

Human Biology of Pastoral Populations

EDITED BY

WILLIAM R. LEONARD

*Department of Anthropology
Northwestern University, Evanston, Illinois, USA*

MICHAEL H. CRAWFORD

*Department of Anthropology
University of Kansas, Lawrence, Kansas, USA*



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1 *The biological diversity of herding populations: an introduction*

MICHAEL H. CRAWFORD AND WILLIAM R. LEONARD

This volume evolved from a 1997 symposium held at the American Association for the Advancement of Science (AAAS) Meetings in Seattle, Washington. This symposium drew together the leading scholars of nomadic pastoralists from anthropology, demography, genetics and medicine. They focused upon the ecology and population biology of contemporary herding groups from Africa, Asia, Europe, and the Middle East. While previous publications have summarized sociocultural variation in pastoralist groups (see Barfield, 1993), no previous volume has attempted to merge the ecological, demographic, health, and biological facets of the herding existence.

Nomadic pastoralists are of great fascination to the more sedentary westerners, who tend to romanticize the nomads for their free spirit, apparently unencumbered by geographical and political boundaries. Nomads are envied for their perceived freedom, being able to break camp and move on to the next pasture. Bruce Chatwin (a writer and adventurer) in an essay entitled “It’s a Nomad *Nomad* World” (Chatwin, 1996) extended this romantic fascination to hypothesize that humans are naturally migratory and that sedentism is the cause of many of the ills of contemporary society. In this introduction, we begin by addressing several key questions about pastoralists: What is nomadic pastoralism, and why does it exist? Why are nomads constantly on the move? What common features do the nomadic societies share? We will then provide an overview of the chapters in this volume, highlighting several central themes addressed throughout the volume.

What is nomadic pastoralism?

Nomadic refers to movement, while pastoralism is a type of subsistence. Therefore, in general, nomadic pastoralism refers to populations that specialize in animal herding, which requires periodic movement for

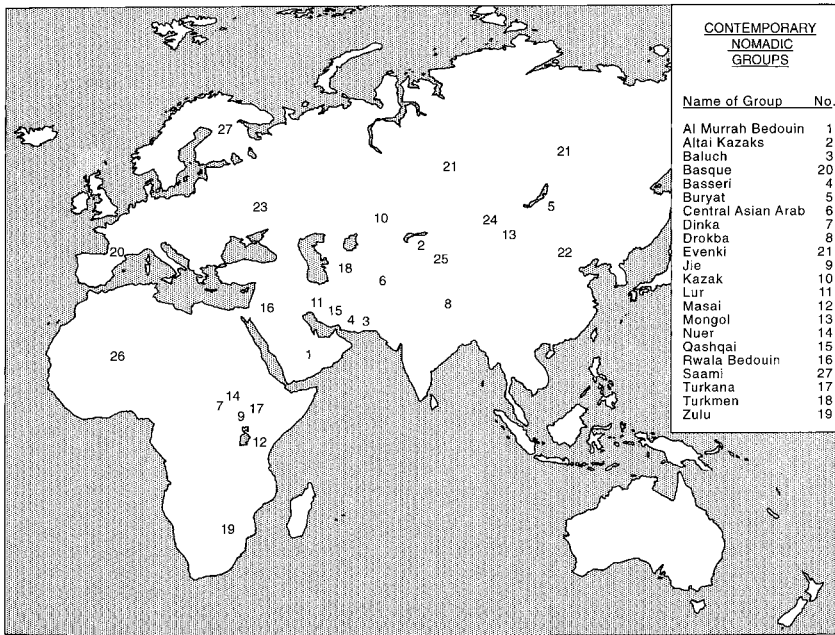


Figure 1.1. Geographical distribution of pastoral populations throughout the Old World.

purposes of grazing. There is enormous variability in herd management strategies, social organization, and degree of mobility. According to Spooner (1973) there are no features of cultural or social organization common to all nomads or even that occur exclusively among nomads.

Where are the nomads found?

The pastoral nomads are distributed widely throughout the Old World (see Figure 1.1). A large concentration of herders is found in Africa with: the camel and goat herding Berbers of the Sahara (marked number 26 on Figure 1.1), the cattle herding Nilotes, such as the Dinka of the Sudan, and the Masai and Turkana of East Africa. The Middle East contains a number of Bedouin Herders, as shown by the Al Murrah and Rwala Bedouins in Figure 1.1. Europe has only two populations with a history of herding: the Sámi reindeer herders of Finland and the sheep-herding Basques of the Pyrenees of France and Spain. As indicated in Figure 1.1,

Central Asia, because of its extensive grasslands still contains many pastoral populations.

