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The “Kurgan Culture,” Indo-European Origins, and the Domestication of the Horse: A Reconsideration¹

by David W. Anthony

THE CONCEPT OF A “KURGAN CULTURE” derives ultimately from *The Aryans*, Childe’s (1926) seminal study of Indo-European origins. Childe assumed that large-scale migrations would have been associated with the prehistoric diffusion of Indo-European languages, and he therefore searched the archaeological record for a material culture horizon that was distributed widely enough to qualify as the archaeological manifestation of that diffusion. Linguistic evidence suggested that any such horizon should be located in the temperate zone, should represent a culture familiar with copper/bronze and wheels, and should predate the 2d millennium B.C. The spread of what was then conceived as the Corded Ware–Battle Axe–Tumulus Burial complex, at the beginning of the Bronze Age, provided him with a qualified candidate. He saw this complex as originating in the Ukrainian North Pontic steppes, a region favored by some linguists (Schrader 1890) as a probable homeland for Proto-Indo-European languages. Moreover, he identified the bearers of the Pit-Grave (or Yamna) culture, a then poorly understood Bronze Age culture from the Ukraine, as the probable original speakers of Proto-Indo-European languages and as the crucible in which the Corded Ware–Battle Axe–Tumulus Burial horizon was formed. The Pit-Grave (or

Yamna) culture was subsumed within a larger cultural entity christened by Gimbutas (1961:193) the “Kurgan culture.”

It soon became clear to European archaeologists, and Childe himself admitted (1950:41), that the concept of a unified Corded Ware–Battle Axe–Tumulus Burial complex with a single cultural origin was untenable. Nevertheless, Central and Eastern European archaeologists continued to turn up evidence for “steppe influences” and “steppe migrations” at the dawn of the Early Bronze Age, and interest in the “Kurgan culture” remained keen (Dumitrescu 1963b, Nestor and Zaharia 1968, Jovanovich 1975). Much of this interest derived from the impressive research of Marija Gimbutas, who constructed the picture of the “Kurgan culture” upon which most Western European and many Eastern European archaeologists rely. In its general outlines this picture is one of a patriarchal, seminomadic, Indo-European-speaking group of stockbreeders who originated in the vicinity of the lower Volga and migrated westward across much of Europe, eastward across Central Asia, and southward into Anatolia and Greece at a time when forest clearance and climatic change favored their pastoralist economy. In the process they or related splinter groups achieved military and/or political hegemony over many other cultures, thus promoting the spread of their languages, their religion, and aspects of their social organization and material culture (Gimbutas 1956, 1963, 1966, 1970, 1977, 1982a).

Gimbutas (1977:table 8) has distinguished three important waves of “Kurgan-culture” outward migration, issuing ultimately from the steppe zone between the Dnieper and the Volga. The first and most important wave she has dated to the early Sredni Stog period (ca. 3500–3300 b.c.),² the second to the end of the Sredni Stog and the early Yamna period (ca. 2700–2500 b.c.), and the third to the late Yamna period (ca. 2300–2200 b.c.). In her interpretation, these migratory waves engulfed and transformed neighboring cultures. The first wave alone was responsible for the destruction and transformation of numerous regional Late Neolithic/Copper Age cultures from the Rhine Valley to Anatolia, including all the cultures along the Danube from its mouth up into Austria (Gimbutas 1977:figs. 1 and 23). The resulting “Kurganized” cultures of

¹ In preparing this article I have benefited greatly from the comments and suggestions of Bernard Wailes, Ward Goodenough, and Andrew Sherratt, to whom I extend thanks and appreciation. The figures were prepared by Dorcas Brown.

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² Dates identified as “b.c.” are uncalibrated as given by the sources in question; dates “B.C.” have been recalibrated according to the 1979 Tucson interlaboratory consensus described by Klein et al. (1982).

this vast region and the later Yamna culture were responsible for the second and third waves. While many archaeologists are uneasy with individual elements of this hypothesis or even with the concept as a whole (see Piggott 1983:61), it has remained the most widely recognized explanation for late Eneolithic/Early Bronze Age culture change in the Black Sea region.

In the "Kurganized" regions beyond the Black Sea region, alternative explanations for these developments have emerged that stress changes in local subsistence and trade patterns rather than immigration. Renfrew's (1972) explanation for this period of change in the Aegean stresses the development of olive and grape production for commercial purposes and posits an ensuing system of elite trade and social stratification; Sherratt's (1981) explanation for contemporary changes in Eastern Europe and elsewhere stresses the development of plow agriculture and of secondary animal industries such as dairying, cheese making, and especially the large-scale breeding of sheep for wool, as well as the spread of domesticated horses; and Gilman's (1981) explanation for much of the change throughout Europe at this date stresses the emergence of capital-intensive subsistence strategies (such as plow agriculture and vine/olive cultivation) that transformed property relations and made it difficult for "peasant" producers, tied to high-investment subsistence pursuits, to move away from nascent centers of coercive authority. In all three models, the primary result of the change is said to have been the emergence of ranked, highly competitive societies dominated by localized elites who controlled local production and enriched themselves through trade and war. The trade and social relations between these new elites can arguably account for the widespread similarities in artifact forms which led Gimbutas to hypothesize a "Kurgan-culture" invasion. Models such as these persuasively account for many (though not all) of the archaeological data that Gimbutas marshaled to support her scenario outside the Kurgan homeland. They do not, however, affect the validity of the "Kurgan-culture" concept as it is applied in that homeland, on the borders of the Black Sea.

The Yamna culture remains the central role player and the primary archaeological foundation for the concept. Included under the mantle of the "Kurgan culture" are various distinct Pontic-region archaeological groups that most Soviet and Romanian archaeologists would prefer to keep separate, among them the Sredni Stog culture, the Usatovo culture, the lower Danube "Ochre Graves," and the Cernavodă I–III cultures (Gimbutas 1970, 1977). The "Kurgan culture" is not, then, what most archaeologists would ordinarily call an archaeological "culture"; if the concept has merit, it is as a "horizon." In her latest formulations Gimbutas herself has recognized this and has begun to use the term "Kurgan tradition" rather than "Kurgan culture" (1977:278), but even this term implies a unity that is somewhat misleading. The Yamna "aspect" of the Kurgan "tradition" is itself now viewed by Merpert (1974:123–25) not as a culture but as a "socioeconomic phase" that evolved over a wide steppe region through a complex dialectical process, and the term "culture" is only used bracketed by quotation marks. If even the Yamna "culture" is too heterogeneous to be termed an archaeological culture, then we might well question the utility of the more general "Kurgan culture" or "tradition" or "horizon."

This is not to imply that there was no relationship between the archaeological groups just named (Sredni Stog, Yamna, Ochre Grave, Usatovo, Cernavodă); Gimbutas has identified numerous apparent linkages between them. If we are to understand the dynamics of the evolution of these linkages, however, we must attempt first to understand each of these groups individually, as in fact Soviet and Romanian scholars ordinarily do.

What follows is an attempt to disassemble the "Kurgan culture" and reassemble its archaeological constituents in a new

framework. The suggested framework is not nearly as neat or as easy to use as the "Kurgan-culture" concept, but I feel that it more accurately reflects the mainstream of current Soviet archaeological work and the diversity of the archaeological record. The primary unifying theme is ecological and centers upon the recurrent adaptive stresses that characterized the boundary between the North Pontic lowland steppes and the upland forests.

ENVIRONMENT AND CULTURE HISTORY: A NEW APPROACH

The Black Sea occupies the bottom of an enormous geological bowl that is still subsiding, drowning coastal estuaries and even inundating some coastal Early Bronze Age burial mounds. The bottom of the bowl is exposed on the northern side, forming a vast coastal plain that rises gently to meet an encircling irregular line of plateaus and hills. These uplands (the Moldavian, Podolian, Dnieper, and Central Russian uplands) catch most of the moisture dropped by prevailing north-westerly winds, leaving the coastal lowlands arid and treeless. The lowland steppes extend from the Danube delta north and east in an ever-widening belt that eventually joins the Central Asian steppes east of the Volga (fig. 1).

The contrast between the juxtaposed environments of resource-poor lowland steppe and the resource-rich upland forest has strongly affected the course of cultural evolution in the region (Bibikova 1975; Dolukhanov 1979; Anthony 1985; chap. 1). The most intense expression of this contrast occurred along the edges of two boundary-zone environments: that of the steppe-zone river valleys, narrow corridors of rich riverine and gallery-forest resources in an environment of dry, open grasslands, and that of the forest-steppe fringe, where an upland mosaic of forest and meadow biotic communities gradually gave way to rolling lowland steppe. Societies that relied upon the resources of the richer forest-steppe or gallery-forest environments (whether through hunting/gathering or rainfall horticulture) risked periodic exposure to severe stress, for small variations in precipitation, temperature, population density, or deforestation rate would dramatically alter the local distribution of critical resources in these fragile borderland communities. Much of the regional culture history (outlined in fig. 2) can be properly understood only in this adaptive context.

Domesticated plants and animals, food production techniques, and village farming societies were introduced into the region by Criș-culture immigrants from the lower Danube Valley, probably before 4800 b.c. (about 5700 B.C.). For the next 2,000 years, successive intrusive farming cultures influenced by communities from southeastern Poland (Linear Pottery) or the lower Danube Valley (Criș, Cucuteni-Tripolye) almost entirely avoided the lowland steppes and the coast, establishing their villages only in the upland forest steppes of Moldavia and Podolia, northwest of the Black Sea. The original immigration of Criș farmers apparently altered the delicate balance of populations and resources that had been established within that borderland environment, forcing the Mesolithic communities living nearest to the immigrants to adopt food production themselves; an indigenous Neolithic Bug-Dniester culture is evident by 4875 ± 150 b.c. at Soroki 2 (Markievich 1965, 1974). The kinds of economic and demographic stresses that would have required local hunting/gathering societies to intensify their subsistence bases by adopting some elements of food production apparently did not occur farther east and north, beyond the impact of the Criș colonization, for the diagnostic evidence (domesticated cereal impressions, domesticated animals, antler "ards," querns) remains confined to the Bug-Dniester region up until about 4000 b.c.

The old Criș territory in the Prut and Seret drainages was not significantly expanded when it was occupied by Linear

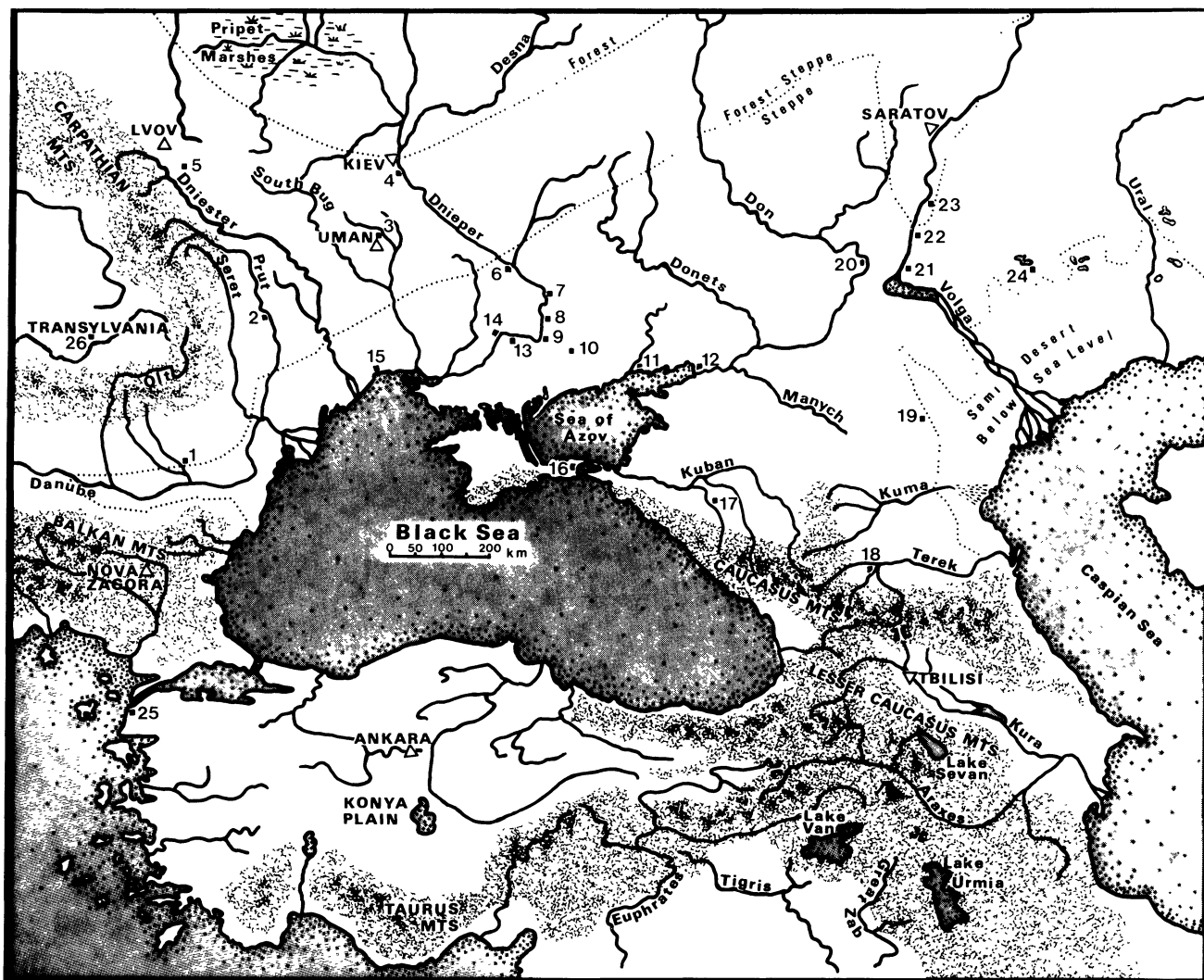


FIG. 1. The Black Sea region, showing some of the sites referred to in the text. 1, Gumelnița; 2, Cucuteni; 3, Maidanets'ke; 4, Tripol'ye; 5, Bilce Złota; 6, Dereivka; 7, Chapli; 8, Petro Svistunovo; 9, Sredni Stog; 10, Novodanilovka; 11, Mariupol; 12, Rakushechni Yar; 13, Bal'ki; 14, Mikhailovka; 15, Usatovo; 16, Kemi-Oba; 17, Maikop; 18, Nalchik; 19, Arkhara; 20, Repin; 21, Kalinovka; 22, Bikovo; 23, Berezhnovka; 24, Urda; 25, Troy; 26, Decea Mureșului. 2-5, Cucuteni-Tripolye culture; 6-12, Sredni Stog culture; 13-14, 19-24, Yamna horizon.

Pottery farmers moving southeast from Poland about 4500 b.c. (5400 B.C.). By about 4000 b.c. (4900 B.C.), however, a complex series of developments among the late Boian societies of the lower Danube Valley (increasingly sophisticated copper metallurgy, communal shrine structures, apparently a form of script, and expanded interregional trade), combined with an intensification of contacts between that region and upland Moldavia (Dniester-Seret), promoted the evolution of a new cultural order in both regions. By 3800 b.c. (4600 B.C.) this process had culminated in the evolution of the Gumelnița culture in the lower Danube Valley and the Cucuteni-Tripolye culture in Moldavia (Ellis 1984; Marinescu-Bilcu 1974, 1981; Zbenovich 1980; Dumitrescu 1963a). Both cultures exhibit many of the archaeological attributes of ranked societies (Renfrew 1978, Anthony 1983, Ellis 1984).

The Cucuteni-Tripolye culture rapidly expanded northeastward towards the Dnieper Valley, entirely absorbing the indigenous Bug-Dniester culture. During this expansion, the hunting/gathering societies living east of the Dnieper, nearest to the new immigrants, adopted food production themselves, resulting in the evolution of the fully Neolithic phase (Phase II) of the Dnieper-Donets culture, about 3800-3500 b.c. (Telegin 1968). Dnieper-Donets II was marked by the appearance of many new features east of the Dnieper, including bifacially chipped

projectile points, polished stone axes, net weights, querns, disc-shaped grinding stones, long lamellar flint blades that occasionally exhibit sickle gloss, domesticated animals (cattle, pig, ovicaprid), and cultivated cereals (only barley is documented, through an impression on a locally made ceramic vessel) (Telegin 1968). The Dnieper remained the boundary between the complex Cucuteni-Tripolye culture and the relatively undeveloped indigenous North Pontic societies (Dnieper-Donets, Sredni Stog) for the next 1,000 years.

