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The beginning of the Early Metal Age in the USSR was, as mentioned above, associated with people from three main regions: the southern part of Soviet Central Asia; Transcaucasia; and the southwestern USSR – or, more accurately, the southern half of eastern Europe (fig. 7). Despite certain similarities in the general appearance of the cultural federations in these areas, they differed markedly in many important features, including their technological and metallurgical production. The development of each of the metalworking focuses was also different.

Southern Soviet Central Asia: the Namazga I-III culture
The earliest farming culture in southern Soviet Central Asia was the Djeitun culture, named after the settlement site of Djeitun. It was distinguished by a purely Neolithic economy, without the slightest indication of metal use. The culture is now generally dated to the sixth millennium BC, although there is little to base this on. The Djeitun culture was replaced by one belonging to the Copper Age proper, previously known as the Anau type of culture, but now usually referred to as the Namazga I-III type. Metal artefacts occur sporadically for the first time in Soviet Central Asia, beginning in the earliest levels of this culture – Namazga I and Dashlydzhi-depe. The settlement sites of this culture usually form tells just north of the Koppeh Dagh. The Namazga-depe tell itself is the most striking of these artificial hills, with major constructions dating from the fifth through to the very end of the second millennium BC; at certain periods of its existence this settlement reached impressive dimensions (up to 100 hectares); because of this we consider it as one of the classic sites, both for the Koppeh Dagh and for regions further south.

It is very difficult to establish a strict chronology for the Namazga I-III culture. This is because of the very small and rather contradictory series of radiocarbon datings from it, as well as its peripheral position with regard to the related cultural community in Iran, and to Mesopotamian sites of the same period. Calibrated radiocarbon dates show that, as a whole, this culture can be dated to the period from the fifth to the middle of the second half of the fourth millennium BC. The latest levels (Namazga III) may be compared, in terms of their ceramic and terracotta assemblages, via Tepe Hissar IB and IC (in Iran), with Tepe Sialk III 5-7 (see, for example, Masson 1964; 123–70; 1982: 13–14; Dyson 1965: 225; Yule 1982: fig. 3), and via these, with Uruk XV–IV. The Sialk IV levels are probably contemporaneous with the Jemdet-Nasr period and with Namazga IV and date to the end of the fourth millennium BC, or closer to 3000 BC. The material from these sites provides evidence for the beginning of the EMA over a large
Cucuteni–Tripolye A (nos. 1–5) and B (nos. 6–10) settlement sites: (1) Karbuna; (2) Novye Ruseshty; (3) Aleksandrovka I; (4) Luka–Vrublevskaya; (5) Sabatinovka; (6) Brynzeny III and IX; (7) Gorodnitsa; (8) Tripolye; (9) Veremey; (10) Vladimiriska.

Sites of Mariupol–Chapli-type steppe cultures (1–3) and the Khvalynsk–Sredni Stog community (4–7): (1) Nikolskoe cemetery; (2) Chapli cemetery; (3) Mariupol cemetery; (4) Sredni Stog I settlement; (5) Petrovskiy-Novoye cemetery; (6) Dereivka settlement; (7) Aleksandrova (Aleksandriya) cemetery; (8) Khvalynsk cemetery.

Settlements of the Shulaveri–Shomutepe (1–4) and later cultures (5–6): (1) Shulaveris-gora; (2) Khramis Didigora; (3) Kul-tepe I near Nakhichevan; (4) Mishurachai; (5) Tchut; (6) Damtsvari-gora.

Settlements of the Namazga I–III culture: (1) Anau; (2) Kara-depe; (3) Altyn-depe; (4) Mondzhably-depe; (5) Ilginy-depe; (6–10) Geoksyur oasis (Geoksyur settlements 1 and 7, Yalangach-depe, and Mulall-depe).

Stray finds: (1) Ust-Labinskaya; (2) Rugudzha; (3) Sarazm (settlement).
region, extending through Iran, Mesopotamia and southern Soviet Central Asia. The use of calibrated radiocarbon dates may push back the start of the Early Bronze Age to the middle of the fourth millennium BC (Mellaart 1979: fig. 1).

The territory of the Copper Age Anau culture includes the foothills of the Koppeh Dagh, from the Caspian as far as the delta of the river Tedzhen, which disappears into the sands. The main sites can be divided into three geographical groups: western (Anau and other), central (Namazga-depe, Kara-depe, Yassy-depe and others), and the eastern or ‘Geoksyur oasis’ group in the Tedzhen delta (Geoksyur I, Yalangach-depe and others).

Decorated pottery is the feature that unites these sites into a single type of culture. Painting on vessels is either mono- or polychromatic. This painting changes over time, and from site to site. In the early stages, monochrome painting predominated, in a dark brown colour on a red or greenish-yellow background. In the Namazga I period geometric representations – triangles, rhombuses, chequered designs and so on – were drawn in this colour. In the Namazga II period, vessels with hatched bands of bi-coloured, geometric shapes occur, along with schematic representations of long-horned goats. As well as the dark brown coloured painting, a reddish-brown colour was used, observed in settlements of the central group. At this time pottery decoration in the Tedzhen delta was far more primitive (the Yalangach type of monochrome painting); however, in the next stage of development of this eastern type of decoration, the individual ‘Geoksyur style’ of vessels with elaborate and elegant ornamentation arose, with complex crosses and zigzags, rhombuses and triangles, graceful figures of goats and fantastic animals painted in black and red. In the west, bi-coloured painting was again replaced by monochrome.

This decorated pottery, so widely represented in layers of Namazga II and II sites was superseded by wheel-made pottery, although some decorated pottery still occurs in Namazga IV deposits. Generally speaking, archaeologists (Masson, Sarianidi and Khlopin) base their conceptions concerning the chronology of these sites, links between cultures, migrations of particular tribes, and so on, on the study of the style of pottery painting. However, painted pottery accounted for only a fifth of the total number of vessels on these tell sites. The vast majority of vessels were crude, comparatively badly worked kitchen pots.

The Anau culture is divided into two main chronological phases. This division is based on changes in the style of architecture (as well as on pottery). In the earlier phase, the rectangular one-room houses with annexes and small courtyards, already known to us from the Djaitun culture, predominate. Archaeologists generally take this as evidence that the Anau culture originated in the preceding Djaitun culture. It is true that, in the Copper Age, mud bricks, measuring roughly 45 cm × 20 cm × 11 cm, began to be used for construction, replacing large clay blocks. These bricks were used to build not only house walls, but also, at several settlements, defensive walls around living complexes. The interiors of houses at this time (as later) were sometimes decorated with painted lines, triangles and rhombuses, and the remains of distinctive hearths or ovens are found in them.

In the later period houses had several rooms, separated from each other by narrow
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passages. Sometimes – as, for example, at Kara-depe – the centre of the settlement was not built over, and can be assumed to have been some kind of social area. Settlements differed greatly in size. One of the tiniest settlements of the Geoksyur oasis, Dashlydzhi-depe, occupied a total area of 1,600m² (Namazga I period). The Geoksyur I settlement covered 12 hectares, and Namazga-depe III is believed to have covered the vast area of 100 hectares. The Namazga III period was the climax of the development of the Copper Age cultures of Soviet Central Asia.

The economy of the inhabitants of this zone was based on irrigation agriculture. Although major channels have not been discovered, there must have been small drainage channels running off from the reservoir or stream. Barley and wheat were the principal cultigens, while stock-raising, mainly of cattle, finally took precedence over hunting for onager, small antelope and wild sheep. The predominance of cattle over sheep and goat is rather unusual for Soviet Central Asia, and can be explained by the presence of good pasture near the settlements and also by the better irrigation of the region as a whole.

Similarities between this culture and Iranian cultures such as Tepe Sialk II–III, Tepe Giyan and other more distant ones, in terms of the pottery vessel assemblage and the huge range of terracottas, were a function of the close links between them and the fact that they all had a farming economy. Among the terracottas, the wide range of carefully made female statuettes with (generally speaking) exaggerated sexual characteristics stand out as exceptional. They are usually in a sitting position and often decorated with representations of neck ornaments and coiffures. Male figurines, with attempts to depict an individual portrait likeness, are known from Kara-depe.

