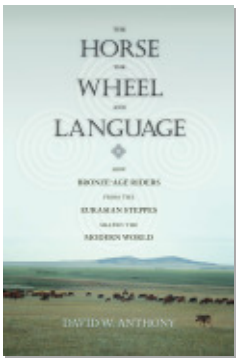
The Horse, the Wheel, and Language

David W. Anthony



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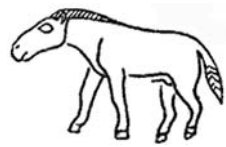
Chapter Thirteen



Wagon Dwellers of the Steppe
The Speakers of Proto-Indo-European

The sight of wagons creaking and swaying across the grasslands amid herds of wooly sheep changed from a weirdly fascinating vision to a normal part of steppe life between about 3300 and 3100 BCE. At about the same time the climate in the steppes became significantly drier and generally cooler than it had been during the Eneolithic. The shift to drier conditions is dated between 3500 and 3000 BCE in pollen cores in the lower Don, the middle Volga, and across the northern Kazakh steppes (table 13.1). As the steppes dried and expanded, people tried to keep their animal herds fed by moving them more frequently. They discovered that with a wagon you could keep moving indefinitely. Wagons and horseback riding made possible a new, more mobile form of pastoralism. With a wagon full of tents and supplies, herders could take their herds out of the river valleys and live for weeks or months out in the open steppes between the major rivers—the great majority of the Eurasian steppes. Land that had been open and wild became pasture that belonged to someone. Soon these more mobile herding clans realized that bigger pastures and a mobile home base permitted them to keep bigger herds. Amid the ensuing disputes over borders, pastures, and seasonal movements, new rules were needed to define what counted as an acceptable move—people began to manage local migratory behavior. Those who did not participate in these agreements or recognize the new rules became cultural Others, stimulating an awareness of a distinctive Yamnaya identity. That awareness probably elevated a few key behaviors into social signals. Those behaviors crystallized into a fairly stable set of variants in the steppes around the lower Don and Volga rivers. A set of dialects went with them, the speech patterns of late Proto-Indo-European. This is the sequence of changes that I believe created the new way of life expressed archaeologically in the Yamnaya horizon, dated about 3300–2500 BCE (figure 13.1). The spread

Table 13.1
Vegetation shifts in steppe pollen cores from the Don to the Irtysh

Site	Razdorskoe, *Lower Don* (Kremenetski 1997)	Buzuluk Forest Pobochnoye peat bog *Middle Volga* (Kremenetski et al. 1999)	Northern Kazakhstan Upper Tobol to *Upper Irtysh* (Kremenetski et al. 1997)
Type	Stratified settlement Pollen core	forest peat bog core	two lake cores and two peat bog cores
Dates	*6500–3800 BCE*	*6000–3800 BCE*	*6500–3800 BCE*
Flora	Birch-pine forest on sandy river terraces. On floodplain, elm and linden forest with hazelnut & black alder. Oak and hornbeam present after 4300 BCE.	Oak trees appear, join elm, hazel, black alder forests around Pobochnoye lake. 4800–3800 BCE lake gets shallower, Typha reeds increase, forest expands.	Birch-pine forest evolving to open pine forest in forest-steppe, with willow near waterways. In steppe, Artemesia and Chenopodia.
	3800–3300 BCE Slight reduction in deciduous trees, increase in Ephedra, hazel, lime, and pine on floodplain.	*3800–3300 BCE* Lake slowly converts to sedge-moss swamp. Typha reeds peak. Pine and lime trees peak. Probably warmer.	*3800–3300 BCE* Moist period, forests expand. Lime trees with oak, elm, and black alder also expand. Soils show increased moisture.
	Sub-Boreal 3300–2000 BCE Very dry. Sharp forest decline. Ceralia appears. Chenopodia sharp rise. Maximum aridity 2800–2000 BCE.	*3300–2000 BCE* Reduction in overall forest. In forest, pine down, birch up. Artemesia, an arid herb indicator, increases sharply. Lake is covered by alder shrubs by 2000 BCE.	*3300–2000 BCE* Forest retreats, broadleaf declines. Mokhove bog on the Tobol dries up about 2800 BCE. Steppe grows.

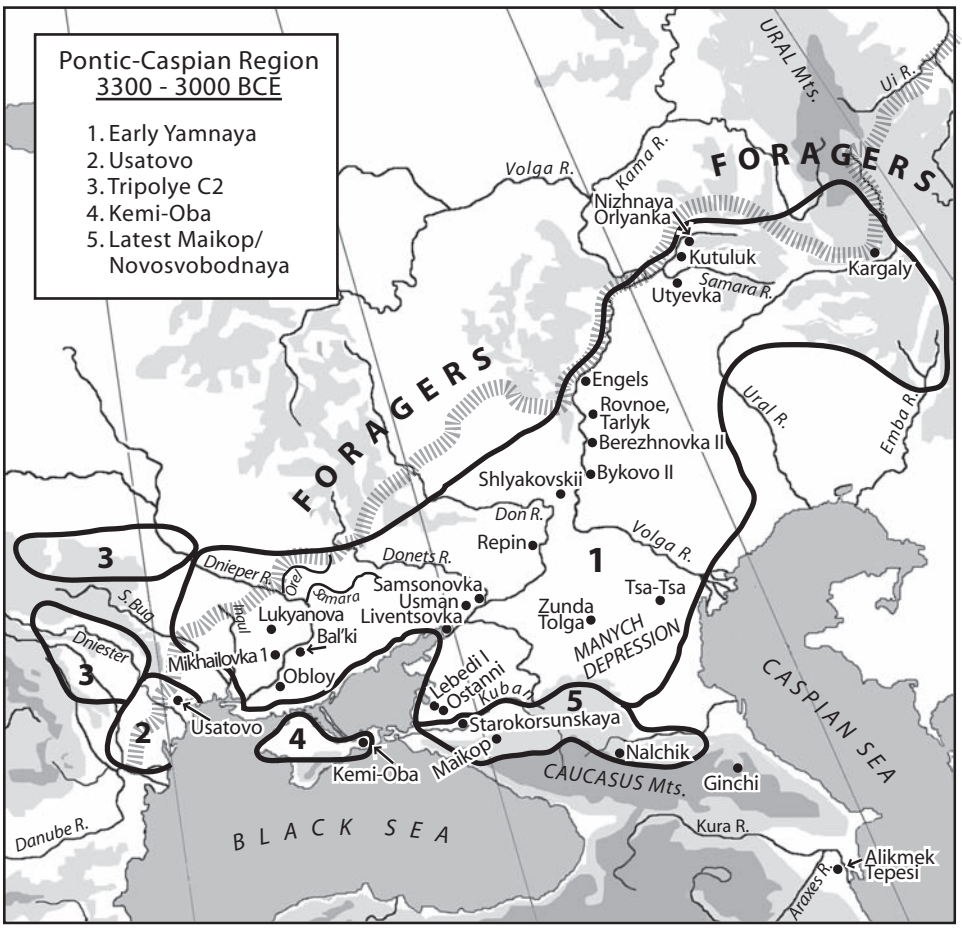


Figure 13.1 Culture areas in the Pontic-Caspian region about 3300–3000 BCE.

of the Yamnaya horizon was the material expression of the spread of late Proto-Indo-European across the Pontic-Caspian steppes.[1]

The behavior that really set the Yamnaya people apart was living on wheels. Their new economy took advantage of two kinds of mobility: wagons for slow bulk transport (water, shelter, and food) and horseback riding for rapid light transport (scouting for pastures, herding, trading and raiding expeditions). Together they greatly increased the potential scale of herding economies. Herders operating out of a wagon could stay with their herds out in the deep steppes, protected by mobile homes that carried

tents, water, and food. A diet of meat, milk, yogurt, cheese, and soups made of wild *Chenopodium* seeds and wild greens can be deduced, with a little imagination, from the archaeological evidence. The reconstructed Proto-Indo-European vocabulary tells us that honey and honey-based mead also were consumed, probably on special occasions. Larger herds meant greater disparities in herd wealth, which is reflected in disparities in the wealth of Yamanaya graves. Mobile wagon camps are almost impossible to find archaeologically, so settlements became archaeologically invisible where the new economy took hold.

The Yamnaya horizon is the visible archaeological expression of a social adjustment to high mobility—the invention of the political infrastructure to manage larger herds from mobile homes based in the steppes. A linguistic echo of the same event might be preserved in the similarity between English *guest* and *host*. They are cognates, derived from one Proto-Indo-European root (**ghos-ti-*). (A "ghost" in English was originally a visitor or guest.) The two social roles opposed in English *guest* and *host* were originally two reciprocal aspects of the same relationship. The late Proto-Indo-European guest-host relationship required that "hospitality" (from the same root through Latin *hospes* 'foreigner, guest') and "friendship" (**keiwos-*) should be extended by hosts to guests (both **ghos-ti-*), in the knowledge that the receiver and giver of "hospitality" could later reverse roles. The social meaning of these words was then more demanding than modern customs would suggest. The guest-host relationship was bound by oaths and sacrifices so serious that Homer's warriors, Glaukos and Diomedes, stopped fighting and presented gifts to each other when they learned that their *grandfathers* had shared a guest-host relationship. This mutual obligation to provide "hospitality" functioned as a bridge between social units (tribes, clans) that had ordinarily restricted these obligations to their kin or co-residents (**h*$_4$*erós-*). Guest-host relationships would have been very useful in a mobile herding economy, as a way of separating people who were moving through your territory with your assent from those who were unwelcome, unregulated, and therefore unprotected. The guest-host institution might have been among the critical identity-defining innovations that spread with the Yamnaya horizon.[2]

It is difficult to document a shift to a more mobile residence pattern five thousand years after the fact, but a few clues survive. Increased mobility can be detected in a pattern of brief, episodic use, abandonment, and, much later, re-use at many Yamnaya kurgan cemeteries; the absence of degraded or overgrazed soils under early Yamnaya kurgans; and the first appearance of kurgan cemeteries in the deep steppe, on the dry plateaus

between major river valleys. The principal indicator of increased mobility is a negative piece of evidence: the archaeological disappearance of long-term settlements east of the Don River. Yamnaya settlements are known west of the Don in Ukraine, but east of the Don in Russia there are no significant Yamnaya settlements in a huge territory extending to the Ural River containing many hundreds of excavated Yamnaya kurgan cemeteries and probably thousands of excavated Yamnaya graves (I have never seen a full count). The best explanation for the complete absence of settlements is that the eastern Yamnaya people spent much of their lives in wagons.

The Yamnaya horizon was the first more or less unified ritual, economic, and material culture to spread across the entire Pontic-Caspian steppe region, but it was never completely homogeneous even materially. At the beginning it already contained two major variants, on the lower Don and lower Volga, and, as it expanded, it developed other regional variants, which is why most archaeologists are reluctant to call it the Yamnaya "culture." But many broadly similar customs were shared. In addition to kurgan graves, wagons, and an increased emphasis on pastoralism, archaeological traits that defined the early Yamnaya horizon included shell-tempered, egg-shaped pots with everted rims, decorated with comb stamps and cord impressions; tanged bronze daggers; cast flat axes; bone pins of various types; the supine-with-raised-knees burial posture; ochre staining on grave floors near the feet, hips, and head; northeastern to eastern body orientation (usually); and the sacrifice at funerals of wagons, carts, sheep, cattle, and horses. The funeral ritual probably was connected with a cult of ancestors requiring specific rituals and prayers, a connection between language and cult that introduced late Proto-Indo-European to new speakers.