The Bug-Dniester culture and the Dnieper-Donets culture, the earliest indigenous Neolithic societies in the region, both seem to have evolved in response to resource stresses caused by the immigration of intrusive populations of village farmers (Cris or Cucuteni-Tripolye) into a neighboring portion of the forest steppe. Mesolithic societies occupying the more distant and homogeneous environments of the central Russian forests to the north and the Black Sea marine coast to the south adopted ceramics (and thus are often termed "Neolithic") but retained economies primarily based on hunting/gathering until after 3000 b.c. (ca. 3700 B.C.). The earliest "Neolithic" sites to the east on the lower Volga and in the North Caspian steppes, sometimes called "proto-Yamna," should also be included in this group, for they consist of little more than scatters of primitive ceramics and geometric microliths on river-edge sand

DATE B.C. b.c.	LOWER DANUBE VALLEY	MOLDAVIAN UPLAND	PODOLIAN - DNIESTER UPLAND	DNIESTER- DANUBE STEPPE LOWLAND	DNIESTER- DONETS UPLAND	DNIESTER-DON STEPPE LOWLAND	NORTH CAUCASUS
2500 2000				LATE YAMNA / CATACOMB	MIDDLE DNIESTER CULTURE	LATE YAMNA / CATACOMB	MIDDLE KUBAN
2850 2250	CERNAVODA II/III	(HORODIȘTEA-GORODSK)					LATE MAIKOP
3350 2500	CERNAVODA I	(VIKHVATINTSI-SOFIEVKA)		USATOVO			EARLY MAIKOP
3550 2750	GUMELNIȚA BII	TRIPOLYE CII		?	DNIESTER- DONETS III	EARLY YAMNA	
3750 3000	GUMELNIȚA BI	CUCUTENI BII			?	?	
4050 3250		CUCUTENI BI	TRIPOLYE CI	SMALL TRIPOLYE B CAMPS (NEAR DNIESTER)		SREDNI STOG II	
4200 3500		CUCUTENI A/B	TRIPOLYE BII				
4550 3750	GUMELNIȚA AI	CUCUTENI AIV				SREDNI STOG I	
4900 4000		CUCUTENI AIII	TRIPOLYE BI				
5150 4250		CUCUTENI AI/AII	TRIPOLYE AII	GUMELNIȚA A (NEAR DANUBE)		(NIKOLSKOE- MARIUPOL)	NALCHIK CEMETERY?
5400 4500	BOIAN IV	PRECUCUTENI III	TRIPOLYE AI		DNIESTER- DONETS II NEOLITHIC	DNIESTER- DONETS II NEOLITHIC	
5600 4750	BOIAN III	PRECUCUTENI II	LATE BUG-DNIESTER	?			
5800 5000	BOIAN II	PRECUCUTENI I	MIDDLE BUG-DNIESTER		DNIESTER- DONETS I SUB-NEOLITHIC	SURSII SUB-NEOLITHIC	
	BOIAN I	LINEAR POTTERY					
	DUDESTI		EARLY BUG-DNIESTER NEOLITHIC	KUKREKSKA/ GREBENIKOV LATE MESOLITHIC	DONETS- VOLHYNIAN LATE MESOLITHIC	KUKREKSKA LATE MESOLITHIC	
	CRİȘ	CRİȘ	LATE BUG-DNIESTER MESOLITHIC				

Fig. 2. Outline of culture history in the Black Sea region.

banks and have produced no evidence of food production (Eremin 1976; Krishevskaja 1972; Merpert 1974:135-37).

During the two millennia after about 4800 b.c. (5700 B.C.), Neolithic subsistence economies were adopted in the North Pontic region only by those indigenous societies occupying the forest-steppe zone, societies that were crowded between immigrant farmers on one side and the inhospitable interior steppes on the other. The steppe/forest-steppe boundary played a major role in this process, for the strategies, techniques, and social systems that were best suited to the exploitation of the high-density-resource forest-steppe environment were not transferable to the arid steppe environment. In an attempt to offset population pressures and remain within the familiar forest-steppe, late Mesolithic (or "sub-Neolithic") boundary-zone populations adopted an intensified food-producing subsistence system. This inability or reluctance to adopt a steppe-oriented subsistence strategy remained a limiting factor until the domestication of the horse made the systematic exploitation of steppe resources feasible for large population groups.

Cucuteni-Tripolye settlements of the "classic" phases have not been found in the steppe-zone lower river valleys or along the coast. The only exception to this rule is the small Tripolye BI occupation discovered at Mirnoe, in the steppes near Odessa (Burdo and Stanko 1981). This site, which was occupied sometime between ca. 3500 and 3300 b.c., yielded only 30 ceramic sherds, a scatter of lithics, and a pit containing several cattle and sheep bones and the carbonized remains of some 500 wild grape seeds (*Vitis sylvestris* Gmel.). It was clearly not a long-term or substantial occupation. In the adjacent uplands, most Cucuteni-Tripolye settlements were fairly large (15-30 large dwellings average, 100-200 maximum); economic reliance on forest-adapted wild game (deer, pig) remained a substantial aspect of subsistence (25-50% of average estimated meat weight); cultivated acreage requirements were extensive (estimated 16-32 hectares average); and substantial firewood was needed for the standard open hearth and domed

oven that equipped each dwelling and even more for the sophisticated ceramic kilns (Comșa 1976) and copper smithies (Greeves 1975) that some settlements supported. The confined gallery-forest environments of the lower river valleys might not have offered a resource base sufficient for the requirements of a traditional Cucuteni-Tripolye village.

The Dnieper-Donets culture, in contrast, expanded both northward into the fringes of the forest zone (along the Pripet and Desna) and southward into the steppe-zone river valleys (from the Dnieper to the Donets and perhaps the Don). Telegin (1968:73, 210) suggests that stockbreeding and horticulture might have become more important among the steppe-zone settlements than elsewhere because of the limited extent of the gallery forests in the steppe-zone river valleys and the consequent shortage of traditional forest-adapted game, roots, berries, etc. This suggestion is provisionally borne out by faunal samples that exhibit a higher percentage of animal domesticates in the steppe-zone riverine settlements than in the settlements of the forest-steppe. Although wild horses became a significant source of food in the steppe-zone river valleys, subsistence remained oriented primarily towards riverine and gallery-forest resources.

Dnieper-Donets II steppe-zone riverine sites (exemplified by Nikol'soe and Mariupol) exhibited other unusual traits that might have evolved partially as a result of demographic, social, and economic stresses within the confined steppe-zone river-valley environment. These traits included a new trench-like communal burial ritual, interments containing mortuary gifts indicating incipient ranking (imported gold and copper rings, porphyry mace-heads, and stone beads, lavish locally produced antler, shell, bone, and boar's-tusk ornaments), and a thin-walled, well-fired, "collared" type of ceramic vessel with elaborate incised decoration. The vessel type might have been modeled after somewhat similar Tripolye A vessels, for the imported copper (and perhaps the porphyry and carnelian) was of Balkan origin, almost certainly obtained through Tripolye traders, and Tripolye A vessels have been found in Dnieper-

Donets II steppe-zone settlements (Telegin 1961, 1968; Chernykh 1966).

The essential culture history underlying the "Kurgan culture" concept begins at about 3500 b.c. and grows directly out of this dynamic background. Prior to 3500 b.c., adaptive stresses along the boundary between steppe and forest-steppe zones and within the circumscribed environment of the steppe-zone river valleys had prompted the adoption of Neolithic economies as a means to intensify subsistence production within the resource-rich riverine/forest environment. After 3500 b.c., continuing stresses (no doubt exacerbated by the deforestation and population growth associated with Dnieper-Donets II) prompted an expansion of the North Pontic resource base through the domestication of the horse, the initial step in the efficient exploitation of the vast and hitherto largely untapped resources of the steppe environment.

THE SREDNI STOG CULTURE AND THE HORSE

In Gimbutas's (1970, 1977) concept of the "Kurgan culture," the appearance of the Sredni Stog culture in the Dnieper Valley at about 3500 b.c. is interpreted as the result of a westward migration from the lower Volga Kurgan homeland, where the Yamna culture had already evolved. Few Soviet scholars support this position, and even Merpert (1977:377), who has at times been associated with it, has emphasized that he regards such an assertion as "mistaken": "the basic connection of the Sredni Stog culture is with the Neolithic of the Dnieper."

The Sredni Stog culture apparently evolved out of a cultural background of interaction between the Dnieper-Donets Neolithic population of the steppe-zone river valleys and a related coastal-steppe Neolithic population that was in many respects quite similar to and probably was derived from Dnieper-Donets but is classed separately as the Rakushechni Yar group (after a site on the Don estuary) by most Soviet scholars (Telegin 1973:144-45; Belanovskaia 1972, 1977; Gei 1979). The evolution of the Sredni Stog culture involved a number of powerful stresses within the steppe-zone river valleys: population growth, deforestation, a decline in the availability of traditional forest-adapted game animals (red deer, pig, aurochs, beaver), increasing reliance on domesticated stock (mainly cattle and sheep) and on horse-hunting, incipient ranking and social differentiation, and intensification of trade with the much more complex Cucuteni-Tripolye culture (Anthony 1985). In such a competitive situation, increasing territoriality and boundary maintenance can be postulated. Some segments of late Dnieper-Donets II society, probably consisting of the weaker peripheral communities, began to turn to an increased exploitation of steppe resources. The most abundant animal resource of the steppes was the wild horse. Stockbreeders already familiar with cattle and sheep herding soon corralled, controlled, and domesticated their new food source, which, much like the dog, was preadapted to domestication by natural bonding mechanisms. The colder conditions of the Piora oscillation, about 3300-3100 b.c. (Frenzel 1967), could have encouraged a wider local acceptance of the new domesticated, which was much better adapted to intense cold and deep snow than either cattle or sheep. The domestication of the horse transformed the culture into which it was introduced, promoting new concepts of property and wealth, creating new social alignments, and radically altering and expanding the North Pontic resource base (Anthony 1985:chap. 3; Bökönyi 1980; Telegin 1983).

Analysis of the age and sex ratios of the horses from the Sredni Stog site of Dereivka has provided clear evidence for controlled management and butchering, strongly implying domestication (Anthony 1985:chap. 3; Bibikova 1969). Fifteen of the seventeen sexable horse mandible fragments from the site were those of males, and almost all of these were juveniles or

young adults; there were no "old" individuals (Bibikova 1969). Such a profile would not result from predation on wild horse bands, which normally consist of a stallion and his harem and would therefore yield a preponderance of females. Young males, being disruptive and unpredictable in their behavior, are precisely those individuals most likely to have been purposefully culled from a managed herd and least likely to have been caught in traps or ambushes set along the well-worn trails made by a wild horse band. The horses at Dereivka accounted for 24.2% of the individuals and almost 60% of the estimated meat weight at the site, suggesting a pattern of specialized exploitation. The site also contained a ritual assemblage consisting of a horse head with hide and hoofs attached, two complete dog skeletons, and several figurine fragments (Telegin 1973:44-45). A crescentic antler tine with a single cord-worn perforation lay near the horse skull, which was that of a stallion seven to eight years old. The tine and others like it from several Sredni Stog graves (where such tines occur in pairs) and settlements have been plausibly interpreted as bridle cheekpieces, an interpretation that has recently received experimental support from research conducted on similar objects found in pairs in rich Funnel-necked-Beaker-culture graves in East Germany (Lichardus 1980). Many other North Pontic or Caucasian artifact types of dubious function have been advanced as putative cheekpieces (Cherniakhov and Shmagli 1983; Danilenko and Shmagli 1972; Munchaev 1975:390), but none of them are as convincing as these perforated crescentic tines. Such objects are morphologically similar to a later, Early/Middle Bronze Age series of objects that certainly functioned as cheekpieces (Hüttel 1977, 1981), they are cord-worn at the perforation, they occur in pairs, and one was found at Dereivka in direct association with the skull of a domesticated stallion.

The implication is that horses were already being used as mounts during the Sredni Stog period, a revolutionary but entirely predictable and quite simple innovation in transport that would have cut the traveling time between localized steppe-zone resources, effectively changing the distribution of those resources. Riding would have expanded the size of potential exploitative territories by a factor of five (Ewers 1955:34, 306-8; Bökönyi 1980), nullifying whatever territorial boundaries had existed previously. These developments would have changed several critical variables affecting the exploitation of steppe resources, allowing the steppes to be entered and efficiently exploited for the first time (Bökönyi 1978, Sherratt 1981). In the steppes, where critical resources could be locally quite rich (e.g., in the river valleys) but where these resource-rich locations were separated by vast stretches of extremely poor, even hostile territory, the means of transport used to move from one rich location to another would have been a critical socioeconomic determinant, limiting the accumulation and storage of resources, group size, the accumulation and manipulation of wealth, settlement structures, intergroup relations, trading capacities, and virtually all other aspects of life. Riding would also have provided the ability to strike across great distances at hostile neighbors and to retreat (typically the most dangerous part of a pedestrian raid) faster than any pedestrian party could pursue. Riding is therefore likely to have ushered in a period of heightened warfare caused by low-risk revenge or looting raids against pedestrian neighbors, horse-stealing raids against horse-using neighbors, and increased territorial boundary disputes.

The Sredni Stog culture evolved about 3500-3300 b.c. (4200-4100 b.c.), as is indicated by the presence of imported painted Tripolye BI ceramics at the early Sredni Stog site of Volos'ke on the Dnieper rapids (Telegin 1973:124). A C¹⁴ age determination from the early Sredni Stog site of Aleksandriia, on the Donets, yielded a reading of 3520 ± 350 b.c. (cited in

Telegin 1982), and two C¹⁴ readings taken from horse bone collagen at Dereivka yielded the dates 3565 ± 90 b.c. (UCLA-1466A) and 2950 ± 100 b.c. (UCLA-1671A). Imported Tripolye CI ceramics at the typologically late occupations at Moliukhor Bugor and Novorozanovka extend the late phases of the Sredni Stog culture to as late as 2700–2500 b.c. (3300–3100 B.C.) (Danilenko 1959; Movsha 1972:9). Sredni Stog occupations stratigraphically overlie Dnieper-Donets II occupations at many sites (e.g., Sredni Stog, Moliukhor Bugor) and stratigraphically underlie Yamna-horizon occupations at Aleksandriia (Telegin 1959), Leventsovka (Bratchenko 1969), Samsonova (Gei 1979), and other locations (Telegin 1973:127). The Sredni Stog culture area extended from the Ingul Valley on the west to the lower Don on the east and was confined to the lowland steppes and the steppe/forest-steppe fringes.

The ceramics associated with the Sredni Stog culture were generally round-bottomed pots with short, everted necks. Some common forms resemble the tulip-shaped funnel-necked beakers of the culture of the same name. The fabric was usually tempered with crushed shell. Decoration was generally spare and limited to the upper third of the vessel. Incised geometric motifs, “caterpillar” U-shaped impressions, and comb-stamped decoration were common. Cord-impressed decoration appeared in the Sredni Stog culture earlier than in any other part of Europe. At Dereivka it appeared on 9% of the reconstructible vessels and only 1.4% of the sherds, but during later phases (e.g., Moliukhor Bugor) it appeared on 25% of the sherds (Telegin 1973:43). Late assemblages also include a wider variety of basin, bowl, pot, and beaker shapes.

Sredni Stog lithics continued a trend, already quite noticeable in Dnieper-Donets II assemblages, away from the microlithic “Tardenoisian” traditions of the local Mesolithic and Dnieper-Donets I. Flint blades up to 20 cm long were a central part of most toolkits, and many tools (scrapers, graters, etc.) were made on segments of these. Some blades exhibit sickle gloss on their edges (Telegin 1973:69). The occasional find of caches of several hundred suggests that they might have been hoarded as exchange commodities. In this sense, the Sredni Stog culture was part of a widely disseminated horizon of cultures that intensively mined flint and traded it in the form of long lamellar blades (Funnel-necked Beaker, Tiszapolgar/Bodrogkeresztur, Cucuteni-Tripolye). Projectile points were eight times more common in Sredni Stog sites and especially in graves than they had been in Dnieper-Donets II sites. This change implies new behaviors in hunting, warfare, or both.

