Photography for Archaeologists
Part II : Artefact recording

Guide 26

BAJR Practical Guide Series
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Introduction

Artefact recording is another area in archaeology that is often overlooked and mis-represented. Not only does the archival quality of the resulting image matter but a simple understanding of lighting can achieve an enormous impact on the given textures, form and inherent detail of objects, giving valuable information which is often lost.

Depending on the complexity of the artefacts' shape, lighting can be experimented with by finding the best position and angle of the lights used for the job. It is often a laborious job to find the time to read up on the correct lighting positions for any given artefact. Often, it is far better to spend some time experimenting and observing, to find the best solution in any given situation. This will help you to judge artefacts by eye, leading to an implicit understanding of the qualities of light and should lead to sound practical experience, which should then become second nature. Simple lighting or copy stands can be cheaply purchased or rigs can be built out of simple materials utilizing desk lamps if your budget is limited. See final section on how to improvise with lighting.

If in doubt about any exposure difficulties, it is always advisable to bracket any shots and this is good practice for all situations, even if you are using digital as well as traditional film cameras. See section on exposure for more detail.

Below are listed some common artefacts that may require 'special' consideration and may be needed for publication purposes or simply to add to the archival record.

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Coins

These are fairly easy to record as long as the light source is controlled and observed well. As with any small finds recording, it pays to observe the little details and this can be done photographically by moving the light source around the object. This will help to determine the best angle of light for the subject. In this case, shadows and reflections are best minimised. Generally speaking, the lighting needs to strike the flat surface of the coin at a fairly oblique angle, approximately 45º. The camera is best mounted on a copy-stand, which places the camera on an adjustable column, vertically facing a baseboard below where the artefacts are placed. Such copy stands have small lights (usually tungsten bulbs), attached to a frame above the baseboard. These lights can be easily re-positioned to achieve the best angles for the job. However, before using such lights, it is advisable to read the section on colour temperature (or white balance with digital cameras), as you will get an orange colour cast when using colour film with this light source.

Further consideration is needed when dealing with coins that have shallow relief marks. Recorded on a copy stand with the light at right angles (90º), such a coin would be rendered flat and lifeless. It would be advisable to bring the lighting to a more oblique angle, 30° may be better, so that the light creates longer shadows, giving greater contrast and relief.

Figure 1. (far left)
Lights positioned at 30º to the baseboard

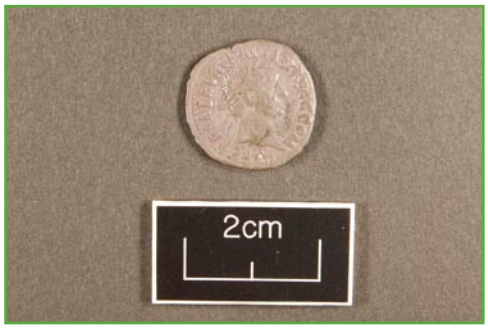

Figure 2. (left)
Lights positioned at 90º to the baseboard

As a final note, it is customary to place both sides of the coin in publications, with the obverse on the left and the reverse on the right. This can be achieved by using a multiple exposure function with a black background. With the camera on multiple exposure mode, the first shot records the obverse, which is then removed after exposure. The coin is then flipped around and, using a ruler to place it in the correct alignment, photographed a second time. It is best to consult your cameras' manual for instructions on setting up multiple exposure modes.

Alternatively you can digitally copy and paste the reverse of the coin through software programmes such as Adobe Photoshop. Fig.3 shows how effective this can be.

Figure 3.
The flip-side of the coin is digitally added to the original image

Flint

Deciding upon which colour background to use is important and is dependent upon the colour and opacity of the flint being photographed. Lighter coloured, less dense flints would lose definition in the edges against a white background or light-box as the light would transmit through the flint.

On the other hand, darker, more opaque flints would be lost against a black setting with the edges disappearing into the backdrop. It may be advisable to use a grey background or contrasting colour to the flint. In extreme situations, photographers have been known to paint the underside of thin flint edges, to prevent transmission of light through the surface, thus giving clearly defined edges to the side of the flint. This is quite a harmless process and involves painting the flint with an acrylic-based paint, such as artist's acrylic or other water-soluble paints. This is easily removed after use.