Scholars base their reconstructions of the complex ideology of these early agricultural and stock-breeding tribes (which were part of a broad zone of cultures, extending during the sixth to fourth millennium BC from the Balkans to southern Afghanistan) on the forms of plastic art and the decoration on prestige pottery. The Namazga I–III culture was on the extreme northeastern periphery of this zone of cultures, and had a basically similar economic system and world outlook.

The ‘Near Eastern’ tradition is also evident in the funeral rite. The majority of graves occur within settlements, but archaeologists have also found special ‘tholos-type’ funeral chambers. These are rectangular or oval in shape, sometimes distinguished by a corbelled vault, containing the remains of as many as eight people (Geoksyur I settlement) buried at different times.

The earliest metalwork in Soviet Central Asia appears in levels belonging to the Namazga I culture. The first metal tools are generally undiagnostic in type and occur as fragments. They increase in number in the Namazga II and III periods. It is then that a range of typologically distinctive artefacts appears. The awls and pins constitute the largest category (fig. 8.16–19). They are tetrahedral (square or rectangular) in section. Their average length is 5–10cm, although the vast majority occur as small fragments. Needles with eyes also belong to this category (fig.8.17). The eye was formed by bending round one of the ends of a thin copper bar. Chisel-type tools are also sometimes found (fig.8.15 and 19).
Figure 8  Copper artefacts from sites in southern Soviet Central Asia dating to the Namazga I-III period: (1) Goksyur IV (settlement); (2) Alu-depe (settlement); (3) Goksyur VII (settlement); (4, 11, 17, 20-22, 28, 29) Goksyur I (settlement); (5, 13) Yalangach-depe (settlement); (6, 7) Urgench-depe (settlement); (8, 16, 18, 26, 27) Kara-depe (settlement); (9, 23-25) Anau (settlement); (10) Altyr-depe (settlement); (12) Mulali-depe (settlement); (14) Titkin-depe (settlement); (15, 30) Serakhskoe (settlement); (19) Mundzhukly-depe (Scales in cm).
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Knives, of which there are a few dozen examples, are far more important. Their form is variable: simple flat knives with no tang (fig. 8.1, 2), knives with an indication of a tang (fig. 8.3–7), and knives with a clearly distinguished tang (fig. 8.9–12) all occur. On the whole, the length of the tools varies between 7cm and 15cm. Their morphological classification has not yet been worked out, since the number of tools is small, and the majority of them are broken. The chronological position of particular typological varieties of knife remains correspondingly unclear.

Large copper tools like the flat axe-adzes from Yalangach-depe (fig. 8.13) or tools like the gouge from Kara-depe (fig. 8.8) are very rare in sites of the Namazga I–III type. It seems evident that craftsmen in the early agricultural cultures of Soviet Central Asia did not usually produce large copper chopping tools.

Copper ornaments were a significant element in metalworking production (fig. 8.20–30): pins (up to 20cm long) with biconical heads and thickened ends were the most important of these (fig. 8.20–2). The earliest examples date to the Namazga I period. Their production then became traditional and continued for three to four millennia – up to the Namazga V–VI period.

In addition to pins, a certain number of rings and bracelets (fig. 8.26, 27, 30), flat disc-mirrors (fig. 8.28, 29), and small beads and pendants (fig. 8.23–5) were also manufactured. Their typological classification is also unclear: their forms are varied and the number representing each type is not great.

The technology of these copper artefacts has been studied in detail with the aid of microscopic methods of metallographic analysis (Chernykh 1962; Terekhova 1975). A large number of different categories of tools and ornaments has been studied and the chemical composition of the metal determined spectrographically.

The spectroanalytical work showed that these artefacts were made from copper that had not been deliberately alloyed, but was nevertheless contaminated with a large number of natural admixtures (lead, bismuth, arsenic, antimony, silver and so on) which had passed into the copper while it was being smelted from the original ore. It was also established that the high degree of impurity in many ways determined the methods of metalworking.

The basic methods of working metal were the smithing methods of casting, followed by hot forging. Cold forging was also used. Cast blanks were hammered into shape. Harmful admixtures of lead and bismuth, deposited in the form of massive inclusions along the boundaries of the copper crystals, prevented the craftsman from carrying out the complete hot-forging process. During heating, lead and bismuth, which have a low melting point, could fuse, which led to the hot-shortening of the object. The craftsman was therefore obliged to carry out the forging in a narrow temperature range – not above 200°C. During cold forging the smith annealed the metal to remove intercrystalline faulting, with the aim of restoring lost plasticity to the copper. During this process he could not exceed the melting point of pure lead and bismuth, which threatened to smelt and hot-shorten the artefact. Metallographic research has shown these methods to have been fundamental to the practice of coppersmithing in Namazga I–III type cultures.

The natural admixtures (those entering the copper from the ore) enumerated above provide clear evidence of the use of polymetallic deposits. The chemical composition of
ores from such deposits was characterized by a sizeable set of admixtures occurring with the copper, of which the main ones were lead, zinc (which evaporated during smelting), bismuth, arsenic and antimony. All attempts to find a copper or polymetallic mineral source with a similar set of admixtures in neighbouring regions have failed. The Koppeh Dagh mountain system is generally very poor in copper deposits and ore outcrops. It is therefore assumed that the metal occurring in Namazga I–III contexts is imported, probably from the mining and metallurgical centres of Iran, where there is definite evidence of metallurgical activity for this period – Shahr-i-Sokhta, Tal-i-Iblis and others (Coldwell and Dougherty 1966; Hauptman 1980). We can thus conclude that the Namazga I–III cultures of the southern regions of Soviet Central Asia were connected with metalworking, rather than a metallurgical focus. Its activities were quite closely linked with the more developed centres of the Iranian plateau, although the characteristics of these still remain in many respects ill-defined. Typologically similar ornaments are known from various Iranian sites, starting with the earliest, the Sialk I type (Pins with biconical heads: Ghirshman 1938: 16, table II, 49, 54–5), and later the Hissar I type (Schmidt 1933: table XC, A; Yule 1982: 18, fig. 10B).

Transcaucasia: the Shulaveri–Shomutepe culture

The second area where there were early agricultural cultures in what is now the USSR is Transcaucasia, represented by a striking and rather original culture, named the Shulaveri–Shomutepe culture (after the settlement sites Shulaveris-gora and Shomutepe) in the sixth to fifth millennia BC. Settlements occur in the southern (valley or steppe) regions of Transcaucasia. Sites of the northern variant of the culture, for example the settlements of Shulaveris-gora, Shomu-tepe, Khramis Didigora, are located in the basin of the middle reaches of the river Kura. Further to the southeast and south in the valley of the river Araks, sites of the southern variant of the culture such as the Kyul-tepe I settlement, occur.

The Shulaveri–Shomutepe settlements are the first of tell type to occur in Transcaucasia. The tells of the northern version of the culture are, generally speaking, quite small and do not exceed 7–8m in height. The southern tells, of the Kyul-tepe I type, are much larger, with up to 18m of stratification. The Shulaveri–Shomutepe culture was the first farming community in Transcaucasia, but it is hard to establish whether agriculture or animal-keeping was more important. The balance between these two elements of the economy has not yet been reconstructed. Domesticates included cattle, sheep and goat, and pigs.

In the Shulaveri–Shomutepe culture the buildings (conical, domed houses with annexes) were grouped tightly together. Each distinct complex of units was relatively surrounded by the low wall of a circular courtyard. Clay was the construction material. Earlier buildings were made of wattle and daub whilst later construction mainly used mud bricks, with a slightly convex, ‘hunchbacked’ top, laid in single rows joined together with a clayey mortar.

Round dwellings predominated; rectangular constructions sometimes occurred, but these always had rounded corners. The diameter of a round dwelling varied from 2.5m to 5m, and the area from 10m² to 25m². Those who have studied the culture believe that
such houses, as a rule, would have been roofed with a dome in which a single opening served as both flue and window (Kiguradze 1976; Dzhaparidze 1976). Traces of the original entrance are also often found in the walls. The dome was sometimes supported by a central wooden column. The remains of a sunken hearth are usually found in the dwelling. The interiors were not notable for luxuries such as painting or furniture.