Sredni Stog burials were usually single inhumations placed in a shallow ovoid pit with few or no grave goods, were oriented generally to the northeast, and were positioned on the back with the knees raised. Long unifacial lamellar flint blades (“knives”) were the most common grave gift. In conformance with her hypothesis of a Volga, Yamna-horizon migratory origin for Sredni Stog, Gimbutas has suggested that most Sredni Stog (“Kurgan I–II”) graves originally had mounds that have since been plowed down (1977:26). There is no Soviet support for such an interpretation. Most Sredni Stog graves were flat. The entirely excavated cemeteries at Dereivka, with 12 burials (Telegin 1973:47–48), and at Aleksandriia, with 31 burials (Telegin 1959), contained only flat graves. The Sredni Stog culture does, however, exhibit the early stages in the evolution of permanent surface markers over exceptional graves. Small cairns made of stone cobbles, with a standing stone set into them, occur over some graves even in the earliest period (e.g., at Balka Kvitiana), as do cromlechs, circles of standing stones set into the ground (at Kirovograd) (Telegin 1973:86, 103). Such permanent surface markers have been reported over only 15% of the published Sredni Stog graves; all of these also contained unusual or elaborate grave offerings.

The development of mortuary rites involving permanent, highly visible surface markers over the graves of prominent community leaders or of members of their families could have

been related to increased territorial competition and boundary maintenance in the region; as Renfrew (1976) has suggested for the northern European megaliths, such graves would serve as visible validators of the territorial claims of particular social groups. The later steppe tumulus burials, in which permanent surface markers (earthen mounds) were erected over a wider social range of inhumations, are an apparent continuation and outgrowth of this early practice.

Some late Sredni Stog cemeteries, contemporary with Tripolye CI (3100–2700 b.c., or 3800–3400 B.C.), contain a few extraordinarily rich graves. The great majority of the grave gifts recovered from all Sredni Stog burials were contained in seven outstanding individual late graves unearthed at Chapli (two rich graves), Petro Svistunovo (two rich graves), Novodanilovka (one rich grave containing two adults), and Mariupol (two rich graves) (Dobrovolskii 1954; Bodianskii 1968; Telegin 1973:102–15; Makarenko 1933). All these sites lie in the region between the lower Dnieper and the Sea of Azov. Four of these graves contained copper spiral bracelets, and in each case they occurred in pairs, associated with a single individual. Other associated imported copper goods consisted of beads, foil appliqué, rolled foil tubes, a copper shaft-hole axe, and pendants wrought in the shape of *Unio* shells. Non-metallurgical gifts included a carved alabaster shell pendant, girdles made of circular, flat, centrally perforated *Unio* shell beads, large quantities of red ochre, and flint axes and projectile points. The contrast between these few very rich burials and the ordinary run of very modestly furnished burials implies the existence of at least moderate ranking. Moreover, the geographic distribution of the copper-rich graves (towards the western edge of Sredni Stog territory), the typological attributes of the copper objects (foil appliqué, rolled tubular beads, spiral bracelets, shaft-hole axes), and spectrographic analysis of some of the pieces (indicating a Balkan ore source) combine to suggest a Cucuteni-Tripolye source for the imported metal (Telegin 1973:78).

A limited range of Cucuteni-Tripolye commodities had been traded eastward across the Dnieper for centuries prior to this, as is established by the recovery of small quantities of Cucuteni-Tripolye painted and plain ceramics, small copper rings and beads made of Balkan ores (Chernykh 1966), a small gold ring, and exotic (Carpathian?) stones such as carnelian and porphyry from Dnieper-Donets II and early Sredni Stog graves (see Telegin 1961; 1973:47; Makarenko 1933). This earlier exchange system might have involved trade for marine and/or steppe resources, the most obvious of which would have been the salt that formed by natural processes on the edges of stagnant coastal lagoons (limans). But these exchanges had never before involved Cucuteni-Tripolye “valuables” of the type found in hoards and other exceptional contexts, almost never in general Cucuteni-Tripolye settlement debris—importantly copper spiral bracelets, rolled tubular beads, and shaft-hole axes. Such “primitive valuables” (Dalton 1975) might have circulated only within a restricted social context because they were means of acquiring or symbols of having attained superior positions in society. The acquisition of such objects by some late Sredni Stog persons strongly implies a restructuring of the intercultural relationship and might even be seen as suggesting the integration of some Sredni Stog individuals into the elite levels of Cucuteni-Tripolye society.

THE YAMNA HORIZON

Merpert's most recent general study suggests that the appearance of the Yamna horizon was the result of the adoption of stockbreeding and limited horticulture by diverse hunter/gatherer groups occupying the Volga-Don steppe-zone river valleys (1974:123–28). The horizon represents the diffusion of an economy, not of a unified cultural complex. A broadly

shared ceramic tradition, represented by many regional ceramic types, and a broadly shared mortuary tradition involving various forms of tumulus burial are its major defining attributes.

Prior to the adoption of a Neolithic economy and the appearance of the tumulus-burial mortuary ritual, the "proto-Yamna" occupants of the lower Volga–North Caspian steppe-zone river valleys had utilized a geometric microlithic tradition that was common to a variety of hunter/gatherer groups from the North Caucasus piedmont to the southern Urals to the eastern Caspian steppes and that contrasted with the macroblade Sredni Stog lithic tradition (Merpert 1974:135; Eremin 1976). This microlithic tradition remained a typical aspect of the Yamna horizon.

The earliest Yamna ceramics were of several distinct types. The Kalinovska type, typically a bag-shaped vessel with pricked or comb-stamped decoration over the entire surface, was stylistically related to the ceramics made by the sub-Neolithic cultures of the southern Ural/middle Volga forest-steppe region (Krishevskaia 1966, Starkov 1970) and perhaps also to similar Kelteminar ceramics made by 4th-millennium hunter/gatherers in the northern and eastern Caspian steppes (Telegin 1973:152; Merpert 1974:139). The Bikovo type was shell-tempered, cord-impressed, and decorated only on the upper third of the vessel and, according to Telegin (1973:150–51), shared many traits with the Sredni Stog ceramic assemblages typified at Dereivka.

In its earliest formative phase, the Yamna horizon was clearly already influenced by a variety of regional traditions. Perhaps the most important aspect of this early stage is the clear evidence it presents for a rising current of interconnection and communication across the steppes from the Dnieper to the Caspian, including the communities of the South Ural forest-steppe borderlands. Revolutionary changes in transport technology—riding and pack horses (high-speed long-distance transport) and ox-drawn wheeled vehicles (high-volume transport)—undoubtedly contributed to the trend (cf. Sherratt 1981:295–96). The earliest evidence for wheeled vehicles reported in the region is two wheels buried in the central pit beneath an early Yamna tumulus grave (Kurgan 1, Burial 57) at Bal'ki on the lower Dnieper, C¹⁴ dated to 2420 ± 120 b.c. (Ki-606) or about 3100 B.C. (Telegin 1977:11). The pit also contained an adult skeleton and a copper laurel-leaf blade.

Merpert (1977) has attempted to date the earliest Yamna tumulus graves on the lower Volga to a period contemporary with Dnieper-Donets II (ca. 3500–3300 b.c.), largely on the basis of common ornament and bead types. Gimbutas accepts this early dating, as indeed she must in order to derive the Sredni Stog culture from the Yamna culture. Telegin points out that the numerous C¹⁴ dates from Yamna graves cluster around 2300–2100 b.c., that Yamna occupations in the North Pontic region stratigraphically *overlie* Sredni Stog occupations (which in turn *overlie* Dnieper-Donets II occupations), and that many aspects of Yamna material culture (ceramics, mortuary practices) seem to be at least partially derived from the Sredni Stog culture (Telegin 1973:150–55; 1977). The Yamna occupation level at Mikhailovka II on the lower Dnieper, which is typologically early (though not, according to Merpert, the earliest), contains imported Tripolye CII ceramics, dated to a period after 2700 b.c. (Lagodovska, Shaposhnikova, and Makarevich 1959). Merpert (1977) concedes that the Yamna occupations in the Dnieper-Don region postdate Sredni Stog but maintains that the typologically earliest Volga sites (of which there are fewer than 25) date to the preceding (4th) millennium.

The case for an eastern (North Caspian or Caspian-Aral) origin of the Yamna horizon and, by implication, for an eastern origin of Gimbutas's Indo-European-speaking "Kurgan culture" (or "tradition") rests primarily upon the presumed chronological priority of Merpert's Period I Yamna materials,

which are found only in tumulus graves east of the Don. Period II ceramics occur in Level II at Mikhailovka and at other western sites. In an excellent review of this matter, Mallory (1977) has pointed out that there is only one Period I tumulus, at Bikovo on the lower Volga, in which Merpert's Period I Yamna ceramics occur in a grave stratified below a grave containing his Period II ceramics. There is no other site where Period I ceramics occur in a definite stratigraphic relationship to Period II ceramics. The chronological priority of Period I ceramic types, which in any case display considerable heterogeneity, therefore rests on the single ceramic vessel from Bikovo II, Kurgan 2, Grave 3, and its position beneath the vessel contained in Grave 1 of that kurgan. Merpert's attempt to distinguish Period I graves through orientation of the body (Period I eastern, Period II northeastern) has been dismissed by Chernykh (1976) and more recently disproved by a statistical demonstration of a correlation between Yamna grave orientations and the positions of lunar and solar risings (Dvorianinov, Petrenko, and Rychkov 1981).

In the absence of any firm stratigraphic or absolute dating criteria indicating the priority of Merpert's Period I, the case for an eastern origin of the Yamna horizon falls back upon relative dating criteria, specifically a type of polished stone mace-head that has been called a "horse-head scepter" (Danilenko and Shmagli 1972) but in fact lacks any zoomorphic features whatsoever and a handful of bone bead types. A stone mace-head of the relevant type was recovered from one "Period I" Yamna grave at Arkhara (27/1), and another came from the Tripolye BI (ca. 3600–3300 b.c.) stratum at Bezrezovska, some 1,000 km to the west (Danilenko and Shmagli 1972:8). The existing data are insufficient to determine the origin or the chronological range of these objects. The bone beads found in some Yamna "Period I" graves are similarly flimsy chronological indicators. One of the crucial sites used to establish an early date for these ornaments, the Nalchik cemetery in the North Caucasus, is itself not well dated; Munchaev (1975:140–41) considers it early, before 3000 b.c., but Formozov (1965:68) would place it after 2500 b.c., in the Maikop period. In sum, there are no really firm dating criteria for distinguishing Merpert's Period I from his Period II. The "homeland" of the Yamna horizon can therefore be assigned to no particular place but only to a very broad steppe region extending from the Dnieper to the Volga. There are no C¹⁴ dates or firm stratigraphic associations indicating an origin before ca. 2700–2500 b.c., or about 3500–3200 B.C., and a strong case could be made for an origin even a century or two later.

The tumulus burials that are the hallmark of the Yamna horizon might also be interpreted as conspicuous validators of particular communities' territorial rights. Yamna tumuli were often erected on ridge crests, presumably to enhance their visibility. Early Yamna tumuli along the lower Volga occur in small linear clusters spaced regularly 10–15 km apart, which might correspond to band or clan territories (Merpert 1974:129). The appearance of these mortuary territorial markers was associated with the adoption of stockbreeding (primarily sheep) in the Volga-Don steppes and with the adoption of horse and oxcart transport. These developments would have increased the economic productivity of the steppe environment but might also have encouraged population growth and increased competition over territory.

Yamna mortuary rituals exhibit suggestive links with earlier Sredni Stog mortuary rituals. It must be reiterated that these practices are firmly dated in Sredni Stog contexts, by both ceramic interchanges and C¹⁴ dates, to a period as early as Tripolye BI (3500–3300 b.c.), while their appearance on the lower Volga cannot be reliably dated to a time before 2700 b.c., contemporary with Tripolye CII. The supine-with-

raised-knees burial posture, which Sulimirski (1970:127) has called "the Yamna position," actually originated with the Sredni Stog culture. The placement of red ochre at the head and pelvis, the orientation of the body towards the east and north, the roofed burial pit, and even the concept of a permanent, visible surface marker might all have been derived from Sredni Stog mortuary rituals. In the Dnieper-Azov region, stone cairns and cromlechs were incorporated into the structure of earthen Yamna burial tumuli, preserving the local Sredni Stog tradition.

The Yamna horizon reflected a major economic change in the steppes, a reorientation towards the active and efficient exploitation of steppe resources. This trend began earliest in the Dnieper-Don region with the domestication of the horse and the evolution of the Sredni Stog culture but did not diffuse across the steppes to the east until stockbreeding, limited horticulture, the domesticated horse, and perhaps wheeled vehicles were adopted by the river-valley occupants of the lower Volga-middle Don steppes. Shilov (1975) argues that a primitive form of nomadic pastoralism had already evolved by this time, underlying the appearance and diffusion of the Yamna horizon, while Merpert (1974:112) and most others (Sinitsyn 1959:184-85) would delay the evolution of fully nomadic steppe societies until 1000 b.c. (about 1100 B.C.), pointing out that there is evidence for seasonal alternation between small deep-steppe (herding?) camps (as at Urda) and larger riverine (horticultural?) occupations during the Yamna period on the lower Volga. Substantial Yamna settlements like Repin on the Don and Mikhailovka and Durna Skelia on the lower Dnieper, in the old Sredni Stog territory, appear to have been relatively permanent central bases (Shaposhnikova 1961).

A final element in the evolution and expansion of the Yamna horizon was the establishment of trade connections between the steppes and the developed societies of the Caucasus. Copper knives, rings, and beads appear in Yamna graves on the Volga and the Dnieper. Local metallurgical centers grew up in the copper-rich South Urals (Chernykh 1969) and even around small ore deposits like those along the Donets (Korenevskii 1976). Trade might also have involved commodities such as textiles, hides, and domesticated horses. The involvement of steppe communities in long-distance trade would have provided additional sources of exotic prestige goods and presumably would have transformed traditional bartering systems, the social role of traders, and the internal structure of the communities involved.

The Yamna horizon covered a vast area, from the South Bug drainage on the west to the Ural River on the east and perhaps (if the Afanasievo culture is considered a Yamna variant) as far east as the Altai, across the entire breadth of Central Asia (Khlobystina 1975). Population movements of a variety of types were probably associated with the horizon; one can hardly envision the occurrence of such radical changes in subsistence, trade, and transport within such a harsh, "patchy" environment without substantial readjustment of territories and populations. Much of the apparent diffusion of the horizon, however, might well represent only the adoption of a new way of life by a diverse array of local populations, much as the American Plains "horse complex" was adopted across the North American Plains after the introduction of the horse (Ewers 1955, Parker 1976).

THE USATOVO CULTURE AND THE "OCHRE GRAVES"

The tumulus cemetery and settlement at Usatovo, near Odessa on the northwest coast of the Black Sea, have long attracted the interest of Western archaeologists, partially because of the manifest connections between this site and the cultures of the Aegean. These connections have, however, been continuously

reinterpreted. In relation to the "Kurgan-culture" concept, the Usatovo culture is seen as a product of the second migratory wave, issuing once more from the Dnieper-Volga steppes and sweeping down the west coast of the Black Sea into the lower Danube Valley (Gimbutas 1977:304). The migrations of the Kurgan I-II period (the first wave), which theoretically involved expanding Sredni Stog and Yamna populations, had already passed through the affected area and had in theory gone on to impact a much broader region than that covered later by the second.

The Usatovo culture is classified by most Soviet scholars as a late regional variant of the Cucuteni-Tripolye culture—specifically, an offshoot of the middle Dniester group of late Tripolye CI/early Tripolye CII—and not as an immigrant culture that originated in the steppes to the east (Zbenovich 1974, 1976; Movsha 1972; Telegin et al. 1971:187-93). At the same time, most scholars recognize that the Usatovo group was quite distinctive and grew out of decidedly heterogeneous cultural influences; derivation entirely from the east or entirely from the Cucuteni-Tripolye culture would be considered equally mistaken.

