MORTIMER WHEELER ARCHAEOLOGICAL LECTURE

AN INTERPENETRATION OF OPPOSITES? PRE-HAN BRONZE METALLURGY IN WEST CHINA

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To the student of ancient Asia the Bronze Age of China must often have seemed as remotely confined by attitudes which dominate in Chinese historiography as by the inaccessibility of the language itself. Seen from our end of the continent the most attractive and fruitful problem is the relation of the initial events of metal-using culture on the Yellow river to the rise and political order of like phases of civilization in the Near East and farther west. To the Chinese archaeologist and historian these questions have held no interest at all, at least until quite recent years. The political circumstances which put a premature stop to Kiselev's efforts in the early 1950s to connect south Siberia with central China chronologically in archaeological terms are only too familiar.[1] Less so are the reasons for Chinese virtual repudiation of concern for even Chinese contribution to bronze utility and to intellectual exchange in inner Asia. As affects the pre-Han period the archaeologist and the historian have been inextricably intertwined, in a manner both productive and yet confining, for centralist and diffusionist theories were unquestioned. The Shang state, ruling on the Central Plain from the seventeenth to the eleventh century BC, and the earliest for whose reality epigraphy and excavation have come to the aid of history, was set no limits within what we are accustomed to thinking of as China proper, even though its highly characteristic bronze vessels and weapons never passed northwards beyond Henan, or westwards to Shaanxi before the twelfth century BC, and are only briefly represented in the territories of the middle Yangtze by a few late pieces which are plausibly interpreted as diplomatic gifts. The structure of Shang

[1] S. V. Kiselev's views are summarized in ch. IV (Karasukskaya epokha) of his *Drevnyaya Istoriya Yuzhnoi Sibiri* (Moscow, 1951).

power and the degree to which the foundries created at the capital cities succeeded in monopolizing the materials and skills required for bronze production are questions which naturally govern our interpretation of metallurgical events on the western frontier, whether the argument is for an exclusive diffusion of techniques from the Shang centre, or counters this view with theories of local development from common premisses, or sees influence reaching China from the opposite quarter, Turkmenia and the far west. It follows from an age-old conviction of universality that Chinese historians have in recent decades rejected the notion of the city-state (as developed notably in Japan, on the Near-Eastern model, by Kaizuka Shigeki and his followers)[1] with its implication of uncertain frontiers and of power declining from the centre outwards. In fact the Shang cities at Zhengzhou and Anyang in Henan have some of the basic features which we associate with the city-state of western Asia: the walled city, an apparent monopoly of bronze, traits of theocracy, a system of noble ranks, writing, slavery, oracle taking, and the sacrifice of animals and humans. For long it was accepted that neolithic culture, wholly unacquainted with bronze, descended to the very eve of the Shang period, in the seventeenth century BC. So one was led to assume that the very advanced bronze of that period sprang fully formed from the soil of Henan, as if the Yellow Emperor had there sown the dragon's teeth and nowhere else. Meanwhile the prior existence of a Xia dynasty (from 2203 to 1706 in the orthodox king list) was acknowledged in chronological tables, but no attempt was made by archaeologists to correlate its recorded history with either neolithic culture or any pre-Shang metal-using culture.[2] It seemed almost that Chinese scholars tacitly accepted a Japanese view, entertained for example by Naitō Torajirō in 1944,[3] that Xia was at least in part contemporary with Shang, and probably geographically distinct, Xia rulers occupying territory south of the Yellow river delta; while others even suggested that the Xia dynasty was wholly the invention of latter-day propagandists active in the eighth and seventh centuries BC. It follows that the main problems of the early

[1] The view of Shang as a city-state is implicit through all the chapters of Kaizuka Shigeki, *Chūgoku kodai shigaku no hatten* (Tokyo, 1946). See also W. Watson, 'The City in Ancient China' in P. R. S. Moorey (ed.), *The Origins of Civilisation, Wolfson College Lectures 1978* (Oxford, 1979).

[2] For example, Xia figured in the chronological table of the Chinese government's archaeological exhibition held in London (cf. *The Genius of China* Royal Academy, London, 1974), in which no items were attributed to a Xia period.

[3] Naitō Torajirō, *Shina kodai-shi* (Tokyo, 1944).

history are touched in our present subject: the origin of the central tradition of bronze manufacture, and in particular its relation to provincial development; the existence of metal in a neolithic context—the definition of a chalcolithic period; and the role in all this of the historical concept of a Xia state, the question which chiefly preoccupies Chinese theorists at the present time. The subject divides chronologically into two phases, early in the north-west, and later, after the twelfth century BC, in the south-west. While the modalities significantly differ, in each phase the same question is posed of the relation of the political centre to remote western regions. In both cases methods differ in ways suggesting diverse tradition.

So, first, what metallurgy in China preceded Shang, dating before the seventeenth century BC? Some facts lately ascertained in excavation suggest in outline a phase of acquaintance with copper and bronze over more than two millennia before that time (Fig. 1). Inevitably, in the terms of the established periodization, these discoveries have been mainly credited to a chalcolithic age, a view which puts China approximately in parallel with the development traced by Soviet archaeologists in Turkmenia, the centre of copper metallurgy nearest to China across the thinly inhabited spaces of Inner Asia.[1] For China there is an awkwardness in this, for the occurrences of metal are very sparse indeed thus far, while purely stone-using neolithic flourished; nor is it quite clear that a period of the hammering of native copper preceded knowledge of the alloys; and of course one must add that in the western and southern regions of China a real dependence on stone tools continued well into the iron age of the few pre-Han centuries. But these are discrepancies which point the interest of the Chinese evolution and in particular the derivative and casual character of the western metallurgy in the pre-Shang period. Items dated by radio-carbon before 2500 BC are significantly dispersed, covering a zone reaching across north China from Gansu to Shandong. Of copper or copper alloy, the objects are small points, rings, and blade-like strips, from which evidence is cited for cold hammering, casting, and alloying. One blade, dated to 4675 BC, shows copper combined with 25 per cent of zinc, and for that reason alone has been rejected as intrusive on the site by some

[1] An Zhimin, 'Zhongguo zaoqi tongqi de jigê wenti' (Some problems of early bronze artefacts in China), *Kaogu xuebao*, 1981, no. 3, pp. 269ff. Yan Wenming, 'Lun Zhongguo de tong-shi bingyong shidai' (On the Chinese chalcolithic period), *Shiqian yanjiu*, 1984, no. 1, pp. 36ff. These two papers give full references to the publication of sites instanced in the present text.

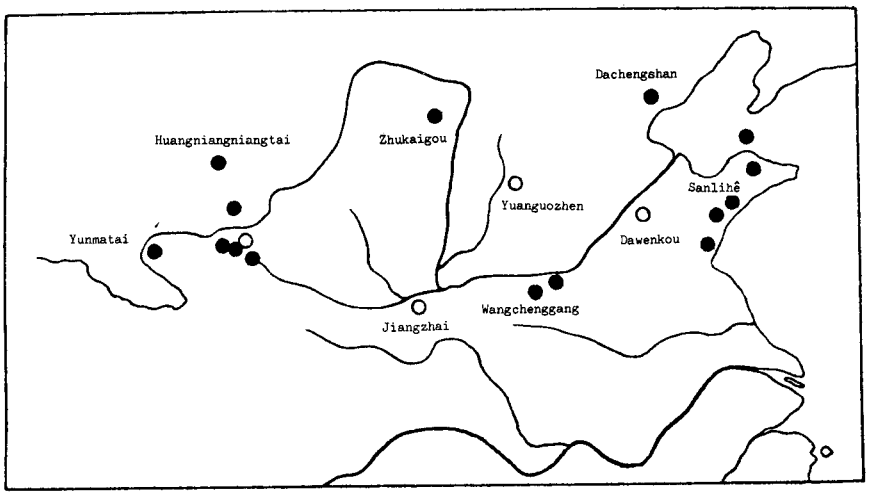


FIG. 1. Find-places of copper and bronze artefacts dated prior to 2000 BC. The hollow circles indicate sites of Yangshao neolithic culture; the solid circles, sites of Longshan or Qijia neolithic culture. After Yan Wenming.

authorities. The zinc problem, reverted to below, remains unresolved, while one notes that the collocation of zinc ore with copper ore at a single mining site is more to be expected in the conditions of east Asia than the coincidence or close proximity of copper and tin. From Shandong, before 2500 BC, are reported only 'smears' of copper salts on potsherds and other objects, one of which, in a context of neolithic dated about 3000 BC, is taken seriously: a bone chisel discoloured it is claimed through contact with a 99.9 per cent pure copper artefact, of which no other trace survived. In Shanxi, in a context of like date, a 'sediment of copper' is argued to show that melting of the extracted metal had taken place in a crucible. More important is a rudimentary 'knife-blade', found at Linjia in Gansu and dated between 3280 and 2740 BC, for this consists of the copper-tin alloy, having been cast in an open mould and hammered after casting.[1] It appears thus that desultory knowledge of copper and bronze is to be admitted in north China in the later part of the Yangshao neolithic culture, though hardly yet is demonstrated to be an integral part of that populous and widespread culture of settled farmers. Parallels have

[1] Zhang Xuezheng *et al.* on the periodization of the Majia, Panshan, Maguang cultures in *Zhongguo Kaoguxuehui diyici nianhui lunwenji* (Papers read at the Ist Congress of the Archaeological Society of China). Also Yan Wenming's paper cited above. The C14 dates, like all those quoted in the lecture, are given with the tree-ring correction, and normal variation is to be assumed.

been invoked with sites in northern Iraq (Zawi Chemi and Shanidar Cave in Turkmenia) and in Iran (Alikosh), where native copper was worked into small ornaments from the IXth and VIIth millennia onwards;[1] but the Chinese finds are all much later, and point to smelting and open-mould casting as well as shaping with the hammer. On the other hand, although Chinese writers are silent on this point, the comparison with the chalcolithic of western Turkmenia across the Topet Dagh from Iran is very close. The awls, pincers, and blades of this region resemble the Chinese equivalents not only in the period before 2500 BC, but also in the later IIIrd millennium, when the evidence for bronze production is surer and the dating is better established through occasional close association with pottery of the Longshan neolithic, as well as by radio-carbon test.

Metal dated in north-west China before the middle of the IIIrd millennium is included in the sphere of painted pottery representing the Chinese aspect of the ceramic tradition which embraces also Xinjiang and Turkmenia. Broadly speaking (the resemblance does not suggest immediate affiliation) the designs found on the Chinese urns are more closely akin to those of Anau I and Namazga in Turkmenia, that is, the early chalcolithic period of that region, than to designs of Namazga II, which represents the middle chalcolithic.[2] Among the latter are schematized animals and human figures which relate to Persian pottery of Sialk III type, and these are absent from the Chinese ornament. So if pottery connection there be between western Turkestan and Yangshao China it appears to fall in the late IVth or the early IIIrd millennium, which is just the time in which the later, Majia and Banshan, phases of Yangshao flourished in Gansu. But the connection is remote at the best.