The most obvious material division within the early Yamnaya horizon was between east and west. The eastern (Volga–Ural–North Caucasian steppe) Yamnaya pastoral economy was more mobile than the western one (South Bug–lower Don). This contrast corresponds in an intriguing way to economic and cultural differences between eastern and western Indo-European language branches. For example, impressions of cultivated grain have been found in western Yamnaya pottery, in both settlements and graves, and Proto-Indo-European cognates related to cereal agriculture were well preserved in western Indo-European vocabularies. But grain imprints are absent in eastern Yamnaya pots, just as many of the cognates related to agriculture are missing from the eastern Indo-European languages.[3] Western Indo-European vocabularies contained a few roots that were borrowed from Afro-Asiatic languages, such as the word for the

domesticated bull, **tawr-*, and the western Yamnaya groups lived next to the Tripolye culture, which might have spoken a language distantly derived from an Afro-Asiatic language of Anatolia. Eastern Indo-European generally lacked these borrowed Afro-Asiatic roots. Western Indo-European religious and ritual practices were female-inclusive, and western Yamnaya people shared a border with the female-figurine–making Tripolye culture: eastern Indo-European rituals and gods, however, were more male-centered, and eastern Yamnaya people shared borders with northern and eastern foragers who did not make female figurines. In western Indo-European branches the spirit of the domestic hearth was female (Hestia, the Vestal Virgins), and in Indo-Iranian it was male (Agni). Western Indo-European mythologies included strong female deities such as Queen Magb and the Valkyries, whereas in Indo-Iranian the furies of war were male Maruts. Eastern Yamnaya graves on the Volga contained a higher percentage (80%) of males than any other Yamnaya region. Perhaps this east-west tension in attitudes toward gender contributed to the separation of the feminine gender as a newly marked grammatical category in the dialects of the Volga-Ural region, one of the innovations that defined Proto-Indo-European grammar.[4]

Did the Yamnaya horizon spread into neighboring regions in a way that matches the known relationships and sequencing between the Indo-European branches? This also is a difficult subject to follow archaeologically, but the movements of the Yamnaya people match what we would expect surprisingly well. First, just before the Yamnaya horizon appeared, the Repin culture of the Volga-Ural region threw off a subgroup that migrated across the Kazakh steppes about 3700–3500 BCE and established itself in the western Altai, where it became the Afanasievo culture. The separation of the Afanasievo culture from Repin probably represented the separation of Pre-Tocharian from classic Proto-Indo-European. Second, some three to five centuries later, about 3300 BCE, the rapid diffusion of the early Yamnaya horizon across the Pontic-Caspian steppes scattered the speakers of late Proto-Indo-European dialects and sowed the seeds of regional differentiation. After a pause of only a century or two, about 3100–3000 BCE, a large migration stream erupted from within the western Yamnaya region and flowed up the Danube valley and into the Carpathian Basin during the Early Bronze Age. Literally thousands of kurgans can be assigned to this event, which could reasonably have incubated the ancestral dialects for several western Indo-European language branches, including Pre-Italic and Pre-Celtic. After this movement slowed or stopped, about 2800–2600 BCE, late Yamnaya people came face to face

with people who made Corded Ware tumulus cemeteries in the east Carpathian foothills, a historic meeting through which dialects ancestral to the northern Indo-European languages (Germanic, Slavic, Baltic) began to spread among eastern Corded Ware groups. Finally, at the end of the Middle Bronze Age, about 2200–2000 BCE, a migration stream flowed from the late Yamnaya/Poltavka cultures of the Middle Volga–Ural region eastward around the southern Urals, creating the Sintashta culture, which almost certainly represented the ancestral Indo-Iranian–speaking community. These migrations are described in chapters 14 and 15.

The Yamnaya horizon meets the expectations for late Proto-Indo-European in many ways: chronologically (the right time), geographically (the right place), materially (wagons, horses, animal sacrifices, tribal pastoralism), and linguistically (bounded by persistent frontiers); and it generated migrations in the expected directions and in the expected sequence. Early Proto-Indo-European probably developed between 4000 and 3500 BCE in the Don–Volga–Ural region. Late Proto-Indo-European, with o-stems and the full wagon vocabulary, expanded rapidly across the Pontic-Caspian steppes with the appearance of the Yamnaya horizon beginning about 3300 BCE. By 2500 BCE the Yamnaya horizon had fragmented into daughter groups, beginning with the appearance of the Catacomb culture in the Don-Kuban region and the Poltavka culture in the Volga-Ural region about 2800 BCE. Late Proto-Indo-European also was so diversified by 2500 BCE that it probably no longer existed (chapter 3). Again, the linkage with the steppe archaeological evidence is compelling.

Why Not a Kurgan Culture?

Marija Gimbutas first articulated her concept of a "Kurgan culture" as the archaeological expression of the Proto-Indo-European language community in 1956.[5] The Kurgan culture combined two cultures first defined by V. A. Gorodtsov, who, in 1901, excavated 107 kurgans in the Don River valley. He divided his discoveries into three chronological groups. The oldest graves, stratified deepest in the oldest kurgans, were the Pit-graves (Yamnaya). They were followed by the Catacomb-graves (Katakombnaya), and above them were the timber-graves (Srubnaya). Gorodtsov's sequence still defines the Early (EBA), Middle (MBA), and Late Bronze Age (LBA) grave types of the western steppes.[6] Gimbutas combined the first two (EBA Pit-graves and MBA Catacomb-graves) into the Kurgan culture. But later she also began to include many other Late Neolithic and

Bronze Age cultures of Europe, including the Maikop culture and many of the Late Neolithic cultures of eastern Europe, as outgrowths or creations of Kurgan culture migrations. The Kurgan culture was so broadly defined that almost any culture with burial mounds, or even (like the Baden culture) without them could be included. Here we are discussing the steppe cultures of the Russian and Ukrainian EBA, just one part of the original core of Gimbutas's Kurgan culture concept. Russian and Ukrainian archaeologists do not generally use the term "Kurgan culture"; rather than lumping EBA Yamnaya and MBA Catacomb-graves together they tend to divide both groups and their associated time periods into ever finer slices. I will seek a middle ground.

The Yamnaya horizon is usually described by Slavic archaeologists not as a "culture" but as a "cultural-historical community." This phrase carries the implication that there was a thread of cultural identity or shared ethnic origin running through the Yamnaya social world, although one that diversified and evolved with the passage of time.[7] Although I agree that this probably was true in this case, I will use the Western term "horizon," which is neutral about cultural identity, in order to avoid using a term loaded toward that interpretation. As I explained in chapter 7, a horizon in archaeology is a style or fashion in material culture that is rapidly accepted by and superimposed on local cultures across a wide area. In this case, the five Pontic-Caspian cultures of the Final Eneolithic (chapter 12) were the local cultures that rapidly accepted, in varying degrees, the Yamnaya lifestyle.

Beyond the Eastern Frontier: The Afanasievo Migration to the Altai

In the last chapter I introduced the subject of the trans-continental, Repin-culture migration that created the Afanasievo culture in the western Altai Mountains and probably detached the Tocharian branch from common Proto-Indo-European. I describe it here because the process of migration and return migration that installed the early Afanasievo culture continued across the north Kazakh steppes during the Yamnaya period. In fact, it is usually discussed as an event connected with the Yamnaya horizon; it is only recently that early Afanasievo radiocarbon dates, and the broadening understanding of the age and geographic extent of the Repin culture, have pushed the beginning of the movement back into the pre-Yamnaya Repin period.

Two or three centuries before the Yamnaya horizon first appeared, the Repin-type communities of the middle Volga-Ural steppes experienced a

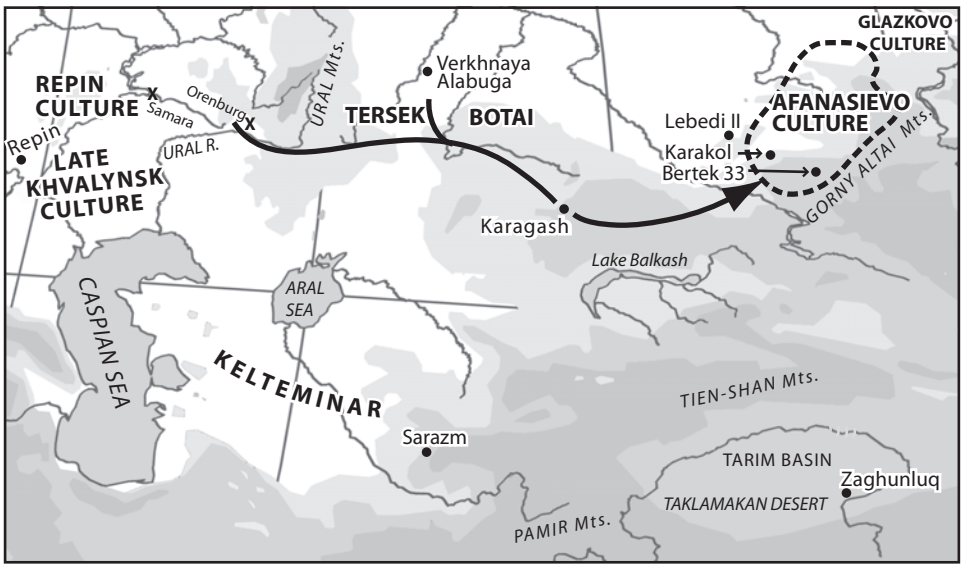


Figure 13.2 Culture areas in the steppes between the Volga and the Altai at the time of the Afanasievo migration, 3700–3300 BCE.

conflict that prompted some groups to move across the Ural River eastward into the Kazakh steppes (figure 13.2). I say a conflict because of the extraordinary distance the migrants eventually put between themselves and their relatives at home, implying a strongly negative push. On the other hand, connections with the Volga-Ural Repin-Yamnaya world were maintained by a continuing round of migrations moving in both directions, so some aspect of the destination must also have exerted a positive pull. It is remarkable that the intervening north Kazakh steppe was not settled, or at least that almost no kurgan cemeteries were constructed there. Instead, the indigenous horse-riding Botai-Tersek culture emerged in the north Kazakh steppe at just the time when the Repin-Afanasievo migration began.

The specific ecological target in this series of movements might have been the islands of pine forest that occur sporadically in the northern Kazakh steppes from the Tobol River in the west to the Altai Mountains in the east. I am not sure why these pine islands would have been targeted other than for the fuel and shelter they offered, but they do seem to correspond with the few site locations linked to Afanasievo in the steppes, and the same peculiar steppe-pine-forest islands occur also in the high mountain valleys of the western Altai where early Afanasievo sites appeared.[8] In the western Altai Mountains broad meadows and mountain

steppes dip both westward toward the Irtysh River of western Siberia (probably the route of the first approach) and northward toward the Ob and Yenisei rivers (the later spread). The Afanasievo culture appeared in this beautiful setting, ideal for upland pastoralism, probably around 3700–3400 BCE, during the Repin–late Khvalynsk period.[9] It flourished there until about 2400 BCE, through the Yamnaya period in the Pontic-Caspian steppes.