Several C¹⁴ dates from sites allied to Usatovo range from 2650 ± 50 b.c. (Le-1054) to 2380 ± 60 b.c. (UCLA-1642A), or about 3300-3100 B.C. These readings agree well with other dates for the Tripolye CII period of 2700-2100 b.c. (Movsha 1972, Zbenovich 1974). The Usatovo culture was distributed along the Black Sea coast from the South Bug estuary to the Danube delta, and sites followed the major river valleys inland to the steppe/forest-steppe border. It was a steppe-zone culture group. Usatovo itself, with its substantial settlement, its two distinct tumulus cemeteries, its two accompanying flat-grave cemeteries, and its rich "chieftain" burials, appears to have been a central focus of power and prestige.

Most of the recorded Usatovo-culture burials were placed under earthen tumuli, though there were two flat-grave cemeteries of 30+ interments at Usatovo. There were related late Tripolye flat-grave cemeteries (without associated tumuli) along the Dniester Valley in the adjacent uplands, as at Vkhvatintsii (Passek 1961:146-209). It should be noted that there are no recorded cemeteries from earlier phases of the Cucuteni-Tripolye culture. The few recorded in-site burials were generally quite fragmentary infants or adolescents, occasionally buried under house floors—apparently for ritual purposes (H. Dumitrescu 1958). The origin of the late Tripolye upland flat-grave cemeteries is therefore open to question. However, the upland flat graves and the flat graves at Usatovo were identical in most aspects of grave type and artifact content, with the notable exception that those at Usatovo had no fine painted ceramics, which appeared there only in tumuli. The flat graves and the tumulus graves at Usatovo were also distinguished from each other by the occurrence of miniature "cult" vessels only and Tripolye-related female figurines predominantly in the flat graves and the occurrence of metal and weapons only in the tumuli. The larger tumuli often contained stone cobble cairns bordered by circles of standing stones buried beneath the mound. Kurgan I-11 (i.e., Kurgan 11 of Kurgan Cemetery I) had a cupola-like corbel-vaulted burial chamber for the central grave (Patokova 1976:52). The central graves were in roofed pits dug 1-1.5 m into the ground and were most often laid down in the supine-with-raised-knees position. Rivetted copper daggers occurred only in the central graves.

The origins of the Usatovo culture cannot be considered apart from the issue of the "Kurganization" of the Cucuteni-Tripolye culture (Gimbutas 1977:287-88). This is an enormously complex theoretical and analytical problem and has yet to be satisfactorily resolved. Briefly, a variety of shell-tempered, cord-impressed "kitchen" ceramics began to appear in very small percentages in middle-phase Cucuteni-Tripolye sites. During Cucuteni A/B and Tripolye BII (ca. 3300-3100 b.c.) ceramics of this kind became, in some areas, the domi-

nant form of "kitchen" ware. Traditional fine wares maintained their high technical and aesthetic standards. Some scholars have argued for an internal origin for the new kitchen wares (Passek 1949, Vulpe 1972), but most see these Cucuteni C wares as a completely foreign element in Cucuteni-Tripolye ceramic assemblages and insist that they reflect some kind of contact (the exact type being the subject of heated disagreements) with the Sredni Stog culture (Movsha 1961; Dumitrescu 1963a; Marinescu-Bilcu 1981:82–84). The ware is too common and widespread to be derived entirely from external trade, so most of it must have been made locally. There are, of course, technical reasons for the adoption of a shell-tempered kitchen ware—it is more resistant to heat shock and therefore less breakable than a silt- or sand-tempered cooking vessel of equal thickness and might therefore be desirable for community members who were increasingly mobile (Steponaitis 1982:45). There are also ecological factors—the shell-tempered wares were fired at a lower temperature than the traditional grog-tempered kitchen wares (Linda Ellis, personal communication) and therefore might have been adopted where deforestation had placed pressure on surviving forest and fuel reserves. Nevertheless, some of the Cucuteni C shapes and decorative techniques do seem to have been directly derived from Sredni Stog traditions.

In addition, there is what appears to be a Sredni Stog burial within the Tripolye BII settlement of Nezvisko (Chernysh 1962:53–54), and a controversial tumulus at Kainari (accidentally bulldozed, not excavated) contained a steppe-type burial in association (?) with a Tripolye BI vessel (Movsha and Chebotarenko 1969). During Tripolye CI (ca. 3100–2700 b.c.) there was an aberrant development of enormous settlements of up to 1,000 dwellings and 300 hectares in size, from Petreni on the Prut to Maidanets'ke on a tributary of the South Bug; these can be best explained as extreme defensive concentrations of population (Shmagli, Dudkin, and Zin'kovskii 1973). (During the same period, Cucuteni-Tripolye "valuables" appeared for the first time in Sredni Stog graves.) Finally, during the subsequent Tripolye CII period the Cucuteni-Tripolye culture area disintegrated into a host of regional variants, settlements became smaller, painted ceramics and female figurines declined in quantity, some regions were abandoned, and Yamna-horizon tumuli were erected on the ruins of some Tripolye CI sites. When fine painted ceramics of the Cucuteni-Tripolye tradition stopped being produced, about 2100 b.c., the culture group disappeared as an archaeologically definable entity. It was in this context that the Usatovo culture—one of the most distinctive Tripolye CII variants—appeared.

Fine painted Tripolye-tradition ceramics constituted 18% of the recovered assemblage at the Usatovo settlement and only 6% at the related settlement of Mayaki on the Dniester estuary but made up fully 30% of the assemblage from the tumulus burials at Usatovo and were even more prevalent in some other Usatovo-culture tumulus groups on the Dniester (Zbenovich 1968:63). Shell-tempered "kitchen wares" with cord impressions, "caterpillar" impressions, and incised motifs—predominantly on the upper third of the vessel—made up as much as 80% of the ceramics from Usatovo settlements. These wares were related to early Yamna and late Sredni Stog ceramics. A final low-frequency element was a class of corded, dark burnished jugs and bowls, the bowls often sharply carinated, with sand or crushed-limestone temper; these were related to the Cernavodă II/III ceramics of the lower Danube (Zbenovich 1968:77). They occurred only in settlements, never in graves, and perhaps reflected trade contacts with the lower Danube Valley. The combination of Tripolye-tradition ceramics and female figurines with Yamna-related ceramics and burial rituals illustrates the primary cultural influences that affected the formation of the Usatovo culture.

Two important developmental processes also apparently contributed to the formation of the Usatovo culture. One was

the maturation of steppe-oriented subsistence strategies—strategies dependent on riding and pack horses, wheeled vehicles, and the secondary products of cattle and sheep—in the region in general (Merpert 1974:125–28; Kuzmina 1974; Shilov 1975; Sherratt 1983; Anthony 1985). This development allowed the lowland steppes along the northwest Black Sea coast to be occupied by large, sedentary population groups like that which settled at Usatovo, something that had not been attempted during the "classic" Cucuteni-Tripolye period. The Usatovo population was able to enter and exploit an underexploited niche in the local environment using the new subsistence system. In fact, this might have occurred somewhat earlier than the crystallization of the mature Usatovo culture pattern, for a small stratified area (Area B) within the Usatovo settlement revealed an earlier occupation—beneath the Usatovo-culture layer—with the bones of short-horned cattle and shell-tempered pottery decorated with fingernail impressions, rows of "pearl" or "button" decoration, and cord impressions (Boltenko 1957:42). This proto-Usatovo occupation appears to have contained material similar to the Cucuteni C wares of the adjacent uplands and to the Cernavodă I materials of the lower Danube Valley (Morintz and Roman 1968).

If it was new subsistence techniques and strategies that allowed the coastal steppes to be intensively occupied, it was long-distance trade and warfare that allowed that occupation to develop the distinctive attributes that define the Usatovo culture. The central tumulus graves at Usatovo contain ornaments made of Baltic amber and Near Eastern or Aegean antimony, in addition to numerous rings and beads of silver and copper. Of the 18 tumuli in Kurgan Cemetery I, the central graves in 7 contained arsenical copper daggers, emphasizing the martial orientation of the community leaders (Zbenovich 1966:38). These graves also contained copper flat axes, adzes, and chisels. All of the daggers were hafted with rivets, and the rivetted daggers from Kurgans I-1 and I-3 at Usatovo and from an Usatovo-culture grave at Sukleya, near Tiraspol, also had large midribs (Zbenovich 1966:44). The dagger from Usatovo Kurgan I-1, at least, appears to have been cast in a bivalve mold. The dagger blades from Kurgans I-3 and I-4 appear to have been silver-plated, although an exterior coating of silver can result from the natural decomposition of a silver-copper alloy or of inverse-segregated arsenic. Silver-copper alloys with as much as 75% silver were used earlier in the manufacture of some Cucuteni-Tripolye ornaments, as at Nezvisko (Chernysh 1962:50).

These finds have been used as recently as 1970 to link Usatovo chronologically with Troy VI (Sulimirski 1970:183). More common is the Soviet tendency to see the Usatovo daggers as a link to the quite similar daggers of Troy II and the Early Cycladic II–III period (Zbenovich 1966, 1974). However, the C¹⁴ dates and the firm Tripolye CII associations of Usatovo indicate an earlier placement, no later than ca. 2200 b.c. (or 2700 B.C.) and quite probably earlier than this, which would make Usatovo contemporary with Early Cycladic I/ Troy I/Sitagroi IV–Va. This would also imply that the Aegean thrusting dagger might have been first invented not in the Aegean but in Europe. In fact, there are many indications that rivetted thrusting daggers were in use as early in Europe (Tripolye CI, ca. 2700 b.c., at Bilce Złota on the upper Dniester) as they were in the Aegean or Anatolia.

The trade connections of the Usatovo culture were primarily with the Maikop culture of the North Caucasus piedmont, the Kemi-Oba culture of the Crimean peninsula, the Yamna culture, and the Tripolye CII cultures of the adjacent uplands. Antimony and rivetted daggers might suggest links with Troy I. The Maikop/Kemi-Oba/Usatovo connection documents the appearance of an active coastal trade, probably seaborne, around the shores of the Black Sea. This trade apparently

played an important role in the formation of the Usatovo culture.

A series of large tumulus burials of this period extends along the west coast of the Black Sea to the Danube delta and into the Dobruja (Suvorovo, Desantnoe, Arțiza). Many of these also contain stone cromlechs or cairns and copper ornaments or tools (Alekseeva 1976, Meliukova 1962). They are sometimes referred to as "the Ochre Graves." Some of these appear to have Usatovo-culture associations.

When Tripolye-tradition ceramics and figurines ceased being made, about 2200–2100 b.c., the Usatovo culture lost some of its most distinctive attributes, and the central settlement of Usatovo appears to have declined in importance.

MIGRATIONS AND CULTURE CHANGE

Merging the Sredni Stog culture with the early Yamna horizon to produce an entity called "Kurgan I-II" obscures important distinctions between the two, among them such key considerations as that they were largely separate chronologically, that they originated in geographically distinct areas, and that they evolved from culturally distinct backgrounds. Similarly, grouping the Usatovo culture with an entity called "Kurgan III" and ascribing it to a second migratory wave obscures its strong local links with the Cucuteni-Tripolye culture and plays down the formative role of new subsistence and trade patterns. Such problems beset the entire "Kurgan-culture" concept. If an overarching "horizon" concept is to be employed as a heuristic device to bring a sense of order to the period, then the Yamna horizon presents a better-defined candidate. It has the added benefits of representing a true cultural and chronological watershed across the Dnieper-Volga steppes, one that underlies much of the subsequent culture history in the region and across Central Asia. The Yamna "culture," or horizon, has always constituted the heart of the "Kurgan-culture" concept for these very reasons.

However we define the cultural entities involved, we still have to deal with the question of migrations, an issue that lies at the core of the "Kurgan-culture" concept. Recent developments in archaeological theory have resulted in a bias against the very concept of migration. Theoretical approaches have for decades centered upon mechanisms of internal development and change, often with admirable and welcome results. Migrations are generally seen by Western archaeologists as sudden and unpredictable interruptions of the norm, essentially beyond anthropological explanation and therefore of little interest to serious professional archaeologists. However, it is evident to any student of history that population movements have played an important and regular role in culture change and evolutionary processes in the past. The "Migration Period" that ushered in the fall of the Roman empire (see Musset 1975) was not a deviation from the norm; Julius Caesar was an eyewitness to equally large-scale movements three or four centuries earlier, as was Herodotus earlier still. The migration of the Helvetii, which Caesar recorded in some detail, involved the movement of a population mass said to number 360,000 initially and found to number 110,000 in Caesar's military census of the defeated remnant (*Gallic War* 1.29). Even assuming a certain amount of exaggeration, this was a very substantial population movement and one that current Western archaeological theory would neither predict nor explain. Caesar's account makes it clear that this was not a unique event and that it was unusual only in its scale, for he describes a situation in which many other population groups were quite regularly moving around northwestern Europe during the same period.

The fact that we have few predictive models or theories capable of incorporating such movements into a larger explanatory framework does not mean that they were unimportant, and any archaeologist who pretends that they did not occur is

quite simply fooling him/herself. It is beginning to be apparent that short-distance migration was a recurrent response to localized resource shortages even among hunter/gatherers (cf. Cohen 1976:62–64), and useful migratory models relating to such populations are beginning to be developed (Bettinger and Baumhoff 1982). The diffusion of prehistoric language stocks (as with Indo-European) virtually demands the movement of populations. There is a large body of literature on migrants and colonists that most archaeologists have yet to tap (cf. Thompson 1973, Miller and Steffen 1977, Kritz, Keely, and Tomasi 1981). The challenge is to develop models that are capable of predicting migration rather than falling into the old trap of using migration itself as an explanation.

In relation to the problem at hand, migratory theories of one type or another have a long and not very distinguished history. We shall look first at some of the traditional evidence cited in support of "Kurgan-culture" migrations and then turn to a model that might throw some new light on this old problem.

The first wave of the "Kurgan-culture" migrations hypothetically not only reached across Central Asia to the Altai but also affected the Cucuteni-Tripolye culture of Moldavia-Podolia, virtually destroyed the Gumelnița (Karanovo VI) culture of the lower Danube/Balkan region, established the Tiszapolgar and Baden-Boleraz cultures within the Hungarian basin along the middle Danube, and imposed the Rossen-Furchenstich complex upon central Germany (Gimbutas 1977:291–301). This migratory complex does not constitute a chronologically consistent whole (Tiszapolgar predates the rest of the complex by a significant margin), and persuasive arguments have been advanced in favor of local origins for most of the cultures concerned. At the same time, the "Kurganization" of the Cucuteni-Tripolye culture and the seemingly more rapid disintegration and collapse of the Gumelnița culture do form a fairly consistent chronological horizon at about 3000–2700 b.c. and represent discontinuous events that reoriented or entirely transformed well-established, traditional cultural trajectories in the regions indicated. Whether these transformations were *caused* by population movements originating in the steppes remains an open question, but there is substantial evidence that such movements at least *occurred* at about the same time.

Much of the evidence for these transformations has been made familiar by Gimbutas. There are the well-known steppe-related cemeteries on the upland Transylvanian plateau around modern Turda, at Decea Mureșului, Mirăslău, and Mișcreac; these graves are in the supine-with-raised-knees position and contain typical Sredni Stog ornaments (Dodd-Opritsescu 1978). Related graves appear even in the Hungarian Plain, as at Csongrád on the Tisza (Ecsédy 1971). These graves have no precedent within local mortuary traditions and are clearly intrusive. They are commonly dated to late Tiszapolgar/early Bodrogkeresztur, contemporary with Cucuteni A/B and Tripolye BII, or about 3300–3100 b.c. (4100–3800 B.C.). This was the period when Cucuteni C wares first became common in Cucuteni-Tripolye settlements and when the intrusive Sredni Stog-type burial was deposited within the Tripolye village of Nezvisko on the upper Dniester (Chernysh 1962:53–55). This evidence could be interpreted to indicate some kind of early population movement across Moldavia and into Transylvania (perhaps towards the metal sources) by some Sredni Stog groups—a movement of a type that did not result in the dislocation of existing cultural patterns, for both the Bodrogkeresztur and the Tripolye BII cultures appear to represent "classic," prosperous developmental stages within their local sequences.