Figure 4.
Opaque flint placed on a light-box gives little detail

Figure 5.
Lighting from above is a better compromise.

Because flints are multi-faceted, it is best to view the artefact under differing lighting conditions before shooting, varying the angle at which the light strikes the surface by moving either the flint or the lights and constantly observing the shadows created for best effect. Viewing through a digital screen is ideal as you can see which lighting condition gives the best effect. Darker flints respond well to being placed on a light-box, with two lights at 45° to the lens axis on either side of a copy stand set up. However, caution must be taken to balance the lighting; if the light-box below is stronger than the light source from above you will get few details and a silhouette. See section below on exposing correctly with a light-box.

The lights should be far away enough from the flint to minimise reflections on the glossy surface. However, placing diffusers over the lights to prevent reflections, would only serve to flatten the edges of the facets and would render the flint as a profile, with very little depth.

Worked edges of flint can be photographed up close using a low single light at right angles to the lens axis, with the camera looking down the flint edge which can be angled to best effect.

Figure 6.
A better compromise with a light-box below and a stronger light on top to achieve a white

Pottery

It is best to take care when setting up shots of complete pots as the angle at which the pot is placed in relation to the camera can make a big difference. For example, if the camera is positioned below the pot, the rim will not be recorded and the base will look enlarged and distorted (Fig.7). If the camera is looking down on the pot, the base will not be seen and the form is distorted (Fig.8). It is advisable to set the camera on a tripod with the lens axis slightly above the middle of the pot (Fig.9). This way, some of the rim will be viewed which will give the pot some depth rather than a flat profile. At the same time, most of the base will be recorded as well.

Figure 7.
The rim shape is lost although the form is clear

Figure 8.
The base is completely lost with a distorted form

Figure 9.
The best position is shot from slightly above the body of the pot

Convention usually calls for handles to be placed to the right with spouts to the left. Bowls are generally shot with the camera placed slightly lower than the mid-point to enable definition of the base to be clearly shown.

Soft, diffused side lighting will give good definition with surfaces that are incised or those that have relief or raised patterns on the surface. One diffused light at 35° to the side of the pot should suffice but if there is too much shadow on the other side a second, weaker light can be used to fill in the shadow details. Highly glazed surfaces are difficult to record due to the reflective quality of the lights being used. However, it may be necessary to show that the surface is, indeed, shiny. In such a situation, a diffused, single light to one side with a reflector (a large sheet of white card which bounces the light back) on the other side may prove sufficient. If the reflection is too strong, a polarising filter may be needed to minimise the surface reflection (see section on attachments).

If photographing more than one pot, be careful when arranging them. Pots placed nearer the camera will appear bigger and those further away will appear smaller. They should not overlap and attention should be paid to shadows, which can obscure details on adjacent vessels. If you are recording pot sherds, differences in size and thickness can prove problematical. Care should be taken to arrange them with the rims at the top of the frame and the bases at the bottom. If there are to be several sherds in one frame, line them up so the top of the rims form a straight line (Fig.10).

Figure 10.
Rim sherds should be placed at the top with body sherds lined up below

Glass

Careful thought needs to be applied when photographing glass. There are numerous difficulties, due to the transparent and reflective qualities of the glass. Black or white backgrounds are best, as any coloured backing will give the glass a false colour appearance. Light-boxes are useful, as they will clearly show the outline as well as any cracks or details in the glass itself. Clear glass shows up well against a light-box and no front lighting is usually necessary (Fig.11).

Figure 11.
Glass photographed simply by placing it on a light-box with no additional lighting required.

If a light-box is not available, a piece of glass with tracing paper will suffice, if a light is shone underneath it (Fig.12).

Figure 12.
A glass shelf has been utilized with a sheet of tracing paper to diffuse the light

Alternatively, a glass shelf with a white background is easily assembled with a light shining below and behind the shelf so that the light shines up through the object. Glass which is highly reflective, especially forms with complicated shapes i.e. perfume bottles, are best shot in diffused lighting. That is lighting which is shielded by tracing paper, umbrellas or'soft-boxes'.

