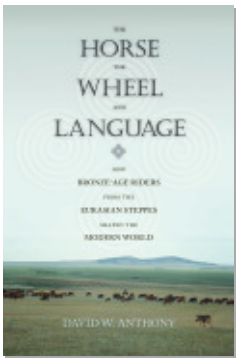
The Horse, the Wheel, and Language

David W. Anthony



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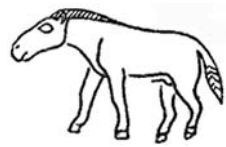
Chapter Sixteen



The Opening of the Eurasian Steppes

Between about 2300 and 2000 BCE the sinews of trade and conquest began to pull the far-flung pieces of the ancient world together into a single interacting system. The mainspring that drove inter-regional trade was the voracious demand of the Asiatic cities for metal, gems, ornamental stones, exotic woods, leather goods, animals, slaves, and power. Participants gained access to and control over knowledge of the urban centers and their power-attracting abilities—a source of social prestige in most societies.[1] Ultimately, whether through cultural means of emulation and resistance or political means of treaty and alliance, a variety of regional centers linked their fortunes to those of the paramount cities of the Near East, Iran, and South Asia. Regional centers in turn extended their influence outward, partly in a search for raw materials for trade, and partly to feed their own internal appetites for power. On the edges of this expanding, uncoordinated system of consumption and competition were tribal cultures that probably had little awareness of its urban core, at least initially (figures 16.1 and 16.2). But eventually they were drawn in. By 1500 BCE chariot-driving mercenaries not too far removed from the Eurasian steppes, speaking an Old Indic language, created the Mitanni dynasty in northern Syria in the heart of the urban Near East.[2]

How did tribal chiefs from the steppes intrude into the dynastic politics of the Near East? Where else did they go? To understand the crucial role that Eurasian steppe cultures played in the knitting together of the ancient world during the Bronze Age, we should begin in the heartland of cities, where the demand for raw materials was greatest.

Bronze Age Empires and the Horse Trade

About 2350 BCE Sargon of Akkad conquered and united the feuding kingdoms of Mesopotamia and northern Syria into a single super-state—

Figure 16.1 Cultures of the steppes and the Asian civilizations between about 2200 and 1800 BCE, with the locations of proven Bronze Age mines in the steppes and the Zeravshan valley.

the first time the world's oldest cities were ruled by one king. The Akkadian state lasted about 170 years. It had economic and political interests in western and central Iran, leading to increased trade, occasionally backed up by military expeditions. Images of horses, distinguished from asses and onagers by their hanging manes, short ears, and bushy tails, began to appear in Near Eastern art during the Akkadian period, although they still were rare and exotic animals. Some Akkadian seals had images of men riding equids in violent scenes of conflict (figure 16.3). Perhaps a few Akkadian horses were acquired from the chiefs and princes of western Iran known to the Akkadians as the Elamites.

Elamite was a non–Indo-European language, now extinct, then spoken across western Iran. A string of walled cities and trade centers stood on the Iranian plateau, revealed by excavations at Godin, Malyan, Konar Sandal, Hissar, Shar-i-Sokhta, Shahdad, and other places. Malyan, the ancient city of Anshan, the largest city on the plateau, certainly was an

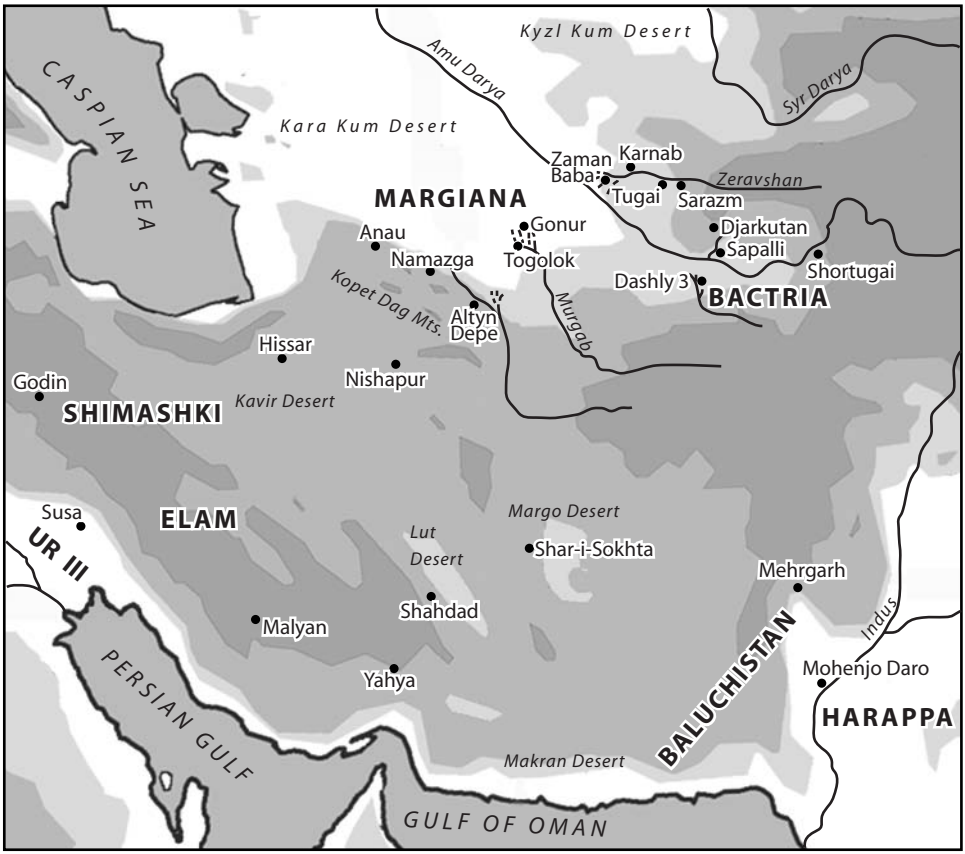


Figure 16.2 Civilizations of Mesopotamia, Iran, Central Asia, and the Indus valley about 2200–1800 BCE.

Elamite city allied to the Elamite king in Susa. Some of the other brick-built towns, almost all of them smaller than Malyan, were part of an alliance called Shimashki, located north of Malyan and south of the Caspian Sea. Among the fifty-nine personal names recorded in the Shimashki alliance, only twelve can be classified as Elamite; the others are from unknown non–Indo-European languages. East of the Iranian plateau, the Harappan civilization of Indo-Pakistan, centered in huge mudbrick cities on the Indus River, used its own script to record a language that has not been definitively deciphered but might have been related to modern Dravidian. The Harappan cities exported precious stones, tropical woods, and metals westward on ships that sailed up the Persian Gulf, through a chain

Figure 16.3 Early images of men riding equids in the Near East and Central Asia: (*top*) Akkadian seal impression from Kish, 2350–2200 BCE (after Buchanan 1966); (*middle*) seal impression of the BMAC from a looted grave in Afghanistan, 2100–1800 BCE (after Sarianidi 1986); (*bottom*) Ur III seal impression of Abbakalla, animal disburser for king Shu-Sin, 2050–2040 BCE (after Owen 1991).

of coastal kingdoms scattered from Oman to Kuwait. Harappa probably was the country referred to as "Melukkha" in the Mesopotamian cuneiform records.[3]

Akkadian armies and trade networks reached far and wide, but inside Akkad was an enemy it could not conquer with arms: crop failure. During the Akkadian era the climate became cooler and drier, and the agricultural economy of the empire suffered. Harvey Weiss of Yale has argued that some northern Akkadian cities were entirely abandoned, and their populations might have moved south into the irrigated floodplains of southern Mesopotamia.[4] The Gutians, a coalition of chiefs from the western Iranian uplands (perhaps Azerbaijan?) defeated the Akkadian army and overran the city of Akkad in 2170 BCE. Its ruins have never been found.

About 2100 BCE the first king of the Third Dynasty of Ur, even then an ancient Sumerian city in what is now southern Iraq, expelled the Gutians and reestablished the power of southern Mesopotamia. The brief Ur III period, 2100–2000 BCE, was the last time that Sumerian, the language of the first cities, was a language of royal administration. A century of bitter wars erupted between the Sumerian Ur III kings and the Elamite city-states of the Iranian plateau, occasionally interrupted by negotiations and marriage exchanges. King Shu-Sin of Ur bragged that he conquered a path across Elam and through Shimashki until his armies finally were stopped only by the Caspian Sea.

During this period of struggle and empire, 2100–2000 BCE, the bones of horses appeared for the first time at important sites on the Iranian plateau such as the large city of Malyan in Fars and the fortified administrative center at Godin Tepe in western Iran. Bit wear made with a hard bit, probably metal, appeared on the teeth of some of the equids (both mules and horses) from Malyan. Excavated by Bill Sumner and brought by Mindy Zeder to the collections of the Smithsonian Museum of Natural History in Washington, D.C. these teeth were the first archaeological specimens that we examined when we started our bit wear project in 1985. Now we know what then we only suspected: the horses and mules of the Kaftari phase at Malyan were bitted with hard bits. Bits were a new technology for controlling equids in Iran, different from the lip- and nose-rings that had appeared before this in Mesopotamian works of art. Of course bits and bit-wear were very old in the steppes by 2000 BCE.[5]

Horses also appeared in significant numbers in the cities of Mesopotamia for the first time during the Ur III period; this was when the word for *horse* first appeared in written records. It meant "ass of the mountains," showing that horses were flowing into Mesopotamia from western Iran

and eastern Anatolia. The Ur III kings fed horses to lions for exotic entertainment. They did not use horse-drawn chariots, which had not yet appeared in Near Eastern warfare. But they did have solid-wheeled battle wagons and battle carts armed with javelins, pulled by teams of their smaller native equids—asses, which were manageable but small, and onagers or hemiones, which were almost untamable but larger. Ass-onager hybrids probably pulled Sumerian battle carts and battle wagons. Horses could have been used initially as breeding stock to make a larger, stronger ass-horse hybrid—a mule. Mules were bitted at Malyan.

The Sumerians recognized in horses an arched-neck pride that asses and onagers simply did not possess. King Shulgi compared himself in one inscription to "a horse of the highway that swishes his tail." We are not sure exactly what horses were doing on Ur III highways, but a seal impression of one Abbakalla, the royal animal disburser for king Shu-Sin, showed a man riding a galloping equid that looks like a horse (see figure 16.3).[6] Ceramic figurines of the same age showed humans astride schematic animals that have equine proportions; and ceramic plaques dated at the time of Ur III or just afterward showed men astride equids that probably were horses, some riding in awkward poses on the rump and others in more natural forward seats. No Ur III images showed a chariot, so the first clear images of horses in Mesopotamia show men riding them.[7]

About 2000 BCE an Elamite and Shimashki alliance defeated the last of the Ur III kings, Ibbi-Sin, and dragged him to Elam in chains. After this stunning event the kings of Elam and Shimashki played a controlling role in Mesopotamian politics for several centuries. Between 2000 and 1700 BCE the power, independence, and wealth of the Old Elamite (Malyan) and Shimashkian (Hissar? Godin?) overlords of the Iranian plateau was at its height. The treaties they negotiated for the Ur III wars were sealed by gifts and trade agreements that channeled lapis lazuli, carved steatite vessels, copper, tin, and horses from one prince to another. The Sintashta culture appeared at just the same time, but showed up 2000 km to the north in the remote grasslands of the Ural-Tobol steppes. The metal trade and the horse trade might have tied the two worlds together. Could the Elamite defeat of Ibbi-Sin have been aided by chariot-driving Sintashta mercenaries from the steppes? It is possible. Vehicles like chariots, with two spoked wheels and a standing driver, but guided by equids with lip- or nose-rings, began to appear on seal images in Anatolia just after the defeat of Ibbi-Sin. They were not yet common, but that was about to change.

The metal trade might have provided the initial incentive for prospectors to explore across the Central Asian deserts that had previously separated

the northern Eurasian steppe cultures from those of Iran. Vast amounts of metal were demanded by Near Eastern merchants during the heyday of the Old Elamite kings. Zimri-Lim, king of the powerful city-state of Mari in northern Syria between 1776 and 1761 BCE, distributed gifts totaling more than 410 kg (905 lb) of tin—not bronze, but tin—to his allies during a single tour in his eighth year. Zimri-Lim also was chided by an adviser for riding a horse in public, an activity still considered insulting to the honor of an Assyrian king:[8]

> May my lord honor his kingship. You may be the king of the Haneans, but you are also the king of the Akkadians. May my Lord not ride horses; (instead) let him ride either a chariot or *kudanu*-mule so that he would honor his kingship.

Zimri-Lim's advisers accepted the fact that kings could ride in chariots—Near Eastern monarchs had by then ridden in wheeled vehicles of other kinds for more than a thousand years. But only rude barbarians actually rode on the backs of the large, sweaty, smelly animals that pulled them. Horses, in Zimri-Lim's day, were still exotic animals associated with crude foreigners. A steady supply of horses first began between 2100 and 2000 BCE. Chariots appeared across the Near East after 2000 BCE. How?

The Tin Trade and the Gateway to the North

Tin was the most important trade commodity in the Bronze Age Near East. In the palace records of Mari it was said to be worth ten times its weight in silver. A copper-tin alloy was easier for the metal smith to cast, and it made a harder, lighter-colored metal than either pure copper or arsenical bronze, the older alternatives. But the source of Near Eastern tin remains an enigma. Large tin deposits existed in England and Malaysia, but these places were far beyond the reach of Near Eastern traders in the Bronze Age. There were small tin deposits in western Serbia—and a scatter of Old European copper objects from the Danube valley contained elevated tin, perhaps derived from this source—but no ancient mines have been found there. Ancient mines in eastern Anatolia near Goltepe might have supplied a trickle of tin before 2000 BCE, but their proven tin content is very low, and tin was *imported* at great cost to Anatolia from northern Syria after 2000 BCE. It was imported into northern Syria from somewhere far to the east. The letters of king Zimri-Lim of Mari said flatly that he acquired his tin from Elam, through merchants at Malyan (Anshan) and Susa. An inscription on a statue of Gudea of Lagash, ca.

2100 BCE, was thought to refer to the "tin of Melukkha," implying that tin came up the Arabian Gulf in ships sent by Harappan merchants; but the passage might have been mistranslated. Intentional tin-bronze alloys occurred in about 30% of the objects tested from the Indus-valley cities of Mohenjo-Daro and Harappa, although most had such a low tin content (70% of them had only 1% tin, 99% copper) that it seems the best recipe for tin bronze (8–12% tin, 92–88% copper) was not yet known in Harappa. Still, "Melukkha" could have been one source of Mesopotamian tin. Tin-bronzes have been found in sites in Oman, at the entrance to the Arabian Gulf, in association with imported pottery and beads from Harappa and bone combs and seals made in Bactria. Oman had no tin of its own but could have been a coastal port and trans-shipment point for tin that came from the Indus valley.[9]

Where were the tin mines? Could the tin exported by the Elamite kings and by Harappan merchants have come from the same sources? Quite possibly. The most probable sources were in western and northern Afghanistan, where tin ore has been found by modern mineral surveyors, although no ancient mines have been found there, and also in the Zeravshan River valley, where the oldest tin mines in the ancient world have been found near the site of Sarazm. Sarazm also was the portal through which horses, chariots, and steppe cultures first arrived at the edges of Central Asia.