The Altai Mountains were about 2000 km east of the Ural River frontier that defined the eastern edge of the early Proto-Indo-European world. Only three kurgan cemeteries old enough to be connected with the Afanasievo migrations have been found in the intervening 2000 km of steppes. All three are classified as Yamnaya kurgan cemeteries, although the pottery in some of the graves has Repin traits. Two were on the Tobol, not far east of the Ural River, at Ubagan I and Verkhnaya Alabuga, possibly an initial stopping place. The other, the Karagash kurgan cemetery, was found 1000 km east of the Tobol, southeast of Karaganda in central Kazakhstan. Karagash was on the elevated green slopes of an isolated mountain spur that rose prominently above the horizon, a very visible landmark near Karkaralinsk. The earthen mound of kurgan 2 at Karagash was 27 m in diameter. It covered a stone cromlech circle 23 m in diameter, made of oblong stones 1 m in length, projecting about 60–70 cm above the ground. Some stones had traces of paint on them. A pot was broken inside the southwestern edge of the cromlech on the original ground surface, before the mound was built. The kurgan contained three graves in stone-lined cists; the central grave and another under the southeastern part of the kurgan were later robbed. The lone intact grave was found under the northeastern part of the kurgan. In it were sherds from a shell-tempered pot, a fragment of a wooden bowl with a copper-covered lip, a tanged copper dagger, a copper four-sided awl, and a stone pestle. The skeleton was of a male forty to fifty years old laid on his back with his knees raised, oriented southwest, with pieces of black charcoal and red ochre on the grave floor. The metal artifacts were typical for the Yamnaya horizon; the stone cromlech, stone-lined cist, and pot were similar to Afansievo types. Directly east of Karagash and 900 km away, up the Bukhtarta River valley east of the Irtysh, were the peaks of the western Altai and the Ukok plateau, where the first Afanasievo graves appeared. The Karagash kurgan is unlikely to be a grave of the first migrants—it looks like a Yamnaya-Afanasievo kurgan built by later people still participating in a cross-Kazakhstan circulation of movements—but it probably does mark the initial route, since routes in long-distance migrations tend to be targeted and re-used.[10]

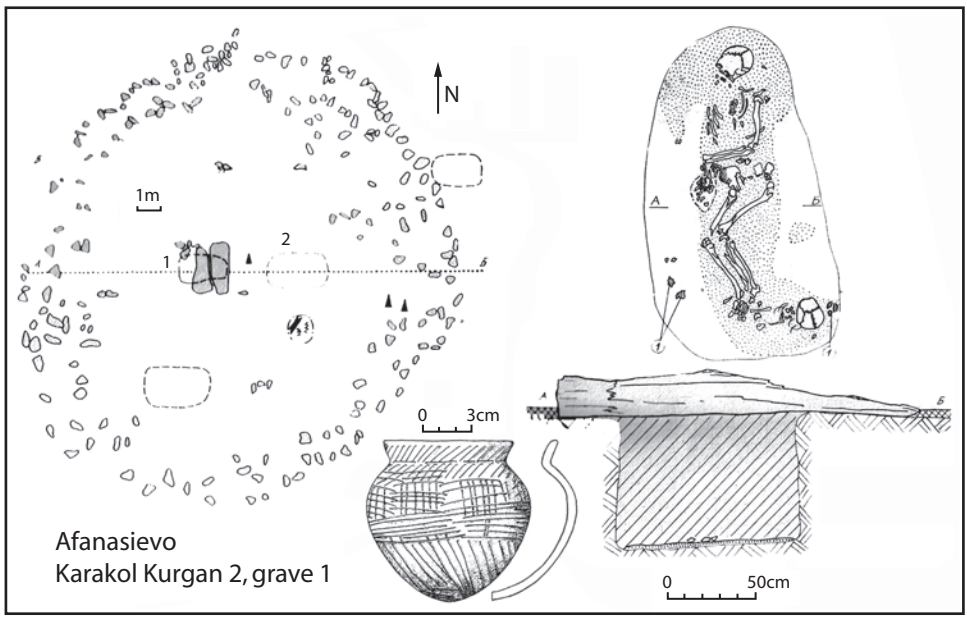


Figure 13.3 Karakol kurgan 2, grave 1, an early Afanasievo grave in the western Gorny Altai. After Kubarev 1988.

The early Afanasievo culture in the Altai introduced fully developed kurgan funeral rituals and Repin-Yamnaya material culture. At Karakol, kurgan 2 in the Gorny Altai, an early Afanasievo grave (gr. 1) contained a small pot similar to pots from the Ural River that are assigned to the Repin variant of early Yamnaya (figure 13.3).[11] Grave 1 was placed under a low kurgan in the center of a stone cromlech 20 m in diameter. Afanasievo kurgans always were marked by a ring of stones, and large stone slabs were used to cover grave pits (early) or to make stone-lined grave cists (late). Early Afanasievo skull types resembled those of Yamnaya and western populations. On the Ukok plateau, where the early Afanasievo cemetery at Bertek 33 was found, the Afanasievo immigrants occupied a virgin landscape—there were no earlier Mesolithic or Neolithic sites. Afanasievo sites also contained the earliest bones of domesticated cattle, sheep, and horses in the Altai. At the Afanasievo settlement of Balyktyul, domesticated sheep-goat were 61% of the bones, cattle were 12%, and horses 8%.[12]

Cemeteries of the local Kuznetsk-Altai foragers like Lebedi II were located in the forest and forest-meadow zone higher up on the slopes of the Altai, and contained a distinct set of ornaments (bear-teeth necklaces

and bone carvings of elk and bear), lithics (asymmetrical curved flint knives), antler tools (harpoons), pottery (related to the Serovo-Glazkovo pottery tradition of the Baikal forager tradition), and funeral rituals (no kurgans, no stone slab over the grave). As time passed, Glazkovo forager sites located to the northeast began to show the influence of Afanasievo motifs on their ceramics, and metal objects began to appear in Glazkovo sites.[13]

It is clear that populations continued to circulate between the Ural frontier and the Altai well into the Yamnaya period in the Ural steppes, or after 3300 BCE, bringing many Yamnaya traits and practices to the Altai. About a hundred metal objects have been found in Afanasievo cemeteries in the Altai and Western Sayan Mountains, including three sleeved copper axes of a classic Volga-Ural Yamnaya type, a cast shaft-hole copper hammer-axe, and two tanged copper daggers of typical Yamnaya type. These artifacts are recognized by Chernykh as western types typical of Volga-Ural Yamnaya, with no native local precedents in the Altai region.[14]

Mallory and Mair have argued at book length that the Afanasievo migration detached the Tocharian branch from Proto-Indo-European. A material bridge between the Afanasievo culture and the Tarim Basin Tocharians could be represented by the long-known but recently famous Late Bronze Age Europoid "mummies" (not intentionally mummified but naturally freeze-dried) found in the northern Taklamakan Desert, the oldest of which are dated 1800–1200 BCE. In addition to the funeral ritual (on the back with raised knees, in ledged and roofed grave pits), there was a symbolic connection. On the stone walls of Late Afanasievo graves in the Altai (perhaps dated about 2500 BC) archaeologist V. D. Kubarev found paintings with "solar signs" and headdresses like the one painted on the cheek of one of the Tarim "mummies" found at Zaghunluq, dated about 1200 BCE. If Mallory and Mair were right, as seems likely, late Afanasievo pastoralists were among the first to take their herds from the Altai southward into the Tien Shan; and after 2000 BCE their descendants crossed the Tien Shan into the northern oases of the Tarim Basin.[15]

Wagon Graves in the Steppes

We cannot say exactly when wagons first rolled into the Eurasian steppes. But an image of a wagon on a clay cup is securely dated to 3500–3300 BCE at Bronocice in southern Poland (chapter 4). The ceramic wagon

models of the Baden culture in Hungary and the Novosvobodnaya wagon grave at Starokorsunskaya kurgan 2 on the Kuban River in the North Caucasus probably are about the same age. The oldest excavated wagon graves in the steppes are radiocarbon dated about 3100–3000 BCE, but it is unlikely that they actually were the first. Wagons probably appeared in the Pontic-Caspian steppes a couple of centuries before the Yamnaya horizon began. It would have taken some time for a new, wagon-dependent herding system to get organized and begin to succeed. The spread of the Yamnaya horizon was the signature of that success.

In a book published in 2000 Aleksandr Gei counted 257 Yamnaya and Catacomb-culture wagon and cart burials in the Pontic-Caspian steppes, dated by radiocarbon between about 3100 and 2200 BCE (see figures 4.4, 4.5, 4.6). Parts of wagons and carts were deposited in less than 5% of excavated Yamnaya-Catacomb graves, and the few graves that had them were concentrated in particular regions. The largest cluster of wagon-graves (120) was in the Kuban steppes north of the North Caucasus, not far from Maikop. Most of the Kuban wagons (115) were in graves of the Novotitorovskaya type, a local Kuban-region EBA culture that developed from early Yamnaya.[16]

Usually the vehicles used in funeral rituals were disassembled and the wheels were placed near the corners of the grave pit, as if the grave itself represented the wagon. But a whole wagon was buried west of the Dnieper in the Yamnaya grave at Lukyanova kurgan, grave 1; and whole wagons were found under nine Novotitorovskaya kurgans in the Kuban steppes. Many construction details can be reconstructed from these ten cases. All ten wagons had a fixed axle and revolving wheels. The wheels were made of two or three planks doweled together and cut in a circular shape about 50–80 cm in diameter. The wagon bed was about 1 m wide and 2–2.5 m long, and the gauge or track width between the wheels was 1.5–1.65 m. The Novotitorovskaya wagon at Lebedi kurgan 2, grave 116, is reconstructed by Gei with a box seat for the driver, supported on a cage of vertical struts doweled into a rectangular frame. Behind the driver was the interior of the wagon, the floor of which was braced with X-crossed planks (like the repoussé image on the Novosvobodnaya bronze cauldron from the Evdik kurgan) (see figure 4.3a). The Lukyanovka wagon frame also was braced with X-crossed planks. The passengers and cargo were protected under a "tilt," a wagon cover made of reed mats painted with red, white, and black stripes and curved designs, possibly sewn to a backing of felt. Similar painted reed mats with some kind of organic backing were placed on the floors of Yamnaya graves (figure 13.4).[17]

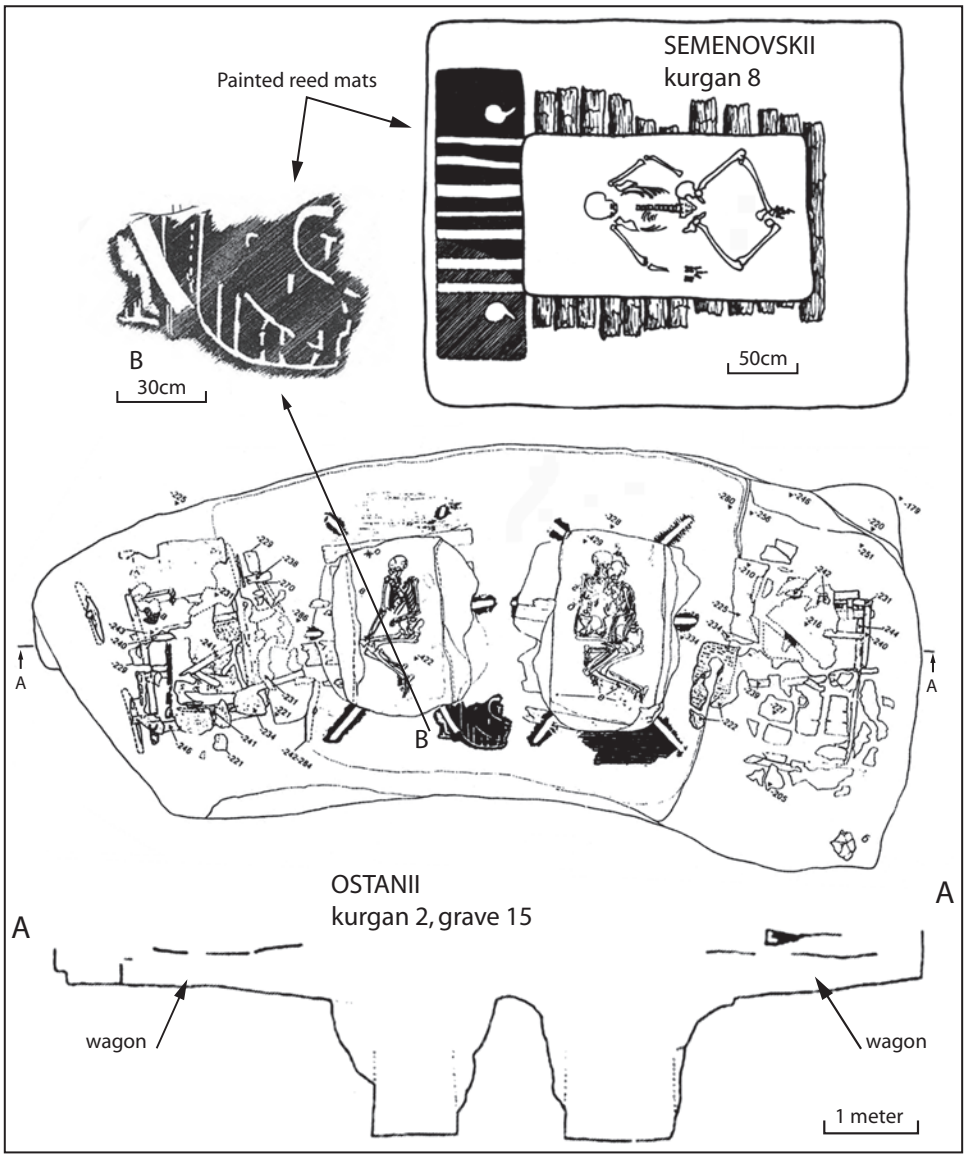


Figure 13.4 Painted reed mats in graves of the Yamnaya and related traditions. Top: Semenovskii kurgan 8, grave 9, late Yamnaya, lower Dniester steppes; bottom, Ostanni kurgan 2, double grave 15 with two wagons, Novotitorovskaya culture, Kuban River steppes. After Subbotin 1985, figure 7.7; and Gei 2000.