In an age when theorists are much inclined to claim independent invention of bronze metallurgy in various parts of Asia, basing the claim on the evidence of earlier radio-carbon dating and the local availability of copper and tin, it is well to reflect on the scatter and poverty of the metallurgy as it appears in regions which lie on the periphery of the centres of greatest progress and ultimate civilization. In Turkmenia, at a time when bronze was already produced in some quantity and with some sophistication in nearby Iraq and Iran, the partial knowledge and the desultory

[1] Cited by Yan Wenming from *Cambridge Ancient History*, vol. i, part 1.

[2] The Turkmenian chalcolithic and early bronze cultures are well described in V. M. Masson and V. I. Sarianidi, *Central Asia. Turkmenia before the Achaemenids* (trans. Ruth Tringham, London, 1972).

use of copper may indicate a thin and sporadic imitation of contemporary work executed elsewhere to a higher standard, rather than the survival of primitive tradition. So far as we have gone the occurrences reported from China bear the same character of derivation. As so often in the later cultural history of inner Asia, an imperfect idea will have travelled abroad, anticipating by many centuries the arrival of technical and artistic refinement. In Turkmenia, as in north-west China, the scarcity of ore deposits, the absence of tin, can only have impeded development towards a normal 10 per cent-tin bronze at this early time, just as the remoteness of the tin supply affected the composition of bronze in north and central China throughout the pre-Han period. The political structures which have lain everywhere behind any considerable growth of bronze metallurgy were not achieved in Turkmenia before about 2500 BC, the opening date of the Namazga IV stage and of an Early Bronze Age properly so-called; while in China no corresponding base of power and economic procurement is to be supposed before 2000 BC. Only in the period from 2500 to 2000 BC does the Chinese evidence for the use of metal accumulate to a significant degree, and pure copper, hammered and cast, is still more frequent than tin bronze. The simple rings, knives, and chisels differ little if at all from the earlier ones. The sites are spread from Shandong to Gansu, as before, now in a context of Longshan neolithic, or, in Gansu, the Qijia facies of this culture. Considering the intensity of research in Henan the finds made in this province of pre-Shang metal are surprisingly few, an exclusion which suggests a cultural-social barrier to the experimentation in metal rather than an obstacle of terrain or an aggravated lack of resources. Most typical is the small pointed instrument designated *zhui*, awl, or drill-point, whose very simplicity seems to be at variance with the signs of technical advance (single and two-part moulds, shaft-hole axes) which presently appear. In Shandong five sites are known with copper artefacts or with some traces of the metal. At Sanlihe (Jiaoxian) an awl which shows dendritic crystallization (proof of liquefaction and casting) on analysis proved to contain between 20.2 and 26.4 per cent of zinc, with only traces of tin and lead, and so constitutes perfect brass.[1] With a melting point at 420 °C and a boiling temperature of 950 °C metallic zinc eluded early metallurgists, for the reduction of the ore required a temperature somewhat in excess of the boiling point. Consequently the claim for the manufacture of

[9] *Kaogu*, 1977, no. 4, pp. 262 ff.

brass in China before 2000 BC has met with great scepticism. Here the presence of zinc is perhaps to be explained by supposing an oxide ore rich in both zinc and copper, the zinc being prevented from evaporating in the smelting through powerful and rapid reduction by charcoal which allowed the alloy to form in the course of smelting, as the cautious An Zhimin is prepared to admit.[1] Nevertheless technical opinion remains sceptical of any zinc being retained in an alloy under primitive conditions, and where no use of zinc appears in later bronze metallurgy before comparatively recent times. The instances of brass in these early Chinese specimens are possibly to be explained as random occurrences in circumstances we can only guess at, but recorded instances of early brass remain intriguing. Masson mentions a piece from Namazga V, approximately contemporary with the Shandong specimen, which proved also to be a zinc-copper brass.[2] Pure copper or tin bronze were, however, the rule. Still distributed through a broad zone in north China, the sites of the second half of the IIIrd millennium from which metal has been recovered show two interesting trends. In the east and central segments of this zone (Shandong, Hebei, Shanxi, Shaanxi) tin was not in use, and excepting the still more or less suspect specimens of brass already mentioned, the artefacts consist of copper adulterated only by concomitant trace elements. One notes in particular that lead is still not present in quantity indicating a deliberate ingredient. On the other hand the evidence forthcoming in Gansu suggests a double practice: either pure copper, now cast in moulds and no longer hammered up from the native metal, or a tin bronze, in which the proportion of tin approaches the optimum 10 per cent. Thus the 'pure' copper metallurgy continued in the northern area even after tin bronze was manufactured, although at sites dated before 2000 BC the alloy appears to be confined to the western end of the zone. With the appearance of tin bronze coincides the adoption of stone moulds, in the tradition spread through Siberia also in the initial phase. In north-west China it gains special significance from the contrast with the practice of the Shang foundries at Zhengzhou and Anyang, where ceramic piece moulds were finely carved for the direct casting of decorated bronze vessels and weapons. In the north-west, towards the end of the IIIrd millennium and in the Longshan/Qijia context, the moulds were single for simple knives and rings, and two-part for axes and mirrors (the latter decorated with linear ornament in

[1] An Zhimin, op. cit., pp. 270–1.

[2] See Masson and Sarianidi, op. cit., p. 120.

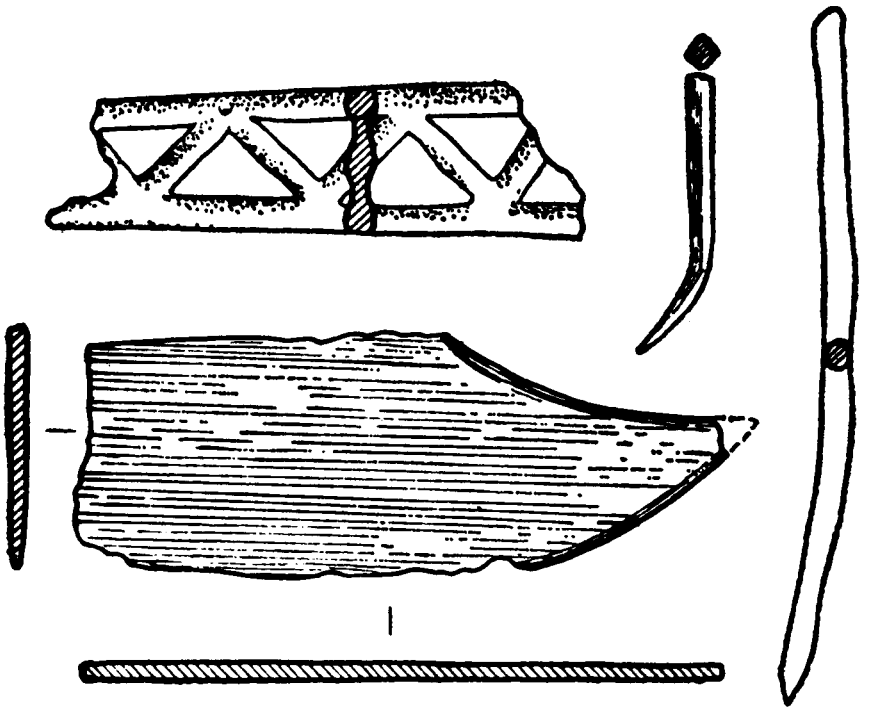


FIG. 2. Copper objects excavated at the Huangniangniangtai site in Wuwei, Gansu: awls, fragment of a knife blade, fragment of openwork ornament. After *Kaogu xuebao*, 1981, no. 3.

relief). It is symptomatic of the ambiguous technical situation in Gansu that at the richest site excavated from this period, Huangniangniangtai, pure copper, in some pieces shown to have been cast in stone moulds, was used for a wide variety of ornaments and simple tools, and this at a time when tin-bronze metallurgy was already established in the region (Fig. 2).[1]

It is at this point that arise the contrast and even incompatibility of early metallurgical practice between the eastern and western provinces of north China which are envisaged in the title of this address. Mysterious still is the almost total absence of the Central Plain from the story, although it is here that a vast and most characteristic development was presently to take place. Although the metal-bearing sites belong by their pottery and other features to well-defined cultures, the metallurgy cannot be shown to be an intimate part of these cultures, an element coterminous with them in time and space. It has been necessary to dwell on this desultory evidence falling before 2000 BC in order

[1] *Kaogu xuebao*, 1960, no. 2, pp. 53ff.; 1978, no. 4, pp. 421ff.

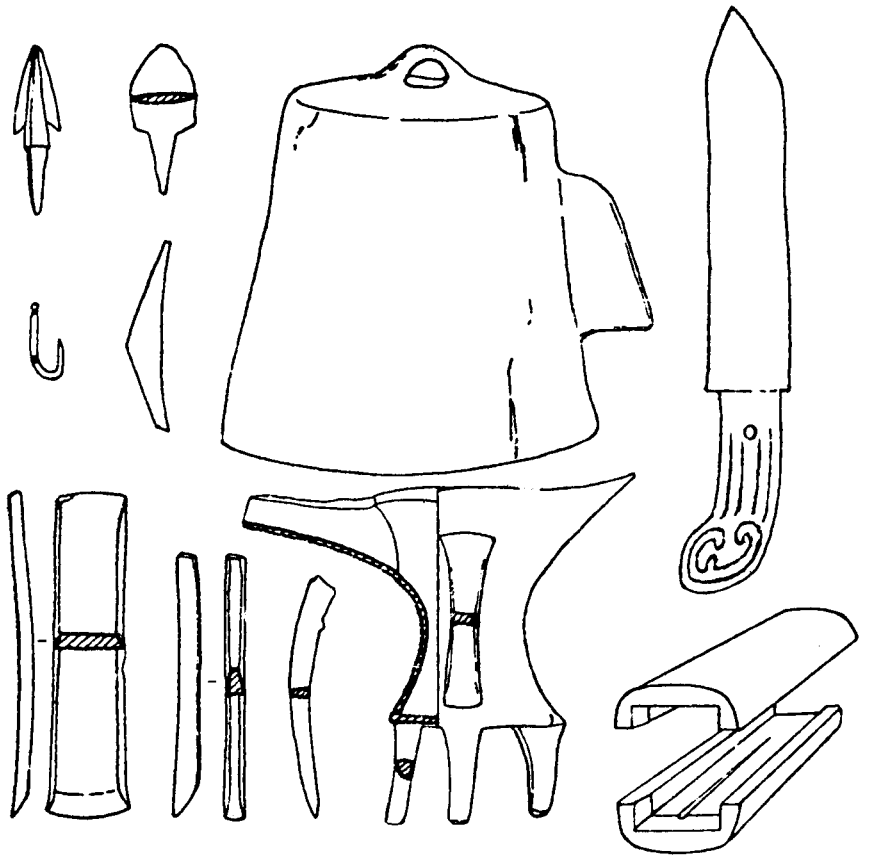


FIG. 3. Bronze artefacts and a stone mould excavated from various levels at the pre-Shang site of Erlitou in Yanshi, Henan. They include arrowheads, flat axes, a *gê* halberd blade, a bell and the tripod goblet *jue*. After *Kaogu*, 1975, no. 5.