Sarazm was founded before 3500 BCE (4880±30 BP, 4940±30 BP for phase I) as a northern colony of the Namazga I–II culture. The Namazga home settlements (Namazga, Anau, Altyn-Depe, Geoksur) were farming towns situated on alluvial fans where the rivers that flowed off the Iranian plateau emerged into the Central Asian deserts. Perhaps the lure that enticed Namazga farmers to venture north across the Kara Kum desert to Sarazm was the turquoise that outcropped in the desert near the lower Zeravshan River, a source they could have learned about from Kelteminar foragers. Sarazm probably was founded as a collection point for turquoise. It was situated on the middle Zeravshan more than 100 km upstream from the turquoise deposits at an elevation where the valley was lush and green and crops could be grown. It grew to a large town, eventually covering more than 30 ha (74 acres). Its people were buried with ornaments of turquoise, carnelian, silver, copper, and lapis lazuli. Late Kelteminar pottery was found at Sarazm in its phase II, dated about 3000–2600 BCE (4230±40BP), and turquoise workshops have been found in the late Kelteminar camps of Kaptarnikum and Lyavlyakan in the desert near the lower Zeravshan. Turquoise from the Zeravshan and from a second source

near Nishapur in northeastern Iran was traded into Mesopotamia, the Indus valley, and perhaps even to Maikop (the Maikop chieftain was buried with a necklace of turquoise beads). But the Zeravshan also contained polymetallic deposits of copper, lead, silver—and tin.

Oddly, no tin has been found at Sarazm itself. Crucibles, slag, and smelting furnaces appeared at Sarazm at least as early as the phase III settlement (radiocarbon dated 2400–2000 BCE), probably for processing the rich copper deposits in the Zeravshan valley. Sarazm III yielded a variety of copper knives, daggers, mirrors, fishhooks, awls, and broad-headed pins. Most were made of pure copper, but a few objects contained 1.8–2.7% arsenic, probably an intentional arsenical bronze. Tin-bronzes began to appear in small amounts in the Kopet Dag home region, in Altyn-Depe and Namazga, during the Namazga IV period, equivalent to late Sarazm II and III. A small amount of tin, perhaps just placer minerals retrieved from the river, probably came from the Zeravshan before 2000 BCE, even if we cannot see it at Sarazm.[10]

The tin mines of the Zeravshan River valley were found and investigated by N. Boroffka and H. Parzinger between 1997 and 1999.[11] Two tin mines with Bronze Age workings were excavated. The largest was in the desert on the lower Zeravshan at Karnab (Uzbekistan), about 170 km west of Sarazm, exploiting cassiterite ores with a moderate tin content—probably ordinarily about 3%, although some samples yielded as much as 22% tin. The pottery and radiocarbon dates show that the Karnab mine was worked by people from the northern steppes, connected with the Andronovo horizon (see below). Dates ranged from 1900 to 1300 BCE (the oldest was Bln 5127, 3476±32 BP, or 1900–1750 BCE; see table 16.1). A few pieces of Namazga V/VI pottery were found in the Andronovo mining camp at Karnab. The other mining complex was at Mushiston in the upper Zeravshan (Tajikistan), just 40 km east of Sarazm, working stannite, cassiterite and copper ores with a very high tin content (maximum 34%). Andronovo miners also left their pottery at Mushiston, where wood beams produced radiocarbon dates as old as Karnab. Sarazm probably was abandoned when these Andronovo mining operations began. Whether the Zeravshan tin mines were worked before the steppe cultures arrived is unknown.

Sarazm probably was abandoned around 2000 BCE, just at the Namazga V/VI transition. On the lower Zeravshan, the smaller villages of the Zaman Baba culture probably were abandoned about the same time as Sarazm.[12] The Zaman Baba culture had established small villages of pithouses supported by irrigation agriculture in the large oasis in the lower

Zeravshan delta just a couple of centuries earlier. Zaman Baba and Sarazm were abandoned when people from the northern steppes arrived in the Zeravshan.[13]

Sarazm exported both copper and turquoise southward during the Akkadian and Ur III periods. Could it have pulled steppe copper miners and horse traders into the chain of supply for the urban trade? Could that explain the sudden intensification of copper production in Sintashta settlements and the simultaneous appearance of horses in Iran and Mesopotamia beginning about 2100 BCE? The answer lies among the ruins of walled cities in Central Asia south of Sarazm, cities that interacted with the cultures of the northern steppes before the Andronovo tin miners appeared on the Zeravshan frontier.

The Bactria-Margiana Archaeological Complex

Around 2100 BCE a substantial population colonized the Murgab River delta north of the Iranian plateau. The Murgab River flowed down from the mountains of western Afghanistan, snaked across 180 km of desert, then fanned out into the sands, dropping deep loads of silt and creating a fertile island of vegetation about 80 by 100 km in size. This was Margiana, a region that quickly became and remained one of the richest oases in Central Asia. The immigrants built new walled towns, temples, and palaces (Gonur, Togolok) on virgin soil during the late Namazga V period, at the end of the regional Middle Bronze Age (figure 16.4). They might have been escaping from the military conflicts that raged periodically across the Iranian plateau, or they might have relocated to a larger river system with more reliable flows in a period of intensifying drought. Anthropological studies of their skeletons show that they came from the Iranian plateau, and their pottery types seem to have been derived from the Namazga V-type towns of the Kopet Dag.[14]

The colonization phase in Margiana, 2100–2000 BCE, was followed by a much richer period, 2000–1800 BCE, during Namazga VI, the beginning of the regional Late Bronze Age. New walled towns now spread to the upper Amu Darya valley, ancient Bactria, where Sapalli-Tepe, Dashly-3, and Djarkutan were erected on virgin soil. The towns of Bactria and Margiana shared a distinctive set of seal types, architectural styles, brick-lined tomb types, and pottery. The LBA civilization of Bactria and Margiana is called the Bactria-Margiana Archaeological Complex (BMAC). The irrigated countryside was dominated by large towns surrounded by thick yellow-brick walls with narrow gates and high corner towers. At the

Table 16.1
Selected Radiocarbon Dates from Earlier Late Bronze Age Cultures in the Steppes

Lab Number	*BP Date*	*Kurgan*	*Square/quad*	*Grave*	*Mean Intercept BCE*	*BCE*
1. Krasnosamarskoe kurgan cemetery IV, Samara oblast, LBA Pokrovka and Srubnaya graves						
AA37038	3490±57	kurgan 3		1	1859, 1847, 1772	1881–1740
AA37039	3411±46	kurgan 3		6	1731, 1727, 1686	1747–1631
AA37042	3594±45	kurgan 3		10	1931	1981–1880
AA37043	3416±57	kurgan 3		11	1733, 1724, 1688	1769–1623
AA37044	3407±46	kurgan 3		13	1670, 1668, 1632	1685–1529
AA37045	3407±46	kurgan 3		16	1730, 1685	1744–1631
AA37046	3545±65	kurgan 3		17	1883	1940–1766
AA37047	3425±52	kurgan 3		23	1735, 1718, 1693	1772–1671
2. Krasnosamarskoe settlement, Samara oblast						
Structure floor and cultural level outside structure, Pokrovka and Srubnaya occupations						
AA41022	3531±43	L5	2	3	1879, 1832, 1826, 1790	1899–1771
AA41023	3445±51	M5	1	7	1741	1871–1678
AA41024	3453±43	M6	3	7	1743	1867–1685
AA41025	3469±45	N3	3	7	1748	1874–1690
AA41026	3491±52	N4	2	6	1860, 1846, 1772	1879–1743
AA41027	3460±52	O4	1	7	1745	1873–1685
AA41028	3450±57	O4	2	5	1742	1874–1679
AA41029	3470±43	P1	4	6	1748	1783–1735
AA41030	3477±39	S2	3	4	1752	1785–1738
AA41031	3476±38	R1	2	5	1750	1875–1706
AA41032	3448±47	N2	2	4	1742	1858–1685
AA47790	3311±54	O5	3	3	1598, 1567, 1530	1636–1518
AA47796	3416±59	Y2	2	4	1736, 1713, 1692	1857–1637
AA47797	3450±50	Y1	3	5	1742	1779–1681
Waterlogged Pokrovka artifacts from deep pit interpreted as a well inside the structure						
AA47793	3615±41	M2	4	–276	1948	1984–1899
AA47794	3492±55	M2	4	–280	1860, 1846, 1773	1829–1742
AA47795	3550±54	M2	4	–300	1884	1946–1776

Table 16.1 (*continued*)

Lab Number	*BP Date*	*Kurgan*	*Grave*	*Mean Intercept BCE*	*BCE*
Srubnaya and Pokrovka artifacts from eroded part of settlement on the lake bottom					
AA47791	3494±56	Lake find 1	0	1862, 1845, 1774	1881–1742
AA47792	3492±55	Lake find 2	0	1860, 1846, 1773	1829–1742
Srubnaya herding camp at PD1 in the Peschanyi Dol valley					
AA47798	3480±52	A 16 3	3	1758	1789–1737
AA47799	3565±55	I 18 2	2	1889	1964–1872
3. Karnab mining camp, Zeravshan valley, Uzbekistan, Andronovo–Alakul occupation					
Bln-5127	3476±32				1880–1740
Bln-141274	3280±40				1620–1510
Bln-141275	3170±50				1520–1400
Bln-5126	3130±44				1490–1310
4. Alakul–Andronovo settlements and kurgan graves					
Alakul kurgan 15, grave 1					
Le-924	3360±50	charcoal			1740–1530
Subbotino kurgan 17, grave 3					
Le-1126	3460±50	wood			1880–1690
Subbotino kurgan 18, central grave					
Le-1196	3000±50	wood			1680–1510
Tasty-Butak settlement					
Rul-614	3550±65	wood, pit 14			2010–1770
Le-213	3190±80	wood, pit 11			1600–1320

center of the larger towns were walled palaces or citadels that contained temples. The brick houses and streets of Djarkutan covered almost 100 ha, commanded by a high-walled citadel about 100 by 100 m. Local lords ruled from smaller strongholds such as Togolok 1, just .5 ha (1.2 acres) in size but heavily walled with large corner turrets. Trade and crafts flourished in the crowded houses and alleys of these Central Asian walled towns and fortresses. Their rulers had relations with the civilizations of Mesopotamia, Elam, Harappa, and the Arabian Gulf.

Between 2000 and 1800 BCE, BMAC styles and exported objects (notably small jars made of carved steatite) appeared in many sites and

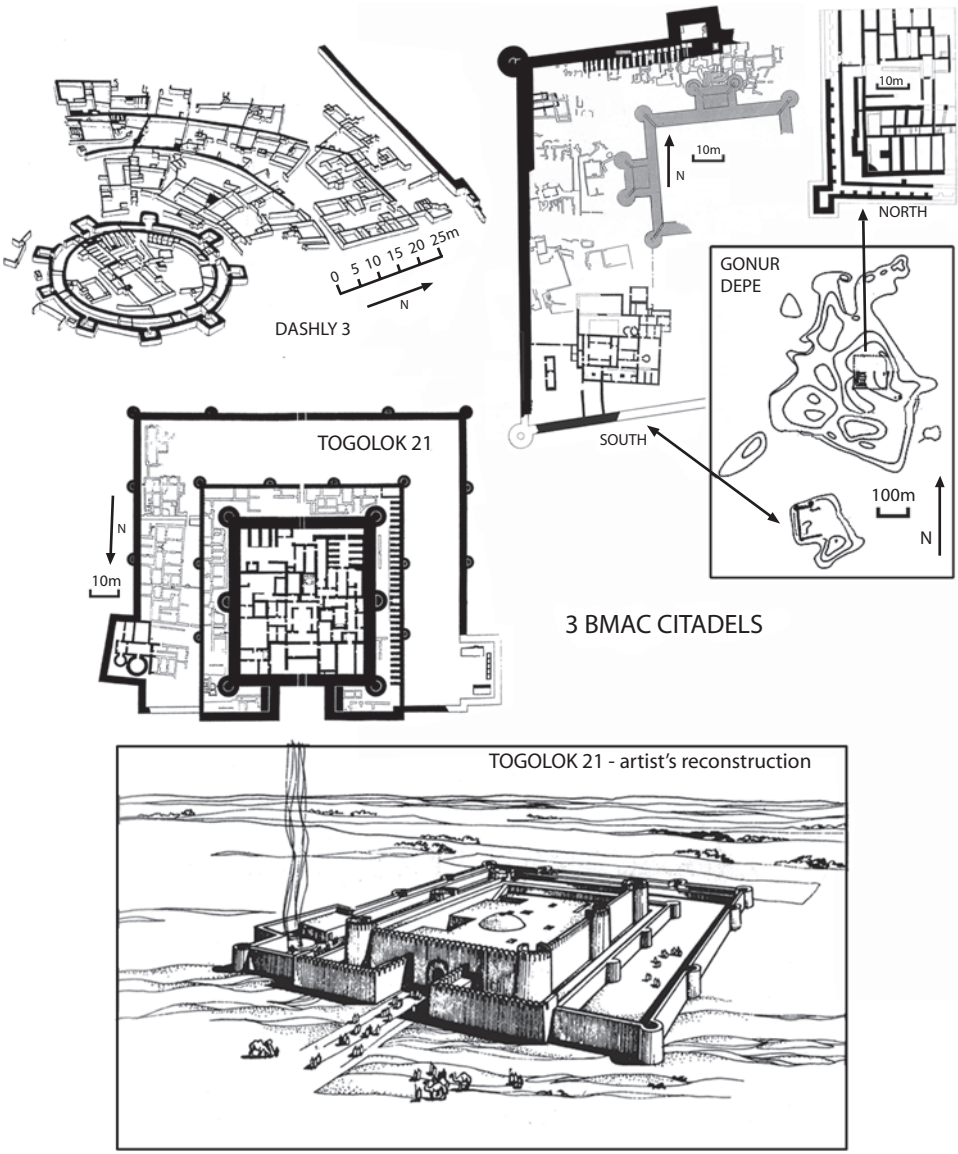


Figure 16.4 Three walled towns of the Bactria-Margiana Archaeological Complex (BMAC) in Central Asia, 2100–1800 BCE. Wall foundations of the central circular citadel/temple and town at Dashly 3, Bactria (after Sarianidi 1977, figure 13); wall foundations at Gonur Depe, Margiana (combined from Hiebert 1994; and Sarianidi 1995); wall foundations and artist's reconstruction of Togolok 21, Margiana (after Hiebert 1994; and Sarianidi 1987).

cemeteries across the Iranian plateau. Crested axes like those of the BMAC appeared at Shadad and other sites in eastern and central Iran. A cemetery at Mehrgarh VIII in Baluchistan, on the border between the Harappan and Elamite civilizations, contained so many BMAC artifacts that it suggests an actual movement of BMAC people into Baluchistan. BMAC-style sealings, ivory combs, steatite vessels, and pottery goblets appeared in the Arabian Gulf from Umm-al-Nar on the Oman peninsula up the Arabian coast to Falaika island in Kuwait. Beadmakers in BMAC towns used shells obtained from both the Indian Ocean (*Engina medicaria, Lambis truncate sebae*) and the Mediterranean Sea (*Nassarius gibbosulus*), as well as steatite, alabaster, lapis lazuli, turquoise, silver, and gold.[15]

The metalsmiths of the BMAC made beautiful objects of bronze, lead, silver, and gold. They cast delicate metal figures by the lost-wax process, which made it possible to cast very detailed metal objects. They made crested bronze shaft-hole axes with distinctive down-curved blades, tanged daggers, mirrors, pins decorated with cast animal and human figures, and a variety of distinctive metal compartmented seals (figure 16.5). The metals used in the first colonization period, late Namazga V, were unalloyed copper, arsenical bronze, and a copper-lead alloy with up to 8–10% lead.

