

## 32. Enlarged casts of fossils

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In collections accessible to the public the exhibition of small fossils often presents certain difficulties, since it is hardly possible to supply each object with a suitable magnifier. The following note suggests that the fossils be supplemented by enlarged casts which can be examined with the naked eye, and describes a method for the preparation of these casts.

In his experiments in the above direction the author has used a plastic substance sold under the trade name Castolite. It is green in colour, and has a very soft and tractable consistency. If desired, it can be diluted by the addition of the required quantity of a 2–4 % solution of ammonia. This has to be added with careful stirring so as to avoid the formation of air bubbles or of foam upon the surface. For the application of the Castolite upon the (positive or negative) fossil, a roughened match or other wooden stick can be used with advantage. The layer should be as uniform as possible, i.e. the thickness should be the same both upon projections and in depressions. After about 24 hours the castolite has set enough so as to be no longer tacky. It is then time to apply a second layer, and after another 24 hours a third one and so on, until a total thickness of about 3 mm has been obtained. This is enough, provided the total surface does not exceed 4 cm<sup>2</sup>. For greater objects the thickness has to be increased until the mould has reached sufficient stability. Three or four days after the last application the mould is separated from the fossil. This mould, which is of the size of the fossil, is left for at least 24 hours for aeration and additional drying.

Now the enlarging can be started, the procedure being as follows. The plastic mould is put upon a grid or net, the surface carrying the imprint facing upwards, and submerged in a dish with kerosene. The diameter of the dish must be not less than twice the greatest diameter of the mould. There the mould is left to soak for at least 6 hours. During this time it is advisable to touch the mould as little as possible, the substance becoming increasingly brittle during the enlargement. During the first hour in the kerosene the swelling takes place in an irregular way, giving the mould a distorted appearance. This is, however, quite normal. When by means of a pair of calipers it is found that the desired size has been reached or that the swelling has ceased, the grid is very carefully lifted from the kerosene, so as not to damage the brittle mould. By tilting, as much as possible of the kerosene is allowed to drain off. Then blowing upon the

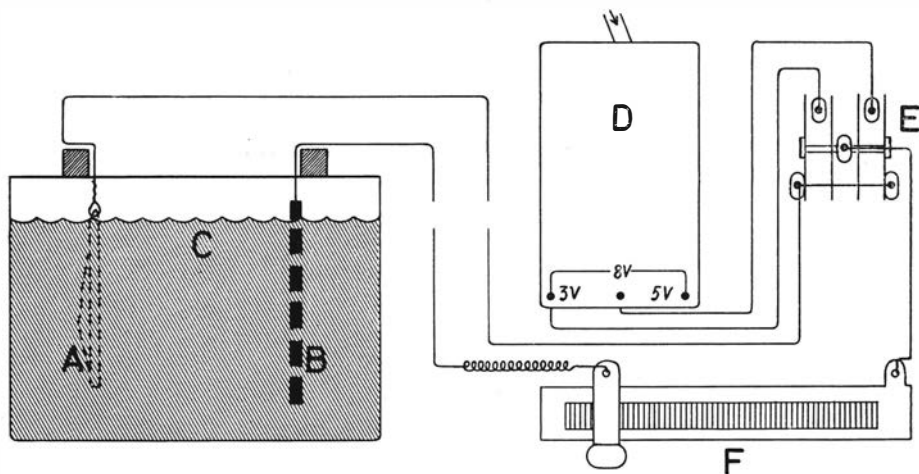


Fig. 1. Scheme of the galvanic apparatus.

*A* Plastic mould; *B* Copper sheet; *C* Sour copper bath; *D* Bell transformer; *E* Selenium-rectifier, AEG's make, B25/20-0.5 505-4-OU; *F* Resistance 100 MRA-50.

surface accumulations of the kerosene are removed from the depressions. When the surface of the mould is half dry it is time to fill it for the first time. This is done with plaster of Paris made up to the desired consistency. In this case the surface of the mould requires no special treatment. After the plaster has set the plastic mould can be picked off. Now we have a plaster cast about 30 per cent larger than the original. This plaster cast forms the basis of the next step in the enlarging, the technique being identical with that used for the first step. The procedure can be repeated until a plaster cast of the desired dimensions has been obtained.

In case the plaster is not considered sufficiently durable for the enlarged replica, it is possible galvanoplastically to obtain a specimen in copper which gives very sharp details.

For this purpose we need: a galvanoplastic vat according to Fig. 1, cellulose varnish, graphite, a sour copper bath, and pure copper.

The enlarged plaster replica is again covered with Castolite as before, but before the substance dries some iron wires or other armature are embedded which should preferably surround the whole object. The Castolite mould is left to set, and separated from the plaster. The mould is not soaked in kerosene, but retains its size. Through one of the edges of the mould a copper wire is passed, and twisted sufficiently tight so as to become partly embedded in the elastic mass. Graphite must then be applied in order to render the mould electrically conductive. Small portions of the mould are brushed over with cellulose varnish diluted with acetone. Very finely powdered graphite is applied to this immediately and worked in with a soft brush. This has to be done before the varnish dries. Care must be taken that the film of graphite makes good

contact with the copper wire. When the entire surface of the mould has been covered with graphite, all excess of the latter is removed with a very soft brush.

Two wooden laths are now placed across the vat with the sour copper bath (C). From one of the laths a piece of sheet copper is suspended in a copper wire, deep enough for the immersion of the greater part of the sheet in the liquid, but not so deep as to bring the conductive copper wire into contact with the surface of the bath (B). From the other lath we suspend the graphited mould with the treated surface facing the copper sheet (A). By bringing a 6 volt incandescent bulb into contact with the wiring we make sure that the resistance (F) is adjusted to the lowest voltage. The voltage is now increased until the lamp filament starts to glow. The wires are then connected with the copper sheet (B) and the mould (A) as shown in Fig. 1. The low voltage is retained for some hours or until the entire graphited surface has assumed copper colour. The lower the voltage during the first hours, the finer the surface of the copper replica. When the entire surface of the mould is covered with a thin film of copper, the voltage can be increased so as to speed up the deposition of the copper. This leads to the deposition of a coarser and more porous layer of copper that strengthens the fine surface layer produced by the low voltage. When the desired thickness has been obtained, the deposition of copper is interrupted. The mould can be used repeatedly, but has to be graphited afresh every time. The copper replica can be patinated or stained with a solution of liver of sulphur in water.

Explanation of figures on plate: (1) Imprint of a graptolite in natural size; (2) The same, four times enlarged; (3) Positive replica in copper of Fig. 2; (4) Fossils in natural size; (5) The enlarged mould of the same, graphited and ready for the copper bath; (6) The finished, enlarged, and patinated copper replica of Fig. 4; Figs. 7 and 8 represent two series of successively enlarged casts.