Alternatively, the artefacts can be shot outside in natural or 'ambient' lighting; an overcast day is best so that the sunlight is diffused and not directly reflecting off the surface although this may render the detail somewhat lifeless and lacking in detail. A final alternative is to construct or purchase a light-tent, which can be made of translucent material. If attempting to make one, tracing paper or muslin is good, and the tent is constructed so that four walls surround the artefact, with an aperture left in one side for camera access.

Against a black background, glass appears to be darker and more contrasty. Diffused light is once again a good option and will help to minimise reflections in both the interior and exterior of the object. A light to one side of the artefact is best placed behind and above to make it stand out from the background (Fig.13). This also serves to prevent light reflecting onto the background, thus keeping it black and not graduated grey.

Figure 13. (far left)
A darker background is more suitable for this intaglio placed at an angle on the baseboard (note low depth of field due to short camera to object distance).

Figure 14.
The background is simply filled with a neutral colour to enhance the design of the intaglio

Problems with lack of depth of field will not affect your artefacts if they are flat but may render the background out of focus, as in Fig.13. If this detracts, the background can be simply removed and filled with a plain colour in Photoshop (Fig.14).

Such simple techniques make a huge difference in the amount of detail and texture than can be photographically recorded. The image in Fig.15, which was shot using ordinary diffused, overhead lighting, shows a drab, badly recorded image in comparison to the images above showing how dramatically you can alter the recording of detail in an object.

If the camera is reflected in the surface of the glass, a black piece of card with an aperture for the lens can be placed in front of the camera to minimise reflections. A polarising filter will also cut down reflections but will often serve to darken the object. Observe and adjust as you see fit; an increase in exposure may help to lighten the glass but may also render the black background grey.

The best way to meter for your light, as it is direct light that hits the camera and not the 'normal' reflected light, is by using a hand-held meter. This is used by taking a reading next to the artefact with the meter pointed directly at the light, thus measuring the light falling on the object rather than the light reflected back towards the camera. Alternatively preview through a digital camera and adjust accordingly.

Figure 15.
Low contrast image using diffused light from above does not work well

Exposing correctly with a light-box

The best form of lighting is a light box, with two lights above, which should be diffused to avoid shadows forming underneath the artefacts were possible (Fig.16). To give a pure white background, the light box illumination will need to be at least one stop brighter than the lights from above but the exposure reading should be taken from the light sources above.

Do this by taking an exposure reading manually with the light-box switched off and the over-head lights on. Then take a second reading with the light-box on and the over-head lights switched off. The reading should be at least one stop difference. For example, the light-box may give a reading of f8 (if working on aperture priority) whereas the over-head lights should give a reading of f5.6 suggesting one stop difference in the exposure. Setting your camera to f5.6 in this example will give a correct reading for the over-head lights and render the light-box one stop over-exposed, thus giving a nice white background. Be careful that the two different light sources have the same bulbs, i.e. tungsten or fluorescent and not a mixture of the two, otherwise colour casts will occur (see colour temp. and light sources below).

Figure 16.
A balanced exposure with the camera exposure meter set to the over-head lights giving a white background with the light-box below being one stop over exposed

Colour temperature

Different light sources emit light at varying temperatures and will give colour casts which are not always visible to the naked eye. This temperature scale, known as the Mired scale and measured in degrees kelvin, needs to be compensated for. If you have a digital camera, you will be able to set the white balance to automatic and this will adjust according to what light sources you use.

The most common types of lighting are tungsten (which gives a orange/yellow shift) as seen in Fig.17 and fluorescent tube lighting which gives a green shift. If using film cameras you are unlikely to see the colour shift until the prints return from the processing lab. We've all been there, taken family snaps inside the house and ended up with orange photos. The reason is that ordinary household lighting gives this colour shift because of the tungsten bulbs that predominate. In this situation you will need to use colour temperature filters, which screw onto the front of the lens. They work by simply absorbing the extra colour hues as the filters are calibrated to be the opposite colour; thus neutralizing the extra hue. If using tungsten lights an 80b blue filter should suffice, giving correct results as in Fig.18.

If the light source you are using is fluorescent (most light boxes use this kind of light source) you need to look inside to see what type of fluorescent strips they are; they should state it on the tube itself. If it says FLB – it is a fluorescent blue strip and the compatible filter is simply an FLB filter which is purple/pink (Fig.19). There are also FLW (fluorescent white) and FLD (fluorescent daylight which should not need filtration). So a basic kit should include an FLW and an FLB filter. If in doubt, use an FLB purple filter or experiment with a digital camera with the white balance switched off to achieve the correct level of filtration.

