Chapter 2

Economic Developments in the Ponto-Caspian Steppe

The Lord wished people would not live so cheap,
He taught them to plow and to sow and to reap.
And everyone started to grow his own bread,
And stopped roaming the Steppe and the forests instead.
–Firdausi, Shah-Nameh

The decisive turning point in the history of mankind and its adaptation to natural conditions was the transition from an extractive (foraging and collecting) to a productive economy, called by V. Gordon Childe the Neolithic Revolution. According to most scholars, this transition came about as a result of a combination of interrelated factors, both natural and human-induced: climatic change, population growth, and the extinction of certain species of animals and plants overexploited by man, leading to the reduction of food resources. This food crisis brought about a new food-producing economy that originated in Western Asia, particularly in Anatolia. From this center the early domesticated species of plants and animals spread west and south to outlying geographic areas. These regions of food-producing cultures came to be known as secondary civilizations, such as Southeastern Europe, Transcaucasia and Southern Central Asia, Eastern Iran, and India (Tsalkin 1970a, b; Shnirelman 1980; 1989).

The Southwestern Asian (Near Eastern) origin of domesticated animal species is apparent from the faunal remains of domesticated animals found at the sites that are dated more than a thousand years older than the domesticated animal remains found at sites in other regions of the Old World. Second, it is the Southwestern Asian species that spread into other regions. Last—and most important—according to genetic evidence, the only wild ancestor of the domesticated sheep, from which originated all the varieties of modern species in the Old World, was found only in the foothills of the Zagros (eastern Iran).

Much later the domestication of local animal species took place in the zones of the secondary civilizations, which by then had already adopted livestock herding: in India of the Zebu cattle, and in Central Asia, of the Bactrian camel.[1] (These facts are vital for solving the issue of the domestication of the horse in the Eurasian Steppe.) From the zones of the secondary civilizations the skills of farming and livestock-herding began to spread to other regions of the Old World, including the Eurasian Steppe.

There were several successive stages of economic development in the history of the Steppe economy, distinguished by distinctive styles of interaction between man and environment, the specific character of the cultural complex, and the different directions of the prevailing cultural relations along the future Silk Road routes.

The First Stage of the Food-Producing Economy

The early acquaintance with a food-producing economy in the Ponto-Caspian Steppe is assigned to the Neolithic Epoch. The paleogeographic data, as apparent from site locations and faunal remains of wild animals, indicates that this was a period of mild, humid climate. The earliest evidence for domesticated animals and plants were the discoveries of pig and cattle bones as well as of emmer wheat and barley at sites of the Bug-Dniester Culture, of cattle and pig bones and sickle blades in the Surski-Dnieper Culture, at sites of the Steppe and mountainous Crimea; in the Don Region, in Matveev Kurgan, of pig and sheep or goat bones, and later, in Rakushechny Yar, of cattle bones; finally, the recent finding of cattle and sheep or goat bones in the Caspian Sea North Littoral on the Djangar site (Danilenko 1969; Markevich 1974; Krizhevskaya 1978; 1983; Belanovskaya 1977; *Arkheologiya* 1985; 1987; Yanushevich 1986; Koltsov 1986).

It is important to emphasize that, from its very beginnings, the food-producing economy was *complex*. The earliest food production in the Steppe included both simple farming and the keeping of several domesticated animal species, similar to food production in other regions of the Old World.

What is the nature of early food production in the Steppe? The long-debated issues of a single center of origin or multiple centers of origin of domesticated species, and how domesticated species were introduced into the Steppe, can now be resolved. The appearance of the principal cereals, cattle, and pigs has been traced back to Southeastern Europe, the main center for the origins of early food production in the Steppe. This is apparent from the group of domesticated species found in Neolithic sites of the Steppe and by tracing the earliest con-

tacts with the Steppe cultures, first with the Bug-Dniester Culture, the farmers of the Balkano-Carpathian zone.

I. B. Vasil'ev and A. A. Vybornov (1988, 46–56) argue that the Sura, Mountainous Crimea, Rakushechny Yar, and Djangar sites constitute a single Steppe cultural province. They underscore its central pull toward the European cultures and note its relations with the Caucasus and its fundamental difference from Central Asian and Kazakhstan cultures.[2]

The spread of the food-producing economy in the Steppe was due to the increasing influence of the populations of the Carpatho-Danubian zone; these contacts can be traced in the Bug-Dniester Culture, whose own origins are situated on the Lower Dniester River (Shnirelman 1980, 90; 1989, 175–78). This validates the conclusions of V. I. Tsalkin (1970b, 257, 265). He challenged the view that Eastern Europe was a local center of domestication for certain animal species (I. G. Pidoplichko, S. Bökönyi, and D. A. Krainov). According to V. I. Tsalkin, most ancient domestic animals appeared in Southeastern Europe in the Boian and Linear Band Pottery (Bandkeramik) cultures, peoples who were already familiar with all the principal species—cattle, sheep, goat, pig. Therefore he concluded that their appearance in the Steppe was a result either of migration or cultural borrowing. He also claimed that all these species found in the Steppe as far as Siberia during the Bronze and Iron Ages originated from earlier Neolithic domesticates from Southern Europe.

V. A. Shnirelman (1980, 88–90; 1989, 177) accepted the possibility of a Caucasian center of origin for sheep domesticates; however, this cannot yet be reliably substantiated, since evidence for active contacts between the Steppe population and the Caucasus come in only in later periods (presumably after the Neolithic Period). Nonetheless, he recognized that the origins of food production in the Steppe came from the West.

In contrast, V. N. Danilenko (1969, 178, 181, 193; 1974, 85, 116–18), suggested that during the late fifth to early fourth millennium B.C., in the Caspian-Azov Range, "the development of the Old Pit-Grave Culture took place, resulting in site types similar to Djebel's upper levels and to Pit-Grave portions of the Zaman-Baba burial ground." This indicates a Caspian-Azov Range center of domestication. The Caspian Sea Littoral's increasing aridity and the human overpopulation of the region caused the Kelteminar and Pit-Grave cultures to migrate westward, taking to Europe sheep or goats and the Indo-European words for them. He also claimed that cattle were brought to Europe from the Trans-Don East, where both Indo-Europeans and Turko-Altaians had domesticated breeds of cattle.