About 2000 BCE, during the Namazga VI/BMAC period, tin-bronze suddenly appeared prominently in sites of the BMAC. Tin-bronzes were common at two BMAC sites, Sapalli and Djarkutan, reaching more than 50% of objects, although at neighboring Dashly-3, also in Bactria, tin-bronzes were just 9% of metal objects. Tin-bronzes were rare in Margiana (less than 10% of metal objects at Gonur, none at all at Togolok). Tin-bronze was abundant only in Bactria, closer to the Zeravshan. It looks like the tin mines of the Zeravshan were established or greatly expanded at the beginning of the mature BMAC period, about 2000 BCE.[16]

There were no wild horses in Central Asia. The native equids were onagers. Wild horses had not previously strayed south of what is today central Kazakhstan. Any horses found in BMAC sites must have been traded in from the steppes far off to the north. The animal bones discarded in and near BMAC settlements contained no horse bones. Hunters occasionally killed wild onagers but not horses. Most of the bones recovered from the settlement trash deposits were from sheep or goats. Asian zebu cattle and domesticated Bactrian camels also appeared. They were shown pulling wagons and carts in BMAC artwork. Small funeral wagons with solid wooden-plank wheels and bronze-studded tires were buried in royal graves associated with the first building phase, dated about 2100–2000 BCE, at

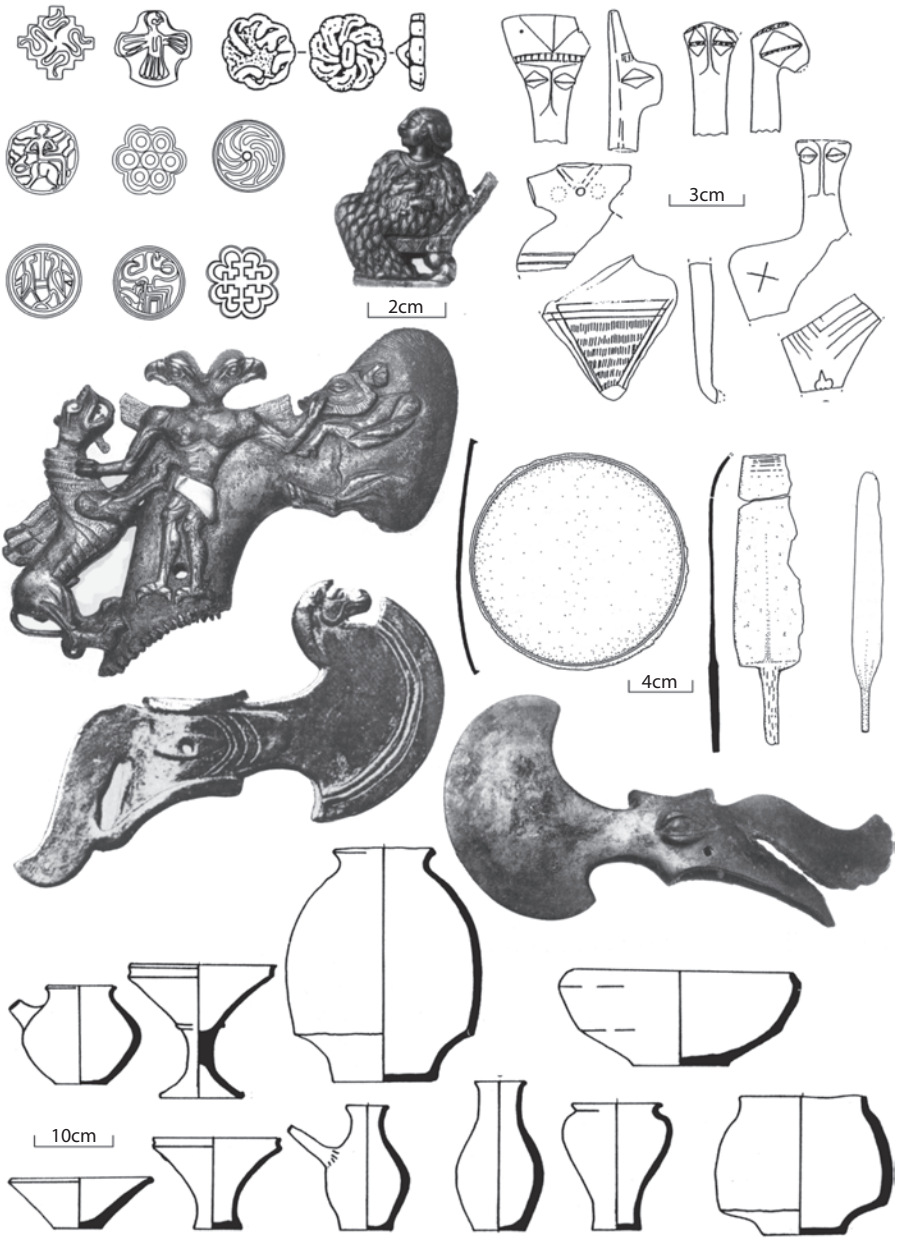


Figure 16.5 Artifacts of the Bactria-Margiana Archaeological Complex, 2100–1800 BCE: (*top left*) a sample of BMAC stamp seals, adapted after Salvatori 2000, and Hiebert 1994; (*top center*) cast silver pin head from Gonur North showing a goddess in a ritual dress, after Klochkov 1998, figure 3; (*top right*) ceramic female figurines from Gonur North, after Hiebert 1994; (*center left*)

Gonur in Margiana (called Gonur North, because the oldest phase was found at the northern end of the modern ruins).

In these graves at Gonur, associated with the early settlement of Gonur North, one horse was found. A brick-lined grave pit contained the contorted bodies of ten adult humans who were apparently killed in the grave itself, one of whom fell across a small funeral wagon with solid wooden wheels. The grave also contained a whole dog, a whole camel, and the decapitated body of a horse foal (the reverse of an Aryan horse sacrifice). This grave is thought to have been a sacrificial offering that accompanied a nearby "royal" tomb. The royal tomb contained funeral gifts that included a bronze image of a horse head, probably a pommel decoration on a wooden staff. Another horse head image appeared as a decoration on a crested copper axe of the BMAC type, unfortunately obtained on the art market and now housed in the Louvre. Finally, a BMAC-style seal probably looted from a BMAC cemetery in Bactria (Afghanistan) showed a man riding a galloping equid that looks very much like a horse (see figure 16.3). The design was similar to the contemporary galloping-horse-and-rider image on the Ur III seal of Abbakalla, dated 2040–2050 BCE. Both seals showed a galloping horse, a rider with a hair-knot on the back of his head, and a man walking.

These finds suggest that horses began to appear in Central Asia about 2100–2000 BCE but never were used for food. They appeared only as decorative symbols on high-status objects and, in one case, in a funeral sacrifice. Given their simultaneous appearance across Iran and Mesopotamia, and the position of BMAC between the steppes and the southern civilizations, horses were probably a trade commodity. After chariots were introduced to the princes of the BMAC, Iran, and the Near East around 2000–1900 BCE, the demand for horses could easily have been on the order of tens of thousands of animals annually.[17]

Steppe Immigrants in Central Asia

Fred Hiebert's excavations at the walled town of Gonur North in Margiana, dated 2100–2000 BCE, turned up a few sherds of strange pottery,

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Figure 16.5 (*continued*) crested shaft-hole axes from the art market, probably from BMAC sites, with a possible horse-head on the lower one, after Aruz 1998, figure 24; and Amiet 1986, figure 167; (*center right*) a crested axe with eye amulet, and a copper mirror and dagger excavated from Gonur North, after Hiebert 1994; and Sarianidi 1995, figure 22; (*bottom*) ceramic vessel shapes from Gonur, after Hiebert 1994.

unlike any other pottery at Gonur. It was made with a paddle-and-anvil technique on a cloth-lined form—the clay was pounded over an upright cloth-covered pot to make the basic shape, and then was removed and finished. This is how Sintashta pottery was made. These strange sherds were imported from the steppe. At this stage (equivalent to early Sintashta) there was very little steppe pottery at Gonur, but it was there, at the same time a horse foal was thrown into a sacrificial pit in the Gonur North cemetery. Another possible trace of this early phase of contact were "Abashevo-like" pottery sherds decorated with horizontal channels, found at the tin miners' camp at Karnab on the lower Zeravshan. Late Abashevo was contemporary with Sintashta.

During the classic phase of the BMAC, 2000–1800 BCE, contact with steppe people became much more visible. Steppe pots were brought into the rural stronghold at Togolok 1 in Margiana, inside the larger palace/temple at Togolok 21, inside the central citadel at Gonur South, and inside the walled palace/temple at Djarkutan in Bactria (figure 16.6). These sherds were clearly from steppe cultures. Similar designs can be found on Sintashta pots at Krivoe Ozero (k. 9, gr. 3; k. 10, gr. 13) but were more common on pottery of early Andronovo (Alakul variant) type, dated after 1900–1800 BCE—pottery like that used by the Andronovo miners at Karnab. Although the amount of steppe pottery in classic BMAC sites is small, it is widespread, and there is no doubt that it derived from northern steppe cultures. In these contexts, dated 2000–1800 BCE, the most likely steppe sources were the Petrovka culture at Tugai or the first Alakul-Andronovo tin miners at Karnab, both located in the Zeravshan valley.[18]

The Petrovka settlement at Tugai appeared just 27 km downstream (west) of Sarazm, not far from the later site of Samarkand, the greatest caravan trading city of medieval Central Asia. Perhaps Tugai had a similar, if more modest, function in an early north-south trade network. The Petrovka culture (see below) was an eastern offshoot of Sintashta. The Petrovka people at Tugai constructed two copper-smelting ovens, crucibles with copper slag, and at least one dwelling. Their pottery included at least twenty-two pots made with the paddle-and-anvil technique on a cloth-lined form. Most of them were made of clay tempered with crushed shell, the standard mixture for Petrovka potters, but two were tempered with crushed talc/steatite minerals. Talc-tempered clays were typical of Sintashta, Abashevo, and even forest-zone pottery of Ural forager cultures, so these two pots probably were carried to the

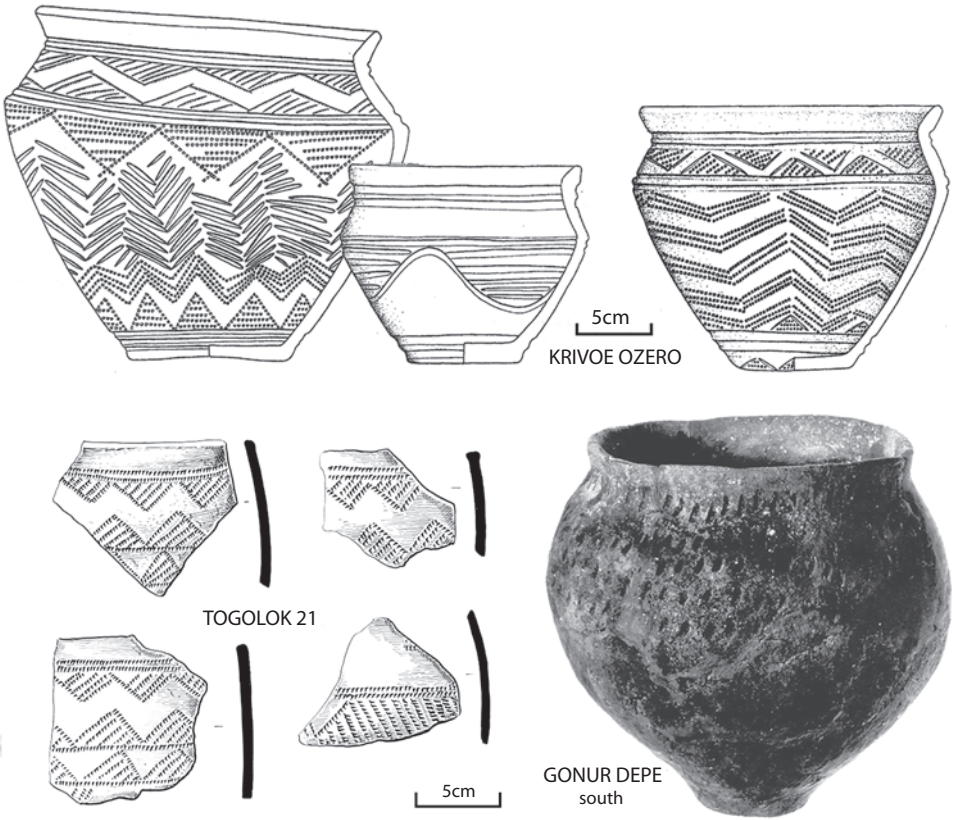
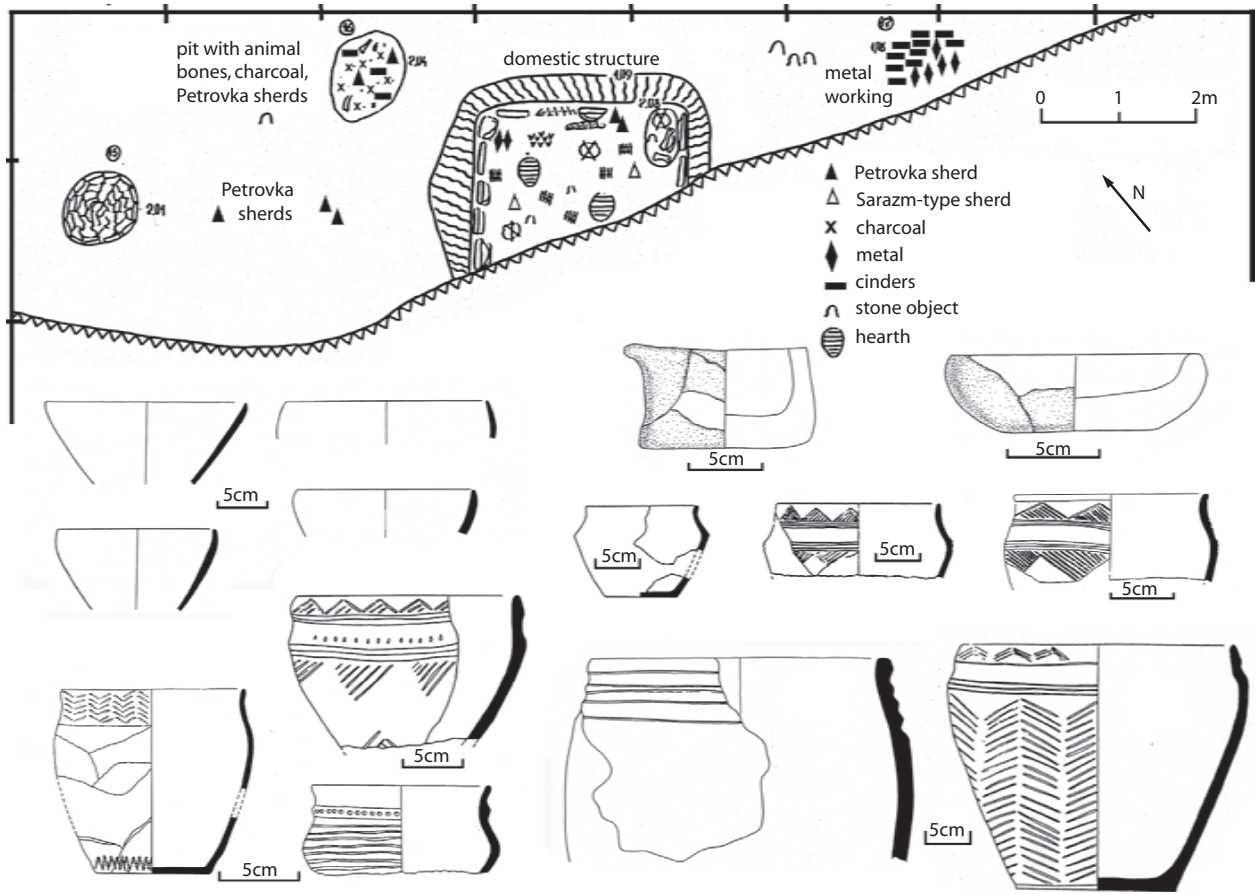


Figure 16.6 A whole steppe pot found inside the walls of the Gonur South town, after Hiebert 1994; steppe sherds with zig-zag decoration found inside the walls of Togolok 1, after Kuzmina 2003; and similar motifs on Sintashta sherds from graves at Krivoe Ozero, Ural steppes, after Vinogradov 2003, figures 39 and 74.