In everyday life, for work, hunting and war, the population mainly used stone and bone tools. The widespread occurrence of bone tools in this culture has surprised scholars, as large assemblages of bone and horn tools are most often characteristic of northern rather than southern Neolithic cultures. A large number of needles, pins, burning tools, spoons and arrowheads were made of bone and horn. Red deer antlers were used for making hoes and hammers. All the bone and horn tools were finished to a high standard.

Even so, stone tools predominate. Large quantities of flat-bladed knives, cutters, scrapers and bushels for bone and wooden sickles were manufactured from flint and fine smoke-coloured obsidian (vulcanogenic deposits of which occur widely in Transcaucasia and Anatolia). There are many pencil-shaped and pyramidal flint cores. Although the technology of working stone and obsidian was of a high standard, polished stone tools—flat axes, hoes and so on—are comparatively rare.

The first pottery in Transcaucasia occurs in the Shulaveri–Shomutepe culture. The quality of the first vessels and the standard of workmanship was not particularly high, and pots had a rather simple shape: oval with large, very thick, flat base. Round-bottomed vessels are also found. The clay paste used for these vessels contained organic admixtures (straw?) and was badly fired. The decorative pattern was also very simple, consisting of rows of lumps beneath the rim. Over time, the quality of the pottery improved. This applies to the firing, the more stable form which the vessels acquired, and to the decorative designs, which became more complicated. The surface of some of the pots was burnished.

The Shulaveri–Shomutepe culture has been divided into five chronological phases (Kiguradze 1976: 151–67). The final phases (the fourth and fifth) are exceptionally important for us in that the materials contain specimens of the first copper artefacts in Transcaucasia (Khramis Didgori, Kyul-tepe I, Tekhut), along with potsherds, painted with red, black and cherry-coloured stripes. It is difficult to overestimate the importance of this pottery, since it presents an opportunity to synchronize the Shulaveri–Shomutepe culture with northern Mesopotamian cultures like Tell Hassuna and Tell Halaf. Moreover, it seems that the final, fifth phase in the development of the Transcaucasian Neolithic—or the Eneolithic proper—can be correlated with the Halaf culture, and the preceding fourth phase can be correlated with the final stages of Hassuna. This is supported by the presence of anthropomorphic images and figurines of bulls. It is usually assumed that the painted pottery is imported, but the possibility of limited local production cannot be excluded.

In any event, the overall appearance of the Shulaveri–Shomutepe culture allows us to include Transcaucasia among the early agricultural communities in western Asia and Asia Minor where the people—for the first time among the cultures of the Old World—set out on the path of productive economy and continued through all the stages of the
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‘Neolithic revolution’. Admittedly, in more southerly regions (Iraq, Iran and Anatolia) this transition was completed much earlier with the rise of the outstanding cultures of the pre-pottery Neolithic, represented by sites like Jericho, Jarmo, Çayönü Tepesi, Çatal Hüyük and others. Unless new discoveries are made in Transcaucasia, we should consider that this stage was completed here later, in the sixth millennium BC. In all probability, Transcaucasia was the northern and relatively backward periphery of the developed Neolithic communities of western Asia and Asia Minor.

The Shulaveri–Shomutepe culture is very important for us in another respect, as the first metal in Transcaucasia appears on its sites. The tools and ornaments are unusually modest, both in their undiagnostic form and in number. Metal is usually associated with the latest phases of the development of the culture (the fourth and fifth). Finds were mainly concentrated on two sites: the Shulaveri–Shomutepe layers of the Kyul-tepe I settlement, near Nakhichevan in the Araks valley, and in the upper levels of the settlement Khramis Didigora on the eastern edge of Georgia. In addition, a metal knife is known from the settlement of Tekhut in Armenia (fig. 9.1), although there is disagreement over whether this settlement belongs to the Shulaveri–Shomutepe culture: many date it to a later time. Nevertheless, it still pre-dates the appearance of the Kuro–Araks culture in Transcaucasia. It is possible that Tekhut should be linked with as yet culturally unattributed pre-Kuro–Araks sites, which archaeologists have recently started to discover in Kakhetia (e.g. the Damtsvari-gora settlement in eastern Georgia). It is possible that these were contemporaneous with ‘Ubaid-type sites in northern Mesopotamia.

Metal artefacts from Shulaveri–Shomutepe sites occur in a very limited number of forms. Tools include various awls and fragments of awls (fig. 9.2), and two knives from Kyul-tepe I and Tekhuta (fig. 9.1, 4). Most of the objects are small, bead-like ornaments, rolled from thin copper leaf (fig. 9.3). The total number of metal finds in sites of this type, including the typologically least diagnostic, does not exceed twenty-five. It can hardly be expected that future excavations will increase this figure by very much.

The study of the typological parallels of this very limited assemblage is not fruitful. Only the knives from Kyul-tepe I and Tekhuta provide an indication that these forms
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were later (at the end of the fourth and during the third millennium BC, in the Early Bronze Age) to occupy one of the central places in the production of Transcaucasian metallurgical centres, already linked with the Kuro-Araks culture. Relatively similar forms of tanged knives occur at sites of the Sialk II–III (Ghirshman 1938: table LII.51; LXXXV. 127, 312, 1735) and Hissar I (Yule 1982: fig. 10b. 6, 7) types.

The vast majority of these artefacts are made of metallurgically ‘pure’ copper, in which only traces of smelting admixtures can be detected by spectroanalysis. However, some artefacts from Kyul-tepe I contain an admixture of arsenic exceeding 1 percent, which compels us to assume that it was introduced into the copper deliberately, although we cannot prove it. Evidence from the Tekhut knife is less ambiguous: it seems to be made from arsenical bronze with an arsenic content of 4.5–5.0 per cent (as determined by different laboratories). However, as we have already mentioned, Tekhut probably dates to a later period, for which the production of deliberately alloyed arsenical bronze can already be clearly proved on the basis of larger series of analyses.

However, copper artefacts which contain heightened concentrations of arsenic are found on contemporaneous sites in Asia Minor (belonging to the period preceding the Early Bronze Age): Mersin XII–XVI, Alişar, Pulur, Beycesultan and others (Esin 1969, analyses nos. 17745, 17710, 17711, 17885, etc.).

The copper ore sources of the Shulaveri–Shomutpe-type sites remain uncertain. It is not impossible that this metal originates from Transcaucasian copper ores, but we are not yet able to prove this.

Nevertheless, metalwork of this type provides evidence of the first steps in Caucasian metallurgy, the main developmental sweep of which belongs to a later period.

The southwestern USSR: the Cucuteni–Tripolye culture

The Tripolye culture is one of the most famous archaeological communities in what is now the USSR, and has already been the subject of dozens of monographs. Tripolye-type settlements (many hundreds are now known) have attracted the attention of amateur archaeologists since the end of the last century. Interest in Tripolye-type antiquities was initially fuelled by the striking pottery, with its complex, original shapes and astonishing painting.

The pottery of the early (A) phase of the Tripolye culture was decorated with incised lines forming complex spirals, flowing, wave-like flourishes and various bands winding around the body of the vessel, as well as other designs. It was not just the vessels themselves which were decorated, but also their lids. The later Tripolye B (or developed) phase was characterized by multicoloured pot painting in the form of various red, black or white wavy bands, often on a bright yellow background. The same decorative motifs usually persisted – complex interlacing bands and an ordered alternation of geometric figures (oval, elliptical and circular). Birds, bulls, goats and clothed figures begin to be depicted. The painting is elegant, with a harmony of structure and colour that required the highest skills of decorative art, developed over centuries. This high level of artistic production is also indicated by the thousands of anthropomorphic clay statuettes of sitting, squatting and standing figures, the vast majority of which are female. The sexual characteristics are accentuated, especially on the female statuettes.
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Depictions of men are also easily identifiable. Often the main facial features—nose, eyes and so on—are depicted. Painted statuettes are also found from time to time.