Table 13.3
Selected Radiocarbon Dates associated with the Afanasievo Migration and the Yamnaya Horizon

Lab nnumber	*BP date*	*Sample*	*Calibrated date*
1. Afanasievo culture, Altai Mountains (from Parzinger 2002, Figure 10)			
Unidentified sites			
Bln4764	4409±70	?	3310–2910 BCE
Bln4765	4259±36	?	2920–2780 BCE
Bln4767	4253±36	?	2920–3780 BCE
Bln4766	4205±44	?	2890–2690 BCE
Bln4769	4022+40	?	2580–2470 BCE
Bln4919	3936±35	?	2490–2340 BCE
Kara-Koba I enclosure 3			
?	5100±50	?	3970–3800 BCE
Elo-bashi enclosure 5			
?	4920±50	?	3760–3640 BCE
2. Yamnaya horizon kurgan cemeteries with multiple kurgans built together and long gaps between construction phases			
A. Yamnaya horizon cemeteries in Ukraine (from Telegin et al. 2003)			
Avgustnivka cemetery			
Phase 1	Ki2118	4800±55	k 1/gr2	3650–3520 BCE
Phase 2	Ki7110	4130±55	k 5/gr2	2870–2590 BCE
	Ki7111	4190±60	k 4/gr2	2890–2670 BCE
	Ki7116	4120±60	k 4/gr1	2870–2570 BCE
Verkhnetarasovka cemetery			
Phase 1	Ki602	4070±120	k 9/18	2870–2460 BCE
	Ki957	4090±95	k 70/13	2870–2490 BCE
Phase 2	Ki581	3820±190	k 17/3	2600–1950 BCE
	Ki582	3740±150	k 21/11	2400–1940 BCE
Vinogradnoe cemetery			
Phase 1	Ki9414	4340±70	k 3/10	3090–2880 BCE
Phase 2	Ki9402	3970±70	k 3/25	2580–2340 BCE
	Ki987	3950±80	k 2/11	2580–2300 BCE
	Ki9413	3930±70	k 24/37	2560–2300 BCE

Table 13.3 (*continued*)

Lab number		*BP date*	*Sample*	*Calibrated date*
Golovkovka cemetery				
Phase 1	Ki6722	3980±60	k 7/4	2580–2350 BCE
	Ki6719	3970±55	k 6/8	2580–2350 BCE
	Ki6730	3960±60	k 5/3	2570–2350 BCE
	Ki6724	3950±50	k 12/3	2560–2340 BCE
	Ki6729	3920±50	k 14/9	2560–2340 BCE
	Ki6727	3910±15	k 14/2	2460–2350 BCE
	Ki6728	3905±55	k 14/7	2470–2300 BCE
	Ki6721	3850±55	k 6/11	2460–2200 BCE
	Ki2726	3840±50	k 4/4	2400–2200 BCE
Dobrovody cemetery				
Phase 1	Ki2129	4160±55	k 2/4	2880–2630 BCE
Phase 2	Ki2107	3980±45	k 2/6	2580–2450 BCE
	Ki7090	3960±60	k 1/6	2570–2350 BCE
Minovka cemetery				
Phase 1	Ki8296	4030±70	k 2/5	2840–2460 BCE
	Ki 421	3970±80	k 1/3	2620–2340 BCE
Novoseltsy cemetery				
Phase 1	Ki1219	4520±70	k 19/7	3360–3100 BCE
Phase 2	Ki1712	4350±70	k 19/15	3090–2880 BCE
Phase 3	Ki7127	4055±65	k 19/19	2840–2470 BCE
	Ki7128	4005±50	k 20/8	2580–2460 BCE
Otradnoe cemetery				
Phase 1	Ki478	3990±100	k 26/9	2850–2300 BCE
Phase 2	Ki 431	3890±105	k 1/17	2550–2200 BCE
	Ki 470	3860±105	k 24/1	2470–2140 BCE
	Ki452	3830±120	k 1/21	2470–2070 BCE
Pereshchepyno cemetery				
Phase 1	Ki9980	4150±70	k 4/13	2880–2620 BCE
	Ki9982	4105±70	k 1/7	2870–2500 BCE
	Ki9981	4080±70	k 1/6	2860–2490 BCE
Svatove cemetery				
Phase 1	Ki585	4000±190	k 1/1	2900–2200 BCE
	Ki586	4010±180	k 2/1	2900–2250 BCE

Table 13.3 (*continued*)

Lab number		*BP date*	*Sample*	*Calibrated date*
Talyanki cemetery				
Phase 1	Ki6714	3990±50	k 1/1	2580–2460 BCE
	Ki6716	3950±50	k 1/3	2560–2340 BCE
Phase 2	Ki2612	3760±70	k 2/3	2290–2030 BCE
B. Yamnaya horizon cemeteries in the middle Volga region (Samara Valley Project)				
Nizhnaya Orlyanka 1				
Phase 1	AA1257	4520±75	k 4/2	3360–3090 BCE
	OxA**	4510±75	k 1/15	3360–3090 BCE
Grachevka II				
Phase 1	AA53805	4342±56	k 5/2	3020–2890 BCE
	AA53807	4361±65	k 7/1	3090–2890 BCE
C. Poltavka cemetery in the middle Volga region, three kurgans built in a single phase.				
Krasnosamarskoe IV cemetery				
AA37034		4306±53	kurgan 1, grave 4	2929–2877 BCE
AA37031		4284±79	kurgan 1, grave 1	3027–2700 BCE
AA37033		4241±70	kurgan 1, grave 3 central	2913–2697 BCE
AA37036		4327±59	kurgan 2, grave 2 central	3031–2883 BCE
AA37041		4236±47	kurgan 3, grave 9 central	2906–2700 BCE
AA37040		4239±49	kurgan 3, grave 8	2910–2701 BCE

The Yamnaya-Poltavka dates show that multiple kurgans were constructed almost simultaneously with long gaps of time between episodes, perhaps indicating episodic use of the associated pastures.

The oldest radiocarbon dates from steppe vehicle graves bracket a century or two around 3000 BCE (table 13.3). One came from Ostannii kurgan 1, grave 160 in the Kuban, a grave of the third phase of the Novotitorovskaya culture dated 4440±40 BP, or 3320–2930 BCE. The other is from Bal'ki kurgan, grave 57, on the lower Dnieper, an early Yamnaya grave dated 4370±120 BP, or 3330–2880 BCE (see figures 4.4, 4.5). The probability distributions for both dates lie predominantly before 3000 BCE, which is why I use the figure 3100 BCE. But almost certainly these were not the first wagons in the steppes.[18]

Wagons probably appeared in the steppes between about 3500 and 3300 BCE, possibly from the west through Europe, or possibly through the late Maikop-Novosvobodnaya culture, from Mesopotamia. Since we cannot really say where the wheel-and-axle principle was invented, we do not know from which direction it first entered the steppes. But it had the greatest effect in the Don-Volga-Ural steppes, the eastern part of the early Proto-Indo-European world, and the Yamnaya horizon had its oldest roots there.

The subsequent spread of the Yamnaya horizon across the Pontic-Caspian steppes probably did not happen primarily through warfare, for which there is only minimal evidence. Rather, it spread because those who shared the agreements and institutions that made high mobility possible became potential allies, and those who did not share these institutions were separated as Others. Larger herds also probably brought increased prestige and economic power, because large herd-owners had more animals to loan or offer as sacrifices at public feasts. Larger herds translated into richer bride-prices for the daughters of big herd owners, which would have intensified social competition between them. A similar competitive dynamic was partly responsible for the Nuer expansion in east Africa (chapter 6). The Don-Volga dialect associated with the biggest and therefore most mobile herd owners probably was late Proto-Indo-European.

Where Did the Yamnaya Horizon Begin?

Why, as I just stated, did the Yamnaya horizon have its oldest roots in the eastern part of the Proto-Indo-European world? The artifact styles and funeral rituals that defined the early Yamnaya horizon appeared earliest in the east. Most archaeologists accept Nikolai Merpert's judgment that the oldest Yamnaya variants appeared in the Volga-Don steppes, the driest and easternmost part of the Pontic-Caspian steppe zone.

The Yamnaya horizon was divided into nine regional groups in Merpert's classic 1974 study. His regions have been chopped into finer and finer pieces by younger scholars.[19] These regional groups, however defined, did not pass through the same chronological stages at the same time. The pottery of the earliest Yamnaya phase (A) is divided by Telegin into two variants, A1 and A2 (figure 13.5).[20] Type A1 pots had a longer collar, decoration was mainly in horizontal panels on the upper third of the vessel, and "pearl" protrusions often appeared on and beneath the collar. Type A1 was like Repin pottery from the Don. Type A2 pots had decorations all over the vessel body, often in vertical panels, and had shorter, thicker, more everted

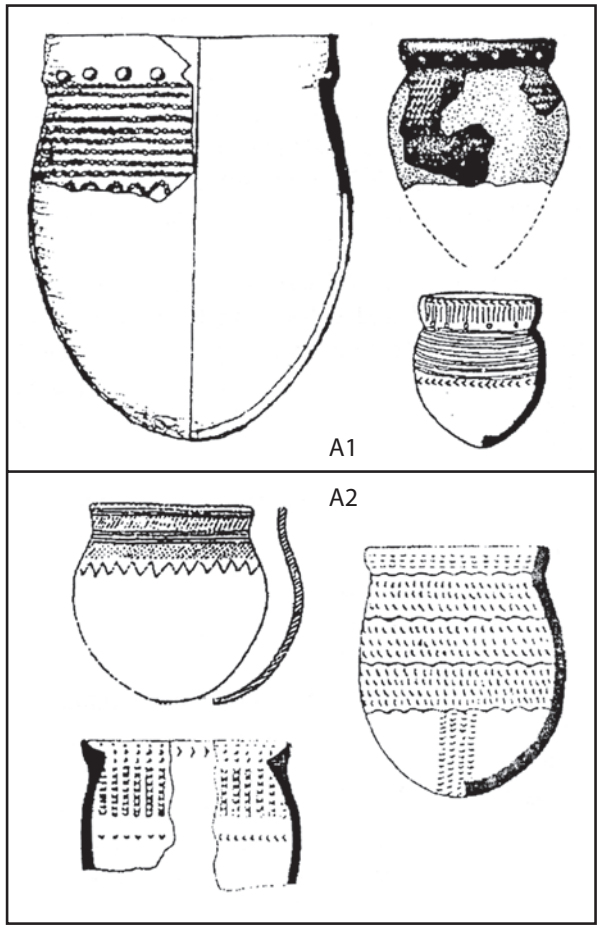


Figure 13.5 Early Yamnaya ceramic types A1 (Repin-related) and A2 (Khvalynsk-related). After Telegin et al. 2003.

rims. Type A2 was like late Khvalynsk pottery from the lower Volga. Repin vessels were made by coiling strips of clay; Type A2 Yamnaya vessels were usually made by pounding strips of clay into bag-shaped depressions or moulds to build up the walls, a very specific technological style. Pots of both subtypes were made of clays mixed with shell. Some of the shell temper seems to have been intentionally added, and some, particularly in Type A2 vessels, came from lake-bottom clays that naturally contained bits of shell and lake snails. Both the A1 and A2 types appeared across the Pontic-Caspian steppes in the earliest Yamnaya graves.