This notion of a Central Asian origin for sheep domestication and

the early formation of the Pit-Grave Culture in the East, with clear evidence for a Central Asian component, is well worth dwelling on, for it influenced many scholars, including N. Ya. Merpert (1974, 143–44) and N. L. Morgunova (1984, 19; 1995, 73, 86–89, 93); the latter, however, assumes the late arrival of the Pit-Grave Culture people to the Urals from the West (Morgunova, Kravtsov 1994, 110).

V. N. Danilenko's hypothesis has already been subjected to sharp criticism (Tsalkin 1972a; Formozov 1972, 23, 31, 34; Kuzmina 1981; Shnirelman 1989, 177). The premises of his hypothesis are groundless, for the following six reasons.

1. The range of the Kelteminar Culture did not include the Caspian Northern Littoral (A. V. Vinogradov 1981, 164). Moreover, A. A. Formozov (1959, 155) had already proven the existence of the border along the Emba River between the two Neolithic zones, European and Asian, noting their specific characteristics. This conclusion was validated later in his study of the Caspian Sea North Littoral's numerous sites, including the stratified ones. "There are major distinctions between the Neolithic cultures of the Caspian Sea Littoral and the Aral Sea Littoral," "the differences between the two cultures' evolutionary stages can be traced," and one should "speak not only of the cultural difference between these regions but also of their belonging to different cultural provinces," and assign the Caspian ones to the Western Caspio-Pontic circle (Ivanov, Vasil'ev 1995, 121).

2. The increased aridity of the Caspian Sea Littoral never took place during the Neolithic Period. This period was known for the increased moisture of the Central Asian climate—"the Lyavlyakan pluvial" (Vinogradov, Mamedov 1975, 234–55). The ecology allowed for the dominance of fishing in the numerous lakes (Vinogradov et al. 1986).

3. Djebel's materials must be treated with maximum caution. Of the site's eight levels, only the third, where imported pottery of the Shahtepe III-II and Kyzyl-Arvat type (the turn of the third–second millennium B.C.) was found (Okladnikov 1956, 201–5), can be dated reliably. Notably, however, the local coarse-ware pottery of the Upper I–III Bronze Age levels is analogous with the previous IV and V levels assigned to the Neolithic, which casts serious doubt on stratigraphic levels at this site.

In all the levels, *dzeren* (a type of gazelle) and sheep/goat bones[3] were found, and in the III level, bones of the bull (aurochs), which was acknowledged as wild by V. I. Tsalkin (1956, 220–21), who, noting that, without sufficient context, "it is extremely difficult to judge whether sheep/goat bones belong to the wild or domestic species," thought that sheep or goat bones from the III and IV levels possibly belonged to domestic individuals. Djebel's stratigraphy aroused discussion because

the ash archaeological levels could have been disturbed (Formozov 1972, 26). Therefore, Djebel cannot be the basis for broad general historical reconstructions.

Domesticated sheep/goat bones were discovered by V. I. Tsalkin (1970b) in the Dam-dam Chashme Cave in Transcaspia (Markov 1966): in level N 6, 5 bones; N 5, 1; N 4, 56; N 3, 189 bones. In the upper level N 2, imported pottery of the Shah-tepe II type was found, which dates the level to the third millennium B.C. V. A. Shnirelman (1980, 74–75) considers as domesticated only the sheep bones from levels III and IV, while G. F. Korobkova believes that materials from this level are comparable to materials from the South. V. A. Shnirelman's conclusion rules out the appearance of domestic sheep in Transcaspia at a very early date, i.e., the Neolithic.

The assumption of A. P. Okladnikov and V. N. Danilenko, still shared by many authors, is based upon the uncritical understanding of C. Coon's work (1951), which acknowledged the Caspian Sea South Littoral as the center of sheep and goat domestication. However, the scanty materials of the Belt Cave came under severe criticism from scholars (Narr 1975, 421–22; Shnirelman 1980, 71–72), since, according to DNA chromosomal data, all the domestic sheep species derive from a Western Asian progenitor.

Credible traces of the early food production economy in Central Asia have been established only for the agricultural Jeitun Culture in Southern Turkmenistan. The Jeitun Culture had its earlier roots in Western Asia and has evidence of domestic sheep, goats and cows, grains of two-rowed barley, and soft and dwarf wheat. These domesticated species were all of Near Eastern origin (Tsalkin 1970b, 123–26, 148; Masson 1971, 79; Shnirelman 1980, 73; Korobkova 1981, 13).

Other sites from the Neolithic and early Eneolithic period in Central Asia do not show any traces of a food-producing economy, although more than 800 Kelteminar sites already have been examined in the Aral Sea Littoral (A. V. Vinogradov 1981; A. V. Vinogradov et al. 1986). Due to specific ecological conditions, the local economy was based on fishing. This was also typical of the Bukharan oasis sites (Gulyamov et al. 1966, 87–90).

Only the discovery of camel bones and a spindle whorl in the late Neolithic burial ground of Tumek-Kichidjik alludes indirectly to the possibility of the origins of livestock herding here (A. V. Vinogradov et al. 1986). Assumptions about the pastoral character of the economy of Tajikistan's mountain tribes of the Hissar Culture also have been disproved (Ranov 1998, 113).

4. In the Steppe zone of Central Asia, the most ancient sites associated with the food-producing economy are the Zaman-Baba burial

ground and settlement (Kuzmina 1958; Gulyamov et al. 1966, 118–86) (Fig. 36). Impressions of wheat and barley grains, as well as querns and sickle inserts, were found here. From the osteological materials, 15% of the bones belong to deer, wild boar, and dzeren, indicating a hunting economy, and 85% of the bones come from domesticated cow, sheep, goat, and donkey. Animal bones are present also in the graves. But this grave and settlement complex is not representative of the origins of the Pit-Grave Culture, if for no other reason than its chronological placement. A. Askarov (1981) and V. I. Sarianidi (1979) assigned it to the latter half and even to the late second millennium B.C. and related the Zaman–Baba Culture to the Bactria–Margiana complex, a chronological placement we no longer accept. The settlement and the burial ground have now been placed at the third–second millennium B.C. on the basis of the southern imports, analogous to materials from Namazga V, Shah-tepe II, Hissar III B, and Mundigak IV (Kuzmina 1958, 33; 1968, 306). This date for the burial ground was recognized by V. M. Masson (1966). Our chronology is built upon the traditional chronology for the Namazga Culture. However, even if we accept the calibrated dates used by Western scholars, Zaman–Baba's dating is later than the calibrated dates for the Pit-Grave Culture (Rassamakin 1999).