The Tripolye culture has been systematically studied and is usually divided into three consecutive chronological phases (Passek 1949; 1961). In the early (A) phase, sites are known from the Southern Bug in the Ukraine to Romanian Moldavia and the eastern Carpathians. In Romania, analogous settlements are termed Cucuteni type, and the whole culture is often called the Cucuteni-Tripolye culture. In the developed Tripolye B period the territory of the culture expanded eastward, as far as the middle reaches of the Dniester, and settlements are known as far west as eastern Transylvania. In the subsequent, third, stage (in fact corresponding with the CII or γII phase in Passek’s system) the Tripolye culture essentially broke up and can no longer be regarded as a single organism. A kind of chain of post-Tripolye cultures arose—the Usatovo, Gorodsk and Sofievka types, amongst others—which inherited only certain of the original features in terms of the production of pottery and clay plastic arts. These cultures are no longer Copper Age but have already entered the cultural system of the Early Bronze Age. For this reason, we will discuss only the Tripolye culture proper (phases A and B) in this section and exclude the latest C phase.

The Tripolye culture is known almost exclusively through its settlements. Only one large cemetery is known, dated to the very end of the Tripolye culture proper and located near the village of Vykhvatintsi in Moldavia, where sixty-one burials were excavated (Markevich 1981: 50–3). The graves were usually marked out with stones, and the bodies were placed in a contracted position in a pit, with a rich assemblage of pottery, statuettes, flint tools and, very occasionally, copper artefacts. In early Tripolye settlements (Luka–Vrublevetskaya, Soloncheny II), some burials in the classic mode of the early agricultural cultures of Eurasia (under the floor or in the foundations of buildings) are also known.

People of the Tripolye culture generally lived in rammed earth houses; sunken-floored or semi-subterranean structures also occur, but mainly in the earliest stage of the culture (phase A1). Later the one-, two- or three-roomed pisé house, rectangular in plan, became almost the only type of dwelling. The house was covered by a pitched roof, wooden rafters and straw or reed thatch. Inside, there were rectangular ovens, clay tables and sacrificial alters. The area of the dwelling varied considerably (between around 50m² and 160m²). It is now suggested that two-storey dwellings were constructed (Markevich 1981: 81–8).

Tripolye settlements varied considerably in size. The largest settlements occupied 50–70 hectares and consisted of around 200 houses (Vladimirovka, Varvarovka VIII, Starye Badrazhi, etc.). Settlements were situated on river banks, near ravines, and on high plateaus—mainly where there was fertile soil and good pasture.

The Tripolye culture had a mixed farming economy, although the hunting of meat animals also played a considerable rôle. The main crops were wheat of various types, barley and millet. Field crops included peas, vines, plums and apricots. The land was worked with hoes made of stone or bone, digging sticks and, possibly, primitive wooden ploughs pulled by oxen. The remains of this kind of plough have been found at the early Tripolye settlement of Novye Ruseshty, and at the Tripolye layers of the
settlement of Floreshty (Floresti), clay figurines of two bulls in harness have been discovered.

Cattle predominated in the domestic herd; sheep, goat and pigs were less significant. A special, although not completely clear position was occupied by the horse. According to osteologists such as V. I. Tsalkin, the horse had already been domesticated and had been adopted by the Tripolye people from the neighbouring peoples of the east European steppe. Certain scholars (e.g. G. F. Korobkova) think that animal husbandry was of paramount importance in the Tripolye economy, although hunting still had a very important role in the early Tripolye phase. There were more wild animals than domestic animals in the settlements of Bernovo-Luka, Lenkovtsi and Lukavrublevetskaya. The animals hunted included deer, aurochs and wild boar.

The stone (flint) tool industry was also of a very high standard: long, bi-faced knives, scrapers and so on occur in very large numbers. This is surprising since copper artefacts occur far more often here than in Transcaucasia or even Turkmensia.

Over the past twenty-five years, research has shown copper artefacts to have been among the most characteristic and important elements of the Tripolye culture. This became particularly obvious after the discovery of the famous hoard at the village of Karbuna in Moldavia (Sergeev 1963) that consisted of hundreds of large copper beads, dozens of large, flat, anthropomorphic appliqués, and two axes (fig. 10). The hoard in many ways upset previous conceptions about this culture. Subsequent excavations carried out in the 1960s by V. I. Markevich at the settlement of Novye Ruseshty, which belongs to early and the beginning of middle Tripolye (phases A and B1), recovered material confirming that the Karbuna hoard, with its rich assemblage of copper artefacts, was no aberration.

Among the metalwork currently known, dating to the initial phase of the culture, there is, generally speaking, a marked predominance of ornaments over other types of artefact: the beads (mentioned above); appliqués (probably originally sewn onto clothing: figs. 10.1–6, 8, 9, 11–31, 37–9; and 11.7); furled bands of sheet copper and bracelets including the particularly typical tightly wound spiral rings (fig. 10.6, 7, 35, 36). There are many tools. From a typological point of view, the most important are the shaft-hole axe-hammer (fig. 10.10) and adze-chisel (fig. 10.32) from Karbuna. Other, less important, tools from the initial phase of the Tripolye culture include awls (fig. 11.5), punches (fig. 11.1) and fish hooks (fig. 11.2–3), found mainly in settlement layers at Novye Ruseshty. The number of metal artefacts from Cucuteni–Tripolye A and B sites greatly exceeds that known from other ancient metal-using cultures in the USSR, such as settlements of Anau–Namazga I–III type in southern Soviet Central Asia or the Transcaucasian Shulaver-Shomutepe-type cultures. Comsăa rightly attributes many of the chance finds of axe-adzes, axe-hammers and adze-chisels from eastern Romania to Cucuteni A, A/B and B (Comsăa 1980: 214–16 and figs. 7–9). More than 500 copper artefacts were known from the Cucuteni–Tripolye areas as a whole when they were catalogued by Greeses (Greeves 1975). The presence of such large amounts of copper provides clear evidence that the Tripolye metalworking centres were part of the larger system of the Carpatho-Balkan Eneolithic Metallurgical Province (see below).

The phenomenally high level of development in mining and metallurgical production
within this system has, in recent years, been the subject of great debate in the archaeological literature (Chernykh 1974 and 1978a: 263–5; Renfrew 1978; Todorova 1979: 41–9, 99 and map 8; Vulpe 1976; Kuna 1981: 44–52; Plesl and Pleslova-Stikova 1982; etc.). The discovery and investigation of ancient mines such as Ai Bunar and others in southern Bulgaria (Chernykh 1978b) and Rudna Glava in Serbia (Jovanovic 1971; 1978; 1982) has completely overturned previous conceptions about the nature of ancient mining in southeast Europe.

Radiocarbon dating methods have significantly pushed back the dates of the earliest metal-production cultures in this region (Neustupný 1968), revealing the autonomous nature of the Copper Age in the Carpatho-Balkans (Renfrew 1970). Further, spectrographic analyses of Carpatho-Balkan Eneolithic metal artefacts have made it possible to associate particular groups with known mines (e.g. Ai Bunar) and to identify exchange networks extending over hundreds or even thousands of kilometres. Specialized metallographic investigation of large numbers of tools and ornaments from Bulgaria (Ryndina and Orlovskaya 1978; Todorova, Ryndina and Chernykh 1977) has clearly demonstrated the high level of metalworking technology in the province's major centres, with a wide variety of standardized tool types being cast in two-, three- and
(probably) four-part moulds. Finally, the discovery of the Varna cemetery, with its inhumation and ‘cenotaph’ graves full of gold ornaments (Ivanov 1978), has revealed new and previously unsuspected aspects of gold exploitation in the Carpatho-Balkan province.

The typological, spectroanalytical and metallographic data lead us to conclude with some confidence that the Tripolye culture was itself a metalworking focus. At present there is no firm evidence that any of the scattered, minor, local ore sources of the Western Ukraine were exploited, although attempts have been made to demonstrate this. Rather, all the spectroanalytical data indicate that early Tripolye copper is chemically remarkably similar to or identical with copper from more westerly regions – Transylvania and, especially, the northern Balkans. All the analyses of tools and ornaments from the Tripolye metalworking focus show that the artefacts were made from a metallurgically ‘pure’ copper (i.e. without deliberate alloying and containing only those impurities already naturally present in the original ore: Chernykh 1966a: 53–8, pl. VI. vi). Quite a number of tools were hammered from copper in which significant levels of particular impurities – lead, bismuth, arsenic, etc. – can be identified. The majority of these objects are from the Karbuna hoard. On the basis of detailed investigation of early metal artefacts in Bulgaria and research into the chemical composition of copper ore sources exploited in the fifth and early fourth millennium BC, it has become clear that metalwork found in Tripolye contexts in Moldavia and the
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Western Ukraine should be linked with the mining and metallurgical centres of the northeastern Balkan peninsula. Specifically, it is now possible to establish the central rôle played by the Ai Bunar mine, and the copper smelted from its ores, in producing the crude metal used in the manufacture of the artefacts in the Karbuna hoard (Chernykh 1978a: 85–6).