Figure 17.
An orange colour cast due to the use of a tungsten light bulb.

Figure 18.
A correctly filtered shot using an 80B blue filter under tungsten light to absorb the orange cast

Figure 19.
A purple colour cast created by utilizing a fluorescent (FLB) colour filter under tungsten lighting

Camera attachments – filters and close-ups

Close-up attachments

There are many attachments that you can use with your cameras to obtain close-up shots of small objects. Some of these, such as true macro lenses, are expensive whilst others, such as a set of close-up filters are more economical. Bellows units can also be utilized fixed between the camera body with a standard lens but these are rarely used or available these days. A better option for maximum optical quality is a set of extension tubes (Fig.20), which are cheap and obtain a good level of detail due to the fact that there are no 'extra' optical glass elements placed between the lens and the body.

Figure 20.
Extension tubes. Make sure you obtain the correct fitting for your camera body

Anytime extra glass elements are inserted, either in front of the lens as with filters or between the lens and the body, a deterioration of the resulting image sharpness occurs. My advice would be to purchase a set of extension tubes if you're going to be photographing objects, such as coins, up close and personal. A set may set you back £50 and they usually come in a set of three varying focal lengths for different sized images. If using these with automatic cameras read the instructions carefully as you will lose the use of your exposure meter once you remove the lens from the body and you may have to compensate your exposure reading accordingly. However, older manual cameras will have no problem with focus and the exposure meter should still function normally.

For a cheap and easy to use option, purchase a set of close-up filters (Fig.21) which often come in three different sizes. These are suitable for most situations but are not the best quality option.

Polarising filters

A polarising filter consists of two cross polar grey filters sandwiched together, the same as a cross polarising microscope. They have tiny cross hairs, which serve to absorb scattered reflected light and effectively cut down on reflections which head back in the direction of the camera. These are useful with highly reflective surfaces but they will also create more contrast in your resulting images so they have a somewhat limited use. However, they can be very effective when photographing glass surfaces. Once again, you will need to know what diameter your lens is to screw them directly onto the front of the lens. The inbuilt exposure meter will compensate for the loss of light and automatically adjust your exposure. If using different lenses with different diameters, you can obtain step-up or step-down filter rings which adjust the diameter accordingly e.g. 49mm- 55mm will adapt 49mm filter to fit onto a lens of 55mm in size.

Figure 21.
A standard set of close-up filters. Make sure you obtain the correct diameter for the front of your lens (usually 49mm, 52mm, 58mm or thereabouts). This is usually written on the front of the lens, if not measure it in millimetres.

Use of scales

A quick reference needs to be made on the subject of scales. Sometimes these can be in the way if shooting small objects and often they look cumbersome. In situations like this it may be better to state the length of the object in mm within the caption of the photograph. If resources are plentiful, shoot each object once with the scale and once without.

Scales need to be suitable in size and the centimetre markings need to be clear. It is better to have a set of scales in different sizes with the marks clearly stated as in Fig.23 and 'home made' version such as that in Fig.22 do not look as professional and can be very cumbersome. There is a contact address for scale suppliers at the end of this article.

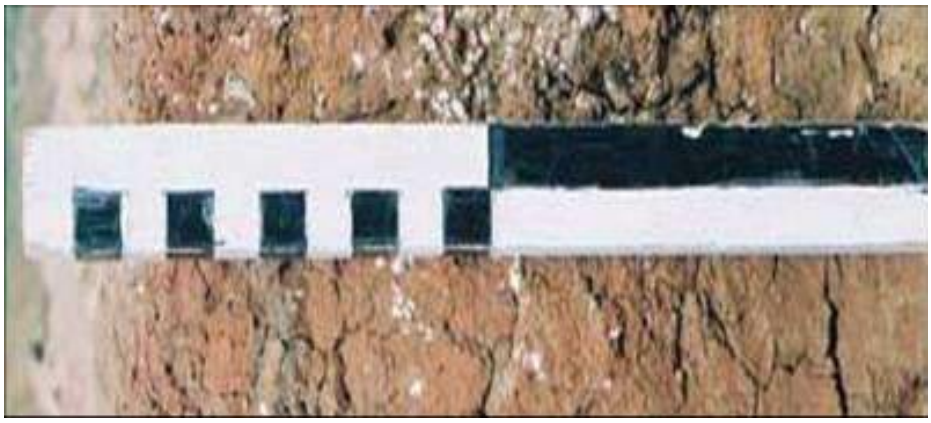

Figure 22.
A home-made set can often be erroneous when dealing with small sized artefacts