Why do nomads migrate?

Nomads migrate in order to utilize seasonal pastures more efficiently, avoid hazardous environments, and reduce competition with other groups for resources. Of these three reasons for migration, the dominant motivation is to find fresh pastures for the herds. For example, in the Siberian *taiga*, the Evenki usually winter at a specific location. However, in the early spring, young men are sent out to search for fresh pastures. As soon as these new pastures are located, work parties build corrals and the herds are relocated to the new grazing lands.

In Africa, pastoral groups move away from breeding grounds of disease vectors such as mosquitoes and tsetse flies. In arid regions, where water supplies are at a premium, herders tend to relocate to avoid conflict for pasture and water resources.

Why does nomadic pastoralism exist?

Pastoralism is an effective means of exploiting marginal environments, such as arid grasslands of the tropics or the tundra and *taiga* ecosystems of the north. In these environments, the amount of energy fixed by plants via photosynthesis (primary productivity) is low (see Begon *et al.*, 1990), and the dominant plants (e.g., grasses, shrubs) are generally poor food sources for humans. The pastoral subsistence economy provides an adaptation to such conditions since it promotes the conversion of low quality plant resources into portable, high quality animal foods. However, the overall low level of energy availability necessitates low population density and high mobility among pastoral populations.

In East Africa there is a continuum from almost total dependence on herds of animals, to some horticulture associated with some cattle herding, to sedentary agriculture. The limiting factors to the type of subsistence practiced by the society are rainfall and soil nutrients. In the case of Arctic/sub-Arctic pastoral groups, such as the Evenki of Siberia, the combination of permafrost and lichen-covered ground does not permit agriculture. Even the hardy onion fails to flourish in Evenkia! Thus, traditionally the Evenki have depended almost entirely on the reindeer for their subsistence. Initially, the Evenki hunted reindeer, later they learned

to herd the reindeer, thus, giving them a more reliable source of food, albeit on the hoof! After Russian contact, the Evenki traded furs for Western products, such as tobacco, sugar, and flour. In recent times, antlers have been traded to Japanese merchants, resulting in an “oasis” of Sony television sets, which often get traded to Russian entrepreneurs to obtain vodka.

Today, population growth, environmental degradation and changing patterns of land use threaten many pastoral populations, in part, because it is a subsistence regime that requires large areas of land to support relatively small populations. For example, the creation of new political borders, disrupting the traditional migratory routes can have dire consequences for the survival of the nomadic pastoral way of life. The Kurds of northern Iraq and Turkey have been adversely affected by the creation of fortified political borders thus limiting movements across traditional grazing areas. Environmental pollution in Siberia, associated with oil exploration and massive irradiation has had dire consequences on the reindeer pastorals. Similarly, the political disintegration of the Soviet Union has been paralleled by unprecedented shortages of fuel for helicopters and airplanes, thus, depriving the isolated herders of basic Western staples to which they had grown accustomed.

What do nomadic pastoralists have in common?

Nomadic pastoralists developed different patterns of social organization that depends on their specific ecological, cultural, political, or historical circumstances. Each geographical region has its own, unique pattern of development and interaction with the surrounding sedentary societies. What all the pastoral nomads share in common is their economic reliance (to varying degrees) on domesticated herds. The periodic migrations of nomadic pastoralists are necessitated by the need for pasture and water for the herds. The distance that the nomads migrate, and the frequency of that migration, are dependent on the ecology of the region. Arid zones require more frequent migrations than the regions where water is plentiful.

Barfield (1993) in his classic volume on pastoral nomads, divided Old World pastoral societies into five distinct zones, each with its own unique style of animal husbandry, ecology, and social organization. In this volume we consider populations from each of Barfield's five zones (South of the Sahara; Desert Zone of camel pastoralism; North of the Arid Desert along the Mediterranean littoral; Eurasian Steppe Zone; High-altitude Pasture of the Tibetan Plateau and neighboring mountain regions). We

additionally examine a category of pastoralists not considered by Barfield, the Arctic herders.