The northeast Balkan centres were thus of fundamental importance in the early development of the Tripolye focus (Tripolye A). However, along with metal which can be associated with the various Bulgarian production centres, we can identify copper which appears to have originated in Transylvania, perhaps in the Banat; this material is characterized by a high degree of chemical purity (Groups N and E∞ following Junghans, Sangmeister and Schröder 1968). The percentage of this copper present in Tripolye assemblages increases with the transition to the fully developed phases of the culture (Tripolye BI and BI1).

We can therefore conclude that during the initial stages of the development of the Tripolye culture and its metalworking some of the most important contacts were to the southwest, with craftsmen of the Gumelnita culture. Evidence of these contacts is provided, not only by the chemical composition of the metal and the form of the tools and weapons, but also by the presence of a particular sort of flat, anthropomorphic pendant, obviously analogous to those found (albeit made of gold) on Gumelnita sites in the area of the Lower Danube bend (Comşa 1974);2 as well as on Tiszapolgár sites in the area of the Upper Tisza (Šiška 1966: figs. 5 and 6). Metal trade to the west, with the Tiszapolgár and Bodrogkeresztúr cultures, later intensified. There may also have been indirect links to Vinča-Ploćnik cultures in the area of the Banat and Bor-Maidanpek deposits, although as yet we have no firm evidence for them.

Along with the demonstrable utilization of metal from the Carpatho-Balkan metallurgical centres, with its characteristic ‘signature’ of impurities, we can also postulate supplies of copper coming from the southwest and west in the form of ingots (as opposed to finished articles). The typological and technological originality of Tripolye metalworking provides clear evidence of this.

The differences between this focus and the central workshops of the Carpatho-Balkan Metallurgical Province are fairly substantial, and are seen in the marked predominance of ornaments over tools, which occur only in very small numbers. This contrast is especially marked in the heavy tool categories – axe-hammers and axe-chisels – of which only two examples are known (one of each type), both from the Karbuna hoard (figs. 10.10 and 10.32) referred to above. In addition, very few awls, usually so abundant on sites of Gumelnita and similar cultures, are known from the Tripolye area.

A large number of direct typological parallels for both the axe-hammer and adze-chisel exist in material from contemporaneous Carpatho-Balkan sites: the shaft-hole axe-hammer in Slovakia (Tíbava, Raškovze, etc.), central and northern Yugoslavia (Ploćnik, etc.), Hungary and Transylvania (see Schubert 1965: fig. 1; Novotna 1970: pl. 3.73; Jovanović 1971: pl. 4.13–15; Chernykh 1978a: 98–100, pls. 7.7–11 etc.); and the adze-chisel among tools of the Gumelnita–Karanovo VI culture in the northwest Balkans, Middle and Lower Danube basins, and elsewhere (Chernykh 1978a: 105–8, pl. 12.1–6; Novotna 1970: pl. 1.9–11). Nevertheless, it is still most likely that they were
made locally, particularly in view of the substantial differences which exist in the technology of their manufacture. In the metallurgical centres of the Gumelnita culture area, which provided the initial stimulus for the early Tripolye focus, such tools were invariably cast in moulds (Ryndina and Orlovskaya 1978). However, both the Karbuna tools were hot-forged metal; metallographic analysis suggests that even the socket hole of the axe-hammer was created by punching, rather than casting (Ryndina 1971: 58–60).

Ryndina’s painstaking study of manufacturing technology shows that hot forging and cold hammering were essentially the only methods available for metal tool and ornament production during the initial stages of the Tripolye metalworking focus. Such forging, reinforced by annealing, which allowed intercrystalline stresses to be reduced, was the basic method used by the Tripolye smiths, although they also used cutting, laminating and other techniques. All of the ornaments, awls and fish hooks that have been found on Tripolye A sites were made using these techniques. Even though the Tripolye coppersmiths excelled in this respect, especially in their application of the blacksmith’s hot-welding technique to two or more plates, it should be recognized that Tripolye metalworking was rather archaic. This is particularly clear when we compare it with the much more developed tool-casting technology of the central metallurgical centres of the Carpatho-Balkans (the Gumelnita focus, for example).

The peripheral and archaic nature of the Tripolye focus did not fundamentally change in the Tripolye B phase, although new tool types – most importantly cruciform axe-adzes3 – appeared in this period (fig. 12.1, 4). Similar tools occur in the Gorodnitsa II hoard and elsewhere, but there are very few of them. Metallurgical analysis has shown that they were cast. However, the question is whether they were cast locally, or imported into Moldavia and the Western Ukraine in finished form from Transylvania, or perhaps even the Middle Danube. The Gorodnitsa II hoard also includes a tanged knife – a type new to the Eneolithic sites of the Carpatho-Balkan province (fig. 12.6).

Taken together with the cruciform axe-adze, this is a clear indication that the assemblage is contemporary with the Bodrogkeresztt culture (Patay 1975: 7, 10), where similar types of artefact occur quite generally. The same hoard includes a neck band or torc with punch-dotted decoration (fig. 12.7).

Despite the presence of cast objects, smithing predominated in Tripolye B, as in the earlier phase (Ryndina 1971: 109–35). Metallurgically ‘pure’ copper continued to be used, whilst metal saturated with high concentrations of natural impurities almost disappeared (it basically occurred only in the Karbuna hoard and the Novye Rusesthy material, where we have shown it to have originated from Ai Bunar). Judging from this, it seems that the metallurgical connections of the Tripolye focus underwent a reorientation westwards in the later phase, towards the Transylvanian mining and metallurgical centres which produced copper exclusively of chemically pure type. Comparatively flat adze-chisels occur in the Tripolye metal assemblage of this period (fig. 12.2, 3, 5), which, in late Gumelnita, are usually made of a copper containing a significant level of arsenic (Chernykh 1978a: 111, chemical group VI). So far, no metal of this type is known from Tripolye sites.

The eastward distribution of copper and copper artefacts, reaching as far as the Seversky Donets, and even the Lower Volga region, was also linked to the activity of the
Tripolye metalworking focus. This eastern European steppe and forest-steppe zone was inhabited by peoples who could be said to constitute their own particular world, ethnically and culturally alien to the Carpatho-Balkan and Tripolye tribes who moved into the region. A new economic strategy emerged on the steppes, based on mobile pastoralism. It was then, as a result of contact with the Tripolye culture, that the eastern European steppe peoples first became acquainted with metal – probably during the early stage of development of Tripolye metalworking.

The eastern European steppe: the Khvalynsk–Sredny Stog community
The Copper Age marked a highly important historical threshold for the steppe and forest-steppe peoples of eastern Europe: sizeable population groups became established in the area and introduced a pastoral economy. The most important animals were cattle, but sheep and goat also played a part. Horse-breeding occupied a special place, as the domestication of the horse and the emergence of horsemen led to a dramatic change in the balance of power, militarily speaking, between the peoples of this zone and their neighbours to the west. From this period onwards, until modern times, cavalry were to constitute the principal offensive strike force.

The population’s mobility and the speed at which it could travel increased greatly. Communications became more reliable and extensive. The steppe tribes of horse-breeders and mobile pastoralists had already begun, in the Copper Age, to play the rôle
which they were to continue to play for the next 5,000 to 5,500 years of human history.

With this in mind, we may now turn to the work carried out by Soviet archaeologists on the steppe cultures that inhabited the region from the Dnieper to the Volga. These are now generally considered to have formed a single historico-cultural community made of two cultures: Khvalynsk and Sredny Stog.

The Sredny Stog culture was located mainly in the Middle and Lower Dnieper region, the Donets, the area round the Sea of Azov, and on the Lower Don (Telegin 1973). Over a hundred settlement and burial sites are known, although burials are usually located within or near settlements.