5. V. N. Danilenko's linguistic reasoning contradicts that of modern linguistics (Kuzmina 1981, 38).

6. His idea (1974, 25) that it was the purely pastoral nomadic economy that originally established itself in the Steppe is invalid also. On the contrary, at the early stages the complex food-production economy was present throughout the Old World (Shnirelman 1980, 94; Rassamakin 1999, 73).

In the southern Russian Steppe, the appearance of domesticated species of plants and animals resulted from contacts with the mixed farming populations of the Carpatho-Danubian zone, which, according to C. Renfrew's model (1987; 1992), were influenced by exchange networks that resulted in the diffusion and spread of farming communities (Shnirelman 1980, 92; 1989, 179).

The Second Stage of the Food-Producing Economy

The second stage in the development of the food-producing economy originates at the beginning of the Copper Age. Here, ecology has a decisive influence on the character of economic activity.

In the zone extending from the Dnieper to the Urals, the absence of bison bones and the decrease in auroch bones in the faunal materials at sites indicate that intensive hunting probably led to the reduction of

the numbers of ungulates. I. V. Ivanov and I. B. Vasil'ev (1995, 200) point out that, along the Caspian Sea Littoral in the Eneolithic period, the main food was wild animal meat, and the major hunted species was the *dziggetai* (the onager),[4] with 10% of the total killed. On the one hand, overexploitation of ungulates caused an economic crisis, but, on the other hand, it opened ecological niches for domesticated species. Thus the crisis was brought about by the intensification of the food-producing economy.

In the zone from the Dnieper to the Urals during the latter half to the late fifth millennium B.C., a number of cultures formed that constituted the Mariupol Community: the Azov–Dnieper Culture (according to V. N. Danilenko 1974), or the Nadporozhye–Azov variant of the Dnieper–Donets Culture (according to D. Ya. Telegin 1965; 1991; *Arkheologiya* 1985; 1987; Kotova 1994), the Nizhny Don (the Lower Don), Samara and Caspian cultures (Vasil'ev 1980a, b; Vasil'ev, Matveeva 1986; Sinyuk 1980; Melent'ev 1970; 1976; *Eneolit* 1980; Kotova 1994).

N. S. Kotova (1994, 58) advances a more refined chronology of these cultures. She dates the Mariupol sites to the late Neolithic and the early Copper Age, including also the second stratigraphic levels of the Razdorskoye settlement and the fourth and fifth stratigraphic levels of Rakushechny Yar. She assigns these levels to the Nizhny Don Culture, thus correlating them with the Bug–Dniester Culture, which dates from the third quarter of the fifth millennium B.C. She also includes the Nizhny ("Lower") Don Culture in the Mariupol Community and assigns the second period of the Azov–Dnieper Culture to the early Copper Age, noting its relations with the Sredny Stog population.

The Mariupol Community sites were succeeded by the cultures of Sredny Stog in the Pontic Steppe and Khvalynsk in the Volga Region, which formed a single community (Telegin 1973; Vasil'ev 1980a, b; Agapov et al. 1990).[5]

At the present time, researchers studying the Ukraine, instead of singling out Sredny Stog Culture (whose classical type-site is the settlement of Dereivka), point to the existence of four independent cultures, each representing different, overlapping chronological periods and geographical axes and constituting the Sredny Stog Province: Skelya, Stog, Kvitya, and Dereivka (Rassamakin 1994, 32–45; *Arkheologiya* 1987; Kotova 1994, 75–83). Skelya, the most ancient Eneolithic culture of the Ukraine, is contemporaneous with the cultures of Gumelnitsa A II–B I, Varna, Cucuteni A, and Tripolye B I–B II, with which it maintained active relations. Based upon these contacts, the culture dates to 4500–3600 B.C. (Movsha 1984). The Kvitya Culture, which spread over the broad territory from the Danube to the Don, is synchronized with the Tripolye C II stage (3600–3000). Finally, the Dereivka Culture ex-

panded into the forest-steppe zone and, judging from the findings of imported artifacts, is contemporaneous with the Tripolye B II–C I and Chernavoda (in Romania) stages, which suggests a chronological placement of 3700–3150 B.C.

According to Yu. Yu. Rassamakin (1994, 42), only the early Skelya Culture of the Sredny Stog province is contemporaneous with the Khvalynsk Culture of the Volga Region.

Many categories of archaeological materials present evidence for the expansion of contacts between the Mariupol and Sredny Stog tribes with the farmers of the Danube Region and the Dnieper Region, whose cultures are known by the Linear Band Pottery. From these centers came the spread of the food-producing economy into the Steppe (Shnirelman 1989, 168).

The Mariupol Community tribes raised cattle, sheep or goat, pig, and horse. Domesticated animal bones amount to over 50% of the osteological materials, which indicates that livestock herding was an important component of the Mariupol economy.

The Domestication and Early Use of the Horse

An important innovation of this period was the domestication of the horse. According to V. I. Gromova (1949), the earliest horse domestication took place in the area between the Dnieper and the Urals–in the natural range of the *tarpan* (the probable ancestor of the horse).[6] This hypothesis was corroborated in the 1970s by all of the prominent paleozoologists (Bibikova 1967; 1969; 1970; Tsalkin 1970b; Bökönyi 1959; Necrasov 1971) and received general recognition (Kuzmina 1977a).[7]

The taming of the horse probably was carried out by a population already familiar with livestock herding. The advocates of the single-center hypothesis of the origins of livestock herding showed that in all the regions of the Old World the local animal species were domesticated after the population had already adopted domesticated herd animals, borrowed from Western Asia (Shnirelman 1989).

Bones of the most ancient horses were found at the sites of the Dnieper-Donets and Samara cultures. Later the number of horses in a herd increased, reaching 60% in Dereivka and 80% in Repin Khutor of the total domesticated animals. The most ancient evidence of the formation of the horse cult was also recorded–so important for the mythology of Old World peoples, notably among those who spoke Indo-European languages.

From the Steppe tribes the horse was borrowed by the farmers of southeastern Europe: domesticated horse bones were found at the settlements of the Linear Pottery, Körös, Boian, Gumelnitsa, Cucuteni,

and Tripolye cultures. Among these, however, they account for only a small part of the osteological materials, which points to the insignificant role of horse breeding in these cultures (Bibikova 1969; Tsalkin 1970b, 183, 184, 196; Bökönyi 1959; Necrasov 1971).