Somewhat later, during the Tripolye CI period (ca. 3100–2700 b.c., or 3800–3300 B.C.), serious signs of stress appeared in the region. Bodrogkeresztur cultural patterns were terminated, and relatively impoverished Baden assemblages (peripheral to the centers of Baden population farther west) re-

placed them in the Hungarian Plain (Bognar-Kutizian 1963:207-8). The Gumelnița culture began to fragment, and strikingly poorer Cernavodă I assemblages appeared on old Gumelnița occupation sites in the lower Danube Valley (Morintz and Roman 1968, Nestor and Zaharia 1968). It should be noted that, although Cernavodă I ceramics were shell-tempered and sometimes cord-impressed, they were not otherwise closely similar to Sredni Stog ceramics. On the contrary, they seem most similar to the hybrid Cucuteni C wares of Moldavia, with the retention of some late Gumelnița vessel shapes. The Cernavodă I complex did, however, signal a rather abrupt termination of the rich, complex Gumelnița culture. Related materials appear to underlie the Usatovo-culture occupation at Usatovo. In upland Moldavia-Podolia, some Cucuteni-Tripolye settlements of this period mushroomed briefly to enormous sizes, arguably for defense. The abrupt appearance in late Sredni Stog graves east of the Dnieper of unprecedented wealth, much of it in the form of previously restricted Cucuteni-Tripolye "valuables," was undoubtedly related to these other significant changes. The stresses that *initiated* cultural devolution in the region were undoubtedly extremely complex and could have involved population growth, deforestation, internecine competition over critical resources, climatic change (Atlantic/Sub-Boreal), and other factors. Among these might have been raids by mounted late Sredni Stog groups.

According to the chronology adopted here, it was not until towards the end of this stage, ca. 2700-2500 b.c. (3300-3100 b.c.) or even later, that the Yamna horizon diffused across the Dnieper-Volga steppes, the Usatovo culture evolved on the northwest coast of the Black Sea, and related tumulus graves began to appear in significant numbers along the lower and middle Danube. There can be little doubt that the Yamna-

related tumulus pit-graves in Hungary and along the lower Danube were intrusive, were numerous, and reflected the immigration of a nonindigenous population (Ecsédy 1979, Nepper 1971, Jovanovich 1975). Yamna tumuli of this period (contemporary with Tripolye CII) were erected on the ruins of even the largest Tripolye CI settlements, and the diverse Tripolye CII regional groups of the Moldavian-Podolian uplands gradually evolved towards a new and less unified cultural order.

All of this is what might be called piecemeal empirical evidence. That it *might* represent the archaeological reflection of a series of migrations is unarguable, but it lacks a comprehensive explanatory model (or models). In another forum I have described one such model (fig. 3), developed from a study of the introduction of the horse among American Indians, which suggests that limited population movements would have been an entirely predictable product of the initial use of horses as mounts in the North Pontic steppes (Anthony 1985:chap. 5).

THE AMERICAN MODEL

The American Indians exhibited two largely independent reactions to the arrival of horses, in North and South America, providing an opportunity for comparison and correction before any generalizations are extended to Europe. While some may doubt the applicability of the 17th- and 18th-century American Indian experience to the Neolithic and Copper Age of the North Pontic region, the ecological, technological, and social environments (insofar as these can be reconstructed) were quite comparable.

The Gran Chaco/Pampas region of South America, the

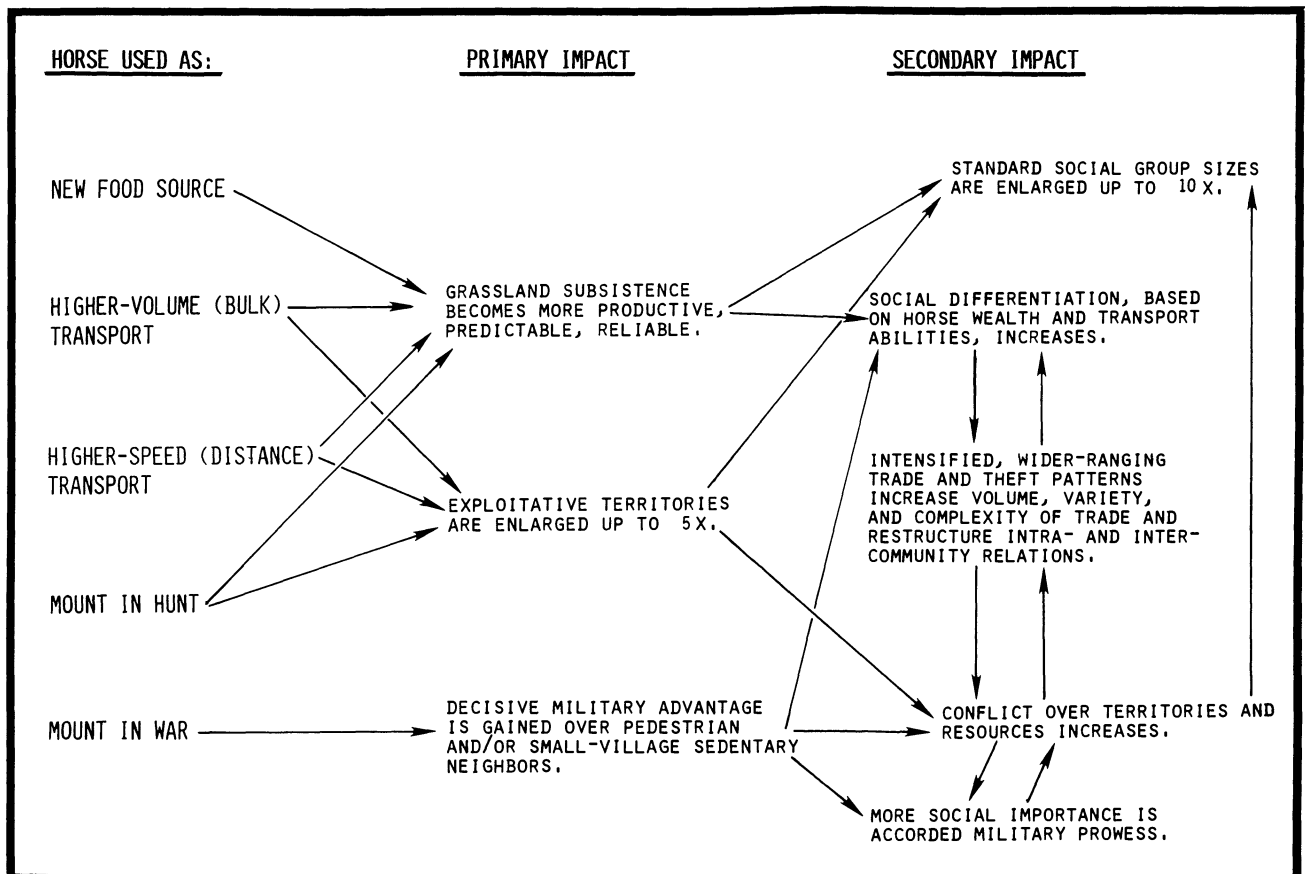


FIG. 3. The socioeconomic impacts of horse exploitation on native societies of the American grasslands.

Plains of North America, and the steppes of the North Pontic region were all temperate grassland environments crossed by river valleys in which most occupation was clustered. All three regions were peripheral to more complex centers of cultural development (the Andes/Guarani cultures, the Mississippian cultures, and the lower Danube/Caucasus). All three supported cultures that relied primarily upon a relatively simple application of stone, wood, and bone tool technologies; and in all three horticulturalists and hunter/gatherers coexisted in different environmental niches. Occasional small tools and ornaments made of metal and/or glass were imported into all three regions prior to the acquisition of horses, but these items had more significance in the social sphere than in practical technology. An important final point is that most of the critical Indian responses to horse acquisition occurred early enough to be identified apart from other European influences. Over most of the North American Plains, in particular, Indians were already using horses in war and on the hunt when they were first encountered by European explorers (Secoy 1953, Roe 1955, Ewers 1955). In any event, it is the general structure of the adaptive response that is important to this study, not the individual empirical details (although these too have provided some useful insights).

It might also be thought that any proposed analogy would be unacceptably contaminated by the fact that the horse was initially presented to the American Indians as a mount and transport animal, with the saddles, bits, stirrups, packs, and other equipment necessary to those ends. However, American Indians' treatment of European riding equipment was truly cavalier. Of the 119 traits that Ewers identified as characteristic of the North American Plains "horse complex," only 9 could be identified as direct European borrowings (Ewers 1955:326). Some of these were infrequently used (saddle, stirrups, crupper, and martingale), and others might well have been invented independently, given the time and opportunity (lariats, leather horse armor, corrals, and the double saddlebag). The great majority of the riding techniques, harnessing arrangements, training methods, riding and transport gear, and health maintenance procedures applied by the American Indians to their horses were of their own invention (Ewers 1955:326–28). There is no reason to deny the North Pontic cultures an equal inventiveness. However, given the fact that they did have to generate these ideas entirely independently, we might expect the impacts of horse acquisition to unfold more slowly in their case, rather than with the explosive suddenness seen in the Americas. In fact, the uses of the horse listed in the left column of figure 3 might be seen as a series that would tend to unfold from top to bottom in order of increasing risk to the novice rider.

In both Americas, the acquisition of domesticated horses by grassland cultures living at a "Neolithic" level of technology resulted in a powerful and tightly interconnected series of cultural responses. These can be divided into five major behavioral areas: subsistence, transport, warfare, exchange, and social differentiation.

SUBSISTENCE

Horses were exploited directly as a productive and mobile food source in those regions where horses were abundantly available (the Pampas and the south-central Plains). As mounts, horses caused radical changes in hunting techniques and strategies, allowing hunters to venture much farther in search of game and to pack much greater quantities of meat home to bases located far from the hunting site. More important, horses permitted the direct chase (primarily in North America), a technique that depended upon personal skills and the quality of the hunter's mount, in sharp contrast to the older communal ideal. In South America, the use of horses permitted a variety of widely scattered bands to coalesce for very large-scale com-

munal hunts, in which a "net" of riders was thrown around an area containing a great quantity of animals that normally lived in scattered small groups. While the direct chase encouraged social differentiation between the horse-rich and the horse-poor and communal surrounds created a more complex social environment involving the convergence of numerous bands, both techniques made life almost impossible for grassland societies that did not yet have horses, for the latter could not hope to compete with the former for game.

TRANSPORT

Among grassland hunter/gatherers, horses allowed for the accumulation and storage of resources on a scale previously unimaginable. As pack animals and as valued resources in and of themselves, horses allowed for the transportation of virtually unlimited quantities of goods over great distances. Indian riders could regularly cover 60–80 miles in a day (Ewers 1955:34), and pack horses could carry a 200-pound load 15–25 miles in a day (Ewers 1955:306). Transport was the critical variable determining the efficiency and productivity of contact-period subsistence systems in the American grasslands. Resources could be locally quite rich and densely packed (a buffalo herd, a river-valley gallery forest), but these rich locations were separated by vast expanses of markedly resource-poor territory. In the case of game animals, the resource was also mobile, and scouting was required to locate it. The primary limitation on pedestrian grassland subsistence was the difficulty of transporting accumulated resources from one rich location to the next, a problem that effectively limited storage capacities and reduced the real value of any surplus obtained. The acquisition of horses removed these limitations by providing a low-cost, high-volume form of transport that was capable of carrying a tremendous quantity of surplus, stored resources; that reduced both transport time and transport energy cost; that greatly improved scouting abilities; and that made possible the regular congregation of widely scattered bands for large-scale cooperative hunting.

WARFARE

The use of horses as mounts led to an expansion in the size of potential exploitative territories by a factor of five and therefore to conflicts over localized resources that had formerly been beyond effective reach. Territorial and ethnic boundaries had to be renegotiated, and renegotiation often meant war. Traditional competitors and enemies who were located on the wrong side of the horse frontier were easily defeated, since a group with horses could strike and retreat much more quickly than a pedestrian group could respond. Warfare was also encouraged by the rising incidence of horse-stealing raids, which soured relations even between groups that had formerly been friendly. The combination of these forces sparked a series of wars and large-scale ethnic movements in North America, the widest-ranging involving (in succession) the Apache, the Comanche, and the Sioux. In South America, the same forces were responsible for expansions involving the Abipon, the Mocovi, and the Mbaya of the Gran Chaco. In North America, where horticultural populations were relatively small and grassland hunter/gatherers initially few, mounted hunter/gatherers simply destroyed many peripheral horticultural societies, while others adopted their enemies' tactics and became mounted hunters themselves. In the Gran Chaco, where a rich riverine adaptation allowed both horticultural and hunter/gatherer societies to maintain relatively high population densities, mounted hunters did not destroy neighboring horticultural societies but established patron-client relationships with them, enslaving part of the settled population and extorting tribute from the rest. It should be noted that none of these movements penetrated beyond the grassland fringes.

Horses were themselves an unprecedented trade commodity, possessing the advantages of high individual value, low maintenance, and ease of transport. They could be accumulated and moved in almost unlimited numbers without causing unacceptable maintenance costs. (This also made them easy to steal.) No pre-horse commodity had possessed all of these characteristics. In North America horses were combined with European-made beads and metal objects (prior to the systematic introduction of manufactured goods ca. 1750–75) to form a complex of new commodities that greatly stimulated native bartering networks. (The exotic beads and metal pieces of the pre-1750 period have good analogues in the imported metals and stones that affected North Pontic trading systems.) Much of the Plains trade took place at annual trading fairs that probably had pre-horse origins (most of them involving contact between horticultural and hunter/gatherer societies of related linguistic stocks) but were radically altered by the introduction of the horse (Ewers 1955:7–14; Jacobsen and Eighmy 1980). The high individual value of horses and the great numbers that could be accumulated and moved produced quantum leaps in the value of goods being traded at a given fair. At the same time, horse transport allowed traders to travel long distances to engage in trade with tribes that had not previously been regular trading partners, raising both the level of activity and the quantity of goods and requiring the extension of social controls to new (and possibly hostile) groups. One institution that accomplished this was a ritual of adoption through which a trading partner was made into a fictitious relative (Bruner 1961:201). With the intensification of trading after the introduction of the horse, a vast network of fictitious kinship relations was extended across large areas, facilitating the transmission of ideas and innovations. Additionally, with the arrival of horses, beads, and metals, the focus of status displays shifted to these exotic trade commodities, a change that greatly enhanced the social status of the successful trader (virtually always a male) and that might have been partially responsible for the marked decline in the quality of traditional ceramic manufactures noted by Deetz (1965).

SOCIAL DIFFERENTIATION

The acquisition of horses and the related intensification of trading produced a sharp increase in the degree of wealth and generosity required for the attainment of high social status. At the same time, the development of mounted hunting and raiding techniques made the possession of horses a prerequisite for participation in these basic activities. Differential personal wealth in horses therefore tended to intensify social differentiation in horse-using societies. Though horses were a volatile and easily stolen form of wealth, "rich" families of the highest status tended to intermarry and to convert some of their horse wealth into more durable prestige goods, and through astute marriages and loans they created a network of kinship and obligation that allowed them to rebuild their wealth even after disastrous losses (Mishkin 1940; Ewers 1955:338–40). A second and far-reaching change was an increased social role for warfare (Mishkin 1940, Smith 1938, Voget 1964), which became the primary activity through which the relative statuses and roles of males were defined. During the period of heightened conflict that accompanied the initial diffusion of horse use, this emphasis on warfare was functionally related to the survival of the social group, but once the system became established it was self-perpetuating. Raids were continued for reasons of personal revenge or status enhancement (glory) even when they exposed the raiders' social group to retaliation from a stronger enemy or when they served only to antagonize a former ally. Such motives were partially responsible for the momentum that carried the raiding parties of some ethnic

groups (notably those named under "warfare" above) far beyond their traditional home regions on campaigns that resulted in significant ethnic expansions.