to bring out the full force of what was about to occur. So far metal use in north China has not differed much from that of the Turkmenian cultures extended along the north-western foothills of the Kopet Dagh. But around 2000 BC a distinct tradition is present in central China, as fully represented at Erlitou a few miles south of the Yellow river in Henan (Fig. 3).[1] Suddenly the bronze weapons quite peculiar to Shang are manufactured in what is almost their definitive forms, the *gê*-halberd and the two-bladed arrowhead; and, most telling of all, the tripod goblet *jue* is made with crisp lines that bespeak original bronze design rather than the copying of a pre-existing pottery shape. Four-fifths of the pieces known from Erlitou are of alloys combining some 90 per

[1] *Kaogu*, 1974, no. 4, pp. 234ff.; 1975, no. 5, pp. 302ff.; 1976, no. 4, pp. 259ff.

cent of copper with tin, or with lead, or both in irregular amounts, and only one-fifth are made of pure copper. The site is stratified in three phases and is thought to cover the two or three opening centuries of the IInd millennium. Technical aspects of these finds apart, there is an expansion of the political environment to be deduced which cannot be without its influence in the upsurge of metallurgy. The abundance of copper and tin witnessed in the later phases of the Erlitou succession points to the prerequisite for an important development of bronze metallurgy in any part of Asia: a political structure capable of assuring the provision of materials regularly from a distance (in this instance from a considerable distance, for the tin is most likely to have come from Yunnan). Two features of the site in particular corroborate the idea of far-flung political contact: in the latest (third) phase of the site the green and white nephrite, used for making ceremonial blades and staffs, axes, and rings, argues an import from the Baikal region of Siberia or the far western end of Shinjiang and, no less significant of a close relation to Shang civilization itself, the *pisé* foundations of a large pillared building anticipate the temple and palace foundations of Anyang in all technical detail, presenting moreover an approximation to the rectangular, south-facing precinct of the first Shang city, at Zhengzhou, whose wall was erected in the decades around 1600 BC.[1]

Erlitou clearly reflects a reach of political influence which eclipses anything achieved by the neolithic communities, and Chinese theorists have been at pains to show that this political structure was no other than that of the Xia state. The radiocarbon dates determined for the Erlitou site, ranging between 2080 and 1580 BC, cover the duration assigned in history to the Xia dynasty, and consequently the identification of the Erlitou culture as that of Xia is accepted widely in China, while a minority of opinion would regard it as a foreshadowing of Shang set in the general context of the late Longshan neolithic. Unlike the dramatic identification of Shang with the Anyang site through the contemporary oracle inscriptions, eventually by the reconstruction of the king list, the case of Xia is still unsupported by epigraphy and must rely on the conflation of history and archaeology expressed by the *four coincidences*—of time, region, stratigraphy (i.e. underlying Shang deposits, as is argued), and artefacts (i.e. foreshadowing Shang types). In view of the later confrontation of Shang metallurgy with a tradition planted in the

[1] *The Origins of Civilisation*, op. cit., pp. 59–60.

north-west, it is of interest to follow some implications of the metallurgy typified by the Erlitou bronzes. We distinguish there on the one hand two-piece stone moulds used for socketed axes, spearheads, and knives, all in line with the casting method attested earlier along the northern zone of China and developed especially in the north-west, and on the other hand the multiple-piece mould which we must suppose to have been employed in casting the *jue*. The probability that this mould was made of pottery amounts almost to a certainty in view of the Shang *jue* which were its heirs, and from the implausibility of the employment of stone in this case and the absence of any sign of acquaintance with *cire-perdue* casting. So here too is the suggestion of contrary methods, the hint of the coexistence of a tradition of wide affinity, linking with Siberia and the earliest metallurgy of the whole of Inner Asia, with a new tradition, still of uncertain origin, which was to dominate presently in central China and underlie the technically sophisticated ritual bronzes of Shang. More can be surmised about the further relations of the Erlitou bronzes, for while the small rings and arrowheads which these include range farther north in Henan and Hebei, only at the eponymous site have the larger castings been found, and then only in the later two of the four levels of the Erlitou stratigraphy. Thus of the larger area attributed to Erlitou culture, reaching far into Hebei along the Taihang range, it is only the southern sector on the middle course of the Yellow river which carries comparatively advanced bronzework and so gives the hint of the political development which a large and progressive metallurgy must demand.[1] And, as in the earlier period, we are left wondering what vital link can have existed between the factors governing the manufacture or use of bronze, and the cultural divisions implicit in differences of ceramic tradition, for no close match appears.

It is here that Zou Heng's pottery studies illuminate and complicate the problem.[2] The boundaries he draws on his map of pottery traditions present in the Central Plain and its immediate periphery depend on what from a farther standpoint must seem minor variations in the proportions and detail of jars and tripod vessels displaying close cousinship, the ceramic which (Zou would maintain) we have come too readily to accept globally as the

[1] Zou Heng, *Xia Shang Zhou kaoguxue lunwenji* (Papers on the archaeology of the Xia, Shang, and Zhou periods), pt. 2, no. 3 ('An Interpretation of Xia Culture').

[2] Ibid., pt. 2, no. 6 ('A Preliminary Enquiry into the Cultural Frontiers of the Northern Regions in the Xia and Shang Periods').

bronze-age sequel to the Longshan tradition of Henan. Zou's object becomes the definition of a tradition, surviving into the Shang period, which derives from Xia and within the Shang conflation of styles has a southern trend. The sites of pronounced Erlitou character lie all in Henan at short distances south of the Yellow river. They fall within Zou's ceramic division which extends from the river southwards over most of its middle course, enters briefly into Shandong where the present course turns to the north-east, and briefly into Shaanxi across the river just before its northward bend. Apart from this transgression no sites of Xia culture (i.e. the later facies of the Erlitou culture) are located north of the Yellow river. Thus the Xia sphere would lie almost wholly south of the river, wholly so in the political heartland of Henan, incorporating the Longshan pottery tradition of central Henan and presiding over an evolution of bronzework deriving from the Erlitou practice. This geographical division of potteries agrees largely with the areas of Shang and Xia rule as the histories give them, except that place-names associated with Xia seem to include also territory nearer the Yangtze mouth. In contrast with this, sites whose bronze and pottery place them in a category designated *initial Shang* (*Xian-Shang wenhua* which lacks the outstanding features of the Erlitou assemblages) lie towards the north-east, in the province of the early phase of Erlitou culture along the eastern edge of the Taihangshan. Only one site representing the initial Shang is said to be located south of the Yellow river. So defined, an initial stage of Shang tradition is conceived as contemporary with the latest phase of Xia, although mostly located well outside territory controlled by the Xia kings. But at the end of the initial phase (it is unclear whether this is to be equated with the opening decades of the dynasty or is immediately pre-dynastic) the diagnostic features of Shang culture and industry spread rapidly to engulf the whole of the former Xia sphere, together with Shanxi and Shandong provinces. On this attractive hypothesis the Shang bronzesmith was subject from the start to the influence of two traditions, one with affinity to the north, and eventually with the north-west, and the other coming from practice established in the Central Plain south of the Yellow river. Here is another example of the interpenetration of diverse tradition manifested in metal.

We should be led too far into the history of Shang in south-central China were we to pursue all the implications of this new model of the Chinese bronze age. We have long been aware of the discrepancy of artistic style which separates the decorated bronze-

work of Zhengzhou from Anyang, and while the former has been interpreted (by Zou Heng himself in the first place) as only a first stage leading smoothly into a later one, the distinct character of a Xia legacy is now arguable. This has a bearing on the relation of metropolitan metallurgy to the incipient bronzework of the south-western provinces, a matter which engages us presently. It is, however, the northern aspect of Shang, the situation as it existed after the move to the northern city near Anyang about 1300 BC, to which we turn in examining relations with the north-western borderlands. In the Anyang phase the involvement of Shang with Inner Asia increased to the point where it can be demonstrated in particular artefacts and even in the dissemination of some rudimentary artistic motifs, this latter anticipating the fuller traffic in such ideas which is discernible after the eighth century BC. The scatter of bronze socketed axes found widespread in the Baikal region derives in some sense from China, and not from the far west where this tool became the hallmark of the latest division of the bronze age of temperate Europe. To south Siberia the Shang workshops transmitted models for axes, harness pieces, and a quite special item of the east-Asian archer's equipment, the bow-guard; and the close comparison which the Shang chariot makes with near-contemporary vehicles from the Caucasus and the Near East has been examined in detail in recent years. Without prejudice to the original modifications which the Chinese brought to the structure, the chariot, very fully represented by Anyang burials of the twelfth century BC, is eloquent of the commerce of ideas obtaining between Shang and territories even beyond Inner Asia to the west. A matter less often attended to is what is implied for casting by the animal-headed knives and decorative jingles which have been found included in the charioteer's equipment. The form of certain ibex heads forming the terminals of some of the knives (generically the knives belong to a tradition which traverses Siberia in a north-westerly direction) is hardly conceivable without resort to lost-wax casting, and the spherical *ajouré* jingle containing a pebble which is often cast at either end of the bow-guard tells strongly in the same sense (Pl. XV). Archaeological writers outside China have hitherto peremptorily denied knowledge in Shang China of the method of forming a ceramic mould by melting out an encased wax model, since it is so firmly established on the evidence of mould fragments recovered in excavation that direct casting in multi-part ceramic moulds was the chief means in foundries responsible for the ritual vessels (Pls. XVI and XVII). But some of the points instanced above do point

to the employment of wax in part of the product, the skilled ornament cast on these pieces being warrant enough that this is not a case of importation. Generally, in the northern zone of China, the circumstantial evidence for the wax procedure expands in the eighth and seventh centuries BC, in the openwork ornament of daggers and their scabbards found in Shaanxi and the nearer parts of Inner Mongolia. The technique thus traced from the latter half of the Shang period does no more than place China within the universal tradition of the Asian bronze age. We therefore may add lost-wax casting to the themes which illustrate the theme of interpenetration. In turn the Henan method of direct casting in pottery moulds was passed west to Shaanxi. It appears there (as we judge from the detail and finish of bronze vessels, not in this case from surviving mould fragments) in the later part of the eleventh century BC, and we surmise the Shaanxi work to have been executed under a government surveillance similar to that which we deduce for the Anyang foundries.[1]