The questions of the time and centers for the domestication of the horse and its original use, which seemed resolved in the 1960s by V. I. Tsalkin and V. I. Bibikova, have recently been reconsidered. At the colloquium "The Indo-Germans and the Horse" in Berlin in 1992, J. Mallory (1981) noted that he knew of no ritual burials of horses from the Urals to the Caspian Sea in the pre–Pit-Grave period, while M. A. Levine (1990; Levine, Rassamakin 1996; Rassamakin 2002) and H.-P. Uerpmann (1990) questioned the reliability of the signs of the domestication of the horses from Dereivka. A. Häusler (1992; 1994) acknowledged the complex of Dereivka to be a trash pit, declared the horse's skull with its signs of domestication to be unrelated to the Sredny Stog level, and refused to recognize the scepters as representing horses.

A quantity of new materials from the Steppe allows archaeologists to revisit the question of horse domestication. It seems methodologically correct to acknowledge three necessary conditions for horse domestication: (1) presence of the wild ancestor of the horse; (2) knowledge of livestock herding; and (3) the necessity for resources from the horse that might stimulate the process of domestication. Only the presence of all three of these preconditions together is necessary and sufficient as evidence of the domestication of the horse. In the Steppe all three pre-conditions were in place: (1) the need for a meat supply came about because of the extermination of large numbers of ungulates in the Copper Age; (2) the population had maintained domesticated cattle, sheep, and goats since the Copper Age; and finally, (3) wild horses were found there.

Whether the horses found there belong to the wild or domesticated type must be decided by paleozoologists. As is well known, the markers for domestication of the horse, in contrast with cattle and sheep or goat, are slight and often indeterminate. However, a number of leading paleozoologists support V. I. Bibikova and V. I. Tsalkin's opinion that the Southern Russian Steppe was indeed the center of the domestication of the horse (Benecke 1993b; Bökönyi 1994; Benecke and Driesch 2003; Boessneck and Driesch 1975; 1976).

Opponents focus their case upon the horse remains from Dereivka, which, owing to work by D. Ya. Telegin and D. Anthony, became world-famous. More recent radiocarbon analysis, in actual fact, suggests the remains come from a later period (as subsequently reported by Anthony). However, domesticated horse bones have been found at late

Neolithic and, particularly, Copper Age, sites from the Dnieper to the Urals.

Yu. Yu. Rassamakin (1994) rightly expresses doubt as to the determination of horse bones at the sites, because the selection is unrepresentative and the complexes are mixed. But horse bones, apart from these sites and Dereivka, are also present at the settlements of Molyukhov Bugor and Alexandria of the Sredny Stog Culture (or province) and the amount is about 50% of the total animal bones (*Arkheologiya* 1985, 309; *Arkheologiya* 1987).

At the Vilovatovskaya site in the Samara Region (Vasil'ev et al. 1980, 151ff.) in the mixed Neolithic and Eneolithic levels, the bones of domesticated animals amount to 46.15% of all found, 40% are horse, 33.3% are sheep, and 23.3% are cattle. A. G. Petrenko, who studied the collection, considers the horse remains to be domesticated. At the late Neolithic Varfolomeyevka site of the Orlovo type in the Volga–Uralian interfluve, bones of domesticated cattle, sheep, dog, and horse were found and determined by A. Yu. Fomichev to be both domesticated and wild (Yudin 1988, 164). The horse remains account for about half of all the bones. On the Ivanovka site in the Orenburg Region (Morgunova 1995), in the Neolithic level, domesticated species account for 52.4% of the bones, of which 45.5% belong to horses, 27.3% to sheep, and 2.7% to cattle. In the Eneolithic level, out of the 45.7% that are domestic animal bones, 53.75% are horse, 25% are sheep, 16.25% are cattle, and 3.75% are dog. According to A. G. Petrenko, the horse remains represent domesticated species.

The domesticated horse is also represented in more northern areas of the Ural region. In the Neolithic level of the Mullino site, among the 26% that are domesticated animal bones, the major part—17.64%—belong to the horse, and only 4.4% each to sheep and cattle. In Davlekanovo, 67.5% of bones belong to the domesticated species, the horse considerably prevailing (44.1%), the cattle accounting for 17.3%, and the sheep, 5.6% (Petrenko 1982, 301–7). The same holds true for the Eneolithic level: according to A. G. Petrenko (1982, 303), in Davlekanovo, domestic animal bones amount to 52.8%, among which the horse accounts for 37.7%, the cattle, 14%, and the sheep, only 0.89%. (In Mullino, the numbers are smaller: 35%, 13%, 15%, and 6.5%, respectively.)

In Transuralia, among the sites of the Surtandy Culture, at the Murat location bones of domestic animals amount to 93% of the total, of which 66.6% is from horses (Matyushin 1982, 82, determinations by A. G. Petrenko).

Thus, from the Dnieper to the Urals stretches a zone of cultures in

which horse bones are quite representative, alongside the borrowed species of cattle and sheep. Such data may be used to determine whether these horses are wild or domesticated.

Unfortunately, the majority of those participating now in the discussion of the domestication of the horse are not professional paleozoologists and offer only general considerations and indirect data on the sites' stratigraphy, the attrition of the teeth, and the age of the slaughtered animals, etc.

Among the most prominent paleozoologists acknowledging the Ponto-Caspian Steppe as the center of the domestication of the horse are S. Bökönyi (1994), N. Benecke, and A. von den Driesch (2003), R. Meadow (1996), and N. Benecke (1993a, b).[8] The last examined bone remains of European horses, identified several centers of the spread of the horse in ancient times, and came to the conclusion that the early domesticated horses in Europe originated from the East European Steppe species, which were the oldest.

As reported by A. von den Driesch,[9] in the initial period of domestication the male leaders of the horse herd would be castrated, as a means of taming them. I am not aware whether the osteological collections from the Southern Russian Steppe have been examined from this angle. However, there is one very important argument, provided by data from the origins of the horse cult in the Southern Russian Steppe. It has already been established by Behrens that an animal important in the economy becomes a cult object (Fig. 4). The most ancient ritual burial of a horse's skull and legs was discovered in the Volga Region in the Syezzheye burial ground of the Samara Culture of the first half of the fourth millennium B.C. On the sacrificial ground lay two horse's skulls and leg bones sprinkled with ocher; according to A. G. Petrenko, they belonged to the domesticated species. Next to these were figurines, made of a wild boar's tusk, of two cattle and two horses (Vasil'ev, Matveeva 1979, 159, fig. 3; Vasil'ev 1981, 67, fig. 7: 1–4).