Major excavations have taken place at the following sites: Sredny Stog II (after which the culture is named), Strelcha Skelya and the Dereivka settlement and cemetery, all in the Dnieper basin; the Aleksandriya settlement and cemetery on the river Oskol; the Konstantinovka settlement site on the Lower Don; and many others.

The cultural assemblage displays local, Neolithic roots. The pottery is mainly of the pointed-bottomed type, with vessels distinguished by a high neck and impressed with comb-tooth or caterpillar track decoration. Flat-bottomed pots and (less often) bowls are quite common on later sites, when corded decoration first appears. Stone and bone tools were in general use. Flint was used to manufacture long, bifacial knives, arrowheads and scrapers. Numerous polished, wedge-shaped axes were also made, as were bone and horn hoes, adzes, etc.

Traces of two residential structures were discovered at the small settlement site of Dereivka (total area c. 0.3ha), fully excavated by Telegin. The buildings were rectangular in plan, measuring around 70–80m². Large stones were used to strengthen the walls of the huts, particularly at the corners. The dwellings were sunk about 30cm into the ground. Hearth were constructed both inside and outside the dwellings. Cult burials of horse skulls and dogs were found near the external hearths.

The inhabitants of these settlements generally buried their relatives in flat cemeteries. There are only two known cases of Sredny Stog burials under kurgans – at the Yama and Koisug cemeteries. The body was usually placed in a pit, on its back with the head to the east or northeast, and was usually sprinkled with ochre. At Chapli, Novodani-lovka and Mariupol the pit was sometimes faced with stone slabs, so that the grave resembled a stone-lined box.

About half of those buried were accompanied into the other world by a mortuary assemblage that included large flint knives (measuring up to 22cm in length), shell, animal-tooth and boar-tusk necklaces, and copper ornaments. The horse was the most important domestic animal. Horse bones accounted for more than 50 percent of the faunal assemblage, suggesting a similar percentage of these animals in the herd. All the other activities of the population – hunting, fishing and agriculture – seem to have played a secondary rôle in subsistence. The finds of stone psalia (cheek-pieces from horse-bits) at the Dereivka settlement and in the cemetery on the island of Vinograd are particularly important. They provide evidence not only for horse domestication, but also for the use of bridles, necessary for riding horses.

Another culture has recently been discovered to the east of the Sredny Stog culture, in the basin of the Middle and Lower Volga. It is known as the Khvalynsk culture, after
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the large and fully excavated cemetery near the town of that name (Vasilev 1981: 22–42). From the Copper Age onwards, the cultures of the steppe and forest-steppe are known almost exclusively on the basis of burial evidence. Settlements are either minor or completely absent. Such an absence of settlements for particular historical periods can be traced almost through to the Middle Ages, and is, as a rule, connected with the emergence at the end of the fourth millennium BC of nomadic or semi-nomadic pastoralism. The settled way of life of the local population of Neolithic hunters and fishers became a thing of the past, and the nature of the community in this distinctive region of Eurasia became economically redefined and fixed. The Khvalynsk culture appears to have belonged to this type.

At the main site of Khvalynsk, 158 burials were excavated. Of these, 45 were single inhumations. There were a number of single-phase (primary) burials in which between two and five people had been buried. Multi-phase collective burial also occurs, and there were a number of burials in the form of a row of bodies from the same family laid head to foot in a long row. The vast majority of bodies were laid on their backs with their legs bent under, although some contracted inhumations with bodies laid on their sides were also found. Ochre was commonly scattered over the burials and a number of the burial pits were faced with stones.

Some burials were devoid of any assemblage, whilst others had large quantities of ornaments. Bone or cockle-shell beads, and tooth and boar-tusk necklaces were found. In one grave, around 2,000 beads that had originally been sewn onto the clothes and head-dress were found, along with about fifty round-bottomed pots, thickened at the rim and decorated with impressed wavy or comb-tooth patterns – clearly a legacy of the preceding period. Flint arrowheads also occur. Further, two exceptional stone artefacts were found, unique within the context of the site: a double-sided axe-hammer with thickening around the shaft-hole, and a ‘sceptre’ in the form of a rough representation of a horse’s head. These are considered to have been distinctive symbols of a leader’s power; although such finds are relatively rare, they occur over a large area, stretching from the Volga to the Danube basin (e.g. Casimcea: Popescu 1940: fig. 5).

The Khvalynsk sites are connected with the penetration of individual warlike groups of steppe cattle- and horse-breeders into an area of Copper Age agricultural cultures (Garašanin 1961: 33; Oprîșescu 1978: 13–16). The funeral rites at the Decea Mureșului cemetery in Transylvania provide evidence of this, with burials similar to the Mariupol type, accompanied by copper tools (a cruciform shaft-hole axe) and ornaments of a type also known from Bodrogkeresztüri sites (Roska 1942: 159–61, fig. 190; Kovács 1944; Gimbutas 1961: 195–6).

Remains of sacrificial altars were well preserved at the Khvalynsk cemetery itself, with cattle, horse and sheep bones found in association. Bones of these animals also occur in burials.

In addition to the site of Khvalynsk, several other cemeteries of the culture have been discovered in the Middle and Lower Volga region, although of lesser size and importance. A cursory examination reveals the closeness of the Khvalynsk and Sredny Stog cultures. They undoubtedly constituted a single historico-cultural community that
Figure 13  Copper tools and ornaments from sites of the eastern European steppe cultures (A: sites of the Mariopol-Chapli type; B: Sredny Stog II-type sites; C: Khvalynsk cemetery on the Lower Volga): (1, 2, 6, 7) Chapli cemetery, Burial 3a; (3) Nikolskoe cemetery; (4, 5) Chapli cemetery, Burial 1a; (8, 9, 13–15) Petro-Svishtovo cemetery; (10, 11) Aleksandrovka, Kurgan 10, Burial 17; (12) Aleksandrovka, Burial 10; (16–23) Khvalynsk burial ground (16 – Burial 15; 17 – Burial 74; 18 – Burial 92; 19 – quadrat 183; 20 – Burial 71; 21 – Burial 72; 22, 23 – Burial 31).
stretched through the southern half of eastern Europe, from the Dnieper region to the Lower Danube (Vasilev 1981: 31–4).

The beginning of the Metal Age in the eastern part of Europe is connected with these steppe and forest-steppe peoples. Copper artefacts are principally found in graves and occur only very rarely on settlement sites. Among them there is a marked predominance of ornaments, a phenomenon which is even more striking than in the Tripolye culture. Of the tools, particular reference should be made to the hammer (fig. 13.15) and the small flat adze from the partially destroyed cemetery of Petro-Sviștunovo in the Lower Dnieper region. The assemblages of these sites lack even awls, which are otherwise the most widespread artefact type among early cultures. Ornaments are represented by bracelets – one of the most typical artefact types here – the most interesting of which are the coiled, spiral bracelets (fig. 13.6, 7, 13, 14, 22, 23), although simpler, smaller ones also occur, in children’s burials (fig. 13.16). Convex clothing appliqués shaped like a riverine bivalve shell (fig. 13.4, 5, 10, 11) occur, both in burials of the Mariupol–Chapli–Petro-Sviștunov group, and on Sredny Stog II-type sites. However, none are known amongst the Khvalynsk material from the Lower Volga. Simpler ornaments come from various sorts of necklace (fig. 13.1, 2, 8, 9) or take the form of ring-shaped pendants (fig. 13.3, 12, 17–21).

Spectrographic analysis of material from all three cultural groups – Mariupol–Chapli, Sredny Stog II and Khvalynsk – has shown these artefacts to be of metallurgically ‘pure’ copper. No deliberate alloys have been identified. Several groups, largely corresponding to Carpatho-Balkan copper, can be identified on the basis of characteristic sets of impurities (Chernykh 1966a: 58), and similar copper also occurs on sites of the Tripolye culture (see above). For these reasons, it is thought that the metal used came from the Carpatho-Balkans.

A number of artefacts, including some from the Khvalynsk cemetery, were beaten out of copper that contained high concentrations of other elements, such as lead, bismuth, arsenic and antimony. This type of chemical make-up basically corresponds to metal smelted from the Ai Bunar ores. Consequently there are convincing reasons for postulating the existence of a highly extended metal-distribution route, from southern Bulgaria to the Dnieper, or even as far as the Lower Volga (Chernykh 1980a: 323).