What I have said thus far of the inception of bronze metallurgy in north China has been almost wholly confined to technical aspects of the problem, with only a mention of the political factor which we presume to underly the important development dating from about the middle of the IInd millennium. More can be said of the influence of the power structures of central China, both bearing on the dissemination of technology and on the version of history recorded in the metropolitan tradition—a version whose bias the archaeologist is called upon to correct. The classical Chinese account speaks of the rulers of the north-west, the house of Zhou, only at the moment of the political upheaval which is encapsulated as the conquest of Shang by Zhou in 1027 BC (according to the shorter derived chronology). The advance of an army from the north-west to the heartland of Henan is presented as the destruction of civilized but morally degenerate rulers by barbarians who had all to learn. Learn they did fast, for was not the Duke of Zhou then the founder of all that is valuable in the Confucian tradition? It was left for the latter-day epigraphist to note that the first fully literate inscriptions were cast on bronze vessels in central China *after* the capitulation to Zhou, and for the

[1] See papers by S. Piggott ('Chinese Chariotry: an Outsider's View') and W. Watson ('The Chinese Chariot: an Insider's View') in P. Denwood (ed.), *Percival David Foundation of Chinese Art: Colloquies on Art and Archaeology in Asia*, no. 7, *Arts of the Eurasian Steppelands*. See also W. Watson, 'The Individuality of the Honan Tradition in the Shang Period', *Proceedings of International Conference on Sinology* (Taipei, 1981), pp. 171–86.

archaeologist to add that the bronze vessels manufactured during the first three reigns after the conquest display a difference in style of decoration which can hardly be accounted for as a sudden transformation of the centuries-old tradition of the Shang art of Henan: the iconography of birds, dragons, and monster masks is new, the ductus of ornament distinct and the casting now embraces much bolder relief effects amounting to sculptural addenda on basic shapes. Thus the centralist myth abolished the reality of an advanced bronze industry established in the north-west before the middle of the eleventh century BC, much as a dynastic fiction was created again in regard to a development of bronze in the south-west some five centuries later. But when we pursue the problem back in time the roots of the north-western tradition are elusive. The interchange we have postulated between a north-western tradition and a central Shang tradition in the IIIrd and IInd millennia requires an extension of the model which will embrace the similarities that have been noted between China and the chalcolithic and early bronze periods of Turkestan, and this without recourse to migration of culture complex or necessarily of population. Into the vacuum where no structured movement is detectable the more migration-minded interpreters have rushed dramatically: Heine-Geldern with his (alas so influential!) theory of a Pontic migration supposed to have introduced into China almost every worthwhile innovation which occurs after 1000 BC, and, in the other direction, Ho Ping-ti's suggestion that the Chinese pottery painters of the north-western Yangshao school were the originators of much of the design used in the far-flung Near-Eastern tradition of painted ceramic. The notion of a sparse cultural continuum existing through inner Asia, extending technical communication over vast spaces of steppe and near-desert, is difficult to grasp if one begins from preconceptions of the Early Bronze Age in the Mediterranean countries and in temperate Europe. As to Turkmenia, there is little sign that any *complex* of culture traits spread beyond its sites in the narrow belt of watered or irrigable territory stretched along the northern foothills of the Kopet Dagh, and no close alliance appears between the Turkmenia of this period and the surrounding communities of hunters and primitive agriculturists. In Khorasmia for example, a region due for rich development, a food-gathering culture lasted until about 2000 BC, the Namazga IV period of the Kopet Dagh chalcolithic. Yet the Kopet Dagh communities were able to absorb and develop the minimal bronze technique which reached them (as we are obliged to conclude) through contact

with the Andronovo culture which in turn was subject to influence emanating from the Caucasian centres of comparatively advanced bronze industry and export. Few such contacts in the bronze age of Asia were a one-way traffic, or remained such once a hierarchic political structure had assumed the exploitation of a bronze industry and the procurement of the requisite materials on a regular basis. In Inner Asia small groups moving over short distances, not impelled by the climatic agents which later occasioned far migration, must have rapidly diffused certain rudimentary technical ideas, leaving no trace of their mission between territories—the Kopet Dagh and north-west China—where the social conditions induced by a ready food supply and a comparatively large population prompted the adoption of the technique on a scale which has left its trace in the archaeological record. In the circumstances of chalcolithic culture it appears vain to hope that the point of origin of any process, whether smelting and casting or the design of artefacts, can be finally determined, for thin as it was over Inner Asian plains and desert the flow of ideas was incessant and reciprocal.

But this interchange was not necessarily a steady one. It becomes the task of the archaeologist not only to observe the interchange, but also to follow the irregular pulse of the bronze evolution, seeking factors in other departments of the cultural life which impose barriers to the process or accelerate it, and herein lies the greater challenge. Thus it may not be an accident of survival that the majority of sites with bronze dated before 2000 BC lie in the east–west zone of uplands north of the Yellow river, the denser neolithic population of the river valley itself having proved less receptive to the metallurgical experiment, or having been excluded from the chain of exchange which passed copper ore and occasionally tin ore from place to place. The uplands were grasslands, where we can imagine a sparse but locally mobile population.[1] A similar distinction of upland and lowland zones is

[1] Jaroslav Prušek, *Chinese Statelets and the Northern Barbarians in the Period 1400–300 B.C.* (Czechoslav Academy of Sciences, Prague, 1971), gives the fullest recent review of theories concerning the west to east movement of peoples in the late Shang and earlier Zhou periods. Views differ as to the cause of the displacement of the Ti tribes in protohistoric times (Qin aggression, or the irruption of the Yuezhi, or both, etc.), but the movement is not projected speculatively back beyond the middle of the IInd millennium, there being an inclination with all parties to suppose earlier populations to be stable and pacific geographically and culturally. Consequently palaeoethnic investigation has not contributed to the interpretation of the rise and early diffusion of metallurgy in north-west and north China.

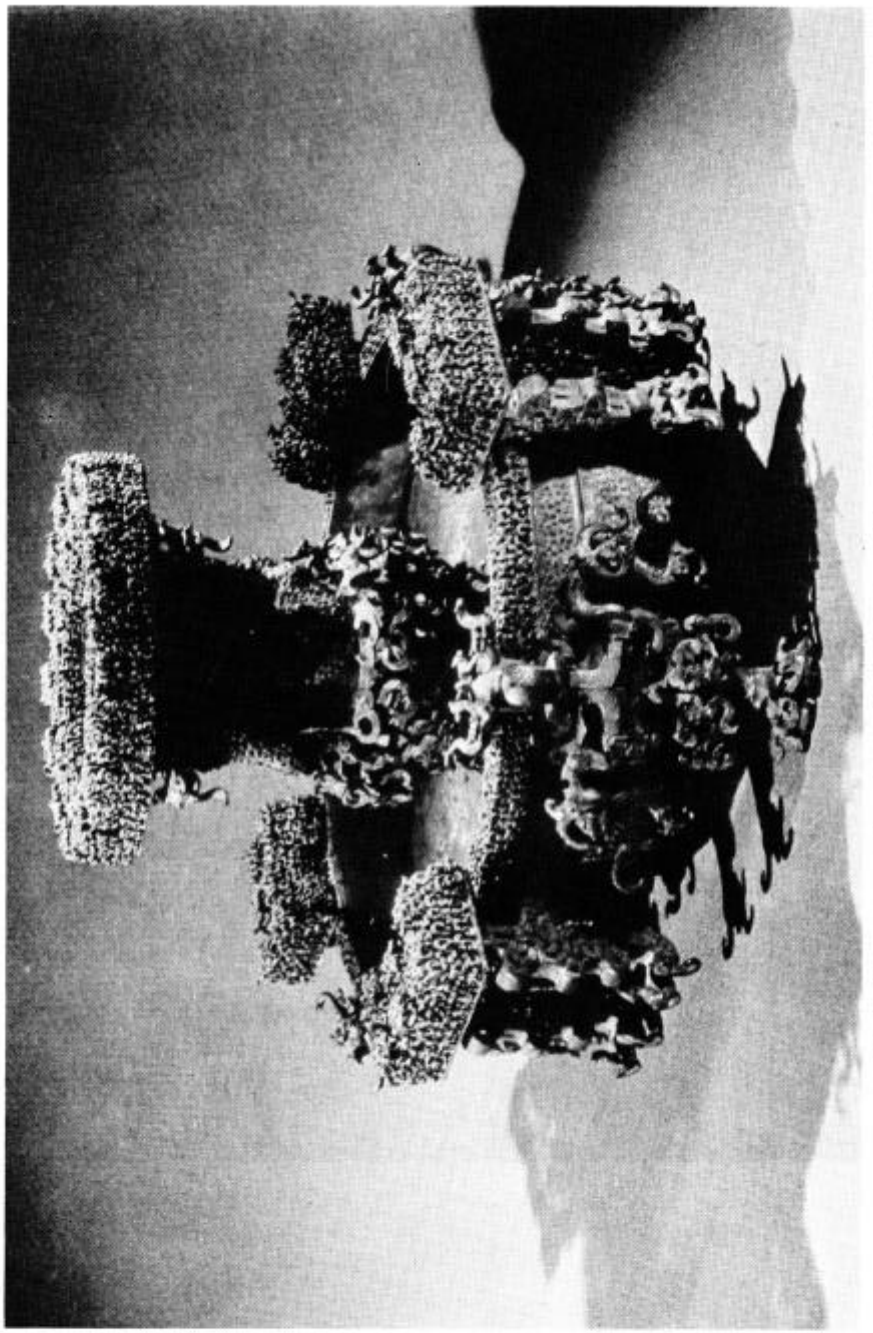
Bronze bow-guard of the late Shang period as found at Anyang, in British Museum.
Photograph: British Museum.

PLATE XVI

Bronze *hé* of the late Shang period. Formerly Malcolm collection.
Photograph: Percival David Foundation.

Detail of the *hé* of Pl. XVI, showing surface condition characteristic of casting in a ceramic mould.
Photograph: Percival David Foundation.

