

News and Notes

Recent finds in Yugoslavia

The late Bronze Age cemetery at Trnjane, near Bor in Serbia has produced in one cremation grave the remains of burning, some copper smelting slag and a small bronze razor. This seems to indicate the use of the local ores which are the source of much of the Yugoslav copper output today.

(from Boris Jovanovic)

Archaeometallurgy in Italy

Two conferences were held in Italy in October 1988. The first was in Valle Camonica in the mountainous hinterland of the two industrial towns of Bergamo and Brescia. This was organised by the Iron Committee (CPSA) of the UIPPS and was confined to iron which was one of the most important activities of these valleys. The conference was hosted by the Commune of Valle Camonica which represents the towns of the Oglio valley, Breno, Bienno and Darfo-Boario. The conference was organised by Dr Ninina Cuomo di Caprio and Ing. Gerhardt Sperl and the work that they put in to make the conference a success was stupendous. The hospitality provided by the Commune, and the individual initiative of the towns themselves was likewise overwhelming.

The technical proceedings were introduced by R F Tylecote who referred to recent work in the UK and Austria on the direct process, in particular the so-called Burgenland furnaces which are now found in two Roman sites in Northants. Their size, over 1 metre in diameter, precludes their being blown by simple bellows draught from one side. Recently, excavations have been carried out by Dr C Bielenin of Poland on other Burgenland furnaces and we eagerly await his report. It is clear, however, that this is an intriguing and challenging type and one suggested method of operation was made by the speaker.

It would seem the shaft furnace gave rise to the high bloomery furnace, such as the Stuckofen, and in due course this developed into the blast furnace as we know it. How this development was affected by prior developments in China is not known but the early appearance of the blast furnace in Sweden and the odd type of bellows shown in Filarete's description of the blast furnace in Ferriere may be evidence of East-West contact.

The UK got its blast furnace from the area of Bray in France according to Awty. An example of the standard

British furnace was that shown from Dol-y-Clochedd in Wales, excavated by Peter Crew. The Bergamesc furnace with its trompe shown by the example at Capalbio, recently excavated by a combined Italo-British team is quite a different type and we were to hear more about this in the course of the conference.

This got under way immediately with a number of Swedish contributions introduced by Nils Bjorkenstamm and Sven Fornander, with Gert Magnussen on ore as a factor in the introduction of the indirect process, Eric Tholander on the early advent of the Stuckofen and the blast furnace. Then M Caligari spoke on the Brescian furnace of the 15th and 16th centuries which like the Bergamesc furnace was a blast furnace with two side supporting buttresses blown like the Stuckofen from the front but with bellows and not a trompe. E Baraldi followed on the same theme believing that the buttresses could have developed from the copper smelting furnaces. E Cima discussed the Brescian sleeve-type furnaces with a trompe feeding air in above the front tap hole and compared these with the shorter Agricola-type furnaces with back bellows blast. Detailed profiles were given and it was pointed out that front blast produced highest temperatures just above the tap hole and thus aided tapping, particularly of slag. The understanding of these Italian papers was aided by the distribution of good translations.

After a break, Elsbietta Nosek showed how in Poland the low shaft developed up to the 17th century when Italian influence brought by the Caccia family introduced the blast furnace. P Turetti spoke about the iron works at Cemmo and Paul Benoit on the significance of terms used in the early days of the iron blast furnace such as *geuse*, *fondée* etc. J F Belhoste and Paul Benoit then gave a joint contribution on the introduction of Bergamesc ferrous metallurgy to the Dauphiné at the beginning of the 17th century. P Benoit described an excavation that he had carried out on a Bergamesc furnace, La Pelousse, near Pinsot in the Allevard region of Franche Comté. It was emphasised that there was no rear or side access to this furnace and all operations were carried out through the front. The front bellows were driven from a water wheel via water carried over the body of the furnace from the back. The bosh-cum-crucible took the form of an inverted cone, and rubble filled the space between this and the carcass. The lining was well-slagged. The absence of a trompe is interesting and suggests that the fall of water was not great enough.