APPLICATION OF THE MODEL TO THE NORTH PONTIC RECORD

As mounts in war or the hunt and as a general form of high-speed long-distance transport (scouting, travel, etc.), horses constituted a technology as unprecedented in the North Pontic region as it was in the Americas. Their introduction there should have had effects analogous to those observed in the Americas, for the adaptive context was remarkably similar. In addition, in the North Pontic region the riding horse was supplemented by the oxcart (low-speed high-volume transport) after about 2700–2500 b.c. (3300–3100 B.C.), further transforming transport. In fact, it has been argued that the systematic exploitation of the steppe environment seemingly documented for the first time during the Yamna period was dependent upon the use of wheeled vehicles (Kuzmina 1974). This might be true for the specific economic mix that underlay the expansion of the Yamna horizon (limited horticulture, diversified stock-raising, and seasonal alternation between deep-steppe herding camps and riverine base camps). The American example demonstrates, however, that horse exploitation and riding could, by themselves, provide a basis for a grassland subsistence adaptation that might be considered transitional to that economic complex.

The applicability of the American model to the North Pontic archaeological record has been tested by converting the behavioral changes described above into 19 archaeological predictions concerned with specific aspects of material culture (Anthony 1985:chap. 6). In a model involving the mutual interplay of so many complex behavior states, no simple null hypothesis could be tested; the test merely determined whether the patterns observed in the North Pontic record were consistent with those observed in the Americas.

Of the 19 predicted changes, the following 10 can be documented in the North Pontic archaeological record for the first time during the Sredni Stog period:

1. Age-sex ratios of horse bones at Dereivka and estimated contribution to diet indicate that horses were exploited directly as a managed food resource.
2. Putative bridle parts appear, implying use of horses as mounts.
3. There is evidence of horse-oriented rituals.
4. A few settlements (Kirovo) and cemeteries (Novodanilovka) appear in deep-steppe locations, documenting an initial phase in the penetration of the steppe environment.
5. The archaeologically documented settlement territory of the culture is much larger than that of its Dnieper-Donets II predecessor, possibly including a long-distance movement into Transylvania.
6. Artifacts classed as weapons (projectile points, antler axes) increase significantly in frequency over Dnieper-Donets II totals in both settlement and mortuary contexts.
7. Individual burials replace the communal ossuaries of the preceding Dnieper-Donets II period.
8. Neighboring culturally distinct sedentary cultivators (Cucuteni-Tripolye) are represented by aberrantly large settlements, presumably for reasons of defense. (These same settlements are abandoned and Yamna burial tumuli erected on their ruins during the subsequent period.)
9. Unprecedented quantities and types of exotic prestige goods (primarily ornaments) appear in late mortuary contexts, documenting an increase in trading and/or raiding.
10. An asymmetrical distribution of exotic prestige goods in

late burials, supported by structural distinctions in grave construction and surface markers, indicates an intensification of social differentiation.

In five cases, archaeological evidence to establish the occurrence of a predicted behavioral change appears for the first time in assemblages of the following (Yamna/Usatovo/early Maikop) period:

1. Horses and other domesticates (primarily sheep) are found across a wide steppe region that has formerly supported only scattered hunter/gatherer populations. (Here the new subsistence system includes some horticulture—by inference from sickle blades—and cart transport.)

2. Deep-steppe fauna (saiga antelope, Bactrian camel) appears in faunal samples, indicating an increasingly systematic penetration of the steppe environment.

3. High-cost “status” weapons (metal daggers and/or lance points) appear in rich graves in association with cart burials, concentrations of metal ornaments and tools, and other indications of prestige.

4. Some “frontier” settlement regions formerly occupied by neighboring culturally distinct sedentary cultivators (Tripolye CI) are abandoned (e.g., along the Ros’ River, south of Kiev), as are some major settlements and possibly some large “interior” settlement regions (e.g., the “supersites” of the Uman region).

5. Use of the horse by neighboring sedentary cultivators increases significantly, as is evident from the rise in the average proportion of horses in late Cucuteni-Tripolye faunal assemblages.

This delay in the full development of the predicted pattern of change emphasizes the transitional position of the Sredni Stog culture (and/or the deficiencies of the archaeological record).

In general behavioral terms, these changes represent significant shifts in subsistence strategies (increasing exploitation of the steppe), transport technologies (horse transport, joined during early Yamna by cart transport), patterns of conflict (increased incidence of warfare), the symbolism attached to warfare (appearance of high-cost status weapons), trading and/or raiding (unprecedented influx of exotic prestige goods), and the internal differentiation of society (sharp contrasts in both the structural and artifactual aspects of mortuary remains). The American model suggests that the domestication of the horse and its development as a mount should have contributed to the evolution of just such a constellation of changes in cultural conformation. While many other inputs also must have affected the system of change (as is always the case in an open system), the American model is the only device yet advanced that is capable of relating all of these changes to each other within a single explanatory framework.

I should sound a final note of caution concerning the application of these data to theories of migration in the North Pontic region. The American model does not predict ethnic expansions beyond the grassland fringe and cannot be used to support any such hypotheses. Nor should steppe raiding ventures be used simplistically to “explain” the fragmentation and transformation of the old Cucuteni-Tripolye culture area after ca. 2700 b.c.; this was a complex, multifaceted process that had numerous probable causes, including deforestation in the fragile forest-steppe boundary zone, shifting subsistence patterns, and climatic change.

However, the Cucuteni-Tripolye and the Sredni Stog cultures did exhibit marked contrasts in almost every aspect of material culture, and they emerged out of very different cultural backgrounds. Throughout the latter part of the 4th millennium b.c., the Dnieper River was perhaps the most clear-cut culture boundary in Europe. There are likely to have been few institutional linkages that might have served to control and arbitrate intercultural disputes (cf. Sahlins 1972:195–201). It is highly unlikely that mounted Sredni Stog communities

would have failed to use the decisive military advantage that riding offered. The American model predicts intensified and successful raiding in such a situation, and the archaeological record reveals both an unprecedented influx of new types of wealth into late Sredni Stog society and unprecedented defensive measures on the part of Cucuteni-Tripolye settlements. The shifting balance suggested by these data would be difficult to explain in the absence of some new factor such as riding. Some peripheral communities of the Cucuteni-Tripolye culture might well have become clients of steppe marauders. Such a situation might underlie the sharply dichotomous flat-grave/tumulus-grave mortuary groupings at the later site of Usatovo.

I began with Childe and the Indo-Europeans, and I shall end with them. One implication of the views presented here is that the Indo-European “homeland” need not be the Central Asian steppes, a location against which many linguists have argued (see Thieme 1954; Friedrich 1970:167). The Yamna horizon might well reflect the remains of an early Indo-European group or groups, but if one sees a western origin for the horses, sheep, carts, mortuary rituals, and metallurgy that prompted the emergence of the Yamna horizon, then one must also look to the west for any theoretical Indo-European homeland. Childe himself seemed to be moving towards the hypothesis of a homeland somewhere in the Vistula-Dnieper region at the end of his career (Childe 1957:219). Such a hypothesis might be seen as consistent with the data presented here. The Dnieper-Donets culture evolved at least partially within this region from an indigenous temperate European, Mesolithic basis. The Sredni Stog culture was primarily a steppe-zone outgrowth of the Dnieper-Donets, and it is from processes and culture patterns initiated by the Sredni Stog culture that the Yamna horizon can most plausibly be derived.

Comments

by PETER BOGUCKI

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Anthony has presented a long-needed evaluation of a complex body of data in an interpretive framework not focused exclusively on the documentation of migrations. As he points out, it is necessary to consider the superimposed cultural and environmental evidence together. The domestication of the horse is a particularly difficult issue, for it is one that must be approached almost exclusively through the use of “proxy” evidence. The faunal remains themselves provide relatively little good evidence for horse riding, although they do suggest management as part of a subsistence system. It is in this context that Anthony’s use of the New World model of the *implications* of horse domestication makes sense. Whether or not it adequately *explains* the development of horse domestication, the examination of the archaeological correlates of this process can provide the proxy data needed to document it.

Many of the issues framed by Anthony are quite clearly anthropological problems in the dynamics of frontiers and boundaries. There are several relevant boundaries in this discussion. The first is the ecological boundary between the lowland steppe and the upland forest. Then, there is the frontier between the exogenous Criş agriculturalists and the indigenous foragers. Finally, one finds the frontier between communities derived from these groups such as Cucuteni-Tripolye, on one hand, and indigenous North Pontic cultures such as Dnieper-Donets and Sredni Stog, on the other. Prehistorians are only beginning to examine the archaeological dimensions of frontiers and boundaries (e.g., O’Brien 1984, Green and Perlman 1985). In their “Introduction,” Green and Perlman (1985:12)

point out that the study of frontiers requires the concept of an "open social system," whereas most ethnographic and archaeological models of culture assume "closed" systems. In European prehistory, the use of "cultures" and "groups" as the basic units of analysis to some degree forces scholars to think in terms of bounded, closed systems. This may ultimately not be the most productive approach. Instead, it may be necessary to view the frontiers between these populations as fluid and transparent, especially on the level of individual communities and households. Using Anthony's position here as a point of departure, it would be interesting to see how perspectives on frontiers as open systems (such as those found in the Green and Perlman volume) might provide fresh insights into prehistoric society in the North Pontic zone.

by EUGEN COMȘA

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This study represents an important synthesis and a useful one. The limited space accorded these comments and the great number of problems touched upon or treated in the work oblige me to restrict myself to a few points.

I agree that the tumulus burials with ochre art cannot be clustered as a "Kurgan culture"; in fact, the various groups originated in different North Pontic regions (had different material cultures and burial traditions) and penetrated the West in several waves over about a 2,000-year period. It is evident that we must give up the term "Kurgan culture."

I would suggest some consideration of the evidence that in the Gilești-Boian phase the use of the primitive plow with animal traction instead of the hoe was associated with greater sedentariness and changes in types of dwellings and settlements, demographic growth, and a dynamic that led to the spread of these communities into western Moldavia—where, by assimilating the late Linear communities, they formed the Pre-Cucuteni culture, with a special thrust toward the northeast.

The historical reality of movements of populations in the region in question seems to call for two terms. For the early and middle Neolithic, the term "swarming" (successive movements from place to place over a long period) is more appropriate, with "migration" being reserved for the movements of groups characterized by tumulus burials with ochre art, although it does not entirely correspond to the various types of movements of that period.

Anthony's ideas about the consequences of horse use are very interesting. I would point to the discovery at Vădastra (in Vădastra II) of a horse bone that, in the opinion of V. Gheție, belonged to a small, dumpy horse, not one suitable for riding (Mateescu 1959:70).

The finds from Berești (excavated by I. T. Dragomir) prove that the use of Cucuteni C wares there begins in Cucuteni A3.

Both Mirăslău and Mișcreac are the remains of settlements, not cemeteries (Rusu 1971:82).

With regard to the chronological table, (1) the Moldavian upland Cucuteni A/B phase has two stages; (2) in place of Vihvatinți should be Foltești, which was partly parallel to Horodiștea; (3) the Dudești culture has three phases—Malul Roșu, Fundeni, and Cernica; (4) Gumelnița B1 was partly parallel to Cucuteni A3; (5) Cernavodă I is genetically linked with Cernavodă III, which, in contiguous zones, was parallel to Cernavodă II.

In recent years there have been several studies of the burials with ochre from eastern Romania that, regrettably, the author has had no possibility of consulting.

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It is now 30 years since the term "Kurgan culture" was introduced (in 1956, not 1961) to describe the horse-riding, warlike patriarchal family of tribes of the North Pontic Dnieper-Volga steppe (Gimbutas 1956:70–71). The Kurgan concept is an outgrowth of my work on East European prehistory (and certainly was not influenced by Childe's *The Aryans*). I consider the mortuary practices of the Kurgan people the most conservative and unifying cultural phenomenon over time. The erection of a tent or house of timber or stone within or over a grave pit and the covering of its floor suggest that the idea was to build a house for the dead. Such practices are *not* evidenced in the Dnieper-Donets culture. The temporal extension of the "Kurgan culture" in the Dnieper-Volga steppe and forest steppe has changed with the discovery of the Stog sites and with radiocarbon dating and its subsequent calibration. In calibrated chronology, the interrelated culture groups of the Kurgan tradition fall (in round numbers) between 4500 and 2500 B.C. Within this time-span there were three major incursions or infiltrations of Kurgan people west of the Black Sea: (1) approximately 4400–4200 B.C. (the Stog-Khvalynsk people), (2) approximately 3400–3300 B.C. (the Mikhailovka I–Maikop group, from the North Pontic–North Caucasus region), and (3) approximately 3000–2900 B.C. (the Yamna people, from the Volga Basin) (see Gimbutas 1977, 1979, 1980). These three waves of Kurgan infiltrations into east-central Europe correspond to the three waves of the arrival of the domesticated horse (Bökönyi 1986).

In contrast to Anthony, I view the bearers of the Kurgan culture as Proto-Indo-Europeans, whose repeated infiltrations into east-central Europe changed the course of European prehistory. The basic features of the Kurgan culture—patriarchy, patrilineality, ranking, animal domestication (including that of the horse), pastoralism, mobility, and armament (bow and arrow, spear, thrusting and cutting flint dagger, and later bronze) and a poor ceramic and architectural tradition—correspond with what has been reconstructed as Proto-Indo-European by means of linguistic studies. These features stand *in opposition* to the Old European matricentric, sedentary, and peaceful culture with great architectural, sculptural, and ceramic traditions. ("Old Europe," is my blanket term for the multitude of culture groups that preceded Indo-Europeanization [Kurganization]; see Gimbutas 1973, 1974.) I view the transformation of European culture from the end of the 5th to the early 3d millennium B.C. (except in the Mediterranean and part of western Europe) as essentially a social change from a gynocentric and matrilineal system to a patriarchal/androcratic and patrilineal system. This change was accompanied by the hybridization of the Old European pantheon of lunar and chthonic goddesses with the Indo-European male pantheon of sky gods typical of shepherds (Gimbutas 1974, 1982a, b, n.d.). The transformation from a peaceful to a warlike society is seen in the rise of hill forts as royal residences, a gradual increase in the horse population and armament (especially after the introduction of hard metal with Wave 2), and the accumulation of wealth in the hands of a ruling class. The term "Kurgan" could be abandoned only if it could be shown that the Kurgan groups of different regions and times were not genetically related. "Kurgan" has deep roots in the scholarly and popular literature (among the latter I would mention Schmoeckel's [1982] *Die Hirten die die Welt veränderten* [*The Shepherds Who Changed The World*], based on my Kurgan hypothesis and emphasis on the importance of the domestication of the horse).

According to Anthony, the Stog complex is an outgrowth of

the Dnieper-Donets culture. I challenge this hypothesis. In spite of the dramatic transformations arising from the domestication of the horse (new concepts of property and wealth, new social alignments, etc.) that are convincingly presented by Anthony, the question of abrupt change in the physical type of the population and in social structure and belief system remains unanswered. Mortuary practices are especially conservative and do not change entirely with innovations in economy and technology.

The large cemeteries (with more than 100 graves) of the later phases of the Dnieper-Donets culture suggest a sedentary way of life. (The main source for this culture is still Telegin 1968.) Cultivated plants (barley impressions on pottery) and domesticated animals (cattle, ovicaprids, pigs, and dog) are known. A very distinctive feature of this culture is collective burial in square and oval pits. A given pit might contain dozens of graves, often in several layers, buried at different times. The dead lay in an extended position, and the compactness of the skeletons suggests that they were bound and possibly wrapped in skins. Pots had vegetal temper and were flat-based (in later phases) and decorated with zigzags, chevrons, nets, triangles, and lozenges. Peculiar plano-convex objects of stone with a deep notch in the center, of unknown function, were decorated with the same motifs. The physical type of the people is described as massive Cro-Magnon (Gokhman 1966).

The Stog people practiced individual burial in pits or in stone cists, some 15% of which were covered by cairns. The body was supine, either contracted or extended, and was usually supplied with flint knife-daggers and beakers with pointed bases. The skeletal remains are dolichomesocranial, taller and more gracile than those of their predecessors in the substratum (Zinevich and Kruts 1968, Kruts 1972). In contrast to the vegetal-tempered Dnieper-Donets ceramics, the Stog pots were tempered with crushed shell; stamped, pitted, or cord-impressed decorations about the neck and shoulders present a solar motif (Telegin 1973). Local evolution cannot account for such abrupt changes in burial customs, symbolism, and physical type. Our task, then, is to seek neighboring cultures genetically related to Stog for a possible source of this contrasting stratum. Such a parallel culture is to be found in the forest-steppe region of the middle Volga, where it is known as the Khvalynsk complex, and in the lower Volga area, where it is known as the earliest Yamna complex.