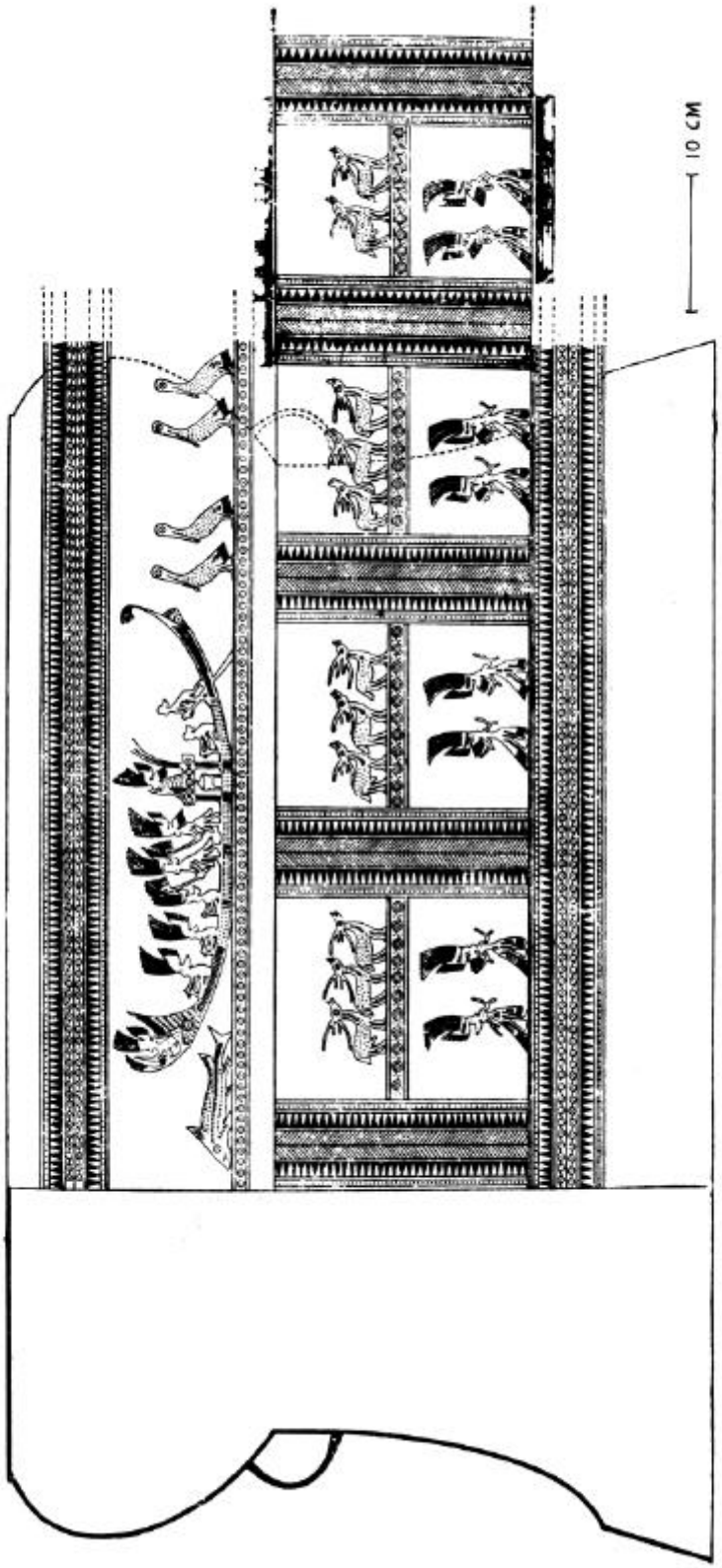
PLATE XVIII



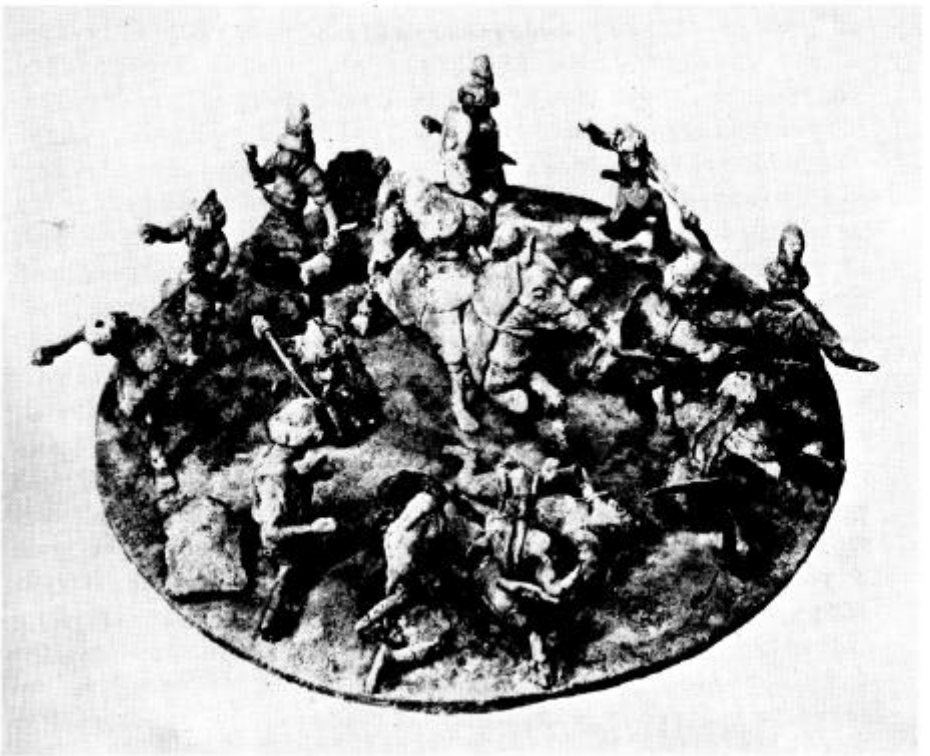
Ornate bronze vessel from the tomb of the Marquis Zeng in Suixian, Hubei.
After publication by the Hubei Provincial Museum.

Bronze drums excavated at Wanjiaba, in Chuxiong, Yunnan (nos. M23: 158 and M23: 159). After *Wenwu*, 1978, no. 10.

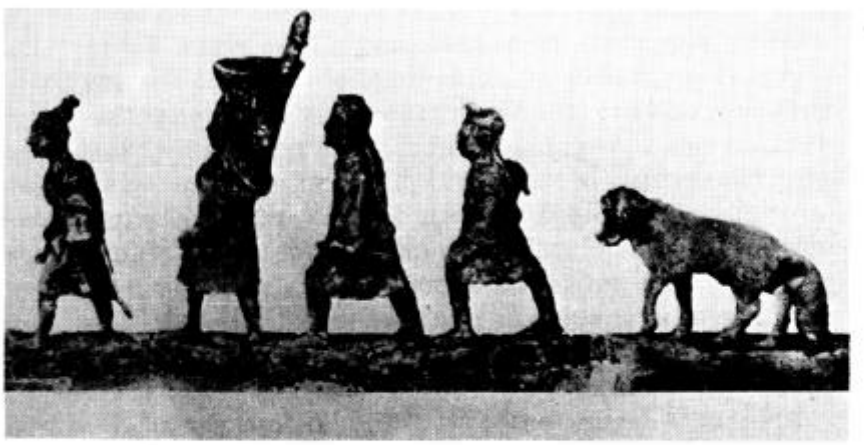
PLATE XX



Bronze drum of the second stage of design, with deer, pelicans, and costumed men parading, excavated at Xilin, Guizhou. After *Wenwu*, 1978, no. 9.



(*a*) Battle scene composed of figures mounted on a plate attached to the upper surface of a bronze drum, excavated at Shizhaishan, Jinning, Yunnan. After publication by the Institute of Archaeology, Beijing.



(*b*) Bronze figurines forming part of a procession placed around the upper edge of a bronze drum, excavated at Shizhaishan, Jinning, Yunnan. After publication by the Institute of Archaeology, Beijing.

discernible in Zou Heng's map of ceramic traditions of the Xia-Shang period. The imposition of a northern tradition over a southern one as exemplified in the diverse origins of Xia and Shang below and above the Yellow river prefigures the eventual domination of the Shang city-state by the Zhou tribal confederacy advancing from the supposedly more backward north-west. Before the second half of the Shang reign the typical Shang bronzework is confined to the Zhengzhou region and seems to occur hardly at all north of the river (the well-furnished Shang tomb at Huixian just north of the river is an isolated case). It is only in the later Shang period, with its more numerous and more varied vessels and weapons, that a more tangible effect of the social barrier is documented. The main items in question here have been cited above: the animal-headed knives, the bow-guard, and the socketed axe, and the now expanded political commitment of the Shang dynasts to the north-western territory of rivals offered a plausible ambience in which the titration of culture traits took place. Although metallurgical skills beyond the Shang pale may well have been inferior, it cannot have been entirely technical incapacity which determined the choice of items destined for a wide circulation in the north and north-west, even when we allow for the absence of the ritual incentive and the custom of political gifts which drove the Anyang foundries to ever fresh achievement. We are now speaking of events in northern Shanxi, northern Shaanxi and Hebei, and beyond them Inner Mongolia, all of which Loehr long ago grouped together as a Northern Zone in the course of his study of Chinese bronze-age weapons.[1] Seldom indeed was the effort made by the bronzesmiths of the Northern Zone to reproduce even the simpler shapes of the vessels which had been given a ritual funerary role in Henan, and in one instance, when a *xian*-tripod was imitated, it was cast in pure copper.[2] But it was to the Northern Zone that ideas of bronze design in the function and adornment of weapons and saddlery bronzes were attracted in the early Zhou period from regions far to the west, and it was from the Northern Zone that items present on the fringes of the Chinese metropolitan tradition were contributed to the rarefied but persistent Inner Asian tradition which culminated in the much lauded animal art of the central Asian steppes.

[1] On the Northern Zone see M. Loehr, *Chinese Bronze Weapons* (Ann Arbor, 1956), and W. Watson, *Cultural Frontiers in Ancient East Asia* (Edinburgh, 1971), chs. 4 and 5.

[2] The *xian* is in the British Museum, where analysis showed an excess of 97 per cent of copper.

The crucial times in the creation of the northern tradition in art and artefacts were the ninth and eighth centuries (i.e. the latter part of the western Zhou period) and the sixth and fifth centuries (i.e. the first part of the period of the Warring States).

To follow the interplay of the north-western tradition with that of the metropolis further into the Zhou period would take us too far from my present purpose, which is to compare the broad development of bronze metallurgy in the north-west with corresponding events in the south-west at a later time, when both similarities and remarkable differences make the study instructive. In north-central China we have defined a metropolitan industry where a tradition of direct casting in complex ceramic moulds is unique for China and for the whole ancient world. This centre exchanges ideas with a north-western school which it eventually dominates, but over both to the north extends an arc of territory where the selection of types, the development of bronze technique and art, follow other rules, and where we look for interchange between metropolitan and exotic elements. The geographical model which this tripartite division suggests may be valid in other regions and at other times when comparable confrontation occurs between metropolitan technical-political organization and the looser lines of bronze growth outside the metropolitan pale. In Inner Asia and east Asia the barbarian lands might create their own metallurgical tradition while they were subject to influence coming from separate urban industries with longer history. Phenomena of this order are to be observed in the history of bronze on the south-western frontiers of China, to which I now turn.