Pastoral zones

South of the Sahara

Cattle herders south of the Sahara in the Sahel and savanna grasslands of East Africa, follow the Great Rift Valley. In this zone cattle are viewed as the most important livestock, yet most of these societies maintain flocks of sheep and goats for subsistence plus donkeys for transport. The pastoralists bordering the northern deserts also include camels in their herds. The herd animals provide blood, milk, and meat for subsistence. Any horticulture practiced in this zone is in the hands of the women. Males traditionally are herders.

In this volume, three of the chapters discuss populations from this pastoral zone: Rene Pennington discusses in Chapter 8 the economic stratification and health among the Herero of Botswana. These Bantu-speaking pastoralists subsist on cattle in the northern Kalahari Desert. Michael Little, in Chapter 7, focuses on the human biology, health, and ecology of Nomadic Turkana pastoralists of northwest Kenya. The Turkana are primarily cattle herders, but also include camels, sheep, goats and donkeys in their herds. In Chapter 5 Sandra Gray and colleagues discuss the adaptive strategies of two East African populations, the Turkana of northwest Kenya and the Karimojong of northeast Uganda. These authors discuss how socioeconomic, political and environmental forces have shaped demographic parameters in these two groups. They view these pastoral adaptive strategies as being reflective on “non-equilibrium” systems; that is, adaptive regimes that are characterized by flexibility and a high degree of seasonal and year-to-year variability.

Desert zone of camel pastoralism

The desert zone of camel pastoralism is contiguous with the Saharan and Arabian Deserts. These pastoralists raise the dromedary camel, on which they rely for both food and transport. These herders trade for dates with the sedentary oasis farmers. In Chapter 4, E. Kobylansky and I. Hershkovitz focus on the genetic structure (marital patterns, inbreeding, and migration) of the South Sinai Bedouins. Although these Bedouins now

make a living in industrial areas of Israel, traditionally, they raised sheep and camels.

North of the arid desert along the Mediterranean littoral

Pastoralists, north of the arid desert along the Mediterranean littoral, extend through the Anatolian and Iranian Plateaus into the mountains of Central Asia. These nomads take advantage of variation in elevation moving their livestock from the lowland winter pastures to highland summer grazing. Their herds consist of sheep, goats, horses, donkeys, and even camels. Cattle are not usually part of their herds because they require better pasture, more water, and cannot negotiate the mountain trails. In Chapter 11, William Irons, discusses the family organization and demography of the Yomut Turkmen of northern Iran and Afghanistan. These populations are primarily agricultural and herd sheep, goats and camels.

Eurasian Steppe zone

The Eurasian Steppe pastoral zone includes the horse riding and herding nomads of Central Asia. This zone stretches from the Black Sea to Mongolia, and is largely flat grasslands, punctuated by mountain ranges. Much of this Steppe zone was controlled by nomadic populations a few hundred years ago. Now, agriculture and cattle herding is found together with a complex consisting of horses, sheep, goats, and camels. Crawford and colleagues, Chapter 2, discuss the genetic structure of the Kizhi-Altai population that inhabits this pastoral zone. The Kizhi-Altai are cattle herders, who reside in mountain valleys, covered by grasslands that are conducive to herding. The Kizhi live in yurts that are similar to those of the Mongolian herders.

High-altitude pasture of the Tibetan Plateau and neighboring mountain regions

This zone is characterized by vast plateaus with grasslands offering rich grazing. The pastoralists on the Tibetan plateau herd yaks, sheep, goats, horses and yak/cattle hybrids. Chapter 6, by Melvyn Goldstein and Cynthia Beall, focuses on the changing patterns of nomadic pastoralism among the Phala nomads of the Tibetan Plateau. The Phala herd yak,

sheep, goats, and horses. Like Gray and colleagues, Goldstein and Beall highlight how sociopolitical changes in Tibet have had a profound impact on the life of the Phala nomads.

Arctic herders

The Nomadic pastoralists of the northern latitudes raise reindeer, an animal that cannot survive outside the tundra/*taiga* zones. However, other domesticated animals cannot survive by grazing on lichens. The arctic zone contains a wide continuum of arctic reindeer exploitation that ranges from hunting to raising and herding. In Chapter 9, Leonard and colleagues examine how historic social and economic changes in Russia have influenced the nutrition and health of the Evenki reindeer herders of central Siberia. Similarly, Crawford and colleagues in Chapter 2, examine the genetic structure of the Evenki and compare it with the patterns observed in the Kizhi-Altai. Chapter 10, by Simo Näyhä and his colleagues, examines the chronic disease patterns observed among the Sámi reindeer herders of Finland.