Early Yamnaya on the Lower Volga and Lower Don

Archaeological surveys led by I. V. Sinitsyn on the lower Volga between 1951 and 1953 revealed a regular series of Bronze Age kurgan cemeteries spaced 15–20 km apart along the level plains on the eastern bank between Saratov and Volgograd (then Stalingrad). Some of these kurgans contained stratified sequences of graves, and this stratigraphic evidence was employed to identify the earliest Yamnaya monuments. Important stratified kurgans included Bykovo cemetery II, kurgan 2, grave 1 (with a pot of Telegin's Type A1 stratified beneath later Yamnaya graves) and Berezhnovka cemetery I, kurgans 5 and 32, graves 22 and 2, respectively (with pots of Telegin's Type A2 stratified beneath later graves). In 1956 Gimbutas suggested that the "Kurgan Culture" began on the lower Volga. Merpert's synthesis of the Yamnaya horizon in 1974 supported Gimbutas. Recent excavations have reconfirmed the antiquity of Yamnaya traditions on the lower Volga. Archaic antecedents of both the A1 and A2 types of early Yamnaya pottery have been found in settlements on the lower Volga at Kyzyl Khak and Kara Khuduk (see figure 12.5), dated by radiocarbon between 4000 and 3500 BCE. Graves that seem intermediate between late Khvalynsk and Yamnaya in style and ritual have also been found at Shlyakovskii kurgan, Engels and Tarlyk between Saratov and Volgograd on the lower Volga.

The A1 or Repin style was made earliest in the middle Don–middle Volga region. Repin pottery is stratified beneath Yamnaya pottery at Cherkassky on the middle Don and is dated between 3950 and 3600 BCE at an antelope hunters' camp on the lower Volga at Kyzyl-Khak. The earliest Repin pottery was somewhat similar in form and decoration to the late Sredni Stog–Konstantinovka types on the lower Don, and it is now thought that contact with the late Maikop-Novosvobodnaya culture on the lower Don at places like Konstantinovka stimulated the emergence and spread of the early Repin culture and, through Repin, early Yamnaya. The metal-tanged daggers and sleeved axes of the early Yamnaya horizon certainly were copied after Maikop-Novosvobodnaya types.

The A2 or Khvalynsk style began on the lower Volga among late Khvalynsk populations. This bag-shaped kind of pottery remained the most common type in lower Volga Yamnaya graves, and later spread up the Volga into the middle Volga-Ural steppes, where the A2 style gradually replaced Repin-style Yamnaya pottery. Again, contact with people from the late Maikop-Novosvobodnaya culture, such as the makers of the kurgan

at Evdik on the lower Volga, might have stimulated the change from late Khvalynsk to early Yamnaya. One of the stimuli introduced from the North Caucasus might have been wagons and wagon-making skills.[21]

Early Yamnaya on the Dnieper

The type site for early Yamnaya in Ukraine is a settlement, Mikhailovka. That Mikhailovka is a settlement, not a kurgan cemetery, immediately identifies the western Yamnaya way of life as more residentially stable than that of eastern Yamnaya. The strategic hill fort at Mikhailovka (level I) on the lower Dnieper was occupied before 3400 BCE by people who had connections in the coastal steppes to the west (the Mikhailovka I culture). After 3400–3300 BCE Mikhailovka (level II) was occupied by people who made pottery of the Repin-A1 type, and therefore had connections to the east. While Repin-style pottery had deep roots on the middle Don, it was intrusive on the Dnieper, and quite different from the pottery of Mikhailovka I. Mikhailovka II is itself divided into a lower level and an upper level. Lower II was contemporary with late Tripolye C1 and probably should be dated 3400–3300 BCE, whereas upper II was contemporary with early Tripolye C2 and should be dated 3300–3000 BCE. Repin-style pottery was found in both levels. The Mikhailovka II archaeological layer was about 60–70 cm thick. Houses included both dug-outs and surface houses with one or two hearths, tamped clay floors, partial stone wall foundations, and roofs of reed thatch, judging by thick deposits of reed ashes on the floors. This settlement was occupied by people who were newly allied to or intermarried with the Repin-style early Yamnaya communities of the Volga-Don region.

The people of Mikhailovka II farmed much less than those of Mikhailovka I. The frequency of cultivated grain imprints was 1 imprint per 273 sherds at Mikhailovka I but declined to 1 in 604 sherds for early Yamnaya Mikhailovka II, and 1 in 4,065 sherds for late Yamnaya Mikhailovka III, fifteen times fewer than in Mikhailovka I. At the same time food remains in the form of animal bones were forty-five times greater in the Yamnaya levels than in Mikhailovka I.[22] So although the total amount of food debris increased greatly during the Yamnaya period, the contribution of grain to the diet decreased. Grain imprints did occur in late Yamnaya funeral pottery from western Ukraine, as at Belyaevka kurgan 1, grave 20 and Glubokoe kurgan 2, grave 8, kurgans on the lower Dniester. These imprints included einkorn wheat, bread wheat (*Triticum aestivum*), millet (*Panicum miliaceum*), and barley (*Hordeum vulgare*). Some

Yamnaya groups in the Dnieper-Dniester steppes occasionally cultivated small plots of grain, as pastoralists have always done in the steppes. But cultivation declined in importance at Mikhailovka even as the Yamnaya settlement grew larger.[23]

When Did the Yamnaya Horizon Begin?

Dimitri Telegin and his colleagues used 210 radiocarbon dates from Yamnaya graves to establish the outlines of a general Yamnaya chronology. The earliest time interval with a substantial number of Yamnaya graves is about 3400–3200 BCE. Almost all the early dates are on wood taken from graves, so they do not need to be corrected for old carbon reservoir effects that can affect human bone. Graves dated in this interval can be found across the Pontic-Caspian steppes: in the northwestern Pontic steppes (Novoseltsy k. 19 gr. 7, Odessa region), the lower Dnieper steppes (Obloy k. 1, gr. 7, Kherson region), the Donets steppes (Volonterivka k. 1, gr. 4, Donetsk region), the lower Don steppes (Usman k. 1, gr. 13, Rostov region), the middle Volga steppes (Nizhnaya Orlyanka I, k. 1, gr. 5 and k. 4, gr. 1), and the Kalmyk steppes south of the lower Volga (Zunda Tolga, k. 1, gr. 15). Early Yamnaya must have spread rapidly across all the Pontic-Caspian steppes between about 3400 and 3200 BCE. The rapidity of the spread is interesting, suggesting both a competitive advantage and an aggressive exploitation of it. Other local cultures survived in pockets for centuries, since radiocarbon dates from Usatovo sites on the Dniester, late Post-Mariupol sites on the Dnieper and Kemi-Oba on the Crimean peninsula overlap with early Yamnaya radiocarbon dates between about 3300 and 2800 BCE. All three groups were replaced by late Yamnaya variants after 2800 BCE.[24]

Were the Yamnaya People Nomads?

Steppe nomads have fascinated and horrified agricultural civilizations since the Scythians looted their way through Assyria in 627 BCE. We still tend to stereotype all steppe nomads as people without towns, living in tents or wagons hung with brilliant carpets, riding shaggy horses among their cattle and sheep, and able to combine their fractious clans into vast pitiless armies that poured out of the steppes at unpredictable intervals for no apparent reason other than pillage. Their peculiar kind of mobile pastoral economy, nomadic pastoralism, is often interpreted by historians as a parasitic adaptation that depended on agriculturally based states. Nomads

needed states, according to this *dependency hypothesis*, for grain, metals, and loot. They needed enormous amounts of food and weapons to feed and arm their armies, and huge quantities of loot to maintain their loyalty, and that volume of food and wealth could only be acquired from agricultural states. Eurasian nomadic pastoralism has been interpreted as an opportunistic response to the evolution of centralized states like China and Persia on the borders of the steppe zone. Yamnaya pastoralism, whatever it was, could not have been nomadic pastoralism, because it appeared before there were any states for the Yamnaya people to depend on.[25]

But the dependency model of Eurasian nomadic pastoralism really explains only the *political* and *military* organization of Iron Age and Medieval nomads. The historian Nicola DiCosmo has shown that political and military organizations among nomads were transformed by the evolution of large standing armies that protected the leader—essentially a permanent royal bodyguard that ballooned into an army, with all the costs that implied. As for the *economic* basis of nomadic pastoralism, Sergei Vainshtein, the Soviet ethnographer, and DiCosmo both recognized that many nomads raised a little barley or millet, leaving a few people to tend small valley-bottom fields during the summer migrations. Nomads also mined their own metal ores, abundant in the Eurasian steppes, and made their own metal tools and weapons in their own styles. The metal crafts and subsistence economy that made Eurasian nomadic pastoralism possible did not depend on imported metal or agricultural subsidies from neighboring farmers. Centralized agricultural states like those of Uruk-period Mesopotamia were very good at concentrating wealth, and if steppe pastoralists could siphon off part of that wealth it could radically transform tribal steppe military and political structures, but the everyday subsistence economics of nomadic pastoralism did not require outside support from states.[26]

If nomadic pastoralism is an economic term, referring not to political organization and military confederacies but simply to a form of pastoral economy dependent on high residential mobility, it appeared during the Yamnaya horizon. After the EBA Yamnaya period an increasingly bifurcated economy appeared, with both mobile and settled elements, in the MBA Catacomb culture. This sedentarizing trend then intensified with the appearance of permanent, year-round settlements across the northern Eurasian steppes during the Late Bronze Age (LBA) with the Srubnaya culture. Finally mobile pastoral nomadism of a new militaristic type appeared in the Iron Age with the Scythians. But the Scythians did not invent the first pastoral economy based on mobility. That seems to have been the great innovation of the Yamnaya horizon.

Yamnaya Herding Patterns

An important clue to how the Yamnaya herding system worked is the location of Yamnaya kurgan cemeteries. Most Yamnaya kurgan cemeteries across the Pontic-Caspian region were located in the major river valleys, often on the lowest river terrace overlooking riverine forests and marshes. But at the beginning of the Yamnaya period kurgan cemeteries also began to appear for the first time in the deep steppes, on the plateaus between the major river valleys. If a cemetery can be interpreted as an ancestral claim to property ("here are the graves of my ancestors"), then the appearance of kurgan cemeteries in the deep steppes signaled that deep-steppe pastures had shifted from wild and free to cultured and owned resources. In 1985 V. Shilov made a count of the excavated kurgans located in the deep steppes, on inter-valley plateaus, in the steppe region between the lower Don, the lower Volga, and the North Caucasus. He counted 799 excavated graves in 316 kurgans located in the deep steppes, outside major river valleys. The earliest graves, the first ones to appear in these locations, were Yamnaya graves. Yamnaya accounted for 10% (78) of the graves, and 45% (359) were from MBA cultures related to the Catacomb culture, 7% (58) were from the LBA Srubnaya culture, 29% (230) were of Scytho-Sarmatian origin, and 9% (71) were historical-Medieval. The exploitation of pastures on the plateaus between the river valleys began during the EBA and rapidly reached its all-time peak during the MBA.[27]

N. Shishlina collected seasonal botanical data from kurgan graves in the Kalmyk steppes, north of the North Caucasus, part of the same region that Shilov had studied. Shishlina found that Yamnaya people moved seasonally between valley-bottom pastures (occupied during all seasons) and deep-steppe plateau pastures (probably in the spring and summer) located within 15–50 km of the river valleys. Shishlina emphasized the localized nature of these migratory cycles. Repetitive movements between the valleys and plateau steppes created overgrazed areas with degraded soils (preserved today under MBA kurgan mounds) by the end of the Yamnaya period.