First a dynastic myth: as the north-western rivals of Shang were given a subaltern role in a Shang history, so the metallurgically powerful state of Dian, centred on the lake of that name, could only become intelligible to the Chinese historian by asserting the ruling house of Dian to be an offshoot of the royal line of the Chu kingdom, which soon after 500 BC was the dominant power in China south of the Yangtze and east of the Huai river. By accepting his origin in Chu the king of Dian no doubt enhanced the legitimacy of his rule and showed sufficient subservience to his eastern neighbours, but Chu armies made repeated attempts to subjugate his territory and to open up regular communication between the Yunnan plains and the region of the middle Yangtze. In Sima Qian's 116th chapter where the history of Dian is recounted no suggestion is made that the procurement of copper, tin, and gold was a motive in this attempted westward expansion,

but we may surely guess that Chu was not indifferent on that score.[1] The story runs that some time between 339 and 329 BC, in the reign of King Wei of Chu, a general named Zhuang Qiao, descended from a Chu king of the same surname who ruled from 613 to 590 BC, was sent westwards to conquer the Dian kingdom. He reached only the border of Dian, but when he tried to retreat his route was barred by troops of the Qin state. Since the first campaign southwards by Qin beyond its normal frontier is recorded for 277 BC, we are asked to believe that Zhuang Qiao lingered near Dian for half a century at least before he thought of returning home. So he settled in Dian where he was elected king and adopted the local customs. The long delay in regaining Chu, as recorded, has been a stumbling block to historians ancient and modern. A past assumption, still on occasion revived, has been that the men of the Chu army took wives in Dian and that their progeny account for the rise of civilization in Yunnan. No less remarkable than this credence is the acceptance of the dates we have cited in some interpretations of archaeological evidence. In fact the historicity of Zhuang Qiao is most questionable, for the name occurs in various literary contexts as that of a bandit or malefactor and is used by Xunzi in moralizing passages as a proverbial reference for a political felon. It is even said that 'when Zhuang Qiao arose the Chu state was divided into three or four'. Here the writer appears to place Zhuang Qiao in the fourth century BC, for the mention of him occurs in remarks upon arms and armour evidently belonging to comparatively recent times, and in this connection one Tang Mie is named who was killed in 301 BC. On the other hand the author of the *Han Feizi* places Zhuang Qiao explicitly in the seventh century BC, in the reign of the Chu king whom Sima Qian understands to be only Zhuang's remote ancestor. In the *Shang junshu* Zhuang Qiao is listed with other instigators of political upheaval, with the comment that he split the Chu state into *five*. For this disruption and for the alleged banditry of the Chu general there is no support whatever in the histories. Zhuang Qiao appears as a less savoury Hereward the Wake or Robin Hood, and if there is a core of historical truth in the feats attributed to him we have no means of knowing what it is. We must avoid the error castigated in Raglan's *Hero* when the

[1] For a discussion of the historical and literary sources on Zhuang Qiao see W. Watson, 'Dongson and the Kingdom of Tien' in *Readings in Asian Topics: Papers read at the Inaugural Symposium of the Scandinavian Institute of Asian Studies* (Copenhagen, 1968). Sima Qian's *Shi ji* (Historical records) was completed *c.*100 BC.

disprovable being discarded what remains is accepted as verified fact.

But what has been quoted from historians and moralists writing at a time when the Dian state evidently flourished reflects a phase of attempted westward expansion by the south-central Chinese power, and its temporary frustration, which enhances our idea of the potential and organization of the Yunnan kingdom, lending colour to the view that any considerable metallurgical development, in bronze perhaps particularly, was inseparable from the maintenance of a political ascendancy. According to Sima Qian, Zhuang Qiao was sent out 'to conquer to the west of Ba, Shu, and Qianzhong'. The region so defined lay roughly along a wide frontier zone that separated the great rivals Qin and Chu. The army of 330 BC was to go up the Yangtze in order to get at Dian. This route would lead along a line roughly separating Shu and Ba in the north from the Qianzhong and Yelang peoples occupying what is now the province of Guizhou. In Shu the influence of Qin was paramount (in 316 BC Shu was invaded and sacked by Qin troops). Now history speaks of the close relation of the Dian and Yelang tribes, a fact which the distribution of bronze drums due for mention presently corroborates. Hence while resistance to the Chu campaign might be expected in the Shu-Ba region, no less, one supposes, would have been the opposition to Chu progress through Guizhou. This last was likely to be to some extent under Dian influence, for it was through Guizhou, from the western frontier into the heart of south China, that ideas in bronze casting and bronze art were transmitted. The latter-day history of the Dian kingdom is better known. Its frontiers were respected in the early decades of Han Wu-di's spectacular campaigns beyond ancient frontiers, that is until 109 BC when, on the excuse that Dian had been supporting the resistance put up by the Nanyue of the southern Chinese seaboard in the course of Wu-di's second and conclusive conquest, the Chinese armies were turned towards Yunnan. But still no conquest of Dian was attempted, and instead its king was ranked among the *waichen* 'lords without the pale' and presented with a gold seal of office by the Chinese emperor. Only some thirty years later was Dian incorporated into the Chinese territory.

This history is summarized here to illustrate the political and military standing of the state in east-central Yunnan where the most abundant evidence of an advanced bronze industry has been found in excavation on sites of the third and second centuries BC. The tale of General Zhuang Qiao's marooning in Dian in 339 BC

has the air of mythologized fact, a dynastic fiction which survived with the Dian aristocracy, legitimizing their royal status *vis-à-vis* the great house of Chu. But the reality of a Dian kingdom able to defy Chu arms from the fastness of its mountains and jungle remains unaffected. Much that I have to say presently bears out the independence of Dian culture in basic elements, both technical and formal or artistic. From a Chinese point of view what immediately attracts attention is the extremely ingenious lost-wax casting practised in the Dian *floruit* of the fourth and third centuries BC. This contrasts utterly with the 'official' Shang and western Zhou legacy of direct casting prevailing in the metropolitan region as a general method until the fourth century BC, and thereafter, in official workshops, well into the Han period. But from the fifth century direct casting appears alongside lost-wax casting, whose virtuosities for sculpture and finical ornament are taken to absurd extremes. This is the case with the vessels and bells excavated from the tomb of Marquis Zeng in Hubei, dated about the mid-fifth century and containing the largest assemblage of bronzes so far unearthed south of Henan (Pl. XVIII).[1] These fall into three classes: tripods and other vessels which would fit with assemblages excavated farther north, in Henan or Shaanxi—nothing in the appearance of these necessarily implies the employment of wax; similar vessels on which some detail suggests a partial resort to wax in the preparation of the mould section, and some extremely baroque specimens in which the body of the vessel is smothered with openwork and undercut features, of great inventiveness, for which only wax modelling can account. The chief problem is the source of this last technique. Although we have assumed the use of wax in casting certain minor items produced even in the Shang sphere at a much earlier date, this work hardly leads into the Hubei performance of five centuries later, while in the interim, in north and central China, we have nothing to show as marking a further advance or transition. On the wooden outer coffins contained in the Zeng tomb are carved geometricized meanders and the weird figures of chthonic powers peculiar to Hubei and Hunan. Corresponding motifs in bronze occur only on pieces enveloped in a flurry of wax-cast detail. In sum, the confrontation of two technical methods, a metropolitan and an exotic, could not be better exemplified. Pursuit of the latter, as regards the technique, leads to Yunnan, whither we now follow these metallurgical events.

[1] The Hibei Provincial Museum, *Suixian Zeng Hou yi mu* (The second tomb of the Marquis Zeng in Suixian) (Peking, 1980).

The Yunnan metal for which the earliest date has been claimed consists of some dozen small socketed axes excavated from a site at Haimenkou, in the Jianchuan district immediately west of the area of chief dispersal of the characteristic Dian bronzes.[1] Radiocarbon dating derived from the large timber structures in the vicinity of the deposit is 1335 BC, but there are sufficient reasons to be adduced against the acceptance of this date for the bronzes to make it inoperable when the larger issues of west-China metallurgical history are considered. First the connection of the timber structure with the bronzes themselves is open to question, then corresponding doubt is raised by the meagre stratigraphical evidence cited by the excavators; and, most forcibly, the accompaniment of shouldered stone axes argues for a date towards 500 BC. These last are part of an illustration of a movement from the north southwards down the extreme western zone of China such as offers plausible context for the development of the bronzework which makes Yunnan distinct. Sima Qian's history records the names of many peoples inhabiting Yunnan and claiming tribal independence while submitting to the authority of the Dian king. In a conflation of history with archaeological data which recalls interpretations in western Asia drawing on Herodotus (except that the Chinese ethnonymy is more complete and the surviving toponymy evidently more reliable), Chinese archaeologists currently attempt to identify regional culture traits with ethnic groups.[2] The tribal mosaic conforms more or less to the plains surrounding the lakes Dian hu and Er hai, and to the courses of the great north–south flowing rivers. The Nu jiang (Salween) and the Lancang jiang (Mekong) allow communication along the eastern edge of the Gaolisong (a southern spur of the east-Tibet massif, forming the north-western boundary of Yunnan) and afford ready access to Burma, Thailand, and Laos. From southern Sichuan into north Yunnan the river routes are less direct, and the serpentine west–east course of the Jinsha jiang (due to become the Yangzte at a confluence in east Sichuan) may have tended to deflect southward movement.

The Haimenkou socketed axes are reported to include speci-

[1] *Kaogu tongxun*, 1958, no. 6, pp. 5 ff.