Zeravshan from the Ural steppes. The pottery shapes and impressed designs were classic early Petrovka (figure 16.7). A substantial group of Petrovka people apparently moved from the Ural-Ishim steppes to Tugai, probably in wagons loaded with pottery and other possessions. They left garbage middens with the bones of cattle, sheep, and goats, but they did not eat horses—although their Petrovka relatives in the northern steppes did. Tugai also contained sherds of wheel-made cups in red-polished and black-polished fabrics typical of the latest phase at Sarazm (IV). The


pit with animal bones, charcoal, Petrovka sherds
domestic structure
metal working
Petrovka sherds
0 1 2m
N
Petrovka sherd
Sarazm-type sherd
charcoal
metal
cinders
stone object
hearth
5cm

principal activity identified in the small excavated area was copper smelting.[19]

The steppe immigrants at Tugai brought chariots with them. A grave at Zardcha-Khalifa 1 km east of Sarazm contained a male buried in a contracted pose on his right side, head to the northwest, in a large oval pit, 3.2 m by 2.1 m, with the skeleton of a ram.[20] The grave gifts included three wheel-made Namazga VI ceramic pots, typical of the wares made in Bactrian sites of the BMAC such as Sappali and Dzharkutan; a trough-spouted bronze vessel (typical of BMAC) and fragments of two others; a pair of gold trumpet-shaped earrings; a gold button; a bronze straight-pin with a small cast horse on one end; a stone pestle; two bronze bar bits with looped ends; and two largely complete bone disc-shaped cheekpieces of the Sintashta type, with fragments of two others (figure 16.8). The two bronze bar bits are the oldest known metal bits anywhere. With the four cheekpieces they suggest equipment for a chariot team. The cheekpieces were a specific Sintashta type (the raised bump around the central hole is the key typological detail), though disc-shaped studded cheekpieces also appeared in many Petrovka graves. Stone pestles also frequently appeared in Sintashta and Petrovka graves. The Zardcha-Khalifa grave probably was that of an immigrant from the north who had acquired many BMAC luxury objects. He was buried with the only known BMAC-made pin with the figure of a horse—perhaps made just for him. The Zardcha-Khalifa chief may have been a horse dealer. The Zeravshan valley and the Ferghana valley just to the north might have become the breeding ground at this time for the fine horses for which they were known in later antiquity.

The fabric-impressed pottery and the sacrificed horse foal at Gonur North and perhaps the Abashevo (?) sherds at Karnab represent the exploratory phase of contact and trade between the northern steppes and the southern urban civilizations about 2100–2000 BCE, during the period when the kings of Ur III still dominated Elam. Information and perhaps even cult practices from the south flowed back to early Sintashta societies. On the eastern frontier in Kazakhstan, where Petrovka was budding off from Sintashta, the lure of the south prompted a migration across more

Figure 16.7 The Petrovka settlement at Tugai on the Zeravshan River: (*top*) plan of excavation; (*center left*) imported redware pottery like that of Sarazm IV; (*center right*) two coarse ceramic crucibles from the metal-working area; (*bottom*) Petrovka pottery. Adapted from Avanessova 1996.

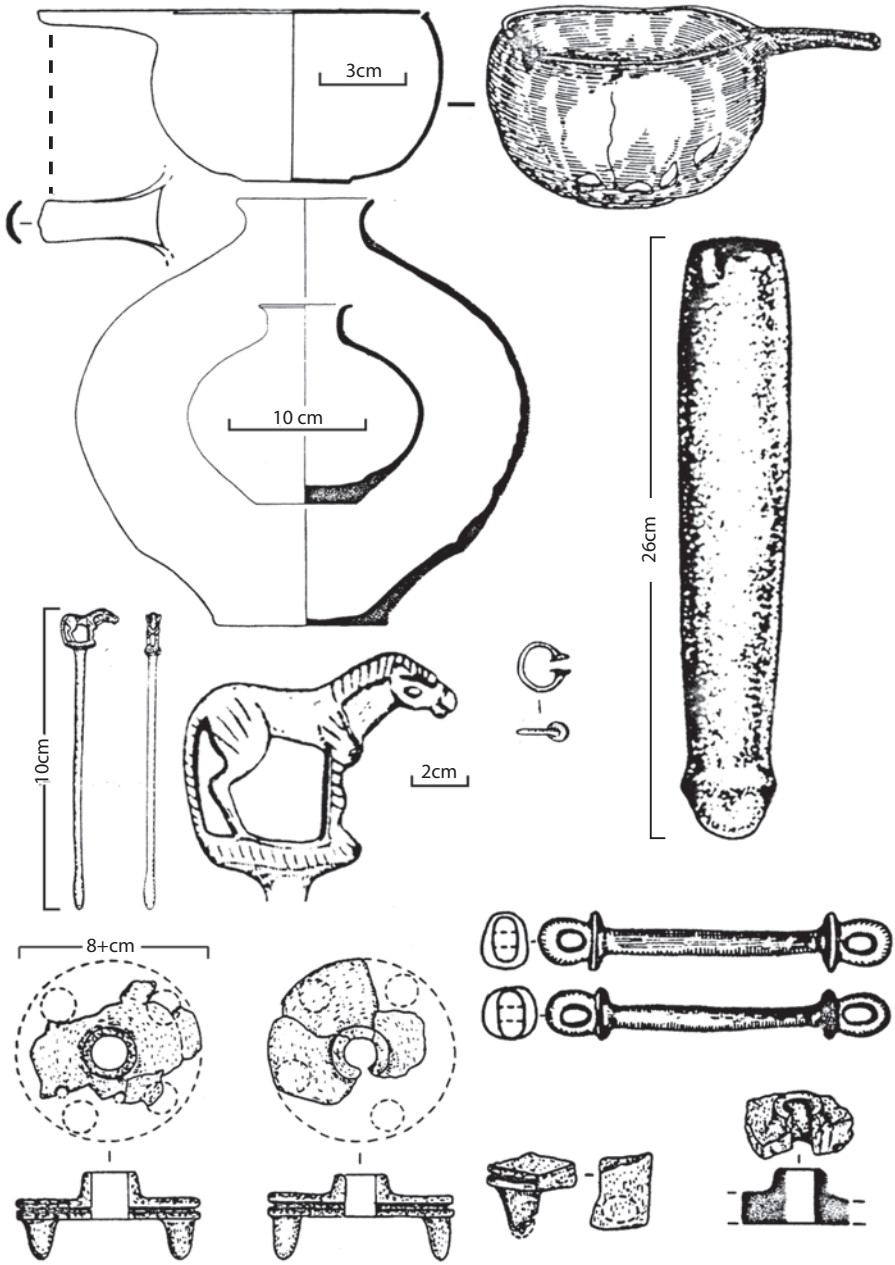


Figure 16.8 Objects from the grave at Zardcha-Khalifa on the Zeravshan River. The trough-spouted bronze vessel and ceramic pots are typical of the BMAC, 2000–1800 BCE; the cast copper horse pin shows BMAC casting methods; the bronze bar bits are the first ones dated this early; and the stone pestle, trumpet-shaped earring, and bone cheekpieces are steppe types. After Bobomulloev 1997, figures 2, 3, and 4.

than a thousand kilometers of hostile desert. The establishment of the Petrovka metal-working colony at Tugai, probably around 1900 BCE, was the beginning of the second phase, marked by the actual migration of chariot-driving tribes from the north into Central Asia. Sarazm and the irrigation-fed Zaman-Baba villages were abandoned about when the Petrovka miners arrived at Tugai. The steppe tribes quickly appropriated the ore sources of the Zeravshan, and their horses and chariots might have made it impossible for the men of Sarazm to defend themselves.

Central Asian Trade Goods in the Steppes

Did any BMAC products appear in Sintashta or Petrovka settlements? Only a few hints of a return trade can be identified. One intriguing innovation was a new design motif, the stepped pyramid or crenellation. Stepped pyramids or crenellations appeared on the pottery of Sintashta, Potapovka, and Petrovka. The stepped pyramid was the basic element in the decorative artwork on Namazga, Sarazm, and BMAC pottery, jewelry, metalwork, and even in a mural painted on the Proto-Elamite palace wall at Malyan (figure 16.9, bottom). Repeated horizontally, the stepped pyramid became a line of crenellated designs; repeated on four sides, it became a stepped cross. This motif had not appeared in any earlier pottery in the steppes, neither in the Bronze Age nor the Eneolithic. Charts of design motifs are regularly published in Russian archaeological ceramic studies. I have scanned these charts for years and have not found the stepped pyramid in any assemblage earlier than Sintashta. Stepped pyramids appeared for the first time on northern steppe pottery just when northern steppe pottery first showed up in BMAC sites. It was seen first on a small percentage (<5%) of Potapovka pottery on the middle Volga (single vessels in Potapovka kurgans 1, 2, 3, and 5) and at about the same frequency on Sintashta pottery in the Ural-Tobol steppes; later it became a standard design element in Petrovka and Andronovo pottery (but not in Srubnaya pottery, west of the Urals). Although no Sarazm or BMAC pottery has been found in Sintashta contexts, the design could have been conveyed to the northern steppes on textiles—perhaps the commodity exchanged for northern metal. I would guess that Sintashta potters copied the design from imported BMAC textiles.

There are other indications of contact. A lead wire made of two braided strands was found among the metal objects in the Sintashta settlement of Kuisak. Lead had never before appeared in the northern steppes as a pure metal, whereas a single ingot of lead weighing 10 kg was found at Sarazm.

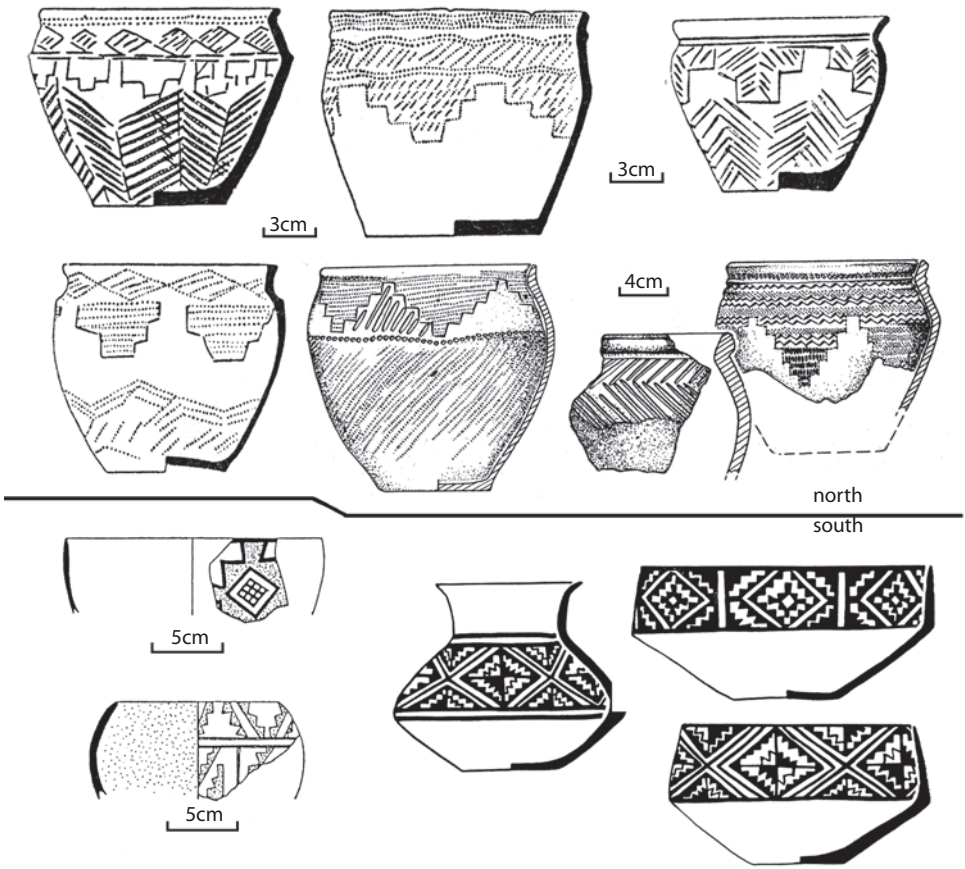


Figure 16.9 Stepped pyramid or crenellation motifs on steppe pottery and on Central Asian pottery: (*top row and left pot in second row*) Potapovka graves, middle Volga region, 2100–1800 BCE, after Vasiliev, Kuznetsov, and Semenova 1994, figures 20 and 22; (*middle row, remaining pots*) Sintashta SII cemetery, grave 1, after Gening, Zdanovich and Gening 1992, figure 172; (*bottom left*) Sarazm, level II, 3000–2500 BCE, after Lyonnet 1996, figures 4 and 12; (*bottom right*) Altyn-Depe, excavation 1, burial 296, after Masson 1988, plate 27.

The Kuishak lead wire probably was an import from the Zeravshan. A lapis lazuli bead from Afghanistan was found at Sintashta. A Bactrian-handled bronze mirror was found in a Sintashta grave at Krasnoe Znamya.[21] Finally, the technique of lost-wax metal casting first appeared in the north during the Sintashta period, in metal objects of Seima-Turbino

type (described in more detail below). Lost-wax casting was familiar to BMAC metalsmiths. Southern decorative motifs (stepped pyramids), raw materials (lead and lapis lazuli), one mirror, and metal-working techniques (lost-wax casting) appeared in the north just when northern pottery, chariot-driving cheekpieces, bit wear, and horse bones appeared in the south.