Other pastoral groups

This subdivision of marginal ecosystems into these distinct zones excludes various pastoral/agricultural groups in Europe and South America. For example, a case can be made for including the Basque sheep-herders of the Pyrenees. In fact, Rosario Calderón in Chapter 3 examines the genetic structure of the Basque populations of northern Spain. Other pastoral/agricultural groups in the Alps of Switzerland and Italy exist, but, visualizing Heidi as a pastoral nomad, challenges scientific credulity! However, populations of camelid herders subsisting in South America, should qualify as pastoralists based upon their existence in a marginal, high-altitude environment.

Alternative perspectives on the biology of pastoral groups

This volume is topically organized into three sections: (1) demography, genetics, and population structure; (2) ecology and health; (3) biocultural and evolutionary perspectives. The chapters by Crawford and colleagues, Calderón, Kobylansky and Hershkovitz, and Gray and colleagues all

demonstrate how the genetic and demographic structure of pastoral populations are shaped by aspects of their distinctive subsistence ecology. Gray and colleagues demonstrate how adapting to “nonequilibrium” ecosystems strongly influences demographic parameters among the Turkana and Karamojong populations. Similarly, Crawford and colleagues show how the clan-based herding systems of indigenous Siberian populations (the Evenki and Kizhi-Altai) help to structure the genetic diversity in these groups.

Chapters 6 through 10 examine aspects of ecology and health among pastoral groups. These chapters consider how pastoral adaptive strategies influence such factors as dietary consumption, growth and development, fertility, mortality and disease risks. Moreover, they demonstrate how changes in traditional pastoral lifeways influence both human and environmental health. Goldstein and Beall demonstrate that traditional pastoral systems of Tibetan nomads successfully maintain their high-altitude grassland ecosystems. In contrast, the “modernization” strategies proposed by the Chinese government threaten to degrade these ecosystems by limiting mobility of the pastoral populations.

Little shows how the biology of traditionally living Turkana pastoralists is highly responsive to environmental variation. Patterns of physical growth, work and fertility are all shaped by seasonal and annual environmental fluctuations.

Pennington explores the influence of economic variation on the growth of Herero children. She finds that the Herero children have growth patterns similar to those observed among other African pastoral groups such as the Turkana. However, variation in economic success, as measured by herd size, was not a significant predictor of childhood growth status.

The chapters by Näyhä and colleagues, and Leonard and colleagues examine how aspects of lifestyle change are influencing health and disease patterns in pastoral populations of northern latitudes. Näyhä and colleagues demonstrate that chronic disease rates among the Sámi of Finland are increasing, but are still considerably lower than those observed in the general population of Finland. Leonard and colleagues find similar results among the Evenki of central Siberia, as lifestyle changes are increasing rates of obesity and risk of coronary heart disease, particularly among women.

The final two chapters by Irons and Holden and Mace explore evolutionary aspects of the pastoral lifeway. Irons shows how, among the Yomut Turkmen, the subordinate social role of women contributes to lower female life expectancy. This study effectively shows how social organization and behavioral factors, in addition to broad ecological con-

straints, can have a dramatic influence on the demography of pastoral populations.

Holden and Mace examine the relationship between pastoralism and the evolution of adult lactose digestion. They test alternative models for explaining lactase persistence, and demonstrate that simple ecological/geographical models alone are not sufficient to explain the world-wide variation in this parameter. Rather, phylogeny (i.e., shared common ancestry of populations) plays an important role that must be controlled for when studying this trait.

Overall, the chapters in this volume highlight the many avenues through which pastoral subsistence ecology shapes human biology. Adaptation to unstable, nonequilibrium ecosystems contribute to distinctive patterns of growth and development, physical work, fertility and mortality among pastoral populations. Moreover, the high mobility, low population density and familial/clan structure that characterize most pastoral societies have important consequences for their genetic structure and diversity. The diverse adaptive strategies employed by pastoral groups have proved successful in exploiting marginal and often hostile environments; however, throughout the world today, social, economic and political pressures are threatening the persistence of the pastoral lifeway. Further research on the biological dimensions of pastoral subsistence is therefore needed to understand how to best promote the health and well-being of these populations in the face of ongoing change.

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