The next day started with many contributions on aspects other than Italian ferrous metallurgy and we will confine ourselves in this report to those referring to Italy. Roberta Morelli spoke on Tuscan blast furnaces such as that at Fallonica and the necessity for permission from the authorities to import foreign workers and ideas. P Rossi spoke on the Catalan and Ligurian bloomery furnaces of the 17th to 19th centuries and M Tizzoni on 17th century gold mining in the Monte Rosa area and the production of iron, alum and kaolin at Locarno Valsesia (Vercelli). This was very wide-ranging, dealing with Bergamesc blast furnaces in

the period 1747-1803, and the early use of gunpowder in iron mining. Roasting of magnetite ores was done to reduce the sulphur content. L Salvi followed with a talk on iron smelting using the Catalan process in Apulia. G Forni spoke on the diffusion of iron working over Europe making reference to the rock drawings of the Valle Camonica which clearly show ploughs with iron shares.

On Saturday 15th October we made a trip up the valleys to see museums, mines and smelters as well as a modern steel-mill rolling reinforcing bars from concast billets. The iron blast furnace at Desso had been used well into this century. It had extensive charcoal storage, a square roasting kiln, and had used high grade ore from local mines. At Schilpario, higher up the valley, was a small ethnic museum showing weaving looms and agricultural tools. Even higher up was one of the mines that supplied ore to Desso. On our return to Bienno we visited a working hammer-forge making edge tools, especially shovels and spades. The water wheels, supplied with more than sufficient water from leats from the hills above, were of the Bulgarian Samokov type in which water was directed on to the iron wheels through a vertical pipe. Thus the wheels were more like impulse turbines rather than the normal water wheel which is turned by the weight of water in the buckets. These wheels were no more than 2 metres in diameter and ran at a speed of 30 rpm. Instead of cams, 4 short bars were placed longitudinally on the shaft operating the tails of the helves. The frames were of stone and the rest of the hammer, hursts and bearings were normal. Although clearly of an old traditional design these units were quite capable of doing the job they were doing efficiently and it would have been difficult to find modern equipment capable of replacing them. One wonders how widely this type of water wheel was used on the north side of the Mediterranean and what its origins were.

The next morning was again devoted to more lectures many of them not related to things Italian but most interesting. R Vergani talked about the industrial hinterland of Venice centred on the town of Belluno in the 12th to 18th centuries. This was followed by M Matteoli on Corsican bloomeries, which as the 19th century metallurgist, John Percy, pointed out have a rather different method of working from their Catalan counterparts, and Riccardo Francovich spoke on the structure of the medieval Tuscan iron industry.

Having opened the technical sessions, R F Tylecote was called upon to close them by giving his impressions. The first was that of crossing the alps from Switzerland and being greeted by torrential rain — not for the first time. Of course rain means water and water means power and if it were not for this rain northern Italy would never have developed in the way it has. The second impression was on the immensity of the hospitality and the warmth of the people. The Commune of Valle Camonica and its individual towns had been determined to make this a great occasion and had succeeded admirably. We owe them our most hearty thanks. The speakers too had done their bit and

we can truly say that we have all learnt a lot about the early days of Italian industry. One must congratulate the Iron Committee and its organisers for providing one of the most exciting conferences yet.

Conference of the Archaeology Committee of the Society

Muck to Metal; how metallurgy helps the archaeologist.

A one-day conference was held at the British Academy on 23rd November with about 80 people present. It was introduced by Dr Bob Smith of the Tower Armouries. In the chair was Richard Hall of the York Archaeological Trust. The morning session included papers by Dr Gerry McDonnell on the processes involved, Dr Henry Cleere on iron-working structures, Dr Chris Salter on iron-working slags and Dr Brian Scott on the artifacts.

The afternoon session was chaired by Dr Jim Charles and opened with Dr Liz Slater on copper-based ores to artifacts, followed by Justine Bayley on residues, crucibles and moulds, and Dr Paul Craddock on metal artifacts and analysis. After a discussion the proceedings were brought to a close by Prof Jack Nutting.

More meetings of this kind are planned for the near future.

Book reviews

Martha Goodway and J Scott Odell
The Historical Harpsichord, Volume 11; The Metallurgy of 17th and 18th Century Music Wire
Pendragon Press, Stuyvesant, New York, 1987, A5 hardback pp. 143 incl. index. Price £32.00

Martha Goodway has been interested in harpsichords for a long time and it is not surprising that as a metallurgist she should take an interest in its materials of construction. Restorers of old instruments which have been restrung many times have found pieces of old wire embedded in softwood at the bases of some of the hitchpins (pegs). Examination of these wires showed that they were consistently made of high phosphorus iron and it became quite clear that this had been selected for its higher tensile strength.

Modern materials are now known to have altered the tone of the old instruments and phosphorus iron is making a comeback. Perhaps one should say in more than one field, as rephosphorised low carbon mild steel is being considered for many other uses.