

## Notes and News

### EGYPTIAN BRONZE-MAKING

Some years ago Mr Lucas pointed out that bronze could not in the beginning have been made by melting together a mixture of metallic copper and metallic tin. At that time it was probably done by the smelting of a natural mixture of the copper ore and the tin ore (1), the resulting bronze being accidental, and the workmen having no idea as to why their product was different from that of others.

As the present writer has pointed out (2), there is every probability of such a natural mixture of ores being found in the beds of the two rivers of Byblos (Gebeil) on the Syrian coast—the Phaedrus and Adonis. For both of these rivers flow through a region containing beds of the two ores. Hence it is important to remember that Byblos was the port of all others with which the Egyptians traded throughout their history, and that this trade goes back even as early as the middle Predynastic and the Protodynastic ages, c. 3000 B.C. and earlier. Professor Battiscombe Gunn suggests to me that this occurrence of the necessary natural mixture at the Syrian port of Byblos was the origin of the well-known expression *bia štt* ‘Asiatic copper’. If so, ‘Asiatic copper’ would be the original name for ‘bronze’. Written in a manner slightly different from the later forms the expression ‘Asiatic copper’ occurs in an inscription of the very end of the Sixth Dynasty or later, c. 2450 B.C. (3), and bronze was already by that time beginning to be used occasionally in Egypt (4).

After long ages of smelting the mixture provided by nature, it would no doubt have been realized, as Lucas suggests, that it was the presence of this other mineral that caused the difference between the ‘copper’ from Asia and other copper. This would have led to the next step in the evolution of the industry—the purposeful mixing together and smelting of the two ores. The final step was of course the mixing and *melting* together of the ready-made metals.

This last step could not have been taken before the ability had been acquired of smelting the metallic tin from its ore, and tin had evidently not been smelted before some time in the 18th Dynasty. This is the date to which belong the earliest objects made of that metal (5). Therefore the final step of mixing together the metals could not have been taken before some time in the 18th Dynasty, i.e. at some time within the period 1580–1350 B.C.

It is now possible to define more closely the moment at which this last step had been taken, and metallic tin and copper had been melted together in the crucible. The accompanying drawing dates to the latter part of the reign of Amenhotep III, or in other words to the period c. 1385 to c. 1370 B.C. (6). Hence the date in question must fall at

<sup>1</sup> A. Lucas, *Ancient Egyptian Materials and Industries*, p. 176.

<sup>2</sup> Wainwright in *Journal of Egyptian Archaeology*, xx, pp. 29–32.

<sup>3</sup> K. Sethe, *Urkunden des Alten Reichs*, I, p. 294, l. 11. The inscription is a decree by a successor of Nefer-ka-rê Pepi II, who was the last king of any importance of that dynasty.

<sup>4</sup> Lucas, *op. cit.* p. 177.

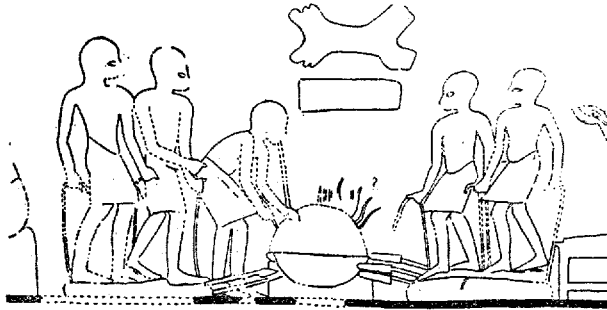
<sup>5</sup> *op. cit.* p. 209.

<sup>6</sup> N. de G. Davies and others, *The Tomb of Two Sculptors at Thebes*, pl. xi bottom register and p. 63. For the date see p. 19.

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some time between 1580 and 1370 B.C. The scene under consideration occurs among those of the metal-workers, and shows something being melted in a fire which is forced by four pairs of bellows. Two ingots are figured with the scene, which clearly show that the operation was one of making bronze by fusing together metallic copper and metallic tin, and not by smelting a mixture of the ores of these metals.

On the upper ingot the jagged places on the outline only represent the present day chipped condition of the paint, and are, therefore, to be ignored. The ingot itself is of the hollow-sided shape which was the standard one for copper ingots throughout the Levant (7). It is drawn on this occasion in the somewhat exaggerated shape which the ingot has assumed at the famous native copper-workings in the Katanga district of the



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Belgian Congo(8). Scheil is therefore correct in colouring it red in his sketches of the painting (9), and Davies in speaking of it as 'copper'. The other ingot, however, Davies calls 'lead', which cannot be correct, for though a copper-lead compound was made in