The sudden shift to large-scale copper production that began about 2100–2000 BCE in the earliest Sintashta settlements must have been stimulated by a sharp increase in demand. Central Asia is the most likely source. The increase in metal production deeply affected the internal politics of northern steppe societies, which quickly became accustomed to using and consuming large quantities of bronze. Although the northern steppe producers probably had direct contact with the Central Asian market only for a short time, internal demand in the steppes remained high throughout the LBA. Once the metallurgical pump was primed, so to speak, it continued to flow. The priming happened because of contact with urban markets, but the flow after that raised the usage of metal in the steppes and in the forest zone to the north, starting an internal European cycle of exchange that would lead to a metal boom in the Eurasian steppes after 2100 BCE.

After 1900 BCE a contact zone developed in the Zeravshan valley and extended southward to include the central citadels in the BMAC towns. In the Zeravshan, migrants from the northern steppes mixed with late Kelteminar and BMAC-derived populations. The Old Indic dialects probably evolved and separated from the developing Iranian dialects in this setting. To understand how the Zeravshan-Bactrian contact zone separated itself from the northern steppes, we need to examine what happened in the northern steppes after the end of the Sintashta culture.

The Opening of the Eurasian Steppes

The Srubnaya (or Timber-Grave) culture was the most important LBA culture of the western steppes, from the Urals to the Dnieper (figure 16.10). The Andronovo horizon was the primary LBA complex of the eastern steppes, from the Urals to the Altai and the Tien Shan. Both grew from the Potapovka-Sintashta complex between the middle Volga and the Tobol. With the appearance of Srubnaya and Andronovo between about 1900 and 1800 BCE, for the first time in history a chain of broadly similar cultures extended from the edges of China to the frontiers of Europe. Innovations and raw materials began to move across the continent. The steppe world was not just a conduit, it also became an innovating

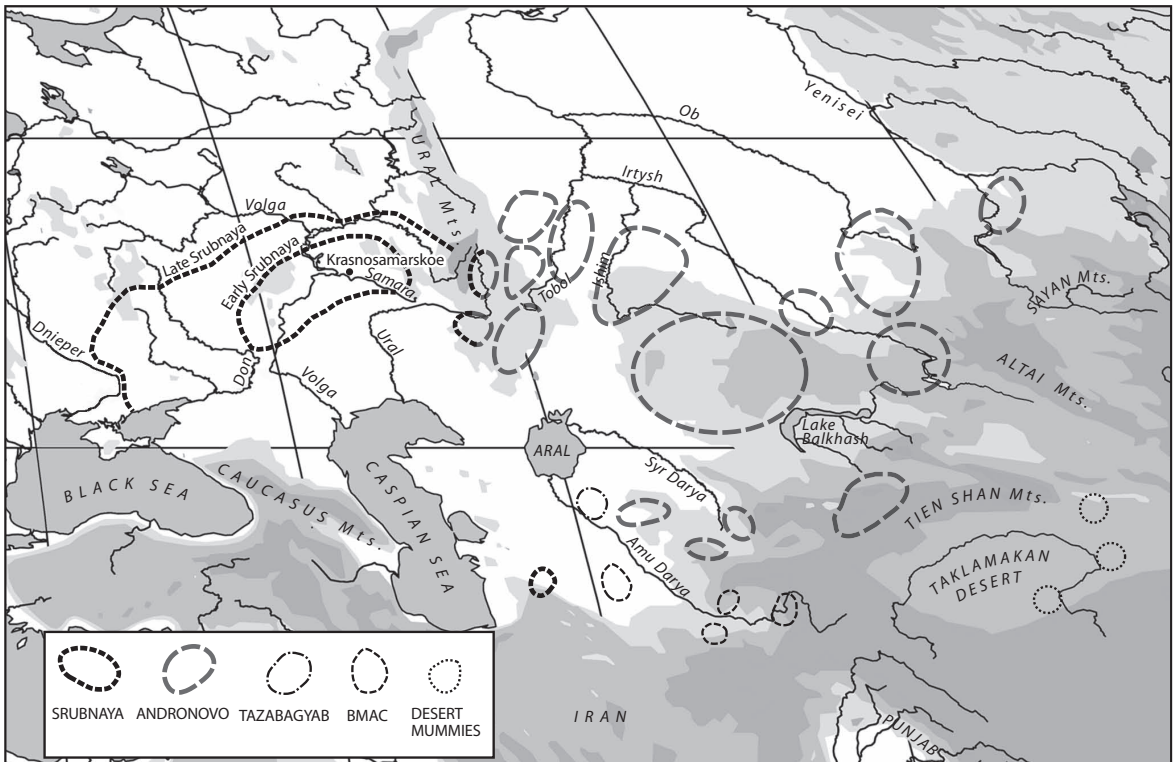


Figure 16.10 The Late Bronze Age cultures of the Eurasian steppes, 1900–1500 BCE.

center, particularly in bronze metallurgy and chariot warfare. The chariot-driving Shang kings of China and the Mycenaean princes of Greece, contemporaries at opposite ends of the ancient world at about 1500 BCE, shared a common technological debt to the LBA herders of the Eurasian steppes.

The Srubnaya Culture: Herding and Gathering in the Western Steppes

West of the Ural Mountains, the Potapovka and late Abashevo groups of the middle Volga region developed into the Pokrovka complex, dated about 1900–1750 BCE. Pokrovka was a proto-Srubnaya phase that rapidly developed directly into the Srubnaya (or Timber-Grave) culture (1800–1200 BCE). Srubnaya material culture spread as far west as the Dnieper valley. One of the most prominent features of the Srubnaya culture was the appearance of hundreds of small settlement sites, most of them containing just a few houses, across the northern steppe and the southern forest-steppe, from the Urals to the Dnieper. Although settlements had reappeared in a few places east of the Don River during the late Catacomb culture, 2400–2100 BCE, and were even more numerous in Ukraine west of the Don during the Mnogovalikovaya (MVK) period (2100–1800 BCE), the Srubnaya period was the first time since the Eneolithic that settlements appeared across the entire northern steppe zone from the Dnieper to the southern Urals and beyond into northern Kazakhstan.

The reason for this shift back to living in permanent homes is unclear. Most Srubnaya settlements were not fortified or defended. Most were small individual homesteads or extended family ranches rather than nucleated villages. The herding pattern seems to have been localized rather than migratory. During the Samara Valley Project, in 1999–2001, we studied the local Srubnaya herding pattern by excavating a series of Srubnaya herding camps that extended up a tributary stream valley, Peschanyi Dol, from the Srubnaya settlement at Barinovka, near the mouth of the valley on the Samara (figure 16.11). The largest herding camps (PD1 and 2) were those closest to the home settlement, within 4–6 km of Barinovka. Farther upstream the Srubnaya camps were smaller with fewer pottery sherds, and beyond about 10–12 km upstream from Barinovka we found no LBA herding camps at all, not even around the springs that fed the stream at its source, where there was plenty of water and good pastures. So the herding system seems to have been localized, like the new residence pattern.

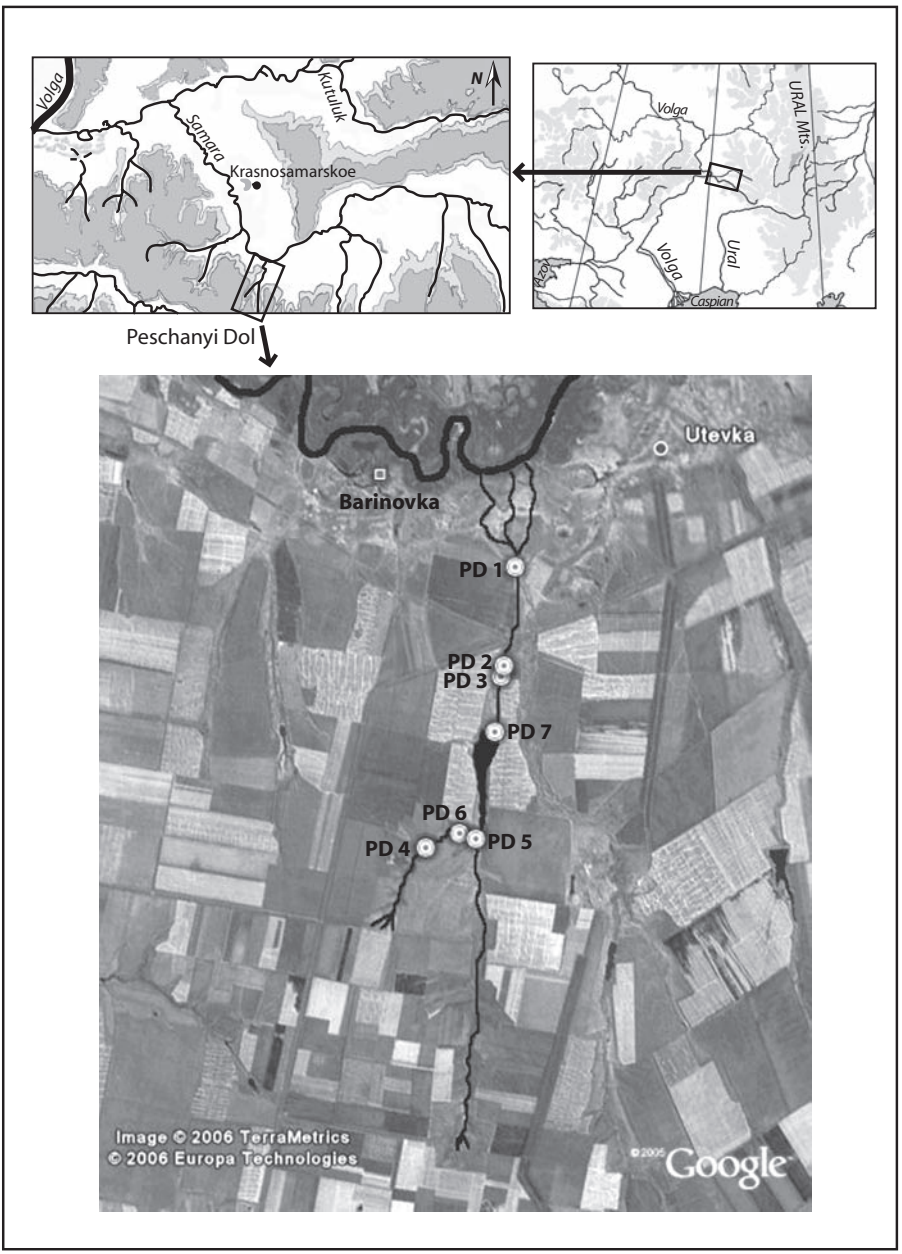


Figure 16.11 The Peschanyi Dol valley, a tributary of the Samara River, surveyed to find ephemeral camps in 1995–96. PD1, 2, and 3, were Srubnaya herding camps excavated in 2000. All numbered sites yielded at least one Srubnaya ceramic sherd. Barinovka was a larger Srubnaya settlement tested in

The Srubnaya economy in the middle Volga steppes does not seem to have required long-distance migrations.

One traditional explanation for the settling-down phenomenon is that this was when agriculture was widely adopted across the northern steppes.[22] But this explanation certainly does not apply everywhere. At the settlement of Krasnosamarskoe in the Samara River valley, where the dog sacrifice was found (chapter 15), a Pokrovka component (radiocarbon dated 1900–1800 BCE) and an early Srubnaya component (dated 1800–1700 BCE) were stratified within a single structure. In the Srubnaya period the structure probably was a well-house and woodshed where a variety of domestic tasks were conducted and food garbage was buried in pits. It was used during all seasons of the year. Anne Pike-Tay's analysis of seasonal bands in the roots of animal teeth established that the cattle and sheep were butchered in all seasons. But there was no agriculture. Laura Popova found no seeds, pollen, or phytoliths of cultivated cereals associated with the LBA occupation, only wild *Chenopodium* and *Amaranthus* seeds. The skeletons of 192 adults from twelve Srubnaya cemeteries in the Samara oblast were examined by Eileen Murray and A. Khokhlov. They showed almost no dental decay. The complete absence of caries usually is associated with a low-starch, low-carbohydrate diet, typical for foragers and quite atypical for bread eaters (figure 16.12). The dental evidence confirmed the botanical evidence. Bread was not eaten much, if at all, in the northern steppes.

In pits at Krasnosamarskoe we found an abundance of carbonized wild seeds, including *Chenopodium album* and *Amaranthus*. Modern wild *Chenopodium* (also known as goosefoot) is a weed that grows in dense stands that can produce seed yields in the range of 500–1000 kg/ha, about the same as einkorn wheat, which yields 645-835 kg/ha.[23] *Amaranthus* is equally prolific. With meat and milk from cattle, sheep, and horses, this was a sufficient diet. Although clear evidence of cereal agriculture has been found in Srubnaya settlements west of the Don in Ukraine, it is possible that agriculture was much less important east of the Don than has often been assumed. Herding and gathering was the basis for the northern steppe economy in at least some regions east of the Don as late as the LBA.[24]

Figure 16.11 (*continued*) 1996 but found to be badly disturbed by a historic settlement. Author's excavation. Bottom image is a Google Earth™ image, © 2006 Terra Metrics, 2006 Europa Technologies.

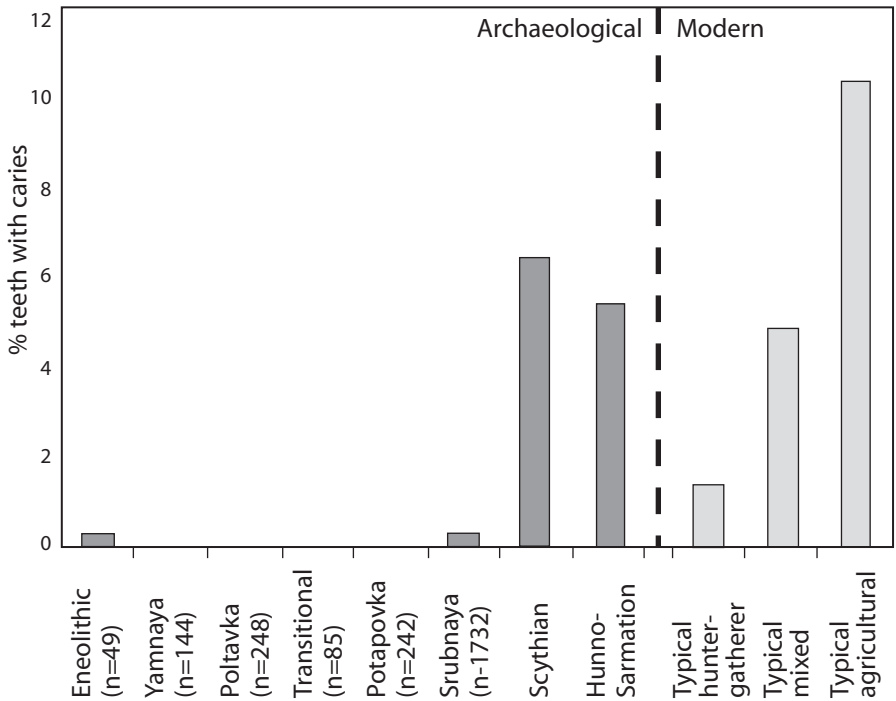


Figure 16.12 Graph of the frequency of dental caries (cavities) in populations with different kinds of food economies (*right*), in Scythian and Sarmatian cemeteries in Tuva (*center*), and in prehistoric populations in the Samara oblast, middle Volga region (*left six bars*). Bread apparently was not part of the diet in the Samara oblast. After Murphy 2003; and Murphy and Khokhlov 2001.