The proposition that the copper utilized by these steppe cultures came from Carpatho-Balkan sources is supported by the fact that absolutely no evidence exists for metallurgy in either the Caucasus or the Urals at this time. Moreover, the chemical character of the metal which later appears in these regions is fundamentally different.

There is also no doubt that the principal link in this astonishingly long-distance eastward distribution of Carpatho-Balkan metal was the Tripolye metalworking focus. Typological analysis of the copper assemblage of the steppe cultures strengthens these conclusions. A number of artefacts – spiral bracelets for example (fig. 13.6, 7, 13, 14, 22, 23) – correspond in type to those known from Karbuna. At the same time, however, it is unlikely that eastern imports exclusively took the form of finished objects. It is not possible, for example, to find direct parallels for the shell-shaped pendants in the Tripolye metalwork assemblage; such artefacts are probably derived from the earlier, local tradition of steppe metalworking.
Preliminary data from metallographic analysis of these ornaments (Ryndina and Ravič 1987) indicate that the hammering and casting methods used are distinctive, even in comparison with those of the Tripolye culture. There are also no close parallels for the shaft hole hammer from Petro-Svistunovo (fig. 13.15) in Tripolye material, making it very likely that this piece was locally made. Moreover, a fairly close analogy for this hammer is now known from the village of Rugudzha in Dagestan (fig. 14.1), made from a metallurgically 'pure' copper that is completely atypical for Caucasian metal, which, in any case, was not produced until much later. A second analogy for the shaft hole axe from Petro-Svistunovo comes from a site of the Pit Grave (Yanmaya) culture – the kurgan burial at Uvak in the Southern Urals (see below; fig. 28.22). The Southern Ural centres of production can be considered to be the direct successors of the
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earliest Eneolithic focuses of the steppe part of eastern Europe, so the appearance of this type of artefact in Pit Grave sites is not surprising.

At the same time, we must not overlook the firmly identified, though very rare, direct imports of Carpatho-Balkan artefacts. A shaft-hole axe-adze, typical of the Carpatho-Balkan Eneolithic, was found by chance in the North Caucasus, at Ust-Labinskaya on the river Kuban (fig. 14.2); it was cast from pure (i.e. Carpatho-Balkan) copper. The occurrence of an axe-adze of similar shape in northern Tadjikistan in Soviet Central Asia, thousands of kilometres east of the Kuban, is much more mysterious (fig. 14.3). It was discovered in 1983 on the surface of the ancient settlement of Sarazm, where rich Namazga III (Sarazm I) material occurs. This period is dated on the basis of calibrated radiocarbon estimates to the second quarter of the fourth millennium BC (Isakov 1983: 56). The chemical composition of the metal of the axe-adze is not yet known. Mor- phologically, it is much closer to tools from the Carpatho-Balkan area (e.g. the Tirgu-Ocna type: Vulpe 1973: fig. 2.18; Chernykh 1978a: 91–2, pl. 2.7 and fig. 61.1; Comșa 1980: 216, fig. 9.2–4) than to later axe-adzes from sites in Iran or neighbouring regions in southern Soviet Central Asia (see Kuzmina 1966: pl. 1.6–8).

The phenomenon of the Carpatho-Balkan Metallurgical Province (CBMP)
The Copper Age in the USSR was characterized by complex historical developments, a number of which need to be re-stated.

The first of these was the emergence of metalworking production in three, apparently isolated, regions: southern Soviet Central Asia, Transcaucasia and the northwestern Black Sea region. The cultures in these regions, in spite of certain external dissimilarities, obviously shared common roots. Each was essentially a northern, peripheral extension of the huge zone of early agricultural Eurasian cultures that stretched from the Danube to the Iranian plateau, dating from the sixth to the beginning of the fourth millennium BC. The metallurgical level of these cultures clearly varied; the cultures of the western, European region were undoubtedly pre-eminent. The cultures of South Turkmenia and Transcaucasia were cut off from more northern, Neolithic populations by vast, uninhabited mountain chains, whereas the Carpatho-Balkan and Tripolye communities enjoyed close contact with the Neolithic steppe peoples, and introduced a number of them to metallurgy.

The second development that we are concerned with in studying the historical development of the peoples at the dawn of the Metal Age, namely the emergence of a new type of pastoralist culture (in which horse-breeding had a special place) among peoples with a knowledge of metallurgy and metalworking, and the sudden activation of the ethnic groups of the steppe in the world arena, is also connected with this. It was in the Copper Age that the first clear outlines of a general picture of interaction between peoples with different cultural-economic structures began to appear – interactions which, to a large extent, determined the character and dynamics of the development of many Eurasian peoples in subsequent historical periods.

Thirdly, the formation of the Carpatho-Balkan Metallurgical Province (CBMP) in the Copper Age undoubtedly had a revolutionary effect on the development of productive technology among a number of peoples in the USSR. As a historical occurrence, the
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CBMP is in many respects unique. Firstly, it was the earliest metallurgical province in the Old World. Secondly, mining and metallurgical production in its central - and peripheral - focuses was surprisingly well developed, in comparison to the contemporary cultures of Asia Minor and western Asia, areas in which metallurgy had begun much earlier. Thirdly, it had an unusually high level of technology, involving the casting and forging of massive artefacts. Fourthly, its rapid formation, brief flowering and unexpected, sudden demise cannot be fully explained. For this reason we shall examine the phenomenon of the CBMP in more detail.

The Carpatho-Balkan Metallurgical Province encompassed a fairly large geographic region (fig. 15), occupied by the Karanovo VI-Gumelnita, Vinča-Pločnik, Sâlcuța II–III, Tiszapolgár–Bodrogkeresztur, Butmir, Petrești and other cultures. It was in the production centres of these cultures that three categories of heavy tool of very similar type suddenly began to be produced. These tools are shaft-hole axe-hammers, shaft-hole cruciform axe-adzes and massive adze-chisels without shaft holes. Apart from these diagnostic categories of copper tools, awls - the most widespread type of copper tool in Copper and Early Bronze Age cultures - were produced in large numbers.

On the basis of broad-based spectroanalytical work carried out in Moscow and Stuttgart, it is possible to identify four geographical zones within the CBMP (fig. 15): (1) the southwestern zone, encompassing western Bulgaria and northern Yugoslavia (the North Balkan metallurgical focus) and the Vinča-Pločnik, Sâlcuța and Butmir cultures, and the southern variants of the Tiszapolgár–Bodrogkeresztur culture; (2) the
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Transylvanian and Middle Danubian zone of the northern variants of the Tiszapolgár-Bodrogkeresztúr culture, and, to some extent, the Lengyel culture. On the basis of preliminary research, it is possible that a third, North Carpathian, zone may be definable in Slovakia, Soviet sub-Carpathian Ruthenia and southern Poland. A southeastern (or, more precisely, eastern) zone, which includes the Gumelnitsa and Tripolye metallurgical focuses, forms the fourth of the zones.

These zones contained archaeological cultures that were closely linked by a network for exchanging metal; each of them used a chemically similar sort of copper.

The Tripolye metalworking focus can be included without hesitation in the system of the CBMP, despite its peculiarities. However, the question of its relationships with the (still hypothetical) metalworking focuses of Khvalynsk–Sredny Stog type, and with steppe focuses, is more complex.

At present all that is completely clear to us is that the copper used by these cultures came from western and southwestern ore sources. At the same time, the characteristic tool assemblage which allowed us to delineate the borders of the CBMP is essentially absent. For this reason the inclusion of the steppe metalworking focuses in the system of the CBMP must be considered as conditional.

In an examination of the metallurgy of subsequent historical periods, we never again come across a similar situation, in which the peripheral focuses of a particular province were markedly different in terms of their metal production and metalworking technology. Bronze Age steppe focuses stand out as highly original, particularly when viewed against the background of the highly developed metallurgical production of the central Carpatho-Balkan focuses.

After touching on the problem of the export of metal from the mining and metallurgical centres of the Carpatho-Balkans to the oreless regions of eastern Europe, we should briefly consider another problem: metal as a source of extra wealth for north Balkan and Carpathian cultures. It is quite obvious that in the fifth to fourth millennia BC, this phenomenally well-developed mining and metallurgical production complex supplied the population of the surrounding regions with huge quantities of metal – not just copper for tools and weapons, but gold for ornaments.

