LETTERS TO THE EDITORS

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Ancient Greek Plated Coins

The techniques of the production of the officially issued plated coins of ancient Greece have been discussed at length by Campbell[1]. In the samples examined, it was inferred that the plating had normally been effected by a fusion process analogous to that by which Sheffield plate was later made. Examples are, however, reported in which a silver solder may have been employed, though the evidence is not sufficiently clear, in Campbell's view, to provide definite proof.

During the examination of a number of similar plated coins, one, however, a didrachm of Neapolis, B.M.C., p. 100/59, the date of which is approximately 300 B.C., was found in which it was certain that solder had been used. Between the core which, incidentally, consisted of copper 95·7 per cent, lead 0·7 per cent, zinc 0·4 per cent and silver 1·9 per cent, and the silver case, there existed a definite, and, on the surfaces, regular layer of a silver–copper alloy. At the edges of the specimen, however, as is shown in Fig. 1, two layers of this solder are to be seen. In Fig. 2 is shown the structure of this duplex layer at higher magnification. It consists, essentially, of a silver–copper alloy, which, from the structure, would appear to be approximately 60 per cent silver–40 per cent copper. It will also be noted from Fig. 2 that the eutectic structure which would be expected if it were due merely to interdiffusion of silver and copper at high temperature is almost non-existent, as a result presumably of previous spheroidization.

From these observations, coupled with the examination of the whole section of the coin, it is apparent that the plating operation was effected by first making a shallow silver cup to fit the copper core, lining this with a thin sheet of the silver solder, and, after the insertion of the core, covering the whole with another inverted cup, similarly lined with solder. When the whole was afterwards reheated above the temperature of the silver–copper eutectic, the solder would melt and run between the two cups, fusing core and plate together. A gentle hammering of the rim would complete the preparation of the blank, which, as the twinned structure of both core and plate

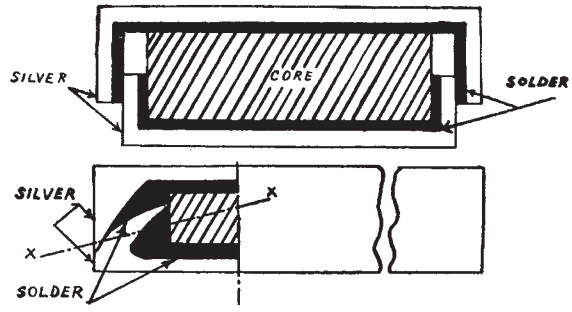

Fig. 4

shows, was then struck hot. This plating process is shown diagrammatically in Fig. 4. Fig. 1 would then represent a section such as that on *XX*. Such a method of production is in excellent agreement with that suggested by Prof. E. Darmstaedter[2].

For comparison, in Fig. 3 is shown the typical silver–copper eutectic obtained by direct fusion, in all ways similar to the corresponding structures observed by Campbell. This proof of a definite soldering operation at this early date seemed of sufficient interest to justify publication.

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[1] Campbell, W., *Numismatic Notes and Monographs*, No. 57, Amer. Numismatic Soc. (1933).
[2] Darmstaedter, E., *Mitt. der Bayer. Num. Gesellschaft*, **48** (1929); trans. Spink's *Numismatic Circular*, **39**, 54 (Feb. 1931).

X-Ray Crystallographic Measurements on some Compounds showing Intramolecular Overcrowding

It has been recognized for some time that there exist classes of aromatic structures in which the (intramolecular) distance of closest approach between non-bonded atoms, calculated on the basis of conventional bond-lengths and bond-angles, is smaller than the sum of the van der Waals' radii of these atoms. Bell and Waring[1] have suggested the term

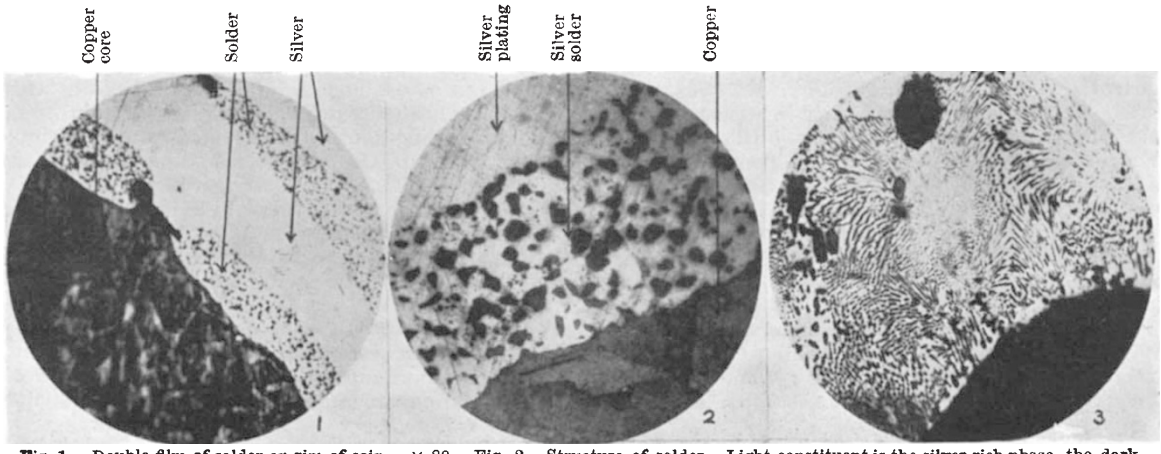

Fig. 1. Double film of solder on rim of coin. × 80. Fig. 2. Structure of solder. Light constituent is the silver-rich phase, the dark the copper-rich solid solution. × 440. Fig. 3. Typical silver–copper eutectic