So if agriculture does not provide an answer, then why did people settle down during the MBA/LBA transition in the northern steppes, including the earlier episode at Sintashta? As explained in chapter 15, climate change might have been the principal cause. A cool, arid climate affected the Eurasian steppes between about 2500–2000 BCE. This was the same event that struck Akkadian agriculture and weakened the Harappan civilization. The late MBA/early LBA settling-down phenomenon, including the earliest episodes at Sintashta and Arkaim, can be interpreted as a way to maintain control over the richest winter forage areas for herds, particularly if grazing animals were the principal source of food in an economy that, in many regions, did not include agriculture. Early LBA Krasnosamarskoe overlooked one of the largest marshes on the lower Samara River.

Some permanent settlements also developed near copper mines. Cattle forage was not the only critical resource in the northern steppes. Mining and bronze working became important industries across the steppes during the LBA. A vast Srubnaya mining center operated at Kargaly near Orenburg in the South Urals, and other enormous copper mines operated near Karaganda in central Kazakhstan. Smaller mining camps were established at many small copper outcrops, like the Srubnaya mining camp at Mikhailovka Ovsianka in the southern Samara oblast.[25]

East of the Urals, Phase I: The Petrovka Culture

The first culture of the LBA east of the Urals was the Petrovka culture, an eastern offshoot of Sintashta dated about 1900–1750 BCE. Petrovka was so similar to Sintashta in its material culture and mortuary rituals that many archaeologists (including me) have used the combined term Sintashta-Petrovka to refer to both. But Petrovka ceramics show some distinctive variations in shape and decoration, and are stratified above Sintashta deposits at several sites, so it is clear that Petrovka grew out of and was generally later than Sintashta. The oldest Petrovka sites, like the type site, Petrovka II, were settlements on the Ishim River in the steppes of northern Kazahstan (figure 16.13). The Petrovka culture probably absorbed some people who had roots in the older post-Botai horse-centered cultures of the Ishim steppes, like Sergeivka, but they were materially (and probably linguistically) almost invisible. Petrovka-style pottery then replaced Sintashta ceramics at several Sintashta fortified sites, as at Ust'ye, where the Sintashta settlement was burned and replaced by a Petrovka settlement built on a different plan. Petrovka graves were dug into older Sintashta kurgans at Krivoe Ozero and Kamenny Ambar.[26]

The settlement of Petrovka II was surrounded by a narrow ditch less than 1 m deep, perhaps for drainage. The twenty-four large houses had dug-out floors and measured from 6 by 10 m to about 8 by 18 m. They were built close together on a terrace overlooking the floodplain, a nucleated village pattern quite different from the scattered homesteads of the Srubnaya culture. Petrovka II was reoccupied by people who made classic Andronovo-horizon ceramics of both the Alakul and Federovo types, stratified above the Petrovka layer, and the Andronovo town was succeeded by a "final-LBA" settlement with Sargar ceramics. This stratified sequence made Petrovka II an important yardstick for the LBA chronology of the Kazakh steppes. Chariots continued to be buried in a few early Petrovka graves at Berlyk II and Krivoe Ozero, and many bone disk-shaped cheekpieces have

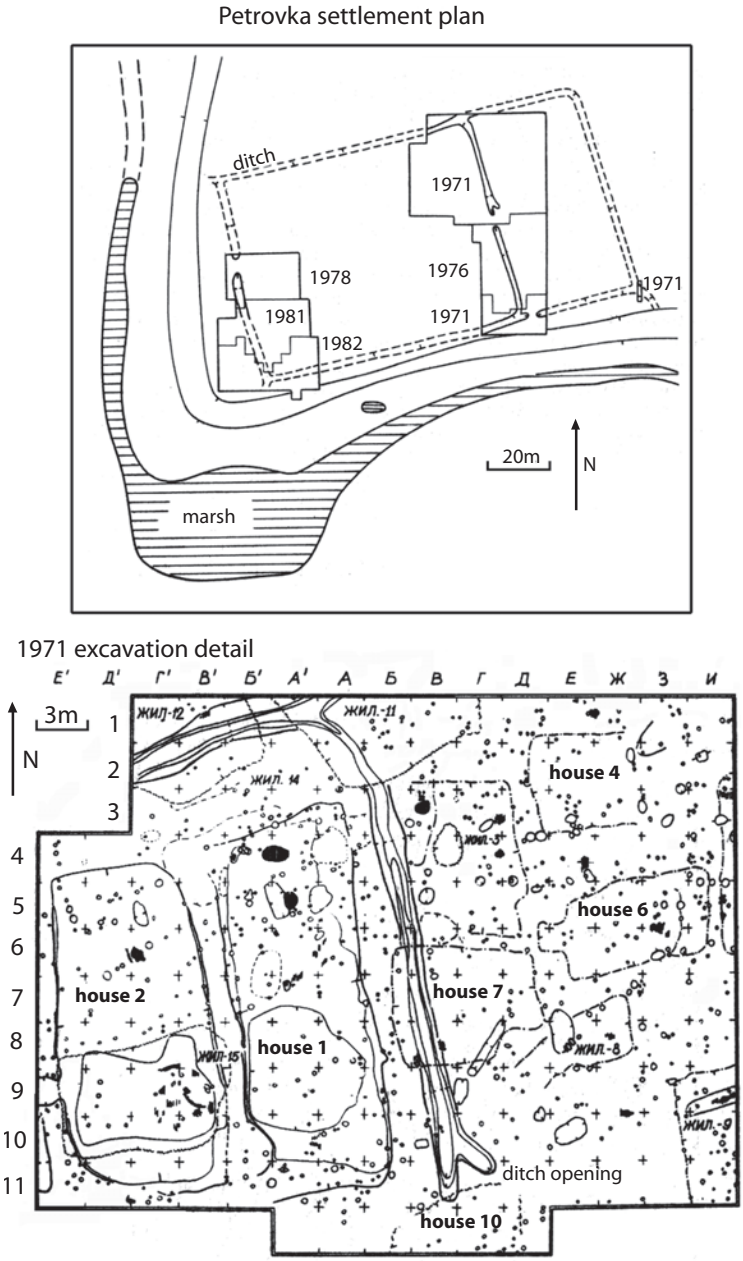


Figure 16.13 The Petrovka settlement, type site for the Petrovka culture, ca. 1900–1750 BCE: (*top*) general plan of the original ditch around the settlement, with a later enlargement at the east end, after Zdanovich 1988, Figure 12; (*bottom*) detail of overlapping rebuilt house floors in the northeast corner of the original settlement, with new houses built over the original eastern ditch, after

come from Petrovka sites. During the Petrovka period, however, chariot burials gradually ceased, the size and number of mortuary animal sacrifices also declined, and large-scale Sintashta-type fortifications were no longer built around settlements in the northern steppes.

Petrovka settlements and kurgan cemeteries spread southward into the arid steppes of central Kazkahstan, and from there to Tugai on the Zeravshan, more than 1,200 km south of central Kazakhstan. Petrovka probably also was in touch with the Okunevo culture in the western Altai, the successor of late Afanasievo. The permanent nucleated settlements of the Petrovka culture do not resemble the temporary camps of nomadic herders, so it is unlikely that the Petrovka economy depended on annual long-distance migrations. Early historic nomads, who did not live in permanent nucleated villages, wintered in the Syr Darya marshes and summered in the north Kazakh steppes, a cycle of annual movements that brought them to the doorstep of Central Asia civilizations each winter. But the Petrovka economy seems to have been less nomadic. If the Petrovka people did *not* engage in long-distance herd migrations, then their movement south to the Zeravshan was not an accidental by-product of annual herding patterns (as is often presumed) but instead was intentional, motivated by the desire for trade, loot, or glory. The later annual migration pattern does at least show that in the spring and fall it was possible to drive herds of animals across the intervening desert and semi-desert.[27]

Petrovka settlements commonly contained two-part furnaces, slag, and abundant evidence of copper smelting, like Sintashta settlements. But, unlike Sintashta, most Petrovka metal objects were made of tin-bronze.[28] A possible source for the tin in Petrovka tin-bronzes, in addition to the Zeravshan valley, was in the western foothills of the Altai Mountains. A remarkable shift occurred in the forest-steppe zone north of the Petrovka territory during the early Petrovka phase.

The Seima-Turbino Horizon in the Forest-Steppe Zone

The Seima-Turbino horizon marks the entry of the forest-steppe and forest-zone foragers into the cycle of elite competition, trade, and warfare that had erupted earlier in the northern steppes. The tin-bronze spears, daggers, and axes of the Seima-Turbino horizon were among the most

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Figure 16.13 (*continued*) Maliutina 1991, Figure 14. The stratigraphic complexity of these settlements contributes to arguments about phases and chronology.

technically and aesthetically refined weapons in the ancient world, but they were made by forest and forest-steppe societies that in some places (Tashkovo II) still depended on hunting and fishing. These very high-quality tin-bronze objects first appeared among the Elunino and Krotovo cultures located on the upper and middle Irtysh and the upper Ob in the western foothills of the Altai Mountains, a surprisingly remote region for such a remarkable exhibition of metallurgical skill. But tin, copper, and gold ores all could be found on the upper Irtysh, near the confluence of the Irtysh and the Bukhtarta rivers about 600 km east of Karaganda. The exploitation of these ore sources apparently was accompanied by an explosion of new metallurgical skills.

One of the earliest and most important Seima-Turbino cemeteries was at Rostovka in the Omsk oblast on the middle Irtysh (figure 16.14). Although skeletal preservation was poor, many of the thirty-eight graves seem to have contained no human bones at all or just a few fragments of a skeleton. In the graves with whole bodies the skeleton was supine with the legs and arms extended. Grave gifts were offered both in the graves and in ritual deposits at the edge of graves. Both kinds of offerings included tin-bronze socketed spearheads, single-edged curved knives with cast figures on the pommel, and hollow-core bronze axes decorated with triangles and lozenges. Grave 21 contained bivalve molds for making all three of these weapon types. Offerings also included stemmed flint projectile points of the same types that appeared in Sintashta graves, bone plates pierced to make plate armor, and nineteen hundred sherds of Krotovo pottery (figure 16.14). One grave (gr. 2) contained a lapis lazuli bead from Afghanistan, probably traded through the BMAC, strung with beads of nephrite, probably from the Baikal region.[29]

Seima-Turbino metalsmiths were, with Petrovka metalsmiths, the first north of Central Asia to regularly use a tin-bronze alloy. But Seima-Turbino metalsmiths were unique in their mastery of lost-wax casting (for decorative figures on dagger handles) and thin-walled hollow-mold casting (for socketed spears and hollow axes). Socketed spearheads were made on Sintashta anvils by bending a bronze sheet around a socket form and then forging the seam (figure 16.15). Seima-Turbino socketed spearheads were made by pouring molten metal into a mold that created a seamless cast socket around a suspended core, making a hollow interior, a much more sophisticated operation, and easier to do with tin-bronze than with arsenical bronze. Axes were made in a similar way, tin-bronze with a hollow interior, cast around a suspended core. Lost-wax and hollow-mold casting methods probably were learned from the BMAC civilization, the only reasonably nearby source (perhaps through a skilled captive?).

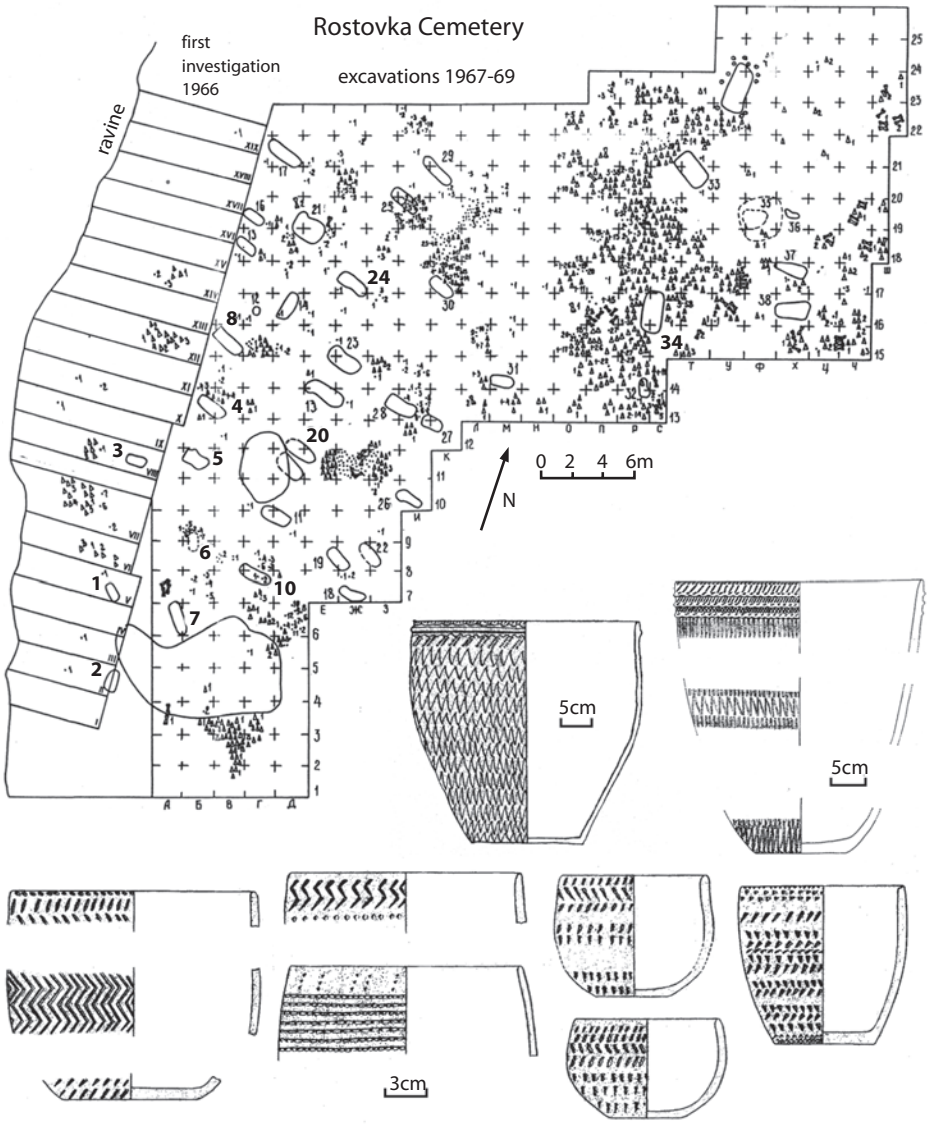

Figure 16.14 The Rostovka cemetery near Omsk, one of the most important sites of the Seima-Turbino culture. Graves are numbered. Black dots represent ceramics, metal objects, and other artifacts deposited above and beside the graves. All the pots conform to the Krotova type. After Matiushchenko and Sinitsyna 1988, figures 4, 81, 82, and 83.