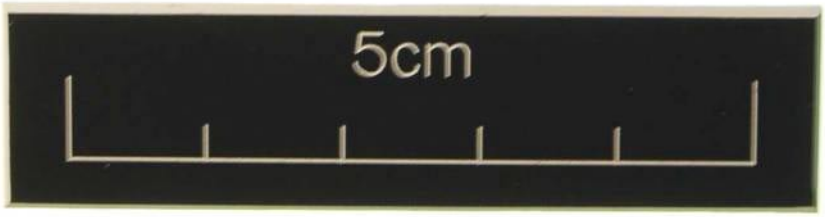

Figure 23.
An essential item is a professionally manufactured set of scales

Figure 24.
A ruler is useful if nothing else is to hand but does not really fit the bill aesthetically?

Bracketing

Sometimes detail can be lost by not exposing your image correctly. If you are unsure about how to do this you can bracket to increase your chances of obtaining the best possible shot. However, commercial units may frown upon this practice as every shot taken with film is taken three times and so one roll of film suddenly incurs the cost of three rolls of film! With digital it will not matter as the best shot can be chosen afterwards for printing/publication.

To bracket you first set your camera on manual and take one exposure as the camera meter advises, another shot underexposing by one stop (this can be done via the shutter, aperture or exposure compensation dial) and a final shot, which overexposes by one stop. For example, if your meter advises you that 1/250th at f5.6 is the 'correct' exposure you are not sure if it has taken a correct reading from highlights, mid-tones or shadows areas. Often the area you want has been mis-read by average exposure meter readings. If you have adjustable spot meters you can select a precise area to be measured but in the absence of this you can use the aperture to compensate. With the example above you would simply take one shot with the shutter on 1/250th and the aperture as recommended (f5.6) then keeping the shutter the same, open up to f4 (or your nearest f-stop) take your second shot and finally take another, still on 1/250th, by closing one stop to f8. This will give you three separate exposures, one of them will give you the best possible results. Alternatively you can affect the same result by using your shutter control. Do not use aperture or shutter priority as the camera will adjust each time and give you exactly the same exposure. You MUST be on manual.

Figure 25.
Exposure compensation control usually has the +/- symbol denoting over or under exposure

If you do not have a manual camera you may have an exposure compensation dial which simply allows you to over-expose one stop or under-expose one stop (Fig.25). If using the manual settings is confusing you may also use this function to achieve your three different exposures by simply adjusting in accordance with your camera manual. On older style SLR cameras there is usually a dial with +2, +1, 0, -1, -2 which sets the exposure compensation in the same way, with '0' being the 'correct' setting which it should normally always be set on if not bracketing.

Building a copy stand

The copy stand in Fig.26 shows a simple construction built from cheap desk lamps which are threaded through lengths of dowelling, available from any DIY store. The clamps used to clip the stand together are laboratory clamps, but you could improvise with other clamps. The main aim is to achieve a rig that adjusts sideways as well as giving moveable height to the lamps.

Copy stands can be the safer option but do not have as much flexibility as these home-made stands which can be set up in a multitude of positions using the versatile lab clamps.

Figure 26.
Simple home-made lighting rig for small object recording

Recommended reading

Basic photography. Michael Langford, 7th edition 2000. Focal Press, Oxford.

Camera techniques in archaeology. V.M.Conlon, 1973. John Baker, London

Photography in archaeology and conservation. Peter G. Dorrell, 1994. Cambridge University Press, Cambridge.

Photography for archaeologists. M.B. Cookson, 1954. Max Parrish and Co., London.

Other Notes

Scales available from:

http://www.pasthorizons.com/shop
and
http://www.aerial-cam.co.uk/scales.html

Elevated mast services are available from the author. Please contact me for prices etc. at;
http://www.vertical-photography.co.uk

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