The Volga sites are of paramount importance for the genesis of the Stog complex and the Proto-Indo-European problem as well. It is clear that the earliest sites in the middle and lower Volga Basin and in the North Caucasian steppe, which already include evidence of the domesticated horse, the cult of the horse and the sun, ranked society, and far-reaching trade relations, *predate* the Stog complex in the Dnieper Basin. Important sites (not mentioned by Anthony) are known from the River Samara (a tributary of the Volga) in the district of Kuibyshev (Vasil'ev and Mat'veeva 1976). These sites are located on hilltops, and burials are individual graves in pits. At S'ezzhee on the bank of the Samara, miniature figurines of horses carved out of flat bone were found. Perforations suggest that they were worn as pendants and must have had symbolic meaning. The richly equipped child's grave at S'ezzhee included two pendants with tauroform heads (perhaps representing a yoke of oxen) and pendants in the shape of ducks. Pots were shell-tempered. A ranked society is suggested by the coexistence of a few exceptionally rich graves (e.g., S'ezzhee Grave Number 6) and many others with practically no grave goods. The armament is related to that of the Stog complex (bows and arrows, spears, flint daggers; even a child at S'ezzhee was furnished with a long flint dagger). According to Merpert (1977:378),

Their burials in ritual are similar to Sredni Stog, and a number of finds permits us to synchronize them clearly both with the cemeteries of the

Mariupol type (Dnieper-Donets culture), i.e., typical boar's tusk lamellae, shell beads, bone pendants, and animal figurines, and with the early Old Yamna period, i.e., again the beads, pendants, but chiefly the pottery which is very similar to the Berezhnovka pot (at Volgograd, formerly Stalingrad) in form and *absolutely* analogous in details of fabric and ornamentation.

The mere fact that the Volga sites are synchronous with the late Dnieper-Donets culture is an argument for the Stog complex's being intrusive in the Dnieper Basin and superimposed on a culture with analogies in the West (i.e., belonging to the Old European symbolic system). This would explain the discontinuity of the Dnieper-Donets funeral customs, symbols, and physical type. The sheep herders of the Volga forest steppe were probably the first to domesticate the horse. Shepherders are likely to have had a patriarchal social system for some time preceding the period under discussion. Dnieper-Donets society does not exhibit any signs of being a male-dominant society. It cannot be argued that the capturing, training, and mounting of wild horses was men's work.

Coterminous with the late Dnieper-Donets culture are the earliest Kurgan sites in the steppe north of the Caucasus. At Arkhara, near Elista, the earliest grave in the kurgan was cut by a grave including a stone "scepter." Two such scepters, in Merpert's words "absolutely analogous to the Kuibyshev and Arkhara ones" (1977:376), were found in an undisturbed layer at Obirşeni in Romanian Moldavia (Bridiu 1975:169). This layer belongs to the Cucuteni A3 phase, radiocarbon-dated and calibrated by Suess to the 44th–43d century B.C. The stratigraphy of the earliest grave suggests a date preceding 4400 B.C.

Anthony's dismissal of the stone scepters as unimportant for chronology and not zoomorphic is a misunderstanding. Carved of porphyry and other semiprecious stones, they are most likely horse heads, ideologically very significant and important chronological markers (see Gimbutas 1977:284–86). Their appearance in rich male graves in association with typical Kurgan I weapons and other diagnostic finds and their distribution from the middle and lower Volga and the northern Caucasus to Moldavia, Dobruja, Transylvania, the lower Danube, and central Bulgaria is proof of the presence and activities (raiding, trading, etc.) of the Kurgan I people in a territory more than 2,000 km wide. The trade in copper extended between the mines at Aibunar in central Bulgaria and the Volga. At this time (4400–4200 B.C.), the whole Dnieper-Volga region, not just the Stog people in the Dnieper Basin, seems to have been dominated by Kurgan I horse riders. The Stog complex is a regional group of the Kurgan I period influenced by the Dnieper-Donets substratum.

Anthony's hypothetical Indo-European "homeland" between the Vistula and the Dnieper was occupied by the Narva and the Nemunas cultures in the north, the Cucuteni-Tripolye culture in the south, and the Dnieper-Donets culture in the east. The Narva culture of settled fishermen developed from the Mesolithic Maglemose-Kunda and ultimately from the Western European late Magdalenian-Hamburgian. The Cucuteni-Tripolye culture, with highly developed art and architecture, is an offshoot of the matricentric Karanovo-Boian culture of Bulgaria and southern Romania, and the physical type of these people is Mediterranean. All of these groups are Old European and display no proto-forms of Indo-European ideology and social structure. Throughout the period 4500–3500 B.C. the Cucuteni-Tripolye agriculturalists coexisted with Kurgan I and II, disintegrating under the pressure of the North Pontic–North Caucasian Kurgan culture (Mikhailovka I–Maikop complex) that was responsible for Wave 2 into east-central Europe (Gimbutas 1980).

Anthony unnecessarily involves "Indo-European origins" in the title of his article: he is not prepared to view this problem in terms of the totality of the evidence, i.e., archaeological

sources combined with comparative linguistics and mythology. The Indo-European problem is essentially a linguistic one. Comparative mythology also offers invaluable data. There is now a consensus of linguists and mythologists that the Indo-European linguistic family is closest to the Finno-Ugric. The Indo-Uralic hypothesis, whereby the Indo-European family is classed with the Uralic-Yukaghir, Altaic, and others, is particularly strong (Anttila 1972). That the Volga Basin is in the neighborhood of the middle Urals, the undisputed home of the Finno-Ugric-speakers, suits the linguistic premise quite well. I assume the possibility of linguistic consolidation in the Kurgan I period in the Dnieper-Volga steppe, perhaps as a consequence of the unprecedented mobility afforded by the adoption of riding.

As linguistically reconstructed, Proto-Indo-European culture is characterized by domesticated animals, including the horse (**ékwo-*), and a patriarchal, warlike class society. In addition to Proto-Indo-European words for sheep, cattle, pig, goat, horse, and dog there is a term for "cows and sheep," *peku(s)*. Since this word has a family of related words connected with the meaning "fleece," "hair," and "to comb," it is assumed that *peku* originally connoted a woolly animal, probably sheep, and that there was a stage when only sheep were domesticated. This may apply to earliest Kurgan times in the lower Volga Basin, where sheep, not cattle, are known to be the prime domesticated animal. The words for wool and weaving are clearly Proto-Indo-European and may date back to the early phase of animal domestication. Furthermore, paleozoologists tell us that East European (Kurgan) sheep are larger and woollier than Southeast European (Old European Neolithic) ones. This species originated from a different wild ancestor, presumably in Central Asia, and was introduced into Europe by the Kurgan people (Bibikova 1963; Haimovici 1965, 1966, 1970; Bökönyi 1986). The dog in Proto-Indo-European culture was a sheepdog: the reconstructed Proto-Indo-European form for "dog" is related to *peku*, **pekuon-* (Hamp 1980). The linguistic data suggest poorly developed agriculture and ceramics. Except for millet, a "ground" cereal, **ieyo-*, a cereal used for fermentation, and **p/h₁ur*, a grass or spelt, there are no other well-attested words for cereals. This evidence cannot be applied to Old European farmers, who had several kinds of wheat, barley, oats, rye, peas, and lentils for several millennia before the Kurgan infiltration. The agricultural terminology was acquired when the Indo-European language moved west (Gimbutas 1985).

The linguistic data are consistent with all that we know of Kurgan I culture but not with what we know of the Dnieper-Donets, Cucuteni-Tripolye, Narva, or other Old European cultures. In Childe's time there was no "Old Europe" as we know it now. I am sure that he would not place the homeland between the Vistula and the Dnieper today. Nor would the linguists place it there, since the earliest Indo-European river names are in central Europe north of the Alps and in the lands of the ancient Balts and have relatives in the North Pontic area (Gimbutas 1985:199). This Indo-European hydronymy very likely reflects a situation after several stages of a complex process of "Kurganization" in central Europe—in temporal terms, the second half of the 4th and the early 3d millennium B.C., in archaeological terms the Baden and Globular Amphora cultures, followed by the Corded Ware. The chain of hill forts with royal residences, such as Baden, and of kurgans with royal burials, such as Usatovo northwest of the Black Sea and Tarnava in northern Bulgaria, are eloquent symbols of the presence of the ruling Indo-European superstratum. In my view, this is a secondary, "European" homeland of the Indo-Europeans.

The domestication of the horse played a paramount role in the transformation of European culture, but the origin and the culture of the people who first mounted the horse should not be left out of focus.

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Leaving aside the complex questions of the relative and absolute chronology of the steppe cultures of the north coast of the Black Sea and the lower Danube Valley, the notable innovation of Anthony's essay is a socioeconomic model of the evolution of the Neolithic and Eneolithic cultures of the steppes. In this regard one should emphasize that current European prehistory often views the raids or migrations of the steppe cultures as representing the arrival of the first Indo-European tribes, the beginning of the Indo-Europeanization of the continent. The proposed model therefore has an interesting application—the explanation, at least in general terms, of the formation of the steppe cultures and their migration. New uses of the horse—as a managed food resource, a means of transport, an instrument of warfare, and a trade commodity of great value and as the basic prerequisite for extension of territory and hunting—are the most important elements of the model. Applying it to eastern Pannonia and the middle Danube Valley raises some interesting problems.

The occurrence of steppe elements in the Balkans and Carpathians may be divided into three stages. The earliest is that of the warrior cemeteries with graves of the Decea Mureșului or Csongrád type. The second is that of the cultures of steppe character of the lower Danube Valley, the most important of them being Cernavodă III. The third is that of the kurgans (tumuli), belonging, in the Yugoslav part of the Danube Valley, mainly to the late phase of the Yamna (Pit-Grave) culture (end of the 3d millennium B.C.) and possessing all the steppe features (burial rites, grave gifts, and construction).

Unexpectedly, no settlements corresponding to these Yamna cemeteries have yet been discovered. This period of prevalence of steppe elements in southern Pannonia corresponds, on the basis of the stratigraphy uncovered in some recently excavated tumuli, to the end of the Late Eneolithic of the Balkan-Danubian region. The best example is the central tumulus at the site of Jabuka, near Pančevo (in the southwestern Banat), which contains a grave of the Yamna type dug through occupation horizons of the Kostolac and Baden cultures. These regional Late Eneolithic cultures are well known and relative-chronologically quite precisely located. The absence of settlements of steppe character places any model of the migration of steppe populations into the middle Danube Valley in a difficult position. Assuming only brief raids, it is impossible to explain the tumuli, which presuppose substantial collective work, and the number and size of the cemeteries. If this was a permanent occupation, however, one would expect to have found, after the many excavations of recent decades, at least some traces of settlements, even if purely nomadic ones. Clear steppe influences (burial rites, cord-impressed ceramics) are now quite well known all the way to the Adriatic coast. This would probably not be the case without a strong population core as the source of these influences.

If steppe elements, cultural or ethnic, represent a process as important as the formation of the Indo-European tribes, any proposed model is welcome, but it is important to see how it fits the facts of recent investigations in the territory in question. It is, for example, a fact that the bearers of the Cucuteni-Tripolye complex were related to the Neolithic and Eneolithic populations of the Balkans and the Danubian Basin—after all, they originated in this cultural area. If the Usatovo group, now viewed as a late branch of the Cucuteni-Tripolye complex, participated in the formation of the Cernavodă I–III cultures and the occupation of the lower Danube Valley, then an old (transformed, but still non-Indo-European) element of Balkan origin played an important role in forming the new Indo-European population of the region. The further evolution of

these mixed populations of steppe origin included local inhabitants as well. Therefore, apart from the socioeconomic model, an ethnic model seems required. With the knowledge we have available, however, it is not clear how we might construct one.

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Anthony's review of the Pontic-Caspian Eneolithic requires some augmentation, since much of the quite important work on the Volga region that has appeared since Merpert (1974) appears to have escaped either his notice or, possibly, access.

Anthony's model sees the spread of the Neolithic economy (and Indo-European origins?) from the west (Criş, Linear Ware, Tripolye, etc.) and the progressive acculturation/assimilation of more easterly hunter-gatherers. But recent work carried out by Vasil'ev (1981), Matyushin (1982), Petrenko (1984), and others suggests a different and apparently earlier origin for the Neolithic economy in the middle Volga-southern Urals, a theory that Danilenko (1974) advanced over a decade ago but without convincing evidence. We now have domestic faunas from about 15 sites in this region. Some, such as Mullino II (5720 \pm 160 b.c.) and Berezki (5600 \pm 200 b.c.), clearly antedate the earliest appearance of domestic livestock in the western Pontic region, and there are a number of other sites that can be synchronized against more westerly cultures that either predate or are contemporaneous with Sredny Stog. These easterly sites are situated largely in the forest steppe, with one, Vilovatoe, located in the northern steppe region. Both archaeologists (Matyushin 1982:286-89) and palaeozoologists (Petrenko 1984:137) look to the Near East via the east Caspian for the source of this economic change. This suggests that interrelations between very early Neolithic societies in the east Caspian and the middle Volga should also have had some impact on the intermediate zones and that we should be cautious in dismissing the lower Volga-north Caspian as a region occupied solely by sub-Neolithic hunter-gatherers.

The faunas from these eastern sites are admittedly quite meagre, with 17 sites or layers producing only 1,063 bones of the major domesticates. Of these, horse (55.3%) predominates, followed by cattle (27.6%) and ovicaprids (17%). Petrenko (1984:70-71) emphasizes that both the age-slaughter pattern and the morphology of the horses from Vilovatoe and Mullino indicate domestic horses similar to the Bronze Age Srubna (Timber Grave) horses of the same region (and differing somewhat from the Dereivka horses). He concludes that the horse was exploited both as a meat animal and for riding. It would thus appear that Bibikova (1986[1969]:175-76) was quite accurate in her suggestion that the earliest zone of horse domestication extended from the Dnieper at least to the Volga. Finally, the use of the horse in the subsistence economy in this region is augmented by its ritual role, seen for example in the head-and-hooves cult which appears in both the Samara-culture cemetery at S'ezzhee and the later Khvalynsk cemetery, which is contemporary with the Sredny Stog culture (Vasil'ev 1981, Telegin 1986).

A model that envisages the Yamna culture as a major watershed producing a broad unity across the Pontic-Caspian region after the adoption of the domestic horse, other livestock, and wheeled vehicles is now in need of some revision. By the mid-5th millennium B.C. we already have very striking cultural similarities from the Dnieper-Donets culture in the west to the Samara culture of the middle Volga, where Mariupol features are regularly encountered in such cemeteries as S'ezzhee. This is continued in the subsequent Sredny Stog period, which finds its Volga parallel in the Khvalynsk culture. Indeed, Vasil'ev (1981:72) even suggests that the uniformity seen in these broadly similar earlier horizons was disturbed by the rise of the

Yamna culture in all of its regional variants. Exchange is probably one factor in explaining the parallels between east and west, as might be seen in the presence of copper objects of Balkan origin in both the Sredny Stog and Khvalynsk cultures (Chernykh 1980:323), but this hardly explains how the same features that Anthony lists to substantiate a Sredny Stog origin for the Yamna culture can all be found in the Khvalynsk culture (Vasil'ev 1981:32). Consequently, Anthony is a bit too hasty in dismissing an eastern origin for the Yamna culture (despite my own previous scepticism [Mallory 1977]). It is tempting to employ Anthony's model to explain why there was this apparent uniformity across the Pontic-Caspian in the pre-Yamna period and seek a solution in the vastly expanded territories postulated for those in possession of the domestic horse for transport. The evidence, however, is not supportive, since the wild fauna of the Sredny Stog sites is clearly riverine-forest, i.e., red deer, wild boar, beaver, and that of the Volga-Ural sites is predominantly elk and beaver. As Anthony suggests, deep-steppe fauna such as saiga do not appear until Yamna times. A convincing explanation for Vasil'ev's major horizons (Mariupol, Sredny Stog-Khvalynsk) that embrace most of the Pontic-Caspian is still quite speculative, and I suspect that we must anticipate a diet of arguments concerning genetic affiliation, possible migrations, and interaction areas in the future.