At the late Neolithic Varfolomeyevka site of the Orlovo Culture in the Saratov Transvolga Region, where bones of domestic animals—cattle, sheep, horse, and dog—were discovered, three bone horse figures with orifices for suspension were found (Fig. 4: 1). On the head of one horse was an indication of a bridle (Kileinikov, Yudin 1993, 81, fig. 11.3–5). At the same location, ornamented horse fetter bones were found, to which analogies are known in Rakushechny Yar, the Vilovatovskaya site, and Botai (V. F. Zaibert 1993, 177, fig. 21). A stone staff with a horse's head was also found (Yudin 1988, 162, fig. 11).

In a burial in the Eneolithic burial ground of Lipovy Ovrag of the Samara Culture, a figure of a horse, made of bone, was discovered; another was found at the Vilovatovskaya site, which also contained

bones of horses, cattle, and sheep or goats (Vasil'ev, Matveeva 1986, fig. p. 37, 39; Vasil'ev et al. 1980, 184, fig. 21: 2) (Fig. 4: 2–6).

The same cult practice as in Syezzheye was preserved in the Volga Region in the mid- to latter half of the fourth millennium B.C., among the population of the Khvalynsk Culture. At the Khvalynsk Eneolithic burial ground, interments are accompanied by skulls and leg bones of cattle and sheep or goats, and in seven cases by the leg bones of horses. On the sacrificial grounds, there were skulls and legs of cattle and sheep or goats, a skeleton of a lamb, and, on three sacrificial altars, the leg bones of horses (Vasil'ev 1981, 69; Agapov et al. 1990, 8, 59, 60, pl. 7).

The burial of horses' skulls and legs, laid together with the hide in keeping with the *pars pro toto* principle, are well known in the ritual practice of the peoples of the Old World, earliest among them the Indo-European populations (V. V. Ivanov 1974; Kuzmina 1963b; 1977a; Piggott 1962; Raulwing 2000; Mair 2007).

Another piece of evidence for the development of the horse cult is the so-called scepters that have zoomorphic representations, including horses' heads (Merpert 1974; Danilenko, Shmaglii 1972; Popov, Smirnov 1973; Vasil'ev 1981, 25; Agapov et al. 1990, 87; Gimbutas 1970) (Fig. 4: 7–10). A new discovery of a scepter with a horse's head was made recently in the Novoorsk district (Morgunova 1995, fig. 76: 2). Included in this grouping of artifacts is a stone staff with a horse's head, found at the Varfolomeyevka site (Yudin 1988, 162, 163, fig. 11), the same site where horse bones and representations of horses carved in bone were found. It is also interesting that a stone pestle was discovered in the Caspian Sea North Littoral in the Ak-Zhunas burial ground (contemporaneous with the one at Khvalynsk) (Dubyagin et al. 1982, 103, 105, fig. 1). It features a horse's head with a clearly depicted bridle ornamented with cheek pieces.

A. Häusler questioned the variety of the depicted animals. Indeed, a number of specimens, particularly in the West, are quite conventionalized. However, on many scepters the horse is represented realistically. It is the scepter-hammer from the Orenburg Region and the scepter from Suvorovskaya, on which a bridle is marked, that primarily dispel all doubts.

The summary of the data and the typological classification of the zoomorphic scepters were put forward by V. A. Dergachev and V. Ya. Sorokin (1986, 54–65), who demonstrated that development in the Steppe went from realistic examples to conventionalized ones, and that their spread into early cultures reflected the Steppe influence in the Carpatho-Danubian Region. Thus, the new data corroborate the hypothesis that the origins of horse breeding took place in the Steppe zone from the Dnieper to the Urals, and that it was precisely here that,

by the fourth millennium B.C., the horse cult—one of the most important rituals of Eurasia—originated.

Much more complicated is whether an independent center of the domestication of the horse originated in Northern Kazakhstan. Here at the Neolithic Botai settlement, a huge number of horse bones was found, constituting 99% of the fauna (V. F. Zaibert 1993). Hunting was a staple of the economy, with no traces of a food-producing economy typical of the cultures of the Old World. On the other hand, there are numerous pits with bones attesting to the mass slaughtering of animals.

The variety of the Botai horses has resulted in much discussion. I. E. Kuzmina (1995) acknowledged them as domesticated and proposed that the skull of the Botai horse resembled the broad-toed Uralian horse. At the same time, the prominent specialist in animal domestication, N. M. Ermolova, did not find any signs of domestication in the portion of the collection that she examined. Among other scholars, opinions also differ. D. Anthony and D. Brown (1991, 2000) consider the Botai horses to be domesticated, based on the analysis of the horses' teeth, on the basis of bit wear on the teeth (Anthony, Brown 2000). M. Levine (1990, 1999), who disagrees with Brown and Anthony, argues that the horses were wild, based on demographic reconstructions of the ages at which the horses were slaughtered (Levine 1990; Levine, Rassamakin 1996).

The location of Botai, on a high promontory separated by a pine forest from a narrow hollow, would have been an ideal place for seasonal horse hunting. Until a final objective evaluation of horse domestication is put forth by paleozoologists, the most balanced view is V. F. Zaibert's tentative opinion (1993) that Botai could have been a place of seasonal hunting, and that the familiarity of its inhabitants with horse husbandry led to the first attempts at taming a few horses for riding as a means for driving the herd into a trap. (This method is employed nowadays in Siberia by reindeer hunters.) For this, the rider needed no bridle. Numerous pits filled with the horse bones at Botai point to the fact that the horse was a main source of food.

The initial use of horses in the Southern Russian Steppe also has been debated. Some archaeologists argue that livestock herding developed independently of farming and was a mobile economy from the very beginning. V. N. Danilenko and N. N. Shmaglii (1972) advanced a hypothesis, supported by M. Gimbutas (1970), for the emergence in the earliest period of rider-warriors, a major turning point in the history of Eurasia. Allegedly, these equestrian squads would carry out military interventions in the Danubian Region and the Carpathian Moun-

tains, destroying, by fire and sword, the agricultural settlements. This hypothesis was further developed by J. Lichardus (1984; 1991).