<sup>7</sup> J. Déchelette, *Manuel d'archéologie*, II, 397-400, fig. 160. Much of the information, but in less detail, will be found in Sir A. J. Evans, *The Palace of Minos* II, 624, fig. 391; IV, 652, fig. 636, where two of the nineteen found at Hagia Triada in Crete are shown. Evans quotes others that have been found at other places in Crete and a piece of one that was found at Knossos itself. Yet others come from Sardinia, Cyprus, Mycenae, Chalkis, and other places on the mainland of Greece. His figure 637 shows how often these ingots are recorded on the tablets from Knossos. They are also brought to Egypt as tribute by the Syrians and Keftiuans, N. de G. Davies, *Bull. Metrop. Mus. of Art*, New York, 1926, *The Egyptian Expedition*, 1924-5, p. 48, fig. 5; Wreszinski, *Atlas zur Altaegyptischen Kulturgeschichte*, pls. 334-5; Nina de G. Davies, *The Tomb of Huy*, pl. XIX top register. For the red colour of Wreszinski's and Mrs Davies' examples see J. G. Wilkinson, *The Manners and Customs of the Ancient Egyptians* (ed. Birch), I, pls. II A, B, following p. 38; Lepsius, *Denkmäler*, III, pl. I 16 A. Pl. XXI of Davies' (unpublished) drawings shows that those ingots set down on the ground in Wreszinski's pl. 335, are labelled *hmt* 'copper'.

<sup>8</sup> Beginning of the 16th century A.D., E. Verhulpen, *Baluba et Balubaïsés du Katanga*, p. 98; in the 70's of last century V. L. Cameron, *Across Africa*, p. 239 and fig. (9 or 10 were slung together, and 2 of the slings, one at each end of a pole, constituted a man's load of about 50 to 60 pounds' weight, p. 396); 20th century, Torday and Joyce, *Notes ethnographiques sur des populations habitant les bassins du Kasai et du Kwango oriental*, pp. 51, 52. The present writer possesses one kindly procured for him from the Katanga by Sir Reginald Wingate, and also part of a much heavier one of which only the long sides are hollow. A mould for a cross-shaped ingot very like the one under discussion was found at Zimbabwe, Th. Bent, *The Ruined Cities of Mashonaland* (1893), p. 218.

<sup>9</sup> V. Scheil, *Le tombeau des graveurs*, pl. II, bottom register (published in *Méms. publiés par les membres de la miss. arch. française du Caire*, II, 555-69).

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Roman and Coptic days (10), only one of all the Pharaonic bronzes that have been analyzed has been found to contain more than a trace of lead (11). But his nomenclature guarantees the grey or blue colour that Scheil gives to the second ingot. It is evident, therefore, that the second ingot is one of tin.

Thus, this picture of the early 14th century B.C. shows the manufacture of bronze by the advanced method of mixing the metals themselves. It also shows that this step had been taken during the 200 years between 1580 and 1370 B.C. After this it only remained to learn the right proportions of the two metals in order to obtain the best results.

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## ARCHAEOLOGICAL OPPORTUNITIES

A correspondent in India has stressed the archaeological opportunity presented when it will be possible to rebuild the bombed areas in our historic towns. The following note supports the necessity for planning excavations on some of the most important sites.

The devastation of parts of some of our older cities and towns, lamentable as it is, will at least give an opportunity to archaeologists such as they have never before received. In large areas of the City of London the modern buildings have been burnt out and since demolished. Of these areas about 100 acres lay within the Roman town and beneath the basements of the buildings which have been destroyed there must lie the remains of the buildings of the Roman town. They lie in London normally below the level of these basements, but the basements of new buildings after the war will be far deeper; they will inevitably destroy the Roman levels. Consequently, if the evidence of these levels is to be recovered, it must be sought for and recorded in the proper archaeological manner before the new buildings are erected or their foundations laid.

The same problem will occur in Canterbury where even less is known of the Roman buildings than in London. Moreover in Canterbury, particularly towards St. Augustine's Abbey, there may well be the remains of an extension of the Roman town in Saxon times. At Exeter also much of the area of the Roman town has been laid waste. Here, however, the Roman level is but a few feet below the modern floors, and the many basements of modern buildings can have left comparatively little intact of the Roman buildings. Already two tessellated pavements have been found there.

The history of Southampton has recently been sketched in these pages. The Saxon town lay away from the medieval and modern nucleus, and what is left of its site should certainly be investigated before rebuilding takes place. Within the medieval town itself there are the sites of several early mansions which should repay excavation, and there is always the chance of finding the remains of wooden houses of the 11th century beneath the floors of the stone houses of the 12th and later centuries.

As far as is known at present this exhausts the list of cities and towns where large scale excavation will be needed. Isolated sites elsewhere, such as that of the Greyfriars in Great Yarmouth and of the Cluniac Abbey at Bermondsey, certainly deserve attention and no doubt will receive it, but the great cities mentioned above propound us the great problem.

To archaeologists the necessity for excavating these sites before rebuilding is obvious. The work must be done then or never, because the new buildings will destroy the ancient levels. To us it is unthinkable that the opportunity will be missed and it is good news that the Ancient Monuments Branch of the Ministry of Works is alive to the situation and is keeping in touch with the planning authorities, both national and local. Much

<sup>10</sup> Petrie, *Arts and Crafts of Ancient Egypt*, p. 103.

<sup>11</sup> Lucas, *op. cit.* p. 426.