What was the composition of Bronze Age herds in the Don-Volga steppes? Because there are no Yamnaya settlements east of the Don, faunal information has to be extracted from human graves. Of 2,096 kurgan graves reviewed by Shilov in both the river valleys and the inter-valley plateaus—a much bigger sample than just the graves on the plateaus—just 15.2% of Yamnaya graves contained sacrifices of domesticated

Table 13.2
Domesticated Animals in Early Bronze Age Graves and Settlements in the Pontic–Caspian Steppes

Culture	*Cattle*	*Sheep/gt*	*Horse*	*Pig*	*Dog*
Don–Volga steppe, Yamnaya graves	15%	65%	8%	—	5%
Mikhailovka II/III, Yamnaya settlement	59%	29%	11%	9%	0.7%
Repin (lower Don), settlement	18%	9%	55%	9%	—

Note: Missing % were unidentifiable as to species.

animals. Most of these contained the bones of sheep or goats (65%), with cattle a distant second (15%), horses third (8%) and dogs fourth (5%) (table 13.2).[28]

Yamnaya herding patterns were different in the west, between the Dnieper and Don valleys. One difference was the presence of Yamnaya settlements, implying a less mobile, more settled herding pattern. At Mikhailovka levels II and III, which define early and late Yamnaya in the Dnieper valley, cattle (60%) were more numerous than sheep (29%), unlike the sheep-dominant herds of the east. Kurgan cemeteries penetrated only a few kilometers into the plateaus; most cemeteries were located in the Dnieper valley or its larger tributaries. This riverine cattle-herding economy was tethered to fortified strongholds like Mikhailovka, supported by occasional small grain fields. About a dozen small Yamnaya settlements have been excavated in the Dnieper-Don steppes at places such as Liventsovka and Samsonovka on the lower Don. Most occupy less than 1 ha and were relatively low-intensity occupations, although fortification ditches protected Samsonovka and Mikhailovka, and a stone fortification wall was excavated at Skelya-Kamenolomnya. Cattle are said to predominate in the animal bones from all these places.[29]

East of Repin no Yamnaya settlements have been found. Occasional wind-eroded scatters of microliths and Yamnaya pottery sherds have been observed in valley bottoms and near lakes in the Manych and North Caspian desert-steppes and deserts, but without intact cultural layers. In the lusher grasslands where it is more difficult to see small surface sites, even Yamnaya surface scatters are almost unknown. For example, the Samara

oblast on the middle Volga was dotted with known settlements of the Mesolithic, Neolithic, Eneolithic, and Late Bronze Ages, but it had no EBA Yamnaya settlements. In 1996, during the Samara Valley Project, we attempted to find ephemeral Bronze Age camps by digging test pits at twelve favorable-looking places along the bottom of a stream valley, Peschanyi Dol, that had four Yamnaya kurgan cemeteries clustered near its mouth around the village of Utyevka (see figure 16.11 for a map). The Peschanyi Dol valley is today used as a summer pasturing place for cattle herds from three nearby Russian rural villages. We discovered seven ephemeral LBA Srubnaya ceramic scatters in this pleasant valley and a larger Srubnaya settlement, Barinovka, at its mouth. The LBA settlement and one camp also had been occupied during the MBA; each yielded a small handful of MBA ceramic sherds. But we found no EBA sherds—no Yamnaya settlements.

If we cannot find the camps that Yamnaya herders occupied through the winter, when they had to retreat with their herds to the protection of riverine forests and marshes (where most Yamnaya cemeteries were located), then their herds were so large that they had to keep moving even in winter. In a similar northern grassland environment with very cold winters, the fifty bands of the Blackfoot Indians of Canada and Montana had to move a few miles several times each winter just to provide fresh forage for their horses. And the Blackfeet did not have to worry about feeding cattle or sheep. Mongolian herders move their tents and animal herds about once a month throughout the winter. The Yamnaya herding system probably was equally mobile.[30]

Yamnaya herders watched over their herds on horseback. At Repin on the Don, 55% of the animal bones were horse bones. A horse skull was placed in a Yamnaya grave in a kurgan cemetery overlooking the Caspian Depression near Tsa-Tsa, south of the Volga, in kurgan 7, grave 12. Forty horses were sacrificed in a Catacomb-period grave in the same cemetery in kurgan 1, grave 5.[31] The grave probably was dug around 2500 BCE. An adult male was buried in a contracted position on his left side, oriented northeast. Fragments of red ochre and white chalk were placed by his hip. A bronze dagger blade was found under his skull. Above his grave were forty horse skulls arranged in two neat rows. Three ram skulls lay on the floor of the grave. The amount of meat forty horses would have yielded—assuming they were slightly bigger than Przewalskis, or about 400 kg live weight—would be roughly 8,000 k, enough for four thousand portions of 2 k each. This suggests a funeral feast of amazing size. Horses were suitable animals for extraordinary ritual sacrifices.

Wild Seeds and Dairy Foods in the Don–Volga Steppes

A ceramics lab in Samara has microscopically examined many Yamnaya pot-sherds from graves, but no cultivated grain imprints appeared on Yamnaya pottery here or anywhere else east of the Don. Yamnaya people from the middle Volga region had teeth that were entirely free of caries (no caries in 428 adult Yamnaya-Poltavka teeth from Samara oblast [see figure 16.12]), which indicates a diet very low in starchy carbohydrates, like the teeth of foragers.[32] Eastern Yamnaya people might have eaten wild *Chenopodium* and *Amaranthus* seeds and even *Phragmites* reed tubers and rhizomes. Analysis of pollen grains and phytoliths (silica bodies that form inside plant cells) by N. Shishlina from Yamnaya grave floors in the eastern Manych depression, in the steppes north of the North Caucasus, found pollen and phytoliths of *Chenopodium* (goosefoot) and amaranths, which can produce seed yields greater in weight per hectare than einkorn wheat, and without cultivation.[33] Cultivated grain played a small role, if any, in the eastern Yamnaya diet.

Although they were very tall and robust and showed few signs of systemic infections, the Yamnaya people of the middle Volga region exhibited significantly more childhood iron-deficiency anemia (bone lesions called *cribra orbitalia*) than did the skeletons from any earlier or later period (figure 13.6). A childhood diet *too* rich in dairy foods can lead to anemia, since the high phosphorus content of milk can block the absorption of iron.[34] Health often declines in the early phases of a significant dietary change, before the optimal mix of new foods has been established. The anomalous Yamnaya peak in *cribra orbitalia* could also have resulted from an increased parasite load among children, which again would be consistent with a living pattern involving closer contact between animals and people. Recent genetic research on the worldwide distribution of the mutation that created lactose tolerance, which made a dairy-based diet possible, indicates that it probably emerged first in the steppes west of the Ural Mountains between about 4600 and 2800 BCE—the Late Eneolithic (Mikhailovka I) and the EBA Yamnaya periods.[35] Selection for this mutation, now carried by all adults who can tolerate dairy foods, would have been strong in a population that had recently shifted to a mobile herding economy.

The importance of dairy foods might explain the importance of the cow in Proto-Indo-European myth and ritual, even among people who depended largely on sheep. Cattle were sacred because cows gave more milk

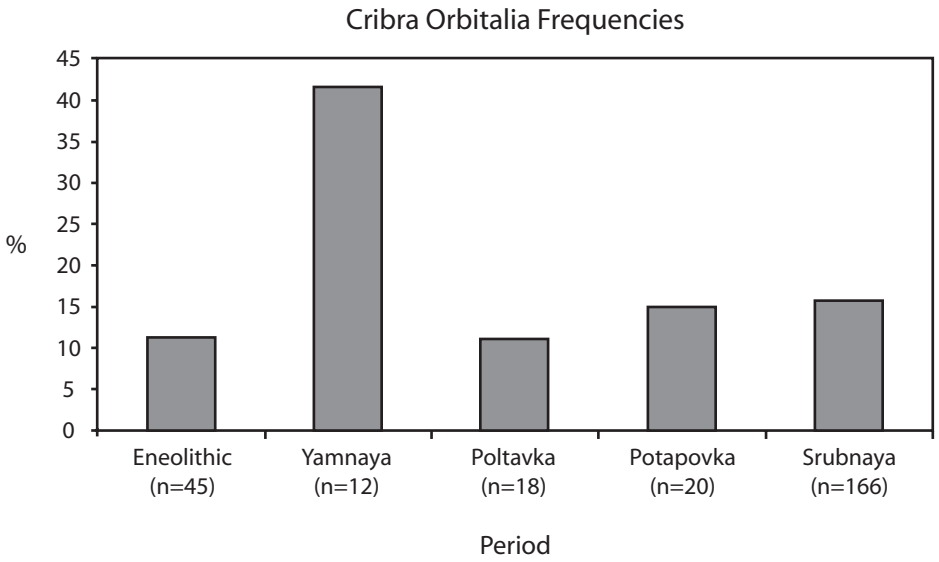


Figure 13.6 Frequencies of cribra orbitalia, associated with anemia, in cultures of the Samara oblast, middle Volga region. After Murphy and Khokhlov 2004.

than any other herd animal in the Eurasian steppe—twice as much as mares and five times more than goats, according to the Soviet ethnographer Vainshtein. He noted that, even among the sheep herders of Tuva in Siberia, an impoverished family of nomads that had lost all its sheep would try to keep at least one cow because that meant they could eat. The cow was the ultimate milk producer, even where herders counted their wealth in sheep.[36]

The Yamnaya wagon-based herding economy seems to have evolved in the steppes east of the Don, like the earliest Yamnaya pottery styles. Unlike the pottery and grave styles, the high-mobility, sheep-herding strategy of eastern Yamnaya pastoralism did not spread westward into the Dnieper steppes or northward into the middle Volga-Ural steppes, where cattle breeding remained the dominant aspect of the herding economies. Instead, it seems that social, religious, and political institutions (guest-host agreements, patron-client contracts, and ancestor cults) spread with the Yamnaya horizon. Some new chiefs from the east probably migrated into the Dnieper steppes, but in the west they added cattle to their herds and lived in fortified home bases.

Yamnaya Social Organization

The speakers of late Proto-Indo-European expressed thanks for sons, fat cattle, and swift horses to Sky Father, **dyew pəter*, a male god whose prominence probably reflected the importance of fathers and brothers in the herding units that composed the core of earthly social organization. The vocabulary for kin relations in Proto-Indo-European was that of a people who lived in a patrilineal, patrilocal social world, meaning that rights, possessions, and responsibilities were inherited only from the father (not the mother), and residence after marriage was with or near the husband's family. Kinship terms referring to grandfather, father, brother, and husband's brother survive in clearly corresponding roots in nearly all Indo-European languages, whereas those relating to wife and wife's family are few, uncertain, and variable. Kinship structure is only one aspect of social organization, but in tribal societies it was the glue that held social units together. We will see, however, that where the linguistic evidence suggests a homogeneous patri-centered Proto-Indo-European kinship system, the archaeological evidence of actual behavior is more variable.

As Jim Mallory admitted years ago, we know very little about the social meanings of kurgan cemeteries, and kurgan cemeteries are all the archaeological evidence left to us over much of the Yamnaya world.[37] We can presume that they were visible claims to territory, but we do not know the rules by which they were first established or who had the right to be buried there or how long they were used before they were abandoned. Archaeologists tend to write about them as static finished objects, but when they were first made they were dynamic, evolving monuments to specific people, clans, and events.

Gender and the Meaning of Kurgan Burial

We can be confident that kurgans were not used as family cemeteries. Mallory's review of 2,216 Yamnaya graves showed that the median Yamnaya kurgan contained fewer than 3 Yamnaya graves. About 25% contained just 1 grave. Children never were buried alone in the central or principal grave—that status was limited to adults. A count of kurgans per century in the well-studied and well-dated Samara River valley, in the middle Volga region, indicated that Yamnaya kurgans were built rarely, only one every five years or so even in regions with many Yamnaya cemeteries. So kurgans commemorated the deaths of special adults, not of everyone in the social

group or even of everyone in the distinguished person's family. In the lower Volga, 80% of the Yamnaya graves contained males. E. Murphy and A. Khokhlov have confirmed that 80% of the sexable Yamnaya-Poltavka graves in the middle Volga region also contained males. In Ukraine, males predominated but not as strongly. In the steppes north of the North Caucasus, both in the eastern Manych steppes and in the western Kuban-Azov steppes, females and males appeared about equally in central graves and in kurgan graves generally. Mallory described the near-equal gender distribution in 165 Yamnaya graves in the eastern Manych region, and Gei gave similar gender statistics for 400 Novotitorovskaya graves in the Kuban-Azov steppes. Even in the middle Volga region some kurgans have central graves containing adult females, as at Krasnosamarskoe IV. Males were not always given the central place under kurgans even in regions where they strongly tended to occupy the central grave, and in the steppes north of the North Caucasus (where Maikop influence was strongest before the Yamnaya period) males and females were buried equally.[38]

The male-centered funerals of the Volga-Ural region suggest a more male-centered eastern social variant within the Yamnaya horizon, an archaeological parallel to the male-centered deities reconstructed for eastern Indo-European mythological traditions. But even on the Volga the people buried in central graves were not *exclusively* males. In the patrilocal, patrilineal society reconstructed by linguists for Proto-Indo-European speakers, *all* lineage heads would have been males. The appearance of adult females in one out of five kurgan graves, including central graves, suggests that gender was not the only factor that determined who was buried under a kurgan. Why were adult females buried in central graves under kurgans even on the Volga? Among later steppe societies women could occupy social positions normally assigned to men. About 20% of Scythian-Sarmatian "warrior graves" on the lower Don and lower Volga contained females dressed for battle as if they were men, a phenomenon that probably inspired the Greek tales about the Amazons. It is at least interesting that the frequency of adult females in central graves under Yamnaya kurgans in the same region, but two thousand years earlier, was about the same. Perhaps the people of this region customarily assigned some women leadership roles that were traditionally male.[39]

Kurgan Cemeteries and Mobility

Were the kurgans in a cemetery built together in a rapid sequence and then abandoned, or did people stay around them and use them regularly

for longer periods of time? For interval dating *between* kurgans it would be ideal to obtain radiocarbon dates from all the kurgans in a cemetery. In a Yamnaya cemetery, that would usually be from three to as many as forty or fifty kurgans. Very few kurgan cemeteries have been subjected to this intensity of radiocarbon dating.