While I value Anthony's use of the "American model" for stimulating discussion, I am hardly convinced that his search for broad patterns of "adaptive response" has not either obscured or ignored too many of those troublesome "empirical details" that really must be discussed. I would query the comparability of American Indians who utilized the horse to exploit the grasslands by hunting herds of buffalo with Pontic-Caspian tribes who exploited the horse within a regime of mixed stockbreeding. I would also have thought that some distinctions should be made between societies that employed the horse primarily for transportation and draft with the Pontic-Caspian tribes that appear to have been primarily horse-consumers during the Eneolithic. The sedentary markers that one finds on Sredny Stog sites, such as domestic pig, and the somewhat less conclusively sedentary indicators such as fishing and the hunting of river fauna tend to underwrite Khazanov's (1984:92) suggestion that in the Sredny Stog culture we seem to be dealing with "the pasturing of small herds of horses with the help of dogs, sometimes on horseback and without going too far away from the settlements." How one moves from here out onto the deep steppe is still unclear. One could hardly disagree with Anthony in citing the horse as a factor, but surely when all of the archaeological evidence, meagre though it may be, indicates a predominance of ovicaprids in steppe sites one might agree with Merpert (1982:327) and Shilov (1975) that sheep was the major factor in extending settlement out from the river valleys.

There is much to say about the specifics of Anthony's cultural historical summary, but this can be obtained much more extensively in Telegin (1986) and Häusler (1985).

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Anthony should be complimented for taking a rational approach to the so-called Kurgan problem. However, it should be emphasized that only a small percentage of Eastern European archaeologists explain culture change in Europe by migrations from the east during the Neolithic and the Early Bronze Age (Häusler 1985).

Anthony stresses the importance of domesticated horses for culture change in the steppes of eastern Europe. Evidence for

the riding of domesticated horses during the Neolithic is, however, very limited, and evidence for the presence of domesticated horses and riding in central Europe is scanty. Vörös's (1981) study of horse bones identifies no domesticated types during the Neolithic in the Carpathian Basin. At Bronocice, southeastern Poland, Kruk and I (Kruk and Milisauskas 1981) recovered a large sample of animal bones, some of which were horse bones, from the Funnel-necked Beaker (3100–2500 b.c. [3700–3100 B.C.]) and Baden (2500–2100 b.c. [3100–2700 B.C.]) occupations. If horses were important in the economy and transportation, we would expect their number to have increased over time at Bronocice. At present, there is no indication that it did. Evidence for the presence of a wheeled wagon was found at Bronocice, but the wagon was probably pulled by cattle (Milisauskas and Kruk 1982).

Reply

by DAVID W. ANTHONY

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The comments offer many useful and cogent observations. The most substantive criticisms are those of Gimbutas and Mallory, also the only commentators that specialize in Pontic-Caspian prehistory. I am particularly pleased to have drawn the always well-informed comments of Mallory. Their disagreements with the model I have advanced do not, however, derive from a coherent opposing explanatory model but rather consist of a series of disputes or misunderstandings over points of data. Partially for this reason, and partially because I can successfully counter or explain most of the points they raise, I feel that my model remains a viable hypothesis. I have yet to see an alternative explanatory model of equal scope and specificity for the period and problem under review.

Both Mallory and Gimbutas have noted my silence on the role played by the middle Volga forest-steppe-zone Khvalynsk and Samara cultures in the origin of the Yamna horizon, the domestication of the horse, and other related issues. Gimbutas derives the Sredni Stog culture from this region, making it a part of her current "Kurgan culture" homeland. Mallory's entire comment deals with this region. I must address the issue now, though I have yet to gain access to some of the recent Russian publications cited by Mallory. My reply deals with five areas of misunderstanding or disagreement: Sredni Stog origins, the concept of a Near-East-influenced early Neolithic in the North Caspian region, the domestication process, Dnieper-Volga cultural connections, and the applicability of the American model to the Sredni Stog culture.

1. *Sredni Stog origins.* Gimbutas is supported only by Danilenko (1974:32–33) in denying a local Dnieper-Don Neolithic origin for the Sredni Stog culture. Dnieper-Donets II and early Sredni Stog assemblages exhibit similarities in lithics, including projectile points, axes, and unifacial lamellar blades (not "knife-daggers" but all-purpose flint tools sometimes used as sickles). Some varieties of ceramics were also quite similar (Telegin 1973:14–15), and in both cultures ceramics were only rarely deposited in graves ("beakers" were not a "usual" grave gift). Settlement locations were often identical, and the typologically earliest Sredni Stog sites are found in the heart of the Dnieper-Donets II settlement area (Telegin 1973:93–100). The reported change in physical type is based on racial characterizations ("Europeoid," "Cro-Magnon") of uncertain genetic significance, subject to rapid change with alterations in diet and/or activity. The change in burial ritual reflects a return to single burial after a brief, unprecedented episode of experimentation with communal ossuary-type burials during the period of maximum interaction between the Dnieper-Donets II and the Cucuteni-Tripolye cultures. Most

Soviet scholars accept a North Pontic Neolithic origin for the Sredni Stog culture.

2. *A Near-East-influenced North Caspian early Neolithic.* Mallory's acceptance of Matyushin's (1982) and Petrenko's (1984) interpretation of an early North Caspian Neolithic does not take into account the difficulties inherent in such a position. A middle Volga Neolithic culture dated to 5600–5700 b.c. would become the earliest Neolithic culture yet discovered in temperate Europe, predating Starčevo and Anza I by centuries and coterminous with the earliest stages of the Djeitun culture, the nearest Near Eastern (or at least Iranian-influenced) culture from which it could be derived. There has been a tendency to attempt to derive Caspian-area cultures from Djeitun ever since that culture was discovered, despite the fact that Djeitun is separated from the North Caspian region by the Kyzyl Kum desert and the desolate Ust-Urt Plateau, the latter of which swallowed an entire Russian army sent against Khiva in 1839, forcing a retreat and the deaths of 3,000 men without a shot's being fired. It is difficult to reconstruct how or, more important, why a Neolithic economic complex would be carried across this vast inhospitable region and the steppes that lie beyond to be grafted onto the culture of hunter/gatherer societies in the middle Volga forest-steppe as early as 5600 b.c.

A possible explanation—one that I advance tentatively, not having seen Petrenko's (1984) study—is that the faunal identifications are incorrect, the animals involved are in fact wild specimens, and the Volga culture is not "Neolithic." Horses are said to predominate, and their domesticated status is reportedly based upon both morphology and slaughter pattern. There is, however, no accepted morphological basis for distinguishing early horse domesticates from their wild cousins. Bibikova's (1967) oft-cited analysis was based upon a single skull belonging to an animal known to be the largest documented at Dereivka and therefore atypical. Additionally, if Petrenko is relying upon the age-sex criteria suggested by Archikhovski and Bökönyi (Bökönyi 1974:237) his conclusion on slaughter pattern will be wrong, for their suggested "domesticated" pattern (a predominance of young females) is in fact most likely to result from the predation of wild horse bands, the most predictable of which (and therefore the easiest hunted) consist primarily of mares. Young males would predominate in a domesticated slaughter pattern, as they do at Dereivka.

3. *The domestication process.* Domestication cannot be simply attributed to an "outside influence" (the Near East, for example) or to motives of "economic advancement." The domestication and maintenance of a new food source requires active, long-term participation in a new set of tasks, responsibilities, and labor divisions and therefore will not occur unless the existing resource base becomes deficient in some respect. In the Dnieper Valley there is evidence for a reduction in the utilization of forest game (notably beaver) and an increase in wild horse exploitation during the late Dnieper-Donets II period, just prior to the emergence of the Sredni Stog culture and the presumed domestication of the horse (Anthony 1985:210–11). Evidence for the development of ranking and increased sedentism, both of which might be associated with increased population density, also occurs during Dnieper-Donets II. The combination of rising population densities, reduced forest resources, a highly circumscribed river-valley environment, and increased utilization of steppe resources (horses) established the preconditions for the domestication process. Only if a similar set of preconditions can be documented on the middle Volga at an earlier date will I alter my position concerning the primacy of the North Pontic region in that process.

4. *Dnieper-Volga cultural connections.* Mallory and Gimbutas emphasize the discoveries at S'ezzhee, Khvalynsk, and

other middle Volga sites (180–300 km northeast of Saratov on my figure 1) in an attempt to demonstrate the existence of strong ties between the Dnieper and Volga regions during the mid-5th millennium B.C. I accept the Sredni Stog–Khvalynsk equation, though I would note that metals like those at Khvalynsk occur only in late Sredni Stog graves, implying a date for Khvalynsk well after 3000 B.C. (or after about 3750 B.C.). In fact, I would consider the appearance of such expanded cultural connections to be a predictable outcome of the domestication of the horse and its development as a mount during the Sredni Stog period. Earlier connections across this region are not, however, as securely documented. Gimbutas and Mallory accept these earlier connections, the former arguing that they establish a middle Volga origin for traits of the Sredni Stog culture and the latter suggesting that they represent an era of Pontic-Caspian cultural unity long antedating the Sredni Stog culture or the Yamna horizon.

The key to the problem is the assertion by Vasil'ev and Mat'veeva (1976) and Vasil'ev (1981) that middle-Volga forest-steppe-zone cemeteries like S'ezzhee exhibit typological parallels to Dnieper-Donets II cemetery assemblages of the Mariupol type, purportedly dated to ca. 3600–3700 B.C. Here I would like to add yet another piece of recently published evidence, that of Tsvek (1985:35), which establishes that the Tripolye ceramic imports found in the Mariupol and Nikol'skoe cemeteries (through which these sites have been dated) are of Tripolye BI type, not Tripolye A, implying that Mariupol itself is slightly later than previously thought. Furthermore, the artifact types found at S'ezzhee are not chronologically confined to the Dnieper-Donets II period. Boar's-tusk plaques and bone beads occur in the Sredni Stog–culture graves at Mariupol as well as in those of the Dnieper-Donets II period (Stoliar 1955:19–20). The ceramics at S'ezzhee are more similar to Sredni Stog or Yamna than to Dnieper-Donets II wares, and the burial ritual exhibits no parallels to Dnieper-Donets II communal ossuaries like those of Mariupol and Nikol'skoe. S'ezzhee might well date to a period earlier than Khvalynsk, but it need not be placed earlier than the Sredni Stog period, or after about 3300 B.C. (4100 B.C.). There was an episode of increased Pontic-Caspian interaction, perhaps even cultural unity, prior to the evolution of the Yamna horizon, but I would relate this to the acquisition of new means of transport during the Sredni Stog period and not to some unspecified and insecurely dated earlier cultural process.

5. *Sredni Stog and the American model.* Mallory's questioning of the applicability of the American model rests largely upon a misunderstanding of how it was developed and applied. The changes noted in the Americas occurred not just among the buffalo hunters of North America but also among the small-game hunters of the South American Pampas and Gran Chaco. Increases in territorial range, in the intensity of social differentiation, in the level and importance of warfare, and in trade in exotic prestige goods as well as equivalent changes in the other areas I have described affected all horse-using societies. Those societies that enjoyed access to dense feral horse populations (in the south-central Plains in North America and the Pampas in South America) ate horses regularly. The importance of horses in the Sredni Stog diet does not preclude their usage as mounts. Dogs are of little help in horse herding—one needs a mount to control a horse band and protect it from the abduction efforts of wild stallions. Domesticated pigs were unimportant in the Sredni Stog economy, averaging 0.6% of the total meat weight represented in Sredni Stog faunal samples. Wild fauna were primarily riverine, but only red deer were of any real significance (8.5% of total meat weight, average), and they were far less important than domesticated horses (48.6% of meat weight, average) or cattle (29.6% of meat weight, average). The absence of deep-steppe fauna from Sredni Stog sites merely underscores the transitional position of the Sredni Stog culture in relation to the development of

steppe-oriented subsistence strategies. I might note that these fauna (saiga antelope, Bactrian camel) appear only rarely even in Yamna-horizon sites.

Finally, I would like to address Mallory's observation that the Sredni Stog culture remained tied economically to the river valleys, and "how one moves from here out onto the deep steppe is unclear." The Sredni Stog meat diet relied largely upon horses, animals that ranged across the heart of the steppe. In this sense Sredni Stog societies established an economic pattern that was unprecedented in the region and that placed one economic foot firmly out into the steppe. I agree that the full development of steppe-oriented subsistence strategies occurred only with the evolution of the Yamna horizon, but this move "onto the deep steppe" cannot be attributed to sheep herding. Sheep were numerically predominant in Dnieper-Donets II faunal assemblages (16.4% of individuals, average) and were numerically second only to horses in Sredni Stog assemblages, long before the move into the deep steppe. I have demonstrated that it is transport that is the critical element in developing an efficient subsistence strategy in the steppe environment. It was the combination of carts, horses, and sheep herding that first permitted human societies to exploit the deep steppe in a reliable, predictable manner. This combination occurred first with the Yamna horizon, which did represent a major cultural watershed in the Pontic-Caspian steppes regardless of the cultural developments that occurred earlier on the forested middle Volga.

Again I will close with a consideration of the Indo-European problem, which after 200 years of study remains a critical unresolved issue in European prehistory. I believe that we are now drawing close to a solution, but not in the direction that Gimbutas has suggested. Some of the points she raises on this subject are debatable. The archeological documentation of matrilineality versus patrilineality is difficult if not impossible. Proto-Indo-European is not closely related to the Finno-Ugric language family (Hopper 1982:138). The reconstructed term **peku-* probably originally meant "movable property" and was narrowed to refer to "sheep" only in certain language stocks (Benveniste 1973:40). Cereals are well attested as elements in the Proto-Indo-European vocabulary. "Solar symbols" need not be invoked to explain simple geometric decorations that encircle ordinary pots. The Vistula-Dnieper region contained a north-facing corridor south of the Pripyet Marshes and north of the Dniester–South Bug drainage system that was not occupied by the "Old European" Cucuteni-Tripolye culture until its final, fragmented phase, during which substantial ethnic mixing might have occurred. This Lvov-Kiev corridor formed a link between Central Europe and the steppes perhaps as early as the Sredni Stog and the Funnel-necked Beaker cultures. It is in this region that I would search for the elusive homeland.

The issues addressed in this study require the development of well-structured explanatory models with specified testable outcomes. Without such models we shall remain awash in a sea of individual facts, endlessly considering an infinite variety of prudent, reasonable combinations. The model I have advanced draws together a diverse array of data into a single explanatory framework. While the comments printed here have augmented and qualified some aspects of the model, its structure remains unchanged and its general applicability unchallenged.

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Calendar

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October 24–26. 18th Algonquian Conference, Winnipeg, Manitoba, Canada. Write: Arden C. Ogg, Coordinator, c/o Linguistics Programme, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2, or phone (204) 474-8238 or 474-9472.

November. 20th International Congress of Administrative Sciences, Cairo, Egypt. Topic: Economic Changes and Administrative Reforms. Write: International Institute of Administrative Sciences, rue de la Charité 25, B-1040 Brussels, Belgium.

November 6–9. 5th Inuit Studies Conference, Montreal, Que., Canada. Theme: Facing the Future: What Can We Learn from the Inuit? Write: Marianne Stenbaek, Centre for

Northern Studies and Research, McGill University, 550 Sherbrooke St. W., Suite 460, West Wing, Montreal, Que., Canada H3A 1B9.

December 3–7. American Anthropological Association, 85th Annual Meeting, Philadelphia, Pa., U.S.A. Write: AAA, 1703 New Hampshire Ave. N.W., Washington, D.C. 20009, U.S.A.

December. International Economic Association, 8th World Congress, New Delhi, India. Theme: The Balance between Industry and Agriculture in Economic Development. Write: IEA, 3, rue Campagne Première, 75014 Paris, France.

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March 5–8. Society of Ethnobiology, 10th Annual Conference, Gainesville, Fla., U.S.A. Topics: cultural ecology, plant and animal domestication, ethnozoology, zooarcheology, ethnobotany, archeobotany, palynology, ethnopharmacol-