The similarities between the funeral rites of the Sredny Stog Culture and the Varna burial ground, which contains very rich burials with gold, attesting to social differentiation, are used to support the hypothesis of an invasion from the Black Sea Littoral by equestrian nomads.

Is the hypothesis that nomadism and the military use of horses originated in the Steppe in the fourth millennium B.C. justifiable given the available evidence?

Undoubtedly, for the shepherds of the Copper Age to control the herd, they probably knew how to ride on horseback. A strap or a cord halter would suffice for these early horseback riders. But the rider who must shoot and fight with a spear requires a means of controlling the horse, presumably a bridle consisting of a bit and cheek-pieces.

D. Ya. Telegin (1973) identified as the earliest extant cheek-pieces those fashioned of bone with one or two orifices at Dereivka. On the basis of these early cheek-pieces, the hypothesis for the early spread of horseback riding in the Eurasian Steppe, also acknowledged by J. Mallory (1989), D. Anthony (Anthony 1995; Anthony and Brown 2000), and others, had been put forth.

In actual fact, this hypothesis is based upon a misunderstanding. In 1970, P. M. Kozhin published an article in which he assumed that the horn articles with holes found at the sites of the Afanasievo Culture in Siberia remotely resembled the cheek-pieces of the Scythian period, and therefore these Afanasievo cheek-pieces indicated the existence of horseback riding. This assumption was rejected by M. P. Gryaznov, causing Kozhin to retract the hypothesis. Nevertheless, V. N. Danilenko and N. N. Shmaglii (1972), and D. Ya. Telegin (1973) identified similar articles from Dereivka as cheek-pieces, thus declaring the horse pastoralists of the Steppe to be nomadic riders, who conducted distant military raids.

M. Gimbutas (1977), who, according to A. Häusler's inquiries (1996), studied in Germany in Heidelberg under prominent supporters of Pan-Germanism, furthered this hypothesis in a political manner. Gimbutas believed that the savage warrior-riders, coming from the east, destroyed the farming culture of Europe by fire and sword.

This is not the first time I have had to challenge this hypothesis (Kuzmina 1983). Recently a study was conducted on a group of European artifacts that are widely distributed across different cultures (Dietz 1992). According to the ethnographic and archaeological data, the analyzed artifacts have a wide distribution ranging from the horn hoes of Tripolye (Rassamakin 1999) to unfastening devices in China

(Komissarov 1980). These artifacts were multifunctional and present in cultures with different economies, including those without horses. The artifacts were particularly numerous at the pile settlements of Switzerland, where they were used for netting (Dietz 1992).

Thus, the proposal that horseback riding originated in the Steppe has no solid support. This by no means rules out the possibility that the shepherd–horse-pastoralists did ride on horseback to manage the herd, controlling their riding horses with a strap or a cord halter. But fighting on horseback—shooting with a bow and thrusting a spear—without the help of the bit and cheek-pieces was impossible.

So how was the horse used at the early stage of its domestication?

S. Bökönyi (1994) identified the stages of early livestock husbandry. At the earliest stage of domestication, humans who had made the transition from hunting to food-producing would simply have eaten the recently tamed animal, much as they had its wild ancestor, using it as "live food on the hoof." Only at the second stage of domestication did people use the animals' milk and wool (secondary products) and employ these animals for traction.

At the Eneolithic sites of the Southern Russian Steppe, horse bones are split, indicating that the horse was used as a meat animal and that under no condition was the horse used for distant migrations.

The Development of the Pit-Grave Cultural Community

The third stage, early third to second millennium B.C., was the height of the Copper Age. According to palynological analyses of the archeological levels at the sites, around the year 3000 B.C. the pluvial period gave way to the drier Subboreal one. The Pontic Steppe lost its deciduous forests; the border between the forest and the Steppe roughly corresponding to the present boundary was established; in Kyzyl Kum, the Lyavlyakan pluvial period came to an end; in Kazakhstan, semidesert and steppe biomes conformed to their modern-day distribution; and, possibly, the transgression of the Caspian Sea occurred (Gerasimov 1937; 1956; 1993; Buchinsky 1979; Neishtadt 1957; 1965, 199, map; Vinogradov, Mamedov 1975, 252; Kassin 1947; *Kolebaniya uvlazhnennosti Aralo-Kaspiiskogo regiona v golotsene* 1980; Khotinsky 1982; Ivanov, Vasil'ev 1995; Kremenetsky 1991; Spiridonova 1991; Lavrushin, Spiridonova 1995a, b).

The third millennium B.C. represents the peak of the Pit-Grave Cultural Community, related to the preceding Eneolithic cultures (Fig. 5). The large quantity of Pit-Grave tombs in the burial mounds throughout the region is evidence for a considerable rise in the population, as a

result of the success of the food-producing economy in the previous period.

However, in the third millennium B.C., the productivity potential of their ecological niche was lessened as a result of the increased demographic pressure of these communities, climatic changes, and the changing nature of the Steppe landscape. The intensification of food production became impossible because the Steppe soil and climatic conditions were insufficient for early farming. The crop yield in Mesopotamia, given irrigation, amounted approximately to 600 kg/ha (sam-30),[10] and sometimes rose to 1500 kg/ha, and even, according to Herodotus (I. 193), would reach sam-200 and sam-300. In Greece it was 800–1000 kg/ha; in the Balkans, 400 kg/ha; in Central Europe, 200 kg/ha; while in the Steppe, it was only 80–300 kg/ha (Vaiman 1961, 3–5; Kuzmina 1968, 176, 177; Shnirelman 1989, 186).

As already mentioned, the climate of the Steppe has an unpredictable rate of precipitation, often small, rendering it an unstable farming zone. Precipitation decreases from the northern border to the south from 430 mm to 150 mm per year, and the humidity factor due to evaporation decreases sixfold (Mordkovich 1982, 26, 98, 99).