We can try to approximate the time interval between kurgans from the 210 radiocarbon dates on Yamnaya graves published in 2003 by Telegin and his colleagues. In his list we find nineteen Yamnaya kurgan cemeteries for which there are radiocarbon dates from at least two kurgans in the same cemetery. In eleven of these nineteen, more than half, at least two kurgans yielded radiocarbon dates that are statistically indistinguishable (see table 13.3 for radiocarbon dates). This suggests that kurgans were built rapidly in clusters. In many cases, the cemetery was then abandoned for a period of centuries before it was reused. For example, at the Poltavka cemetery of Krasnosamarskoe IV in the middle Volga region we can show this pattern, because we excavated all three kurgans in a small kurgan group and obtained multiple radiocarbon dates from each (figure 13.7). Like many kurgan groups in Ukraine, all three kurgans here were built within an indistinguishably brief time. The central graves all dated about 2700–2600 BCE (dates reduced by 200 radiocarbon years to account for the measured ^{15}N in the human bone used for the date), and then the cemetery was abandoned. Cemeteries like Krasnosamarskoe IV were used intensively for very short periods.

If pastures were like the cemeteries that marked them, then they were used briefly and abandoned. This episodic pasturing pattern, similar to swidden horticulture, possibly was encouraged by similar conditions—a low-productivity environment demanding frequent relocation. But herding, unlike swidden horticulture, required large pastures for each animal, and it could produce trade commodities (wool, felt, leather) if the herds were sufficiently large. To "rest" pastures under these circumstances would have been attractive only at low population densities.[40] It could have happened when the new Yamnaya economy was expanding into the previously unexploited pastures between the river valleys. But as the population of wagon-driving herders grew during the Early Bronze Age, some pastures began to show signs of overuse. A. A. Golyeva established that EBA Yamnaya kurgans in the Manych steppes were built on pristine soils and grasses, but many MBA Catacomb-culture kurgans were built on soils that had already been overgrazed.[41] Yamnaya kurgan cemeteries were dynamic aspects of a new herding system during its initial expansionary phase.

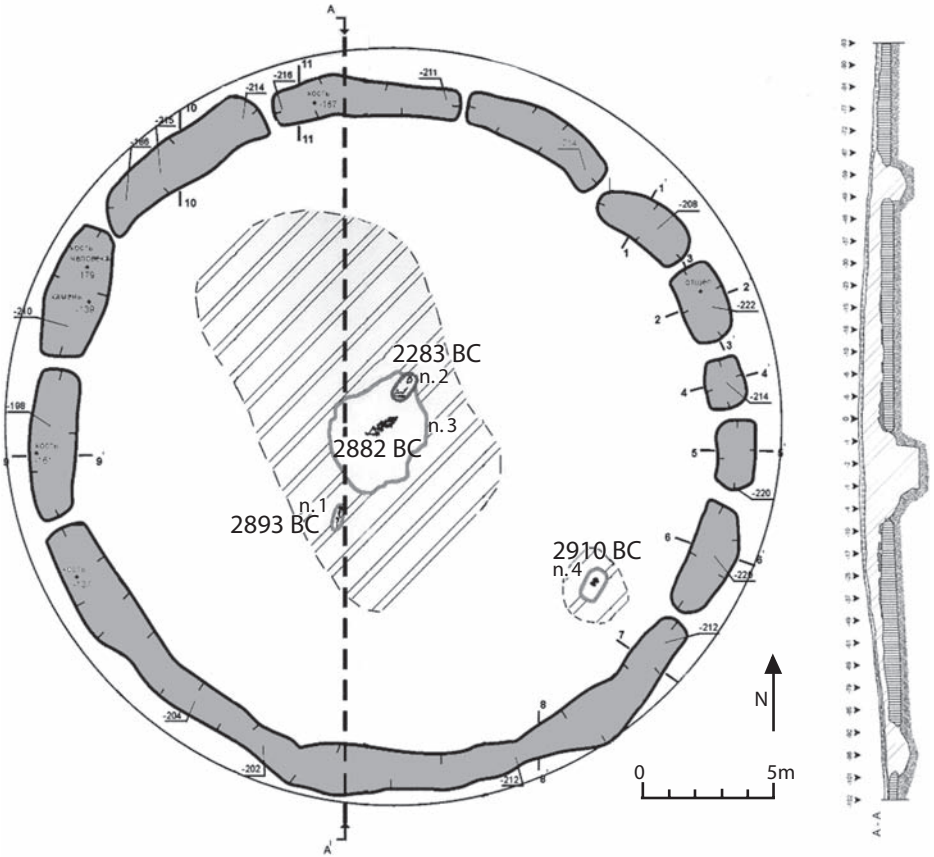


Figure 13.7 Krasnosamarskoe cemetery IV, kurgan 1, early Poltavka culture on the middle Volga. Three graves were created simultaneously when the kurgan was raised, about 2800 BCE: the central grave, covered by a layer of clay, a peripheral grave to its southeast, and an overlying grave in the kurgan. Author's excavation.

Proto-Indo-European Chiefs

The speakers of Proto-Indo-European followed chiefs (**weik-potis*) who sponsored feasts and ceremonies and were immortalized in praise poetry. The richer Yamnaya graves probably commemorated such individuals. The dim outlines of a social hierarchy can be extracted from the amount of labor required to build kurgans. A larger kurgan probably meant that a larger number of people felt obligated to respond to the death of the person

buried in the central grave. Most graves contained nothing but the body, or in some cases just the head, with clothing, perhaps a bead or two, reed mats, and wooden beams. The skin of a domestic animal with a few leg or head bones attached was an unusual gift, appearing in about 15% of graves, and a copper dagger or axe was very rare, appearing in less than 5%. Sometimes a few sherds of pottery were thrown into the grave. It is difficult to define social roles on the basis of such slight evidence.

Do big kurgans contain the richest graves? Kurgan size and grave wealth have been compared in at least two regions, in the Ingul River valley west of the Dnieper in Ukraine (a sample of 37 excavated Yamnaya kurgans), and in the Volga-Ural region (a sample of more than 90 kurgans).[42] In both regions kurgans were easily divided into widely disparate size classes—three classes in Ukraine and four on the Volga. In both regions the class 1 kurgans were 50 m or more in diameter, about the width of a standard American football field (or two-thirds the width of a European soccer field), and their construction required more than five hundred man-days, meaning that five hundred people might have worked for one day to build them, or one hundred people for five days, or some other combination totaling five hundred.

The biggest kurgans were not built over the richest central graves in either region. Although the largest class 1 kurgans did contain rich graves, so did smaller kurgans. In both regions wealthy graves occurred both in the central position under a kurgan and in peripheral graves. In the Ingul valley, where there were no metal-rich graves in the study sample, more objects were found in peripheral graves than in central graves. In some cases, where we have radiocarbon dates for many graves under a single kurgan, we can establish through overlapping radiocarbon dates that the central grave and a *richer* peripheral grave were dug simultaneously in a single funeral ceremony, as at Krasnosamarskoe IV. The richest graves in some Novosvobodnaya kurgans, including the Klady cemetery, were peripheral graves, located off-center under the mound. It could be misleading to count the objects in peripheral graves, including some wheeled vehicle sacrifices, as separate from the central grave. In at least some cases, a richer peripheral grave accompanied the central grave in the same funeral ceremony.

Elite status was marked by artifacts as well as architecture, and the most widespread indication of status was the presence of metal grave goods. The largest metal artifact found in any Yamnaya grave was laid on the left arm of a male buried in Kutuluk cemetery I, kurgan 4, overlooking the Kinel River, a tributary of the Samara River in the Samara oblast east of the

Figure 13.8 Kutuluk cemetery I, kurgan 4, grave 1, middle Volga region. An Early Yamnaya male with a large copper mace or club, the heaviest metal object of the Yamnaya horizon. Photograph and excavation by P. Kuznetsov; see Kuznetsov 2005.

Volga (figure 13.8). A solid copper club or mace weighing 750 gm, it was 48.7 cm long and more than 1 cm thick, with a diamond cross-section. The kurgan was medium-sized, 21 m in diameter and less than 1 m high, but the central grave pit (gr. 1) was large. The male was oriented east, positioned supine with raised knees, with ochre at his head, hips, and feet—a classic early Yamnaya grave type. Two samples of bone taken from his

skeleton were dated about 3100–2900 BCE (4370±75 AA12570 and 4400±70 BP OxA 4262), but ^{15}N levels suggest that the date probably was too old and should be revised to about 2900–2700 BCE.

In the Samara River valley, near the village of Utyevka on the floodplain of the Samara River, was the richest steppe grave of the Yamnaya-Poltavka period. Utyevka cemetery I, kurgan 1 was 110 m in diameter. Central grave 1 was a Yamnaya-Poltavka grave containing an adult male, positioned supine with legs in an uncertain position. He was buried with two golden rings with granulated decoration, unique objects with analogies in the North Caucasus or Anatolia; also a copper tanged dagger, a copper pin with a forged iron head, a flat copper axe, a copper awl, a copper sleeved axe of the classic Volga-Ural type IIa with a slightly rising blade, and a polished stone pestle[43] (figure 13.9). In the Volga-Ural region numerous Yamnaya graves contained metal daggers, chisels, and cast shaft-hole axes.

Overall, the wide disparities in labor invested in kurgans of different sizes, from 10 m to more than 110 m in diameter, indicate a broad sociopolitical hierarchy, though one not always correlated with grave wealth. The class 1 kurgans tended to contain rich graves but they were not always the central grave, and rich graves frequently occurred in smaller kurgans. Chernykh observed that kurgans seem to have been bigger, as a rule, in the North Pontic steppes, where many also had additional stone elements including cromlechs or curbs, carved stone stelae, and even coverings of stone or gravel, whereas the graves of the Volga-Ural region were richer in metal but had simpler earthen monuments.[44]

The Identity of the Metalworker

The craft of the steppe metalsmith improved and became more sophisticated under Yamnaya chiefs. Metalworkers in the Pontic-Caspian steppes made cast-copper objects regularly for the first time, and in late Yamnaya they even experimented with forged iron. Thin seams of copper ore (azurite, malachite) are interbedded with iron-bearing sandstones between the central North Caucasus region (Krasnodar) and the Ural Mountains (Kargaly), including the entire Volga-Ural region. These ores are exposed by erosion on the sides of many stream valleys, and were mined by Yamnaya metalworkers. A Yamnaya grave at Pershin in Orenburg oblast, near the enormous copper deposits and mines at Kargaly on the middle Ural River, contained a male buried with a two-piece mold for a sleeved, one-bladed axe of Chernykh's type 1. The grave is dated about 2900–2700 BCE