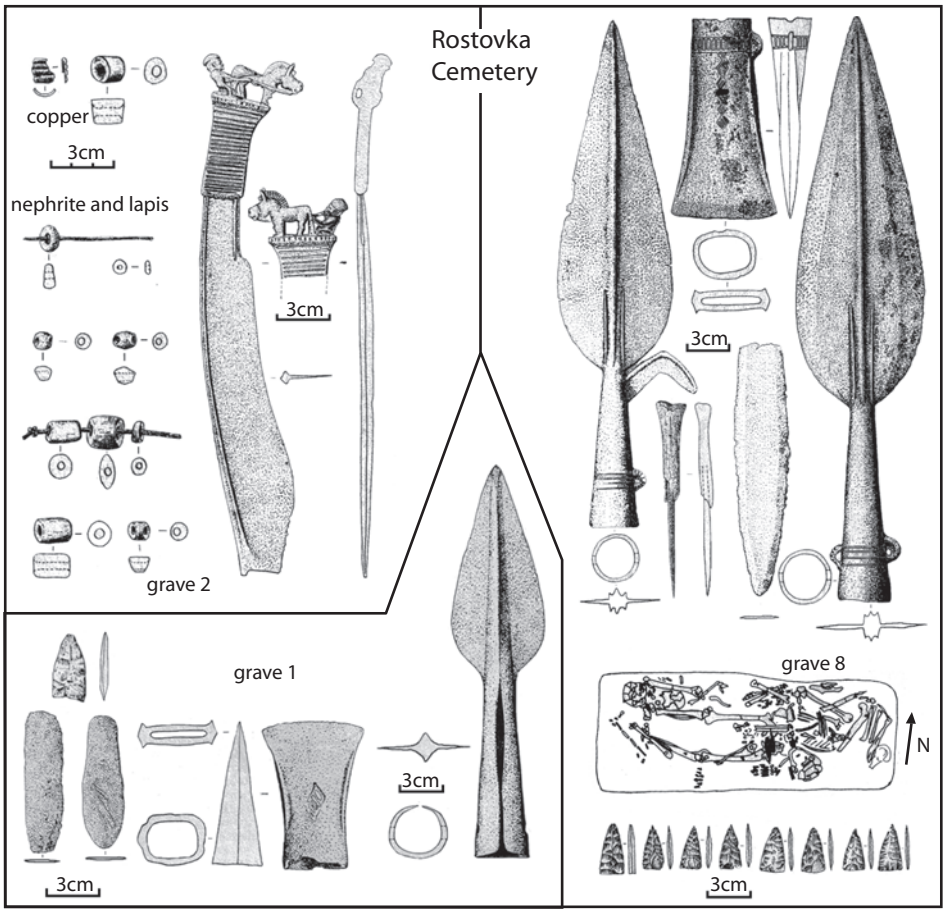

Figure 16.15 Grave lots from the Rostovka cemetery, graves 1, 2, and 8. The lost-wax cast figure of a man roping a horse and the hollow-mold casting of spears and axes were technical innovations probably learned from BMAC metalsmiths. Grave 1 contained beads made of both lapis lazuli from Afghanistan and nephrite probably from the near Lake Baikal. After Matiushchenko and Sinitsyna 1988, figures 6, 7, 17, and 18.

Beyond the western Altai/middle Irtysh core area the Seima-Turbino horizon was not a culture. It did not have a standard ceramic type, settlement type, or even a standard mortuary rite. Rather, Seima-Turbino metal-working techniques were adopted by emerging elites across the southern Siberian forest-steppe zone, perhaps in reaction to and competing with the Sintashta and Petrovka elites in the northern steppes. A

series of original and distinctive new metal types quickly diffused through the forest-steppe zone from the east to the west, appearing in late Abashevo and Chirkovskaya cemeteries west of the Urals almost at the same time that they first appeared east of the Urals, beginning about 1900 BCE. The rapidity and reach of this phenomenon in the forest zone is surprising. The new metal styles probably spread more by emulation than by migration, along with fast-moving political changes in the structure of power. Seima-Turbino spearheads, daggers, and axes were displayed at the Turbino cemetery in the forests of the lower Kama, southward up the Oka, and as far south as the Borodino hoard in Moldova, in the East Carpathian foothills. East of the Urals, most Seima-Turbino bronzes were tin-bronzes, and west of the Urals, they were mostly arsenical bronzes. The source of the tin was in the east, but the styles and methods of Seima-Turbino metallurgy were diffused across the forest-steppe and forest zones from the Altai to the Carpathians. The Borodino hoard contained a nephrite axe probably made of stone quarried near Lake Baikal. In the eastern direction, Seima-Turbino metal types (hollow-cast socketed spearheads with a side hook, hollow-cast axes) appeared also in sites on the northwestern edges of the evolving archaic Chinese state, probably through a network of trading trails that passed north of the Tien Shan through Dzungaria.[30]

The dating of the Seima-Turbino horizon has changed significantly in recent years. Similarities between Seima-Turbino socketed spearheads and daggers and parallel objects in Mycenaean tombs were once used to date the Seima-Turbino horizon to a period after 1650 BCE. It is clear now, however, that Mycenaean socketed spearheads, like studded disk cheek-pieces, were derived from the east and not the other way around. Seima-Turbino and Sintashta were partly contemporary, so Seima-Turbino probably began before 1900 BCE.[31] Seima-Turbino and Sintasha graves had the same kinds of flint projectile points. Sintashta forged socketed spearheads probably were the simpler predecessors of the more refined hollow-cast Seima-Turbino socketed spearheads. A hollow-cast spearhead of Seima-Turbino type was deposited in a Petrovka-culture chariot grave at Krivoe Ozero (k. 2, gr. 1); and a Sintashta bent and forged spearhead appeared in the Seima-Turbino cemetery at Rostovka (gr. 1) (see figure 16.15).

The metal-working techniques of the northern steppes (Sintashta and Petrovka) and the forest-steppe zone (Seima-Turbino) remained separate and distinct for perhaps one hundred to two hundred years. But by the beginning of the Andronovo period they merged, and some important

Seima-Turbino metal types, such as cast single-edged knives with a ring-pommel, became widely popular in Andronovo communities.

East of the Urals, Phase II: The Andronovo Horizon

The Andronovo horizon was the principal LBA archaeological complex in the steppes east of the Urals, the sister of the Srubnaya horizon west of the Urals, between about 1800 and 1200 BCE. Andronovo sites extended from the Ural steppes eastward to the steppes on the upper Yenisei River in the Altai, and from the southern forest zone southward to the Amu Darya River in Central Asia. Andronovo contained two principal subgroups, Alakul and Federovo. The earliest of these, the Alakul complex, appeared in some places by about 1900–1800 BCE. It grew directly out of the Petrovka culture by small modifications of ceramic decorations and vessel shapes. The Federovo style might have developed from a southern or eastern stylistic variant of Alakul, although some specialists insist that it had completely independent origins. Andronovo continued many of the customs and styles inherited through Sintashta and Petrovka: small family kurgan cemeteries, settlements containing ten to forty houses built close together, similar spear and dagger types, similar ornaments, and even the same decorative motifs on pottery: meanders, hanging triangles, "pine-tree" figures, stepped pyramids, and zig-zags. But chariots were no longer buried.

Alakul and Federovo are described as separate cultures within the Andronovo horizon, but to this observer, admittedly not an expert in the details of LBA ceramic typology, the Alakul and Federovo ceramic styles seem similar. Pot shapes varied only slightly (Federovo pots usually had a more indented, undercut lower profile) and decorative motifs also varied around common themes (some Federovo motifs were "italicized" or forward-slanted versions of Alakul motifs). Pots and potsherds of these two ceramic styles are found in the same sites from the Ural-Tobol steppes southeastward to central Kazkahstan, often in the same house and pit features, and in adjoining kurgans in the same cemeteries. Some pots are described as Alakul with Federovo elements, so the two varieties can appear on the same pot (figure 16.16). Alakul pottery is stratified beneath Federovo pottery in a few key features at some sites (at Novonikol'skoe and Petrovka II in the Ishim steppes and Atasu 1 in central Kazakhstan), but Federovo pottery has never been found stratified beneath Alakul. The earliest Alakul radiocarbon dates (1900–1700 BCE) are a little older than the earliest Federovo dates (1800–1600 BCE), so Alakul

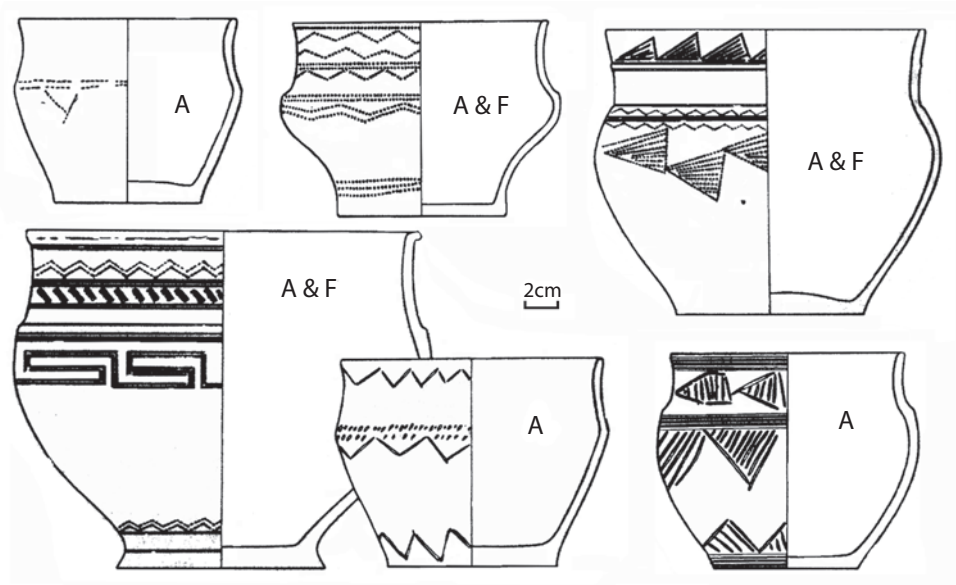

Figure 16.16 Andronovo pots that are described as typical Alkakul (A) or Alakul with Federovo traits (A+F) from the Priplodyi Log kurgan cemetery I on the Ui River, Chelyabinsk oblast, Russia. Traits of both styles can appear on the same pot. After Maliutina 1984, figure 4.

probably began a century or two earlier, although in many settlements the two are thoroughly mixed. Kurgans containing Federovo pots often had larger, more complex stone constructions around the grave and the dead were cremated, whereas kurgans with Alakul pots were simpler and the dead usually were buried in the flesh. Since the two ceramic styles occurred in the same settlements and cemeteries, and even in the same house and pit features, they cannot easily be interpreted as distinct ethnic groups.[32]

The spread of the Andronovo horizon represented the maturation and consolidation of an economy based on cattle and sheep herding almost everywhere in the grasslands east of the Urals. Permanent settlements appeared in every region, occupied by 50 to 250 people who lived in large houses. Wells provided water through the winter. Some settlements had elaborate copper-smelting ovens. Small-scale agriculture might have played a minor role in some places, but there is no direct evidence for it. In the northern steppes cattle were more important than sheep (cattle 40% of bones, sheep/goat 37%, horses 17% in the Ishim steppes), whereas in

central Kazakhstan there were more sheep than cattle, and more horses as well (sheep/goat 46%, cattle 29%, horse 24%).[33]

Although it is common in long-established tribal culture areas for a relatively homogeneous material culture to mask multiple languages, the link between language and material culture often is strong among the early generations of long-distance migrants. The source of the Andronovo horizon can be identified in an extraordinary burst of economic, military, and ritual innovations by a single culture—the Sintashta culture. Many of its customs were retained by its eastern daughter, the Petrovka culture. The language spoken in Sintashta strongholds very likely was an older form of the language spoken by the Petrovka and Andronovo people. Indo-Iranian and Proto-Iranian dialects probably spread with Andronovo material culture.

Most Andronovo metals, like Petrovka metals, were tin-bronzes. Andronovo miners mined tin in the Zeravshan and probably on the upper Irtysh. Andronovo copper mines were active in two principal regions: one was south of Karaganda near Uspenskyi, working malachite and azurite oxide ores; and the other was to the west in the southern Ulutau Hills near Dzhezkazgan, working sulfide ores. (Marked on figure 15.9.) One mine of at least seven known in the Dzhezkazgan region was 1,500 m long, 500 m wide, and 15 m deep. Ore was transported from the Uspenskyi mine to copper-smelting settlements such as Atasu 1, where excavation revealed three key-shaped smelting ovens with 4 m-long stone-lined air shafts feeding into two-level circular ovens. The Karaganda-region copper mines are estimated to have produced 30 to 50,000 metric tons of smelted copper during the Bronze Age.[34] The labor and facilities at these places suggest enterprises organized for export.

Trade with and perhaps looting raids into Central Asia left clear evidence surprisingly far north in the steppes. Wheel-made Namamzga VI pottery was found in the Andronovo settlement of Pavlovka, in northern Kazkahstan near Kokchetav, 2,000 km north of Bactria. It was 12% of the pottery on two house floors. The remainder was Andronovo pottery of the Federovo type.[35] The imported Central Asian pots were made with very fine white or red clay fabrics, largely undecorated, and in forms such as pedestaled dishes that were typical of Namazaga VI (figure 16.17). Pavlovka was a settlement of about 5 ha with both Petrovka and Federovo pottery. The Central Asian pottery is said to have been associated with the Federovo component.