[2] The ethnic divisions of ancient Yunnan and the distinctions of regional cultures are described and discussed at length by Tong Enzheng, 'Jinnianlai Zhongguo xinan minzu diqu Zhanguo Qin Han shidai de kaogu faxian ji qi yanjiu' (A study of recent archaeological discovery of the Zhanguo, Qin, and Han periods in the regions of the south-western Chinese peoples), *Kaogu xuebao*, 1980, no. 4, pp. 417 ff.

mens of pure copper (in which case their casting is a feat of special skill) and others of tin bronze. Whether the early date attributed to them in China be maintained, or a later one allowed on the grounds explained above, their shape is closer to that of axes known from Sichuan (*c.*500 BC) than to that of any specimens referable to Shaanxi or the Chinese central provinces. The Haimenkou axes were cast in bivalve stone moulds (one half of such a mould was recovered on the site) and so represent an extension of the tradition of Inner Asia and of the Chinese northern zone. Eventually, elsewhere in the western zone and in the southern coastal provinces of China, it appears that the bivalve moulds were made of pottery to exactly the shape of their stone predecessors. The shouldered stone axes which accompanied the Haimenkou metal axes have also a revealing geographical distribution. In China at large this tool is confined to the south-east of a line joining the Yangtze delta with the area of the Guizhou–Guangxi boundary, and southwards down the western zone, through Gansu–Sichuan–Yunnan, it is found in increasingly refined versions. Thus the roughest specimens occur on the head-waters of the Lancang jiang in eastern Tibet, and in central Sichuan; but in this last area and southwards the rectangularity of the shoulder and tang improve. At both the north-west and the south-east ends of Gansu the axes continue late, with many varieties, dating from the middle of the IInd millennium onwards. One authority connects this distribution with a slow migration of the Jiang people, who seem to have begun their travel from the eastern edge of the Tibet massif and to have followed the rivers southwards.[1] The spread of the shouldered axe south of the Yangtze, into Guizhou and Guangdong, may well be explained as the culmination of this movement down the western zone. It is noticeable that the south-China specimens are particularly well formed. From Thailand we have little information; but whereas the chisel-shaped, small stone axe-adze almost regularly enters the grave-goods of burials in central and north-east Thailand dated about 1000 BC and earlier, shouldered axes are never seen. An isolated well-formed specimen found *on the surface* at Kok Charoen in Lopburi province suggests that the type reached central Thailand after the time of the burials, which centres on 1000 BC. By such means one may argue for the continuity of a culture trait, present in the western zone in the later IInd and the earlier Ist millennium, which distinguishes this zone from regions farther

[1] Ibid., pp. 439–40.

east in China. A comparable kind of intercommunity communication, such as need not imply the transfer of tribes or cultural complexes, is demonstrated no less decisively by the geographical distribution of stone slab-graves. While the notion of a 'slab-grave culture' has been entertained, based on the northern distribution of these tombs and their increasingly impoverished contents, there can be no idea of a uniform cultural complex or a unitary ethnic group following the extraordinarily wide spread of the slab-cist tradition.[1] From the northern segment of our western zone the slab-graves extend far to the east, reaching the line of the Taihang shan and beyond, and in this extension carrying with them a pale reflection of the bronze tools and weapons associated with the 'Scythic complex' on the central Asian steppe. The southward extension enters Sichuan, where it is contemporary with the wooden boat-coffin burials of central Sichuan, and a little later with the shaft tombs and characteristic coffins stemming from the Chinese metropolitan tradition. In Sichuan the stone slab-graves are elegant indeed, and eventually, in the north of the province, are found to contain the black burnished urns with large loop-handles, of the so-called Lifan culture, possessed of one of the most distinguished early ceramics of China. East of Gansu and Sichuan, and what is more to our present purpose, in Yunnan, the stone slab-graves are not found. If the stone settings associated with the earth-pit burials of the IInd and early Ist millennia in Thailand are in any way an echo of the tradition of stone cists, the connection is surely too remote to vindicate the continuum of a culture trait.

It follows from these observations that not a single culture, or even a succession of closely related cultures, occupied the western zone of China in the centuries which saw the first manufacture there of bronze at a number of widely spaced places. But from north to south can be followed a concatenation of traits which indicate communication from place to place and in sum a continuum of receptivity through which ideas concerning metallurgy might be transmitted, without the necessity of narrow cultural or ethnic attachment and without a concordant distribution of metallurgical phenomena with other cultural elements. The model conceived on these lines places the problem of metal-working origins and diffusion in the same perspective as that supposed above for the Yangshao and Longshan cultures of north-west and central China.

[1] W. Watson, *Cultural Frontiers in Ancient East Asia*, pp. 25–38.

The copper and bronze socketed axes of Sichuan and Yunnan, by their mutual resemblance and common difference from types known farther east in China, establish an initial case for metallurgical connection between the two provinces. In other matters the trend of adoption appears to be from north to south, so there is a presumption that the basic knowledge of bronze casting, if there was transmission of it from place to place, moved also in a north-to-south direction through our western zone—unless, that is, one gives credence to the theory of primary local invention in one or both of two regions of South-east Asia, as maintained by some writers. To that question I revert below. We note that when a diffusion of bronze types from Yunnan can be shown indubitably, the movement is towards the south and east, and never to the north. So there is reason for believing that the communication of technique which gave rise to the Yunnan bronze age also followed a north-to-south trend, bringing ideas from north-west China into Yunnan, and arguably beyond, along the uplands and down the valleys of west China, bypassing the Central Plain. The sequel in Yunnan is one of the most arresting events in the Asian bronze age. A little farther south from the much discussed socketed axes of Haimenkou, at Dabona (Xiangyun xian) and Wanjiaba (Chuxiong xian) on the Lancang–Jinsha watershed, have recently been excavated bronze drums of a hitherto unrecorded variety, and of primitive aspect (Pl. XIX).[1] Their shape and lack of ornament places them typologically ahead of the classical, much decorated class of Heger's Type I,[2] which is abundantly present at the Dian necropolis of Shizhaishan[3] and is widespread in South-east Asia. In the Dabona tomb the drum and a bronze bell accompanied a bronze inner coffin, the latter two items being decorated with repeating geometric patterns in grooved lines. Like the drum, but more explicitly, the bell and coffin suggest recourse to wax casting. The wooden casing of the coffin is dated by radio-carbon to 400 or 465 BC, and the Wanjiaba drum, present at a site where one grave is dated to

[1] Dabona: *Kaogu*, 1964, no. 12, pp. 613ff., and 1965, no. 9, pp. 478ff.; Wanjiaba: *Wenwu*, 1978, no. 10, pp. 1ff.

[2] F. Heger, *Alte Metalltrommeln aus Südostasien* (Leipzig, 1902).

[3] The fullest review of the results of the Shizhaisan excavations in a western language is found in Michèle Pirazzoli-t'Serstevens, *La Civilisation du royaumé de Dian à l'époque Han* (École française d'Extrême-Orient, Paris, 1974). It will be noted that discussion of the drums takes our narrative into the Han period and so beyond the limit of the title. The Dian and Dongson phenomena are, however, wholly a prolongation of pre-Han tradition. *Yunnan qingtongqi luncong* (Peking, 1981) is the most recent comprehensive study made in China.

690 BC, is believed also to belong to the fifth century. Since the Shizhaishan drums (or cowrie containers, for they were put to this use) date at the earliest to the late fourth century, the new specimens are taken to head the Chinese list as Type A in Wang Ningsheng's classification and Type 1*a* in Li Weiqing's.[1] The method of casting used for the early drums is strictly open to question, for lacking the tell-tale ornament they give no direct evidence for the employment of wax models. But the Dian drums, as well as the abundance of contemporary decorated weapons and ceremonial objects, leave us in no doubt: they represent the most skilled lost-wax casting executed in the ancient east, and thereafter, until almost modern times, the same method is documented in the manufacture of the bronze drums in their far spread through South-east Asia. The weapons and decorated objects included in the tombs of the Dian necropolis fall approximately into three chronological groups. The oldest group is dated by radio-carbon to an upper limit of 550 BC, and for them it may be argued, though perversely, that stone moulds were employed. In the fourth century, at the transfer to the second stage, weapons and tools certainly appear to have been cast from moulds formed on wax models, as were the first Shizhaishan examples of drums and cowrie containers (Figs. 4–5). At the third stage, in the second and early first centuries BC, the wax castings are at their most elaborate and artistically at their most expressive, and the custom arises of fixing much modelled bronze handles on iron blades—the outstanding instance of the 'bimetallism' celebrated by South-east Asian archaeologists (Pl. XXI*a* and *b*). The freest modelling appears in figurines of unparalleled realism. The art is already advanced at the site of Lijiashan near the Dian centre, where the inferred date lies between the mid-sixth and the early third century BC.[2] In sum, we may now confidently place the beginning of lost-wax casting in Yunnan at the latest around 400 BC, but the circumstantial evidence—particularly the large castings found at Dabona—strongly suggests that the method was followed in an elaborate degree somewhat earlier in the fifth century. When wax casting is adopted in south-central China for the manufacture of funerary vessels and some sepulchral paraphernalia now trans-

[1] Papers by Li Weiqing and Wang Ningsheng in *Gudai tonggu xueshu taolunhui wenji* (Papers read at the research colloquium on ancient bronze drums) (Peking, 1982); Tong Enzheng, *Shi lun zaoqi tonggu de shidai fenbu zushu ji gongneng* (On the date, distribution, ethnic identity, and function of the early bronze drums) (Sichuan University, 1982).

[2] *Kaogu xuebao*, 1975, no. 2, pp. 97 ff.

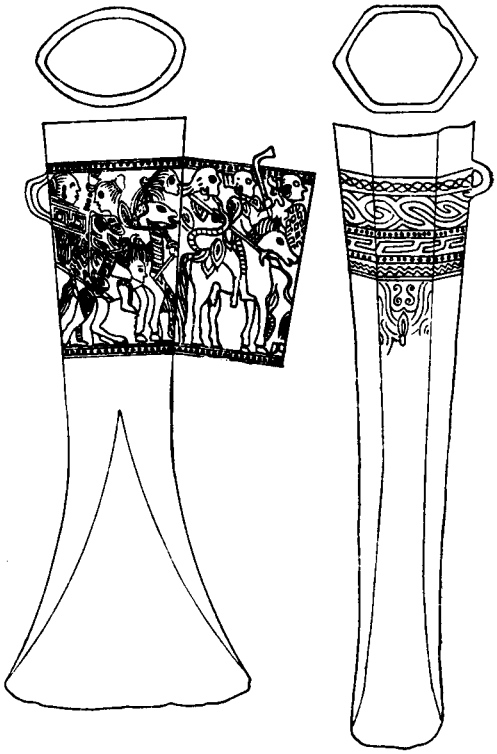


FIG. 4. Bronze socketed axes with geometric and figural decoration, excavated at Lijiashan, Jiangchuan, Yunnan. After *Kaogu xuebao*, 1975, no. 2.

ferred from wood to bronze for the first time, as exemplified in the Zeng tomb, it may have long remained distinct from direct casting as a matter of workshop practice. Only in the Han period can we find work which indicates a ready association of the two methods. Thus in the two pre-Han centuries we perceive an association of diverse technical methods in bronze production, the distinction being reinforced in the grand funerary bronze of princes by the connection of one with ritual forms of ancient Zhou tradition, and the other with neoteric items deriving from local cult and custom. In the latter respect the central region of Hubei and Hunan shows independence comparable to that of the Dian kingdom. We have already supposed that a tradition of wax casting was transmitted from the north-west down the western zone, and the likelihood is that workshops in south-central and south China were tributary to the same tradition.

