that the block can be taken there immediately upon removal from the ground.

Sound waterlogged wood can be cleaned with water. Handle it carefully, however, as its soft, cheesy surface can be damaged easily. Pack it in three well-sealed polyethylene bags with excess water to which 0.01% *Panacide* has been added, then place the bags in a sealed container with more water and fungicide.

Any piece of wood to be used for dating should not be contaminated with fungicide or consolidant.

If large structural timbers are found waterlogged in quantity, it may not be feasible to try to save them all and a system of sampling may have to be worked out. Such a system is well explained by Keene (1977). Lifting such large waterlogged pieces is a difficult process and is described by Spriggs (1980).

Textiles

If a piece of textile is found dry, keep it dry. Since its fibres and threads are likely to be extremely brittle, do not attempt to clean or pick off adhering pieces of dirt. Pack it carefully in acid-free tissue or perforated polyethylene bags and store it flat.

If a textile is found waterlogged, keep it as found. Excavated wet textile is generally extremely fragile, so do not try to clean it, and handle it as little as possible. Keeping it with its surrounding mud, pack it in three well-sealed polyethylene bags with some 0.01% *Panacide*. Store it horizontally in a cool place until it can be taken to a conservator. If it cannot be taken immediately, check it frequently to make sure it does not dry out.

Composite Objects

Composite objects are often difficult to deal with as the two or more materials involved generally require opposite treatments. Often a decision has to be made as to which part of the object is most important and then treat the object accordingly. Composite objects should be taken to a conservator as soon as possible to ensure the optimum care for all the components.

Most combinations of materials can safely be kept dry, packed carefully using silica gel if iron is involved. If the object is found waterlogged and consists largely of an organic material, keep it wet, place it in three well-sealed polyethylene bags with 0.01% *Panacide* and take it to a conservator as soon as possible.

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FURTHER READING

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- LEIGH, D. 1978. *First Aid for Finds. A Practical Guide for Archaeologists*. Rescue Publication N° 1, 2nd ed., Hertford.
- UKIC, Archaeology Section. 1983. *Packing and Storage of Freshly Excavated Artefacts from Archaeological Sites*. Conservation guidelines N° 2, (reproduced below).

SUPPLIERS AND MATERIALS

SUPPLIERS:

Conservation Materials, Ltd.
Box 2884
Sparks, Nevada 89431
U.S.A.

Conservation Resources Ltd.
Unit 1, Pony Road
Horspath Industrial Estate
Cowley, Oxfordshire
OX4 2RD, U.K.
Tel. (0865) 717-755

MATERIALS:

- bandage, plaster bandage, swabs:** local chemist or medical supply firm
- PVA emulsion:** supplier
- PVA resin:** supplier
- Paraloid B-72 (U.K. and Europe), Acryloid B-72 (U.S.A.):** supplier
- hydrochloric acid, nitric acid, acetic acid:** chemical supply house
local chemist
- pH indicator strips:** supplier
- HMG adhesive:** supplier
- UHU adhesive:** local stationers
- acid-free tissue:** supplier
- Panacide (or other all-purpose fungicide):** supplier
- acetone, toluene, ethyl or isopropyl alcohol:** local chemist
supplier
chemical supply house
- polystyrene:** chemical supply house
- polyether foam:** do-it-yourself shops

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[Editor's note: recommendations for the packaging and storage of freshly excavated finds are also to be found in *Conservation Guidelines, N°2* prepared by the Archaeology Section of the United Kingdom Institute for Conservation. The text is reproduced on the following pages with the permission of the Archaeology Section.]