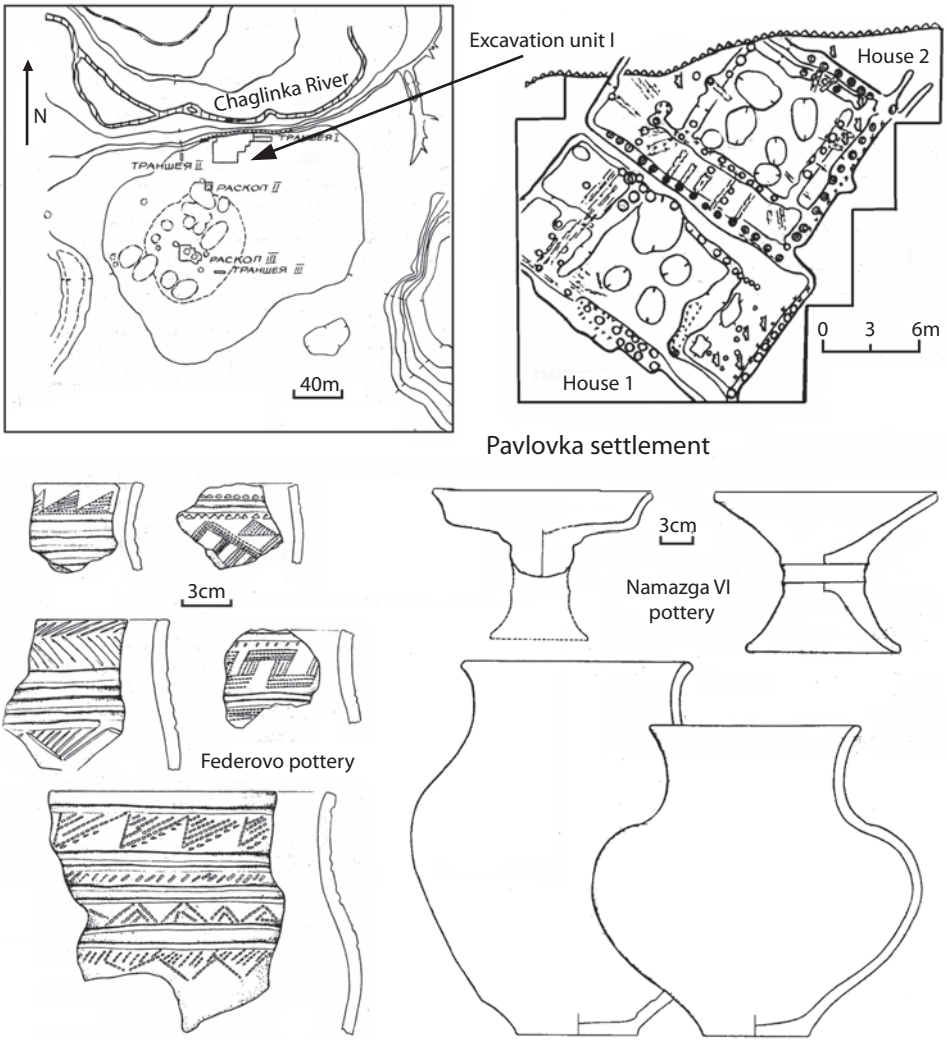

Figure 16.17 Pavlovka, an Alakul-Federovo settlement in the Kokchetav region of northern Kazakhstan, with imported Namazga VI pottery constituting more than 10% of the sherds on two house floors. After Maliutina 1991, figures 4 and 5.

Proto-Vedic Cultures in the Central Asian Contact Zone

By about 1900 BCE Petrovka migrants had started to mine copper in the Zeravshan valley at Tugai. They were followed by larger contingents of Andronovo people who mined tin at Karnab and Mushiston. After 1800 BCE Andronovo mining camps, kurgan cemeteries, and pastoral camps spread into the middle and upper Zeravshan valley. Other Andronovo groups moved into the lower Zeravshan and the delta of the lower Amu Darya (now located in the desert east of the modern delta) and became settled irrigation farmers, known as the Tazabagyab variant of the Andronovo culture. They lived in small settlements of a few large dug-out houses, much like Andronovo houses; used Andronovo pottery and Andronovo-style curved bronze knives and twisted earrings; conducted in-settlement copper smelting as at many Andronovo settlements; but buried their dead in large flat-grave cemeteries like the one at Kokcha 3, with more than 120 graves, rather than in kurgan cemeteries (figure 16.18).[36]

About 1800 BCE the walled BMAC centers decreased sharply in size, each oasis developed its own types of pottery and other objects, and Andronovo-Tazabagyab pottery appeared widely in the Bactrian and Margian countryside. Fred Hiebert termed this the *post-BMAC* period to emphasize the scale of the change, although occupation continued at many BMAC strongholds and Namazga VI–style pottery still was made inside them.[37] But Andronovo-Tazabagyab coarse incised pottery occurred both within post-BMAC fortifications and in occasional pastoral camps located outside the mudbrick walls. Italian survey teams exposed a small Andronovo-Tazabagyab dug-out house southeast of the post-BMAC walled fortress at Takhirbai 3, and American excavations found a similar occupation outside the walls of a partly abandoned Gonur. By this time the people living just outside the crumbling walls and at least some of those now living inside were probably closely related. To the east, in Bactria, people making similar incised coarse ware camped atop the vast ruins (100 ha) of the Djarkutan city. Some walled centers such as Mollali-Tepe continued to be occupied but at a smaller scale. In the highlands above the Bactrian oases in modern Tajikistan, kurgan cemeteries of the Vaksh and Bishkent type appeared with pottery that mixed elements of the late BMAC and Andronovo-Tazabagyab traditions.[38]

Between about 1800 and 1600 BCE, control over the trade in minerals (copper, tin, turquoise) and pastoral products (horses, dairy, leather) gave the Andronovo-Tazabagyab pastoralists great economic power in the old

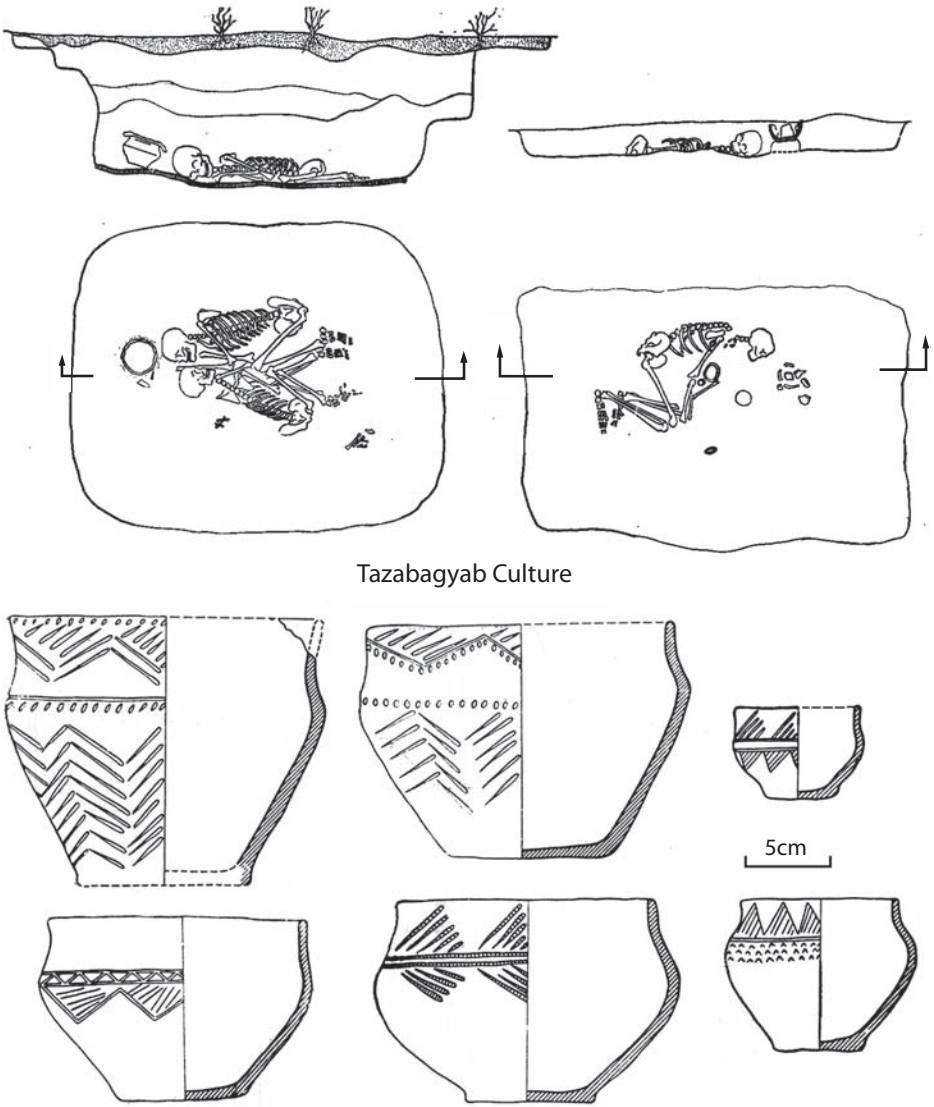

Figure 16.18 Graves of the Tazabagyab-Andronovo culture at the Kokcha 3 cemetery on the old course of the lower Amu-Darya River. Pottery like this was widespread in the final phase of occupation in the declining BMAC walled towns of Central Asia, 1700–1500 BCE. After Tolstov and Kes' 1960, figure 55.

BMAC oasis towns and strongholds, and chariot warfare gave them military control. Social, political, and even military integration probably followed. Eventually the simple incised pottery of the steppes gave way to new ceramic traditions, principally gray polished wares in Margiana and the Kopet Dag, and painted wares in Bactria and eastward into Tajikistan.

By 1600 BCE all the old trading towns, cities, and brick-built fortified estates of eastern Iran and the former BMAC region in Central Asia were abandoned. Malyan, the largest city on the Iranian plateau, was reduced to a small walled compound and tower occupied within a vast ruin, where elite administrators, probably representatives of the Elamite kings, still resided atop the former city. Pastoral economies spread across Iran and into Baluchistan, where clay images of riders on horseback appeared at Pirak about 1700 BCE. Chariot corps appeared across the Near East as a new military technology. An Old Indic-speaking group of chariot warriors took control of a Hurrian-speaking kingdom in north Syria about 1500 BCE. Their oaths referred to deites (Indra, Varuna, Mithra, and the Nasatyas) and concepts (*r'ta*) that were the central deities and concepts in the *Rig Veda*, and the language they spoke was a dialect of the Old Indic Sanskrit of the *Rig Veda*.[39] The Mitanni dynasts came from the same ethnolinguistic population as the more famous Old Indic–speakers who simultaneously pushed eastward into the Punjab, where, according to many Vedic scholars, the *Rig Veda* was compiled about 1500–1300 BCE. Both groups probably originated in the hybrid cultures of the Andronovo/ Tazabagyab/ coarse-incised-ware type in Bactria and Margiana.[40]

The language of the *Rig Veda* contained many traces of its syncretic origins. The deity name *Indra* and the drug-deity name *Soma*, the two central elements of the religion of the *Rig Veda*, were non–Indo-Iranian words borrowed in the contact zone. Many of the qualities of the Indo-Iranian god of might/victory, Verethraghna, were transferred to the adopted god Indra, who became the central deity of the developing Old Indic culture.[41] Indra was the subject of 250 hymns, a quarter of the *Rig Veda*. He was associated more than any other deity with *Soma*, a stimulant drug (perhaps derived from *Ephedra*) probably borrowed from the BMAC religion. His rise to prominence was a peculiar trait of the Old Indic speakers. Indra was regarded in later Avestan Iranian texts as a minor demon. Iranian dialects probably developed in the northern steppes among Andronovo and Srubnaya people who had kept their distance from the southern civilizations. Old Indic languages and rituals developed in the contact zone of Central Asia.[42]

Loan Words Borrowed into Indo-Iranian and Vedic Sanskrit

The Old Indic of the *Rig Veda* contained at least 383 non–Indo-European words borrowed from a source belonging to a different language family. Alexander Lubotsky has shown that common Indo-Iranian, the parent of both Old Indic and Iranian, probably had already borrowed words from the *same* non–Indo-European language that later enriched Old Indic. He compiled a list of 55 non–Indo-European words that were borrowed into common Indo-Iranian *before* Old Indic or Avestan evolved, and then later were inherited into one or both of the daughters from common Indo-Iranian. The speakers of common Indo-Iranian were in touch with and borrowed terms from *the same foreign language group* that later was the source from which Old Indic speakers borrowed even more terms. This discovery carries significant implications for the geographic locations of common Indo-Iranian and formative Old Indic—they must have been able to interact with the same foreign-language group.

Among the fifty-five terms borrowed into common Indo-Iranian were the words for bread (**nagna-*), ploughshare (**spʰāra*), canal (**iavīā*), brick (**išt(i)a-*, camel (**Huštra-*), ass (**kʰara-*) sacrificing priest (**ućig-*), soma (**anću-*), and Indra (**indra-*). The BMAC fortresses and cities are an excellent source for the vocabulary related to irrigation agriculture, bricks, camels, and donkeys; and the phonology of the religious terms is the same, so probably came from the same source. The religious loans suggest a close cultural relationship between some people who spoke common Indo-Iranian and the occupants of the BMAC fortresses. These borrowed southern cults might possibly have been one of the features that distinguished the Petrovka culture from Sintashta. Petrovka people were the first to migrate from the northern steppes to Tugai on the northern edge of Central Asia.

Lubotsky suggested that Old Indic developed as a vanguard language south of Indo-Iranian, closer to the source of the loans. The archaeological evidence supports Lubotsky's suggestion. The earliest Old Indic dialects probably developed about 1800–1600 BCE in the contact zone south of the Zeravshan among northern-derived immigrants who were integrated with and perhaps ruled over the declining fortunes of the post-BMAC citadels. They retained a decidedly pastoral set of values. In the *Rig Veda* the clouds were compared to dappled cows full of milk; milk and butter were the symbols of prosperity; milk, butter, cattle, and horses were the proper offerings to the gods; Indra was compared to a mighty bull; and wealth was counted in fat cattle and swift horses. Agricultural products

were never offered to the gods. The people of the *Rig Veda* did not live in brick houses and had no cities, although their enemies, the *Dasyu*s, did live in walled strongholds. Chariots were used in races and war; the gods drove chariots across the sky. Almost all important deities were masculine. The only important female deity was Dawn, and she was less powerful than Indra, Varuna, Mithra, Agni, or the Divine Twins. Funerals included both cremation (as in Federovo graves) and inhumation (as in Andronovo and Tazabagyab graves). Steppe cultures are an acceptable source for all these details of belief and practice, whereas the culture of the BMAC, with its female deity in a flounced skirt, brick fortresses, and irrigation agriculture, clearly is not.

During the initial phase of contact, the Sintashta or the Petrovka cultures or both borrowed some vocabulary and rituals from the BMAC, accounting for the fifty-five terms in common Indo-Iranian. These included the drug *soma*, which remained in Iranian ritual usage as *haoma*. In the second phase of contact, the speakers of Old Indic borrowed much more heavily from the same language when they lived in the shadows of the old BMAC settlements and began to explore southward into Afghanistan and Iran. Archaeology shows a pattern quite compatible with that suggested by the linguistic evidence.

The Steppes Become a Bridge across Eurasia

The Eurasian steppe is often regarded as a remote and austere place, poor in resources and far from the centers of the civilized world. But during the Late Bronze Age the steppes became a bridge between the civilizations that developed on the edges of the continent in Greece, the Near East, Iran, the Indian subcontinent, and China. Chariot technology, horses and horseback riding, bronze metallurgy, and a strategic location gave steppe societies an importance they never before had possessed. Nephrite from Lake Baikal appeared in the Carpathian foothills in the Borodino hoard; horses and tin from the steppes appeared in Iran; pottery from Bactria appeared in a Federovo settlement in northern Kazakhstan; and chariots appeared across the ancient world from Greece to China. The road from the steppes to China led through the eastern end of the Tarim Basin, where desert-edge cemeteries preserved the dessicated mummies of brown-haired, white-skinned, wool-wearing people dated as early as 1800 BCE. In Gansu, on the border between China and the Tarim Basin, the Qijia culture acquired horses, trumpet-shaped earrings, cast bronze ring-pommel

single-edged knives and axes in steppe styles between about 2000 and 1600 BCE.[45] By the time the first Chinese state emerged, beginning about 1800 BCE, it was exchanging innovations with the West. The Srubnaya and Andronovo horizons had transformed the steppes from a series of isolated cultural ponds to a corridor of communication. That transformation permanently altered the dynamics of Eurasian history.