The productivity of the Steppe soils is diverse as well (Map 5). Over 2.5 million ha are chernozems. According to nineteenth-century Ukrainian data, they yielded 50 poods (equivalent approximately to 36 avoirdupois pounds) of wheat from each desyatina (equivalent to 2.7 acres) (Bibikov 1965, 53). At the same time, in some regions, particularly in the East, soils of low fertility prevailed, with some altogether infertile, such as brown and gray earths and sands. In Western Kazakhstan the former amounts to some 40%, the latter to 10–30% of land. In the Orenburg Region fertile chestnut soils give way to saline soils (Uspanov 1949). Accordingly, in 1909 in the Aktyubinsk *uyezd* (i.e., district), the wheat crop was sam-l0, and the millet sam-4 (*Spravochnaya knizhka i adres-kalendar' Turgaiskoi oblasti* 1911, figure). Naturally, in the Copper Age the crop yield was even lower.

Thus, given primitive tools and simple agricultural technologies, farming in some areas of the Steppe was close to impossible and in other areas was much less effective than in Western Asia and Southeastern Europe.

At the same time, the Eurasian Steppe, a natural pasture covered mostly by the very rich feather-grass–multiherbaceous vegetation, and also wormwood–sheep's-fescue grasses, provided optimal conditions for livestock herding. The feather-grass–multiherbaceous steppe can produce 15 kg/ha (kilogram per hectare) of hay, the wormwood–sheep's-fescue, 7 kg/ha, and the semidesert plots, 5 kg/ha. One square kilometer can feed six to seven head of cattle and horses annually.

These conditions were ideal for a food-producing economy in which livestock herding prevailed. Moreover, such conditions predicted the specific character of the economic adaptations that occurred in different regions.

As early as the 1960s, archaeologists demonstrated that the development of a food-producing economy in the Steppe was uneven. In the Ukraine, a mixed economy prevailed, and farming still played an important role, as is apparent from agricultural tools found at sites and the large quantity of settlements (Durna Skelya, Skelya Kamenolomnya, etc.), including large multicomponent ones (Mikhailovka). In the Volga-Ural region, settlements are practically unknown, indicative of a different economic type (Merpert 1968, 41; 1974, 109–13; Shaposhnikova 1985; *Istoriya* 1997).

Judging by the osteological materials, hunting and fishing lost their significance for the Pit-Grave peoples; instead, these groups bred cattle, sheep, and horses. At the Ukrainian settlements, the bone distribution of cattle was 45%, sheep or goat over 30%, horse around 18%. In the upper level of Mikhailovka it was 60%, 30%, and 10% respectively for the bones, and 46%, 34%, and 18% for the individuals (Tsalkin 1970b, 247, pl. 51; Merpert 1974, 116–17; Shaposhnikova 1985, 350). Due to the lack of data from the Volgo-Uralian settlements, it is impossible to determine the percentages of animal bones at the sites; the ritual burials of animals found in the burial mounds suggest an identical species composition.

The specifics of livestock husbandry in the eastern regions is best understood by examining the locations of these sites. V. P. Shilov (1975) has established that some burial grounds (Kuzin Khutor, Balkin Khutor, Tsatsa) are situated away from river watersheds (Shilov 1970; 1975, 37–39). This is unquestionable proof for the presence of a specialized economy dominated by livestock husbandry and also by mobile pastoralism.

The Spread of Wheeled Transport: A Prerequisite for the Opening of the Great Silk Road Routes

The important innovation of Pit-Grave peoples of this period was that of wheeled transport (Fig. 8). The question of the origins of wheeled transport requires an analysis of the history of transportation in the Old World. The appearance of wheeled transport in the Steppe dates from the latter half of the third millennium B.C. and is documented by discoveries of wheels, fragments of vehicles, models of vehicles, and pairs of draft cattle at the burial grounds of the Novosvobodnaya and Novotitorovka cultures in the Kuban Region and of the Pit-Grave Com-

munity from the Dniester to the Urals (Childe 1951; Piggott 1969; 1983; Kuzmina 1974a; 1980b; 1983; Häusler 1981; Azzaroli 1985; *Achse* 1986; Izbitser 1993; and others).

The invention of the wheel is one of the most important discoveries in the history of humankind. For five millennia it has largely determined the evolution of our civilization. The use of wheeled transport considerably increased labor productivity both in farming, where it provided for the delivery of crops from the field, and in livestock herding, where it allowed the herdsmen to follow their cattle in pursuit of new pastures, which resulted in the emergence of nomadic pastoralism. But first and foremost, it furthered the unprecedented expansion of exchange, which in turn promoted cultural contacts between remote regions and accelerated the diffusion of ideas, and consequently led to great historical change. Therefore, studying the evolution of wheeled transport is of considerable scientific interest.

According to most researchers subscribing to Childe's single-center hypothesis (Childe 1951; 1954) for food production, wheeled transport was invented in the late fourth millennium B.C. in Western Asia and in the course of the third millennium B.C. spread from there to the areas of the second-order civilizations: to the Caucasus, to Northwest Hindustan, to Southeastern Europe, and to the Southern Russian Steppe.

The history of wheeled transport can be reconstructed on the basis of several sources: (1) written evidence; (2) archaeological findings of vehicles and chariots; (3) findings of draft animal bones in the osteological materials of settlements and burial grounds; (4) representations of wheeled transport in ancient monumental art, glyphs, figurines, etc.; and (5) representations of wheeled transport in petroglyphs.

In Western Asia, based upon discoveries from the burial grounds of Kish, Ur, and Susa, by the images found on the seals, mosaics, and reliefs, and by bronze and clay sculptures, wheeled transportation consisted predominantly of four-wheeled and two-wheeled ox-drawn vehicles with open or closed bodies (Fig. 6, 7). From the images, it was assumed that mules and onagers were used later. However, zooarchaeological data suggest that these draft animals were only big donkeys (Shnirelman 1980, 54–56).

Closed vehicles are known through the four-wheeled clay models found in Hammam, Tepe Gawra, and Susiana, and through the copper two-wheeled model in Tel-Agrab (Moorey 1969, 431–32; Ziegler 1962, pl. 7 N137; Özguç 1953, pl. LXIV). In the Caucasus, four-wheeled and two-wheeled ox-drawn vehicles with an open or closed body have been discovered in burials and as clay and bronze models (Kuftin 1941; Dzhaparidze 1960; 1976; Esayan 1966; 1976; Piggott 1969).

In Northwest Hindustan, wheeled transport appeared in the latter

half of the third millennium B.C., documented by discoveries in the Harappan settlements of clay and bronze models of two-wheeled vehicles and also of clay wheels and figures of draft cattle. Characteristic of the Harappa civilization were two-wheeled vehicles of two types: with an open body or with only a seat mounted over the axle (the latter type is evidenced by the model from Chanhu-daro) (Mackay 1951, 97; pl. XXI, 13; Piggott 1970, 200–202). Indian humpback cattle were used as draft animals in India during the Harappan period.