In the sphere of ritual bronze the advance of south-western tradition into central and south China is symbolized vividly by the

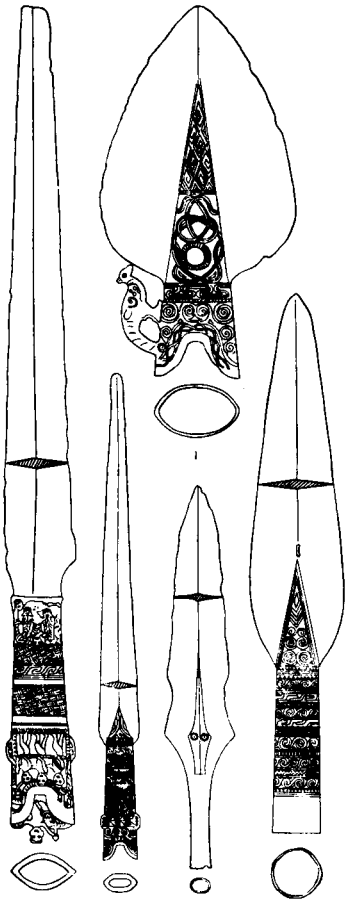


FIG. 5. Bronze spearheads with geometric and figural decoration, excavated at Lijiashan, Jiangchuan, Yunnan. After *Kaogu xuebao*, 1975, no. 2.

travel of the bronze drums. Placed in typological and chronological series these are seen to spread outwards to east and south from the Dian region, but everywhere—in Thailand, Malaysia, Java, and south China—it is drums of Heger's Type I that are found, in other words the second transformation of the drum in the chronological series currently argued by Chinese authorities.[1] Such is the case of the drum unearthed at Xilin on the western tip of Guangxi, the ancestor of a large family of south-China versions that continued in manufacture for a thousand years (Pl. XIX). It is arguable on the present evidence that the eastward movement

[1] The fullest recent review of the Heger Type I drums, with an analysis of their ornament, is J. Loewenstein, 'The Origin of the Malayan Metal Age', *Journal of Malayan Branch of Royal Asiatic Society*, xxix, pt. 2 (1962), pp. 5–78.

began in west Yunnan (cf. the sites of Dabona and Wanjiaba in the Erhai region), reached the Dian centre in the second stage of development, and so on into Guangxi and Guizhou at the hands of a population of consanguineous, or at least confederated, tribes: the Yelang of the histories, eastern neighbours of Dian and with them sharing the further ethnonym Pu. In other directions tribal relationship cannot, in the lack of written record, be invoked to account for the diffusion of virtually identical specimens of the classical type (i.e. Heger Type I, Wang Ningsheng Type B, Li Weiqing Type I*b*), which passed to places where no sign of other Dian products appears. Where utility supplies no explanation, ritual motives, rather than aesthetic or ceremonial-political, have been examined in a vast western literature, to which is now added a growing positivist literature in China. Here it must suffice to take note of the most persuasive synthesis of interpretation lately put forward by Loofs-Wissowa.[1] This 'regalia theory' sees the drums as 'bestowed emblems of legitimate power', and 'we must further imagine the coming and going of embassies or missions from tribal chiefs in various parts of South-east Asia who through the obtaining of a drum would seek to become kings in the then accepted sense of the term and thus be integrated into a wider politico-religious system, transcending their own relatively limited one'. In this the author sees in some way prefigured an aspect of the later indianization of South-east Asia in the course of which elements of Indian kingship and brahmanical religion were appropriated. One may add that such a function of the drums would also echo the donation, and as it were manufacture under royal licence, of the ritual bronzes of Zhou China, as part of ceremony designed to confirm political bonds; and the bestowal of a gold seal by Wu-di on the king of Dian in 109 BC prolongs the same notion of legitimization coming from a paramount power. In the case of South-east Asia, however, we are left in a quandary, which Loofs-Wissowa does not claim to resolve: does this theory require recognition of a single dominating rule, and if it does, where is that to be located? Before identifying the bearing of drum-interpretation on technical affiliation in metallurgy the regalia theory may be commented on from another side. At Kok Charoen in central Thailand examples were found of a superior pottery, shown by analysis of the fabric to be of probable distant manufacture (at least some forty kilometres from the site), which in one instance had been buried apart from the graves of the

[1] H. H. E. Loofs-Wissowa, 'The Distribution of Dongson Drums: Some Thoughts'. *Festschrift für Karl Jettmar* (Wiesbaden, 1983), pp. 410–17.

cemetery.[1] The vase in question is decorated with a meander pattern which recurs in the pottery of the Jinsha valley in north Yunnan, and is not unlike some of the geometric design used on early bronze. In Yunnan the pottery was dated by radio-carbon to 1260 BC, at Kok Charoen by thermoluminescence to a date between 1180 and 980 BC. It is reasonable to suppose that when the bronze drums were spread they followed routes blazed at an earlier time, traversing neolithic populations. The pottery from Kok Charoen may indicate displacement over a short distance of the vessels in question, but their exotic decoration and ceremonial treatment, linking with a region far to the north, carry the hint of a point to point communication of ideas from which the passage of bronze drums was later to benefit. The transport by river of the Type A/I*b* drums seems to be guaranteed by the prominence in their decoration of impractical boats crewed by warriors in festive garb. This ornament, drawing as it does so much on an iconography of myth and rite, perforce commemorates much more than a political mission, but this is not incompatible with a role in advertising tribal power.

The view which I have proposed of a leading part played by the Yunnan bronze industry in relation to South-east Asia as a whole by no means goes unchallenged.[2] Some issues important in principle emerge from the tangle of a debate in which radio-carbon dates have flown like brickbats in the effort to establish the ownership of the earliest bronze and the earliest drum. One is the question of an independent invention of copper and bronze metallurgy at a South-east Asian centre. Not only Yunnan, but

[1] Recent papers on Thailand/Yunnan relations are as follows: W. Watson, 'Pre-Han Communication from China to Thailand', *Proceedings XXXIst International Congress of Human Sciences in Asia and North Africa* (Tokyo, 1984), pp. 269ff.; W. Watson, I. C. Freestone, and C. M. Ho, 'Thin Section Analysis of Pre-Iron-Age Pottery in Southeast Asia', *Proceedings Shanghai Conference on Ceramic Technology* (1983), forthcoming; W. Watson, 'China's Western Zone', *Proceedings Research Conference on Early Southeast Asia* (8–11 April 1985) (British Institute in South East Asia, Bangkok), forthcoming.

[2] The current controversy is well examined by H. H. E. Loofs-Wissowa, 'The Development and Spread of Metallurgy in Southeast Asia: a Review of the Present Evidence'. *Journal South East Asian Society*, xiv, pt. 1 (March 1983), pp. 1–11. This paper is followed by rejoinders by D. Bayard and Pisit Charoenwongsa, and by W. G. Solheim, and finally by Loofs-Wissowa's reply. For the latest claims made by Vietnamese archaeologists see Phom Huy Thong, 'New Horizons in Vietnamese Archaeology: I', *South-east Asian Studies Newsletter*, no. 18 (December 1984), pp. 1f. (B.I.S.E.A., Bangkok). A number of papers with detailed exposition and argument is included in R. B. Smith and W. Watson (eds.), *Early South East Asia* (Oxford, 1979).

north Vietnam, Laos, Thailand, and Burma have the unique advantage of close deposits of copper and tin. For theories intent on vindicating independent invention the proximity of the two ores is enough to spark invention and to foster rapid development. In this respect north-west and central China are much less well favoured, and indeed no claim for absolute priority has been raised there. At Non Nok Tha in north-east Thailand a series of radio-carbon dates applying to a complex stratification was said to support a late IIIrd millennium date for bronze, and parts of a bivalve mould proved the manufacture of socketed axes. It was even surmised at one point in the debate that a sophisticated form of this tool was in use in South-east Asia during the IVth or even the Vth millennium BC. A merit of these interpretations of technical data is the resolve to abandon, or at least view askance, a conventional approach to the Asian bronze age, in which the priorities of central China and the Near East tend to be accepted as axiomatic simply because in these regions it was that high bronze-age civilization arose. This controversy, largely obscure to the outside world through the controversialists' appeal to unpublished material and inaccessible statements, turns on the vindication of the independence and originality, technical and artistic, of bronze-age culture present on China's south-west border and in the countries of the southern seas. The distinct character of the South-east Asian development has, however, never been questioned, so the debate turns on origins, and for a decade or more has been conducted as a *concours de priorité*. As to absolute dates there appears now after all to be agreement that bronze was known in mainland South-east Asia 'by at least the mid-IInd millennium', while some observations suggest a date earlier by five or six centuries. The analogy however of events we have reviewed in west China certainly favours the lower estimate; and in Yunnan, although no such early date is reported for bronze working, we perceive through the Ist millennium a logic of cultural development which integrates plausibly with traditions passing through the Chinese western zone from the north. But in South-east Asia metallurgical events have not yet been so well related to cultural and political contexts. A second issue in principle has been the existence in South-east Asia of a phase—not only a chance aberration—in which pure copper was shaped or cast, a chalcolithic age. In north China, it can be argued, the use of pure copper may have been enforced by the mere lack of tin. Since there can have been no such shortage in South-east Asia, the identification of a phase of copper use would have a general

interest with implication farther afield in Asia. But no satisfactory evidence for the existence of this phase has been adduced, while the invocation of the copper axes found at Haimenkou in Yunnan is weakened by the doubts attaching to the stratification and date of that site. The third branch of discussion has long been the search for an origin, an initial *foyer de dispersion*, of the bronze drums. Only the province of Tonkin in north Vietnam, where the eponymous site of the Dongson bronze age of South-east Asia is located, rivals with Yunnan, and here we mention only the heads of the debate. First, the abundant production in this region of the fully figured drums of the Heger I type, and of the figural plastic art associated with them—this at a rudimentary level compared with Yunnan—have sustained the argument for the primacy of Tonking, or its equal ranking with Yunnan in the dissemination of the design, ornamentation and ritual institution of the drums. Fact is averred against fact, even to the existence in Tonkin of elementary forms matching the Dabona drums of Yunnan, and radio-carbon dates of equal or higher age. But, for what that is worth in a comparison where the near contemporaneity of production at the two centres is not in doubt, the context of the process found in Yunnan suggests an initial priority, for there the early type of the diaspora appears among numerous other drums and similar vessels; the figural art is far and away in advance of that of Dongson; and the geographical spread of the drums—particularly the transmission east into Guizhou—upholds the Yunnan view. But the divergence of opinion in this case matters less than the contestants would make it seem. Joined by the course of the Red river, over a distance of a mere five hundred kilometres, the Yunnan and the Tonkin bronze industries were evidently in close communication, jointly creating an axis of progress that was fundamental in the bronze age culture of South-east Asia. If, one cannot refrain from adding, the drums travelled south in the first phase of their history down the Mekong and Red rivers from Yunnan, what more natural than to decorate them with festive boats and gaily attired crews? To explain these motifs one perhaps need not invoke the 'ships of the dead' so beloved of recent western exegetes. The advanced bronze industry of north Vietnam can have arisen only under the aegis of a political organization wielding wide influence. Of this we still know less than we do of the history of the Dian state of Yunnan.