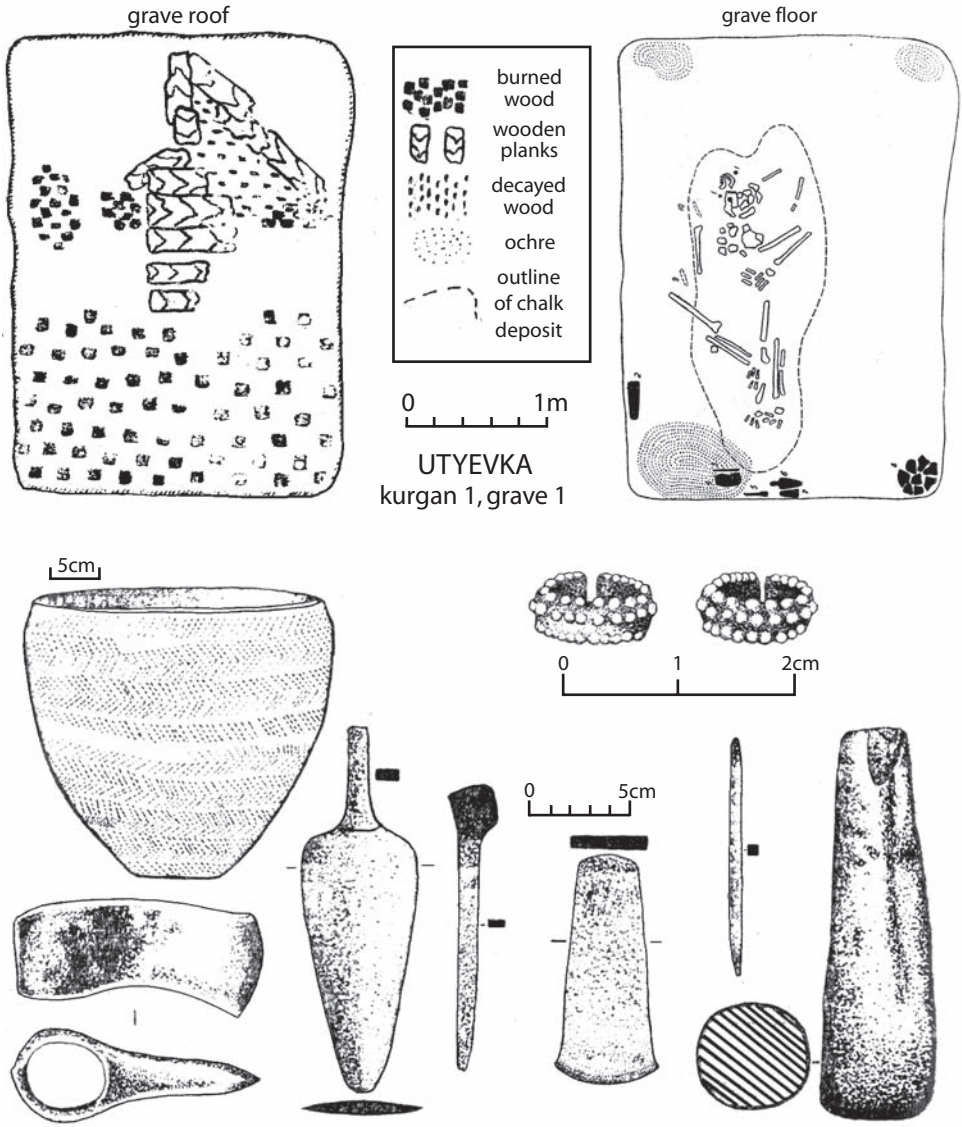


Figure 13.9 Utyevka cemetery I, kurgan 1, grave 1, between 2800 and 2500 BCE, middle Volga region. The richest grave and among the largest kurgans (more than 100 m in diameter) of the Yamnaya-Poltavka horizon. Gold rings with granulated decoration, ceramic vessel, copper shaft-hole axe, copper dagger, copper pin with iron head, copper flat axe, copper awl, and stone pestle. After Vasiliev 1980.

(4200±60, BM-3157). A Yamnaya mining pit has been found at Kargaly with radiocarbon dates of the same era. Almost all the copper objects from the Volga-Ural region were made of "clean" copper from these local sources. Although the cast sleeved single-bladed axes and tanged daggers of the early Yamnaya period imitated Novosvobodnaya originals, they were made locally from local copper ores. North Caucasian arsenical bronze was imported by people buried in graves in the Kalmyk steppe south of the lower Volga and in Kemi-Oba sites on the Crimean peninsula, but not in the Volga-Ural steppes.[45]

The grave at Pershin was not the only smith's grave of the period. Metalworkers were clearly identified in several Yamnaya-period graves, perhaps because metalworking was still a form of shamanic magic, and the tools remained dangerously polluted by the spirit of the dead smith. Two Post-Mariupol smith's graves on the Dnieper (chapter 12) probably were contemporary with early Yamnaya, as was a smith's grave with axe molds, crucibles, and *tulieres* in a Novotitorovskaya-culture grave in the Kuban steppes at Lebedi I (figure 13.10). Copper slag, the residue of metalworking, was included in other graves, as at Utyevka I kurgan 2.[46]

One unappreciated aspect of EBA and MBA steppe metallurgy was its experimentation with iron. The copper pin in Utyevka kurgan 1 with a forged iron head was not unique. A Catacomb-period grave at Gerasimovka on the Donets, probably dated around 2500 BCE, contained a knife with a handle made of arsenical bronze and a blade made of iron. The iron did not contain magnetite or nickel, as would be expected in meteoric iron, so it is thought to have been forged. Iron objects were rare, but they were part of the experiments conducted by steppe metalsmiths during the Early and Middle Bronze Ages, long before iron began to be used in Hittite Anatolia or the Near East.[47]

The Stone Stelae of the North Pontic Steppes

The Yamnaya horizon developed in the Pontic-Caspian steppes largely because an innovation in land transport, wagons, was added to horseback riding to make a new kind of herding economy possible. At the same time an innovation in sea transport, the introduction of the multi-oared longboat, probably was responsible for the permanent occupation of the Cycladic Islands by Grotta-Pelos mariners about 3300–3200 BCE, and for the initial development of the northwest Anatolian trading communities such as Kum Tepe that preceded the founding of Troy.[48] These two horizons, one on the sea and the other on a sea of grass, came into contact around the shores of the Black Sea.

Figure 13.10 Lebedi cemetery I, kurgan 3, grave 10, a metal worker's gave of the late Novotitorovskaya culture, perhaps 2800–2500 BCE, Kuban River steppes. He wore a boars-tusk pendant. Under his arm was a serpentine hammer-axe (*upper left*). By his feet was a complete smithing kit: heavy stone hammers and abraders, sharp-edged flint tools, a round clay crucible (*upper right*), and axe molds for both flat and sleeved axes. After Gei 1986, figures 1, 4, 6, 7, and 9.

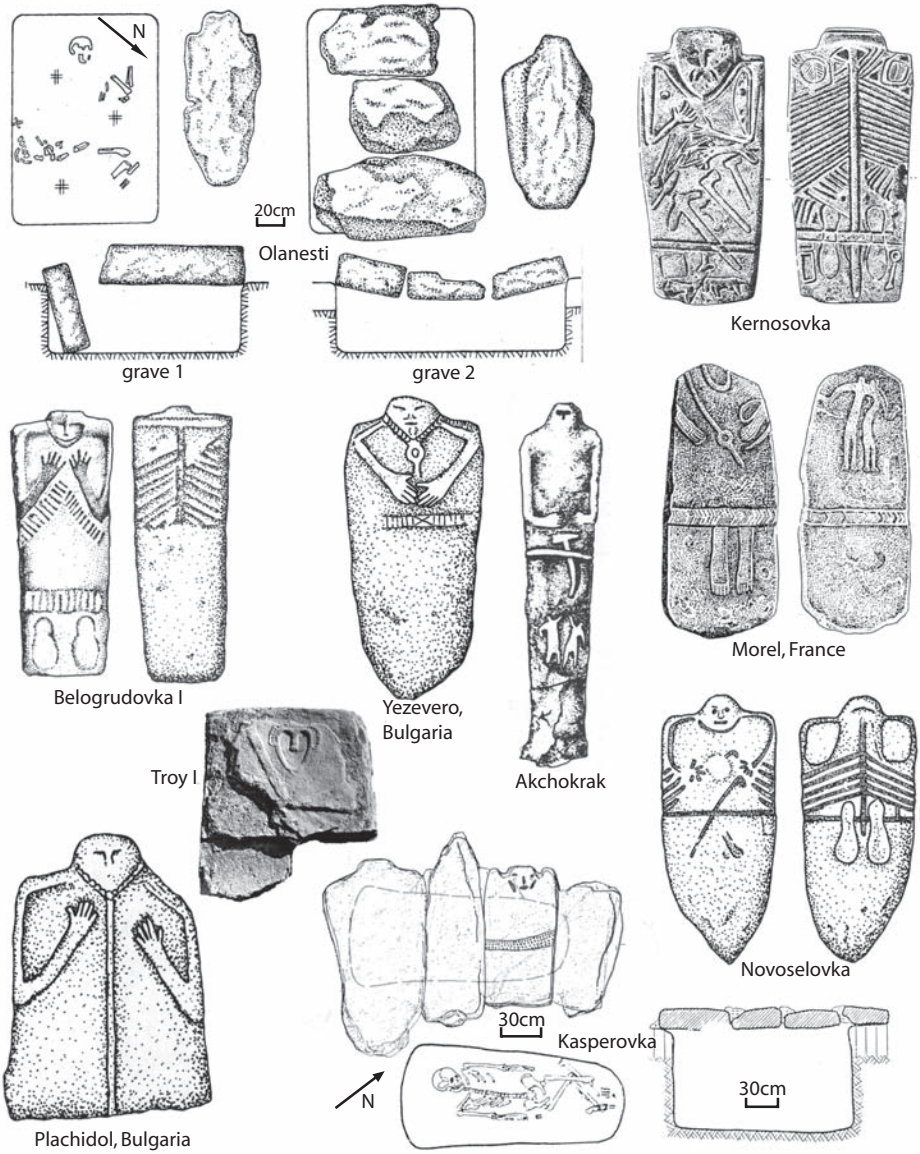


Figure 13.11 Carved stone anthropomorphic stelae of the Pontic steppes, Bulgaria, Troy I, and southeastern France. Graves 1 and 2 of Olaneşti kurgan 2 (*upper left*), located in the lower Dniester steppes, are pre-Usatovo, so before 3300 BCE. The Yamnaya stelae of Ukraine and Crimea (Kernosovka, Belogrudovka, Akchorak, Novoselovka, and Kasperovka) and Bulgaria (Plachidol, Yezerovo) probably date 3300–2500 BCE. Parallels at Troy I and in the mountains of southeastern France (Morel) are striking. After Telegin and Mallory 1994; and Yarovoy 1985.

The Kemi-Oba culture was a kurgan-building culture dated 3200–2600 BCE centered in the Crimean peninsula. Its dark-surfaced pottery was a continuation of Mikhailovka I ceramic traditions. Kemi-Oba grave cists were lined with flat-shaped stones, some painted in geometric designs, a custom shared with Novosvobodnaya royal graves (e.g., the Tsar kurgan at Nalchik). Kemi-Oba graves also contained large, stone funeral stelae, many with human heads carved at the top and arms, hands, belts, tunics, weapons, crooks, sandals, and even animal scenes sometimes carved on one or both faces (figure 13.11) This custom spread from the Crimean peninsula into both the Caucasus (where only a few stelae appeared) and the western Pontic steppes. At least three hundred stelae have been found in Yamnaya and Catacomb graves in the North Pontic steppes, usually re-used as grave-pit covers, with more than half concentrated between the South Bug and Ingul rivers.[49] The carving of funeral stelae seems to have expanded in frequency and elaboration in the Crimean and Pontic steppes after about 3300 BCE. Their original purpose is unknown. Perhaps they marked the future site of a kurgan cemetery before the first kurgan was built, or maybe they marked the first kurgan until the second one was built. In any case, they are usually found re-used as stone covers over grave pits, sealed beneath kurgans.

Eerily similar stelae, with carved heads, bent arms, hands, weapons, and even specific objects such as crooks, were carved in northern Tuscany and the Italian piedmont at about the same time, and a fragment of a similar-looking stela was built into a stone building in Troy I. It is difficult to imagine that these widely separated but strikingly similar and contemporaneous funeral stelae were unconnected. A newly invigorated maritime trade probably was responsible for carrying ideas and technologies across the sea. The Yamnaya horizon spread across the Pontic-Caspian steppes while an invigorated sea trade spread across the eastern Mediterranean. A full understanding of the significance of the Yamnaya horizon requires an understanding of its external relations—the subject of the next chapter.