Information on the earliest wheeled transport from Northeast Iran is scarce and confined to the discoveries of clay models of wheels with double-sided hubs in Shah-tepe III-II and Hissar III (Schmidt 1937, 185, pl. XLIV, H2649; Arne 1945, 262), and also to the disputable representation of a two-wheeled vehicle with a cross-bar wheel assembled by mortise and tenon from three pieces, a platform with the driver before the axle, and a harnessed animal, probably a donkey (Littauer, Crouwel 1979, 40, fig. 21), on the cylinder seal from Hissar III B of the late third millennium B.C. (Fig. 32).

Central Asia is another zone of the Old World where wheeled transport was used in ancient times (Fig. 33). Its appearance in the first half of the third millennium B.C., in the period of Namazga III, is apparent from the discoveries of models of wheels with a two-sided hub and the figure of a harnessed bovine; and in the periods of Namazga IV and V, from the numerous discoveries of figures and heads of draft-cattle, and also models of wheels and vehicles of two types. Of these, type I is four-wheeled with the body open at the front and with raised sides (which distinguishes it from both the Western Asian and the Danubian versions); type II is (a) two-wheeled with raised sides, and, possibly, (b) with a closed body. In Central Asia, in contrast to other regions of the Old World, not only cattle, but also Bactrian camels were used as draft animals, as documented by numerous models depicted with the heads of draft animals (Kuzmina 1980b; 1983).

Two types of vehicles are represented on the silver bowl from Afghanistan now in the Louvre (P. Amiet in Ligabue, Salvatori 1988, 161, fig. 6) (Fig. 32). One is a heavy four-wheeled vehicle of the Central Asian type with raised sides and an open front drawn by two oxen by means of a Y-pole on which the driver's feet rest. At his back there is another figure. The second vehicle is two-wheeled, also drawn by a pair of oxen by means of a Y-pole, and it has a very small platform over the axle upon which the driver stands. The wheels of both vehicles are assembled by mortise and tenon from opposing segments fixed on the protruding hub. These are the so-called cross-bar wheels (like those on the seal from Hissar) (Littauer, Crouwel 1977a), which differ from both the Mesopotamian and Central Asian solid wheels of the third millen-

nium B.C. and the spoked wheels of the true horse chariots used in the Eurasian Steppe and Levant in the early second millennium B.C. It is possible that such a wheel design was a transition to the spoked wheel proper. The numerous representations of camels in Bactria suggest that they could also have been used as draft animals.

Discoveries in southeastern Europe, including the Balkans and the Danube Region, included only four-wheeled, open ox-drawn vehicles. Some of these models feature a bull's head depicted on the front of the vehicle's body.

In the Southern Russian Steppe, E. V. Izbitser (1993) has inventoried some 250 burials, each with one or two vehicles (Fig. 8; Map 8). These were harnessed with a pair of cattle or bullocks by means of a yoke and a pole, and they had solid wooden wheels fixed on the axle, a protruding hub, and sometimes a closed body. All early vehicles that have survived are four-wheeled. At the same time, a number of graves containing only a single pair of wheels have been found, as have clay models of single-axle vehicles, which leads one to believe that two-wheeled vehicles existed as well, contrary to Izbitser's opinion.[11]

V. Kul'baka and D. Kachur (2000) counted many more vehicles of the Novotitarovo, Yamna, and Catacomb cultures (Maps 8; 9).

Open four-wheeled vehicles could have spread in the Steppe from both the Danube Region and the Caucasus, while the two-wheeled and closed vehicles might have arrived through the Caucasus (this is borne out not only by typological similarity, but also by the analysis of the yew of which one of the vehicles in Kalmykia was made) (Erdniev 1975, 16–17).

It has been suggested that vehicles also could have found their way to the Steppe through the third zone of a second-order civilization, namely, through Central Asia. This is unlikely, first, because the design of Central Asian vehicles is different from that of the Steppe version, and, second, because in the third millennium B.C. contacts between the farmers and the livestock herders were not intensive, and their zone of contact was interrupted by the Kelteminar fishermen. One hypothesis asserts that wheeled transport was brought to Central Europe in the third millennium B.C. from the Pontic Steppe (Waals 1964).

The crucial precondition for the formation of specialized pastoralism and for seminomadic pastoralism was the invention of a means of transportation that for the first time allowed the shepherds to follow their herds. Another precondition for this process was the use of metal tools needed for the manufacture of vehicles. The presence of metal is common at the Pit-Grave sites. The nature and composition of metals indicates that it was supplied to the Steppe by the farmers of Southeastern Europe, though metal artifacts made in the Caucasus also exist

(Chernykh 1966; 1978; Ryndina 1971). Some deposits in the Southern Urals, first in Kargaly, are likely to have been developed in the late Pit-Grave period (Morgunova, Kravtsov 1994; Chernykh 1998). The entire set of these interrelated innovations was put in place by Pit-Grave peoples by the latter half of the third millennium B.C. These conditions, for the first time in the history of the Old World, empowered these peoples to adopt a fundamentally new economic system adapted to the ecological niche of the Steppe. This was the economy that eventually led to the development of pastoral nomadism.

A pair of bullocks in a team moving at a speed of two miles per hour can travel twelve miles a day, which makes it possible to cover a distance of several hundred kilometers within one summer season (Fowler 1967). The establishment of mobile livestock herding had historic consequences. It gave the pastoral peoples the opportunity to make distant migrations, which led to the gradual development of vast territories and the formation of large-scale cultural communities unknown in the other regions of the Old World.

At the same time, in the mobile livestock economy, herd animals came to be easily alienable mobile property. This helped intensify exchange with neighboring farming peoples, but it also triggered clashes over herd animals.

The change in the political situation on the Steppe is evidenced by the appearance of ancient defenses in the last quarter of the second millennium B.C. In the settlement of Mikhailovka, for instance, at the final stage of its existence, ditches and defensive stone walls were constructed on the site around the central hill, running parallel to each other. The fortification of Mikhailovka correlates with the defensive constructions of the settlements in Southeastern Europe (Ezero IV) (Shaposhnikova 1985, 340–43). These processes developed further in the next historical epoch.