The rôle of metal in ancient societies has been the subject of much discussion. I would like to draw attention to another aspect of the problem: trade in metal, and the export of metal to oreless regions. Spectrographic analysis clearly indicates that a highly developed commercial exchange operated here in the Neolithic. Trade routes starting in the mining and metallurgical regions of Thrace generally led northeastwards to Moldavia, the Western Ukraine, the Dnieper and beyond, as far as the Volga. Without doubt, the valuable goods which passed through the hands of local tribes were part of a reciprocal process. It may be that the magnificence of individual burials in the Varna cemetery was an explicit expression of wealth based on such trade, although a careful study of the various forms of exchange themselves is clearly required.

The genesis or origin of the CBMP, particularly the Gumelnitsa focus, presents us with another problem, the essence of which is that this whole extraordinarily developed complex of mining and metallurgical production must have been based on a strong local tradition of mining and (especially) metallurgy in the preceding series of cultures –
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Karanovo V, Maritsa, Boian, Vinča C, etc. — yet we have not found anything that might indicate that this was actually so. In Karanovo V—Maritsa and Boian sites in Bulgaria and southern Romania, the known copper artefacts number barely ten and are mainly undiagnostic and small (Todorova 1974: 81; 1981: 4; Chernykh 1978a: 123).

Even though the beginning of mining is now clearly documented by the discovery of numerous pieces of copper minerals on the Maritsa culture settlement excavated near the regional hospital in Stara Zagora, Bulgaria (as well as on other Maritsa culture settlements), not even the smallest copper object has yet been found on this site. And, despite reported finds of small numbers of copper artefacts and pieces of malachite in the late Eneolithic layers of the Starčevo—Criş—Körös historico-cultural community (Gimbutas 1973: 166; Vulpe 1976: 134; Horedt 1976: 175—8; Chapman and Tylecote 1983: 375), the basic conclusion still remains unchanged: the local roots are extraordinarily weak in comparison to the mighty outgrowth of mining and metallurgical production in the Carpatho-Balkan Metallurgical Province.

This has compelled scholars to look for the initial stimulus for the development of the CBMP in areas of earlier mining and metallurgical production, in particular in Anatolia (Hartmann and Sangmeister 1972: 624; Jovanovic 1978). However, the amount of metal in contemporaneous Anatolian sites dating to the fifth and early fourth millennium BC is so small that these sites can in no way be compared in this respect to the southeast European Eneolithic cultures in question. As potential candidates, these Anatolian sites also have no particular advantage over the local cultures which immediately preceded the creation of the CBMP. Consequently, it is risky to try to locate the centre of the key influences on the metallurgy of the CBMP in Anatolia. The only hypothesis which, in my view, bears detailed discussion and investigation is the possibility that the original stimulus which led to the beginning of mining and metallurgy in southeast Europe came from Anatolia. Subsequent developments — the astonishing increase in production and the creation of the CBMP — were clearly completely independent. The phenomenon of the earliest European metallurgy evidently cannot be explained in terms of a guiding western Asiatic influence (Renfrew 1970: 12—36). The difference between the main forms of tools and weapons in each region was considerable, and, in mining and metallurgical productive power during the fifth to fourth millennium BC, the balance was significantly in favour of Europe.

The next problem concerns the fate of the CBMP. The disappearance of the CBMP was as unexpected as its appearance. Karanovo VI—Gumelnita and Bodrogkereszty-type cultures were replaced by a series of quite different cultures: Karanovo VII—Ezero, Baden and others; the Eneolithic type of metallurgy virtually disappeared; the forms of tools and weapons changed sharply (and do not display obvious genetic roots in the preceding period); in terms of technology, metalworking became noticeably more primitive. Even more mysterious, at first glance, is the extraordinarily sharp fall in metallurgical production and, apparently, mining. This is expressed diagrammatically (fig. 16, top), with the number of recorded finds from EMA Bulgaria graphed over time. The drop in production in the Early Bronze Age is highly significant. This observation, originally made for Bulgarian material (Chernykh 1974), has since been confirmed for Romania (Vulpe 1976: 159, fig. 1) and Yugoslavia (Kuna 1981: pl. 1).
The reasons for this phenomenon are, of course, many, and cannot yet be fully evaluated. We are faced with the complete replacement of a culture, a fact which to some extent reflects the appearance of new population groups with their own craft traditions and organization; the loss or even rejection of former mining and metallurgical skills and techniques; the departure, perhaps, of the old population (or at least a considerable part of it); a renunciation of the majority of former artefact types; and, so it seems, the growth of irrational elements in the general culture complex (Chernykh 1982a: 19, 1982b). This is one of the most interesting and complex problems in the history of the Carpatho-Balkan EMA population; it cannot be resolved without studying all aspects of the culture of local peoples. Moreover, it is quite clear that the decline in mining and metallurgy occurred over the entire Carpatho-Balkan region. An examination of the distribution of all recorded Eneolithic shaft-hole axe-adzes and axe-hammers, and Early and Middle Bronze Age shaft-hole axes from the entire region and their distribution on the same time-scale (fig. 16) produces an essentially analogous picture.

The last problem—that of erratic metallurgical production—is closely connected with the two preceding ones, being a function of them. The diagrams (fig. 16) very clearly show the erratic nature of production, both in the limited territory of Bulgaria and in
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the Carpatho-Balkan region as a whole, over four millennia. This contradicts the a priori conceptions of uninterrupted growth and progress in metallurgy which can be found in a number of general archaeological and historical works. In actual fact, advances constantly alternated with periods of regression, in which there was a reduction in the quantity of tools manufactured and an increase in the primitiveness of the technology used. This is shown very clearly in the study of Carpatho-Balkan material, but similar processes can also be observed in other provinces and mining and metallurgical regions. The causes of this fluctuation were probably multiple and linked to numerous concomitant historical phenomena, as noted above in the discussion of the previous problem. A detailed investigation of these is required in each particular case (see chapters 5 and 10).

The processes responsible for fluctuations in production, the disappearance of Copper Age cultures, and the appearance of a complex of essentially alien Early Bronze Age communities, were manifested most strongly in the central regions of the Carpatho-Balkan Metallurgical Province, especially in the northeastern Balkans (Bulgaria); they are much weaker and less distinct in the southwestern USSR. The collapse of the Tripolye culture and its replacement by a group of Early Bronze Age cultures (such as the Usatovo, Krasny Khutor and Sofievka cultures) was not as dramatic as in the Carpatho-Balkans, since these cultures adopted a number of material cultural traits (albeit in modified form) from the Tripolye culture.

Notes
1 The Tekhat settlement is sometimes considered to be later and is not always included in the Shulaveri–Shomutepe culture (Kiguradze 1976: 167–8, 173).
2 In view of the metallurgical links of the Tripolye culture and the corresponding metalworking focus, it should be noted that the widely held view that the final stages of the Tripolye culture (AII) were contemporaneous with the Maritsa–Karanovo V culture (Chernykh 1982d: 174–6, and elsewhere) is not sustainable. The fact that the metal from Karbuna and other Tripolye AII period sites is obviously imported from somewhere in the northeastern Balkans, along with the clear typological correspondences between the Karbuna material and that from the Gumelnita B–Karanovo VI horizon, is compelling evidence that these stages of cultural development were contemporaneous. Maritsa culture settlements are almost devoid of metalwork, and very little is found on early Gumelnita (Gumelnita A) sites. The explosion in mining and metallurgical production took place mainly during the Gumelnita B period. In this period the large-scale export of copper to the oreless regions of the Lower Danube basin, Moldavia and the Western Ukraine began. It is this copper that we can identify on late Tripolye A sites.
3 Although cruciform axes generally relate to a later period than shaft-hole axe-hammers, the two forms obviously coexisted for a certain period. This is shown by, for example, the Split hoard, in which both forms occur (Marović 1953, 1970: 12, fig. 2; see also Chernykh 1978a: 120).
4 Some researchers consider that the Casmimca–Petro-Svistunovo-type graves belong to a separate cultural group, earlier than the Sredny Stog community (Zbenovich 1983), but this seems doubtful on the basis of the types of copper artefacts involved (see fig. 13A and B).